Bassetlaw DISTRICT COUNCIL
North Nottinghamshire

2018 Air Quality Annual Status Report (ASR)

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

November 2018

IPPC Consultants

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Executive Summary: Air Quality in Our Area

Air pollution is an issue that can affect everyone with varying levels of severity. The air that we breathe is essential for health and wellbeing and it shouldn't have to be a cause of detrimental health effects. Where we live, where we work, our travel choices and journeys made can affect the concentrations of certain air pollutants that we are exposed to.

Local authorities have an obligation through the LAQM regime to review and assess the air quality within their regions. Specific measures are implemented by way of an Air Quality Action Plan (AQAP) for areas where poor air quality has been determined, but action by community engagement through education and promotion also helps improving air quality at a local level. Good air quality begins at a local level, with actions being replicated on regional and national scales benefitting wider scale air quality and helping to meet the Air Quality Strategy (AQS) objectives that are set out in EU and UK law.

About Bassetlaw

Bassetlaw is the northern most of the seven Nottinghamshire authorities. It covers an area of approximately 240 square miles and has a population of approximately 112,000. The population density (as of 2011 census information) is 176/km^2. The borough is predominantly rural with the two main settlements being the market towns of Worksop and Retford. The A1 trunk road runs straight through the borough from the north-west (at Harworth) to the south-east (at Tuxford).

The traditional industry in the west of the borough (around Worksop) was coal mining. Since 1980, all of the coal mines in Nottinghamshire have now closed. A variety of smaller and diverse businesses have established in the district as part of ongoing regeneration initiatives in the district. The River Trent forms the eastern boundary of the borough with Lincolnshire, and apart from the coal-fired power stations on the Trent there is little or no heavy industry in the east. The land becomes flatter in the east of the borough and arable farmland covers much of the 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 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].

In the status report **(BDC/SR/2018)** Bassetlaw District Council compares the monitoring data obtained during a twelve-month period (January 2017 – December 2017) with the annual air quality objectives as defined in the Air Quality Regulations. The report concluded that there were **no** exceedances of the air quality objectives. However, a number of tubes were close to the limit; specifically A1 Tuxford and these will therefore be kept under review during the 2018 sampling programme.

Bassetlaw District Council has continued to monitor levels of Nitrogen Dioxide at key locations across Bassetlaw during the 2017 sampling programme. The results of the monitoring data obtained during a twelve-month period (January 2017 – December 2017) have been compared with previous years monitoring data and the annual air quality objectives as defined in the Air Quality Regulations.

The conclusion from the 2017 round of sampling and analysis **(BDC/ASR/2018)** is a promising downward trend in emissions at all the locations. This can be seen in the trend charts in Figure A.1

[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

Actions to Improve Air Quality

A monitoring network of nitrogen dioxide (NO2) diffusion tubes is in place within the District and this currently does not show any exceedences of the relevant AQS objective for NO2 at any relevant location. This monitoring network is set to continue acting as a system to monitor changes in concentration of NO2 and to identify any changes in trends.

Historically, air quality within Bassetlaw has consistently complied with the UK AQS objectives. The District in general benefits from a very good standard of air quality.

There are also a small number of 'hot-spot' locations where pollution has been shown over a number of years to be close to the legal limits. These are in the towns of Worksop and Retford in locations where standing traffic during busy periods causes air quality to be impacted. As the A1 slices across the district it intersects in a number of key locations with some of Bassetlaw's roads. At these locations the A1 either passes under, over or directly alongside the local road network and residents in the immediate vicinity could be impacted by pollution caused by increased levels of traffic. These are areas which are kept under close review to ensure that traffic related pollution is not above the health-based objectives.

With continued levels of development being experienced across the country, an emphasis on air quality is important to ensure areas of poor air quality are identified and acted upon. Across the District air quality continues to be assessed through the monitoring network whereby any areas of poor air quality would be identified.

As an authority we are extremely keen to promote more sustainable transport methods and ensure that the region remains a green, pleasant and healthy environment for all.

Action plans for Air Quality in Bassetlaw

1) Permitting Regime - inspections

Under the Environmental Permitting (England and Wales) Regulations the council regulates a number of complex, polluting industries covering a wide range of prescribed functions, from mineral processing and galvanising to solvent use and mushroom composting production. The Council issues a permit to operate for the industrial process. The permit contains detail process operating conditions to minimise and eliminate emissions to atmosphere. The Council has to regularly inspect permitted process and report its inspection activity to central government.

2) Collaborative working in Nottinghamshire

Representatives of the pollution team attend a regional working group on air quality with officers from the other Nottinghamshire authorities. Regional group's co-ordinate programmes to develop area wide strategies to reduce emissions and improve air quality.

3) Education and awareness

The council have an education and awareness officer who is based in Environmental Health. Schemes which promote sustainable transport choices will feature in the event planning for 2018-19.

4) Planning for improvement

The Environmental Health department works in close collaboration with the Planning department to establish protocols which can limit or mitigate against poor air quality. The action plan being prepared considers how future development can be designed and located to better protect occupiers from poor air quality and prevent new developments from making air quality worse. The action plan includes information on areas of the district identified as 'being of concern' because they are close to main roads and already subjected to elevated levels of nitrogen dioxide. Advice and/or conditions will be placed on planning application in these areas to require developers to consider air quality as part of their designs.

Local Priorities and Challenges

Housing developments within the district will lead to an increase in population and therefore in vehicle usage. Further housing development is taking place at the existing Gateford Road/Carlton Road Ashes Park estate located on the west boundary of the town with the approval of 163 houses. Further housing schemes in the district continue to progress at Simpson Park in Harworth (former Harworth colliery site) for a further 200 residential units.

A retail park has been proposed on the location of the previous proposed Tesco development at Blyth Road in Worksop. Traffic and air quality assessments had previously been undertaken for such a development. The former Vesuvius industrial site at Sandy Lane Worksop is being developed for a large supermarket and retail development. The scheme involves new traffic management for the Sandy Lane/Shireoaks Road, however there are no sensitive receptors in that area that could be impacted from increased road traffic activity to access the development.

New permitted processes that have been regulated since 2017 include a wood biomass boiler for a large distributions warehouse and a new crematorium. Both sites hold permits for air pollution control. The impact upon local air quality was assessed during the permit application process and both processes do not impact air quality levels locally.

Planning permission is being sought for a potential 320,000 tonne per annum RDF (refuse derived fuel) waste to energy power generation facility located at the Harworth Growth zone next to the A1. This type of industrial process would be regulated by the Environment Agency. The application has been submitted to Nottinghamshire County Council.

How to Get Involved and local engagement

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/Pages/Category/free-resources.

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/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1

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

Table of Contents

1 Local Air Quality Management

This report provides an overview of air quality in Bassetlaw during 2017. 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 can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Progress and Impact of Measures to address Air Quality in Bassetlaw

Bassetlaw has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Stricter conditions on environmental permits	Environmental Permits	Measures to reduce pollution through IPPC permits going beyond BAT	Bassetlaw	Complete 2015	Complete 2016	None	N/A	Ongoing	Ongoing	
2	Attendance at regional working group	Control	Regional groups co-ordinating programmes to develop area wide strategies to reduce emissions and improve air quality	Nottingham City	Complete	Ongoing	None	N/A	Ongoing	Ongoing	
3	Education and awareness campaigns	Promoting travel awareness	Promotion of cycling / walking	Bassetlaw	Complete	April 2017	None	N/A	Ongoing	Ongoing	
4	New campaign leaflets	Public information	Via leaflets	Bassetlaw	Complete	April 2017	None	N/A	Ongoing	Ongoing	
5	Info on social media	Public information	Via other mechanisms	Bassetlaw	complete	April 2017	None	N/A	Ongoing	June 2017	

2.2 $PM_{2.5}$ – 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 District Council considers PM2.5 a priority when planning measures to reduce levels of pollutants. As levels are considered to be within the air quality objectives no plans have been devised that target PM2.5 specifically. However, more work is being undertaken by Bassetlaw to promote messages of air quality and encourage greater understanding. These 'soft' measures – (ie. education and awareness) are deemed to fulfil the requirement to consider and seek to reduce levels of PM2.5.

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

Bassetlaw does not have any automatic monitoring sites

3.1.2 Non-Automatic Monitoring Sites

Bassetlaw undertook non-automatic (passive) monitoring of NO_2 at 24 sites during 2017.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

Nitrogen dioxide is monitored at 24 sites across the district. At the start of the recording year an assessment of all the tube locations was carried out to ensure that they were all situated in the most appropriate and suitable location to represent relevant exposure. No changes were made to the location of the tubes during this reporting period.

