Sunderland City Council

2017 Air Quality Annual Status Report (ASR)

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

Date (June, 2017)

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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 2016. 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.

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

Air Quality Initiatives

Here are a few examples of initiatives taking place in Sunderland that aim to bring improvements in our air quality.

Ultra Low Emissions Vehicles

Sunderland City Council are encouraging the use of Ultra Low Emission Vehicles (ULEV). Sunderland's own council fleet now includes electric fleet vehicles like the below.

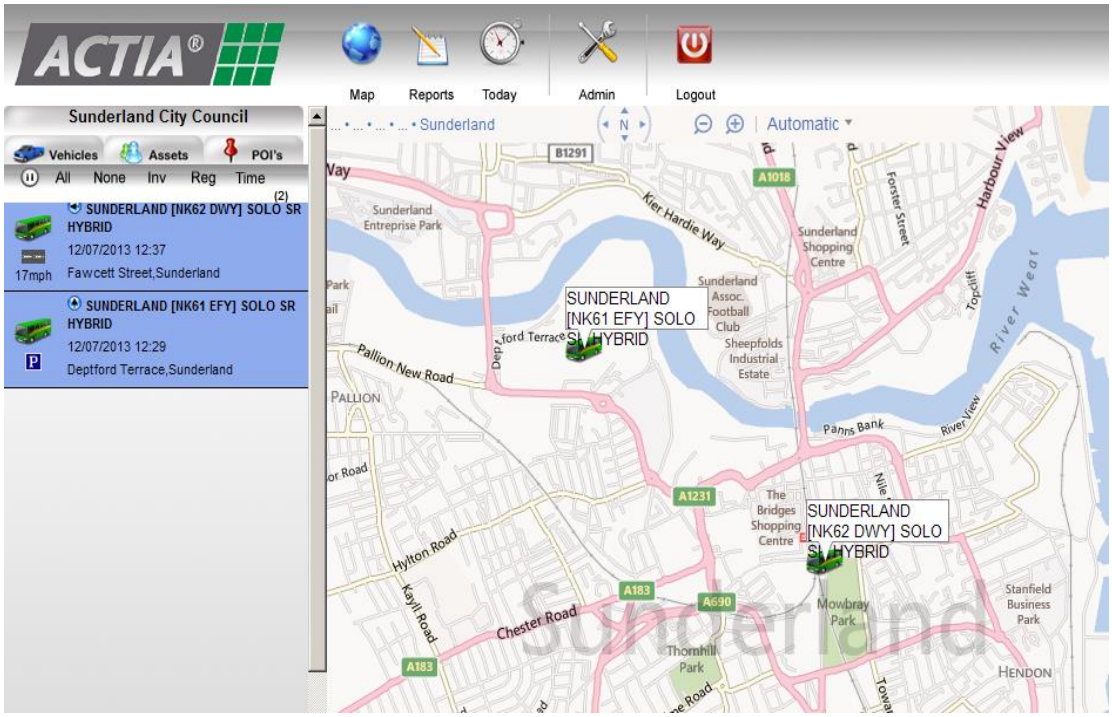
Residents can also try out electric vehicles by using the Co-wheels Car Club which has hybrid and low emission vehicles at 4 locations throughout the city close to public transport links. Staff, community organisations and the public may hire the cars at an hourly rate

AMAP Project (Automotive and Manufacturing Advanced Practice)

Sunderland City Council, University of Sunderland and Nexus have been working in partnership to carry out a Low Carbon & Electric Vehicle Monitoring Project which involves the Study of Fleet Vehicles operated by partners including Electric Cars and Hybrid Buses. The scope of the project includes

- Remote Vehicle and Driver Performance Monitoring
- Efficiency and Long Term Benefits of EV and Hybrid Vehicles

Live tracking of vehicles to monitor performance.



Go Ultra Low City Programme

In the last Annual Status Report, we reported on the inception of the Go Ultra Low (GUL) City Scheme of which Sunderland City Council are a leading partner. The North East Combined Authority (NECA) secured development funding to deliver two GUL Filling Stations at sites in Newcastle (Science Central) and Sunderland (A19)

Site Assessments, concept designs and layouts have now been produced. The project aims to Build and Operate 6 Rapid Charging Units with grid supply and potential local energy storage solution. The site will be ideally located for drive in, short stays to recharge batteries for both EV and Driver.

