

2015 Air Quality Annual Status Report (ASR)

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

June 2016

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Report Reference number	ASR15
Date	June 2016

Executive Summary: Air Quality in Our Area

Air Quality in Broadland

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 billion³.

Air quality in Broadland is generally good, mainly because it is not an intensively built-up area, and it has wide swathes of rural areas. The majority of air pollution is associated with road traffic with hotspots associated with queuing traffic on busy roads. There are no air quality management areas in Broadland as monitoring indicates that the levels of traffic related pollutants are all below the air quality standard levels.

The Northern Distributor Road is currently being constructed and should help to ease queuing traffic on the radial routes out of Norwich into the Broadland area which should in turn reduce air pollution.

Actions to Improve Air Quality

Broadland works closely with Norfolk County Council on initiatives to reduce pollution from road traffic. Because of its nature as the more rural area surrounding Norwich, improvements made in the city centre often improve air quality outside it, for example retro –fitting buses, and new cycle routes.

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

Local Priorities and Challenges

Broadland will continue to monitor nitrogen dioxide across the district over the coming year.

How to Get Involved

If you would like to find out more about air quality, please contact us at environ.protection@broadland.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Broadland District Council during 2015. 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 Broadland 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 the objectives.

Broadland District Council currently does not have any AQMAs.

2.2 Progress and Impact of Measures to address Air Quality in Broadland District Council

In previous rounds of review and assessment one poultry unit was identified as a having a potential exceedance for the PM₁₀ objective due to the proximity of nearby properties. TG16 gave further guidance on calculating potential emissions, however since the original screening assessment, the Environment Agency (the permitting authority) has required the number of birds to be halved and as a result the new screening assessment has concluded that there is no significant risk of exceeding the PM₁₀ objective.

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.

Levels of PM_{2.5} are lower in more rural areas of the district, and higher in more built up areas. The dominant source of particulate matter in Broadland is from road traffic, particularly radial routes out of Norwich into Broadland towns and villages.

The measures taken by Norfolk County Council to address pollution from busses in and around Norwich should also have an impact on reducing PM_{2.5} levels in Broadland. Norfolk County Council has obtained funding from the DfT to retrofit 24 busses that are currently at euro III and IV standard for emissions, and this will include particulate traps, this initiative is due to be completed by Winter 2016. The bus operators also encourage eco driving, and provide training and equipment in the cabs to facilitate this.

The Push the Pedalways initiative is led by Norwich City Council who have obtained funding to build new cycleways in both circular and radial routes out of the city. The first phase is already constructed, and phase two is due to be completed by 2018

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

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Broadland District Council undertook non- automatic (passive) monitoring of NO₂ at 16 sites during 2015. Table A.1 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D.

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

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 (NO₂)

There were no exceedances above the objective level for nitrogen dioxide. Table A.2 in Appendix A gives the ratified and adjusted data for 2015, and

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

This is also shown in figure A.1. It can be seen that the NO₂ levels are back down to similar levels that were recorded in 2008, apart from at BN11, which is a site with heavy and regular queuing. This should be alleviated by the new Northern Distributor Road.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.1 – Details of Non-Automatic Monitoring Sites

