2018 Air Quality Annual Status Report (ASR)

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

Date June 2018

Local Authority Officer	Joanne Dodson
Department	Public Protection & Regulatory Services
Address	Jack Crawford House, Sunderland
Telephone	0191 561 1696
E-mail	Public.health@sunderland.gov.uk
Report Reference number	ASR 2018
Date	JUN 2018

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.

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 levels of air quality throughout the City; Appendix A of this report contains a summary of air quality data collected in 2017. Our real time monitoring data as well as data from other sites across the region can be accessed by going to http://www.ukairquality.net/

We also look at new sources such as new roads or industrial sites to assess their potential impact on the City's air quality.

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 too.

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.

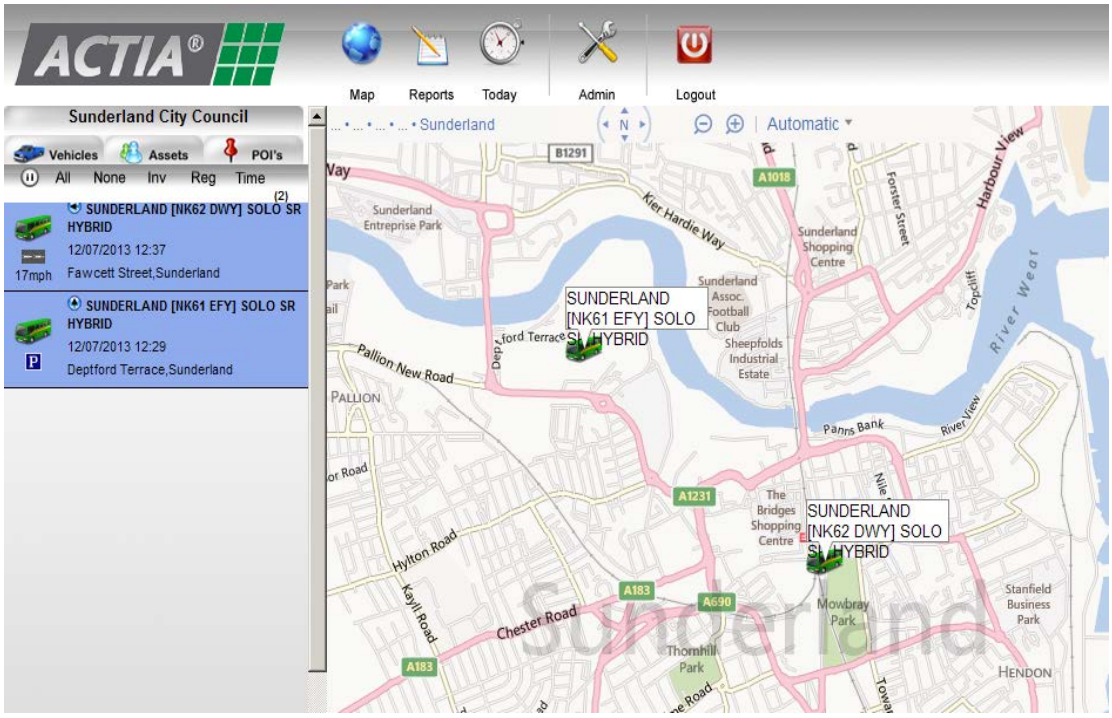
Residents can also try out electric vehicles by using the Co-wheels Car Club which has hybrid and low emission vehicles at 4 locations throughout the city close to public transport links. Staff, community organisations and the public may hire the cars at an hourly rate. Please go to http://www.co-wheels.org.uk/ for more information.

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 and delivery date of the project is September 2018. 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.

Additionally Sunderland recently supported a bid to the Clean Bus Technology Fund led by Gateshead which covered a Go North East cross boundary service travelling

between Sunderland, Gateshead and Newcastle. This award is part of the recently announcement where Councils across the country will benefit from a £40 million funding boost as part of a government drive to put more low emission buses on the roads. The 2018/19 funding will enable 16 buses on the 56 service which travels the A1290 and serves the Nissan plant; to be retrofitted with a Selective Catalytic Reduction System. This technology will assist reductions in NOx and NO2 emissions and will also reduce harmful particulate matter.

