Mansfield
District 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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The cover photograph shows High Street, Mansfield Woodhouse, with its old stone buildings and red telephone box.

Executive summary: air quality in our area

Air quality in the Mansfield District

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 health inequalities 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].

Historically, the Mansfield area relied heavily on coal for heating and the pollutants of concern were therefore 'black smoke' and sulphur dioxide. Over a number of years, Smoke Control Orders were introduced to cover the whole district, which produced a major improvement in air quality as regards both 'black smoke' and SO_2. Following the closure of the coal mines, and therefore the massive reduction in residential solid fuel use, the emphasis has shifted to vehicle exhaust emissions (NO_2) and airborne dust (PM_{10} and $PM_{2.5}$). Currently, the Council does not undertake PM_{10} or $PM_{2.5}$ monitoring, but it does monitor for NO_2. However, in November 2023, Bureau Veritas began to assess six sites in the Council's district with a view to selecting one for a real-time analyser to monitor $PM_{2.5}$.

The Council has not needed to declare an Air Quality Management Area to date, but has continued to pay greater attention to the northern end of Chesterfield Road North, Pleasley, and the Debdale Lane/Chesterfield Road North junction, Mansfield, where the highest NO_2 levels in the district are experienced. We have a real-time analyser on Chesterfield Road North, and eight diffusion tubes in place at roadside locations throughout the district. This is

[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

a significant reduction from the number of diffusion tubes in place prior to the outbreak of Covid-19, but many were lost due to weathering of the fixings or vandalism; the missing fixings were replaced in December 2022, and new tubes were put in place at various locations throughout the district.

In 2022, none of our monitoring sites exceeded the national Air Quality Objective of an annual mean of 40µgm^3 when the required factors were applied. The trend for NO_2 generally in the district over the last eight years shows a decline in levels.

A detailed air quality assessment was carried out for Pleasley in 2015, using NO_2 diffusion tubes and a real-time analyser, and it was concluded that an Air Quality Management Area was not required, but monitoring would continue. Real-time monitoring began again in Pleasley in April 2019, using an NO_2 analyser at a site some 100m further south of the previous location. It was hoped that after two years' monitoring at this location, the real-time unit could be moved to another site, but this was delayed because the results for 2020 were artificially lowered by the travel restrictions necessary during the Covid-19 outbreak; the Council felt that the unit should remain in place until travelling was back to normal, or near-normal, levels.

It is difficult for a local Council alone to reduce NO_2 emissions in its district, as these are primarily from vehicle exhausts. Consequently, the Council is reliant on actions also being taken by the County Council, Highways England, vehicle manufacturers and other involved parties.

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

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

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.

Improving air quality is a priority of the Nottinghamshire Joint Health and Wellbeing Strategy 2022-26, under the section for developing healthy and sustainable places. Please see https://www.nottinghamshire.gov.uk/policy-library/38815/the-joint-health-and-wellbeing-strategy-for-2022-2026.

Mansfield District Council's Smoke Control Area programme (which covers the whole district, including all the open land) has been a great success in reducing air pollution from domestic heating sources, and the Council has not needed to monitor for 'black smoke' or sulphur dioxide for over twelve years. However, it is necessary to remind residents at intervals about the requirements of the Smoke Control Orders.

Nationwide, there has been a massive increase in the use of wood-burning stoves, and whenever Mansfield's Environmental Protection team becomes aware of people installing these locally, it offers them advice on the installation and use of these stoves. Fortunately, the stoves tend to be scattered about the district rather than concentrated in an area, so any effects are usually confined to their immediate surroundings.

A number of Council properties still require converting from old solid fuel-fired district heating systems to gas or electric. The work was delayed due to the Covid-19 outbreak, but only one group of properties – a sheltered housing scheme – now need to be converted, and this will be done by the end of 2023.

The Air Quality Action Plan has now been updated with the actions taken in 2022. Since Mansfield Council currently only monitors for NO_2, and the diffusion tubes have been positioned to monitor traffic emissions, it is difficult to quantify many of the outcomes of the Action Plan.

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

A closer working relationship with other Councils has been achieved through various schemes, including the Local Authority Energy Partnership and the Nottingham City Procurement Unit.

Mansfield is part of the group led by Nottinghamshire County Council that has updated the Nottinghamshire Air Quality Improvement Strategy.

Conclusions and priorities

Mansfield District Council currently only monitors for NO_2, using both real-time and passive methods. No exceedances of the annual mean objective of 40µg/m^3 were identified during 2022, and there were no exceedances of the 1-hour mean of 200µg/m^3. The council therefore still has no need to declare an Air Quality Management Area for NO_2 in any part of its district.

The general trend of monitoring results continues to be downward (discounting the artificially-lowered results for 2020, when the Covid-19 travel restrictions were in full force and working at home was the norm). Working at home has now become an accepted part of life, and has no doubt been of benefit in lowering NO_2 emissions from traffic. In addition, the use of electric or hybrid vehicles is increasing, partly due to the impending deadline of 2030, when no new single-fuel petrol or diesel cars and vans will be produced.

Several large areas of housing are being built or are planned in various parts of the district. An Air Quality Assessment has been required for each development as part of the planning process, and none has indicated that there would be a significant increase in NO_2 levels caused by extra vehicle movements.

In December 2022, the Council's air pollution monitoring tube network was extended; there are now 14 tubes at various locations in Mansfield, Mansfield Woodhouse, Warsop, Forest Town and Rainworth, plus three co-located tubes next to the real-time monitoring unit in Pleasley. The co-located tubes should enable a local factor to be calculated for use in annualising monitoring results, rather than continuing to rely on the national one. The extended network will give us a better picture of NO_2 levels throughout the district.

Our priorities for the coming year are:

- To monitor for a further year with the NOx real-time analyser at the Chesterfield Road North site in Pleasley, as the results recorded in 2022 are still likely to have been affected by the aftermath of the outbreak of Covid-19.

- To reinstate the missing diffusion tubes at their original locations, or as close to them as possible, and to put new tubes in place to extend the monitoring network;
- To look into the feasibility of reinstating real-time PM_{10} monitoring in the district, and to support any proposed initiative to begin $PM_{2.5}$ monitoring;
- To implement and continue to develop the various measures the Council is taking to improve local air quality;
- To promote the Nottinghamshire Air Quality Improvement Strategy; and
- To promote the requirements of the Air Quality Regulations 2020 (England), which came into force on 1 May 2021.

Local engagement and how to get involved

Several of the initiatives detailed in Table 2.1 have been undertaken in partnership with other bodies, usually the County Council or county-wide groups. This helps to achieve both efficiency and consistency.

The Environmental Protection Team continues to give advice on air quality issues when requested by the public, particularly in respect of wood-burning stoves and garden bonfires.

The public can help to improve air quality in the district in several ways:

1) If you are using an open fire, you must burn only solid smokeless fuels, not wood or coal. This is a legal requirement under the Clean Air Act 1993 and the various Smoke Control Orders that cover all properties in the district. The text of the Clean Air Act 1993 is available at www.legislation.gov.uk/ukpga/1993/11/contents; information on the Council's Smoke Control Orders and the streets within each is available on request from the Environmental Health section. Please note that Mansfield has Smoke Control Areas, not "Smokeless Zones", and smoke will be emitted by a chimney when an open or closed solid-fuel fire is being lit from cold or re-fuelled.
2) If you have a closed solid-fuel fire (stove or roomheater), you should burn only the type of fuel recommended by the manufacturer. Again, this is a legal requirement. Some stoves are advertised as 'multi-fuel', but if they are not on the Defra 'approved appliances' list, you cannot burn anything except smokeless fuel on them. Approved

appliances are listed at www.smokecontrol.defra.gov.uk/appliances.php?country=england; and authorised fuels at www.smokecontrol.defra.gov.uk/fuels.php. If you use other types of fuel on a stove, you risk damaging its interior, which may release fumes into your house or cost you money to repair.

3) If you are using a wood-burning stove, you should burn only clean, dry wood. Wood must be left to dry for at least a year before you use it (unless you have bought 'kiln-dried' wood), and it must contain less than 20% moisture. Moisture meters can be bought to check this; they are particularly useful if you buy wood from several different sources, as the moisture content may not be consistent. Store your firewood in a place where it will not get damp - if possible, bring wood indoors at least a week before using it, to help it to dry out further, and check its moisture content before using it. Never burn wood that has been painted, varnished or treated in any way (this includes pallets), as it could cause damage to the interior of your stove and release fumes inside your house or cost you money to repair. New legislation came into force in May 2021 to regulate the sale of wood as a fuel - visit www.hetas.co.uk/ready-to-burn-what-consumers-need-to-know for more information.

