CHESTERFIELD
BOROUGH COUNCIL

2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management, as amended by the Environment Act 2021

Date: June, 2023

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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 29,000 to 43,000 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 2022**

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 closely monitored and kept under review 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, January 2023

[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, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details 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) Derbyshire Active Travel Group

ii) Derbyshire Planning and Health Group

[5] Defra. Environmental Improvement Plan 2023, January 2023

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

iii) Derbyshire Cycle Network

iv) Derbyshire Local Sustainable Travel Group

v) Derby and Derbyshire Air Quality Working Group

vi) Derbyshire Environmental Pollution Group

vii) 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) The Air Quality Action Plan related to the Chesterfield Nº 1 AQMA is complete, and awaiting corporate approval.

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).

There is a continued increase in the use of wood burning domestic heating appliances, 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.

Ellie Houlston, Director of Public Health, Derbyshire Couny Council

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 2022 . It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. 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 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Chesterfield BC 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 Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Chesterfield No1	Declared 14th August 2015	NO_2 Annual Mean	4 to 18 (evens only) Church Street, Brimington	No	42.5	Not applicable	7	AQAP completed and awaiting corporate approval	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. The appraisal did highlight that some graphical representations of long term trends were cluttered and difficult to interpret. This has been amended in the current report.

Chesterfield Borough Council has taken forward a number of direct measures during the current reporting year of 2022 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 Borough Council have made during the reporting year of 2022 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 Borough Council expects the following measures to be completed over the course of the next reporting year: submit the completed AQMA Action Plan document for approval by DEFRA.

Chesterfield Borough Council's priorities for the coming year are:

i) to continue to work with 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, following funding being made available for some of the traffic management solutions which have been proposed.

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. However, there is a consultation exercise (closing on 31st Dec 2023) on Electric Vehicle charging provision across Derbyshire (details at: https://www.derbyshire.gov.uk/council/have-your-say/consultation-search/consultation-details/electric-vehicle-charging-in-your-area.aspx). Outline details on the proposals, including the provision of roadside chargepoints linked to existing streetlights can be found on the Derbyshire County Council website: https://www.derbyshire.gov.uk/council/news-events/news-updates/news/lamp-post-charge-points-to-be-considered-for-electric-vehicles.aspx, with full details being found in the Cabinet report at: https://democracy.derbyshire.gov.uk/documents/s19344/Low%20Emission%20

Vehicle%20Infrastructure%20Programme%20Update%20and%20Forward%20Programme%20of%20Activity.pdf

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. The local Highways Authority have noted that while there is no ongoing breach of the AQO priority will be given to other areas where breaches have been found. No action is expected by the local Highways Authority at present or in the short term (and possible medium term) future. 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 Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Chesterfield No1 AQMA.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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	Genaral 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

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	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
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
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.PG22 (Chapter 8), 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 Borough Council 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, (notwithstanding the changes in enforcement options brought in by the Environment Act 2021) . 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 $PM_{2.5}$ (a maximum concentration of 10µg/m^3 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 2022 by Chesterfield Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Chesterfield Borough Council undertook automatic (continuous) monitoring at 2 sites during 2022. 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 Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 36 sites during 2022. 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 – 0.81 and travel blank adjustment – 1.4µg/m^3 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 2022 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.

