



CHESTERFIELD
BOROUGH COUNCIL

2019 Air Quality Annual Status Report (ASR)

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

(May, 2019)

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 ASR 2019
Date	31st May 2019

Derbyshire County Council; Endorsement from the Director of Public Health

Air pollution has a significant effect on public health, and poor air quality is the largest environmental risk to public health in the UK. Long-term exposure to air pollution has been shown to reduce life expectancy, due to its impact on cardiovascular and respiratory diseases and lung cancer. Many everyday activities such as transport, industrial processes, farming, energy generation and domestic heating can have a detrimental effect on air quality.

The annual status report is fundamental to ensuring the monitoring of trends and identification of areas of local air pollution exposure. The cumulative effect of a range of interventions has the greatest potential to reduce local air pollution and improve population health, as such the annual status report and associated action plans provide an opportunity to engage a range of partners.

The Public Health Department will continue work with partners to advocate for improvements in Air Quality and provide expertise and evidence to inform policy.

A handwritten signature in black ink, appearing to read 'Dean Wallace', written in a cursive style.

Dean Wallace, Director of Public Health, Derbyshire County Council

May 2019

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^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The main pollutant of concern in Chesterfield is Nitrogen Dioxide (NO₂) and the predominant source is traffic. The overall trend in levels of the pollutant continues to show 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 monitoring location showed a breach (albeit minor) of the Air Quality Objective for Nitrogen Dioxide during 2018.** Further details are given in section 2.5.1

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 (PM₁₀ and PM_{2.5}) 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.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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
- viii) Sheffield City Region Air Quality and Climate Group

Conclusions and Priorities

1) Conclusions

- i) The levels of pollution, attributed to traffic, have shown an increase when the levels across the borough, as a whole, are compared with the 2018 report. Some variation across the borough has been noted, but the increase is, with a single exception, uniform. AURN measurements indicate that this trend is duplicated across the wider region.
- ii) Current levels within the Air Quality Management Area do not demonstrate an ongoing breach of the Air Quality Objective for Nitrogen Dioxide, but the results have demonstrated variability over time. As such, we will not revoke the Chesterfield No1 Air Quality Management Area, unless the reduction is demonstrated to continue.
- iii) Levels on a single stretch of Sheffield Road (where terraced housing is close to a busy section of traffic light controlled road) have also shown an increase in levels, one of the four monitoring locations on the affected façade demonstrates a minor breach of the Air Quality Objective for Nitrogen Dioxide. Once again,

given the historic variation in the data, targeted monitoring will continue at this location.

2) Priorities

- i) 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, by the use of (for example) travels plans, supporting car clubs, and supporting active travel schemes.
- ii) The East Midland Air Quality Network planning guidance document on air quality has been adopted by Chesterfield BC. We will utilise the planning process to mitigate and reduce air pollution locally, in accordance with the National Institute for Health and Clinical Excellence Quality Statement 181.
- iii) We will promote the adoption and use of Low Emission Vehicles, including the “future-proofing” of developments (including workplaces, commercial developments and residential areas) by requiring that the infrastructure for electric charging points be installed as part of the build phase. This is particularly important as central government has set an aspirational target for all new vehicles in the UK to be zero emission at source by 2040 (as contained in *The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations: Detailed Plan*, published July 2017). We support the in the development and adoption of a County wide Low Emission Vehicle Initiative strategy.
- iv) Where practical, and possible, Chesterfield BC’s internal procurement policy will promote the use of Low Emission Vehicles.
- v) Encourage the planting of landscape features (trees and vegetation) such as “green” walls, setbacks, and green spaces, in order to reduce pollution exposure.
- vi) The raising of public awareness of air quality and health issues, by the use of the public facing sections of our website, and by publicising national initiatives (such as Clean Air Day on June 20th).
- vii) We will work with County-wide sustainable travel initiatives to support modal shift either through our own workforce or wider population, through active travel, ensuring connectivity within communities and infrastructure such as (but not exclusively) cycle paths.

viii) Complete, and publish, the Air Quality Action Plan related to the Chesterfield N^o 1 AQMA.

Local Engagement and How to get Involved

Most inputs 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).

Following the VW emissions scandal in 2015, the reduction in the use of diesel fuels appears to be continuing. While this has a positive effect on public health and air quality grounds, it runs contrary to the previous policy which promoted the use of diesel as a positive action for addressing climate change. This continues to undermine the effectiveness of the air quality message. There is also a continued increase in the use of wood burning domestic heating appliances, again promoted as an effective alternative fuel source with positive climate change properties. Research indicates that these have an adverse effect on particulate pollution levels. We note, and welcome, the DEFRA backed Woodsure Ready to Burn initiative, but also note the cautionary comments made by the House of Commons Environmental Audit Committee regarding scrutiny of the Draft Environment (Principles and Governance) Bill

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>

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1 Local Air Quality Management

This report provides an overview of air quality in Chesterfield during 2018. 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 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 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		
						At Declaration		Now		Name	Date of Publication	Link
Chesterfield No1	Declared 14th August 2015	NO2 Annual Mean	Brimington, Chesterfield	4 to 18 (evens only) Church Street, Brimington	NO	42.5	µg/m3	39.3	µg/m3	Draft Action Plan for Chesterfield No1 AQMA	Currently in draft form	Not Applicable

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, occasionally, be additional exceedences of the Air Quality Objective for Nitrogen Dioxide outside the existing AQMA, and supported the decision to continue intensive monitoring of the terrace façade on Sheffield Road.

Chesterfield has taken forward a number of direct measures during the current reporting year of 2019 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 suggest 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) The local Highway Authority (Derbyshire County Council) has not signed up to the On-street Residential Chargepoint Scheme.

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 not breaching the NO₂ air quality objective, but this may be due to underlying variations in regional emissions. 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, a small number of electric vehicles are being used. 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)

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 and 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_{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Chesterfield BC is taking the following measures to address PM_{2.5}:

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 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 continuing to be undermined by the increase in the use of DEFRA approved wood burning appliances which are effectively exempt from local authority enforcement actions. Research results increasingly indicate that these fireplaces have an adverse effect on particulate air pollution.

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.

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

2.4 Summary of Monitoring Undertaken

2.4.1 Automatic Monitoring Sites

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

Chesterfield undertook automatic (continuous) monitoring at 2 sites during 2018. Table A. in Appendix A shows the details of the sites. NB. 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. National monitoring results are available at 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.

2.4.2 Non-Automatic Monitoring Sites

Chesterfield undertook non-automatic (passive) monitoring of NO₂ at 38 sites during 2018. Table A.2 in Appendix A shows the details of the sites.

