Mansfield
District Council

2019 Air Quality Annual Status Report (ASR)

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

June 2019

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Cover photo – Mansfield's Grade II Listed railway viaduct, with the 'High Heels' street art celebrating the town's former shoe manufacturing industry

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Historically, the District 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, both for 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, to a smaller degree, airborne dust (PM_{10}). The Council monitors extensively for NO_2, with 15 passive monitoring tubes at roadside locations throughout the District in 2018. The trends for these two pollutants generally in the District over the last seven years suggest a decline in levels of both, that for PM_{10} being greater than that for NO_2.

The Council has no Air Quality Management Areas at present, but has been looking particularly at the northern end of Chesterfield Road North, Pleasley, the junction of Chesterfield Road North and Poplar Drive, and the Debdale Lane/Chesterfield Road North junction, Mansfield, where the highest NO_2 levels in the District are experienced. In 2018, no sites were exceeding the national Air Quality Objective of an annual mean of 40µgm[3].

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

A detailed assessment was carried out for Pleasley in 2015[4], using NO_2 diffusion tubes and a real-time analyser, and it was concluded that an AQMA was not required at this time, but monitoring would continue. Unfortunately, due to the age and condition of the NO_2 analyser and its enclosure, real-time monitoring had to cease in August 2017, and at the time of writing it has not been possible to begin again. However, a new enclosure and NO_2 analyser have been purchased, and a suitable site has been found on Chesterfield Road North to continue monitoring in the Pleasley area. It is hoped that monitoring can start again by summer 2019.

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.

[4] Pleasley Detailed Assessment Report, 2016

Actions to improve air quality

Mansfield District Council's Smoke Control Area programme 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 some eleven years. However, it is necessary to remind residents at intervals about the requirements of Smoke Control Orders.

Nationwide, there has been a massive increase in the use of wood-burning stoves, and whenever Mansfield's Environmental Health Department becomes aware of people installing these locally, it endeavours to give them advice and assistance. Fortunately, these stoves tend to be scattered about the District rather than concentrated in an area, so effects are usually confined to their immediate surroundings.

In 2015, five old coal-fired group heating systems in Council estates were removed and replaced with individual heating systems in 1,350 individual properties, augmented by air- or ground-source heat pumps. The Council used to receive complaints of airborne dust in the vicinity of the boiler-houses; it now receives none. Work is still continuing to replace other old solid fuel-fired district heating systems

with gas or electric systems in individual Council properties, with another 200 houses being converted in 2018.

A new list of measures being taken by various Council departments to improve local air quality was put together in 2016, with several items on it already completed. This was updated in 2017 and again in 2018; the latest version can be found in Table 2.1, 'Progress on measures to improve air quality'.

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 is working to update the Nottinghamshire Air Quality Improvement Strategy.

Conclusions and priorities

Our conclusions from monitoring in 2018 are:

1) The only NO_2 diffusion tube that is now giving high readings is the one on Debdale Lane (near the Chesterfield Road/Abbott Road junction). The raw data result only exceeded the annual Objective of 40µg/m^3 by 0.39µg/m^3, which means it is below the Objective when the various correction factors are applied.

2) Although the Council does not monitor for $PM_{2.5}$, we assume that, comparing monitored levels recorded in the centre of Nottingham and Defra's modelled background level for Mansfield, $PM_{2.5}$ levels in the area will not be a cause for concern. No Air Quality Objective has been set to date for $PM_{2.5}$, but the World Health Organisation guideline value is 10µgm^3. Mansfield's levels are thought likely to be around 9µgm^3. The actions identified in Table 2.1 that will help to reduce PM_{10} concentrations should also reduce $PM_{2.5}$.

3) A detailed report of NO_2 monitoring carried out in the Pleasley area in 2015 concluded that an Air Quality Management Area was not required there, as the evidence suggested a slight but steady reduction in NO_2 concentrations. The high-reading diffusion tube on Chesterfield Road North did not show an

exceedance in 2017 or 2018 – a situation which hopefully will continue and support this conclusion.

4) Detailed dispersion modelling was carried out by a consultant looking at possible air quality issues from three road junctions and two residential development locations for the proposed Local Plan allocation. The report concluded that, although implementation of the Local Plan would cause an increase in traffic loading at the junctions, it would not have significant impacts on local air quality. Even if the expected improvements in vehicle emissions did not materialise, the impact would still be 'negligible' to 'slight'. Monitoring has been taking place for some years at one of the junctions in question; a diffusion tube will be put in place at a suitable point once one of the residential developments has been completed, as a receptor was identified that might have an increase in NO_2 levels of up to 3.9µgm^3.

Our priorities for the coming year are:

1) to continue diffusion tube monitoring for NO_2 throughout the District to enable us to have an ongoing indication of levels of this pollutant;

2) to install a new, smaller enclosure containing NOx and PM_{10} real-time analysers on Chesterfield Road North in Pleasley, and monitor there for at least a year;

3) to implement and continue to develop the various measures the Council is taking to improve local air quality; and

4) to work together with the other Nottinghamshire Councils to update the Nottinghamshire Air Quality Improvement Strategy.

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 Health Department 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 using open fires, burn only solid smokeless fuels on them. This is a requirement under the Clean Air Act 1993 and the Smoke Control Order that covers your property.

2) If using a closed fire (roomheater), burn only the type of fuel recommended by the manufacturer. Again, this is a legal requirement.

3) If using a wood-burning stove, burn only clean, dry wood.

4) Avoid garden bonfires as much as possible. Never burn furniture, carpets or anything containing plastics, foam rubber, or other materials likely to cause black smoke and smell. Allow plant and tree cuttings to dry before burning them.

5) Wherever possible, use alternative forms of transport rather than your car. When changing cars, look for a ‘cleaner’ vehicle. Have your car serviced regularly, and if the exhaust starts smoking, have it checked.

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1 Local Air Quality Management

This report provides an overview of air quality in the Mansfield District during 2018. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Mansfield District Council to improve air quality and any progress that has been made.

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

2 Actions to improve air quality

2.1 Air Quality Management Areas

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

Mansfield District Council does not have any AQMAs at present. For reference, maps of the Council's monitoring locations are available in Appendix D.

2.2 Progress and impact of measures to address air quality in the Mansfield District

Defra's appraisal of last year's ASR concluded: "The Local Authority currently has no AQMAs declared for exceedances of Nitrogen Dioxide (NO_2) or particulate (PM_{10}) objectives. Consequently, the Council does not have a formal Air Quality Action Plan, but has developed measures to improve air quality linked to the County Council's AQ Improvement Strategy, and the District Council's Local Plan. There are plans to commission air quality modelling at 3 hotspots which should prove to be informative."

"Air quality monitoring for NO_2 is undertaken via a network of 15 diffusion tubes. No automatic monitoring was undertaken in 2017. There are no exceedances of the air quality objectives."

"On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants, taking note of the comments below in further reports."

The new enclosure for the real-time monitors on Chesterfield Road North, Pleasley, will be sited some 250m further south from the previous location at the Landmark Centre, to move it away from the possible influence of vehicles using the car park. This places it near a new housing development, which does not front onto the main road, but it is not possible to locate it near the remaining older houses where the front

doors open straight onto the pavement. Please see Figure 2.2 for the location. The unit will be put in place in the spring of 2019.

Mansfield District Council has continued to take forward a number of measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned, are set out in Table 2.1.

The measures are ordered in terms of their expected efficacy, which in practice has meant that the measures giving a result over the shorter term are higher up the list than those which are policy-based and are likely to take longer to produce an effect.