Low Carbon Bus Service in Sunderland

This project has provided a City Centre Shuttle Bus service to improve connections between the City Centre, University Campuses and main tourist locations in Sunderland. Sunderland Connect 700 low carbon hybrid bus service introduced in Sunderland in 2011 and extended in 2013.

The service promotes the use of public transport, health and wellbeing through sustainable travel. The service meets with the aims and objectives of the Local Transport Plan and Economic master-plan for Sunderland

Gas buses in Sunderland

17 new (CNG) gas buses were initially introduced following an investment from Stagecoach of over £2.5 million in buses Stagecoach's investment in the buses part-funded by a grant from the Department for Transport's (DfT) Green Bus Fund including a £1 million for the infrastructure at the Sunderland depot, which includes a gas plant for the fuel supply.

The new gas buses are Scania / ADL Enviro 300 single-deckers. The original 17 vehicles entered service in February 2014 on city routes 16 and 20. A further 23 have since being procured and are in service.

Cycle to work scheme

Sunderland City Council has recently introduced a cycle to work scheme which will help employees to purchase a cycle via salary sacrifice. It is hoped the scheme will increase the number of employees choosing to cycle to work and along with health

benefits associated with regular exercise, it is hoped that this will improve air quality within the city.

Air Quality in Sunderland

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 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.

[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

Conclusions and Priorities

We are pleased to report that no exceedences of the Air Quality Objectives were identified during the year 2016. Sunderland City Council does not currently have any AQMA's and because of our good air quality we conclude that we do not need to declare an AQMA for any pollutants.

Looking back over the last 5 years of data it can be seen that there has been a general decrease in NO_2 levels up to 2015. However, during 2016 an increase in NO_2 levels at most of our monitoring sites (apart from 3 diffusion tube sites) has been recorded although levels are still below the National Air Quality Objectives. This is disappointing as levels of pollution appeared to have been on a downward trend previous to this. According to the UK's Annual report on air pollution for 2015, levels of NO_2 have been decreasing at urban background sites but the same trend has not been repeated at urban roadside sites.

In the coming year Sunderland City Council intend to continue to monitor local air quality and to identify any opportunities for projects that will have a positive impact on air quality. We have added new monitoring location maps into Appendix D of this report and reviewed the locations in line with feedback from last year's ASR.

Sunderland Council has strong partnership links with Sunderland University, Nexus, Local businesses and the other Tyne & Wear Local Authorities and intend to build on these partnerships in the future in order to promote the improvement of our City's air.

New developments in the Sunderland Road Network, in particular Phase 2 of the Sunderland Strategic Transport Corridor, are now being constructed. The new Wear Crossing and associated road network are close to being completed and are due to open in spring 2018. Phase 3 (linking the new bridge to the city centre) in the advanced stages of the statutory consents and approvals process.

Local Engagement and How to get Involved

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

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.

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1 Local Air Quality Management

This report provides an overview of air quality in Sunderland City Council during 2017. 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 City Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

Sunderland City Council currently does not have any AQMAs. For reference, a map of Sunderland's monitoring locations is available in Appendix D.

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

Sunderland has taken forward a number of direct measures during the current reporting year of 2016 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 2016, at 6µg/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.

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 2 sites during 2016. 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 36 sites during 2016. 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 bias, "annualisation" and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B. The diffusion tubes have been bias corrected and distance corrected to the nearest receptor where appropriate.

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 2016 apart from at one non-automatic site. The site is located at Dunn House in North Bridge Street (site ref 132) and has been the subject of a recent detailed assessment following similar diffusion tube results in 2012 and 2013 which exceeded the annual NO_2 annaul objective of 40 µg/m^3. An automatic site with chemiluminescent NO_x analyser was installed to measure levels of NO_2 during 2014 and 2015. The results of this monitoring confirmed that levels were below the objective and that an AQMA did not need to be declared. The automatic analyser is considered to be a more acurate way of measuring pollutant concnentrations and hence give more reliable data than the passive diffusion tubes. Therefore Sunderland City Council are confident that levels are below the objective at this location and because a Detailed Assesment has so recenlty been carried out, it is not necessary to repeat this exercise. We will continue to monitor this location and also take account of any traffic flow changes that may influence pollution levels. All sites met the hourly mean objectibe of 200µg/m^3.