4) Since 2005, wood-burning stoves have been required by law to have a Certificate of Compliance from a HETAS-registered engineer, or a Building Notice from a Building Control Officer, to confirm that they have been fitted correctly. If you do not have a certificate for your stove, you should have it serviced by a HETAS-registered engineer, who will give you a certificate for twelve months.

5) Avoid garden bonfires as much as possible. Never burn household waste, furniture, carpets, anything containing plastics or foam rubber, or any other items likely to cause black smoke and smell. You can burn plant and tree cuttings from your garden, but you must allow them to dry out first, so that they produce less smoke and burn away quickly. You can also burn confidential papers if you cannot shred them or dispose of them securely in another way. Any garden fire you do have should be attended at all times by someone with access to a hosepipe or a bucket of water, soil or sand, to put it out if it gets out of control or if the wind blows the smoke towards another property or a road. Fires must be put out before leaving them at night. Please note that garden fires are not covered by Smoke Control Orders or the Clean Air Act 1993; bonfires that are causing a nuisance are dealt with under the Environmental Protection Act 1990. There are no set times when a bonfire can be lit; we ask that

residents avoid lighting them on windy days, or when other residents have their washing out, their windows open, or are sitting in their gardens.

6) Wherever possible, use alternative forms of transport rather than your car. When changing cars, look for a 'cleaner' vehicle; in particular, be aware that no new single-fuel cars and vans (i.e. those that only use petrol or diesel) will be produced after 2030. Have your car serviced regularly, and if the exhaust starts smoking, have it checked. Please note that car exhaust emissions are not covered by Smoke Control Areas or the Clean Air Act 1993, which only deal with emissions from chimneys. Vehicle idling (i.e. leaving the engine running when the vehicle is stationary for a long period of time) is an offence against the Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002, and a fine can be given to a person who does not switch off their vehicle engine when asked to do so.

Local responsibilities and commitment

This ASR was prepared by the Environmental Health Department of Mansfield District Council with the support and agreement of the following departments: Planning; Planning Policy; Housing; Private Sector Housing; Taxi Licencing; Fleet Management; Facilities; and Public Relations.

This ASR has been signed off by the Head of Health and Communities at Mansfield District Council, and the Senior Public Health and Commissioning Manager at Nottinghamshire County Council.

If you have any comments on this ASR, please send them to Mrs S Dilks, Miss C Dewick or Mrs A Gundel on sdilks@mansfield.gov.uk, cdewick@mansfield.gov.uk or agundel@mansfield.gov.uk.

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1 Local Air Quality Management

This report provides an overview of air quality in the Mansfield District 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 Mansfield District 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.

Mansfield District Council currently has no declared AQMAs.

Mansfield District Council has no separate air quality strategy, but was one of the councils that produced the Air Quality Strategy for Nottingham and Nottinghamshire (2020-2030), an update of the previous strategy 'A Breath of Fresh Air for Nottinghamshire' (2008). (See below)

Defra's appraisal of last year's ASR concluded:

1. Within Table 2.2 there is an error with referencing, where it states Error! Hyperlink reference not valid, in the future it is encouraged that the document is checked before submission to ensure these issues are resolved.

This was an error that was missed during final checking. Three officers have checked the current document.

2. The Council has addressed the comments made in last year's appraisal, in a good level of detail and this is appreciated, and it is encouraged that this continues in future reports.

3. There is good discussion on what the Council is doing to tackle $PM_{2.5}$ concentrations and emissions within its boundaries, as well as the mention of the D01 indicator, which is welcomed.

4. Figure A.1 is clear and easy to read, in the future it would be appreciated if a line could be added for the annual mean NO_2 air quality objective (40µg/m^3).

This has been addressed in this document.

5. Mansfield District Council has not confirmed that 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System, in the future it would be useful if this was done.

This has been addressed in this document.

6. In Appendix D the maps of monitoring locations are not very clear, particularly Figure D.1, as it is hard to tell exactly where the diffusion tubes are located due to the low resolution of the maps and lack of road markings. It is noted that the Council have stated that due to issues with the mapping system they were unable to produce new maps for this submission. It is expected that they will have produced new, clearer maps of monitoring locations for submission in 2023.

New maps have been produced for this document, each including the site's grid reference, the road number it is located on, and the distance from the town centre.

Mansfield District 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 2.1. 26 measures are included within Table 2.1, with the type of measure and the progress the Council has 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 2.1.

Mansfield District Council expects the Green Homes Grant Scheme and the works at leisure centres to be completed over the course of the next reporting year.

Mansfield District Council worked to implement several measures in partnership with the other stakeholders during 2022 – please see Table 2.1 for details.

The principal challenge and barrier to implementation that Mansfield District Council anticipates facing is the prevailing attitude to the use of cars, particularly the convenience of driving to and from work in a car, even if it is not used by its owner during the working day. This has the potential to affect several measures.

Mansfield District Council's priorities for the coming year are:

- To monitor for a further year with the NOx real-time analyser at the Chesterfield Road North site in Pleasley, as the results recorded in 2022 are still likely to have been affected by the aftermath of the outbreak of Covid-19.

- To reinstate the missing diffusion tubes at their original locations, or as close to them as possible, and to put new tubes in place to extend the monitoring network;
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Mansfield District Council is one of the councils who produced the Air Quality Strategy for Nottingham and Nottinghamshire (2020-2030), an update of the previous strategy 'A Breath of Fresh Air for Nottinghamshire' (2008). The current strategy is available on the Nottingham City Council's website at

https://committee.nottinghamcity.gov.uk/documents/s107973/Notts%20AQ%20Strategy%202020%20FINALv1.0.pdf.

The District Council's updated Local Plan was adopted on 8 September 2020 and can be found at https://www.mansfield.gov.uk/downloads/file/1645/mdc-adopted-local-plan-2020. A policy for assessing air quality is included in the plan, to ensure its impact is considered during the planning stage of all new developments. Climate change has also been incorporated.

Information about Nottinghamshire County Council's Local Transport Plan 2011-2026 can be found at https://www.nottinghamshire.gov.uk/transport/public-transport/plans-strategies-policies/local-transport-plan.

Much of Mansfield's future approach to air quality issues will be influenced by the actions that are taken in and around the city of Nottingham, which was included in a World Health Organisation list released in 2016 as one of ten UK cities failing to meet WHO air pollution guidelines.

