2017 Air Quality Annual Status Report (ASR)

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

October 2017

Local Authority Officer	Darren Walters
Department	Environmental Protection Department
Address	Newcastle under Lyme Borough Council Civic Offices, Merrial Street, ST5 2AG
Telephone	01782 717717
E-mail	environmentalhealth@newcastle-staffs.gov.uk
Report Reference number	ASR 2017
Date	October 2017

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
July 2017

Executive Summary: Air Quality in Our Area

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 18 years, by using Nitrogen dioxide diffusion tubes and an automatic monitoring station, which monitors real time concentrations of particulate matter (PM_{10}) and Nitrogen dioxide (NO_2) in the air. These substances are monitored because they are found in vehicle exhaust fumes, which is the main source of pollution within the Borough.

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

[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

route linking many areas of Newcastle under Lyme and Stoke on Trent with junctions 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 forty-five 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 17 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 **Error! Reference source not found.** below

Figure 1 Air Quality Management Areas in Newcastle under Lyme 2016

AQMA	Description	Date Declared	Date Amended	Date Revoked	Pollutants
Kidsgrove - Number 1	Declared due to exceedance of the N02 annual mean objective along Liverpool Road A50, Kidsgrove	15/01/2015	-	-	Nitrogen dioxide NO_2
Newcastle-under-Lyme Town - Number 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	15/01/2015	-	-	Nitrogen dioxide NO_2
AQMA Number 3 - Maybank, Wolstanton, Porthill	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.	15/01/2015	-	-	Nitrogen dioxide NO_2
AQMA Number 4 - Little Madeley	Declared around two properties at Little Madeley due to an exceedance of the NO2 annual mean arising from the M6	15/01/2015	-	-	Nitrogen dioxide NO_2

AQMA	Description	Date Declared	Date Amended	Date Revoked	Pollutants
	motorway				

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.

Development of the action plan is ongoing, and has involved input from a number of different sectors including Highways England, neighbouring local authorities planning, highways, and environmental health departments and Public Health at Staffordshire County Council. The aim of an Air Quality Action Plan is to look at 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. 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, and at http://uk-air.defra.gov.uk/aqma/list

Monitoring of NO_2 concentration in the AQMAs and at a variety of locations across the Borough during 2016 shows, that there has been a general decrease in NO_2, with the majority of sites monitored being under the annual mean objective. There are however a number of hotspots within the Town Centre and Kidsgrove AQMA's

Town Centre AQMA

Air Quality in this area is influenced by local road traffic and 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 2016 sites DTK2 (76 King Street) DT85 (106 King Street), DT 96 (52/54 London Road and site DT104 7 King Street produced annual nitrogen dioxide levels in excess of the annual mean objective. There are also a number of sites 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

Porthill-Wolstanton-Maybank AQMA

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 steady decrease in NO_2 concentration at the established diffusion tube monitoring sites within this AQMA over the past 6 years, with the highest NO_2

concentration within the Porthill-Wolstanton-Maybank AQMA for 2016 being 37.7 µg/m^3 at site DT24 26 High Street, Maybank.

Diffusion tube monitoring site 103 (Grange Lane), was reported in the last ASR as a possible exceedance based on an a three month monitoring period, however following a full calendar year of monitoring the site is showing an annual mean of 23.2 µg/m^3 adjusted to the nearest receptor.

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 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 2018.

Accordingly, 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.

Kidsgrove AQMA

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 decreased each year from 2012 onwards within this AQMA. Diffusion tube Site 6 (106 Liverpool Road) produced an NO2 annual mean of 41.8 µg/m^3 and is therefore still showing an exceedance of the annual mean nitrogen dioxide objective.

The monitoring network The 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.

Madeley AQMA

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.

The NO_2 concentration at this location in has been within 10% of the annual mean for the previous 4-year period between 2012 and 2015. NO_2 annual mean results at monitoring site DT3 (Collingwood 3 Newcastle Road) dropped dramatically in 2016 to 31.9 $\mu g/m^3$. It is however too early to say if this is likely to remain the situation moving forward given the previous year's results.

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.

Across the Borough of Newcastle under Lyme

There has been a general decrease in the annual NO_2 concentrations across the Borough over the past three years. This indicates that the strategies currently in place are already helping to reduce the NO_2 concentration within these areas of the Borough. However, 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.

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.

Particulate matter (PM_{10}) is measured using an automatic monitor located at Queens Gardens (Site CM1) within the Town Centre AQMA. Particulate matter (PM_{10}) levels within Newcastle-under-Lyme, continues to be well below the annual mean objective level of 40µg/m^3, with the annual mean concentration for 2016 being 22.93µg/m^3.

During 2016 there were 0 days when the 24hour mean objective of 50µg/m^3 was exceeded.

Due to the health risk posed by $PM_{2.5}$, there has been a requirement since the 2016 ASR to assess $PM_{2.5}$ concentrations. As Newcastle-under-Lyme does not currently monitor for this fraction of particulate matter, an estimation of the $PM_{2.5}$ concentration for 2015 has been made using the national factor for $PM_{2.5}$ and the method set out in TG16. The estimated concentration for $PM_{2.5}$ for 2016 is 16µg/m^3.

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 now looking at 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)

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 Research Laboratory Ltd (TRL).

  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@trl.co.uk
  To find out more about ECO-Stars visit http://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 www.gov.uk/government/organisations/office-for-low-emission-vehicles / 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 www.newcastle-staffs.gov.uk/smokecontrolareas
- ✓ Purchase "Green Power" for the electricity in your home. (Contact your power 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. 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. www.newcastle-staffs.gov.uk/laqm

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:	environmentalhealth@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.

Table of Contents

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Newcastle-under-Lyme Borough Council during 2016. 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 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 Borough Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Newcastle-under-Lyme Borough Council can be found in **Error! Reference source not found.**. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at http://uk-air.defra.gov.uk/aqma/list

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).

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 (inc. date of publication)
						At Declaration	Now	
Kidsgrove - 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	40.5µg/m3	41.8µg/m3	In progress. Will be published at www.newcastle-staffs.gov.uk/laqm
Newcastle under Lyme Town - number 2	Declared January 2015	NO2 Annual Mean	Newcastle under Lyme	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	56.2 µg/m^3	45.3 µg/m^3	In progress. Will be published at www.newcastle-staffs.gov.uk/laqm
Maybank Wolstanton and Porthill - 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	37.2µg/m3	38	In progress. Will be published at www.newcastle-staffs.gov.uk/laqm
Little Madeley - 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	36.4µg/m3	31.9µg/m3	In progress. Will be published at www.newcastle-staffs.gov.uk/laqm

☒ **Newcastle under Lyme Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

Table 2. 1 summary of AQMAs declared by Newcastle-under-Lyme Borough Council

2.2 Progress and Impact of Measures to address Air Quality in Newcastle-under-Lyme Borough Council

Newcastle-under-Lyme Borough Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

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 Strategy for Newcastle-under-Lyme
- Adoption of an Air Quality Developers Guide
- Formal adoption of Air Quality Action Plan
- Town centre wayfinding strategy to be completed
- 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.

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

- 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

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 has 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
- Formal adoption of Air Quality Action Plan

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 the Town Centre AQMA, Maybank Porthill and Wolstanton AQMA, Kidsgrove AQMA

Table 2.2 – Progress on Measures to Improve Air Quality

Newcastle under Lyme Town - Town Centre AQMA action plan measures											
Measure Number	**Measure**	**EU Category**	**EU classification**	**Organisations Involved and Funding Source**	**Planning Phase**	**Implementation Phase**	**Key Performance Indicator**	**Reduction in pollutant / emissions from measure**	**Progress to date**	**Estimated completion date**	**Comments barriers to Implementation**
	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		Awaiting implementation and monitoring	Take from plan	reduced vehicle emissions	Complete	Complete	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		TBA	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.
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 submitted	Comment on acceptability of assessment to LPA	No increase in emissions at failing locations			Application made to Newcastle under Lyme B.C

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		Objective limits not breached at relevant location	Planning condition requested requiring assessment		Conditions imposed on permission. Hours of use of plant to be limited to minimise effects on AQ
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	Cycle / walking journeys undertaken	Unable to quantify			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		2017/19	Cycle journeys undertaken	Reduced vehicle emissions	Upgrade in progress		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		Complete		Measured journey times reported in LTP report.	System optimised	Completed	UTC optimised on network around ringroad 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, Sustrains and Town Centre Business Improvement District			Improved links in place	Reduced vehicle emissions			Options identified for consultation
N7	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

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, Sustrans and Town Centre Business Improvement District	2017	2018/19		Reduced vehicle emissions			Options identified for consultation / Potential funding constraints

Kidsgrove Town Centre AQMA action plan measures

Measure Number	Measure	EU Category	EU classification	Organisations Involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in pollutant / emissions from measure	Progress to date	Estimated 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		Scheme optimised/ NO2 levels at receptors		2017/18	

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	Bus tops locations reviewed with regards to accessibility and congestion	Reduced vehicle emissions		2017/18	

Maybank Wolstanton Porthill AQMA action plan measures

Measure Number	Measure	EU Category	EU classification	Organisations Involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in pollutant / emissions from measure	Progress to date	Estimated 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		Journey times	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		Routing strategy in place	Potential short term -ve 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		Level of N02 at existing locations monitored for at least 5 years	unclear	Impacts not yet quantified	Application anticpated winter 2017	Awaiting AQ assessment. EIA Project. Planning application to Newcastle under Lyme Borough Council. Potential -ve effects on Maybank Porthill, Wolstanton AQMA. Potential to improve AQ in Stoke on Trent at Basford Bank here hourly mean N02 is being exceeded.

Little Madeley AQMA action plan measures

Measure Number	Measure	EU Category	EU classification	Organisations Involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in pollutant / emissions from measure	Progress to date	Estimated completion date	Comments barriers to Implementation
M1	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 either 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

Borough wide action plan measures											
Measure Number	Measure	EU Category	EU classification	Organisations Involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in pollutant / emissions from measure	Progress to date	Estimated 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	Winter 2017/18	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	Winter 2017/18	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	Select from the available categories	Select from the available classifications	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)		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				Reduced vehicle emissions	Implementation on-going	2018	4* Ecostars award with action plan
6	1Green Travel Plan for new Civic Hub development in Town Centre	Promoting Travel Alternatives	Workplace Travel Planning	Lead by Staffordshire County Council as		Awaiting implementation and monitoring		reduced vehicle emissions	Completed	Completed	Progress on implementation requires monitoring

				building owner in conjunction with Borough Council, Police, Library Service, Social Services, Aspire Housing							
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.

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 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 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[5] is based.

