CHESTERFIELD
BOROUGH COUNCIL

2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June, 2022

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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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The main pollutant of concern in Chesterfield is Nitrogen Dioxide (NO_2) 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 has demonstrated intermittent breaches of the Air Quality Objective. Pollution levels dropped appreciably as a result of the COVID-19 lockdowns in 2020, however this was not sustained as the restrictions were eased, and pollution levels have increased to near pre-pandemic levels. Notwithstanding this, **there were no breaches of the Air Quality Objective for Nitrogen Dioxide during 2021**

Further details are given in section 3.1.3

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.

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

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

[3] Defra. Air quality appraisal: damage cost guidance, July 2021

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

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_{10} 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.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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

[5] Defra. Clean Air Strategy, 2019

[6] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

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 a decrease (following the long term trend), reversing the short-term increase in 2018. Some variation across the borough has been noted, but the decrease is, with a few minor exceptions, 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) are all below the Air Quality Objective for Nitrogen Dioxide. However, there is notable variation along the short stretch of road. Once again, given the historic variation in the data, targeted monitoring will continue at this location.

iv) The sharp reduction in pollution levels in 2020 (due to the restrictions imposed as a result of the COVID-19) has not been sustained as restrictions were eased but the overall trend remains a gradual reduction in pollution levels

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) travel 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 2030 (as contained in *The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations: Detailed Plan*, published July 2017). We support 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)

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 Nº 1 AQMA.

Local Engagement and How to get Involved

Most inputs regarding managing air quality are 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.

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

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Chesterfield Borough Council .

This ASR has been signed off by a 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.

The annual status report is fundamental to ensuring the monitoring of trends and identification of areas of local air pollution exposure, and I am pleased to endorse this report from Chesterfield Borough Council.

Lower levels of air pollution is a priority outcome for the Derbyshire Health & Wellbeing Board. Air pollution is associated with a number of adverse effects across the life course, contributing towards asthma in children, worsening of respiratory and cardiovascular disease, and cases of lung and other cancers.

During the height of the COVID pandemic the population of Derbyshire changed the way they lived and travelled. These behaviours, if sustained, can have a positive effect on local air quality as well as our physical and mental health. It is crucial that we build on this and the decarbonisation plans to support further reductions in local air pollution.

If you have any comments on this ASR please send them to Steven Payne at:

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1 Local Air Quality Management

This report provides an overview of air quality in Chesterfield during 2021. 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 are presented in Table E.1.

2 Actions to Improve Air Quality

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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Chesterfield Borough Council can be found in Table 2.1. The table presents a description of the single AQMA that is currently designated within Chesterfield. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA and also the air quality monitoring locations in relation to the AQMA. The air quality objectives pertinent to the current AQMA designation are as follows:

- NO_2 annual mean

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

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Chesterfield No1	Declared 14th August 2015	NO2 Annual Mean	4 to 18 (evens only) Church Street, Brimington	No	42.5	36.3	AQAP in draft form	Not applicable

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

☐ **Chesterfield BC confirm that all current AQAPs have been submitted to Defra**

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 and detailed. Annual NO_2 concentrations are generally decreasing steadily across the borough, this trend is also true for annual, and 24-Hour mean, levels for both PM_{10} and $PM_{2.5}$ concentrations at both AURN sites. The conclusions reached were acceptable for all sources and pollutants.

Chesterfield BC has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 10 measures are included within Table 2.2, with the type of measure and the progress Chesterfield BC have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Chesterfield BC expects the following measures to be completed over the course of the next reporting year: to complete the AQMA Action Plan document.

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 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.

iii) 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.

iv) 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 that 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 NO_2 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 AQMA number 1.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Industrial Emissions	Environmental Permits	Other measure through permit systems and economic instruments	2010	2032	Local Authority Environmental Health Dept.	Local Authority	NO	Partially Funded	£10k - 50k	Implementation	General Reduction in Industrial Emissions	All Permitted process rated as Low/Medium Environmental Impact	Completed	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	2017	2032	Local Authority Environmental Health Dept.	Local Authority	NO	Partially Funded	£10k - 50k	Implementation	General Reduction in Traffic Emissions	None assigned	Implementation on-going	Reduction in staff numbers 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	2016	2032	Local Authority Environmental Health Dept., LA Fleet Manager	Local Authority	NO	Funded	£10k - 50k	Implementation	Reduced vehicle emissions	None assigned	Implementation on-going	Lack of funding
4	Agile Working	Promoting Travel Alternatives	Encourage / Facilitate home-working	2014	2032	Local Authority	Local Authority	NO	Funded	£10k - 50k	Completed	Reduced vehicle emissions	Number of staff homeworking per day	Data no longer recorded	Uptake greatly increased due to Covid-19
5	Publicity	Public Information	Via the Internet	2013	2032	Local Authority Environmental Health Dept.	Local Authority	NO	Funded	< £10k	Implementation	Possible Reduction in vehicle emissions	Number of website hits	Website kept up to date	
6	Car Parking	Promoting Travel Alternatives	Workplace Travel Planning	2017	2032	Local Authority	Local Authority	NO	Funded	< £10k	Implementation	Possible Reduction in vehicle emissions	Increased Parking Income/Number of staff homeworking	Many staff working from home	Uptake greatly increased due to Covid-19
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	2010	2032	Local Authority Environmental Health Dept., LA County Council, PHE	Local Authority	NO	Partially Funded	< £10k	Implementation	Reduction in a range of emissions	None assigned	Work Plans/Action Plans Developed	Air Quality Working Group involves key players in public and voluntary sectors
8	Travel Plans Required as planning conditions for larger developments	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2010	2032	Local Authority Environmental Health Dept., LA Planning Dept.	Local Authority	NO	Not Funded	< £10k	Implementation	Reduced vehicle emissions	None assigned	Implementation on-going	Travel Plans required as planning conditions for larger developments

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
9	100% Coverage of Smoke Control Area	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2010	2032	Local Authority Environmental Health Dept.	Local Authority	NO	Not Funded	< £10k	Completed	Smoke and Sulphur Dioxide emissions reduced through Clean Air Act Regulation	Air Quality Objective	Education and Enforcement, as required	Reduction in staff numbers 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	2010	2032	Local Authority Environmental Health Dept.	Local Authority	NO	Funded	< £10k	Implementation	Reduction in a range of emissions	Air Quality Objective	Implementation on-going	Raise awareness on actions that individuals can take

$PM_{2.5}$ – 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 $PM_{2.5}$:

1) 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.
2) 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.
3) 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.
4) 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.

