



# **2020 Air Quality Annual Status Report (ASR) for Broxtowe Borough Council**

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

June 2020

**Broxtowe Borough Council**

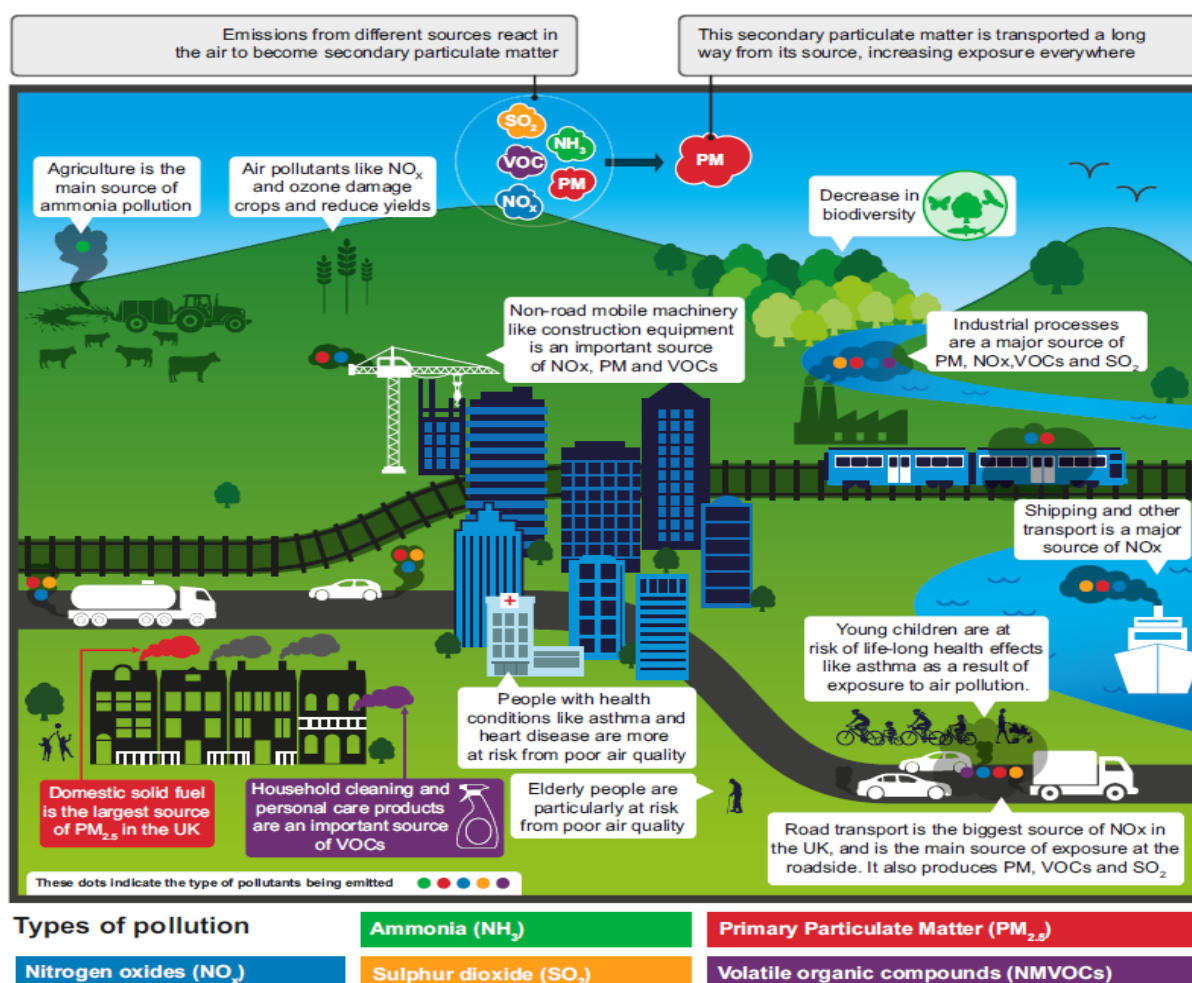
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# Executive Summary: Air Quality in Our Area

## What is Air Pollution and where does it come from?

Air pollution is generally defined as any type of particulate (dust) or gaseous substance (e.g. Oxides of Nitrogen) that is emitted into the atmosphere due to the combustion of fuels such as coal, oil, gas, petrol, diesel and the burning of wood or natural gas from domestic central heating boilers or power stations. When these fuels are combusted, they are emitted into the atmosphere and they affect the air quality within the United Kingdom (UK).

### The sources of air pollutants and their effects.



Source – Clean Air Strategy 2019, DEFRA

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/770715/clean-air-strategy-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf)

Poor air quality can affect people's health on a daily basis and can result in premature death. Therefore, it is imperative that poor air quality is recognised as a public health issue and that continual measures are taken to improve the air quality even if the air quality objectives in the UK are being met.

The two main types of air pollution within the United Kingdom are Nitrogen Dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>), therefore this report will explain the effects of these pollutants on health, the concentration levels within the Borough of Broxtowe and measures that have been, are being and will be taken to improve the air quality within the Borough.

## **What is Nitrogen Dioxide?**

Nitrogen Dioxide is a reddish brown gas with the chemical formula NO<sub>2</sub>. Nitrogen Monoxide is a colourless gas with the chemical formula NO. Collectively NO<sub>2</sub> and NO are known as Oxides of Nitrogen and the chemical formula is NO<sub>x</sub>.

As mentioned previously NO<sub>x</sub> is emitted into the atmosphere due to the combustion of fuels such as coal, oil, gas, petrol, diesel and the burning of wood or as natural gas from domestic central heating boilers or power stations.

Some sources of NO<sub>x</sub> release NO<sub>x</sub> in the form of NO<sub>2</sub> into the atmosphere, these are known as primary sources of NO<sub>2</sub>, which are mainly emitted from vehicle exhausts. It was previously believed that it was petrol vehicles that were the main source of NO<sub>2</sub> however the use of diesel particulate filters within the exhaust systems of diesel vehicles have resulted in high concentrations of NO<sub>2</sub> being emitted into the atmosphere.

Another source of NO<sub>2</sub> in the atmosphere is due to a chemical reaction in the atmosphere between NO and Ozone (O<sub>3</sub>). This is classed as a secondary source of NO<sub>2</sub>. However, if concentrations of O<sub>3</sub> are low near to the source of NO then NO<sub>2</sub> will not be formed.

## What is Particulate Matter?

Particulate matter is the term used for a mixture of solid particles and/or liquid droplets within the air. Particulate matter varies in size with some particles being easily visible to humans e.g. dust, soot, smoke and vapour from domestic boiler flues. However, some particles are so small that they cannot be seen with the naked eye and it is these particles that are easily absorbed deep into the lungs and cannot be expelled when they are breathed in.

### Size of Particulate Matter



Source: USEPA - <https://www3.epa.gov/pm/basic.html>

Research has shown that there is significant harm to health at concentrations of Particulate Matter well below the current EU and UK limit values. (See Appendix K for the Air Quality Objectives for the UK).

There are many sources of particulate matter in the United Kingdom, examples of these are:

- Vehicle exhausts
- The wearing of brake pads, tyres and asphalt
- Rust from vehicles
- Poor fuel combustion
- Dust from demolition and building sites
- Bonfires and inefficient burning of solid fuel e.g. wood.

Within the United Kingdom the main particulate matter that causes concern is particulates that are classed as 'fine particles' (PM<sub>2.5</sub>) or 'inhalable coarse particles' (PM<sub>10</sub>). The particles are measured in size and referred to as microns (µm). PM<sub>10</sub> are particles that are 10 microns to 2.5 microns in size, and PM<sub>2.5</sub> are particles that are 2.5 microns or less.

## **What are the Health Effects of Poor Air Quality?**

Air pollution is associated with a number of adverse health impacts both short term and long term. 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<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

To be able to understand the full effects of poor air quality on humans an understanding of how the pollutants enter the body, where they go once they are within the body and the effects that they have are shown in the diagram below.

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

<sup>2</sup> Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

## Where air pollutants go in our bodies and what they do

A few hours of PM<sub>2.5</sub> over 35 µg/m<sup>3</sup> or NO<sub>2</sub> over 200 µg/m<sup>3</sup> irritates the eyes, nose and throat.

PM can cause strokes. Ultrafine PM has been found in samples of brain and central nervous system tissue.

Heart and blood vessel diseases like strokes and hardening of the arteries are one of the main effects of air pollution. These can be caused by a few years exposure to even low levels of PM<sub>2.5</sub>.

Poor air quality affects everyone. It can have long term impacts on all and immediate effects on vulnerable people, with a disproportionate impact on the young and old, the sick and the poor.

Exposure for a few hours to high levels of PM<sub>2.5</sub> can bring on existing illness or strokes and heart attacks in ill people.

Ultrafine PM can get into the blood then throughout the body. Ultrafine particles have been found in body organs.

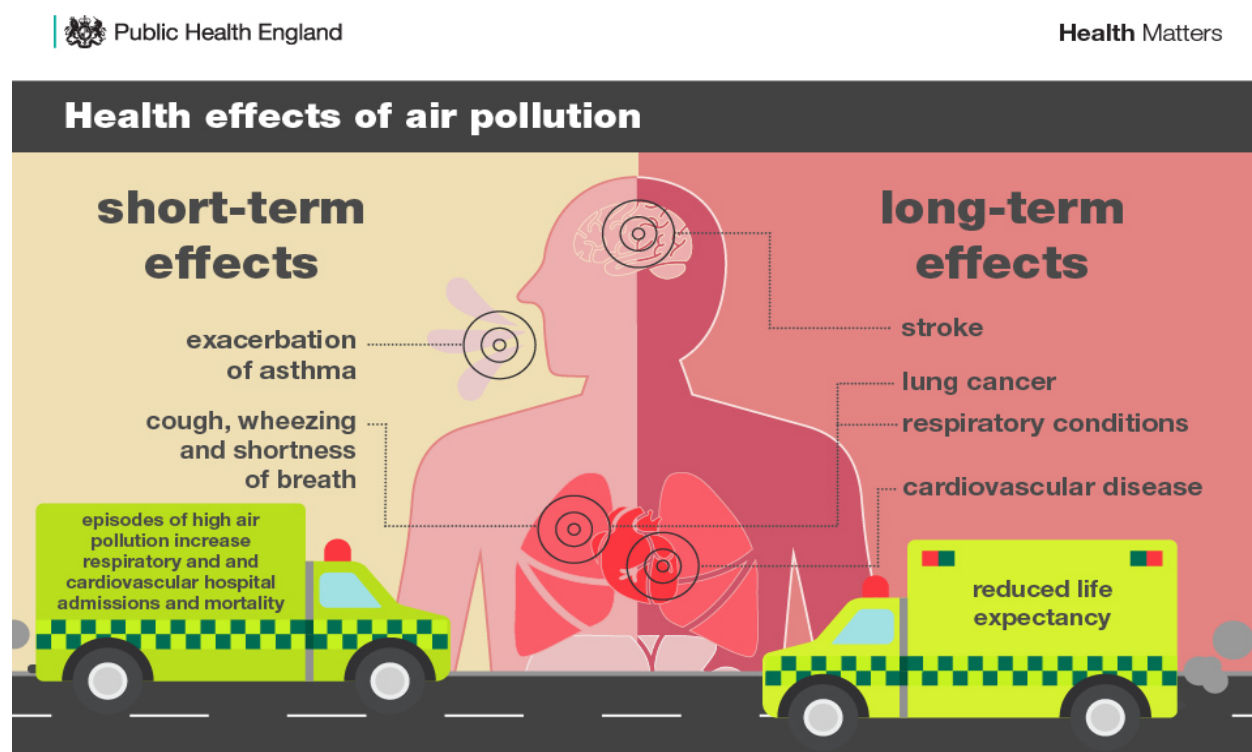
PM has been found in the reproductive organs and in unborn children.

Source - Air Quality: A Briefing for Directors of Public Health, March 2017  
<https://laqm.defra.gov.uk/assets/63091defraairqualityguide9web.pdf>



When people are within an area of poor air quality the length of time they are there is called the 'exposure' time'. There are two types of exposure, short-term and long term. Short-term is when the person is subjected to poor air quality for a short time e.g. a couple of hours and the effects are called 'Short-term effects'. Long term exposure is when people are consistently living or working with in an area where there is poor air quality. The short- term and long-term effects on the body are shown in the diagram below.

### The short and long-term effects of air pollution



Source – Health Matters 2018, Public Health England

### Health Effects of Nitrogen Dioxide

The main health effect of breathing in raised levels of Nitrogen Dioxide is the increased likelihood of respiratory problems, as Nitrogen Dioxide inflames the lining of the lungs, and it can reduce immunity to lung infections. This can cause problems such as wheezing, coughing, colds, flu and bronchitis and can exasperate pre-existing conditions like asthma and Chronic Obstructive Pulmonary Disease.



The Committee on the Medical Effects of Air Pollution (COMEAP) has produced estimates of the attributable deaths of people aged 25+ due to NO<sub>2</sub> and Particulate Matter based on 36,000 for all local authorities in the United Kingdom. The estimates are based on the researched evidence of mortality risk combined with modelled levels of background air pollution to which populations are exposed to at each local authority. Table i provides the results for the East Midlands, Nottinghamshire County Council, Nottingham City and all the District and Borough Councils within Nottinghamshire.

**Table i – Estimated Attributable Deaths in 2018 due to NO<sub>2</sub> and Particulate Matter based on 36,000.**

<b>Area</b>	<b>Attributable deaths Age 25+ due to NO<sub>2</sub> and PM based on 36,000</b>	<b>Associated Life-years Lost based on 36,000</b>
East Midlands	3,115	29,813
Nottinghamshire County Council	594	5,430
Nottingham City	181	1,734
Ashfield	94	913
Gedling	87	866
Newark and Sherwood	87	863
Bassetlaw	84	855
Broxtowe Borough Council	86	844
Mansfield	79	819
Rushcliffe	77	728

**Source:** COMEAP, Associations of long-term average concentrations of Nitrogen Dioxide with mortality, 2018.

Table i shows that in the Borough of Broxtowe out of 844 life years lost, 86 of these are attributable to NO<sub>2</sub> and Particulate Matter. However, the data also identifies that Broxtowe does not have the highest number of deaths that are attributable to air quality in comparison to other District and Borough authorities in Nottinghamshire

## **Health Effects of Particulate Matter**

The health effects associated with short term and long-term exposure to particulate matter are; exacerbation of asthma, effects on lung function, increases in hospital admissions for respiratory and cardiovascular conditions, and also increases in mortality<sup>4</sup>. Public Health England (PHE) has produced estimates of the risk of mortality from particulates for all local authorities in the United Kingdom. The estimates are based on the researched evidence of mortality risk combined with modelled levels of background air pollution to which populations are exposed to at each local authority. See Section 2.3 of this report for further information on the estimated effects of annual mortality in 2018 of human made PM<sub>2.5</sub> air pollution.

## **Air Quality in the Borough of Broxtowe**

The main air quality issue within the Borough is due to the M1 and the A52, which is the main road that connects Nottingham to Derby and is used heavily by commuters. Residential properties are situated alongside the M1 and the A52.

The main pollutant of concern within the Borough is Nitrogen Dioxide, which is emitted from vehicle exhausts and is prevalent in areas where there are congested roads. However, it must also be noted that ambient background levels are affected by emissions from domestic heating e.g. Oxides of nitrogen from boilers and particulate matter from solid fuel burners.

Broxtowe Borough Council participates in the United Kingdom Nitrogen Dioxide diffusion tube network and has 43 diffusion tubes sites throughout the Borough. The sites are primarily monitoring the M1 corridor and the A52. Some of the diffusion

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<sup>4</sup>Gowers, A.M. et al Estimating Local Mortality burdens associated with Particulate Air Pollution, Public Health England, 2017.

tubes are sited within and near to the existing Air Quality Management Area (AQMA), which is situated in Trowell. Monitoring is still being undertaken in the three revoked AQMAs to ensure that the concentrations remain below the air quality objective. Further information on the AQMA is discussed in Chapter 2.1 of this report.

The 2019 nitrogen dioxide results show that the air quality levels are below the objective of  $40\mu\text{g}/\text{m}^3$  for all of the monitoring locations throughout the Borough. The results are discussed in greater detail in Chapter 3.2.1 of this report.

Since January 2013, there are only thirteen  $\text{NO}_2$  monitoring sites that have continued to be used for the past six years. Therefore, it is important to identify any trends in these sites. Out of the thirteen sites, twelve of the sites are showing a downward trend since 2013, The one remaining site has only shown a very slight downward trend but has increased in 2019 by  $3\mu\text{g}/\text{m}^3$  in comparison to 2018. The trends are discussed in greater detail in Chapter 3.2.1 of this report and Appendix C contains the trend graphs for the thirteen sites.

In respect of particulates, the modelled background level provided by Defra for the Borough of Broxtowe indicated levels between  $8\mu\text{g}/\text{m}^3$  and  $11\mu\text{g}/\text{m}^3$  for 2019, with the annual mean for 2019 being  $9.73\mu\text{g}/\text{m}^3$ . The World Health Organisation (WHO) guideline level for  $\text{PM}_{2.5}$  is  $10\mu\text{g}/\text{m}^3$ .

Broxtowe Borough Council has a close working relationship with Highways England and Nottinghamshire County Council Highways Department. Highways England manages the M1 Motorway and the A52, which run through the Borough. Nottinghamshire County Council Highways Department manage the remaining roads that run through the Borough; this includes the A610/B600 Nuthall Roundabout.

The Council works with Highways England and Nottinghamshire County Council by continuing to monitor air quality levels throughout the Borough, to inform them of any changes to the air quality levels, to provide maps of the air quality management areas and to provide yearly air quality reports. By working together actions are implemented where possible to ease congestion by maintaining a steady flow of traffic throughout the Borough and to also promote sustainable travel.

The Environmental Health team at Broxtowe Borough Council also works closely with the Environment Agency who attend the Nottinghamshire Environmental Protection Working Group meetings along with colleagues in the Planning department at the Council. This ensures that air quality issues are raised and considered throughout the planning process.

## **Actions to improve Air Quality**

Below is a brief summary of the core actions to target sources of pollution in the Borough of Broxtowe over the past year.

- Low Emission Fleet Vehicles – Broxtowe Borough Council has purchased two more Euro 6 vehicles to replace two older more polluting vehicles.
- Electric Fleet Vans – Two electric fleet vans have been procured by Broxtowe Borough Council.
- Marketing and promotion of sustainable transport alternatives – both the County Council and Broxtowe Borough Council continue to develop and deliver programmes to encourage more sustainable travel. These include infrastructure improvements such as the County Council's integrated transport programme delivering improvements for pedestrians, cyclists and bus users; cycle training, as well as marketing materials and campaigns developed in partnership with stakeholders such as passenger transport operators.
- Go-Ultra Low programme – the County Council, in partnership with Nottingham and Derby City Councils, successfully secured £6.1m of funding to deliver the Go-Ultra Low programme between 2016 and 2020. The programme included the development and delivery of an area-wide electric vehicle charging infrastructure network. Using this funding, 28 publicly available charge points have been installed across the Borough, all of which are in Broxtowe Borough Council owned car parks in Beeston, Eastwood, Kimberley and Stapleford.
- Retrofitting of buses – In February 2018 it was announced that the County Council (and Nottingham City Council) had successfully secured funding from the Green Technology Fund to retrofit some of the most polluting buses in the

county – including a number of buses that travel in the Borough. Work is now underway to retrofit the identified vehicles and will continue in to 2020.

- Traffic management improvements – general traffic management schemes have been introduced in the vicinity of the AQMA during 2019/20, including the introduction of an environmental weight limit on Nottingham Road, Nuthall to help ensure HGVs follow the most appropriate route; and A610/Ikea roundabout signing and lining improvements to help improve capacity/traffic flows.
- Effective Network Management – the County Council continues to work with stakeholders to effectively manage its highway network. Along with the co-ordination of works, contingency planning, and effective event and incident planning, the County Council purchased a third camera enforcement car during 2019/20 to effectively enforce parking violations.
- Workplace Travel Plans – Broxtowe Borough Council and Nottinghamshire County Council have completed a council Travel Plan to help promote sustainable travel amongst staff as part of both their journeys to work and whilst undertaking Council business. Travel Plans are also developed with businesses through the development control process.
- Nottinghamshire Air Quality Strategy – The Nottinghamshire City, County and District Councils have jointly reviewed and updated the Nottinghamshire Air Quality Strategy, which was formally approved by the Nottinghamshire City and County Health and Wellbeing Boards.
- Cycle network improvements – work was completed on the delivery of enhancements to a number of cycle routes in the Beeston area to improve links between the town, the City and the Nottingham Enterprise Zone.

Further information on these core actions and progress on grant funded projects are discussed in greater detail in Table 2.2 of this document.

## **Conclusions and Priorities**

The 2019 nitrogen dioxide results show that the air quality levels are below the objective of 40µg/m<sup>3</sup> for all of the monitoring locations throughout the Borough including the AQMA. Although the objectives are being met it is very important to

continue to improve air quality within the UK as poor air quality is a public health concern.

Therefore, to continue to improve the air quality in the Borough the priorities for Broxtowe Borough Council in addressing air quality for the coming year are to:

- Review the NO<sub>2</sub> diffusion tubes network annually, discontinue sites where the annual air quality levels are comfortably below the objective, and relocate them to new sites within the Borough. Extensive monitoring will allow Broxtowe Borough Council to identify and focus on ‘problem’ areas.
- Continue to reduce the levels of NO<sub>2</sub> in the Borough by working with Highways England and Nottinghamshire County Council.
- Continue to be a member of the East Midlands Air Quality Network (EMAQN), to liaise with colleagues in Public Health and other local authorities.
- Continue to promote the final version of the “EMAQN Air Quality and Emissions Mitigation: guidance for developers” document.
- Continue to be a member of the Nottinghamshire Environmental Protection Working Group, and to liaise with colleagues in Public Health and the Health and Wellbeing Boards (Nottingham City and Nottinghamshire County) to ensure that Air Quality continues to be included in the Joint Strategic Needs Assessment for the County and any future work that involves air quality issues.
- Engage with the public about air quality and raise awareness of the health effects of air quality.
- Continue to provide the public, companies and businesses within the Borough with methods that they can use to improve air quality for themselves and also the health of their employees.
- Continue to provide information on green travel e.g. walking, cycling by providing leaflets.
- Continue to support bus companies and taxis that operate within the Borough to reduce emissions.
- Continue to review suitable research methods for reducing air quality levels for both NO<sub>2</sub> and particulate matter.