Of the 24 tubes, six are considered to be of concern and kept under close review. The results and trend data of those specific tubes are presented in appendix A.

Tube number 28 is situated at Elkesley and is on the side of the A1 trunk road. At this location the A1 passes very close to the houses in Elkesley and is an area the council have concerns over. During 2015/2016 Highways England carried out a significant junction upgrade at Elkesley to improvement safety as a bridge was put over the A1 to allow access to the village of Elkesley via dedicated slips roads both north and south bound of the carriageway. There were two years of road works (with 50mph speed restrictions) and during that period it was not considered worthwhile

continuing with monitoring. Also the location that had always been used (on a lamp post on the outskirts of the village) had been removed and this area formed part of the compound used by the contractors.

The new road and bridge opened in early 2017 and tube 28 has been re-located as close to the original position as possible. The Elkesley section of the A1 continues to have a 50 mph speed limit for safety.

Tube 29 is also close to the A1 and is located in Tuxford where the A1 passes over the local road network. This is an area that the council have concerns about because it is set very low in a canyon and dispersion is poor. There are houses quite close to the road and they are impacted by the local road network traffic and the traffic from the A1. Unfortunately the data capture rate at this location was very poor during 2015-16 because the tube kept going missing. We concluded that the tube had probably been seen by children and was just getting frequently removed. The tube has been re-located to the other side of the road and on the other side of the bridge. It's further from a sensitive receptor so more data adjustments will need to be made, but it's considered more important to get a complete data set. Up to now the tube seems to be remaining in place and the data capture for 2017 is 100%.

Appendix A - Includes the details of the 2017 monitoring sites

Appendix B contains tables which compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3 and the full 2017 dataset of monthly mean values.

Appendix C – Details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the 2017 diffusion tubes

Appendix D - Maps showing the location of the monitoring sites

3.2.2 Particulate Matter (PM_{10})

Bassetlaw District Council do not monitor for Particulate Matter (PM_{10})

3.2.3 Particulate Matter ($PM_{2.5}$)

Bassetlaw District Council do not monitor for Particulate Matter ($PM_{2.5}$)

3.2.4 Sulphur Dioxide (SO_2)

Bassetlaw District Council do not monitor for sulphur dioxide

Appendix A: Monitoring Results

Table A.1 – Details of the 2017 Automatic Monitoring Sites

Bassetlaw District Council does not have any automatic monitoring sites

Table A.2 – Details of the 2017 non-automatic Monitoring Sites

Site ID	Site name	Site type	X OS Grid ref	Y OS Grid ref	Pollutant	In AQMA	Distance to relevant receptor	Distance to kerb of nearest road	Tube height
2	Cuckney	Suburban	456490	371245	NO_2	NO	1m	1m	2
3	7a Kings Head, Carlton Rd, Worksop	Urban Centre	458564	379284	NO_2	NO	1m	1m	2
5	Newcastle Avenue, Worksop	Urban Centre	458230	378909	NO_2	NO	1m	1m	2
12	Watson Road, Worksop (1)	Urban Centre	458569	379162	NO_2	NO	0.5m	1m	2
15	Blyth Rd, Ranby	Urban Centre	464921	381197	NO_2	NO	0.5m	1m	2
22	Little Styrrup, DunhamTuxford	Urban Centre	481325	374504	NO_2	NO	4m	1m	2
25	London Rd Junction, Retford	Urban Centre	470759	380698	NO_2	NO	5m	1m	2

26	Hospital Road, Retford	Urban Centre	470095	381292	NO_2	NO	2m	1m	2
27	Arlington Way / Grove Street, Retford	Urban Centre	470793	381106	NO_2	NO	1m	1m	2
28	Elkesley, A1	Urban Centre	468518	375695	NO_2	NO	1m	1m	2
29	Lincoln Road, A1 Overpass, Tuxford	Urban Centre	473779	371093	NO_2	NO	1m	1m	2
30	Beaufort Road, NrA57 bypass	Urban Centre	457557	379081	NO_2	NO	2m	1m	2
31	Claylands Ave, Worksop	Urban Centre	457837	380581	NO_2	NO	2m	1m	2
32	Birch Court, Tuxford	Urban Centre	473911	370840	NO_2	NO	2m	1m	2
34	Watson Road, Worksop (2)	Urban Centre	458639	379009	NO_2	NO	2m	2m	2
35	Selby Road, Styrrup, A1	Urban Centre	461104	390658	NO_2	NO	5m	2m	2
36	Retford Road, A1, Blyth	Urban Centre	463022	386937	NO_2	NO	2m	2m	2
37	Scrooby Road	Urban Centre	461636	391547	NO_2	NO	25m	1m	2
39	Carlton Road - New Tesco	Urban Centre	458685	379893	NO_2	NO	17m	1m	2
40	Scrroby Road - New ASDA	Urban Centre	462598	391521	NO_2	NO	2m	1m	2
41	Kilton Road - New Morrisons	Urban Centre	459376	379451	NO_2	NO	1m	1m	2
42	Hall Drive, Worksop (St. Annes Roundabout)	Urban Centre	457738	378729	NO_2	NO	1m	1m	2

43	Mansfield Road, Worksop	Urban Centre	457556	378743	NO_2	NO	1m	1m	2
44	Shireoaks Common (Background)	Suburban	456313	381183	NO_2	NO	1m	1m	2

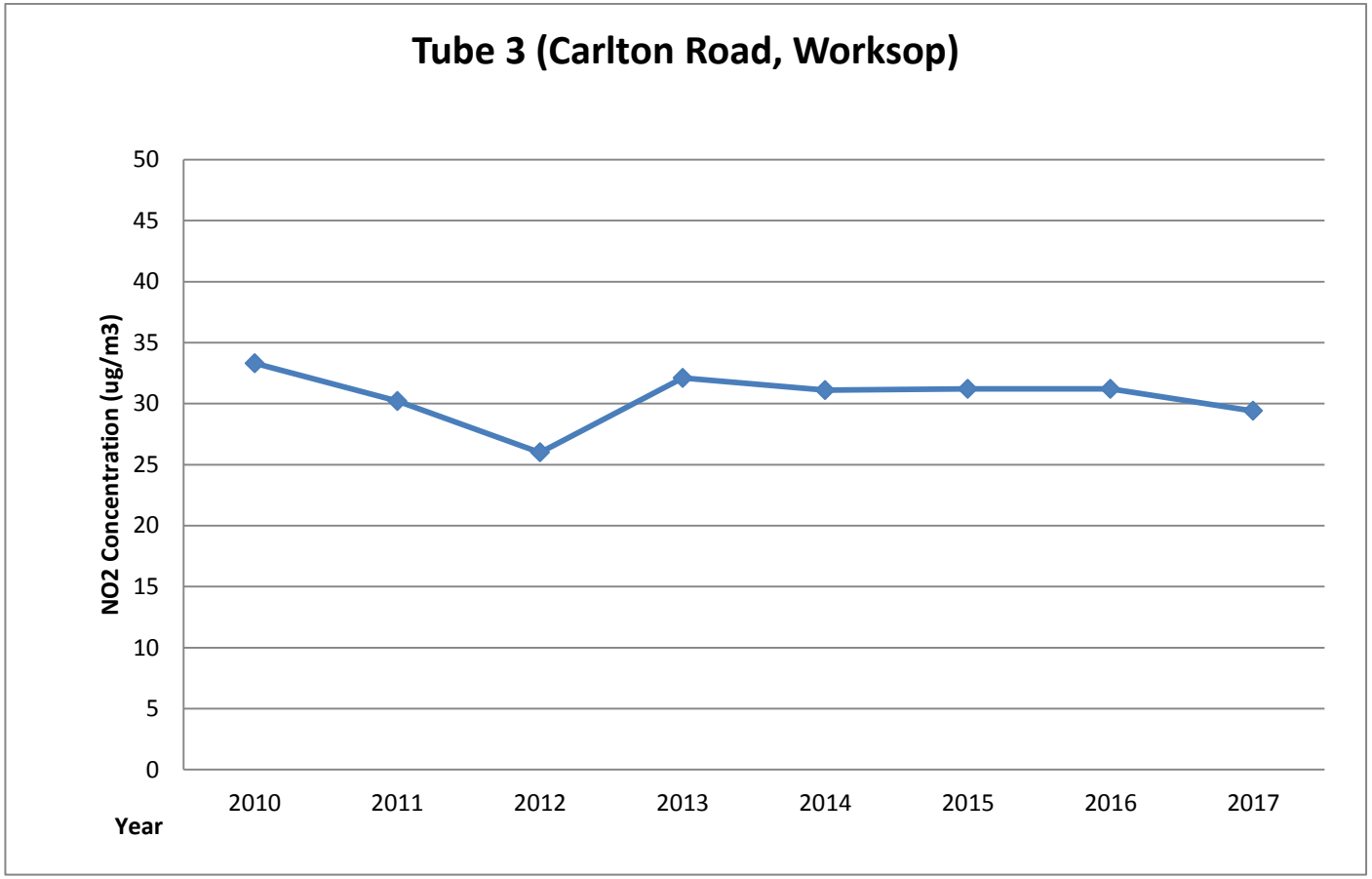
Table A.3 – Annual Mean NO2 Monitoring Results

