



2022 Air Quality Annual Status Report (ASR)

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

Date: November 2022

Information	Bassetlaw District Council
Local Authority Officer	James Whalley
Department	Environmental Health
Address	Queen's Buildings Potter Street Worksop Nottinghamshire S80 2AH
Telephone	01909 533533
E-mail	Environmental.health@bassetlaw.gov.uk
Report Reference Number	BDC/ASR/2022
Date	October 2022

Executive Summary: Air Quality in Our Area

Air Quality in Bassetlaw

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas^{1,2}.

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

The Council monitors for Nitrogen Dioxide and there is a general trend towards improvement in Nitrogen Dioxide levels. Most sites saw similar levels in 2021 to the lows seen during the height of the pandemic.

Actions to Improve Air Quality

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

The 2019 Clean Air Strategy⁵ sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero⁶ sets out the approach to reduce exhaust

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

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

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

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

⁵ Defra. Clean Air Strategy, 2019

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

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.

Bassetlaw District Council continues to see improvements in Air Quality despite a steady increase in population and number of households within the district.

Conclusions and Priorities

There were no measured or modelled breaches of the National Air Quality Objectives within Bassetlaw.

Our priority is to ensure that Air Quality continues to improve within our district with specific interest in Objective 1, Place Making and Development for Good Air Quality, of the Nottinghamshire Air Quality Strategy.

We will continue to monitor for Nitrogen Dioxide in our area and ensure that there are no areas that require monitoring that lack adequate diffusion tubes.

Local Engagement and How to get Involved

If you have thoughts, comments or suggestions on any measures concerning the details in this report please contact us using the details at the front of this report. If you would like to learn more about air quality and how we monitor, there is information at

<http://www.bassetlaw.gov.uk/environmental-health/pollution-control/air-quality/>

The national clean air day website www.cleanairday.org.uk/reduce-air-pollution has advice on how to reduce air pollution. There are also free toolkits available to download for schools, workplaces, communities and healthcare organisations at

www.cleanairday.org.uk/

Central Government is a source of national strategies and technical information on air quality.

<https://uk-air.defra.gov.uk/air-pollution/>

<https://www.gov.uk/government/publications/clean-air-strategy-2019> A large proportion of road vehicles are private car users. If you can reduce car journeys by using alternatives

such as walking, cycling, public transport or sharing car journeys, this will help to improve air quality

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Bassetlaw District Council.

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to James Whalley at:

Queen's Buildings, Worksop, Nottinghamshire, S80 2AH

James.whalley@bassetlaw.gov.uk

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in Bassetlaw	i
Actions to Improve Air Quality	i
Conclusions and Priorities	ii
Local Engagement and How to get Involved.....	ii
Local Responsibilities and Commitment	iii
1 Local Air Quality Management	1
2 Actions to Improve Air Quality	2
Air Quality Management Areas	2
Progress and Impact of Measures to address Air Quality in Bassetlaw	3
PM _{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations	5
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance	6
Summary of Monitoring Undertaken	6
3.1.1 Non-Automatic Monitoring Sites	6
Individual Pollutants	6
3.1.2 Nitrogen Dioxide (NO ₂)	6
Appendix A: Monitoring Results	8
Appendix B: Full Monthly Diffusion Tube Results for 2021	20
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC	22
New or Changed Sources Identified Within Bassetlaw During 2021	22
Additional Air Quality Works Undertaken by Bassetlaw During 2021	22
QA/QC of Diffusion Tube Monitoring	22
Diffusion Tube Annualisation.....	23
Diffusion Tube Bias Adjustment Factors	23
NO ₂ Fall-off with Distance from the Road.....	24
Appendix D: Map(s) of Monitoring Locations and AQMAs	25
Appendix E: Summary of Air Quality Objectives in England	29
Glossary of Terms	30
References	31

Figures

Figure A.1 – Trends in Annual Mean NO ₂ Concentrations.....	14
Figure D.1 – Map of Non-Automatic Monitoring Site.....	25

Tables

Table 2.2 – Progress on Measures to Improve Air Quality.....	4
Table A.2 – Details of Non-Automatic Monitoring Sites	8
Table A.4 – Annual Mean NO ₂ Monitoring Results: Non-Automatic Monitoring (µg/m ³)	11
Table B.1 – NO ₂ 2021 Diffusion Tube Results (µg/m ³)	20
Table C.1 – Bias Adjustment Factor	24
Table E.1 – Air Quality Objectives in England	29

1 Local Air Quality Management

This report provides an overview of air quality in Bassetlaw during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

Air Quality Management Areas

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

Bassetlaw currently does not have any declared AQMAs as there are no modelled or measures exceedances of the Air Quality Objectives.

