Newcastle City Council

2018 Air Quality Annual Status Report (ASR)

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

September 2018

AECOM

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Executive Summary: Air Quality in Our Area

Air Quality in Newcastle City Council

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

When quantifying the total impact associated with exposure to pollutants nitrogen dioxide (NO_2) and particulate matter of a size less than 2.5 microns ($PM_{2.5}$), it is necessary to account for an overlap in the response functions. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3], with the annual equivalent number of attributable deaths associated with the two pollutants combined estimated to be 44,750–52,500.

In the City of Newcastle, the main pollutant of concern is NO_2, with the primary source being from road vehicle exhaust. Newcastle City Council (NCC) have declared two air quality management areas due to monitored exceedances of the annual mean NO_2 objective (https://www.newcastle.gov.uk/environment-andwaste/pollution/air-pollution/monitoring-air-quality):

- City centre; and
- Gosforth

In addition the Secretary of State has identified that key major road links are in breach of European Air Quality Directive Limit values and has served direction on the local authority to investigate measures to improve air quality in the shortest possible time. Annual mean NO_2 concentrations measured in 2017 continue to exceed the annual mean objective at many sites in the centre and on key routes.

No significant new emission sources were identified since the previous ASR, and the most significant source of atmospheric pollution continues to be emissions from road

[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

traffic. The concern is predominantly high concentrations of NO_2 in the City of Newcastle, although it is recognised that fine (PM_{10}) and ultra-fine ($PM_{2.5}$) particulate matter can have health effects at concentrations below the NAQS.

Actions to Improve Air Quality

The Air Quality Action Plans (AQAP) for Newcastle City Centre and Gosforth were adopted in February 2006 and May 2011 respectively, to satisfy the statutory requirements of Defra's Local Air Quality Management (LAQM) regime for local authorities that have declared Air Quality Management Areas (AQMAs). These actions are being reviewed as part of the Clean Air Zone review work required by the secretary of state and a business plan will be published at the beginning of 2019 highlighting the measures that will improve air quality in the shortest possible time. These plans will be overseen and scrutinised by Joint Air Quality Unit at DEFRA and the Department for Transport.

A summary of the current actions that have been adopted and are currently included in the City's Air Quality Action Plan is presented below.

Action
Residents parking permits - 18,000 residents/visitor parking permits issued.
Specific bus corridors including bus lanes, or segregation of buses - St. Mary's Place bus corridor scheme implemented. Consideration is now being given to Sandyford Road Corridor.
Increase public transport priority - Intro of bus priority enforcement on John Dobson Street (JDS), Tyne Bridge, High Level etc. in 2015/16. Urban Core Plan adopted in 2016.
Higher priority for pedestrians and cyclists (in terms of highway space)
Decriminalized parking enforcement - transfer of enforcement powers from the police to the council to help reduce congestion and improve road safety.
Urban traffic management control (UTMC). Ongoing experiment with SMART (intelligent traffic light system) - in process of implementation.
Encourage low emission/ zero emission vehicles
Enforcing idling engines legislation - All staff within RSPP are authorised to issue fixed penalty notices, and periodic enforcement is currently carried out. Legislation is flawed by requirement to instruct driver to turn off engine before issue of notice, thus making it impossible to issue notice and actually carry out enforcement. 2017 Posters placed at locations within AQMA where engine idling has become a problem, eg, bus/coach stops and taxi ranks.
Delivery times outside peak hour - A freight consolidation centre was operational in Newburn from July 2011. Hours of freight delivery will be co-ordinated around quieter times, in lower emission vehicles. Freight consolidation to be reviewed.
Taxi emissions - Taxi licensing strategy was reviewed in 2011 and emission standard will be gradually introduced. Not completed in 2011 - underway in 2017 to include age limitations.
Use of low emission delivery vehicles/ times of delivery - To be considered as part of freight consolidation. Freight consolidation to be reviewed.

Consideration and modelling of a clean air zone within the area to establish the improvements that are necessary to comply with the secretary of states direction – work to be completed January 2019
Speed Restrictions - The speed restriction scheme '"20's Plenty" has been rolled out across large parts of the Gosforth area of Newcastle and is an advisory scheme to encourage people to reduce their speed on selected streets and roads across Newcastle.
Upgrade of Urban Traffic Control (UTC) and Scoot - Signal coordination currently being upgraded as part of the UTMC project.
Park and Ride - To be implemented through both bus and Metro. Metro Park and Rides in operation along with Great Park bus & Soccerbus
Promotion of Cycling - To be implemented through the cycle strategy (Urban Core Plan)
Annual Travel Card discount - This has been rolled out to Newcastle Council staff, and major employers are being encouraged by Nexus to join the scheme.
Quality bus contracts - Discussions were undertaken between regional bus operators and local authorities on Quality bus partnerships. Part of this could be geared around higher quality vehicle emission standards.
Travel Plans for businesses/ schools - Developing programmes from Local Transport Plan 1 and 2 (LTP1 and LTP2). All schools achieved school travel plans and these are now being refreshed.
Action
Alternative Travel - Work is continuing with the football club and key stakeholders to implement a number of measures to mitigate the negative impacts of travel to St James' Park. Current arrangements about to be reviewed but updated arrangements to be in place.
Car Loan schemes - Pool car system currently on-going by some employers.
Use of car parking charges to encourage alternatives - Under investigation as part of the core strategy. Parking strategy encourages Green Travel Hub at Science Central with EV charging, cycle parking and journey planning advice.
Car Clubs - Car clubs are being developed and new cars added as demand arises for this. Car club contract being re-procured.
Home Zones
Electric Vehicle Recharging Infrastructure
Electric Vehicles in NCC Fleet - 25 electric vehicles already in fleet.
Switch EV Council Trial – complete.
Switch EV Public Trial – complete.
Switch EV Car club trial – complete.
Eco driving training - Completed but not within NCC Remit. Low take up among council drivers/no resource to continue.
Subsidise public transport
Create extra capacity on trains/ Metro/buses
Flexible work times/ school hours/ home working - NCC has already implemented this scheme. Most school hours now outwith LA control as schools become academies. Legal process still needed for LA schools. SMOTS being refreshed.
Provision of Real Time Information (RTI) at bus stops
Target schools and parents with information campaigns
Health Promotion
Education regarding safety on Public Transport
Provision of information on 'High Pollution Days - Not to be implemented in the short term, but may however be linked to future UTMC systems. Being explored with UTMC.
Include cycle facilities in new developments - This is a standard requirement for a new development. Implemented - requirement of new planning applications.

Consideration of the location of essential services such as housing and employment - Implementation as part of the new accessibility strategy and cross organisational working arrangements. Included in Urban Core Plan.
Strengthen joint working between local authorities - Ongoing. Also strengthened relationships with Urban Observatory, Newcastle University.
Implement greater planning controls in AQMAs
Local Development Frameworks need to identify AQMAs - Local development framework has taken air quality into account. Background monitoring to support/validate planning application submissions.
Cap existing development sites
Encourage mixed use developments - This is already part of Newcastle City Council's sustainable development policy.
Undertake air quality assessments of relevant new developments
Air Quality Awareness Campaign - Campaign to raise air quality and how behavioural change can both improve personal health and at the same time improve air quality. Be Air Aware time limited project engaged with the community and supported by Go Smarter.

Conclusions and Priorities

The most significant local challenge for the local authority is complying with Secretary of States Direction to improve air quality in the shortest possible time. The work has identified so far that exceedences may extend possible beyond the areas identified in the existing AQMAs.

The annual mean objective for nitrogen dioxide (NO2) was exceeded or within 10% of the objective value at the majority of monitoring locations in the city centre (23 of 32), which are distributed throughout the AQMA i.e. there are no localised areas of the AQMA where air quality has improved noticeably or discrete areas where exceedances are consistently recorded. Outside, but close to, the City Centre AQMA, one monitoring location (DT32, City Road) continues to exceed the annual mean objective for NO2. The exceedance outside the City Centre AQMA is an indication that the AQMA boundary may need to be amended.

Air quality in the Gosforth AQMA has overall improved slightly, with two of the six monitoring locations below the NO_2 annual mean objective in 2017 compared to 2016. However, two monitoring locations continue to record NO_2 concentrations in exceedance of the annual mean objective. A further year of monitoring will be undertaken to determine if the AQMA is should be amendment or revocated as part of the 2019 ASR.

The clean air zone feasibility study is a major piece of work, that is being conducted in collaboration with Gateshead and North Tyneside Councils. The study is underway and

its outcomes will be balanced across shared priority areas including transportation, public and environmental health. It's outcomes will be discussed and summarised in next year's ASR; where appropriate the modelling work that is being undertaken may be used to review the appropriateness of the current AQMA, and the current monitoring network.

Local Engagement and How to get Involved

The Newcastle City Centre and Gosforth AQAPs include a number of measures that will require a high level of public support and buy-in to ensure they are successful, such as:

- Increasing access to alternative modes of travel to the private motor car;
- Increased use of low emission vehicles;
- Increased use of cycle-ways as a modal shift across the city of Newcastle; and
- Use of car loan schemes and car clubs, including the uptake of car sharing and pooling or the use of alternative forms of travel.

NCC will continue to provide information about air quality and pollution control:

- paper copies, or alternative formats, of any of the electronic reports published online at https://www.newcastle.gov.uk/environment-and-waste/pollution/airpollution/monitoring-air-quality
- information on previous review and assessment reports
- Any questions or concerns about air quality in the county answered.

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1 Local Air Quality Management

This report provides an overview of air quality in Newcastle City 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 Newcastle 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.

A summary of AQMAs declared by Newcastle City Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://www.newcastle.gov.uk/environment-andwaste/pollution/air-pollution/monitoring-air-quality. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan
						At Declaration	Now	
AQMA No. 1b (City Centre)	Declared February 2006, Amended April 2008	NO_2 Annual Mean	Newcastle	An area encompassing the previous AQMAs 1-3, covering Newcastle City Centre	NO	-	-	City of Newcastle upon Tyne Air Quality Action Plan - Newcastle City Centre AQMA – January 2006 https://www.newcastle.gov.uk/sites/default/files/wwwfileroot/environmentand-waste/pollution/city_centre_aqma_action_plan_0.pdf
AQMA No. 5 (Gosforth)	Declared April 2008	NO_2 Annual Mean	Gosforth	An area encompassing parts of the A189 and B1318 in Gosforth.	YES			Air Quality Action Plan: Gosforth, Newcastle City Council – May 2011 https://www.newcastle.gov.uk/sites/default/files/wwwfileroot/environmentand-waste/pollution/gosforth_aqma_action_plan_0.pdf

☐ **Newcastle City Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

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

NCC has taken forward a number of direct measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans.

As part of recent developments by Defra, NCC must take action to reduce NO_2 near to specific roads. These locations were identified through the Pollution Climate Mapping (PCM) dispersion model. NCC (together with neighbouring Gateshead and North Tyneside) is undertaking an 18 month clean air zone feasibility study as part of this process, which has been the priority in terms of measures to improve air quality. In addition, Defra has made funding available for NCC to work with its partners (Gateshead and North Tyneside) to examine air quality along parts of the A167 across the Tyne Bridge and towards North Tyneside. The Outline Business Case is due for submission at the end of 2018.

The measures taken to improve air quality include:

- Action 1 & 22: Residents parking permits and car parking charges – 18,000 residents/visitor parking permits issued to date to discourage free city centre all-day commuter parking.
- Action 2: Traffic management through bus corridors - St. Mary's Place bus corridor scheme implemented. Consideration still being given to Sandyford Road Corridor.
- Action 3, 15 & 38: Increase public transport priority – Included in the Urban Core Plan 2016. Bus priority enforcement was introduced on John Dobson Street, Tyne Bridge and High Level in 2015/16. Park and Ride facilities are being implemented through both bus and Metro; Metro Park and Rides are in operation along with Great Park bus and Soccerbus. Public safety on public transport is being addressed through proactive use of more staffing and CCTV.
- Action 4, 16 & 40: Higher priority for pedestrians and cyclists - Included in the Urban Core Plan 2016 is the standard requirement that new developments include cycle facilities. Newcastle was awarded £10.6 m through the Cycle City

Ambition fund to implement or expand pedestrianised areas and on and off-road cycle lanes and routes.

- Action 6, 14 and 39: Ongoing monitoring of traffic flow and queuing times using the urban traffic management control (UTMC) and ongoing experiment with SMART (intelligent traffic light system). Signal coordination is being upgraded as part of the UTMC project. Linking of UTMC traffic data to air pollution events is being explored with a view to making this information publicly available.
- Action 8: Enforcing idling engines legislation - All staff within the Regulatory Services and Public Protection (RSPP) are authorised to issue fixed penalty notices, and periodic enforcement is currently carried out. However, the legislation is flawed by the requirement to instruct driver to turn off engine before issue of notice, thus making it impossible to issue notice and actually carry out enforcement.
- Action 9: Freight and delivery management - A freight consolidation centre which became operational in Newburn from July 2011 will be reviewed.
- Action 10: Taxi emissions - Taxi licensing strategy was reviewed in 2011 and emission standards was gradually introduced in 2017 to include age limitations.
- Action 17: Annual travel car discount - This has been rolled out to Newcastle Council staff, and major employers are being encouraged by Nexus[4] to join the scheme.
- Action 19: Travel Plans for businesses/schools - All schools achieved school travel plans and these are being refreshed.
- Action 23: Car clubs - Car clubs are being developed and new cars added as demand arises for this. Car club contract is being re-procured.
- Action 24: Home Zones – superseded by Streets for People Community Areas and principles carried through in new housing developments.
- Action 26: Electric Vehicles in NCC Fleet – 25 vehicles in fleet, with more to be added in the future.