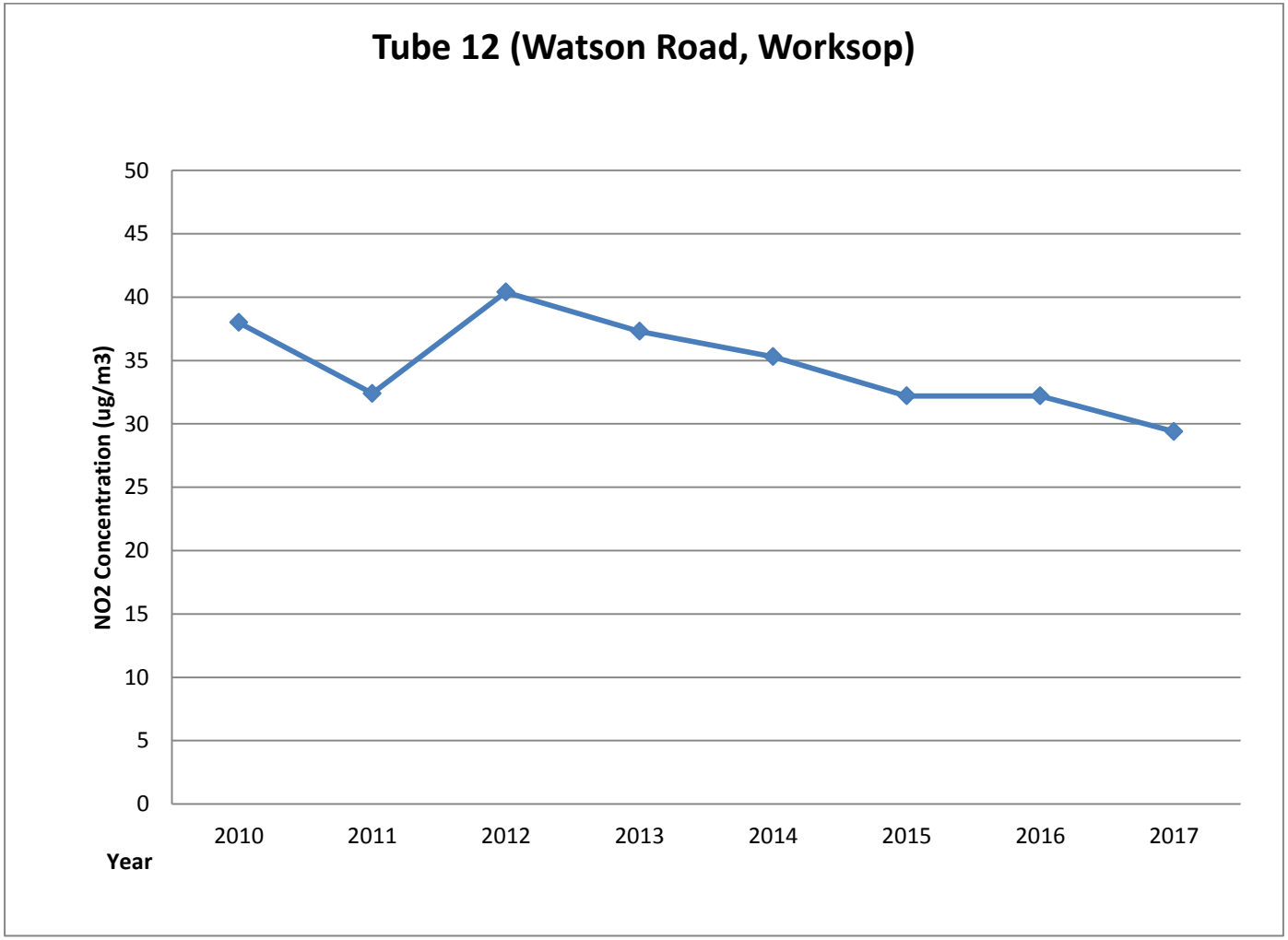
					NO2 Annual Mean concentration (ug/m^3)				
Site Name	Site Type	Monitoring type	Valid data capture for monitoring period	Valid data capture for (2017)	2013	2014	2015	2016	2017
2	Suburban	Diffusion Tube	100%	100%	26.1	22.9	23.6	22.3	21.9
3	Urban Centre	Diffusion Tube	100%	100%	32.1	31.1	31.2	31.2	29.4
5	Urban Centre	Diffusion Tube	83%	83%	28.6	27.4	29.8	29.4	27.8
12	Urban Centre	Diffusion Tube	100%	100%	37.3	35.3	32.2	32.2	30.8
15	Urban Centre	Diffusion Tube	100%	100%	23.8	21.2	25.8	25.8	21.0
22	Urban Centre	Diffusion Tube	100%	100%	33.3	29.1	25.9	25.9	25.2
25	Urban Centre	Diffusion Tube	92%	92%	31	28.8	31.4	30.7	26.4
26	Urban Centre	Diffusion Tube	100%	100%	34.3	33.8	32	32.1	30.5
27	Urban Centre	Diffusion Tube	100%	100%	31.4	30.5	32.8	32.7	27.3
28	Urban Centre	Diffusion Tube	100%	100%	39.6	34.3			20.1
29	Urban Centre	Diffusion Tube	100%	100%	44.6	40.1	39.1	39.4	37.5
30	Urban Centre	Diffusion Tube	83%	83%	23.3	23.3	24.3	24.5	21.3
31	Urban Centre	Diffusion Tube	100%	100%	28.4	27.7	27.7	27.7	25.9

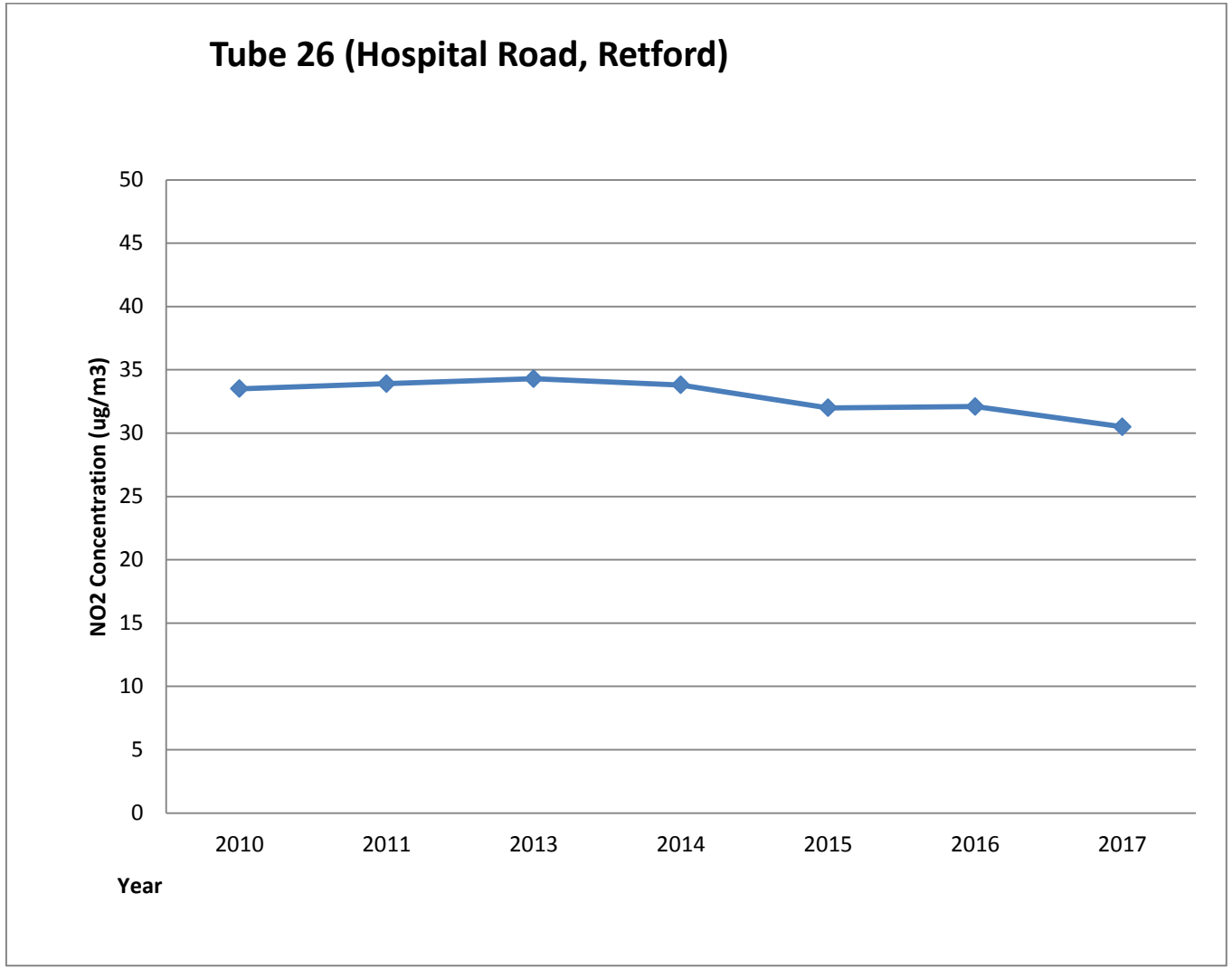
Site Name	Site Type	Monitoring type	Valid data capture for monitoring period	Valid data capture for (2017)	2013	2014	2015	2016	2017
32	Urban Centre	Diffusion Tube	92%	92%	33.2	28.8	26.7	26.7	22.1
34	Urban Centre	Diffusion Tube	100%	100%	34.3	31.6	32.4	32.4	26.0
35	Urban Centre	Diffusion Tube	92%	92%	29.2	27.5	27.7	27.7	23.2
36	Urban Centre	Diffusion Tube	100%	100%	33.1	32.6	30.4	30.4	28.1
37	Urban Centre	Diffusion Tube	92%	92%	30	28.2	32.5	32.5	28.1
39	Urban Centre	Diffusion Tube	75%	75%	31.4	29.3	26.3	26.3	26.2
40	Urban Centre	Diffusion Tube	75%	75%	31.6	28	32.9	32.9	28.6
41	Urban Centre	Diffusion Tube	100%	100%		29.8	31.5	31.5	31.4
42	Urban Centre	Diffusion Tube	100%	100%			31.5	31.5	20.0
43	Urban Centre	Diffusion Tube	100%	100%			26.9	26.5	23.8
44	Suburban	Diffusion Tube	100%	100%			25.7	25.5	23.9

