2018 Air Quality Annual Status Report (ASR)

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

June 2018

Local Authority Officer	Mr Darren Walters
Department	Environmental Protection Team
Address	Newcastle-under-Lyme Borough Council, Civic Offices, Merrial Street, ST5 2AG
Telephone	01782 717 717
E-mail	Environmental_health@newcastle-staffs.gov.uk
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Endorsement from the Director of Health and Care, Staffordshire County Council

Staffordshire County Council is committed to working with partners to ensure that Staffordshire will be a place where improved health and wellbeing is experienced by all.

Poor air quality has a negative impact on public health, with potentially serious consequences for individuals, families and communities. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of Staffordshire residents. Improving air quality is often a complex issue, presenting a multi-agency challenge – so it is essential that all agencies work together effectively to deliver improvements where they are needed.

As Director of Health and Care across Staffordshire I endorse this Annual Status Report which sets out the position for all the District and Borough Council's across Staffordshire and we will support an ongoing work programme to address air quality issues.

Dr Richard Harling
Director of Health and Care
Staffordshire County Council
June 2018

Executive Summary: Air Quality in Our Area

Air Quality in Newcastle-under-Lyme

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].

Air Quality in Newcastle-under-Lyme

Air quality has been monitored in the Borough of Newcastle-under-Lyme over the last 19 years, by using Nitrogen dioxide diffusion tubes and an automatic monitoring station, which monitors real time concentrations of Nitrogen dioxide (NO_2) in the air. This substance is monitored because it is found in vehicle exhaust fumes, which is the main source of pollution within the Borough.

Conclusions and Priorities

Local Priorities and Challenges

The Borough is located in North Staffordshire and covers an area of 21,096 hectares (81 square miles), with a population of approximately 123,000. Newcastle's strategic location at the important junction between the roads running north from London to Carlisle and west to Chester has ensured that transport has played a major part in its growth. In addition to these historical routes, modern trunk roads also pass Through the Borough. These include the M6, which is currently one of the most heavily trafficked and congested roads in the country along with the A500, which is a major route linking many areas of Newcastle under Lyme and Stoke on Trent with junctions

[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

15 and 16 of the M6. Both of these junctions are adjacent to the Borough boundary and thus contribute to the traffic congestion in the area. A number of main roads converge on the two main towns in the Borough, notably Newcastle under Lyme and Kidsgrove. The A34, A52, A525, A527 and the A53 pass Through Newcastle and the A50, A5011 and A34 pass through Kidsgrove.

Traffic on these roads is a significant source of air pollutants affecting the air quality of the Borough. The other sources are industry and domestic properties. Particular industries with the greatest potential to cause air pollution have been prescribed for air pollution control under the Environmental Permitting (England and Wales) Regulations 2016. Some processes are regulated by the Environment Agency (these are referred to as Part A1 processes) and others regulated by local authorities (these are referred to as Part A2 and Part B processes). Within the Borough there are two Part A1 processes, three Part A2 processes and 39 Part B processes holding a permit. Details of the processes regulated by the Borough Council can be found on our website at www.newcastle-staffs.gov.uk/airquality.

The priorities for the local authority in addressing air quality are therefore, centred around ways in which;

1. The amount of traffic on the road can be reduced
2. Assessing and improving the vehicles using the roads within the Borough
3. Road traffic can be better managed to reduced stop-start, idling and congestion.
4. Traffic light signalling systems can be improved to enable a more fluid movement of traffic, particularly around the Town Centre ring road.
5. Residents can be encouraged to take up other forms of transport, including public transport, cycling and walking

Nitrogen Dioxide (NO_2)

Nitrogen dioxide is a gas which poses a risk to health as it can irritate the lungs and lower resistance to respiratory infections such as influenza. Particulate matter also affects the respiratory system, as it is made up of fine small solid particles or liquid

droplets which are suspended in the air. The smaller the particles, the deeper they can penetrate into the respiratory system and the more harmful they can be.

Through monitoring Nitrogen dioxide (NO_2) over the last 19 years, we have been able to identify that NO_2 emissions from road traffic, exceed the limits set down in law, in four areas of the Borough.

Four geographic areas of the Borough were declared as Air Quality Management Areas (AQMA's) in 2015 due to exceedances of the Nitrogen Dioxide annual mean objective at relevant receptors. These are detailed in Table 1: Air Quality Management Areas in Newcastle-under-Lyme 2016 below.

Table 1: Air Quality Management Areas in Newcastle-under-Lyme 2016

AQMA	No.	Description	Date Declared	Date Amended	Date Revoked	Pollutants
Kidsgrove	1	Declared due to exceedance of the NO2 annual mean objective, along Liverpool Road A50, Kidsgrove	15/01/15	-	-	Nitrogen dioxide (NO_2)
Newcastle-under-Lyme Town Centre	2	Covers Newcastle-under-Lyme Town Centre including the ring road (A53), King Street, George Street and London Road to the boundary with the City of Stoke on Trent AQMA.	15/01/15	-	-	Nitrogen dioxide (NO_2)
Maybank, Wolstanton, Porthill	3	Covers the principle routes between Maybank, Wolstanton and Porthill. Declared due to exceedances of the NO2 annual mean in Maybank High Street and the Porthill area.	15/01/15	-	-	Nitrogen dioxide (NO_2)
Little Madeley	4	Declared around the two properties at Little Madeley due to an exceedance of the NO2 annual mean arising from the M6 motorway	15/01/15	-	-	Nitrogen dioxide (NO_2)

Declaring these areas as AQMA's, means that the Council must put in to place an action plan of how the air quality can be improved and brought back within legal limits.

Air Quality Action Plans (AQAP) for each AQMA and the Borough as a whole have now been completed. Development of these AQAPs has involved input from a number of different sectors including Highways England, neighbouring local authorities planning, highways, and environmental health departments, Public Health at Staffordshire County Council. The AQAPs address the different ways in which levels of pollution can be reduced by managing traffic more efficiently, and encouraging walking, cycling, and the use of public transport across the Borough. Since declaring the AQMA's no new major sources of emissions have been identified.

Further information about the AQMAs and Action Plan can be found at:

https://www.newcastle-staffs.gov.uk/airquality

http://uk-air.defra.gov.uk/aqma/list

The Borough of Newcastle under Lyme

Overall Nitrogen dioxide levels in the Borough are falling, with the majority of monitoring stes showing annual mean concentrations below the annual mean objective. This indicates that the strategies currently in place are already helping to reduce the NO_2 concentration within these areas of the Borough.

Of the 41 Nitrogen dioxide diffusion tube sites;

- 35 showed a decrease in nitrogen dioxide levels when compared wioth levels seenin 2016
- 10 of the 41 sites have annual mean concentrations of within 10% of the annual mean objective, with 3 of these measuring an annual mean concentration greater than the annual mean objective.

Work needs to be done to ensure that any further developments, and changes to the road networks across the Borough do not lead to an increase in the annual NO_2 concentration above the annual mean objective of 40µg/m^3.

Kidsgrove AQMA – No. 1

Air Quality in this location is heavily influenced by traffic using the A34 Liverpool Road and local traffic accessing side roads from Liverpool Road within the centre of Kidsgrove. Relevant receptors are located back of footway and in close proximity to junctions and areas of congestion.

NO_2 concentrations have generally decreased each year from 2012 onwards within this AQMA. DT6 had the highest annual NO_2 mean concentration for this AQMA in 2017, with a value of 37.7µg/m^3. DT64 had an annual mean which was within 10% of the annual mean objective.

This AQMA will remain in place until all sites measure an annual mean NO_2 concentration that is consistently below the annual mean legal objective.

Staffordshire County Council are planning a number of works in this area which area aimed at reducing congestion on Liverpool Road and hopefully this will have a beneficial effect on air quality.

Accordingly, the diffusion tube-monitoring network in this area will remain in place to monitor the success of the highway improvement works and until all sites measure an annual mean NO_2 concentration that is consistently below the annual mean legal limit.

Town Centre AQMA – No. 2

Air Quality in this area is influenced by traffic utilising the major arterial routes, which converge on the town centre. There are a number of relevant receptors located at the back of pavement. The network is heavily congested at peak times of the day with high volumes of low speed mixed traffic. The town centre is experiencing a period of regeneration with provision for developments to provide around 3000 student bed spaces over the next four years. The Civic Offices site located on the Rycroft is destined to contribute towards a significant amount of accommodation as well as providing a mixed retail / leisure development. A number of office spaces are able to

covert to residential use without requiring consideration of air quality. This has resulted in significant increases in the numbers of relevant receptors within the area where the Council is unable to influence development. In addition, the rural areas of the Borough are facing increased demands for applications for residential development, with people in these areas heavily reliant on cars to access services and employment opportunities within the town centre and wider areas.

NO_2 concentrations have generally decreased each year from 2012 onwards within the Town Centre. In 2017, sites DTK1, DT85 and DT102 had annual mean NO_2 concentrations in excess of the annual mean objective, with DT102 producing the highest reading across all of the AQMA's, with an annual mean of 60.4µg/m^3. There are also a number of sites that remain within 10% of the annual mean, which are at risk of exceedance in future years.

This AQMA will remain in place until all sites measure an annual mean NO_2 concentration that is consistently below the annual mean legal objective

Maybank-Wolstanton-Porthill AQMA – No. 3

Air Quality in this area is influenced by local road traffic and traffic utilising the junctions associated with the A500 dual carriageway. Relevant receptors in this location are mainly located at the back of footway. The main route through the area is single carriageway with traffic lighted junctions, signal controlled crossings, on street bus stops and significant sections of on street parking. Porthill Bank and Grange Lane are on significant gradients.

There has been a general decrease in NO_2 concentration at the diffusion tube monitoring sites within this AQMA. DT24 remains the highest annual mean NO_2 concentration within the Porthill-Wolstanton-Maybank AQMA, with the value for 2017 remains being 35.3µg/m^3.

The diffusion tube sited at the junction with Grange Lane and Church Lane (DT103) will remain in place as there are a number of works planned which may affect upon

this location, this includes the Etruria Valley Development scheme, which sees changes to the junction, the junction near to this site, and a new access from Grange Lane into the City Centre via Etruria Valley. There are also planned improvement works by Highways England to the A500 between Wolstanton and Porthill. Both schemes are planned for delivery by 2020. These works have the potential to increase traffic flow through this AQMA. Traffic modelling and the associated air quality impacts are currently being assessed by Highways England and Stoke on Trent City Council for their respective schemes

Accordingly, the diffusion tube-monitoring network will remain in place in this AQMA, until the highway schemes have become embedded and there is confidence that $N0_2$ annual mean levels are consistently below the statutory objective.

Little Madeley AQMA – No. 4

Air Qulaity in this location is heavily influenced by traffic using M6 motorway which runs within 20 metres of the nearest receptor at Collingwood, 3 Newcastle Road, Little Madeley.

The NO_2 concentration at this location in has decreased over the past 6 years. The $N0_2$ annual mean result at DT3 for 2017 was 31µg/m^3.

Highways England are introducing smart managed motorways and hard shoulder running up to Junction 15 of the M6 (Stoke on Trent South) and from junction 16 (Stoke on Trent North and Crewe) through to junction 22. The stretch of motorway between junctions 15 and 16, which runs past the receptor experiences congestion at peak periods and may become a candidate for hard shoulder running and smart managed motorways in the future.

Due to the works to the M6 motorway, this location will continue to be monitored for the near future.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter, or PM, is the term use to describe particles found in the air, including dust, dirt and liquid droplets. PM comes from both natural and man-made sources, including traffic emissions and Saharan-Sahel dust. These particles can be suspended in the air for long periods of time, and can travel across large distances.

PM less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. PM less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks, as they can lodge deeply into the lungs.

The Council ceased monitoring for PM_{10} at the start of 2016.

Based on data provided by the Public Health Directorate at Staffordshire County Council, manmade $PM_{2.5}$ is estimated cause some 60 deaths per annum for adults over 30 years of age within the Borough.

The Borough Council, along with the Staffordshire County Air Quality Group, is looking into ways in which $PM_{2.5}$ concentrations can be reduced at both a local and regional level.

Actions to Improve Air Quality

To ensure that air quality within the Borough continues to improve the following areas are currently being looked into and promoted;

1. Eco-Stars
2. Involvement with planned road improvement works to the A500 at the Grange Lane junction, with Highways England
3. Managing planning applications pro-actively both at a County and Borough Planning level
4. Involvement in changes to traffic light sequencing, in conjunction with Staffordshire County Highways Department
5. Involvement with proposed changes to road layouts, with both Highways England and Staffordshire County Highways Department

6. Promotion of Health and Wellbeing Through liaising with Public Health colleagues
7. Developing an air quality strategy for the Borough
8. Developing air quality action plans for the four air quality management areas
9. Developing air quality planning guidance for developers looking to build within the Borough.
10. Inclusion of air quality related planning policies in the new Newcastle under Lyme and Stoke and on Trent local plan (scheduled for publication 2020)

Local Engagement and How to get involved

How to Get Involved

If residents and businesses reduce the amount of fuel and chemicals used, it will improve air quality. The following ways can help:

Commute

- ✓ Leaving the car at home one day a week. Further information can be found at www.staffssaferroads.co.uk/
- ✓ Consider car sharing your journey Further guidance can be found at https://share-a-lift.co.uk/
- ✓ Using public transport whenever practicable will reduce traffic congestion and improve air quality. Travel planning APP's are available for most smart phones. You can also find information online at http://travelsmartns.co.uk/
- ✓ By avoiding idling engines and/or air conditioning running continuously - switch your engine off; to save fuel, money and improve local air quality.

School Run

- ✓ Walking or cycling to school is not only good for health but it will save on fuel costs and help reduce local air pollution. Further guidance can be found within Travel into School www.staffordshire.gov.uk/transport/Stafford/Schools/Schools.aspx

- ✓ Take turns with friends, neighbours or family to drive or walk the children to school. Check whether your school has a travel plan.

Energy Efficiency

- ✓ Improving the energy efficiency of your home / school / workplace will help reduce energy bills, as well reducing the air pollution associated with power generation. For further information, please visit the Energy Savings Trust (EST) website www.energysavingtrust.org.uk, which is a non-profit organisation that promotes energy savings, funded by the Government and private sector.

Workplace transport

- ✓ ECO Stars (Efficient and Cleaner Operations) Fleet Recognition Scheme encourages and helps operators of HGVs, buses, coaches, vans and taxis to run fleets in the most efficient and green way. The scheme provides recognition for best operational practices, and guidance for making improvements. The ultimate aim is to reduce fuel consumption, which naturally leads to fewer vehicle emissions and has the added benefit of saving money! ECO Stars is currently managed by specialist transport consultants, Transport and Travel Research Ltd (TTR).

  It is free and straightforward to join ECO Stars. Simply contact the ECO Stars team by phone or email. They can complete the application form with you. One of the team can visit you in person to take you through the application

  Phone: 01543416416
  Email: ecostars@ttr-ltd.com
  To find out more about ECO-Stars visit https://www.ecostars-uk.com/

- ✓ Grants may be available to support your business in becoming more energy efficient and towards the purchase of cleaner vehicles and support with charging infrastructure. Further information can be found at;

- Office for Low Emission Vehicles: https://www.gov.uk/government/organisations/office-for-low-emission-vehicles
- Energy Saving Trust: www.energysavingtrust.org.uk

Around The Home

- ✓ Use water-based or low solvent paints, glues, varnishes and wood preservatives, look for brands with a low VOC content.
- ✓ Make sure your home is well ventilated especially during DIY or cleaning.
- ✓ Have your central heating system checked regularly to avoid risking exposure to toxic carbon monoxide.
- ✓ Keep wood stoves and fireplaces well maintained, and make sure that wood burners are exempted for use in smoke control areas. See our webpage for further advice (https://www.newcastle-staffs.gov.uk/all-services/environment/environmental-protection/smoke-control-advice)
- ✓ Purchase "Green Power" for the electricity in your home. (Contact your energy supplier).
- ✓ Be energy efficient- make sure your house is well insulated and use energy efficient appliances. Your energy supplier may offer grants to insulate your home.
- ✓ Avoid using bonfires to dispose of waste and never burn household waste, especially plastics, rubber and treated timber. See our webpages for advice on disposal / recycling and composting, at www.newcastle-staffs.gov.uk/bonfires

Newcastle under Lyme Borough Council's air quality reports and action plan documents are accessible from the following link https://www.newcastle-staffs.gov.uk/airquality

For enquires or suggestions on how to improve air quality please feel free to contact us:

Write to:	The Environmental Protection Team, Newcastle under Lyme Borough Council Civic Offices Merrial Street Newcastle under Lyme ST5 2AG
Email:	environmental_health@newcastle-staffs.gov.uk
Telephone:	01782 717717

Further Information

More information about local and national air quality can be found at the following sites;

- **UK Air** – https://uk-air.defra.gov.uk/

  This site is maintained by the Department for Environment, Food and Rural Affairs (Defra). It has a wide range of information including daily pollution forecasts for the UK, as well as health information for people who suffer with conditions such as asthma, lung conditions and heart problems.

- **Friends of the Earth** - https://www.foe.co.uk/index

  This site contains information about how you can get involved in helping to tackle air pollution and climate change, including information about renewable energy, how to reduce waste and ways that you can help to reduce air pollution from day to day.

- **Air Quality England** - http://www.airqualityengland.co.uk/

  This site has air quality monitoring data and site/pollutant air quality statistics for a number of locations within England. It has clear summary statistics on all the relevant pollutants in the context of UK and European legislation. You are

also able to access the uBreathe app via this website, which provides air pollution health advice wherever you are in the UK.

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1 Local Air Quality Management

This report provides an overview of air quality in Newcastle-under-Lyme 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-under-Lyme 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.

AQMA Name	Date of Declaration	Pollutants and Air Quality Object	City / Town	One Line Description	Is air quality in the AQMA influenced by roads	Level of Exceedance (maximum monitored/modelled concentration at a	Action Plan

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-under-Lyme can be found in

		ives			controlled by Highways England?	location of relevant exposure)			
						At Declaration (µg/m3)	Now (µg/m3)	Date of Publication	Link
Newcastle-under-Lyme Borough								**2018**	https://www.newcastle-staffs.gov.uk/airquality
Kidsgrove AQMA Number 1	Declared January 2015	NO2 Annual Mean	Kidsgrove	Declared due to exceedance of the N02 annual mean objective along Liverpool Road A50, Kidsgrove.	NO	47.99	58.02	**2018**	
Newcastle under Lyme Town Centre AQMA Number 2	Declared January 2015	NO2 Annual Mean	Newcastle under Lyme	Declared due to exceedance of the N02 annual mean objective. Covers Newcastle under Lyme Town Centre including the ring road A53, King Street, George Street and London Road to the boundary with the City of Stoke on Trent AQMA	NO	58.8	83.88	**2018**	
Maybank, Wolstanton and Porthill AQMA Number 3	Declared January 2015	NO2 Annual Mean	Newcastle under Lyme	Covers the principal routes between Maybank, Wolstanton and Porthill. Declared due to exceedances of the N02 annual mean in Maybank High Street and in the Porthill area	NO	46.5	52.27	**2018**	

Little Madeley AQMA Number 4	Declared January 2015	NO2 Annual Mean	Madeley	Declared around two properties at Little Madeley due to an exceedance of the NO2 annual mean arising from the M6 motorway.	YES	52.1	56.65	**2018**	

Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://www.newcastle-staffs.gov.uk/all-services/environment/environmental-protection/air-quality-newcastle-under-lyme

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 Area

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 (µg/m3)	Now (µg/m3)	Date of Publication	Link
Newcastle-under-Lyme Borough								**2018**	https://www.newcastle-staffs.gov.uk/airquality
Kidsgrove AQMA Number 1	Declared January 2015	NO2 Annual Mean	Kidsgrove	Declared due to exceedance of the N02 annual mean objective along Liverpool Road A50, Kidsgrove.	NO	47.99	58.02	**2018**	
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☒Newcastle-under-Lyme Borough 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-under-Lyme

Defra's appraisal of last year's ASR concluded

Points raised by DEFRA on last ASR	How this has been addressed over the past year
Publication of an Action Plan covering the four AQMAs is to be finalised as soon as possible.	The Air Quality Action Plan's have been completed and are due to be consulted on in Summer 2018
Assessment of the effectiveness of measures implemented to meet the nitrogen dioxide objective is to be undertaken, and additional measures are to be introduced if those in use are not having the desired effect.	The effectiveness of measures used in past years to bring the NO_2 levels within the Borough to below the objective limit have been reviewed. Improvements have been seen year-on-year with the measures currently in place.

Newcastle-under-Lyme Borough Council 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;

1. Borough Wide Air Quality Strategy[4]
2. Air Quality Planning Guidance
3. Inclusion of air quality related policies in the joint Newcastle under Lyme and Stoke on Trent Local Plan[5]

[4] https://www.newcastle-staffs.gov.uk/airquality
[5] http://www.stoke.gov.uk/ccm/content/planning/planning-general/local-development-framework/joint-local-plan.en

Key completed measures are:

- Adoption of a Green Travel Plan for new Civic Hub ('Castle House') Development in the Town Centre

Newcastle-under-Lyme Borough Council expects the following measures to be completed over the course of the next reporting year:

- Adoption of an Air Quality Action Plan for Newcastle-under-Lyme
- Adoption of an Air Quality Developers Guide
- Details of impacts and mitigation measures for the Highways England works to the A500 and the Stoke on Trent City Council proposals for Etruria Valley to be understood.
- Measures to reduce traffic congestion in Kidsgrove to be completed.
- Continue to monitor existing sites for nitrogen dioxide and identify new locations
- Continue to screen and comment on planning applications for impacts on air quality
- Continue to ensure compliance with Environmental Permitting requirements for permitted installations or installations requiring a permit
- Provide education and advice and if necessary enforce the smoke control areas within the Borough
- Provide education and advice and if necessary enforce relevant legislation relating to burning of domestic and commercial waste
- Work with Staffordshire Air Quality Forum to reduce $PM_{2.5}$ exposure.
- Actively engage in the development of the new Newcastle under Lyme and Stoke on Trent Local Plan to ensure that it is air quality friendly

Newcastle-under-Lyme Borough Council's priorities for the coming year are;

- Finalise Air Quality Planning and Policy Guidance
- Inclusion of air quality related policies in the joint Newcastle under Lyme and Stoke on Trent Local Plan
- Development of the Voluntary Quality Network Partnership with bus operators
- Involvement in discussions regarding the potential for a Clean Air Zone (CAZ) in the Potteries agglomeration

The principal challenges and barriers to implementation that Newcastle-under-Lyme Borough Council anticipates facing are;

- Increase in traffic growth and consequent congestion caused by a geographically constrained highway network which is operating beyond maximum design capacity
- Development aspirations Newcastle Town Centre and Keele University campus potentially increasing exposure or use of private vehicles
- The lack of a 5 year sustainable housing supply which is seeing large scale housing being developed in the countryside and the need to rely on private vehicles to access services and employment opportunities within the town centre and beyond
- Reduction in the frequency of bus services across the Borough
- Cessation of financially unviable bus routes by operators or removal of subsidy

Progress on the following measures had been slower than expected due to available resources;

- Adoption of an Air Quality Strategy for Newcastle-under-Lyme
- Adoption of an Air Quality Developers Guide

Newcastle-under-Lyme Borough Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in all four of the AQMA's.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Newcastle-under-Lyme Borough Council anticipates that further additional measures not yet prescribed, will be required in subsequent years to achieve compliance and enable the revocation of all four of the AQMA's.

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	Borough Wide Air Quality Strategy	Policy Guidance and Development Control	Other policy	Lead and Funded: LA Environmental Health.	In progress			Reduction in emissions	Funding secured, planning phase	Autumn 2018	Requires formal consultation and committee approval
2	Air Quality Planning Guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Lead + Funded: LA Environmental Health	In progress			Reduction in emissions	Funding secured, planning phase	Autumn 2018	Requires formal consultation and committee approval
3	Inclusion of air quality related policies in the joint Newcastle under Lyme and Stoke on Trent Local Plan	Transport Planning and Infrastructure	Other	LA Environmental Health and Planning (Joint project with Stoke on Trent City Council)	In progress			Reduction in emissions	Implementation on-going	Winter 2020	
4	Staffordshire and Stoke on Trent Eco-Stars	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Staffordshire Local Authorities (Lead by Cannock Chase DC)	In progress	Active	Target 20 HGV /HDV operators per LA area	Reduced vehicle emissions	Implementation on-going	2018	Slow take up by operators across County
5	Eco Stars award for Council Streetscene and Waste fleet	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	NULBC Streetscene Division	In progress			Reduced vehicle emissions	Implementation on-going	2018	4* Ecostars award with action plan
6	Green Travel Plan for new Civic Hub development in Town Centre	Promoting Travel Alternatives	Workplace Travel Planning	Lead by Staffordshire County Council as building owner in conjunction with Borough Council, Police, Library Service, Social Services, Aspire Housing	Completed	Awaiting implementation and monitoring		reduced vehicle emissions	Completed	Completed	Progress on implementation requires monitoring
7	Voluntary Quality Network Partnership with bus operators	Alternatives to private vehicle use	Other	Staffordshire County Council / Stoke on Trent City Council/ Local Bus Companies	Not yet started			Reduced vehicle emissions /	Not yet commenced. Identified in Newcastle under Lyme LTP		Requires commitment from bus operators and councils. Decline in bus passenger numbers and services affects financial viability for improvements. Local operators use older fleet vehicles across area.