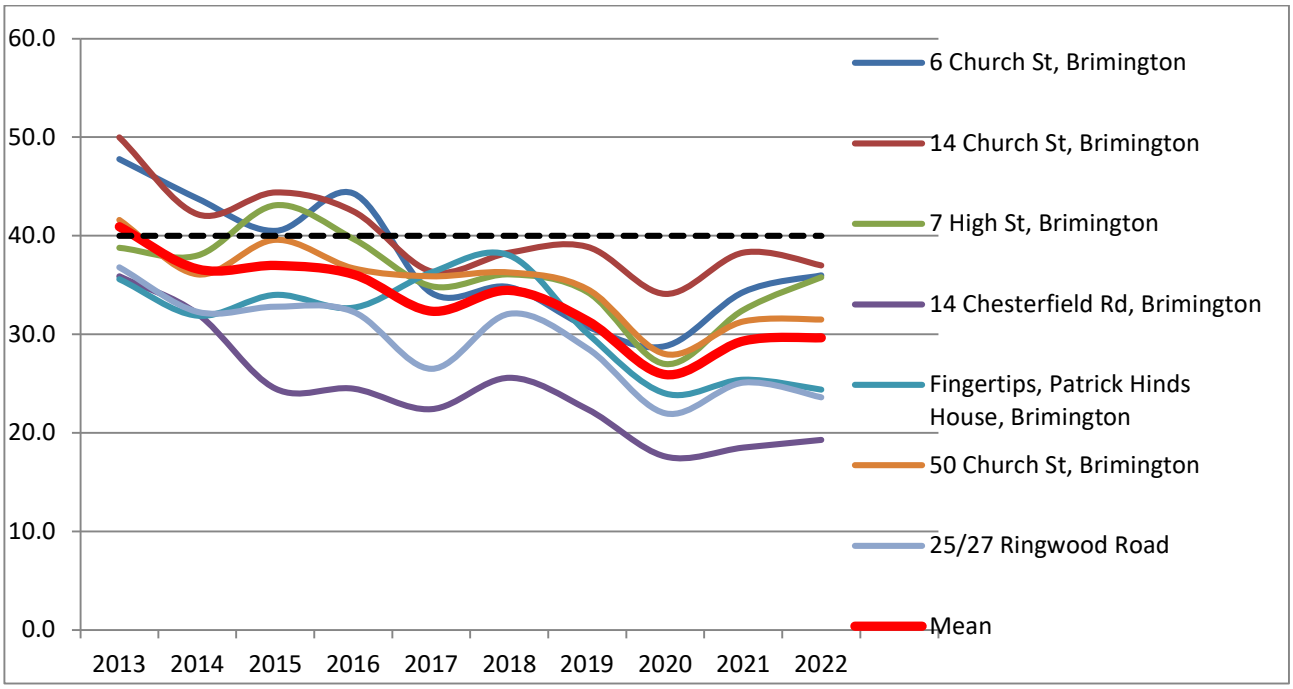
Pollution levels fell appreciably during 2020, due to the restrictions associated with the initial stages of the Covid-19 pandemic, but as the restrictions eased pollution levels across the borough returned to near pre-pandemic levels, and this increase in levels has continued, but not as steeply as during 2021. Overall, the long term trend still demonstrates a gradual reduction in levels.

No breaches of the Air Quality Objectives for Nitrogen Dioxide were found during 2022, 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 (numbers 6 and 14 Church Street) 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

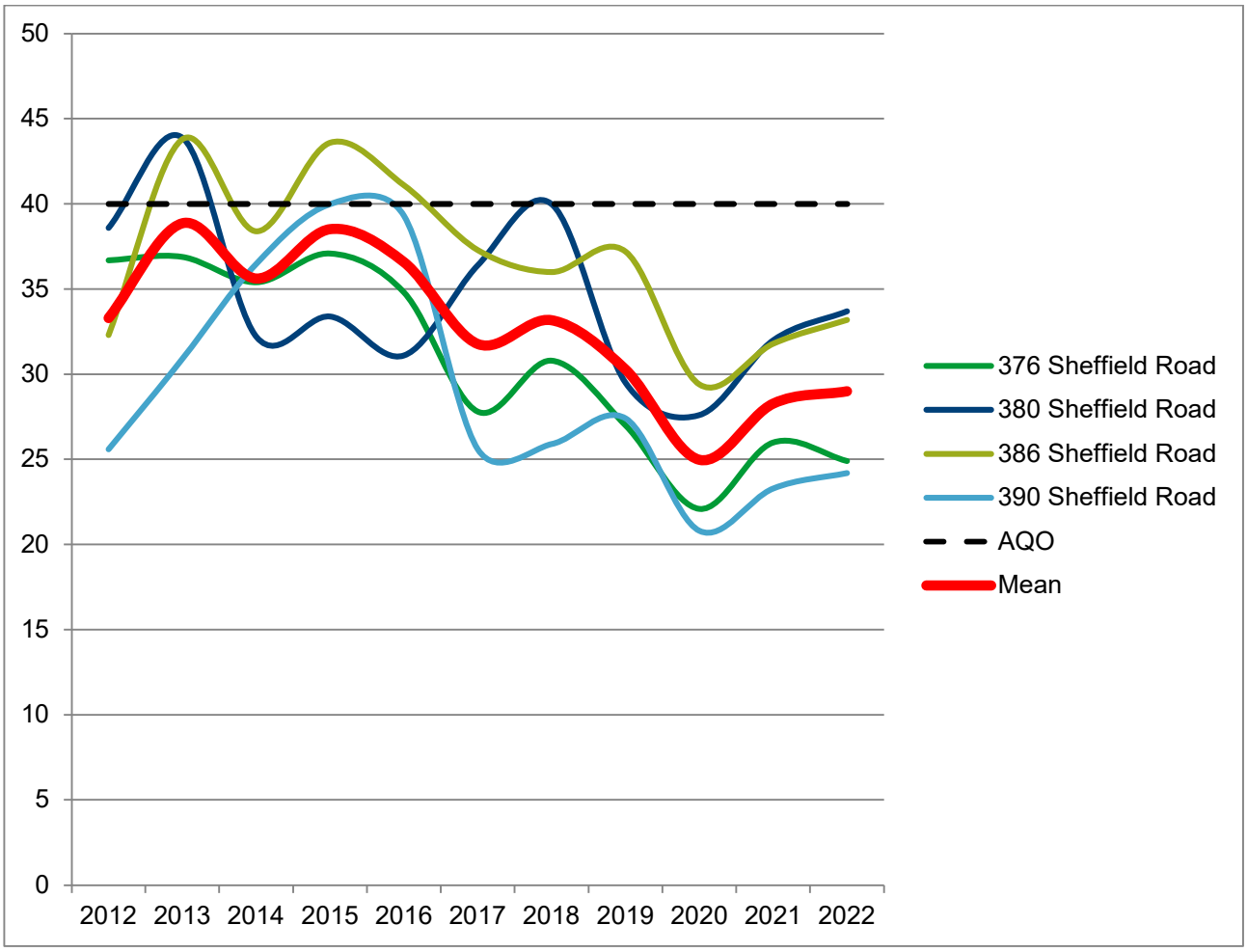
Note: The Chesterfield No1 AQMA is highlighted in blue