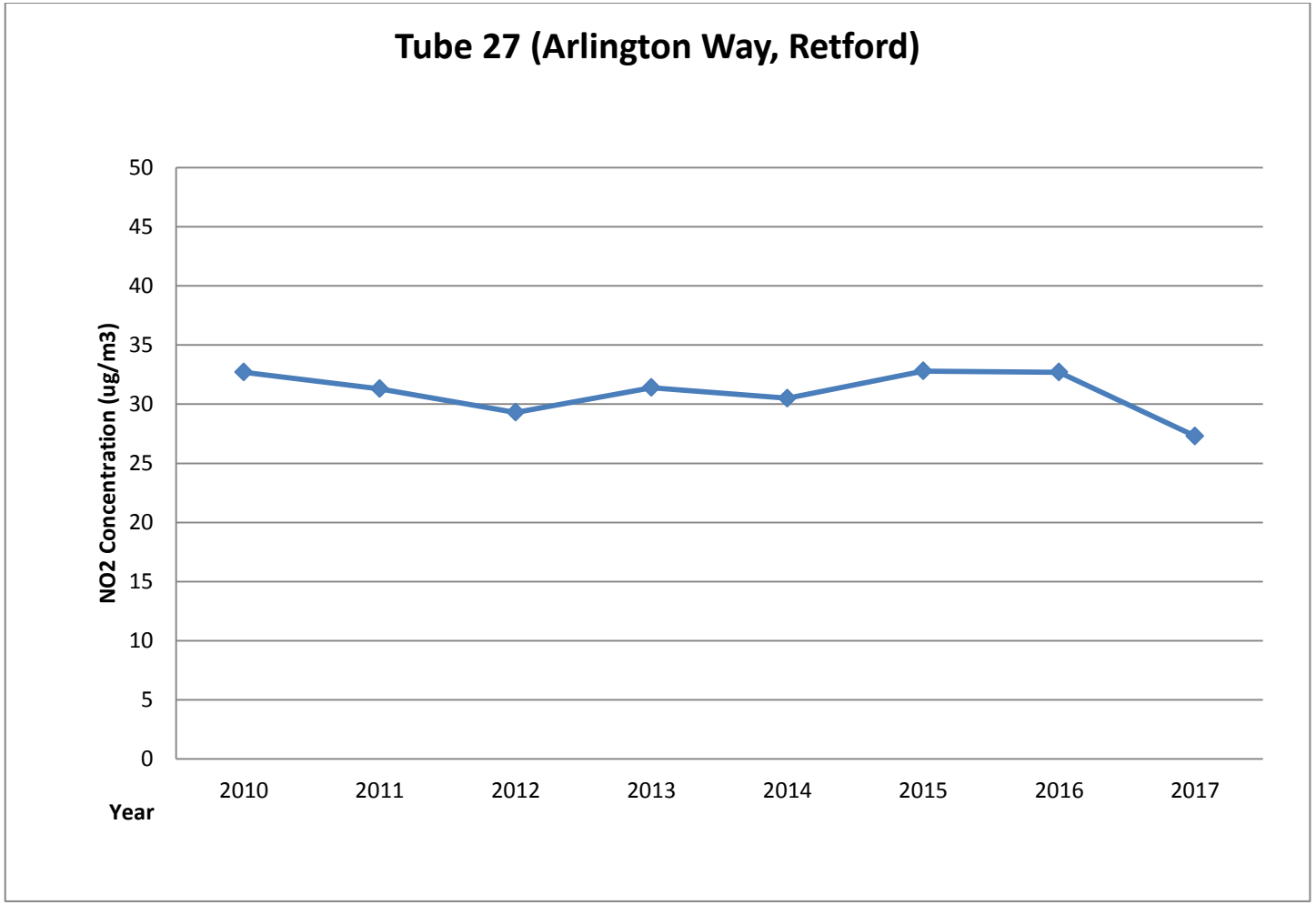
Figure A.1 – Trends in Annual Mean NO_2 concentration

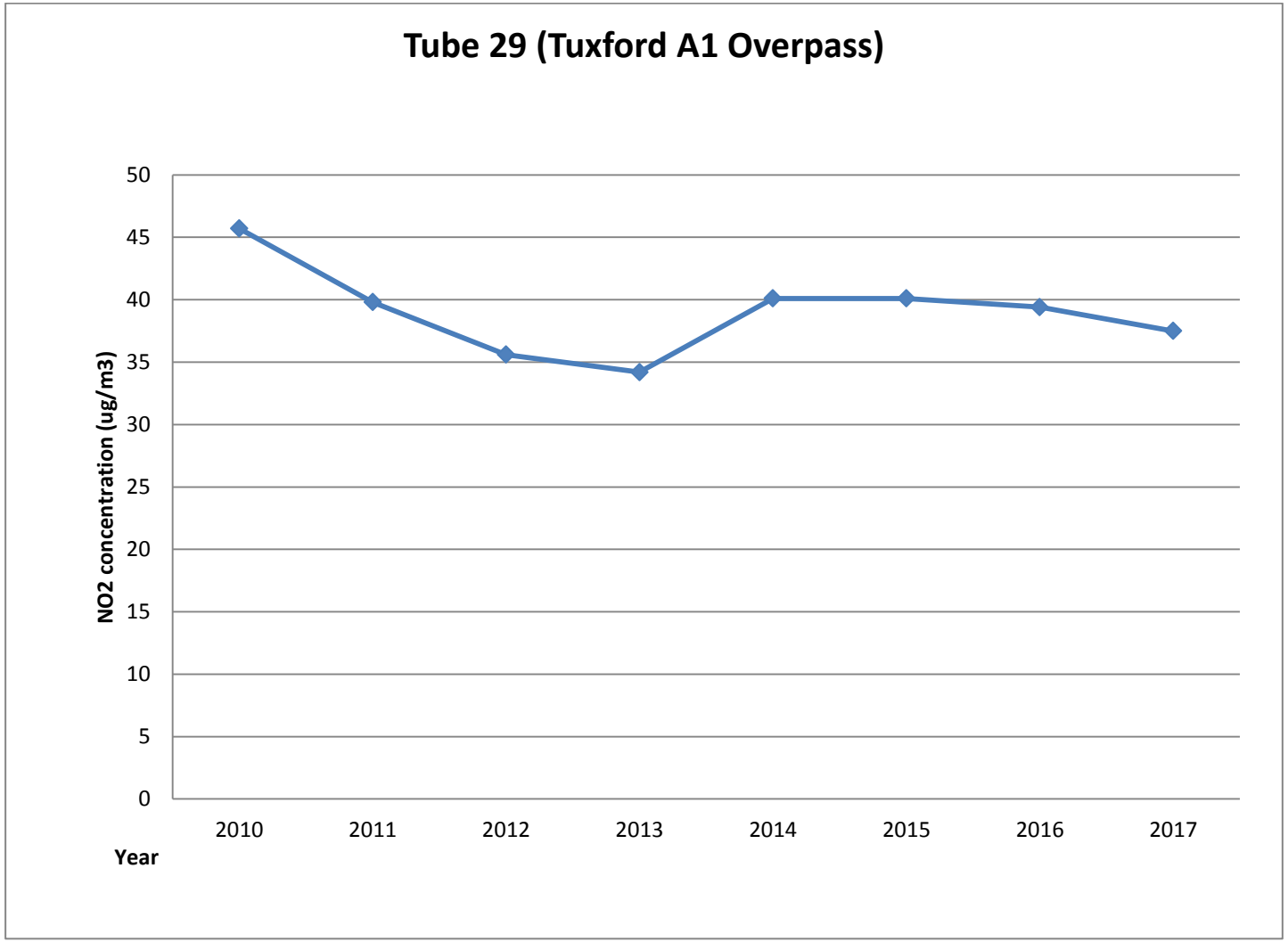
The following figures show the results of six tube locations over the last 8 years. These six tubes have been selected for further detailed trend data because they are the ones that have always been close to the annual mean (40µg/m3) exceedance level for nitrogen dioxide.