[4] Nexus is the Tyne and Wear Passenger Transport Executive administering funds on behalf of the North East Combined Authority. Their task is to improve the quality of life and fortunes of everyone in Tyne and Wear, by creating better transport networks.

- Action 34, 36 & 37: Public information initiatives – Ongoing and one off events, such as the provision of real time information at bus stops (bus companies are developing applications), Cycling in the City, Active Newcastle, This Girl Can, Sky Rides, Cycle Cross, Make the Switch.

The principal anticipated challenges and barriers to implementation of existing AQAP are:

- Whilst the feasibility plan will take precedence over the existing programme of work by Environmental Health the Council will be working hard to continue to accelerate the measures described here and included in the AQAPs.
- Newcastle City Council recognises that in order to deliver air quality across AQMAs it must work with its neighbouring authorities and other stakeholders such as Highways England. In addition, the Council understands that unintended consequences of low emission measures are very likely but will be ameliorated by working closely with the Transportation Authority and Public Health England.
- Air Quality mitigation measures will be developed from the Clean air Zone study work and funding bids will made for mitigation works. The CAZ work will ensure plans are coordinated with the National Air Quality Strategy, which was published as a draft in April 2017, and the updated PCM model used to identify roads where the annual mean concentration of NO_2 exceeds National Air Quality Objectives.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Newcastle City Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Residents parking permits	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Newcastle City Council	2001	Ongoing	Issue residents parking permits to discourage free city centre all-day commuter parking	Low-Medium	18,000 residents/visitor parking permits issued	2030	
2	Specific bus corridors including bus lanes, or segregation of buses.	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Newcastle City Council	2001	Ongoing	Assess bus corridors for priority measures such as selective vehicle detection at traffic signals, new signal installations, or bus priority or 'no-car' lanes	Low (in some targeted areas)	St. Mary's Place bus corridor scheme implemented. Consideration is now being given to Sandyford Road Corridor. Identified public transport corridors in 2015 Cabinet report. CITS Corridor trial	2020	
3	Increase public transport priority	Alternatives to private vehicle use	Other	Newcastle City Council	2011	Ongoing		Medium (< 2 µg/m3 NO2)	Ongoing - Included in Urban Core Plan 2016. Introduction of bus priority enforcement on John Dobson Street, Tyne Bridge and High Level in 2015/16.	2015	

4	Higher priority for pedestrians and cyclists (in terms of highway space)	Promoting Travel Alternatives	Promotion of cycling	Newcastle City Council	2011	Ongoing	Implement or expand pedestrianised areas and expand on and off-road cycle lanes and routes	Low	Ongoing – Included in Urban Core Plan 2016. Taking place through Cycle City Ambition fund – Newcastle awarded £10.6m between 2015-2018.	2020	
5	Decriminalized parking enforcement	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Newcastle City Council	2008	Implemented	Improve enforcement of parking controls to reduce congestion caused by illegally parked cars, by transferring enforcement to local authority.	Low	Introduced on 15 April 2009. The transfer of enforcement powers from the police to the council to help reduce congestion and improve road safety.	2009	
6	Urban traffic management control (UTMC). Ongoing experiment with SMART (intelligent traffic light system)	Traffic Management	UTC, Congestion management, traffic reduction	Tyne and Wear Authorities	2011	Ongoing	Monitoring using traffic flow count data, as well as subjective analysis of the queuing times, and compared with the modelled option to indicate whether the predicted emission reductions may be achieved.	Low	Ongoing	2020	

7	Encourage low emission/ zero emission vehicles	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Tyne and Wear Authorities	2004	Implemented	Anticipated reduction in NO_X and PM emissions due to increased us of low/zero emission vehicles.	Low	Diesel electric hybrid buses were operating on Quaylink Quayside/City Centre Route. These buses have been removed from Q3 circulation. Hydrogen Alliance in discussion with bus operator about hydrogen fuelled buses	2006	
7b	Encourage low emission/ zero emission vehicles	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	Tyne and Wear Authorities	2013	Implemented	Anticipated reduction in NO_X and PM emissions due to increased us of low/zero emission vehicles.	Low	Clean Bus transport fund implemented – 30 buses operated by Go North East adapted with Gyrodrive fuel-saving technology.	2015	
7c	Encourage low emission/ zero emission vehicles	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	Tyne and Wear Authorities	2015	Implemented		Low	Clean Vehicle transport fund implemented	2016	
8	Enforcing idling engines legislation	Policy Guidance and Development Control	Other policy	Newcastle City Council	2008	Implemented	Anticipated reduction in NO_X and PM emissions due to less idling vehicles.	Low	All staff within RSPP are authorised to issue fixed penalty notices, and periodic enforcement is currently carried out.	2020	Legislation is flawed by requirement to instruct driver to turn off engine before issue of notice, thus making it impossible to issue notice and actually carry out enforcement.
9	Delivery times outside peak hour	Freight and Delivery Management	Quiet & out of hours delivery	Newcastle City Council	2006	Ongoing	Anticipated reduction in NO_X and PM emissions due to decreased congestion caused by delivery vehicles parking in congested streets.	Low	A freight consolidation centre operational in Newburn from July 2011. Hours of freight delivery will be co-ordinated around quieter times, in lower emission vehicles. Freight consolidation to be reviewed.	2020	

10	Taxi emissions	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Newcastle City Council	2011	Ongoing	Anticipated reduction in NO_X and PM emissions due to stricter standards for taxis and private hire vehicles.	Low	Taxi licensing strategy was reviewed in 2011 and emission standard will be gradually introduced. Not completed in 2011 - underway in 2017 to include age limitations	2020	
11	Use of low emission delivery vehicles/ times of delivery	Vehicle Fleet Efficiency	Other	Newcastle City Council	2011	Under consideration	Anticipated reduction in NO_X and PM emissions due to increased use of low/zero emission vehicles.	Low	Under consideration	2014	
12	Low emission zone	Policy Guidance and Development Control	Low Emissions Strategy	Newcastle City Council	2013	Considered	Conduct viability assessment of LEZ. The completion of the assessment will have a single point of implementation and so there will be a definite milestone for completion.	Medium-High (High: > 2 µg/m3 NO2) (in zone)	Part of Urban Core Area Action Plan 2016. LEZ study completed. Not recommended. Based on compliance being achieved by 2020. Results being reviewed in light of DEFRA predictions and COPERT factors	2011	
13	Speed Restrictions	Traffic Management	Reduction of speed limits, 20mph zones	Newcastle City Council	2009	Complete	Establish a “Clear Zone”, where a speed limit of 20 mph applies to all vehicles.	Low	The speed restriction scheme ‘”20’s Plenty” has been rolled out across large parts of the Gosforth area of Newcastle and is an advisory scheme to encourage people to reduce their speed on selected streets and roads across Newcastle.	2020	

14	Upgrade of Urban Traffic Control (UTC) and Scoot	Traffic Management	UTC, Congestion management, traffic reduction	Tyne and Wear Authorities	2011	Ongoing		Low	Signal coordination is currently being upgraded as part of the UTMC project.	2020	
15	Park and Ride	Promoting Travel Alternatives	Other	Newcastle City Council	2014	Ongoing	Anticipated reduction in NO_X and PM emissions due to decreased use of private vehicles for commuting.	Low-Medium	To be implemented through both bus and Metro. Metro Park and Rides in operation along with Great Park bus & Soccerbus	2020	
16	Promotion of Cycling	Promoting Travel Alternatives	Promotion of cycling	Newcastle City Council	2011	Ongoing		Low	Ongoing	2020	
17	Annual Travel Card discount	Promoting Travel Alternatives	Workplace Travel Planning	Newcastle City Council	2010	Ongoing	Anticipated reduction in NO_X and PM emissions due to decreased use of private vehicles for commuting.	Low	This has been rolled out to Newcastle Council staff, and major employers are being encouraged by Nexus to join the scheme.	2017	
18	Quality bus contracts	Policy Guidance and Development Control	Regional Groups Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Newcastle City Council	2015	Not implemented		Low	Not implemented - discussions were undertaken between regional bus operators and local authorities on Quality bus partnerships. Part of this could be geared around higher quality vehicle emission standards	2020	

19	Travel Plans for businesses/ schools	Policy Guidance and Development Control	Regional Groups Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Newcastle City Council	2005	Ongoing		Low	Developing programmes from Local Transport Plan 1 and 2 (LTP1 and LTP2). All schools achieved school travel plans and these are now being refreshed.	2020	
20	Alternative Travel	Promoting Travel Alternatives	Other	Newcastle City Council	2010	Ongoing		Low	Ongoing	2020	
21	Car Loan schemes	Promoting Travel Alternatives	Workplace Travel Planning	Newcastle City Council	2005	Ongoing		Low	Ongoing	2020	
22	Use of car parking charges to encourage alternatives.	Promoting Travel Alternatives	Workplace Travel Planning	Newcastle City Council	2014	Ongoing		Medium (< 2 µg/m3 NO2)	Ongoing	2020	
23	Car Clubs	Promoting Travel Alternatives	Workplace Travel Planning	Newcastle City Council	2011	Ongoing		Low	Car clubs are being developed and new cars added as demand arises for this. Car club contract being reprocured.	2020	
24	Home Zones	Policy Guidance and Development Control	Other policy	Newcastle City Council	2014	Ongoing		Low	Currently programmed as part of Plan Partners LTP schemes. Home Zones as a project dropped although some of principles carried through in new housing developments. Superseded by Streets for People Community Areas.	2015	

25	Electric Vehicle Recharging Infrastructure	Promoting Travel Alternatives	Other	Newcastle City Council	2011	Ongoing	Charging points on the network and anticipated reduction in NO_X and PM emissions due to increased use of electric vehicles	Medium (< 2 µg/m3 NO2)	47 charging points installed – this element completed	2020	
26	Electric Vehicles in NCC Fleet	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Newcastle City Council	2007	Ongoing	Electric vehicles in fleet and anticipated reduction in NO_X and PM emissions due to increased use of electric vehicles	Low	Ongoing - 25 electric vehicles already in fleet	2014	
27	Switch EV Council Trial	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Newcastle City Council	2014	Implemented		Low	Trialled electric vehicles amongst existing council services along with new technologies.	2014	
28	Switch EV Public Trial	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Newcastle City Council	2014	Implemented		Low	Trials to increase public awareness of the viability of electric vehicles, and hence their future uptake	2015	
29	Switch EV Car club trial	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	Newcastle City Council	2014	Implemented	Greater awareness of viability of car club as well as publicity for electric vehicles	Low	Implemented	2020	

30	Eco driving training	Vehicle Fleet Efficiency	Driver training and ECO driving aids	Newcastle City Council	2011	Implemented	Incorporate into standard staff (driver) training. Anticipated reduction in NO_X and PM emissions due to more efficient driving	Low	Completed but not within NCC Remit. Low take up among council drivers/no resource to continue.	2020	
31	Subsidise public transport	Promoting Travel Alternatives	Other	Newcastle City Council	2011	Implemented	Reduce fares for public transport to encourage use and anticipated reduction in NO_X and PM emissions due to decreased use of private vehicles for commuting, etc.	Low	To be implemented by way of concessionary fares for OAPs on buses and Metro. Out of NCC control - with Nexus, who are considering subsidies for 16-19 year olds in full time education (high fares a major barrier to public transport use by young people).	2030	
32	Create extra capacity on trains/ Metro/buses	Promoting Travel Alternatives	Other	Newcastle City Council	2010	Implemented		Low-Medium	Operator investment as deemed appropriate. Out of NCC control - believe Nexus have submitted a bid for rolling stock refurb and extra capacity.	2030	
33	Flexible work times/ school hours/ home working	Promoting Travel Alternatives	Encourage / Facilitate home-working	Newcastle City Council	2014	Implemented		Low	NCC has already implemented this scheme. Most school hours now outwith LA control as schools become academies. Legal process still needed for LA schools. SMOTS being refreshed.	2030	

34	Provision of Real Time Information (RTI) at bus stops	Public Information	via other mechanisms	Newcastle City Council	2010	Ongoing	Access to real-time air information at bus stops.	Low	Out of NCC control - believe this is underway. Nexus and bus companies developing applications.	2020	
35	Target schools and parents with information campaigns	Public Information	via other mechanisms	Newcastle City Council	2014	Ongoing		Low	Go Smarter to School AQ bid submitted to DEFRA but unsuccessful.	2020	
36	Health Promotion	Public Information	via other mechanisms	Newcastle City Council	2006	Ongoing		Low	To be led by (Primary Care Trust) PCT in liaison with Transport Policy staff. Cycling in the City Active Newcastle/This girl can.	2030	
37	One off events	Public Information	via other mechanisms	Newcastle City Council	2014	Ongoing		Low	Sky Rides, Cycle Cross, Make the Switch	2030	
38	Education regarding safety on Public Transport	Public Information	via other mechanisms	Newcastle City Council	2010	Ongoing		Low	LTP3 was committed to improve actual and perceived levels of security through proactive use of more staffing and CCTV. Nexus delivering.	2030	
39	Provision of information on 'High Pollution Days'	Traffic Management	UTC, Congestion management, traffic reduction	Tyne and Wear Authorities	2014	N/A	Access to realtime air quality information on the air quality website.	Low	Not to be implemented in the short term, but may however be linked to future UTMC systems. Being explored with UTMC.	2016	

39	Provision of information on 'High Pollution Days'	Traffic Management	UTC, Congestion management, traffic reduction	Tyne and Wear Authorities	2014	N/A	Access to realtime air quality information on the air quality website.	Low	Not to be implemented in the short term, but may however be linked to future UTMC systems. Being explored with UTMC.	2016	

Reduction in pollutant classification terminology:

Low: imperceptible (a step in the right direction). Improvements unlikely to be detected within the uncertainties of monitoring and modelling.