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
W1	Improvements to Wolstanton and Porthill Junctions on A500 to reduce congestion	Traffic Management	UTC, Congestion management, traffic reduction	Highways England	Scheme achieved RIS approval for delivery by 2020			Reduction in congestion / improved journey times	Scheme being revised prior to tender	To be delivered in current Roads Investment Strategy window by March 2020	Funding identified by HE. Project flagged as high risk for air quality along A500 due to exceedance of EU action level
W2	Short term routing strategy to mitigate impact of congestion associated with works to A500	Traffic Management	UTC, Congestion management, traffic reduction	Highways England / Staffs County Council / Stoke on Trent City Council and NULBC Environmental Health	Issue flagged with HE at stakeholder meetings			Potential short term negative impact during build	Impacts not yet quantified	2020	Off network effects on AQ awaiting assessment by HE. Concerns about impact on Town Centre AQMA and Maybank, Wolstanton Porthill AQMA's as potential alternative route during two year build programme
W3	Evaluate the impact of the Etruria Valley Link Road in the May Bank, Porthill, Wolstanton area and provide appropriate mitigation	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Lead by Stoke on Trent City Council with planning application to Newcastle under Lyme Borough Council/ Staffordshire County Council involved	Issued flagged with Stoke on Trent City Council			unclear	Impacts not yet quantified	Updated application with revised air quality assessment Application anticipated Summer 2018	Awaiting AQ assessment. EIA Project. Planning application to Newcastle under Lyme Borough Council. Potential negative effects on Maybank Porthill, Wolstanton AQMA. Potential to improve AQ in Stoke on Trent at Basford Bank here hourly mean N02 is being exceeded.

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
K1	Kidsgrove Railway Station Transport hub including parking and improved bus/rail interchange with new bus facilities closer to the station, Real Time Passenger Information provided at Kidsgrove station and at the bus stops, disabled/cycle parking, drop off and taxi facilities, and safer pedestrian and cycle access routes to the station	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	East Midlands Trains	2015	2018/19		Has potential to increase patronage / increase use of public transport and private cat		2020	
K2	Traffic light optimisation to reduce congestion ALONG Liverpool Road	Traffic Management	UTC, Congestion management, traffic reduction	Staffordshire County Council	2017	2018		Reduced vehicle emissions		2018	
K3	Review location of bus stops to facilitate traffic flow around Liverpool Road / The Avenue	Traffic Management	UTC, Congestion management, traffic reduction	Staffordshire County Council	2017	2018		Reduced vehicle emissions		2018	
N1	Ensure that effects of additional traffic generated by Ryecroft mixed retail / student development are properly understood	Other	Other	Henry Davidson Developments / Planning Application to Newcastle under Lyme B.C.	Aug-17						Application made to Newcastle under Lyme B.C green travel infrastructure and EV charging sought
N2	Ensure that effects of emissions from plant associated with Ryecroft mixed retail / student development are properly understood	Other	Other	Henry Davidson Developments / Planning Application to Newcastle under Lyme B.C.		Nov-17					Conditions imposed on permission. Hours of use of plant to be limited to minimise effects on AQ

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
N3	Wayfinding strategy Newcastle under Lyme Town Centre and outlying areas for walking and cycling	Promoting Travel Alternatives	Promotion of walking	Lead by Newcastle under Lyme Borough Council with support from Staffordshire County Council, Sustans and Town Centre Business Improvement District	2017	2018		Reduced vehicle emissions		In progress	Strategy awaiting public consultation
N4	Cycle route improvements on A34 North (Cedar Road to Lower Milehouse Lane and Milehouse) and A527 (Town to Keele University)	Promoting Travel Alternatives	Promotion of cycling	Lead by Newcastle under Lyme Borough Council with support from Staffordshire County Council, Sustans and Town Centre Business Improvement District		2018/19		Reduced vehicle emissions		Completed in 2017/18	Options identified for consultation
N5	Local Transport Package Managing Peak Hour Congestion and C-emissions on local roads and at junctions with the trunk road network	Traffic Management	UTC, Congestion management, traffic reduction	Staffordshire County Council				Reduced vehicle emissions	System optimised	Completed	UTC optimised on network around ring road and King Street / Etruria Road (A53) Limited capacity for physical works as network is heavily congested and constrained by local geography. Borough lies at centre of major road network for cross country freight.
N6	LSTF funding of cycling walking and bus links between N-u-L and Stoke	Alternatives to private vehicle use	Other	Lead by Newcastle under Lyme Borough Council with support from Staffordshire County Council, Sustans and Town Centre Business Improvement District				Reduced vehicle emissions			Options identified for consultation

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
N7	Ring-Road enhanced signage & subway	Traffic Management	UTC, Congestion management, traffic reduction	Lead by Newcastle under Lyme Borough Council with support from Staffordshire County Council, Sustans and Town Centre Business Improvement District	2017	2018/19		Reduced vehicle emissions			Options identified for consultation
N8	Car Park VMS Street parking restrictions	Traffic Management	Other	Lead by Newcastle under Lyme Borough Council with support from Staffordshire County Council, Sustans and Town Centre Business Improvement District	2017	2018/19		Reduced vehicle emissions			Options identified for consultation / Potential funding constraints
N9	Promotion of public transport RTPI upgrades	Public Information	Other	Staffordshire County Council with support via conditions on planning applications for inclusion in high occupancy student / keyworker accommodation	2017	Ongoing		Reduced vehicle emissions			RTPI and subsidised bus travel / green travel plans sought for large scale multi occupancy residential accommodation. Town centre expected to accommodate 3000 students for local universities
M1	Continue to monitor N02 at relevant location in Little Madeley	Other	Other	Newcastle under Lyme Borough Council Environmental Health		Ongoing					
M2	Engage with HE concerning proposals to introduce smart managed motorway / hard shoulder running in Madeley area between junctions 15 and 16 of the M6 motorway	Traffic Management	Other	Lead by Highways England	Scheme not identified in current HE RIS window up to 2020			Has potential to reduce congestion and vehicle emissions			Scheme not yet identified. Sections where side of junctions 15 and 16 of the M6 are being smart managed with hard shoulder running. Local geography is an issue to identifying appropriate solutions

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.

Particulate matter, or PM, is the term used to describe particles found in the air, including dust, dirt and liquid droplets. PM comes from both natural and man-made sources, including traffic emissions and Saharan-Sahel dust. These particles can be suspended in the air for long periods of time, and can travel across large distances.

PM less than 10 micrometres in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. PM less than 2.5 micrometres in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks, as they can lodge deeply into the lungs and also pass into the bloodstream.

$PM_{2.5}$ is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator 3.01[6] is based.

The Royal College of Physicians (RCP) undertook a review in February 2016[7] where they found that long term exposure to air pollution impairs lung function growth in children, and that outdoor exposure is linked to lung cancer in adults. Within Staffordshire it is estimated that 4.8%of all deaths can be attributed to exposure to $PM_{2.5}$, compared to 5.1% across England (40,000 deaths annually)[8]. Overall, the estimated cost to individuals and society is more than £20 billion annually for the UK.

Table 3 details the measures that Newcastle-under-Lyme Borough Council is taking to address $PM_{2.5}$

[6] Public Health Outcomes Framework 2016 – 2019 indicator 3.01 Fraction of mortality attributable to particulate air pollution https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000005/ati/102/are/E10000028/iid/30101/age/230/sex/4

[7] ['Every Breath we Take: The Lifelong Impact of Air Pollution; Report of a working Party, February 2016, ISBN 978-1-86016-567-2],

[8] Mortality attributable to particulate air pollution Public Health Outcomes Framework

Table 3: Measures taken by Newcastle-under-Lyme Borough Council to address PM $_{2.5}$ levels

Measure	New	Existing	Part of Action Plan Y/N	Action Plan Name	Date Implemented
Urban Traffic Control System in areas of Newcastle-under-Lyme Town Centre and Kidsgrove AQMAs.		✓	Y	Newcastle-under-Lyme Town Centre Air Quality Action Plan Kidsgrove Air Quality Action Plan	
Encouraging agile and home working by Newcastle-under-Lyme Borough Council Staff		✓			
Working in partnership to promote travel alternatives for school travel, cycling and walking campaigns and Staffordshire 'Share-a-Lift' schemes		✓			
Working in partnership to promote the use of rail and inland waterways		✓			
Updating local transport plans and district strategies		✓			
Kidsgrove Station Interchange – due to begin 2018		✓	Y	Kidsgrove Air Quality Action Plan	

Measure	New	Existing	Part of Action Plan Y/N	Action Plan Name	Date Implemented
RTPI routes 3 & 4 Newcastle Town Centre. Improved future bus services to Chatterley Valley		✓			
To influence policies to support improvements in emissions through the development of the 'Newcastle under Lyme Stoke-on-Trent Joint Local Plan'.		✓			
Continue to work in partnership in lobbying government concerning STOR Sites (Short Term Operating Reserve) Energy Generation. Regulation for this is via planning / permitting regime.		✓			
Working in partnership to improve route management plans, and develop strategic routing strategies for HGV's		✓			
Continuing to be part of ECO Stars to recognition for best operational practices and improvements to reduce vehicle emissions.		✓			
Continuing to reduce pollution through IPPC Permits going beyond BAT		✓			

Measure	New	Existing	Part of Action Plan Y/N	Action Plan Name	Date Implemented
Reporting 'smokey' vehicles via the gov.uk hotline		✓			
Continuing to be involved with multi agency working with Fire Service and Environment Agency for burning on trade premises		✓			
Continuing to be involved with multi agency working with Staffordshire Fire Service and Local Authority Building Control regarding chimney fires and complaints about DIY domestic heating systems.		✓			

2.3.1 Particulate Matter ($PM_{2.5}$) Levels in Staffordshire and Stoke-on-Trent

A number of the Staffordshire Authorities currently monitor locally for PM_{10}. Defra's Automatic Urban and Rural Network (AURN) site Stoke-on-Trent Centre has a dedicated $PM_{2.5}$ monitor. Table 2.3 presents data on the local level of $PM_{2.5}$ annual mean concentrations for the Staffordshire Authorities. Where the data is derived from PM_{10} monitoring this has been adjusted by applying a correction factor of 0.7 to derive the $PM_{2.5}$ component. The correction factor has been derived from the average of all ratios of $PM_{2.5}/PM_{10}$ for the years from 2010 to 2014 for forty sites within the Automatic Urban and Rural Network (AURN) where these substances are measured on an hourly basis and follows the guidance published in LAQM (TG16).

Table 4: Annual Mean PM_{10} and $PM_{2.5}$ Results of monitoring by Staffordshire Authorities 2011 to 2017

Annual Mean PM_{10} and $PM_{2.5}$

Results from monitoring Staffordshire Authorities 2013 - 2017

Authority	Site Type	Monitor Location	OS Grid Ref		Year				
					2013	2014	2015	2016	2017
Newcastle under Lyme	Roadside	Queen`s Gardens	E385057 N346137	PM_{10}	22.5	22	22.9	(2)	(2)
				$PM_{2.5}$	15.8 (1)	15.4 (1)	16 (1)		
Cannock Chase	Roadside	Watling St Bridgetown	SJ980086	PM_{10}	21	19.6	(3)	(3)	(3)
				$PM_{2.5}$	14.7 (1)	13.7 (1)			
	Roadside	Cannock A5190	E401392 N309954	PM_{10}	-	-	-	-	14
				$PM_{2.5}$	-	-	-	-	9.8
Stoke on Trent	Roadside	Basford	E386288 N346802	PM_{10}	-	-	-	-	23
				$PM_{2.5}$	-	-	-	-	16
	Roadside	A50 Meir Tunnel	E392548 N342572	PM_{10}	-	-	20(4)	20	18
				$PM_{2.5}$	-	-	14(4)	14	13
	Urban Background	Stoke on Trent Central	E388351 N347895	$PM_{2.5}$	10	10	12	12	9
	Roadside	Middleport	E385780 N349376	PM_{10}	25	24	22	(5)	(5)
				$PM_{2.5}$	18(1)	17(1)	15(1)		
East Staffordshire	Roadside	Derby Tum	E424671 N324019	PM_{10}	29	31	23	(6)	(6)
				$PM_{2.5}$	20.3(1)	21.7(1)	16.1(1)		

Notes:
(1) $PM_{2.5}$ results are derived from PM_{10} monitored results corrected with a 0.7 correction factor in accordance with TG16 Annex B: Derivation of $PM_{2.5}$ to PM_{10} Ratio. All other results are directly monitored.
(2) Newcastle-under-Lyme PM10 monitor decommissioned in 2016
(3) Cannock Chase Watling Street and Bridgetown PM_{10} monitors decommissioned
(4) A50 Meir Tunnel Valid data capture for 2015 was 59%. The site was commissioned on 22 May 2015.
(5) Middleport monitor was decommissioned at the end 2015.
(6) East Staffordshire`s monitors were decommissioned 2016.

As can be seen from the results, concentrations of $PM_{2.5}$ within the Staffordshire Authorities remain below the 2020 EU limit value of 25µg/m^3.

2.3.2 $PM_{2.5}$ and Mortality in Staffordshire & Stoke-on-Trent

Although the levels of $PM_{2.5}$ within the County and City of Stoke on Trent are below the 2020 EU Limit value, the impact on adult mortality directly attributable to $PM_{2.5}$ is nonetheless still an important public health issue within Staffordshire and Stoke-on-Trent. This is revealed in data obtained from Public Health England used to inform Public Health Outcomes Framework indicator 3.01[9], as shown in Table 5.

The percentage estimated number of deaths attributable to $PM_{2.5}$ in adults over 30 has been translated into the estimated number of attributable deaths for each local authority area within Staffordshire, and are shown in Table 6. The data presented to 2013 is the latest data available at time of publication of this report. Approximately 5% of deaths within the County can be attributed to $PM_{2.5}$.

Table 5: Mortality attributable to $PM_{2.5}$ air pollution, for adults aged 30 and over, by Local Authority Area within Staffordshire from 2012 to 2016[9]

Local Authority	2012	2013	2014	2015	2016
Cannock Chase	4.8%	5.1%	5.1%	4.6%	5.4%
East Staffordshire	4.8%	5.1%	5.1%	4.8%	5.6%
Lichfield	5.0%	5.1%	5.0%	4.6%	5.5%
Newcastle-under-Lyme	4.6%	4.9%	4.7%	4.2%	4.7%
South Staffordshire	4.8%	5.1%	5.0%	4.7%	5.1%
Stafford	4.6%	4.9%	4.8%	4.7%	4.8%
Staffordshire Moorlands	4.2%	4.7%	4.5%	4.0%	4.6%
Tamworth	5.2%	5.5%	5.4%	4.9%	6.0%
Staffordshire	**4.7%**	**5.0%**	**4.9%**	**4.5%**	**5.2%**
West Midlands	**5.1%**	**5.4%**	**5.2%**	**4.8%**	**5.5%**
England	**5.1%**	**5.3%**	**5.1%**	**4.7%**	**5.3%**

[9] *Source: Public Health Outcome Framework, Public Health England, http://www.phoutcomes.info/*

Table 6: Public Health Outcomes Framework Indicator 3.01- Fraction of annual all cause adult mortality attributable to anthropogenic (human made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$) for Staffordshire Authorities 2012 to 2016[10]

	YEAR														
	2012			2013			2014			2015			2016		
District/ County	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths
Newcastle-under-Lyme	**1218**	**4.6**	**60**	**1295**	**4.9**	**60**	**55**	**4.7**	**60**	**55**	**4.2**	**50**	**1291**	**4.7**	**60**
Stafford	1195	4.6	50	1261	4.9	60	65	4.8	60	60	4.7	60	1254	4.8	60
East Staffordshire	966	4.8	60	1097	5.1	60	55	5.1	50	55	4.8	50	1065	5.6	60
South Staffordshire	1162	4.8	60	1102	5.1	60	55	5	50	55	4.7	60	1128	5.1	60
Lichfield	953	5	50	1050	5.1	50	50	5	50	50	4.6	50	1044	5.5	60
Staffordshire Moorlands	1020	4.2	40	1085	4.7	50	45	4.5	50	45	4	40	1110	4.6	50
Cannock Chase	844	4.8	40	787	5.1	40	45	5.1	40	45	4.6	40	879	5.4	50
Tamworth	553	5.2	30	592	5.5	30	35	5.4	30	30		30	615	6	40
Stoke on Trent	2386	4.9	115	2412	5.2	125	2318	5.0	115	2479	4.9	110	2454	5.0	120
Staffordshire County	7911	4.7	372	8269	5	420	400	4.9	400	390	4.5	390	8386	5.2	430

[10] Source Public Health England https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000005/ati/102/are/E10000028/iid/30101/age/230/sex/4

Air pollution is known to increase the chances of individuals being admitted to hospital. During 2016/17 there were almost 400 emergency (unplanned) admissions to hospital as a result of COPD for Newcastle residents aged 35 and over [6]. Between 2015/16 and 2016/17 there was an increase in the number of Newcastle residents being admitted to hospital with rates now being higher than the national average (Figure 1).

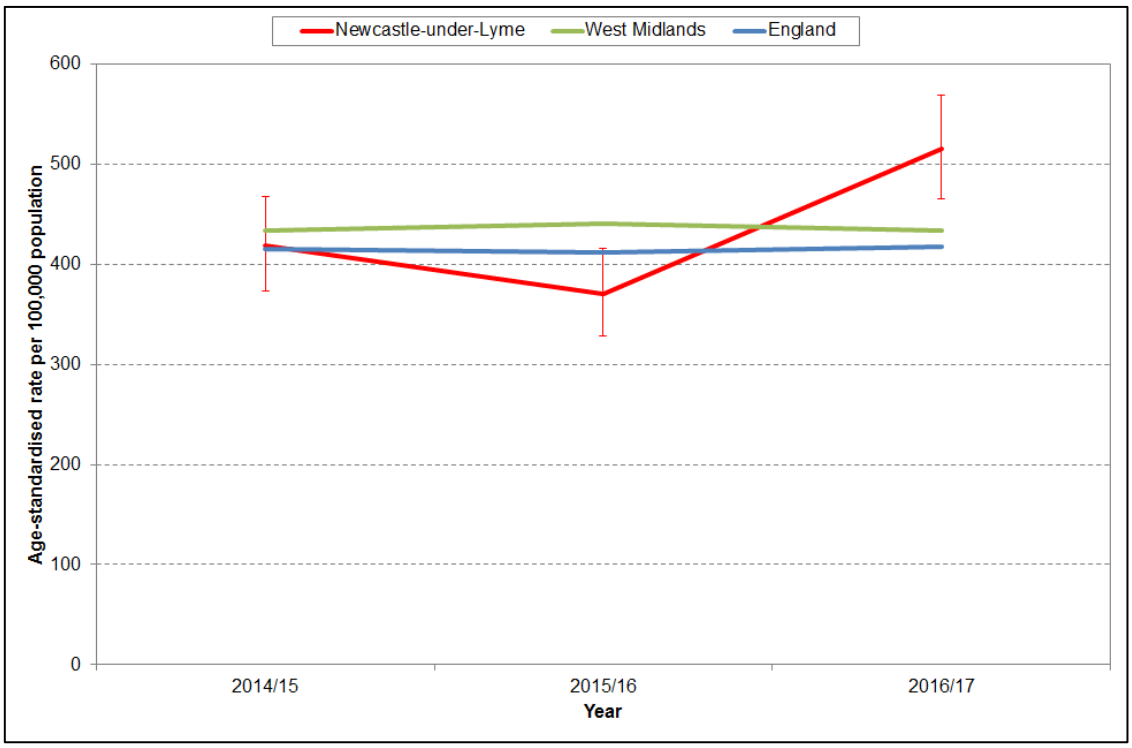


Figure 1: Emergency admissions from chronic obstructive pulmonary disease, adults aged 35 and over [11]

2.3.3 Actions being taken within Staffordshire to reduce $PM_{2.5}$

A number of the Staffordshire Authorities are currently involved in implementing measures to reduce levels of $N0_2$ within their areas, which are detailed elsewhere in this report. Whilst there is currently no statutory duty imposed on Local Authorities in England to reduce $PM_{2.5}$, a number of the measures are complementary. A mapping exercise completed by the Staffordshire Air Quality Forum members details the measures currently in place which are considered to have an impact in reducing $PM_{2.5}$ within the County. These are produced in Table 2.4 below;

[11] *Source: http://fingertips.phe.org.uk/, Public Health England*

2.4 Actions being taken within Staffordshire to reduce $PM_{2.5}$

A number of the Staffordshire Authorities are currently involved in implementing measures to reduce levels of NO2 within their areas, which are detailed elsewhere in this report. Whilst there is currently no statutory duty imposed on Local Authorities in England to reduce $PM_{2.5}$, a number of the measures are complementary. A mapping exercise completed by the Staffordshire Air Quality Forum members details the measures currently in place which are considered to have an impact in reducing $PM_{2.5}$ within the County. These are produced in Table 2.4 below;

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions Y/N	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle-under-Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
Traffic Management	Urban Traffic Control systems, Congestion management, traffic reduction	low	Y	✓	UTC in Leek Town Centre	UTC in areas of Newcastle Town Centre AQMA and Kidsgrove AQMA	UTC in Stafford Town Centre	UTC in Cannock Town Centre	UTC in Burton Town Centre. Planned A444 corridor study. Burton Town Centre regeneration. B5017 corridor improvements between Wellington Road/ Shobnall Road & Postern Road. Tatenhill and Rangemore improvements	Investigations ongoing into UTC in areas of Lichfield City Centre		UTC in Tamworth Town Centre at Ventura Park
	Reduction of speed limits, 20mph zones	low	Y	✓			20mph zones near some schools in residential areas	20mph zones in Brereton, Hednesford and Rugeley	20 mph zones near some schools in residential areas		20mph zones in Trysull, Bradley, Kinver and Bilbrook	
	Road User Charging (RUC)/ Congestion charging	low	Y					M6 Toll		M6 Toll	M6 Toll	
	Anti-idling enforcement	low	Y									
	Other		Y									
Promoting Travel Alternatives	Workplace Travel Planning	low	Y		Staffordshire County Council has successfully acquired funding for a 2 year work and school travel plan programme for work in the vicinity of AQMAs in Stafford and Stoke. **Staffordshire Sustainable Travel – Cycling maps, guides and Route Planner**							
	Encourage / Facilitate home-working	low	Y	Agile working adopted by Stoke-on-Trent CC		Agile working adopted by NULBC		Homeworking policy adopted	Homeworking policy adopted		Agile working policy adopted	Homeworking policy adopted
	School Travel Plans	low	Y	Modeshift STARS	Staffordshire School Active Travel							
	Promotion of cycling	low	Y	**Stoke Cycle Maps**	**Staffordshire Sustainable Travel – Cycling maps, guides and Route Planner**							
	Promotion of walking	low	Y	Travel Smart	Staffordshire Walking Routes							
	Staffordshire Share a Lift Scheme		N	Stoke-on-Trent Share a Lift Scheme	Staffordshire Car Share							
	Promote use of rail and inland waterways	medium	Y	North Staffordshire Community Rail Partnership	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line, includes Blythe Bridge Rail Station. The County Council	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line, includes Blythe Bridge Rail Station. The County Council	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line, includes Blythe Bridge Rail Station. The County Council	SCC is a member of West Midlands Rail Ltd which will bring a change in the way that local rail services are managed and operated. The County Council Draft Rail Strategy is	Community Rail Partnership operating along the North Staffordshire Lineand includes Uttoxeter Rail Station. The County Council Draft Rail Strategy is			

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions Y/N	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle-under-Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
					Draft Rail Strategy is available HERE	Draft Rail Strategy is available HERE	Draft Rail Strategy is available HERE	available HERE	available HERE			
Transport Planning and Infrastructure	Local Transport Plans and District Strategies	high	Y	Local Transport Plan	Local Transport Plan							
	Public transport improvements- interchanges stations and services	low	Y	Improvements around Stoke-on-Trent railway station in development		Kidsgrove Station interchange planned 2018	Recent improvements completed at Stafford Rail Station	Planned improvements at Cannock Station as part of Mill Green development	Planned improvements at Burton Rail Station	Planned improvements at Lichfield City station as part of Friarsgate development. Lichfield Trent Valley improvements to make station accessible		Improvements at Tamworth station
	Public cycle hire scheme	low	Y	Stoke Railway Station 'Brompton Dock' Bike Hire & Cycle Hub				In house Cycle to work scheme				
	Cycle network	low	Y	Stoke-on-Trent Cycle Map & Guide	Staffordshire Sustainable Travel – Cycling maps, guides and Route Planner							
	Bus route improvements	high	Y	Improvements around Stoke-on-Trent railway station in development	Continued delivery of demand responsive public transport Moorlands Connect, bus infrastructure improvements to route 9 Biddulph-Hanley	RTPI routes 3 & 4 Newcastle Town Centre. Improved future bus services to Chatterley Valley	RTPI Stafford Town Centre, A34 RTPI and bus priority measures, Stafford. Improved bus priority and interchange on A518, Stafford post-SWAR	Proposed improvements to services 23,24 and 26 in Rugeley, service 2 Cannock-Walsall and service 32/33 Pye Green	Removal of obstructions on New Street	New central bus station. New or extended services to Fradley. New bus infrastructure Burntwood Town Centre. RTPI Lichfield City Centre.	Improved bus infrastructure Gt Wyrley to Bloxich corridor, & on routes 256 Wombourne to Stourbridge, 255 Wolverhampton to Merry Hill, 5 Codsall to Wolverhmapton, 1 Huntington to Walsall and 54 Stafford to Wolverhampton.	Improved bus infrastructure route 2 Tamworth-Perrycrofts. RTPI Tamworth Town Centre and Ventura Park. Victoria Road, Tamworth upgraded interchange.
Alternatives to private vehicle use	Bus based Park & Ride	medium	Y					Nil				
	Car Clubs	low	Y					Nil				
Policy Guidance and Development Control	Planning applications to require assessment of exposure / emissions for development requiring air quality impact assessment	high	Y				✓	Local plan - Policy CP16 - Climate Change and Sustainable Resource Use Cannock chase	http://www.eaststaffsbc.gov.uk/planning/planning-policy/local-plan-2012-2031			
	Air Quality Strategy		N	Local Air Quality Strategy - Stoke-on-Trent City Council		In progress. Due Autumn 2018	✓	nil	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			
	Planning Guidance for developers		N	To develop planning guidance for developers and to develop into SPD		In progress. Due Autumn 2018	✓	Supplementary Planning Policy Documents	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions Y/N	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle-under-Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
				once Local Plan Policies in Place								
	Developer Contributions based on damage cost calculation		N	To develop policies to secure contributions to offset pollution					Yes			
	Planning Policies		N	To influence policies to support improvements in emissions Through development of Newcastle under Lyme Stoke-on-Trent Joint Local Plan		To influence policies to support improvements in emissions Through development of Newcastle under Lyme Stoke-on-Trent Joint Local Plan	✓	Local Plan	Air Quality Policy for Development Control.			
	STOR Sites (Short Term Operating Reserve) Energy Generation . Regulation via planning / permitting regime	high	Y	To lobby Central Government via appropriate forums (e.g. Staffordshire Air Quality Forum / Midlands Joint Advisory Council) for consideration of air quality implications at a national level and to support local authorities and developers with appropriate guidance.								
	Low Emissions Strategy	high	Y									
Freight and Delivery Management	Freight Consolidation Centre	medium	Y									
	Route Management Plans/ Strategic routing strategy for HGV's	high	Y	Staffordshire Local Transport Plan								
	Quiet & out of hours delivery	low	Y				✓	✓				
	Delivery and Service plans	medium	Y									
	Freight Partnerships for city centre deliveries	high	Y									
Vehicle Fleet Efficiency	Driver training and ECO driving aids	medium	Y				✓	✓	ESBC staff undertaken ECO driving			
	Promoting low emission public transport	high	Y									
	Vehicle retrofitting programmes	medium	Y									
	Fleet efficiency and recognition schemes	medium	Y	Staffordshire and Stoke-on-Trent Eco-Stars								
Promoting low emission transport	Low emission zone (LEZ) Clean Air Zone (CAZ)	high	Y									
	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	high	Y					Waste fleet vehicles comply with Euro VI.				
	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	high	Y				✓					