- Broxtowe Borough Council to continue as an active member in the Air Quality Strategy Task Group.
- Ensure that the new Nottinghamshire Air Quality Strategy when completed is promoted and used once more as a valuable working document.
- Review the measures in Broxtowe Borough Council's Air Quality Action Plan and to continue to report on them in the next ASR as well as all the measures that are being implemented in the Borough to reduce air pollution levels.
- Continue to attend regional HS2 meetings to ensure that suitable mitigation measures are made during the construction phase and when HS2 is operational.

One of the challenges associated with addressing the air quality in the Borough is that the main source of the air quality problem is the M1 Motorway, which is managed by Highways England and is not under the control of Broxtowe Borough Council. Although Broxtowe Borough Council have a close working relationship with Highways England it is unable to impose or make any changes to the M1 to improve the air quality within the neighbouring residential areas. However, Highways England has undertaken projects at great expense in the past to improve the air quality within the Borough e.g. widening scheme and Smart Motorway scheme.

Apart from the M1 and the A52 all of the roads within the Borough are managed by Nottinghamshire County Council who manage the traffic flows, repairs, diversions etc. There are several challenges associated with this. The first challenge is that Broxtowe Borough Council is unable to impose or make any changes to the structure or flow of the roads. The second challenge is the limited funding currently available to County Councils for significant walking and cycling improvements, which was exacerbated when funding available for integrated transport improvements was substantially reduced from 2015/16 onwards (to only £3.9m per year for all safety, capacity, active travel, parking, bus and traffic management infrastructure improvements) and has remained at the same level since then. This significantly reduces the funding available for transport improvements that will deliver air quality improvements.



The monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> is very expensive to undertake due to the costs and the maintenance of the equipment. However, the possibility of sharing equipment is being investigated. Although monitoring is not currently carried out, 'modelled' figures are received from Defra. See Section 2.3 of this report for further information.

## **Local Engagement**

Since the 2019 Annual Status Report (ASR) Broxtowe Borough Council has continued to be in the East Midlands Air Quality Network (EMAQN), which reviews current air quality issues for the area. EMAQN is run by Public Health England. EMAQN has collectively produced a report to assist local authorities and developers when determining whether an air quality assessment is needed during the planning application process. The aim of EMAQN is to engage decision makers from different disciplines to assist in reducing AQ levels as a whole in the East Midlands. This also enables neighbouring counties to communicate more openly, which is vital for Broxtowe Borough Council due to it being next to Derbyshire because the A52 is a major source of air pollution, which runs through Derbyshire and Nottinghamshire.

Defra have identified Derby and Nottingham as exceeding the air quality objective therefore, they are mandated to implement a Clean Air Zone (CAZ). However, Nottingham City Council subsequently undertook air quality modelling of several potential CAZ options (charging and non-charging) alongside planned actions (e.g. measures to provide and promote sustainable transport infrastructure) to determine if they would deliver the required air quality objectives. This modelling has identified that air quality objectives are anticipated to be met without the introduction of a charging CAZ.

Broxtowe Borough Council was selected in 2018 to be in the Air Quality Task and Finish Group, which was set up to update the Nottinghamshire Air Quality Strategy (NAQS). The draft NAQS was approved at the Nottinghamshire County and City Health & Wellbeing Boards in 2019 and the finished format of the NAQS will be published online and sent to all Nottinghamshire Councils to be endorsed by them in 2020.

## How to Get Involved

Residents and businesses living or working in Nottinghamshire can improve the air quality in the area by taking simple measures. One of the main changes that can be made is to use sustainable travel more and reduce dependency on the car when possible. Below are some of the actions that people can take, and particularly for short journeys.

- Public transport – To use all means of public transport whenever possible e.g. trams, buses and trains. In addition to printed materials, an integrated public transport planning tool detailing local bus, rail and tram networks, as well as for trips further afield can be found at <https://www.nottinghamshire.gov.uk/travelchoice/journey-planner> and <http://www.traveline.info/> Details on travelling on school buses to Nottinghamshire schools and assistance available to do so, can be found at <http://www.nottinghamshire.gov.uk/education/travel-to-schools>. The tram timetable is available at <http://www.thetram.net/> The Big Wheel promotes sustainable travel within the Nottingham urban area (including parts of Broxtowe); it assists people and businesses with journey planning and advice. Further information can be found at <http://www.thebigwheel.org.uk/>
- Car share – The Nottinghamshire car share scheme, ‘*nottinghamshare*’, is available to anyone <https://liftshare.com/uk/community/nottinghamshare> but all businesses can produce their own.
- Park and Ride – There are a variety of Park and Ride sites within Nottinghamshire, which serve the Nottingham Tram and buses. Information for these Park and Ride sites which includes maps of their locations are found at <http://www.nottinghamshire.gov.uk/transport/public-transport/park-and-ride>
- Walking and Cycling – The health benefits of physical activity e.g. walking or cycling outweigh the risks from air pollution. You can easily avoid the worst pollution by travelling along quieter streets. Even walking on the side of the pavement furthest from the road can help.

### Walking -

- Walk short distances rather than drive; this also has the benefit of improving your health as well.

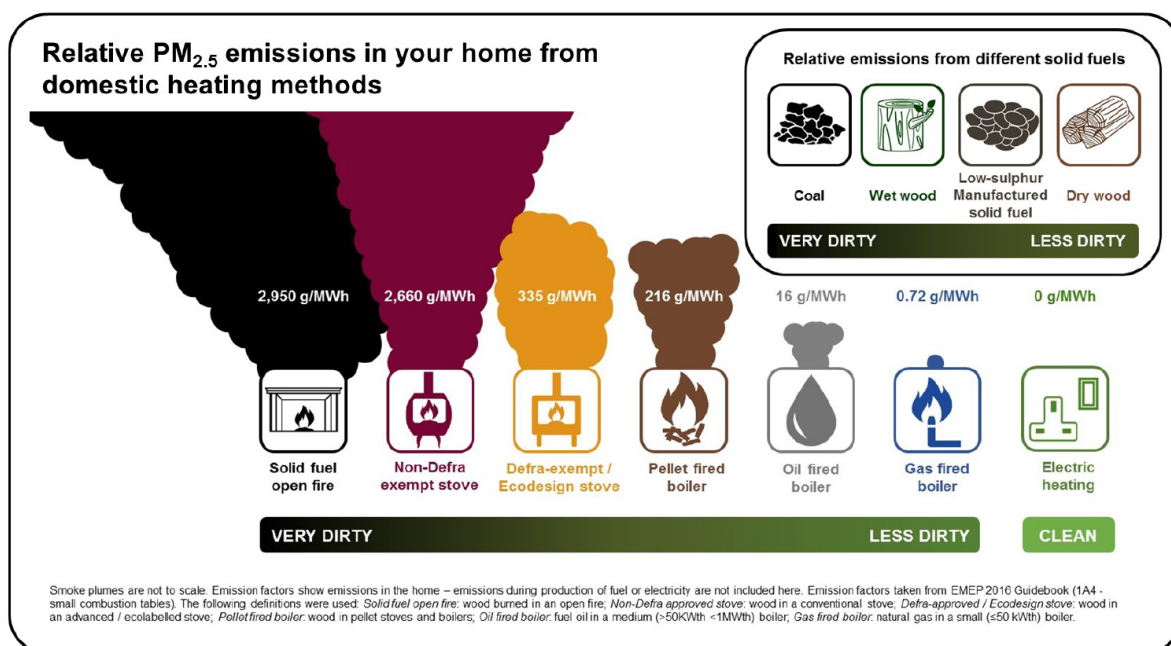
- Information on walking networks in Nottinghamshire can be found at <http://www.nottinghamshire.gov.uk/planning-and-environment/walking-cycling-and-rights-of-way/walking> and <http://www.nottinghamcity.gov.uk/transport-parking-and-streets/rights-of-way-walking-and-cycling/walking-in-nottingham/> and a planning tool for deciding your route when walking can be found at <http://walkit.com/>
- Walking and cycling to school – School travel plans promote group cycling and walking for pupils to safely get to school. Information on the travel to school options can be found at <http://www.nottinghamshire.gov.uk/education/travel-to-schools>.

#### Cycling –

Use the extensive cycle routes that are available throughout Nottinghamshire. Maps and cycling journey planners that cover all of Nottinghamshire, including the city and further afield are available at <http://www.nottinghamshire.gov.uk/planning-and-environment/walking-cycling-and-rights-of-way/cycling>. Maps of just the city cycle routes for Nottingham are available at <http://www.nottinghamcity.gov.uk/cycling>. Sustrans is a charity that promotes sustainable travel and further information can be found at <http://www.sustrans.org.uk/> RideWise, a local cycling charity, also provide advice, training, bike rides, free bike loans and information about routes and journey planning. Further information about RideWise can be found at <http://www.ridewise.org.uk/ride/index.php>

- Driving- When you have to drive you can still help to improve air quality by;
  - Make sure that your car is at its most efficient and think about how you drive, this will also save you money. Tips on how to save money on fuel and reduce your emissions are available at <http://www.energysavingtrust.org.uk/travel/driving-advice>.
  - If you are thinking about changing your car consider buying a low-emission vehicle, you can get more information on these vehicles and the support available at <http://goultralownottingham.org.uk/>

- Bonfires – To not have bonfires at all and to compost all garden waste and recycle rubbish rather than burn it.
- Heating your home –
  - Smoke Control Area – Large parts of Nottinghamshire are smoke control areas, therefore you cannot emit smoke from a chimney unless you are burning an authorised fuel or using an exempt appliance e.g. some burners or stoves. Further information on suitable fuels and exempt appliances can be found at <https://smokecontrol.defra.gov.uk/index.php> All appliances must be kept in good working order to ensure that they are working efficiently and it is advised that you contact your Local Council to determine whether you are in a smoke control area or not
  - House Boilers – Ensure that boilers are serviced regularly and kept in good working order. If a boiler needs replacing then purchase one that has a low NOx emission rating



Source – Clean Air Strategy 2019, DEFRA

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/770715/clean-air-strategy-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf)

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# 1 Local Air Quality Management

This report provides an overview of air quality in Broxtowe Borough Council during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Broxtowe 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 L.1 in Appendix L.



## 2 Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMA) 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 the objectives.

Further information about the one remaining AQMA declared by Broxtowe Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMA, including maps of AQMA boundaries are available online at

<https://www.broxtowe.gov.uk/for-you/noise-pollution-and-pests/air-quality/>

Alternatively, see Appendix E: Maps of Monitoring Locations and Appendix F: Map of AQMA in Trowell, which provides a map of all the monitoring locations throughout the Borough and also a map of the AQMA in Trowell.

Section 2.4 of this report provides an update on the Air Quality Action Plan.

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored concentration at a location of relevant exposure)		Action Plan (inc date of publication)
						At Declaration µg/m <sup>3</sup>	Now µg/m <sup>3</sup>	
AQMA 1 Trowell	1 <sup>st</sup> February 2006	NO <sub>2</sub> Annual Mean	Trowell, Nottingham	AQMA 1 encompasses twenty properties on parts of Iona Drive and Tiree Close next to the M1 motorway in Trowell	Yes	45	30*	<a href="#">Action Plan 2008.</a>

\* The average of all sites with the AQMA.

## 2.2 Progress and Impact of Measures to address Air Quality in Broxtowe Borough

Defra's appraisal of last year's ASR concluded that;

- ❖ *The Local Authority provide a very detailed discussion of the NO<sub>2</sub> trends within the borough. In addition to this they discuss the trends in relation to locations which is extremely useful and this approach to data discussion is encouraged in future reports. – BBC will continue to report data in this manner.*
- ❖ There have been no exceedances of national air quality objectives in 2018 and concentrations in the Trowell AQMA continue to fall. The Council have stated that they plan to implement measures to ensure NO<sub>2</sub> concentrations are below the AQOs and when long-term compliance is achieved they will revoke the AQMA. If current NO<sub>2</sub> trends continue and concentrations decline, then the revocation of the AQMA is strongly supported. – **See Section 2.4 of this report for an update on the AQMA and AQAP.**
- ❖ It would be useful if Section 2.3 could make reference to the Public Health Outcomes Framework, and the local indicator for PM2.5 in the district. The Council may wish to consider comparing the '3.01 - Fraction of mortality attributable to particulate air pollution indicator' value for Broxtowe to nearby LAs and National indicator values. This can be found in the link below. <https://fingertips.phe.org.uk/profile/public-health-outcomesframework/data#page/0/gid/1000043/pat/6/par/E12000005/ati/101/-are/E07000194>. –**BBC has made reference to this and the data is provided in Section 2.3.**

Broxtowe Borough Council (BBC) and Nottinghamshire County Council (NCC) have taken forward a number of measures during the current reporting year of 2018/2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2 More detail on these measures can be found in BBC Action Plan, the Nottinghamshire Local Transport Plan 2011-2026 (and its

implementation plans) and Highways England Reports (Post opening project evaluation reports for the M1 Junction 25 to 28 widening and the A52 West of Nottingham Corridor Improvements).

Key completed measures are:

- Planning and Policy Guidance – the adoption of Broxtowe Borough Council's Local Plan including Policies 20 and 26 which are relevant to improving AQ within the Borough.
- Electric Fleet Vans – Two electric fleet vans have been procured by Broxtowe Borough Council.
- Low Emission Fleet vehicles – Broxtowe Borough Council has purchased two more Euro 6 fleet vehicles to replace two older more polluting vehicles.
- A third camera enforcement vehicle was purchased by Nottinghamshire County Council - to enforce parking obstructions outside schools and in bus lanes.
- Introduction of a cycle to work scheme – Broxtowe Borough Council has introduced a scheme to enable the purchase of bikes through a tax relief scheme for employees.
- Marketing and promotion of sustainable transport alternatives –the County Council continues to develop and deliver programmes to encourage more sustainable travel. These include infrastructure improvements such as the County Council's integrated transport programme delivering improvements for pedestrians, cyclists and bus users; as well as marketing materials and campaigns developed in partnership with stakeholders such as passenger transport operators
- Go-Ultra Low programme – the County Council, in partnership with Nottingham and Derby City Councils, successfully secured £6.1m of funding to deliver the Go-Ultra Low programme between 2016 and 2020. The programme includes the development and delivery of an area-wide electric vehicle charging infrastructure network
- Electric Vehicle Charging Points - To date, 123 locations in the county have been investigated for the potential provision of electric vehicle (EV) charge

points. This has resulted in the installation of EV charge points at 23 locations in 17 towns in Nottinghamshire (providing a total of 10 rapid and 55 fast chargers across these locations). Within Broxtowe borough 24 locations have been investigated but the provision of EV charge points is currently only feasible at five of those locations. This has resulted in the provision of one rapid and 20 fast charge points within car parks in four towns within the borough (Beeston, Eastwood, Kimberley and Stapleford). Alternative funding sources are currently being sought to continue this programme

- Retrofitting of buses – In February 2018 it was announced that the County Council (and Nottingham City Council) had successfully secured funding from the Green Technology Fund to retrofit some of the most polluting buses in the County – including a number of buses that travel in the Borough. Work is now underway to retrofit the identified vehicles and will continue in to 2020.
- Effective Network Management – the County Council continues to work with stakeholders to effectively manage its highway network. With the co-ordination of works, contingency planning, and effective event and incident planning.
- Workplace Travel Plans – Broxtowe Borough Council and Nottinghamshire County Council have completed a council travel plan to determine which modes of transport are suitable. Travel Plans are also developed with businesses through the development control process
- Nottinghamshire Air Quality Strategy (NAQS) - Completion of the revised Draft NAQS and approval at the Nottinghamshire County and City Health and Wellbeing Boards.
- Increase in the number of members registered in the car share scheme - to 3,545 members. As a result, it is estimated that during the 2019 calendar year the Nottinghamshire car share scheme delivered reductions of 1.3m miles travelled, 298t of CO2 emissions, and 1.35t of NOx emissions
- Cycling Networks - Completion of the improved cycle links between Beeston, the Enterprise Zone and the City
- Cycle Training - 9,383 people received cycle training during 2019/20.

Broxtowe Borough Council expects the following measures to be completed over the course of the next reporting year:

- ❖ Local Cycling and Walking Infrastructure Plan (LCWIP) – the County Council (in partnership with Derby City, Derbyshire County, and Nottingham City councils) are developing a D2N2 LCWIP. It is anticipated that the D2N2 LCWIP will be completed in Summer 2020; and will include a prioritised list of proposed improvements
- ❖ Bus retrofitting programme - Collectively Nottingham County Council and Nottingham City Council secured £2.8 million from the Green Bus Technology Fund to retrofit older buses. This includes 6 different services that operate in the Borough of Broxtowe
- ❖ Nottinghamshire Air Quality Strategy (NAQS) – Publishing the finished revised NAQS within Nottinghamshire and to complete the website containing the NAQS.
- ❖ Off-Street Parking Order – All of Broxtowe Borough Councils Off-street Parking orders are to be consolidated into one order and approved by the BBC's cabinet.
- ❖ Cycling Maps – To be reviewed and updated following completion of improvements across the county.
- ❖ School travel advice toolkit – An online school travel advice toolkit has been developed which aims to provide information for the whole school community (pupils, parents, school staff/teachers, governors, local residents, etc.). It is being trialled with four pilot schools in the county during the 2019/20 academic year. Should the schools find the toolkit useful and useable it is proposed to make it available to all schools during the 2020/21 academic year
- ❖ Emergency Active Travel Fund (Tranche 1) – Nottinghamshire has been given a Tranche 1 indicative allocation of £573,000 from Government's £250m Emergency Active Travel Fund to encourage more walking and cycling. The aim of the funding is to try and embed walking and cycling as part of long-term commuting habits to secure the associated health, air quality and congestion benefits. In the short-term this will also help avoid overcrowding on public transport as the economy restarts. The County Council has made a

submission to the DfT and is awaiting further discussion with/confirmation from the DfT on the proposals. Should the Tranche 1 funding be awarded the schemes within it will be delivered during 2020.

Broxtowe Borough Council's priorities for the coming year are predominantly through measures to make the best use of the transport networks and through smarter travel measures that will encourage people to travel more sustainably. Measures will include:

- On-going effective land use planning and securing of appropriate levels of developer contributions for mitigation (including travel planning) and sustainable transport improvements
- Traffic control and information provision to minimise disruption and delay on County Council managed roads (including the A610) such as contingency planning, the effective co-ordination of works and the provision of real-time travel information
- On-going parking enforcement on County Council managed roads to ensure that the traffic keeps moving
- Measures to reduce the need to travel at peak times such as the provision and encouragement of flexible working arrangements
- The facilitation of smarter travel behaviour such as the provision of a car sharing scheme and integrated and concessionary ticketing schemes
- The encouragement of smarter travel behaviour such as the marketing and promotion of passenger transport, walking and cycling, provision of cycling and walking route maps, cycle training programmes, and web-based journey planners
- The encouragement of the uptake of low-emission vehicles, including the continued identification and implementation of the Nottinghamshire public electric vehicle charging network as well as grants for businesses to install on-site charging infrastructure
- Enhancements to the local cycling and walking networks
- Development of an online school travel advice toolkit



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- Travel planning such as the development of new travel plans at businesses across the county through planning conditions
- Undertaking feasibility work on significant projects such as cycling improvements along the A6005.

The principal challenges and barriers to implementation that Broxtowe Borough Council and Nottinghamshire County Council anticipates facing are:

- Availability of funding for the above measures to continue their delivery
- Ensuring sufficient mitigation is secured through the development control process to address the potential impacts on the highway network of not only individual developments but also the cumulative impacts of development.

Progress on the following measures has been slower than expected due to:

- Cycling Networks – cycling improvements are developed and delivered as part of the annual integrated transport programme but the schemes are dependant on funding being made available for such improvements.
- Public Cycle Hire Scheme – The scheme is dependent upon commercial cycle hire scheme providers committing to and delivering a scheme.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Broxtowe Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to continue to achieve compliance and enable the revocation of AQMA 1 in Trowell.