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

2.5 Individual Pollutants

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

2.5.1 Nitrogen Dioxide (NO₂)

Table A. in Appendix A compares the ratified and adjusted (for bias factor – 0.91, travel blank adjustment – 2.1 µg/m³ mean over-read, no annualisation was required as data capture was at least 75% for all sites) monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

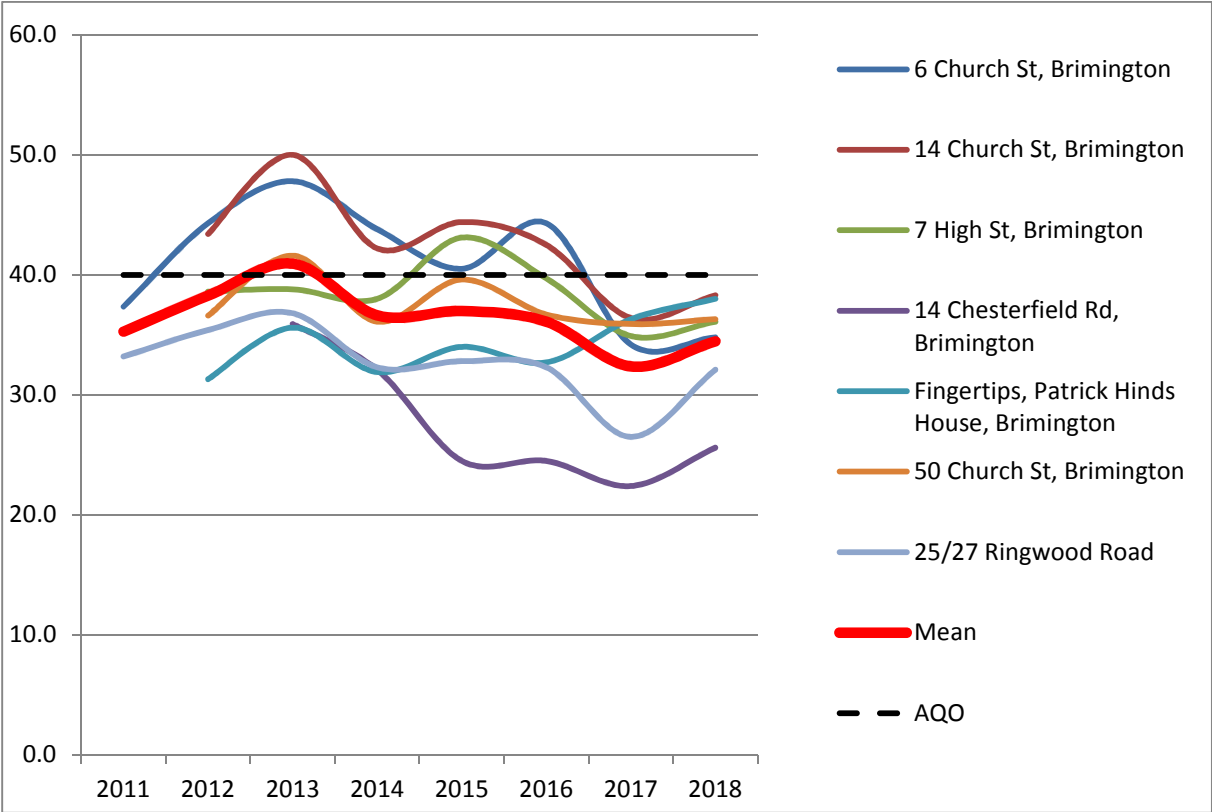
For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

No exceedences of the annual average levels of NO₂ has been found within the area of Chesterfield No1 AQMA.

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

Figure 1: Variation in NO₂ in and around the vicinity of Chesterfield No.1 AQMA



The two monitoring locations within the AQMA do not demonstrate a breach of the AQO for NO₂. **Once again, none of the monitoring locations within or around the AQMA demonstrate a breach of the AQO for NO₂.**

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 2: Locations of Diffusion Tube monitoring within and in the vicinity of Chesterfield No1 AQMA



Note: The green locations are below the AQO for NO₂ during the current year's data. The extent of the AQMA is shown in blue

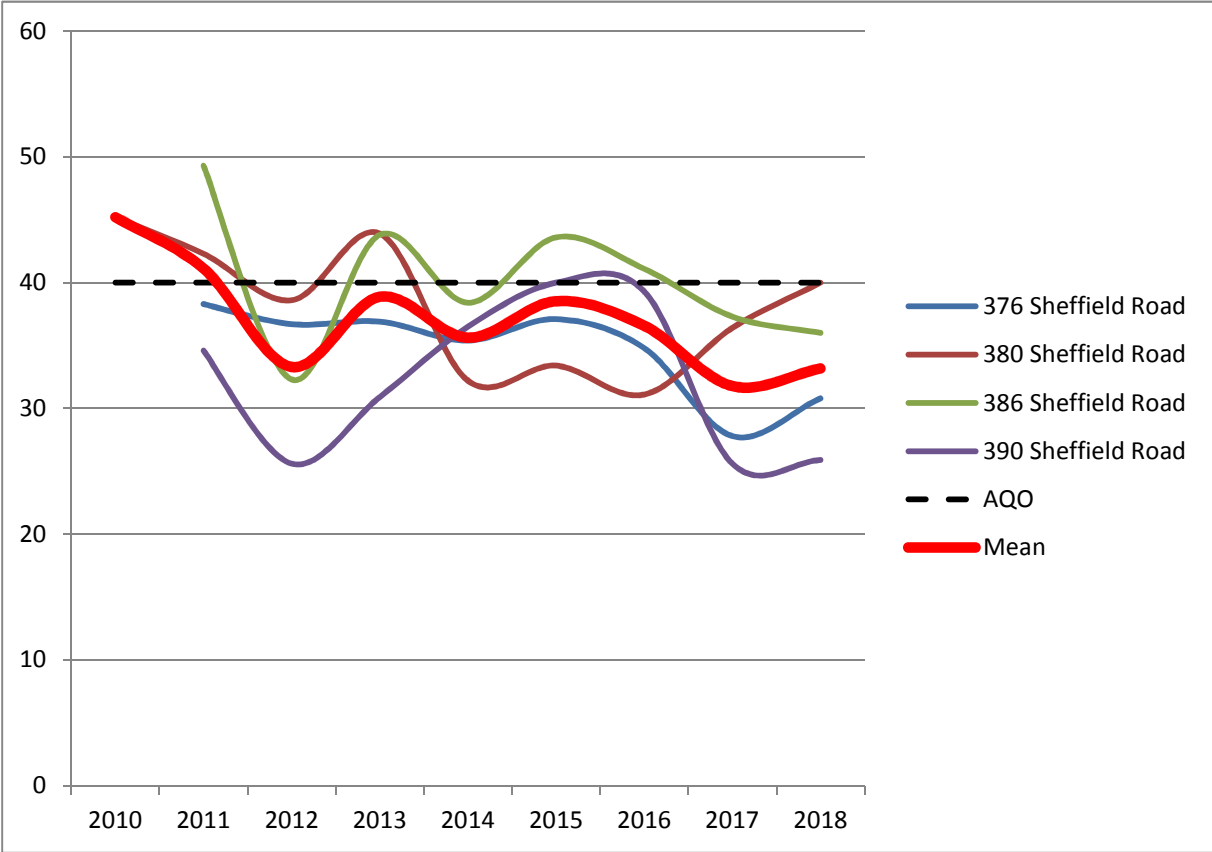
Intensive monitoring is also taking place at a row of houses affected by the change in a road junction serving a major supermarket (this has been discussed fully in the 2013 Detailed Assessment and 2014 Progress Report). This is a row of mixed commercial premises (comprising a public house, retail shop, sandwich shop, and hairdressers) and residential properties (7 homes). There are 4 diffusion tubes on this row of properties. **One of the locations on this façade demonstrate a borderline breach of the air quality objective.**

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 3, overleaf).