Table 2.1 – 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	Home energy conservation	Policy guidance and development control	Other policy	2011/ 2013/ 2015	2023	MDC Housing	Internal					Potentially locally-significant impact – may prevent residents resorting to cheaper, possibly non-authorised, fuels	Percentage reduction in heating costs	Home Energy Conservation Act Report	Remaining MDC properties converted from district heating systems to gas central heating, with exception of one sheltered scheme scheduled to be upgraded in 2023
2	Carbon management plan	Policy guidance and development control	Low Emissions Strategy	2010	Ongoing	MDC Planning Policy	Internal						Percentage reduction in emissions. Carbon-neutral status	Full Council declared climate emergency 'in principle' on 5 March 2019. Council to go carbon-neutral by 2040. Pledge to make Mansfield carbon-neutral by 2040 and work with local businesses and industry	Draft Climate Change Strategy & Delivery Plans have been produced
3	Warm Homes on Prescription	Policy guidance and development control	Other		When funding exhausted	MDC Private Sector Housing						See comments to Measure 1	Number of homes improved	143 properties improved since grant introduced in 2016/17, including 33 in 2022/23 financial year	Health professionals encouraged to refer patients if they have concerns about heating and insulation of their homes
4	Green Homes Grant LAD Scheme	Policy guidance and development control	Other	2020	September 2023	MDC Private Sector Housing	BEIS						Number of homes improved	235 properties improved to date	Targeted advertisement towards eligible properties
5	Carbon-reducing and energy-saving measures	Promoting low emission plant	Shift to installations using low emission fuels for stationary and mobile sources	2022	2023	MDC Leisure Services, Serco				£1.3 million	Began May 2022	Estimated 417,825kgCO_2 p.a.	Meeting estimated target	Works to leisure centres – one solar panel installation scheme complete; another installation begun. One new boiler installed. Existing ground-source heat pumps to be replaced with new pumps. Other measures such as roof insulation, light management plans and pool covers to be completed by 2023	
6	Sustainable procurement	Policy guidance and development control	Sustainable procurement guidance		Ongoing compliance with strategy	Nottingham City Council Procurement Unit						Potentially significant impact of less-frequent deliveries in town centre, as most delivery vehicles are diesel	Impact on air quality	Minimise environmental impact of goods, services and works procured	Sustainable procurement being considered as part of new contract with Notts. County Council beginning in June 2023
7	Energy partnership	Policy guidance and development control	Regional groups co-ordinating programmes to develop area-wide strategies to reduce emissions and improve air quality		Ongoing funding available	Local Authority Energy Partnership made up of 20 authorities from Nottinghamshire and Derbyshire							Co-ordination of strategies likely to have positive effect on air pollution throughout county	MDC's strategy published – see https://www.mansfield.gov.uk/downloads/file/2970/approved-draft-climate-change-strategy-september-2021	Internal Climate Change and Resilience Group has been set up to drive policies forward locally
8	Air quality strategies	Policy guidance and development control	Regional groups co-ordinating programmes to develop area-wide strategies to reduce emissions and improve air quality	2022	2022	Nottinghamshire local authorities					Completed	Potentially significant impact on air quality and health	Impact on air quality	Nottinghamshire Air Quality Strategy – see https://committee.nottinghamcity.gov.uk/documents/s107973/Notts%20AQ%20Strategy%202020%20FINALv1.0.pdf. Nottinghamshire Joint Health and Wellbeing Strategy – see https://www.nottinghamshire.gov.uk/policy-library/38815/the-joint-health-and-wellbeing-strategy-for-2022-2026.	
9	Cleaner taxis	Promoting low emission transport	Taxi emission incentives	Will be introduced in 2023	Ongoing	MDC Taxi Licencing	Internal						Increased number of taxi operators using cleaner vehicles	Licence fee for hybrid vehicles reduced by 25%	Monitoring projects in neighbouring districts - will consider review if necessary
10	Cleaner taxis	Promoting low emission transport	Taxi licensing conditions	Will be introduced in 2023	Depends on creation of	MDC Taxi Licencing	Internal					All new vehicles to be at least Euro 6	Fewer older vehicles operating	MDC reviewing taxi licencing policy to encourage newer, cleaner vehicles	To be completed by end of March 2023

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
					any national standards										
11	MDC vehicle fleet efficiency	Vehicle fleet efficiency	Fleet efficiency and recognition schemes		When all MDC fleet vehicles are Euro 6 (or ideally electric)	MDC Fleet Management	Internal					Future replacement of diesel fleet vehicles with electric ones will contribute to local AQ improvements	Percentage reduction in emissions and fuel usage; increased number of cleaner vehicles	Halving of fleet replacement budget in 2018 has meant that replacement of vehicles has not kept up with planned timeline. New vehicle replacement scheme being put in place by new fleet manager, aiming for all vehicles to be Euro 6 by 2026. Fleet includes 4 electric vehicles; 4 charging points available at fleet depot	No Euro 4 vehicles in fleet; 45% of HGVs are Euro 5, all others are Euro 6. Aiming for no vehicles to be older than 10 years
12	Alternative fuels	Promoting low emission plant	Shift to installations using low-emission fuels for stationary and mobile sources	2015	When all sources meet required standard	MDC Facilities	Internal						Reduction in electricity costs	Solar panels put on Civic Centre roof in March 2016 – savings of over £70,000 to date. Wind turbine project put on hold due to possibility of MDC moving to town centre premises. Building Management System to be upgraded in 2023	Solar panels being put on several new MDC commercial and residential buildings
13	LEV parking and charging	Promoting low emission transport	Priority parking for LEVs		Ongoing	MDC Planning	Internal					Greatest impact may not be seen for some years after 2030, when natural wastage of existing single-fuel vehicles takes effect	Number of spaces provided alongside demand	Updated Local Plan (2013-33) includes policies addressing electric car charging, and mitigation and adaptation to climate change. Local Plan Annual Monitoring Report has recorded number of applications for electric car charging points and renewable energy. See https://www.mansfield.gov.uk/planning-policy/annual-monitoring-reports-1 Development Management putting conditions on new developments for electric charging points	District now has least 60 public charging points for electric cars. Several stores and public houses have indicated they will be applying for planning permission to provide charging points in their car parks
14	School travel plans	Promoting travel alternatives	School travel plans		Ongoing	Notts County Council Education Department	NCC					Potentially locally-significant impact, particularly in areas of high-density housing	Reduction in number of private vehicle school runs	Several school travel plans already implemented	Lack of cycle lanes could be a barrier to implementation
15	Working from home	Promoting travel alternatives	Encourage/ facilitate home-working	2014	Ongoing	MDC Human Resources	Internal					Impact likely to be most noticeable at peak times – people working from home likely to plan journeys to avoid those times	Number of people taking up option	Home working policy implemented 2014; currently being updated to include 'hybrid working'	MDC now operates a hybrid working system – staff work from home, but come into office when necessary
16	Bus lane	Traffic management	Strategic highway improvements, re-prioritising road space away from cars, including access management, selective vehicle priority, bus priority, high-occupancy lane	Included in Transport Plan 2011-2026	Ongoing – new bus lanes under consideration	Notts County Council Highways	NCC					Local impact potentially quite significant – existing bus lane is on street with terraced houses next to traffic lights	Reduction of bus waiting time at one busy traffic-lighted junction	Bus lane on Leeming Lane South has been in place for several years. Possibility of two further bus lanes, plus extension of existing one, being investigated by NCC	Existing bus lane has reduced bus waiting time at traffic lights by two minutes on average
17	Speed limit reductions	Traffic management	Reduction of speed limits, 20mph zones	Included in Transport Plan 2011-2026	Ongoing	Notts County Council Highways	NCC					Potentially significant impact during peak times	Reduction in traffic emissions; accident reduction	Some 40mph roads reduced to 30; 20mph zones around most schools in district, although those on main roads operate only during school start and finish times on Mondays to Fridays during school terms	Primarily for road safety, but should also improve air quality
18	Delivery management	Freight and delivery management	Quiet & out-of-hours delivery		Ongoing	MDC Planning							Reduction in complaints from nearby residents	Discussions with businesses to reduce frequency of deliveries. Construction Environmental Management Plan conditions put on major developments as standard to restrict deliveries and lorry routing during building process	Considered during planning process; conditions attached where appropriate
19	"Part B" process controls	Environmental permits	Measures to reduce pollution through IPPC permits going beyond BAT		Ongoing	MDC Environmental Health							Reduction in solvent use	Permitted processes reporting on progress every two years	Discussed with businesses during inspection process; also considered in each business's Six-Year Review

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20	Local Plan	Policy guidance and development control	Air quality planning and policy guidance	2013	Ongoing development and refinement of AQ policies	MDC Planning Policy	Internal					Impact in immediate area of development potentially significant – development should include potential to reduce poor air quality in area	Increased awareness of air quality issues, and action to improve air quality, among developers in District	Updated Local Plan adopted September 2020. See https://www.mansfield.gov.uk/local-plan/adopted-local-plan-2013-2033	Updated Local Plan addresses air quality in policies P7 (Amenity) and NE3 (Pollution and land stability). Evidence on air quality to be gathered and used to inform AQ policies within local plan. Updated Local Plan Objectives 9 and 12, and monitoring indicator for NE3, address air quality
21	Renewable energy statements	Policy guidance and development control	Other policy	2022	Ongoing	MDC Planning								Renewable Energy Statement required for major planning applications (Planning Policy P5 Climate Change)	
22	Cycle-to-work scheme	Promoting travel alternatives	Promotion of cycling	2016	Ongoing; relaunched 2022	MDC	Internal						Number of people cycling to work	Cycle-to-work scheme already implemented at MDC. Scheme relaunched and promoted internally	
23	Cycle network	Promoting travel alternatives	Promotion of cycling	2017/18	Ongoing	MDC, Notts County Council	D2N2 LEP LGF					Considered likely to have only small impact on AQ – will mostly affect health	Increased use of cycle network	Potential cycle routes identified in 2017	
24	Promotion of walking	Promoting travel alternatives	Promotion of walking	2016	Ongoing	MDC Planning Policy	Internal					See comment above	Increased number of people walking; improvements in health	MDC Planning Policy and Notts. County Council are identifying and promoting walking routes – see https://www.nottinghamshire.gov.uk/planning-and-environment/walking-cycling-and-rights-of-way/walking. Mansfield CVS have commenced a walking group programme, and Serco (on behalf of MDC) has created shorter walks scheme for encouraging the less-active	
25	Public information	Public information	Via radio, press, and internet		Ongoing	MDC Public Relations and Communications Team	Internal						Increased number of hits, comments and likes recorded from website, Facebook pages, etc.	Positive publicity via social media, MDC website, press releases, etc., and by taking part in national awareness campaigns	
26	Public information	Public information	Via leaflets, radio, and internet		Ongoing	MDC Environmental Health	Internal					Local impact potentially quite significant – necessary to remind residents at intervals of requirements of Smoke Control Orders	Increased number of requests per annum for leaflets and interviews; increased number of hits on EH section of website	Various leaflets always available on request; interviews as requested by local radio station; information on MDC website	Some requests received for advice on wood-burning stoves, but clearly many more stoves being put in without MDC advice

$PM_{2.5}$ – 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.