**Table 2.2 - Progress on Measures to Improve Air Quality**

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
1	<b>Light rail tram infrastructure</b>	Transport Planning and Infrastructure	Public transport improvements - interchanges stations and services	2015	NCiC/NCC; DfT/WPL funding	Increased passenger transport patronage	Reduction in NO <sub>2</sub> and PM as 5.7% increase in passenger use in comparison to 2017-2018.	<ul style="list-style-type: none"> <li>•NET Phase 2 (with route through Broxtowe) opened 2015</li> <li>•2018-2019, there were 18.8 million passengers using the Tram an increase of 5.7% on the previous year.</li> <li>•The extension of the existing tram to the HS2 Hub in Toton is included in Midlands Connect's 'Access to the HS2 EM Hub study' although feasibility work has not been completed and no funding has been secured for its delivery as yet.</li> </ul>	<p><b>Complete</b></p> <p>On-going</p> <p>Currently Unknown</p>
2	<b>Car sharing scheme</b>	Alternatives to private vehicle use	Car & lift sharing schemes	Early 2000s	NCC	In 2019: 1.35 tonnes reduction in NO <sub>x</sub> ; 298t reduction in CO <sub>2</sub>	In 2019: 1.35 tonnes reduction in NO <sub>x</sub> ; 298t reduction in CO <sub>2</sub>	<ul style="list-style-type: none"> <li>•3,545 current members. (increase of 194 members)</li> </ul>	On-going
3	<b>Introduction of car club</b>	Alternatives to private vehicle use	Car Clubs	2014	NCC/NCiC	Restrain average journey times in the morning peak to a 1% increase per year	Reduction in NO <sub>2</sub> and PM.	<ul style="list-style-type: none"> <li>•Nottm city scheme introduced in 2014.</li> <li>•Provider reviewed in 2018. Expansion of scheme into county dependent on its success which is still unclear</li> <li>•Funding for implementation to be determined</li> </ul>	On-going

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
4	<b>Nottingham Go-Ultra Low programme - introduction of areawide EV charging network</b>	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2016	NCiC/NCC/BBC; OLEV funding	On-going take-up of cleaner vehicles	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>£6.1m funding secured for 2016-2020 through the Go Ultra Low programme</li> <li>123 locations in the county have been investigated for the potential provision of EV charge points as part of GUL project - 24 in Broxtowe; of which five were currently feasible; providing one rapid and 20 fast charge points within car parks in four towns within the borough (Beeston, Eastwood, Kimberley and Stapleford).</li> <li>Funding for the programme ended in 2020; additional funding to continue the programme is being sought</li> </ul>	2020
5	<b>Nottingham Go-Ultra Low programme - promoting uptake of LEVs</b>	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2016	NCiC/NCC; OLEV funding	On-going take-up of cleaner vehicles	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>£6.1m funding secured for 2016-2020</li> <li>Promotion events held for public, businesses and fleet operators including loans of LEVs for trial use in 2018 and 2019</li> </ul>	2020
6	<b>Nottingham City Clean Air Zone</b>	Promoting Low Emission Transport	Low Emission Zone (LEZ) or Clean Air Zones (CAZ)	2019/20	NCiC; DfT funding	Reduced Emissions	Reduced Emissions	<ul style="list-style-type: none"> <li>Nottingham City Council undertook air quality modelling of several potential CAZ options (charging and non-charging) alongside planned actions (e.g. measures to provide and promote sustainable transport infrastructure) to determine if they would deliver the required air quality objectives. This modelling has identified that air quality objectives are anticipated to be met without the introduction of a charging CAZ.</li> </ul>	2020

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
7	<b>Joint Strategic Needs Assessment</b>	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2017	NCC/NCiC/ Borough and District councils	Raising awareness and reduced emissions	Reduced Emissions from raising awareness	<ul style="list-style-type: none"> <li>Air Quality is now a chapter in the Joint Strategic Needs Assessment and part of the Health and wellbeing Board considerations.</li> <li>Reviewed and updated in 2019.</li> </ul>	<b>Complete</b>
8	<b>Nottinghamshire Air Quality Strategy</b>	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	NCC/NCiC/ Borough and District councils	Improving Air Quality, reduced Emissions and Raising awareness.	Reduced Emissions from raising awareness	<ul style="list-style-type: none"> <li>Strategy reviewed and rewritten; and the draft was approved at the Nottinghamshire County and City Health &amp; Wellbeing Board in 2019.</li> <li>The NAQS will be published online in 2020</li> <li>The finished format of the NAQS will be published and sent to all Nottinghamshire Councils to be endorsed by their portfolio holders in 2020.</li> </ul>	<b>Complete</b>  2020  2020
9	<b>Planning and Policy Guidance</b>	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	BBC	Reduced Emissions	0.2µg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Broxtowe Part 2 of the Local Plan (2018-2028), which includes Policy 20 on Air Quality, was adopted in 2019. This policy ensures that air quality remains an important consideration when granting planning permission and to encourage developers to include sustainable travel measures as part of the planning application.</li> </ul>	<b>Complete</b>
10	<b>Developer requirements to provide of EV charging points at new development</b>	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2019	BBC	Reduced Emissions	0.2µg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Review of the Broxtowe Local plan includes Policy 26 that would require a Travel Plan to be submitted with any planning application for 10 or more dwellings or 1,000 square metres or more floorspace. This policy was adopted in September 2019.</li> </ul>	<b>Complete</b>

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
11	Inspection of Permitted Processes	Environmental Permits	Introduction/increase of environment charges through permit systems and economic instruments	On-going	BBC	Reduced Emissions	Reduction in air borne pollutants from the various processes throughout the Borough.	<ul style="list-style-type: none"> <li>Annual inspections of permitted processes were undertaken; all permitted processes were risk rated with the higher risk processes incurring a higher annual subscription fee. The risk rating did not change in 2019, and all permitted processes were fully compliant.</li> </ul>	On-going
12	Encouragement of low-emission public transport fleets	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	2018	NCC/operators; NCC/OLEV - Green Bus Technology Fund	Reduced Emissions and On-going take-up of cleaner vehicles	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>NCC secured £1.3m; and NCiC secured £1.5m from the Green Bus Technology Fund in Feb 2018 to retrofit older buses</li> <li>This includes 21, 34, 35, Indigo, Rainbow 1 and Rapid 1 services in the Borough.</li> </ul>	2020
13	Encouragement of low-emission public transport fleets	Vehicle Fleet Efficiency	Promoting low emission public transport	2017	NCC; NCC/OLEV - Green Bus Fund	Reduced Emissions and on-going take up of cleaner vehicles	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>NCC secured £527,000 OLEV funding and will match fund the scheme with £410,000 from its transport budget.</li> <li>Introduction of two electric buses (and their associated infrastructure) on route 510, serving communities in Beeston and Stapleford.</li> </ul>	On-going <b>Complete</b>
14	Encouragement of low-emission public transport fleets	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	On-going	NCC/NCiC/PT operators; NCT (operator) funding	Reduced Emissions	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>The Statutory Quality Partnership Schemes (SQPSs), which includes fleet standards is in place affecting all buses travelling through AQMA.</li> </ul>	On-going

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
15	<b>Review of on-street car parking in and around the AQMA</b>	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	On-going	NCC	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions by reducing congestion on the roads in and around the AQMA	<ul style="list-style-type: none"> <li>• Introduction of junction protection and targeted roadside parking restrictions (including bus stop clearways) along feeder corridors into the AQMA to help traffic flows/journey times.</li> <li>• Parking restrictions already in place, no additional side-road/off-line locations currently identified as requiring restrictions to aid traffic flow; but annual programmes of such schemes are developed should any be required in the future</li> </ul>	On-going  Implemented and On-going
16	<b>Traffic control and information</b>	Traffic Management	UTC, Congestion management, traffic reduction	On-going	Nottinghamshire County Council (NCC)/Via EM Ltd/Nottingham City Council (NCiC): NCC and NCiC revenue funding	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions by reducing congestion on the roads.	<ul style="list-style-type: none"> <li>• Traffic control centre that monitors traffic movement on the local highway network (not the trunk road/motorways) and provides real time traffic control over many traffic signal installations, including on A610 at Nuthall</li> <li>• Potential barrier: Lack of future revenue funding</li> </ul>	On-going  On-going

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
17	Co-ordination of street works	Traffic Management	UTC, Congestion management, traffic reduction	On-going	NCC/Via EM/NCiC: NCC and NCiC revenue funding	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions by reducing congestion on the roads.	<ul style="list-style-type: none"> <li>• Systems for notice management and coordination have been upgraded to enhance noticing handling, monitoring of works proposals, coordination of works and directing timing of works</li> <li>• Street designations/network hierarchy review is on-going to improve data quality for works promoters and network managers and to prioritise works management</li> <li>• Regular coordination meetings held between all works promoters and regional partners in addition to regular meetings between HE and regional partners to create a framework programme of planned works affecting strategic and local routes</li> <li>• Detailed journey time monitoring undertaken annually since 2005/06</li> <li>• Implementation on-going</li> </ul>	<p>On-going</p> <p>On-going</p> <p>On-going</p> <p>On-going</p>
18	Real time travel information	Public Information	Other	On-going	NCC/Via EM Ltd: NCC revenue funding	Restrain average journey times in the morning peak to a 1% increase per year	Reduced Emissions	<ul style="list-style-type: none"> <li>• Information conveyed by all forms of media (press, radio, website, social media etc.).</li> <li>• The Travelwise centre remains in operation 24hrs a day, every day.</li> <li>• Implementation on-going</li> </ul>	<p>On-going</p> <p>On-going</p>



Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
19	<b>Contingency planning, and effective event and incident management</b>	Traffic Management	UTC, congestion management, traffic reduction	On-going	NCC/Via EM/NCiC/Highways England (HE): NCC, NCiC, HE revenue funding	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions by reducing congestion on the roads.	<ul style="list-style-type: none"> <li>The local operating agreement between NCC and HE has been comprehensively reviewed to identify the relevant parts of the network which have interaction on each authority and to put in place appropriate communication channels for management of incidents and dissemination of information</li> </ul>	On-going
								<ul style="list-style-type: none"> <li>Key locations on the local network have been identified and associated diversion routes investigated in line with the developing network hierarchy</li> </ul>	On-going
								<ul style="list-style-type: none"> <li>Incidents dealt with through agreed procedures and regular partnership meetings held. Working in close collaboration with the City and HE, tactical diversion routes have been developed for the emergency diversion of traffic from any part of the strategic road network, to reduce the delay in rerouting traffic to ease congestion at the time of incidents</li> </ul>	On-going
								<ul style="list-style-type: none"> <li>Detailed journey time monitoring undertaken annually since 2005/06.</li> <li>Implementation on-going</li> </ul>	On-going
20	<b>Bus service improvements</b>	Transport Planning and Infrastructure	Public transport improvements - interchanges stations and services	On-going	NCC/PT operators	Increased passenger transport patronage	Reduction in NO <sub>2</sub> and PM as increased bus patronage	<ul style="list-style-type: none"> <li>Review of all of the bus services in the county, including commercial, supported and specialist services.</li> <li>The aim of this work is to review and design cost effective services that meet local needs.</li> </ul>	On-going

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
21	<b>Bus infrastructure</b>	Transport Planning and Infrastructure	Public transport improvements - interchanges stations and services	On-going	BBC and NCC; integrated transport block funding	Increased bus patronage	Reduced emissions due to increased bus patronage.	<ul style="list-style-type: none"> <li>An annual programme of updates and maintenance of all stops including updating network maps to ensure all information is current and accurate is on-going. In 2019/20 this included the North Broxtowe Infrastructure Improvements - bus stop infrastructure improvements on strategic corridors to tie in with growth areas and operator investment</li> <li>Implementation on-going</li> <li>BBC provides 50% of the funds for the installation of new bus shelters and real time bus information at bus stops.</li> </ul>	On-going  On-going
22	<b>Sustainable Travel information for the Public</b>	Public Information	Via leaflets, internet, other	On-going	BBC	Increased use of public transport	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>BBC have leaflets on safe cycling on the tram lines, bus routes, Broxtowe cycling map, Broxtowe Country and Erewash Valley routes and walking leaflets. These are all available in the Council reception</li> <li>Sustainable Travel methods are also available on the main council website.</li> </ul>	On-going
23	<b>Concessional fare schemes</b>	Transport Planning and Infrastructure	Other	On-going	NCC/PT operators	Increased passenger transport patronage	Reduced emissions due to increased bus patronage.	<ul style="list-style-type: none"> <li>Implementation on-going</li> </ul>	On-going
24	<b>Nottingham city workplace parking levy (WPL)</b>	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2012	NCiC	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions	<ul style="list-style-type: none"> <li>NCiC introduced WPL within the city in 2012 and have used funding to make passenger transport improvements in the city</li> </ul>	Introduced 2012 and on-going

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
25	<b>Public sector LEV procurement</b>	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2015	NCC/BBC	Reduction in vehicle emissions due to less polluting vehicles replacing older more polluting vehicles	Reduction in NO <sub>2</sub> and PM due to increased use of low emission vehicles.	<ul style="list-style-type: none"> <li>•NCC upgraded its pool vehicles to lower emission diesel vehicles. All new fleet vehicles at BBC are Euro6 emissions compliant. There are 90+ fleet vehicles and they are on a 10 year replacing rolling programme</li> <li>•Procurement strategies for such measures are being reviewed as part of NCC's Environmental Strategy</li> <li>•Dependant on whether funding from Central Government continues</li> </ul>	2024
26	<b>Vehicle emissions testing</b>	Vehicle Fleet Efficiency	Testing Vehicle Emissions	On-going	BBC	Reduced emissions	Reduction in NO <sub>2</sub> and PM as regular serviced and maintained vehicles to ensure they are operating efficiently.	<ul style="list-style-type: none"> <li>•All BBC Fleet vehicles (98 road vehicles including 20 LGV's) are annually emission tested in house prior to MOT Emission testing.</li> <li>•BBC also undertakes additional emissions tests on all fleet vehicles if any new fuel or engine components have been changed. This is to ensure vehicle emission compliance.</li> </ul>	On-going  On-going
27	<b>Marketing and promotion of passenger transport</b>	Promoting Travel Alternatives	Other	On-going	NCC/NCiC/PT operators	Increased passenger transport patronage	Reduction in NO <sub>2</sub> and PM as increased bus patronage	<ul style="list-style-type: none"> <li>•NCC undertakes various marketing campaigns in partnership with operators and NCiC</li> <li>•Co-ordinated through the Greater Nottingham Bus Quality Partnership.</li> <li>•Network maps produced to coincide with route/timetable changes</li> <li>•NCC's Travel Choice webpages include information on public transport across the county (for residents and businesses)</li> </ul>	On-going  <b>Complete</b>

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
28	<b>Taxi Licensing Conditions</b>	Promoting Low Emission Transport	Taxi Licensing Conditions	2018	BBC	Reduced emissions	Reduction in NO <sub>2</sub> and PM as cleaner vehicles	<ul style="list-style-type: none"> <li>• No cars normally older than 8 years will be licensed as a taxi within the borough.</li> <li>• A review of the taxi licensing conditions will be undertaken to establish a common policy of conditions throughout the County.</li> <li>• From 13th June 2018, all petrol vehicles are required to meet Euro 5 standards, all new diesel vehicles are required to meet Euro 6 emissions.</li> <li>• Hybrid and Electric Vehicles to be licensed as "Taxi's" by quoting minimum 70kW and reducing boot space requirement to allow for battery storage.</li> </ul>	<p>On-going</p> <p><b>Complete</b></p> <p><b>Complete</b></p> <p><b>Complete</b></p>
29	<b>Civil Parking Enforcement</b>	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2008	NCC; NCC revenue funding	Manage parking to improve journey time reliability.	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Introduced on County roads in May 2008 to help ensure parking does not interfere with the free flowing traffic.</li> <li>• Implemented and on-going</li> </ul>	Implemented and On-going
30	<b>CCTV enforcement vehicle</b>	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2016 and 2019	NCC; NCC revenue funding	Manage parking to improve journey time reliability	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• 'Camera car' to enforce school keep clear and bus stop clearway markings became fully operational during 2016</li> <li>• A second CCTV vehicle was purchased in 2018; and a third CCTV vehicle purchased in 2019.</li> </ul>	<p>on-going</p> <p><b>Complete</b></p>

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
31	Encouraging the use of emissions standards when procuring school bus contracts and supported bus services	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	On-going	NCC/PT operators	Reduced Emissions and On-going take-up of cleaner vehicles	Reduced Emissions of NO <sub>2</sub> and PM	• On-going take-up of LEVs	On-going
32	School travel plans	Promoting Travel Alternatives	School Travel Plans	2000	N/A	Restrain average journey times in the morning peak to a 1% increase per year	Reduced Emissions of NO <sub>2</sub> and PM if alternative methods of sustainable travel are used	• NCC is currently trialling an online travel advice toolkit with four pilot schools. Should the schools find it useful it will be rolled out to all schools during the 2020/21 academic year (although this may be delayed due to the recent COVID-19 related school closures).	2021
33	Cycling networks - development of Local Cycling and Walking Infrastructure Plan (LCWIP)	Transport Planning and Infrastructure	Cycle network	2019	NCC/NCiC /DCC/DCiC/borough and district councils/Sustrans/other stakeholders; DfT funding	Increased levels of cycling	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Funding secured to develop D2N2 wide LCWIP. Data collected, three stakeholder events held</li> <li>• Prioritised list of improvements to be included in final LCWIP</li> <li>• LCWIP is scheduled to be completed Summer 2020</li> </ul>	2020

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
34	<b>Cycling networks</b>	Transport Planning and Infrastructure	Cycle network	2018/19	NCC/Via EM/NCiC: LGF, s106 funding	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Construction of improved cycle links between Beeston, Enterprise Zone and the City were completed in 2019</li> <li>• NCC, working in partnership with NCiC, has secured funding through NCiC's Transforming Cities Bid to upgrade routes along A6005</li> <li>• Other cycling improvements are developed and delivered as part of the annual integrated transport programme and through developer funded improvements</li> </ul>	<b>Complete</b>  Schemes dependent on funding being made available for such improvements
35	<b>Cycle hire scheme</b>	Transport Planning and Infrastructure	Public cycle hire scheme	To be Determined	NCiC/NCC ; funding source to be determined	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Hire schemes at the nearby University of Nottingham in place</li> <li>• Feasibility study undertaken on a city based hire scheme which potentially could include parts of the county such as Beeston</li> <li>• Scheme dependent on commercial cycle hire scheme providers committing to, and delivering a scheme</li> </ul>	Not known - dependent on commercial cycle hire scheme providers
36	<b>Cycle training</b>	Promoting Travel Alternatives	Promotion of cycling	Circa 1970s	NCC; DfT funding/PH funding	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• 9,383 people received cycle training during 2019/20.</li> <li>• Scheme dependent on DfT funding being made available for Bikeability</li> <li>• Implementation on-going</li> </ul>	On-going
37	<b>Cycle parking facilities</b>	Transport Planning and Infrastructure	Cycle network	2015	NCC/BBC; integrated transport block/ developer contributions	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Cycle hub installed in 2015 to integrate with bus/rail services</li> <li>• Ad-hoc parking provided where required</li> <li>• Potential barrier: Lack of future revenue funding</li> </ul>	<b>Complete</b>  On-going

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
38	<b>Marketing of cycling</b>	Promoting Travel Alternatives	Promotion of cycling	2010 and 2017	NCC	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM due to increased cycling uptake	<ul style="list-style-type: none"> <li>•Cycling in Nottinghamshire has increased by 4% between 2010 and 2019; and in Broxtowe district there has been a 5% increase in cycling between 2010 and 2019</li> <li>•Marketing of cycling is undertaken in a variety of formats for both commute and leisure trips. Various NCC campaigns have been undertaken including 'cycling week', 'Notts Routes &amp; Rides'</li> <li>•NCC's Travel Choice webpages include information on cycling across the county (for residents and businesses)</li> </ul>	On-going  On-going
39	<b>Cycle maps</b>	Promoting Travel Alternatives	Promotion of cycling	2018 and 2019	NCC; DfT funding	Increased cycling trips	Reduced Emissions due to increased cycling uptake	<ul style="list-style-type: none"> <li>•Greater Nottingham cycling maps reviewed during 2018, updated and available as a leaflet and online</li> <li>•Cycling maps reviewed as/when the network is enhanced</li> </ul>	<b>Complete</b>  2019 and on-going
40	<b>Cycle to work Scheme</b>	Promoting Travel Alternatives	Promotion of cycling	2018/19	BBC	Increased cycling trips	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>•Cycle to work Scheme – to assist and give tax relief on bike purchases for employees of BBC.</li> <li>•Nine employees used this scheme in 2019.</li> </ul>	On-going
41	<b>Encouraging the use of Hybrid or Electric vehicles for BBC staff</b>	Promoting Low Emission Transport	Other	2018/19	BBC	On-going take up of cleaner vehicles	Reduced Emissions of NO <sub>2</sub> and PM due to greener travel methods	<ul style="list-style-type: none"> <li>•To encourage employees of BBC to purchase hybrid vehicles and electric vehicles for their personal and business use.</li> <li>•One employee used a personal hybrid vehicle in 2019.</li> </ul>	On-going

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
42	<b>Marketing of cycling</b>	Promoting Travel Alternatives	Promotion of cycling	2010 and 2017	BBC	In Broxtowe district there has been a 30% increase in cycling between 2010 and 2014	Reduced Emissions of NO <sub>2</sub> and PM	<ul style="list-style-type: none"> <li>• Cycling in Broxtowe has increased by 5% between 2010 and 2019.</li> <li>• New cycle stands were installed at Beeston Train station and in Eastwood and Beeston Town Centres. Improved more stands Kimberley Leisure Centre and Council Offices.</li> </ul>	On-going  <b>Complete</b>
43	<b>Marketing of walking</b>	Promoting Travel Alternatives	Promotion of walking	On-going	NCC	Increased walking trips	Reduced Emissions of NO <sub>2</sub> and PM due to more people walking	<ul style="list-style-type: none"> <li>• Marketing of walking is undertaken in a variety of formats for both commute and leisure trips. Various NCC campaigns have been undertaken including 'walk week', 'Notts Routes &amp; Rides'.</li> <li>• NCC's Travel Choice webpages include information on walking across the county (for residents and businesses)</li> </ul>	On-going
44	<b>Pedestrian infrastructure improvements</b>	Transport Planning and Infrastructure	Other	On-going	NCC/BBC	Increased walking trips	Reduction in NO <sub>2</sub> and PM emissions as more people are walking	<ul style="list-style-type: none"> <li>• Pedestrian improvements developed and delivered as part of the annual integrated transport programme. Funding also secured to deliver improvements through the planning process.</li> <li>• Potential barrier: Lack of future funding.</li> </ul>	On-going
45	<b>Review of off-street car parking charging</b>	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2019	BBC	Restrain average journey times in the morning peak to a 1% increase per year	Reduced emissions	<ul style="list-style-type: none"> <li>• BBC is currently consolidating all of their Off-Street Parking Orders into one Order which will be made legal in 2020</li> <li>• Charges will also be reviewed on an adhoc basis with the next review being due in 2020 for the 2020/21 charges. This review will also include the use of electric vehicle charging points.</li> </ul>	2020  2020



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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
46	<b>Flexible working arrangements</b>	Promoting Travel Alternatives	Encourage / Facilitate home-working	2010 and 2019	NCC/BBC	Restrain average journey times in the morning peak to a 1% increase per year	Reduction in NO <sub>2</sub> and PM due to employees not commuting	<ul style="list-style-type: none"> <li>•NCC operates flexible working arrangements for all its staff</li> <li>•BBC New Ways of Working was introduced in 2019, which allows and encourages employees to work from home when practical to do so.</li> </ul>	<p>On-going</p> <p>On-going</p>
47	<b>Workplace travel plans</b>	Promoting Travel Alternatives	Workplace Travel Planning	On-going	BBC planning/ NCC	Restrain average journey times in the morning peak to a 1% increase per year	0.2µg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>•Broxtowe Part 2 of the Local Plan (2018-2028), which includes Policy 26 on Travel Plans, was adopted in 2019. It is expected in this policy that all planning applications for large development sites (10 or more dwellings or 1,000 square metres or more gross floor space) must include a travel plan.</li> <li>•BBC and NCC have a travel plan</li> <li>•BBC has undertaken a review of the Councils travel plan by reviewing Lease cars, car allowances and work place parking. Produced a transport map specifying the modes of transport the organisation considers acceptable if other modes or transport are not suitable. Feasibility study of having bus card/Tickets for employee use.</li> </ul>	<p><b>Complete</b></p> <p><b>Complete</b></p> <p><b>Complete</b></p>
48	<b>NCC car pool vehicles</b>	Alternatives to private vehicle use	Car Clubs	2016/17	NCC	Restrain average journey times in the morning peak to a 1% increase per year	0.2µg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>•NCC upgraded its pool vehicles to lower emission diesel vehicles</li> </ul>	<b>Complete</b>