Figure 3 demonstrates the wide variation in results from the monitoring which is closely co-located. Due to this, we are not confident that the data is robust enough to justify the declaration of an AQMA, nor to draw any firm conclusions with regard to long term trends.

Given the above, intensive monitoring will continue at this location.

Figure 3: Variation in NO₂ on Sheffield Road



The locations of the monitoring, using diffusion tubes due to the restricted space available, on the façade of the terraced houses is shown in Figure 4 (overleaf).

Figure 4: Locations of Diffusion Tube monitoring on the affected façade



Note: The green locations are below the AQO for NO₂. The red location denotes an annual exposure at the AQO for NO₂. For comparison with Figure 1 (above), the premises numbers run left to right.

Across the Borough, no annual mean results are greater than 60µg/m³, as such we can be confident in concluding that there are no sites with an exceedance of the 1-hour mean objective.

2.5.2 Particulate Matter (PM₁₀)

Both AURN sites monitor for PM₁₀. The levels monitored do not breach either the annual mean or the 24 hour mean objectives.

Table A. in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A. in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

2.5.3 Particulate Matter (PM_{2.5})

Both AURN sites monitor for PM_{2.5}. The data show that the levels of PM_{2.5} within the borough area comply with the annual average EU limit value (25µg/m³ 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 four 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_{2.5} annual mean concentrations for the past 5 years.

2.5.4 Sulphur Dioxide (SO₂)

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.**

2.5.5 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) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
AURN 1	Chesterfield Roadside	Roadside	463348	370651	NO ₂ , PM ₁₀ , PM _{2.5} , Benzene	NO	Chemiluminescent FDMS, FDMS, Pumped Tubes	3	2	3
AURN 2	Chesterfield Loundsley Green	Urban Background	436472	372038	NO ₂ , PM ₁₀ , PM _{2.5} , Heavy Metals	NO	Chemiluminescent FDMS, FDMS, Pumped Filter	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) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
1	Bradbury Club, 150 Chatsworth Rd	Façade	437222	370956	NO2	No	0	1m	N	2
2	Bridge Inn, Hollis Lane	Facade	438710	370950	NO2	No	0	2m	N	2
3	376 Sheffield Road	Façade	438291	373006	NO2	No	0	1m	N	2
4	390 Sheffield Road	Façade	438284	373057	NO2	No	0	1m	N	2
5	17, South Place	Façade	438293	370863	NO2	No	0	1m	N	2
6	6 Church Street, Brimington	Façade	440440	373514	NO2	Yes	0	1m	N	2
7	DCC Offices, West Street	Roadside	437670	371490	NO2	No	3m	1m	N	2
8	212 Derby Road	Façade	438395	369776	NO2	No	0	3m	N	2
9	287 Derby Road	Façade	438385	369574	NO2	No	0	2m	N	2
10	7 High Street, Brimington	Façade	440531	373484	NO2	No	0	1m	N	2
11	42, Whittington Hill	Façade	438307	374560	NO2	No	0	2m	N	2
12	460, Sheffield Road	Façade	438279	373336	NO2	No	0	2m	N	2
13	10 Calow Lane, Hasland	Façade	439780	369440	NO2	No	0	1m	N	2
14	348 Derby Road, Storforth Lane	Façade	438357	369410	NO2	No	0	2m	N	2
15	Chatsworth Road AQ. Site	Co-location	436349	370658	NO2	No	4m	4m	Y	3
16	Chatsworth Road AQ. Site	Co-location	436349	370658	NO2	No	4m	4m	Y	3
17	Chatsworth Road AQ. Site	Co-location	436349	370658	NO2	No	4m	4m	Y	3

18	1 New Beetwell Street	Roadside	438104	370989	NO2	No	0	1m	N	2
19	28a Park Road	Façade	438090	370970	NO2	No	0	1m	N	2
20	74 Park Road	Façade	438072	370758	NO2	No	3m	1m	N	2
21	14 Chesterfield Road, Brimington	Roadside	440175	373396	NO2	No	1m	1m	N	2
22	25/27 Ringwood Road, Brimington	Façade	440669	373711	NO2	No	0	1m	N	2
23	29 Mansfield Road, Hasland	Façade	439830	369320	NO2	No	0	2m	N	2
24	10, Compton Street, Saltergate	Façade	437686	371433	NO2	No	0	1m	N	2
25	J+S Trophies, The Green, Hasland	Façade	439490	369608	NO2	No	0	3m	N	2
26	Harold Lillekar's Funerals, Mansfield Rd	Façade	439490	369590	NO2	No	0	6m	N	2
27	Lowgates, Staveley	Façade	443897	374912	NO2	No	0	3m	N	2
28	Patrick Hinds House, Church St, Brimington	Façade	440323	373482	NO2	No	0	1m	N	2
29	Hollywell Cross R/T, Old Post Restaurant	Façade	438417	371357	NO2	No	0	1m	N	2
30	348, Chatsworth Rd, Brampton Mile	Façade	436702	370761	NO2	No	0	1m	N	2
31	386 Sheffield Road	Façade	438289	373028	NO2	No	0	2m	N	2
32	Warner Street, Hasland	Roadside	438976	370356	NO2	No	2m	1m	N	2
33	55 Duke Street, Staveley	Façade	443452	374762	NO2	No	0	4m	N	2
34	Travel	-	-	-	-	-	-	-	-	-

	Blank									
35	632, Chatsworth Road, Storrs Road	Façade	435654	370537	NO2	No	0	3m	N	2
36	Lite Bites, Mansfield Road, Hasland	Façade	439710	369420	NO2	No	0	2m	N	2
37	50 Church Street, Brimington	Façade	440361	373513	NO2	No	0	1m	N	2
38	14 Church Street, Brimington	Façade	440421	373515	NO2	Yes	0	1m	N	2
39	43 Sheffield Road	Façade	438343	371908	NO2	No	0	1m	N	2
40	380 Sheffield Road	Façade	438290	373014	NO2	No	0	1m	N	2
41	James Street / Lockoford Lane	Roadside	438407	372798	NO2	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 NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
AURN 1	Roadside	Automatic	91.9	20.6	19.9	20.3	18	16.8
AURN 2	Urban Background	Automatic	91.6	-	14.4	16.7	12.4	12.2
1	Roadside	Diffusion Tube	100	26.9	28.7	23.5	23.3	24.3
2	Roadside	Diffusion Tube	100	34	32.9	28.4	24.9	27.0
3	Roadside	Diffusion Tube	100	35.4	36.6	34.8	27.8	30.8
4	Roadside	Diffusion Tube	100	36.5	39.5	39.3	25.6	25.9
5	Roadside	Diffusion Tube	83	26.9	28.8	27.8	21.9	23.8
6	Roadside	Diffusion Tube	100	43.8	40.5	44.3	34.2	34.8
7	Roadside	Diffusion Tube	92	24.1	22.6	24.4	21	19.8
8	Roadside	Diffusion Tube	92	30.7	30.3	28.8	24	27.4
9	Roadside	Diffusion Tube	75	30.2	27.5	28	-	25.3
10	Roadside	Diffusion Tube	100	38	43.1	39.7	34.9	36.1
11	Roadside	Diffusion Tube	92	35.2	24.6	23.8	20.5	22.4
12	Roadside	Diffusion Tube	100	27.6	28.7	28.3	23	25.5
13	Roadside	Diffusion Tube	83	24.6	23.5	22.4	19.6	21.5
14	Roadside	Diffusion Tube	83	34.7	35.3	33.6	27.7	31.5
15	Roadside	Diffusion Tube	92	18.2	19.4	18.8	17.3	17.7
16	Roadside	Diffusion Tube	92	18.2	19.4	18.2	16.7	17.4
17	Roadside	Diffusion Tube	92	19.1	20	17.8	16.1	17.6
18	Roadside	Diffusion Tube	92	-	25.3	22.4	19.5	22.7
19	Roadside	Diffusion Tube	92	-	27.2	23.7	18.8	21.3
20	Roadside	Diffusion Tube	100	-	28.4	23.8	21.3	25.1
21	Roadside	Diffusion Tube	92	32.1	24.5	24.5	22.4	25.6
22	Roadside	Diffusion Tube	75	32.3	32.8	32.2	26.5	32.1
23	Roadside	Diffusion Tube	100	25.2	24.3	24.4	23.1	24.3

