



# 2017 Air Quality Annual Status Report (ASR)

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

(September, 2017)

**Chesterfield Borough Council**

Local Authority Officer	Steven Payne
Department	Environmental Health
Address	Chesterfield Borough Council Stonegravels Depot Old Brick Works Lane Chesterfield S41 7LF
Telephone	01246 345741
E-mail	steven.payne@chesterfield.gov.uk
Report Reference number	CBC AQM 2017
Date	20th September 2017

## **Derbyshire County Council; Endorsement from the Director of Public Health**

Derbyshire County Council is committed to working with partners to improve health and wellbeing for the residents of Derbyshire.

Air quality is a significant determinant of health, and is a substantial risk factor in the mortality and morbidity of the local population. Whilst air pollution is not a new problem, unlike the visible smog's of the 1950s, modern day outdoor air pollution is largely invisible and yet continues to have a significant impact on health. Although the impact of air pollution affects the whole population, its impact is disproportionately borne by the young, older people, those with underlying health conditions and the most disadvantaged within our communities.

The Annual Status Report provides an important mechanism for identifying areas of concern in terms of poor air quality, and supporting joint strategic action. Through the collaborative working of agencies this ensures focus and action in those areas of highest risk, and supports wider population improvements in air quality and wellbeing.

**Dean Wallace Director of Public Health Derbyshire County Council**

**April 2017**

## Executive Summary: Air Quality in Our Area

### Air Quality in Chesterfield

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

The main pollutant of concern in Chesterfield is Nitrogen Dioxide (NO<sub>2</sub>) and the predominant source is traffic. The overall trend in levels of the pollutant shows a gradual decline in levels, but year-on-year data show fluctuating levels and at pollutant hotspots this variation demonstrates intermittent breaches of the Air Quality Objective.

One location (Church Street, Brimington) has required the declaration of an Air Quality Management Area and a second location (Sheffield Road, Stonegravels) is being considered due to the changes in levels of Nitrogen Dioxide.

Details of the Air Quality Management Area can be found on the Chesterfield BC website: <https://www.chesterfield.gov.uk/health-and-environment/air-quality/air-quality-management-area-brimington.aspx>

A map of the location can be found in Appendix D.

Fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) is also a concern. The levels measured do not indicate a breach of the Air Quality Objectives, but as a general systemic irritant, measures are required to address the general increase in traffic congestion, as this is the pre-dominant source of pollution across the Borough.

---

<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

## **Actions to Improve Air Quality**

Air quality monitoring, targeted on priority areas (where high traffic flows are located closely to housing), is continuing, allowing informed decisions on planning and public health initiatives to be made.

We attend, and participate in, the following policy and work groups:

- i) Active Travel Group
- ii) Planning and Health Group
- iii) Active Transport Group
- iv) Derbyshire Cycle Network
- v) Local Sustainable Travel Group
- vi) Derbyshire Air Quality Working Group
- vii) Derbyshire Environmental Pollution Group

## **Conclusions and Priorities**

The levels of pollution, attributed to traffic, have shown a slight reduction when the levels across the borough, as a whole, are considered. Some variation across the borough has been noted, the reduction is not uniform. Levels within the Air Quality Management Area still demonstrate an ongoing breach of the Air Quality Objective for Nitrogen Dioxide. As such, we will not revoke the Chesterfield No1 Air Quality Management Area. Levels on a single stretch of Sheffield Road (where terraced housing is close to a busy section of traffic light controlled road) have shown a slight reduction in levels. One monitoring location (of a total of four on the façade) is demonstrating a marginal breach of the Air Quality Objective for Nitrogen Dioxide. Given the uncertainty of the data, we will not declare an air quality management area at this location. Targeted monitoring will continue at this location.

Long term redevelopment schemes may have an adverse effect of the levels of traffic flow through the area of the Air Quality Management Area. The information supplied in support of these planning application required will be scrutinised carefully, in order to ensure that any such impacts are fully mitigated.

## Local Engagement and How to get Involved

Most input regarding managing air quality is related to the planning of local developments (either by assessing the possible impact of proposed works, or by promoting low emission infrastructure). However, it has been noted that there is resistance to the acceptance that air quality management can be positively acted upon at the planning stage.

Similarly, the increasing pressure to reduce the use of diesel fuels on public health and air quality grounds runs directly contrary to the previous policy which promoted the use of diesel as a positive action for addressing climate change, and undermines the effectiveness of the air quality message.

Information on action to improve air quality can be found on the Chesterfield BC website at:

<https://www.chesterfield.gov.uk/health-and-environment/air-quality.aspx>

Details on how the public can act to improve air quality can be found at:

<https://www.chesterfield.gov.uk/health-and-environment/air-quality/the-publics-role-in-air-quality.aspx>

# Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>i</b>
Air Quality in Chesterfield .....	i
Actions to Improve Air Quality .....	ii
Conclusions and Priorities .....	ii
Local Engagement and How to get Involved .....	iii
<b>1 Local Air Quality Management</b> .....	<b>1</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>2</b>
2.1 Air Quality Management Areas.....	2
2.2 Progress and Impact of Measures to address Air Quality in Chesterfield.....	4
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations .....	9
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>10</b>
3.1 Summary of Monitoring Undertaken .....	10
3.1.1 Automatic Monitoring Sites .....	10
3.1.2 Non-Automatic Monitoring Sites.....	10
3.2 Individual Pollutants .....	11
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	11
3.2.2 Particulate Matter (PM <sub>10</sub> ).....	14
3.2.3 Particulate Matter (PM <sub>2.5</sub> ).....	14
3.2.4 Sulphur Dioxide (SO <sub>2</sub> ).....	15
3.2.5 Benzene .....	15
<b>Appendix A: Monitoring Results</b> .....	<b>16</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2016</b> .....	<b>29</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>32</b>
<b>Appendix D: Map(s) of Monitoring Locations and AQMAs</b> .....	<b>35</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>40</b>
<b>Appendix F: Derbyshire Air Quality Working Group</b> .....	<b>41</b>
<b>Glossary of Terms</b> .....	<b>42</b>
<b>References</b> .....	<b>43</b>

**List of Tables**

Table 2.1 – Declared Air Quality Management Areas..... 3

Table 2.2 – Progress on Measures to Improve Air Quality ..... 7

**List of Figures**

- Figure 1: Variation in NO<sub>2</sub> on Sheffield Road
- Figure 2: Locations of Diffusion Tube monitoring on the affected façade
- Figure 3: Variation in NO<sub>2</sub> in and around the vicinity of Chesterfield No.1 AQMA
- Figure 4: Locations of Diffusion Tube monitoring within and in the vicinity of Chesterfield No1 AQMA
  
- Figure A.1 – Trends in Annual Mean NO<sub>2</sub> Concentrations
- Figure A.2 – Trends in Annual Mean PM<sub>10</sub> Concentrations
- Figure A.3 – Trends in Number of 24-Hour Mean PM<sub>10</sub> Results >50µg/m<sup>3</sup>
- Figure A.4 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations



## 1 Local Air Quality Management

This report provides an overview of air quality in Chesterfield during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether 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 Chesterfield BC to improve air quality and any progress that has been made.

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

## 2 Actions to Improve Air Quality

### 2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Chesterfield BC can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <https://www.chesterfield.gov.uk/health-and-environment/air-quality/air-quality-management-area-brimington.aspx>

See Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
Chesterfield No 1	Declared 14th August 2015	NO <sub>2</sub> Annual Mean	Brimington, Chesterfield	4 to 18 (evens only) Church Street, Brimington	NO	42.5µg/m <sup>3</sup> (average within AQMA)	43.4µg/m <sup>3</sup> (average within AQMA)	Currently in draft form only

Chesterfield BC confirm the information on UK-Air regarding their AQMA(s) is up to date

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

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed and provided the information required by the supporting guidance. The appraisal agreed that monitoring suggested that there may be additional exceedences of the Air Quality Objective for Nitrogen Dioxide, but that the exceedences are marginal and may be within the uncertainty of the measurement. The report suggest that the monitoring be reviewed and if need be revised. In light of this the monitoring has been reviewed, but is unchanged, as we believe that any changes would be of little benefit, as the areas of uncertainty are currently subject to intensive monitoring.

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

Chesterfield BC's priorities for the coming year are:

- i) to continue to press for action by the local Highway Authority to implement action to address the issue of congestion and associated poor air quality within Chesterfield No1 AQMA, and by extension the wider area.
- ii) to complete the AQMA Action Plan document.
- iii) to closely assess applications for housing developments which may place an increased traffic loading on the road network where air pollution levels are close to, or have already exceeded, the air quality objective.
- iv) to assess the suitability of the existing electric cars and vans currently in use, in order to look into the increased use of such vehicles across the local authority fleet, with the long term view being to encourage the introduction of low emission vehicles by partner agencies.
- v) to continue to work in conjunction with existing regional bodies (East Midlands Air Quality Network, Sheffield City Region Climate Change and Air Quality Group, etc.) to share experience and best practice.