Many of the measures are ongoing, either because they are part of a rolling programme or because they are awaiting the outcome of some other project or report.

The column in Table 2.1 headed “Reduction in pollutant/emission from measure” has not been completed, as it is very difficult to quantify the likely reduction in levels that these measures would produce, either individually or taken together. However, we believe that the road-based measures have already contributed to the steady drop in NO_2 levels that many of our diffusion tubes have been showing over the past few years.

Mansfield District Council is one of the councils who produced the Nottinghamshire Air Quality Improvement Strategy, “A Breath of Fresh Air”, and is involved in the updating of this document, led by Nottinghamshire County Council. The original strategy has been removed from the websites of the county’s various councils, and we are awaiting the new version. (A paper copy of the original can be provided if required).

The District Council’s Local Plan can be found at https://www.mansfield.gov.uk/localplan1998. This was adopted in November 1998; it is still in the process of being updated. Most of its policies have been ‘saved’ until it is superseded by the new document. The Council submitted the Local Plan, together with the representations received and other relevant supporting documents, to the Secretary of State for Housing Communities and Local Government on 19 December 2018 for independent examination. A policy for assessing air quality has already

been written for the new plan, to ensure its impact is considered during the planning stage of all new developments. A summary of progress on the new Local Plan is available at https://www.mansfield.gov.uk/localplan.

The Climate Change Strategy was incorporated into the Council's corporate vision and priorities approved on 26 July 2016 – the key priorities of the strategy are available at https://www.mansfield.gov.uk/article/7584/Council-sets-out-its-vision-for-the-future.

The Nottinghamshire Local Transport Plan 2011-2026 can be found at https://www.nottinghamshire.gov.uk/media/123040/local-transport-plan-strategy.pdf, and the county's action plans for public transport can be found at www.nottinghamshire.gov.uk/transport/public-transport/plans-strategies-policies.

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 the recent World Health Organisation list of the ten UK cities failing to meet WHO air pollution standards.

Table 2.1 – Progress on measures to improve air quality

Measure no.	Measure	EU category	EU classification	Organisations involved and funding source	Planning phase	Implementation phase	Key performance indicator	Reduction in pollutant / emission from measure	Progress to date	Estimated / actual completion date	Comments / barriers to implementation
1	Home energy conservation	Policy guidance and development control	Other policy	MDC Housing	2011/ 2013/ 2015	2017	Percentage reduction in heating costs		Home Energy Conservation Act Report	Ongoing	A further 208 Council properties converted from district heating systems to gas central heating - over 1,700 properties converted since scheme began
2	School travel plans	Promoting travel alternatives	School travel plans	Notts County Council Education Department			Reduction in number of private vehicle "school runs"		Several school travel plans already implemented	Ongoing	One more school travel plan implemented in 2018
3	Cleaner taxis	Promoting low emission transport	Taxi emission incentives	MDC Taxi Licencing	2016		Increased number of taxi operators using cleaner vehicles		Licence fee for hybrid vehicles reduced by 10%	Ongoing	Monitoring similar projects in neighbouring districts, and will consider review if necessary
4	Cleaner taxis	Promoting low emission transport	Taxi licensing conditions	MDC Taxi Licencing	2016		Fewer older vehicles operating		No current plans to review age criteria for either new vehicle applications or existing licensed vehicles with MDC	Ongoing	Awaiting the creation of National Standards, and will consider implementation where relevant
5	MDC vehicle fleet efficiency	Vehicle fleet efficiency	Fleet efficiency and recognition schemes	MDC Fleet Management	N/A	Ongoing	Percentage reduction in emissions and fuel usage; increased number of cleaner vehicles		Vehicle replacement scheme in operation, with aim of all vehicles to be Euro 6	Ongoing	No fleet vehicles are older than 10 years; no Euro 4 vehicles now in use. All existing refuse vehicles are Euro 5 or 6. All newly-

											purchased commercial vehicles are Euro 6. Scheme permits replacement of 1 refuse vehicle and 10-15 vans per year
6	Alternative fuels	Promoting low emission plant	Shift to installations using low-emission fuels for stationary and mobile sources	MDC Facilities	2015	Ongoing	Reduction in electricity costs		Solar panels put on Civic Centre roof in March 2016 – savings of £27,813 to date		Solar panels being put on several new MDC commercial and residential buildings
7	Working from home	Promoting travel alternatives	Encourage/ facilitate home-working	MDC	2014		Number of people taking up option		Home working policy implemented 2014	Ongoing	Home working being trialled by Finance Department. 13 officers have expressed an interest
8	LEV parking and charging	Promoting low emission transport	Priority parking for LEVs	MDC Planning			Number of spaces provided alongside demand		Policy included in draft Local Plan. Four businesses have charging points for electric cars at present	Ongoing	Several stores and public houses have indicated they will be applying for planning permission to provide charging points in their car parks
9	Carbon management plan	Policy guidance and development control	Low Emissions Strategy	MDC Planning Policy	2010	2012-2014	Percentage reduction in emissions		Implementation of council's Carbon Management Plan and Climate Local Declaration	Ongoing	Cut emissions by 35% from Council activities from 2008/09 baseline in 5 years
10	Warm Homes on Prescription	Policy guidance and development control	Other	MDC Private Sector Housing	N/A	Ongoing	Number of homes improved		24 properties improved in 2018/19. 63 properties improved since grant was introduced in	N/K - when funding exhausted	Health professionals encouraged to refer their patients if they have concerns about heating and insulation of their

									2016/17		homes
11	Speed limit reductions	Traffic management	Reduction of speed limits, 20mph zones	Notts County Council Highways	Included in Transport Plan 2011-2026		Reduction in traffic emissions; accident reduction		Some 40mph roads reduced to 30; 20mph zones around several schools. One further 20mph zone put in place outside a school in 2018	Ongoing	Primarily for road safety, but should also improve air quality
12	Delivery management	Freight and delivery management	Quiet & out-of-hours delivery	MDC Planning			Reduction in complaints from nearby residents		Discussions with businesses to reduce frequency of deliveries	Ongoing	Considered during planning process and conditions attached where appropriate
13	"Part B" process controls	Environ-mental permits	Measures to reduce pollution through IPPC permits going beyond BAT	MDC Environmental Health		Discussed with businesses during inspection process	Reduction in solvent use		Permitted processes reporting on progress every two years	Ongoing	Also considered in each business's Five Year Review
14	Energy partnership	Policy guidance and development control	Regional groups co-ordinating programmes to develop area-wide strategies to reduce emissions and improve air quality	Local Authority Energy Partnership made up of 20 authorities from Nottinghamshire and Derbyshire	N/A		N/A		Strategies being written and programmes developed	Ongoing funding available	No further progress since 2017, as no Energy Officer currently in post
15	Local Plan	Policy guidance and development control	Air quality planning and policy guidance	MDC Planning Policy		2013-2033			Local Plan submitted for examination on 19 December 2018	Early 2020	New guidance written for updated emerging Local Plan
16	Sustainable procurement	Policy guidance and development control	Sustainable procurement guidance	Nottingham City Council Procurement Unit	N/A		Impact on air quality		Minimise environmental impact of goods, services and works procured	Ongoing compliance with strategy	
17	Personal travel plans	Promoting travel alternatives	Personal travel plans	MDC, Notts County Council (funding from	2017	2018/19 and 2019/20	Number of people taking up option		Target groups identified: jobseekers,	2019/20	