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.

Pedestrian and Cycling Routes

As part of the Regional Growth Fund 4 programme in the Washington area, 2,865m of new shared surface footway/cycleway was installed and 12,725m of existing footway was upgraded to a shared surface of a minimum 3m width. **Works completed March 2015**.

Following on from this work a further 8,855m of existing footway was upgraded to shared use, creating a north/south connection in the vicinity of the A182 in order further increase the penetration of the network in this area and link to the national cycling network. These works were funded by Council LTP funding. **Works completed March 2017**.

Both of these schemes included provision of new or upgraded crossing facilities to facilitate safe routes for cyclists and avoid conflict with other road users and compliance with the Equalities Act, and provision of new street lighting where appropriate.

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 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.

Conclusions and Priorities

We are pleased to report that no exceedences of the Air Quality Objectives were identified during the year 2017. Sunderland City Council does not currently have any

[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

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. During 2017 a downward trend has again been observed across most of our monitoring sites. 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.

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.

The new Wear Crossing and associated road network are close to being completed and are due to open in summer 2018 being delayed by poor weather in the first 4 months of this year. Further air quality monitoring is scheduled following the opening of the bridge to assess air quality levels in the vicinity.

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 is part of the Department for Transport funded 'Go Smarter' sustainable transport programme launched four 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.

Table of Contents

Executive Summary: Air Quality in Our Area ..... **i**

Air Quality in Sunderland vii

Conclusions and Priorities vii

Local Engagement and How to get Involved viii

1 Local Air Quality Management **1**

2 Actions to Improve Air Quality **2**

2.1 Air Quality Management Areas 2

2.2 Progress and Impact of Measures to address Air Quality in Sunderland 3

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations 3

2.3.1 Automatic Monitoring Sites 6

2.3.2 Non-Automatic Monitoring Sites 6

2.4 Individual Pollutants 6

2.4.1 Nitrogen Dioxide (NO_2) 6

2.4.2 Particulate Matter (PM_{10}) 7

2.4.3 Particulate Matter ($PM_{2.5}$) 7

Appendix A: Monitoring Results **8**

Appendix B: Full Monthly Diffusion Tube Results for 2017 ..... **21**

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC **24**

Appendix D: Map(s) of Monitoring Locations and AQMAs **31**

Appendix E: Summary of Air Quality Objectives in England **34**

Glossary of Terms **35**

References ..... Error! Bookmark not defined.

1 Local Air Quality Management

This report provides an overview of air quality in Sunderland 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 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

Defra's appraisal of last year's ASR concluded that *on the basis of the evidence provided by the local authority the conclusions reached area acceptable for all sources and pollutants*. Defra has also provided comments to assist with future reports and this advice has been applied to improve this year's report.

We have recently commissioned 4 new diffusion tube sites along the A1231 corridor in Washington. In turn 4 sites have been removed from our monitoring regime that have consistently shown low levels of NO_2 well below the AQ Objective.

The new sites have been selected after a stretch of highway in Washington had been identified by DEFRA's Pollution Climate Mapping Model (PCM) as having an exceedance of the NO_2 AQ Objective. The section of road under consideration is the A1231, from its junction with A182 to the A195. The PCM has predicted that the EU limit value of 40µg/m^3 will be achieved in the year 2019. Following a Ministerial Directive, Sunderland has begun work on modelling concentrations in this area in combination with a targeted feasibility study to deliver nitrogen dioxide concentration in the shortest possible time. The results of this will be reported to DEFRA according to the prescribed timetable and further updates will be presented within 2019's ASR.

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 recently 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 2017, 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.

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.

2.3.1 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 2017. 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.

2.3.2 Non-Automatic Monitoring Sites

Sunderland undertook non- automatic (passive) monitoring of NO_2 at 35 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. "annualisation" and/or distance correction), are included in Appendix C.

2.4 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.