Site location	Site ID	Site Type	Colocated	Tube Height (cm)	Grid Reference	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to kerb?	Worst-case exposure?
A47 N Burlingham	BN1	Kerbside	N	209	636268 310000	NO2	n/a	N (231m)	<1 m	Y
Norwich Rd, Acle	BN2	Kerbside	N	217	639713 310237	NO2	n/a	N (24m)	<1 m	Y
Cox Hill, Beighton	BN3	Kerbside	N	220	638094 308891	NO2	n/a	N (417m)	<1 m	Y
Hillside Ave, Thorpe	BN4	Roadside	N	257	626911 308738	NO2	n/a	Y (0m)	2 m	Y
Dussingdale, Thorpe	BN5	Roadside	N	248	627755 309440	NO2	n/a	Y (0m)	2 m	Y
Breck Rd, Sprowston	BN6	Roadside	N	234	626313 311010	NO2	n/a	Y (0m)	2 m	Y
Heath Crescent, Hellesdon	BN7	Roadside	N	140	621539 312522	NO2	n/a	Y (0m)	2 m	Y
Hansell Road, Thorpe	BN8	Roadside	N	232	627003 309849	NO2	n/a	Y (0m)	2 m	Y
Chartwell Road, Old Catton	BN9	Roadside	N	209	622938 311399	NO2	n/a	Y (0m)	2 m	Y
Yarmouth Rd, Thorpe	BN10	Roadside	N	282	625264 308411	NO2	n/a	N (76m)	2 m	Y
Reepham Rd, Hellesdon	BN11	Roadside	N	232	621642 311622	NO2	n/a	Y (0m)	8 m	Y
10A Boundary Rd, Hellesdon	BN12	Roadside	N	203	621698 311565	NO2	n/a	Y (0m)	6 m	Y
213 Milecross Lane, Hellesdon	BN13	Roadside	N	197	621811 311636	NO2	n/a	Y (0m)	5 m	Y
Berrington Rd, Hellesdon	BN14	Roadside	N	221	621690 311758	NO2	n/a	Y (0m)	4 m	Y
Wroxham Library	BN15	Roadside	N	210	630182 318042	NO2	n/a	N (16m)	2 m	Y
The Avenues, Wroxham	BN16	Roadside	N	210	629887 317575	NO2	n/a	N (35m)	2 m	Y

Table A.2 – Annual Mean NO₂ Monitoring Results

Site location	Site ID	Site Type	Colocated	Tube height(cm)	Data Capture (%)	Data annualised?	Raw data	Bias adjusted results (µg/m ³)
A47 N Burlingham	BN1	Kerbside	N	209	83	N	31.2	28.4
Norwich Rd, Acle	BN2	Kerbside	N	217	83	N	20	18.3
Cox Hill, Beighton	BN3	Kerbside	N	220	83	N	14.6	13.3
Hillside Ave, Thorpe	BN4	Roadside	N	257	83	N	14	12.7
Dussingdale, Thorpe	BN5	Roadside	N	248	83	N	22.2	20.2
Breck Rd, Sprowston	BN6	Roadside	N	234	83	N	13.1	12.7
Heath Crescent, Hellesdon	BN7	Roadside	N	140	83	N	14.9	13.6
Hansell Road, Thorpe	BN8	Roadside	N	232	83	N	13	11.8
Chartwell Road, Old Catton	BN9	Roadside	N	209	83	N	31.1	28.3
Yarmouth Rd, Thorpe	BN10	Roadside	N	282	66	Y	23.8	20.6
Reepham Rd, Hellesdon	BN11	Roadside	N	232	83	N	22.1	30.1
10A Boundary Rd, Hellesdon	BN12	Roadside	N	203	83	N	32.1	29.2
213 Milecross Lane, Hellesdon	BN13	Roadside	N	197	83	N	26.8	24.4
Berrington Rd, Hellesdon	BN14	Roadside	N	221	83	N	17.6	16
Wroxham Library	BN15	Roadside	N	210	50	Y	17.5	16.3
The Avenues, Wroxham	BN16	Roadside	N	210	66	Y	20	17
Air quality standard		40						

Table A.3 – Trend data for Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Within AQMA?	2010 (Bias adjusted *0.75)	2011 (Bias adjusted *0.84)	2012 (Bias adjusted *0.87)	2013 (Bias adjusted *0.95)	2014 (Bias adjusted *0.91)	2015 (Bias adjusted *0.91)
BN1	Kerbside	n/a	30	32.5	35.6	33.7	30.8	28.4
BN2	Kerbside	n/a	21	22.5	24.3	23.5	21.6	18.3
BN3	Kerbside	n/a	14	15.4	14.7	17.9	16.5	13.3
BN4	Roadside	n/a	15	15.5	16.9	17.4	14.6	12.7
BN5	Roadside	n/a	22	21.6	23.7	22.5	22	20.2
BN6	Roadside	n/a	15	14.3	15.7	14.6	13.8	12.7
BN7	Roadside	n/a	16	16.6	16.1	15.8	15.5	13.6
BN8	Roadside	n/a	18	16.5	18.1	17.2	15.4	11.8
BN9	Roadside	n/a	29	29.3	33.5	31.4	23.4	28.3
BN10	Roadside	n/a	20	20.6	28.7	27.4	22.7	20.6
BN11	Roadside	n/a	20	35.3	38.6	34.5	34.3	30.1
BN12	Roadside	n/a	32	31.2	36.4	33.8	33.5	29.2
BN13	Roadside	n/a	n/a	27.4	30.4	27	25.8	24.4
BN14	Roadside	n/a	n/a	30.9	25.2	24.7	17.6	16
BN15	Roadside	n/a	n/a	20.9	23.8	22.3	21.7	16.3
BN16	Roadside	n/a	n/a	20	21.9	20.5	19.2	17