Medium: perceptible (a demonstrable improvement in air quality). An improvement of up to 2 µg/m^3 NO_2, which could be shown by a modelling scenario. Improvement is not likely to be shown by monitoring due to confounding factors of the weather.

High: significant. Improvement of more than 2 µg/m^3 NO_2. Can be clearly demonstrated by modelling or monitoring (a significant improvement is likely to be delivered by a package of options rather than by a single intervention).

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.

Furthermore, Defra published 'A Briefing for Directors of Public Health' in March 2017 (Defra, 2017), which advises that health outcomes from PM should be considered in the assessment and planning process.

The main sources of $PM_{2.5}$ in the city of Newcastle are road traffic emissions (comprising engine exhaust, road and tyre/brake abrasion). All the AQAP measures aim to reduce road traffic emissions or to promote the use of alternative and sustainable modes of transports.

The estimated background pollutant concentrations for the 1km grid squares for the whole of the UK are published by Defra (https://uk-air.defra.gov.uk/data/laqmbackground-maps?year=2015). The maximum concentration of $PM_{2.5}$ identified in the Newcastle City Council administrative area in 2017 was 7.9 µg/m^3. This is well below the $PM_{2.5}$ target value of 25 µg/m^3 to be achieved by 2020.

The Public Health Outcomes Framework has published statistics on the health effects of exposure of the public to fine particulate pollution (http://www.phoutcomes.info).
The fraction of mortality attributable to particulates measured as healthy life expectancy at birth for males and females are shown below in Figure 2.1 and 2.2. Newcastle is highlighted, and indicates that particulates are near the lower end of the range where particulates are a major contributor to mortality, compared to other regions. These data were downloaded in July 2018.

Figure 2.1 Public Health Outcomes Framework, Fraction of Mortality Attributable to Particulates (Male)

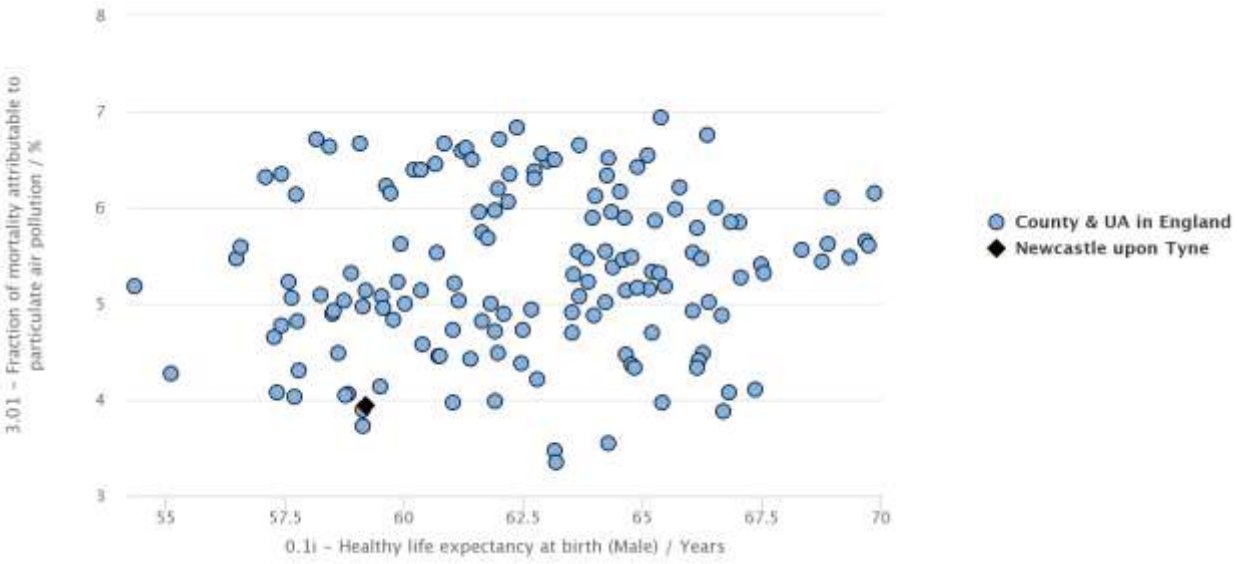
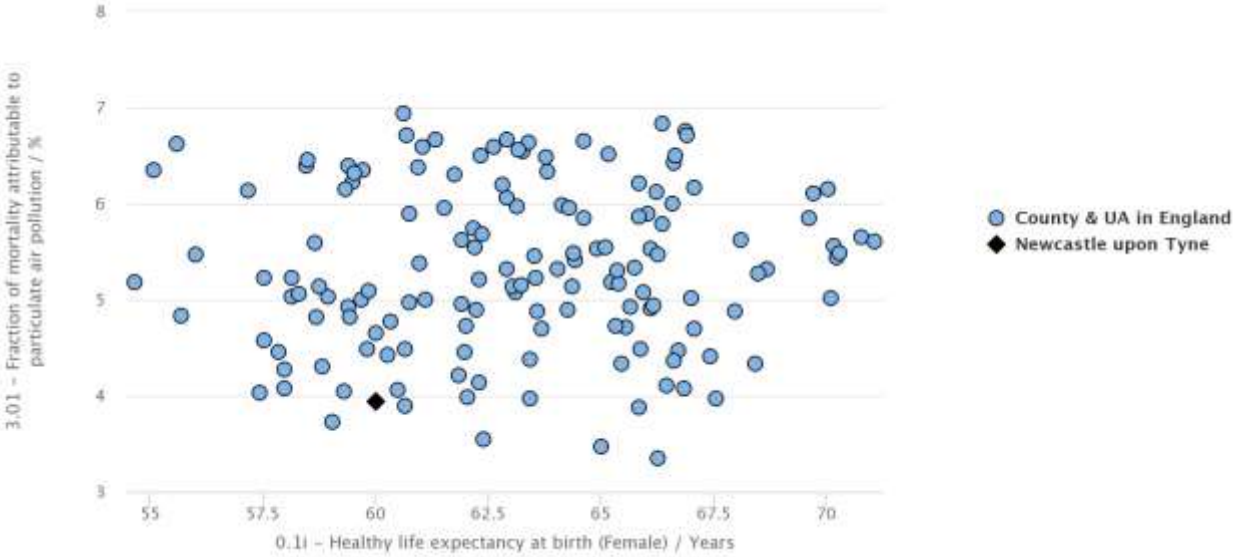


Figure 2.2. Public Health Outcomes Framework, Fraction of Mortality Attributable to Particulates (Female)



2.4 Planning

The following planning applications have been received in the past 12-months, and for which potential air quality effects may be associated:

- Planning Ref: 2018/0440/01/DET; The erection of student accommodation in two buildings 8-12 storeys high comprising 535 bed spaces within a total of 162 apartments (75 apartments Class C3 and 87 apartments Class C4), including management suite, 62 cycle spaces, associated access

arrangements, servicing and external landscaping, Manors Technopole, Kings Manors Business Park, Newcastle upon Tyne. An air quality assessment report was completed dated 3rd April 2017; Comments were submitted on 10th April 2018.

- Planning Ref: 2016/1350/19/DCC; Submission of a detailed air quality scheme to provide clean air to the building to comply with condition 22 of planning permission 2016/1350/15/RVC dated 14/12/2017, Clough House, Kings Manor, Newcastle upon Tyne. Comments were submitted on 10th April 2018.

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.

Newcastle City Council undertook automatic (continuous) monitoring at four sites during 2017. These monitoring sites successively recorded levels below the AQO limit values. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.airqualityengland.co.uk/localauthority/?la_id=139[6].

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

Newcastle City Council undertook non-automatic (passive) monitoring of NO_2 at 43 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites in 2017 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.

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.

[6][5] Note that the link is for Gateshead Metropolitan Borough Council. However all data for Newcastle City Council are available here
Note that the link is for Gateshead Metropolitan Borough Council. However all data for Newcastle City Council are available here

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 40 µg/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 200 µg/m^3, not to be exceeded more than 18 times per year.

Continuous monitoring of NO_2 at the St. Mary's Place, Cradlewell, Percy Street and Pilgrim Street sites recorded exceedances of the objective value at Percy Street and Pilgrim Street, though these concentrations represent a decrease from 2016 concentrations. No exceedances were recorded by the St. Mary's Place or Cradlewell monitors. NO_2 concentrations decreased at St. Mary's Place compared to 2016 levels, while concentrations at the Cradlewell site increased.

There were no exceedances of the hourly NO_2 objective of 200 µg/m^3 at any of the continuous monitoring locations.

Low data capture was recorded at Cradlewell (22.8%); this was due to instrument failure in January 2017 and subsequent replacement in November 2017. Data has been appropriately adjusted. Data capture below the 85% objective also occurred at Pilgrim Street, where issues were experienced with the modem transmitting the data from October onwards. A new modem has been installed to resolve this issue.

City Centre AQMA

In April 2008, an AQMA covering Newcastle city centre was declared. During 2017 NCC undertook monitoring at 34 locations within this AQMA; DT2-26, DT28-31, DT34, DT37, DT40, DT52-54 and DT63. NCC has historically operated an extensive network of 42 diffusion tubes throughout the city centre AQMA, although several of these sites were closed in 2015 and 2016 due to consistently recording values below the annual mean objective. The trends recorded at City Centre AQMA sites are shown in Figure A.1. Accounting for the results in 2017 the general trend is showing improvement at some locations and deterioration at others in terms of air quality.

Exceedances of the annual mean objective were recorded at the following monitoring locations in 2017:

- DT 5-10
- DT 12-14
- DT 19-21
- DT 25-26
- DT 29-31
- DT34
- DT40
- DT63

NO_2 concentrations at monitoring locations DT6, DT9, and DT63 increased from 2016 concentrations, exceeding the objective value, which was not the case in 2016.

Locations which recorded exceedances in 2017 but which also showed a decrease in NO_2 concentration from 2016 levels include DT7, DT20, DT29, DT31, DT34 and DT40.

Locations which continued to record exceedances as well as increased NO_2 concentrations from 2016 levels include: DT5, DT8, DT10, DT12-14, DT19, DT21, DT25, DT26 and DT30.

Four sites recorded concentrations within 10% of the annual mean objective (> 36 $\mu g/m^3$), which may indicate risk of a potential exceedence:

- D16
- DT36
- DT37
- DT53

NO_2 concentrations at DT37 and DT53 were in exceedance of the objective value in 2016 but were below the objective in 2017.

NO_2 concentrations at DT16 and DT36 were below the objective in 2017 but these have increased from 2016 levels.

Gosforth AQMA

In April 2008, an AQMA covering parts of the A189 and B1318 in Gosforth was declared. NCC undertook monitoring at six locations within this AQMA; D42-45, D48 and D50. The trends recorded at Gosforth AQMA sites are shown in Figure A.1. Accounting for the results in 2017 the annual mean NO_2 has improved slightly from 2016 results, with the exception of DT45, where concentrations have increased.

Exceedances of the annual mean objective were recorded at two monitoring location in 2017:

- DT43
- DT45

NO_2 concentrations at DT43 exceed the objective value but have decreased from 2016 concentrations.

Two sites recorded concentrations within 10% of the annual mean objective (> 36 µg/m^3), which may indicate risk of a potential exceedence:

- D48
- D50

However, NO_2 concentrations at DT48 and DT50 have decreased from levels exceeding the objective in 2016 to levels below the objective in 2017, indicating an improvement in local air quality at these locations.

Low data capture was recorded for DT48; it operated until May 2017 after which time there was no access to Killingworth Road due to roadworks. It is expected to back in operation once the road reopens.

Outside the AQMA

Exceedences of the annual mean NO_2 objective were recorded at one site in Newcastle outside the AQMA on City Road:

- DT32

The concentration recorded at this location was 45.7 µg/m^3, which is an increase from the 2016 average concentration.

Three sites recorded concentrations within 10% of the annual mean objective (> 36 µg/m^3), which may indicate risk of a potential exceedence:

- DT56
- DT57
- DT62

NO_2 concentrations at DT56 and DT57 have increased from 2016 levels, while DT62 concentrations have decreased.

Summary of Monitoring

Monitored annual mean NO_2 concentrations continue to exceed the annual mean objective at locations within the City Centre and Gosforth AQMAs, although there is an exceedence outside the AQMA on City Road (DT32). Therefore, it is recommended that monitoring continue in these areas and will be used to inform any amendments to the AQMAs. The exceedance outside the City Centre AQMA is an indication that the AQMA boundary may need to be amended. Therefore, it is recommended that monitoring continue in these areas and will be used to inform any amendments to the AQMAs.