				DfT)					school leavers, employees and residents		
18	Cycle-to-work scheme	Promoting travel alternatives	Promotion of cycling	MDC	2016	Ongoing	Number of people cycling to work		Implemented cycle-to-work scheme at MDC – wider scheme recently proposed	Ongoing	To be included in new Health and Wellbeing Agenda
19	Cycle network	Promoting travel alternatives	Promotion of cycling	MDC, Notts County Council (funding from D2N2 LEP LGF)	2017/18	2018/19	Increased use of cycle network		Consultation on proposals in early 2017; potential routes identified	2018/19	
20	Promotion of walking	Promoting travel alternatives	Promotion of walking	MDC	2016		Increased number of people walking; improvements in health		New corporate priorities launched 2016, including actions to help people live healthier lives, and for climate change issues, district heating improvements, energy efficiency, carbon footprint reductions		To be included in new Health and Wellbeing Agenda
21	Bus lane	Traffic management	Strategic highway improvements, re-prioritising road space away from cars, including access management, selective vehicle priority, bus priority, high vehicle occupancy lane	Notts County Council Highways	Included in Transport Plan 2011-2026	Complete	Reduction of bus waiting time at one busy traffic-lighted junction		Bus lane on Leeming Lane South has been in place for several years	Complete	Reduced bus waiting time by 2 mins on average
22	Public information	Public information	Via radio, press, and internet	MDC Public Relations and Communications			Increased number of ‘hits’,		Positive publicity via social media,	Ongoing	

				Team			comments and 'likes' recorded from website, Facebook pages, etc.		MDC website, press releases, etc., and by taking part in national awareness campaigns		
23	Public information	Public information	Via leaflets, radio, and internet	MDC Environmental Health			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 station; information on MDC website	Ongoing	

2.3 $PM_{2.5}$ – Local Authority approach to reducing emissions and/or concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases. The Public Health Outcomes Framework Indicator 3.01, 'Fraction of mortality attributable to particulate air pollution' for Nottinghamshire (measured as $PM_{2.5}$ and taken from 2016 data, the latest available) is 5.7%. This is the same as the East Midlands figure, but a little above the figure for the whole of England, which is 5.3%.

Mansfield District Council does not monitor for $PM_{2.5}$ at present, therefore the likely local levels have been predicted from the nearest AURN site that measures $PM_{2.5}$ and the modelled background concentrations from the Defra website. The modelled background level for 2018 from the Defra website for the Mansfield town centre is about 9.1µgm^3. In 2017 (the latest available results), the annual mean concentration at the AURN site in Nottingham Centre was 12µgm^3. (Please note that the Mansfield figure is modelled, whereas the Nottingham one is monitored).

The World Health Organisation guideline value for $PM_{2.5}$ is 10µgm^3; no air quality objective has been set to date. It seems very unlikely that the levels in Mansfield would be as high as those in Nottingham city centre, so we must assume that Mansfield's levels are closer to the modelled 9.1µgm^3 (which is below the WHO guideline value) than to 12µgm^3, and therefore there is unlikely to be a major problem with $PM_{2.5}$ in this area.

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 had to stop until new equipment could be purchased) 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

3.1 Summary of monitoring undertaken

3.1.1 Automatic monitoring sites

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

Mansfield District Council did not undertake any automatic (continuous) monitoring during 2018. It became necessary to decommission the automatic monitoring unit in August 2016 due to issues with data-logging and the age of the enclosure. The Environmental Health Department has now purchased a new enclosure and a nitrogen dioxide analyser with a data-logger, and the enclosure will be sited on the pavement near the new houses on Chesterfield Road North, Pleasley, in the spring of 2019. Map A.1 in Appendix A shows the site. This is about 120m further south than the location given on the map in the 2018 report, the reason being that trees near the original proposed site have grown with unexpected vigour, and would have prevented an all-round flow of air.

National monitoring results are available at https://uk-air.defra.gov.uk/networks/find-sites.

3.1.2 Non-automatic monitoring sites

Mansfield District Council undertook non-automatic (passive) monitoring of NO_2, using diffusion tubes, at 15 sites during 2018. Table A.1 in Appendix A gives the details of the sites.

Two of the co-located diffusion tubes that had been sited on the front of the real-time monitoring unit until August 2016 were moved to locations on busy streets towards the end of that year – Old Mill Lane, Forest Town (near a superstore and industrial estate), and Hermitage Lane, Mansfield (near two industrial estates). Neither tube is giving high readings (except in January 2017 and November 2018, which were high-result months throughout the district), and both are below the annual mean Air Quality Objective of 40µg/m^3 without correction factors being applied.

The diffusion tube at the Old Town Hall in Warsop - which was high up on a balcony and not always accessible, particularly during the Christmas period - was moved to a drainpipe on the south-east side of the building in 2017. It is now at the recommended height of 2m. Again, the results are below the Objective without any correction factors being applied.

The diffusion tube at Stopford Associates, which is also located at first-floor level, will be replaced on a lamp-post or drainpipe closer to dwelling-houses in the nearby area in 2019.

The diffusion tube on the corner of Poplar Drive and Chesterfield Road North, Pleasley disappeared, along with its fixings, in August 2016. It was decided that the tube should not be replaced on the same site, as it was close to a bus stop. A review of monitoring in the area in 2018 found a more suitable location nearby, and a new tube will be put on a downpipe at a nearby property in 2019. Another tube will be located on the new real-time monitoring unit when that is operational, for comparison purposes.

Maps showing the locations of the various 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.

3.2 Individual pollutants

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

3.2.1 Nitrogen dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

The full 2018 dataset of monthly mean values recorded by diffusion tubes is provided in Table B.1 in Appendix B.

Monitoring in the Mansfield District in 2018 showed no exceedances of the air quality objectives, and no Air Quality Management Areas have had to be declared.

No exceedances of the 1-hour mean objective were logged by real-time monitoring between 2012 and 2016. No real-time monitoring has been carried out since, but in 2016, 99.8 of the 1-hour means were under 43µg/m^3. The annual mean concentration for 2016 was 16µg/m^3 – the annual mean concentrations for 2014 and 2015 were also around this level, suggesting that the annual mean of 43µg/m^3 recorded in 2013 (annualised from very little data) was an anomaly.

Mansfield still has no roads where the traffic count has recorded more than 26,500 vehicles per day. The largest percentage of HGVs on any road is 11%, which was recorded on the outer ring road (the A617), one of the functions of which is to remove such vehicles from the town itself. The nearest receptors on any part of this road are protected by embankments and belts of trees. The largest percentage of buses on any road in the District is 26%, on a section of the inner ring road to the north of the town centre (the A6009). In this location, the backs of some houses are 14m away, but they are located at a much higher level than the road, so that it is considered likely that the NO_2 levels will be low due to dilution and dispersion. The latest traffic growth percentage available for the District (2017) indicates a 0.8% increase.

It is encouraging to note that cycle use in the Mansfield District continues to increase, by 38% from the figures recorded in the base year of 2010.

3.2.2 Particulate matter (PM_{10})

Mansfield District Council has not monitored PM_{10} levels since the real-time unit had to be decommissioned in August 2016. In 2019, the analyser will be replaced in a new secure housing near the new houses on Chesterfield Road North, Pleasley, about 480m south of the previous monitoring site. This location should prevent any possible effects from vehicles using the Landmark Centre car park.

