



# **2016 Air Quality Annual Status Report (ASR)**

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

**August 2016**

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# Executive Summary: Air Quality in Our Area

## Why Air Quality Matters

Clean air is important for both public health and the environment, and contributes to the quality of life that Ipswich residents, visitors and workers enjoy. Improving air quality can reduce both the short term and the long term effects on health and the quality of the air is something that affects the whole population. Air pollution is associated with a number of adverse health impacts and 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<sup>1,2</sup>. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

Road transport accounts for a significant proportion of the major air pollutants in the atmosphere. As a result the way we choose to travel has a huge impact on air quality and everybody has a part to play, starting with day to day behaviour. There are many ways people can travel while creating minimal pollution. Simple actions such as walking or cycling to work or school will benefit air quality as well as having a knock-on positive effect on health and the environment. Using public transport, car clubs and eco-driving can all reduce traffic emissions. If driving is unavoidable, a cleaner vehicle (e.g. hybrid or electric) is greener and cheaper to run.

Actions taken locally to improve air quality can benefit regional air quality and help meet air quality limit values and objectives set out in European and UK law. The Local Air Quality Management (LAQM) system, as set out in Part IV of the Environment Act 1995, 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 achieved. Where exceedances are considered likely, the local

authority must declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out measures it intends to put in place in pursuit of the objectives.

## **Air Quality in Ipswich Borough**

Ipswich Borough Council has declared four Air Quality Management Areas:

- The land in or around the junction of Norwich Road, Chevallier Street and Valley Road;
- The land in or around the junction of Crown Street, Fonnereau Road, St Margaret's Street and St Margaret's Plain;
- The land in or around the junction of Grimwade Street, St Helen's Street, and the Star Lane gyratory system - including Fore Street, Salthouse Street, Key Street, College Street, Bridge Street, Foundation Street and Slade Street.
- Part of the Bramford Road and Chevallier Street junction.

All were declared because of exceedances of the annual average nitrogen dioxide objective level. The main source of the high levels of nitrogen dioxide is transport. The Council has an Action Plan developed in response to the declaration of the AQMAs, and this will be reviewed over the next two years. The Action Plan lists measures to be considered or implemented to improve air quality within the town.

Nitrogen Dioxide levels are monitored across the town through the use of diffusion tubes and continuous monitors. Recent evidence suggests that, in general, annual average nitrogen dioxide levels are decreasing - more detail on this can be found in Appendix F.

Ipswich Borough Council is a member of the Suffolk Air Quality Management Group which includes all of the Suffolk local authorities.

Further information on air quality within the Ipswich borough, and details of the Air Quality Management Areas can be found on the Councils website -

<https://www.ipswich.gov.uk/airqualitymanagement> .

## **Actions to Improve Air Quality**

The Suffolk County Council Travel Ipswich scheme (formerly Ipswich Fit for the 21<sup>st</sup> Century Major Scheme) was a package of traffic management actions and promotion of smarter travelling choices (such as bus, walking and cycling improvements) to address the main transport issues facing Ipswich in the future. This scheme has now, in the main, been completed.

Core Aspects of the scheme were:

- Urban Traffic Management Control (UTMC);
- Real time passenger information;
- Pedestrian guardrails;
- Advanced stop lines (ASL).

A number of areas of town now have improved accessibility for pedestrians, cyclists and bus passengers. This should encourage smarter travel choices by making it easier and safer.

Further detail can be found at the Travel Ipswich website -

<https://www.suffolk.gov.uk/roads-and-transport/roadworks/travel-ipswich/> .

## **Local Priorities and Challenges**

The priority for 2016/2017 is to consider the most recent monitoring information and to determine any changes to the existing AQMAs. This in turn will lead to a new Action Plan being developed in co-operation with Suffolk County Council and other stakeholders. The council will continue to monitor nitrogen dioxide to ensure that any changes are detected.

The challenges for 2016/17 will be to identify the specific sources of the transport based nitrogen dioxide, and develop actions to mitigate them.

## How to Get Involved

If you wish to know more about the air quality in Ipswich, to suggest methods to improve the air quality of Ipswich, or to provide further information on the air quality of Ipswich, please contact Environmental Health at Ipswich Borough Council on 01473 433110 or [environmental.health@ipswich.gov.uk](mailto:environmental.health@ipswich.gov.uk) .

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

<sup>2</sup> Air Quality and social deprivation in the UK: an environmental inequalities analysis, 2006

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013.

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# 1 Local Air Quality Management

This report provides an overview of air quality in the Ipswich Borough 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 Ipswich Borough 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.