The Royal College of Physicians (RCP) undertook a review in February 2016 [6] 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 5%of all deaths can be attributed to exposure to $PM_{2.5}$, compared to 5.3% across England (40,000 deaths annually)[4]. Overall, the estimated cost to individuals and society is more than £20 billion annually for the UK.

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 2.3 Annual Mean PM_{10} and $PM_{2.5}$ Results of monitoring by Staffordshire Authorities 2011 to 2016

Annual Mean PM_{10} and $PM_{2.5}$ Results from monitoring Staffordshire Authorities 2012 - 2016									
Authority	**Site Type**	**Monitor Location**	**OS Grid Ref**		**Year**				
					2012	**2013**	**2014**	**2015**	**2016**
Newcastle under Lyme	Roadside	Queen`s Gardens	E385057	PM_{10}	14.9	22.5	22	22.9	22.93
			N346137	$PM_{2.5}$	10.43(1)	15.75(1)	15.4(1)	16(1)	16
Cannock Chase	Roadside	Watling St	SJ980086	PM_{10}	23	21	19.6	-(2)	-(2)
		Bridgetown		$PM_{2.5}$	16.1(1)	14.7(1)	13.7(1)		
Stoke on Trent	Roadside	A50 Meir Tunnel	E392548	PM_{10}	-	-	-	20(3)	20
			N342572	$PM_{2.5}$	-	-	-	14(3)	14
	Urban Background	Stoke on Trent Central	E388351 N347895	$PM_{2.5}$	11	10	10	12	12
									-
	Roadside	Middleport	E385780	PM_{10}	24	25	24	22	-
			N349376	$PM_{2.5}$	17(1)	18(1)	17(1)	15(1)	(4)
East Staffordshire	Roadside	Derby Tum	E424671 N324019	PM_{10}	25.4	29	31	23	(5)
				$PM_{2.5}$	17.8(1)	20.3(1)	21.7(1)	16.1(1)	(5)

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)Cannock Chase Watling Street Bridgetown PM_{10} monitor decommissioned
(3) Valid data capture for 2015 was 59%. The site was commissioned on 22 May 2015.
(4) Middleport monitor was decommissioned at the end 2015
(5) East Staffordshire`s monitors were decommissioned 2016)

As can be seen from the results, concentrations of $PM_{2.5}$ within the Staffordshire Authorities are below the 2020 EU limit value of 25µg/m3.

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[7], as shown in Figure 2

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 Figure 3. 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 $PM_{2.5}$.

Figure 2 Estimated number of deaths by local authority area attributable to $PM_{2.5}$ within Staffordshire for adults over 2011 to 2015

District/County	Percentage
Newcastle-under-Lyme	4.6%
Stafford	4.7%
East Staffordshire	5%
South Staffordshire	4.9%
Lichfield	5%
Staffordshire Moorlands	4.4%
Cannock Chase	4.9%
Tamworth	5.3%
Stoke on Trent	4.9%
Staffordshire County	4.8%
England	5.1%

7 Public Health Outcomes Framework 2016-2019Indicator 3.01 Fraction of mortality attributable to particulate air pollution https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/520457/At_a_glance.pdf

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 3 below;

Figure 2 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 2011 to 2015[8]

Estimated numbers of annual all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$*) for Staffordshire 2011 to 2015[8]
*** Fraction of annual all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$*)**

	2011			2012			2013			2014			2015		
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	1187	4.8	60	1218	4.6	60	1295	4.9	60	55	4.7	60	55	4.2	50
Stafford	1178	4.7	60	1195	4.6	50	1261	4.9	60	65	4.8	60	60	4.7	60
East Staffordshire	972	4.9	50	966	4.8	60	1097	5.1	60	55	5.1	50	55	4.8	50
South Staffordshire	1009	4.9	50	1162	4.8	60	1102	5.1	60	55	5	50	55	4.7	60
Lichfield	902	5.1	50	953	5	50	1050	5.1	50	50	5	50	50	4.6	50
Staffordshire Moorlands	927	4.4	40	1020	4.2	40	1085	4.7	50	45	4.5	50	45	4	40
Cannock Chase	766	5%	40	844	4.8	40	787	5.1	40	45	5.1	40	45	4.6	40
Tamworth	532	5.4	30	553	5.2	30	592	5.5	30	35	5.4	30	30		30
Stoke on Trent	2252	5.2	115	2386	4.9	115	2412	5.2	125	2318	5.0	115	2479	4.9	110
Staffordshire County	7473	4.9	366	7911	4.7	372	8269	5	420	400	4.9	400	390	4.5	390

8 Source Public Health England www.fingertips.phe.org.uk- Public Health Outcomes Framework Indicator 3.01

Figure 3 Actions being taken within Staffordshire to reduce $PM_{2.5}$

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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	✓	✓	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	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	✓	✓			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	✓				□	M6 Toll		M6 Toll	M6 Toll	
	Anti-idling enforcement	low	✓				□					
Promoting Travel Alternatives	Workplace Travel Planning	low	✓	https://www.staffordshire.gov.uk/transport/greentravel/travelplans/home.aspx								
	Encourage / Facilitate home-working	low	✓	Agile working adopted by Stoke-on-Trent CC		Agile working adopted by NULBC	✓	Homeworking policy adopted	Homeworking policy adopted			
	School Travel Plans	low	✓	Modeshift STARS	https://www.staffordshire.gov.uk/transport/Stafford/Schools/School-Travel-STARS.aspx							
	Promotion of cycling	low	✓	Stoke-on-Trent Cycle Map & Guide	https://www.staffordshire.gov.uk/transport/greentravel/cycling/Cycling.aspx							
	Promotion of walking	low	✓	Travel Smart	https://www.staffordshire.gov.uk/Search.aspx?search_keywords=walking							
	Staffordshire Share a Lift Scheme		□	Stoke-on-Trent Share a Lift Scheme	https://www.staffordshire.gov.uk/transport/greentravel/carsharing/Q002.aspx							

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
	Promote use of rail and inland waterways	medium	✓	Staffordshire County Council 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 available from: Link &Link Community Rail Partnership operating along the North Staffordshire Line and includes Uttoxeter Rail Station. The County Council Draft Rail Strategy is available from: http://moderngov.staffordshire.gov.uk/documents/s69891/Appendix%201%20for%20Rail%20Strategy.pdf								
Transport Planning and Infrastructure	Local Transport Plans and District Strategies	high	✓	Local Transport Plan	https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/Integrated-transport-documents/East-Staffordshire-Transport.pdf							
	Public transport improvements -interchanges stations and services	low	✓	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		Planned improvements at Tamworth station
	Public cycle hire scheme	low	✓	Stoke Railway Station 'Brompton Dock' Bike Hire & Cycle Hub				In house Cycle to work scheme				
	Cycle network	low	✓	Stoke-on-Trent Cycle Map & Guide	affordshire.gov.uk/transport/greentravel/cycling/Cycling.aspx							

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
	Bus route improvements	high	✓	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	New Street, Burton interchange enhancements. RTPI Burton Town Centre. Stop upgrades on A511, B5017 and B5108 Improvements to Uttoxeter bus station.	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	✓					nil				
	Car Clubs	low	✓					nil				
Policy Guidance and Development Control	Planning applications to require assessment of exposure / emissions for development requiring air quality impact assessment	high	✓				✓	Local plan - Policy CP16 - Climate Change and Sustainable Resource Use Cannock chase. Www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf	http://www.eaststaffsbc.gov.uk/planning/planning-policy/local-plan-2012-2031			
Policy Guidance and Development Control	Air Quality Strategy		□	Local Air Quality Strategy - Stoke-on-Trent City Council		In progress Due winter 17/18	✓	nil	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	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
	Planning Guidance for developers			To develop planning guidance for developers and to develop into SPD once Local Plan Policies in Place		In progress Due winter 17/18	✓	http://www.cannockchasedc.gov.uk/residents/planning/planning-policy/supplementary-planning-policy-documents	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			
	Developer Contributions based on damage cost calculation			To develop policies to secure contributions to offset pollution				http://www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf	Yes			
	Planning Policies			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	✓		http://www.eaststaffsbc.gov.uk/sites/default/files/docs/pollution/Air%20Quality%20Policy%20for%20Development%20Control%20%28Public%20Version%29.pdf			
	STOR Sites (Short Term Operating Reserve) Energy Generation . Regulation via planning / permitting regime	high	✓	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.								

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
freight & Delivery Management	Low Emissions Strategy	high	✓									
	Freight Consolidation Centre	medium	✓									
	Route Management Plans/ Strategic routing strategy for HGV's	high	✓		https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/appendixl-staffordshirefreightstrategy.pdf							
	Quiet & out of hours delivery	low	✓				✓					
	Delivery and Service plans	medium	✓									
	Freight Partnerships for city centre deliveries	high	✓									
Vehicle Fleet Efficiency	Driver training and ECO driving aids	medium	✓				✓					
	Promoting low emission public transport	high	✓									
	Vehicle retrofitting programmes	medium	✓									
	Fleet efficiency and recognition schemes	medium	✓	Staffordshire and Stoke-on-Trent Eco-Stars http://www.ecostars-uk.com/eco-stars-schemes/								
Promoting low emission transport	Low emission zone (LEZ) Clean Air Zone (CAZ)	high	✓									
	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	high	✓					Waste fleet vehicles comply with Euro VI.				

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	high	✓				✓					
	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	high	✓				✓					
	Priority parking for LEV's	high	✓	Electric Vehicle charging spaces								
	Taxi Licensing conditions	medium	✓	Hackney Carriage & Private Hire Licensing Policy 2016-2019								
	Taxi emission incentives	medium	✓									
Environmental permits	Introduction/increase of environment charges Through permit systems and economic instruments (Permit fees set centrally)	medium	✓	✓ Unable to achieve at a local level without central government approval								
	Measures to reduce pollution Through IPPC Permits going beyond BAT	medium	✓	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211863/env-permitting-general-guidance-a.pdf (Chapter 15)								
	Large Combustion Plant Permits and National Plans going beyond BAT	high	✓									

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
Other measures	Smoky Diesel Hotline			https://www.gov.uk/report-smoky-vehicle								
	A5 and M6 Partnership							http://www.hinckley-bosworth.gov.uk/info/10020/strategies_plans_and_policies/1272/a5_partnership				
	Domestic Smoke Control advice and Enforcement			Smoke control advice	-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/chimney-smoke	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/smoke-control-areas	-		
	Garden Bonfires - Advice and nuisance enforcement			Garden bonfires advice	-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/bonfire-smoke-nuisance	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires	-		
	Commercial burning advice and enforcement				-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/bonfire-smoke-nuisance	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			
	Multi agency working with Fire Service and Environment Agency for trade burning			Information shared as appropriate								
	Multi agency working with Staffordshire Fire Service and Local Authority Building Control regarding chimney fires and complaints about DIY domestic			Information shared as appropriate								

Measures category	Measure Classification	Effect on reducing NOx and PM10 emissions(low, medium, high)	Reduces PM2.5 emissions	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
	heating systems											
	Stoke-on-Trent Low Carbon District Heat Network			Stoke-on-Trent Low Carbon District Heat Network								

2.3 $PM_{2.5}$ 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 had been proposed in addition to those outlined in the action plan. However progress on these and the action plan has been limited and it is intended that they will be reported on in the 2018 ASR.