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 2016.

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 AURN 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

Notes:

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
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
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
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
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

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
					2012	2013	2014	2015	2016
CM1	Kerbside	Automatic		94	35.3	33.5	38.9	34.2	37
CM2	Urban Background	Automatic		95	18	16	16	14	16
29	Roadside	Diffusion Tube		83	34.9	28.0	23.6	18.6	22.6
38	Roadside	Diffusion Tube		67	32.4	31.0	28.9	28.9	35.6
39	Urban Centre	Diffusion Tube		83	25.5	23.8	22.2	20.2	23.2
53	Roadside	Diffusion Tube		92	33.3	32.3	27.1	28.1	29.8
55	Roadside	Diffusion Tube		92	37.8	33.3	30.6	30.1	33.5
56	Roadside	Diffusion Tube		83	32.4	28.7	25.8	22.1	22.4
57	Kerbside	Diffusion Tube		75	36.8	34.6	35.4	29.0	32.4
58	Kerbside	Diffusion Tube		92	35.8	32.8	32.7	32.4	33.9
86	Roadside	Diffusion Tube		92	22.9	21.3	20.7	18.0	21.9
94	Kerbside	Diffusion Tube		58	37.8	37.0	35.1	31.7	31.2

100	Kerbside	Diffusion Tube		92	40.8	40.0	36.9	33.4	33.7	
101	Urban Background	Diffusion Tube		92	18.8	**40.2**	16.7	34.0	33.7	
103	Kerbside	Diffusion Tube		83	40.0	39.0	37.2	34.2	33.7	
104	Kerbside	Diffusion Tube		92	40.1	16.7	37.1	15.0	17.1	
105	Urban Background	Diffusion Tube		83	19.1	16.3	16.2	14.7	16.4	
106	Urban Background	Diffusion Tube		92	18.9	16.0	15.3	14.5	16.3	
109	Roadside	Diffusion Tube		83	34.4	29.1	32.3	31.7	34.5	
111	Roadside	Diffusion Tube		92	23.7	21.8	19.3	18.1	21.0	
113	Roadside	Diffusion Tube		83	33.2	29.5	27.0	26.3	21.6	
116	Urban Centre	Diffusion Tube		83	27.7	26.6	25.9	22.6	26.8	
117	Roadside	Diffusion Tube		67	41.1	35.8	35.7	33.9	33.8	
118	Roadside	Diffusion Tube		83	30.4	26.4	24.0	24.2	25.3	
119	Roadside	Diffusion Tube		83	33.5	30.3	26.1	26.6	27.1	
120	Roadside	Diffusion Tube		83	30.0	25.9	29.9	22.1	27.0	
121	Roadside	Diffusion Tube		83	21.4	28.3	26.2	25.3	30.9	

123	Roadside	Diffusion Tube		83	39.4	35.0	35.6	34.0	37.7
125	Roadside	Diffusion Tube		75	29.5	26.7	25.8	22.5	31.4
128	Roadside	Diffusion Tube		92	32.2	31.2	30.8	28.3	21.3
129	Roadside	Diffusion Tube		75	27.1	22.2	20.2	21.1	23.5
130	Roadside	Diffusion Tube		83	27.9	25.3	24.0	21.4	32.3
131	Kerbside	Diffusion Tube		75	39.3	35.4	33.0	31.5	31.2
132	Kerbside	Diffusion Tube		83	**46.2**	**46.0**	39.1	36.2	**40.3**
133	Roadside	Diffusion Tube		83	32.2	31.5	31.3	28.9	31.3
134	Roadside	Diffusion Tube		92	35.2	31.9	30.3	28.3	31.2
135	Roadside	Diffusion Tube		83	25.1	25.9	24.1	20.7	24.3
136	Roadside	Diffusion Tube		92	24.7	24.8	21.9	21.0	24.3