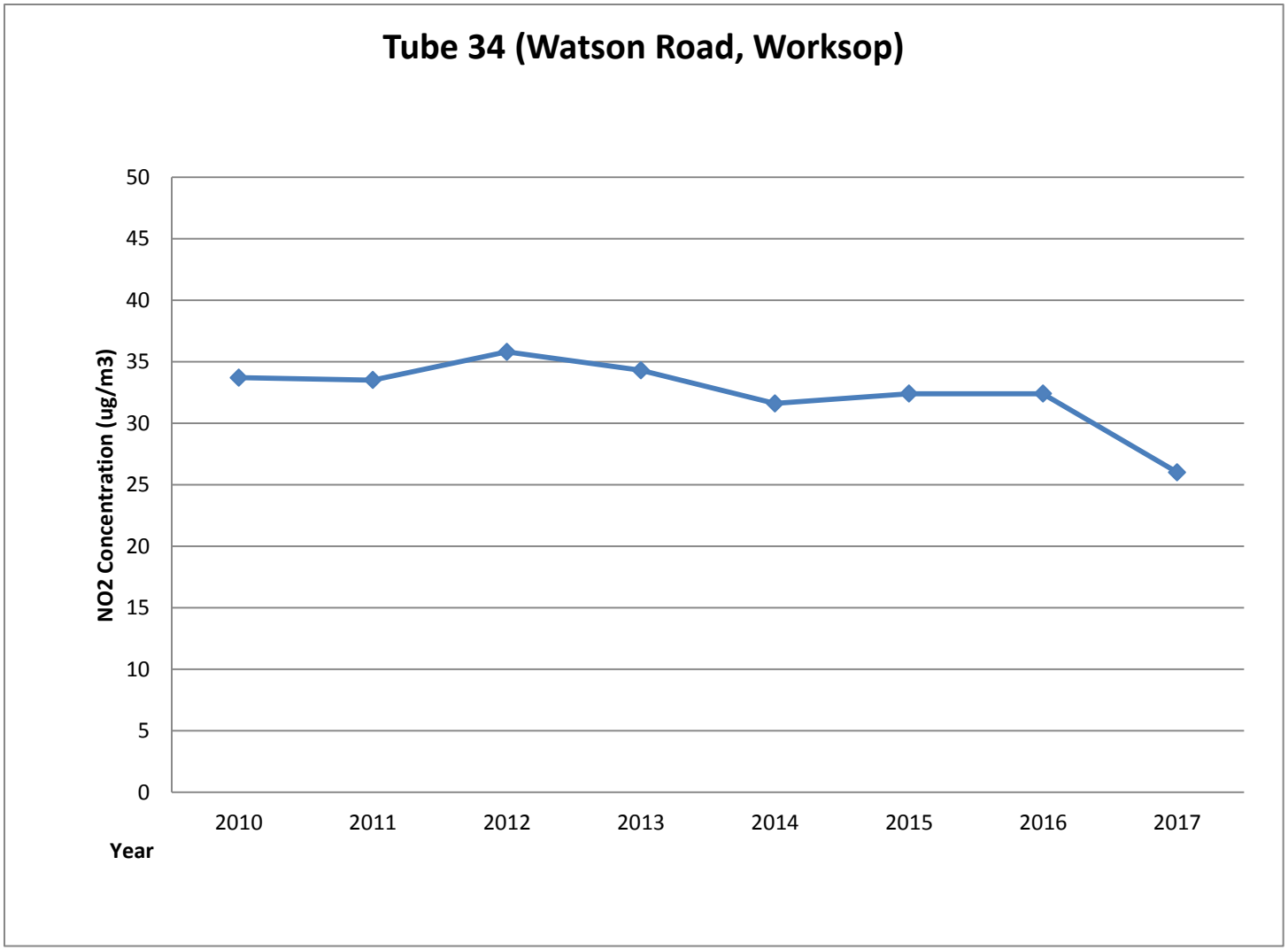



Tube 12 (Watson Road, Worksop)
NO2 Concentration (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
2015
2016
2017
Year


Tube 26 (Hospital Road, Retford)
NO2 Concentration (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2010
2011
2013
2014
2015
2016
2017
Year


Tube 27 (Arlington Way, Retford)
NO2 Concentration (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
2015
2016
2017
Year


Tube 29 (Tuxford A1 Overpass)
NO2 concentration (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
2015
2016
2017
Year


Tube 34 (Watson Road, Worksop)
NO2 Concentration (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
2015
2016
2017
Year

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2017

Site No.	Distance from kerb	Distance to relevant exposure	Site Name	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Annual Average	Bias Adjusted data	Data Capture (%)
2	1m	5m	Cuckney	34.35	33.67	25.42	23.01	20.71	18.96	21.61	17.76	23.36	21.26	30.75	31.58	25.20	21.9	100
3	1m	4m	7a Kings Head, Carlton Rd, Worksop	42.00	36.56	36.23	29.17	29.31	26.40	27.78	26.58	31.5	30.56	44.28	44.96	33.78	29.4	100
5	1m	10m	Newcastle Avenue, Worksop	38.97	32.29	34.20			22.04	35.19	19.97	25.86	30.55	39.14	41.73	31.99	27.8	83
12	1m	15m	Watson Road, Worksop (1)	44.70	40.13	34.72	34.41	38.87	30.88	31.82	24.83	33.89	25.57	42.21	42.43	35.37	30.8	100
15	1m	2m	Blyth Rd, Ranby	36.36	28.52	34.57	23.29	19.53	19.52	20.65	21.07	22.42	24.51	31.88	33.5	24.13	21.0	100
22	1m	9m	Little Styrrup, DunhamTuxford	38.15	32.23	30.91	28.47	23.44	23.57	22.25	22.49	26.07	27.02	36.28	36.7	28.96	25.2	100
25	1m	Tube on façade	London Rd Junction, Retford	46.38	34.97	37.37		0.39	24.13	27.16	25.49	30.00	29.26	40.18	38.16	30.32	26.4	92