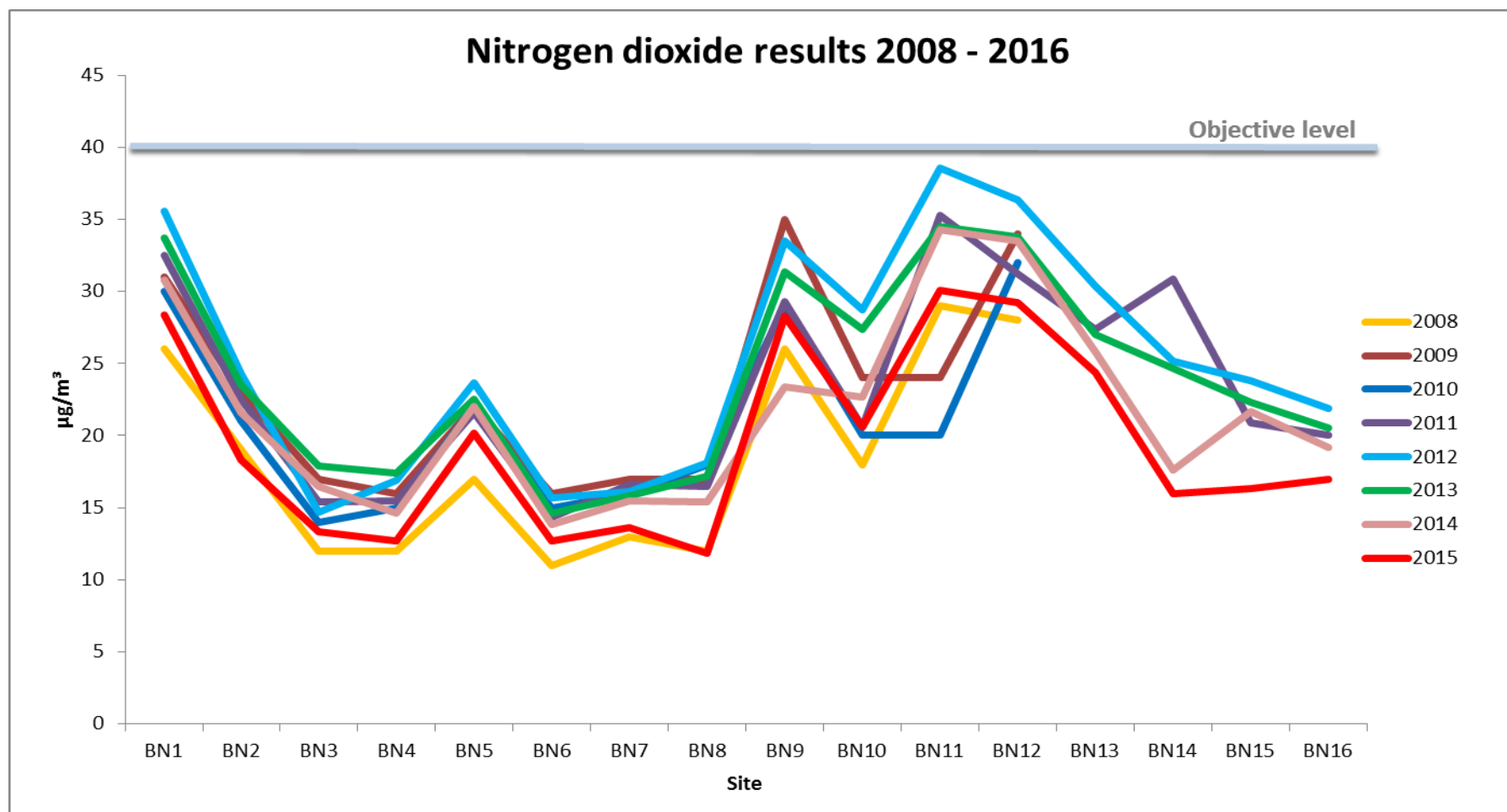


Figure A.1 – Trend data for Annual Mean NO₂ Monitoring Results

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO₂ Monthly Diffusion Tube Results – 2015