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

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

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

Notes:

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

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

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

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

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

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
CM1	Kerbside	Automatic		94	0	0	0	0(92)	7
CM2	Urban Background	Automatic		95	0(80)	0(80)	0(76)	0(67)	0

Notes:

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2012	2013	2014	2015	2016
CM1	Kerbside		99	22.1	21.6	21.3	20.9	18
CM2	Urban Background		90	15.6	15.3	13.9	14.6	13

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

Notes:

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2012	2013	2014	2015	2016
CM1	Roadside		99.1	10	3	6	1	2
CM2	Urban Background		90	0	3	2	1	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
				2012	2013	2014	2015	2016
CM2	Urban Background	N/A	93	10	9	10	7	6

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

Notes:

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2016

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

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
29		28.84	23.72	20.02			19.57	17.26	21.09	26.63	35.42		24.1	22.6	N
38	44.85	41.11	31.86	29.30	24.64		28.91	24.51	34.69		60.73	58.19	37.9	35.6	N
39	30.21	26.55	22.92	22.50	20.29		20.02	17.99	21.22	21.92	33.29	34.21	24.6	23.2	N
53	36.95	36.32	32.51	31.48	29.61		24.69	23.23	24.54	30.22	39.23	39.72	31.7	29.8	N
55	43.37	39.48	36.95	31.29	27.81		26.77		29.13	30.25	43.51	47.85	35.6	33.5	N
56	34.10	30.22	20.29	17.61	15.39			19.66	18.61	21.43	37.48		23.9	22.4	N
57	35.41	37.10	32.12	36.85	37.77		29.17	26.38	32.67	35.02	39.33	36.89	34.4	32.4	N
58	40.12	38.50	33.75	29.19	25.57		30.17	32.42	33.75	34.86	44.43	53.99	36.1	33.9	N
86	28.07	26.54	22.09	19.15	21.8		15.39	16.92	18.47	25.57	29.90	32.41	23.3	21.9	N
94		36.81			36.77		31.86	27.51		36.3	48.11	47.00	37.8	35.5	31.2
100	47.08	42.24	36.11	34.79	38.64		34.60	33.16	38.08	42	48.34	49.24	40.4	38.0	33.7
103	43.57	41.90	38.30	35.26	36		34.52	34.33	37.79	44.17	50.10	47.75	40.3	37.9	33.7
104	49.72	43.16	34.82	31.89	36.09		35.06	34.46	37.97	39.92		49.94	39.3	36.9	33.7
101	26.14	21.27	18.38	14.98	12.19		11.79	11.96	9.96	19.67	23.83	30.04	18.2	17.1	N
105	23.01	21.97	13.04	12.36	13.24			10.03	13.39	17.56	22.88	27.50	17.5	16.4	N