The principal challenges and barriers to implementation that Chesterfield BC anticipates facing are:

- i) Chesterfield is a traffic node for goods vehicles and general traffic from the south of Manchester, Stockport, Macclesfield, and Stoke-on-Trent. These vehicles use the A619 to enter Chesterfield through the Peak District and (if heading north) use this route to access the M-1. This places an increased traffic loading on the road passing through the AQMA.
- ii) The changes to local authority funding which are due to come into effect may have an adverse effect, in that there will be pressure to approve applications for both commercial and residential developments which would have a deleterious impact on air quality both within the existing AQMA, and across the wider Chesterfield BC area.
- iii) Lower than expected uptake of low emission vehicles across the region as a whole, in conjunction with a vehicle fleet which DVLA data suggests is older than the national average to a statistically significant degree, means that traffic pollution has a higher impact than traffic modelling data suggests.
- iv) A widespread resistance to the perceived need to “future-proof” new developments by installing electric charging infrastructure for the expected increase in the numbers of privately owned electric vehicles.
- v) The local Highway Authority (Derbyshire County Council) has not signed up to the On-street Residential Chargepoint Scheme.
- vi) Following the last round of local and national elections, and the proposal for Chesterfield to join a regional assembly, this council and the local County Council (the local highway authority) are politically diametrically opposed, and both groups of politicians have no willingness to support joint working. This is evidenced by initiatives being carried out by Derbyshire County Council without any involvement being invited from this authority (these include the development of an urban cycle network, and a proposed roadside EV charging scheme). While these initiatives are to be welcomed, the unwillingness to work in a co-operative manner is a cause for concern. It is hoped that working with the policy and work groups (noted on page ii) should aid communication and joint working.

Progress on the following measures has been slower than expected due to slower than hoped action by the local Highway Authority in planning and implementing actions to free up vehicle flows along the road affected the AQMA. Pollution levels are currently breaching the NO<sub>2</sub> air quality objective. This is a marginal breach, at present, and changes to traffic lights controlling vehicle flows through the existing AQMA may have a positive effect pending further works being carried out to change the road junction, in order to address the problem fully.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Chesterfield BC anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Chesterfield No 1 AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Industrial Emissions	Environmental Permits	Other measure through permit systems and economic instruments	LA Environmental Health	2010	2012	All Permitted process rated as Low/Medium Environmental Impact	General reduction in industrial emissions (including noise)	Completed	2014	Financial constraints on private businesses may exceed saving in Permit Fees
2	Joint Working	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	LA Environmental Health	2017	2018	None assigned	General reduction in traffic emissions	Implementation on-going	Ongoing	Reduction in numbers of staff dedicated to air quality roles/ increase in non-air quality work leading to pressure on available resources
3	Electric Vehicles	Policy Guidance and Development Control	Other policy	LA Environmental Health, LA Fleet Manager	2016	2017	None assigned	Reduced vehicle emissions	Implementation on-going	2018	Trial scheme completed, funding sought to allow further uptake of Low Emission Vehicles for fleet, however budgetary pressures have made widespread uptake unlikely
4	Agile working	Promoting Travel Alternatives	Encourage / Facilitate home-working	Corporate	2014	2015	Number of staff homeworking per day	Reduced vehicle emissions	Data no longer recorded	Ongoing	Conflicting requirement for staff (wish to encourage home working versus need to be present when required)

## Chesterfield Borough Council

5	Publicity	Public Information	Via the Internet	LA Environmental Health	2013	2015	Number of website hits	Possible Reduction in vehicle emissions	Website kept up to date	Ongoing	Lack of IT support
6	Car Parking	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	Corporate	2017		Increased Parking Income / Number of staff homeworking	Possible Reduction in vehicle emissions	Currently being planned	2019	Scheme is being brought in to gain parking income from staff, but may encourage home working
7	East Midlands Air Quality Network	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	PHE/Derbyshire County Council/LA	Ongoing	Ongoing	N/A	Reduction in a Range of Pollutants	Work Plans/Action Plans Developed	N/A	Air Quality Working Group involves key players in public sector and voluntary sectors
8	Travel Plans Required as planning conditions for larger developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	LA	Ongoing	Ongoing	N/A	Reduced vehicle emissions	Implementation on-going	N/A	Travel Plans Required as planning conditions for larger developments
9	100% Coverage of Smoke Control Area	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	LA	Completed	Completed	Air Quality Objective	Smoke and Sulphur Dioxide emissions reduced through Clean Air Act Regulation	Education/Enforcement, as required	N/A	Reduction in numbers of staff dedicated to air quality roles/ increase in non-air quality work leading to pressure on available resources
10	Making Air Quality Reports available to the Public	Public Information	Via the Internet	LA	Ongoing	Ongoing	Air Quality Objective	Reduction in a Range of Pollutants	Implementation on-going	Ongoing	Raise awareness on actions individuals can take



## 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.

Chesterfield BC is taking the following measures to address PM<sub>2.5</sub>:

We are a member of the East Midlands Air Quality Network and we will continue to work with partner agencies to ensure effective traffic management, in order to minimise the impact of traffic pollution across the borough.

Chesterfield BC is also a non-constituent member of the Sheffield City Region combined authority, and works as part of the Sheffield City Region Air Quality and Climate Change group.

The whole of the borough area of Chesterfield is included in well-established Smoke Control Areas (often referred to as Smokeless Zones). However, the effectiveness of these is being undermined by the increase in the use of DEFRA approved wood burning appliances which are effectively exempt from local authority enforcement actions.

We are working with Derbyshire County Council (the local highways authority) in order to achieve the incremental changes in traffic management which would have sufficient beneficial impact to ameliorate the effects of traffic within the vicinity of the declared AQMA, and a concomitant reduction in adverse health effects on the local population.

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

### **3.1 Summary of Monitoring Undertaken**

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

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

Chesterfield BC undertook automatic (continuous) monitoring at 2 sites during 2016. These sites are affiliated to AURN and this has allowed the gathering of full 12 months data. Table A.1 in Appendix A shows the details of the sites.

Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem (there are no such circumstances in this area, but we are part of the Non-Automatic Hydrocarbon Network). National monitoring results are available at [https://uk-air.defra.gov.uk/data/data\\_selector](https://uk-air.defra.gov.uk/data/data_selector)

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

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

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

Chesterfield BC undertook non-automatic (passive) monitoring of NO<sub>2</sub> at 40 sites during 2016. Table A.2 in Appendix A shows the details of the sites.

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

## 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation”, and travel blank correction. Distance correction is not required. Further details on adjustments are provided in Appendix C.

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

Table A.3 in Appendix A compares the ratified and adjusted (for bias factor – 0.87, travel blank adjustments – 1.8µg/m<sup>3</sup> mean over-read, and annualisation) monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

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

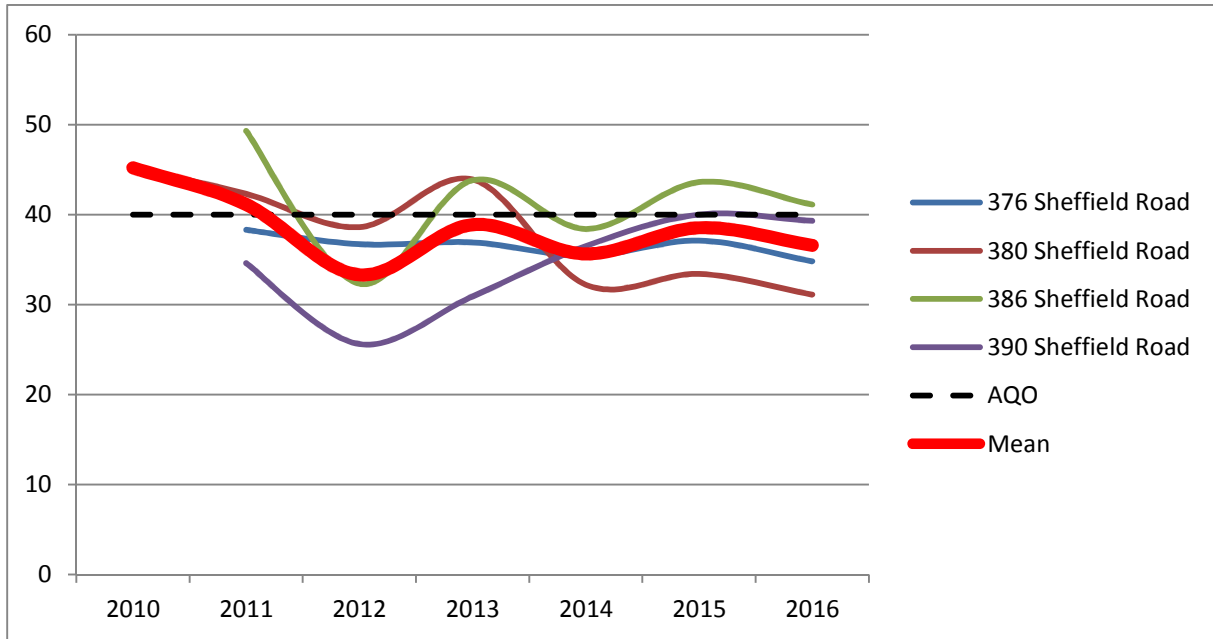
Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

Marginal exceedences of the annual average levels of NO<sub>2</sub> continue to be found within the area of Chesterfield No1 AQMA. Traffic analysis work (carried out in support of planning applications for housing developments in the vicinity of the AQMA) indicate that the road network which includes the AQMA is approaching capacity.