Mansfield District Council does not monitor for $PM_{2.5}$ at present, therefore the local levels have been predicted from the nearest AURN site that measures $PM_{2.5}$, and the modelled background concentrations from the Defra website. This website was checked on 22 May 2023 and the 2022 levels were not available, so the 2021 levels have been used again. The modelled background level for 2021 for the Mansfield area is 7.9µgm^3. In 2022, the annual mean concentration at the AURN site in Nottingham Centre was 11.9µgm^3, an increase from the 2021 figure of 8.3µgm^3. (Please note that the Mansfield figure is modelled, whereas the Nottingham one is monitored).

In November 2022, Bureau Veritas carried out a scoping exercise on six sites in the district, with a view to installing a $PM_{2.5}$ urban background monitoring station. The site to be used should be decided upon in early to mid-2023, and the unit put in place towards the end of the year. This will give the Council access to real-time monitoring results.

In September 2021, the World Health Organisation published its updated Air Quality Guidelines, and its guideline value[6] for $PM_{2.5}$ is now 5µgm^3; no air quality objective has been set to date. The recommended guideline limit in the UK is 10µgm^3. The European Union legal annual mean is 25µg/m^3, which has been transposed into UK law, although the Mayor of London said in the Greater London Authority's 2019 report, "$PM_{2.5}$ in London: roadmap to meeting World Health Organisation guidelines by 2030" that he did not think this limit "goes far enough for the protection of human health". Several countries with cities of a size comparable to London have set out to meet the previous WHO guideline of 10µgm^3, rather than the EU legal annual mean.

It seems very unlikely that the levels in Mansfield town centre would be as high as those in Nottingham city centre, so the assumption has been made that Mansfield's

levels are closer to the modelled 7.9µgm^3 than to Nottingham's monitored 11.9µgm^3, and therefore there is unlikely to be a major problem with $PM_{2.5}$ in the district. Mansfield's modelled levels are below the European Union legal annual mean and the WHO guideline value.

Mansfield District Council does not currently have any measures in place to deal specifically with $PM_{2.5}$. However, the levels of PM_{10} that we were finding in the district up to August 2016, when real-time PM_{10} monitoring stopped, suggested that we would not have high levels of $PM_{2.5}$, since studies indicate that $PM_{2.5}$ levels tend to be approximately 0.6% of PM_{10} levels. In addition, we believe that the measures we are taking to reduce PM_{10} will have a knock-on effect on $PM_{2.5}$. These measures are detailed in Table 2.1 above.

3 Air quality monitoring data and comparison with Air Quality Objectives and national compliance

This section sets out the monitoring undertaken within 2022 by Mansfield District 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

Mansfield District Council undertook automatic (continuous) monitoring at one site during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring site. The automatic monitoring results are not available on line at present, except in summary form in previous Air Quality Reviews.

A map showing the location of the monitoring site is provided in Appendix D. Further details on how the monitor is calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-automatic monitoring sites

Mansfield District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at eight 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 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. The 2022 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

Table A.5 in Appendix A compares the ratified continuously-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.

No exceedances of the annual mean or hourly mean Air Quality Objectives were recorded in 2022. However, due to the number of people that are still working from home, the 2022 monitoring results are still the product of exceptional circumstances. It will be interesting to see whether Covid-19 has a lasting effect on air pollution levels, and to what extent.

In December 2022, the Environmental Protection Team reviewed its NO_2 monitoring tube network, which had been reduced to eight tubes during the Covid-19 outbreak. All existing sites were visited and the tube fixings checked for stability and repaired as required; two sites formerly in use were reinstated; four new sites were put in place; and three co-located tubes have been put up next to the real-time unit in Pleasley. Reporting on these will begin in 2023. The new tube sites were decided upon following assessment of locations where houses were close to a busy road.

3.1.4 Particulate matter (PM_{10})

Mansfield District Council does not currently monitor for PM_{10}. If any indication of PM_{10} levels is required, the Council sources it from the national AURN network and Defra's national modelled background maps, both available on line.

3.1.5 Particulate matter ($PM_{2.5}$)

Mansfield District Council does not currently monitor for $PM_{2.5}$. If any indication of $PM_{2.5}$ levels is required, the Council sources it from the national AURN network and Defra's national modelled background maps, both available on line.

3.1.6 Sulphur dioxide (SO_2)

Mansfield District Council does not monitor for SO_2. If any indication of SO_2 levels is required, the Council sources it from the national AURN network and Defra's national modelled background maps, both available on line.

Appendix A: Monitoring results

Table A.1 – Details of automatic monitoring sites

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)
Chesterfield Road North	Roadside	450974	363730	NO_2	No	Chemiluminescent	1	5	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.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)
DL	Debdale Lane	Roadside	452515	362508	NO_2	N	4	3	N	2
FT1	Forest Town 1	Roadside	457199	362697	NO_2	N	9	5	N	2
LLS	Leeming Lane South	Roadside	454421	362860	NO_2	N	11	3	N	2.5
NR	Nottingham Road	Roadside	453842	360174	NO_2	N	5	2	N	2.5
OML	Old Mill Lane	Roadside	455834	362101	NO_2	N	11	3	N	2
SS	Sherwood Street	Roadside	456928	367423	NO_2	N	8	4	N	2.5
SRE	Southwell Road East	Roadside	458513	358623	NO_2	N	8	3	N	2
WT	Warsop Town Hall	Roadside	456663	368019	NO_2	N	7	4	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
Chesterfield Road North	450974	363730	Roadside	-	100	-	14.2	6.5	5.6	4.41

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

☒ **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 six 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
DL	452515	362508	Roadside	-	100	37.6	33.2	21.5	28.7	27.7
FT 1	457199	362697	Roadside	-	100	25.6	23.9	15.3	20.1	19.2
LLS	454421	362860	Roadside	-	84.6	29.7	27.3	15.4	20.8	22.0
NR	453842	360174	Roadside	-	57.7	35.5	31.2	18.2	23.5	26.1
OML	455834	362101	Roadside	-	92.3	30.6	27.9	15.7	23.0	22.6
SS	456928	367423	Roadside	-	100	21.6	19.4	11.7	16.0	16.5
SRE	458513	358623	Roadside	-	57.7	20.9	18.3	10.6	14.0	15.2
WT	456663	368019	Roadside	-	100	26.5	23.0	13.5	20.4	20.7

☒ **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 six months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in annual mean NO_2 concentrations

Figure A.1 presents NO_2 annual mean concentrations for the diffusion tube monitoring sites between years 2018 to 2022. There are no exceedances of the annual mean objective in 2022; this objective of 40µgm^3 is shown on the chart by a heavy horizontal line. There is a general trend of reduction experienced across the sites.