26	1m	3m	Hospital Road, Retford	43.40	37.56	35.68	31.16	34.07	31.70	31.70	30.50	31.86	31.97	38.65	42.4	35.06	30.5	100
27	1m	14m	Arlington Way / Grove Street, Retford	42.47	40.10	30.02	28.41	30.93	23.97	25.66	25.59	29.05	25.95	34.78	40	31.41	27.3	100
28	1m	7m	Elkesley, A1	28.66	24.94	20.19	18.76	29.62	17.34	25.24	13.86	22.73	16.30	28.76	30.59	23.08	20.1	100
29	1m	30m	Lincoln Road, A1 Overpass, Tuxford	49.04	47.26	48.53	39.71	25.27	38.68	31.72	48.66	50.92	44.09	47.49	45.54	43.08	37.5	100
30	1m	15m	Beaufort Road, NrA57 bypass	9.21	29.04	29.65		18.38		23.52	20.70	23.2	22.30	33.66	35.59	24.53	21.3	83
31	1m	52m	Claylands Ave, Worksop	37.21	35.36	35.41	25.75	22.86	22.67	23.89	24.14	27.17	28.83	37.99	36.48	29.81	25.9	100
32	1m	6m	Birch Court, Tuxford	31.71	36.43		26.46	32.21	19.33	24.69	14.50	18.45	17.82	24.95	32.66	25.38	22.1	92
34	2m	22m	Watson Road, Worksop (2)	18.62	38.61	33.08	26.77	34.59	28.14	26.07	24.25	31.23	25.80	37.70	33.63	29.87	26.0	100
35	2m	4m	Selby Road, Styrrup, A1	34.57	42.11	25.57	25.28		21.94	22.44	19.33	24.5	21.50	22.31	34.3	26.71	23.2	92
36	2m	17m	Retford Road, A1, Blyth	38.74	38.83	31.39	31.35	35.15	27.23	27.13	24.79	30.22	28.46	38.38	36.5	32.35	28.1	100

37	1m	19m	Scrooby Road	46.34	37.35	38.76	31.4	27.12	26.43	26.37	28.11	29.89		43.13	45.43	32.35	28.1	92
39	1m	4m	Carlton Road - New Tesco	38.20	30.20	32.58	27.54	23.72	22.75	21.93				36.55	37.55	30.11	26.2	75
40	1m	4m	Scrroby Road - New ASDA	46.88	39.24	37.75	28.67	23.83	25.27	24.65			24.57		45.39	32.92	28.6	75
41	1m	2m	Kilton Road - New Morrisons	44.71	37.70	37.77	32.55	26.35	32.44	32.87	29.31	35.04	33.52	44.68	45.85	36.07	31.4	100
42	1m	2m	Hall Drive, Worksop (St. Annes Roundabout)	32.13	30.06	29.36	22.89	18.17	17.95	18.46	18.32	10.37	18.48	30.02	29.41	22.97	20.0	100
43	1m	3m	Mansfield Road, Worksop	36.22	33.61	28.43	24.37	25.43	22.37	22.04	22.11	25.09	24.27	33.00	31.49	27.37	23.8	100
44	1m	2m	Shireoaks Common (Background)	34.46	35.21	31.29	23.94	23.94	25.12	23.25	20.93	23.69	25	32.29	30.1	27.43	23.9	100

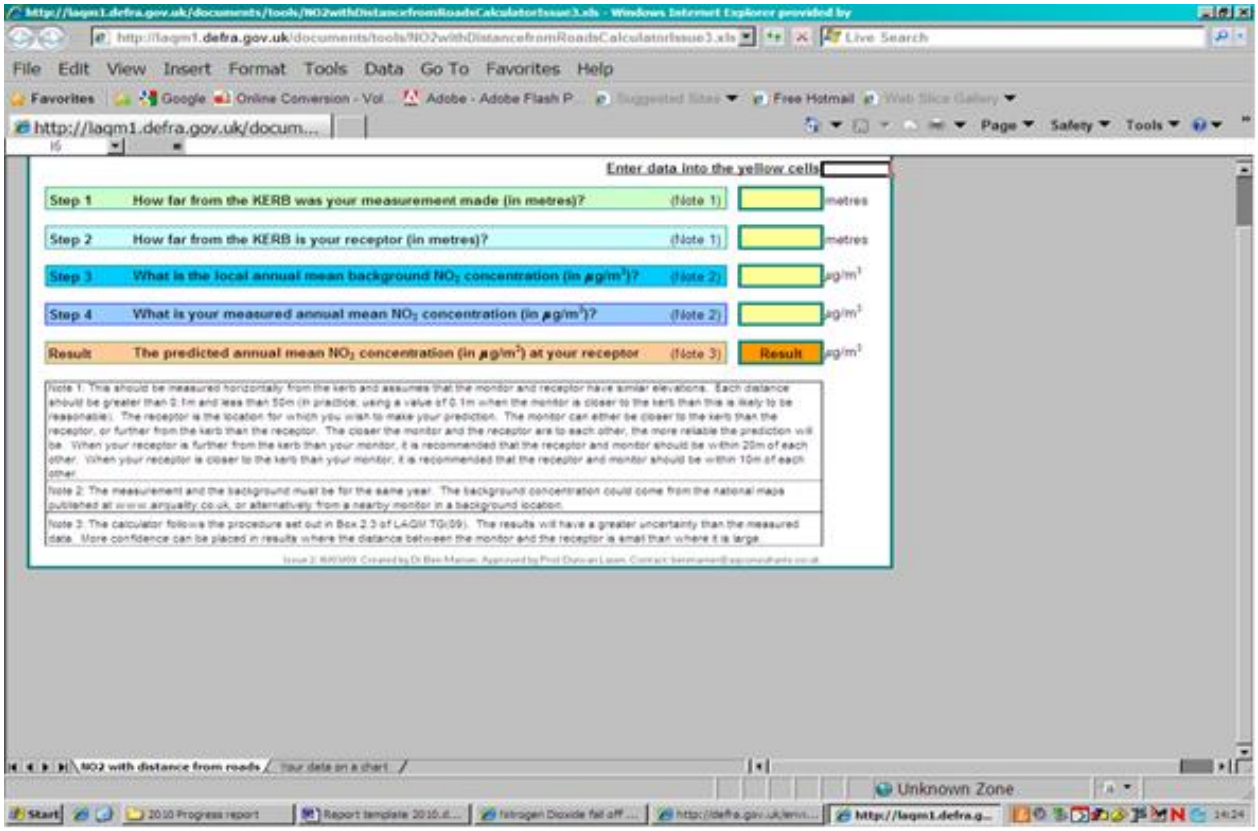
B.2 Predicting nitrogen dioxide concentrations at different distances from roads

A method has been developed to allow NO2 measurements made at one distance from a road to be used to predict concentrations at a different distance from the same road. It is appropriate for distances between 0.1 m and 140 m of the kerb. In table B2 below is the methodology used for predicting nitrogen dioxide concentrations at different distances from roads.

Table B2 Methodology for predicting nitrogen dioxide concentrations at different distances from roads

Step 1:	Identify the local background concentration in µg/m3, either from local monitoring or from the national maps published at www.airquality.co.uk.
Step 2:	Apply the following calculation: CZ = ((Cy-Cb) / (-0.5476 x Ln(Dy) + 2.7171)) x (-0.5476*Ln(Dz)+2.7171) + Cb Where: Cz is the total predicted concentration (µg/m3) at distance Dz; Cy is the total measured concentration (µg/m3) at distance Dy; Cb is the background concentration (µg/m3); Dy is the distance from the kerb at which concentrations were measured; and Dz is the distance from the kerb (m) at which concentrations are to be predicted. Ln(D) is the natural log of the number D.

Figure B.1 below shows the spread sheet tool used to calculate the predicted nitrogen dioxide concentrations at different distances from roads



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

Quality Assurance and quality control

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. 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).

Selection of suitable bias factor

Bassetlaw District Council do not have any chemiluminescense 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 below and shown in figure 2.5 has been used to calculate an appropriate bias factor of 0.87

Lhttp://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Figure C.1 – Selection of bias adjustment factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 09/18

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of March 2019

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in **blue** at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

	Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
2302	Gradko	20% TEA in water	2017	R	Gateshead Council	12	36	37	-2.7%	G	**1.03**
2303	Gradko	20% TEA in water	2017	R	Gateshead Council	12	29	25	17.5%	G	**0.85**
2304	Gradko	20% TEA in water	2017	R	Gateshead Council	12	34	35	-5.3%	G	**1.06**
2309	Gradko	20% TEA in water	2017	R	LB Hounslow	12	65	54	22.2%	G	**0.82**
2310	Gradko	20% TEA in water	2017	R	LB Hounslow	12	59	53	10.6%	G	**0.90**
2311	Gradko	20% TEA in water	2017	B	LB Hounslow	11	28	30	-6.0%	G	**1.06**
2312	Gradko	20% TEA in water	2017	R	LB Hounslow	11	43	34	28.8%	G	**0.78**
2313	Gradko	20% TEA in water	2017	B	LB Hounslow	9	38	33	14.9%	G	**0.87**
2314	Gradko	20% TEA in water	2017	R	LB Hounslow	11	52	42	24.4%	G	**0.80**
2320	Gradko	20% TEA in water	2017	UB	Liverpool	11	20	17	15.2%	G	**0.87**
2326	Gradko	20% TEA in water	2017	R	North Ayrshire Council	12	26	21	23.2%	G	**0.81**
2335	Gradko	20% TEA in water	2017	R	South Gloucestershire Council	12	25	23	10.3%	G	**0.91**
2342	Gradko	20% TEA in water	2017	KS	Marylebone Road Intercomparison	12	101	79	28.6%	G	**0.78**
2349	Gradko	20% TEA in water	2017	R	Ards and North Down Borough Council	11	40	25	59.2%	G	**0.63**
2350	Gradko	20% TEA in water	2017	UC	Belfast City Council	12	32	25	27.5%	G	**0.78**
2359	Gradko	20% TEA in water	2017	R	Lisburn & Castlereagh City Council	12	41	27	51.9%	G	**0.66**
2384	Gradko	20% TEA in water	2017	R	The Highland Council	11	24	21	15.1%	G	**0.87**
2385	Gradko	20% TEA in water	2017	R	The Highland Council	10	36	39	-7.9%	G	**1.09**
2677	Gradko	20% TEA in water	2017		**Overall Factor[3] (39 studies)**				**Use**		**0.87**