Intensive monitoring is also taking place at a row of houses affected by the change in a road junction serving a major supermarket (this has been discussed fully in the 2013 Detailed Assessment and 2014 Progress Report). This is a row of mixed commercial premises (comprising a public house, retail shop, sandwich shop, and hairdressers) and residential properties (7 homes). There are 4 diffusion tubes on this row of properties. A single location indicates a very marginal breach of the air quality objective. The other locations, in the same façade, are below the objective (one of them consistently well below the objective). Figure 1 (overleaf) demonstrates the wide variation in results from the monitoring which is closely co-located. The locations are shown in Figure 2 (also overleaf). Due to this, we are not confident that the data is robust enough to justify the declaration of an AQMA. This location was subject to a Detailed Assessment in 2012, and this was reported on in March 2013. The targetted intensive monitoring has continued at this location since that time, and

levels have fluctuated around the air quality objective. There is little consistency in the monitoring results, but the overall trend demonstrates a gradual reduction on average levels (as shown in Figure 1, below). Intensive monitoring will continue at this location.

**Figure 1: Variation in NO<sub>2</sub> on Sheffield Road**



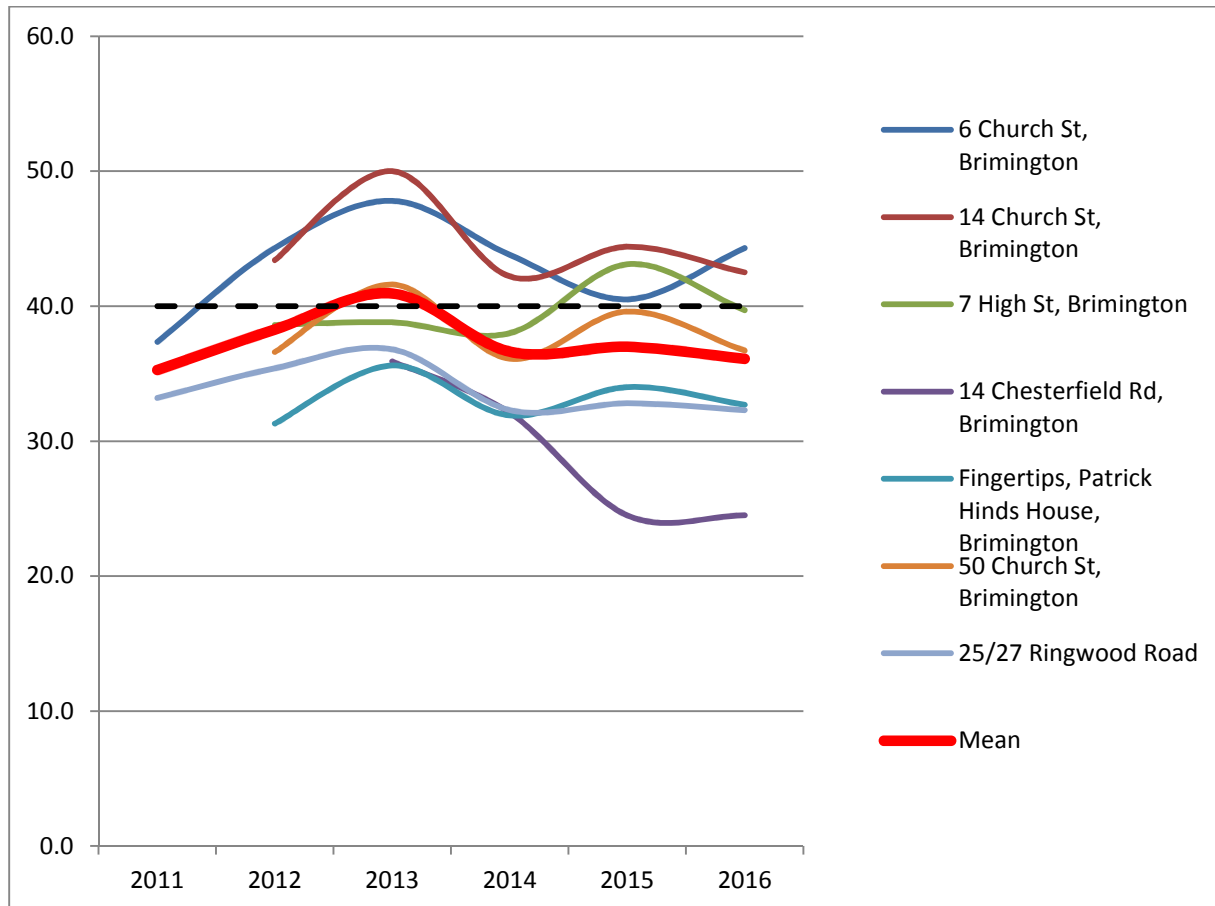
**Figure 2: Locations of Diffusion Tube monitoring on the affected façade**



Note: The green locations are below the AQO for NO<sub>2</sub>, the red location demonstrates exceedences during the current year. For comparison with Figure 1 (above), the premises numbers run let to right.

Ongoing monitoring within, and in the vicinity of, the Chesterfield No.1 AQMA has demonstrated continued fluctuation in levels, as shown in Figure 3 (below).

**Figure 3: Variation in NO<sub>2</sub> in and around the vicinity of Chesterfield No.1 AQMA**



The two monitoring locations within the AQMA still demonstrate a breach of the AQO for NO<sub>2</sub>. Recent traffic modelling work, in support of large scale residential development proposals in the Staveley and Rother Valley Corridor, has indicated that the one-way system which flows past the residential façade in the AQMA is expected to reach capacity in the next few years, even if the proposed residential developments do not take place. The intensive monitoring will continue within, and around the vicinity of the AQMA.

Figure 4 (overleaf) shows the locations of the above monitoring sites, and the existing boundary of the AQMA.

**Figure 4: Locations of Diffusion Tube monitoring within and in the vicinity of Chesterfield No1 AQMA**



Note: The green locations are below the AQO for NO<sub>2</sub>, the red locations demonstrate exceedences during the current year's data. The extent of the AQMA is shown in blue

No annual mean results are greater than 60µg/m<sup>3</sup>, as such we can be confident in concluding that there are no sites with an exceedance of the 1-hour mean objective.

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

Both AURN sites monitor for PM<sub>10</sub>. The levels monitored do not breach either the annual mean or the 24 hour mean objectives.

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past 5 years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year.

### 3.2.3 Particulate Matter (PM<sub>2.5</sub>)

Both AURN sites monitor for PM<sub>2.5</sub>. The data show that the levels of PM<sub>2.5</sub> within the borough area comply with the annual average EU limit value (25µg/m<sup>3</sup> by 2020). The levels at Chatsworth Road have been fairly consistent for the last few years, and have shown a gradual slight decrease in levels. No long term trend data is yet available at the Loundsley Green site, as it has only operated at this site for two

years. The levels at this background site are lower, as would be expected. Monitoring is continuing. Table A.7 in Appendix A presents the ratified and adjusted monitored PM<sub>2.5</sub> annual mean concentrations for the past 5 years.

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

Sulphur Dioxide is not a pollutant of concern, following the closure of a long standing chemical works which included a Sulphuric Acid production site in 2007. Prior to this the whole of the borough was covered by a number of smoke control areas. This, combined with the widespread uptake in the use of gas for domestic heating, meant that the use of coal and other solid fuels dramatically declined. As a result of these steps, sulphur dioxide is no longer monitored in Chesterfield.

### **3.2.5 Benzene**

The Chesterfield Roadside site is part of the Non-Automatic Hydrocarbon Network. The results show that the levels are well below the Air Quality Objective and demonstrate no likelihood of breaching the Air Quality Objective, as the long term trend demonstrates a very gradual reduction in levels since 2010.

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
AURN 1	Chesterfield Roadside	Roadside	463348	370651	NO <sub>2</sub> PM <sub>10</sub> PM <sub>2.5</sub> Benzene	NO	Chemiluminescent FDMS FDMS Pumped Tubes	3	2	3
AURN 2	Chesterfield Loundsley Green	Urban Background	436472	372038	NO <sub>2</sub> PM <sub>10</sub> PM <sub>2.5</sub> Heavy Metals	NO	Chemiluminescent FDMS FDMS Pumped Filters	N/A	17	3

**Notes:**

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

(2) N/A if not applicable.



Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
1	Bradbury Club, 150 Chatsworth Rd	Façade	437222	370956	NO <sub>2</sub>	No	0	1m	N	2
2	Bridge Inn, Hollis Lane	Facade	438710	370950	NO <sub>2</sub>	No	0	2m	N	2
3	376 Sheffield Road	Façade	438291	373006	NO <sub>2</sub>	No	0	1m	N	2
4	390 Sheffield Road	Façade	438284	373057	NO <sub>2</sub>	No	0	1m	N	2
5	17, South Place	Façade	438293	370863	NO <sub>2</sub>	No	0	1m	N	2
6	6 Church Street, Brimington	Façade	440440	373514	NO <sub>2</sub>	Yes	0	1m	N	2
7	DCC Offices, West Street	Roadside	437670	371490	NO <sub>2</sub>	No	3m	1m	N	2
8	212 Derby Road	Façade	438395	369776	NO <sub>2</sub>	No	0	3m	N	2
9	287 Derby Road	Façade	438385	369574	NO <sub>2</sub>	No	0	2m	N	2
10	7 High Street, Brimington	Façade	440531	373484	NO <sub>2</sub>	No	0	1m	N	2
11	42, Whittington Hill	Façade	438307	374560	NO <sub>2</sub>	No	0	2m	N	2
12	460, Sheffield Road	Façade	438279	373336	NO <sub>2</sub>	No	0	2m	N	2

Chesterfield Borough Council

13	10 Calow Lane, Hasland	Façade	439780	369440	NO <sub>2</sub>	No	0	1m	N	2
14	348 Derby Road, Storforth Lane	Façade	438357	369410	NO <sub>2</sub>	No	0	2m	N	2
15	Chatsworth Road AQ. Site	Co- location	436349	370658	NO <sub>2</sub>	No	4m	4m	Y	3
16	Chatsworth Road AQ. Site	Co- location	436349	370658	NO <sub>2</sub>	No	4m	4m	Y	3
17	Chatsworth Road AQ. Site	Co- location	436349	370658	NO <sub>2</sub>	No	4m	4m	Y	3
18	Sheffield Road AQ Site	Co- location	438308	373014	NO <sub>2</sub>	No	2m	2m	Y	2
19	Sheffield Road AQ Site	Co- location	438308	373014	NO <sub>2</sub>	No	2m	2m	Y	2
20	Sheffield Road AQ Site	Co- location	438308	373014	NO <sub>2</sub>	No	2m	2m	Y	2
21	14 Chesterfield Road, Brimington	Roadsid e	440175	373396	NO <sub>2</sub>	No	1m	1m	N	2
22	25/27 Ringwood Road, Brimington	Façade	440669	373711	NO <sub>2</sub>	No	0	1m	N	2
23	29 Mansfield Road, Hasland	Façade	439830	369320	NO <sub>2</sub>	No	0	2m	N	2
24	10, Compton Street, Saltergate	Façade	437686	371433	NO <sub>2</sub>	No	0	1m	N	2
25	J+S Trophies, The Green, Hasland	Façade	439490	369608	NO <sub>2</sub>	No	0	3m	N	2
26	Harold Lillekar's Funerals, Mansfield Rd	Façade	439490	369590	NO <sub>2</sub>	No	0	6m	N	2
27	Lowgates, Staveley	Façade	443897	374912	NO <sub>2</sub>	No	0	3m	N	2

Chesterfield Borough Council

28	Patrick Hinds House, Church St, Brimington	Façade	440323	373482	NO <sub>2</sub>	No	0	1m	N	2
29	Hollywell Cross R/T, Old Post Restaurant	Façade	438417	371357	NO <sub>2</sub>	No	0	1m	N	2
30	348, Chatsworth Rd, Brampton Mile	Façade	436702	370761	NO <sub>2</sub>	No	0	1m	N	2
31	386 Sheffield Road	Façade	438289	373028	NO <sub>2</sub>	No	0	2m	N	2
32	Warner Street, Hasland	Roadside	438976	370356	NO <sub>2</sub>	No	2m	1m	N	2
33	55 Duke Street, Staveley	Façade	443452	374762	NO <sub>2</sub>	No	0	4m	N	2
34	Travel Blank	-	-	-	-	-	-	-	-	-
35	632, Chatsworth Road, Storrs Road	Façade	435654	370537	NO <sub>2</sub>	No	0	3m	N	2
36	Lite Bites, Mansfield Road, Hasland	Façade	439710	369420	NO <sub>2</sub>	No	0	2m	N	2
37	50 Church Street, Brimington	Façade	440361	373513	NO <sub>2</sub>	No	0	1m	N	2
38	14 Church Street, Brimington	Façade	440421	373515	NO <sub>2</sub>	Yes	0	1m	N	2
39	43 Sheffield Road	Façade	438343	371908	NO <sub>2</sub>	No	0	1m	N	2
40	380 Sheffield Road	Façade	438290	373014	NO <sub>2</sub>	No	0	1m	N	2

41	James Street / Lockoford Lane	Roadside	438407	372798	NO <sub>2</sub>	No	2	1m	N	2
----	----------------------------------	----------	--------	--------	-----------------	----	---	----	---	---

**Notes:**

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
AURN 1	Roadside	Automatic	93	93	19.3	21.7	20.6	19.9	20.3
AURN 2	Urban Background	Automatic	98.7	98.7				14.4	16.7
1	Roadside	Diffusion Tube	92	92	27.6	30.9	26.9	28.7	23.5
2	Roadside	Diffusion Tube	100	100		37.7	34	32.9	28.4
3	Roadside	Diffusion Tube	100	100	35.7	36.9	35.4	36.6	34.8
4	Roadside	Diffusion Tube	83	83	27.1	30.9	36.5	39.5	39.3
5	Roadside	Diffusion Tube	83	83	27	29.5	26.9	28.8	27.8
6	Roadside	Diffusion Tube	100	100	<b>44.3</b>	<b>47.8</b>	<b>43.8</b>	<b>40.5</b>	<b>44.3</b>
7	Roadside	Diffusion Tube	100	100	35	23.3	24.1	22.6	24.4
8	Roadside	Diffusion Tube	100	100	29.1	32.8	30.7	30.3	28.8
9	Roadside	Diffusion Tube	67	67	29.2	31.6	30.2	27.5	28.0
10	Roadside	Diffusion Tube	100	100	38.6	38.8	38	<b>43.1</b>	39.7
11	Roadside	Diffusion Tube	100	100	34.7	37.9	35.2	24.6	23.8
12	Roadside	Diffusion Tube	92	92	28.7	29.4	27.6	28.7	28.3
13	Roadside	Diffusion Tube	100	100	26	24.3	24.6	23.5	22.4
14	Roadside	Diffusion Tube	100	100	32.8	38.1	34.7	35.3	33.6
15	Roadside	Diffusion Tube	100	100	19.1	21.7	18.2	19.4	18.8
16	Roadside	Diffusion Tube	100	100	19.7	21.7	18.2	19.4	18.2
17	Roadside	Diffusion Tube	100	100	19.5	21.9	19.1	20	17.8
18	Roadside	Diffusion Tube	67	67				25.3	22.4
19	Roadside	Diffusion Tube	67	67				27.2	23.7

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
20	Roadside	Diffusion Tube	67	67				28.4	23.8
21	Roadside	Diffusion Tube	100	100		35.9	32.1	24.5	24.5
22	Roadside	Diffusion Tube	67	67	35.4	36.8	32.3	32.8	32.2
23	Roadside	Diffusion Tube	75	75		27.7	25.2	24.3	24.4
24	Roadside	Diffusion Tube	100	100	33.8	37.7	35.8	36.6	33.0
25	Roadside	Diffusion Tube	100	100		36.1	33	33	32.4
26	Roadside	Diffusion Tube	100	100		20.3	18.3	19.9	19.1
27	Roadside	Diffusion Tube	100	100	30.1	33.3	31.3	30.6	31.9
28	Roadside	Diffusion Tube	100	100		35.6	31.9	34	32.7
29	Roadside	Diffusion Tube	75	75	30.2	<b>41.6</b>	35.6	36.3	32.4
30	Roadside	Diffusion Tube	100	100	26	33	30.2	28.5	26.6
31	Roadside	Diffusion Tube	83	83	36.4	<b>43.8</b>	38.4	<b>43.1</b>	<b>41.4</b>
32	Roadside	Diffusion Tube	100	100	34.1	36.1	29.9	31.4	33.3
33	Roadside	Diffusion Tube	100	100		39.9	32.8	38.4	36.6
34	Travel Blank	Diffusion Tube	-	-	-	-	-	-	-
35	Roadside	Diffusion Tube	100	100	30.3	33.6	29.7	29.4	29.8
36	Roadside	Diffusion Tube	92	92		31.1	27.1	27.8	27.1
37	Roadside	Diffusion Tube	100	100	36.6	<b>41.6</b>	36.1	39.6	36.7
38	Roadside	Diffusion Tube	100	100	<b>43.4</b>	<b>50</b>	<b>42.2</b>	<b>44.4</b>	<b>42.5</b>
39	Roadside	Diffusion Tube	92	92	27.8	31.6	29.2	27.5	28.0
40	Roadside	Diffusion Tube	100	100	39.5	<b>43.9</b>	32.2	33	31.1
41	Roadside	Diffusion Tube	83	83	31.2	33.8	31.2	28.8	30.0