- To agree a target for reducing Fraction of All Cause Mortality from PM2.5 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 2017/2018 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.

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

3.1 Summary of Monitoring Undertaken

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

3.2 Automatic Monitoring Sites

Newcastle-under-Lyme Borough Council undertook automatic (continuous) monitoring at 1 site during 2016 Table A.1 in Appendix A shows the details of the sites. 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.

3.3 Non-Automatic Monitoring Sites

Newcastle-under-Lyme Borough Council undertook non- automatic (passive) monitoring of NO_2 at 40 sites during 2016. 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.

3.4 Individual Pollutants

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

3.5 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

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.

3.5.1 Town Centre AQMA

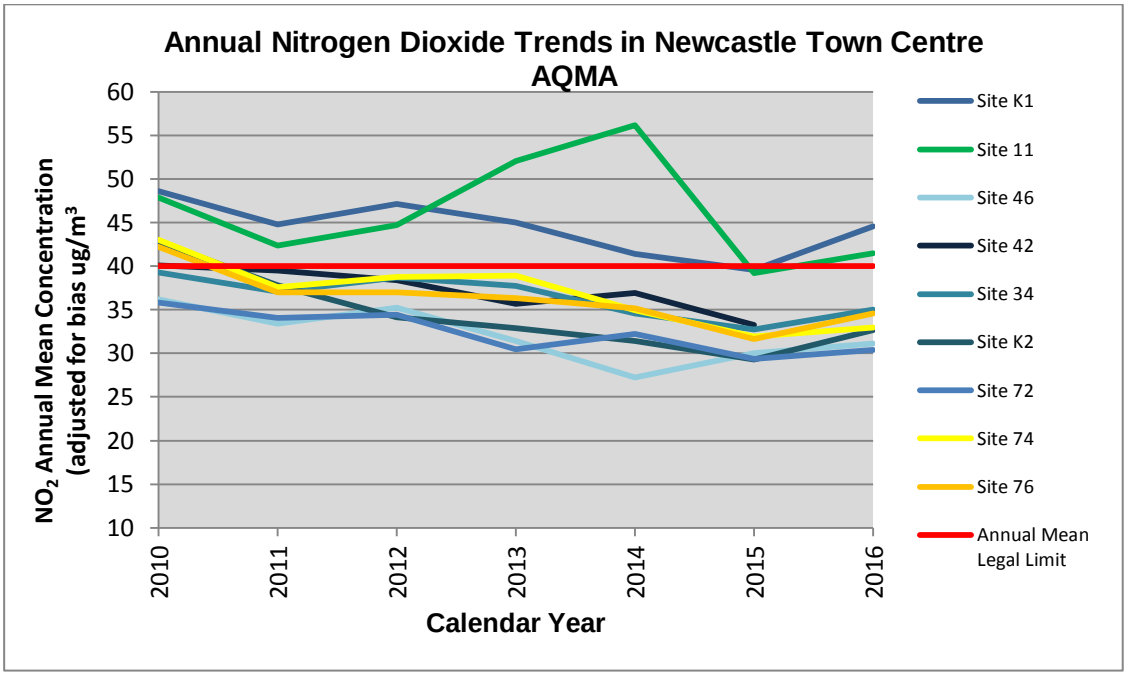
Air Quality in this area is influenced by local road traffic and traffic utilising the major arterial routes, which converge on the town centre. There are a number of relevant receptors located at the back of pavement. The network is heavily congested at peak times of the day with high volumes of low 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 2016 sites DTK2 (76 King Street) DT85 (106 King Street), DT 96 (52/54 London Road and site DT104 7 King Street produced annual nitrogen dioxide levels in excess of the annual mean objective. There are also a number of sites 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

Figure 4 Graph showing $N0_2$ diffusion tube trends in Newcastle-under-Lyme Town AQMA



3.5.2 Porthill-Wolstanton-Maybank AQMA

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.

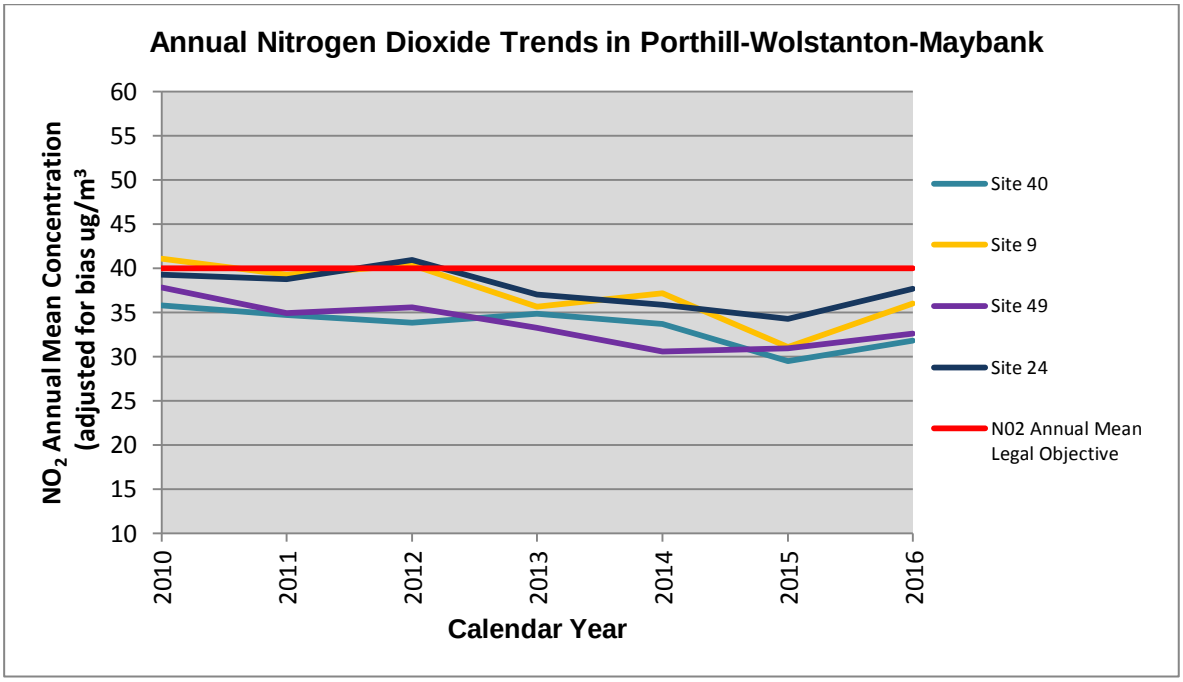
There has been a steady decrease in NO_2 concentration at the established diffusion tube monitoring sites within this AQMA over the past 6 years, with the highest NO_2 concentration within the Porthill-Wolstanton-Maybank AQMA for 2016 being 37.7 µg/m^3 at site DT24 26 High Street, Maybank.

Diffusion tube monitoring site 103 (Grange Lane), was reported in the last ASR as a possible exceedance based on an a three month monitoring period, however following a full calendar year of monitoring the site is showing an annual mean of 23.2 µg/m^3 adjusted to the nearest receptor.

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 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 2018.

Accordingly, the diffusion tube-monitoring network in this area will remain in place until the highway schemes have become embedded and there is confidence that N0^2 annual mean levels are consistently below the statutory objective.

Figure 5 Graph showing $N0_2$ diffusion tube trends in Maybank, Wolstanton & Porthill, and AQMA



3.5.2 Kidsgrove AQMA

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.

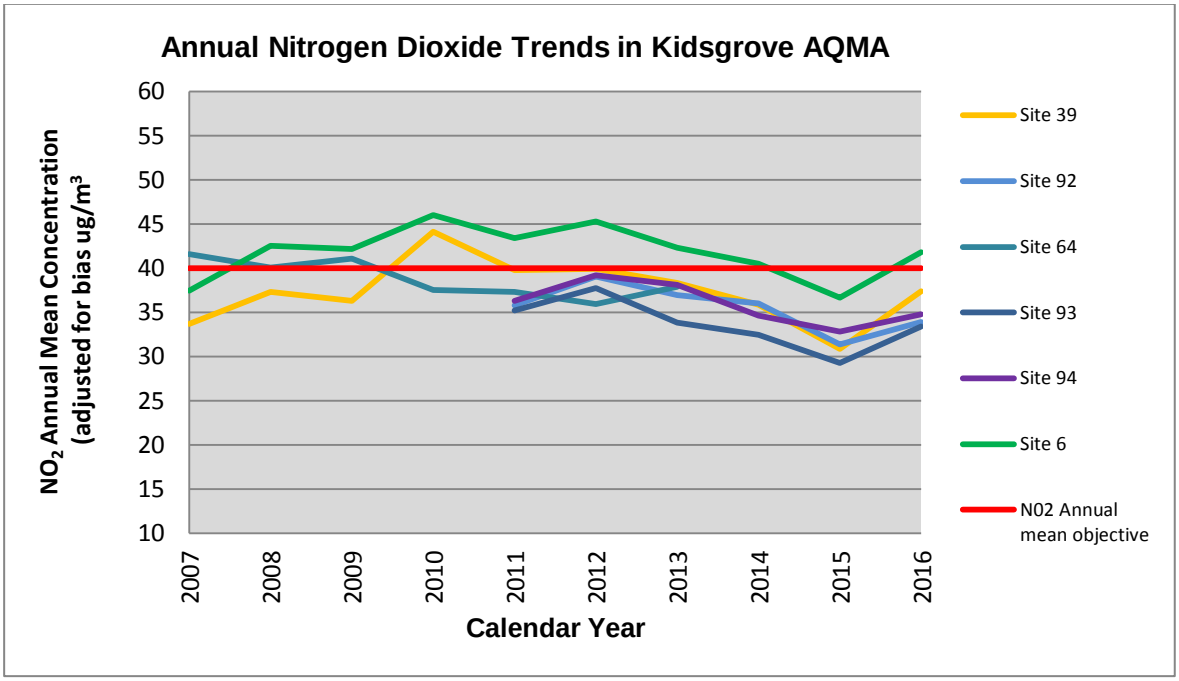
NO_2 concentrations have decreased each year from 2012 onwards within this AQMA. Diffusion tube Site 6 (106 Liverpool Road) produced an NO2 annual mean of 41.8 µg/m^3 and is therefore still showing an exceedance of the annual mean nitrogen dioxide objective.