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions Y/N	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle-under-Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	high	Y				✓					
	Priority parking for LEV's	high	Y	Electric Vehicle charging spaces								
	Taxi Licensing conditions	medium	Y	Hackney Carriage & Private Hire Licensing Policy 2016-2019								
	Taxi emission incentives	medium	Y									
Environmental permits	Introduction/increase of environment charges through permit systems and economic instruments (Permit fees set centrally)	medium	Y				✓	Unable to achieve at a local level without central government approval				
	Measures to reduce pollution through IPPC Permits going beyond BAT	medium	Y	Environmental Permitting General Guidance Manual; Chapter 15								
	Large Combustion Plant Permits and National Plans going beyond BAT	high	Y									
	Other	Unknown	Y									
Other measures	Smoky Diesel Hotline			Report a Smoky Vehicle								
	A5 and M6 Partnership							A5 Partnership			Strategy for the A5 2011-2026	
	Domestic Smoke Control advice and Enforcement			Smoke control advice		Smoke control advice	✓	Smoke control advice	Smoke control advice		Smoke control advice	
	Garden Bonfires - Advice and nuisance enforcement			Garden bonfire advice		Garden bonfire advice	✓	Garden bonfire advice	Garden bonfire advice		Garden bonfire advice	Garden bonfire advice
	Commercial burning advice and enforcement			Bonfire advice		Bonfire advice	✓	Bonfire advice	Bonfire advice			Bonfire advice
	Multi agency working with Fire Service and Environment Agency for trade burning						✓	Information shared as appropriate				Information shared as appropriate
	Multi agency working with Staffordshire Fire Service and Local Authority Building Control regarding chimney fires and complaints about DIY domestic heating systems							Information shared as appropriate				

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions Y/N	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle-under-Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
	Stoke-on-Trent Low Carbon District heat Network			Stoke on Trent Low Carbon District Heat Network								

2.5 $PM_{2.5}$ in Staffordshire & Stoke-on-Trent - Next steps

As $PM_{2.5}$ is an issue requiring collaboration between the district, county and city authorities within Staffordshire, the following actions are proposed in addition to those outlined in the action plan. Progress on these and the action plan will be detailed in the 2019 ASR.

- To agree a target for reducing Fraction of All Cause Mortality from $PM_{2.5}$ in each district, city and county authority by 2020
- To agree a target for reducing $PM_{2.5}$ exposure (calculated from PM_{10} exposure / background maps / local monitoring where available)
- To maintain compliance with the 2020 EU limit value of 25µg/m3
- To include Public Health Outcome Framework Indicator 3.01 in the Staffordshire and District Authority and City Council Joint Strategic Needs Assessment for 2018/2019 onwards and to report progress to the relevant Health and Wellbeing Boards.
- To continue to identify risks affecting $PM_{2.5}$ which need to be addressed at a national level e.g.
    - A number of authorities within Staffordshire are receiving applications for STOR (Short Term Operating Reserve) sites to supplement power to the National Electricity Grid at times of peak demand. These sites typically operate during the autumn / winter months and can be high emitters of PM. There is currently a conflict in national policy which is seeking security of energy supply and the drive to reduce anthropogenic $PM_{2.5}$. Recent approaches to DEFRA have revealed a lack of suitable guidance to local authorities and STOR operators.
    - To lobby for a suitable damage cost calculation to reflect the cost to society from $PM_{2.5}$ and to support this through local and national planning policies.