2.4.1 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 2017 dataset of monthly mean values is provided in Appendix B. The diffusion tubes have been annualise, 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 2017.. All sites met the hourly mean objective of 200µg/m^3.

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 2017 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.

2.4.2 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.

2.4.3 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}	NO	Chemiluminescent; TEOM	3	0.5	2
CM2	Silksworth	Urban Background	438116	554462	NO_2; PM10; PM2.5	NO	Chemiluminescent, TEOM, FDMS	230	0.5	2

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	439508	557151	NO2	NO	100	0	NO	4
38	17 Parkside South	Roadside	435714	552473	NO2	NO	0	18	NO	2
39	15 John Street	Urban Centre	439835	556978	NO2	NO	115	6	NO	2
53	166 Chester Road	Roadside	438568	556566	NO2	NO	0	4	NO	2
55	25 Eden Vale	Roadside	438690	556135	NO2	NO	0	3	NO	2
56	101 Southwick Road	Roadside	439101	558282	NO2	NO	0	2	NO	2
57	5/6 Nbridge St	Kerbside	439664	557829	NO2	NO	0	2	NO	2
58	6 Beatrice Tce	Kerbside	432634	552616	NO2	NO	0	3	NO	2
86	2 Alice St	Roadside	439466	553484	NO2	NO	0	4	NO	2
94	Chaplin's PH	Kerbside	439423	556738	NO2	NO	0	2	NO	4
100	Air Quality Trailer, Trimdon	Kerbside	438927	557151	NO2	NO	3	4	YES	2

	Street									
101	Puma Centre, Silksworth Lane	Urban Background	438927	557151	NO2	NO	130	3	YES	2
103	Air Quality Trailer, Trimdon Street	Kerbside	438927	557151	NO2	NO	3	4	YES	2
104	Air Quality Trailer, Trimdon Street	Kerbside	438116	554462	NO2	NO	3	4	YES	2
105	Puma Centre, Silksworth Lane	Urban Background	438116	554462	NO2	NO	130	3	YES	2
106	Puma Centre, Silksworth Lane	Urban Background	438116	554462	NO2	NO	130	3	YES	2
109	23 Newcastle Road, Bowling Alley	Roadside	435278	547463	NO2	NO	0	3	NO	2
111	237 Queen Alexandra Rd, Barnes roundabout	Roadside	428269	553809	NO2	NO	0	9	NO	2
113	181	Urban	429555	558545	NO2	NO	20	4	NO	4

	Durham Road..	Centre								
116	9 Derwent Street	Roadside	439648	558120	NO2	NO	0	2	NO	4
117	3, Holmside (Baker's Oven)	Roadside	439901	558514	NO2	NO	97	4	NO	4
118	27 Bridge Street	Roadside	438453	555507	NO2	YES	0	2	NO	4
119	4 Athaneum Street	Roadside	439792	556921	NO2	NO	88	2	NO	4
120	Gillespies	Roadside	439806	557063	NO2	NO	100	5	NO	4
121	16 Windsor Terrace	Roadside	440702	554722	NO2	NO	0	2	NO	4
123	263 Chester Road	Roadside	437943	556341	NO2	NO	0	4	NO	2
125	45 Station Road	Roadside	435417	547025	NO2	NO	0	2	NO	2
128	Echo Building	Roadside	439707	557312	NO2	NO	20	2	NO	4
129	West Sunniside	Roadside	439938	557089	NO2	NO	2	1	NO	4
130	St Mary's Car Park	Roadside	439538	557292	NO2	NO	177	3	NO	4
131	Chaplins 2nd Tube	Roadside	439397	556666	NO2	NO	3	1	NO	3
132	Dunn House Nth Bridge St	Roadside	439661	557901	NO2	NO	0.5	3	NO	4
133	Northern Way	Roadside	438123	558344	NO2	NO	0	3	NO	4