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
49	<b>Low emission vehicle procurement</b>	Promoting Low emission transport	Company vehicle Procurement -prioritising uptake of low emission vehicles	2017, 2019 and 2020	BBC	Reduced emissions	Reduction in NO <sub>2</sub> and PM due to cleaner vehicle technology and the procurement of two electric fleet vehicles.	<ul style="list-style-type: none"> <li>•All new fleet vehicles at BBC are Euro6 emissions compliant. There are 90+ fleet vehicles and they are on a 10 year replacing rolling programme.</li> <li>•BBC has purchased three new Euro 6 vehicles in 2017/2018 replacing three older vehicles.</li> <li>•Two new Euro 6 vehicles purchased in 2019 / 2020</li> <li>•BBC have procured two electric vans in 2019</li> <li>•Subject to satisfactory trials another two vehicles will be purchased in 2020.</li> </ul>	2024  <b>Complete</b>  <b>Complete</b>  <b>Complete</b>  2020
50	<b>Eco-driver training sessions</b>	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2012	NCC	Reduced emissions	Reduction in NO <sub>2</sub> and PM due to improved driving efficiency.	<ul style="list-style-type: none"> <li>•Eco-driving training sessions held for NCC staff</li> </ul>	<b>Complete</b>
51	<b>Fleet vehicle tracking system</b>	Vehicle Fleet Efficiency	Driver Training and ECO driving aids	2015-2017	BBC/NCC	Reduced emissions	Reduction in NO <sub>2</sub> and PM due to improved driving efficiency and efficient routes.	<ul style="list-style-type: none"> <li>•All BBC and NCC fleet vehicles are fitted with a vehicle tracking system, which records vehicle speed and idling time.</li> <li>•A review of the journeys undertaken will ensure that if necessary measures can be implemented e.g. staff training, to improve fleet efficiency.</li> </ul>	<b>Complete</b>  <b>Complete</b>
52	<b>Zoning of refuse collections</b>	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	2016-2017	BBC	Reduced emissions	Reduction in NO <sub>2</sub> and Particulate Matter as there is one less fleet vehicle used.	<ul style="list-style-type: none"> <li>•A review of the refuse collection areas at BBC to enable the areas to be zoned to ensure that the collection rounds are within the designated zone, which reduces the amount of non-productive travelling time.</li> <li>•The Refuse round restructure is now complete and we have reduced the fleet size by one vehicle.</li> </ul>	<b>Complete</b>

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Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisation involved and funding source	Key Performance Indicator and reduction in pollutant	Reduction in Pollutant/Emission from Measure	Progress to Date, comments / barriers of implementation	Estimated Completion Date
53	<b>Integrated ticketing</b>	Transport Planning and Infrastructure	Other	2014/15	NCC/NCiC/PT operators	Increased passenger transport patronage	Reduction in NO <sub>2</sub> and PM due to increased passenger transport patronage	<ul style="list-style-type: none"> <li>• Integrated ticketing strategy developed in 2014/15.</li> <li>• New smartcard platform introduced in 2014. Robin Hood card scheme introduced in 2015</li> <li>• Further smartcard/contactless improvements being developed</li> </ul>	On-going
54	<b>Personalised travel planning</b>	Promoting Travel Alternatives	Personalised Travel Planning	2016/17	NCC/AECOM	Restrain average journey times in the morning peak to a 1% increase per year	Reduction in NO <sub>2</sub> and PM due to increase in sustainable travel	<ul style="list-style-type: none"> <li>• Personalised Travel Planning undertaken in Beeston during 2016/17</li> <li>• No DfT funding currently available</li> </ul>	<b>Complete</b> On-hold.
55	<b>Web based journey planners</b>	Public Information	Via the Internet	Early 2000s	NCC	Increased walking/cycling/ passenger transport trips	Reduction in NO <sub>2</sub> and PM due to increase in sustainable travel	<ul style="list-style-type: none"> <li>• Nottinghamshire is part of the national, multi-modal Traveline journey planner</li> <li>• Web links to the Traveline site are publicised and available from the County Council's website.</li> <li>• Implementation on-going</li> </ul>	On-going

**BBC**= Broxtowe Borough Council, **NCC**= Nottinghamshire County Council, **HE** = Highways England, **NCiC**= Nottingham City Council, **DfT** = Department for Transport

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

As BBC does not currently monitor PM<sub>2.5</sub> the only methods that can be used to try and determine what the potential levels of PM<sub>2.5</sub> in the Borough are is to review the nearest relevant Automatic Urban and Rural Network (AURN) site which monitors PM<sub>2.5</sub> and to identify the modelled background levels for the Borough from Defra's webpages.

The nearest AURN site is in Nottingham City and for 2019 the annual mean concentration is 10.84µg/m<sup>3</sup>. The modelled background level provided by Defra for the Borough of Broxtowe are modelled to be between 8µg/m<sup>3</sup> and 11µg/m<sup>3</sup> for 2019, with the annual mean for 2019 being 9.73µg/m<sup>3</sup>. The modelled background concentrations are shown to be in the higher range along the M1 Motorway, The background maps are shown in Appendix G.

The Air Quality Objective (AQO) for PM<sub>2.5</sub> is an annual mean of 25µg/m<sup>3</sup>. However, the World Health Organisation guideline value are more stringent for PM<sub>2.5</sub>, as it is currently 10µg/m<sup>3</sup> (although it is believed that the guideline value will be reviewed in the future) therefore the modelling results show that parts of the Borough are exceeding WHO guideline but meeting the AQO.

As well as reviewing the modelled background and the nearest AURN to identify PM<sub>2.5</sub>, it is also important to review the Public Health Outcomes Framework (PHOF), which is published by Public Health England (PHE) and reviewed every three years. PHOF enables local authorities to identify the local indicator for PM<sub>2.5</sub> in their district,

to compare the 'Fraction of mortality attributable to particulate air pollution indicator' value and to compare this to nearby local authorities.

Table 2.3 below provides the estimated effects of annual mortality in 2018 of human-made PM<sub>2.5</sub> air pollution for Nottingham City, Broxtowe Borough Council and other neighbouring local authorities. The figures show that within the Borough of Broxtowe there are believed to be 59 deaths attributable to human-made air pollution this figure needs to be put into context as deaths that are attributable to smoking and alcohol consumption are far higher. For example, Nottingham City had 181 deaths attributable to human-made air pollution (PM and NO<sub>2</sub>), but there are 1408 deaths attributable to smoking<sup>5</sup> and 153 deaths related to alcohol consumption<sup>6</sup>.

**Table 2.3 – Estimated Effects of Annual Mortality in 2018 of human-made PM<sub>2.5</sub> Air Pollution.**

Council/Area	Attributable fraction	Attributable * Deaths aged 30 and over	Mortality Statistics for 2018
Nottingham City	5.2	120	2,312
Newark and Sherwood District	4.8	62	1,282
Gedling Borough	4.9	61	1,240
Ashfield District	4.6	59	1,276
Broxtowe Borough	4.9	59	1,214
Bassetlaw District	4.6	57	1,249
Rushcliffe Borough	4.8	53	1,097
Mansfield District	4.6	51	1,113

**Source:** Estimating Local Mortality Burdens associated with particulate air pollution, PHE, 2019.

<sup>5</sup> Tobacco Control Profiles 2015-2017, Public Health England. <http://fingertipsreports.phe.org.uk/health-profiles/2017/e06000018.pdf>

<sup>6</sup> Local Alcohol Profiles for England, 2017. <https://fingertips.phe.org.uk/profile/local-alcohol-profiles/data#page/4/gid/1938132832/pat/6/par/E12000004/ati/102/are/E06000018/iid/91382/age/1/sex/4>

\*Air pollution is likely to contribute a small amount to the deaths of a larger number of exposed individuals rather than being solely responsible for the number of deaths equivalent to the calculated figure of attributable deaths.

However, research has shown that there is significant harm to health at concentrations of Particulate Matter well below the current EU and UK limit values. Therefore, BBC are working towards reducing the PM<sub>2.5</sub> levels by taking the following measures:

- Ensuring that dust management plans are requested during the planning application stage for all sites that involve large scale demolition and building works.
- To ensure that best practicable means of dust control measures are being used regardless of how large the development is. These measures can include the use of bowzers, road sweepers and dust suppression to prevent 'trackout'. Also minimise dust generating activities on dry windy days and if there are stockpiles ensure they are covered to prevent wind-whipping.
- Ensuring that developers are carrying out dust suppression monitoring on site at large development sites.
- Ensuring that water suppressants are in use when Nibblers and mobile crushers are on site.
- Educating the public in matters that contribute to air quality e.g. not having bonfires.
- Educate and advise the public about using exempt appliances with the correct fuel for that appliance in BBCs smoke control areas.
- Enforcing the Clean Air Act 1993 and the Environmental Protection Act 1990 where necessary to minimise the risk of particulates becoming air borne.
- To continue to manage, advice and enforce the Pollution Prevention and Control Regulations 1999 and the Environmental Permitting (England and Wales) Regulations 2010 on permitted processes when necessary
- To encourage, support and promote sustainable travel within the Borough by working with a variety of organisations and neighbouring local authorities.

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- To continue to promote green travel e.g. walking, cycling, low emissions/ electric vehicles and the tram network.
- To continue to support bus companies and taxis that operate within the Borough to reduce emissions.
- To continue to review suitable research methods for reducing air quality levels for particulate matter e.g. the use of vegetation.
- Promote and encourage the use of the final version of the “EMAQN Air Quality and Emissions Mitigation: guidance for developers” document.
- To assist and advice consultants working on the proposed HS2 project. This ensures that suitable dust control measures will be used throughout the project.

## **2.4 Update on the 2008 Air Quality Action Plan**

### **2.4.1 The history of Broxtowe Borough Council's Air Quality Action Plan.**

Part IV of the Environment Act 1995 requires all local authorities to review and assess the current and future air quality in their area against objectives set out for eight key pollutants, under the provisions of the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002.

Where an exceedance of the objectives is likely, the local authority is under a duty to declare an Air Quality Management Area (AQMA) to improve air quality.

Following detailed work reviewing and assessing the air quality in Broxtowe in 2006, it was predicted that the annual mean nitrogen dioxide (NO<sub>2</sub>) concentrations in certain locations would not achieve the air quality objective of 40µg/m<sup>3</sup> or less by the end of 2005. Broxtowe Borough Council (BBC) declared four Air Quality Management Areas (AQMAs) within the borough along the M1 corridor. A NO<sub>2</sub> reduction of around 6µg/m<sup>3</sup> was required in order to achieve the objective.

In line with its statutory duty, Broxtowe Borough Council produced an Air Quality Action Plan (AQAP) in 2008 to manage the air quality throughout the borough to try to ensure the air quality standards and objectives were met.

### **2.4.2 Limitations to the Air Quality Action Plan**

The primary source of NO<sub>2</sub> within the AQMAs is from vehicle emissions from the M1 Motorway. Unfortunately, the motorway's control is outside the Council's management as the responsibility lies with Highways England. However, BBC considered various motorway strategies, taking into account factors such as whether the Council has the ability to implement the options identified, cost, feasibility and non-air quality benefits.

The conclusion of the AQAP was that whilst the primary source of NO<sub>2</sub> within the AQMAs is outside the Council's management, BBC had identified other measures that would have an effect on the contributing levels of NO<sub>2</sub> to improve the air quality



both in the AQMAs, as well as the rest of the borough, whilst also continuing to work alongside Highways England.

### 2.4.3 Update on the four AQMAs.

Broxtowe Borough Council used to have four AQMAs, however three of these have now been revoked and the one remaining AQMA is situated in Trowell. Table 2.4 below shows the four AQMAs, their locations, the date they were declared and the dates that the three were revoked.

Although AQMAs 1, 2 and 3 have been revoked, a decision was made to continue to monitor the air quality at these locations to ensure that the air quality objectives are still being met, which they are. All of the AQMAs are due to the M1 Motorway, which is managed and maintained by Highways England.

**Table 2.4 – The four AQMAs in the Borough.**

AQMA Name	Location	Date Declared	Date Revoked
AQMA 1	Trowell – Iona Drive & Tiree Close	2006	-
AQMA 2	Trowell – Derbyshire Avenue	2006	2010
AQMA 3	Trowell – Nottingham Road	2006	2010
AQMA 4	Nuthall - Nottingham Road	2006	2017

### 2.4.4 The NO<sub>2</sub> Annual Mean Concentrations for the remaining AQMA.

When AQMA 1 in Trowell (which will now be referred to as “the AQMA” was declared in 2006, it was an area that had been identifying as exceeding the AQO of 40µg/m<sup>3</sup>. The data showed that within this area in 2006 the annual mean was 45µg/m<sup>3</sup> and therefore exceeding the AQO by 5µg/m<sup>3</sup>.

Since 2012, there has been a general decreasing trend with the concentrations being below the air quality objective since 2016. Table 2.5 shows the annual mean

concentrations for nitrogen dioxide from 2012 to 2019. This data is also shown as a trend chart in Figure A.2 in the Appendices.

Since January 2016, there has been a second monitoring location added which is situated in Tiree Close. This is to ensure that there is an adequate representation of the air quality within this AQMA. The locations are situated between Junctions 25 and 26 of the M1 and are monitoring NO<sub>2</sub> levels from the M1 Motorway (see Appendix B for a map of the AQMA and the locations). The tubes are sited on the façade of properties that are the closest to the M1.

**Table 2.5 – Results for AQMA in Trowell 2012 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )							
	2012	2013	2014	2015	2016	2017	2018	2019
18	-	-	-	-	34	33	28	28
BX11 or 19	42	39	38	42	38	37	32	31

Although the 2013 -2014 and 2016-2019 NO<sub>2</sub> results for Site 19 and the 2016-2019 NO<sub>2</sub> results for Site 18 are below the air quality objective, the 2015 data did show an increase in NO<sub>2</sub>. This may have been as a result of the SMART Motorway scheme on the M1 between junctions 28 and 31 (Junctions 25 to 28 were completed in 2010), which had just been opened in June 2016. Therefore it was considered that this may have caused congestion further south, which could have had an effect on increasing the air quality levels in 2015. The SMART Motorway scheme will be discussed in greater detail in Section 2.4.5.

However, the results do show that there is a decreasing trend (if the 2015 data is seen as an anomaly due to the SMART Motorway Scheme), as the NO<sub>2</sub> levels have reduced by 6µg/m<sup>3</sup> from 2016 to 2019 for site 18 and 7µg/m<sup>3</sup> from 2016 to 2019 for site 19. Site 18 in 2019 is 12µg/m<sup>3</sup> below the AQO and Site 19 in 2019 is 9µg/m<sup>3</sup> below the AQO.

The results in Table 2.5 show that for four consecutive years the AQO has been met within the remaining AQMA and for two years the data has been below 36µg/m<sup>3</sup> which is a 10% reduction of the 40µg/m<sup>3</sup> AQO.

## 2.4.5 SMART Motorway Scheme

The SMART Motorways is a scheme that was introduced by Highways England with the aim of relieving congestion by making the hard shoulder available for use by traffic. On some SMART motorways, the hard shoulder is opened at busy times. On others it is permanently converted into a traffic lane (known as all-lane running). Regularly spaced refuge areas are used for emergencies.

SMART motorways use technology to:

- monitor traffic levels
- change the speed limit to smooth traffic flow, reduce frustrating stop-start driving and improve journey times
- activate warning signs to alert you to traffic jams and hazards up ahead
- close lanes – for example to allow emergency vehicles through

Highways England has been implementing this scheme on the M1 within the boundary of the borough of Broxtowe and the stretch of the M1 to the north and south of the borough. Table 2.6 shows the junctions in which this scheme has been introduced and the period in which it was completed. This identifies where there is likely to be congestion issues as the number of lanes of the M1 were reduced to allow the work to be undertaken safely. This will have had an effect upon the air quality within the area. This information may explain why there was an increase in 2015 within the AQMA.

**Table 2.6 – SMART Motorway Scheme on the M1 between Junctions 23a – 35a.**

Junctions of the M1 Motorway	Start Date	Completion Date
23a to 25	Feb 2017	Feb 2019
25 to 28	Jan 2007	Dec 2010
28 to 31	Oct 2014	Dec 2015
32 to 35a	Jan 2015	Mar 2017

Further information about the Smart Motorway scheme can be found on the Highways England website: <https://highwaysengland.co.uk/programmes/smart-motorways/>

#### **2.4.6 Defra's recommendations for Broxtowe Borough Council.**

Every year the Council analyses the results, and discuss their findings and observed trends in the ASR. This includes the results for the monitoring sites located within the remaining AQMA. The annual ASR has also included all of the actions that BBC are implementing to reduce the background air quality within the borough and also any measures that Nottinghamshire County Council are also implementing. These measures are displayed in Table 2.2 and discussed throughout the report. The ASR once completed is then submitted to Defra for approval.

Defra as well as approving the ASR also provide recommendations for the Council to implement and to be discussed in the next ASR.

The recommendations that BBC have received from Defra are:

- ❖ The borough has made some good progress towards developing their AQAP and implementing AQAP measures in the last year, which is commended.
- ❖ The borough has stated that they will continue to monitor and keep the AQMA under review whilst the effects of the SMART motorway scheme are being determined, and until a significant decreasing trend can be demonstrated. This is supported, and it is suggested that the AQMA could be considered for revocation after demonstrating compliant NO<sub>2</sub> concentrations below 36 µg/m<sup>3</sup> for three consecutive years.
- ❖ There have been no exceedances of national air quality objectives in 2018 and concentrations in the Trowell AQMA continue to fall. The Council have stated that they plan to implement measures to ensure NO<sub>2</sub> concentrations are below the AQOs and when long-term compliance is achieved they will revoke the AQMA. If current NO<sub>2</sub> trends continue and concentrations decline, then the revocation of the AQMA is strongly supported.

Although for the past four consecutive years, the data has been below the AQO the data has only been below 36 µg/m<sup>3</sup> for two consecutive years. Therefore, BBC will not revoke the AQMA until it is consistently below 36 µg/m<sup>3</sup> for three or more consecutive years.

#### 2.4.7 Proposed Methodology for not producing a new AQAP.

As the measures in the 2008 Air Quality Action Plan (AQAP) are to reduce the background NO<sub>2</sub> concentrations and the results are below the AQO within the remaining AQMA, and Defra has also recommended revoking the AQMA. BBC contacted the LAQM helpdesk to discuss the need for revising the Air Quality Action Plan.

BBC proposed that instead of producing a new AQAP, that the measures that BBC are implementing to improve the air quality are continued to be discussed annually in the ASR instead and are shown in Table 2.2 until the AQMA is revoked within the next couple of years.

The LAQM Helpdesk discussed the proposal with BBC (See Appendix K for the email conversations) and it was agreed that if BBC undertook the following measures that there would not be a need to produce a new AQAP if Defra agreed.

The measures are;

1. To undertake a detailed monitoring study, by increasing the number of diffusion tubes within the AQMA to identify whether the AQMA designation is required. – *Since March 2020, two additional monitoring locations have been added within the AQMA, these new sites will be discussed in the 2021 ASR.*
2. To send the LAQM helpdesk the latest results on a regular basis rather than providing an annual figure – *BBC are sending updated data to LAQM.*
3. To identify any factors that would contribute to the anomaly in 2015 when there was an increase in NO<sub>2</sub> levels. *BBC identified that it was likely to have been the SMART motorway scheme.*

As BBC will continue to monitor NO<sub>2</sub> levels in this area and work alongside Highways England to improve air quality levels, the Council requests Defra's approval to not produce a new AQAP but to agree to the AQAP measures being reviewed within the ASR instead until the final AQMA is revoked.

## **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 the air quality objectives.

#### **3.1.1 Automatic Monitoring Sites**

BBC does not currently utilise any automatic air quality monitoring within the Borough

#### **3.1.2 Non-Automatic Monitoring Sites**

BBC undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 43 sites during 2019. Table A.1 in Appendix A shows the details of the sites. There were no changes to the site locations in 2019.

Maps showing the location of the monitoring sites are provided in Appendix E. 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 D.

### **3.2 Individual Pollutants**

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

#### **3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)**

Table A.2 in Appendix A compares the ratified and adjusted monitored Nitrogen Dioxide (NO<sub>2</sub>) annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. Figure A.1 in the appendices shows the Trends in annual mean concentrations for all of the sites in use since 2016 to 2019.

For diffusion tubes, the full 2019 dataset of monthly mean values are provided in Table B.1 of Appendix B.

### **Nitrogen Dioxide Diffusion Tube Monitoring Results**

The results from the bias corrected NO<sub>2</sub> diffusion tube monitoring have shown that there are no exceedences of the 40µg/m<sup>3</sup> air quality objective at any of the 43 monitoring locations within the Borough for 2019.

Although there are no exceedances of the NO<sub>2</sub> objective there is still one AQMA within the Borough, which is situated in Trowell. The monitoring results from the diffusion tubes sited in the AQMA will be discussed in greater detail below.

As well as discussing the results from the recently revoked AQMA in Nuthall and the current AQMA. The following chapter will discuss areas of concern within the Borough where the air quality levels are higher than average, but still within the Air Quality Objective. This is to determine whether any trends are developing, which will allow suitable measures if necessary, to be put in place to reduce the likelihood of an exceedance in the future.

### **Revoked AQMA in Nuthall**

There are three diffusion tube sites located on Nottingham Road in Nuthall that are located within the recently revoked AQMA in Nuthall. The results below show that since 2012 the levels of NO<sub>2</sub> are consistently below the objective of 40µg/m<sup>3</sup> for all three sites.

**Table 3.1 – Results for the Revoked AQMA in Nuthall 2012 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )							
	2012	2013	2014	2015	2016	2017	2018	2019
BX01 or 33	31	33	29	28	29	29	23	25
BX05 or 34	32	33	32	29	29	27	28	26
BX13 or 35	35	33	34	34	32	34	30	30

Monitoring will continue to be undertaken at these three sites and the results will be reported in the 2021 Air Quality Annual Status Report.

### AQMA in Trowell

Since January 2016 there are now two monitoring sites within the AQMA in Trowell as opposed to just one site. They are situated between Junction 25 and 26 of the M1 and are monitoring NO<sub>2</sub> levels from the M1 Motorway. The tubes are sited on the façade of properties that are the closest to the M1.

The original monitoring site is on the façade of a property on Iona Drive, which has been there since 2011. The new monitoring site is on the façade of a property that is in Tiree Close (See Appendix F for the map of the AQMA and the tube locations). The diffusion tube monitoring results from 2012 to 2019 are shown below. Please see Figure A.2 in the appendices for a trend chart showing the data below.

**Table 3.2 – Results for AQMA in Trowell 2012 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )							
	2012	2013	2014	2015	2016	2017	2018	2019
18	-	-	-	-	34	33	28	28
BX11 or 19	42	39	38	42	38	37	32	31

Although the 2016 and the 2017 NO<sub>2</sub> results for both sites in the AQMA are below the air quality objective, the 2015 data did show an increase in NO<sub>2</sub>. This may have been as a result of the SMART Motorway scheme on the M1 between Junctions 28 and 31 (Junctions 25 to 28 were completed in 2010), which had just been opened at the time of writing the 2016 report. Therefore it was considered that this may have caused congestion further South, which could have had an effect on increasing the air quality levels in 2015.