Two of the six monitoring locations were below the NO_2 annual mean objective in 2017 as compared to 2016 within the Gosforth AQMA. However, two other monitoring locations continue to record NO_2 concentrations in exceedance of the annual mean objective. It is therefore recommended to continue monitoring for another year to determine if the AQMA is eligible for amendment or revocation as part of the 2019 ASR.

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. NCC undertook monitoring at two locations in 2017; concentrations in 2017 were well below the objective, as they have been for all of the past five years. The trends recorded at these locations are shown in Figures A.3 and A.4.

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 objective was not exceeded at either the

St. Mary's Place or the Cradlewell site, with two days above 50 µg/m^3 being the maximum at both sites.

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 at the St Mary's Place monitor for the past 5 years. The concentration in 2017 was well below the objective, as it has been for all of the past five years. The trends recorded at this location are shown in Figures A.5.

3.2.4 Sulphur Dioxide (SO_2)

Monitoring for SO_2 is not undertaken by Newcastle City Council.

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)
	St. Mary's Place (AURN)	Urban Background	425029	564916	NO, NO_X, NO_2, PM_{10}, $PM_{2.5}$, O_3	YES	Chemiluminescence, TEOM-FDMS, UV-absorption	n/a	20	2.5
	Jesmond Road, Cradlewell	Roadside	425992	565831	NO_2, PM_{10}, O_3	YES	Chemiluminescence, TEOM-FDMS, UV-absorption	7	3	2.5
	Percy Street	Roadside	424776	564861	NO_2	YES	Chemiluminescence	20	3	1.8
	Swan House, Pilgrim Street	Roadside	425124	564112	NO_2	YES	Chemiluminescence	10	2	1.8

Notes:

(1) 0 m 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)
DT2	Newcastle AURN 1	Urban Background	425029	564916	NO_2	YES	N/A	20	YES	2.7
DT3	Newcastle AURN 2	Urban Background	425029	564916	NO_2	YES	N/A	20	YES	2.7
DT4	Newcastle AURN 3	Urban Background	425029	564916	NO_2	YES	N/A	20	YES	2.7
DT5	St Marys Place/John Dobson Street	Roadside	424948	564870	NO_2	YES	0	1	NO	2.7
DT6	John Dobson St/North Street	Roadside	425027	564695	NO_2	YES	2	2	NO	2.7
DT7	Blackett Street/Northumberland Street	Roadside	424934	564474	NO_2	YES	N/A	1	NO	2.7
DT8	10 Market Street	Roadside	424943	564347	NO_2	YES	N/A	1	NO	2.7
DT9	98 - 100 Pilgrim Street	Roadside	425045	564208	NO_2	YES	0	4	NO	2.7
DT10	Pilgrim Street/Swan House roundabout	Roadside	425088	564168	NO_2	YES	20	8	NO	2.7
DT12	8 Mosley Street	Roadside	425186	564147	NO_2	YES	N/A	2	NO	2.7
DT13	Neville Street/Westgate Road	Roadside	425077	564116	NO_2	YES	N/A	1	NO	2.7
DT14	Waterloo Street/Westmoreland Road	Roadside	424729	563922	NO_2	YES	2	1	NO	2.7
DT16	3 Nexus House, St James Boulevard	Roadside	424550	563899	NO_2	YES	N/A	1	NO	2.7

DT17	96 - 98 Westgate Road/Crosss Street	Roadside	424441	564055	NO_2	YES	2	2	NO	2.7
DT18	Gallowgate/St Andrews Street	Roadside	424432	564414	NO_2	YES	N/A	2	NO	2.7
DT19	Gallowgate/Percy Street	Roadside	424591	564477	NO_2	YES	10	1	NO	2.7
DT20	Newgate Street/Grainger Street	Roadside	424588	564472	NO_2	YES	5	1	NO	2.7
DT21	115 - 119 Grainger Street/Market Street	Roadside	424737	564171	NO_2	YES	5	3	NO	2.7
DT23	Leazes Lane near Romon (formerly Leazes Lane Romon 2)	Roadside	424797	564295	NO_2	YES	12	2	YES	2.7
DT25	Strawberry Place	Roadside	424341	564494	NO_2	YES	2	2	NO	2.7
DT26	Leazes Lane/Percy Street	Roadside	424616	564559	NO_2	YES	10	1	NO	2.7
DT28	101 Percy Street/St Thomas Street	Roadside	424726	564768	NO_2	YES	1	4	NO	2.7
DT29	Percy Street Romon 1	Roadside	424776	564861	NO_2	YES	25	1	YES	2.7
DT30	Percy Street Romon 2	Roadside	424776	564861	NO_2	YES	25	1	YES	2.7
DT31	Percy Street Romon 3	Roadside	424776	564861	NO_2	YES	25	1	YES	2.7
DT32	City Road	Roadside	425819	564237	NO_2	YES	2	2	NO	2.7
DT34	Trinity Chambers/Flynns, Quayside	Roadside	425428	563917	NO_2	YES	2	1	NO	2.7
DT36	The Side/Dean Street	Roadside	425085	563942	NO_2	YES	15	2	NO	2.7
DT37	Sandhill/Swing Bridge	Roadside	425151	563807	NO_2	YES	15	1	NO	2.7
DT40	Near Forth Banks/Pottery Lane	Roadside	424596	563558	NO_2	YES	2	1	NO	2.7

DT42	Blue House Roundabout (North)	Roadside	424616	566899	NO_2	YES	10	2	NO	2.7
DT43	53 High Street, Gosforth	Roadside	424394	567625	NO_2	YES	1	3	NO	2.7
DT44	102 - 104 High Street,	Roadside	424401	567844	NO_2	YES	2	4	NO	2.7
DT45	201 Gosforth High St (formerly Gosforth Hog 1)	Roadside	424413	568079	NO_2	YES	2	3	YES	2.7
DT48	Dene Park House, Killingworth Road	Roadside	425641	568204	NO_2	YES	1	2	NO	2.7
DT50	84 Station Road	Roadside	425503	568109	NO_2	YES	1	2	NO	2.7
DT52	2 - 4 Victoria Square	Roadside	425183	565261	NO_2	YES	2	10	NO	2.7
DT53	2 - 3 Osborne Terrace	Roadside	425425	565364	NO_2	YES	6	2	NO	2.7
DT54	178 Sandyford Road	Roadside	425701	565350	NO_2	YES	5	2	NO	2.7
DT56	263 Shields Road	Roadside	427234	564893	NO_2	YES	1	3	NO	2.7
DT57	124 Shields Road	Roadside	426843	564775	NO_2	YES	1	3	NO	2.7
DT62	5 Birchfield Gardens	Roadside	419448	565124	NO_2	YES	3	2	NO	2.7
DT63	Bewick House, Neville Street	Roadside	424302	563837	NO_2	YES	N/A	2	NO	2.7

Notes:

(1) 0 m 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
St. Mary's Place (AURN)	Urban Background	Automatic	99.2	99.2	29.1	30	29.4	29.7	28.8
Jesmond Road, Cradlewell	Roadside	Automatic	22.8	22.8	**45.7**	35.9	**41.3**	37.5	34.4
Percy Street	Roadside	Automatic	98.8	98.8	**47.7**	**42.6**	**46.7**	**58.6**	**58.4**
Swan House, Pilgrim Street	Roadside	Automatic	61.9	61.9	**52.7**	**45.7**	**49.4**	**54.9**	**48.3**
DT2	Urban Background	Diffusion Tube	100	100	-28.7	-25.8	22.4	33.1	29.1
DT3	Urban Background	Diffusion Tube	100	100	29.1	26.2	22.8	30.7	29.1
DT4	Urban Background	Diffusion Tube	100	100	28.7	25.8	22.2	31.1	29.3
DT5	Roadside	Diffusion Tube	92	92	**49.7**	**48.8**	**47.9**	**45.8**	**48.2**
DT6	Roadside	Diffusion Tube	100	100	34.4	34.2	27.4	38.4	**43.4**
DT7	Roadside	Diffusion Tube	100	100	**48.2**	**50.1**	**48.6**	**51.0**	**49.2**
DT8	Roadside	Diffusion Tube	67	67	**50.6**	**48.1**	**60.4**	**48.5**	**49.8**
DT9	Roadside	Diffusion Tube	100	100	**41.4**	**41.5**	38.7	38.8	**42.0**
DT10	Roadside	Diffusion Tube	92	92	**51.6**	**51.7**	-	**47.3**	**53.4**

DT11 (closed)	Roadside	Diffusion Tube	-	-	38.4	35.0	34.6	-	-
DT12	Roadside	Diffusion	100	100	**64.9**	**62.5**	**58.4**	**53.3**	**58.1**
DT13	Roadside	Diffusion Tube	100	100	**52.2**	**50.5**	**52.2**	**44.5**	**52.9**
DT14	Roadside	Diffusion Tube	100	100	**42.9**	**44.7**	**40.2**	**41.7**	**43.2**
DT15 (closed)	Roadside	Diffusion Tube	-	-	32.1	34.4	27.4	-	-
DT16	Roadside	Diffusion Tube	92	92	**42.4**	37.5	34.6	37.9	39.0
DT17	Roadside	Diffusion Tube	100	100	36.3	34.5	27.8	32.2	33.4
DT18	Roadside	Diffusion Tube	100	100	37.5	35.9	26.2	30.6	26.6
DT19	Roadside	Diffusion Tube	100	100	**43.6**	**41.8**	**46.8**	**46.4**	**47.5**
DT20	Roadside	Diffusion Tube	100	100	**48.8**	**45.5**	**41.1**	**50.4**	**42.0**
DT21	Roadside	Diffusion Tube	83	83	**44.9**	**47.8**	**45.5**	**46.0**	**47.1**
DT22 (closed)	Roadside	Diffusion Tube	-	-	29.6	29.3	-	-	-
DT23	Roadside	Diffusion Tube	100	100	30.8	30.7	25.5	32.3	32.5
DT24 (closed)	Roadside	Diffusion Tube	-	-	30.5	29.1	-	-	-
DT25	Roadside	Diffusion Tube	100	100	37.7	37.1	30.1	**44.8**	**45.2**
DT26	Roadside	Diffusion Tube	92	92	**48.8**	**44.0**	34.9	**47.7**	**47.8**

DT27 (closed)	Roadside	Diffusion Tube	-	-	29.2	27.1	24.1	-	-
DT28	Roadside	Diffusion Tube	100	100	**40.4**	33.5	27.8	37.9	34.2
DT29	Roadside	Diffusion Tube	100	100	**53.9**	**51.1**	**53**	**61.1**	**55.7**
DT30	Roadside	Diffusion Tube	100	100	**54.5**	**49.7**	**51.3**	**57.7**	**58.4**
DT31	Roadside	Diffusion Tube	100	100	**53.5**	**51.2**	**49**	**59.9**	**59.1**
DT32	Roadside	Diffusion Tube	100	100	**44.1**	37.2	35.1	**42.2**	**45.7**
DT33 (closed)	Roadside	Diffusion Tube	-	-	36	34.3	35.9	-	-
DT34	Roadside	Diffusion Tube	100	100	**41**	34.6	39.9	**45.8**	**42.3**
DT35 (closed)	Roadside	Diffusion Tube	-	-	32.4	30.2	34.9	-	-
DT36	Roadside	Diffusion Tube	-	-	34.7	32.1	34.7	38.1	38.4
DT37	Roadside	Diffusion Tube	100	100	39.3	31.9	36.9	**40.8**	38.4
DT38 (closed)	Roadside	Diffusion Tube	-	-	35.5	33.4	33	-	-
DT39 (closed)	Roadside	Diffusion Tube	-	-	29.3	26.3	33.5	-	-
DT40	Roadside	Diffusion Tube	33	33	36.2	**47.6**	23.1	**46.9**	**46.7**
DT41 (closed)	Roadside	Diffusion Tube	-	-	37.4	33.4	-	-	-
DT42	Roadside	Diffusion Tube	100	100	33.4	29.9	-	31.1	26.7

DT43	Roadside	Diffusion Tube	100	100	**41.8**	36.5	34.5	**42.1**	**40.4**
DT44	Roadside	Diffusion Tube	92	92	39.1	33.8	28.9	39.2	32.3
DT45	Roadside	Diffusion Tube	100	100	28.5	26.6	20.5	**51.5**	**59.3**
DT46 (closed)	Roadside	Diffusion Tube	-	-	27.9	25.9	22.2	-	-
DT47 (closed)	Roadside	Diffusion Tube	-	-	29.9	27.9	23.5	-	-
DT48	Roadside	Diffusion Tube	42	42	**47.2**	39.2	39.8	**46.2**	36.3
DT49 (closed)	Roadside	Diffusion Tube	-	-	26.6	23.5	18.6	-	-
DT50	Roadside	Diffusion Tube	100	100	**44.8**	33.1	33.2	**42.4**	38.6
DT51 (closed)	Roadside	Diffusion Tube	-	-	32.2	26.5	18.9	-	-
DT52	Roadside	Diffusion Tube	92	92	38.1	33	36.8	38.3	35.4
DT53	Roadside	Diffusion Tube	92	92	**41.1**	29.1	35.5	**42.7**	38.8
DT54	Roadside	Diffusion Tube	92	92	33.4	35.3	30.8	35.5	34.1
DT55 (closed)	Roadside	Diffusion Tube	-	-	30.3	29.9	29.3	-	-
DT56	Roadside	Diffusion Tube	100	100	36.3	32.9	37.2	36.7	37.4
DT57	Roadside	Diffusion Tube	100	100	37.6	34.9	36.7	37.1	38.1
DT58 (closed)	Roadside	Diffusion Tube	-	-	32.8	28.4	29.2	-	-

DT59 (closed)	Roadside	Diffusion Tube	-	-	34.1	27.4	25.1	-	-
DT60 (closed)	Roadside	Diffusion Tube	-	-	22.5	20.9	16.7	-	-
DT61 (closed)	Roadside	Diffusion Tube	-	-	36.8	31.7	-	-	-
DT62	Roadside	Diffusion Tube	100	100	39	36.2	-	38.9	36.4
DT63	Roadside	Diffusion Tube	100	100	-	-	**41.2**	37.9	**44.6**

☒ **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**.