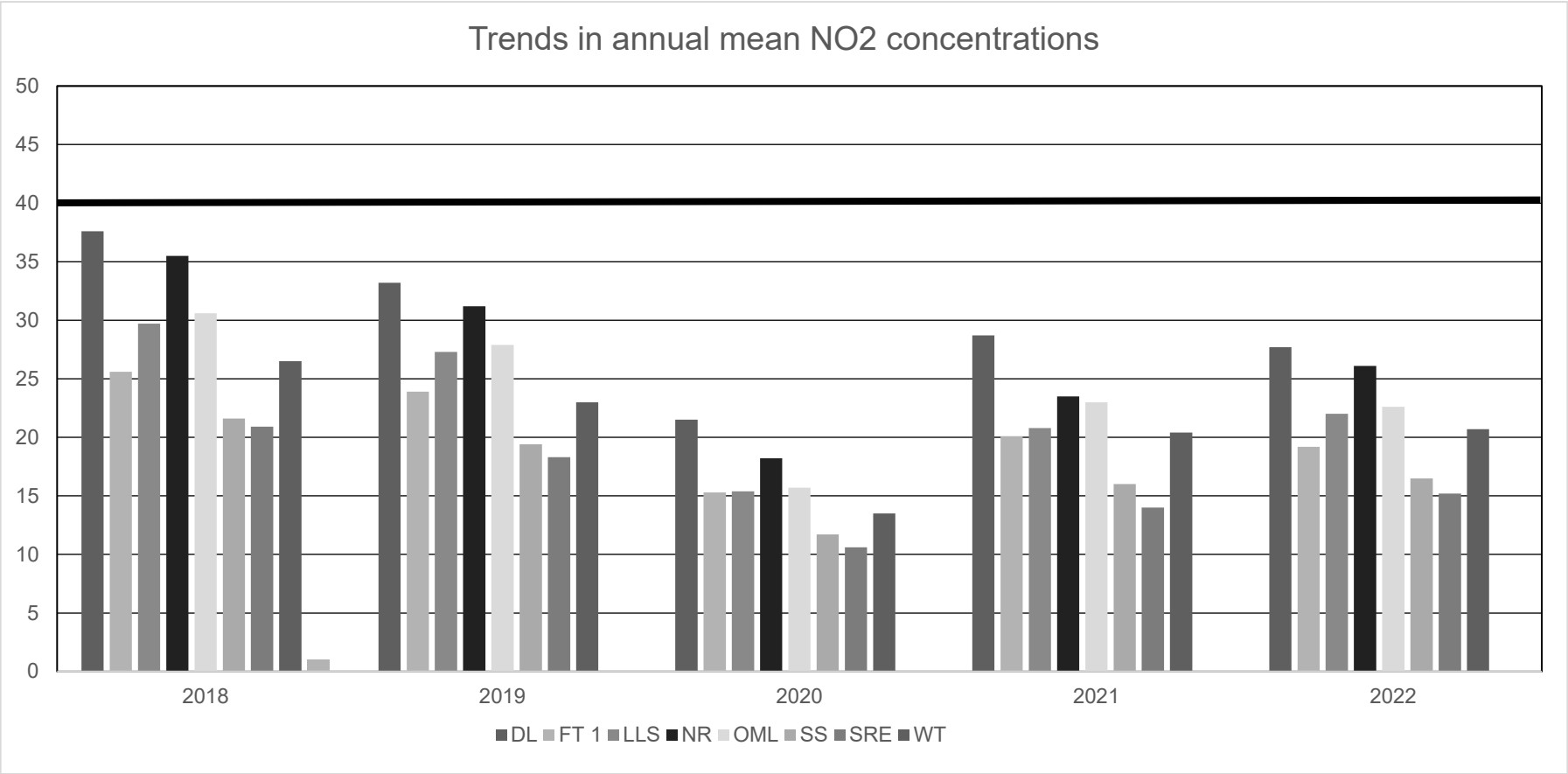


Table A.5 – 1-hour mean NO_2 monitoring results, number of 1-hour means >200µg/m^3

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
Chesterfield Road North	450974	363730	Roadside	-	100	-	**47** (99.8th percentile 351.6)	None	None	None

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 six months, the maximum data capture for the full calendar year is 50%).

No trend chart has been provided, as three of the four years monitored did not have any exceedances.

Appendix B: Full monthly diffusion tube results for 2022

Table B.1 – NO_2 2022 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 and bias-adjusted (0.83)	Annual mean: distance corrected to nearest exposure	Comment
DL	452515	362508	42.2	32.6	33.9	28.5	27.8	30.9	27.3	28.2	31.8	37.6	42.0	37.4	33.4	27.7	-	
FT 1	457199	362697	37.3	26.8	23.2	19.6	17.7	18.4	18.7	18.6	21.6	27.3	17.7	30.1	23.1	19.2	-	
LLS	454421	362860			33.4	23.6	20.1	19.9	21.1	23.9	26.3	31.0	32.1	33.4	26.5	22.0	-	
NR	453842	360174		31.9	35.0	27.0		27.2		27.9	34.1			42.8	32.3	26.3	-	Site appears vulnerable to persons removing tube – location to be reviewed
OML	455834	362101		25.6	34.4	26.9	21.3	21.4	22.9	26.1	30.1	26.7	32.0	32.7	27.3	22.6	-	
SS	456928	367423	30.1	19.9	21.3	16.0	12.3	12.8	12.6	14.2	19.2	21.7	28.1	29.9	19.8	16.5	-	
SRE	458513	358623	25.7	17.8		15.8	12.8	12.7		16.1	20.0				17.3	15.3	-	Tube and fixings disappeared in October – renewed in December
WT	456663	368019	33.6	21.6	26.5	22.5	18.8	20.5	22.2	22.7	28.4	22.8	28.0	31.2	24.9	20.7	-	

☒ **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.**

☒ **Mansfield District Council confirms 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 the Mansfield District during 2022

Several large areas of housing are being built or are planned in the district, the locations being:

- To the south of Mansfield, along the A617 outer ring road (Sherwood Way East), where land is being developed on the north side of the road. About a third of the proposed development has been completed;
- To the west of Mansfield, between the A617 outer ring road and the A6075 (Abbott Road). The housing part of the development has been completed; and
- To the south-west of Warsop, off Stonebridge Lane. Construction is expected to begin in early 2023.

An Air Quality Assessment has been required for each development as part of the planning process, and none has indicated that there would be a significant increase in NO_2 levels caused by extra vehicle movements.

Since much of the district is on sandy soil, new developments have a potential to cause dust emissions during the construction phase. In conjunction with the Planning Department, the Environmental Protection Team responds to complaints about dust from these developments and ensures that appropriate measures are in place to minimise emissions.

Additional air quality works undertaken by Mansfield District Council during 2022

Mansfield District Council has not completed any additional works within the reporting year of 2022.

QA/QC of diffusion tube monitoring

All the Local Authorities in Nottinghamshire have a contract with Gradko International for the supply and analysis of NO_2 diffusion tubes, so that there is consistency throughout the county. Gradko has a very strict QA procedure which involves analysing, once a month, a certified solution supplied by AEA Technology. Gradko also takes part in the NO_2 Network

Field Intercomparison Exercises carried out by AEA Technology, in which it is rated as 'good'.

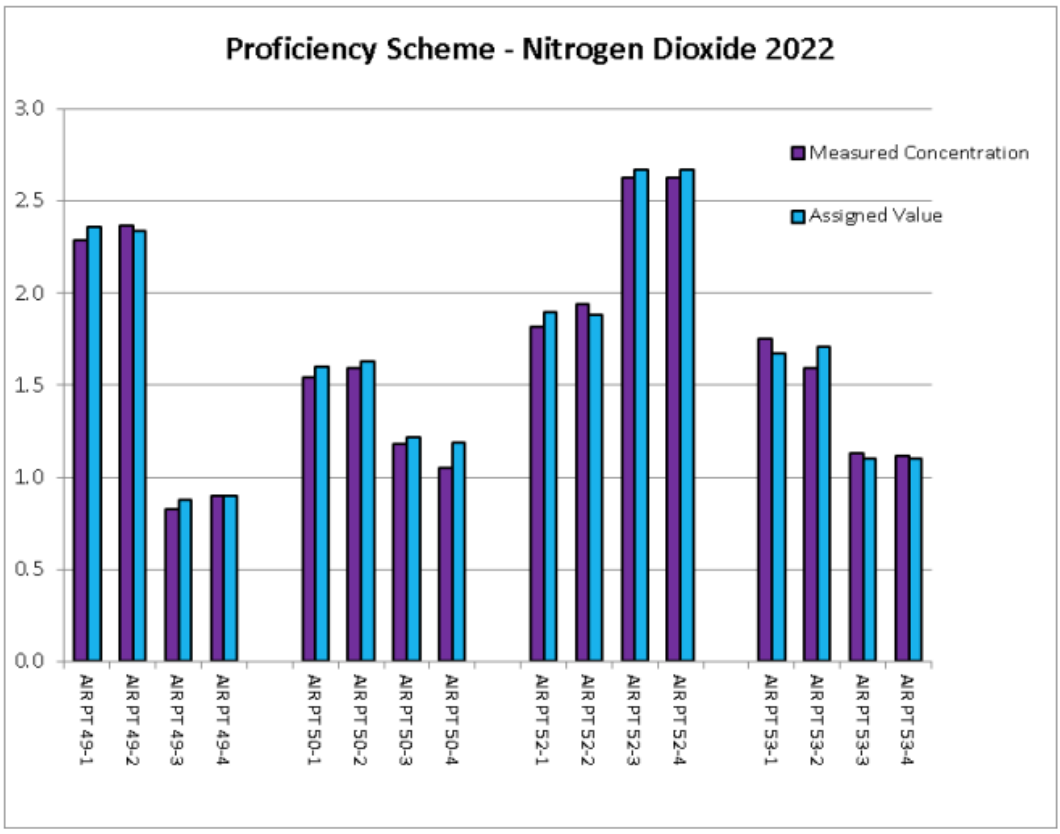
The diffusion tubes used in Nottinghamshire are prepared using 20% TEA in water. Mansfield's tubes are stored under refrigeration prior to use, and are used within the specified expiry dates. The tube exposure periods in 2022 conformed to the Diffusion Tube Exposure Calendar.