134	Southwick Rd/ Thompson Rd	Roadside	438563	558517	NO2	NO	0	2	NO	4
135	Merle Terrace	Roadside	437561	557538	NO2	NO	0	4	NO	2
136	1, Morningside	Roadside	428269	553809	NO2	NO	0	9	NO	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 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2013	2014	2015	2016	2017
CM1	Kerbside	Automatic		99.8	33.5	38.9	34.2	37	30
CM2	Urban Background	Automatic		93	16	16	14	16	13
29	Roadside	Diffusion Tube		50	28	23.6	18.6	22.6	22.5
38	Roadside	Diffusion Tube		100	31	28.9	28.9	35.6	34.4
39	Urban Centre	Diffusion Tube		58	23.8	22.2	20.2	23.2	19.9
53	Roadside	Diffusion Tube		75	32.3	27.1	28.1	29.8	25.9
55	Roadside	Diffusion Tube		83	33.3	30.6	30.1	33.5	31.0
56	Roadside	Diffusion Tube		100	28.7	25.8	22.1	22.4	24.1
57	Kerbside	Diffusion Tube		92	34.6	35.4	29	32.4	26.9
58	Kerbside	Diffusion Tube		83	32.8	32.7	32.4	33.9	32.1
86	Roadside	Diffusion Tube		75	21.3	20.7	18	21.9	17.5
94	Kerbside	Diffusion Tube		83	37	35.1	31.7	31.2	29.9
100	Kerbside	Diffusion		100	40	36.9	33.4	33.7	34.9

		Tube							
103	Kerbside	Diffusion Tube		100	**40.2**	37.1	34	33.7	33.8
104	Kerbside	Diffusion Tube		100	39	37.2	34.2	33.7	36.8
101	Urban Background	Diffusion Tube		92	16.7	16.7	15	17.1	14.3
105	Urban Background	Diffusion Tube		92	16.3	16.2	14.7	16.4	14.8
106	Urban Background	Diffusion Tube		92	16	15.3	14.5	16.3	13.7
109	Roadside	Diffusion Tube		83	29.1	32.3	31.7	34.5	30.5
111	Roadside	Diffusion Tube		92	21.8	19.3	18.1	21	18.0
113	Roadside	Diffusion Tube		100	29.5	27	26.3	21.6	29.1
116	Urban Centre	Diffusion Tube		100	26.6	25.9	22.6	26.8	22.7
117	Roadside	Diffusion Tube		92	35.8	35.7	33.9	33.8	29.2
118	Roadside	Diffusion Tube		83	26.4	24	24.2	25.3	28.6
119	Roadside	Diffusion Tube		100	30.3	26.1	26.6	27.1	23.0
120	Roadside	Diffusion Tube		67	25.9	29.9	22.1	27	27.0
121	Roadside	Diffusion Tube		92	28.3	26.2	25.3	30.9	23.1
123	Roadside	Diffusion		75	35	35.6	34	37.7	31.3

		Tube							
125	Roadside	Diffusion Tube		83	26.7	25.8	22.5	31.4	24.0
128	Roadside	Diffusion Tube		75	31.2	30.8	28.3	21.3	29.9
129	Roadside	Diffusion Tube		100	22.2	20.2	21.1	23.5	19.6
130	Roadside	Diffusion Tube		100	25.3	24	21.4	32.3	23.3
131	Kerbside	Diffusion Tube		75	35.4	33	31.5	31.2	28.7
132	Kerbside	Diffusion Tube		83	**46**	39.1	36.2	**40.3**	40.0
133	Roadside	Diffusion Tube		92	31.5	31.3	28.9	31.3	27.1
134	Roadside	Diffusion Tube		83	31.9	30.3	28.3	31.2	28.7
135	Roadside	Diffusion Tube		58	25.9	24.1	20.7	24.3	19.1
136	Roadside	Diffusion Tube		100	24.8	21.9	21	24.3	21.8

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

☒ **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) 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 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
CM1	Kerbside	Automatic		99.8	**0**	0	**0(92)**	7	**6**
CM2	Urban Background	Automatic		93	**0**	**0(76)**	**0(67)**	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 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 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
CM1	Kerbside		92	21.6	21.3	20.9	18	16
CM2	Urban Background		99	15.3	13.9	14.6	13	12

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

Notes:

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
CM1	Kerbside		92	3	6	1	2	2
CM2	Urban Background		99	3	2	1	0	2