However, the results do show that there is a decreasing trend (if the 2015 data is seen as an anomaly due to the SMART Motorway Scheme), as the NO<sub>2</sub> levels have reduced by 6µg/m<sup>3</sup> from 2016 to 2019 for site 18 and 7µg/m<sup>3</sup> from 2016 to 2019 for site 19. BBC will continue to monitor NO<sub>2</sub> levels in this area and work alongside



Highways England to improve air quality levels. Please view Section 2.4 of this report on an Update on the Air Quality Action Plan for this AQMA.

### A610/B600 Nuthall Island

Since 2016 there have been two new sites for monitoring the air quality levels on the Nuthall Island (Site's 36 and 37). The reason for changing the original site (BX 22) was due to the diffusion tube being located less than 1m from Nottingham Road which was very near to the A610/B600 Nuthall Island but not near the residential properties. Therefore, the site was not a true representation of the levels that receptors are receiving at their properties so the site was relocated to the façade of a residential property in January 2016 (See Appendix H for the Map of the roundabout and the current monitoring locations).

In January 2016 a second site was also chosen to determine what the NO<sub>2</sub> levels are on a residential property that is situated on the opposite side of the roundabout to Site 36 where the traffic is leaving Nottingham City and travelling into the Borough of Broxtowe. The results from 2012 to 2015 are shown for the 'old' site and the 2016 to 2019 results for the 'new' sites are shown below.

**Table 3.3 – Results for Nuthall Island 2012 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )							
	2012	2013	2014	2015	2016	2017	2018	2019
BX 22	42	41	39	41	-	-	-	-
36	-	-	-	-	35	35	33	32
37	-	-	-	-	32	30	29	26

The results above show that that the original site did not provide a true representation of NO<sub>2</sub> levels at the façade of the properties. However, the two 'new' sites are showing that the levels are below the air quality objective by 8µg/m<sup>3</sup> for site 36 and 14µg/m<sup>3</sup> for site 37 in 2019 and are showing a decreasing trend.

BBC will continue to monitor NO<sub>2</sub> levels at these sites and provide an update in the 2021 ASR. BBC will continue to work alongside Nottinghamshire County Council to improve air quality levels.

### **Bramcote Island, Derby Road, Bramcote**

Since January 2016, increased monitoring has been undertaken at this location due to the original site showing exceedances of the air quality objective of 40µg/m<sup>3</sup>. The original site (BX04) was discontinued and relocated in January 2016 to a neighbouring property at a more suitable height and nearer to Bramcote Island (Site 41). An additional site was also chosen to determine whether the concentration reduces further away from the roundabout (Site 40). Both sites are on the façade of properties on Derby Road. (See Appendix I for the Map of the roundabout and the monitoring locations).

As discussed in the 2016 ASR, the diffusion tube results were believed to be over the objective level for several years as there were a number of parallel traffic schemes which were being undertaken in the Borough and also within Nottingham City. Therefore as suspected, the traffic schemes affected the results when comparing the past results to the results since 2016.

**Table 3.4 – Results for Bramcote Island 2012 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )							
	2012	2013	2014	2015	2016	2017	2018	2019
BX 04	42	38	42	41	-	-	-	-
40	-	-	-	-	38	33	34	32
41	-	-	-	-	37	36	34	31

The table above shows that in 2019 Site 40 is 32µg/m<sup>3</sup>, which is a reduction of 2µg/m<sup>3</sup> and Site 41 is 31µg/m<sup>3</sup>, which is a reduction of 3µg/m<sup>3</sup> in comparison to the 2018 results.

Although this is an overall downward trend for both sites from 2016 and they are below the objective level. There is a slight increase by 1µg/m<sup>3</sup> at Site 40 in 2018. This

could have been due to localised roadworks that were taking place on the A52, which has resulted in an increase in stationary traffic near to this site. However, in 2019 this site has a measured reduction of  $2\mu\text{g}/\text{m}^3$  in comparison to 2018 figures which further indicates that the slight increase was due to localised roadworks which were completed in 2018.

BBC will continue to monitor and report on the  $\text{NO}_2$  levels in this area, to note any works that are being undertaken and to continue to work alongside Highways England to improve the air quality levels in this area.

### **Town Street, Bramcote.**

In December 2016 a review was undertaken of the monitoring network and as Town Street is often used as a 'rat run' in rush hour to avoid the A52 a decision was made to monitor at this location.

The new site started in January 2017 and the exact location was picked as the street is narrowed due to residents parking outside their properties, which tends to cause a 'bottle neck' situation in rush hour (See Appendix J for the Map identifying the monitoring location). The siting of the tube has been chosen so that it is parallel with the façade of a nearby residential property as there were no suitable downpipes to attach it to the façade of the property.

**Table 3.5 – Results for Town Street 2016 – 2019.**

Site ID	<b><math>\text{NO}_2</math> Annual Mean Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>			
	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
48	-	38	36	30
56	-	-	25	23

Above is the result for the sites for 2017 to 2019. The result for 2017 is  $38\mu\text{g}/\text{m}^3$ . The result at site 48 for 2019 is  $30\mu\text{g}/\text{m}^3$  which is a reduction of  $8\mu\text{g}/\text{m}^3$  in comparison to the 2017 results, which shows a downward trend.

Due to the result in 2017, a decision was made to start monitoring at a second location on Town Street (Site 56) in 2018 (the tube is sited on the façade of a house that is near to the Bramcote Island end of Town Street). The additional site in 2018 was to determine whether there is a potential issue along all of Town Street, or just at the site where there is a bottle neck. The result at site 56 for 2019 is  $23\mu\text{g}/\text{m}^3$  which is a reduction of  $2\mu\text{g}/\text{m}^3$  in comparison to the 2018 result. This enforces the theory that the results are higher on site 48 due to the 'Bottle neck' situation.

BBC will continue to monitor  $\text{NO}_2$  levels at these sites and provide an update in the 2021 ASR. BBC will continue to work alongside Nottinghamshire County Council to improve air quality levels.

### **The Results and Trends for all Monitoring Sites that have been in use since 2016.**

Defra requested that trend charts were provided for all monitoring sites to identify any trends in the annual mean concentrations. The trend charts are displayed in Figure A.1 in the Appendices for all of the sites in use since 2016 to 2019.

Although some sites have been in use since 2013, (they are presented within the next section). It was decided that due to the review of the monitoring sites and the subsequent increase in monitoring sites starting in January 2016, that any trend charts for all monitoring sites should start from 2016.

The trend charts have identified that out of the 35 sites in use since 2016, eleven are showing a consistent downward trend year on year, nine are showing the same annual mean for 2019 and 2018. Out of the nine, two of these sites (site 22 and site 32) have had the same concentration for the last three years.

Seven of the 35 sites are showing that in 2019 there was a reduction in concentration in comparison to 2018. Three of the seven sites (site 13, site 30 and site 39), showed an increase in the 2017 and two of the seven sites (site 40 and site 43) showed an

increase in 2018 data but overall there is a decreasing downward trend in all seven sites since 2016.

Three of the 35 sites have shown an increase in 2019 data in comparison to 2018 data (site 1, site 11 and site 33) but overall there is a decreasing downward trend in these three sites since 2016.

Four of the 35 sites (site3, site 10, site 45 and site 31) have not shown a consistent trend from 2016 to 2019 however, with continuous yearly data being collected it is hoped that a clear trend can be identified in future years.

The remaining site (site 15) out of the 35 sites has shown that for the past three years the annual concentration has risen year on year.

**Table 3.6 – Results for George Spencer Academy, Stapleford 2016 – 2019.**

Site ID	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )			
	2016	2017	2018	2019
15	36	26	28	29

Table 3.6 above shows that the highest concentration was in 2016 at 36µg/m<sup>3</sup>. In 2017 it had decreased greatly by 10µg/m<sup>3</sup>. In 2018 it increased by 2µg/m<sup>3</sup> and an additional 1µg/m<sup>3</sup> in 2019. Although there has been a slight increase for the past three years and the reason is unknown, the site is still below the air quality objective of 40µg/m<sup>3</sup>.

The location of this site is closer to the A52 than the main academy buildings, this is to ensure that the monitoring data is consistently collected, as previously diffusion tubes have been removed.. This location also allows BBC to determine the worst case scenario for the academy. However, this site will be closely monitored and an update will be provided in the ASR in 2021.

**The Results and Trends for the Thirteen Monitoring Sites that have been in use since 2013.**

Defra requested that trend graphs and comparisons are made for the thirteen sites that have been continuously monitored since 2013. See Appendix C for the trend graph for all thirteen sites.

The trend graph in Appendix C shows that out of the thirteen sites, twelve of the sites are showing an overall downward trend since 2013 (Sites 1, 5, 7, 19, 20, 22, 33, 34, 35, 38, 39 and 43). The one remaining site (site 31) has only shown a very slight downward trend. Site 31 will therefore be discussed in greater detail below.

Since 2013, Sites 1 & 33 have shown an overall downward trend but in 2019 both of these sites have shown a slight increase between  $1\mu\text{g}/\text{m}^3$  and  $2\mu\text{g}/\text{m}^3$  in comparison to 2018 results. Therefore these sites will be discussed in greater detail below.

**Site 1 – Near 113 Wollaton Road, Beeston.**

Since 2013, Site 1 has shown a downward trend until 2016 when there was a slight increase of  $1\mu\text{g}/\text{m}^3$  in comparison to 2015 result. Then it has continued to reduce in 2017 and again in 2018. However in 2019 there has been a slight increase of  $1\mu\text{g}/\text{m}^3$  in comparison to 2018 result. Overall since 2013 there has been a decrease of  $6\mu\text{g}/\text{m}^3$  with the highest concentration being  $32\mu\text{g}/\text{m}^3$  it is currently  $27\mu\text{g}/\text{m}^3$ , which is comfortably below the air quality objective of  $40\mu\text{g}/\text{m}^3$ . This is one of the main roads into Beeston town centre and is a busy road that is used by commuters. Road works have been undertaken on this road to improve the road surface which may have resulted in a localised slight increase of  $\text{NO}_2$ .

**Site 31 – 15 Hayley Close, Kimberley**

Since 2013, Site 31 has shown a slight downward trend overall between 2013 and 2019 as there has been a decrease of  $6\mu\text{g}/\text{m}^3$  with the highest concentration being  $32\mu\text{g}/\text{m}^3$  and the lowest concentration being  $26\mu\text{g}/\text{m}^3$  in 2018. There have been fluctuations at this site where the concentrations have increased or decreased slightly

throughout this monitoring period. Although it must be noted that even with these fluctuations the concentrations are below the air quality objective of  $40\mu\text{g}/\text{m}^3$ .

In 2019 there has been an increase of  $3\mu\text{g}/\text{m}^3$  in comparison to 2018 result. It is thought that this increase is due to the increased activity and vehicle movements on the former Beamlight site that is currently undergoing development and is situated near to this location.

This site will be closely monitored and an update will be provided in the 2021 ASR.

### **Site 33 – 19a Nottingham Road, Nuthall.**

Since 2013, Site 33 has shown a downward trend until 2019 when there has been a slight increase of  $2\mu\text{g}/\text{m}^3$  in comparison to 2018 result. Overall since 2013 there has been a decrease of  $10\mu\text{g}/\text{m}^3$  with the highest concentration being  $33\mu\text{g}/\text{m}^3$  and the lowest being  $23\mu\text{g}/\text{m}^3$  it is currently  $25\mu\text{g}/\text{m}^3$  which is below the air quality objective of  $40\mu\text{g}/\text{m}^3$ .

The reason for the slight increase is unknown as this is a co-location study with Site 34 which has not shown an increase. However, this site will be closely monitored and an update will be provided in the 2021 ASR.

The breakdown of the annual figures for each year from 2013 to 2019 can be viewed in Appendix A, Table A.2 of this report.

### **3.2.2 Particulate Matter ( $\text{PM}_{10}$ )**

BBC does not currently monitor  $\text{PM}_{10}$  within the Borough. However, discussions are currently taking place with Nottinghamshire District and Borough Authorities and Nottinghamshire County Council, to collectively buy and maintain particulate monitors in the future. The outcome of this will be discussed in the 2021 ASR.

### **3.2.3 Particulate Matter ( $\text{PM}_{2.5}$ )**

BBC does not currently monitor  $\text{PM}_{2.5}$  within the Borough. However, discussions are currently taking place with Nottinghamshire District and Borough Authorities and Nottinghamshire County Council, to collectively buy and maintain particulate monitors in the future. The outcome of this will be discussed in the 2021 ASR.

#### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

Previous air quality reports have shown there are no relevant sources of Sulphur Dioxide within the Borough. Subsequently, the Council does not monitor for this pollutant



## Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Site.

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
1	113 Wollaton Road, Beeston	R	452527	337313	NO <sub>2</sub>	N	0	1^	N	1.9
50	309 Wollaton Road, Beeston	R	452114	338018	NO <sub>2</sub>	N	0	16^	N	1.7
2	166 Derby Road, Beeston	R	452091	338122	NO <sub>2</sub>	N	0	7^	N	1.8
3	8 Queens Road East, Beeston	R	453659	337412	NO <sub>2</sub>	N	0	12^	N	1.8
4	226 Queens Road, Beeston	R	453361	336627	NO <sub>2</sub>	N	0	6^	N	1.8
51	36 Meadows Road, Beeston	R	453537	336100	NO <sub>2</sub>	N	0	4^	N	1.7

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Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
52	228 Station Road Beeston	R	453287	336349	NO <sub>2</sub>	N	0	4^	N	1.7
5	Chilwell Olympia School, Beeston	UB	451782	335320	NO <sub>2</sub>	N	0	104^	N	1.9
7	31 Hickton Drive, Chilwell	R	450756	334328	NO <sub>2</sub>	N	0	10^	N	1.9
53	1 Calverton Close, Chilwell	R	450360	334982	NO <sub>2</sub>	N	0	5^	N	1.7
8	The Manor Pub, 350 Nottingham Road, Toton	R	450422	334243	NO <sub>2</sub>	N	0	5^	N	1.8
9	Toton branch Surgery, 2 Banks Road, Toton	R	449876	334804	NO <sub>2</sub>	N	0	8^	N	1.8

**Broxtowe Borough Council**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
10	1 Katherine Drive, Toton	R	449748	335472	NO <sub>2</sub>	N	0	13^	N	1.7
11	269 Stapleford Lane, Toton	R	449694	335501	NO <sub>2</sub>	N	0	7^	N	1.8
12	Lamppost, Stapleford Lane, Toton	R	449615	335664	NO <sub>2</sub>	N	0	2^	N	1.9
45	209 Toton Lane, Stapleford	R	449467	336220	NO <sub>2</sub>	N	0	16^	N	1.8
15	George Spencer Academy, Stapleford	R	449406	336135	NO <sub>2</sub>	N	0	9^	N	1.9
13	George Spencer Lower School, Toton	R	449266	336075	NO <sub>2</sub>	N	0	16^	N	1.8

Broxtowe Borough Council

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
16	24 Brampton Drive, Stapleford	R	449516	336216	NO <sub>2</sub>	N	0	11^	N	1.7
54	195 Derby Road, Stapleford	R	448467	336591	NO <sub>2</sub>	N	0	4^	N	1.8
17	Lampost Church Street, Stapleford	R	448890	337190	NO <sub>2</sub>	N	0	3^	N	1.8
55	12 Ilkeston Road, Stapleford	R	449814	338471	NO <sub>2</sub>	N	0	11^	N	1.8
18	20 Tiree Close, Trowell	R	448560	338889	NO <sub>2</sub>	Y	0	26	N	1.7
19	15 Iona Drive, Trowell	R	448586	339023	NO <sub>2</sub>	Y	0	23	N	1.9
20	30 Derbyshire Avenue, Trowell	R	448652	339652	NO <sub>2</sub>	N	0	39	N	1.9

Broxtowe Borough Council

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
22	81 Nottingham Road, Trowell	R	448832	340098	NO <sub>2</sub>	N	0	33	N	1.8
44	32 Mansfield Road, Eastwood	R	446509	347091	NO <sub>2</sub>	N	0	2^	N	1.8
27	Sun Inn Pub, 6 Derby Road, Eastwood	R	446465	346985	NO <sub>2</sub>	N	0	6^	N	1.8
30	560 Nottingham Road, Giltbrook	R	448544	345241	NO <sub>2</sub>	N	0	3^	N	1.9
31	15 Hayley Close, Kimberley	R	448826	344883	NO <sub>2</sub>	N	0	11^	N	1.9
32	59b Main Street, Kimberley	R	450122	344658	NO <sub>2</sub>	N	0	5^	N	1.8
33	19a Nottingham Road, Nuthall*	R	451631	344526	NO <sub>2</sub>	N	0	42	N	1.7

**Broxtowe Borough Council**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQM A?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
34	19a Nottingham Road, Nuthall*	R	451631	344526	NO <sub>2</sub>	N	0	42	N	1.7
35	20 Nottingham Road, Nuthall	R	451728	344440	NO <sub>2</sub>	N	0	32	N	1.9
36	113 Nottingham Road, Nuthall	R	452232	344033	NO <sub>2</sub>	N	0	20^	N	1.7
37	114 Nottingham Road, Nuthall	R	452331	343910	NO <sub>2</sub>	N	0	27^	N	1.7
38	Opp Sherwin Arms, Derby Road, Bramcote	R	450389	337866	NO <sub>2</sub>	N	2	1^	N	1.8
39	9 Bembridge Court, Bramcote	R	450434	337781	NO <sub>2</sub>	N	0	6^	N	1.6
56	10 Town Street, Bramcote	R	450570	337851	NO <sub>2</sub>	N	0	10^	N	1.9

**Broxtowe Borough Council**

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube co-located with a Continuous Analyser?	Height (m)
40	153 Derby Road, Bramcote	R	450632	337929	NO <sub>2</sub>	N	0	14^	N	1.7
41	169 Derby Road, Bramcote	R	450555	337909	NO <sub>2</sub>	N	0	11^	N	1.8
48	Near 73 Town Street, Bramcote	R	450817	337592	NO <sub>2</sub>	N	0	2	N	1.8
43	Broxtowe Borough Council Offices	UB	452733	336962	NO <sub>2</sub>	N	0	10^	N	1.8

**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.

(^) All distance to kerb to nearest road relate to the M1 which is the primary source of NO<sub>2</sub> throughout the borough unless indicated using the ^ symbol

(\*) Co-located tubes

**Table A.2 – Annual Mean NO<sub>2</sub> Monitoring Results**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
1	452527	337313	R	DT	100	100	29	30	28	26	27
50	452114	338018	R	DT	100	100	-	-	-	28	29
2	452091	338122	R	DT	100	100	-	31	29	27	27
3	453659	337412	R	DT	100	100	-	26	22	22	23
4	453361	336627	R	DT	100	100	-	30	28	26	26
51	453537	336100	R	DT	83	83	-	-	-	18	16
52	453287	336349	R	DT	100	100	-	-	-	23	24
5	451782	335320	UB	DT	92	92	20	20	19	17	16



Broxtowe Borough Council

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
6	451482	334936	R	DT	-	-	-	26	25	-	-
7	450756	334328	R	DT	100	100	26	27	26	23	23
53	450360	334982	R	DT	100	100	-	-	-	19	20
8	450422	334243	R	DT	92	92	-	31	29	27	24
9	449876	334804	R	DT	100	100	-	24	21	22	22
10	449748	335472	R	DT	92	92	-	26	26	21	22
11	449694	335501	R	DT	100	100	-	30	29	26	28
12	449615	335664	R	DT	83	83	-	29	25	24	20
13	449266	336075	R	DT	100	100	-	31	34	26	25

Broxtowe Borough Council

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
45	449467	336220	R	DT	100	100	-	28	29	26	27
15	449406	336135	R	DT	92	92	-	36	26	28	29
16	449516	336216	R	DT	100	100	-	28	26	26	25
54	448467	336591	R	DT	100	100	-	-	-	30	30
17	448890	337190	R	DT	92	92	-	37	35	33	33
55	449814	338471	R	DT	100	100	-	-	-	25	24
18	448560	338889	R	DT	100	100	-	34	33	28	28
19	448586	339023	R	DT	100	100	<b>42</b>	38	37	32	31
20	448652	339652	R	DT	100	100	26	26	24	34	23

Broxtowe Borough Council

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
22	448832	340098	R	DT	100	100	26	27	24	24	24
23	448195	342287	R	DT	-	-	-	24	22	-	-
24	448230	344446	R	DT	-	-	-	26	24	-	-
44	446509	347091	R	DT	100	100	-	36	33	34	32
27	446465	346985	R	DT	92	92	-	26	24	24	20
28	44601	346920	R	DT	-	-	-	25	21	-	-
30	448544	345241	R	DT	92	92	-	27	28	23	22
31	448826	344883	R	DT	100	100	30	30	32	26	29
32	450122	344658	R	DT	100	100	-	30	29	29	29

**Broxtowe Borough Council**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
33	451631	344526	R	DT	100	100	28	29	29	23	25
34	451631	344526	R	DT	100	100	29	29	27	28	26
35	451728	344440	R	DT	100	100	34	32	34	30	30
36	452232	344033	R	DT	100	100	-	35	35	33	32
37	452331	343910	R	DT	100	100	-	32	30	29	26
38	450389	337866	R	DT	100	100	31	34	30	30	27
39	450434	337781	R	DT	100	100	28	31	26	27	25
56	450570	337851	R	DT	100	100	-	-	-	25	23
40	450632	337929	R	DT	100	100	-	38	33	34	32

**Broxtowe Borough Council**

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2019 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3) (4)</sup>				
							2015	2016	2017	2018	2019
41	450555	337909	R	DT	100	100	-	37	36	34	31
48	450817	337592	R	DT	100	100	-	-	38	36	30
43	452733	336962	UB	DT	100	100	21	21	18	19	18