24	Roadside	Diffusion Tube	100	35.8	36.6	33	32.4	35.9
25	Roadside	Diffusion Tube	92	33	33	32.4	28.2	32.0
26	Roadside	Diffusion Tube	-	18.3	19.9	19.1	-	-
27	Roadside	Diffusion Tube	100	31.3	30.6	31.9	28.3	29.6
28	Roadside	Diffusion Tube	92	31.9	34	32.7	36.3	38.0
29	Roadside	Diffusion Tube	83	35.6	36.3	32.4	30.7	36.1
30	Roadside	Diffusion Tube	100	30.2	28.5	26.6	23.9	26.9
31	Roadside	Diffusion Tube	92	38.4	43.1	41.4	37.3	36.0
32	Roadside	Diffusion Tube	92	29.9	31.4	33.3	28.7	34.0
33	Roadside	Diffusion Tube	83	32.8	38.4	36.6	34.1	37.5
34	Travel Blank	Diffusion Tube	-	-	-	-	-	-
35	Roadside	Diffusion Tube	92	29.7	29.4	29.8	28.4	30.4
36	Roadside	Diffusion Tube	83	27.1	27.8	27.1	23	27.2
37	Roadside	Diffusion Tube	100	36.1	39.6	36.7	35.9	36.3
38	Roadside	Diffusion Tube	100	42.2	44.4	42.5	36.4	38.3
39	Roadside	Diffusion Tube	92	29.2	27.5	28	26	29.4
40	Roadside	Diffusion Tube	100	32.2	33	31.1	36.4	40.0
41	Roadside	Diffusion Tube	83	31.2	28.8	30	27.1	30.5

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75% - Note: all data capture 75% or greater, no annualisation required

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

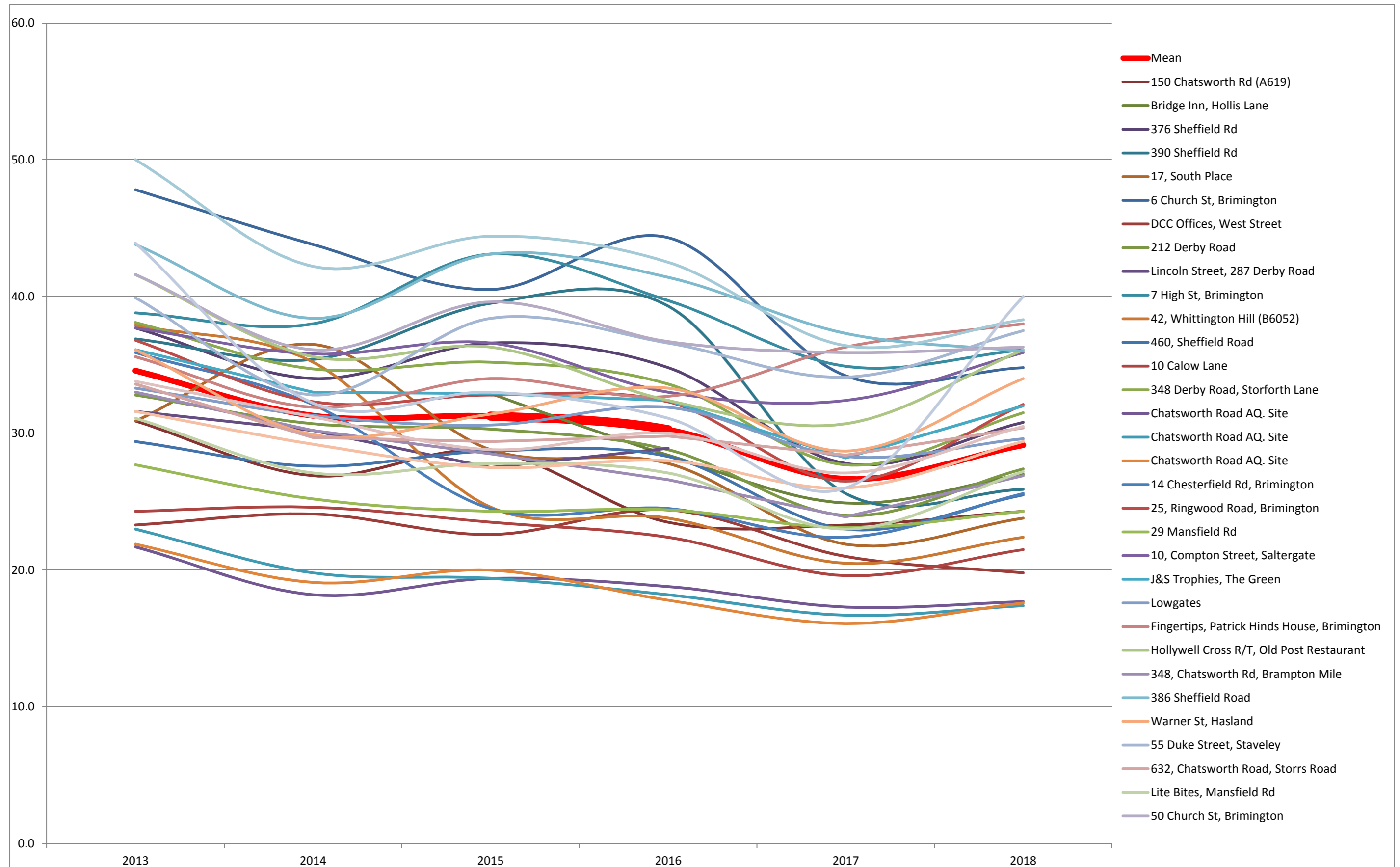


Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
				2014	2015	2016	2017	2018
AURN 1, Chesterfield Roadside	Roadside	Automatic	91.8	0	0	0	0	0
AURN 2, Chesterfield Loundsley Green	Urban Background	Automatic	91.6	-	0 (53.5)	0	0 (58.2)	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

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

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

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

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
			2014	2015	2016	2017	2018
AURN 1, Chesterfield Roadside	Roadside	82.30%	19.0	19.8	17.7	14.3	16.8
AURN 2, Chesterfield Loundsley Green	Urban Background	95.20%	-	14.4	14.8	12.0	14.4