- ☒ Diffusion tube data has been bias corrected
- ☒ Annualisation has been conducted where data capture is <75%
- ☒ If applicable, all data has been distance corrected for relevant exposure

**Notes:**

Exceedances of the NO<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 Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.5 – Trends in Annual Mean NO<sub>2</sub> Concentrations

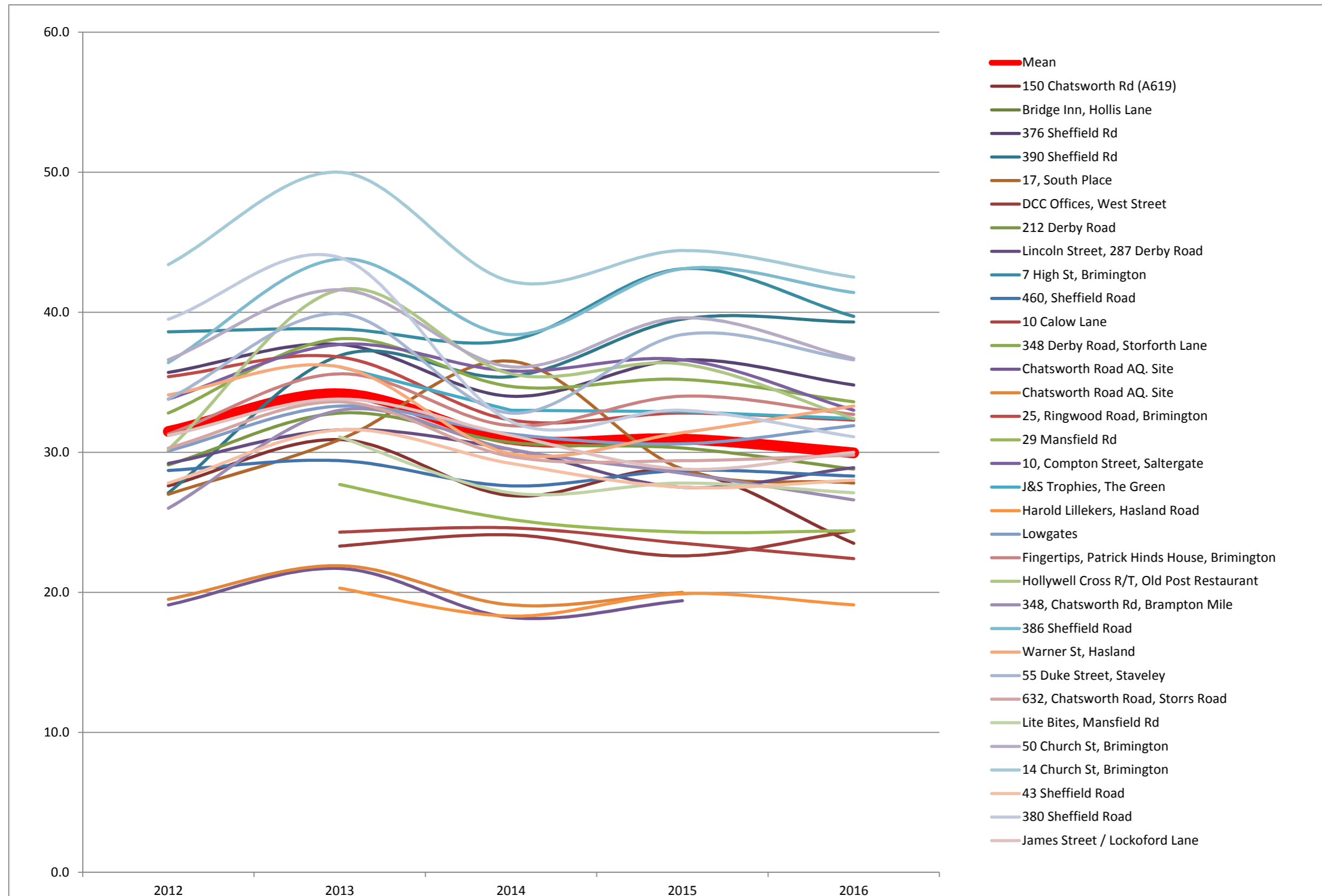




Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2012	2013	2014	2015	2016
AURN 1 Chesterfield Roadside	Roadside	Automatic	93.1	93.1	0	0	0	0	0
AURN 2 Chesterfield Loundsley Green	Urban Background	Automatic	98.7	98.7	-	-	-	0 (53.5)	0

**Notes:**

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

(3) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

**Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
AURN 1 Chesterfield Roadside	Roadside	95.6	95.6	20.2	15.9	19	19.8	17.7
AURN 2 Chesterfield Loundsley Green	Urban Background	90.7	90.7	-	-	-	14.4	14.8

Annualisation has been conducted where data capture is <75%

**Notes:**

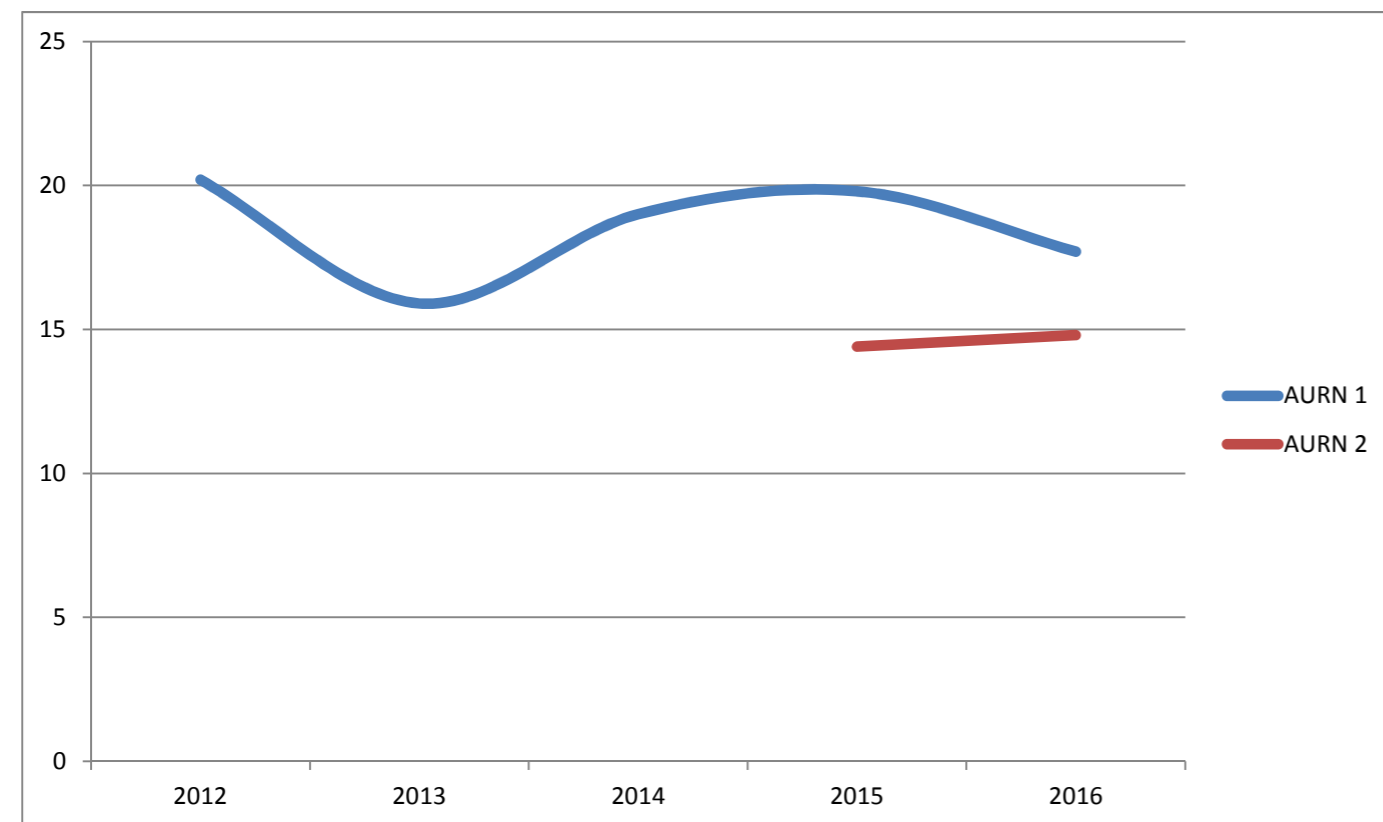
Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

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

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

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

**Figure A.6 – Trends in Annual Mean PM<sub>10</sub> Concentrations**



**Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
				2012	2013	2014	2015	2016
AURN 1 Chesterfield Roadside	Roadside	95.6	95.6	14 (35.7)	6 (26)	11	2	0
AURN 2 Chesterfield Loundsley Green	Urban Background	90.7	90.7	-	-	-	1(23)	0