2.6 A53 PCM (Pollution Climate Mapping)

~~~ DARREN TO COMPLETE ~~~

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-under-Lyme Borough Council undertook automatic (continuous) monitoring at one site (CM1) during 2017. Table A.1 in Appendix A shows the details of the site.

National monitoring results are available at www.newcastle-staffs.gov.uk/airquality.

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-under-Lyme Borough Council undertook non- automatic (passive) monitoring of NO_2 at 41 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.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 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.

Nitrogen dioxide Levels Across the Borough of Newcastle-under-Lyme

Overall Nitrogen dioxide levels in the Borough are falling, with the majority of monitoring stes showing annual mean concentrations below the annual mean objective. Of the 41 Nitrogen dioxide diffusion tube sites situated across the borough;

- 35 showed a decrease in nitrogen dioxide levels when compared wioth levels seenin 2016
- 10 of the 41 sites have annual mean concentrations of within 10% of the annual mean objective, with 3 of these measuring an annual mean concentration greater than the annual mean objective.

Figure A.1 shows the annual mean NO_2 trends for all diffusion tube monitoring locations within the Borough. The annual mean NO_2 concentration for all 41 diffusion tubes across the Borough of Newcastle-under-Lyme in 2017 was 32.7µg/m^3.

Newcastle-under-Lyme Air Quality Management Areas

Four AQMAs were declared across the Borough of Newcastle-under-Lyme in 2015, relating to elevated levels of Nitrogen dioxide (NO_2). The results from diffusion tube monitoring within these AQMAs is as follows;

3.2.2 Kidsgrove - AQMA Number 1

Air Quality in this location is heavily influenced by traffic using the A34 Liverpool Road and local traffic accessing side roads from Liverpool Road within the centre of Kidsgrove. Relevant receptors are located back of footway and in close proximity to junctions and areas of congestion.

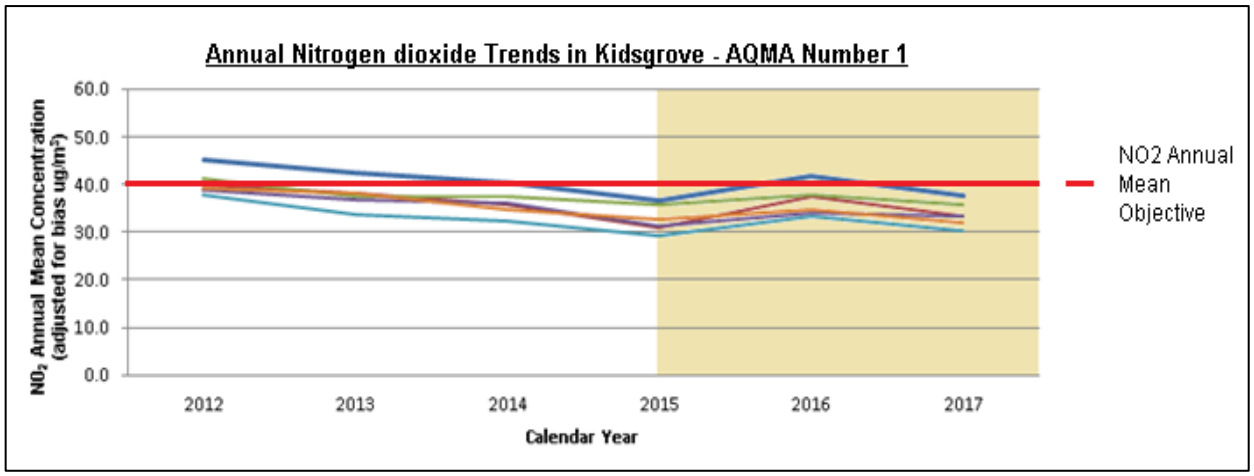


Figure 2 - Annual Mean NO_2 Concentrations from 2012 to 2017 of Kidsgrove AQMA Number 1

Figure 2 shows the annual Nitrogen dioxide trends in the Kidsgrove AQMA from 2012 to 2017. The highlighted section shows the changes in NO_2 concentrations from 2015, when the AQMA was declared, to 2017.

Over the past 6 years, there has been a general decrease in NO_2 concentrations each year from 2012 onwards within this AQMA.

In the year following the AQMA declaration, there was a slight increase in annual mean NO_2 concentration, however, over the past 12 months this has decreased and is almost back to the levels that were seen in 2015.

As shown in ***Figure 2***, during 2017 all monitoring sites measured an annual mean concentration below the annual mean objective, however Site DT6 is still measuring an annual concentration within 10% of the objective (DT6 has an annual mean NO_2 concentration of 37.7µg/m^3). Site DT64 had an annual mean concentration of 35.9µg/m^3 in 2017, which is just outside of the 10%.

As site DT6 was within 10% of the annual mean objective limit, a nitrogen dioxide distance correction calculation was conducted, which confirmed that although beneath the objective value, the predicted concentration at the receptor remained within 10% of the objective value (predicted concentration at receptor 37.3µg/m^3). Details of this calculation can be found in *Appendix D: 3.3 Distance Correction.*

Sites DT6 and DT64 are located on Liverpool Road, Kidsgrove, which becomes heavily congested at peak times. This results in vehicles idling while waiting for lights to change, and while vehicles turn onto 'The Avenue' and 'Heathcote Street'. Both DT6 and DT64 monitoring sites are representative of public exposure.

Staffordshire County Council are planning a number of works in this area which area aimed at reducing congestion on Liverpool Road, it is hoped that this will have a beneficial effect on air quality

The Kidsgrove AQMA will remain in place to monitor the success of the highway improvement works and until all sites measure an annual mean NO_2 concentration that is consistently below the annual mean objective.

3.2.3 Town Centre AQMA Number 2

Air Quality in this area is influenced by road traffic utilising the major arterial routes which converge on the town centre. There are a number of relevant receptors located at the back of pavement. The network is heavily congested at peak times of the day with high volumes of low speed mixed traffic. The town centre is experiencing a period of regeneration with provision for developments to provide around 3000 student bed spaces over the next four years. The Civic Offices site located on the Rycroft is destined to contribute towards a significant amount of accommodation as well as providing a mixed retail / leisure development. A number of office spaces are able to covert to residential use without requiring consideration of air quality. This has resulted in significant increases in the numbers of relevant receptors within the area where the Council is unable to influence development. In addition, the rural areas of the Borough are facing increased demands for applications for residential development, with people in these areas heavily reliant on cars to access services and employment opportunities within the town centre and wider areas.

Figure 4 shows the annual Nitrogen dioxide trends in Newcastle Town Centre AQMA from 2012 to 2017. Within this AQMA, NO_2 concentrations have generally decreased each year from 2012 onwards. The highlighted section of ***Figure 4*** emphasizes the

difference in annual mean NO_2 concentrations since the AQMA was declared in 2015.

In the year following the AQMA declaration, there was a slight increase in annual mean NO_2 concentration across the monitoring sites within this AQMA, however, over the past 12 months the annual mean NO_2 concentration has fallen back to levels that were seen in 2015.

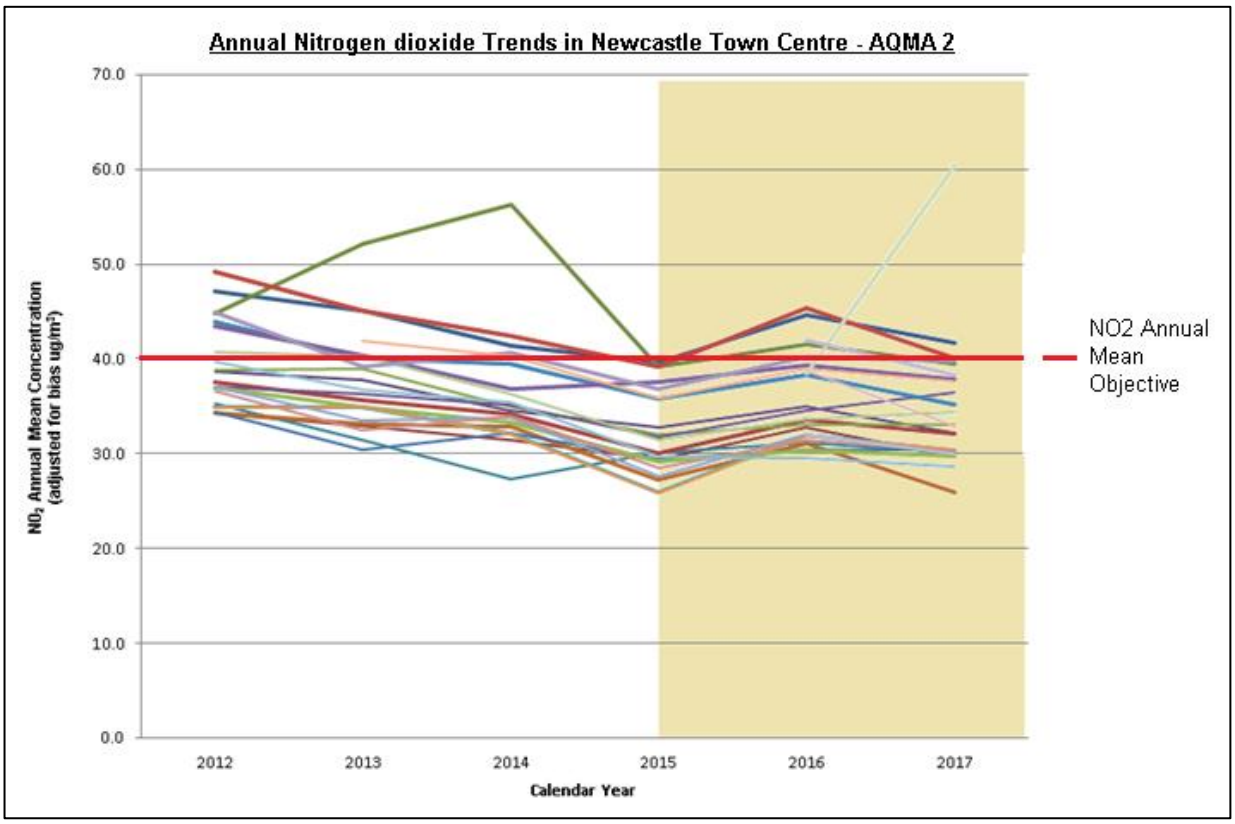


Figure 4 - Annual Mean NO_2 Concentrations from 2012 to 2017 of Newcastle Town Centre AQMA Number 2

In 2017 three of the monitoring sites within this AQMA measured an annual mean concentration which was higher than the previous year, these sites were;

- DT76 - Located at 11 Brunswick Street, Newcastle-under-Lyme
  - This site is representative of public exposure
  - Monitored value 36.5ug/m^3: Increase of 1.9 µg/m^3 on 2016 annual mean concentration

- DT95 - Located at 76 London Road, Newcastle-under-Lyme
  - This site is representative of public exposure
  - Monitored value 34.3ug/m3: Increase of 0.6 µg/m^3 on 2016 annual mean concentration

- DT102 - Located at 'Maxims', Lower Street, Newcastle-under-Lyme
  - This site is representative of public exposure
  - Monitored value of 60.4ug/m3: Increase of 21.9 µg/m^3 on 2016 annual mean concentration

Site DT102 had the most significant change in annual mean concentration, with a value of 60.4 µg/m^3 in 2017 (57% increase on 2016 concentration). This indicates that an exceedance of the 1 hour mean objective is likely at this location. Throughout 2017, the concentration of Nitrogen dioxide at this site was above the annual mean objective.

As the annual mean for Site DT102 was above the annual mean objective for Nitrogen dioxide, a distance correction calculation was conducted, which found that the predicted concentration at the receptor is likely to be above the AQS Objective (predicted concentration at receptor 52.9µg/m^3). Details of this calculation can be found in *Appendix D: 3.3 Distance Correction.*

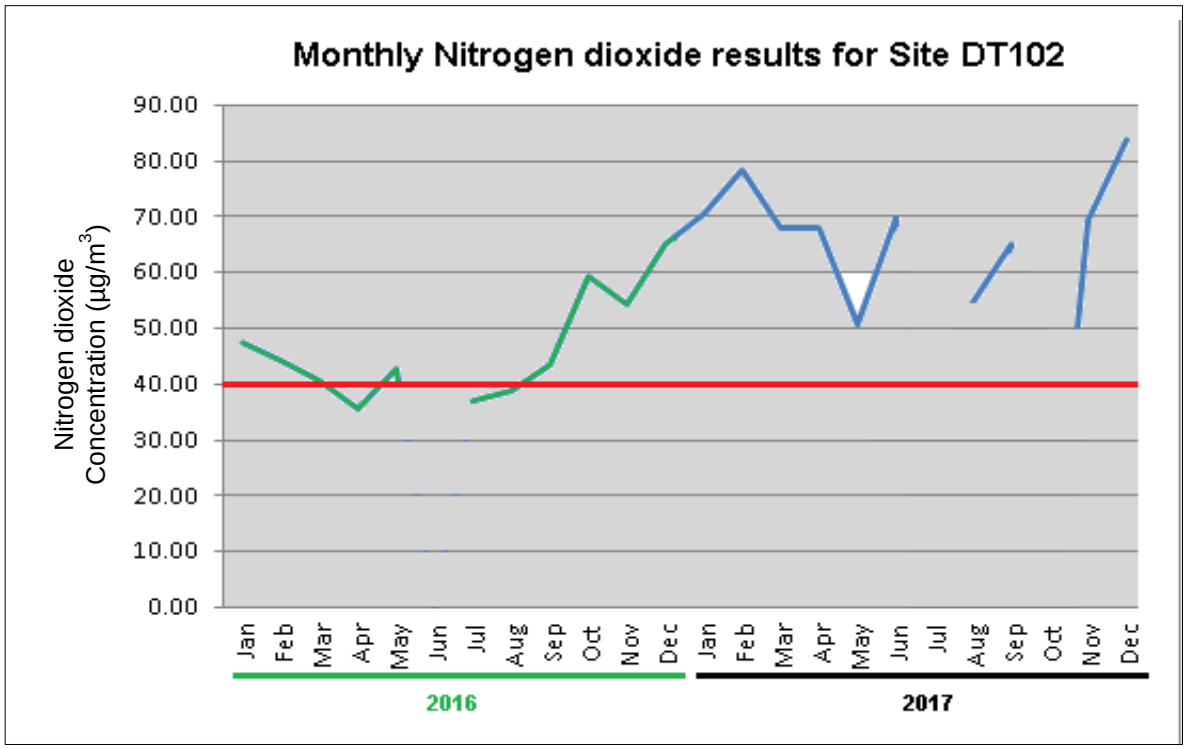


Figure 5 - Graph showing the difference between monthly concentrations of Nitrogen dioxide at site DT102 in 2016 and 2017. Note: Diffusion tube results were not available for June 2016, and June and October 2017.

Figure 5, shows the NO_2 concentrations at site DT102 in 2016 and 2017. It is clear from this graph that there has been a steady increase in NO_2 concentration at this location over the past 2 years, with a marked difference between levels measured in 2016 and those seen in 2017. The largest difference was between February 2016 and February 2017, where the monthly concentration increased from 44.27µg/m^3 to 78.31µg/m^3.

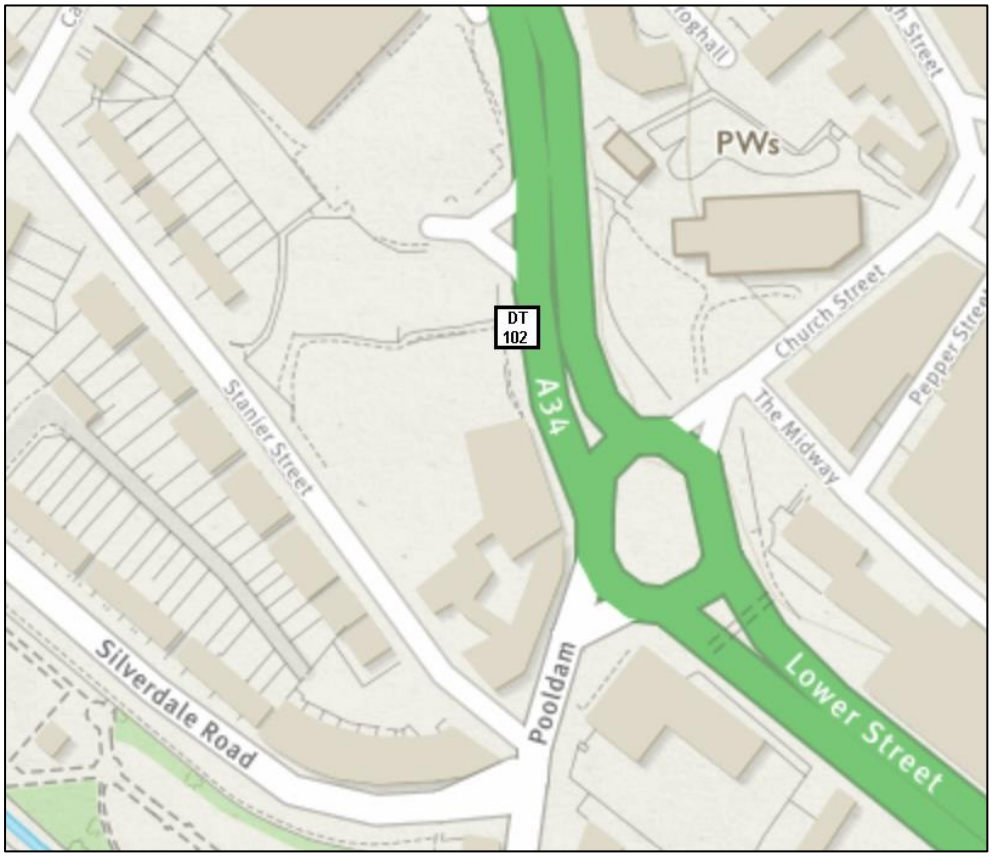


Figure 6: Location of Site DT102 on A34 (Lower Street), Newcastle-under-Lyme