Notes:

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

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2013	2014	2015	2016	2017
CM2	Urban Background		95	9	10	7	6	7

☐ **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 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2017

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
29				21.7	19.9	19.8	17.5	15.7			25.9		20.1	17.9	N
38	43.6	39.6	42.7	36.0	36.0	33.0	27.7	34.3	33.1	38.4	47.7	51.7	38.7	34.4	N
39	28.5	23.15		18.9	19.72	20.51	18.59	18.81					21.2	18.8	N
53	35.94	27.6				23.27	21.96	20.83	30.44	29.22	35.72	36.59	29.1	25.9	N
55	38.98	34.95	45.88		30.33	29.1	27.28	31.39		34.21	37.53	38.78	34.8	31.0	N
56	29.4	28.9	25.83	21.59	20.99	31.44	16.68	20.31	25.59	26.75	42.66	35.1	27.1	24.1	N
57	28.53	32.47	30.5	32.13	38.76	28.94	26.68		26.26	28.33	27.01	33.12	30.2	26.9	N
58	48.87	39.34	39.79	30.66	31.05	33.61	27.96	35.37	36.67	37.42			36.1	32.1	N
86	23.62			19	19.79	15.02		12.43	18.92	19.38	22.06	26.36	19.6	17.5	N
94	34.68	37.39	42.55		32.8	33.13	27.33	25.86	30.29	34.07	38.08		33.6	29.9	24.9
100	48.98	48.47	45.68	31.54	36.98	38.09	31.9	33.15	35.29	36.73	39.33	44.6	39.2	34.9	31.3
103	41.11	42.61	42.94	35.84	39	38.97	30.99	29.92	35.57	36.52	37.76	43.95	37.9	33.8	30.4
104	42.77	48.08	42.21	67.04	41.12	36.17	32.4	32.62	33.93	37.05	36.2	47.09	41.4	36.8	32.8
101	23.62	20.06	19.12	12.99	13.77	8.55	12.53	10.92	14.26		19.68	21.47	16.1	14.3	N
105	23.53	20.42	20.43	12.55	13.92	9.48	10.9	10.98	19.68		19.26	21.36	16.6	14.8	N

106	20.15	21.68	19.85	13.07	13.93	13.68	11.09	11.75	13.94	5.83	19.06	20.65	15.4	13.7	N
109	37.83	33.21	34.81	31.69	28.91		28.59	33.29	34.24	37.6		42.45	34.3	30.5	N
111	27.2	19.23	22.31	17.85	19.2	15.43	15.9		16.61	18.13	24.41	26.15	20.2	18.0	N
113	40.44	33.83	35.9	28.26	28.83	25.77	24.71	28.12	27.95	33.36	42.92	42.26	32.7	29.1	21.4
116	29.07	28.15	26.03	21.04	19.06	22.72	18.54	21.99	20.5	27.8	33.34	37.18	25.5	22.7	N
117	33.23	33.42	34.9	33.79		32.18	27.95	29.44	27.94	31.4	37.62	39.16	32.8	29.2	N
118	27.21	27.16	35.68	33.26	26.34	33.22	27.97	32.05	32.42		39.72	38.7	32.2	28.6	N
119	29.96	27.81	27.92	22.51	19.43	23.79	20.38	21.07	22.06	27.96	31.68	35.13	25.8	23.0	N
120				24.16	20.57	23.32	19.03	20.92	23.51	27.26	34.65		24.2	21.5	N
121	32.6	13.89	35.04	26.06	27.3	22.65	21.15	21.53	24.79	24.67		35.73	25.9	23.1	N
123	35.27	44.52	42.48				30.76	29.53	33.32	33.07	32.16	35.55	35.2	31.3	N
125	33.74	33.3	25.02	27.53	32.37	23.52	22.69	20.1	24.95	26.53			27.0	24.0	N
128				26.54	21.13	31.25	26.19	32.62	31.59	40	43.97	48.95	33.6	29.9	23.2
129	26.39	25.82	24.97	16.08	17.14	18.53	15.86	14.92	18.63	24	29.51	32.59	22.0	19.6	19.5
130	31.44	31.93	24.58	21.13	21.77	22.6	19.75	21.84	25.77	30.08	30.57	32.24	26.1	23.3	N
131				32.4	29.97	33.31	25.44	26.55	31.23	32.38	38.78	40.6	32.3	28.7	26.0
132	47.68			39.48	35.94	39.21	36.83	43.04	36.65	45.38	55.73	69.33	44.9	40.0	N
133	35.63	33.83		27.26	29.65	24.94	23.19	26.12	29.09	30.75	35.71	38.55	30.4	27.1	N
134	43.38		33.51	28.73		29.46	24.35	28.72	25.79	33.14	36.91	38.28	32.2	28.7	N
135	26.01						15.65	14.78	21.89	20.4	24.19	27.5	21.5	19.1	N
136	27.66	23.59	28.6	23.03	19.2	18.56	18.58	19.16	21.86	27.69	33.83	32.75	24.5	21.8	N