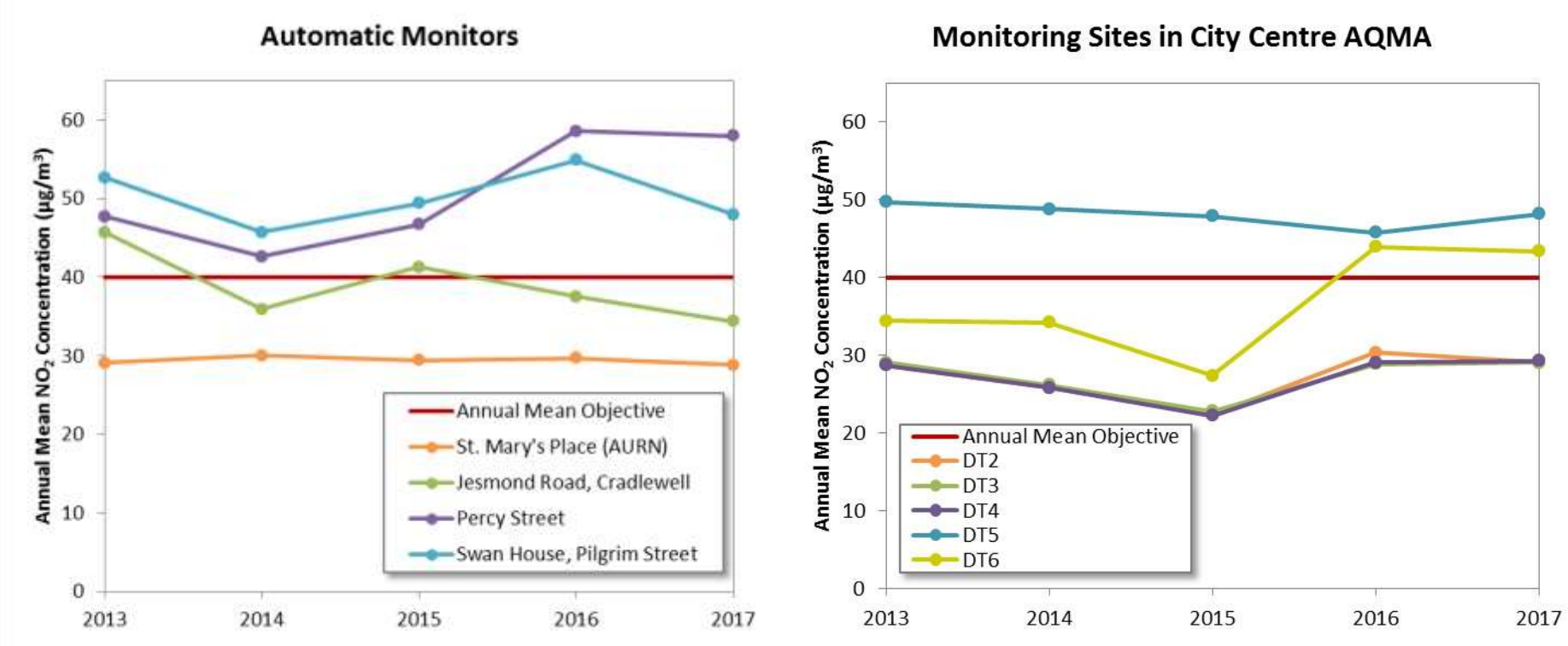
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

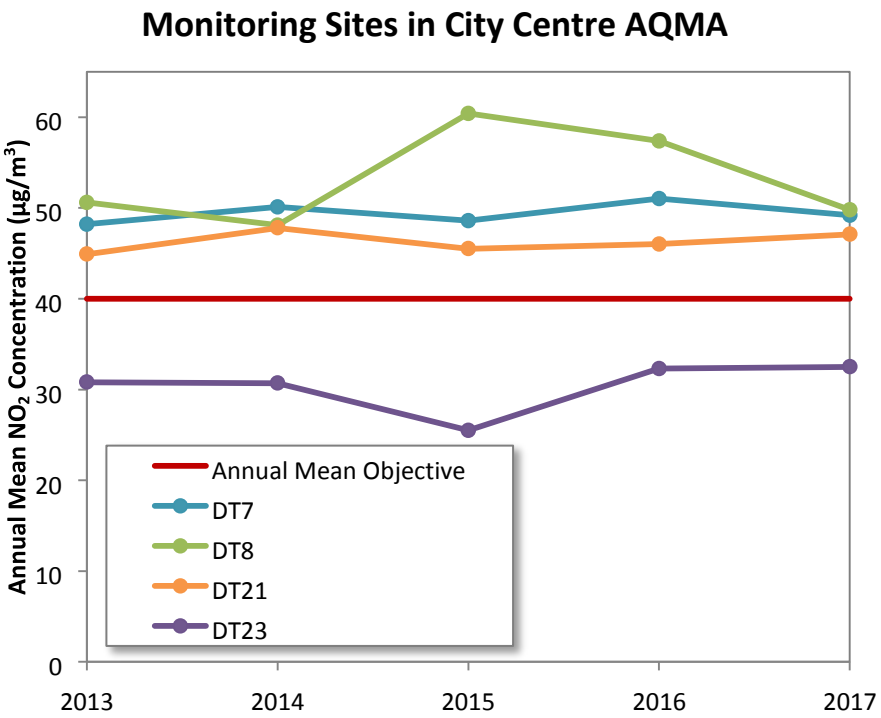
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

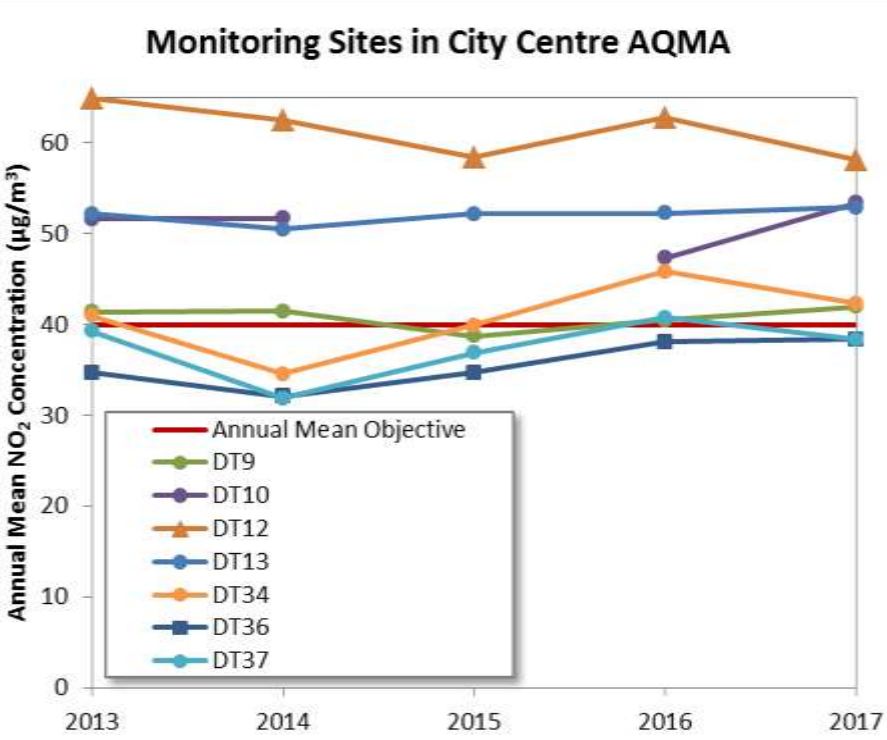
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

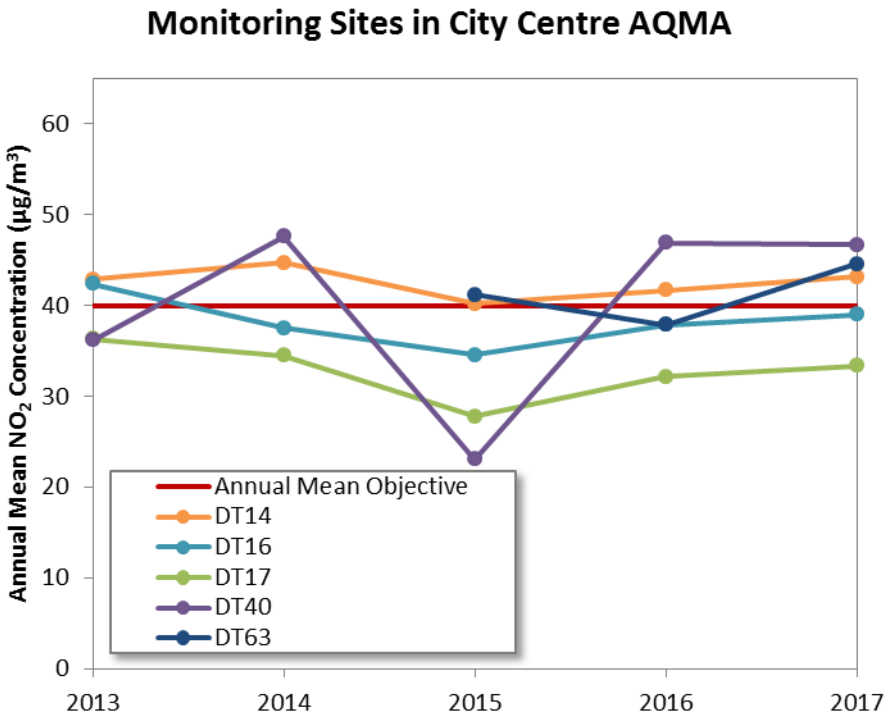
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

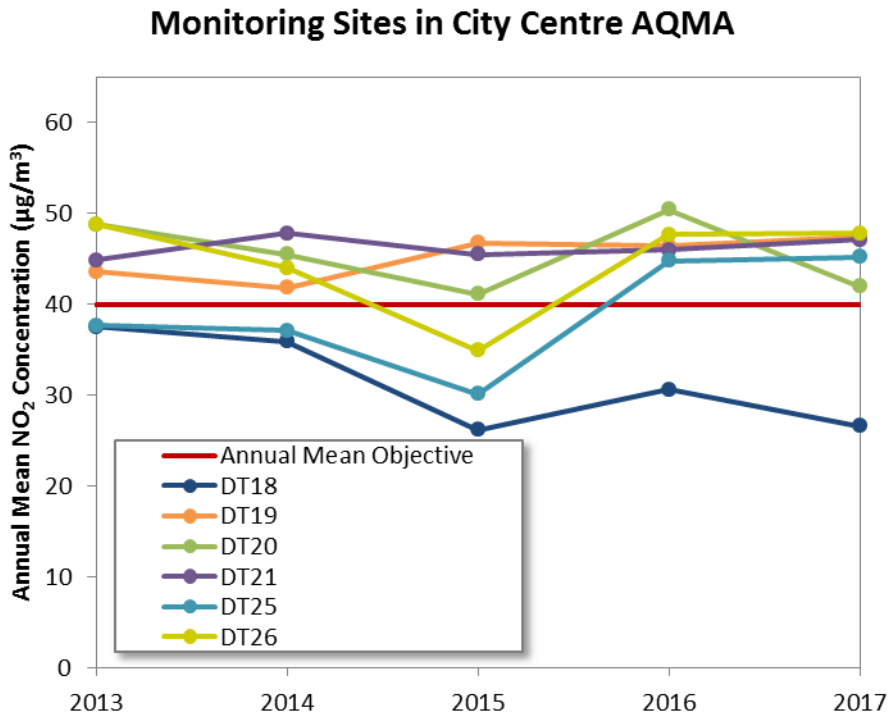
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