Progress and Impact of Measures to address Air Quality in Bassetlaw

Bassetlaw has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. The measures are included within Table 2.1, with the type of measure and the progress Bassetlaw have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.1.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Maintain a High quality Environmental Permitting Regime	Environmental Permits	Other measure through permit systems and economic instruments	2012	2032	Local Authority	Permitted Processes				Implementation	Varies with Process	Extractive Sampling	Excellent	Resistance of Businesses to spend Capital to achieve results beyond what is legally required.
2	Attendance at regional working group	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2012	2032	Sister Council's	LA				Implementation	Longterm downward Trends in NO2	NO2	Longterm downward Trends	Meetings have been online since Covid
3	Local Education and Awareness Campaigns	Public Information	Via the Internet	2012	2032	Local Authority	LA				Implementation	Long-term downward Trends in NO2	NO2	Long-term downward Trends	
4	Establishing Air Quality as a factor when planning local development	Policy Guidance and Development Control	Policy Guidance and Development Control	2019	2032	Local Authority, County Council and Developers	LA and Developers				Implementation	Long-term downward Trends in NO2	NO2	Long-term downward Trends	
5	Promotion Of Cycling	Alternatives to private vehicle use	Other	2020	2031	Local Authority	LA				Implementation	Long-term downward Trends in NO2	NO2	Long-term downward Trends	Council Events offering Free Cycle Services were very popular
6	Promotion of Walking Groups	Alternatives to private vehicle use	Other	2020		Local Authority	LA				Implementation	Longterm downward Trends in NO2	NO2	Longterm downward Trends	

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.

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

In urban areas road traffic is an important source of PM_{2.5} emissions and consequently roadside levels tend to be much higher than those in background locations. Domestic wood burning is also a key source of particulate matter. As are Industrial emissions and emissions related to Agriculture.

Bassetlaw District Council does not undertake monitoring for PM_{2.5} although the [Defra](#) 2021 background mapping estimates PM 2.5 ranging from 10.3µg in Tuxford to 6.9 µg in the rural areas south of Worksop. The high PM 2.5 readings in Tuxford are a likely result of the proximity of the town to the A1 Road.

The Public Health England Public Health Outcomes Framework indicator D01 provides estimates of local mortality burdens associated with particulate air pollution. This data, presented for each local authority, is based on the research evidence of mortality risk and modelled levels of background air pollution to which populations are exposed at a local level. The attributable fraction (i.e. the proportion of deaths estimated as due to long-term exposure to anthropogenic particulate PM_{2.5} air pollution) for Bassetlaw for 2020 was 4.6% which is better than the national level of 5.6%.

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

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

Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Bassetlaw undertook non- automatic (i.e. passive) monitoring of NO₂ at 24 sites during 2021. Table A.1 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.

3.1.2 Nitrogen Dioxide (NO₂)

Error! Reference source not found. and Table A.2 in Appendix A compare the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40µg/m³. 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 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Appendix A: Monitoring Results

Table A.1 – 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)
2	Mansfield Road, Cuckney 2	Roadside	456489	371248	NO2	No	1.0	1.0	No	2.0
3	7A Kings Head, Carlton Road, Worksop 3	Urban Centre	458558	379288	NO2	No	1.0	1.0	No	2.0
5	Newcastle Avenue, Worksop (lamppost) 5	Roadside	458246	378911	NO2	No	1.0	1.0	No	2.0
12	Watson Road (1) Near undertakers 12	Roadside	458587	379136	NO2	No	2.0	2.0	No	2.0
15	Blyth Road, Ranby 15	Urban Background	464945	381178	NO2	No	1.0	1.0	No	2.0
22	Dunham (1), Little Styrrup 22	Roadside	481341	374505	NO2	No	1.0	1.0	No	2.0
25	London Road Junction, Retford 25	Roadside	470744	380706	NO2	No	1.0	5.0	No	2.0
26	Hospital Road, Retford 26	Roadside	470090	381296	NO2	No	1.0	2.0	No	2.0
27	Arlington Way / Grove Street, Retford 27	Roadside	470784	381115	NO2	No	1.0	1.0	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co located with a Continuous Analyser?	Tube Height (m)
28	Elkesley A1 (lamp 93) 28	Roadside	469150	375542	NO2	No	1.0	5.0	No	2.0
29	Tuxford, Lincoln Road A1 overpass 29	Roadside	473811	371146	NO2	No	1.0	3.0	No	2.0
30	Beaufort Road / Nr A57 Worksop bypass 30	Urban Background	457554	379080	NO2	No	10.0	11.0	No	2.0
31	Claylands Avenue, Worksop 31	Industrial	457873	380581	NO2	No	1.0	2.0	No	2.0
32	Birch Court, Tuxford 32	Roadside	473916	370838	NO2	No	10.0	15.0	No	2.0
34	Watson Road (2) Near Newcastle Ave 34	Roadside	458639	379002	NO2	No	1.0	1.0	No	2.0
35	Styrrup, Serlby Road / A1 35	Roadside	461089	390658	NO2	No	1.0	5.0	No	2.0
36	Blyth, Retford Road / A1 36	Roadside	463021	386942	NO2	No	2.0	2.0	No	2.0
37	Scrooby Road Roundabout	Roadside	461635	391533	NO2	No	1.0	20.0	No	2.0
39	Carlton Road - New Tesco	Roadside	458726	379923	NO2	No	1.0	17.0	No	2.0
40	Scrooby Road - New Asda	Roadside	462683	391523	NO2	No	1.0	2.0	No	2.0
41	Kilton Road - (New morrisons)	Roadside	459382	379464	NO2	No	1.0	3.0	No	2.0