Appendix A: Monitoring results

Table A.2 – Details of non-automatic monitoring sites

Site ID	Site name	Site type	X OS grid ref	Y OS grid ref	Pollutant monitored	In AQMA?	Distance to relevant exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a continuous analyser?	Height (m)
AR	Abbott Road	Roadside	451854	362436	NO_2	N	8	1	N	2
CRN	Chesterfield Road North	Roadside	450820	364028	NO_2	N	2	1	N	2
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
FT2	Forest Town 2	Roadside	457407	362701	NO_2	N	11	2	N	2
HL	Hermitage Lane	Roadside	452423	360050	NO_2	N	12	6	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
SA	Stopford Associates	Roadside	453670	360594	NO_2	N	5	6	N	4
TL	Toothill Lane	Roadside	454072	361102	NO_2	N	6	2	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/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual mean NO_2 monitoring results

Site ID	Site type	Monitoring type	Valid data capture for monitoring period (%) (1)	Valid data capture 2018 (%) (2)	NO_2 annual mean concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018
AR	Roadside	Diffusion tube	N/A	100	30	29.55	32.48	31.03	23.1
CRN	Roadside	Diffusion tube	N/A	92	**44**	**41.72**	**42.95**	37.84	32.3
DL	Roadside	Diffusion tube	N/A	83	38	36.70	**47.26**	37.10	35.8
FT 1	Roadside	Diffusion tube	N/A	100	26	24.97	36.45	23.29	23.1
FT 2	Roadside	Diffusion tube	N/A	100	24	19.63	20.76	21.01	16.1
HL	Roadside	Diffusion tube	N/A	92			**42.96**	26.01	20.6
LLS	Roadside	Diffusion tube	N/A	100	30	28.88	31.20	27.94	24.5
NR	Roadside	Diffusion tube	N/A	92		35.42	37.11	37.86	31.3
OML	Roadside	Diffusion tube	N/A	100			**48.79**	28.49	24.7
SS	Roadside	Diffusion tube	N/A	100	20	20.04	23.20	21.14	19.5
SRE	Roadside	Diffusion tube	N/A	100	22	20.01	21.52	20.08	18.1
SA	Roadside	Diffusion tube	N/A	100	26	23.84	37.49	25.18	25.2
TL	Roadside	Diffusion tube	N/A	100	24	23.51	24.86	23.05	20.7
WT	Roadside	Diffusion tube	N/A	100	25	23.20	32.47	24.73	23.9

☒ **Diffusion tube data has been bias-corrected**

☒ **Annualisation has been conducted where data capture is <75%**

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.**

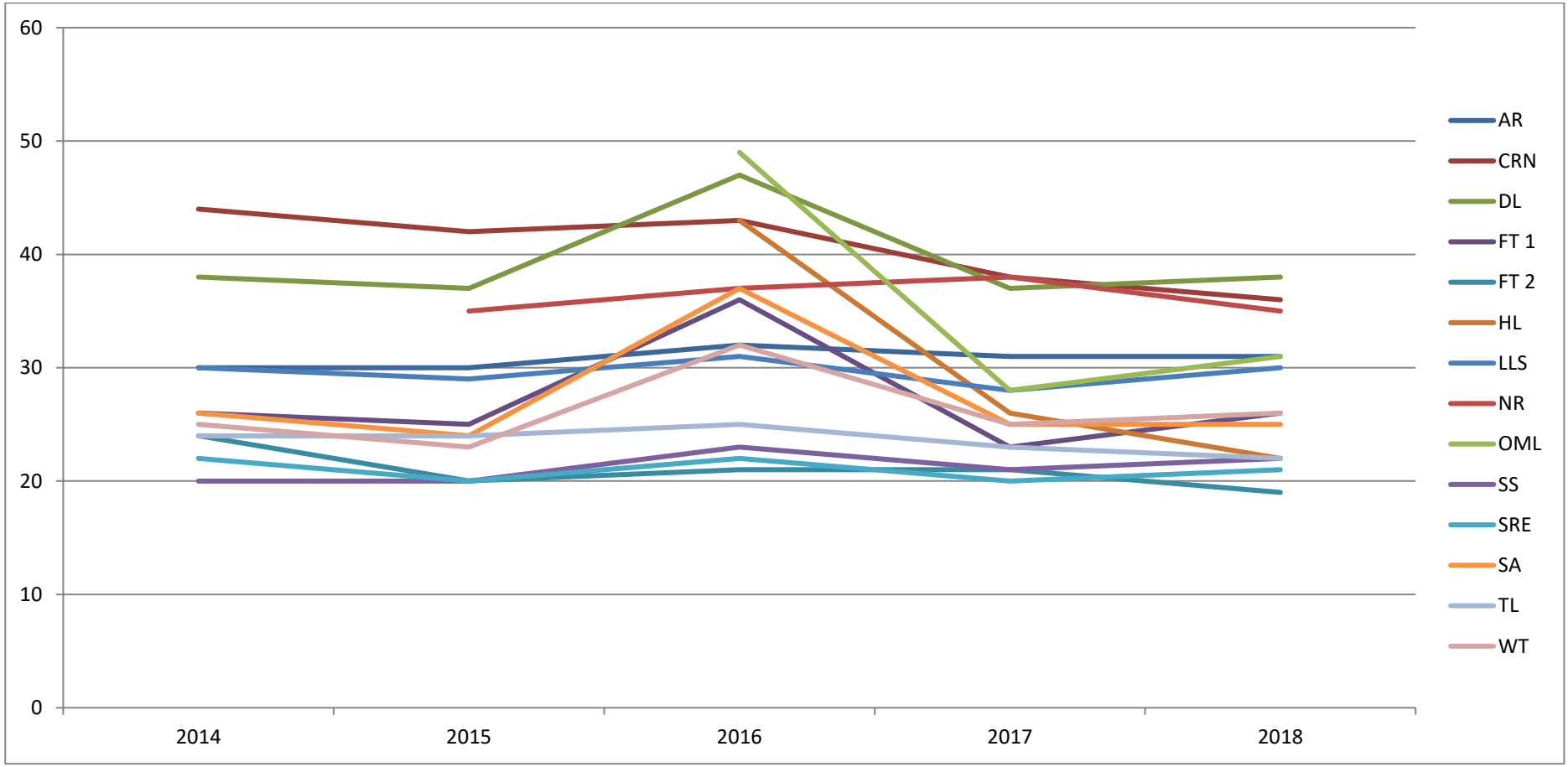
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(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%).

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

Figure A.1 – Trends in annual mean NO_2 concentrations

Results are rounded to the nearest whole number



Appendix B: Full monthly diffusion tube results for 2018

Table B.1 – NO_2 monthly diffusion tube results - 2018

Site ID	NO_2 mean concentrations (µg/m^3)														
													Annual mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw data	Bias-adjusted and annualised (1)	Distance-corrected to nearest exposure (2)
AR	36.39	34.58	37.64	30.57	29.97	24.47	25.70	33.90	33.93	37.71	36.08	34.01	32.91	30.60	23.1
CRN	48.89	32.20		43.35	11.77	38.59	37.79	36.61	37.95	44.38	50.22	41.77	38.50	35.81	32.3
DL	47.29	43.89	44.45	35.38	33.12	29.64	34.18			45.89	47.55	42.54	40.39	37.56	35.8
FT 1	32.33	28.95	31.73	23.12	27.59	17.92	21.53	24.53	27.51	27.57	31.35	36.16	27.52	25.59	23.1
FT 2	27.90	23.10	25.09	14.66	12.03	12.52	15.77	18.14	21.33	22.96	28.99	26.04	20.71	19.26	16.1
HL	34.76	37.81	30.87	30.05	15.44	23.56	26.13	24.72	29.23	32.84	BDL		23.78	22.12	20.6
LLS	35.97	35.26	39.80	29.24	30.54	24.48	24.39	27.97	29.24	34.05	35.28	36.65	31.91	29.68	24.5
NR	44.41	39.97	37.91	37.75	34.13		36.63	33.49	33.77	38.23	41.95	41.22	38.13	35.46	31.3
OML	36.70	38.47	38.89	31.14	31.42	26.65	28.18	26.32	28.76	34.49	42.17	32.07	32.94	30.63	24.7
SS	28.56	26.34	25.45	19.04	16.45	16.20	17.57	20.29	22.42	27.12	31.28	27.61	23.19	21.57	19.5
SRE	25.62	28.49	26.93	21.25	20.56	16.76	18.88	17.94	18.26	23.14	26.54	25.25	22.47	20.90	18.1
SA	30.45	29.37	29.70	25.62	24.90	19.47	25.17	22.68	22.29	29.02	30.51	29.34	26.54	24.68	25.2
TL	31.45	27.41	26.50	22.98	19.66	16.05	17.74	20.58	19.59	24.07	32.40	30.36	24.07	22.39	20.7
WT	30.99	29.46	29.77	27.68	27.37	23.37	24.34	24.83	26.29	32.34	33.07	31.95	28.46	26.47	23.9