The significant increase in annual mean NO_2 concentration at this site could be due to factors such as;

- Works involved in the conversion of the old 'Maxims' building into offices and training space

- Works involved in the construction of an elderly care village consisting of a three and four storey building containing a 74 bed care home with 28 care apartments, communal areas and offices, adjacent to the old 'Maxims' building.
- Installation of a number of boilers in these buildings.
- Roadworks taking place at other points along the Town Centre ring road leading to traffic idling for an increased period along this stretch of road.

As monitoring at site DT102 indicates that the an exceedance of the 1 hour mean objective is likely, the monitoring strategy for this area may need to be altered in order to more clearly identify the source contributions. This could be achieved by;

- Monitoring NO_2 concentrations upwind of site DT102, to allow a more accurate assessment of the contributions of the different sources to the measured values.
- Analysis of the type, speed and volume of traffic in this area at peak times and throughout the day. Congestion modelling may need to be undertaken to determine whether localised traffic around DT102 is a significant contributor to the elevated NO_2 concentrations.
- Details of the boiler systems installed and the height of the stack(s) serving the plant are required, as for certain types of installation, both seasonal and daily variations in emissions can be significant.

Persons living in this type 'assisted living' accommodation, are likely to suffer with pre-existing diseases which may make them more susceptible to health conditions associated with air pollution. Increased pollution exposures are associated with increased mortality and hospital admissions, due to exacerbations of chronic diseases or to respiratory tract infections. Chronic exposure to elevated levels of air pollution has been related to the incidence of chronic obstructive pulmonary disease (COPD), chronic bronchitis (CB), asthma, and emphysema. Research indicates that there are higher health risks in the elderly compared to the rest of the population due to poor air quality[12]. As high annual mean and monthly mean concentrations of Nitrogen dioxide in this area have been measured over the past 2 years, site DT102 will remain in place until levels a reduced to below the annual mean objective.

[12] Adverse effects of outdoor pollution in the elderly, Marzia Simoni et al. Journal of Thoracic Disease 2015 Jan; 7(1): 34–45. doi:10.3978/j.issn.2072-1439.2014.12.10,

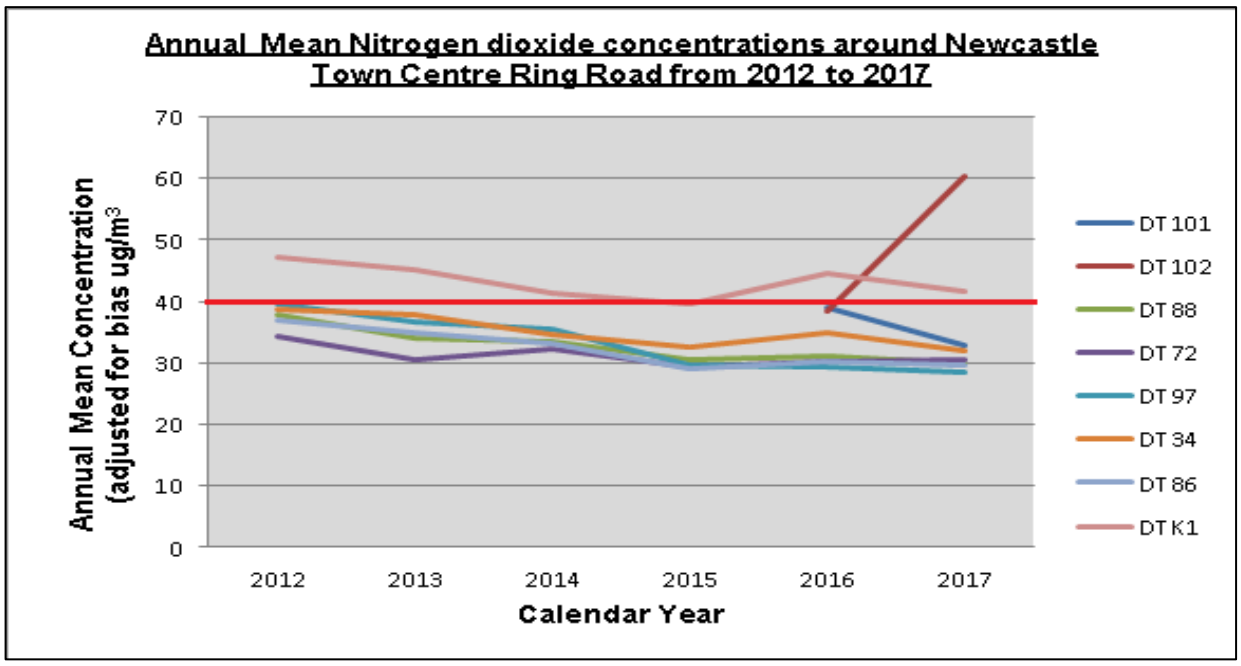


Figure 7 - Annual Mean Nitrogen dioxide concentrations around Newcastle Town Centre Ring Road from 2012 to 2017

Figure 7 shows the annual mean NO_2 trends for diffusion tubes located around the Town Centre ring road. Of the eight diffusion tubes located around the ring road, two (DT102 and DTK1) had annual mean concentrations which were above the annual mean objective, with only DT102 showing an increase in concentration when compared to 2016.

Of the twenty-six diffusion tube sites in the Town Centre AQMA, six remain within 10% of the annual mean, and are at risk of exceedance in future years. All other monitoring sites within this AQMA either remained static (DT72 and DT74), or showed a decrease on last years' annual mean concentrations.

The Newcastle-under-Lyme Town Centre AQMA will remain in place until all sites measure an annual mean NO_2 concentration that is consistently below the annual mean legal objective.

3.2.4 Porthill-Wolstanton-Maybank AQMA 3

Air Quality in this area is influenced by local road traffic and traffic utilising the junctions associated with the A500 dual carriageway. Relevant receptors in this location are mainly located at the back of footway. The main route through the area is single carriageway with traffic lighted junctions, signal controlled crossings, on street bus stops and significant sections of on street parking. Porthill Bank and Grange Lane are on significant gradients.

As shown in ***Figure 8***, there has been a steady decrease in NO_2 concentrations within this AQMA over the past 6 years. The highlighted section of the graph shows the change in annual mean NO_2 concentration since the AQMA was declared in 2015.

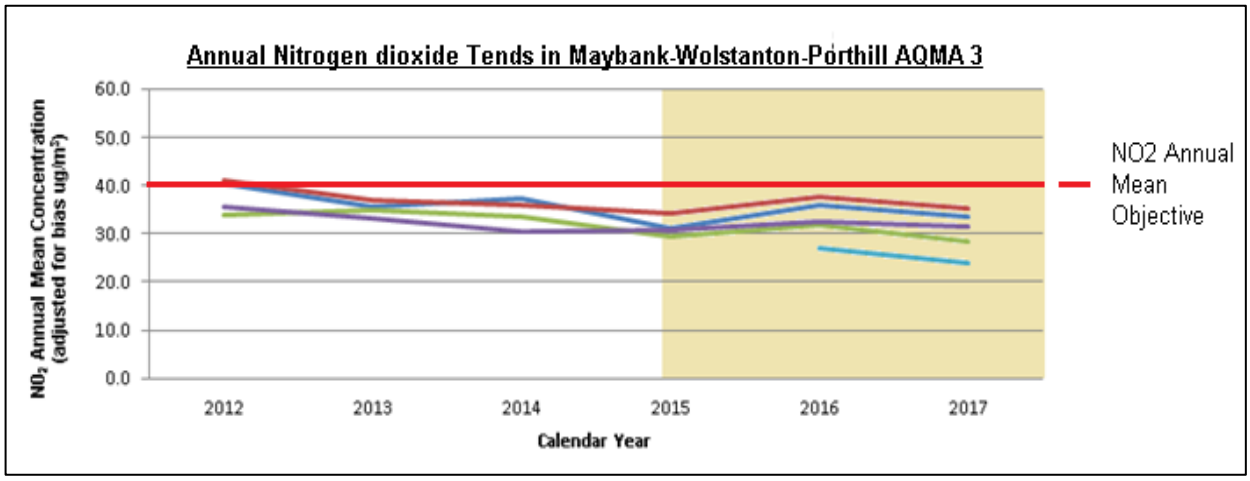


Figure 8 – Annual Mean NO_2 Concentrations from 2012 to 2017 of Maybank-Wolstanton-Porthill AQMA 3

All monitoring sites within this AQMA are now showing annual mean concentrations below the annual mean objective, with none of the sites being within 10% of the objective for 2017. The highest NO_2 concentration within the Porthill-Wolstanton-Maybank AQMA for 2017 was 35.3 µg/m^3 at site DT24.

There are a number of works planned which may affect this location, including the Etruria Valley Development scheme, which will see changes to the Church Lane / Grange Lane junction the junction near to this site and a new access from Grange Lane into the City Centre via Etruria Valley. There are also planned improvement

works by Highways England to the A500 between Wolstanton and Porthill. Both schemes are planned for delivery by 2020. They have the potential to increase traffic flow through this AQMA. Traffic modelling and the associated air quality impacts are currently being assessed by Highways England and Stoke on Trent City Council for their respective schemes. It is anticipated that this information will be available for inclusion in the next ASR due in June 2019.

The diffusion tube-monitoring network in this area will remain in place until the highway schemes have become embedded and there is confidence that NO_2 annual mean levels are consistently below the statutory objective.

3.2.5 Madeley AQMA 4

Air Qulaity in this location is heavily influenced by traffic using M6 motorway which runs within 20 metres of the nearest receptor at Collingwood 3 Newcastle Road.

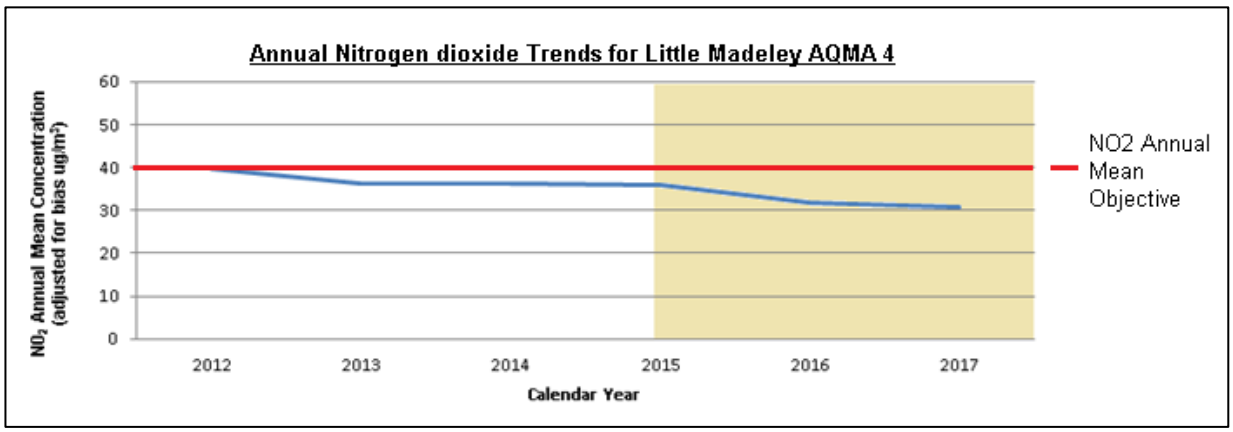


Figure 9 – Annual mean NO_2 Concentration from 2012 to 2017 of Little Madeley AQMA

As shown in ***Figure 9***Figure 8, there has been a decrease in NO_2 concentrations within this AQMA over the past 6 years. The highlighted section of the graph shows the change in annual mean NO_2 concentration since the AQMA was declared in 2015. The NO_2 concentration at this location in has been within 10% of the annual mean for the period between 2012 and 2015. NO_2 annual mean results at monitoring site DT3 have continued to fall, with annual concentration for 2017 being 30.7µg/m^3.

Highways England are introducing smart managed motorways and hard shoulder running up to Junction 15 of the M6 (Stoke on Trent South) and from junction 16 (Stoke on Trent North and Crewe) through to Junction 22. The stretch of motorway between junctions 15 and 16, which runs past experiences congestion at peak periods and may become a candidate for hard shoulder running and smart managed motorways in the future.

Based on the results since 2012 to present and potential future works to the M6 motorway this location will continue to be monitored for the near future.

3.2.6 Particulate Matter ($PM_{2.5}$)

Given the low levels of monitored PM_{10} in previous years which have been consistently below the relevant objective levels and that the monitoring equipment reached the end of its serviceable life early in 2016, the Council has decided to discontinue monitoring for this pollutant.

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	Newcastle under Lyme Queen's Gardens	Roadside	385046	346147	NO_2	YES	Chemiluminescent	2	3	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)
DTK1	A34 Holy Trinity	Urban Background	385051	345726	NO_2	YES	22	3	NO	3
DTK2	76 King St, N/C	Urban Centre	385469	346362	NO_2	YES	0	3	NO	2
DTUB1	Wolstanton (Haritngton St)	Kerbside	384739	348326	NO_2	NO	7	2	NO	3
DTUB2	Westlands (4 Sneyd Crescent)	Kerbside	383916	345059	NO_2	NO	23	2	NO	3
DT3	(Collingwood 3 Newcastle Rd)	Rural	378116	345488	NO_2	YES	0	128	NO	-2
DT6	(106 Liverpool Rd)	Suburban	384014	354429	NO_2	YES	0	4	NO	3
DT9	32 Porthill Bank	Suburban	385519	349055	NO_2	YES	0	6	NO	3
DT11	34 London Road, N/C	Suburban	385112	345636	NO_2	YES	0	3	NO	3
DT24	26 High St, May Bank	Roadside	385574	347530	NO_2	YES	0	3	NO	3
DT28	Limbrick Cottage Shraleybrook	Rural	377994	350105	NO_2	NO	0	45	NO	6
DT34	15 Barracks Road	Urban Centre	385059	345840	NO_2	YES	1	4	NO	3
DT 39	4/6 Liverpool Road, Kidsgrove	Suburban	383560	354739	NO_2	YES	0	2	NO	3