A summary of AQMAs declared by Ipswich Borough Council can be found in Table 2.1. Further information related to AQMAs, including maps of AQMA boundaries are available online at <https://www.ipswich.gov.uk/airqualitymanagement> and <http://uk-air.defra.gov.uk/aqma/>. The boundaries of the existing AQMAs will be assessed and amended as required during 2016/2017.

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
1	NO <sub>2</sub> annual mean	Ipswich	The land in or around the junction of Norwich Road, Chevallier Street and Valley Road	Ipswich Air Quality Action Plan <a href="https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf">https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf</a>
2	NO <sub>2</sub> annual mean	Ipswich	The land in or around the junction of Crown Street, Fonnereau Road, St Margaret's Street and St Margaret's Plain	Ipswich Air Quality Action Plan <a href="https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf">https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf</a>
3	NO <sub>2</sub> annual mean	Ipswich	The land in or around the junction of Grimwade Street, St Helen's Street, and the Star Lane gyratory system - including Fore Street, Salhouse Street, Key Street, College Street,	Ipswich Air Quality Action Plan <a href="https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf">https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf</a>

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
			Bridge Street, Foundation Street and Slade Street.	
4	NO <sub>2</sub> annual mean	Ipswich	Bramford Rd/Yarmouth Rd/Chevallier St junction and part of Chevallier St.	Ipswich Air Quality Action Plan <a href="https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf">https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Air_Quality_Action_Plan_1_.pdf</a>

## 2.2 Progress and Impact of Measures to address Air Quality in Ipswich Borough Council

The Air Quality Action Plan lists a number of measures considered to improve air quality. During 2014/2015 and the current reporting year of 2016 a number of these measures have been taken forward in pursuit of improving local air quality. Details of all measures completed, in progress or planned during this time period are set out in Table 2.2. More detail on these measures can be found in the Ipswich Air Quality Action Plan or on the Travel Ipswich website - <https://www.suffolk.gov.uk/roads-and-transport/roadworks/travel-ipswich/>. The key completed measures have been implemented as part of the Travel Ipswich Scheme (formerly Transport Fit for the 21<sup>st</sup> Century Major Scheme).

Suffolk County Council and Ipswich Borough Council expect the following measure to be adjusted as required over the course of the next reporting year:

- UTMC.

Ipswich Borough Council's priorities for the coming year are:

- To review the AQMA boundaries and update the Ipswich Borough Council Air Quality Action Plan.

**Table 2.2 – 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
1a	Princes Street Roundabout Alterations (Travel Ipswich)	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars.	SCC	2011	Completed	Reduced congestion and promotion of sustainable travel	Not classified	Completed	Completed	
1b	Bus Station Improvements (Travel Ipswich)	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	SCC	2011	Completed	Promotion of sustainable travel.	Not classified	Completed	Completed	
1c	Cycling and Walking Routes (Travel Ipswich)	Transport Planning and Infrastructure	Cycle network	SCC	2011	Completed	Reduced congestion and promotion of sustainable travel.	Not classified	Completed	Completed	
1d	UTMC (Travel Ipswich)	UTC	UTC, Congestion management, traffic reduction	Suffolk County Council	This is a major component of the Travel Ipswich Major Scheme	Construction during 2012 – 2015.	Traffic to be controlled to reduce congestion and reduce idling.	Not classified	Ongoing	Autumn 2016 for system to be fully in place.	Ongoing adjustments will continue to be made.
2	St Margarets Street Signal Review	Traffic Management	UTC, Congestion management, traffic reduction	IBC/SCC			Reduce Congestion in AQMA	Not classified	Linked to UTMC	Anticipated further improvements as part of UTMC scheme.	
3	Bus Stop Improvements	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	SCC			Improved use of buses	Not classified		Autumn 2016	
4	Bus Timetable Improvements	Promoting Travel Alternatives	Other	SCC					Bus Priority consideration as part of UTMC	Autumn 2016 for system to be in place.	Ongoing adjustments will continue to be made.

## Ipswich Borough Council

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
5	Quality Bus Partnership development	Vehicle Fleet Efficiency	Other	SCC/IBC					SCC is awaiting the outcome of the Bus Services Bill before progressing further.		
6	Green Travel Planning	Promoting Travel Alternatives	Travel planning	IBC/SCC		For new development, changes of use of buildings or land and alterations to existing buildings, the transportation and accessibility outcomes of development needs to be set out as part of a planning submission.	Encouraging sustainable travel.	Unknown	Ongoing	Completed	This is an ongoing commitment.