Ongoing monitoring indicates that the possible target for PM2.5 (a maximum concentration of 10µg/m3 to be met across England by 2040) is currently being met within Chesterfield BC area.

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

This section sets out the monitoring undertaken within 2021 by Chesterfield BC and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Chesterfield BC undertook automatic (continuous) monitoring at 2 sites during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring 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. Automatic monitoring results for Chesterfield BC are available through the UK-Air website: 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 (i.e. passive) monitoring of NO_2 at 36 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic 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.

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.1.3 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment (for bias factor – 0.89, and travel blank adjustment – 1.3µg/m^3 mean over-read) and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

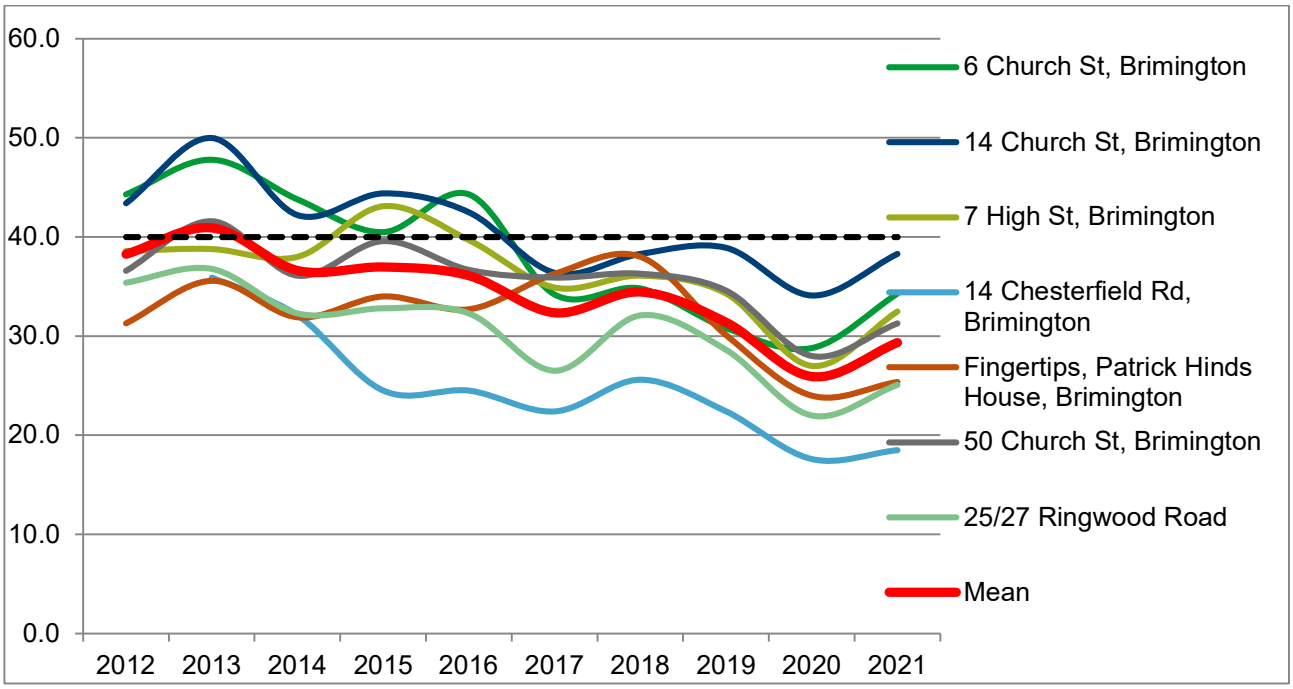
Pollution levels fell appreciably during 2020, due to the restrictions associated with the initial stages of the Covid-19 pandemic, but as the restrictions eased pollution levels across the borough returned to near pre-pandemic levels.

No breaches of the Air Quality Objectives for Nitrogen Dioxide were found during 2021, across the whole of the Borough of Chesterfield.

We have reviewed the location of current monitoring sites, with regard to the sources of pollution, and confirm that the locations are still suitable.

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

Figure 1: Variation in NO_2 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 NO_2. **Once again, none of the monitoring locations within or around the AQMA demonstrate a breach of the AQO for NO_2.**

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 residental façade in the AQMA is expected the reach capacity in the next few years, even if the proposed residental developments do not take place. The intensive monitoring will continue within, and around the vicinity of the AQMA.

We do not intend to revoke the existing AQMA.