The monitoring network The 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.

Figure 6 Graph showing $N0_2$ diffusion tube trends in Kidsgrove AQMA



3.5.4 Madeley AQMA

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.

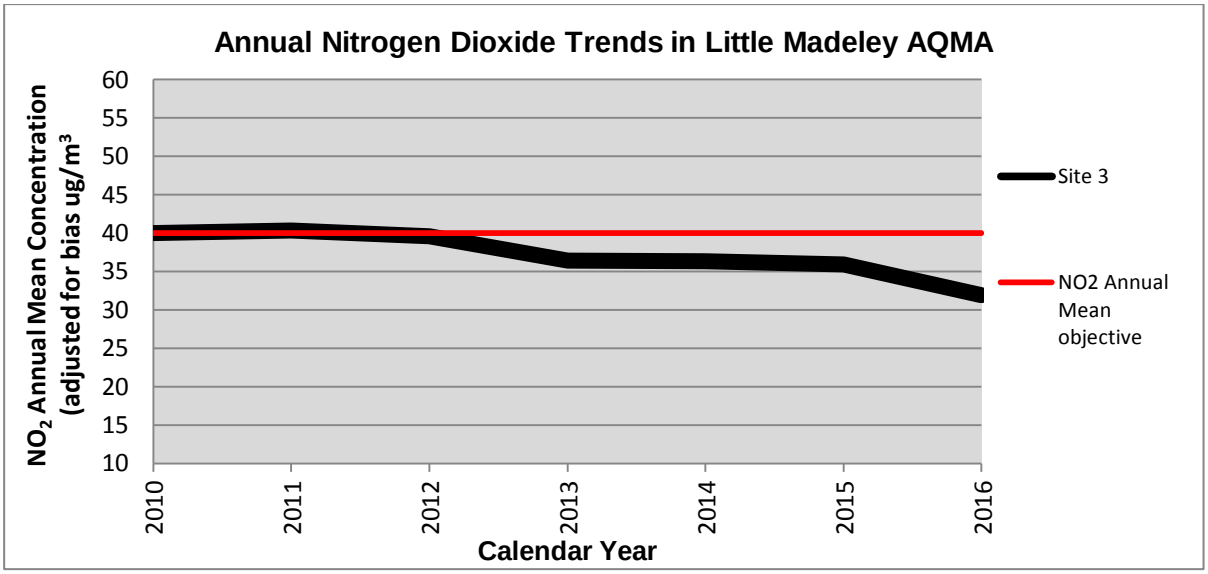
The NO_2 concentration at this location in has been within 10% of the annual mean for the previous 4-year period between 2012 and 2015. N02 annual mean results at monitoring site DT3 (Collingwood 3 Newcastle Road) dropped dramatically in 2016 to 31.9 µg/m^3. It is however too early to say if this is likely to remain the situation moving forward given the previous year's results.

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.

Figure 7 Graph showing $N0_2$ diffusion tube trends in Little Madeley AQMA



3.5.6 Across the Borough of Newcastle under Lyme

There has been a general decrease in the annual NO_2 concentrations across the Borough over the past three years. This indicates that the strategies currently in place are already helping to reduce the NO_2 concentration within these areas of the Borough. However, 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.

3.5.1 Particulate Matter (PM_{10})

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 at the end of 2016.,

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 PM_{10}	YES	Chemiluminescent Beta Attenuation	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

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)
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
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

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)
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

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2012	2013	2014	2015	2016
CM1	Roadside	Automatic	100	50	31.92	28.8	33	25.7	37.5
DTK1	A34 Holy Trinity	Diffusion Tube	100	100	**47.1**	**45**	**41.4**	39.6	**44.6**
DTK2	76 King St, N/C	Diffusion Tube	100	100	34.2	32.9	31.4	29.3	32.7
DTUB1	Wolstanton (Haritngton St)	Diffusion Tube	100	100	23.7	21.4	18.3	18.4	19.7
DTUB2	Westlands (4 Sneyd Crescent)	Diffusion Tube	100	100	18.6	18.5	17.9	16.3	17.4
DT3	(Collingwood 3 Newcastle Rd)	Diffusion Tube	100	100	39.6	36.4	36.3	35.9	31.9
DT6	(106 Liverpool Rd)	Diffusion Tube	100	100	**45.3**	**42.4**	**40.5**	36.7	**41.8**
DT9	32 Porthill Bank	Diffusion Tube	100	100	40.4	35.6	37.2	31.1	36
DT11	34 London Road, N/C	Diffusion Tube	100	100	**44.7**	**52.1**	**56.2**	39.2	**41.5**
DT24	26 High St, May Bank	Diffusion Tube	100	100	**40.9**	37	35.9	34.3	37.7
DT28	Limbrick Cottage Shraleybrook	Diffusion Tube	100	100	36.8	35.3	33.1	32.8	30.8
DT34	15 Barracks Road	Diffusion Tube	100	100	38.7	37.7	34.6	32.7	35
DT 39	4/6 Liverpool Road, Kidsgrove	Diffusion Tube	100	100	39.9	38.3	35.9	30.8	37.4
DT40	Banktop Court, Porthill	Diffusion Tube	100	100	33.8	34.8	33.7	29.5	31.8
DT46	1 London Road (Trinity Court)	Diffusion Tube	100	100	35.3	31.5	27.2	30	31.1
DT47	1 London Rd (Brook La)	Diffusion Tube	100	100	34.4	33.1	32.9	27.2	31.1
DT49	2 Vale View, Porthill	Diffusion Tube	100	100	35.6	33.3	30.6	30.9	32.6
DT64	Kidsgrove Carpets 57 - 59 Liverpool Road	Diffusion Tube	100	100	**41.1**	37.6	37.3	35.9	37.9
DT72	134 High Street	Diffusion Tube	100	100	34.4	30.4	32.2	29.4	30.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2012	2013	2014	2015	2016
	Newcastle								
DT73	21 London Road Newcastle	Diffusion Tube	100	100	37.6	35.7	34.2	30	33.6
DT74	39 London Road Newcastle	Diffusion Tube	100	100	38.8	38.9	35	32	33
DT76	11 Brunswick Street Newcastle	Diffusion Tube	100	100	37	36.3	35.2	31.7	34.6
DT84	102 King Street Newcastle	Diffusion Tube	100	100	**43.9**	**40.1**	39.5	35.8	38.3
DT85	106 King Street Newcastle	Diffusion Tube	100	100	**49.1**	**45.1**	**42.4**	39.2	**45.3**
DT86	Hassell C.P. School Barracks Road N/C	Diffusion Tube	100	100	37	34.8	33.2	29.1	30.4
DT87	Blue Chilli 1 King Street Newcastle	Diffusion Tube	100	100	**43.4**	**40.3**	36.8	37.6	39.3
DT88	27 Lower Street Newcastle	Diffusion Tube	100	100	37.7	34	33.6	30.7	31.2
DT89	Queens Gardens Newcastle	Diffusion Tube	100	100	34.9	34.9	32	25.9	31.9
DT90	Queens Gardens Newcastle	Diffusion Tube	100	100	37	33.5	33.7	27.6	32.1
DT91	Queens Gardens, Newcastle	Diffusion Tube	100	100	36.6	32.5	33.9	28.4	31.5
DT92	41/43 Liverpool Road Kidsgrove	Diffusion Tube	100	100	39	36.9	36	31.4	33.9
DT93	118 Liverpool Road Kidsgrove	Diffusion Tube	100	100	37.8	33.8	32.5	29.3	33.4
DT94	116 Liverpool Road Kidsgrove	Diffusion Tube	100	100	39.2	38.1	34.6	32.8	34.8
DT95	76 London Road Newcastle	Diffusion Tube	100	100	**40.8**	**40.3**	36.3	31.5	33.7
DT96	52/54 London Road Newcastle	Diffusion Tube	100	100	**44.9**	39.2	40.6	36.8	**40.2**
DT97	Blackfriars/ Lower Street	Diffusion Tube	100	100	39.6	36.7	35.5	29.6	29.5
DT98	Newcastle Taxis	Diffusion Tube	100	83	39.6	36.7	35.5	29.6	29.5

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
	Brunswick Street								
DT100	Sainbury's Carpark Near to Courts	Diffusion Tube	100	92					32.05
DT101	Blackburn House Lower Street Newcastle	Diffusion Tube	100	92					38.88
DT102	Maxims Lower Street Newcastle	Diffusion Tube	100	92					38.5
DT103	Grange Lange/High Street Wolstanton	Diffusion Tube	100	100					27.09
DT104	7 King Street Newcastle	Diffusion Tube	100	67					**42**

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

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

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

Notes:

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

Nitrogen Dioxide Diffusion Tube Monitoring Annual mean concentration (adjusted for bias) mg/m^3 2007 to 2016											
Site ID	Within AQMA?	2007 (Bias Adjustment Factor = 0.88)	2008 (Bias Adjustment Factor = 0.98)	2009 (Bias Adjustment Factor = 0.81)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.88)	2012 (Bias Adjustment Factor = 0.97)	2013 (Bias Adjustment Factor = 0.95)	2014 (Bias Adjustment Factor = 0.91)	2015 (Bias Adjustment Factor = 0.91)	2016 (Bias Adjustment Factor = 0.94)
K1	Y	**43**	**43.3**	**44.1**	**48.6**	**44.8**	**47.1**	**45.0**	**41.4**	39.6	**44.6**
K2	Y	28.7	31.8	31	**42.8**	37.8	34.2	32.9	31.4	29.3	32.7
UB1	Y	20	21	19.8	24.7	21.1	23.7	21.4	18.3	18.4	19.7
UB2	N	17.7	17.5	18.3	21.1	18.7	18.6	18.5	17.9	16.3	17.4
3	Y	37.7	**40.5**	38.2	**40**	**40.3**	39.6	36.4	36.3	35.9	**31.9**
6	Y	37.5	**42.5**	**42.2**	**46**	**43.4**	**45.3**	**42.4**	**40.5**	36.7	**41.8**
9	Y	35.8	37.8	36	**41.1**	39.3	**40.4**	35.6	37.2	31.1	36
11	Y	39.9	**42**	**40.4**	**47.9**	**42.4**	**44.7**	**52.1**	**56.2**	39.2	**41.5**
24	Y	34.3	37	36.9	39.3	38.8	**40.9**	37.0	35.9	34.3	37.7
28	N	38	**41.2**	36.5	39.5	37.6	36.8	35.3	33.1	32.8	30.8
34	Y	32.4	35	35.4	39.3	37.1	38.7	37.7	34.6	32.7	35
39	Y	33.7	37.3	36.3	**44.1**	39.8	**39.9**	38.3	35.9	30.8	37.4
40	Y	30.8	31.1	32.5	35.8	34.7	33.8	34.8	33.7	29.5	31.8
42	Y	32.9	36.9	36.9	**40.1**	39.5	38.4	35.7	36.9	33.2	
46	N	31.4	39.5	31.6	36.2	33.4	35.3	31.5	27.2	30.0	31.1
47	N	33.8	35.9	34.3	37.6	32.3	34.4	33.1	32.9	27.2	31.1
49	N	30.2	31.3	32.8	37.8	34.9	35.6	33.3	30.6	30.9	32.6
64	y		**48.4**	38.9	**41.6**	**40.1**	**41.1**	37.6	37.3	35.9	**37.9**
72	y			32.1	35.8	34.1	34.4	30.4	32.2	29.4	30.4
73	y			33.1	**41.2**	36.1	37.6	35.7	34.2	30.0	33.6
74	y			35.2	**43**	37.6	38.8	38.9	35.0	32.0	33
76	y			37.4	**42.2**	37	37.0	36.3	35.2	31.7	34.6
84	y				**46.8**	**41.2**	**43.9**	**40.1**	39.5	35.8	**38.3**
85	y				**54.9**	**52.1**	**49.1**	**45.1**	**42.4**	39.2	**45.3**
86	y				**43.3**	33.6	37.0	34.8	33.2	29.1	30.4
87	y				**52.2**	**42**	**43.4**	**40.3**	36.8	37.6	**39.3**
88	y				**44.8**	33.6	37.7	34.0	33.6	30.7	31.2
89	y				**43.8**	34.2	34.9	34.9	32.0	25.9	31.9
90	y				**42.5**	34.4	37.0	33.5	33.7	27.6	32.1
91	y				**44.7**	34.2	36.6	32.5	33.9	28.4	31.5
92	y					35.8	39.0	36.9	36.0	31.4	33.9
93	y					35.2	37.8	33.8	32.5	29.3	33.4
94	y					36.3	39.2	38.1	34.6	32.8	34.8
95	y					37.1	**40.8**	**40.3**	36.3	31.5	33.7
96	y					**40.5**	**44.9**	**39.2**	**40.6**	36.8	**40.2**
97	y					35.2	39.6	36.7	35.5	29.6	29.5
98	y							**42.0**	**40.3**	35.8	39
100	y										32.05
101	y										38.88
102	y										38.5
103	y										27.09
104	y										**42**

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

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2012	2013	2014	2015	2016
CM1	Select	Automatic	100	50	**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 2016

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

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aµg	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DTK1 - A34 Holy Trinity	46.8	54.4	46.2	44.3	40.9	41.2	40.9	42.8	38.7	51.3	65.6	57.0	47.5	**44.6**	**44.6**
DT2K2 - 76 King St Newcastle	37.7	39.0	31.9	31.2	31.9	30.7	24.1	29.1	28.1	42.3	46.6	44.6	34.8	32.7	32.7
DTUB1 - Wolstanton (Hartington Street)	26.9	22.4	23.1	16.5	14.8	15.1	12.1	12.7	15.1	24.7	34.5	31.4	21.0	19.7	19.7
DTUB2 - (Westlands) 4 Sneyd Crescent	24.2	24.4	19.8	15.2	12.1	13.2	10.6	11.0	15.7	20.3	27.2	28.0	18.5	17.4	17.4
DT3 - Madeley (Collingwood)	41.7	45.1	35.6	34.8	33.7	27.7	27.9	31.5	27.6	28.8	37.0	35.8	33.9	31.9	31.9
DT6 - Kidsgrove (106 Liverpool Road)	46.0	45.0	42.6	46.8	43.7	39.8	35.2	38.9	41.0	50.3	56.0	48.5	44.5	**41.8**	**41.8**
DT9 - 32 Porthill Bank	41.0	43.5	39.6	36.8	38.9	31.8	29.4	31.1	33.1	41.0	47.5	46.4	38.3	36.0	36.0
DT11- 34 London Road, N/C	47.7	50.8	43.9	41.7	40.4	36.8	36.6	39.6	42.8	42.6	55.0	52.0	44.1	**41.5**	**41.5**
DT24 - 26 High St, May Bank	46.8	44.9	37.7	42.3	36.2	32.9	32.5	32.7	32.2	42.3	51.9	48.7	40.1	37.7	37.7
DT28 - Limbrick Cottage Shraleybrook	40.5	40.5	33.6	31.3	30.4	28.0	21.9	32.2	26.3	30.7	42.6	35.1	32.8	30.8	30.8
DT34 - 15 Barracks Road	33.5	40.6	36.2	40.3	33.4	37.1	28.4	32.1	31.0	44.8	50.0	39.4	37.2	35.0	35.0
DT 39-4/6 Liverpool Road,	37.9	40.4	38.7	41.6	41.8	36.8	30.9	36.7	29.3	48.9	51.4	43.4	39.8	37.4	37.4

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aµg	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Kidsgrove															
DT40-Banktop Court, Porthill	35.9	39.4	33.3	33.9	28.8	28.9	24.5	35.1	27.9	36.9	45.2	36.5	33.8	31.8	31.8
DT46- 1 London Road (Trinity Court)	36.3	37.0	30.6	34.3	27.9	28.2	29.1	30.1	29.0	34.6	41.2	38.5	33.1	31.1	31.1
DT47- 1 London Rd (Brook La)	32.1	35.5	32.1	34.6	31.3	34.1	21.5	27.1	28.5	39.1	45.3	35.6	33.1	31.1	31.1
DT49- 2 Vale View, Porthill	38.4	39.1	35.5	34.9	31.3	29.5	28.9	26.3	32.2	35.7	44.4	40.5	34.7	32.6	32.6
DT64 - Kidsgrove Carpets 57 - 59 Liverpool Road	46.4	46.5	37.0	39.4	37.2	33.9	33.9	33.4	34.6	44.0	48.4	48.7	40.3	37.9	37.9
DT72 - 134 High Street Newcastle	39.5	39.1	30.0	27.5	28.7	26.9	25.5	28.3	27.1	37.5	38.2	39.2	32.3	30.4	30.4
DT73 - 21 London Road Newcastle	39.0	38.2	29.7	35.7	33.4	35.0	29.5	31.6	30.1	38.9	46.2	42.2	35.8	33.6	33.6
DT74 - 39 London Road Newcastle	38.7	42.9	32.2	47.1	39.4	39.8	27.3	30.6	33.3	41.1	0.4	48.4	35.1	33.0	33.0
DT76 - 11 Brunswick Street Newcastle	39.3	38.6	32.6	33.2	32.6	36.0	27.5	33.5	28.5	44.3	48.7	46.8	36.8	34.6	34.6
DT84 - 102 King Street Newcastle	37.9	42.1	35.1	36.0	39.0	37.4	33.3	35.1	37.7	50.4	51.3	53.6	40.8	38.3	38.3
DT85 - 106 King Street Newcastle	44.0	45.3	52.3	46.5	48.1	46.0	40.6	44.0	43.7	55.8	49.6	63.2	48.2	**45.3**	**45.3**
DT86 - Hassell C.P. School	33.7	39.2	35.7	32.6	31.2	29.6	28.2	25.2	25.6	31.6	40.1	35.4	32.3	30.4	30.4

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aµg	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
Barracks Road N/C															
DT87 - Blue Chilli 1 King Street Newcastle	41.4	45.7	37.3	48.9	43.1	39.1	36.4	37.2	36.9	45.8	46.7	43.9	41.9	39.3	39.3
DT88 - 27 Lower Street Newcastle	37.2	39.6	34.0	30.0	30.0	29.8	26.4	27.4	25.1	37.0	41.2	40.7	33.2	31.2	31.2
DT89 - Queens Gardens Newcastle	35.2	38.1	31.7	34.0	34.8	32.5	23.4	27.0	30.0	37.9	42.3	40.5	33.9	31.9	31.9
DT90 - Queens Gardens Newcastle	35.0	35.0	33.3	37.6	32.0	32.6	23.5	27.3	27.2	40.4	41.3	45.0	34.2	32.1	32.1
DT91 - Queens Gardens, Newcastle	36.8	36.4	28.7	35.4	32.0	32.9	22.4	24.9	29.7	40.2	37.7	44.9	33.5	31.5	31.5
DT92 - 41/43 Liverpool Road Kidsgrove	39.9	41.7	32.9	27.9	30.1	30.1	29.4	31.6	30.7	44.6	46.4	47.2	36.0	33.9	33.9
DT93 - 118 Liverpool Road Kidsgrove	37.2	36.8	34.7	34.1	28.2	37.7	28.2	32.3	34.3	39.0	42.8	40.6	35.5	33.4	33.4
DT94 - 116 Liverpool Road Kidsgrove	38.0	41.9	34.2	43.6	36.3	40.1	30.0	30.4	31.3	37.4	42.2	39.2	37.1	34.8	34.8
DT95 - 76 London Road Newcastle	41.4	45.0	32.8	38.1	30.5	34.7	27.7	30.4	32.4	35.2	38.5	43.7	35.9	33.7	33.7
DT96 - 52/54 London Road Newcastle	43.7	48.0	38.6	44.8	38.0	36.6	33.9	36.5	38.9	46.9	50.3	56.5	42.7	**40.2**	**40.2**
DT97 - Blackfriars/ Lower Street	31.9	36.0	25.7	27.8	30.5	27.2	21.4	28.3	27.8	37.5	43.1	39.7	31.4	29.5	29.5

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aµg	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.94) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT98 - Newcastle Taxis Brunswick Street	47.5	43.4		25.7		34.5	35.8	35.8	39.0	44.5	56.1	52.8	41.5	39.0	39.0
DT100 - Sainbury's Carpark Near to Courts	32.5	36.7	28.8		26.7	46.9	22.1	25.8	26.5	39.9	42.3	46.7	34.1	32.1	32.1
DT101 Blackburn House Lower Street Newcastle	33.42	44.44	37.98	44.36	42.6		37.63	36.87	31.17	51.13	51.71	43.68	41.4	38.8	34.1
DT102 Maxims Lower Street Newcastle	47.44	44.27	40.47	35.66	42.89		37.02	38.98	43.33	59.29	54.25	65.23	46.3	**43.5**	38.5
DT103 Grange Lange/High Street Wolstanton	31.52	34.14	27.87	27.57	23.64	26.14	15.99	21.86	25.88	32.36	37.24	41.64	28.8	27.9	23.2
DT104 7 King Street Newcastle					38.61	37.57	33.25	30.06	35.4	46.33	52.02	46.47	40.0	**42.0**	**42.0**

☒ **Local bias adjustment factor used**
☒ **National bias adjustment factor used**
☒ **Annualisation has been conducted where data capture is <75%**

Notes:
Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**
(1) See Appendix C for details on bias adjustment and annualisation
(2) See Appendix C for Distance corrected to nearest relevant public exposure.