DT40	Banktop Court, Porthill	Suburban	385128	348811	NO_2	YES	0	20	NO	5
DT46	1 London Road (Trinity Court)	Urban Centre	385086	346155	NO_2	YES	0	4	NO	3
DT47	1 London Rd (Brook La)	Urban Centre	385073	345685	NO_2	YES	0	5	NO	3
DT49	2 Vale View, Porthill	Urban Centre	385023	345678	NO_2	YES	0	6	NO	3
DT64	Kidsgrove Carpets 57 - 59 Liverpool Road	Urban Centre	385595	349129	NO_2	YES	0	10	NO	10
DT72	134 High Street Newcastle	Roadside	383950	354445	NO_2	YES	0	3	NO	3
DT73	21 London Road Newcastle	Roadside	384980	345787	NO_2	YES	0	4	NO	3
DT74	39 London Road Newcastle	Roadside	385070	345738	NO_2	YES	0	4	NO	3
DT76	11 Brunswick Street Newcastle	Roadside	385132	345640	NO_2	YES	0	2	NO	3
DT84	102 King Street Newcastle	Roadside	385226	346156	NO_2	YES	0	2	NO	3
DT85	106 King Street Newcastle	Urban Centre	385548	346400	NO_2	YES	0	5	NO	3

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)
DT86	Hassell C.P. School Barracks Road N/C	Urban Centre	385575	346413	NO_2	YES	0	5	NO	2
DT87	Blue Chilli 1 King Street Newcastle	Urban Centre	385075	345910	NO_2	YES	0	5	NO	3
DT88	27 Lower Street Newcastle	Urban Centre	385105	346225	NO_2	YES	0	5	NO	2
DT89	Queens Gardens Newcastle	Urban Centre	384709	345881	NO_2	YES	0	5	YES	3
DT90	Queens Gardens Newcastle	Urban Centre	385054	346134	NO_2	YES	1	5	YES	1
DT91	Queens Gardens, Newcastle	Urban Centre	385054	346134	NO_2	YES	1	5	YES	1
DT92	41/43 Liverpool Road Kidsgrove	Urban Centre	385054	346134	NO_2	YES	1	5	NO	1
DT93	118 Liverpool Road Kidsgrove	Urban Centre	383890	354461	NO_2	YES	0	2	NO	3
DT94	116 Liverpool Road Kidsgrove	Urban Centre	384056	354393	NO_2	YES	0	3	NO	4
DT95	76 London Road Newcastle	Urban Centre	384030	354416	NO_2	YES	0	4	NO	4
DT96	52/54 London Road Newcastle	Roadside	385171	345539	NO_2	YES	0	2	NO	4
DT97	Blackfriars/ Lower Street	Roadside	385131	345601	NO_2	YES	0	3	NO	3
DT98	Newcastle Taxis Brunswick Street	Roadside	384795	345796	NO_2	YES	0	2	NO	2
DT100	Sainbury's Carpark Near to Courts	Roadside	384784	342528	NO_2	YES	0	117	NO	2
DT101	Blackburn House Lower Street Newcastle	Roadside	384710	346282	NO_2	YES	5	4	NO	4
DT102	Maxims Lower Street Newcastle	Roadside	384806	345849	NO_2	YES	4	4	NO	4
DT103	Grange Lange/High Street Wolstanton	Roadside	384613	345999	NO_2	YES	20	5	NO	5
DT104	7 King Street Newcastle	Roadside	385216	346271	NO_2	YES	0	5	NO	5
DT105	The Avenue, Kidsgrove	Roadside	385213	346270	NO_2	YES	0.2	2	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 ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
CM1	Urban Centre	Automatic	100	100	28.8	33	25.7	37.5	23.1
DTK1	Kerbside	Diffusion Tube	100	100	**45.0**	**41.4**	39.6	**44.6**	**41.7**
DTK2	Urban Centre	Diffusion Tube	100	100	32.9	31.4	29.3	32.7	29.7
DTUB1	Kerbside	Diffusion Tube	100	100	21.4	18.3	18.4	19.7	19.0
DTUB2	Kerbside	Diffusion Tube	100	100	18.5	17.9	16.3	17.4	15.5
DT3	Rural	Diffusion Tube	100	100	36.4	36.3	35.9	31.9	30.7
DT6	Suburban	Diffusion Tube	100	100	**42.4**	**40.5**	36.7	**41.8**	37.7
DT9	Suburban	Diffusion Tube	100	100	35.6	37.2	31.1	36	33.4
DT11	Suburban	Diffusion Tube	100	100	**52.1**	**56.2**	39.2	**41.5**	39.5
DT24	Roadside	Diffusion Tube	100	100	37.0	35.9	34.3	37.7	35.3
DT28	Rural	Diffusion Tube	100	100	35.3	33.1	32.8	30.8	29.9
DT34	Urban Centre	Diffusion Tube	100	100	37.7	34.6	32.7	35	32.1
DT 39	Suburban	Diffusion Tube	100	100	38.3	35.9	30.8	37.4	33.4
DT40	Suburban	Diffusion Tube	100	100	34.8	33.7	29.5	31.8	28.3
DT46	Urban Centre	Diffusion Tube	100	100	31.5	27.2	30.0	31.1	30.1
DT47	Urban Centre	Diffusion Tube	100	100	33.1	32.9	27.2	31.1	25.8
DT49	Urban Centre	Diffusion Tube	100	100	33.3	30.6	30.9	32.6	31.5

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2017 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2013	2014	2015	2016	2017
DT64	Urban Centre	Diffusion Tube	100	100	37.6	37.3	35.9	37.9	35.9
DT72	Roadside	Diffusion Tube	100	100	30.4	32.2	29.4	30.4	30.4
DT73	Roadside	Diffusion Tube	100	100	35.7	34.2	30.0	33.6	32.0
DT74	Roadside	Diffusion Tube	100	100	38.9	35.0	32.0	33	33
DT76	Roadside	Diffusion Tube	100	100	36.3	35.2	31.7	34.6	36.5
DT84	Roadside	Diffusion Tube	100	100	**40.1**	39.5	35.8	38.3	35.1
DT85	Urban Centre	Diffusion Tube	100	100	**45.1**	**42.4**	39.2	**45.3**	**40.0**
DT86	Urban Centre	Diffusion Tube	100	100	34.8	33.2	29.1	30.4	29.7
DT87	Urban Centre	Diffusion Tube	100	100	**40.3**	36.8	37.6	39.3	37.9
DT88	Urban Centre	Diffusion Tube	100	100	34.0	33.6	30.7	31.2	29.9
DT89	Urban Centre	Diffusion Tube	100	100	34.9	32.0	25.9	31.9	30.4
DT90	Urban Centre	Diffusion Tube	100	100	33.5	33.7	27.6	32.1	30.0
DT91	Urban Centre	Diffusion Tube	100	92	32.5	33.9	28.4	31.5	30.3
DT92	Urban Centre	Diffusion Tube	100	92	36.9	36.0	31.4	33.9	33.5
DT93	Urban Centre	Diffusion Tube	100	100	33.8	32.5	29.3	33.4	30.4
DT94	Urban Centre	Diffusion Tube	100	100	38.1	34.6	32.8	34.8	32.1
DT95	Urban Centre	Diffusion Tube	100	100	**40.3**	36.3	31.5	33.7	34.3
DT96	Roadside	Diffusion Tube	100	100	39.2	**40.6**	36.8	**40.2**	39.8
DT97	Roadside	Diffusion Tube	100	100	36.7	35.5	29.6	29.5	28.6

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2013	2014	2015	2016	2017
DT98	Roadside	Diffusion Tube	100	100	**42.0**	**40.3**	35.8	39	37.7
DT100	Roadside	Diffusion Tube	100	100				32.05	30.0
DT101	Roadside	Diffusion Tube	100	100				38.88	33.0
DT102	Roadside	Diffusion Tube	100	83				38.5	**60.4**
DT103	Roadside	Diffusion Tube	100	100				27.09	24.1
DT104	Roadside	Diffusion Tube	100	100				**42**	38.2
DT105	Roadside	Diffusion Tube	100	42					28.38(3)

☒ **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**.

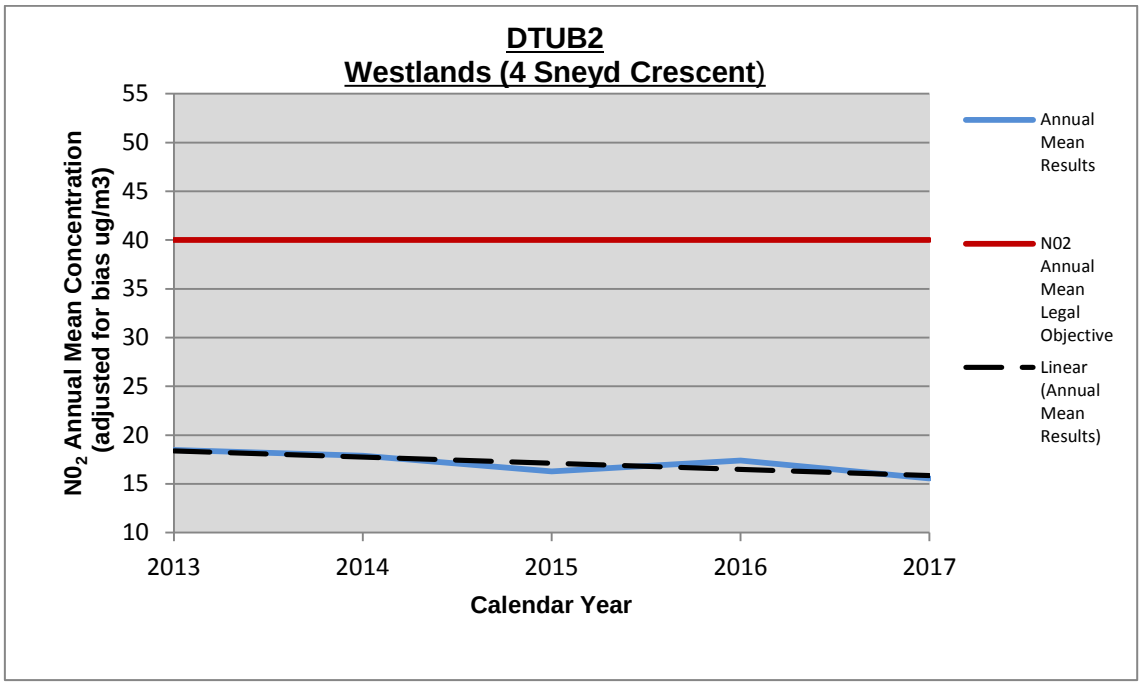
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

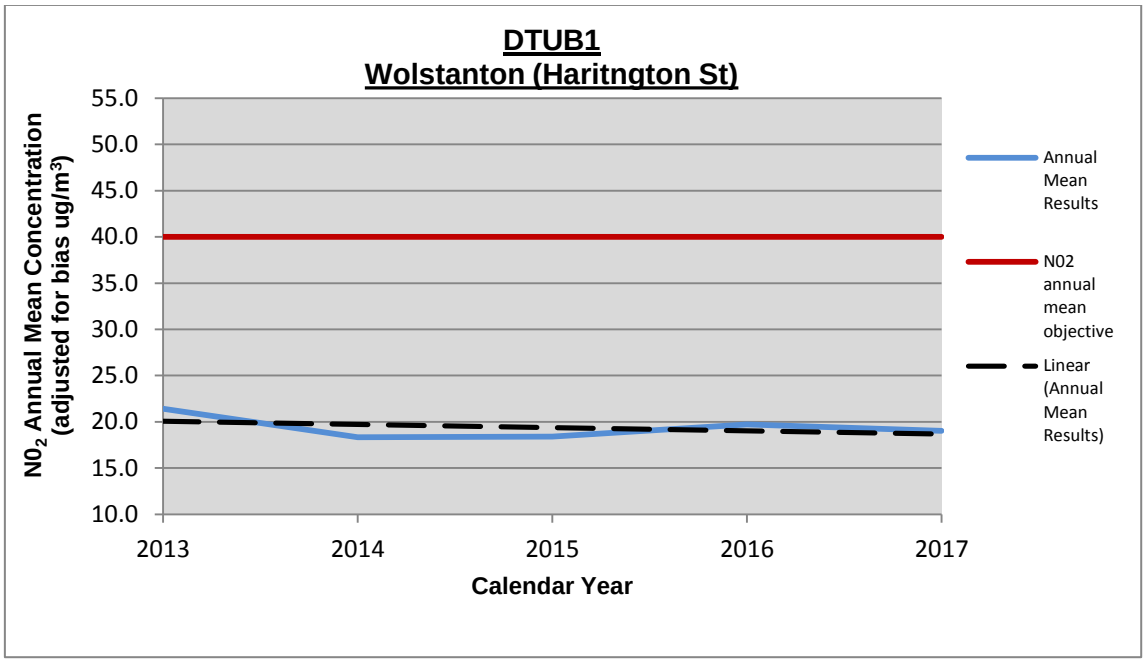
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

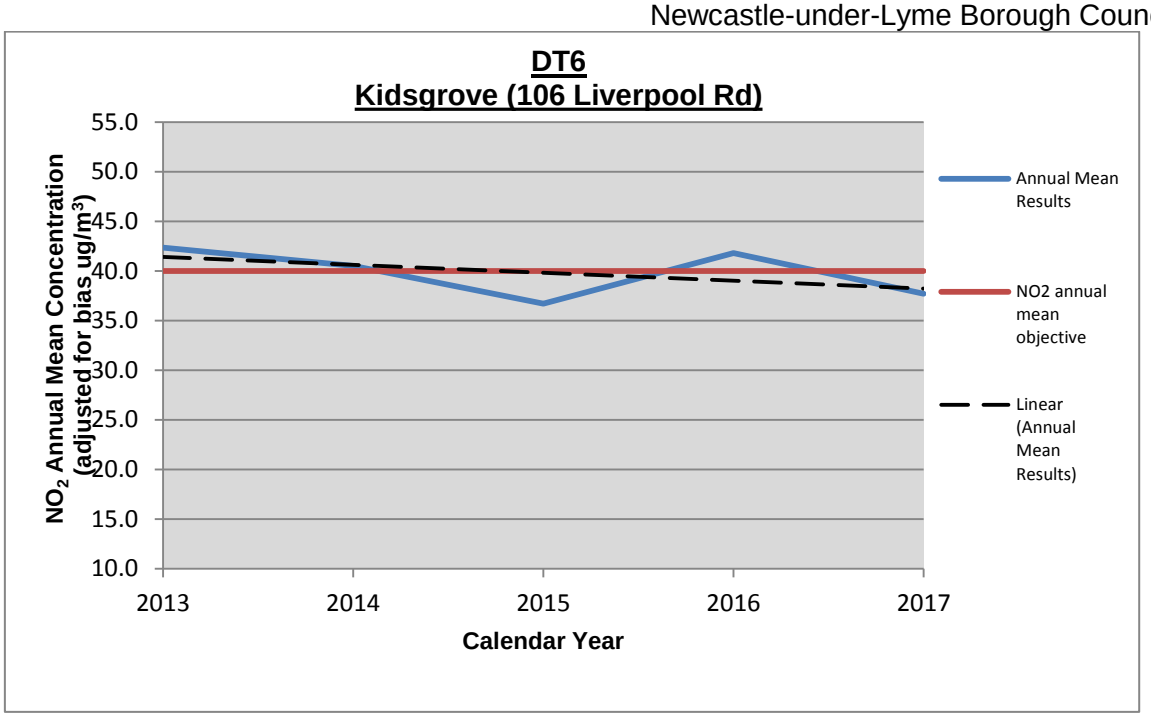
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

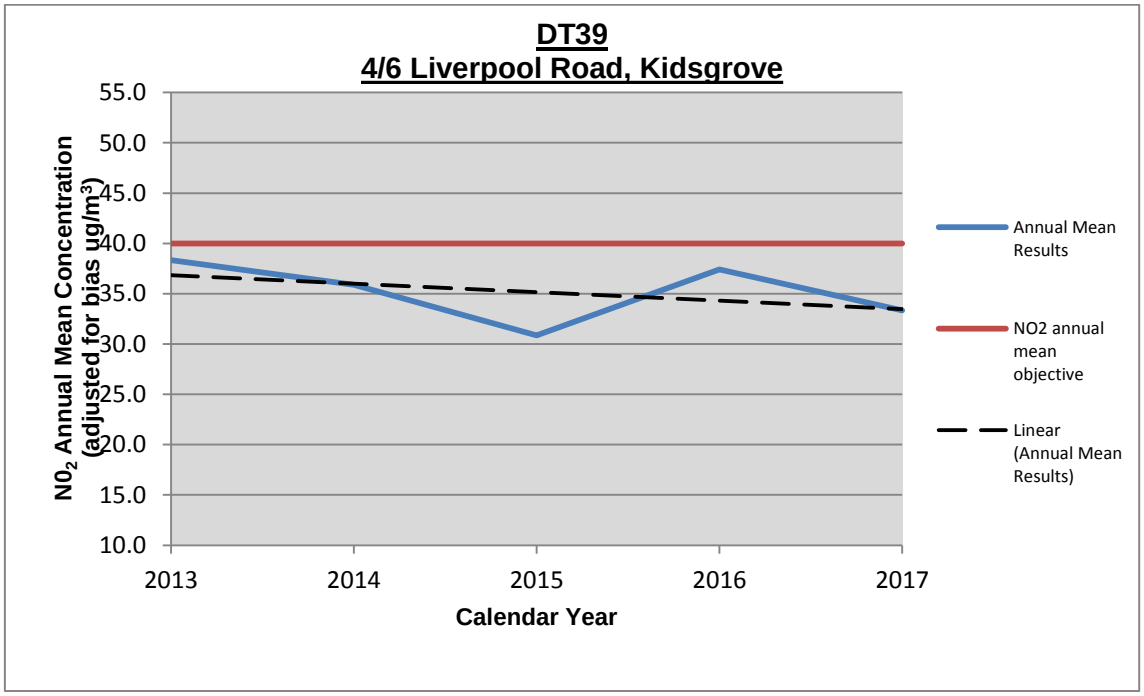
(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

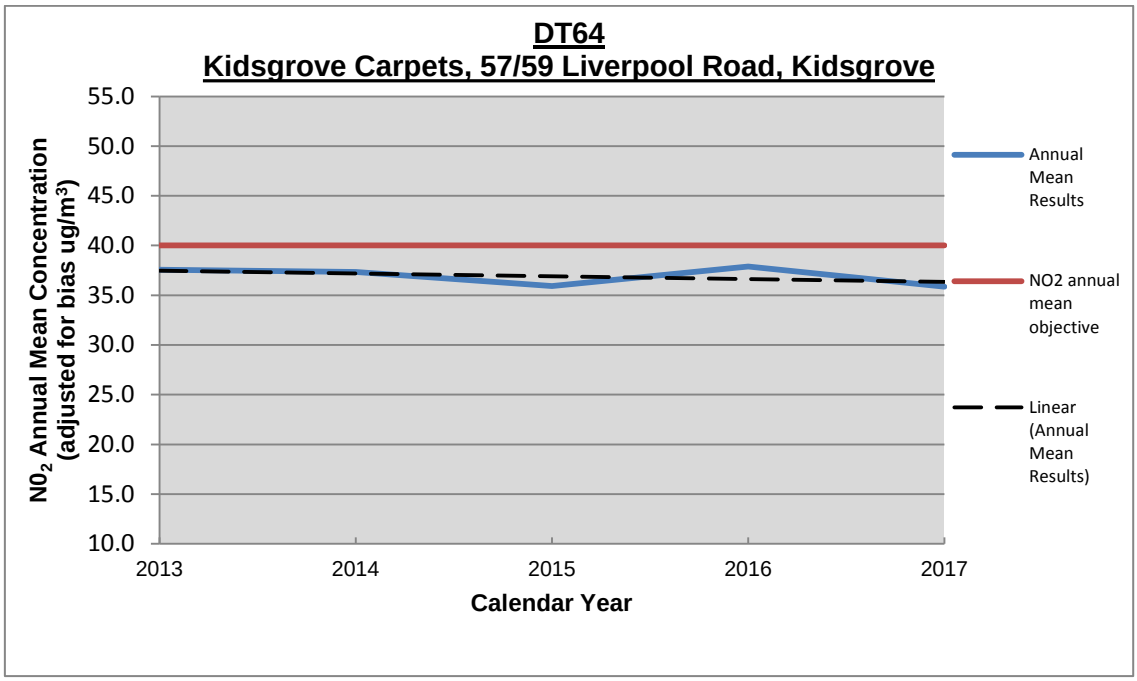
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

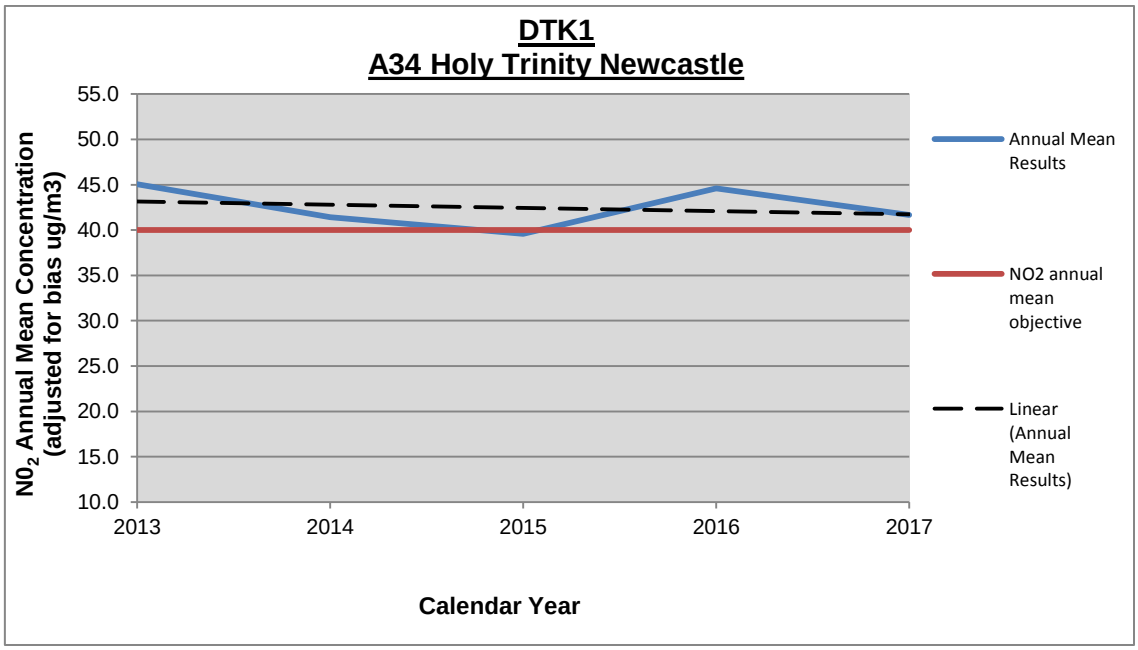


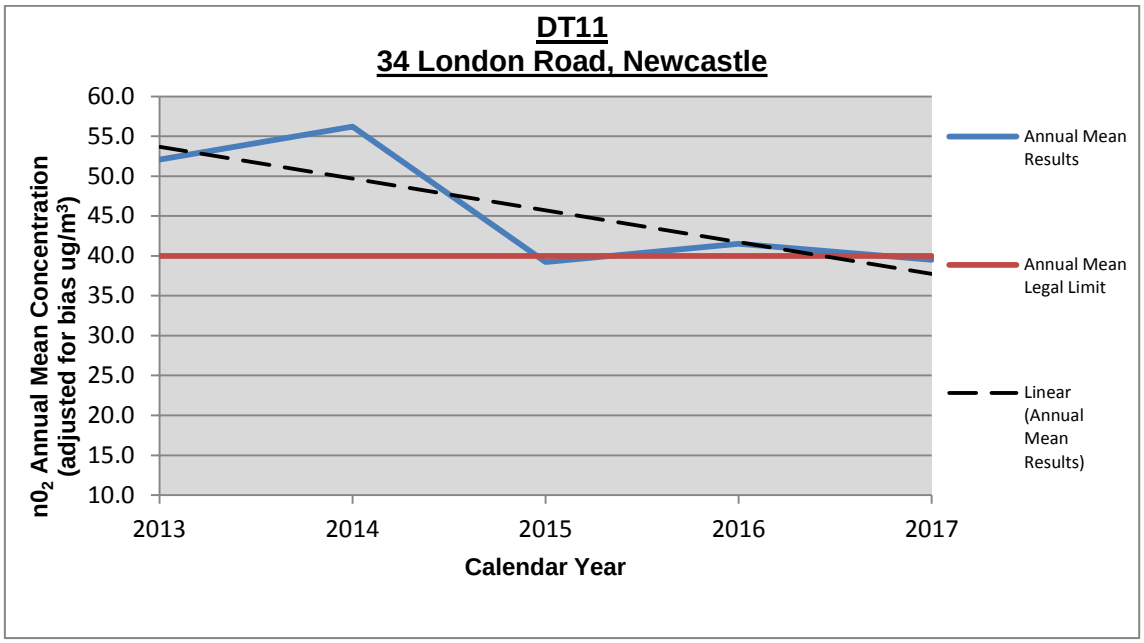


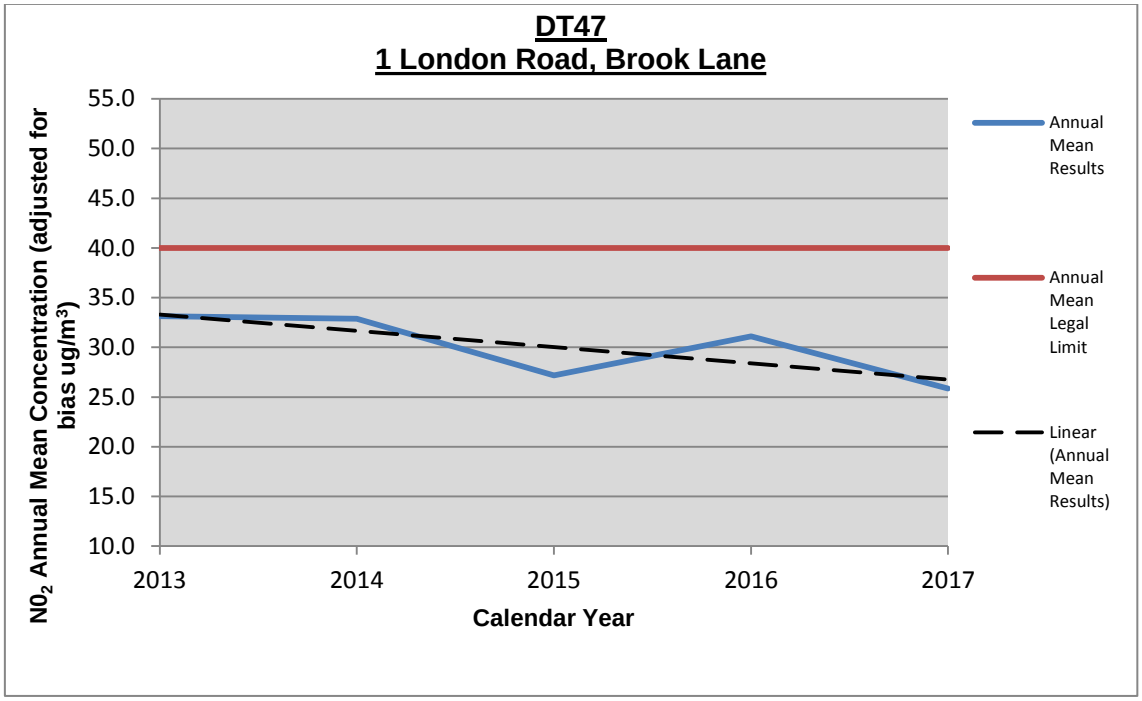

DT6
Kidsgrove (106 Liverpool Rd)
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
NO2 annual mean objective
Linear (Annual Mean Results)

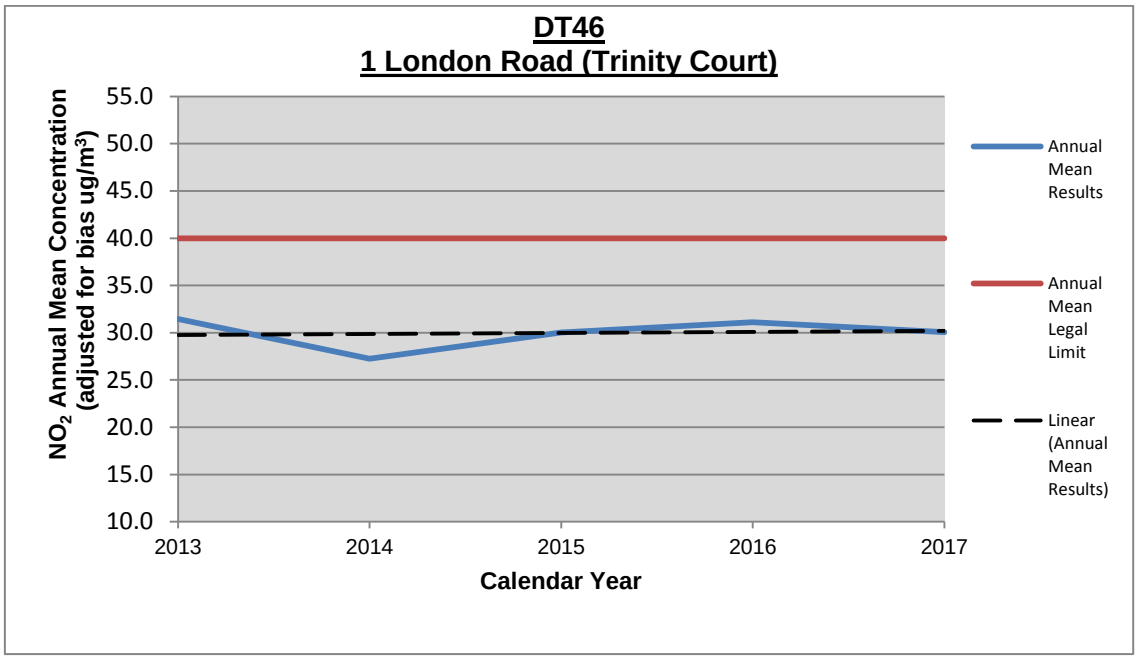

DT39
4/6 Liverpool Road, Kidsgrove
N02 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
NO2 annual mean objective
Linear (Annual Mean Results)

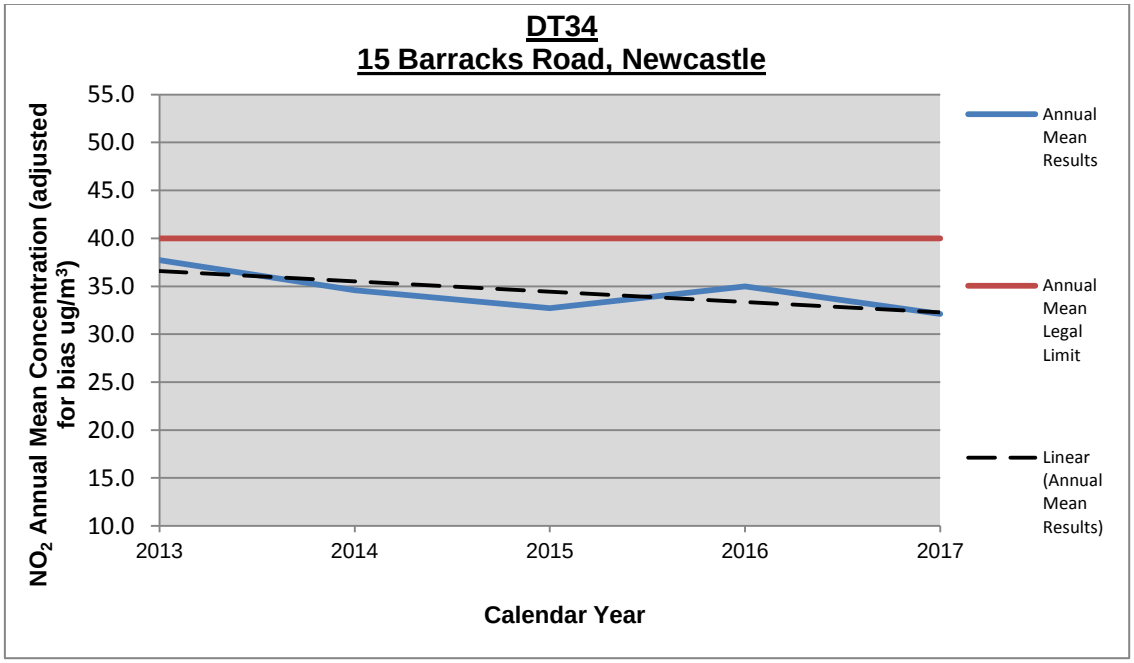

DT64
Kidsgrove Carpets, 57/59 Liverpool Road, Kidsgrove
NO_2 Annual Mean Concentration (adjusted for bias ug/m³)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
NO2 annual mean objective
Linear (Annual Mean Results)

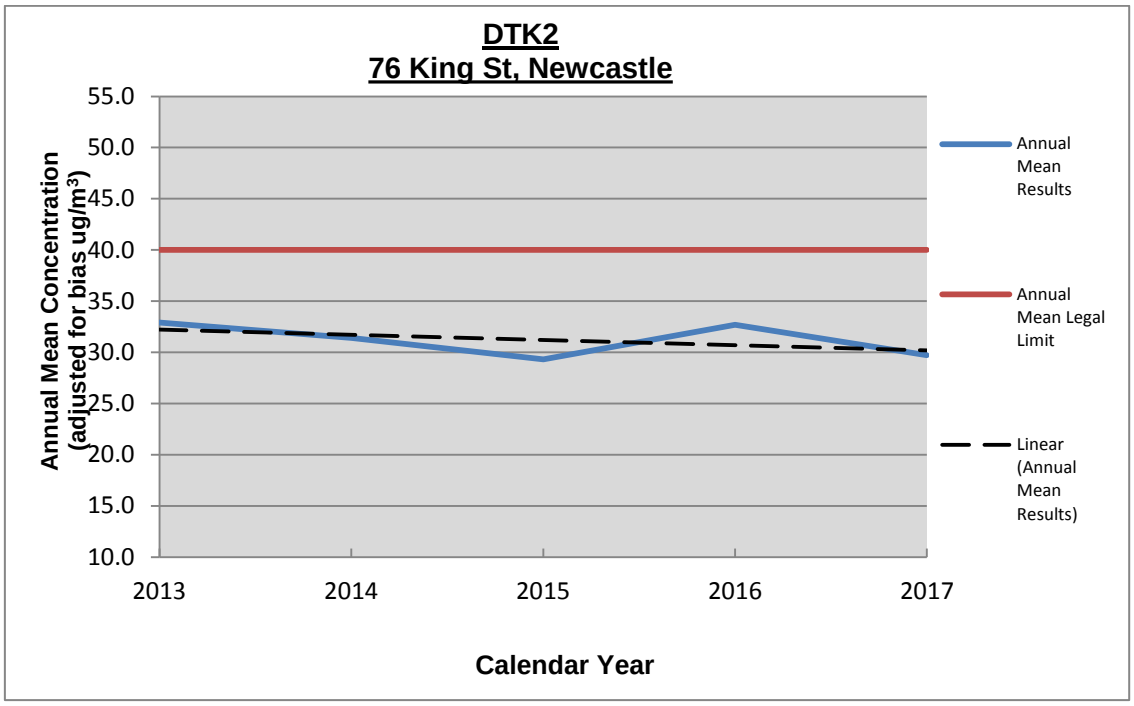

DTK1
A34 Holy Trinity Newcastle
NO_2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
NO2 annual mean objective
Linear (Annual Mean Results)

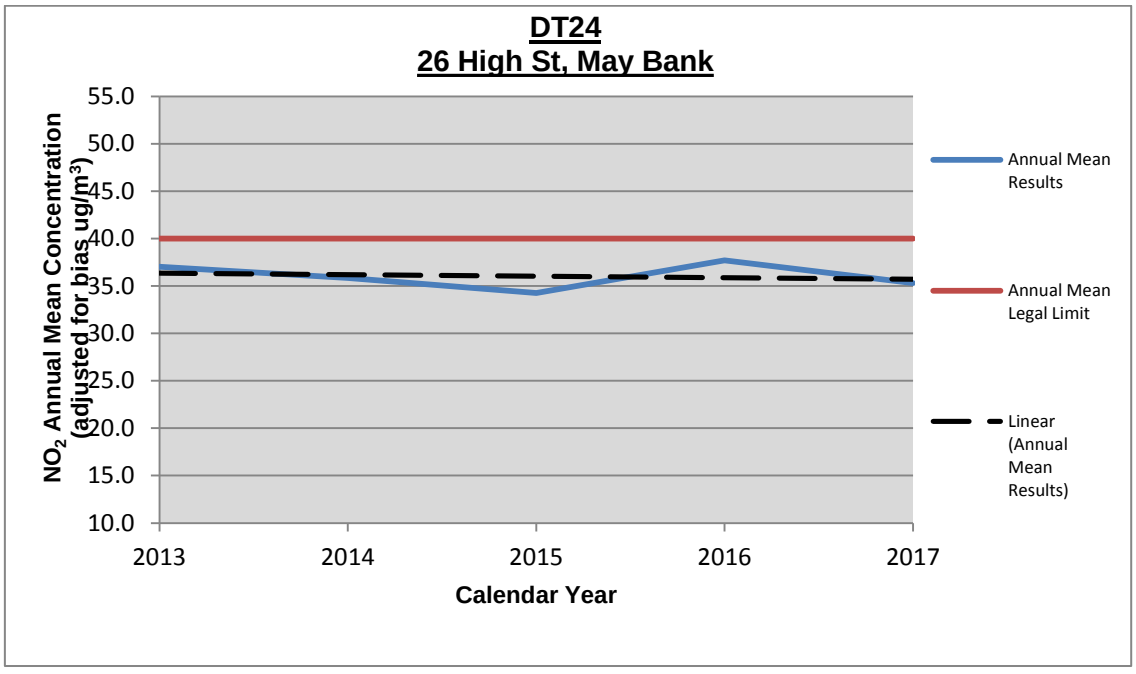

DT11
34 London Road, Newcastle
n0$_2$ Annual Mean Concentration (adjusted for bias ug/m^3)
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

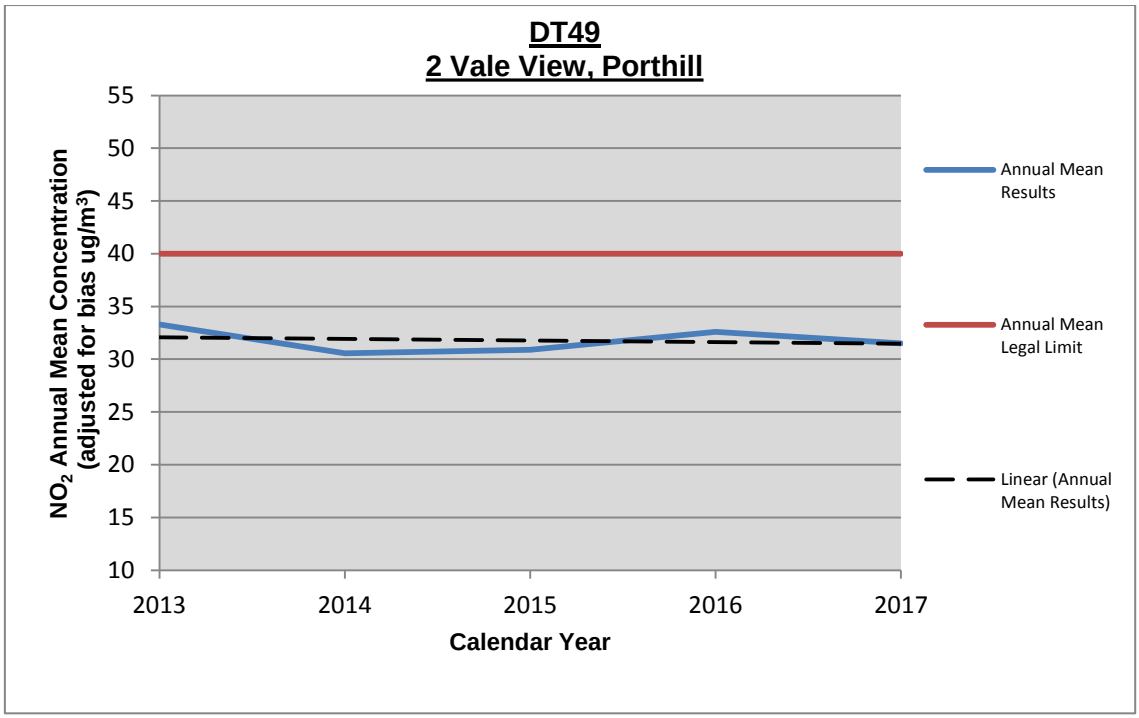

DT47
1 London Road, Brook Lane
N0$_2$ Annual Mean Concentration (adjusted for bias ug/m^3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

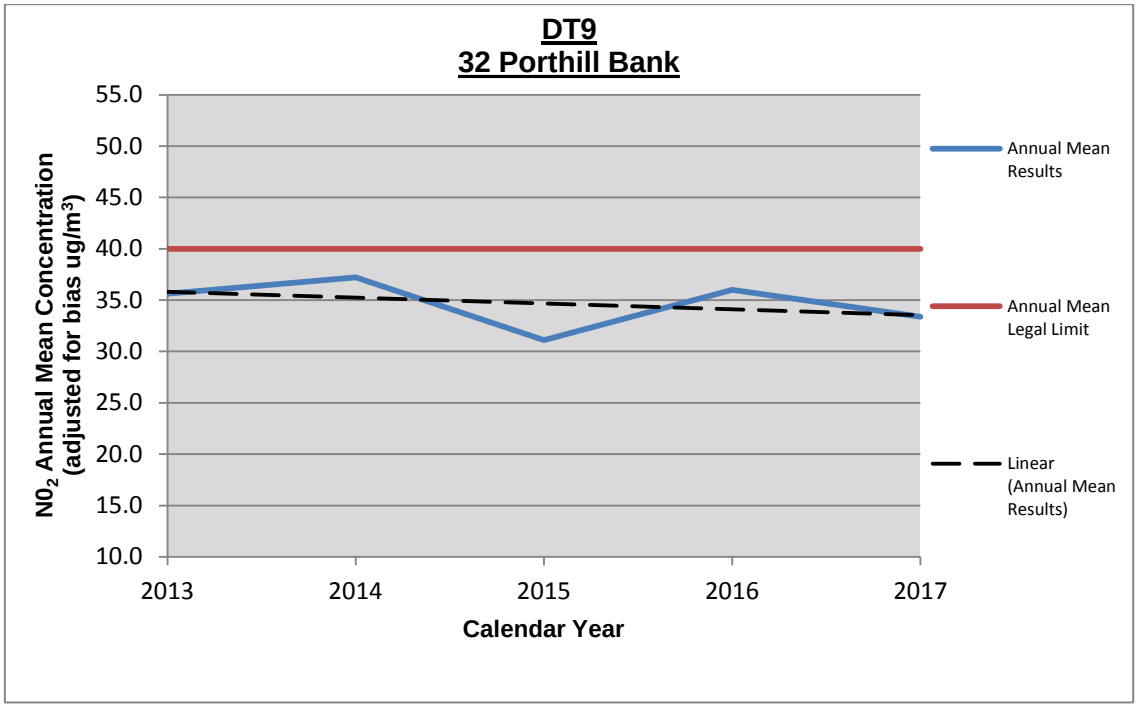

DT46
1 London Road (Trinity Court)
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

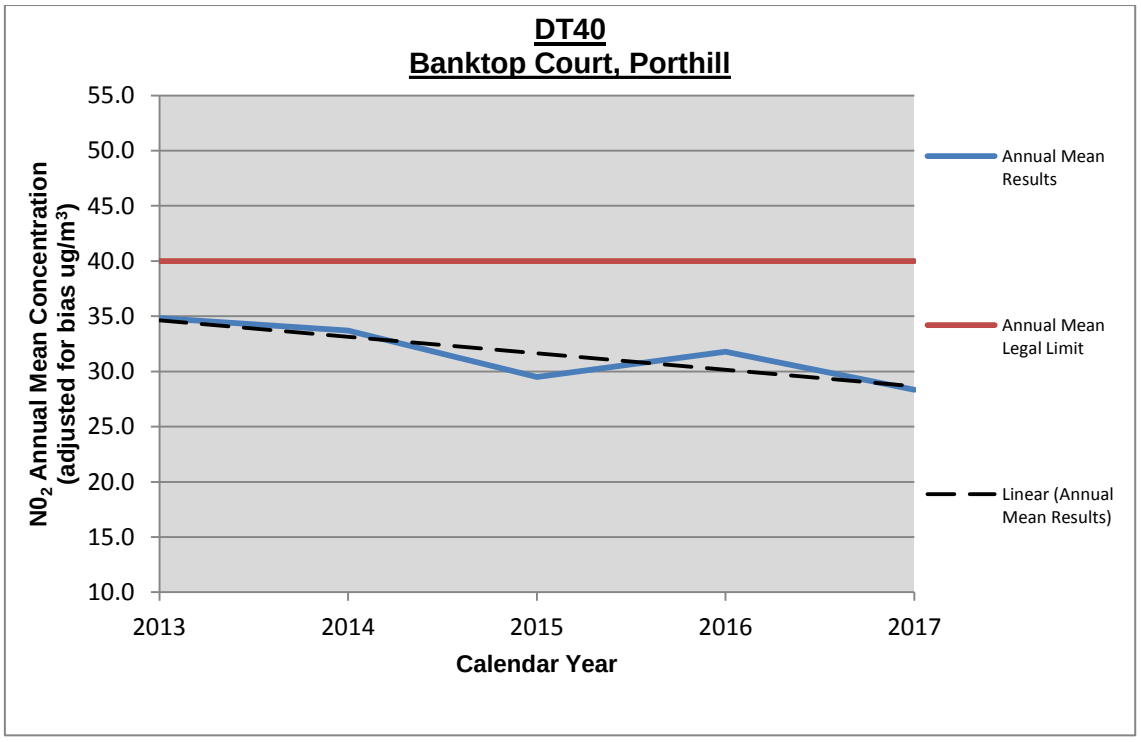

DT34
15 Barracks Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

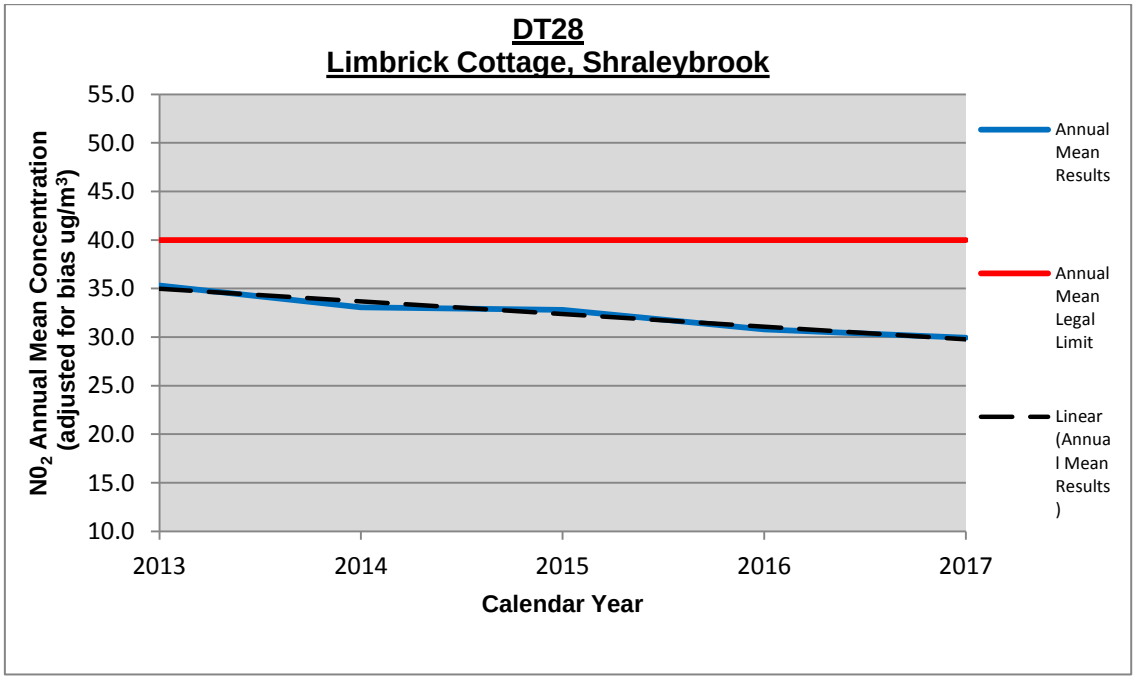

DTK2
76 King St, Newcastle
Annual Mean Concentration (adjusted for bias ug/m³)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

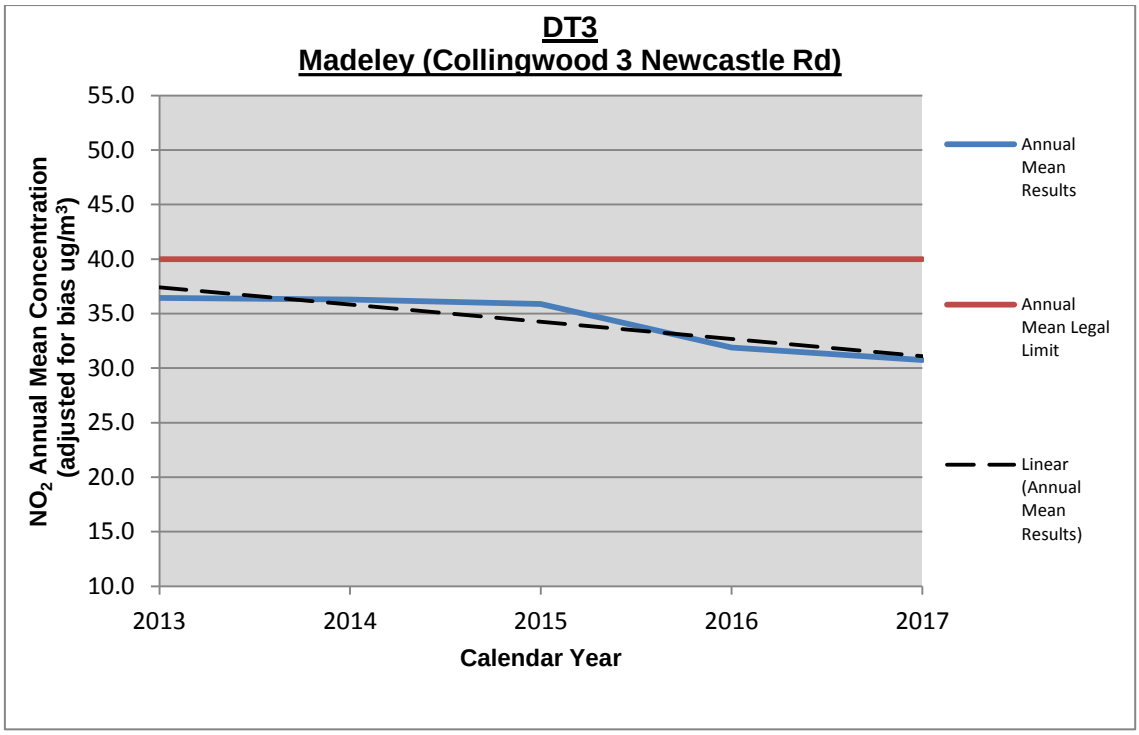

DT24
26 High St, May Bank
NO2 Annual Mean Concentration (adjusted for bias ug/m³)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

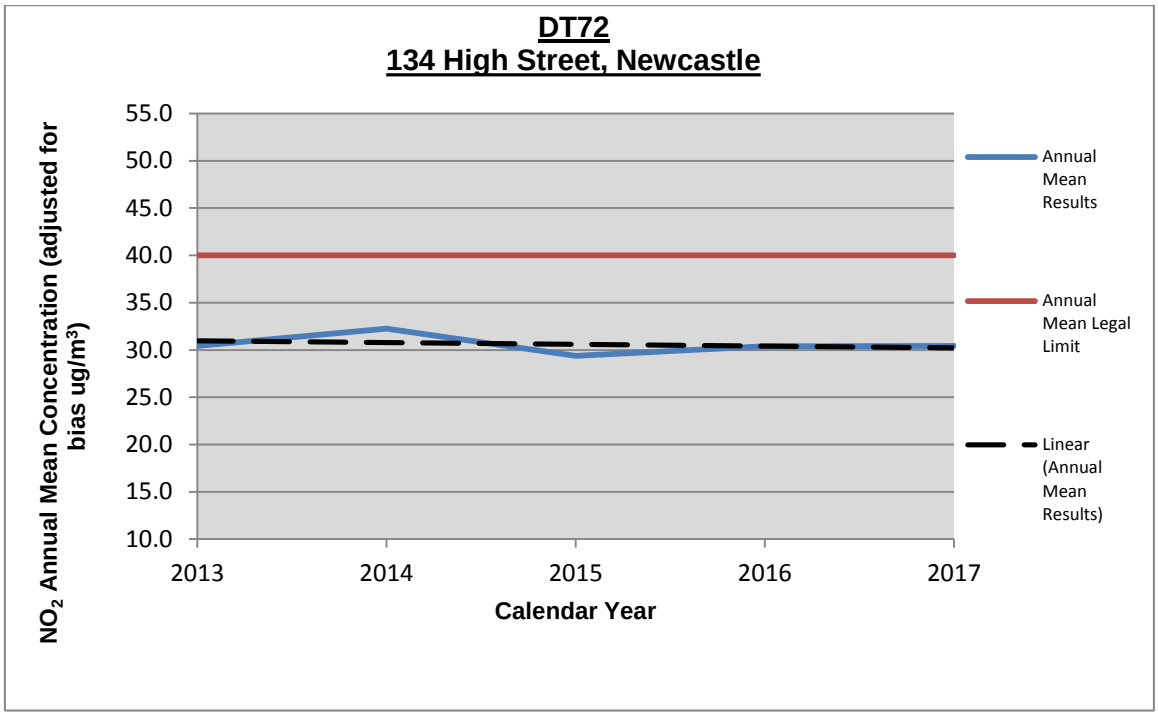

DT49
2 Vale View, Porthill
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55
50
45
40
35
30
25
20
15
10
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

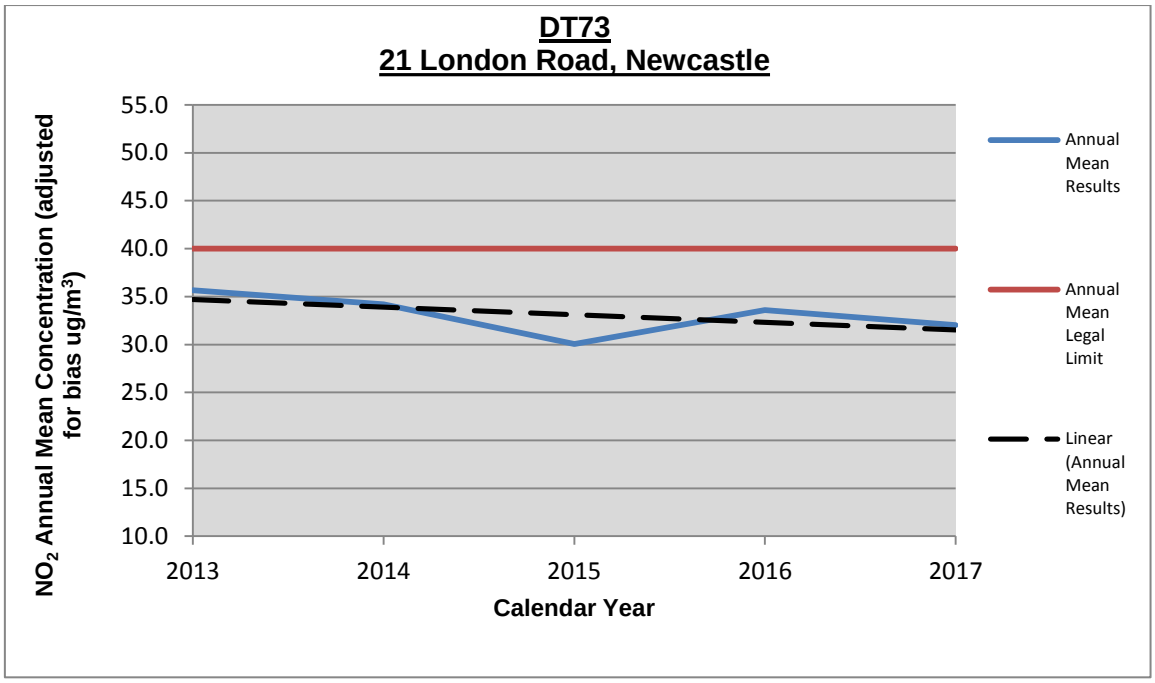

DT9
32 Porthill Bank
N02 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

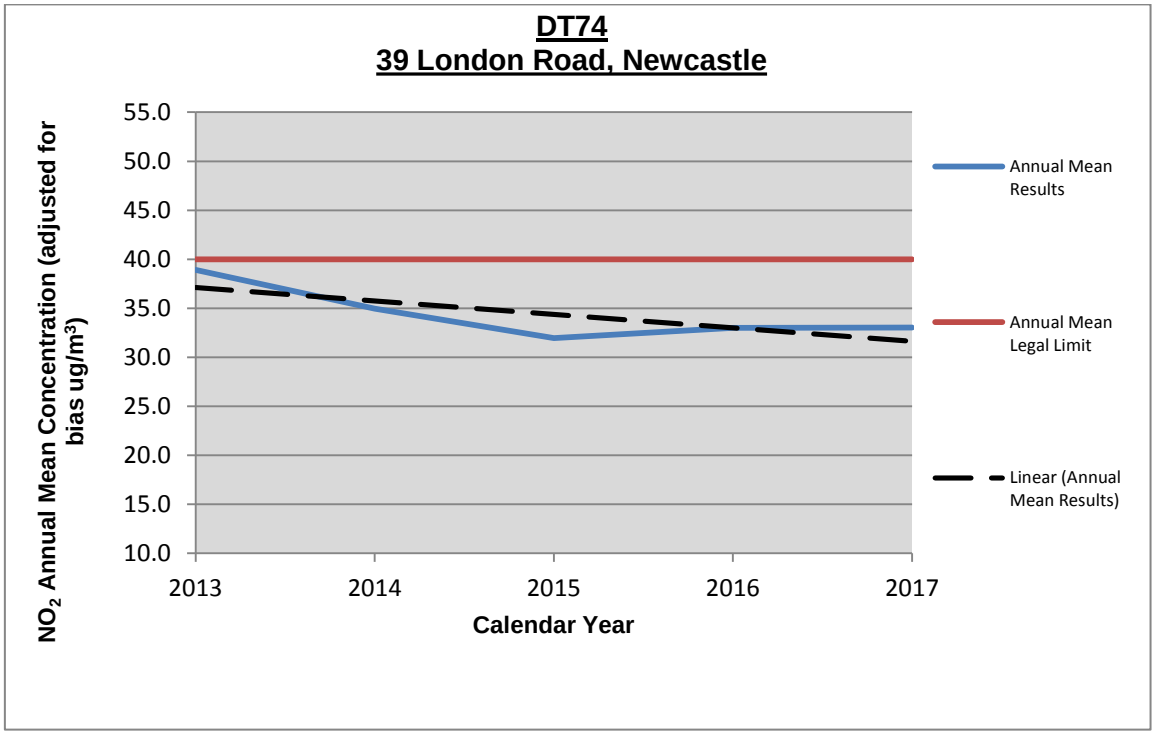

DT40
Banktop Court, Porthill
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

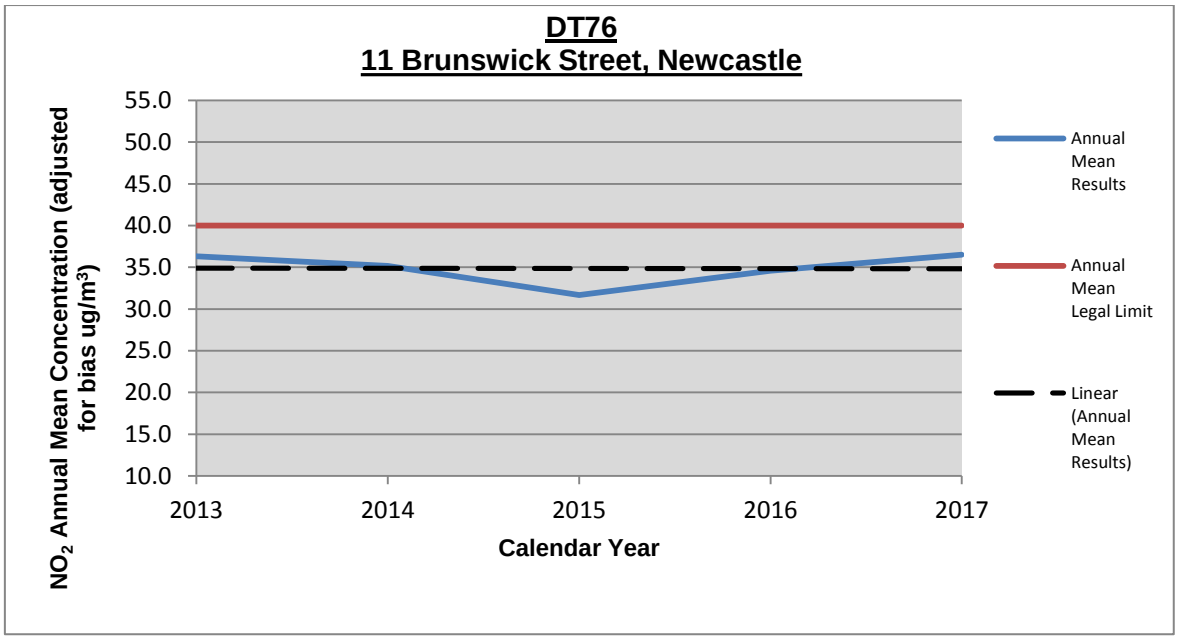

DT28
Limbrick Cottage, Shraleybrook
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

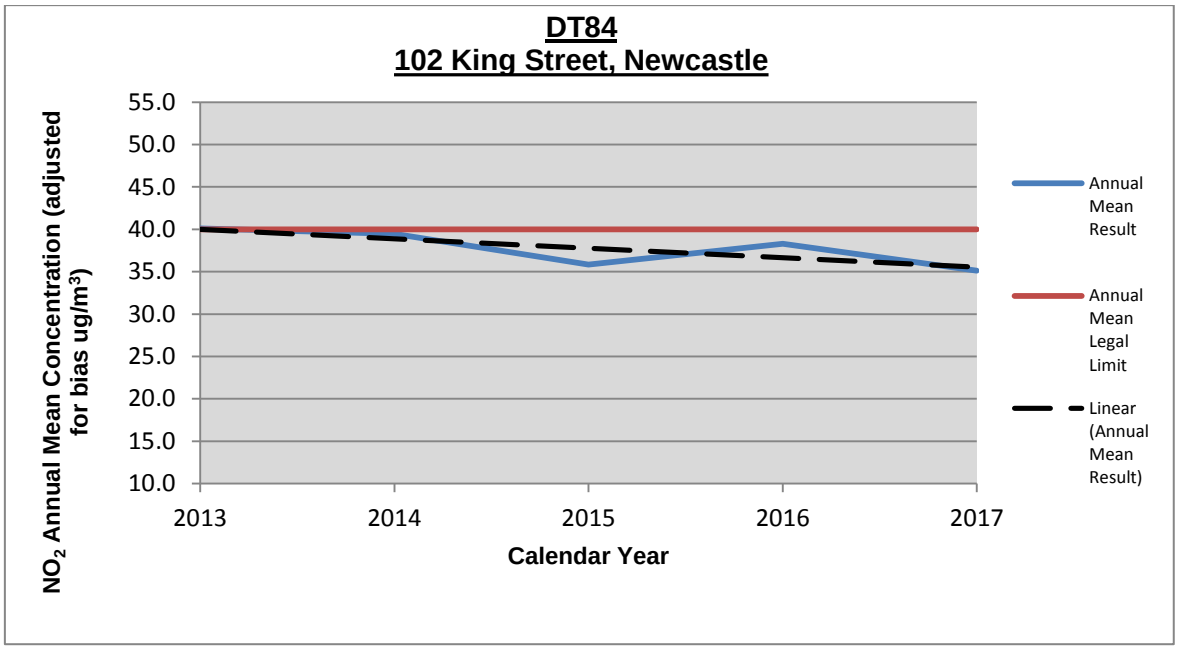

DT3