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

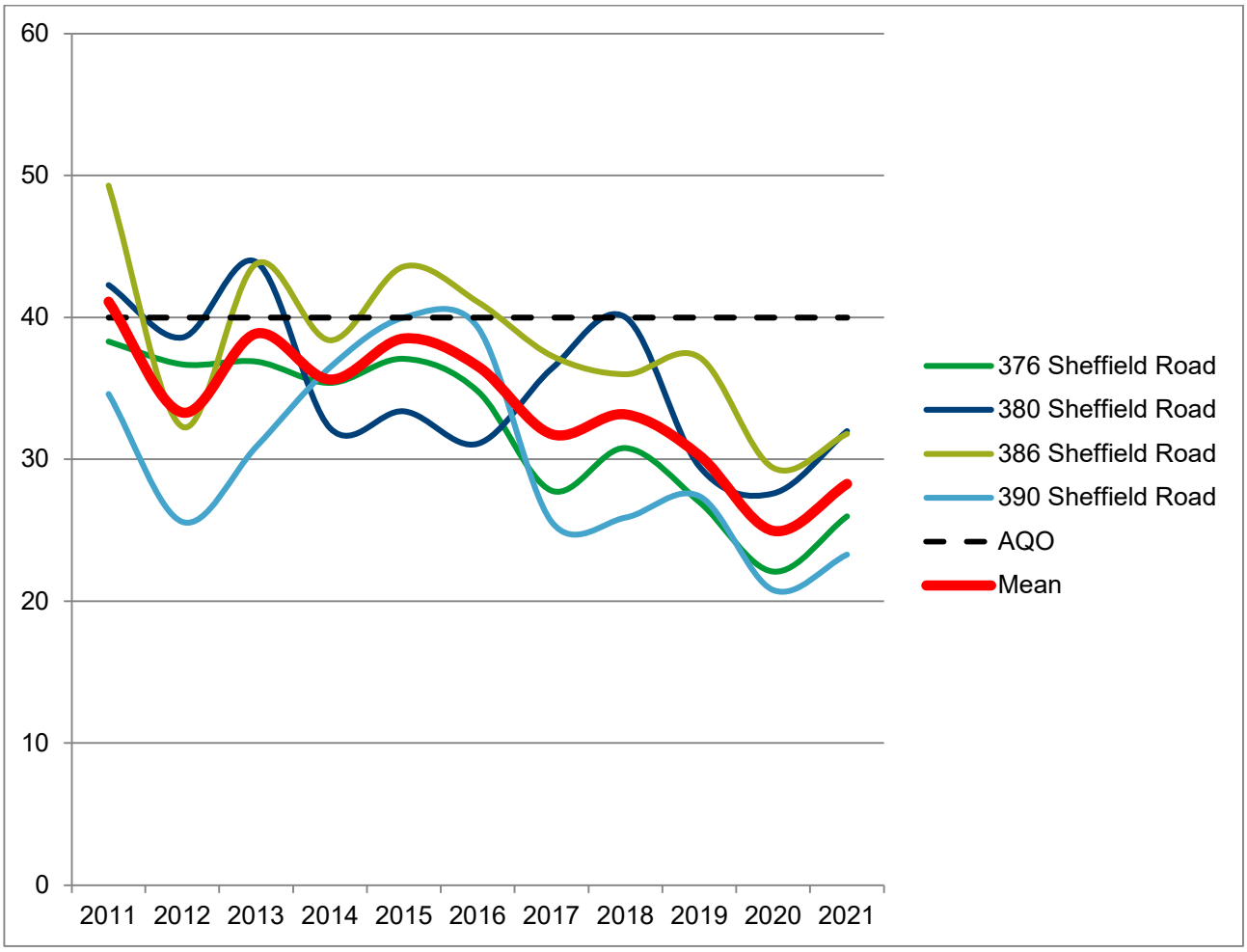
Intensive monitoring is also taking place at a row of houses affected by the change in a road junction serving a major supermarket (this has been discussed fully in the 2013 Detailed Assessment and 2014 Progress Report). This is a row of mixed commercial premises (comprising a public house, retail shop, sandwich shop, and hairdressers) and residential properties (7 homes). There are 4 diffusion tubes on this row of properties. **None of the locations on this façade demonstrate a 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 NO_2 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 NO_2. For comparison with Figure 3 (above), the premises numbers run left to right.

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

3.1.4 Particulate Matter (PM_{10})

Both AURN sites monitor for PM_{10}. The levels monitored do not breach either the annual mean or the 24 hour mean objectives

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.
Monitoring is located on two sites which are affiliated to the AURN.

3.1.5 Particulate Matter ($PM_{2.5}$)

Both AURN sites monitor for PM2.5. The data show that the levels of PM2.5 within the borough area comply with the annual average EU limit value (25µg/m^3 by 2020). The levels at Chatsworth Road have been fairly consistent for the last few years, and have shown a gradual slight reduction in levels. The levels at the Loundsley Green site, are also fairly consistent, and similarly show a gradual reduction in the background level. The levels at this background site are lower, as would be expected. Monitoring is continuing.

The fraction of mortality attributable to particulate air pollution (as calculated by Public Health England, and made available in the Public Health Outcomes Framework: https://fingertips.phe.org.uk/static-reports/public-health-outcomes-framework/at-a-glance/e07000034.html?area-name=chesterfield) is 4.72%, this is slightly lower than the England value (5.64%), but is not statistically significant

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

3.1.6 Sulphur Dioxide (SO_2)

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. Historically, 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.**

3.1.7 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 (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which 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	NO2, PM10, PM2.5, Benzene	NO	Chemiluminescent, Light Scattering, Pumped Tubes	3	2	3
AURN 2	Chesterfield Loundsley Green	Urban Background	436472	372038	NO2, PM10, PM2.5, Heavy Metals	NO	Chemiluminescent, Light Scattering 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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co located with a Continuous Analyser?	Tube Height (m)
1	150 Chatsworth Rd	Façade	437222	370956	NO_2	No	0	1m	N	2
2	Bridge Inn, Hollis Lane	Facade	438710	370950	NO_2	No	0	2m	N	2
3	376 Sheffield Road	Façade	438291	373006	NO_2	No	0	1m	N	2
4	390 Sheffield Road	Façade	438284	373057	NO_2	No	0	1m	N	2
5	17, South Place	Façade	438293	370863	NO_2	No	0	1m	N	2
6	6 Church Street, Brimington	Façade	440440	373514	NO_2	Yes	0	1m	N	2
7	DCC Offices, West Street	Roadside	437670	371490	NO_2	No	3m	1m	N	2
8	212 Derby Road	Façade	438395	369776	NO_2	No	0	3m	N	2
9	287 Derby Road	Façade	438385	369574	NO_2	No	0	2m	N	2
10	7 High Street, Brimington	Façade	440531	373484	NO_2	No	0	1m	N	2
11	42, Whittington Hill	Façade	438307	374560	NO_2	No	0	2m	N	2
12	460, Sheffield Road	Façade	438279	373336	NO_2	No	0	2m	N	2
13	10 Calow Lane, Hasland	Façade	439780	369440	NO_2	No	0	1m	N	2
14	348 Derby Road, Storforth Lane	Façade	438357	369410	NO_2	No	0	2m	N	2