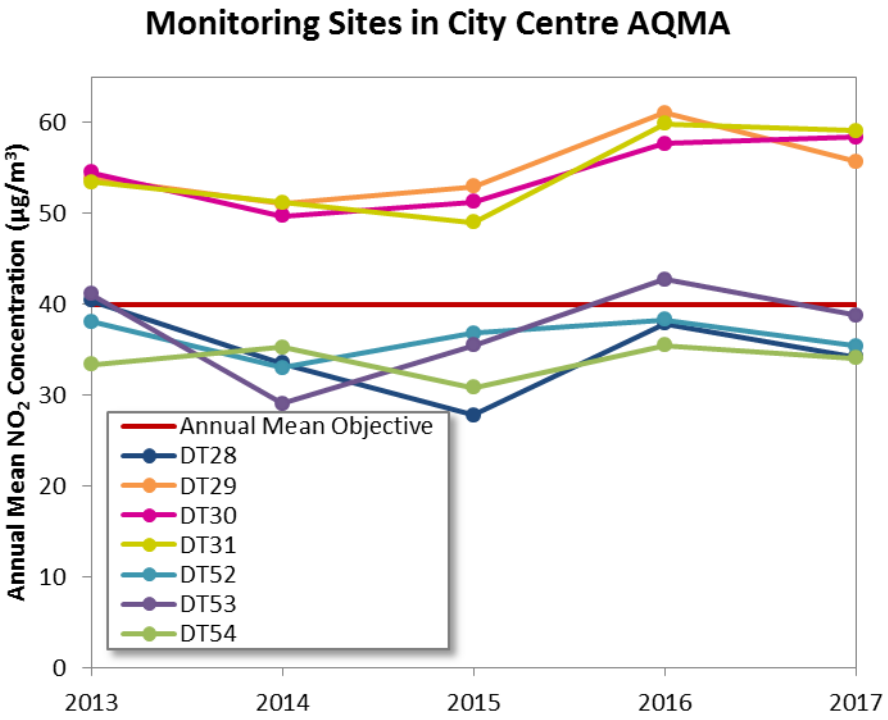


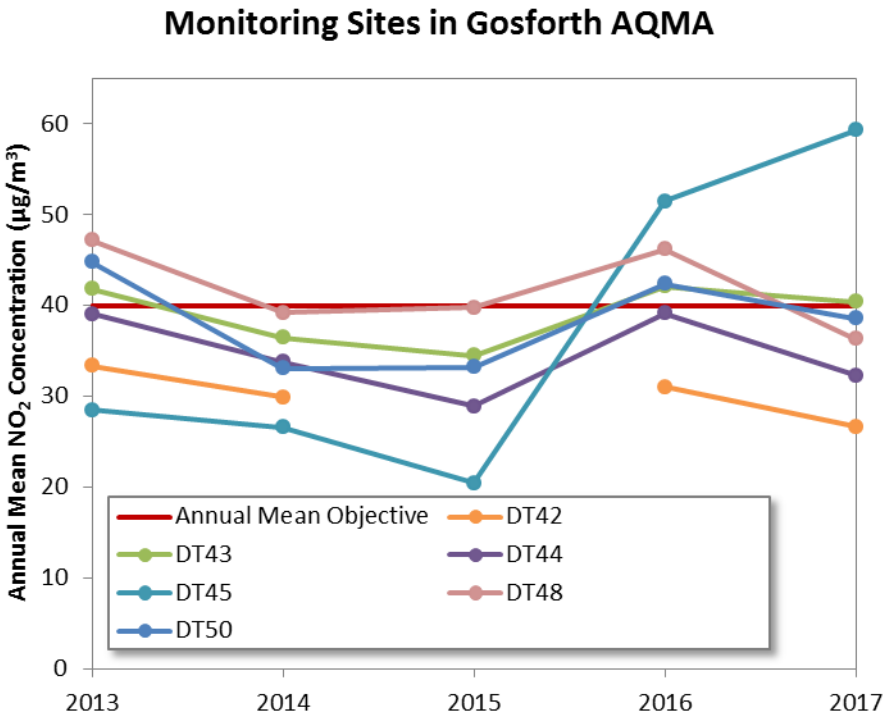

Monitoring Sites in City Centre AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT7
DT8
DT21
DT23


Monitoring Sites in City Centre AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT9
DT10
DT12
DT13
DT34
DT36
DT37


Monitoring Sites in City Centre AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT14
DT16
DT17
DT40
DT63


Monitoring Sites in City Centre AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT18
DT19
DT20
DT21
DT25
DT26


Monitoring Sites in City Centre AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT28
DT29
DT30
DT31
DT52
DT53
DT54


Monitoring Sites in Gosforth AQMA
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT42
DT43
DT44
DT45
DT48
DT50

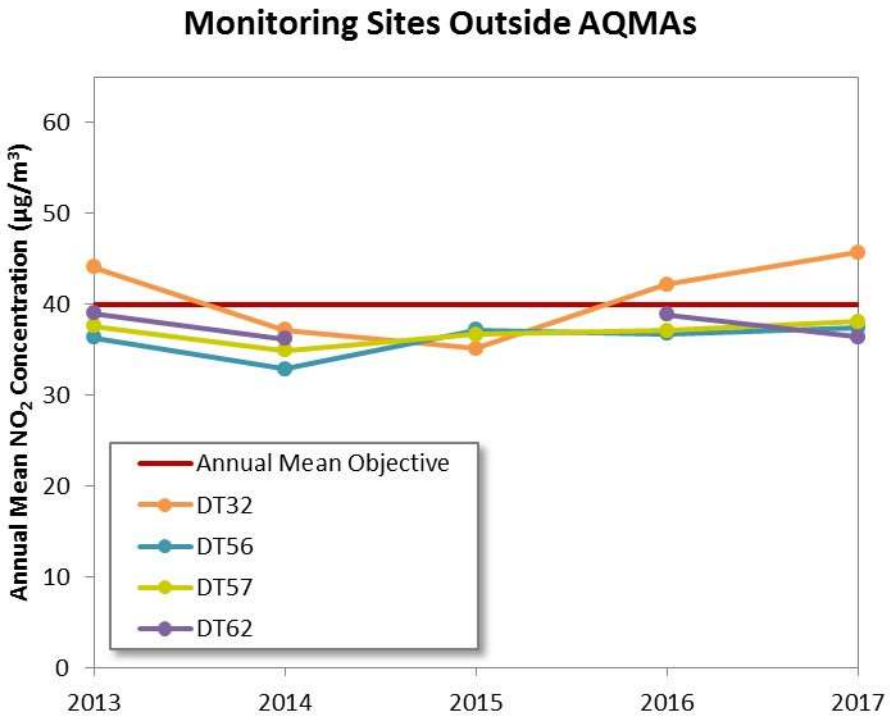

Monitoring Sites Outside AQMAs
Annual Mean NO2 Concentration (µg/m3)
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Annual Mean Objective
DT32
DT56
DT57
DT62

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
St. Mary's Place (AURN)	Urban Background	Automatic	99.2	99.2	N/A	0 (95.3)	0	0	0
Jesmond Road, Cradlewell	Roadside	Automatic	22.8	22.8	14	1	0 (135.2)	-	0 (147.1)
Percy Street	Roadside	Automatic	98.8	98.8	0	0	0 (139.5)	8	0
Swan House, Pilgrim Street	Roadside	Automatic	61.9	61.9	0	0 (143.5)	1	1	0 (142.0)

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.

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
St. Mary's Place (AURN)	Urban Background	97.2	97.2	12.7	12.6	14.8	11.3	10.7
Jesmond Road, Cradlewell	Roadside	63.5	63.5	20.6	18.6	18.1	18.0	14.0

Notes:

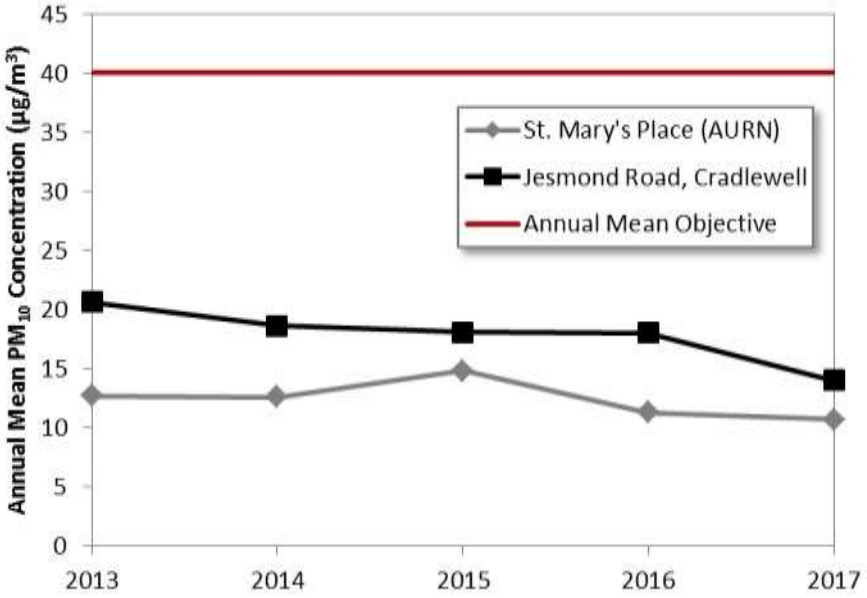
Exceedances of the PM_{10} annual mean objective of $40\mu g/m^3$ are shown in **bold.**

(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.

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations



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
St. Mary's Place (AURN)	Urban Background	97.2	97.2?	2	3 (21.9)	4	0	2
Jesmond Road, Cradlewell	Roadside	63.5	63.5	4	2	2	3	2 (25.0)

Notes:

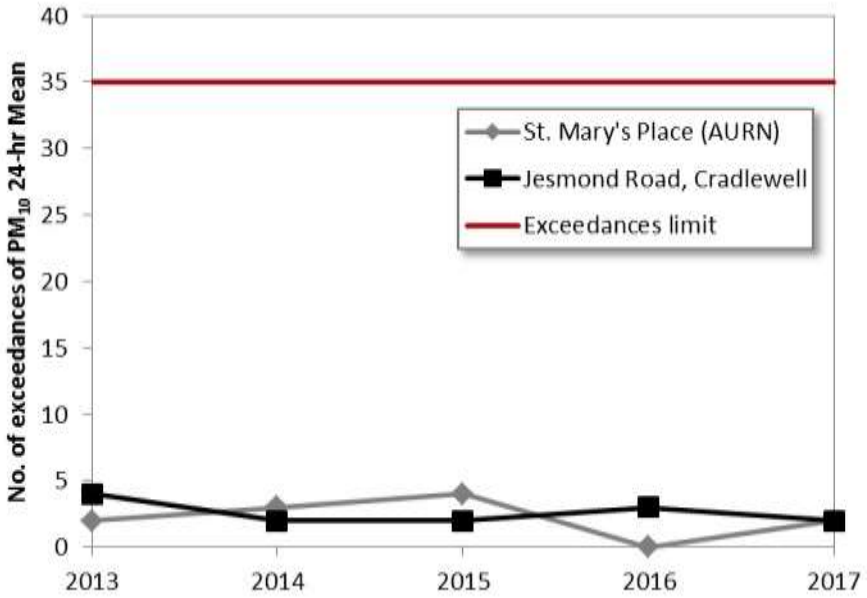
Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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.

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results >50µg/m^3



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 ($\mu g/m^3$) [3]				
				2013	2014	2015	2016	2017
St. Mary's Place (AURN)	Urban Background	97.4	97.4	10.4	9.7	10.5	8.9	7.0

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 ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.88) and Annualised (1)	Distance Corrected to Nearest Exposure (^{2})
DT2	48.8	41.9	33.5	29	21.7	24.7	21.4	20	38.5	34.3	42	40.4	33	29.1	
DT3	45.3	45.5	41.1	28.7	25.4	24.9	22.6	18.5	31.7	35.9	39.3	38.5	33.1	29.1	
DT4	43.4	44.9	41.1	28.4	24	24.9	22.1	19.7	36.7	33.7	44	36.2	33.3	29.3	
DT5	67.3	62.5	69	53.1	43.6	45.1	47.9	45.5	55.6	-	63.1	49.3	54.7	**48.2**	
DT6	61.7	60.2	48	49.5	41	37.3	33.8	34.7	49.9	46.8	62.8	66.3	49.3	**43.4**	**40.5**
DT7	67.1	57.9	66.4	57.5	49.9	45.1	49.1	45.8	52.5	49.7	61.5	67.9	55.9	**49.2**	
DT8	61.7	64	65.5	53.1	93	-	-	45.7	-	52.4	44.4	-	60	**49.8**	
DT9	52.9	52.5	42.2	49.3	43.7	41.2	42.6	40.1	50	47.5	55.6	55.8	47.8	**42**	
DT10	65.5	66.1	64.2	55.2	93.5	-	47.5	45.8	56.4	52.9	55.3	64.6	60.6	**53.4**	**41.3**
DT12	73.2	81.9	79.4	59.4	70.8	57.8	59.4	52.2	72.5	59.9	63.4	61.8	66	**58.1**	
DT13	68.5	66.8	68.9	58.2	49.5	49.9	51.2	53.1	53	57.3	65.5	79.1	60.1	**52.9**	
DT14	54.2	58.3	59.7	55.4	42.6	31.3	35.9	32.9	52.2	49.4	67.5	50	49.1	**43.2**	38.5