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)
42	Hall Drive, Worksop (St. Annes Roundabout)	Urban Background	457736	378716	NO2	No	1.0	1.0	No	2.0
43	Mansfield Road, Worksop	Roadside	457552	378744	NO2	No	1.0	1.0	No	2.0
45	Tuxford Eldon Street	Urban Centre	473600	371013	NO2	No	1.0	1.0	No	2.0

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 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
2	456489	371248	Roadside	100	100.0	21.9	23.1	20.8		17.6
3	458558	379288	Urban Centre	92.1	92.1	29.4	28.8	30.2		25.4
5	458246	378911	Roadside	100	100.0	27.8	26.2	25.7	20.8	21.1
12	458587	379136	Roadside	91.6	91.6	30.8	33.5	34.6		30.0
15	464945	381178	Urban Background	100	100.0	21.0	19.6	19.2	14.7	13.3
22	481341	374505	Roadside	100	100.0	25.2	24.1	23.5	17.6	18.1
25	470744	380706	Roadside	91.6	91.6	26.4	25.7	24.7	21.7	21.3
26	470090	381296	Roadside	65.39509537	65.4	30.5	31.1	30.1	23.8	26.1
27	470784	381115	Roadside	90.46321526	90.5	27.3	28.2	28.7	22.6	23.2
28	469150	375542	Roadside	100	100.0	20.1	22.1	18.9	15.2	16.3
29	473811	371146	Roadside	100	100.0	37.5	33.1	33.2		25.9
30	457554	379080	Urban Background	100	100.0	21.3	20.9	20.9	17.9	17.0
31	457873	380581	Industrial	83.10626703	83.1	25.9	25.2	25.4	21.9	22.7

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
32	473916	370838	Roadside	82.01634877	82.0	22.1	25.1	23.0	16.7	18.5
34	458639	379002	Roadside	82.83378747	82.8	26.0	30.4	30.5		25.4
35	461089	390658	Roadside	83.92370572	83.9	23.2	25.4	24.1		17.5
36	463021	386942	Roadside	100	100.0	28.1	28.6	26.1	21.3	22.1
37	461635	391533	Roadside	91.00817439	91.0	28.1	28.0	28.8	24.0	24.3
39	458726	379923	Roadside	100	100.0	26.2	24.2	25.0		22.4
40	462683	391523	Roadside	92.37057221	92.4	28.6	26.4	28.9		22.6
41	459382	379464	Roadside	91.00817439	91.0	31.4	30.2	30.6	24.3	25.0
42	457736	378716	Urban Background	100	100.0	20.0	20.5	19.9	16.2	16.1
43	457552	378744	Roadside	100	100.0	23.8	24.7	23.9	18.8	19.0
45	473600	371013	Urban Centre	91.55313351	91.6	23.9	23.5	21.2		25.8

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

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 $\mu\text{g}/\text{m}^3$.

Exceedances of the NO_2 annual mean objective of $40\mu\text{g}/\text{m}^3$ are shown in **bold**.

NO_2 annual means exceeding $60\mu\text{g}/\text{m}^3$, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

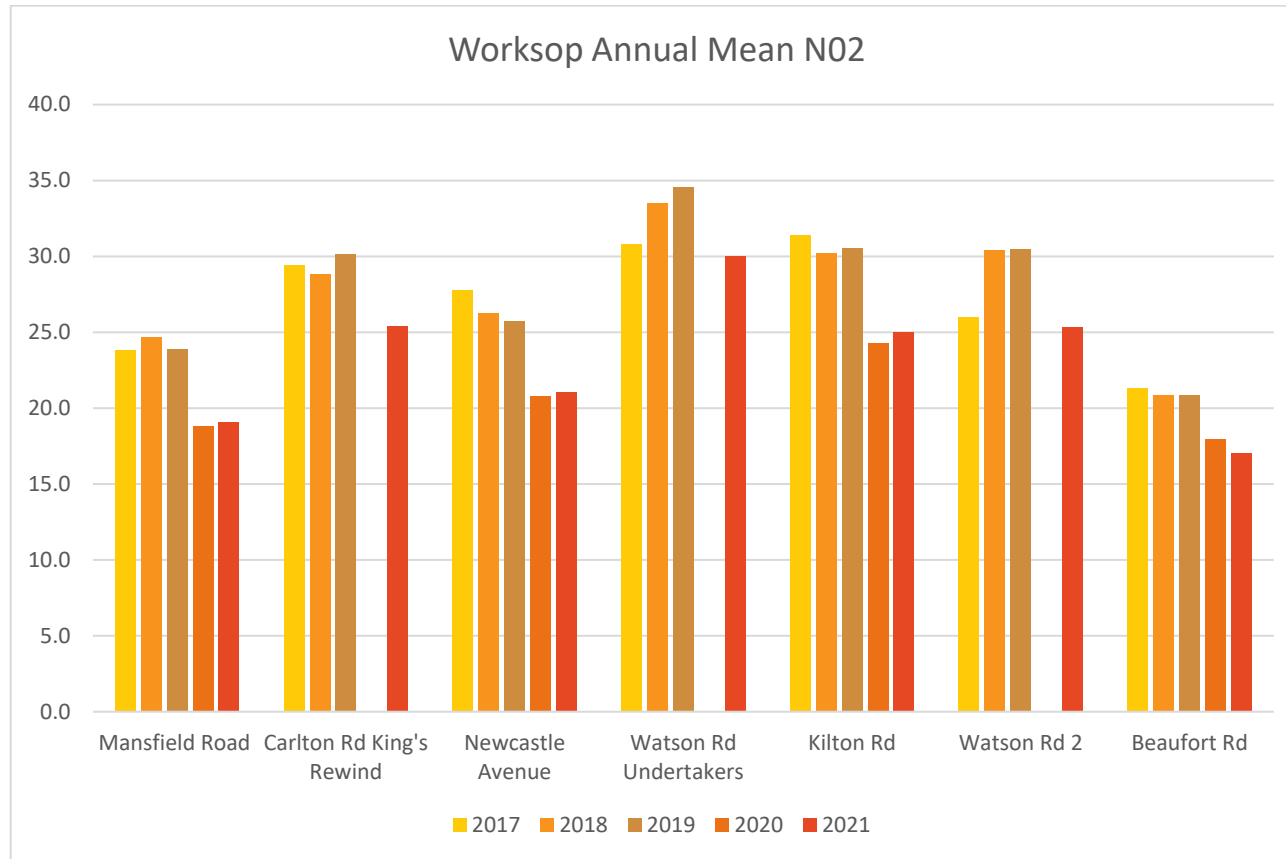
Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