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co located with a Continuous Analyser?	Tube Height (m)
15	Chatsworth Road AQ. Site	Co-location	436349	370658	NO_2	No	4m	4m	Y	3
16	Chatsworth Road AQ. Site	Co-location	436349	370658	NO_2	No	4m	4m	Y	3
17	Chatsworth Road AQ. Site	Co-location	436349	370658	NO_2	No	4m	4m	Y	3
18	Site Removed									
19	28a Park Road	Façade	438090	370970	NO_2	No	0	1m	N	2
20	74 Park Road	Façade	438072	370758	NO_2	No	3m	1m	N	2
21	14 Chesterfield Road, Brimington	Roadside	440175	373396	NO_2	No	1m	1m	N	2
22	25/27 Ringwood Road, Brimington	Façade	440669	373711	NO_2	No	0	1m	N	2
23	29 Mansfield Road, Hasland	Façade	439830	369320	NO_2	No	0	2m	N	2
24	10, Compton Street, Saltergate	Façade	437686	371433	NO_2	No	0	1m	N	2
25	J+S Trophies, The Green, Hasland	Façade	439490	369608	NO_2	No	0	3m	N	2
26	Site Removed									
27	Lowgates, Staveley	Façade	443897	374912	NO_2	No	0	3m	N	2
28	Patrick Hinds House, Church St, Brimington	Façade	440323	373482	NO_2	No	0	1m	N	2

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co located with a Continuous Analyser?	Tube Height (m)
29	Hollywell Cross R/T, Old Post Restaurant	Façade	438417	371357	NO_2	No	0	1m	N	2
30	348, Chatsworth Rd, Brampton Mile	Façade	436702	370761	NO_2	No	0	1m	N	2
31	386 Sheffield Road	Façade	438289	373028	NO_2	No	0	2m	N	2
32	Warner Street, Hasland	Roadside	438976	370356	NO_2	No	2m	1m	N	2
33	55 Duke Street, Staveley	Façade	443452	374762	NO_2	No	0	4m	N	2
34	Travel Blank	-	-	-		-	-	-	-	-
35	Site Removed									
36	Lite Bites, Mansfield Road, Hasland	Façade	439710	369420	NO_2	No	0	2m	N	2
37	50 Church Street, Brimington	Façade	440361	373513	NO_2	No	0	1m	N	2
38	14 Church Street, Brimington	Façade	440421	373515	NO_2	Yes	0	1m	N	2
39	43 Sheffield Road	Façade	438343	371908	NO_2	No	0	1m	N	2
40	380 Sheffield Road	Façade	438290	373014	NO_2	No	0	1m	N	2
41	James Street / Lockoford Lane	Roadside	438407	372798	NO_2	No	2	1m	N	2

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
AURN 1	463348	370651	Roadside	95	95	18.0	16.8	17.4	14.9	15.9
AURN 2	436472	372038	Urban Background	71	71	12.4	12.2	12.4	8.1	13.9

☒ **Annualisation has not been required**

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
1	437222	370956	Roadside	100	100	23.3	24.3	22.7	17.1	18.5
2	438710	370950	Roadside	100	100	24.9	27.0	25.4	22.3	22.9
3	438291	373006	Roadside	92	92	27.8	30.8	27.5	22.1	26
4	438284	373057	Roadside	100	100	25.6	25.9	27.9	20.8	23.3
5	438293	370863	Roadside	100	100	21.9	23.8	21.9	16.9	19.7
6	440440	373514	Roadside	100	100	34.2	34.8	31.3	28.8	34.3
7	437670	371490	Roadside	83	83	21.0	19.8	18.8	14.3	15
8	438395	369776	Roadside	100	100	24.0	27.4	24.8	21.1	23.9
9	438385	369574	Roadside	100	100	-	25.3	23.6	18.7	23.1
10	440531	373484	Roadside	100	100	34.9	36.1	34.9	27.0	32.5
11	438307	374560	Roadside	100	100	20.5	22.4	21.7	17.9	20.3
12	438279	373336	Roadside	100	100	23.0	25.5	24.4	19.0	21
13	439780	369440	Roadside	100	100	19.6	21.5	19.8	15.1	17.2
14	438357	369410	Roadside	100	100	27.7	31.5	28.0	22.5	26.2
15	436349	370658	Roadside	100	100	17.3	17.7	16.5	13.1	14.8
16	436349	370658	Roadside	100	100	16.7	17.4	16.2	12.5	14.4
17	436349	370658	Roadside	100	100	16.1	17.6	16.4	12.9	14.5
18	438104	370989	Roadside	-	-	19.5	22.7	20.6	-	-
19	438090	370970	Roadside	83	83	18.8	21.3	20.9	15.5	17.1
20	438072	370758	Roadside	83	83	21.3	25.1	23.4	17.1	21.7
21	440175	373396	Roadside	100	100	22.4	25.6	23.1	17.6	18.5
22	440669	373711	Roadside	100	100	26.5	32.1	29.1	22.0	25.1
23	439830	369320	Roadside	92	92	23.1	24.3	22.8	16.6	19.7
24	437686	371433	Roadside	92	92	32.4	35.9	33.5	25.3	27.1
25	439490	369608	Roadside	100	100	28.2	32.0	29.5	23.3	27.3
26	439490	369590	Roadside	-	-	-	-	-	-	-
27	443897	374912	Roadside	100	100	28.3	29.6	27.2	22.3	25.6
28	440323	373482	Roadside	100	100	36.3	38.0	30.6	24.0	25.4
29	438417	371357	Roadside	100	100	30.7	36.1	34.0	25.0	26.9
30	436702	370761	Roadside	92	92	23.9	26.9	24.6	19.0	21.3
31	438289	373028	Roadside	100	100	37.3	36.0	37.8	29.4	31.8
32	438976	370356	Roadside	100	100	28.7	34.0	31.1	23.4	27.8
33	443452	374762	Roadside	100	100	34.1	37.5	33.1	26.0	29.8
34	-	-	Travel Blank	-	-	-	-	-	-	
35	435654	370537	Roadside	-	-	28.4	30.4	25.5	-	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
36	439710	369420	Roadside	67	67	23.0	27.2	25.1	17.9	21.0
37	440361	373513	Roadside	100	100	35.9	36.3	35.2	28.0	31.6
38	440421	373515	Roadside	100	100	36.4	38.3	39.5	34.1	38.3
39	438343	371908	Roadside	100	100	26.0	29.4	26.8	20.5	23.2
40	438290	373014	Roadside	100	100	36.4	**40.0**	30.0	27.6	32
41	438407	372798	Roadside	92	92	27.1	30.5	24.7	22.6	26.3