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.

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR007, 9, 10, 12, 13, 15, 16 and 18

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

AIR PT Round	AIR PT AR007	AIR PT AR009	AIR PT AR010	AIR PT AR012	AIR PT AR013	AIR PT AR015	AIR PT AR016	AIR PT AR018
Round conducted in the period	April – May 2015	July – August 2015	October – November 2015	January – February 2016	April – May 2016	July – August 2016	September – October 2016	January – February 2017
Aberdeen Scientific Services	100 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	100 %	100 %	100 %	100 %	75 %	75 %	100 %	100 %
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	100 %	75 %	100 %	0 %	100 %	100 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	100 %	100 %	100 %	100 %	NR [2]	NR [2]
Lambeth Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
Milton Keynes Council	100 %	100 %	100 %	50 %	100 %	100 %	75 %	100 %
Northampton Borough Council	100 %	100 %	100 %	50 %	100 %	NR [2]	75 %	0 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	75 %	100 %	100 %	75 %	100 %	100 %
Staffordshire County Council	100 %	75 %	75 %	75 %	75 %	100 %	NR [2]	100 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	NR [2]	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	75 %	75 %	75 %	75 %	100 %	NR [2]	50 %	100 %

[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Kent Scientific Services, Cardiff Scientific Services and Exova (formerly Clyde Analytical) no longer carry out NO_2 diffusion tube monitoring and therefore did not submit results.

Figure 8 Air PT Results for Gradko 2015

C.1.6. Short-term to Long-term Data Adjustment –

C.1.6.1 NO2 annualisation for Queens Gardens Continuous Monitor

Data adjustment has been undertaken for the N02 data from the Queens Gardens Monitoring site as the equipment had not been in operation between the 1/3/16 and 31/8/16. This has been undertaken using the method set out in Box 7.10 of TG(16) using the following data.

Newcastle under Lyme Queen's Gardens Annualisation 2016						
Continuous Monitor Measured Mean 2016						
NO	NO2	NOx				
31.0	29.0	76.0				
Site	Distance (approx)	Annual Mean	Period mean (1/3/16 - 31/8/16)	Ratio	Annualisation factor	Annual mean estimate
Ladybower	53km	9.3	7.5	1.2	1.4	41.6
Stoke-on-Trent	5km	53.5	42.9	1.2		
Warrington	49km	43.3	29.8	1.5		
Wrexham	51km	34.6	28.2	1.2		
Chesterfield	59km	31.2	15.6	2.0		

Figure 9 Queen's Garden's Annualisation procedure

C.1.6.2 Annualisation of NO_2 data to derive annual mean before bias adjustment for site DT104

Data adjustment for site 104 has been required due to data capture being 67%, which is less than the 75% considered appropriate for a valid result. Annualisation of the result from this diffusion tubes, was undertaken using the method set out in Box 7.10 of TG(16) using the following data

Diffusion Tube 104 Annualisation

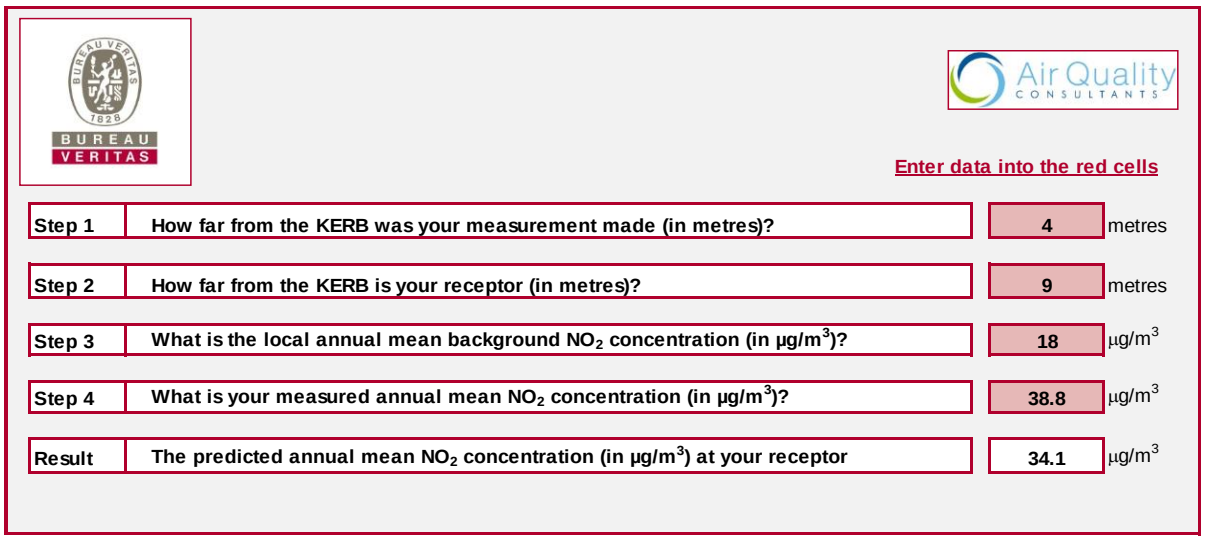
Diffusion tube DT104 Mean for 1/5/16 - 31/12/16
39.96

Site	Distance (approx.)	Annual Mean	Period mean (1/1/16 - 30/4/16)	Ratio	Annualisation factor	Annual mean estimate
Ladybower	53km	9.3	11.5	0.8	0.95	37.88
Stoke-on-Trent	5km	53.5	54.1	1.0		
Warrington	49km	43.3	44.9	1.0		
Wrexham	51km	34.6	40.8	0.8		
Chesterfield	59km	31.2	27.6	1.1		

Figure 10 Annualisation procedure for DT104

C.1.7 Distance correction for diffusion tubes sites DT101, DT102, DT103

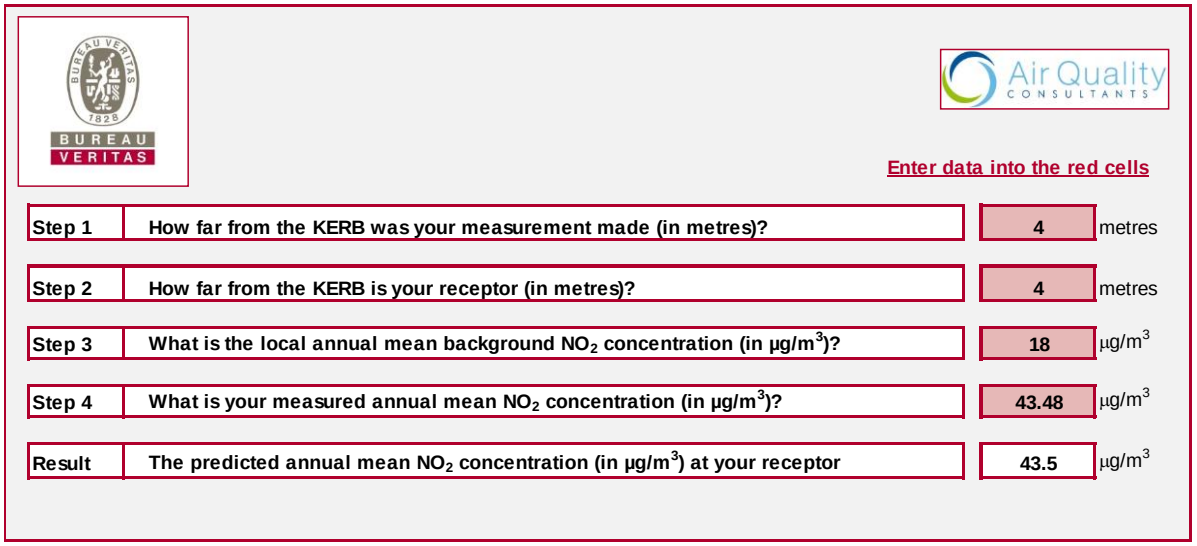
It has been necessary to undertake distance correction for the following sites, to ensure that results are representative of relevant exposure for the annual mean objective for NO_2. The N02 Fall Off With Distance from Roads calculator has been used for this purposes https://laqm.defra.gov.uk/documents/NO2-Fall-Off-With-Distance-from-Roads-Calculator-v4.1.xls with the relevant 1km grid square N02 background data for 2016 taken from https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013. The distance correction has been applied to the bias adjusted figure.



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	4	metres
Step 2	How far from the KERB is your receptor (in metres)?	9	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	18	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	38.8	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	34.1	$\mu g/m^3$

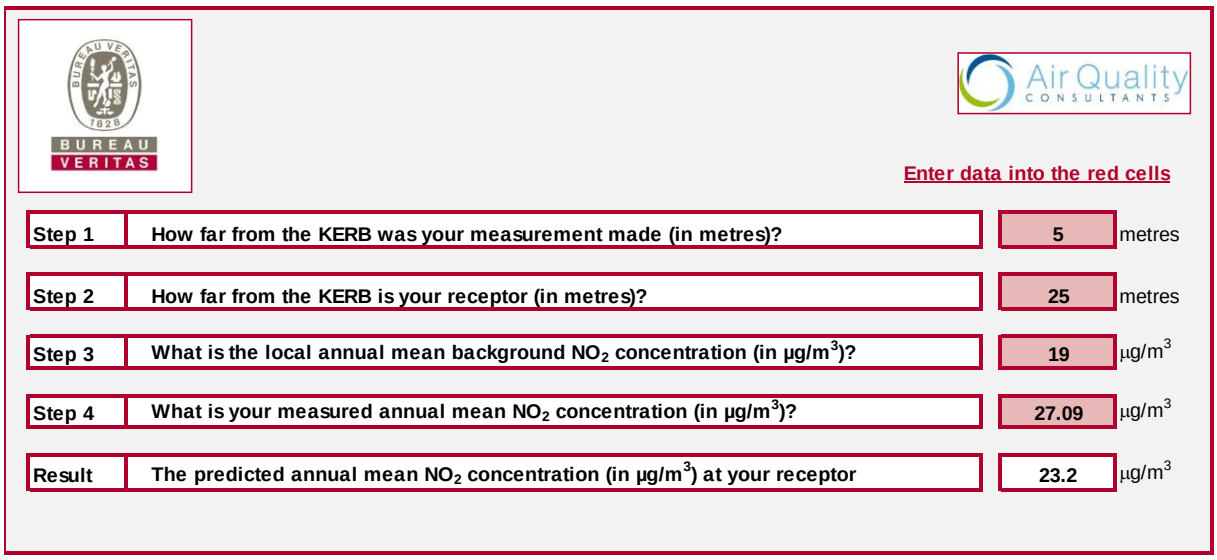
Figure 11 DT101 Blackburn House, Distance correction calculation