*Completed prior to 2015 and reported in previous review and assessment reports:*

- Valley Road Cycle Lane;
- Bishops Hill Bus Lane;
- Train Service Improvements (signalling changes to improve Ipswich – Lowestoft service);
- Healthy School Status;
- Raise awareness of passenger transport;
- Smarter Travel Plan Suffolk;
- Season Tickets to students;
- Air Quality Assessments where required as part of development control process.

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Ipswich Borough Council and/or Suffolk County Council are taking the following measures that may address PM<sub>2.5</sub>:

- Travel Ipswich Major Scheme;
- Urban Traffic Management System – implemented as part of the Travel Ipswich Major Scheme;
- Low Emission Supplementary Planning Document – this is a new action and will be developed in conjunction with the updated AQMA Action Plan.

Suffolk Air Quality Group is meeting with Public Health in September 2016 to discuss options and the way forward with regard air quality. The outcome of the meeting, and any proposals, will be reported in future ASR's.

## **3 Air Quality Monitoring Data and Comparison with the Air Quality Objectives and National Compliance**

### **3.1 Summary of Monitoring Undertaken**

#### **3.1.1 Automatic Monitoring Sites**

Ipswich Borough Council did not undertake automatic (continuous) monitoring during 2015 due to faults/decommissioning of the monitors.

#### **3.1.2 Non-Automatic Monitoring Sites**

Ipswich Borough Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 74 sites during 2015. Table A.2 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 is 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 (NO<sub>2</sub>)**

Table A.3 in Appendix A compares the ratified adjusted continuously monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

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

Exceedances of the annual average air quality objective are found at a number of the monitoring sites and are shown in bold on the tables. These are generally within the

AQMA areas but a number are outside of AQMAs and have been considered within the recently submitted and approved Detailed Assessment report (carried out prior to the new guidance being issued) and the WSP|Parsons Brinckerhoff Air Quality Modelling report commissioned to support the Ipswich Borough Council Local Plan. The information from the two reports is being studied prior to recommendations being made for any necessary alterations to the AQMA boundaries. The outcome of this will be reported on in future ASRs.

There are no annual averages greater than  $60 \mu\text{g}/\text{m}^3$  that would indicate an exceedance of the hourly mean objective.

### **3.2.2 Particulate Matter (PM<sub>10</sub>)**

Ipswich Borough Council does not monitor for particulate matter (PM<sub>10</sub>) – historic studies/monitoring have not identified any exceedance of the objective levels.

### **3.2.3 Particulate Matter (PM<sub>2.5</sub>)**

Ipswich Borough Council does not monitor for particulate matter (PM<sub>2.5</sub>).

### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

Ipswich Borough Council does not monitor for Sulphur Dioxide (SO<sub>2</sub>) – previous screening work has not suggested that there will be any exceedance of the objective levels.

## Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m)	Distance to kerb of nearest road (m)	Inlet Height (m)
Chevallier Street	Urban Roadside	615257	245349	NO <sub>2</sub>	Y	Chemiluminescent	Equal distance from kerb as relevant exposure	2.5	1.5
St Margarets Street	Urban Roadside	616578	244759	NO <sub>2</sub>	Y	Chemiluminescent	Sited immediately adjacent to residential property	3	2.7

Table A.2 – Details of Non-Automatic Monitoring Sites 2015

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
1	Civic Drive	Roadside	615982	244419	NO2	N	30	3.77	N	2.34
2	Chevallier Street	Roadside	615141	245243	NO2	Y	1.49	2.44	N	2.04
3	Coprolite Street/Duke Street	Kerbside	617067	244038	NO2	Y	9.07	0.71	N	2.52
4	Berners Street	Roadside	615926	244924	NO2	N	5.68	1.77	N	2.36
5	Fore Street	Roadside	616868	244130	NO2	Y	1	2.27	N	2.59
6	Kings Avenue	Urban Backgrou	617282	244417	NO2	N	11.9	2.02	N	2.6

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
		nd								
7	Bramford Road	Roadside	615003	245238	NO2	N	0	5.36	N	2.32
8	Bramford Road	Roadside	615128	245204	NO2	N	4.02	2.33	N	2.43
9	Bramford Road	Roadside	615128	245204	NO2	N	4.02	2.33	N	2.43
10	Bramford Road	Roadside	615128	245204	NO2	N	4.02	2.33	N	2.43
11	St Margarets Street	Roadside	616595	244747	NO2	Y	0	2.42	N	2.28
12	St Margarets	Roadside	616595	244747	NO2	Y	0	2.42	N	2.28