A bias factor of **0.87** has been calculated from the Defra spreadsheet tool which includes the results of nationwide diffusion tube co-location studies. The bias factor is applied to the 2017 data set

Appendix D: Map(s) of Monitoring Locations

Figure D.1

MAP OF NON-AUTOMATIC MONITORING SITES

BASSETLAW WEST

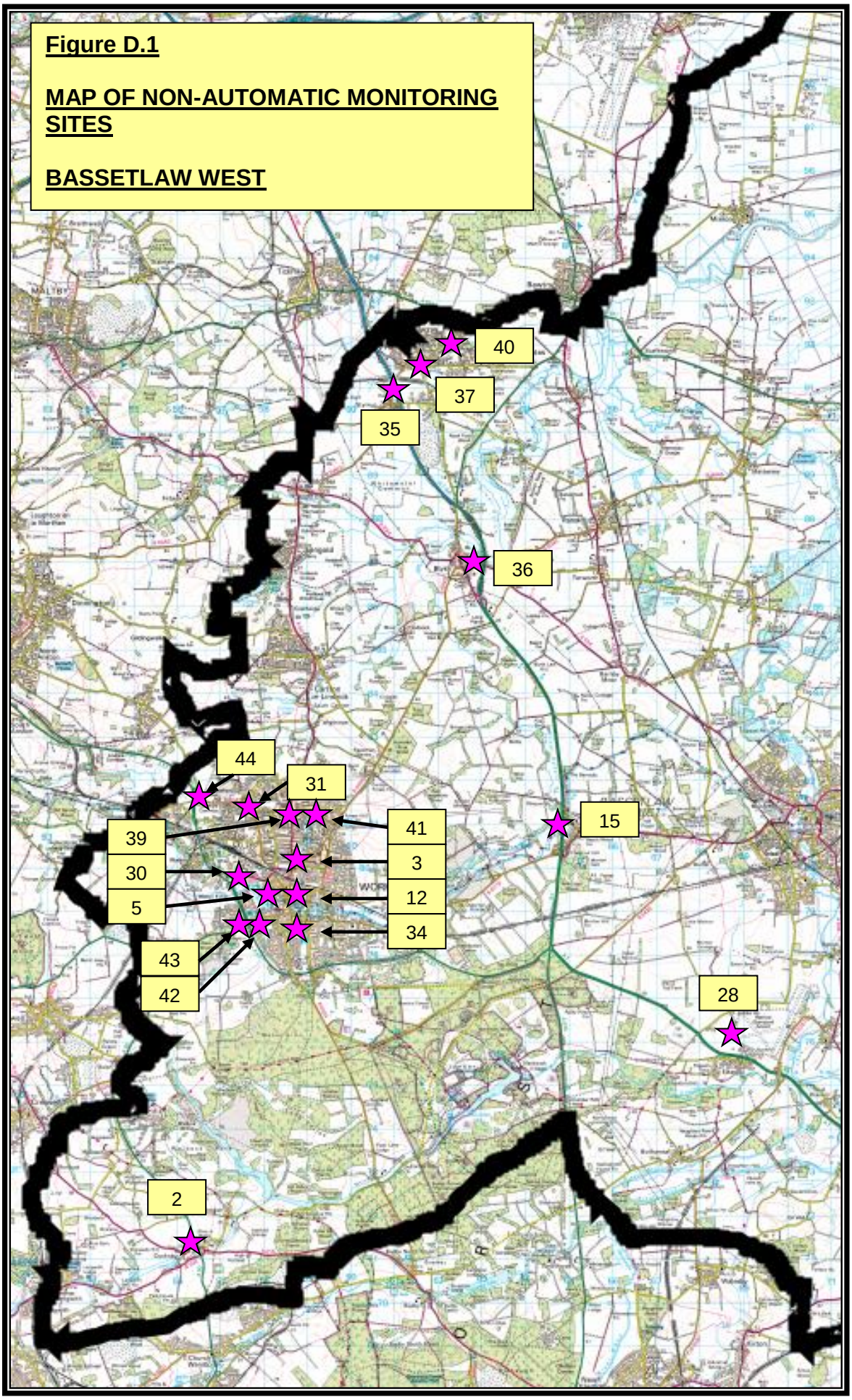


FIGURE D.2

Map of Non-Automatic Monitoring Sites

Bassetlaw East

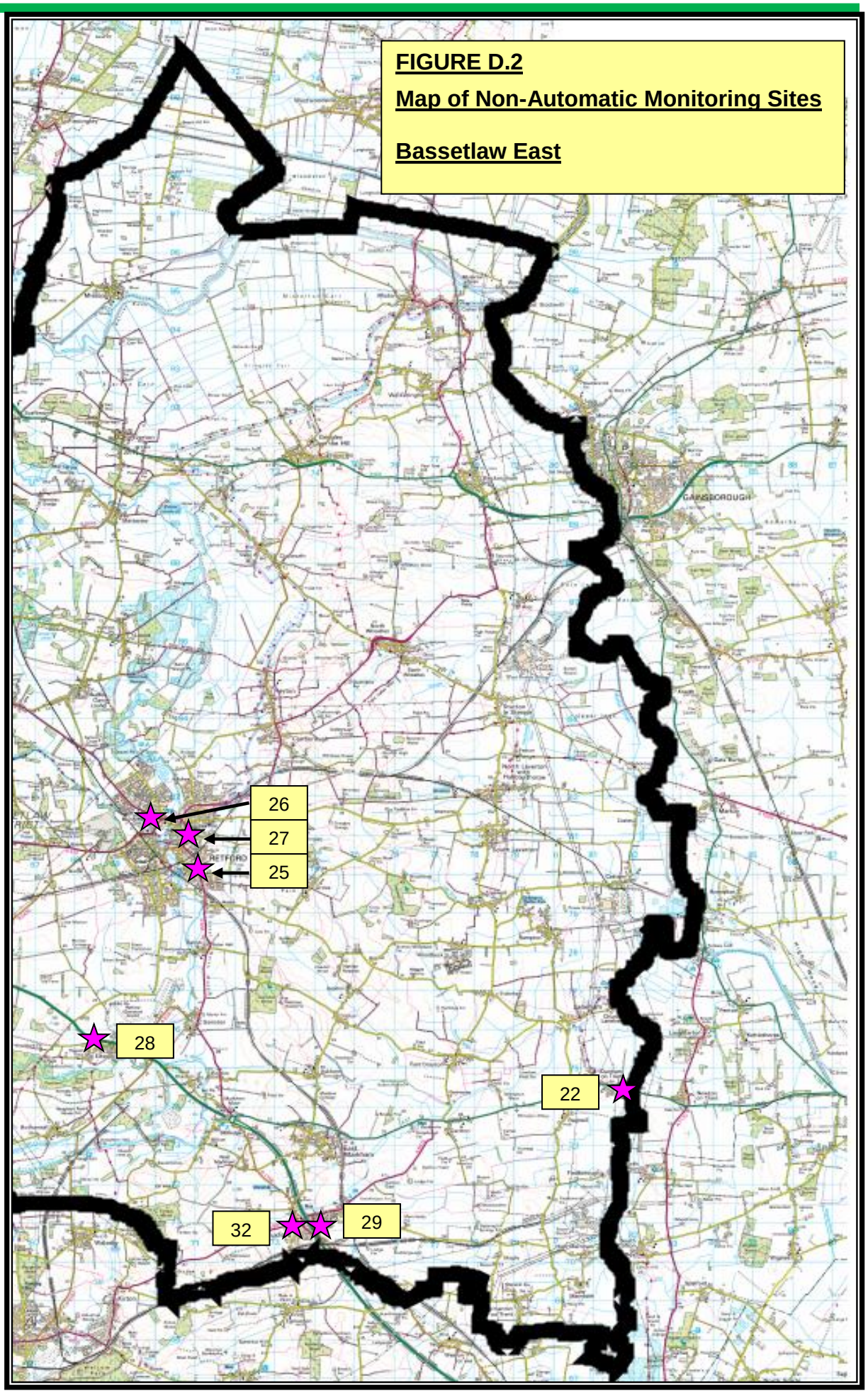


FIGURE D.3

Map of Non-Automatic Monitoring Sites (Worksop Town Centre – Detailed)