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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

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

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

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

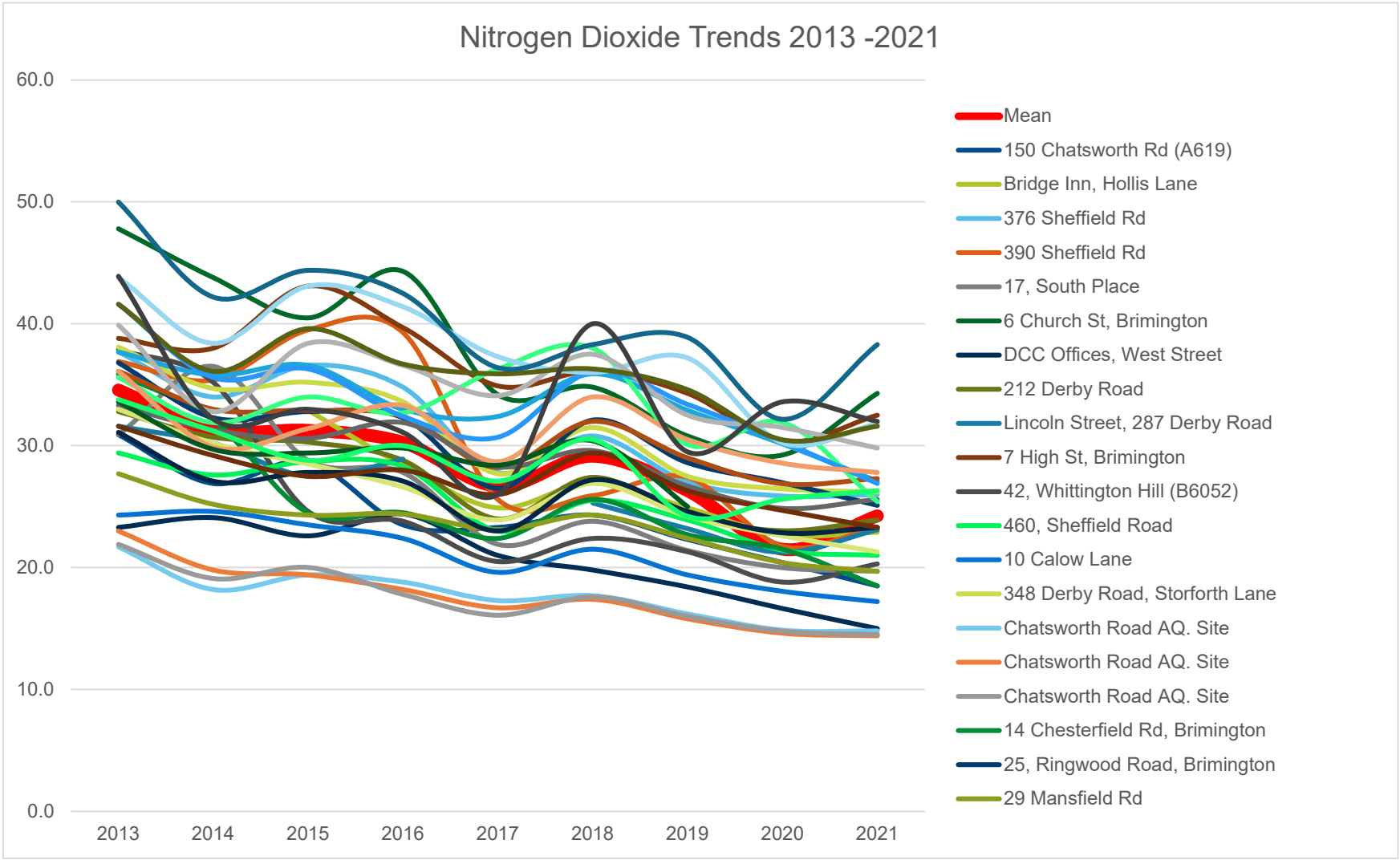


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
AURN 1	463348	370651	Roadside	100	100	0	0	0	0	0
AURN 2	436472	372038	Urban Background	100	100	0	**0 (58.2)**	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

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

(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%).

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
AURN 1	463348	370651	Roadside	100	100	14.3	16.8	14.1	12.2	11.8
AURN 2	436472	372038	Urban Background	100	100	12	14.4	12.7	10.9	10.3