106		21.20	17.28	16.00	13.1		11.12	10.88	13.74	18.17	23.78	28.57	17.4	16.3	N
109	42.22	38.91	34.32	31.62	28.76		32.90		31.66	32.64	48.05	45.62	36.7	34.5	N
111	25.19	28.47	23.06	19.95	17.45		15.02	14.96	17.28	24.91	29.40	29.59	22.3	21.0	N
113		41.75	28.33	27.73	23.67		24.98		23.40	31.23	46.23	34.80	31.3	29.5	21.6
116	36.14	33.70	23.95	23.98	19		21.13		22.37	26.48	39.72	38.41	28.5	26.8	N
117	43.13	39.02			33.77		25.33		28.17	29.56	42.44	45.91	35.9	33.8	N
118	36.42	33.21	28.08	23.48	19.64		23.26	19.18	26.12	24.13	35.41		26.9	25.3	N
119	38.43	33.23	25.90	25.82			22.03	20.23	23.98	23.62	36.98	37.84	28.8	27.1	N
120	37.46	32.48	25.68	22.89			23.18	17.84	22.04	25.72	39.90	39.63	28.7	27.0	N
121		35.92	29.28	28.33	25.5		22.97	22.98	23.74	28.63	43.47	41.39	30.2	28.4	N
123	34.90	38.25	37.20	33.84	34.78		31.44	17.92	35.84	42.27	21.87		32.8	30.9	27.7
125	29.55	32.49	30.91				17.40	18.73	30.24	35.01	37.99	37.36	30.0	28.2	N
128	47.37	39.38	26.73	23.99	19.81		29.44	24.57	29.86	30.47	45.22	50.20	33.4	31.4	21.3
129	34.13	29.10	23.58	15.68			17.01		22.00	22.34	35.24	33.77	25.9	24.3	23.5
130		35.90	25.03	19.18	18.95		19.98	19.66	22.49	28.04	36.21	39.14	26.5	24.9	N
131		33.24	33.71	31.43	29.52		31.69	28.86	31.18		45.79	44.17	34.4	32.3	N
132	52.52	42.62	39.41	35.11	31.38		39.84		37.77	37.1	59.28	53.38	42.8	**40.3**	N
133	39.87	38.53	30.53	32.49	32.09			23.43	28.22	30.25	37.06	40.64	33.3	31.3	N
134	41.92	33.28	35.21	30.52	24.33		29.00	29.32	27.07	32.48	36.46	45.67	33.2	31.2	N
135		27.90	22.26	16.91	22.34		17.36	31.79	17.69	24.05	32.51	45.61	25.8	24.3	N
136	31.14	31.88	25.61	22.28	20.19		19.1	17.71	23.18	23.67	34.57	35.29	25.9	24.3	N

☐ Local bias adjustment factor used

☒ National bias adjustment factor used

☐ Annualisation has been conducted where data capture is <75%

Notes:

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

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

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

(2) Distance corrected to nearest relevant public exposure.

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

Sunderland City Council continues to assess new sources of pollution and since the last report there has been one 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 2016. 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 this installation 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
C S Ford Plant & Machinery	Coalbank Farm Moorsley Hetton-Le-Hole, DH5 0DX	Mobile Crusher	NO_x and PM_{10}	B

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

Phase 2 of the Sunderland Strategic Transport Corridor linking the A19 to the City is nearing completion and should be opened in Spring 2018. As part of the planning conditions the bridge contractor's will need to carry out 12 months of monitoring at two locations (one North and one South of the Wear) that were identified by the AQ assessment as having increased NO_2 concentrations. 12 months of monitoring pre commencement of the project have already been carried out and reported in previous Air Quality reports.

An AQ Assessment for Phase 3 of SSTC has now been submitted as part of the planning process. The assessment considered impacts on air quality from both the operational and construction phase of the development.

Operational

Ten sensitive receptors which are located along the route have been assessed for the impact of emissions from the road vehicles. Emissions of NO_2 and PM_{10} have been assessed for the 5 scenarios and concentrations compared to the Air Quality Objectives.

Concentrations of NO_2 are predicted to reduce at 7 receptors due to the scheme and thus produce a beneficial effect. At receptors where concentrations are predicted to rise, upon the scheme opening the levels are below AQ Objectives and in some cases fall again in the future scenario of 2035.

Concentrations of PM_{10} are expected to achieve the AQ Objective at all receptors and assessed as having negligible impact on overall PM_{10} levels.

Construction

Taking into account the sensitivity and location of surrounding receptors and the quantity of dust each construction activity is likely to produce, the assessment has concluded that the overall risk of dust effects are considered to be medium without mitigation.

Therefore the report recommends that the temporary mitigation measures listed in the relevant paragraph of the EIA are adopted to reduce the risk of dust effects. The developer should incorporate these measures within a CEMP once a contractor has been appointed

New Major Development

IAMP

The International Advanced Manufacturing Park (IAMP) is one the most important development sites in the north of England, if not the country.

With up to 150 hectares of development land to the north of Nissan UK and adjacent to the A19 trunk road, IAMP is designated a 'Nationally Significant Infrastructure Project' (NSIP) by the UK Government, and is a partnership between Sunderland and South Tyneside.

IAMP is a hub for automotive, advanced manufacturing and technology businesses, accelerating economic growth and generating the conditions for private sector investment of more than £300 million. It is predicted to deliver 260,000m2 of developable floorspace and 5,200 new jobs by 2027.