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. **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 initially fluctuated around the air quality objective. There is little consistency in the monitoring results, but there has been no breach of the air quality objective since 2016. The long term trend demonstrates a gradual reduction on average levels (as shown in Figure 3, overleaf).

Figure 3 (overleaf) demonstrates the wide variation in results from the monitoring which is closely co-located. 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.

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.

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

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)
14	348 Derby Road, Storforth Lane	Façade	438357	369410	NO_2	No	0	2m	N	2
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

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)
28	Patrick Hinds House, Church St, Brimington	Façade	440323	373482	NO_2	No	0	1m	N	2
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

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)
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 2022 (%) (2)	2018	2019	2020	2021	2022
AURN 1	463348	370651	Roadside	97.5	97.5	16.8	17.4	14.9	15.9	15.2
AURN 2	436472	372038	Urban Background	97.6	97.6	12.2	12.4	8.1	13.9	11.5

☒ **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.TG22 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 2022 (%) [2]	2018	2019	2020	2021	2022
1	437222	370956	Roadside	100	100	24.3	22.3	20.4	18.5	20.0
2	438710	370950	Roadside	100	100	27.0	24.9	22.7	22.9	25.5
3	438291	373006	Roadside	100	100	30.8	27.0	25.9	26.0	24.9
4	438284	373057	Roadside	92	92	25.9	27.4	21.8	23.3	24.2
5	438293	370863	Roadside	100	100	23.8	21.4	20.0	19.7	21.4
6	440440	373514	Roadside	100	100	34.8	30.8	29.2	34.3	36.0
7	437670	371490	Roadside	84	84	19.8	18.4	16.6	15.0	16.3
8	438395	369776	Roadside	100	100	27.4	24.3	23.0	23.9	23.4
9	438385	369574	Roadside	100	100	25.3	23.2	21.3	23.1	21.7
10	440531	373484	Roadside	92	92	36.1	34.3	30.3	32.5	35.8
11	438307	374560	Roadside	100	100	22.4	21.3	18.8	20.3	19.9
12	438279	373336	Roadside	100	100	25.5	23.9	21.4	21.0	20.0
13	439780	369440	Roadside	100	100	21.5	19.4	18.1	17.2	17.2
14	438357	369410	Roadside	100	100	31.5	27.5	26.5	26.2	25.5
15	436349	370658	Roadside	100	100	17.7	16.2	14.9	14.8	14.4
16	436349	370658	Roadside	100	100	17.4	15.8	14.6	14.4	13.9
17	436349	370658	Roadside	100	100	17.6	16.0	14.8	14.5	13.7
21	440175	373396	Roadside	100	100	25.6	22.7	21.5	18.5	19.3
22	440669	373711	Roadside	100	100	32.1	28.6	27.0	25.1	23.6
23	439830	369320	Roadside	92	92	24.3	22.4	20.4	19.7	19.8
24	437686	371433	Roadside	100	100	35.9	32.9	30.2	27.1	29.7
25	439490	369608	Roadside	84	84	32.0	29.0	26.9	27.3	27.4
27	439490	369590	Roadside	100	100	29.6	26.7	24.9	25.6	24.9
28	443897	374912	Roadside	100	100	38.0	30.1	31.9	25.4	24.4
29	440323	373482	Roadside	84	84	36.1	33.4	30.3	26.9	27.7
30	438417	371357	Roadside	100	100	26.9	24.2	22.6	21.3	20.6
31	436702	370761	Roadside	92	92	36.0	37.2	30.2	31.8	33.2
32	438289	373028	Roadside	92	92	34.0	30.5	28.6	27.8	26.6
33	438976	370356	Roadside	100	100	37.5	32.5	31.5	29.8	28.0