DT16	65	59.3	49.6	40.2	39.7	32.3	39.1	28.4	-	38.6	47.7	48	44.3	39	26.1
DT17	52	45.4	45.7	34.2	32	28.4	30.6	28.2	37.7	34.6	40.9	46	38	33.4	31.8
DT18	40.9	39.1	36.3	26.9	30.7	23	21.9	21.2	29.2	24.3	30.8	38.5	30.2	26.6	24.6
DT19	66	51.5	63.5	63.1	48.2	49	42.3	43.4	49	51.6	63.3	57.4	54	**47.5**	35.9
DT20	60.3	57.2	60	50.9	56.4	34.5	42.6	30.4	48.2	34.7	50	46.7	47.7	**42**	35.3
DT21	60.3	57.5	60.3	-	48	44.9	-	46.8	58.6	51.2	54	54	53.6	**47.1**	41.1
DT23	48.7	42.9	41.5	31.7	35.3	32.5	30.8	26.5	37.8	34.5	36.2	45.1	36.9	32.5	28.4
DT25	61.7	52.4	59	49.6	46.1	34.4	37	37.5	45.4	47.1	65.2	80.8	51.3	**45.2**	**41.7**
DT26	64.1	61	55.4	55.3	56	-	36.9	37.6	55.2	50.8	65.9	59.9	54.4	**47.8**	36.1
DT28	47.9	44.3	44.8	34.7	45.4	34.6	32.4	28.6	43.4	32.3	38.8	40	38.9	34.2	33.6
DT29	72.6	72.8	76.3	76.2	63.9	61.1	53.1	46	84.6	60.7	74.6	18.1	63.3	**55.7**	34.5
DT30	71.9	72.4	75.2	74.2	61.4	66.1	54.2	39.4	79.1	63.2	74.8	65.1	66.4	**58.4**	35.5
DT31	65.6	75.6	76	75.3	57.3	58.9	53.8	46.7	84.7	66.6	76.2	69	67.2	**59.1**	35.7
DT32	69.6	57.2	60	50.2	46.6	41	38.5	42.6	40.3	48.7	64.6	63.8	51.9	**45.7**	**42.4**
DT34	61.5	58	58.8	49.5	48.6	35.3	39.7	37.1	42.4	45.3	43.3	57.5	48.1	**42.3**	39.2
DT36	55.8	47.9	52	42	37.9	31.5	32.5	33.7	41.8	43.7	51.6	53.3	43.6	38.4	37.6
DT37	56	47.7	50.8	38.9	43.8	29.8	36.4	31.9	44.3	38.5	50.1	55.8	43.7	38.4	29.9
DT40	61.8	68.2	69.8	-	-	-	-	50.9	-	-	-	-	62.7	**46.7**	
DT42	43.2	36	35.3	22.6	30.1	24.6	27.1	30.6	33.2	25.4	24.3	31.4	30.3	26.7	21.9
DT43	61.8	44	48.9	44.6	37.5	37.2	36.9	44.3	41.8	43.7	59.1	51.3	45.9	**40.4**	38.6
DT44	47.7	43	50.8	33.6	46	26.1	31.3	32.1		30.1	33.5	29.7	36.7	32.3	30.5
DT45	74.1	82.1	81.4	65.5	56.6	59.5	53.1	63.8	61.6	70.1	75.5	64.9	67.3	**59.3**	**53.5**
DT48	50.3	50.4	52.4	40.9	42	-	-	-	-	-	-	-	47.2	**36.3**	34.3
DT50	64.4	53.7	50.8	47.5	41.1	28.2	31.4	39.6	37.5	39.1	55.5	37.7	43.9	38.6	36.4
DT52	39.5	48.1	50.2	37.5	42	33.4	33.1	35.9	38.7	37.4	46.4	-	40.2	35.4	34.4
DT53	52.2	49.2	56.9	41.5	49.7	29.5	37.1	36.9	42.1	42.9	46.9	-	44.1	38.8	33.2

DT54	48.1	42.9	49	35.1	36.5	29.1	27.8	34.3	33.9	43	46.1	-	38.7	34.1	30.4
DT56	56.6	47.4	51	44.4	37	30.8	31.9	40.1	38.2	37	49.4	46.5	42.5	37.4	36
DT57	50.1	50.2	55.5	38.3	39	34.4	30.9	41	38.7	43.4	48.2	50.2	43.3	38.1	36.8
DT62	57.2	65.1	53.9	32.6	58.2	30.8	32.7	35.6	30.4	31.1	31	38.3	41.4	36.4	32.7
DT63 (249 in 2015)	60.6	53.9	54.1	55.2	50.3	42.3	42.7	41.6	56.3	46.4	49	55.3	50.6	**44.6**	

☒ **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

QA/QC

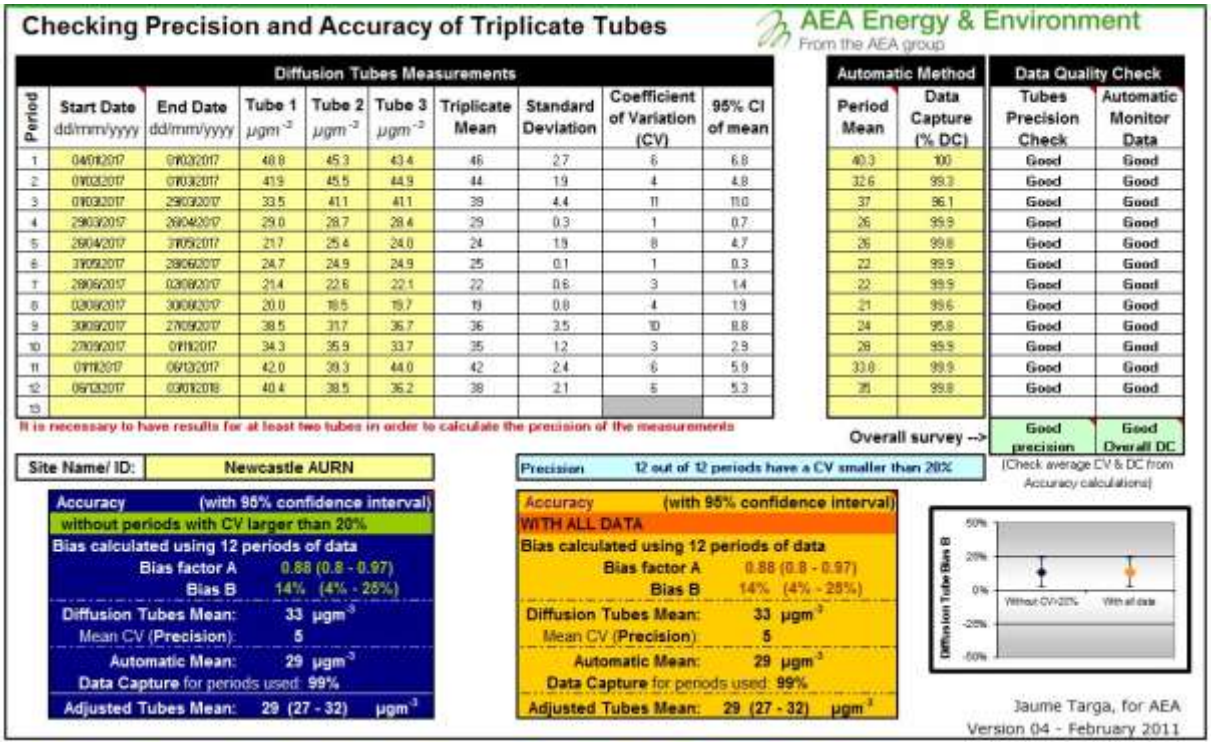
The Council is the Local Site Operator (LSO) for the AURN and has adopted Defra's quality control procedures. Officers have been trained by Defra in the operation and maintenance of the AURN air quality monitoring equipment and they adhere to AEA Technology's Site Operator's Manual for the AURN. The AURN is calibrated on a monthly basis by LSOs and serviced at six monthly intervals by Ricardo-AEA. Data from the AURN are quality controlled and ratified by Bureau Veritas.

The diffusion tubes are supplied and analysed by Environmental Scientifics Group Ltd (ESG) Didcot using the 50% triethanolamine (TEA) in acetone method. ESG participates in the Annual Field Inter-Comparison Exercise and the laboratory also participates in Defra's AIR NO_2 Proficiency Testing Scheme. The ESG laboratory follows the procedures set out in the Harmonisation Practical Guidance and is UKAS accredited. In 2017, the tube precision for nitrogen dioxide Annual Field Inter-Comparison for ESG using the 50% TEA in acetone method was 'good' for the results from all 29 participating local authorities.

Local Bias Adjustment Factor

Newcastle City Council use a local co-location site to validate NO_2 diffusion tube results which are used to calculate the bias adjustment. This is done by comparison with the chemiluminescent analyser located at the AURN, St Mary's Place. Figure C.1 below shows ratified data and calculated bias adjustment factor for NO_2 diffusion tubes in 2017. The local biased adjustment factor was 0.88.

Figure C.1: Local bias adjustment factor calculation for NO_2 diffusion tube data.



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/01/2017	01/02/2017	48.8	45.3	43.4	46	2.7	6	6.8
2	01/02/2017	01/03/2017	41.9	45.5	44.9	44	1.9	4	4.8
3	01/03/2017	29/03/2017	33.5	41.1	41.1	39	4.4	11	11.0
4	29/03/2017	26/04/2017	29.0	28.7	28.4	29	0.3	1	0.7
5	26/04/2017	31/05/2017	21.7	25.4	24.0	24	1.9	8	4.7
6	31/05/2017	28/06/2017	24.7	24.9	24.9	25	0.1	1	0.3
7	28/06/2017	02/08/2017	21.4	22.6	22.1	22	0.6	3	1.4
8	02/08/2017	30/08/2017	20.0	18.5	19.7	19	0.8	4	1.9
9	30/08/2017	27/09/2017	38.5	31.7	36.7	36	3.5	10	8.8
10	27/09/2017	01/11/2017	34.3	35.9	33.7	35	1.2	3	2.9
11	01/11/2017	06/12/2017	42.0	39.3	44.0	42	2.4	6	5.9
12	06/12/2017	03/01/2018	40.4	38.5	36.2	38	2.1	5	5.3
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
40.3	100	Good	Good
32.6	99.3	Good	Good
37	96.1	Good	Good
26	99.9	Good	Good
26	99.8	Good	Good
22	99.9	Good	Good
22	99.9	Good	Good
21	99.6	Good	Good
24	95.8	Good	Good
28	99.9	Good	Good
33.8	99.9	Good	Good
35	99.8	Good	Good
Overall survey -->		Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Newcastle AURN

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A: 0.88 (0.8 - 0.97)
Bias B: 14% (4% - 25%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A: 0.88 (0.8 - 0.97)
Bias B: 14% (4% - 25%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

National Biased Adjustment Factor

The national bias adjustment value of 0.77 for 2017 was determined from version 0618final of the national bias adjustment spreadsheet.

The summary of laboratory precision published by the UWE Air Quality Helpdesk, tubes analysed by Gradko displayed ‘Good’ precision in all 29 studies in 2017 for 20% TEA / Water (based on spreadsheet version v0618final published July 2018).

Discussion of Choice of Factor to Use

Newcastle City Council has chosen to use a local co-location site which takes into account local trends.

Short-term to Long-term Data Adjustment

A number of diffusion tube monitoring sites recorded <75% data capture in 2017. These data were seasonally adjusted (annualised) by comparison with two automatic monitoring stations, one of which (St. Mary’s Place) is operated as part of the Defra Automatic Urban and Rural Network (AURN). The other, Sunderland Silkworth is also an urban background location. St. Mary’s Place is an urban background site, while Percy Street and Pilgrim Street are roadside sites. The Cradlewell AURN site was used in previous years for this adjustment, however data capture was too low (22.8% overall) to carry out the adjustment. Percy Street and Pilgrim Street, operated by Newcastle City Council, have been used for seasonal adjustment in previous reports, but it is

considered more appropriate to use urban background locations for annualisation, according to LAQM.TG(16) guidance (Defra, 2016).