**Notes:**

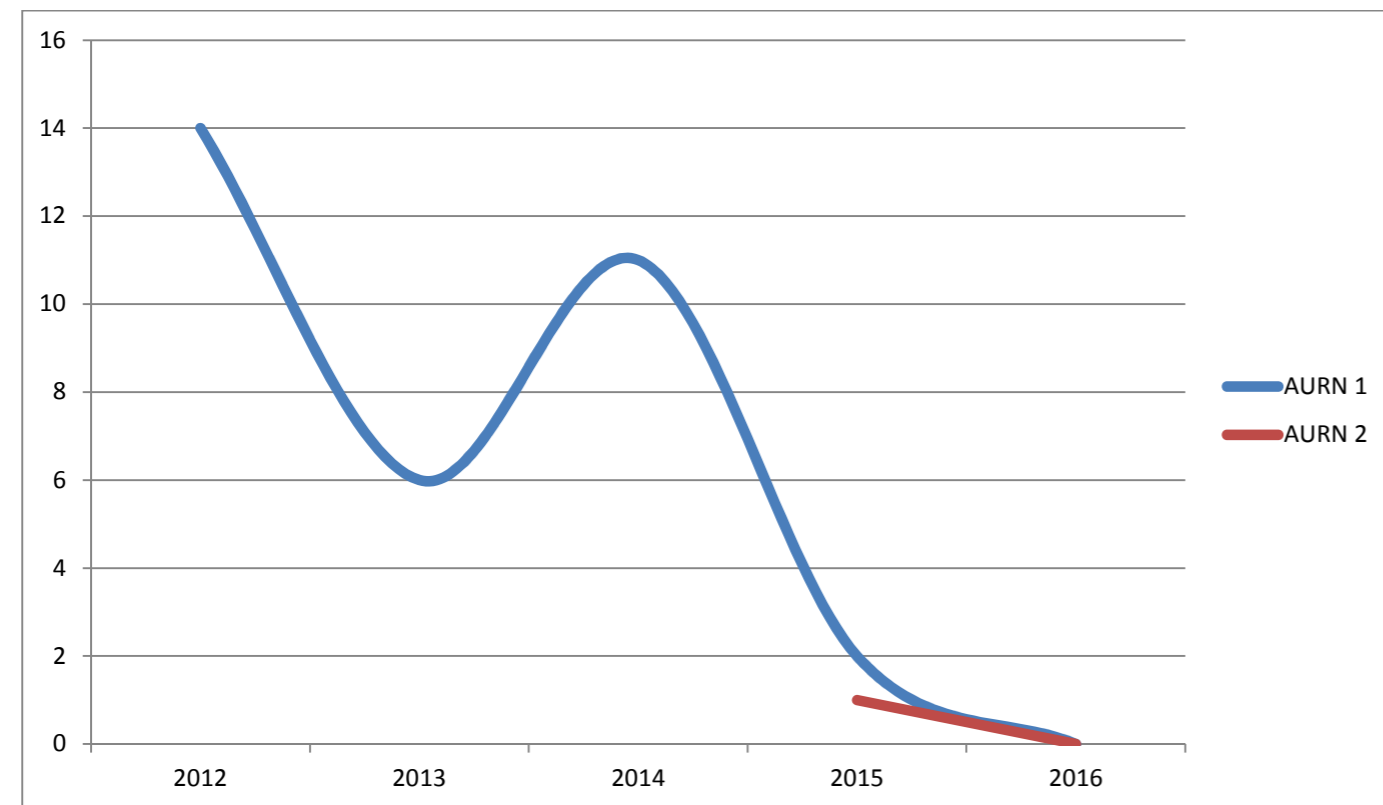
Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

**Figure A.7 – Trends in Number of 24-Hour Mean PM<sub>10</sub> Results >50µg/m<sup>3</sup>**



**Table A.7 – PM<sub>2.5</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	PM <sub>2.5</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2012	2013	2014	2015	2016
AURN 1 Chesterfield Roadside	Roadside	93.7	93.7	14.8	10.2	11.5	10.4	11.3
AURN 2 Chesterfield Loundsley Green	Urban Background	92.9	92.9	-	-	-	7.8	10.3