Upon changing the tubes, the date, site and exposure times are recorded, and the tubes are put into a sealed bag. They are forwarded to Gradko for analysis along with an unexposed tube from the same batch.

Gradko has confirmed that the laboratory complies with the procedures detailed in the Defra Harmonisation Practical Guidance.

Their proficiency scheme results for 2022 are as follows:

AIR PT Proficiency Scheme - Nitrogen Dioxide 2022					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb-22	AIR PT 49-1	2.36	2.29	-0.4	-3.0%
Feb-22	AIR PT 49-2	2.34	2.37	0.2	1.3%
Feb-22	AIR PT 49-3	0.88	0.83	-0.65	-5.7%
Feb-22	AIR PT 49-4	0.9	0.9	0.0	0.0%
May-22	AIR PT 50-1	1.6	1.54	-0.5	-3.8%
May-22	AIR PT 50-2	1.63	1.59	-0.29	-2.5%
May-22	AIR PT 50-3	1.22	1.18	-0.44	-3.3%
May-22	AIR PT 50-4	1.19	1.05	-1.48	-11.8%
Aug-22	AIR PT 52-1	1.90	1.82	-0.56	-4.2%
Aug-22	AIR PT 52-2	1.88	1.94	0.43	3.2%
Aug-22	AIR PT 52-3	2.67	2.63	-0.2	-1.5%
Aug-22	AIR PT 52-4	2.67	2.63	-0.2	-1.5%
Oct-22	AIR PT 53-1	1.67	1.75	0.64	4.8%
Oct-22	AIR PT 53-2	1.71	1.59	-0.94	-7.0%
Oct-22	AIR PT 53-3	1.1	1.13	0.36	2.7%
Oct-22	AIR PT 53-4	1.1	1.12	0.24	1.8%



Diffusion tube annualisation

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

Site ID	Annualisation factor (Nottingham Centre)	Annualisation factor (Chesterfield Loundsley Green)	Annualisation factor (Leicester University)	Average annualisation factor	Raw data annual mean	Annualised annual mean
NR	0.9943	0.9591	0.9875	0.9803	32.3	31.6
SRE	1.0538	1.1139	1.0244	1.0640	17.3	18.4

Diffusion tube bias adjustment factors

The diffusion tube data presented within the 2022 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.

Mansfield District Council has applied a national bias adjustment factor of 0.83 to the 2022 monitoring data, as there are currently no co-located tubes in the District. The council intends to co-locate three tubes with the real-time unit on Chesterfield Road North in 2023. The national bias adjustment factor has been calculated from 27 studies from version 03/23 of the spreadsheet, all with a precision rating of 'good'. A summary of bias adjustment factors used by the Council 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	National	03/23	0.83
2021	National	03/22	0.84
2020	National	03/21	0.81
2019	National	03/20	0.84
2018	National	03/19	0.93

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.

No diffusion tube NO_2 monitoring locations within the District required distance correction during 2022.

QA/QC of automatic monitoring

Two officers share the task of servicing the real-time monitoring unit and uploading the data, and visit the site once a month.

The data presented in this document have been collated and ratified in-house by the officer who has been compiling the Air Quality Review since its inception in 2003.

Only summary data is available on the Council's website, by downloading copies of the Air Quality Reviews (to be found at www.mansfield.gov.uk/pollution/air-quality-1). Reviews from 2014 onwards are on the website; earlier copies are available on request.

A website giving both real-time and diffusion tube results for the monitoring sites throughout Nottingham and Nottinghamshire is in the process of development and should be on line in 2023. Mansfield's NO_2 diffusion tube results will be available on this site.

Automatic monitoring annualisation

The automatic monitoring location within the District recorded data capture of greater than 75%, therefore it was not necessary to annualise the monitoring data.

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.

No automatic NO_2 monitoring locations within the District required distance correction during 2022.

Appendix D: Maps of monitoring locations

Figure D.1 – Map of non-automatic monitoring site DL

The red dot shows the diffusion tube location near the junction of the A6191 (Chesterfield Road) and the A6075 (Debdale Lane) in Mansfield at 452515 362598, approximately 3 km from the town centre to the east-south-east and 12.5 km from M1 junction 29 to the north-west.

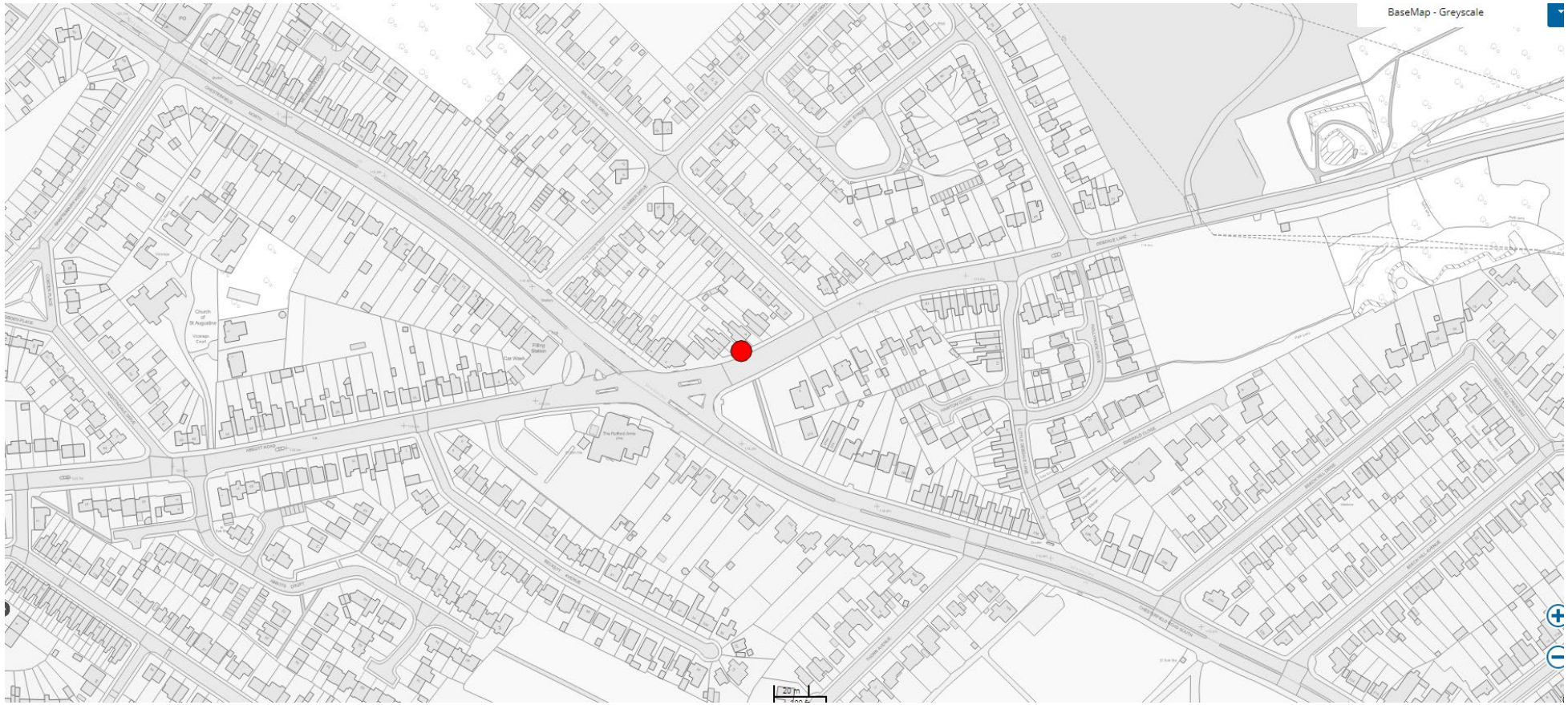


Figure D.2 – Map of non-automatic monitoring site FT1

The red dot shows the tube's location on the B6030 (Clipstone Road East) in Forest Town at 457199 362697, approximately 4.5 km from Mansfield town centre to the south-east.