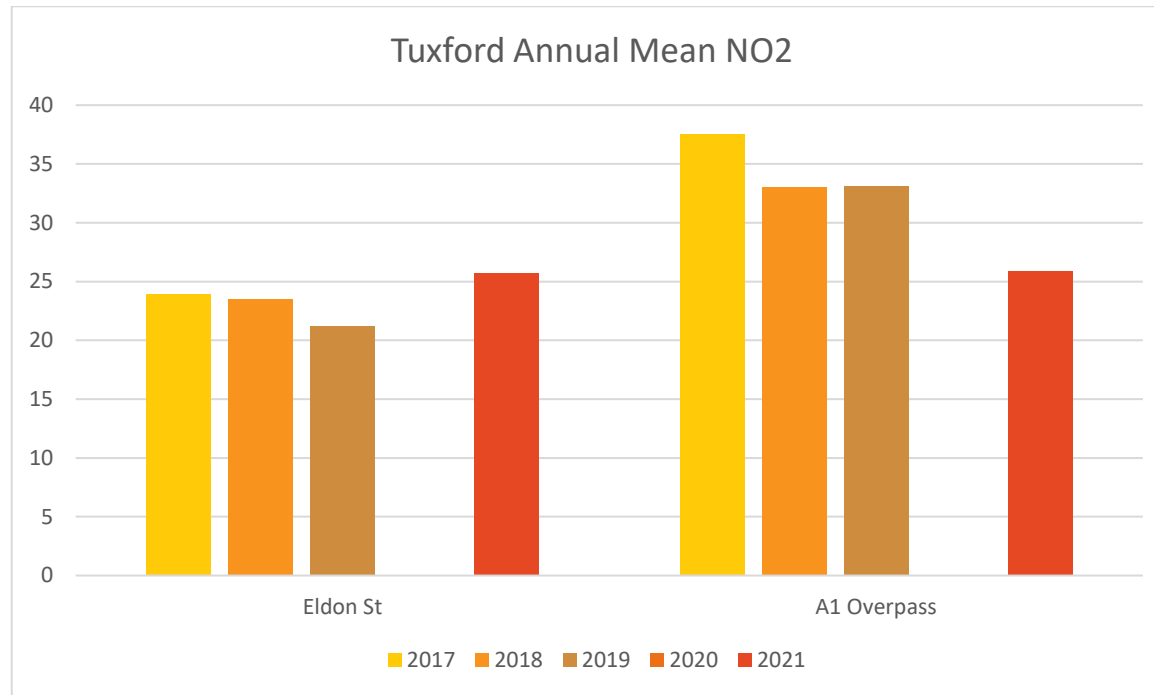
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