Site ID	Monthly concentration (not adjusted for bias or annualised) µg/m ³												Annual mean
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
BN1	35.8	36.8	30.5	22	25.3	N/A	30.8	30.2	39	N/A	N/A	30.7	31.2
BN2	22.7	25.2	19.6	12.2	16.6	N/A	19.4	17.7	22.1	N/A	N/A	25	20.1
BN3	19.1	18	14.4	12.2	9.2	N/A	10.3	12	17.2	N/A	N/A	19	14.6
BN4	20	19.2	14.4	10.4	10.1	N/A	10.7	10.6	14.7	N/A	N/A	15.5	14
BN5	27	26.9	22	17.4	15.8	N/A	20.1	20	27.5	N/A	N/A	23.3	22.2
BN6	19.5	19.8	13.7	9.3	8.9	N/A	9.6	9.4	11.7	N/A	N/A	16	13.1
BN7	23	19.8	16.6	10.7	9.6	N/A	11.7	12.5	14.4	N/A	N/A	16.7	15
BN8	20.4	17.8	15.1	9.9	3.7	N/A	9.6	9.9	13.1	N/A	N/A	17.3	13
BN9	38.4	37	30.7	22.5	25.7	N/A	27.8	29.5	31.5	N/A	N/A	37	31.1
BN10	30.3	27.5	22.8	N/A	17.2	N/A	N/A	18.7	27.9	N/A	N/A	22.45	23.8
BN11	39	37.7	30.7	29.6	21.6	N/A	31.6	30.1	40.4	N/A	N/A	37	33.1
BN12	39.5	34.5	35.5	30.3	22.6	N/A	28.7	25.8	36.2	N/A	N/A	35.6	32.1
BN13	32.2	33.8	25	21.3	19.5	N/A	26.1	23.1	29.9	N/A	N/A	30.3	26.8
BN14	22.8	27.3	16.7	12.8	11.3	N/A	12.2	13	16.2	N/A	N/A	26.1	17.6
BN15	N/A	N/A	N/A	18.4	14.3	N/A	16.6	17.7	17.7	N/A	N/A	20.6	17.5
BN16	25.4	25.7	20.8	15.8	15.1	N/A	17.4	N/A	20.8	N/A	N/A	18.9	20

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

Diffusion Tube Bias Adjustment Factors

Broadland's diffusion tubes are prepared and analysed by Gradko International using 20% TEA in water. As no automatic monitoring was undertaken in Broadland, the bias adjustment factor used in this document was derived from the latest version of the national database co-location studies available on the LAQM support website at <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html> . The results from this spreadsheet provided a bias adjustment factor of 0.91 for 2015.

Short-term to Long-term Data Adjustment

There were 3 diffusion tube sites with 75% or less data capture in 2014. Because there are known seasonal variations in the concentration of nitrogen dioxide, any significant gaps in data collection are likely to influence the annual mean. The data for sites 10, 15 and 16 have been annualised following the approach detailed in TG (16) Details of the calculations are shown below:

BN10					
Site	Site Type	Annual Mean	Period Mean	Ratio	Corrected Value
Lakenfields	Urban Background	12.15	14	0.87	
St Osyth	Rural Background	10.6	10.3	1.03	
Average				0.95	20.6