Figure D.3 – Map of non-automatic monitoring site LLS

The red dot shows the tube's location on the A60 (Leeming Lane South) in Mansfield Woodhouse at 454421 362860, approximately 3 km from Mansfield town centre to the south-south-west.

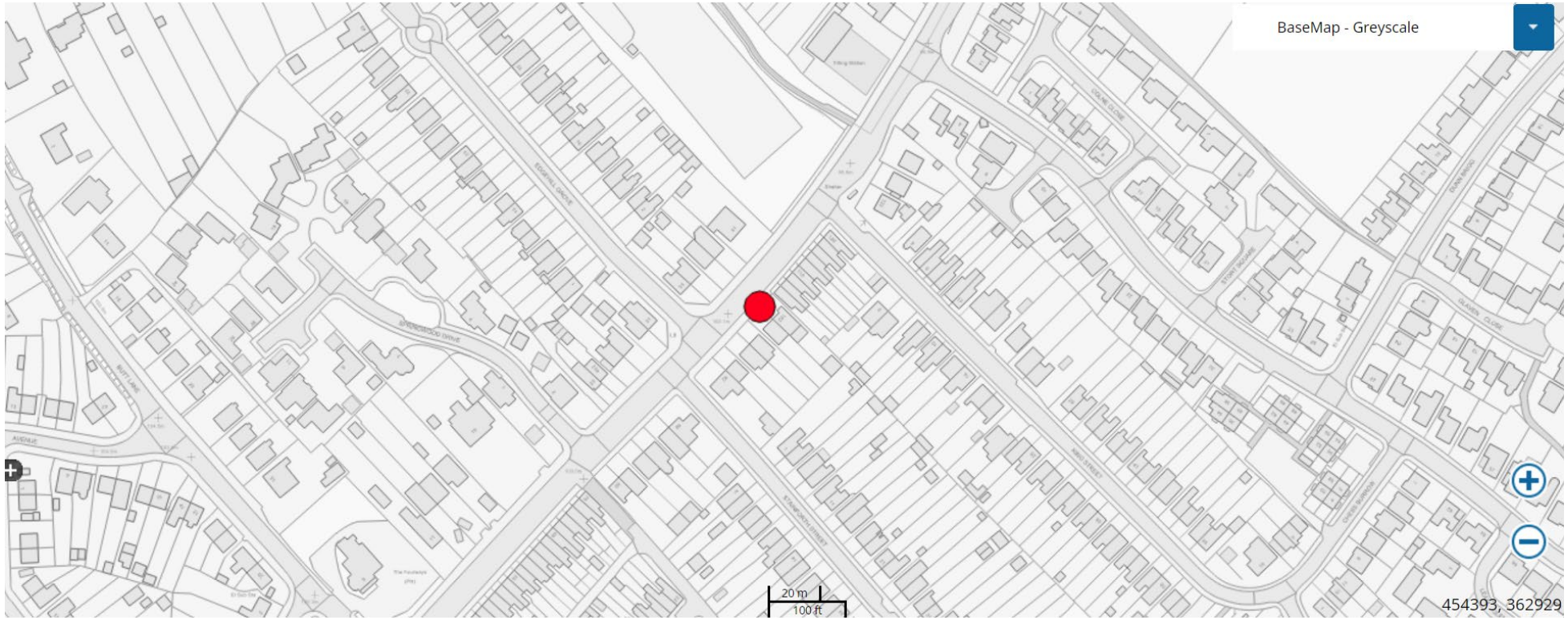


Figure D.4 – Map of non-automatic monitoring site NR

The red dot shows the tube's location on the A60 (Nottingham Road) in Mansfield at 453842 360174, approximately 1 km from Mansfield town centre to the north and 6 km from the Mansfield outer ring road (the A617) to the south.

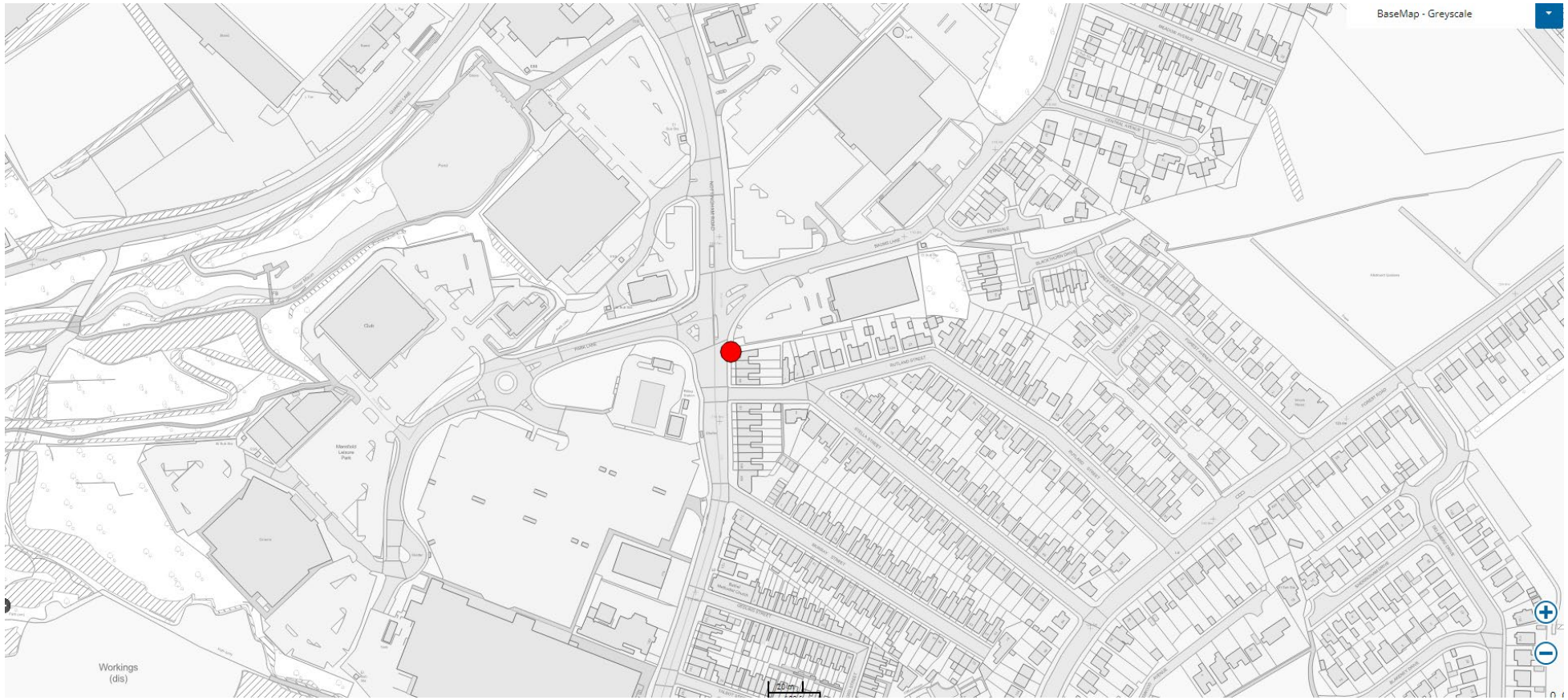
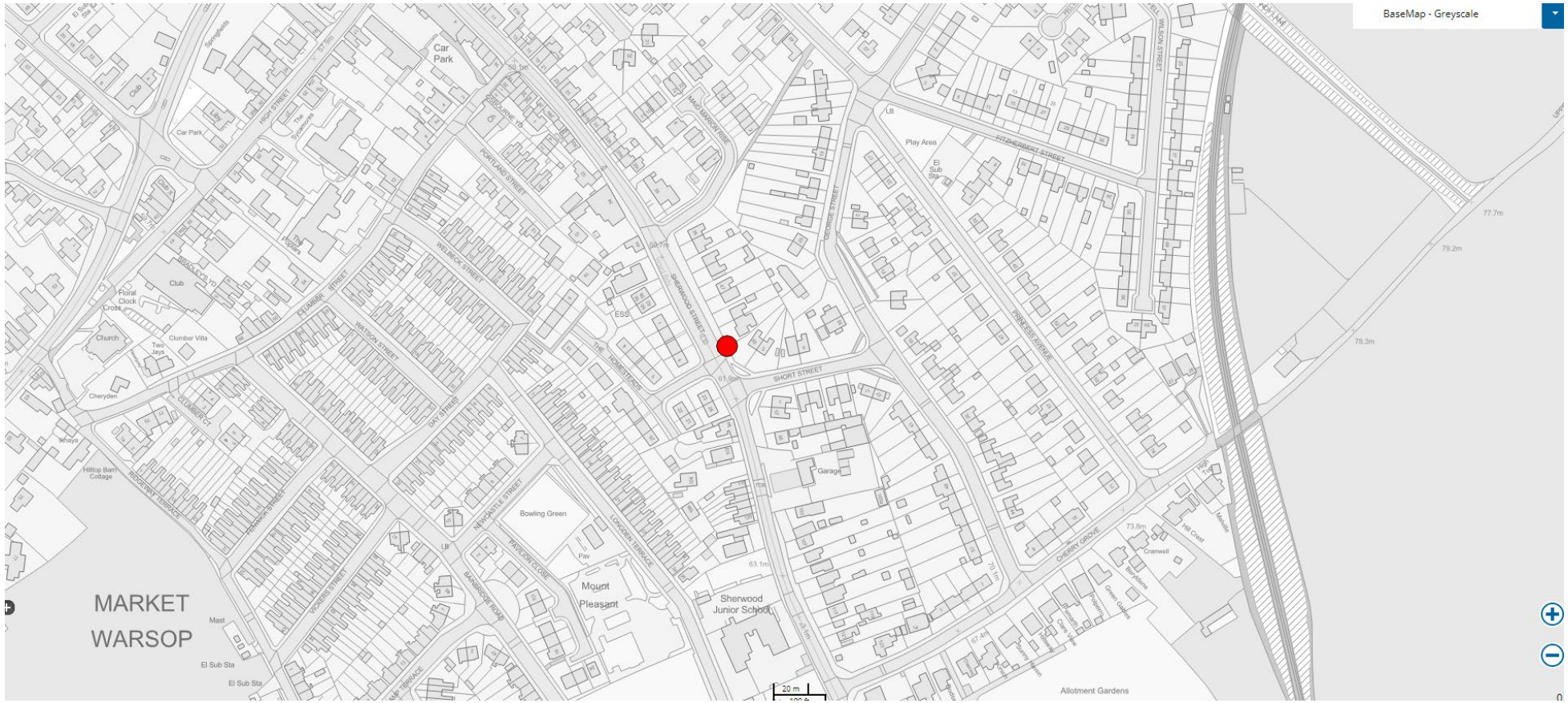