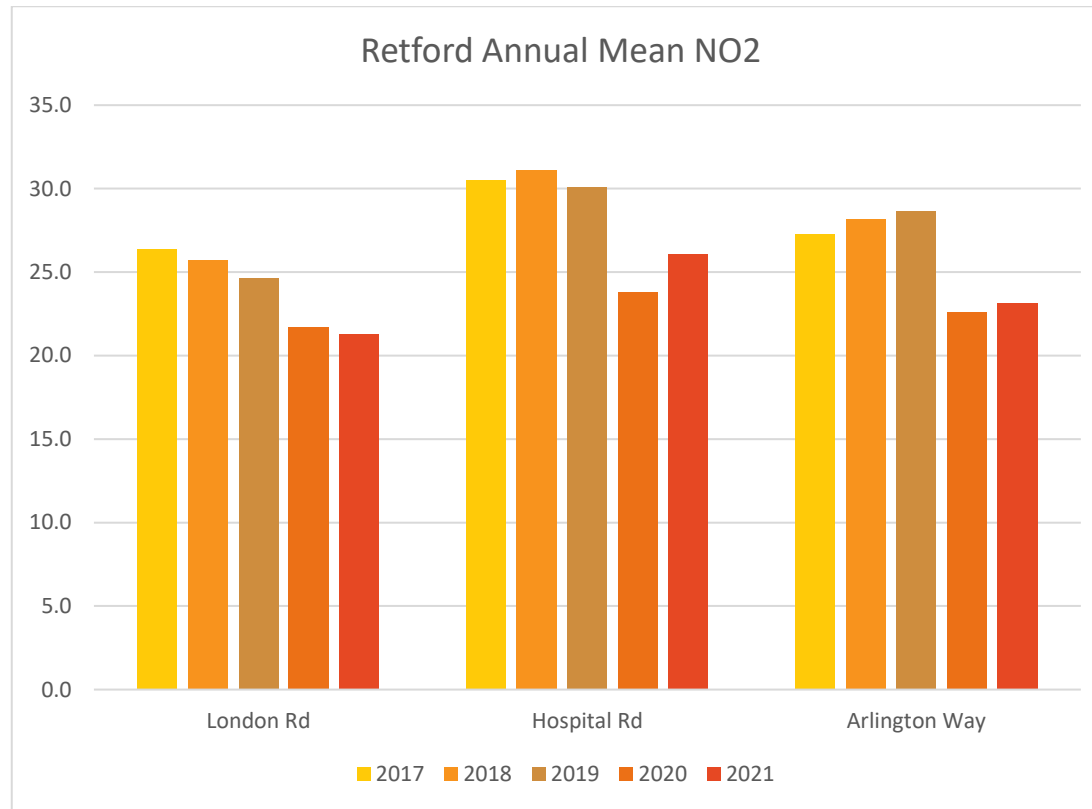
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations







Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
2	456489	371248	Roadside	100	100.0	21.9	23.1	20.8		17.6
3	458558	379288	Urban Centre	92.1	92.1	29.4	28.8	30.2		25.4
5	458246	378911	Roadside	100	100.0	27.8	26.2	25.7	20.8	21.1
12	458587	379136	Roadside	91.6	91.6	30.8	33.5	34.6		30.0
15	464945	381178	Urban Background	100	100.0	21.0	19.6	19.2	14.7	13.3
22	481341	374505	Roadside	100	100.0	25.2	24.1	23.5	17.6	18.1
25	470744	380706	Roadside	91.6	91.6	26.4	25.7	24.7	21.7	21.3
26	470090	381296	Roadside	65.39509537	65.4	30.5	31.1	30.1	23.8	26.1
27	470784	381115	Roadside	90.46321526	90.5	27.3	28.2	28.7	22.6	23.2
28	469150	375542	Roadside	100	100.0	20.1	22.1	18.9	15.2	16.3
29	473811	371146	Roadside	100	100.0	37.5	33.1	33.2		25.9
30	457554	379080	Urban Background	100	100.0	21.3	20.9	20.9	17.9	17.0
31	457873	380581	Industrial	83.10626703	83.1	25.9	25.2	25.4	21.9	22.7
32	473916	370838	Roadside	82.01634877	82.0	22.1	25.1	23.0	16.7	18.5

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
34	458639	379002	Roadside	82.8	82.8	26.0	30.4	30.5		25.4
35	461089	390658	Roadside	83.9	83.9	23.2	25.4	24.1		17.5
36	463021	386942	Roadside	100	100.0	28.1	28.6	26.1	21.3	22.1
37	461635	391533	Roadside	91	91.0	28.1	28.0	28.8	24.0	24.3
39	458726	379923	Roadside	100	100.0	26.2	24.2	25.0		22.4
40	462683	391523	Roadside	92.4	92.4	28.6	26.4	28.9		22.6
41	459382	379464	Roadside	91	91.0	31.4	30.2	30.6	24.3	25.0
42	457736	378716	Urban Background	100	100.0	20.0	20.5	19.9	16.2	16.1
43	457552	378744	Roadside	100	100.0	23.8	24.7	23.9	18.8	19.0
45	473600	371013	Urban Centre	91.6	91.6	23.9	23.5	21.2		25.8

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

Notes:

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO₂ 2021 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northin g)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (x.x)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
2	456489	371248	23.3	21.5	15.7	20.0	19.3	16.8	16.1	15.4	35.0	21.3	23.7	23.4	21.0	17.6	-	
3	458558	379288	36.8	32.7	30.6	28.2	25.4	27.4	26.7		27.9	32.2	35.0	29.5	30.2	25.4	-	
5	458246	378911	33.6	26.8	22.9	24.6	21.5	21.4	22.3	21.8	23.8	25.3	30.2	26.9	25.1	21.1	-	
12	458587	379136	42.4	34.9		43.4	35.7	30.9	36.8	37.3	32.6	29.4	31.7	37.7	35.7	30.0	-	
15	464945	381178	21.2	19.1	13.9	15.2	13.0	12.6	11.2	13.4	14.0	19.2	21.9	15.0	15.8	13.3	-	
22	481341	374505	27.2	23.0	18.4	21.9	20.3	15.8	19.0	20.4	21.4	23.1	22.8	24.6	21.5	18.1	-	
25	470744	380706	33.8	29.5		23.0	20.8	17.8	19.3	18.0	26.5	24.8	33.4	32.1	25.4	21.3	-	
26	470090	381296		33.7	27.4	31.0	27.7	25.3		25.7	31.2	31.0			29.1	26.1	-	
27	470784	381115		31.1	25.3	31.1	26.7	22.9	26.8	23.0	29.2	26.8	28.0	32.3	27.6	23.2	-	
28	469150	375542	22.3	20.7	14.3	22.2	17.9	18.5	19.6	21.0	16.4	18.9	19.9	20.4	19.4	16.3	-	
29	473811	371146	30.7	27.4	26.6	33.2	24.9	48.4	24.7	21.4	35.2	32.7	32.9	32.0	30.8	25.9	-	
30	457554	379080	27.0	25.6	17.8	18.3	16.8	15.3	16.1	14.8	20.3	18.9	24.8	27.2	20.2	17.0	-	
31	457873	380581	33.9	30.4	24.8	23.8	22.7	21.6	22.3	20.9			32.7	37.2	27.0	22.7	-	
32	473916	370838		27.1	17.3	27.1	21.7	22.4	22.1	25.1	19.3	15.1	22.5		22.0	18.5	-	
34	458639	379002	34.1	34.0		31.8	29.9	25.6		25.4	27.7	27.0	35.5	30.8	30.2	25.4	-	
35	461089	390658	26.7	26.4	16.0	24.1		17.4	20.0	17.0	17.4	19.0		24.5	20.8	17.5	-	
36	463021	386942	30.8	30.6	22.7	27.9	27.3	22.9	25.5	25.9	26.1	24.6	26.3	25.8	26.4	22.1	-	
37	461635	391533	33.2	30.6	24.8	29.4	27.0	22.7	26.5	21.9	30.5		31.7	39.4	28.9	24.3	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northin g)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (x.x)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
39	458726	379923	59.0	28.2	23.8	24.8	22.6	20.4	20.8	20.6	22.9	24.1	28.2	24.4	26.7	22.4	-	
40	462683	391523	31.8		22.4	24.9	22.0	19.7	22.3	20.0	28.1	30.3	37.8	36.4	26.9	22.6	-	
41	459382	379464	33.5	30.8	27.1	29.5	29.0	25.5	22.4	25.3	31.4		37.5	35.6	29.8	25.0	-	
42	457736	378716	27.7	20.9	18.9	17.6	15.5	14.6	14.3	14.8	17.5	20.2	26.0	22.4	19.2	16.1	-	
43	457552	378744	28.6	26.0	20.4	22.7	20.8	18.5	21.1	21.3	22.8	21.4	20.8	27.7	22.7	19.0	-	
45	473600	371013	39.1	35.3	22.9		28.1	26.0	29.3	25.4	21.0	34.5	37.4	38.3	30.7	25.8	-	

- All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16
- Local bias adjustment factor used
- National bias adjustment factor used
- Where applicable, data has been distance corrected for relevant exposure in the final column
- Bassetlaw District Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System

Notes:

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

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

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 Bassetlaw During 2021

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

Additional Air Quality Works Undertaken by Bassetlaw During 2021

Bassetlaw has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

LAQM.TG(09) specifically encourages local authorities to select sampling labs that maintain high standards of quality assurance and quality control. The lab selected by Bassetlaw District Council for purchasing and analysing the nitrogen dioxide tubes is Gradko International and 20% Tea Diffusion Tubes are used. Gradko participate in the Workplace Analysis Scheme for Proficiency (WASP). The scheme is an independent analytical performance testing scheme operated by the Health and Safety Laboratory (HSL). WASP is an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). At quarterly intervals HSL supplies the labs with 4 samplers doped with unknown amounts of nitrite. It then assesses and calculates a performance index from the results. Gradko's analytical laboratory is assessed annually by UKAS to establish conformance of our Laboratory Quality Procedures to the requirements of ISO/IEC 17025 Standard. Gradko employ the use of travel blanks as recommended TG (09).

Bassetlaw District Council do not have any chemiluminescence analysers so the precision and accuracy of the nitrogen dioxide tubes cannot be validated by the use of a local co-location study. An appropriate bias adjustment factor derived from nationally available bias factors must be applied to the mean values of the tube results. The spreadsheet tool referenced at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html> has been used to calculate an appropriate bias factor of 0.84

Diffusion Tube Annualisation

All diffusion tubes were annualised using the Diffusion Tube Data Processing Tool

Diffusion Tube ID	Annualisation Factor Tuxford, Lincoln Road A1 overpass 29	Annualisation Factor Carlton Road - New Tesco 39	Annualisation Factor Slyth, Retford Road / A1 26	Annualisation Factor London Road Junction, Retford 25	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m³)	Annualised Data Simple Annual Mean (µg/m³)	Comments
26	0.8888	1.1531	1.0170	1.1099	1.0665	29.1	31.1	

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.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous

analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Bassetlaw have applied a National bias adjustment factor of 0.84 to the 2021 monitoring data. A summary of bias adjustment factors used by Bassetlaw over the past five years is presented in Table C.1.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	09/22-	0.84
2020	National	09/21	0.81
2019	National	09/20	0.92
2018	National	06/19	0.87
2017	National	09/18	0.91