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

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

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

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

Figure A.2 – Trends in Annual Mean PM₁₀ Concentrations

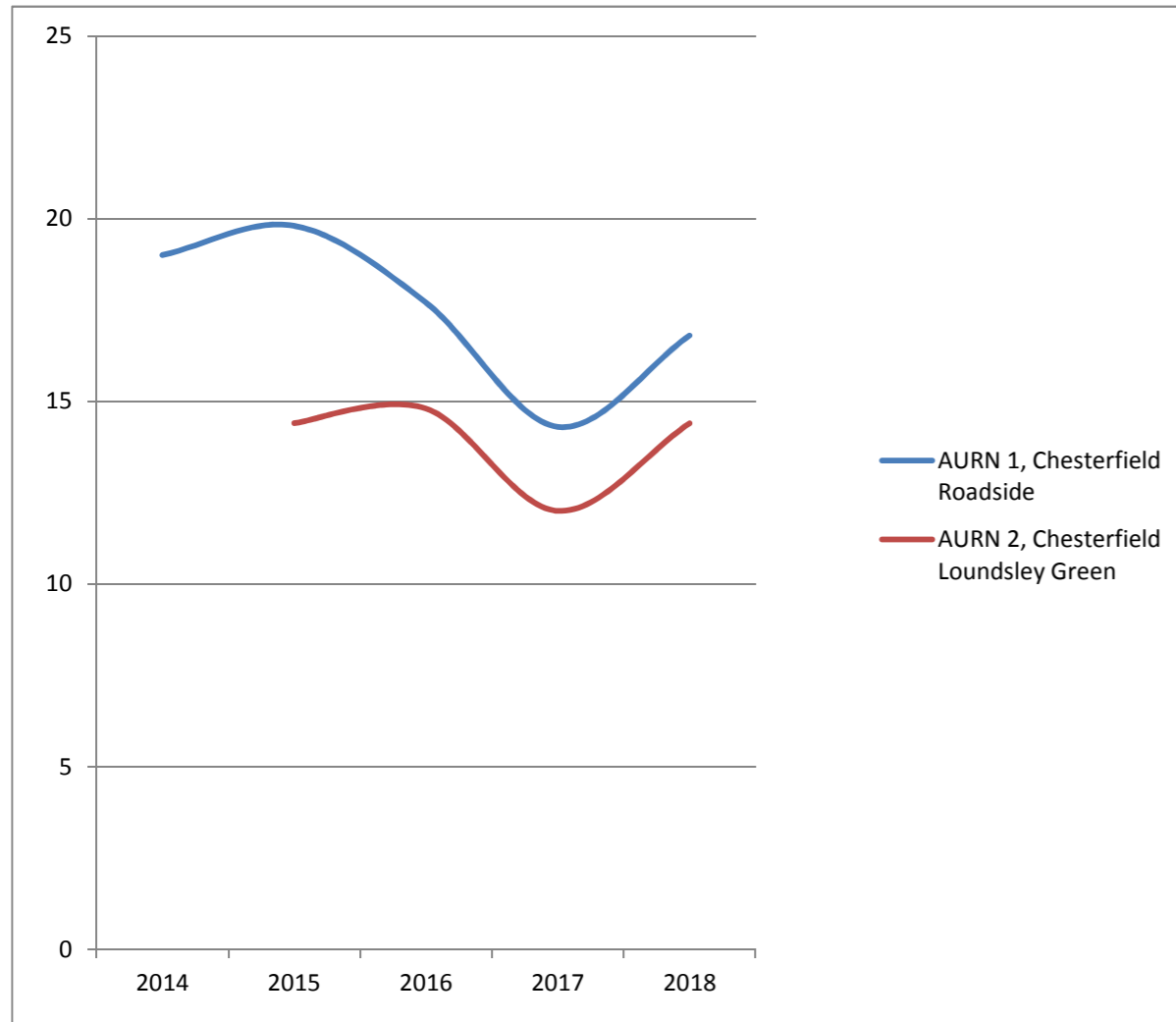


Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
			2014	2015	2016	2017	2018
AURN 1, Chesterfield Roadside	Roadside	82.20%	11	2	0	3	3 (29.3)
AURN 2, Chesterfield Loundsley Green	Urban Background	95.80%	-	1 (23)	0	3 (23.1)	2

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

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

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

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

Figure A.3 – Trends in Number of 24-Hour Mean PM₁₀ Results >50µg/m³

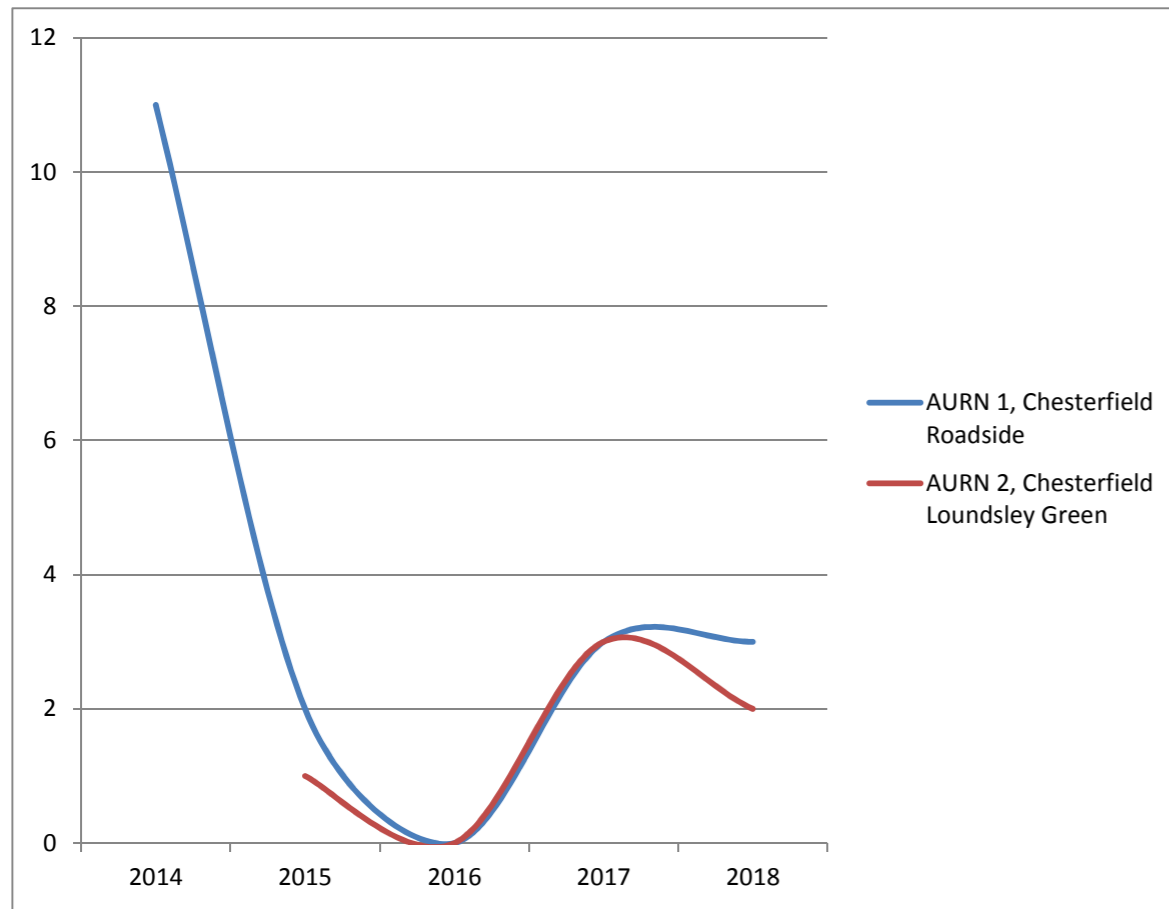


Table A.7 – PM_{2.5} Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
			2014	2015	2016	2017	2018
AURN 1, Chesterfield Roadside	Roadside	95.50%	11.5	10.4	11.3	8.8	9.7
AURN 2, Chesterfield Loundsley Green	Urban Background	95.00%	-	7.8	10.3	8.7	9.6