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	4	metres
Step 2	How far from the KERB is your receptor (in metres)?	4	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	18	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	43.48	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	43.5	$\mu g/m^3$

Figure 12 DT102 Maxims, Distance correction calculation



Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	5	metres
Step 2	How far from the KERB is your receptor (in metres)?	25	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	19	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	27.09	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	23.2	µg/m^3

Figure 13 DT103 Grange Lane Distance correction

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

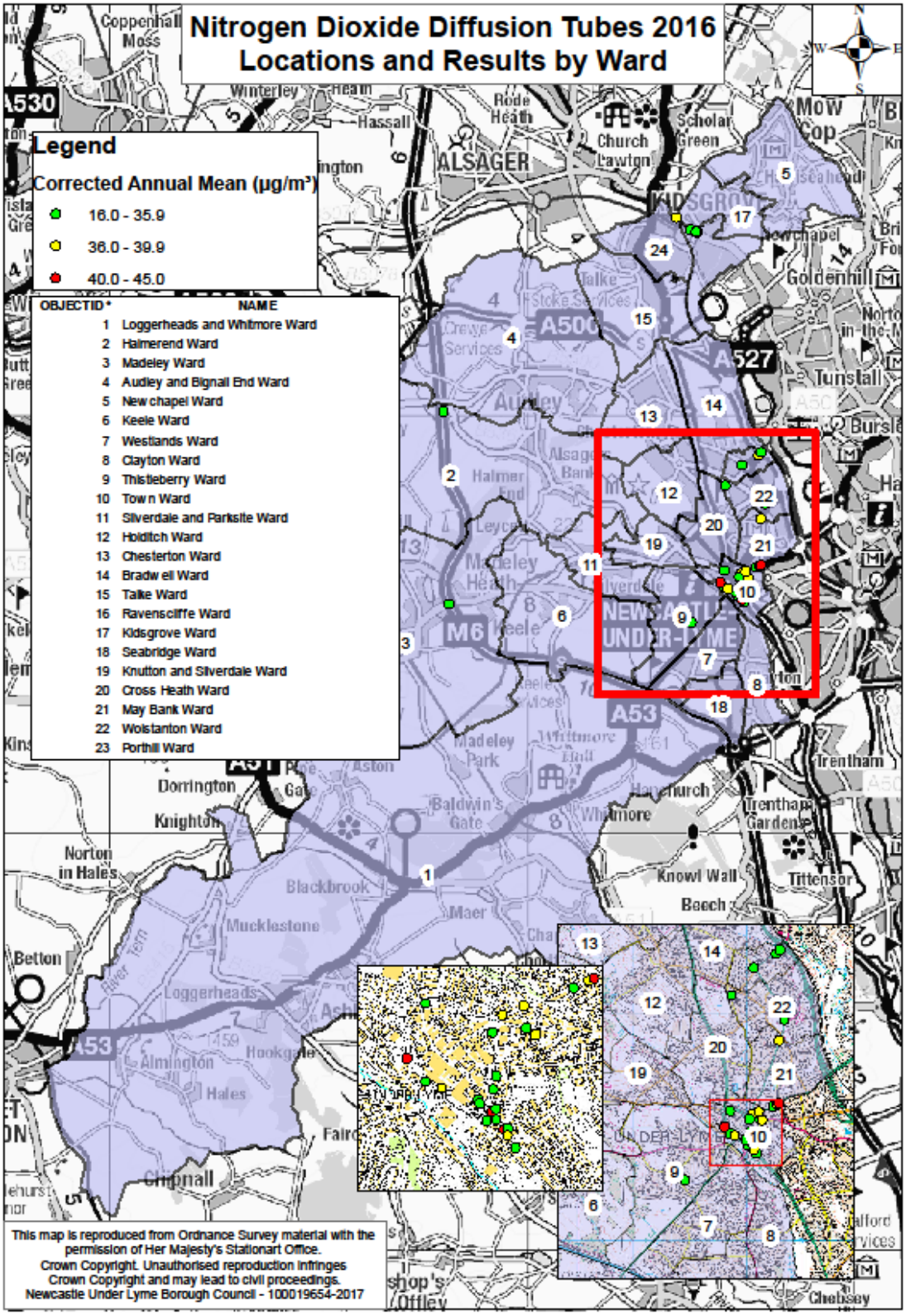


Figure 14 Map showing Nitrogen Dioxide Diffusion Tube Results 2016 by Electoral Ward

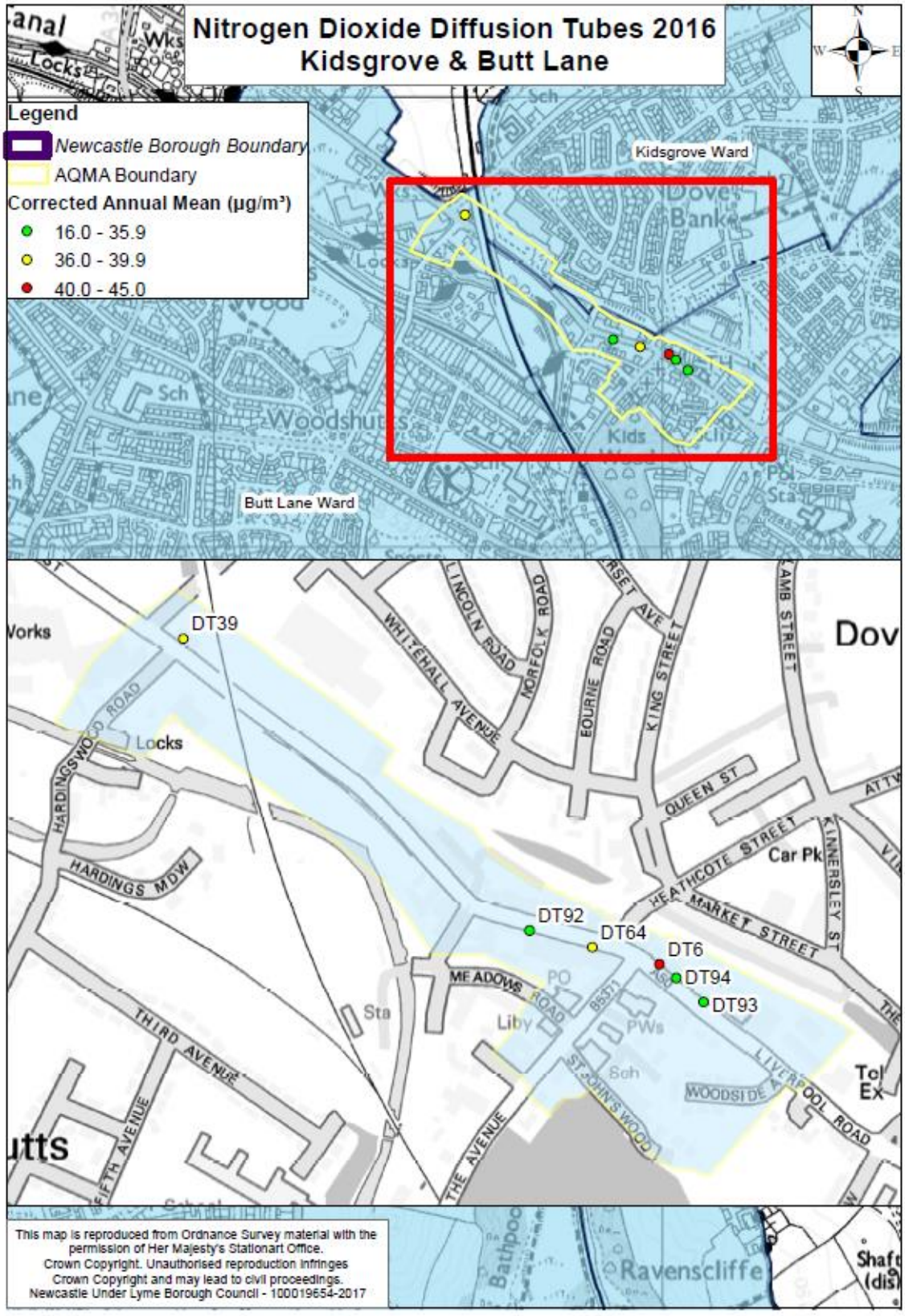


Figure 15 Map Showing Nitrogen Dioxide Diffusion Tube Results for 2016 – Kidsgrove AQMA