NO₂ Fall-off with Distance from the Road

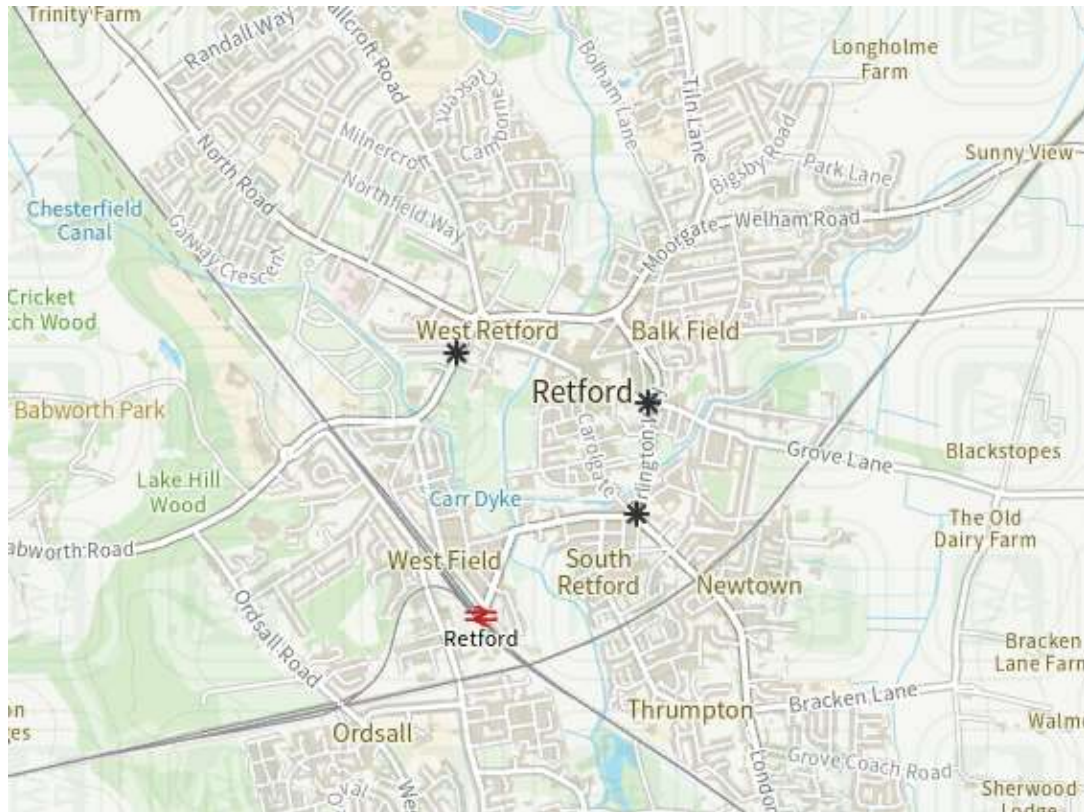
Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

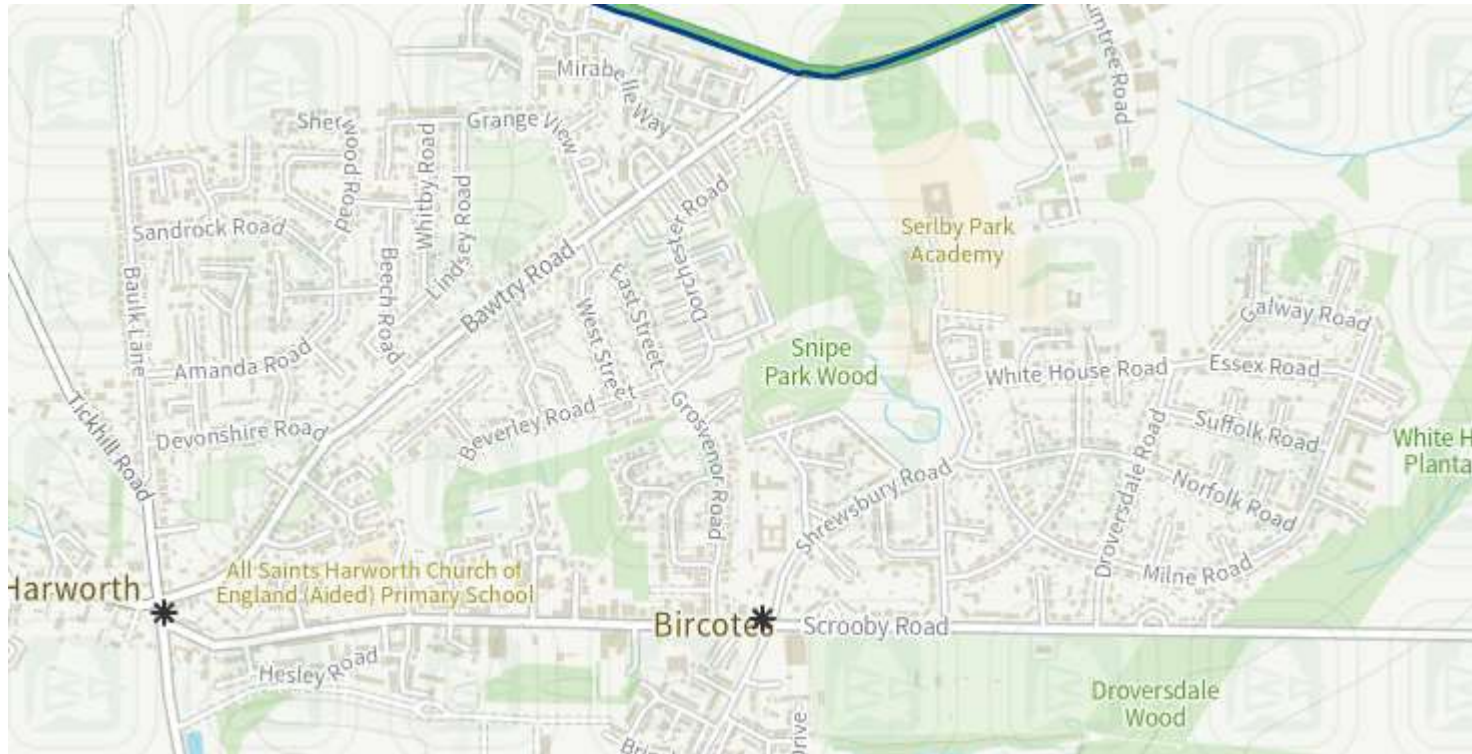
No diffusion tube NO₂ monitoring locations within Bassetlaw required distance correction during 2022.