Annualisation has been conducted where data capture is <75%

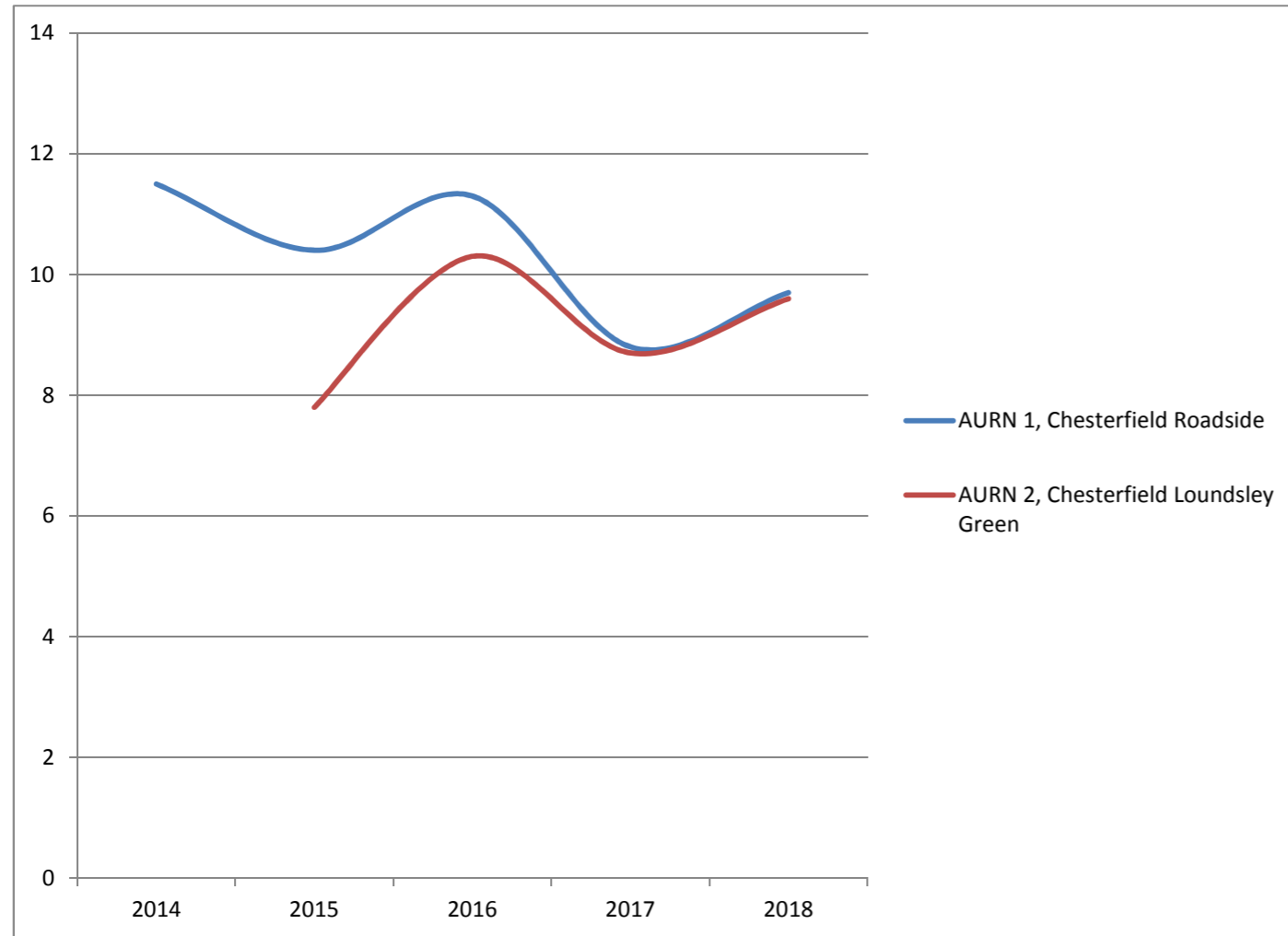
Notes:

(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.4 – Trends in Annual Mean PM_{2.5} Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2018

Site ID	NO ₂ Mean Concentrations (µg/m ³)													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.91) ⁽¹⁾	
1	33	32	37	34	23	22	25	23	25	25	37	30	28.8	24.3	
2	36	32	37	36	28	27	31	29	29	24	35	37	31.8	27.0	
3	35	38	42	40	32	31	36	30	31	32	41	44	36.0	30.8	
4	37	35	37	29	25	25	33	26	24	28	33	35	30.6	25.9	
5	-	28	31	-	25	29	29	24	24	26	35	32	28.3	23.8	
6	39	47	46	45	39	38	42	32	34	39	39	44	40.3	34.8	
7	31	26	32	-	17	17	20	16	19	22	32	31	23.9	19.8	
8	33	33	-	39	30	30	29	25	26	28	38	43	32.2	27.4	
9	30	-	37	33	27	24	28	-	21	-	35	34	29.9	25.3	
10	49	38	44	39	33	40	44	42	44	37	38	53	41.8	36.1	
11	-	30	30	29	28	27	28	22	21	22	28	29	26.7	22.4	
12	33	35	33	30	26	25	30	25	27	27	32	38	30.1	25.5	
13	32	27	-	24	-	-	23	21	21	22	30	32	25.8	21.5	
14	36	32	41	39	35	39	-	-	30	33	41	41	36.7	31.5	
15	31	22	20	20	17	-	18	16	14	20	31	28	21.5	17.7	
16	26	24	21	21	16	-	15	16	18	20	27	29	21.2	17.4	
17	30	24	23	23	12	-	18	17	17	19	27	26	21.5	17.6	
18	32	29	33	-	22	25	23	21	22	26	31	34	27.1	22.7	
19	30	26	36	-	19	19	22	19	19	21	33	36	25.5	21.3	
20	29	28	30	37	30	29	32	24	22	28	35	32	29.7	25.1	
21	33	28	37	31	26	27	29	22	24	-	35	40	30.2	25.6	
22	39	35	42	35	-	-	-	32	32	31	38	52	37.3	32.1	
23	36	33	37	26	24	27	24	22	22	27	33	35	28.8	24.3	
24	46	37	44	44	35	31	45	43	42	34	46	52	41.6	35.9	
25	42	27	44	44	32	32	42	29	-	32	38	48	37.3	32.0	
26	Not In Use In 2018														
27	40	30	44	40	30	28	34	30	31	34	34	41	34.7	29.6	
28	49	44	61	49	49	37	-	36	37	34	39	47	43.8	38.0	
29	41	37	44	-	47	43	45	33	-	35	42	51	41.8	36.1	