**Notes:** Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details

**R** = Roadside

**UB** = Urban Background

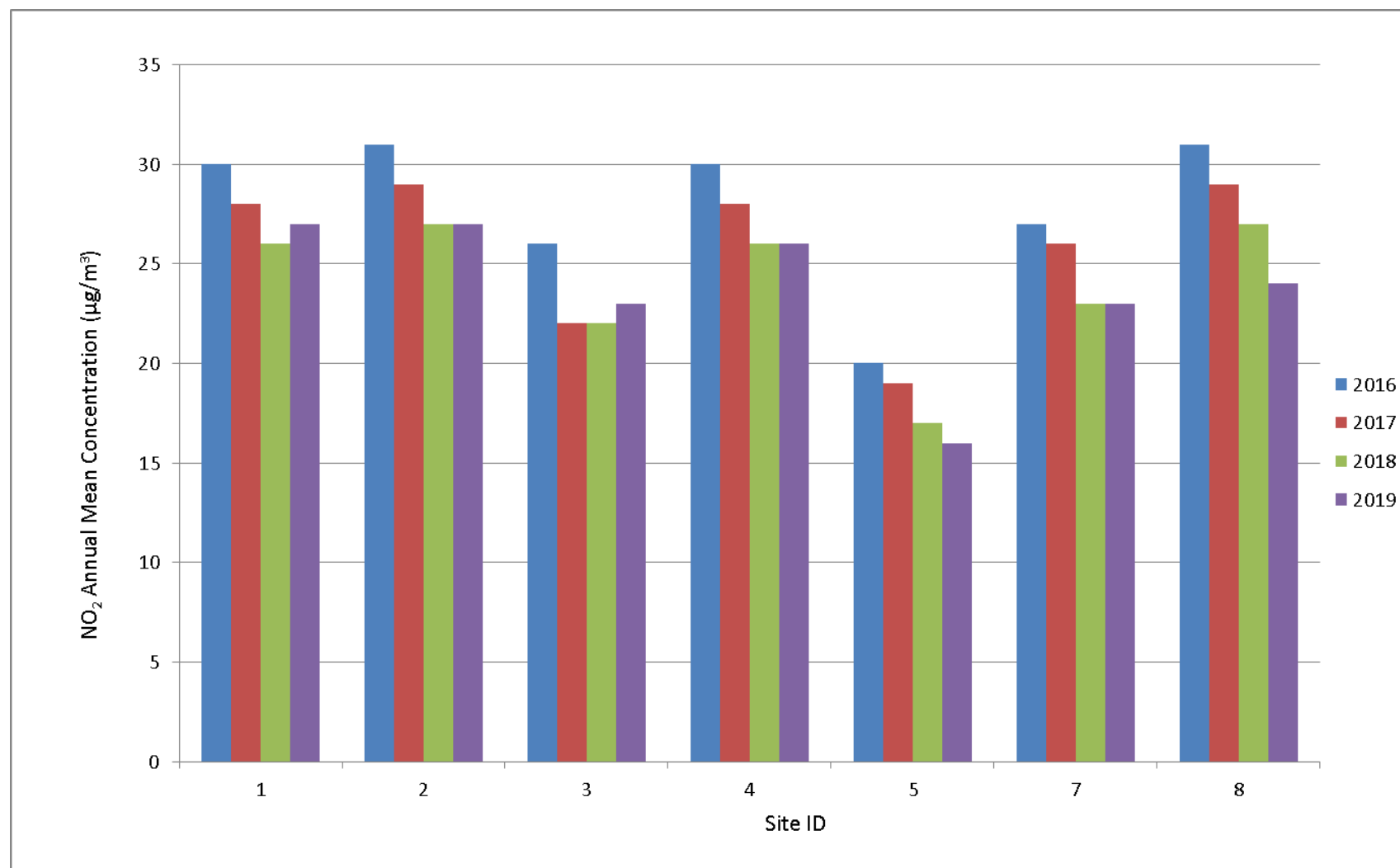
**DT** = Diffusion Tube

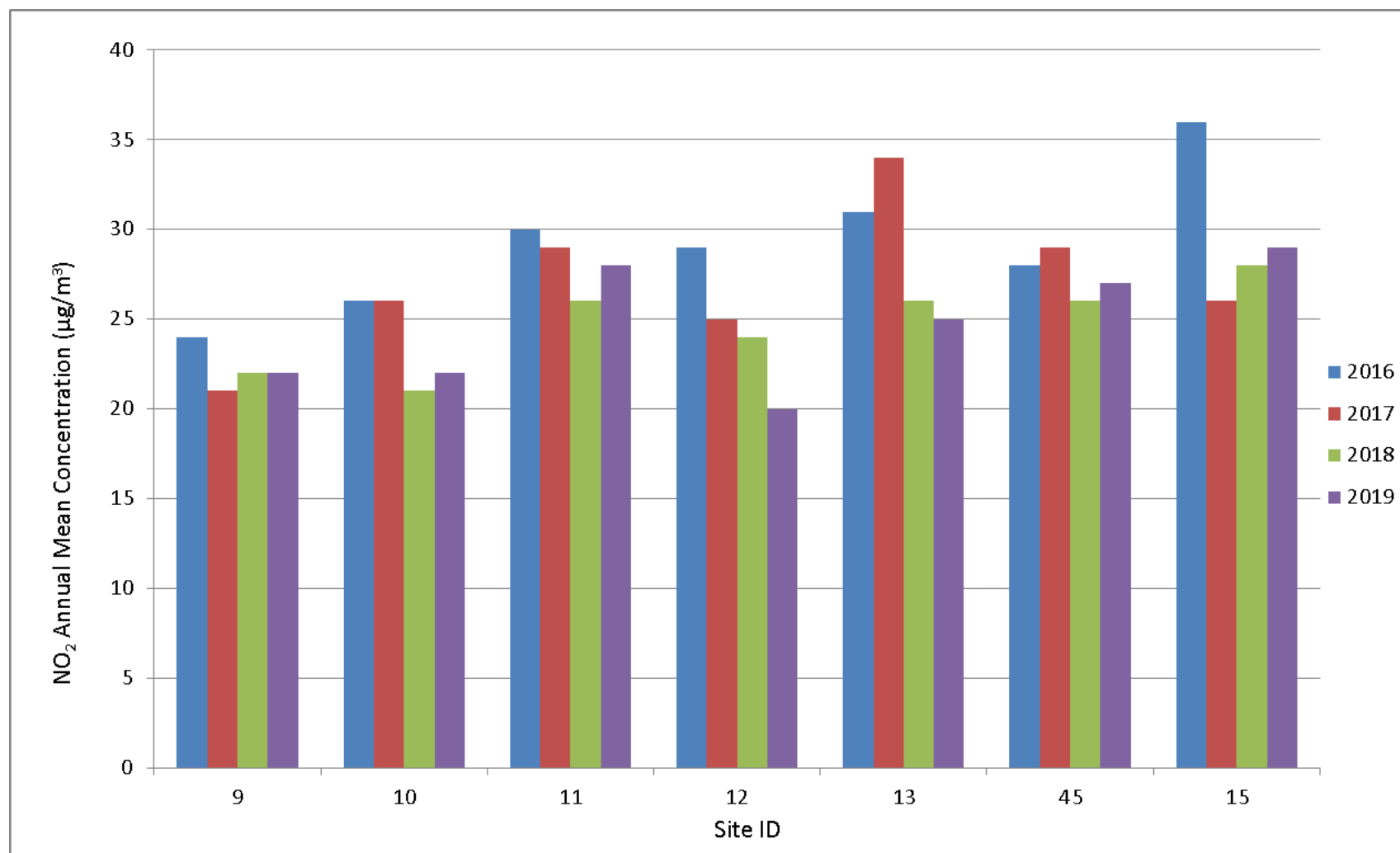
☒ **Diffusion tube data has been bias corrected**

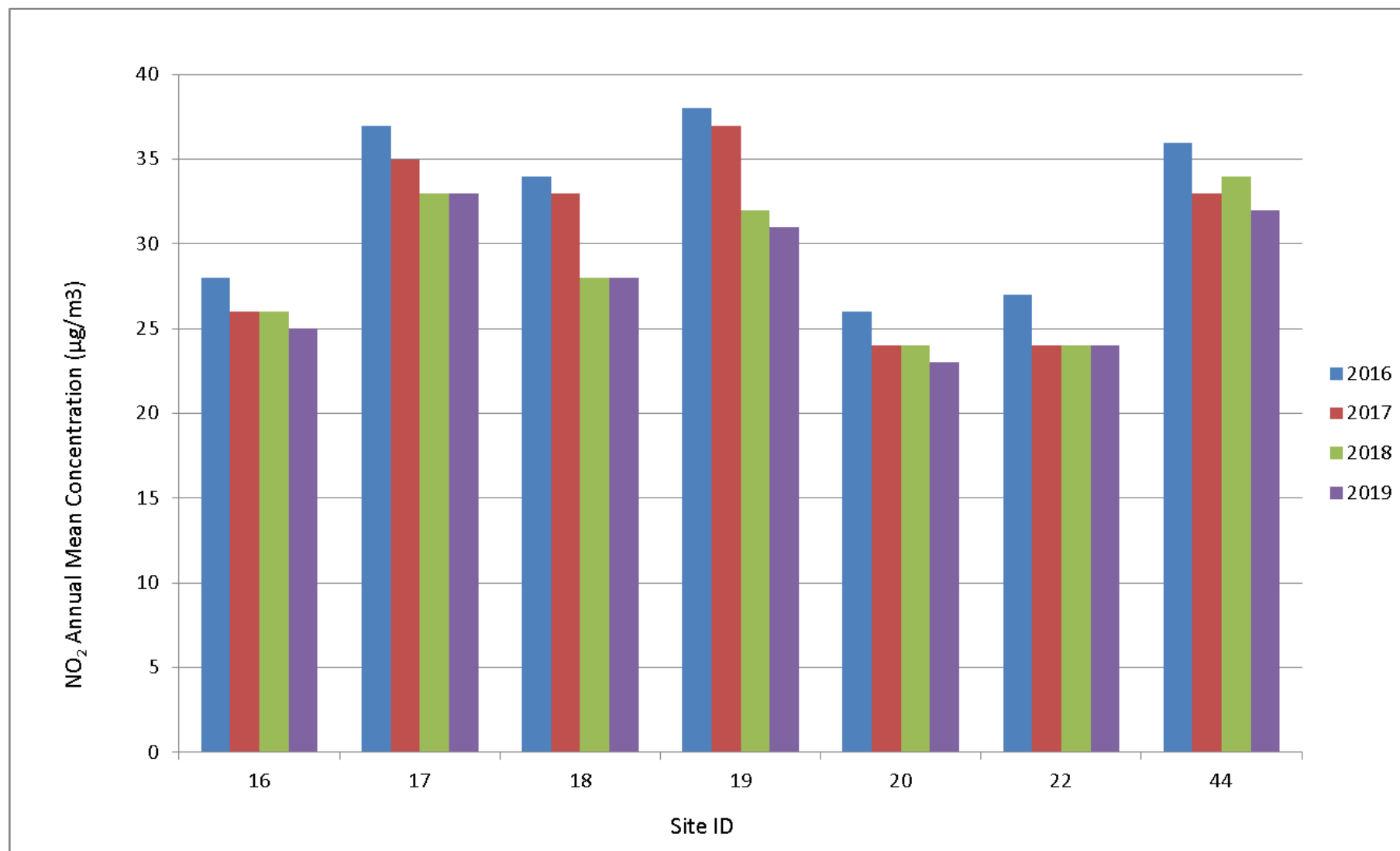
☒ **Annualisation has been conducted where data capture is <75%**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment**

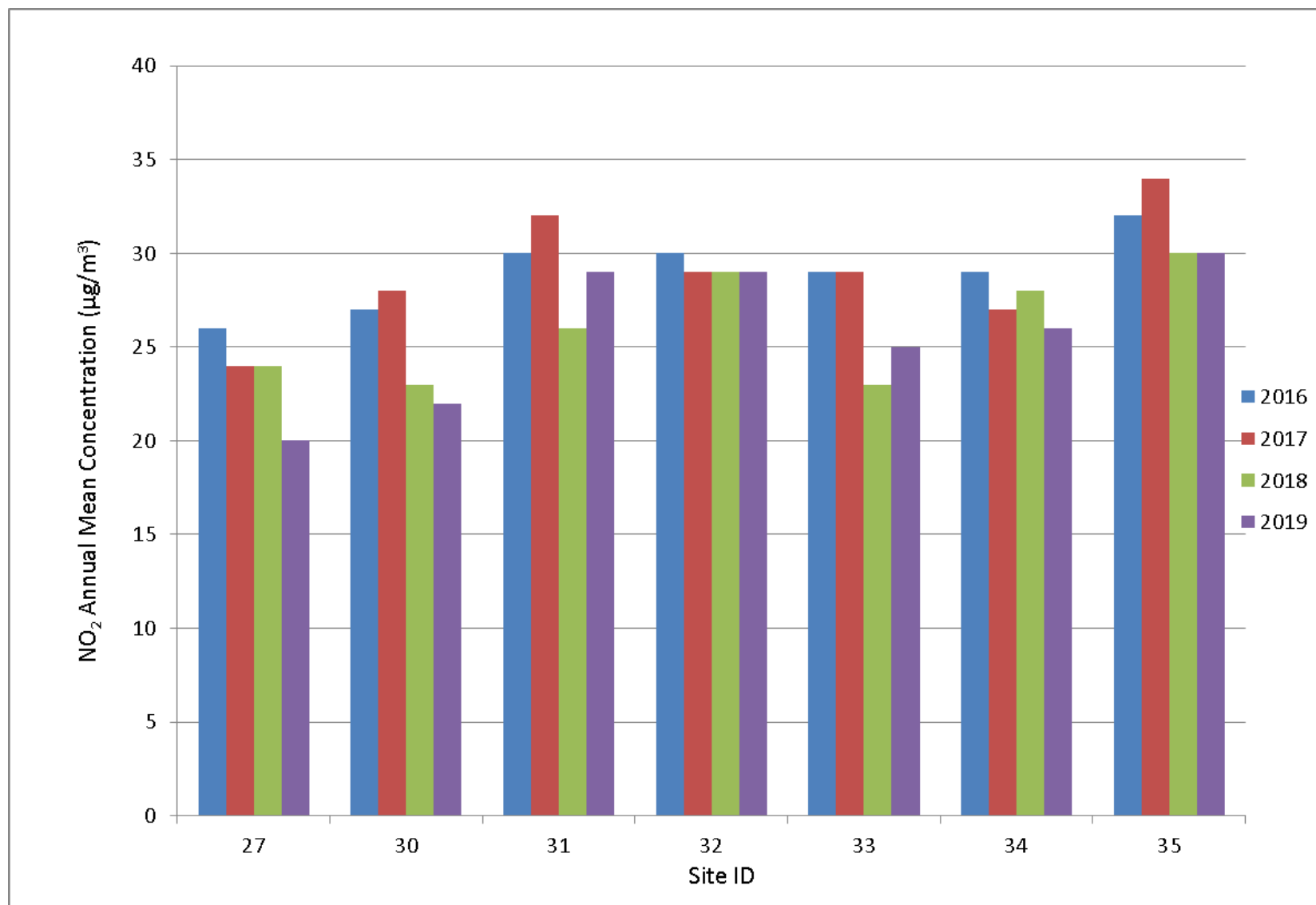
**Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations for all sites in use since 2016 to 2019.**

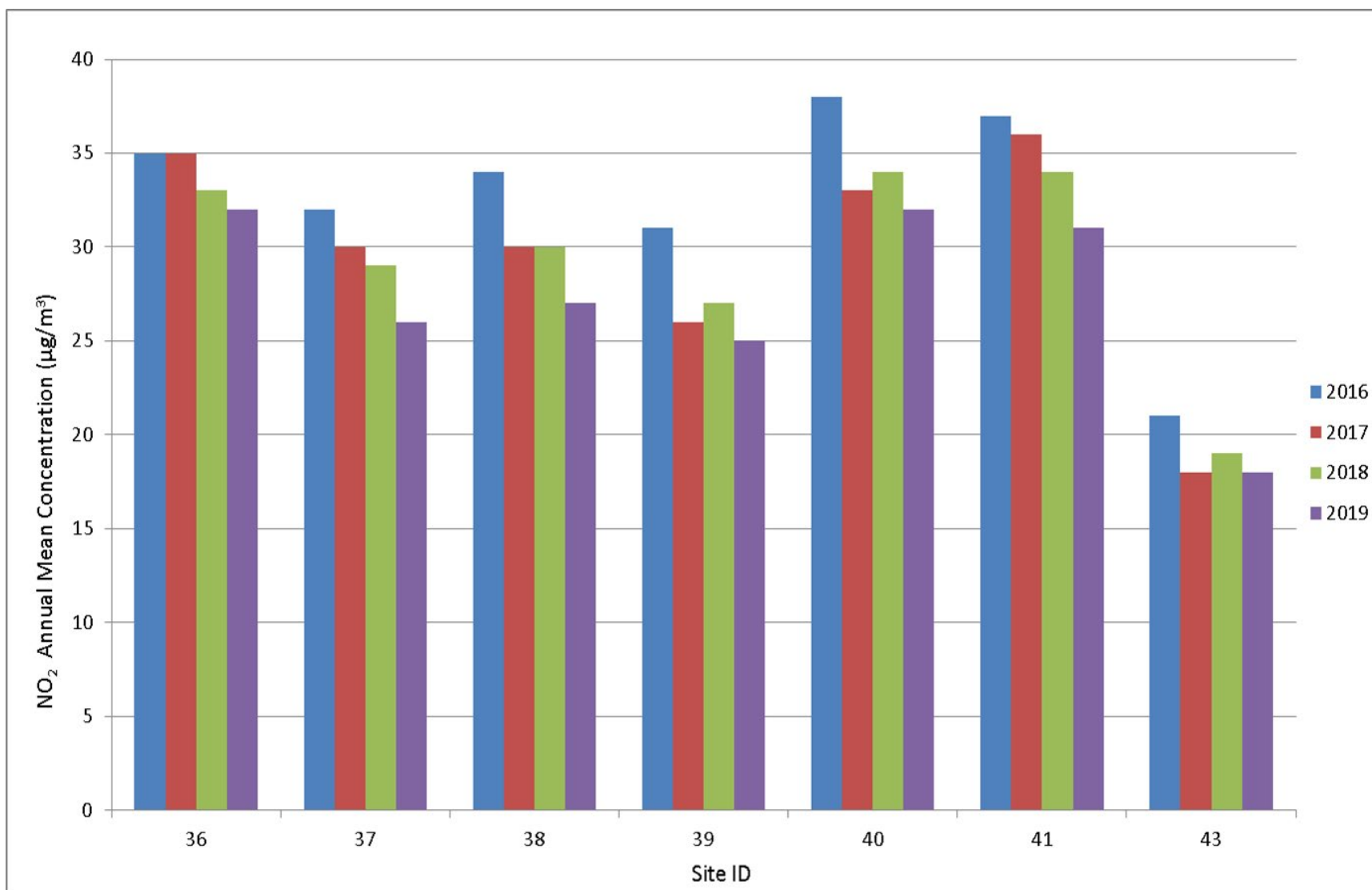




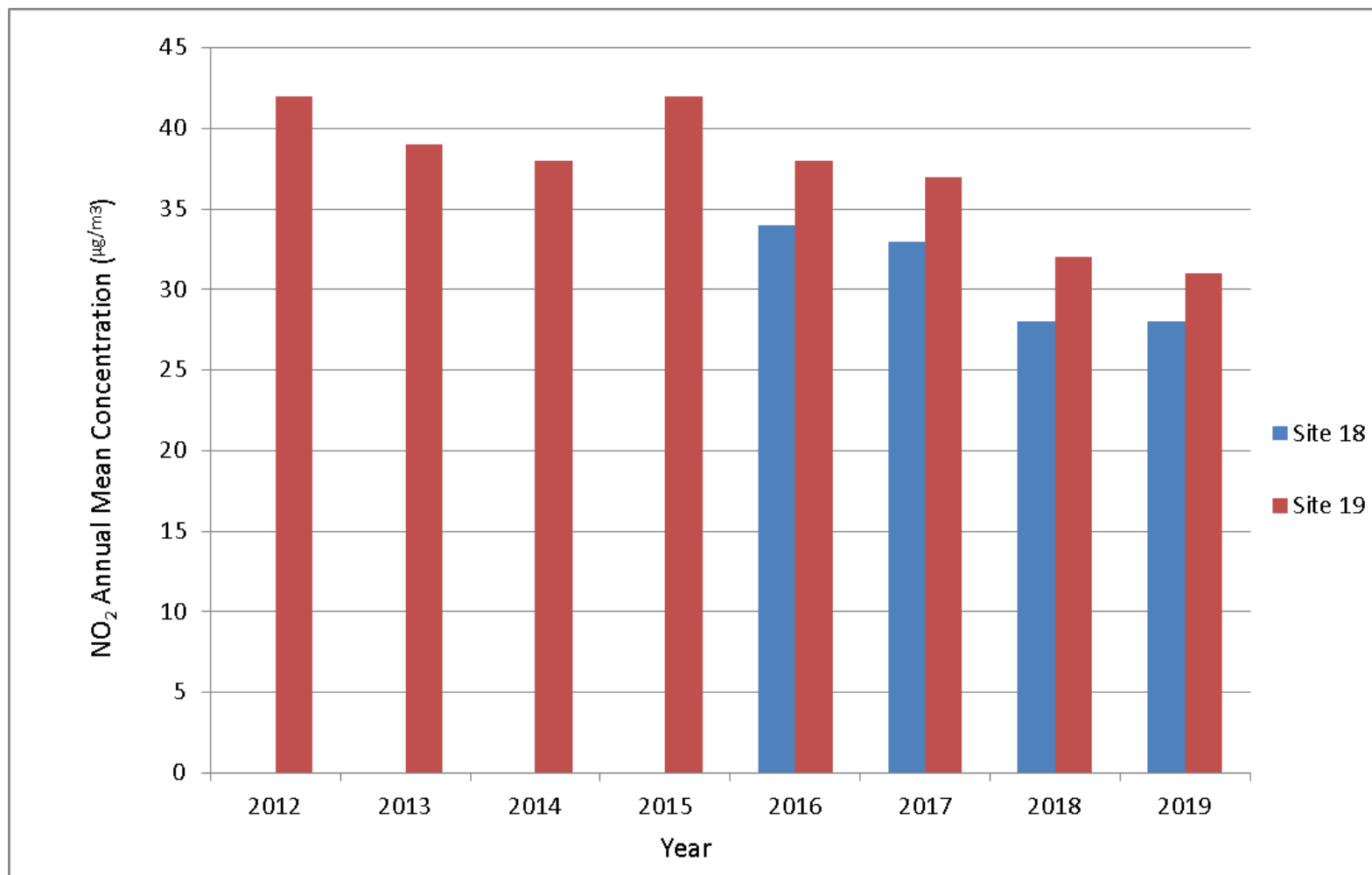








**Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations for the AQMA 2012 to 2019.**



# Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )															
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
															Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance corrected to Nearest Exposure <sup>(2)</sup>	
1	452527	337313	32	42	32	25	24	23	22	26	28	28	32	32	29	27	-	
50	452114	338018	54	57	34	24	24	22	16	18	24	34	30	38	31	29	-	
2	452091	338122	35	42	25	27	22	22	22	29	25	30	29	34	28	27	-	
3	453659	337412	33	31	22	28	21	21	15	18	23	27	35	24	25	23	-	
4	453361	336627	38	40	31	21	21	19	20	25	21	29	34	33	28	26	-	
51	453537	336100	31	28			17	18	16	21	24	26	32	25	17	16	-	
52	453287	336349	40	36	27	22	17	19	18	17	23	25	37	33	26	24	-	
5	451782	335320		25	19	14	12	13	12	15	18	20	29	25	17	16	-	
7	450756	334328	35	35	24	23	18	18	16	20	22	26	37	28	25	23	-	
53	450360	334982	31	26	21	18	18	16	14	16	20	22	30	24	21	20	-	
8	450422	334243	37	36	30		23	23	22	26	29	29	32	28	26	24	-	
9	449876	334804	31	30	23	25	20	17	16	17	22	23	31	23	23	22	-	