The development is currently at the stage of planning approval with an Air Quality Assessment expected as part of the submission. Further updates will be provided in 2018's ASR as to the conclusions of this assessment.

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 0.94 was obtained from the Spread sheet version 03/17 v2.

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 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 and AQMAs

Figure 1: City of Sunderland Monitoring Locations.

Key: Red = non automatic sites, Black = Automatic sites

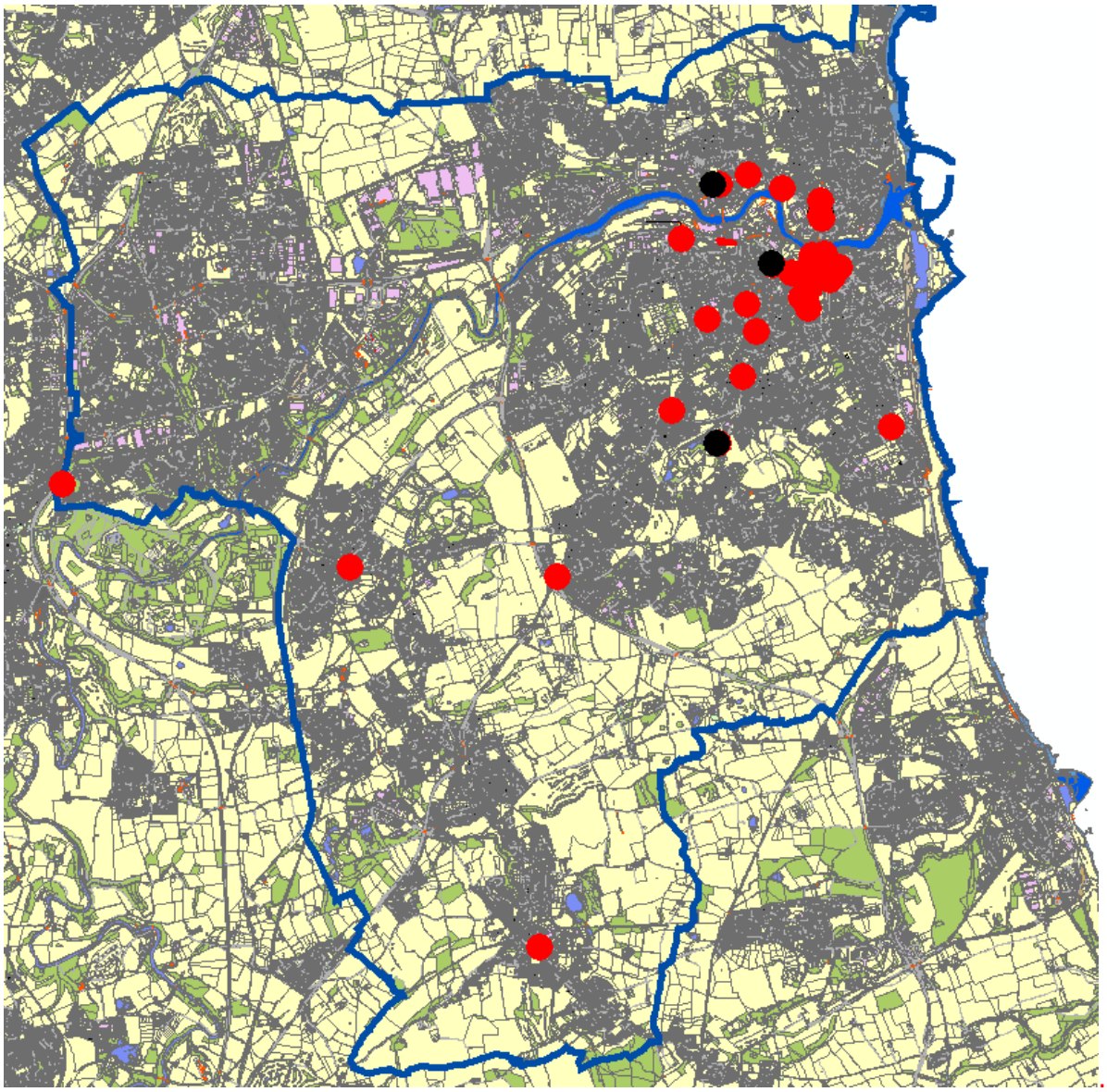


Figure 2: Sunderland Central Area