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☐ **Annualisation has been conducted where data capture is <75%**

☒ **Where applicable, data has been distance-corrected for relevant exposure**

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.**

BDL – below detection limit

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

(2) Distance-corrected to nearest relevant public exposure.

Appendix C: Supporting technical information/air quality monitoring data QA/QC

Modelling of air quality at three junctions and two residential development locations

In 2018, a consultant carried out detailed dispersion modelling at three road junctions and two residential development locations for the proposed Local Plan allocation.

The junctions modelled were:

- Debdale Lane/Abbott Road, Mansfield,
- Chesterfield Road North/MARR, Pleasley, and
- Nottingham Road/Park Lane, Mansfield.

The two residential developments were:

- Penniment Farm, Abbott Road, Mansfield, and
- Lindhurst, Sherwood Way East, Mansfield.

The Debdale Lane/Abbott Road junction has produced borderline-exceeding NO_2 diffusion tube results, and is likely to be affected by the Penniment Farm development. The Chesterfield Road North/MARR junction is close to the Mansfield part of Pleasley village, where slight NO_2 exceedances have been recorded, and detailed monitoring was carried out in 2015 to ascertain if an AQMA was required. The Nottingham Road/Park Lane junction has several large stores and a small leisure park on two of its corners, and is a known ‘bottleneck’. Although the Lindhurst development is on greenfield land to the south of the town, it is a large scheme that will ultimately provide some 1,700 homes.

The ADMS Roads software was used to model these locations, with the latest available traffic and monitoring data. The conclusions were that, although implementation of the Local Plan would cause an increase in traffic loading at the junctions, it would not have a significant impact on local air quality. Even if the expected improvements in vehicle emissions did not materialise, the impact would still be ‘negligible’ to ‘slight’.

The effects of the Lindhurst and Penniment developments would contribute to increased pollutant concentrations, but these effects would be 'negligible' to 'slight' at 48 of the 49 receptors modelled. The other receptor, at a junction near the Penniment scheme, was predicted to experience a 'moderate' impact with an increase in NO_2 levels of 3.9µg/m^3. Although the consultant concluded that the implementation of the Local Plan would not have a significant effect on local air quality at the three junctions and the two residential developments, the Council will continue to monitor at the Debdale junction, and will put a diffusion tube in place at a suitable point near the highlighted receptor once the Penniment development has been completed.

Quality assurance/quality control of monitoring data

Factor from local co-location studies (if available)

Mansfield District Council does not have any co-located tube results available for 2018, so a local factor cannot be calculated.

Diffusion tube bias adjustment factors

The Gradko diffusion tube bias adjustment factor, from studies carried out in 2018, is 0.93. This is the factor for tubes prepared using 20% TEA in water. 18 studies were used, only one of which was not of 'good' precision. The spreadsheet version 03/19 was consulted.

Discussion of choice of factor to use

Since a local factor was not available for 2018 for comparison, the Gradko bias adjustment factor of 0.93 has been used for the diffusion tube data.

Annualisation process

In 2018, no NO_2 monitoring site had a data capture of less than 75%, therefore annualisation was not required.

QA/QC of diffusion tube monitoring

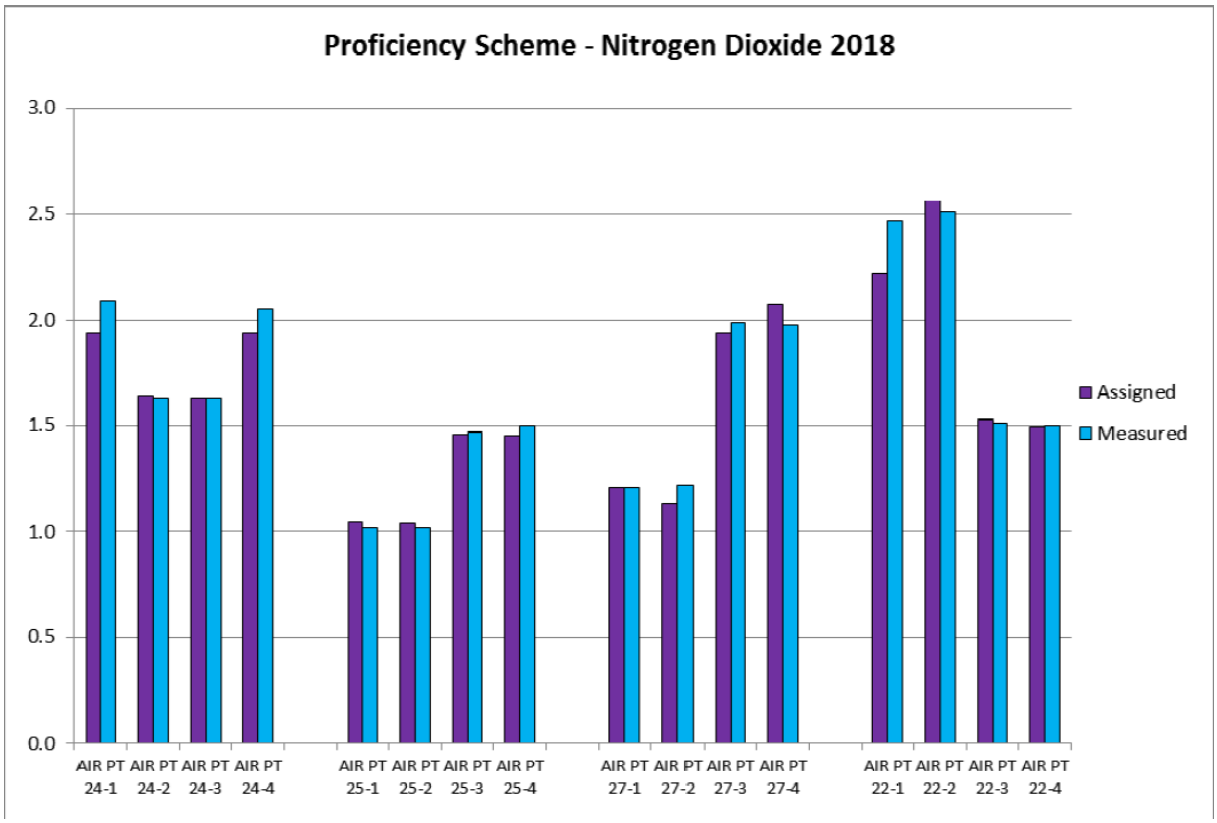
All the Local Authorities in Nottinghamshire are contracted with Gradko International for the supply and analysis of NO_2 diffusion tubes, so that there is consistency throughout the county. Gradko has a very strict QA procedure which involves analysing, once a month, a certified solution supplied by 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'.