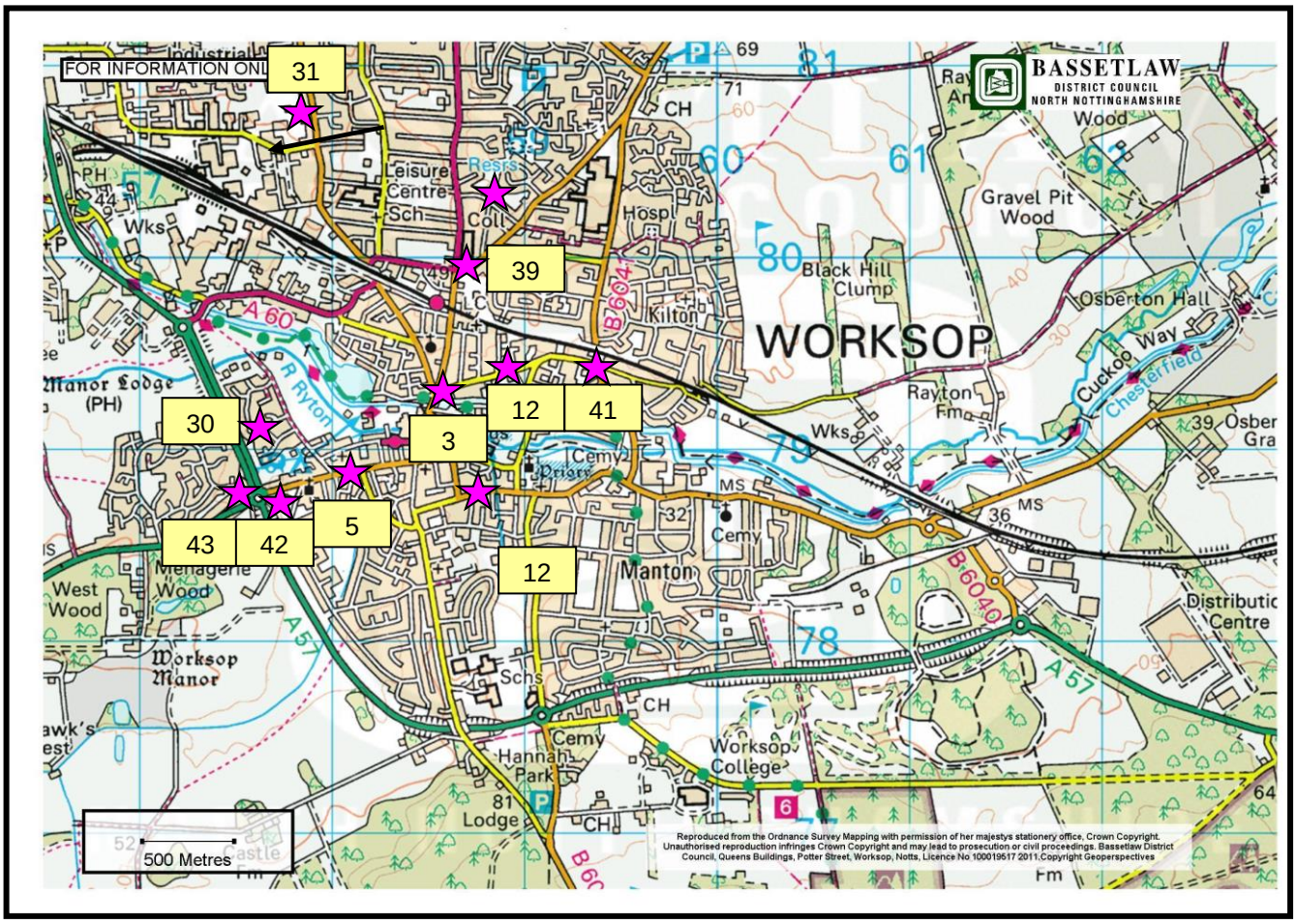
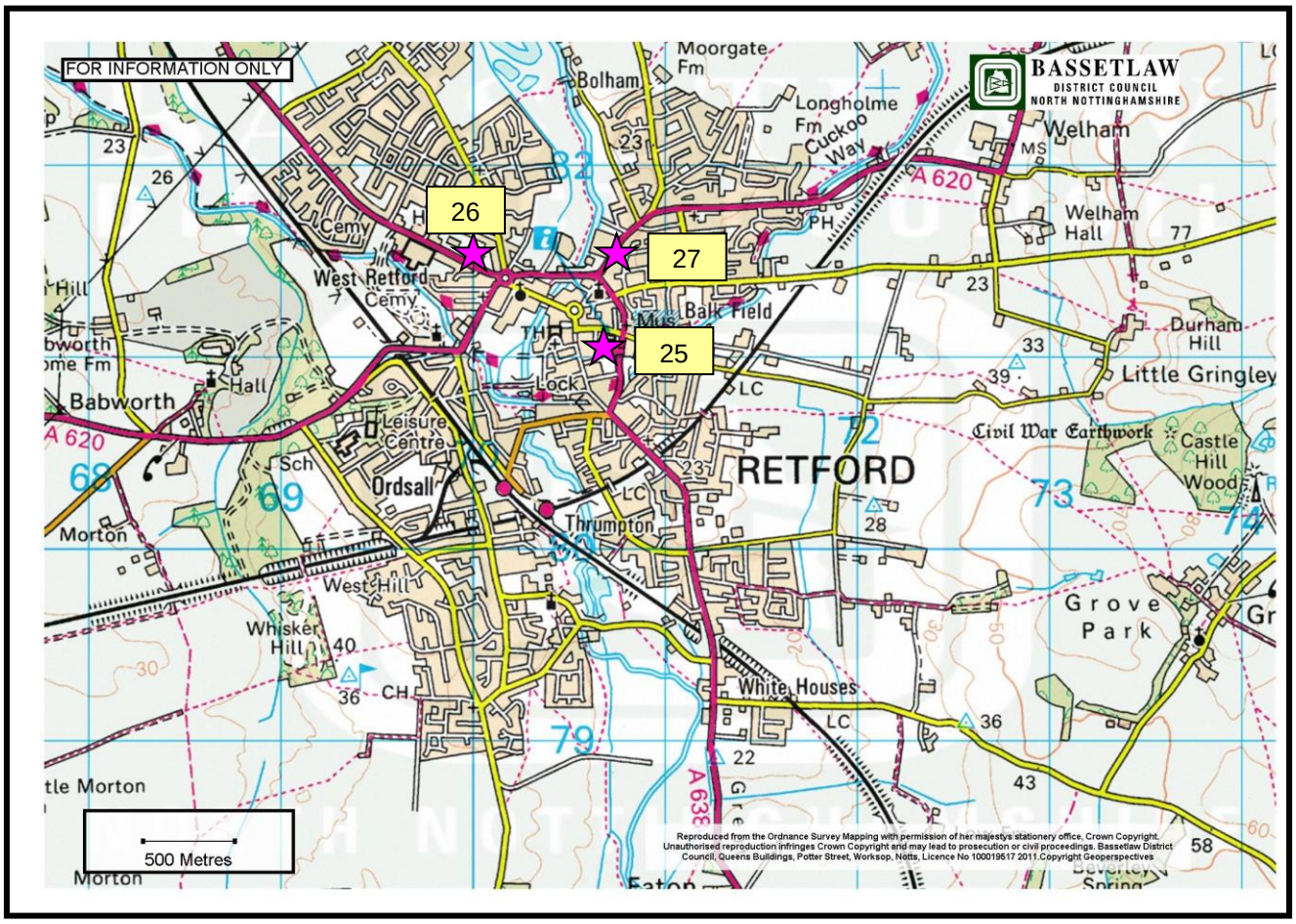


FIGURE D.4

Map of Non-Automatic Monitoring Sites (Retford Town Centre – Detailed)



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[4] 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
…	…

Thank you for taking the time to read the Bassetlaw District Council Annual Air Quality Status Report.

END OF REPORT