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

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

☒ **Where applicable, 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) 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 has 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
Thomas Armstrong (Aggregates) Ltd	Hudson Dock East Side Barrack Street Port of Sunderland Sunderland SR1 2BU	Cement and Loading, unloading or storing of pulverised fuel ash	PM_{10}	B

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

Sunderland Strategic Transport Corridor (SSTC)

Phase 2 of the Sunderland Strategic Transport Corridor linking the A19 to the City is nearing completion and should be opened imminently. Phase 2 includes the new River Wear crossing which has been named Northern Spire. 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.

Phase 3 of SSTC is the critical 2km link between the New Wear Crossing and the city centre and is due for completion in 2020. This phase has now been given consent through the planning process. An Air Quality Assessment has been submitted in support of the application and covers emissions to air during the construction period and also during the operational period after the road has been constructed.

Construction Phase

Taking into account the sensitivity and location of surrounding receptors and the quantity of dust each construction activity is likely to produce, the assessment 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 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

Operational Phase

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 several 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.

Therefore operational impacts on Air Quality are deemed to be low and do not require any further mitigation measures.

New Major Development

Renewable Energy Centre

Plans for a new Renewable Energy Centre have been submitted to Sunderland City Council (LPA) for consideration. The development will be designed for the recovery of energy from non-hazardous waste using an Advanced Conversion Technology (gasification). The Air Quality and Greenhouse Gas Assessments submitted for the site have been considered by SCC but also peer reviewed by Consultant's Bureau Veritas (BV) to provide a robust review.

BV concluded that overall the air quality assessment has provided for a detailed and suitable evaluation of impacts derived from the proposed development. The results of the assessment have shown that potential exposure to poor air quality on all sensitive receptors assessed is likely to be insignificant with the development in place. There were however, some recommendations for further explanations of some aspects of the assessment which when addressed should provide a full picture of the extent of impacts and changes in air pollution. Further updates on the progress of this planning application will be provided within the 2019 ASR.

IAMP Update

The International Advanced Manufacturing Park (IAMP) is one the most important development sites in the north of England.

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 floor space and 5,200 new jobs by 2027.

The first stage of the project, IAMP One, has now been approved through the planning process and work is to begin on the first plot in the very near future. An Air Quality Assessment was provided in support of the application. The scope of the assessment covered a qualitative assessment of dust impact from the construction phase and a quantitative operational phase assessments of the effects of road traffic emissions. Relevant guidance had been used in both cases to inform the method of assessment. SCC considered that the assessment is a fair appraisal of the likely impacts of the development on air quality which were predicted not to have a significant impact on the local AQ. The developer will incorporate a Dust Management Plan into their Construction Management Plan to minimise the impacts of the construction phase.

The second phase, IAMP Two is currently in the planning phase and as yet official plans have not been submitted.

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/ Water.
The bias adjustment factor of 0.89 was obtained from the National Diffusion Tube Bias Adjustment Factor Spread sheet version 03/18.
Tubes have also been annualised where data capture has fallen below 75% using data from our local urban background continuous site (CM2).
Sites that are not representative of a receptor have been distance corrected and the results presented in Table B1.