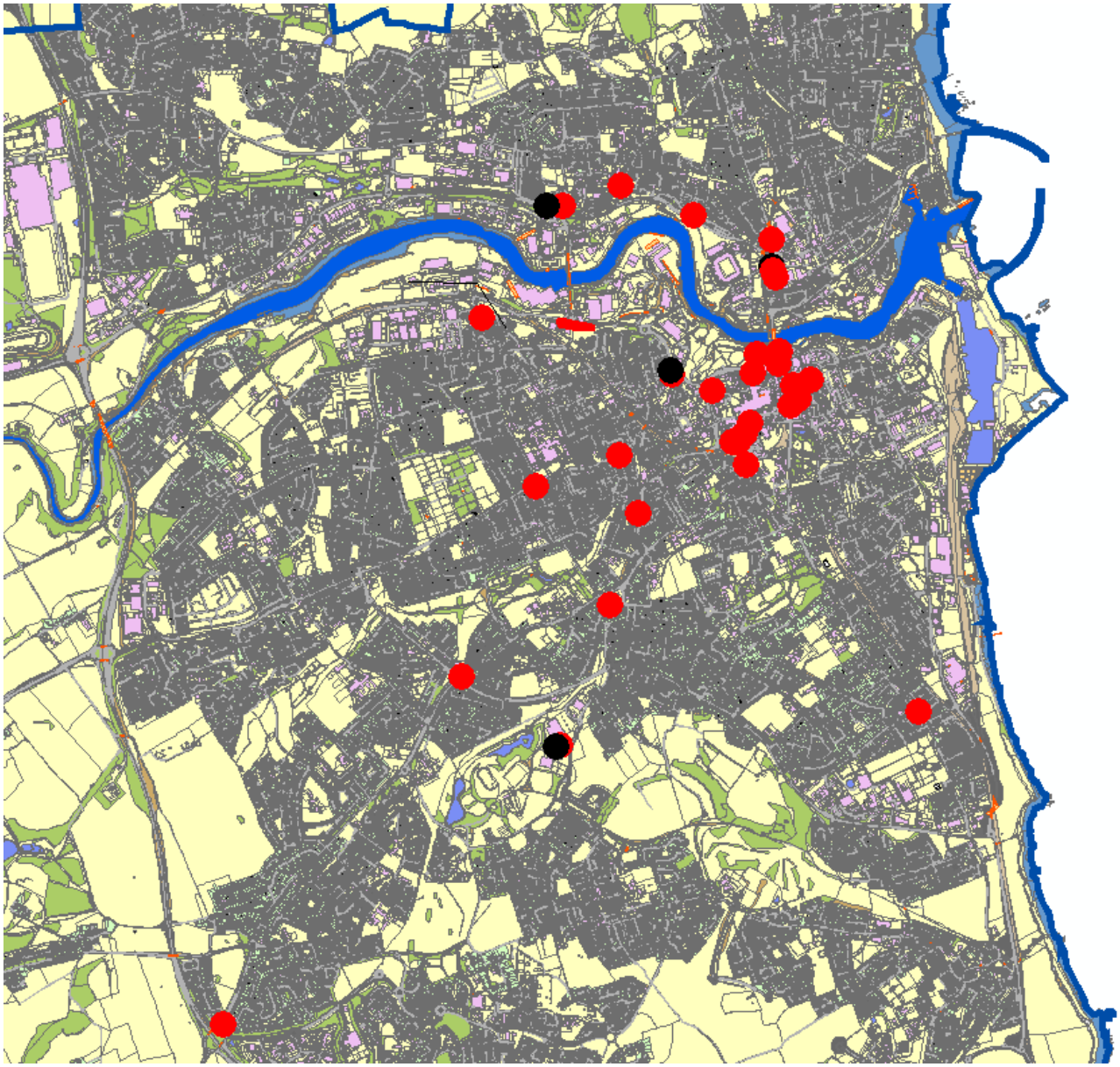
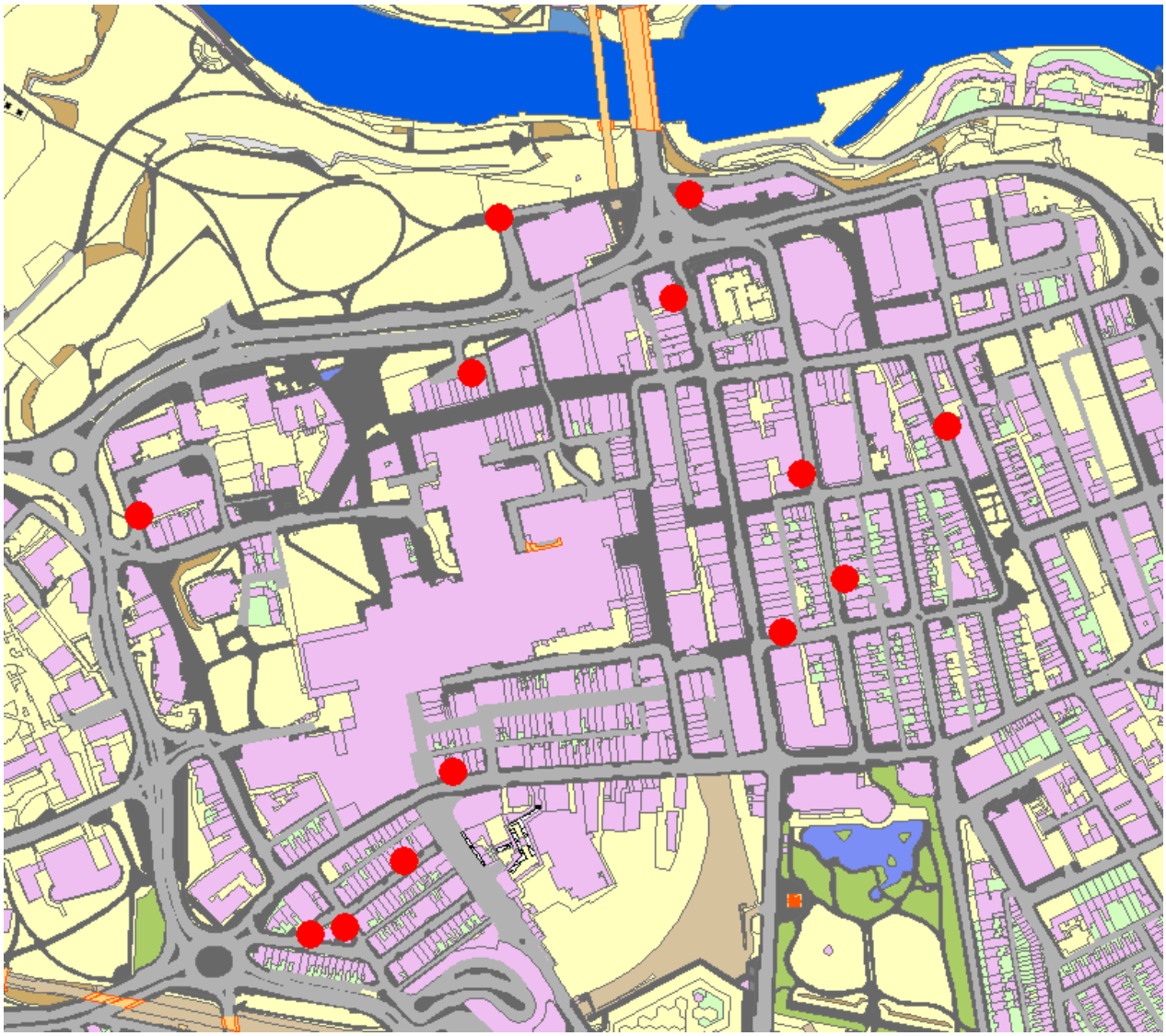


Figure 3: Houghton & Washington Areas

Figure 4: City Centre



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[3]	
	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

[3] 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