Mansfield's diffusion tubes are stored under refrigeration prior to use, and are used within the specified expiry dates. Upon changing the tubes, the date, site and exposure times are recorded and they are put into a sealed bag. The tubes are mounted following AEA guidance (except in specific cases - see Section 2.2.1). They are forwarded to Gradko for analysis along with a sealed 'travel blank' tube.

Gradko has confirmed that the laboratory complies with the procedures detailed in the Defra Harmonisation Practical Guidance. Their proficiency scheme results for 2018 are as follows:

Table C.2 AIR PT Nitrogen Dioxide Proficiency Scheme Results 2018

AIR PT Proficiency Scheme – Nitrogen Dioxide 2018					
Date	Round	Assigned value	Procedure GLM 7		
			Measured concentration	z-Score	% Bias
Feb 18	AIR PT 24-1	2.09	1.94	-0.91	-7.2
Feb 18	AIR PT 24-2	1.63	1.64	0.08	0.6
Feb 18	AIR PT 24-3	1.63	1.63	0	0
Feb 18	AIR PT 24-4	2.05	1.94	-0.72	-5.4
May 18	AIR PT 25-1	1.02	1.05	0.39	2.9
May 18	AIR PT 25-2	1.02	1.04	0.26	2.0
May 18	AIR PT 25-3	1.47	1.46	-0.09	-0.7
May 18	AIR PT 25-4	1.5	1.45	-0.44	-3.3
Aug 18	AIR PT 27-1	1.21	1.21	0	0
Aug 18	AIR PT 27-2	1.22	1.13	-0.99	-7.4
Aug 18	AIR PT 27-3	1.99	1.94	-0.34	-2.5
Aug 18	AIR PT 27-4	1.98	2.07	0.60	4.5
Oct 18	AIR PT 22-1	2.47	2.22	-1.35	-10.1
Oct 18	AIR PT 22-2	2.51	2.56	0.27	2.0
Oct 18	AIR PT 22-3	1.51	1.53	0.18	1.3
Oct 18	AIR PT 22-4	1.5	1.49	-0.1	-0.7


Proficiency Scheme - Nitrogen Dioxide 2018
3.0
2.5
2.0
1.5
1.0
0.5
0.0
AIR PT 24-1
AIR PT 24-2
AIR PT 24-3
AIR PT 24-4
AIR PT 25-1
AIR PT 25-2
AIR PT 25-3
AIR PT 25-4
AIR PT 27-1
AIR PT 27-2
AIR PT 27-3
AIR PT 27-4
AIR PT 22-1
AIR PT 22-2
AIR PT 22-3
AIR PT 22-4
Assigned
Measured