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 solution.

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

Figure 1: City of Sunderland Monitoring Locations.

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

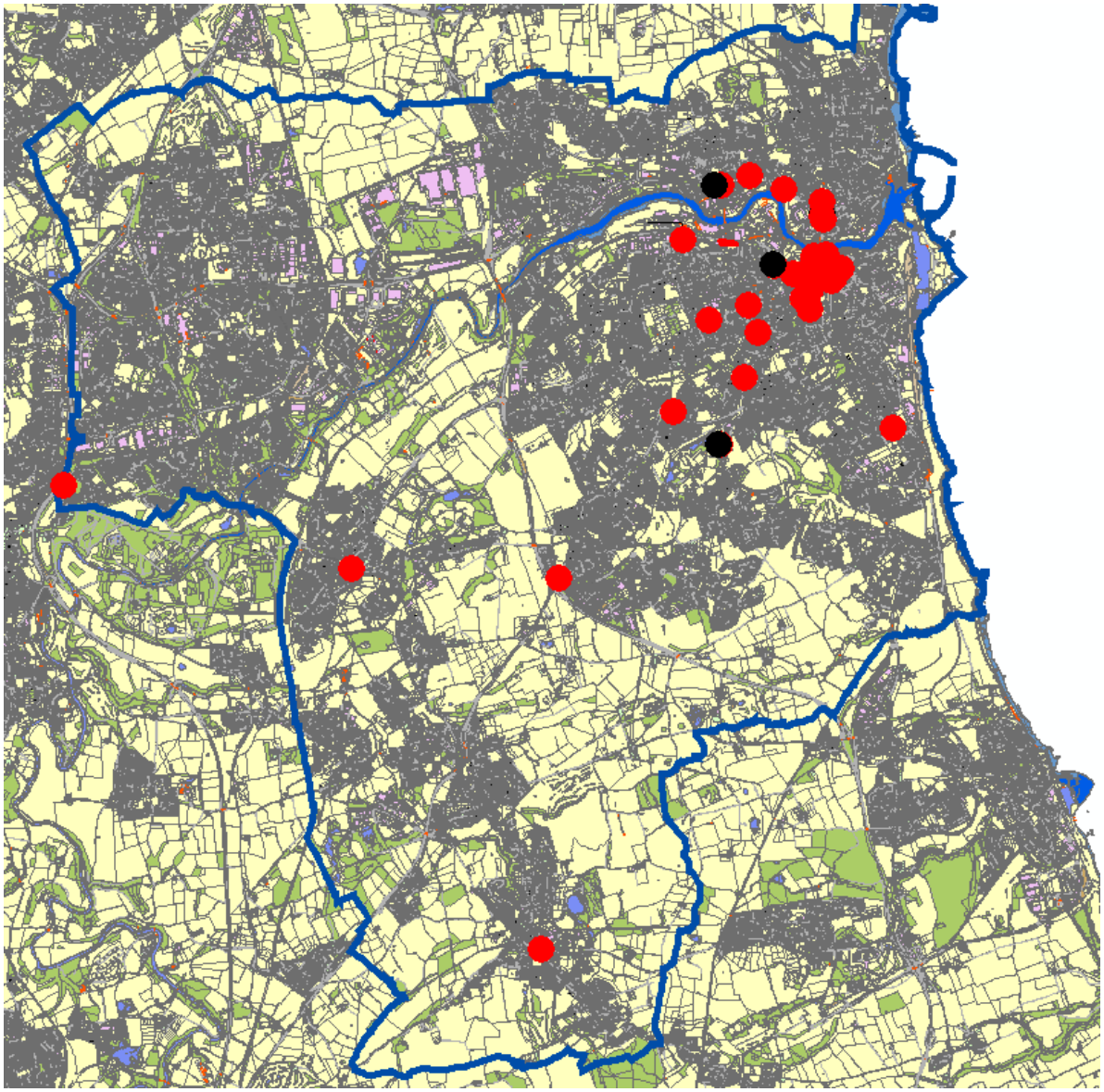


Figure 2: Sunderland Central Area

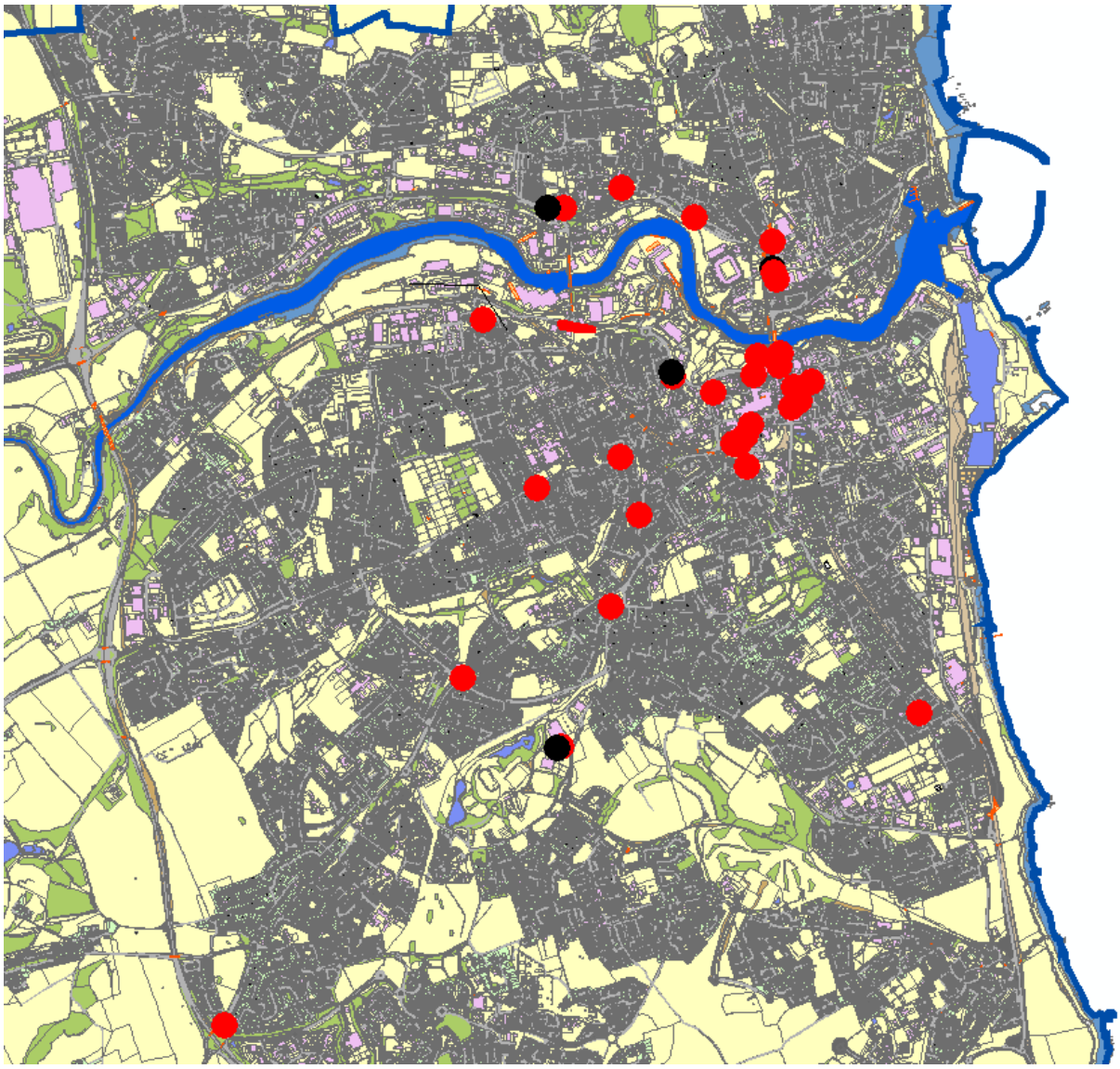


Figure 3: Houghton & Washington Areas

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
…	…