Madeley (Collingwood 3 Newcastle Rd)
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

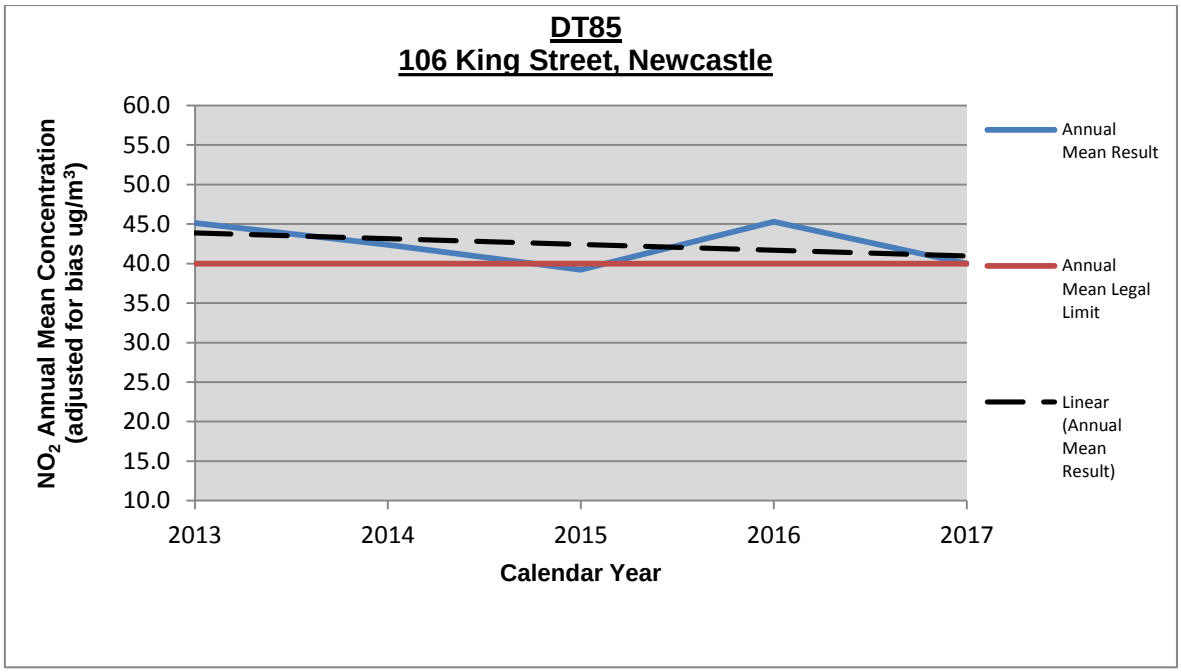

DT72
134 High Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

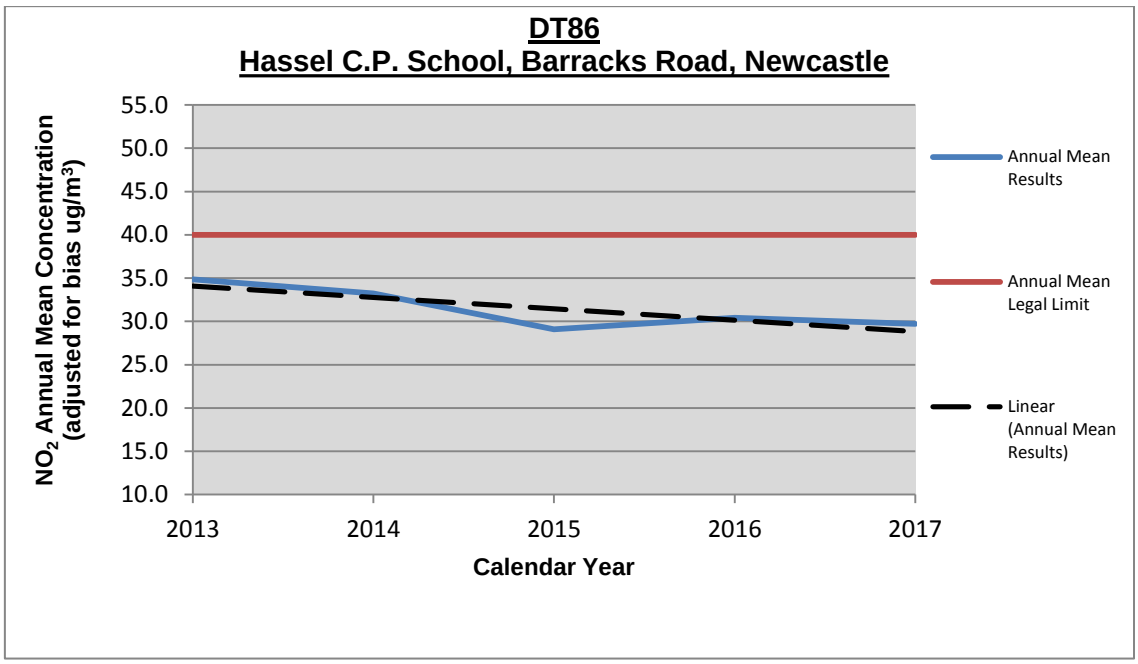

DT73
21 London Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

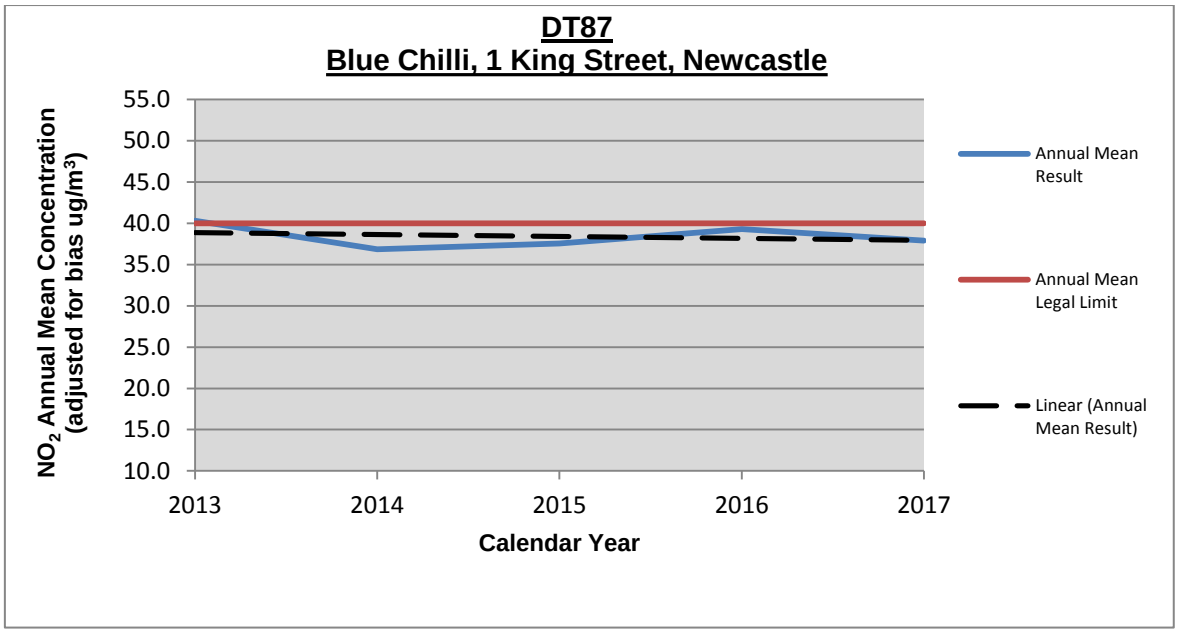

DT74
39 London Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

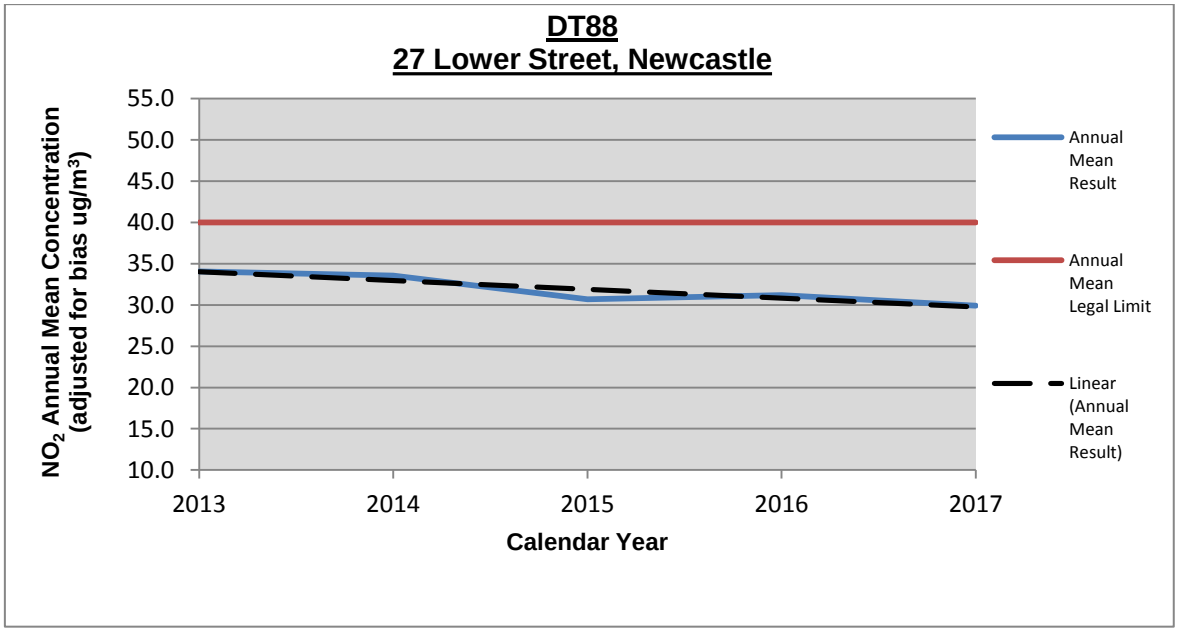

DT76
11 Brunswick Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

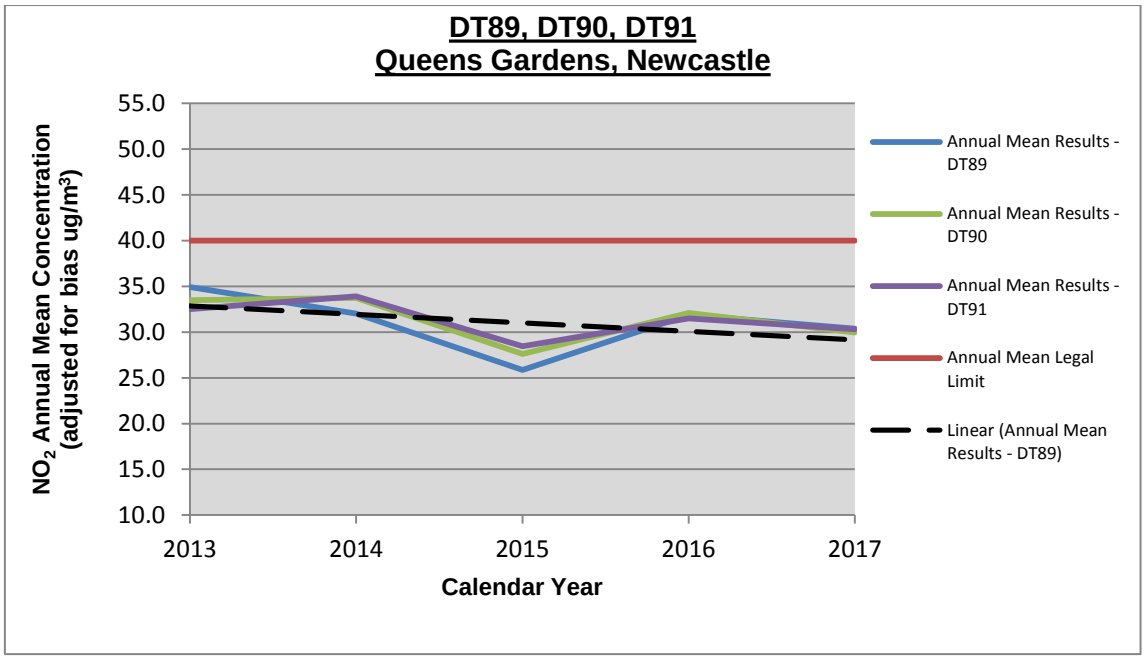

DT84
102 King Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Result
Annual Mean Legal Limit
Linear (Annual Mean Result)

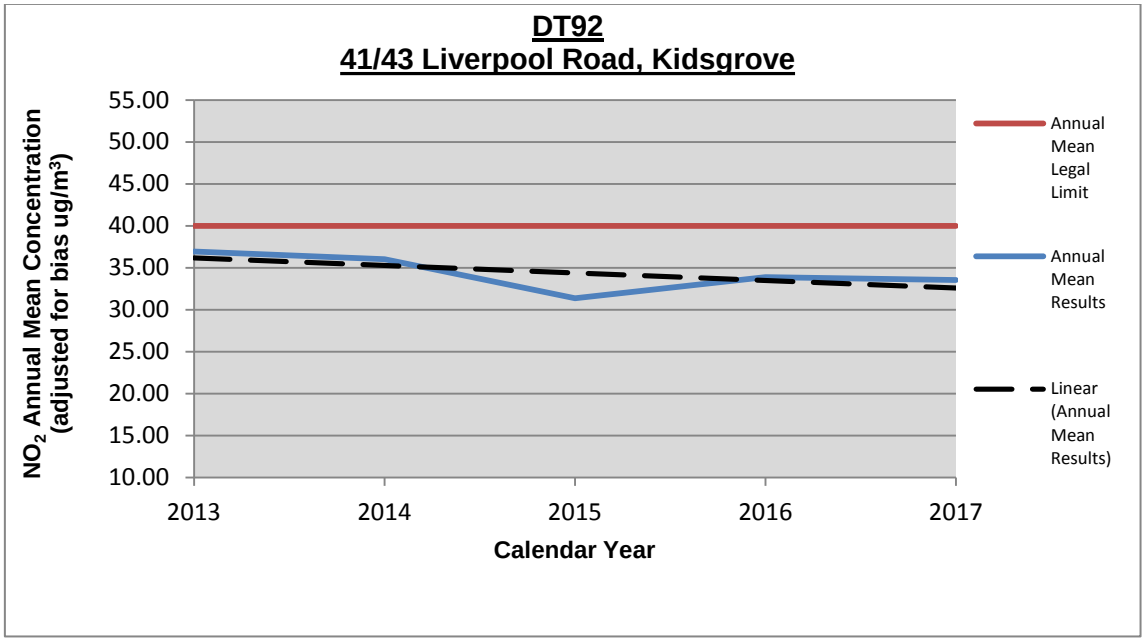

DT85
106 King Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Result
Annual Mean Legal Limit
Linear (Annual Mean Result)

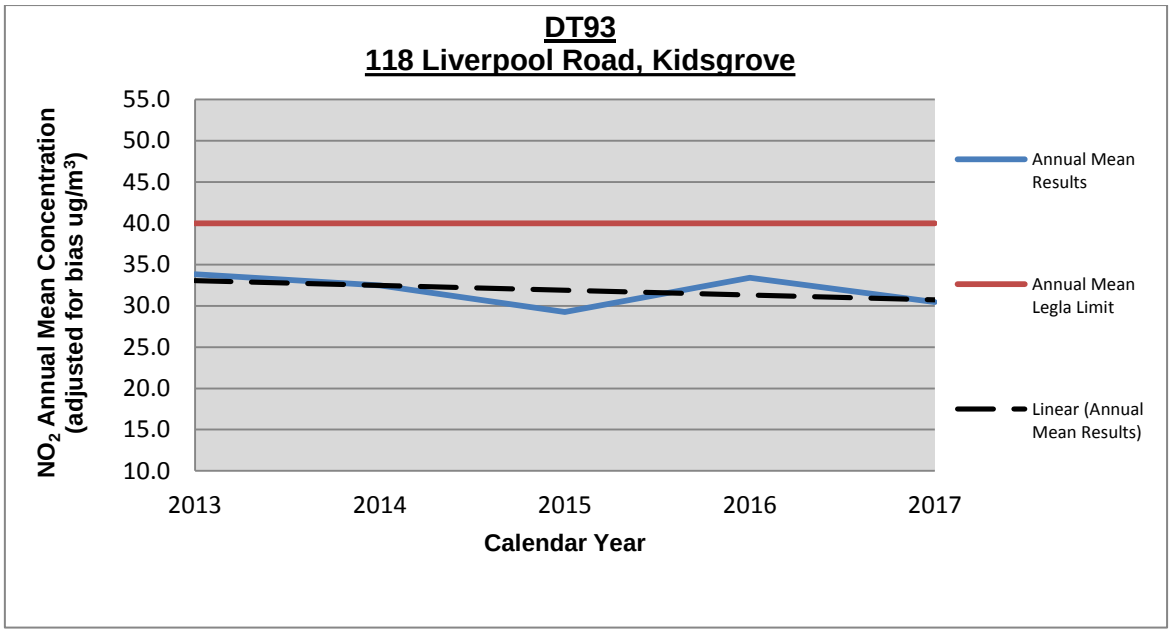

DT86
Hassel C.P. School, Barracks Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)

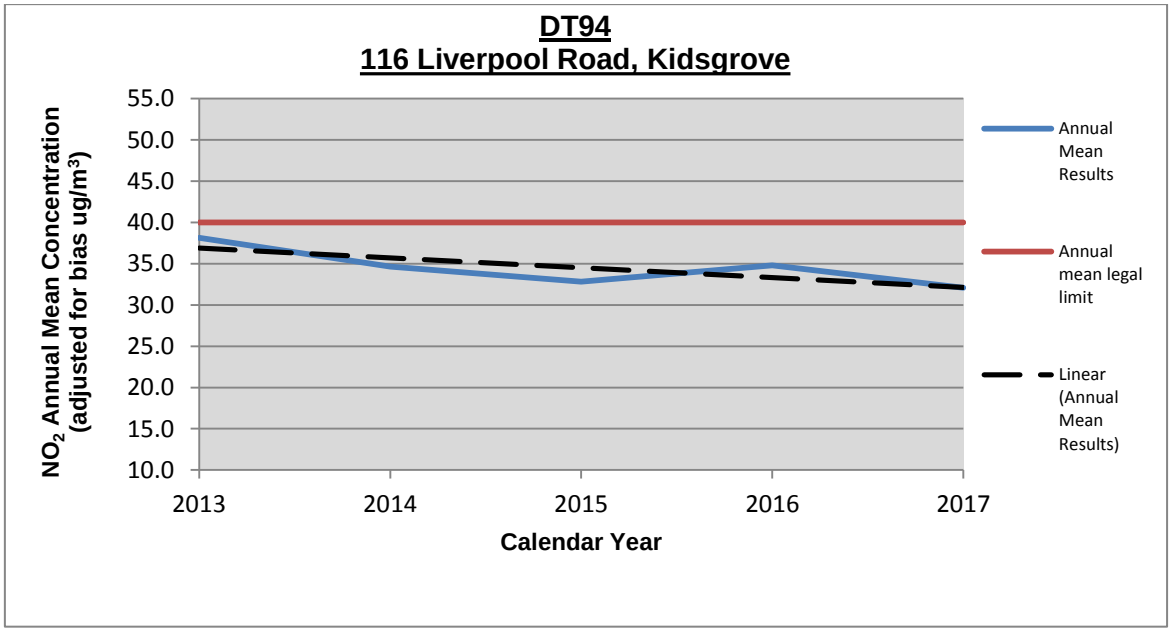

DT87
Blue Chilli, 1 King Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Result
Annual Mean Legal Limit
Linear (Annual Mean Result)

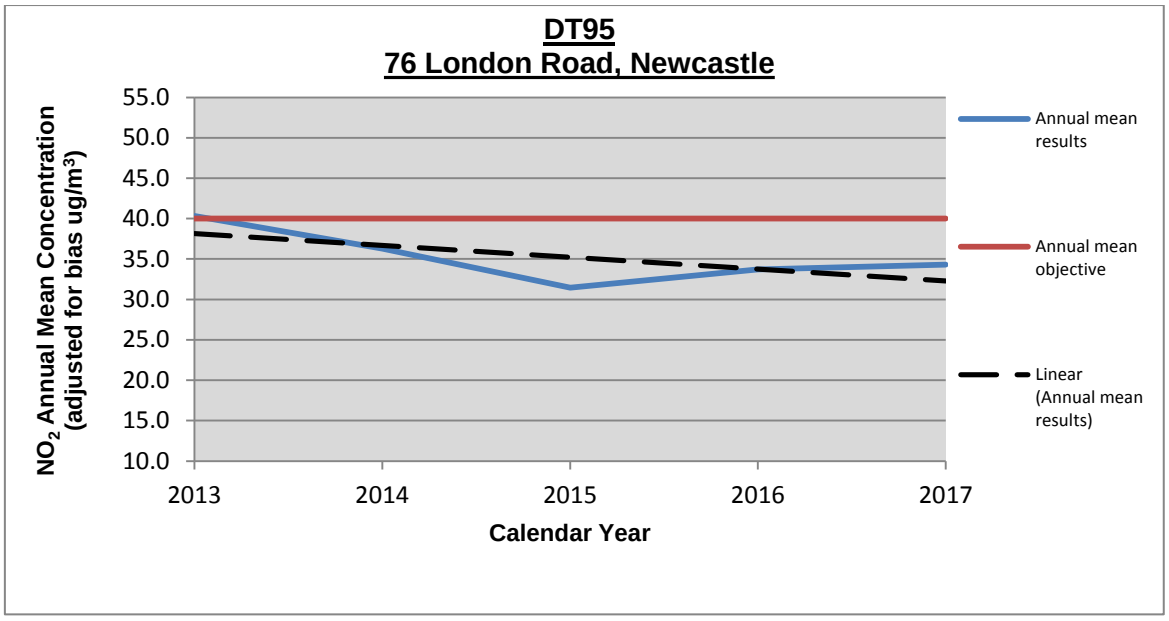

DT88
27 Lower Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Result
Annual Mean Legal Limit
Linear (Annual Mean Result)

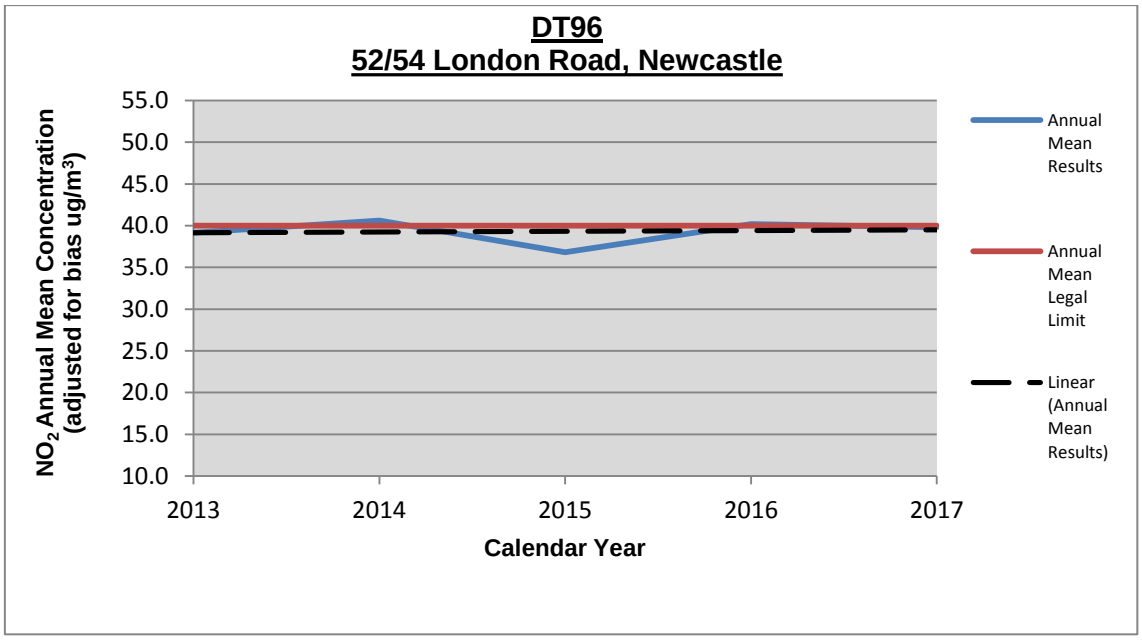

DT89, DT90, DT91
Queens Gardens, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results - DT89
Annual Mean Results - DT90
Annual Mean Results - DT91
Annual Mean Legal Limit
Linear (Annual Mean Results - DT89)

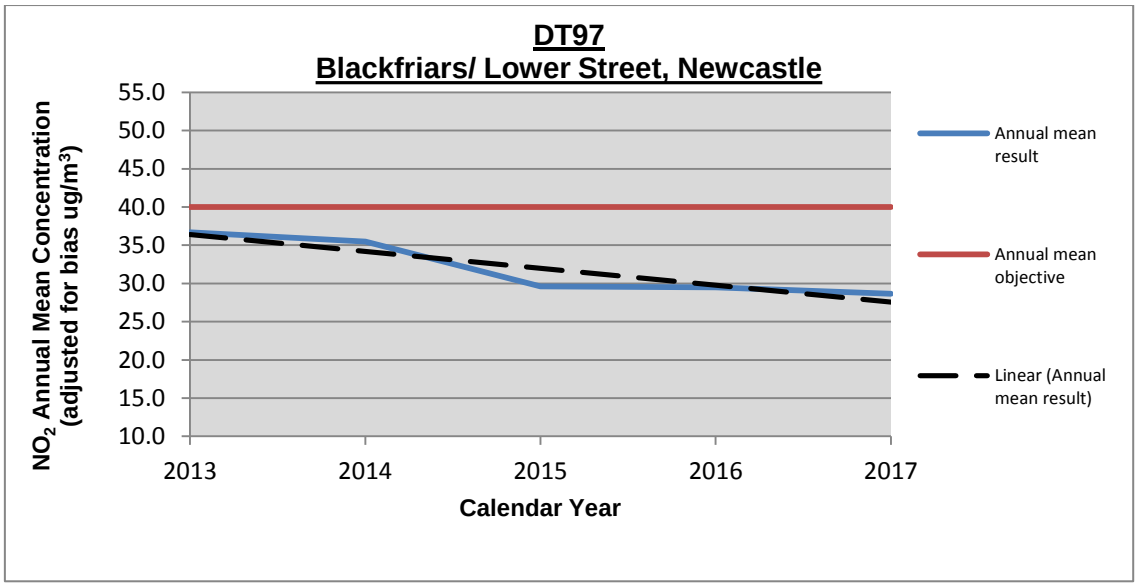

DT92
41/43 Liverpool Road, Kidsgrove
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Legal Limit
Annual Mean Results
Linear (Annual Mean Results)

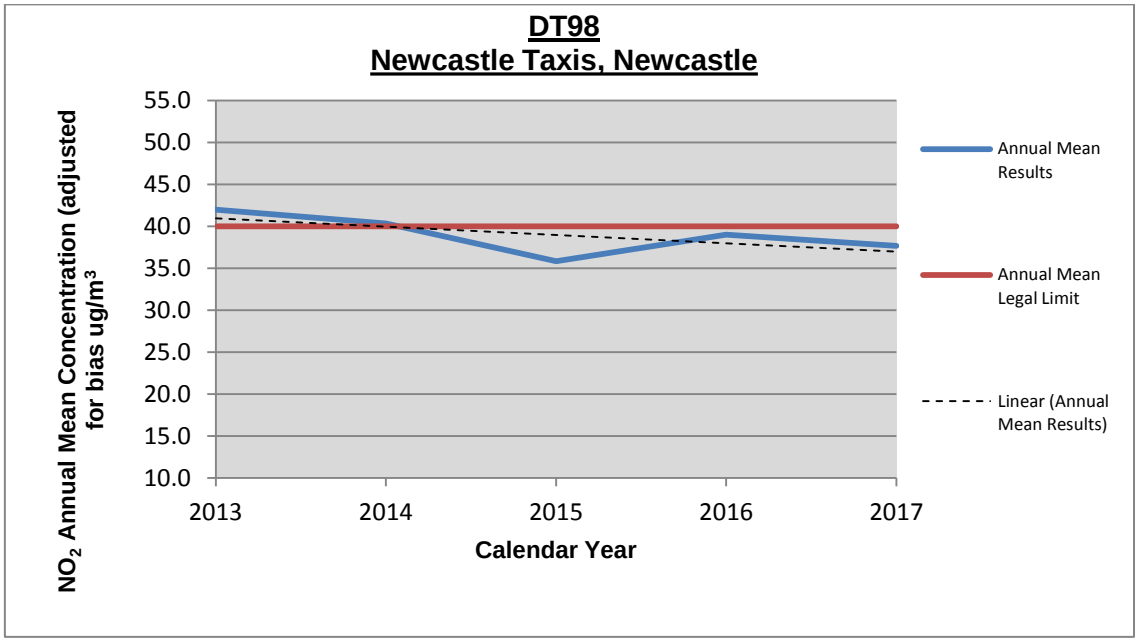

DT93
118 Liverpool Road, Kidsgrove
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legla Limit
Linear (Annual Mean Results)

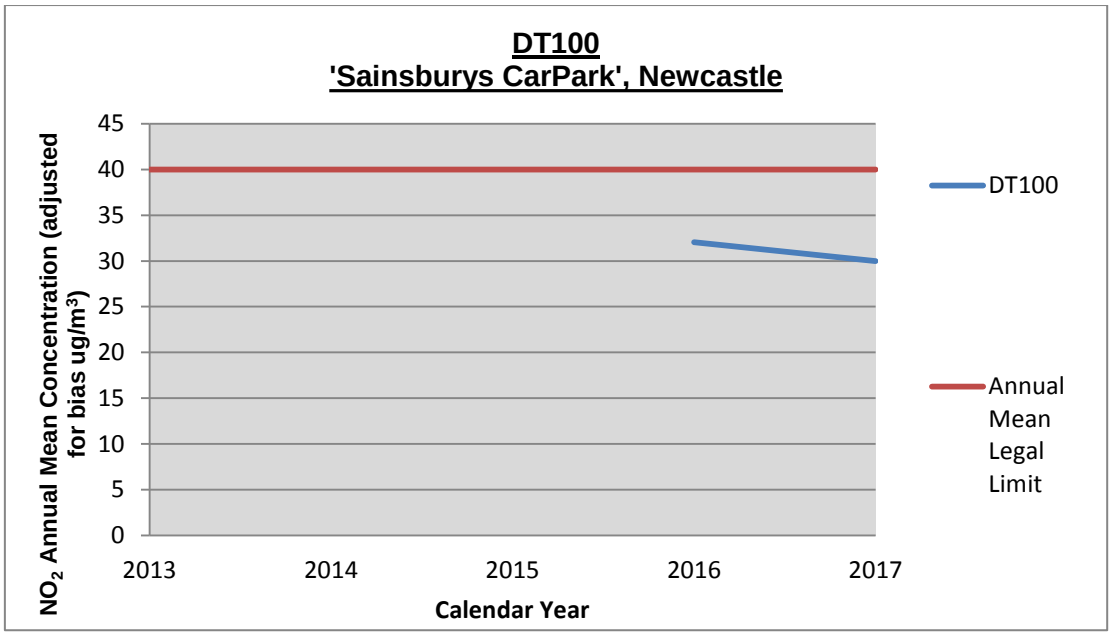

DT94
116 Liverpool Road, Kidsgrove
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual mean legal limit
Linear (Annual Mean Results)

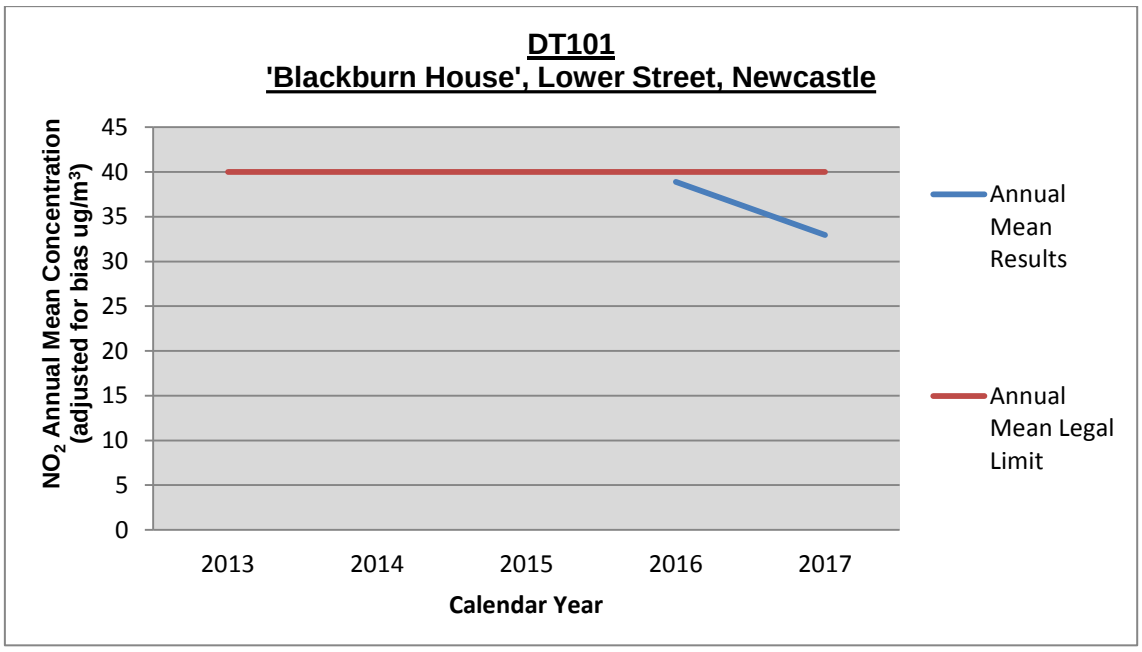

DT95
76 London Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual mean results
Annual mean objective
Linear (Annual mean results)


DT96
52/54 London Road, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)


DT97
Blackfriars/ Lower Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual mean result
Annual mean objective
Linear (Annual mean result)


DT98
Newcastle Taxis, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit
Linear (Annual Mean Results)


DT100
'Sainsburys CarPark', Newcastle
NO_2 Annual Mean Concentration (adjusted for bias ug/m³)
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
Calendar Year
DT100
Annual Mean Legal Limit


DT101
'Blackburn House', Lower Street, Newcastle
NO_2 Annual Mean Concentration (adjusted for bias ug/m³)
45
40
35
30
25
20
15
10
5
0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit

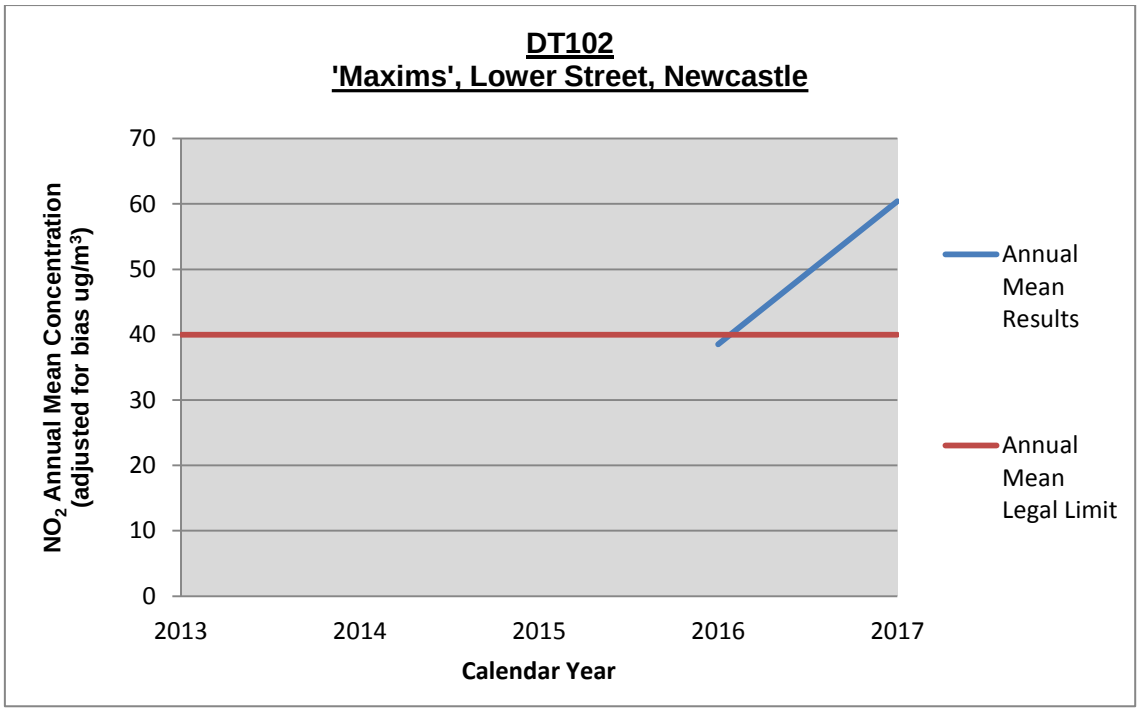

DT102
'Maxims', Lower Street, Newcastle
NO2 Annual Mean Concentration (adjusted for bias ug/m3)
70
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
Calendar Year
Annual Mean Results
Annual Mean Legal Limit

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	Urban Centre	Automatic	100	92.21	0	0	0	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.

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 (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT K1	61.98	46.6	47.25	52.50	36.66	38.06	32.56	41.83	48.63	44.97	56.78	54.22	**46.8**	**41.7**	**28.3**
DT K2	46.07	44.4	38.03	26.48	30.30	28.43	22.60	25.71	33.30	27.63	39.10	38.84	33.4	29.7	
DT UB1	36.81	26.9	20.71	19.56	13.43	12.88	13.89	15.91	19.61	18.80	29.14	28.83	21.4	19.0	
DT UB2	34.00	23.4	17.46	15.21	11.66	10.94	11.40	12.90	15.49	14.82	20.28	21.99	17.5	15.5	
DT 3	43.61	32.3	39.10	47.22	22.86	32.31	26.78	28.42	27.68	29.76	45.45	38.93	34.5	30.7	
DT 6	56.65	42.3	50.68	45.95	37.41	38.61	28.03	36.69	44.45	36.01	51.32	40.31	**42.4**	37.7	37.3
DT 9	45.16	43.6	41.52	41.59	33.58	32.34	28.52	26.42	35.96	33.04	45.24	43.04	37.5	33.4	
DT 11	63.34	50.0	44.38	46.26	34.24	36.88	31.87	35.46	44.06	39.98	57.14	48.96	**44.4**	39.5	36.9
DT 24	52.27	40.1	38.36	44.53	30.60	33.65	28.95	32.87	39.26	37.95	48.97	48.46	39.7	35.3	
DT 28	44.01	37.2	36.21	42.32	23.28	31.03	26.72	29.94	29.31	27.65	39.63	36.37	33.6	29.9	
DT 34	48.59	39.8	36.79	37.80	33.49	30.45	27.57	29.01	37.89	30.02	43.70	37.74	36.1	32.1	
DT 39	53.37	42.3	37.52	37.62	39.59	32.70	27.74	30.50	37.51	28.42	44.18	38.24	37.5	33.4	
DT 40	48.25	39.4	34.02	28.06	26.54	26.89	22.54	25.10	29.18	26.82	37.08	38.05	31.8	28.3	
DT 46	44.65	34.52	36.55	37.49	25.51	28.98	26.22	29.10	36.98	30.82	38.60	36.08	33.8	30.1	
DT 47	33.39	35.8	30.79	30.75	29.77	23.26	21.04	23.56	30.56	22.90	34.71	32.06	29.0	25.8	

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 (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT 49	46.48	33.8	35.49	40.25	26.74	30.25	25.65	33.85	35.12	31.01	42.56	43.44	35.4	31.5	
DT 64	50.66	42.5	44.24	45.48	32.99	37.70	31.99	34.75	40.56	33.64	47.92	40.97	**40.3**	35.9	
DT 72	43.04	39.9	35.53	30.25	27.44	29.51	24.87	30.53	33.98	31.84	42.29	41.03	34.2	30.4	
DT 73	47.29	42.7	32.90	40.49	29.90	29.27	25.66	30.13	34.35	33.16	44.14	41.87	36.0	32.0	
DT 74	56.87	37.1	34.98	44.27	33.25	26.86	26.46	32.61	42.15	28.37	44.69	37.94	37.1	33.0	
DT 76	53.08	49.0	46.29	42.75	34.79	34.33	30.22	28.07	45.63	38.50	47.08	42.68	**41.0**	36.5	36.0
DT 84	54.60	48.2	40.37	37.31	33.88	37.73	23.32	34.99	40.37	36.51	41.41	44.98	39.5	35.1	
DT 85	58.85	47.4	42.25	42.28	43.05	42.74	37.34	38.44	48.07	34.79	59.19	44.90	**44.9**	**40.0**	30.7
DT 86	46.74	33.7	31.40	39.35	26.30	26.89	23.57	31.07	33.43	28.81	40.61	38.87	33.4	29.7	
DT 87	52.65	42.9	31.16	50.96	36.66	38.54	33.52	40.94	44.98	39.50	55.42	43.90	**42.6**	37.9	37.6
DT 88	46.63	33.8	33.12	38.19	25.43	27.90	21.17	31.86	35.80	30.28	41.76	37.51	33.6	29.9	
DT 89	50.51	38.7	33.80	31.84	30.08	26.61	26.39	30.18	37.69	29.72	37.18	36.81	34.1	30.4	
DT 90	48.71	39.4	34.25	32.30	30.59	28.70	22.39	27.09	35.45	28.13	39.17	37.69	33.7	30.0	
DT 91	46.21	41.6	36.35	31.54	29.10	28.21	25.97	29.24	37.59	30.48	38.35		34.1	30.3	
DT 92	58.02	46.2	40.64	26.68	30.40	31.40		31.92	36.67	31.61	41.47	39.43	37.7	33.5	
DT 93	52.66	37.4	36.10	38.37	30.99	30.37	23.91	28.03	34.84	27.71	33.87	36.19	34.2	30.4	
DT 94	52.23	35.2	30.67	48.01	31.60	0.37	45.41	30.48	37.84	32.24	48.18	40.50	36.1	32.1	
DT 95	57.65	41.9	35.67	46.63	27.72	29.44	26.83	30.46	39.28	32.51	51.57	43.05	38.6	34.3	
DT 96	65.25	51.4	41.43	55.09	33.44	33.82	32.66	36.34	44.68	36.81	55.37	50.31	**44.7**	39.8	39.3

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 (factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT 97	48.96	37.6	41.93	31.69	28.11	24.97	22.38	24.84	32.35	25.67	35.43	32.27	32.2	28.6	
DT 98	55.87	48.6	42.39	42.75	34.27	39.29	31.93	32.72	44.88	39.76	48.21	47.24	**42.3**	37.7	37.2
DT 100	49.84	40.0	30.03	37.48	25.39	23.43	22.53	33.89	31.39	26.48	43.33	40.37	33.68	29.98	
DT 101	52.31	39.82	37.52	36.95	35.88	29.09	28.04	30.38	39.10	31.81	44.82	38.78	37.04	32.97	
DT 102	70.61	78.31	68.01	67.90	50.85	69.89	/	54.66	65.00	/	69.53	83.88	**<u>67.86</u>**	**<u>60.40</u>**	**52.9**
DT 103	47.69	41.04	29.12	21.93	25.94	19.82	16.82	21.58	23.91	22.59	24.14	29.98	27.05	24.07	
DT 104	55.04	46.61	40.08	45.71	32.21	34.75	31.20	33.73	43.30	37.85	72.41	42.51	**42.95**	38.23	37.7
DT 105	/	/	/	/	/	/	/	24.32	28.88	27.73	36.00	35.6	30.51	28.38	

☒ 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 **<u>bold and underlined.</u>**

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

(2) Distance corrected to nearest relevant public exposure.

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/18

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2018

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[5]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2017	R	Borough Council of King's Lynn & West Norf	12	29	25	16.0%	G	**0.86**
Gradko	20% TEA in water	2017	R	Bath & North East Somerset	12	45	45	-0.2%	G	**1.00**
Gradko	20% TEA in water	2017	R	NOTTINGHAM CITY COUNCIL	12	38	41	-6.6%	G	**1.07**
Gradko	20% TEA in water	2017	R	Lancaster City Council	12	35	32	9.7%	G	**0.91**
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	12	54	52	3.3%	S	**0.97**
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	11	35	33	7.0%	G	**0.93**
Gradko	20% TEA in water	2017	R	Thurrock Borough Council	9	33	29	14.3%	G	**0.87**