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

Figure D1: Air Quality Monitoring in Newcastle City Centre

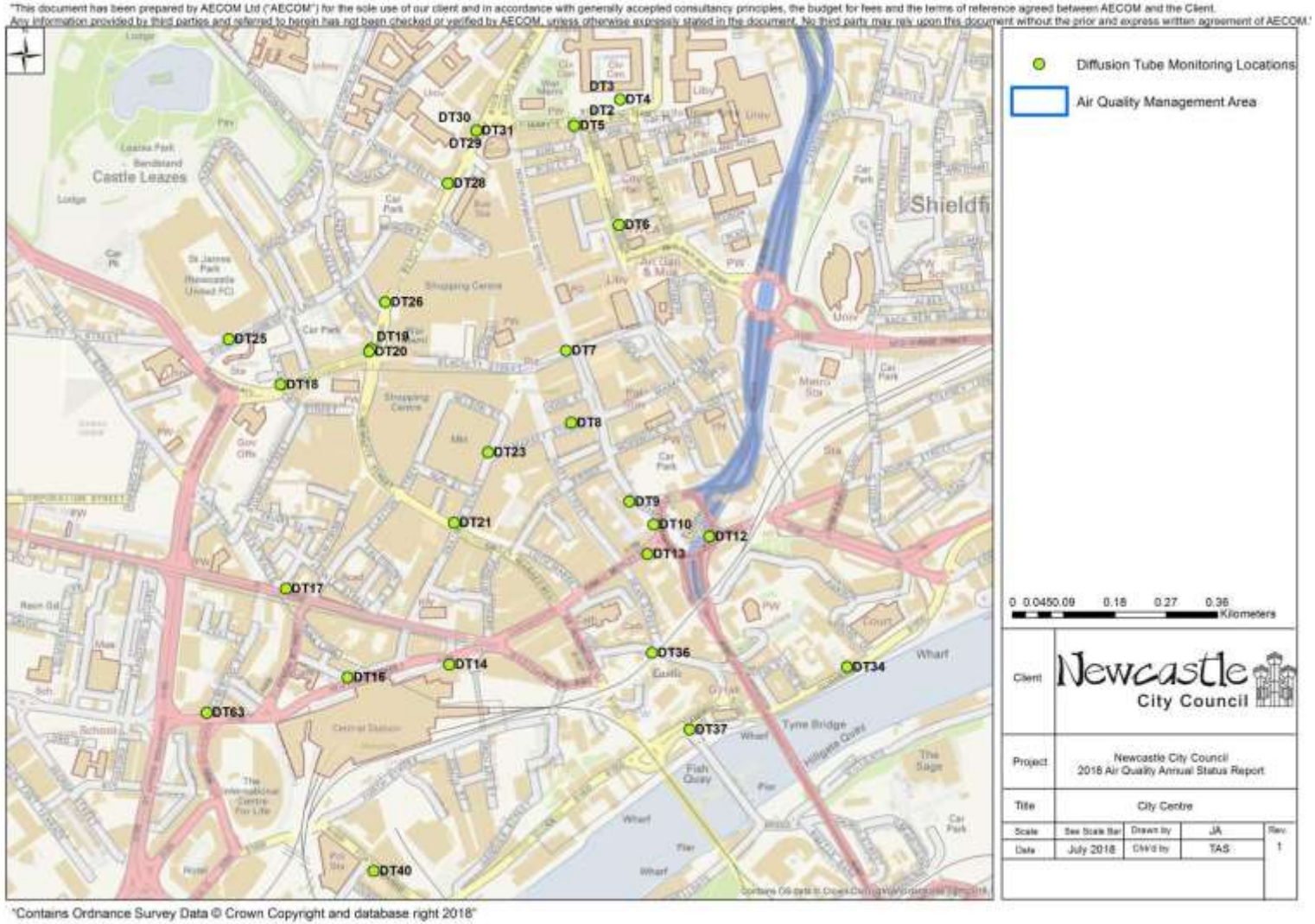


Figure D2: Air Quality Monitoring in Newcastle City Centre

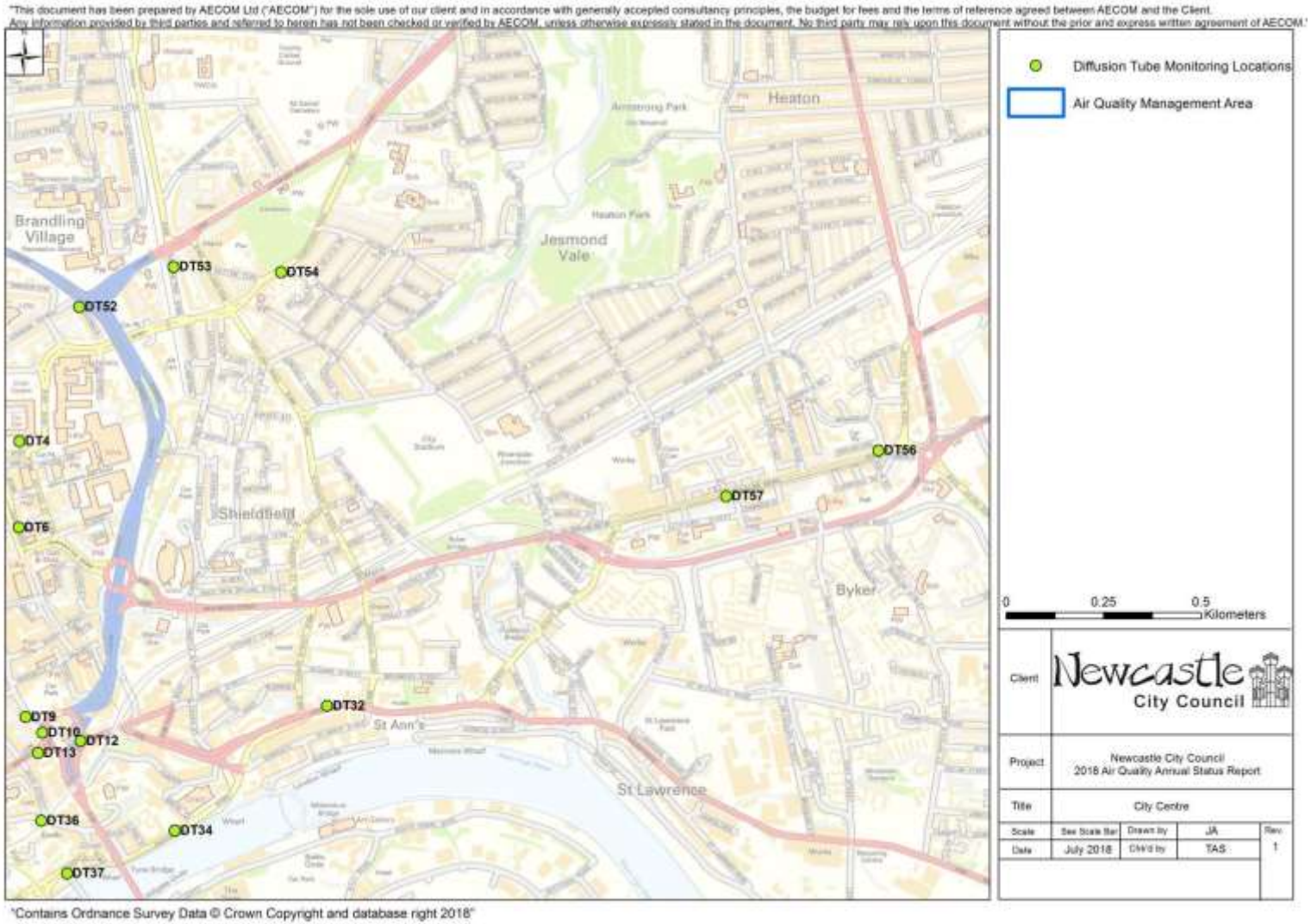


Figure D3: Air Quality Monitoring in Gosforth

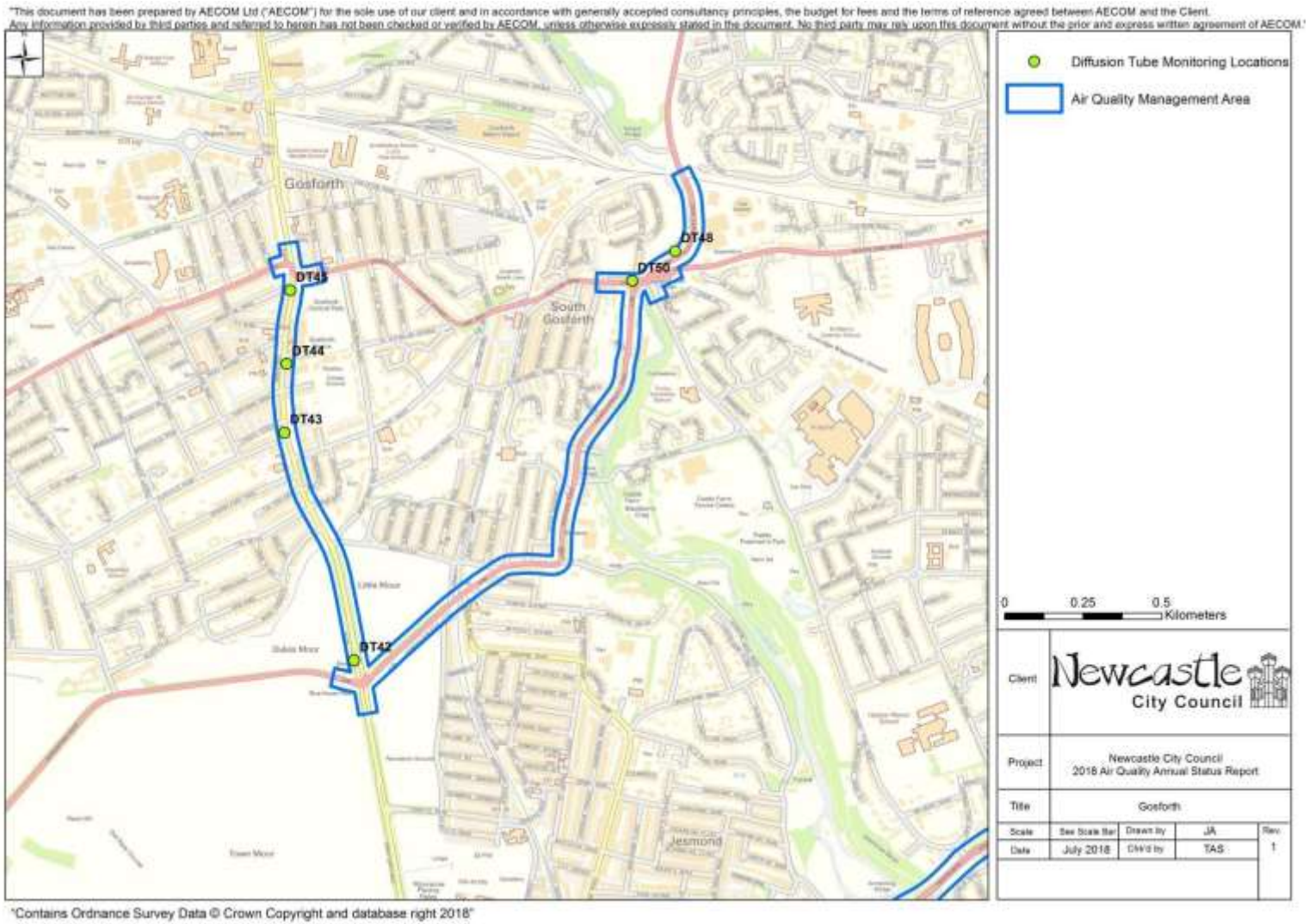
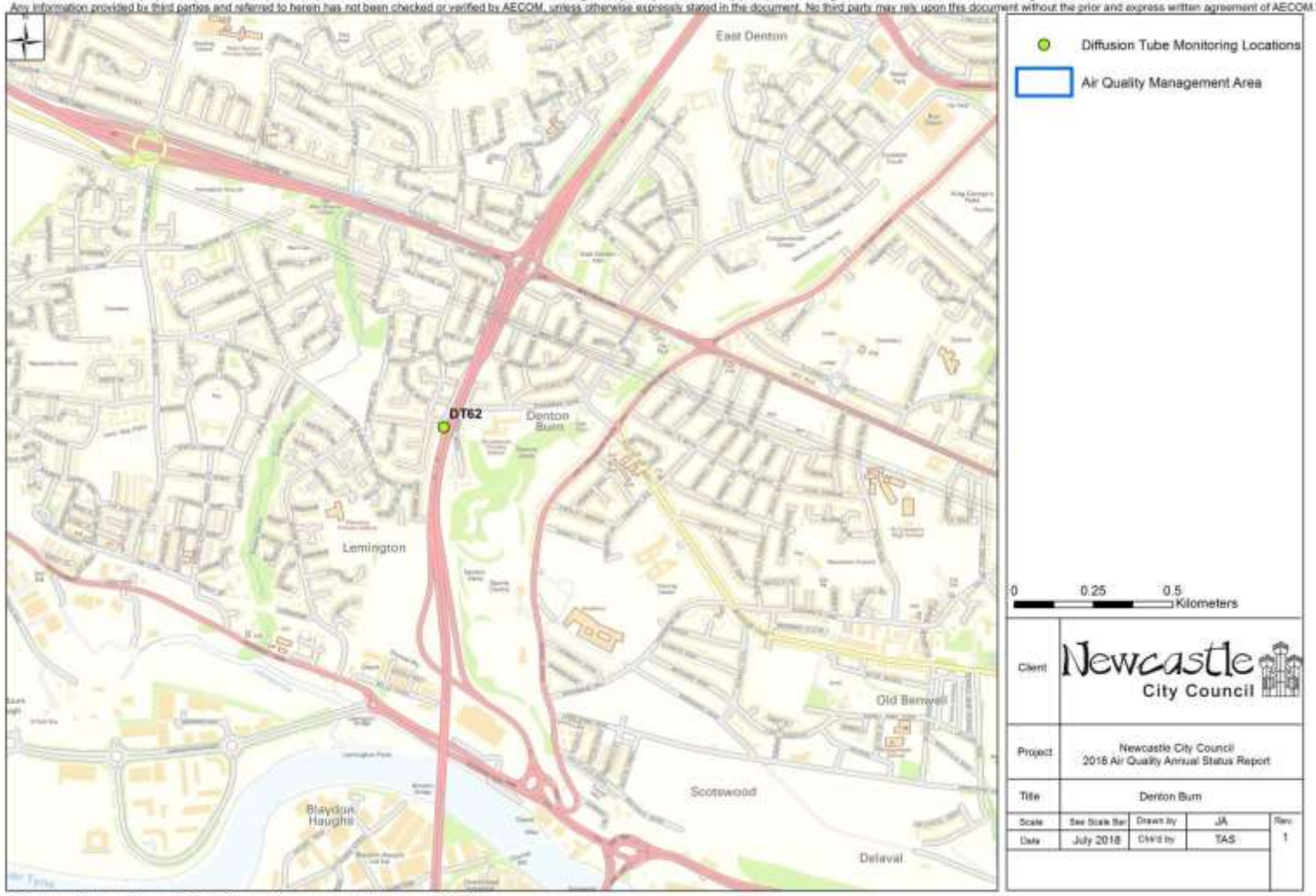


Figure D4: Air Quality Monitoring in Denton Burn



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	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

[5] 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
NECA	North East Combined Authority

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