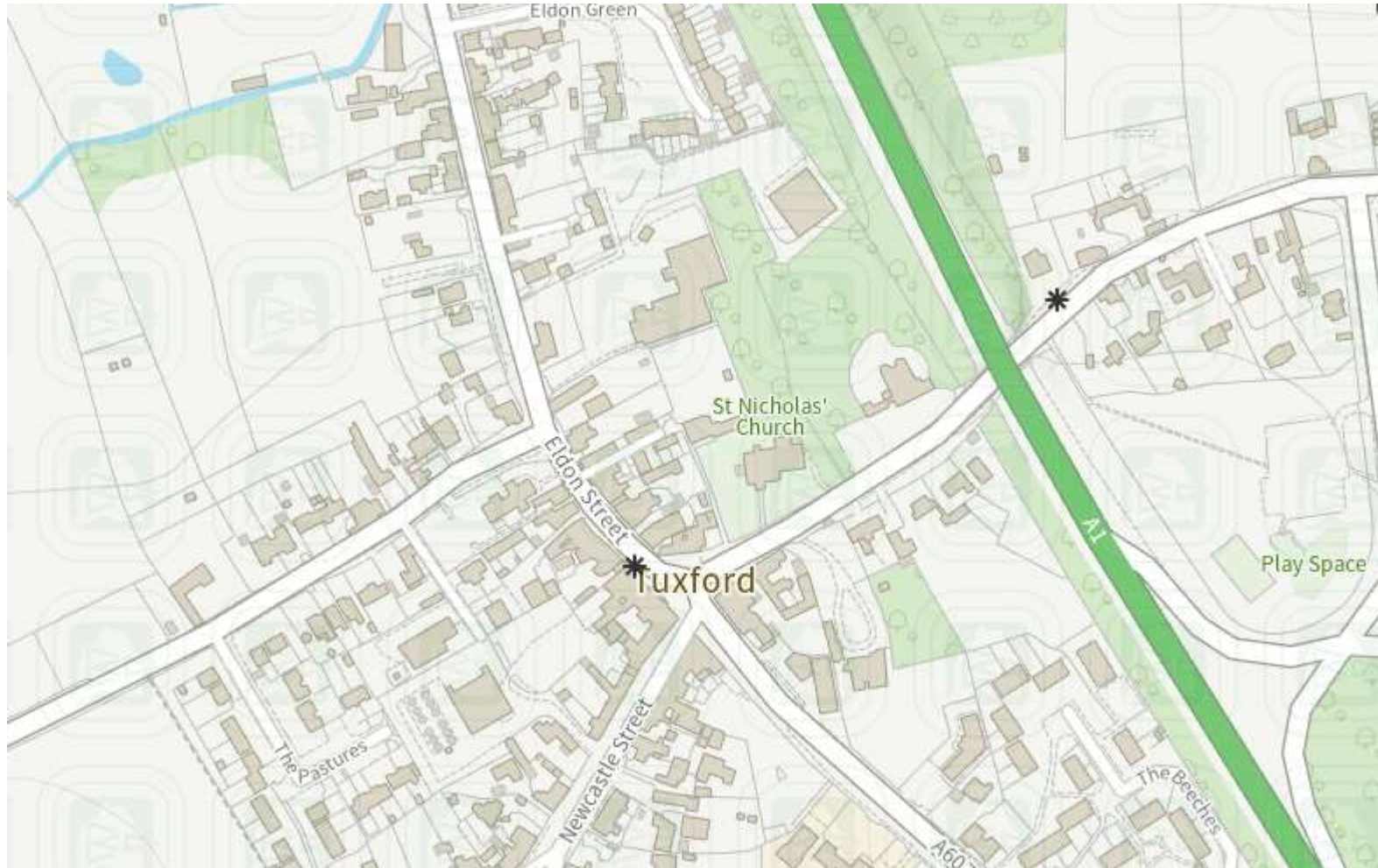
Appendix D: Map(s) of Monitoring Locations and AQMAs

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









Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

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/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	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.TG16. April 2021. 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.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.