Gradko	20% TEA in water	2017	UB	Thurrock Borough Council	11	30	28	8.0%	S	**0.93**
Gradko	20% TEA in water	2017	R	Dudley MBC	12	50	50	0.8%	G	**0.99**
Gradko	20% TEA in water	2017	UB	Dudley MBC	12	24	19	26.6%	G	**0.79**
Gradko	20% TEA in water	2017	R	City of Lincoln Council	12	42	31	33.2%	G	**0.75**
Gradko	20% TEA in water	2017	R	Gedling Borough Council	12	35	31	10.1%	G	**0.91**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	36	37	-2.7%	G	**1.03**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	29	25	17.5%	G	**0.85**
Gradko	20% TEA in water	2017	R	Gateshead Council	12	34	35	-5.3%	G	**1.06**
Gradko	20% TEA in water	2017	R	LB Hounslow	12	65	54	22.2%	G	**0.82**
Gradko	20% TEA in water	2017	R	LB Hounslow	12	59	53	10.6%	G	**0.90**
Gradko	20% TEA in water	2017	B	LB Hounslow	11	28	30	-6.0%	G	**1.06**
Gradko	20% TEA in water	2017	R	LB Hounslow	11	43	34	28.8%	G	**0.78**
Gradko	20% TEA in water	2017	B	LB Hounslow	9	38	33	14.9%	G	**0.87**
Gradko	20% TEA in water	2017	R	LB Hounslow	11	52	42	24.4%	G	**0.80**
Gradko	20% TEA in water	2017	UB	Liverpool	11	20	17	15.2%	G	**0.87**
Gradko	20% TEA in water	2017	R	North Ayrshire Council	12	26	21	23.2%	G	**0.81**
Gradko	20% TEA in water	2017	R	South Gloucestershire Council	12	25	23	10.3%	G	**0.91**
Gradko	20% TEA in water	2017	KS	Marylebone Road Intercomparison	12	101	79	28.6%	G	**0.78**
Gradko	20% TEA in water	2017		**Overall Factor[3] (34 studies)**				**Use**		**0.89**

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

C.1 QA/ QC on monitoring data

C.1.1. Calibration Checks

The Chemiluminescence nitrogen oxide analyser has fortnightly calibration checks and maintenance visits, which followed, documented procedures.

These procedures were drawn up in accordance with equipment manuals and the manufacturer's instructions. During the calibration checks, a two point calibration is carried out using a zero air scrubber and Nitric Oxide calibration gas, supplied by **BOC ,** to quantify the analyser 'zero' and 'span' response. The 'zero' response is the response of the analyser when the pollutant species being measured is not present in the sample air stream.

The 'span' response is the response of the analyser to a gas mixture of accurately known concentration. In addition to the fortnightly checks, **ESU1** carried out six monthly reference calibrations.

C.1.2. Equipment service and maintenance

The Council has an ongoing service and maintenance contract with **ESU1** for the analysers. The contract provides the following cover:

- Routine six monthly service visits in accordance with the manufacturers'
- instructions
- Guaranteed breakdown call out response
- Written report showing work carried out and status of instrumentation
- All work and documentation is carried out in accordance with a BS ISO 9002 accredited system
- Dedicated telephone support in normal working hours

C.1.3 Data processing

Data management and ratification is handled by **Air Quality Data Management (AQDM)** with regular data downloads during the day.

The raw data collected has to be converted to more useful pollutant concentrations and this conversion is achieved using the 'zero' and 'span' responses that are recorded during the fortnightly visits. The 'zero' response, Vz, is the response in measurement units of the analyser when the pollutant species being measured is not present in the sample air stream.

The 'span' response, Vs, is the response of the analyser to an accurately known concentration, c, in ppb (parts per billion) of the pollutant species. The instrument 'zero' and 'span' factors are then calculated using these data as follows:
Instrument zero = Vz

Instrument span, F = c/(Vs-Vz)

Ambient pollution data are then calculated by applying these factors to logged output signals as follows:
Pollutant concentration (ppb) = F(Va-Vz)
Where Va is the recorded signal from the analyser sampling ambient air. The fortnightly calibration factors applied to the raw data are then filed.

C.1.4. Data validation and ratification

Once the calibration factors have been applied to the raw data, the data is screened, by visual examination to see if they contain any spurious and/or unusual measurements. Any suspicious data, such as large spikes or spurious high concentrations can be 'flagged' and investigated more fully.

This process is known as validation. Data validation is followed by data ratification, which is carried out at 3 – 6 month intervals. Steps in the ratification process include:

- Examination of calibration records to ensure correct application of calibration factors
- Examination of data for other pollutants and monitoring sites to highlight any anomalies
- Deletion of data shown i.e. spikes generated by the analyser
- Correction of any baseline drift as indicated by examination of daily calibration records
- Examination of any local scale changes to the site environment

When data verification has been completed then the data is ready for further statistical and critical examination for reporting purposes.

C.2. Short-term to Long-term Data Adjustment

C.1.6.1 NO_2 annualisation for Queens Gardens Continuous Monitor

This was not necessary as data capture for the site was above 90%.

C.1.6.2 Annualisation of NO_2 diffusion tube data

Data adjustment for Site DT 105 has been required due to data capture being 41.6%, which is less than the 75% considered appropriate for a valid result.

Annualisation of the result from this diffusion tube, was undertaken using the method set out in Box 7.10 of TG(16) using the following data;

Table 7: Annualisation for Site DT 105

Start date	End Date	B1	D1	B1 when D1 is available
04.01.2017	01.02.2017	34.68		
01.02.2017	01.03.2017	28.40		
01.03.2017	29.03.2017	26.58		
29.03.2017	26.04.2017	19.81		
26.04.2017	31.05.2017	23.57		
31.05.2017	28.06.2017	14.57		
28.06.2017	02.08.2017	16.97		
02.08.2017	30.08.2017	16.63	24.32	16.63
30.08.2017	27.09.2017	22.52	28.22	22.52
27.09.2017	01.11.2017	18.28	27.73	18.28
01.11.2017	06.12.2017	27.49	36.00	27.49
06.12.2017	03.01.2018	25.06	35.60	25.06
Average		23.12	30.37	21.99
Ratio (A_m/P_m)		1.05		
Measured period mean x Ratio		30.37 x 1.05		
Annualised Value for Site DT 105		**31.89µg/m^3**		
Bias Adjusted		**28.38 µg/m^3**		

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

3.3 Distance Correction

It has been necessary to undertake distance correction for the following sites, to ensure that results are representative of relevant exposure for the annual mean objective for NO_2. 'The NO_2 Fall off With Distance from Roads" calculator has been used for this purpose. (https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html).

The relevant 1km grid square NO_2 background data for 2017 has been taken from https://uk-air.defra.gov.uk/data/laqm-background-home. The distance correction has been applied to the bias adjusted figure.

Table 8: Nitrogen Dioxide fall off with distance calculation for diffusion tube sites where measured annual mean values which were within 10% of, or exceeded the annual mean objective for Nitrogen dioxide.

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
DT K1	3.0	22.0	15.8	41.7	28.3	Warning: your receptor is mo than 20m further from the ke than your monitor - treat resu with caution.
DT 85	5.0	5.2	16.8	40.0	*39.7*	Predicted concentration at Receptor within 10% the AQ objective.
DT 102	2.0	4.0	14.0	60.4	**52.9**	Predicted concentration at Receptor above AQS objectiv
DT 6	4.0	4.2	12.0	37.7	*37.3*	Predicted concentration at Receptor within 10% the AQ objective.
DT 11	3.0	3.3	15.8	39.5	*38.9*	Predicted concentration at Receptor within 10% the AQ objective.
DT 76	2.0	2.2	15.8	36.5	*36.0*	Predicted concentration at Receptor within 10% the AQ objective.
DT 87	5.0	5.2	15.8	37.9	*37.6*	Predicted concentration at Receptor within 10% the AQ objective.
DT 96	2.0	2.2	15.8	39.8	*39.3*	Predicted concentration at Receptor within 10% the AQ objective.

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration ($\mu g/m^3$)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
DT 98	2.0	2.2	14.07	37.7	*37.2*	Predicted concentration at Receptor within 10% the AQ objective.
DT 104	2.0	2.2	16.8	38.2	*37.7*	Predicted concentration at Receptor within 10% the AQ objective.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[13]	
	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

[13] 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
…	…

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