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 2022 (%) (2)	2018	2019	2020	2021	2022
36	439710	369420	Roadside	84	84	27.2	24.6	22.8	23.3	20.1
37	440361	373513	Roadside	92	92	36.3	34.6	30.5	31.6	31.5
38	440421	373515	Roadside	100	100	38.3	38.9	32.2	38.3	37.0
39	438343	371908	Roadside	100	100	29.4	26.3	24.7	23.3	22.6
40	438290	373014	Roadside	100	100	40.0	29.5	33.6	32.0	33.7
41	438407	372798	Roadside	84	84	30.5	24.2	25.6	26.3	22.9

☐ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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**.

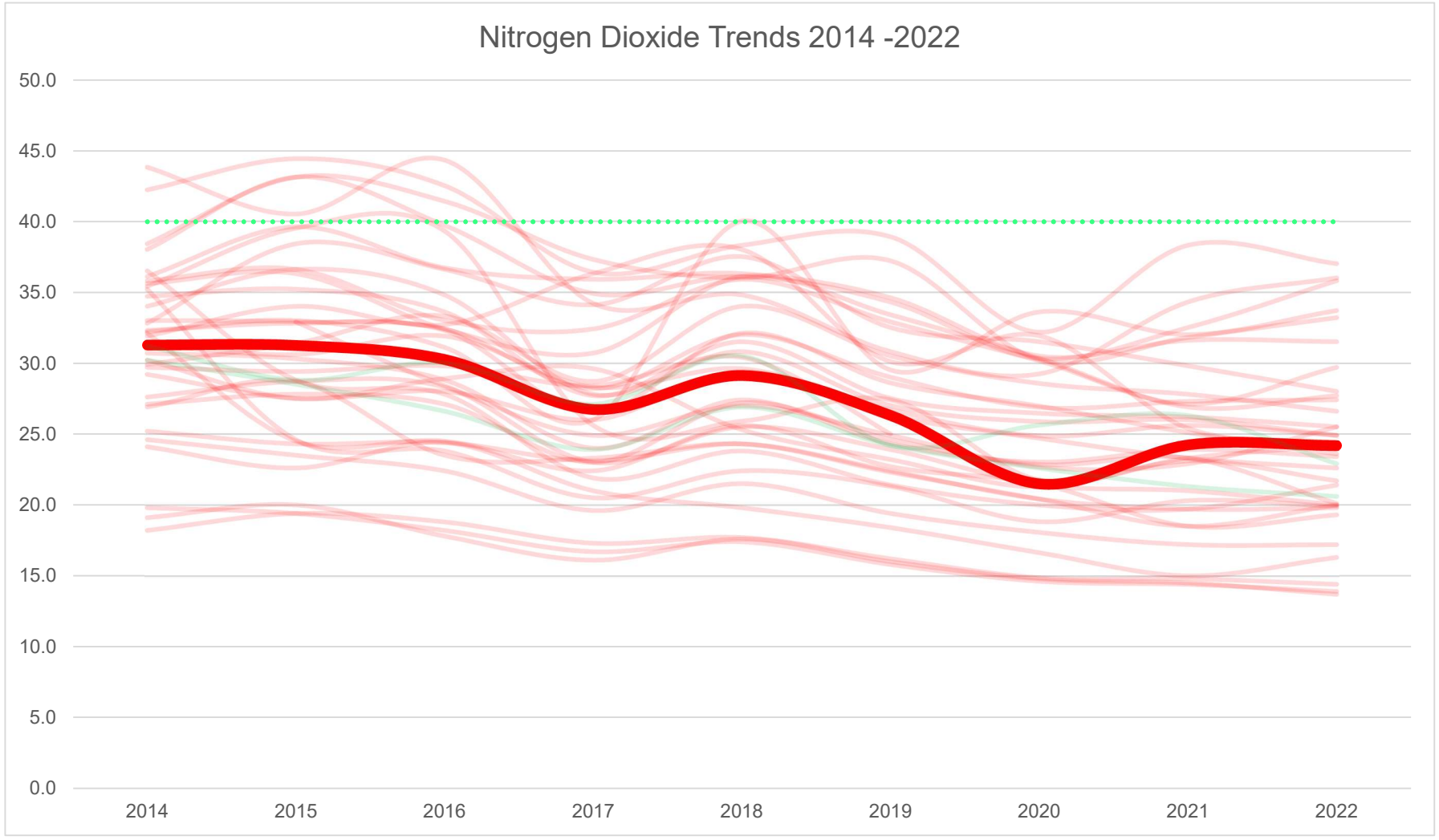
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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



Note: Due to the large amount of data only the mean levels are highlighted. The measured data is represented to show the range of results gathered between 2014 and 2022.