30	25	33	46	38	29	29	28	28	28	27	32	37	31.7	26.9
31	47	40	50	43	39	35	47	39	40	37	41	-	41.6	36.0
32	40	43	50	43	35	-	39	35	32	33	40	44	39.5	34.0
33	44	37	49	43	40	36	47	-	-	43	39	55	43.3	37.5
Travel Blank														
35	44	32	42	38	-	29	35	30	30	29	40	41	35.5	30.4
36	40	34	40	37	-	-	25	23	24	28	35	34	32.0	27.2
37	50	39	54	41	37	32	39	43	37	40	43	49	42.0	36.3
38	49	33	49	38	35	42	48	45	42	41	47	61	44.2	38.3
39	34	28	44	40	32	30	32	26	-	30	39	44	34.5	29.4
40	51	36	56	46	43	37	47	43	44	46	47	57	46.1	40.0
41	35	33	49	-	37	40	30	26	25	-	39	42	35.6	30.5

Local bias adjustment factor used

National bias adjustment factor used

Annualisation has been conducted where data capture is <75% - Note: data capture > 75%

Where applicable, data has been distance corrected for relevant exposure – Note: not applicable

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

(2) Distance corrected to nearest relevant public exposure.

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

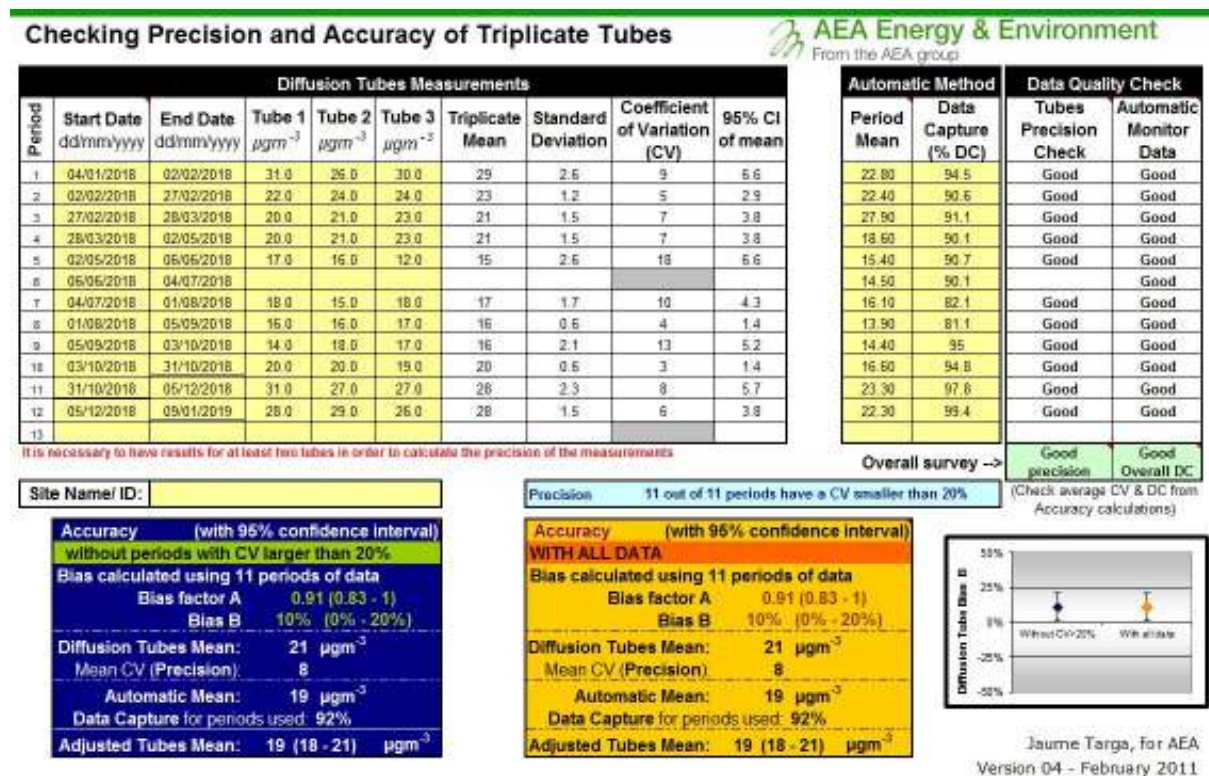
NO₂ diffusion tubes are supplied by South Yorkshire Air Quality Samplers, the preparation method being 50% triethanolamine in acetone. The laboratory follows the procedures set out in the Harmonisation Practical Guidance. The national bias factor for the tubes supplied by this source is 0.95. Data from 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): 0.91

The calculation for deriving this factor is shown below:



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 (0.91) varies from the national factor (0.95) 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. The locally derived bias factor has been calculated and used each year since 2011.

The reported results use the locally calculated bias factor, for the reasons discussed above.

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 $2.1\mu\text{g}/\text{m}^3$, prior to the bias factor adjustments being made.

Annualisation

Data capture for all sites is equal to or exceeds 75%, as such no annualisation of data is required.