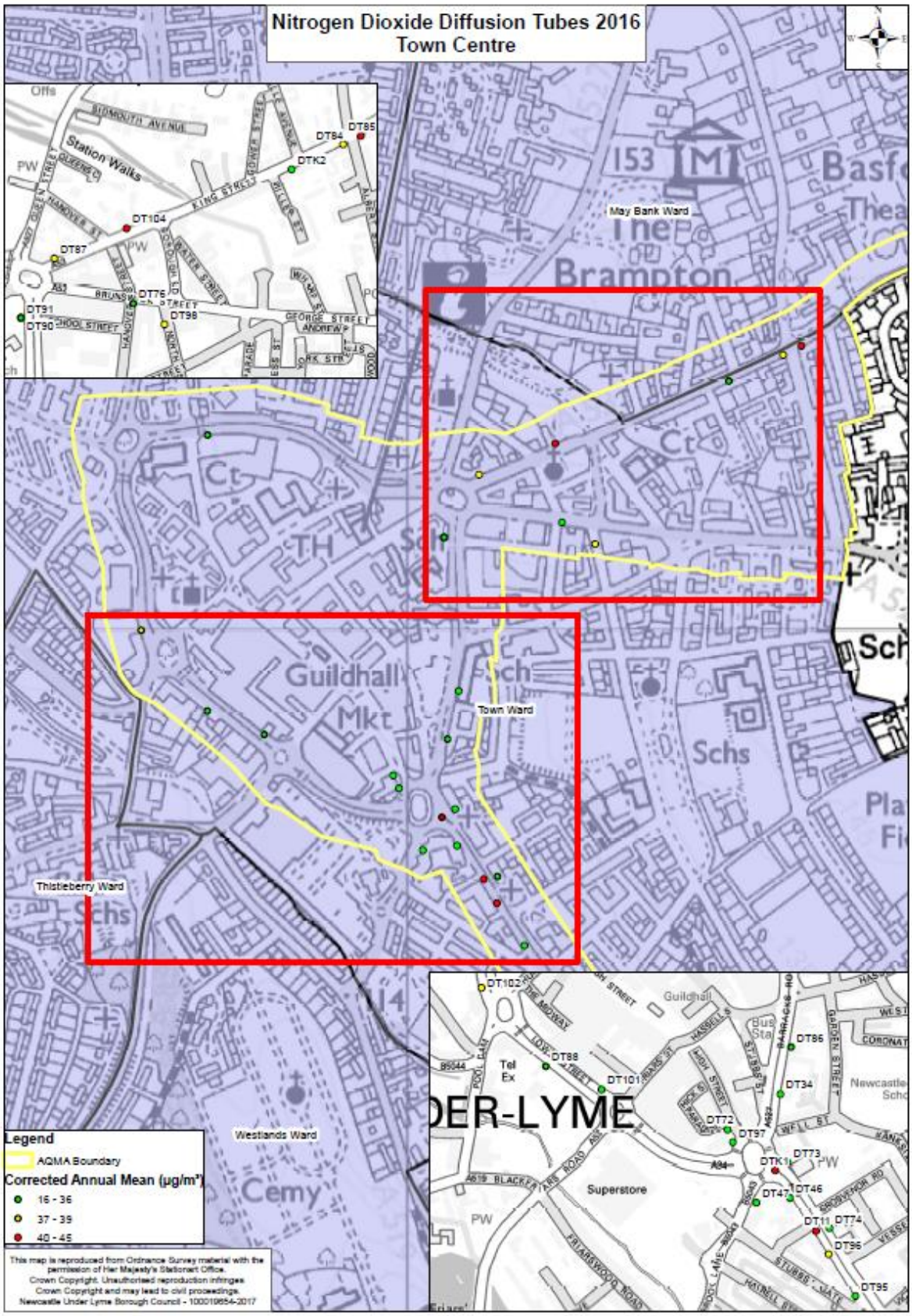


Figure 16 Map Showing Nitrogen Dioxide Diffusion Tube Results for 2016 – Newcastle Town Centre AQMA

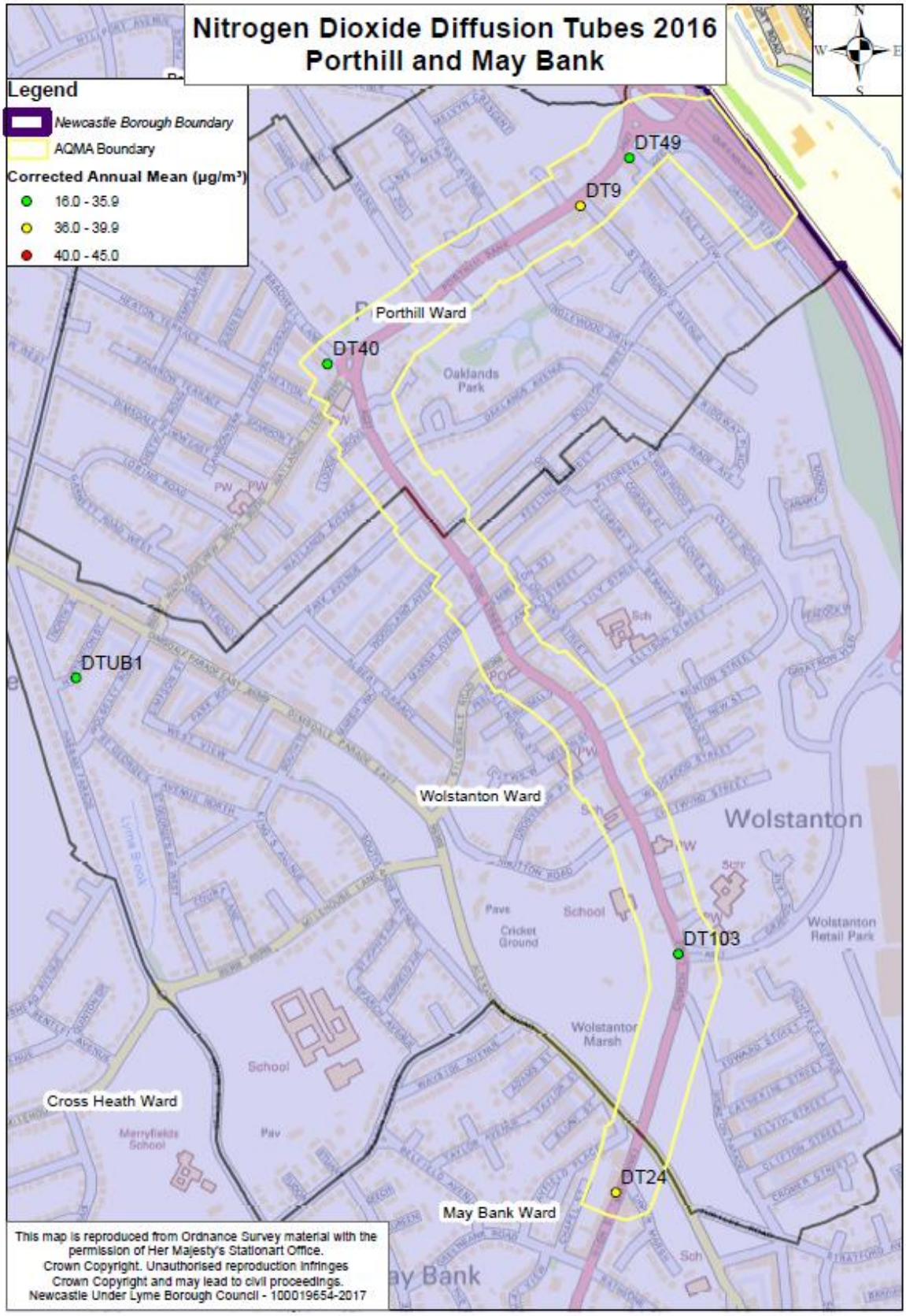


Figure 17 Map Showing Nitrogen Dioxide Diffusion Tube Results for 2016 – Maybank, Wolstanton, Porthill AQMA

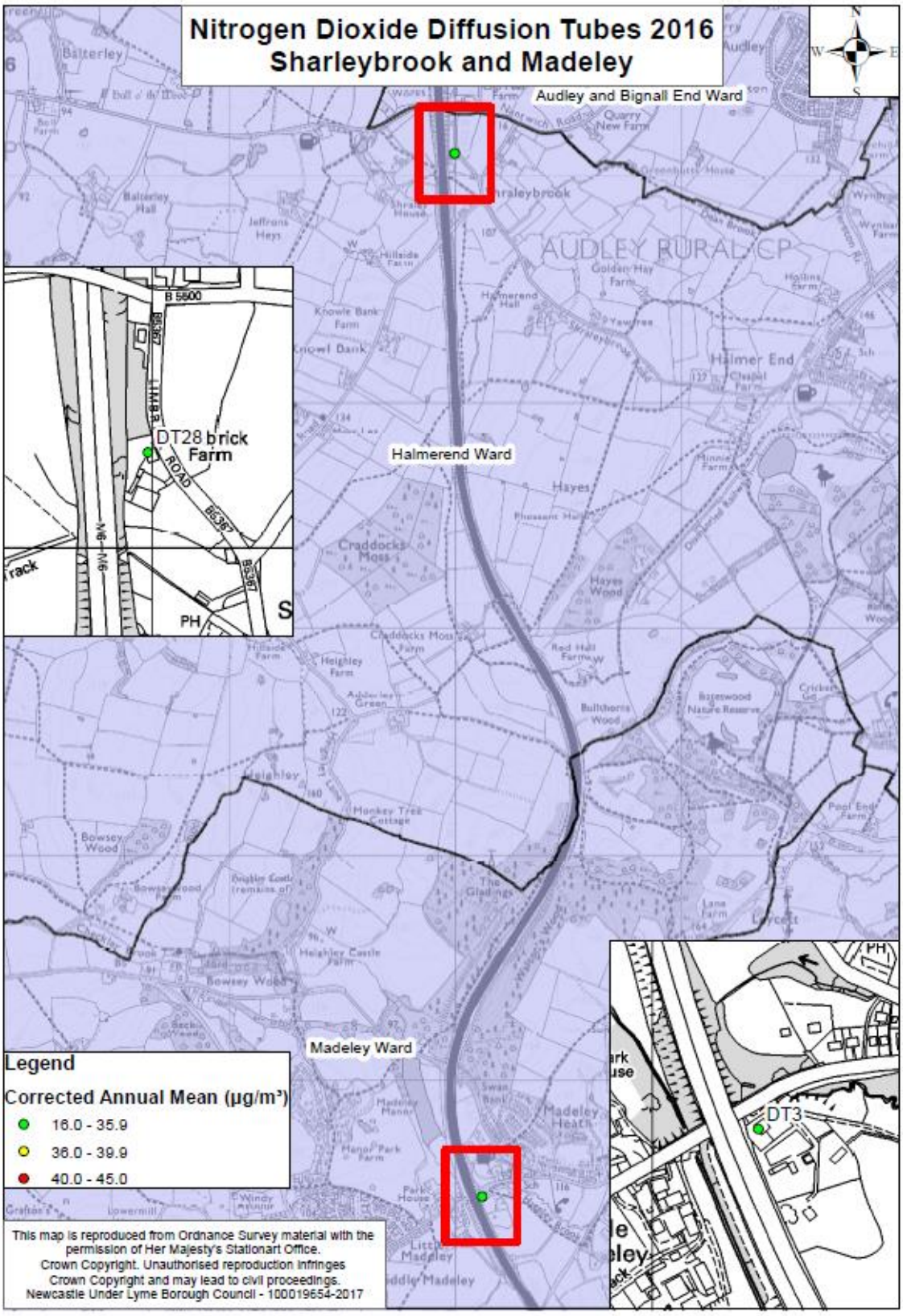


Figure 18 Map Showing Nitrogen Dioxide Diffusion Tube Results for 2016 – Little Madeley AQMA

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
HE	Highways England
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NULBC	Newcastle under Lyme Borough Council
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
SCC	Staffordshire County Council
SO_2	Sulphur Dioxide
SOTCC	Stoke on Trent City Council

References

1. Part IV of the Environment Act 1995 – Local Air Quality Management; Technical Guidance LAQM.TG (16)
2. Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
3. http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
4. http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38
5. http://www.londonair.org.uk
6. www.metoffice.gov.uk
7. http://www.environment-health.ac.uk/news/air-pollution
8. http://uk-air.defra.gov.uk/news?view=183
9. http://www.dft.gov.uk/traffic-counts/cp.php
10. Appendix 2, Etruria Valley Enterprise Area - Draft Supplementary Planning Document 2012. (www.stoke.gov.uk)
11. EMEP/EEA Emission Inventory Guidance2013