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 2022 (%) (2)	2018	2019	2020	2021	2022
AURN 1	463348	370651	Roadside	97.5	97.5	0	0	0	0	0
AURN 2	436472	372038	Urban Background	97.6	97.6	**0 (58.2)**	0	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%).

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

No figure, as no exceedances of NO_2 1-hour mean target

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 2022 (%) (2)	2018	2019	2020	2021	2022
AURN 1	463348	370651	Roadside	100	100	16.8	14.1	12.2	11.8	13
AURN 2	436472	372038	Urban Background	100	100	14.4	12.7	10.9	10.3	11.4

☒ **Annualisation has not been required.**

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.TG22 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.3 – Trends in Annual Mean PM_{10} Concentrations

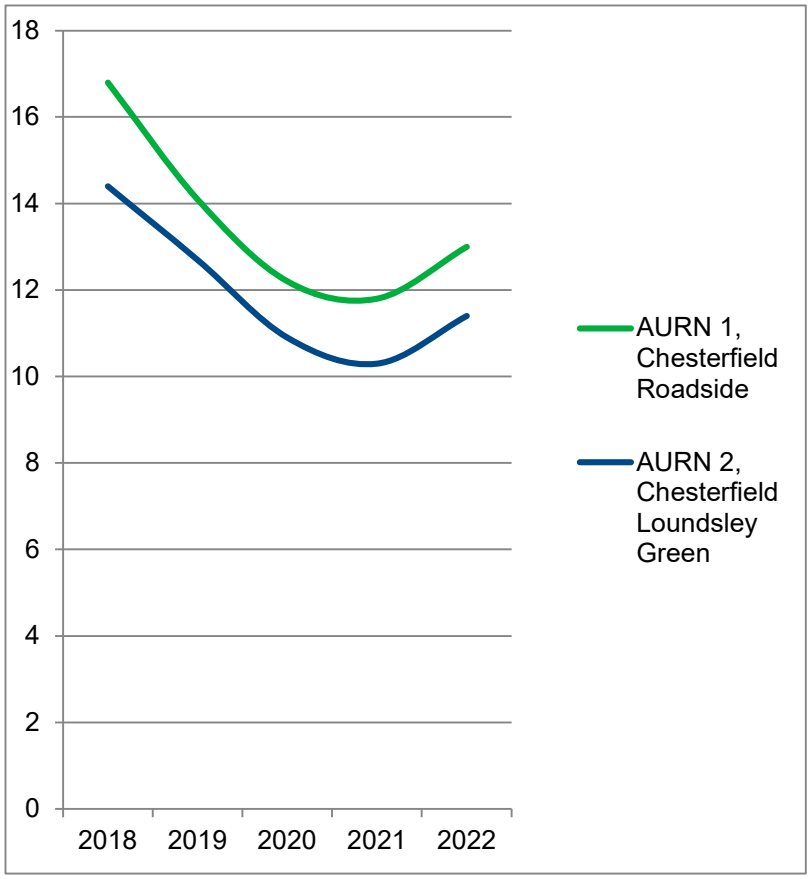


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AURN 1	463348	370651	Roadside	100	100	3	3	2	1	3
AURN 2	436472	372038	Urban Background	100	100	2	3	1	1	3