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

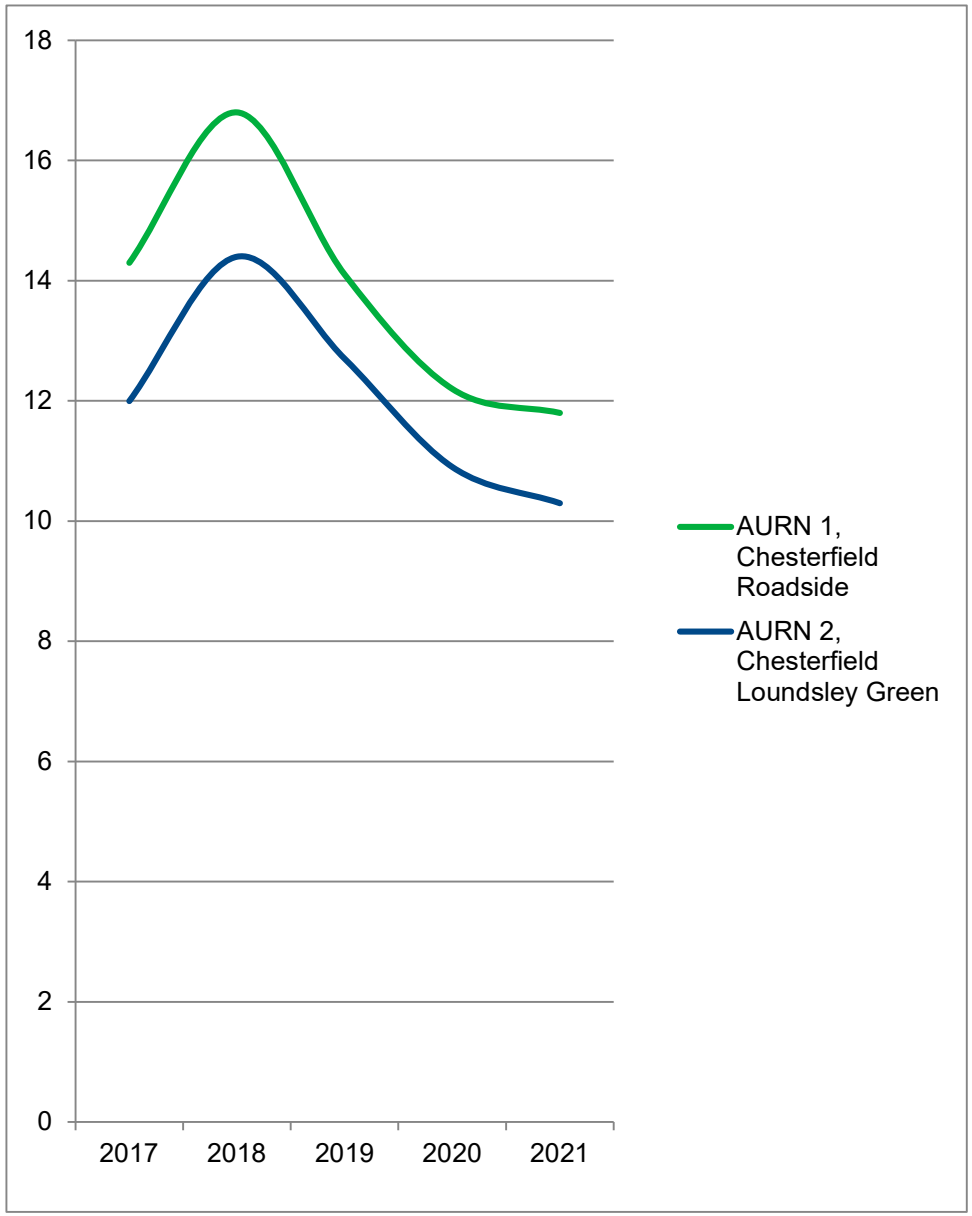


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
AURN 1	463348	370651	Roadside	100	100	3	3	3	2	1
AURN 2	436472	372038	Urban Background	100	100	3	2	3	1	1

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

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

(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%).

Figure A.3 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

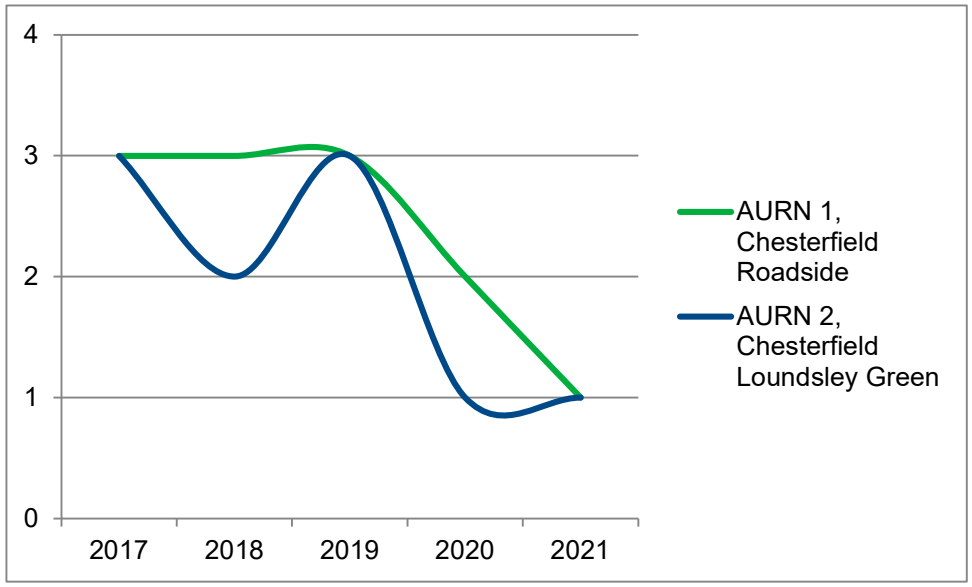


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
AURN 1	463348	370651	Roadside	100	100	8.8	9.7	8.9	7.5	7.3
AURN 2	436472	372038	Urban Background	100	100	8.7	9.6	8.4	6.9	6.5

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(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%).