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance corrected to Nearest Exposure <sup>(2)</sup>
10	449748	335472		38	29	16	20	20	19	25	26	26	31	31	23	<b>22</b>	-
11	449694	335501	36	37	34	24	28	27	24	26	30	29	32	31	30	<b>28</b>	-
12	449615	335664	38	36	21	25		20	16	18	24	27		25	22	<b>20</b>	-
13	449266	336075	36	31	27	31	23	23	18	19	26	27	34	24	29	<b>27</b>	-
45	449467	336220	36	<b>41</b>	26	24	23	23	22	22	29	31	35	33	35	<b>29</b>	-
15	449406	336135	38	<b>42</b>	33	32	31		29	36	36	<b>41</b>	38	38	31	<b>25</b>	-
16	449516	336216	34	39	25	28	21	22	19	25	25	30	35	26	27	<b>25</b>	-
54	448467	336591	38	<b>41</b>	<b>48</b>	35	26	24	21	25	25	34	39	29	32	<b>30</b>	-
17	448890	337190	<b>44</b>	<b>47</b>	<b>43</b>	24	27	23	27	34	39	36	<b>42</b>		35	<b>33</b>	-
55	449814	338471	33	38	24	22	20	21	16	22	25	28	35	23	26	<b>24</b>	-
18	448560	338889	39	37	38	21	27	21	25	32	31	29	35	30	31	<b>28</b>	-
19	448586	339023	<b>42</b>	<b>45</b>	38	19	30	29	27	35	36	32	36	32	33	<b>31</b>	-
20	448652	339652	28	30	22	30	24	23	20	19	20	26	31	26	25	<b>23</b>	-
22	448832	340098	26	36	22	30	20	25	23	24	24	28	28	25	26	<b>24</b>	-
44	446509	347091	39	<b>43</b>	38	28	32	27	28	28	37	36	<b>41</b>	31	34	<b>32</b>	-

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance corrected to Nearest Exposure <sup>(2)</sup>
27	446465	346985	32	30	24	27	23	22	20	19		27	37	40	22	20	
30	448544	345241	39	36	30	23	21	21	20	23		30	38	26	24	22	-
31	448826	344883	38	37	37	23	23	27	28	32	30	29	34	31	31	29	-
32	450122	344658	38	38	34	36	28	26	25	24	29	32	38	25	31	29	-
33	451631	344526	31	37	25	30	24	25	25	23	26	27	35	31	27	25	-
34	451631	344526	32	36	32	27	20	23	22	26	26	32	38	28	28	26	-
35	451728	344440	36	40	39	19	27	26	29	35	34	34	33	30	32	30	-
36	452232	344033	39	49	40	25	26	25	34	37	33	39	39	37	34	32	-
37	452331	343910	34	32	34	29	29	23	22	23	29	29	35	21	28	26	-
38	450389	337866	36	37	30	34	23	24	22	23	28	26	37	25	29	27	26
39	450434	337781	32	34	25	36	25	25	21	21	28	28	31	23	27	25	-
56	450570	337851	35	30	27	20	22	23	17	23	24	25	34	22	25	23	
40	450632	337929	41	40	34	36	34	28	30	29	37	38	46	32	34	32	-
41	450555	337909	40	38	36	36	32	28	26	26	36	35	39	33	33	31	-
48	450817	337592	42	32	22	27	32	31	30	37	41	43	43	32	33	30	-

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
															Raw Data	Bias Adjusted (0.93) and Annualised <sup>(1)</sup>	Distance corrected to Nearest Exposure <sup>(2)</sup>
43	452733	336962	27	26	21	18	15	13	12	12	18	22	30	22	20	18	-

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

(2) Distance corrected to nearest relevant public exposure.

**(a)** Missing tubes

**(b)** Result not valid

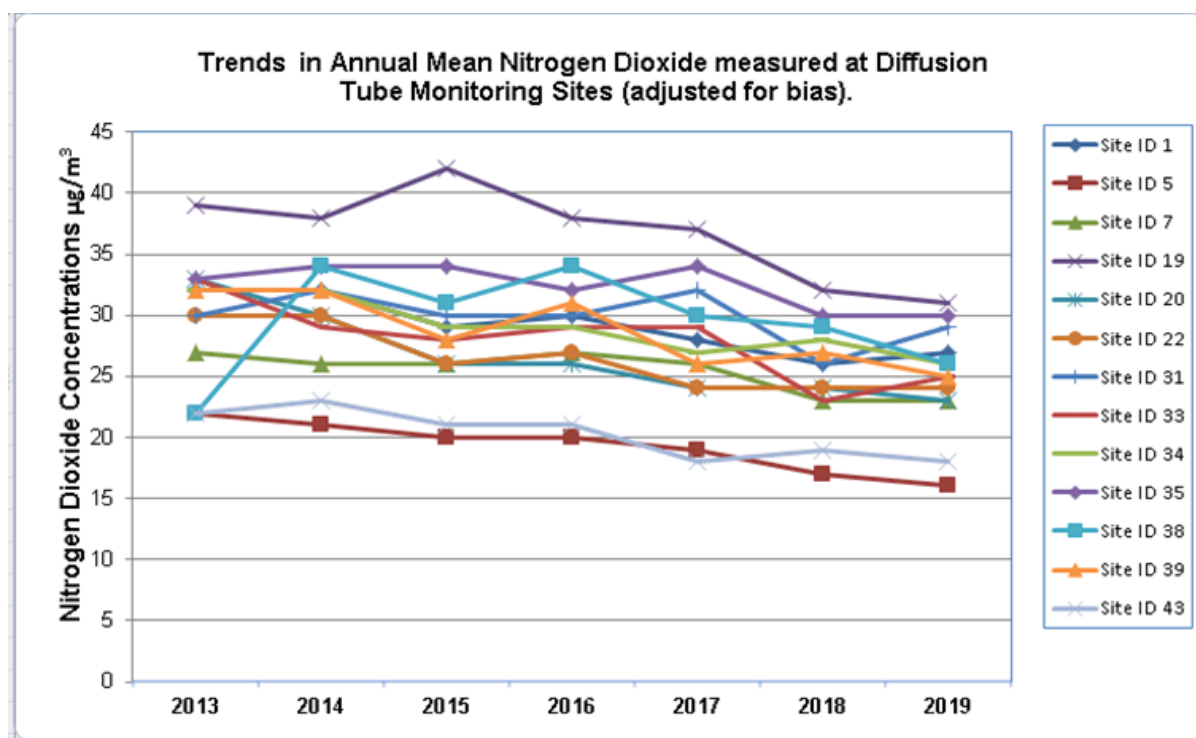
☒ Local bias adjustment factor used

☒ National bias adjustment factor used

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

☒ Where applicable, data has been distance corrected for relevant exposure

## Appendix C: A Trend Graph for 13 Continuous Monitoring Sites from 2013 to 2019



**Figure C.1 – Trend Graph of 13 Sites 2013 to 2019.**

**Site ID 1** = 113 Wollaton Road, Beeston

**Site ID 5** = Chilwell Olympia School, Beeston

**Site ID 7** = 31 Hickton Drive, Chilwell

**Site ID 19** = 15 Iona Drive, Trowell

**Site ID 20** = 30 Derbyshire Avenue, Trowell

**Site ID 22** = 81 Nottingham Road, Trowell

**Site ID 31** = 15 Hayley Close, Kimberley

**Site ID 33** = 19a Nottingham Road, Nuthall

**Site ID 34** = 19a Nottingham Road, Nuthall

**Site ID 35** = 20 Nottingham Road, Nuthall

**Site ID 38** = Opposite Sherwin Arms, Derby Road, Bramcote

**Site ID 39** = 9 Bembridge Court, Bramcote

**Site ID 43** = Broxtowe Borough Council Offices



## **Appendix D: Supporting Technical Information / Air Quality Monitoring Data QA/QC**

### **Nitrogen Dioxide Diffusion Tube Adjustment Information**

BBC diffusion tubes are supplied and analysed by Gradko Ltd. Since April 2008 BBC has entered into a contract with Gradko along with all Nottinghamshire Local Authorities to ensure that any deviations within different laboratory practices are ruled out. This enables data to be easily compared between the County authorities. The tubes are prepared using a 20% solution of triethanolamine (TEA) in de-ionised water. The tubes are exposed for one month before being returned for laboratory analysis.

### **Diffusion Tube Bias Adjustment Factors**

The national bias adjustment factor was used to bias correct the data. The adjustment factor specific to each year is shown below.

### **2019 Figures**

The Review and Assessment (R&A) Helpdesk Database 2019 bias adjustment factor for Gradko 20% TEA in water tubes = 0.93. This figure is the average of 27 studies and was taken from Spreadsheet Version Number: 03/20.

Diffusion tube precision was good for 25 of the 27 studies used to derive the national bias adjustment factor. Tube precision is categorised as “good” where the coefficient of variation (CV) of triplicate diffusion tubes for eight or more periods during the year is less than 20%, and the average CV of all monitoring periods is less than 10% (LAQM.TG(16)).

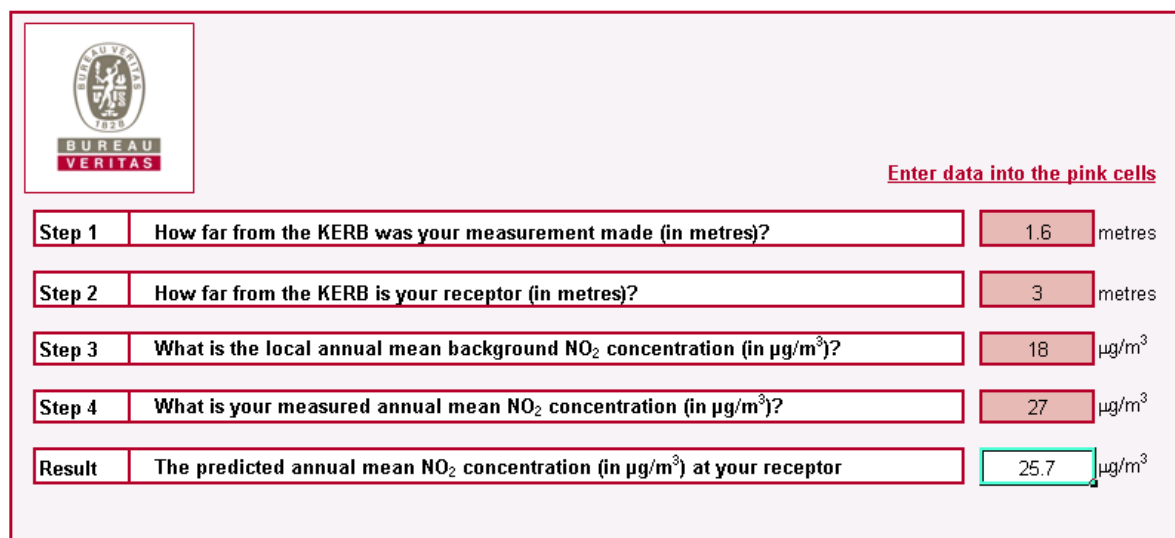
### **Annualisation**

As the data capture was not below 75%, it was not necessary for the data to be annualised.

## Distance Correction

One site (Site 38) has been distance corrected to the nearest public exposure using the NO<sub>2</sub> fall-off with distance calculator available on the LAQM website

<http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html> .



Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.6	metres
Step 2	How far from the KERB is your receptor (in metres)?	3	metres
Step 3	What is the local annual mean background NO <sub>2</sub> concentration (in µg/m <sup>3</sup> )?	18	µg/m <sup>3</sup>
Step 4	What is your measured annual mean NO <sub>2</sub> concentration (in µg/m <sup>3</sup> )?	27	µg/m <sup>3</sup>
Result	The predicted annual mean NO <sub>2</sub> concentration (in µg/m <sup>3</sup> ) at your receptor	25.7	µg/m <sup>3</sup>

Figure D.1 - Road Calculation to nearest Receptor for Site 38.

## QA/QC Data for Non-Automatic Sites

### Broxtowe Borough Council

The QA/QC procedure's that are followed when deploying diffusion tubes are:

- The diffusion tubes on arrival are labelled (including the travel blank), put back in a sealed bag then stored in a fridge until they are deployed.
- The diffusion tubes (including the travel blank) are removed from the fridge 10 minutes before undertaking the changeover.
- All of the diffusion tubes are deployed vertically in a spacer at each location and the date and time of their removal is recorded. The travel blank is not exposed e.g. the end cap is not removed.
- After all of the diffusion tubes have been changed over, they are then put back into the fridge until they are sent to the laboratory.

- The paperwork is then filled in and the diffusion tubes and the associated paperwork are sent to the laboratory for analysis.

### **Gradko**

Gradko International (diffusion tube supplier and analyst) is United Kingdom Accreditation Service (UKAS) accredited; it is assessed annually for compliance to ISO 17025 and participates in other proficiency schemes.

Gradko International confirms that:

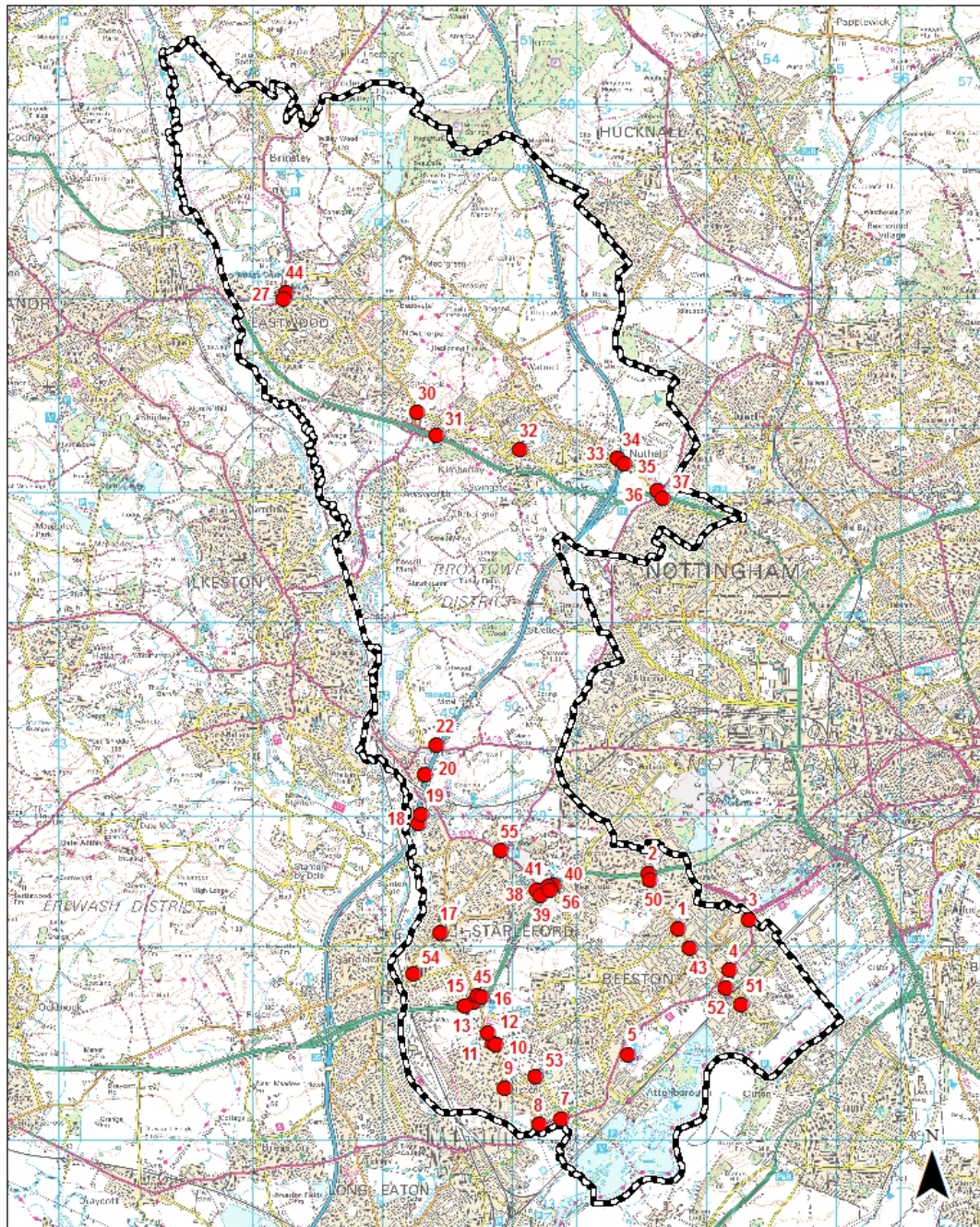
- Their procedures have been amended to follow the guidance issued on behalf of Defra (AWA Energy & Environment, Feb 2008) relating to the preparation, extraction, analysis and calculation procedures for passive NO<sub>2</sub> diffusion tubes. And
- That most of these procedures were in force before the guidance was introduced and any amendments necessary in achieving compliance were minimal

Gradko International also participates in a number of QA/QC monitoring systems to demonstrate satisfactory performance:

- The Workplace Analysis Scheme for Proficiency (WASP) programme to ensure uniformity of data throughout the year. Only laboratories that are in the WASP scheme are used for analysing tubes from the National Nitrogen Dioxide Diffusion Tube Network.
- The monthly field inter-comparison exercise with other laboratories to enable assessment of bias and precision undertaken by AEA Energy & Environment

An external QC scheme to check solutions is run by AEA Energy & Environment

## Appendix E: Map of All Monitoring Locations within the Borough of Broxtowe.

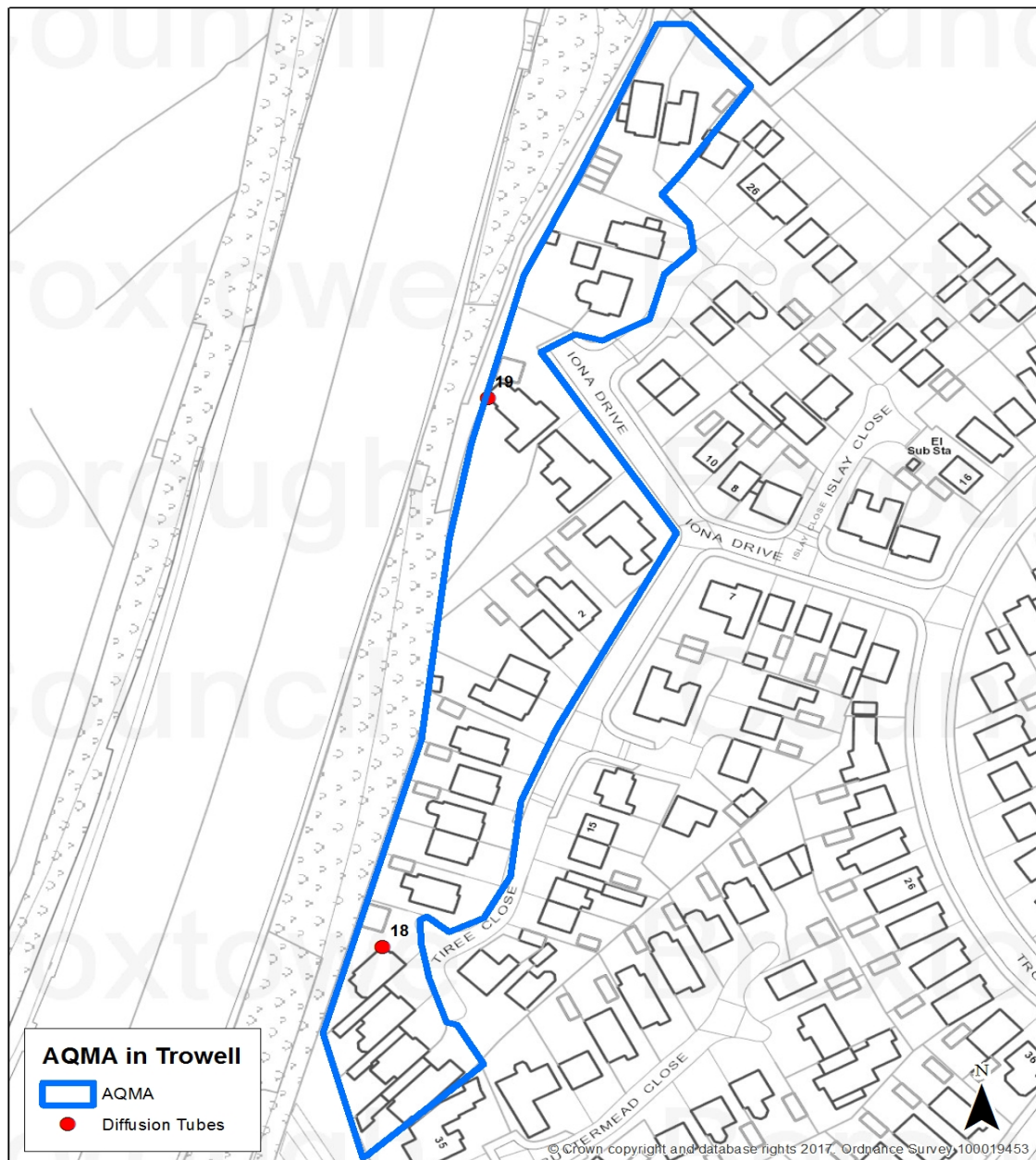


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Figure E.1 – 2019 Diffusion Tube Locations



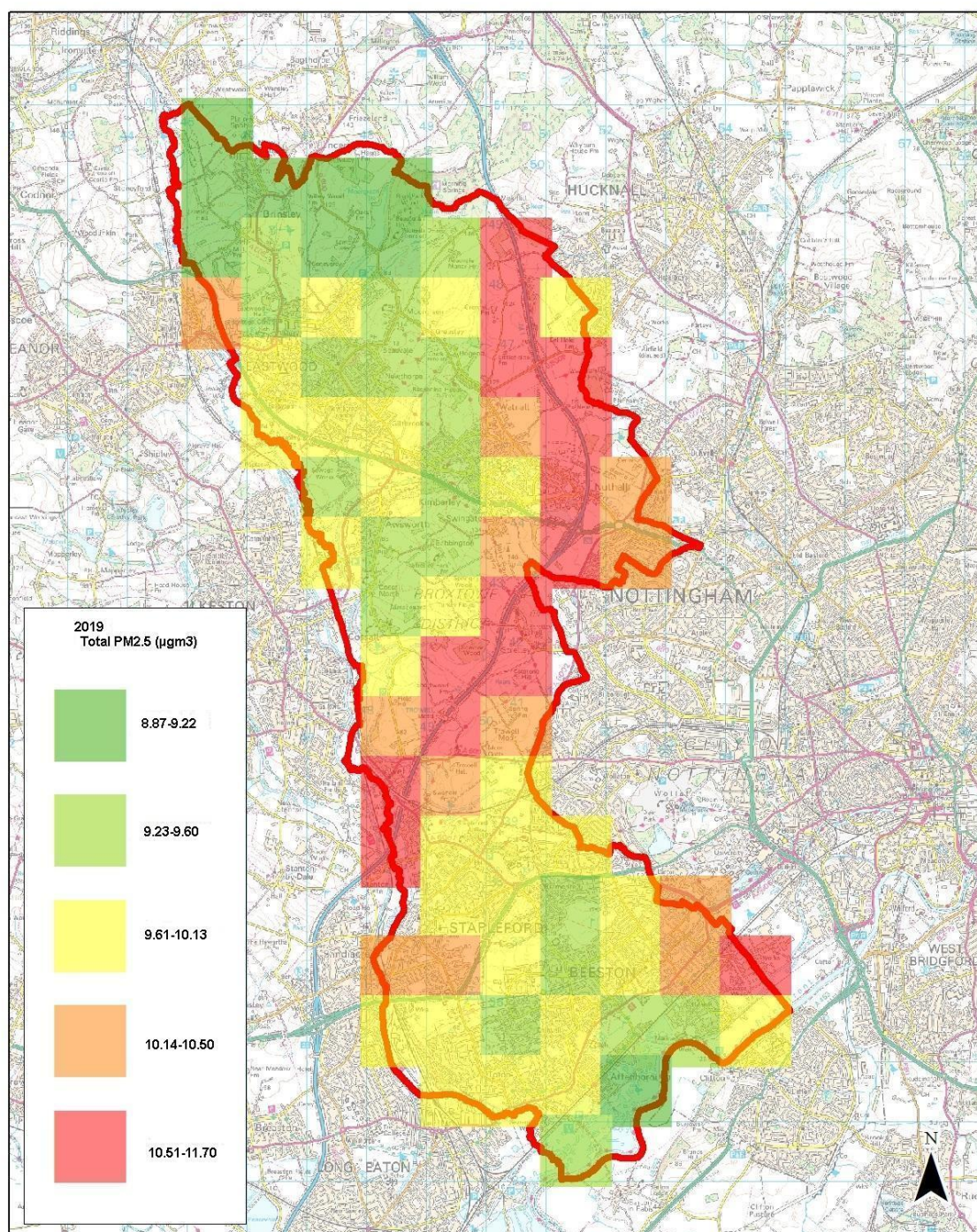
## Appendix F: Map of AQMA in Trowell.