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

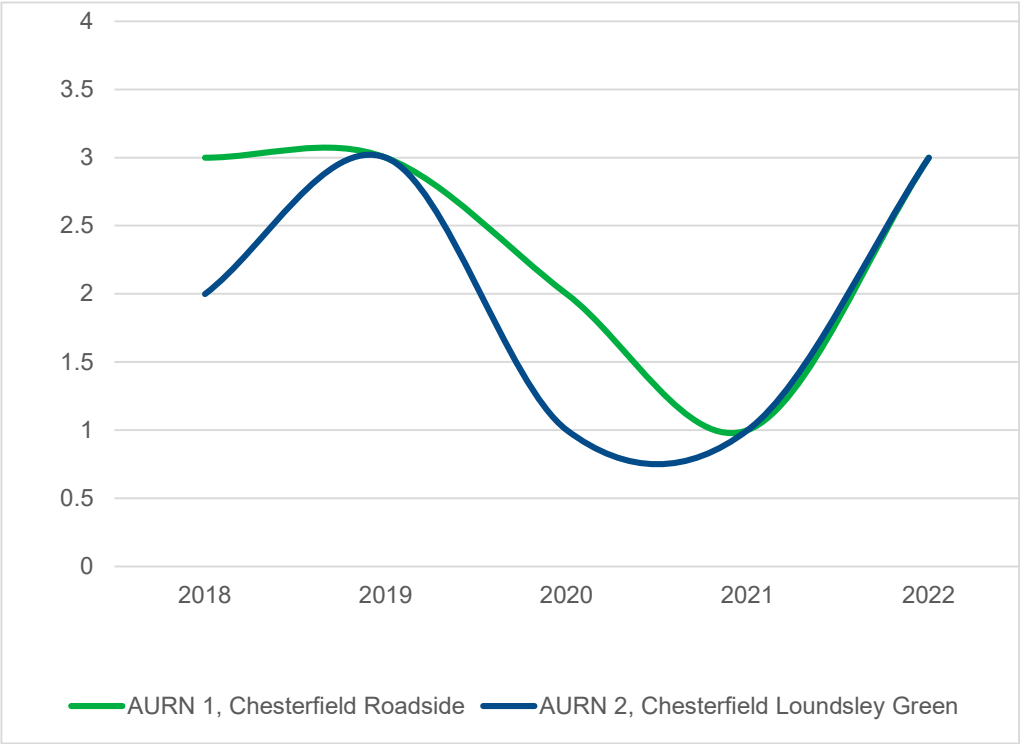


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
AURN 1	463348	370651	Roadside	100	100	9.7	8.9	7.5	7.3	7.9
AURN 2	436472	372038	Urban Background	100	100	9.6	8.4	6.9	6.5	7.2

☒ **Annualisation has not been required.**

Notes:

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

All means have been "annualised" as per LAQM.TG22 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.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations

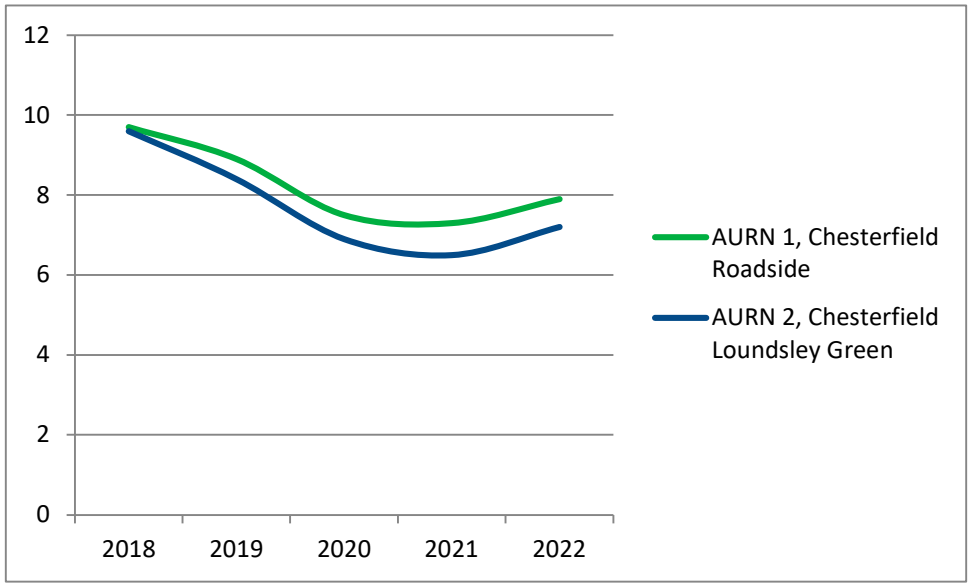


Table A.9 – SO_2 2022 Monitoring Results, Number of Relevant Instances

Sulphur Dioxide is no longer a pollutant of concern in Chesterfield

Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results ($\mu g/m^3$)