Figure A.4 – Trends in Annual Mean $PM_{2.5}$ Concentrations

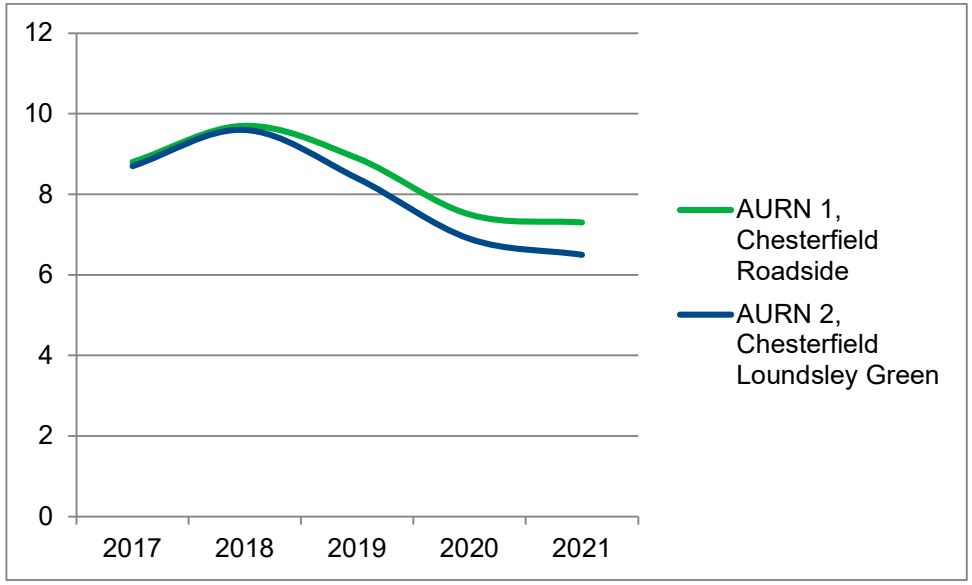


Table A.9 – SO_2 2021 Monitoring Results, Number of Relevant Instances

Sulphur Dioxide is no longer a pollutant of concern in Chesterfield

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised (where needed), Travel Blank Adjusted, and Bias Adjusted (0.89)
1	437222	370956	31	26	18	24	26	19	16	10	26	21	26	23	22.1	18.5
2	438710	370950	35	27	27	31	31	24	24	15	30	25	32	23	27.0	22.9
3	438291	373006	37	27	29	33	33	-	31	22	24	28	33	38	30.5	26.0
4	438284	373057	37	24	28	25	26	29	23	29	26	22	29	30	27.5	23.3
5	438293	370863	28	26	21	27	20	20	25	15	24	23	29	24	23.4	19.7
6	440440	373514	49	38	34	49	48	40	40	35	44	32	37	33	39.9	34.3
7	437670	371490	-	19	15	21	18	17	19	13	20	16	23	-	18.1	15.0
8	438395	369776	31	32	27	34	26	30	30	21	22	26	29	30	28.1	23.9
9	438385	369574	35	29	26	29	29	26	25	25	26	21	30	26	27.3	23.1
10	440531	373484	44	30	36	34	38	36	41	36	44	40	40	35	37.9	32.5
11	438307	374560	30	27	24	29	24	23	25	14	28	20	24	22	24.2	20.3
12	438279	373336	37	24	24	23	23	23	23	17	24	24	29	29	24.9	21.0
13	439780	369440	27	21	21	21	21	17	18	13	20	18	25	25	20.6	17.2
14	438357	369410	29	33	28	32	34	32	36	25	34	25	30	32	30.7	26.2
15	436349	370658	27	23	14	17	16	16	15	9	18	14	20	25	17.9	14.8
16	436349	370658	25	21	13	19	18	18	13	10	17	15	20	20	17.5	14.4
17	436349	370658	25	22	16	17	15	14	18	12	16	15	20	21	17.6	14.5
18	438104	370989	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	438090	370970	27	24	16	21	-	18	18	14	22	18	-	27	20.5	17.1
20	438072	370758	30	27	21	28	26	23	26	-	26	-	22	28	25.7	21.7
21	440175	373396	30	25	21	24	23	17	21	16	21	16	25	24	22.0	18.5
22	440669	373711	40	29	29	35	30	28	28	23	27	22	31	31	29.5	25.1
23	439830	369320	35	24	23	23	24	20	-	15	24	20	26	24	23.5	19.7
24	437686	371433	-	21	25	32	37	31	31	24	38	33	39	38	31.7	27.1
25	439490	369608	38	34	26	30	35	29	30	24	35	29	34	40	32.0	27.3
26	439490	369590	35	31	25	29	29	18	22	20	26	-	25	30	26.2	22.2
27	443897	374912	43	28	29	31	30	25	28	23	29	29	34	32	30.1	25.6
28	440323	373482	39	30	28	32	29	27	23	23	32	28	35	32	29.8	25.4
29	438417	371357	39	37	25	38	19	33	32	26	35	27	33	35	31.5	26.9
30	436702	370761	34	27	23	27	-	22	23	18	28	23	26	29	25.3	21.3
31	438289	373028	48	40	36	34	39	29	33	28	40	37	37	43	37.0	31.8
32	438976	370356	40	31	29	41	33	29	31	27	33	25	35	35	32.6	27.8
33	443452	374762	45	35	33	32	35	31	34	25	35	33	41	38	34.8	29.8
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	435654	370537	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	439710	369420	32	38	25	-	-	25	-	18	26	-	-	28	27.5	22.2

37	440361	373513	44	38	33	38	34	32	34	29	43	34	40	42	36.8	31.6
38	440421	373515	56	42	41	52	49	40	43	37	51	34	43	44	44.3	38.3
39	438343	371908	34	30	22	30	29	23	27	23	32	22	26	31	27.4	23.2
40	438290	373014	49	37	38	38	41	26	27	19	43	39	45	44	37.3	32.0
41	438407	372798	45	38	26	37	27	27	27	25	31	23	32	33	30.8	26.3

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

☒ **No distance correction is required**

☒ **Chesterfield BC confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within During 2021

Chesterfield BC has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Chesterfield BC During 2021

Chesterfield BC has not completed any additional works within the reporting year of 2021

QA/QC of Diffusion Tube Monitoring

NO_2 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 0.77. Data from the two sites operated by Chesterfield BC is supplied to DEFRA for input into the calculation of this factor.