Annualisation has been conducted where data capture is <75%

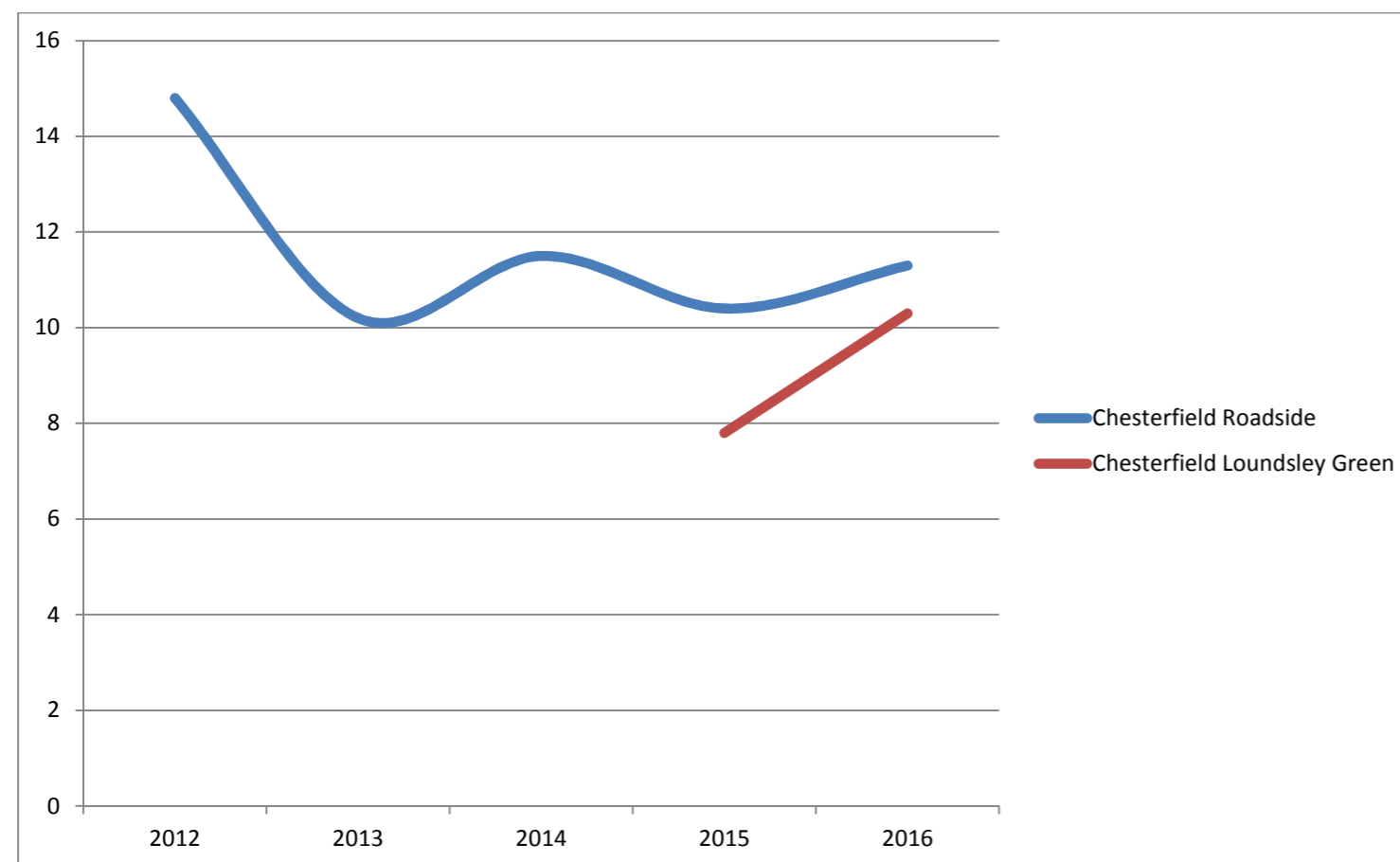
**Notes:**

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

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

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

**Figure A.8 – Trends in Annual Mean PM<sub>2.5</sub> Concentrations**



## Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2016

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.87), Travel Blank Adjusted (-1.6) and Annualised <sup>(1)</sup>	
1	38	34	28	28	28	19	18	20	31	32	NR	41	28.8	23.5	
2	41	39	33	28	30	33	23	25	34	37	46	44	34.4	28.4	
3	47	49	41	40	37	36	34	29	40	45	50	53	41.8	34.8	
4	49	46	42	52	NR	NR	40	33	45	48	51	64	47.0	39.3	
5	31	35	37	NR	46	26	24	27	35	38	39	NR	33.8	27.8	
6	45	50	48	55	56	60	40	50	49	65	63	51	52.7	<b>44.3</b>	
7	27	34	25	39	24	26	14	24	41	34	35	35	29.8	24.4	
8	37	39	26	34	39	35	27	21	38	44	42	37	34.9	28.8	
9	34	44	NR	38	34	28	NR	22	NR	NR	45	35	35.0	28.0	
10	58	50	40	41	48	45	39	41	49	52	53	53	47.4	39.7	
11	30	30	24	30	29	28	18	23	28	36	38	36	29.2	23.8	
12	36	34	35	33	32	30	24	NR	34	33	38	49	34.4	28.3	
13	30	31	31	26	24	22	18	17	28	32	40	32	27.6	22.4	
14	36	41	37	40	44	39	30	38	40	46	47	47	40.4	33.6	
15	24	27	25	22	21	16	14	14	24	24	35	35	23.4	18.8	
16	27	26	25	19	21	18	15	14	21	25	31	31	22.8	18.2	
17	27	27	23	21	20	15	13	16	20	25	32	28	22.3	17.8	
18	33	35	28	23	25	21	19	19	NR	NR	NR	NR	25.4	22.4	
19	35	31	30	26	29	24	19	20	NR	NR	NR	NR	26.8	23.7	
20	34	36	27	29	22	23	25	19	NR	NR	NR	NR	26.9	23.8	
21	36	35	30	28	27	27	20	17	26	33	45	36	30.0	24.5	
22	37	40	NR	NR	NR	NR	27	31	33	47	56	40	38.9	32.2	
23	29	37	31	28	28	NR	20	NR	24	NR	42	25	29.9	24.4	
24	51	51	43	24	43	34	41	18	27	48	52	45	39.8	33.0	
25	42	46	25	44	40	38	29	27	40	39	45	54	39.1	32.4	
26	23	29	34	22	20	23	10	16	19	29	30	30	23.8	19.1	
27	38	44	45	34	38	39	28	26	34	38	53	45	38.5	31.9	
28	38	44	39	39	39	32	25	30	36	45	54	52	39.4	32.7	
29	38	42	32	NR	40	NR	24	29	41	NR	52	53	39.0	32.4	
30	36	34	31	29	31	31	22	22	31	40	44	37	32.3	26.6	
31	57	52	45	48	45	36	NR	NR	43	47	58	63	49.4	<b>41.4</b>	
32	37	40	45	39	43	38	24	26	34	50	53	52	40.1	33.3	
33	45	49	45	38	46	40	34	33	43	46	56	52	43.9	36.6	
34	5	5	2	1	2	0	1	0	0	3	1	1	1.8	-	
35	36	34	34	31	37	34	34	29	37	35	46	46	36.1	29.8	
36	31	36	36	NR	31	31	14	22	29	44	48	41	33.0	27.1	
37	51	48	46	41	45	42	33	33	39	44	57	49	44.0	36.7	
38	46	41	53	55	52	57	37	39	47	57	65	59	50.7	<b>42.5</b>	
39	36	35	34	NR	33	36	14	22	34	40	46	44	34.0	28.0	

<b>40</b>	46	37	36	43	34	29	27	27	37	36	51	48	37.6	31.1
<b>41</b>	37	40	35	NR	38	31	18	24	37	50	NR	53	36.3	30.0

- Local bias adjustment factor used
- National bias adjustment factor used

Annualisation has been conducted where data capture is <75%

**Notes:**

Exceedances of the NO<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.

Distance correction is not required – see Appendix C

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

NO<sub>2</sub> diffusion tubes are supplied by South Yorkshire Air Quality Samplers, the preparation method being 50% triethanolamine in acetone. The laboratory follows the procedures set out in the Harmonisation Practical Guidance. The national bias factor for the tubes supplied by this source is 0.83. Data from the two sites operated by Chesterfield BC is supplied to DEFRA for input into the calculation of this factor.


### Factor from Local Co-location Studies (if available)

The local bias factor for the traffic site operated by Chesterfield BC is as follows:

Chesterfield Roadside (Chatsworth Road): 0.87

The calculation for deriving this factor is shown below:

### Checking Precision and Accuracy of Triplicate Tubes



From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2016	03/02/2016	24.0	27.0	27.0	26	1.7	7	4.3
2	03/02/2016	02/03/2016	27.0	26.0	27.0	27	0.6	2	1.4
3	02/03/2016	30/03/2016	25.0	25.0	23.0	24	1.2	5	2.9
4	30/03/2016	27/04/2016	22.0	19.0	21.0	21	1.5	7	3.8
5	27/04/2016	25/05/2016	21.0	21.0	20.0	21	0.6	3	1.4
6	25/05/2016	29/06/2016	16.0	18.0	15.0	16	1.5	9	3.8
7	29/06/2016	27/07/2016	14.0	15.0	13.0	14	1.0	7	2.5
8	27/07/2016	24/08/2016	14.0	14.0	16.0	15	1.2	8	2.9
9	24/08/2016	28/09/2016	24.0	21.0	20.0	22	2.1	10	5.2
10	28/09/2016	26/10/2016	24.0	25.0	25.0	25	0.6	2	1.4
11	26/10/2016	30/11/2016	35.0	31.0	32.0	33	2.1	6	5.2
12	30/11/2016	04/01/2017	35.0	31.0	28.0	31	3.5	11	8.7
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
20.15	94.9	Good	Good
19.74	50	Good	or Data Capture
22.52	92.9	Good	Good
20.04	96.7	Good	Good
17.16	97.4	Good	Good
18.02	99.5	Good	Good
12.46	95.4	Good	Good
12.60	94.8	Good	Good
15.95	97.6	Good	Good
21.84	99.3	Good	Good
25.32	98.7	Good	Good
28.13	99.9	Good	Good

Overall survey -->

<b>Good precision</b>	<b>Good Overall DC</b>
-----------------------	------------------------

(Check average CV & DC from Accuracy calculations)

<b>Site Name/ ID:</b> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></span>	<b>Precision</b> 12 out of 12 periods have a CV smaller than 20%
---	--

**Accuracy (with 95% confidence interval)**

**without periods with CV larger than 20%**

**Bias calculated using 11 periods of data**

Bias factor A **0.87 (0.81 - 0.94)**

Bias B **15% (7% - 24%)**

---

Diffusion Tubes Mean: **22  $\mu\text{gm}^{-3}$**

Mean CV (Precision): **7**

---

Automatic Mean: **19  $\mu\text{gm}^{-3}$**

Data Capture for periods used: **97%**

---

Adjusted Tubes Mean: **20 (18 - 21)  $\mu\text{gm}^{-3}$**

**Accuracy (with 95% confidence interval)**

**WITH ALL DATA**

**Bias calculated using 11 periods of data**

Bias factor A **0.87 (0.81 - 0.94)**

Bias B **15% (7% - 24%)**

---

Diffusion Tubes Mean: **22  $\mu\text{gm}^{-3}$**

Mean CV (Precision): **7**

---

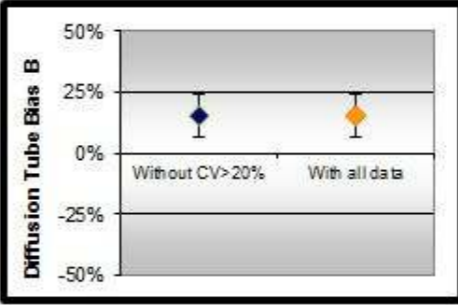
Automatic Mean: **19  $\mu\text{gm}^{-3}$**

Data Capture for periods used: **97%**

---

Adjusted Tubes Mean: **20 (18 - 21)  $\mu\text{gm}^{-3}$**



Diffusion Tube Bias B

Jaume Targa, for AEA  
Version 04 - February 2011



Further details on the sites are given in Appendix D of this report

### Discussion of Choice of Factor to Use

The bias factor used in adjusting the data for this report is a local factor and, more specifically, is calculated using the traffic site, Chesterfield Roadside. This site is used as it is in a very similar location to those where the diffusion tubes are all now placed. The local factor (0.87) varies from the national factor (0.83) but as the data is specific to this region and, more pertinently, to the roadside monitoring which is now being uniformly undertaken, it is believed that the use of the local factor is fully justified.

### Distance Correction

The monitoring locations are mounted on facades (or directly equivalent locations, such as lamp standards located at the façade), as such no distance correction is required.

### Travel Blank

The mean result for analysis of the travel blank, which has not been exposed, is  $1.8\mu\text{g}/\text{m}^3$ , after annualisation (where appropriate), and prior to the bias factor adjustments being made.

### PM Monitoring Adjustment

Monitoring is carried out using FDMS equipment, no data adjustment is required.