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 and Bias Adjusted <(0.81>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
1	437222	370956	21	24	30	30	22	23	12	27	24	30.7	33	37	26.1	20.0		
2	438710	370950	30	29	29	35	31	34	16	36	34	38.9	43	40	32.8	25.5		
3	438291	373006	37	29	31	38	31	37	22	7	38	35.5	43	39	32.2	24.9		
4	438284	373057	35		28	29	29	30	16	30	28	35.5	41	44	31.3	24.2		
5	438293	370863	31	21	29	32	26	25	15	31	28	31	35	32	27.9	21.4		
6	440440	373514	44	26	45	55	47	50	27	62	50	45.3	47	51	45.8	36.0		
7	437670	371490	24	19	30	24	15	18	11	22	20	-	-	34	21.6	16.3		
8	438395	369776	31	25	32	35	27	26	16	32	30	33.1	39	37	30.3	23.4		
9	438385	369574	31	24	27	29	24	23	13	30	30	30	34	42	28.2	21.7		
10	440531	373484		39	37	43	49	54	27	45	51	49.4	53	55	**45.6**	35.8		
11	438307	374560	27	20	30	30	22	23	13	29	29	24.4	31	34	26.0	19.9		
12	438279	373336	33	20	29	27	22	23	13	27	26	26.6	29	37	26.1	20.0		
13	439780	369440	26	18	25	24	20	20	10	23	20	24.8	29	33	22.7	17.2		
14	438357	369410	34	23	37	36	33	32	19	39	32	37	32	42	32.9	25.5		
15	436349	370658	24	17	25	20	16	15	8	19	14	20.3	25	27	19.2	14.4		
16	436349	370658	24	16	21	20	16	14	8	20	15	17	25	28	18.5	13.9		
17	436349	370658	21	17	22	18	15	15	9	17	16	20	24	26	18.3	13.7		
19	438090	370970	29	18	30	23	17	17	11	23	23	25.6	29	34	23.2	17.7		
20	438072	370758	20	18	31	25	19	21	14	31	27	24.6	28	38	24.6	18.8		
21	440175	373396	32	20	26	28	26	23	14	26	26	25.4	26	30	25.2	19.3		
22	440669	373711	27	21	35	37	30	27	16	38	38	27.7	33	38	30.6	23.6		
23	439830	369320	31	19	30	27	21	23	13	27	29	-	30	34	25.8	19.8		
24	437686	371433	44	33	36	37	33	40	22	41	40	33.1	48	47	38.0	29.7		
25	439490	369608	38	26	35	-	34	36	18	41	42	36	-	47	35.3	27.4		
27	439490	369590	44	26	28	32	29	32	17	36	35	30.3	37	39	32.1	24.9		
28	443897	374912	39	28	32	29	32	27	17	31	31	35.8	41	35	31.5	24.4		
29	440323	373482	39	29	44	37	33	26	17	44	43	-	-	43	35.6	27.7		
30	438417	371357	32	23	30	30	23	23	12	28	24	30.3	36	32	26.8	20.6		
31	436702	370761	52	43	44	38	37	43	24		39	44.7	51	51	**42.4**	33.2		
32	438289	373028	41	27		41	31	26	18	40	40	30.8	37	45	34.3	26.6		
33	438976	370356	48	34	36	35	34	35	18	37	32	35.1	40	47	35.9	28.0		
36	439710	369420	34	19	-	33	22	20	12	29	32	24.2	-	37	26.2	20.1		
37	440361	373513	50	-	40	40	40	38	20	43	40	41.3	48	44	**40.3**	31.5		
38	440421	373515	56	37	54	55	46	43	25	55	52	43.2	46	52	**47.0**	37.0		

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 and Bias Adjusted <(0.81>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
39	438343	371908	32	22	40	31	24	23	14	30	28	30.4	37	40	29.3	22.6		
40	438290	373014	53	54	43	40	35	43	24	40	42	43	46	54	**43.1**	33.7		
41	438407	372798	37	24	41	32	22	18	13	34	-	-	35	42	29.7	22.9		

☒ **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.TG22.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Chesterfield BC confirm that all 2022 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 Chesterfield During 2022

Chesterfield BC has not identified any new sources relating to air quality within the reporting year of 2022

Additional Air Quality Works Undertaken by Chesterfield BC During 2022

Chesterfield BC has not completed any additional works within the reporting year of 2022

QA/QC of Diffusion Tube Monitoring

NO_2 diffusion tubes are supplied by South Yorkshire Air Quality Samplers for the first 3 months of 2022, changing to SOCOTEC from April onwards (due to the operator of SYAQS retiring). The preparation method being 50% triethanolamine in acetone for both suppliers. The laboratory follows the procedures set out in the Harmonisation Practical Guidance. The national bias factor for the tubes supplied by this source is 0.76. Data from the two sites operated by Chesterfield BC is supplied to DEFRA for input into the calculation of this factor.

Diffusion Tube Annualisation

Annualisation has not been required for any monitoring locations as data capture has been greater than 75%

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

Not required

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 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.TG22 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 0.81 to the 2022 monitoring data. A summary of bias adjustment factors used by Chesterfield BC over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	Local	-	0.81
2021	Local	-	0.89
2020	Local	-	0.84
2019	Local	-	0.83
2018	Local	-	0.91

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	3	9			
Bias Factor A	0.92 (0.71 – 1.29)	0.77 (0.69 – 0.88)			
Bias Factor B	9% (-22% - 40%)	29% (13% - 45%)			
Diffusion Tube Mean (µg/m^3)	21	18			
Mean CV (Precision)	7	6			
Automatic Mean (µg/m^3)	15	14			
Data Capture	95	98			
Adjusted Tube Mean (µg/m^3)	19 (15 – 27)	14 (12 – 16)			

Notes:

The annual mean has been derived using the method specified in FAQ 138 - Bias Adjusting Diffusion Tubes when Supplier/Method Changed | LAQM (defra.gov.uk):

The bias factor adjustment for the first 3 months is 0.92, the resultant adjustment factor is 0.23.