Diffusion Tube Annualisation

Tube 36 (Lite Bites, Mansfield Road, Hasland required annualization). Details of this are shown overleaf:

Start date	End Date	AURN B1	Lite Bites D1	Corresponding AURN B1 when D1 is Available
06/01/2021	03/02/2021	23.00	32	23.00
03/02/2021	03/03/2021	21.85	38	21.85
03/03/2021	31/03/2021	14.07	25	14.07
31/03/2021	05/05/2021	19.35		
05/05/2021	02/06/2021	14.11		
02/06/2021	30/06/2021	12.35	25	12.35
30/06/2021	04/08/2021	11.14		
04/08/2021	01/09/2021	10.05	18	10.05
01/09/2021	29/09/2021	16.35	26	16.35
29/09/2021	03/11/2021	13.04		
03/11/2021	01/12/2021	16.07		
01/12/2021	05/01/2022	18.22	28	18.22
Mean	A_m	15.80	27.43	P_m 16.56
Minus Travel Blank		-1.3	26.13	
Bias Factor Adjustment		0.89	23.25	
Ratio	A_m/P_m	0.95		
Annualised Value		**22.19**		

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Chesterfield BC have applied a local bias adjustment factor of 0.89 to the 2021 monitoring data. A summary of bias adjustment factors used by Chesterfield BC over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.89
2020	Local	-	0.84
2019	Local	-	0.83
2018	Local	-	0.91
2017	Local	-	0.83

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Chesterfield BC required distance correction during 2021.

QA/QC of Automatic Monitoring

Data management is carried out by BureauVeritas, as part of the AURN system

LSO Duties are carried out in-house by Chesterfield BC. Calibration visits are carried out on the fortnightly basis on both AURN sites

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10} and $PM_{2.5}$ monitors utilised within Chesterfield BC do not required the application of a correction factor.

Automatic Monitoring Annualisation

All automatic monitoring locations within Chesterfield BC recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Chesterfield BC required distance correction during 2021.

Table C.2 – Local Bias Adjustment Calculation

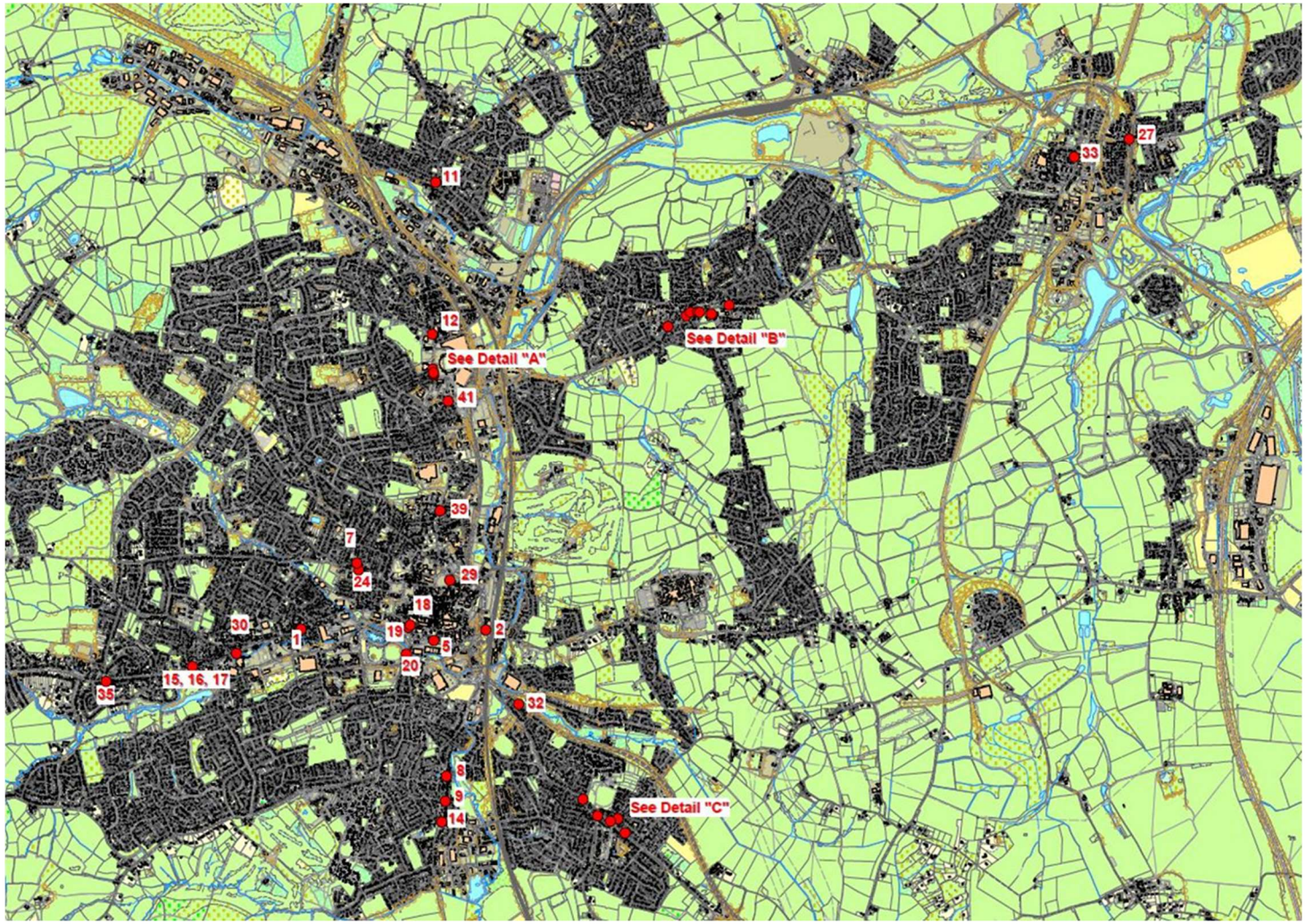
	Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Factor A	0.89 (0.7 – 1.04
Bias Factor B	19% (-4% - 42%)
Diffusion Tube Mean (µg/m^3)	17
Mean CV (Precision)	7%
Automatic Mean (µg/m^3)	15
Data Capture	99%
Adjusted Tube Mean (µg/m^3)	15 (12-18)

Notes:

A single local bias adjustment factor has been used to bias adjust the 2021 diffusion tube results.

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

Figure D.1 – Map of Non-Automatic Monitoring Sites



Detail A

Detail B

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

Detail C

Location and extent of Chesterfield No 1 AQMA

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
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 or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

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