Appendix D: Map(s) of monitoring locations

Figure 2.1a Map of non-automatic monitoring sites in central Mansfield

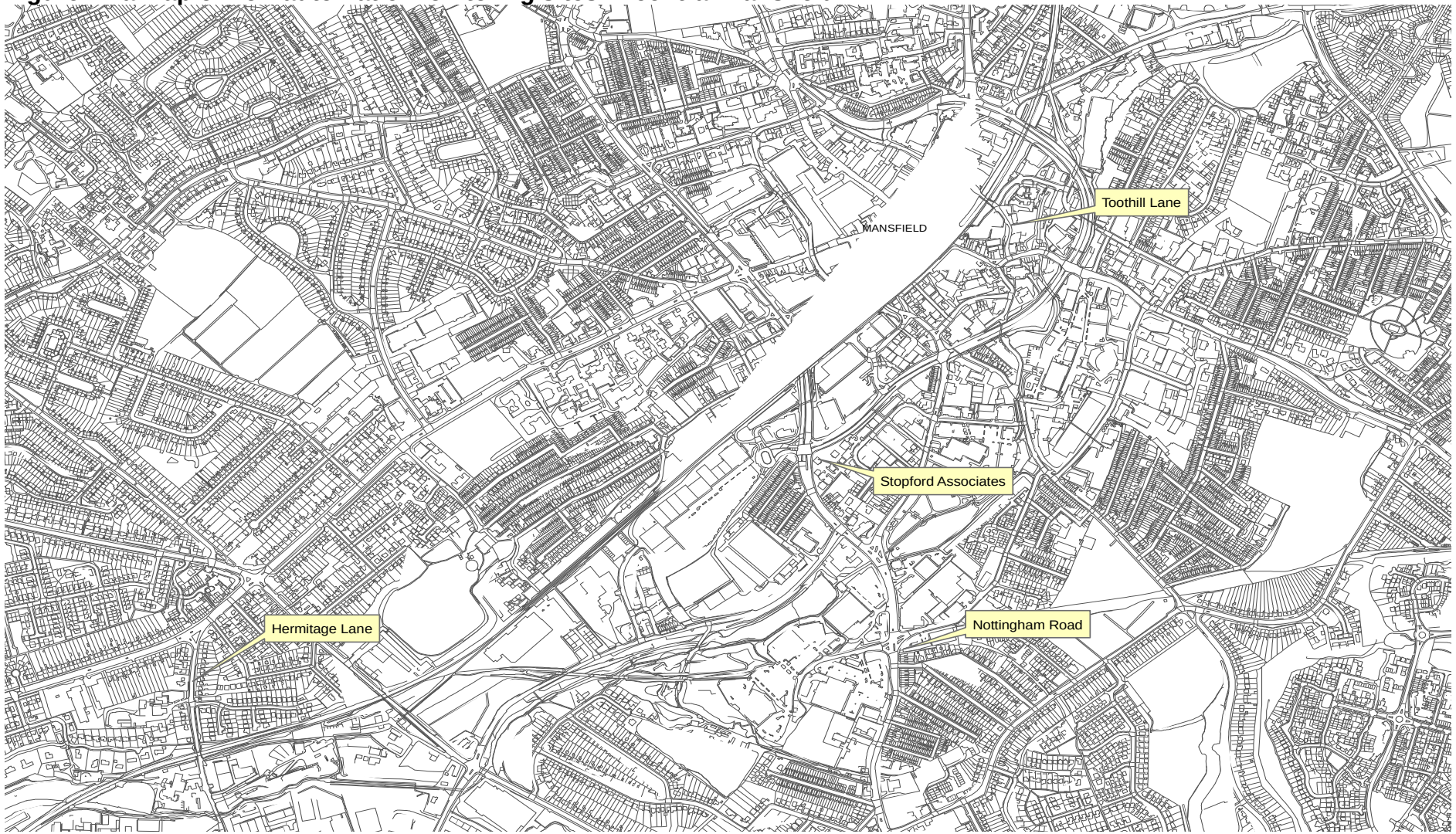


Figure 2.1b Location map of non-automatic monitoring sites in northern Mansfield

Figure 2.1c Location map of non-automatic monitoring site in Pleasley

Please note that the distance to the M1 junction should read 4 miles

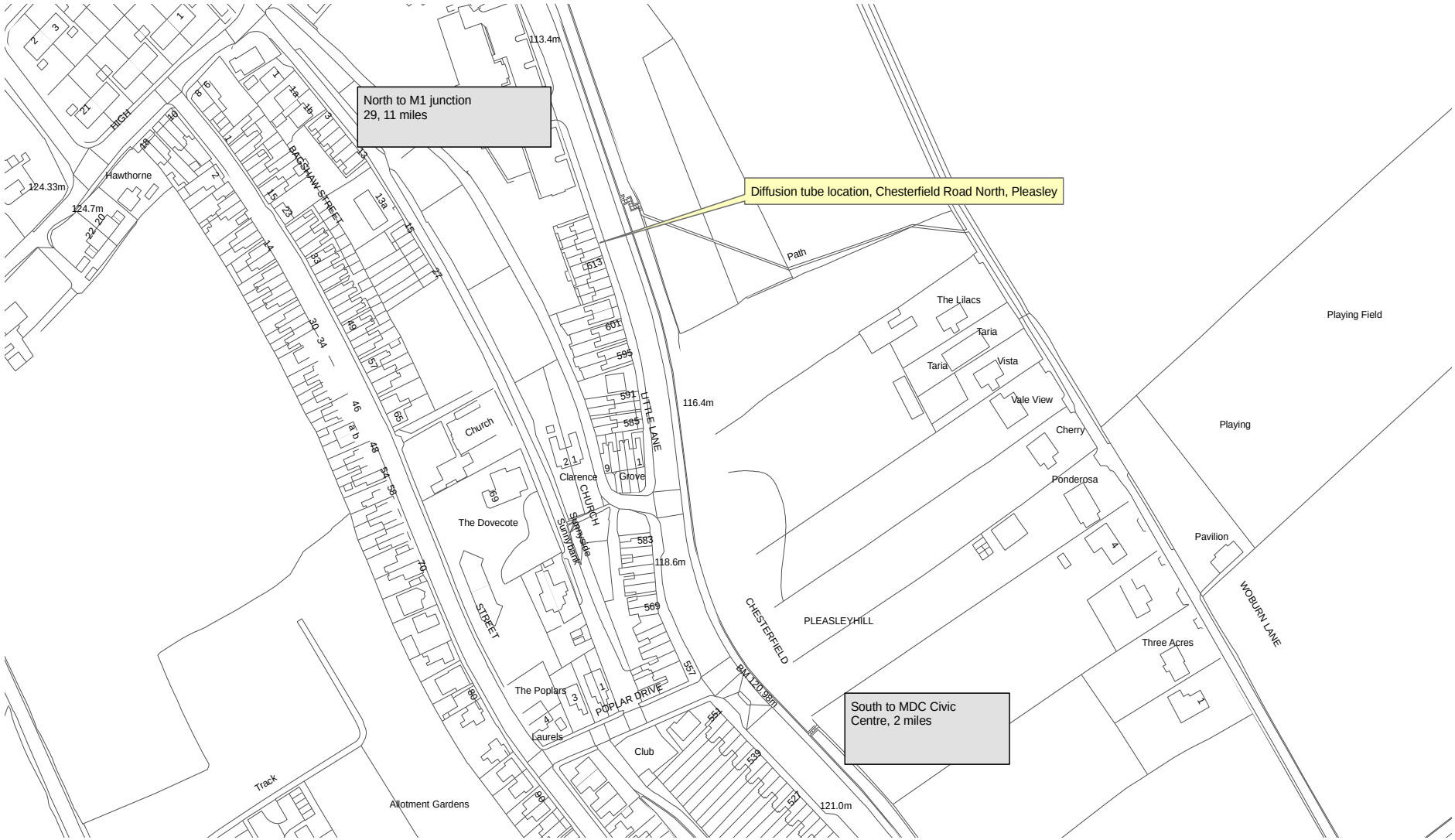


Figure 2.1d Location map of non-automatic monitoring site in Mansfield Woodhouse

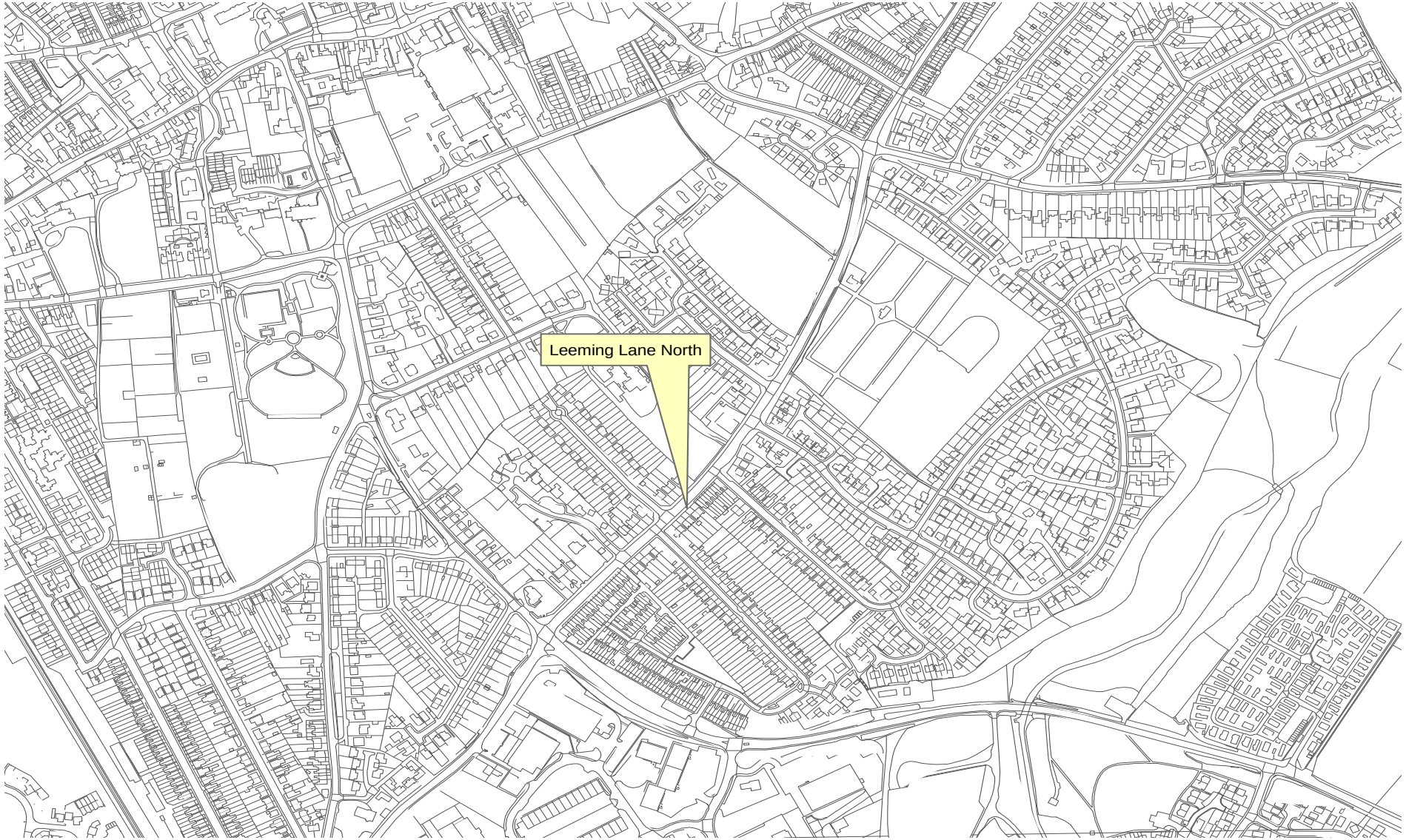


Figure 2.1e Location map of non-automatic monitoring sites in Forest Town

Figure 2.1f Location map of non-automatic monitoring sites in Warsop

Figure 2.1g Location map of non-automatic monitoring site in Rainworth

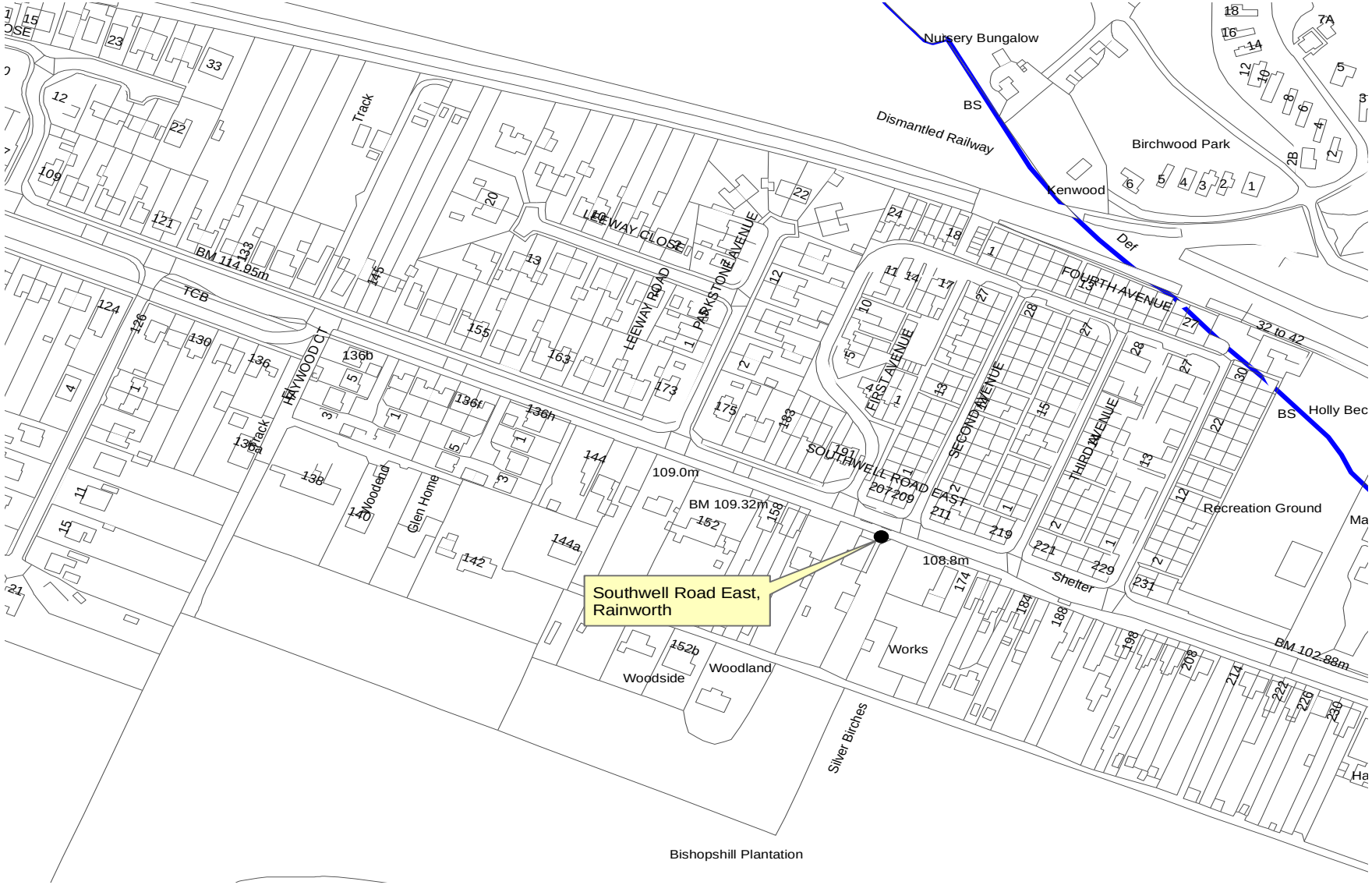
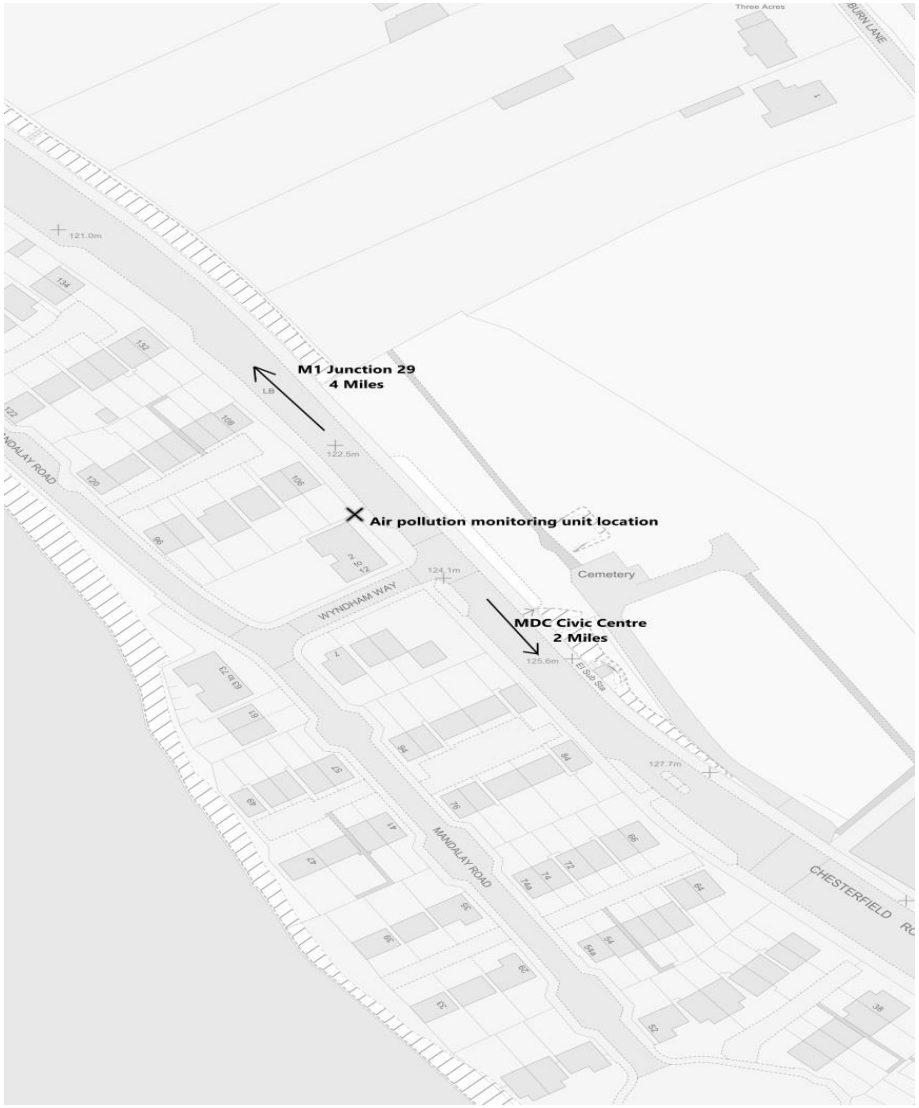


Figure 2.2 Map of proposed real-time monitoring location



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[5]	
	Concentration	Measured as
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	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
	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
	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[5] 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	Air Quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur dioxide

References

1. The Environment Act 1995 Chapter 25, Part IV

2. Local Air Quality Management: Technical Guidance TG(09). Defra, 2009

3. Local Air Quality Management: Policy Guidance PG(09). Defra, 2009

4. Pleasley Detailed Assessment Report. Mansfield District Council, 2016

5. LAQM PGA (05) Part IV of the Environment Act 1995 – Local Air Quality Management Policy Guidance Addendum 2006. Defra, 2005