**Figure F.1 - AQMA 1 encompassing twenty properties on parts of Iona Drive and Tiree Close next to the M1 motorway and the Trowell Park estate (boundary marked in blue).**



## Appendix G: Map of the Borough showing the 2019 modelled background levels of PM<sub>2.5</sub>.



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**Figure G.1 - Map of the Borough showing the modelled background levels of PM<sub>2.5</sub>.**

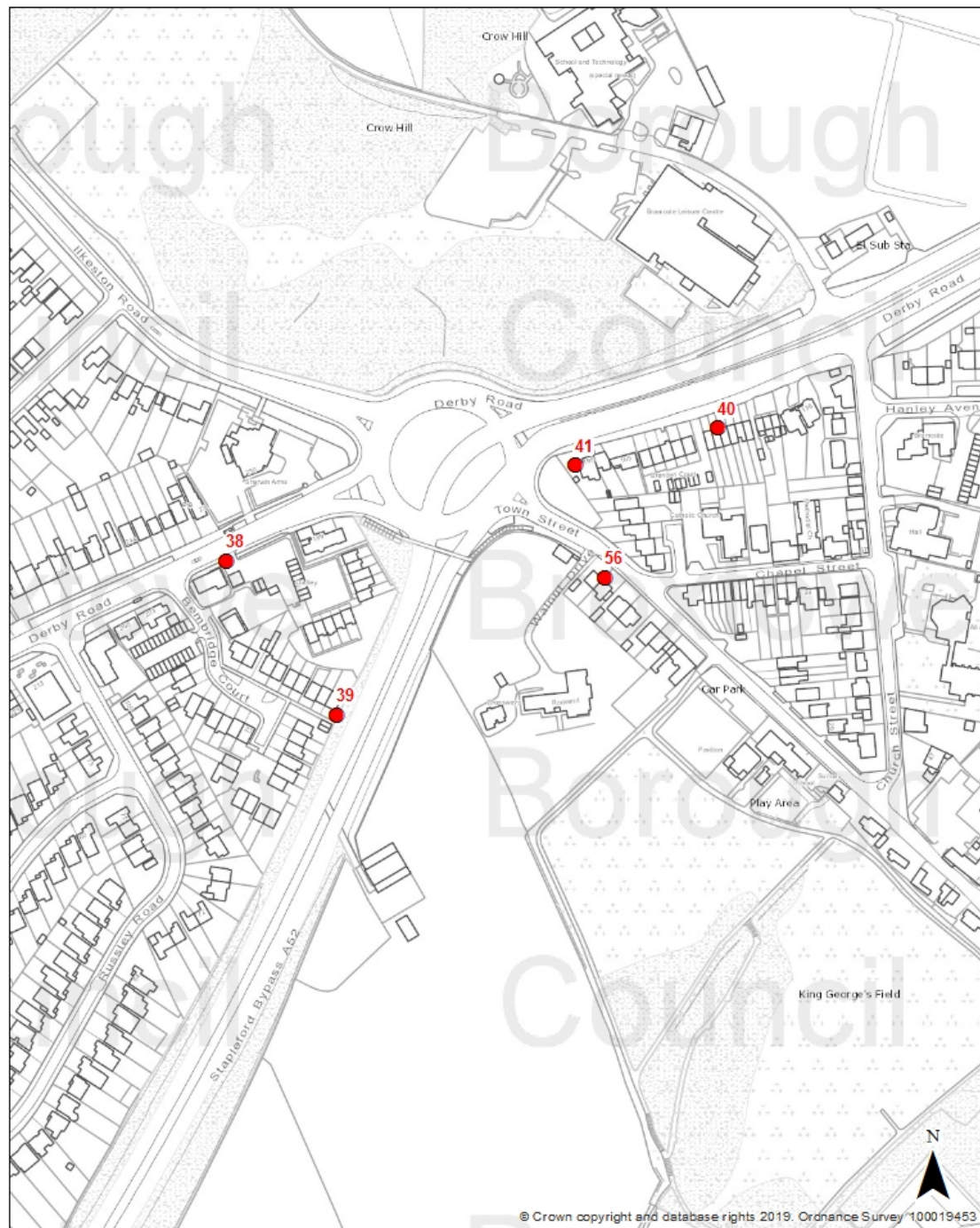


## Appendix H: Map of A610/B600 Nuthall Island showing the Monitoring Locations.



Figure H.1 – Nuthall Island and Diffusion Tube Location.

## Appendix I: Map of Bramcote Island, Derby Road, Bramcote showing the Monitoring Locations.

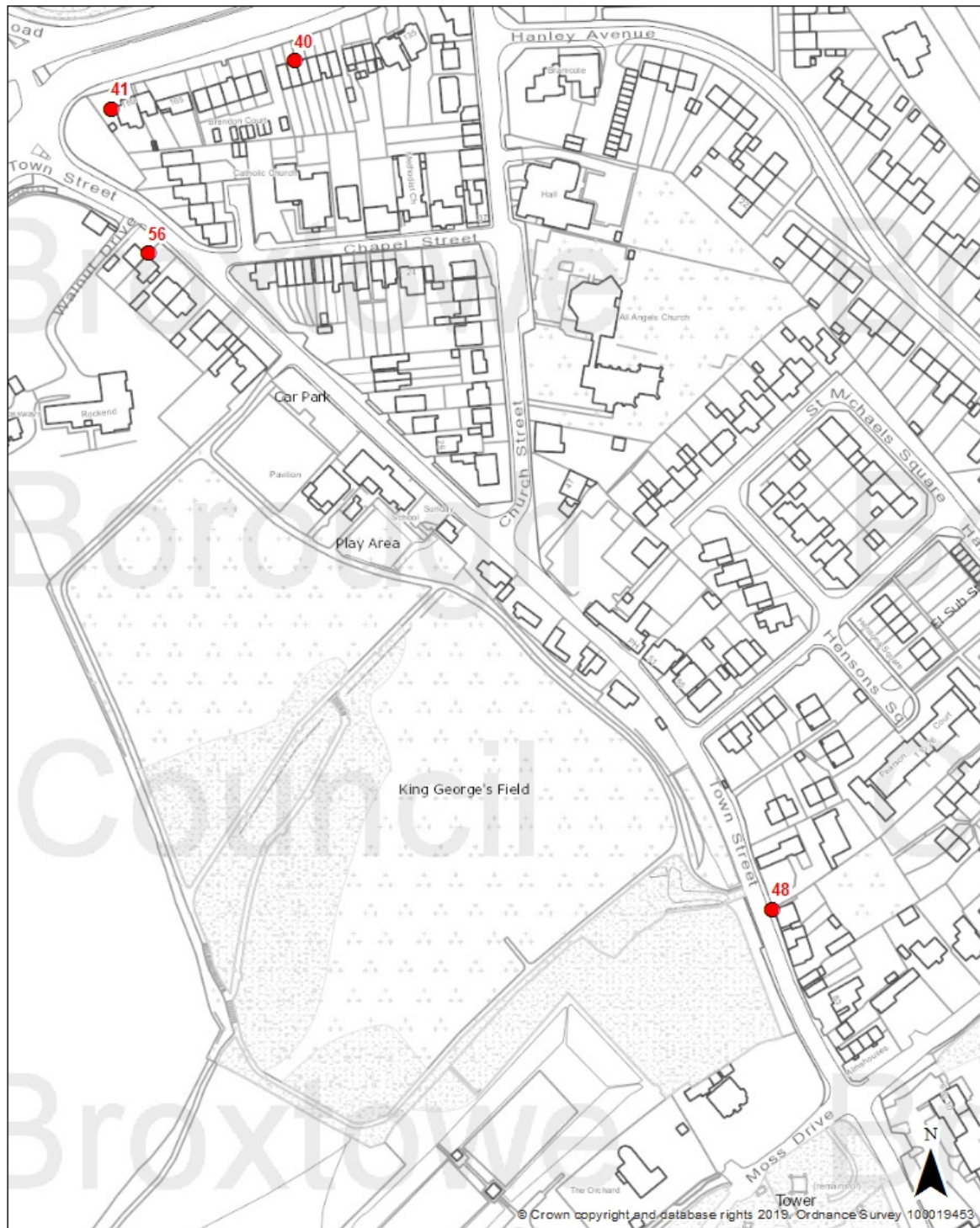


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Figure I.1 – Bramcote Island and Diffusion Tube Location



## Appendix J: Map of Town Street, Bramcote showing the Monitoring Location.



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Figure J.1 – Map of Town Street, Bramcote and Diffusion Tube Location

## Appendix K: Air Quality Action Plan Email Conversation with LAQM Helpdesk

To: LAQMHelpdeskmail@VERITAS  
Subject: AQAP

Hello,

I am wondering whether you can provide me with some advice please?

I work at Broxtowe Borough Council and we used to have 4 AQMAs and we now have one. However, the remaining one is below the AQO and has been for three years. Defra have said for several years in response to my ASR's that they will strongly support the revocation of our remaining AQMA (please see the attached letters from Defra).

The remaining AQMA is in Trowell in Nottinghamshire and runs parallel to the M1, which is managed by Highways England, who put measures in place to improve traffic flows e.g. SMART Motorway. The only control that Broxtowe can implement to revoke this AQMA is to compulsory purchase the properties next to the M1 that are in the AQMA (which I have two monitoring sites on the façade of two properties with the AQMA). This is not a feasible cost to the Council. Please see the attached map for the AQMA and how many houses are within the boundary.

With all of the above information in mind, I have included measures that are within our AQAP in the ASR (which I report on every year). However, the time line of our AQAP has been longer than five years now. Therefore, I am writing to you to determine whether you want me to create a new AQAP for our remaining AQMA, which I aim to revoke within a couple of years, which has been strongly supported by Defra. My aim is to follow your guidance and get five years' worth of monitoring to prove it is below the AQO and then I will revoke it.

With all of this information in mind and that the fact that it will be a very small AQAP and the only measures that the council can take are compulsory purchase and have measures to reduce the background levels (these are already in the ASR and updated and reviewed in the next ASR) would you like me to create a new AQAP or continue with what we have and putting all the measures for the AQMA in the ASR which will be reported on and reviewed yearly.

Kind regards  
**Kate Ratcliffe**

Broxtowe Borough Council  
Environmental Health-Public Protection

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On Behalf Of [LAQMHelpdesk@bureauveritas.com](mailto:LAQMHelpdesk@bureauveritas.com)

Sent: 10 January 2020 13:16

To: Ratcliffe, Kate

Subject: 5917 - Re: AQAP

Good morning Kate,

*Thank you for contacting the LAQM Helpdesk. Your query has been allocated the unique reference code 5917 and you should use this as a reference for any further follow up regarding the following response.*

Obviously we would look to avoid any abortive work for the council, but then do have to abide by the LAQM regime in terms of updating action plans around every 5 years. I will discuss the situation with the team.

Kind regards,

Paul Bentley

LAQM Helpdesk Team

---

To: LAQMHelpdeskmail@VERITAS  
Subject: RE: 5917 - Re: AQAP

Hello Paul,

I wondered whether I would be allowed to do a section within the next ASR solely about an update on the AQAP or are you still wanting me to redo it all even though we have not exceeded the AQO for three years running (also from reviewing 2019's data I would say we are still below the AQO in the AQMA).

Thanks  
Kate

---

On Behalf Of [LAQMHelpdesk@bureauveritas.com](mailto:LAQMHelpdesk@bureauveritas.com)

Sent: 21 January 2020 09:34

To: Ratcliffe, Kate

Subject: RE: 5917 - Re: AQAP

Good morning Kate,

I think we have to look at whether the AQMA is to remain in place or is going to be revoked. Looking at the 2012-2018 results for diffusion tubes 18 and 19; there has been a decline in the concentration at 18 from 2016 to 2018 - three years where concentrations are below 36ug/m3 (within 10% of the AQO), at 19 the concentration is relatively constant between 2012 and 2017 (range of 5ug/m3) and then drops in 2018. Firstly, were there any works on-going/completed on the M1 during 2017/2018 that you think would affect the concentration at 19? Secondly, what is the raw annual average for 2019 for the location (I know we don't have a bias adjustment factor yet for 2019 but it may be worth initially converting using the 2018 factor or a 5-year average factor just to get an indication).

I'm wary on moving straight to revoke the AQMA in relation to paragraph 3.50 in the Technical Guidance, avoid cycling between declaring and revoking AQMAs due to changing concentrations. In

addition to checking the above points is there the possibility of additional monitoring sited within the AMQA at worst case locations (rear of the properties at the closest points to the M1)?

Kind regards,

Paul

---

To: LAQMHelpdesk@VERITAS  
Subject: RE: 5917 - Re: AQAP

Good Morning Paul,

I have tried to answer your questions below and hopefully answer them fully.

*1. Firstly, where there any works ongoing/completed on the M1 during 2017/2018 that you think would affect the concentration at 19?*

The SMART Motorway Scheme was completed between Junctions 32 to 35a of the M1 in March 2017 as shown in the following link:  
<https://highwaysengland.co.uk/projects/m1-junctions-32-35a/> therefore the 2018 Data would have been the first full year that the Smart motorway and variable speed limits would have been in use between Junctions 25 to 35a. This is evident in the data that there haven't been tailbacks.

It is also worth noting that SMART Motorway works were also being undertaken between Junctions 23a and 25 of the M1 and this was started in completed on the 27<sup>th</sup> February 2019, as shown in the following link,  
<https://www.nottinghampost.com/news/local-news/m1-nottinghamshire-now-fully-functional-2589146?sa=X&ved=2ahUKEwjXoZiYh5XnAhUDZMAKHVE2AHIQFjACegQIBxAB>

The SMART Motorway that was introduced on the M1 are shown below with the Junctions the start date and the completion date. Although these junctions are not all within our Borough, they have had an effect on queuing traffic into our borough.

Junction	Start Date	Completion Date
23a to 25	February 2017	February 2019
25 to 28	January 2007	2010
28 to 31	October 2014	2015
32 to 35a	January 2015	March 2017

*2. Secondly, what is the raw annual average for 2019 for the location?*

Please find attached an Excel file with the raw data, the data with the 2018 correction factor and also the five year average bias corrected data for site 18 and site 19. Please Note I have not received December's data yet. However, once I receive it I will update it and send you a new version.

*3. In addition to checking the above points is there the possibility of additional*

*monitoring sited within the AQMA at worst case locations (rear of the properties at the closest points to the M1)?*

We are monitoring in the two locations that are nearest to the M1 however we would be happy to undertake further monitoring of the AQMA.

If you have any further questions then please ask me.

Kind regards  
Kate

---

**On Behalf Of** [LAQMHelpdesk@bureauveritas.com](mailto:LAQMHelpdesk@bureauveritas.com)

**Sent:** 22 January 2020 16:12

**To:** Ratcliffe, Kate

**Subject:** RE: 5917 - Re: AQAP

Hiya Kate,

From the 2019 data you've sent through, as you've said, it does look as though concentrations within 2019 will be below the AQO and in line with the 2018 monitoring results showing the reduction in concentrations experienced at the two sites. At this point I would advise not updating the AQAP for this remaining AQMA, to present the details you have provided below within the 2020 ASR in terms of measures taken on the M1 that have effected concentrations within the AQMA, and also if possible to get a few more diffusion tubes out in accessible worst case exposure locations for the rest of this year to hopefully provide further evidence to show concentrations are now below the objective. Following this there would be enough of an evidence base to revoke the AQMA.

I think as long as you are clear within the ASR as to why the AQAP is not being updated (HE road and completing a detailed monitoring study to confirm if AQMA designation is required) this should be enough to present to Defra that you are investigating the current status of the AQMA. Please also reference our emails within the ASR as an evidence base for the methodology being undertaken.

Kind regards,

Paul

---

**To:** LAQMHelpdeskmail@VERITAS  
**Subject:** RE: 5917 - Re: AQAP

Hello Paul,

Thank you for this I really appreciate it. I will ensure that I monitor a few more houses within the AQMA and that I write a chapter in the next ASR referencing what actions we are taken and reference our emails.

You have been very helpful and your help is very much appreciated.

Kind regards  
Kate

---

On Behalf Of [LAQMHelpdesk@bureauveritas.com](mailto:LAQMHelpdesk@bureauveritas.com)

Sent: 24 January 2020 08:44

To: Ratcliffe, Kate

Subject: RE: 5917 - Re: AQAP

Good morning Kate,

That's no problem. Keep me in the loop with the ongoing concentrations you monitor within the AQMA and keep a record of them at our end.

Kind regards,

Paul

---

To: LAQMHelpdesk@VERITAS  
Subject: RE: 5917 - Re: AQAP

Hello Paul,

As promised please find attached the latest data including December's data. As before the figures are with last years bias correction factor and also the average of the five years bias correction factor. I am pleased to say that the figures are below the AQO (28 and 31).

Kind regards

Kate

Site ID	Annual Mean Not bias corrected	Annual Mean Bias corrected with 2018's 0.93 Bias Correction Factor	Annual Mean Bias corrected with Five years average factor of 0.92 Bias Correction Factor
18	31	28	28
19	33	31	31
2018 Bias Factor			0.93
2017 Bias Factor			0.89
2016 Bias Factor			0.94
2015 Bias Factor			0.91
2014 Bias Factor			0.91
<b>Average 5 year Bias=</b>			<b>0.92</b>

---

On Behalf Of [LAQMHelpdesk@bureauveritas.com](mailto:LAQMHelpdesk@bureauveritas.com)

Sent: 04 February 2020 08:46

To: Ratcliffe, Kate

Subject: RE: 5917 - Re: AQAP

Good morning Kate,

Thank you for sending that across. I imagine that when released, the Gradko bias adjustment factor

## **Broxtowe Borough Council**

will remain relatively consistent with the previous five years so the annual means should remain below the AQO.

Kind regards,

Paul

---



## Appendix L: Summary of Air Quality Objectives in England

Table L.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>7</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>2.5</sub> )	Work towards reducing emissions/concentrations of fine particulate matter (PM <sub>2.5</sub> )	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>7</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).



## 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
AURN	Automatic Urban and Rural Network
BBC	Broxtowe Borough Council
CAZ	Clean Air Zone
COMEAP	Committee on the Medical Effects of Air Pollution
CV	Coefficient of Variation
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
D2N2	Local Enterprise Partnership for Derby, Derbyshire, Nottingham and Nottinghamshire
EMAQN	East Midlands Air Quality Network
EU	European Union
HE	Highways England
HGV's	Heavy Goods Vehicles
HS2	High Speed Train 2
ITSO	Integrated Transport Smartcard Organisation
LAQM	Local Air Quality Management
LAQM.PG(16)	LAQM Policy Guidance 2016
LAQM.TG(16)	LAQM Technical Guidance 2016
LCWIP	Local Cycling and Walking Infrastructure Plan

LGA	Local Government Association
LSTF	Local Sustainable Transport Fund
µg/m <sup>3</sup>	Microgrammes of pollutant per cubic metre of air
NEPWG	Nottinghamshire Environmental Protection Working Group
NET	Nottingham Express Transit
NCT	Nottingham City Transport
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
Notts CC	Nottingham City Council
NCC	Nottinghamshire County Council
O <sub>3</sub>	Ozone
OLEV	Office for Low Emission Vehicles
PHE	Public Health England
PM	Particulate Matter
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
PTP	Personalised Travel Planning
QA/QC	Quality Assurance and Quality Control
R&A	Review and Assessment
SAFED	Safe And Fuel Efficient Driving
SO <sub>2</sub>	Sulphur Dioxide
SQPS	Statutory Quality Partnership Schemes
TEA	Triethanolamine
UK	United Kingdom

ULEVs	Ultra Low Emission Vehicles
WASP	Workplace Analysis Scheme for Proficiency
WHO	World Health Organisation
WPL	Workplace Parking Levy

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