The bias factor adjustment for the remaining 9 months is 0.77, the resulting factor is 0.58.

The resulting annual bias factor is 0.81

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 2022.

Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)

Not required

QA/QC of Automatic Monitoring

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

LSO dities are carried out in-house by Chesterfield BC. Calibration visits are carried out on a monthly 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.

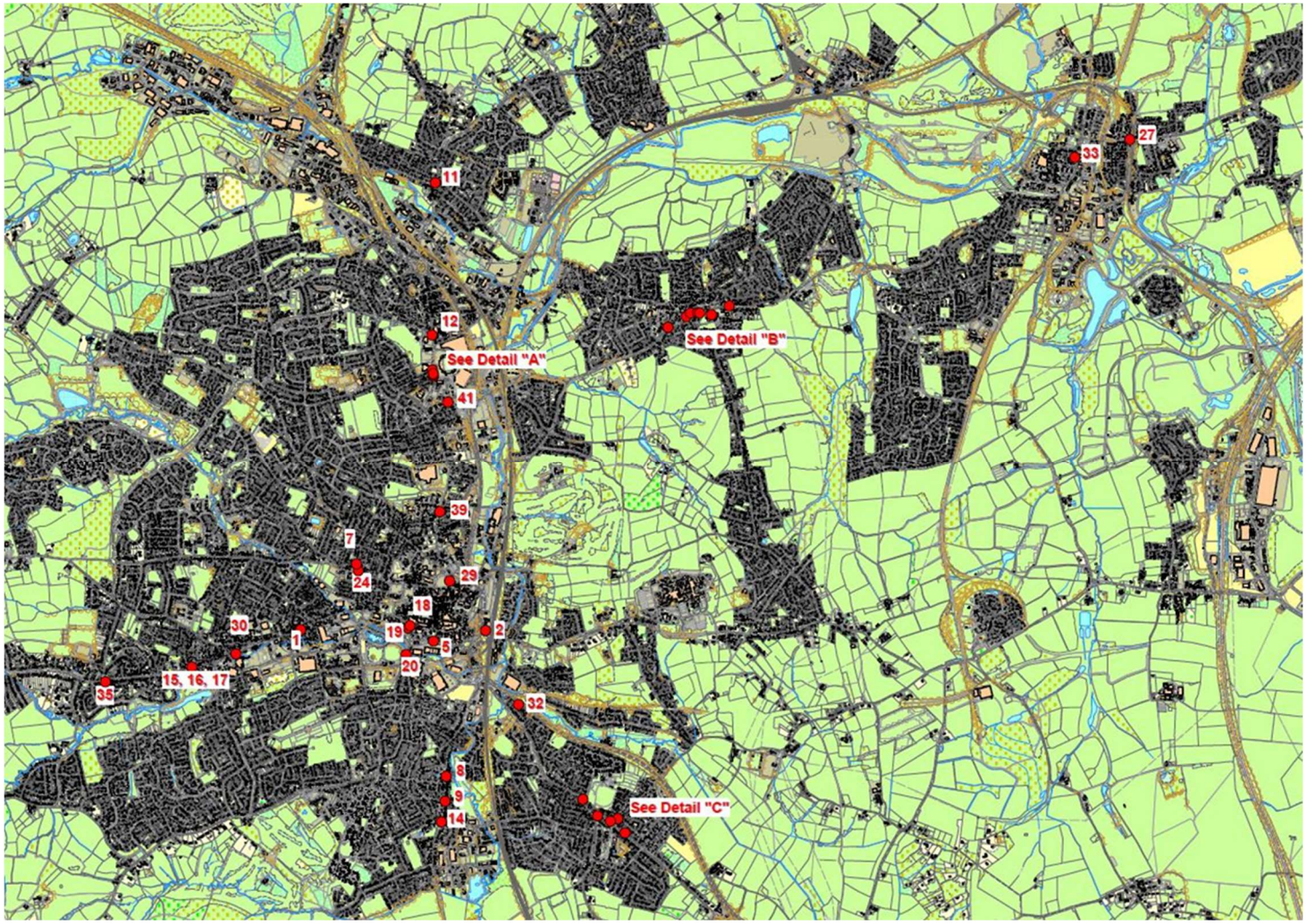
NO_2 Fall-off with Distance from the Road

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 2022.

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

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



Detail A

Detail B

Detail C

Location and extent of Chesterfield No 1 AQMA

Note: The location of this map is also shown in the centre of Detail B (above)

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
AQO	Air Quality Objective
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

References

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- A Review of Air Quality Station Type Classifications for UK Compliance Monitoring, Ricardo-AEA 2013
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- http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html