### Short-term to Long-term Data adjustment

Details of annualisation of diffusion tubes data (where required), is given below:

Date on	Date off	Co-location Tubes	AURN	AURN Data	Tube 9	AURN Data	Tube 18	AURN Data	Tube 19	AURN Data	Tube 20	AURN Data	Tube 22
06/01/2016	03/02/2016	26	20.15	20.15	34	20.15	33	20.15	35	20.15	34	20.15	37
03/02/2016	02/03/2016	27	19.74	19.74	44	19.74	35	19.74	31	19.74	36	19.74	40
02/03/2016	30/03/2016	24	22.52	-	-	22.52	28	22.52	30	22.52	27	-	-
30/03/2016	27/04/2016	21	20.04	20.04	38	20.04	23	20.04	26	20.04	29	-	-
27/04/2016	25/05/2016	21	17.16	17.16	34	17.16	25	17.16	29	17.16	22	-	-
25/05/2016	29/06/2016	16	18.02	18.02	28	18.02	21	18.02	24	18.02	23	-	-
29/06/2016	27/07/2016	14	12.46	-	-	12.46	19	12.46	19	12.46	25	12.46	27
27/07/2016	24/08/2016	15	12.6	12.6	22	12.6	19	12.6	20	12.6	19	12.6	31
24/08/2016	28/09/2016	22	15.95	-	-	-	-	-	-	-	-	15.95	33
28/09/2016	26/10/2016	25	21.84	-	-	-	-	-	-	-	-	21.84	47
26/10/2016	30/11/2016	33	25.32	25.32	45	-	-	-	-	-	-	25.32	56
30/11/2016	04/01/2017	31	28.13	28.13	35	-	-	-	-	-	-	28.13	40
<b>Mean:</b>		22.9	19.49	20.15	35.00	17.84	25.38	17.84	26.75	17.84	26.88	19.52	38.88
<b>Minus Mean Travel Blank Over-read (1.6 – 1.8 multiplied by bias factor):</b>					33.4		23.8		25.2		25.3		37.3
<b>Annualising Correction:</b>				0.96769		1.09295		1.09295		1.09295		0.99848	
<b>Result with Annualising Correction:</b>					32.3		26.0		27.5		27.6		37.2
<b>Locally Calculated Bias Factor:</b>					0.87		0.87		0.87		0.87		0.87
<b>Bias Factor Adjusted Final Value:</b>					<b>28.0</b>		<b>22.4</b>		<b>23.7</b>		<b>23.8</b>		<b>32.2</b>

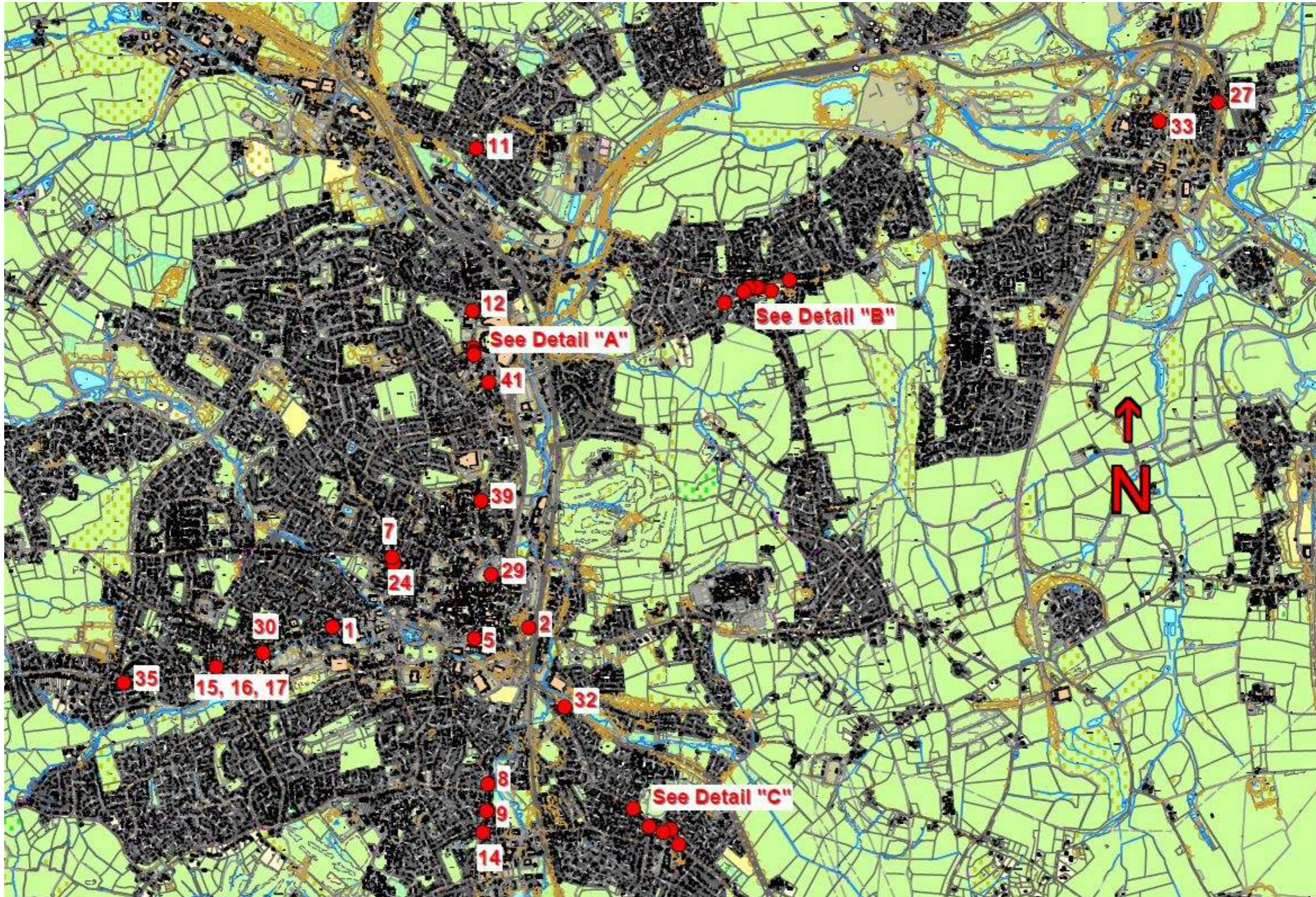
**QA/QC of automatic monitoring**

Data validation is carried out by BureauVeritas on behalf of DEFRA. On site calibration is carried out by Chesterfield BC staff on a 14 day cycle, using standard calibration gases, and the calibration data is sent direct to BureauVeritas, and RicardoAEA, by email. The margin of error for the NO<sub>x</sub> Monitor is 11.1%, the margins of error for the Particulate Monitors are 8.7% and 16.4% for the PM<sub>10</sub> and PM<sub>2.5</sub>, respectively. This meets the requirements of the air quality Directive 2008/50/EC

**QA/QC of diffusion tube monitoring**

The diffusion tube monitoring is carried out in full compliance with the guidance contained in the document "Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance for Laboratories and Users". The WASP results show the overall performance of the analysis laboratory as good.

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



Detail A



Detail B



Note: See location details of Chesterfield No 1 AQMA (overleaf)

Detail C



Location and extent of Chesterfield No 1 AQMA



Note: the detail relates to the section of highway shown at the centre of Detail B (above)

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

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>4</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
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>4</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).



## Appendix F: Derbyshire Air Quality Working Group

### Derbyshire County and City Air Quality Working Group

#### Terms of Reference 2016/17

##### **Purpose of the Air Quality Working Group**

To provide assurance to the Health Protection and Health and Wellbeing Boards of Derbyshire County and Derby City Councils around the strategic priorities to address air quality, including the management, monitoring, planning and response required to address air quality across the geographical area and protect the public's health.

A working group for agreeing strategic priorities and ensuring collaborative action around air quality through the facilitation of relationships between stakeholders, sharing best practice, ensuring collaborative working in applications for resources, collating common evidence base and monitoring progress on action.

##### **Scope**

To provide strategic oversight of work to address air quality across the geographical area. This will include priorities and initiatives across a range of stakeholders including;

- Derby City and Derbyshire County Borough and District Councils; Planning, Transport, Environmental Health
- Derbyshire County and City Council; Planning and Transport
- Derbyshire County and Derby City Public Health
- NHS Clinical Commissioning Groups / Provider organisations

##### **Objectives**

To provide strategic oversight of work to reduce the impact of air quality on health across Derbyshire County and Derby City.

##### **Discharging Functions**

The group will discharge functions through local task and finish groups as required or associated groups as required including Planning and Health and Chief Regulators Group. Members will be expected to ensure arrangements for reporting as required within their respective organisation.

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
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
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
TEA	Tetra Ethyl Acetate
WASP	Workplace Analysis Scheme for Proficiency

## References

Air Quality (England) Regulations 2000

Air Quality (England) (Amendment) Regulations 2000

Environment Act 1995

Environment, Food and Rural Affairs Committee, Air Quality – Fourth Report of Session 2015-16

Air Quality Plan for the achievement of EU air quality limit value for nitrogen dioxide (NO<sub>2</sub>) in East Midlands (UK0032)

Improving air quality in the UK – Tackling nitrogen dioxide in our towns and cities. Technical report, December 2015

NO<sub>2</sub> Diffusion Tubes for LAQM: Guidance Notes for Local Authorities, March 2006

The Relationship Between Diffusion Tubes Bias and Distance From the Road July 2006

Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance, Feb 2008

QA/QC Procedures for the UK Automatic Urban and Rural Air Quality Monitoring Network

Fine Particulate Matter (PM<sub>2.5</sub>) in the United Kingdom, DEFRA 2012

A Review of Air Quality Station Type Classifications for UK Compliance Monitoring, Ricardo-AEA 2013

Evidential Value of DEFRA Air Quality Compliance Monitoring AQEG 2015

Local Air Quality Management Policy Guidance (PG16) DEFRA 2016

Local Air Quality Management Technical Guidance (TG16) DEFRA 2016

<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>