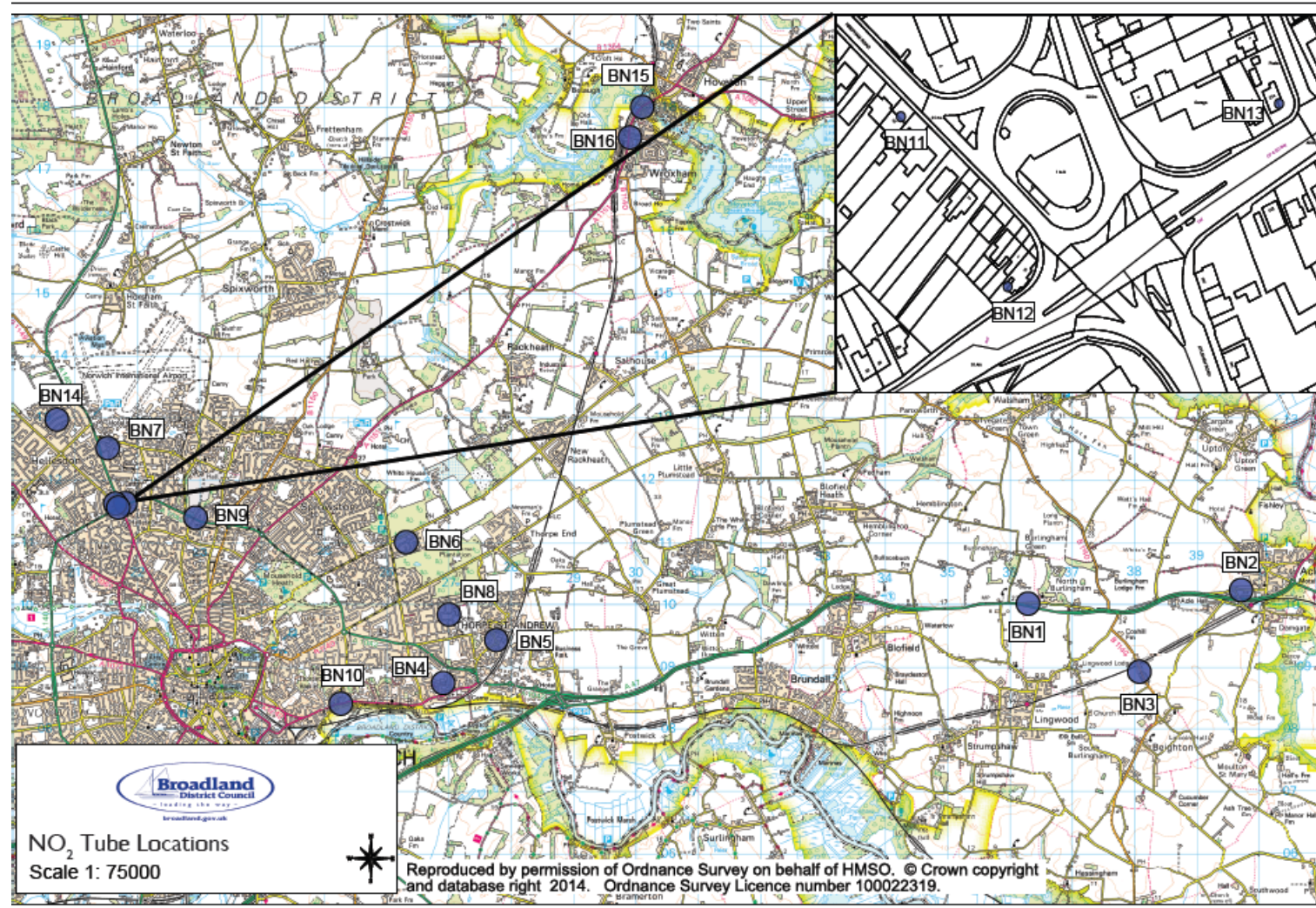
BN15					
Site	Site Type	Annual Mean	Period Mean	Ratio	Corrected Value
Lakenfields	Urban Background	12.15	12.31	0.98	
St Osyth	Rural Background	10.6	10	1.06	
Average				1.02	16.3

BN16					
Site	Site Type	Annual Mean	Period Mean	Ratio	Corrected Value
Lakenfields	Urban Background	12.15	13.89	0.87	
St Osyth	Rural Background	10.6	10.7	0.99	
Average				0.93	17

QA/QC of Diffusion Tube Monitoring

The diffusion tubes used by Broadland are prepared and analysed by Gradko using the 20%TEA in water method. The lab has shown good precision in 2015 and their performance was deemed 100% satisfactory in the WASP scheme. Gradko follow DEFRA's "Practical Guidance" in terms of procedure, and their analysis of diffusion tubes is covered by UKAS accreditation.

Appendix D: Map(s) of Monitoring Locations



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/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	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
...	...