Figure D.5 – Map of non-automatic monitoring site OML

The red dot shows the tube's location on the A6117 (Old Mill Lane) in Forest Town at 455834 362101, approximately 3 km from Mansfield town centre to the east-south-east.

Figure D.6 – Map of non-automatic monitoring site SS

The red dot shows the unit's location on the B6035 (Sherwood Street) in Warsop at 456928 367423, approximately 9 km from Mansfield town centre to the south-south-west.



D.7 – Map of non-automatic monitoring site SRE

The red dot shows the unit's location on the B6020 (Southwell Road East) in Rainworth at 458513 358623, approximately 6 km from Mansfield town centre to the north-west.

Figure D.8 – Map of non-automatic monitoring site WT

The red dot shows the unit's location on the A60 (Church Street) at Warsop Town Hall (456663 368019), approximately 8.5 km from Mansfield town centre to the south-south-west.

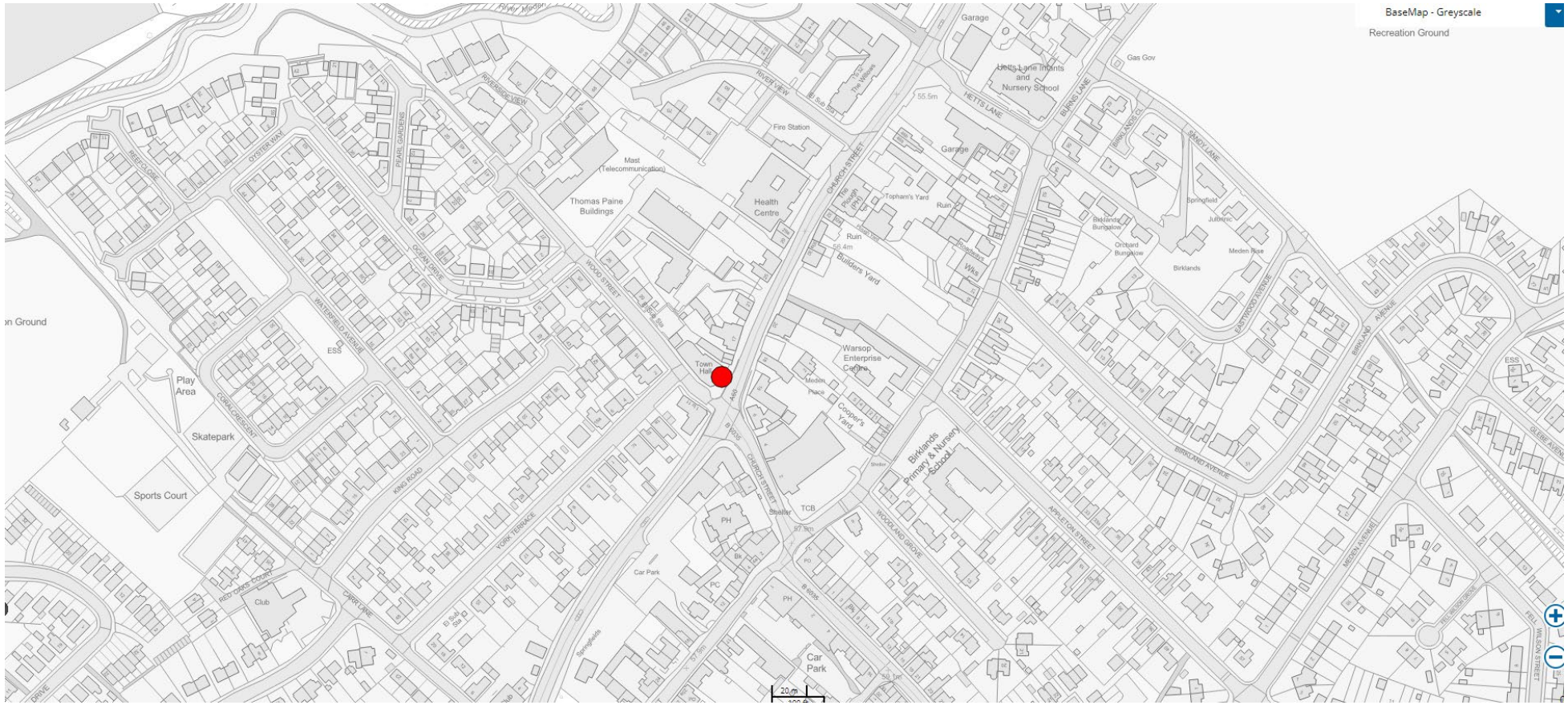


Figure D.9 - Map of automatic monitoring site CRN

The red dot shows the unit's location on the A6191 (Chesterfield Road North) in Pleasley at 450974 363730, approximately 300m from the junction with the A617 Mansfield outer ring road to the south-east, 5 km from Mansfield town centre to the south-east, and 7.5 km from M1 junction 29 to the north-west.

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

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.