PM Monitoring Adjustment

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

QA/QC of automatic monitoring

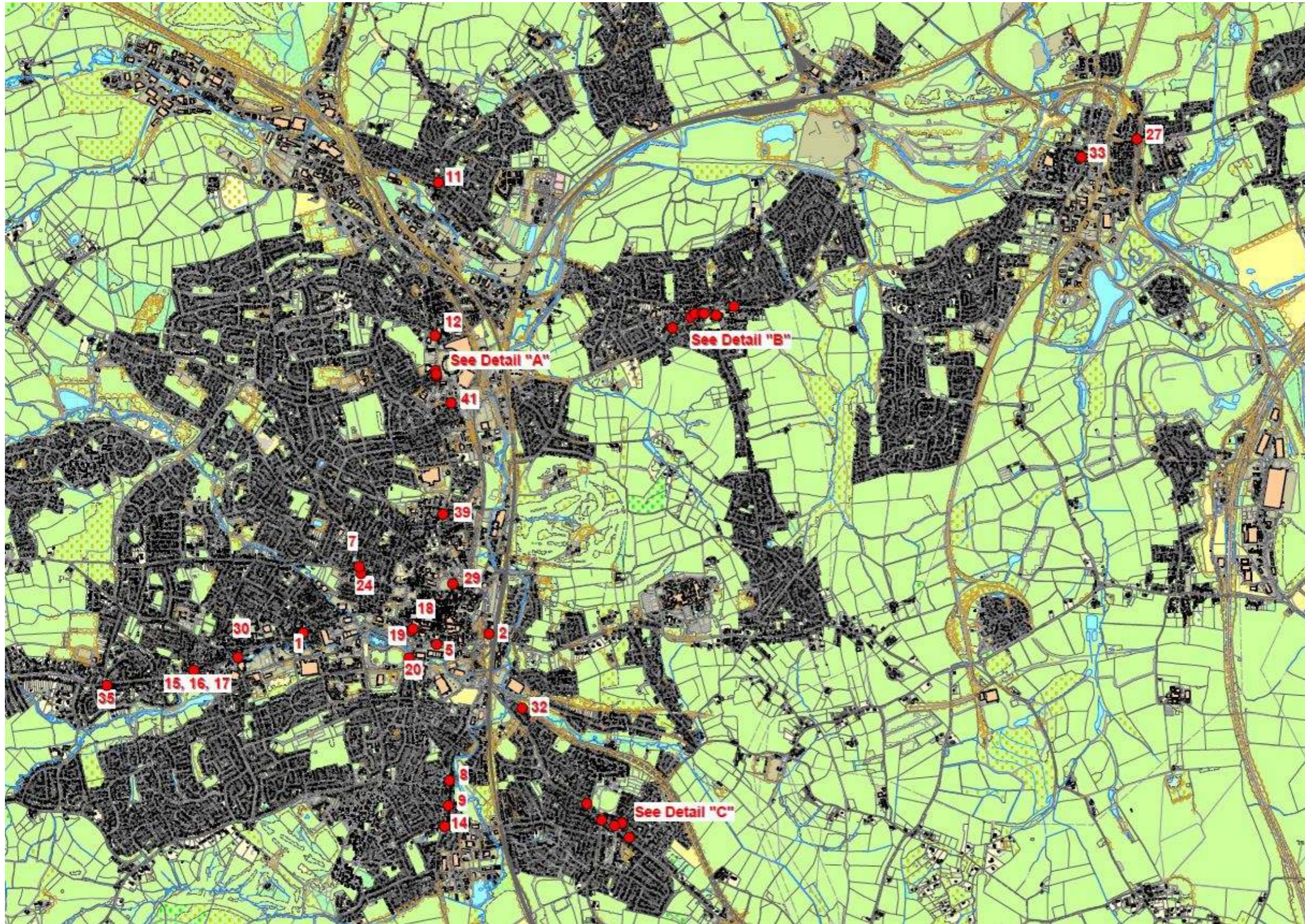
Data validation is carried out by BureauVeritas on behalf of DEFRA. On site calibration is carried out by Chesterfield BC staff on a 14 day cycle, using standard calibration gases, and the calibration data is sent direct to BureauVeritas, and RicardoAEA, by email. The margin of error for the NO_x Monitor at the Chesterfield Roadside site is 11.1%. The margin of error for the NO_x Monitor at the Chesterfield Loundsley Green site site is 11.9%. The margins of error for the Particulate Monitors at both sites are 8.7% and 16.4% for the PM_{10} and $\text{PM}_{2.5}$, 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_2 Monitoring: Practical Guidance for Laboratories and Users".

The AIR-PT scheme results show the overall performance of the analysis laboratory as good

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



Detail A

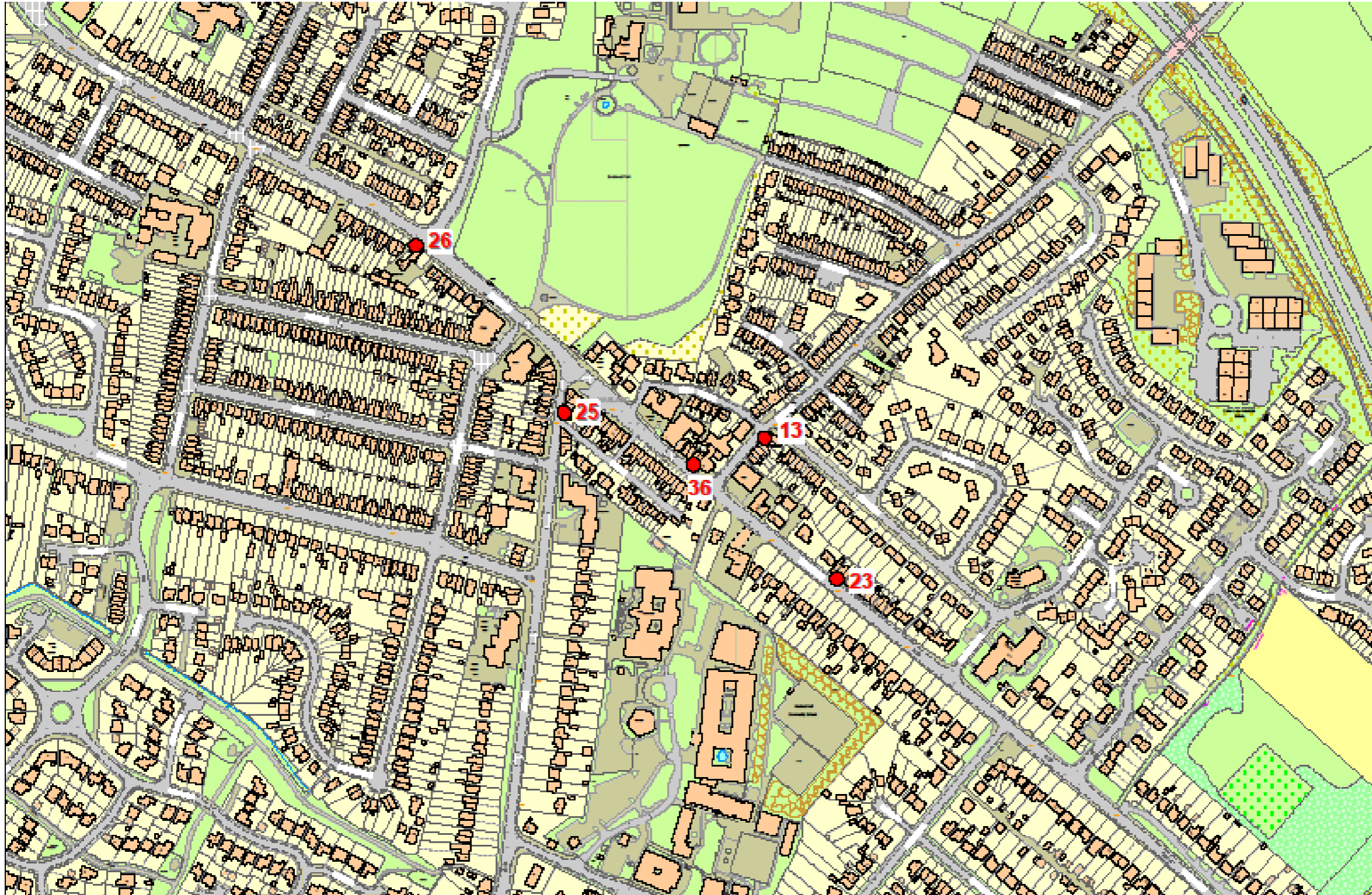


Detail B



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 ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

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 (NO₂) in East Midlands (UK0032)

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

NO₂ 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 NO₂ Monitoring: Practical Guidance, Feb 2008

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

Fine Particulate Matter (PM_{2.5}) in the United Kingdom, DEFRA 2012

Assessment of Particulate Emissions from Wood Log and Wood Pellet Heating Appliances, Ricardo-AEA 2017

Airborne Particles from Wood Burning in UK Cities, King's College London/National Physical Laboratory 2017

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

Improving Air Quality, House of Commons 2018

Local Air Quality Management Policy Guidance (PG16) DEFRA 2016

Local Air Quality Management Technical Guidance (TG16) DEFRA 2018

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