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	Street									
13	Bramford Lane	Roadside	615115	245301	NO2	N	3.03	1.49	N	2.52
14	Chevallier Street	Roadside	615283	245391	NO2	Y	0.52	2.47	N	2.2
15	Tavern Street	Urban Centre	616272	244642	NO2	N	N/A	N/A	N	2.62
16	Valley Road	Roadside	615368	245442	NO2	Y	2.4	3.36	N	2.42
17	Woodbridge Road	Roadside	616983	244657	NO2	N	2.48	1.92	N	2.5
18	Yarmouth Road	Roadside	615093	245172	NO2	N	0	7.7	N	2.28
19	St	Roadside	616595	244747	NO2	Y	0	2.42	N	2.28

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	Margarets Street									
20	Fonnereau Road	Roadside	616455	244824	NO2	Y	1.51	2.44	N	2.6
21	St Margarets Plain	Roadside	615491	244808	NO2	Y	N/A	2.29	N	2.36
22	St Margarets Plain/Northgate Street	Roadside	616488	244789	NO2	Y	N/A	1.81	N	2.59
23	St Margarets Green	Roadside	616641	244784	NO2	Y	N/A	3.42	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
24	St Margarets Street	Roadside	616661	244689	NO2	N	N/A	3.65	N	2.3
25	St Helens Street	Roadside	616751	244578	NO2	N	3.06	2.11	N	2.52
26	St Helens Street/Grimwade Street	Roadside	616966	244505	NO2	Y	4.93	3.92	N	2.46
27	Argyle Street/St Helens Street	Roadside	616962	244544	NO2	Y	5.69	1.46	N	2.57
28	Chevallier Street	Roadside	615191	245289	NO2	Y	2.39	1.98	N	2.46

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
29	Fore Hamlet	Roadside	617124	244070	NO2	Y	0	2.17	N	2.68
30	Fore Street	Roadside	616911	244118	NO2	Y	2.2	2.78	N	2.46
31	Star Lane	Roadside	616325	244134	NO2	Y	N/A	2.26	N	1.94
32	Spring Road	Roadside	617391	244567	NO2	N	3.02	2.42	N	2.46
33	Key Street	Roadside	616656	244112	NO2	Y	2.29	1.88	N	2.45
34	College Street	Roadside	616468	244071	NO2	Y	N/A	2.52	N	1.82
35	Cobden Place	Roadside	616744	244694	NO2	N	0	1.27	N	2.48
36	Franciscan Way	Roadside	616153	244245	NO2	N	3.6	1.82	N	2.44
37	Lower	Kerbside	616479	244164	NO2	Y	N/A	0.83	N	2.28

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	Brook Street									
38	Civic Drive	Kerbside	615898	244796	NO2	N	6.85 (est)	0.88	N	2.48
39	Star Lane/Fore Street	Kerbside	616716	244255	NO2	Y	N/A	0.61	N	2.6
40	Norwich Road	Roadside	615458	245144	NO2	Y	5.77	3	N	2.36
41	Norwich Road	Roadside	615560	245009	NO2	N	N/A	1.27	N	2.54
42	Norwich Road	Roadside	615741	244898	NO2	N	0 (but est 3 to nearest flat above)	2.35	N	2.54
43	Yarmouth Road/Bramf	Roadside	615104	245197	NO2	Y	0.24	3.6	N	2.4

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	ord Road									
44	Bramford Road	Roadside	615051	245233	NO2	N	4.57	1.44	N	2.35
45	Chevallier Street	Roadside	615260	245348	NO2	Y	2.61	3.89	N	1.81
46	Chevallier Street	Roadside	615260	245348	NO2	Y	2.61	3.89	N	1.81
47	Chevallier Street	Roadside	615260	245348	NO2	Y	2.61	3.89	N	1.81
48	Valley Road	Roadside	615414	245477	NO2	Y	6.9	2.49	N	2.7
49	St Matthews Street	Roadside	615803	244871	NO2	N	0 (but 3 (est) to flat above)	1.91	N	2.57

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
50	Barrack Lane	Roadside	615768	244885	NO2	N	1.42	1.52	N	2.37
51	St Matthews Street junction with Portman Road	Roadside	615759	244864	NO2	N	4.03	1.04	N	2.55
52	St Matthews Street	Roadside	615821	244868	NO2	N	N/A	2.32	N	2.49
53	St Matthews Street	Roadside	615822	244855	NO2	N	Flat above (est 3)	2.53	N	2.28
54	St Matthews Street	Roadside	615880	244862	NO2	N	4 (est)	10 (estimate)	N	2.41
55	Berners	Roadside	615914	244894	NO2	N	2 (est)	2.47	N	2.38

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	Street									
56	Berners Street	Roadside	615931	244913	NO2	N	1 (est)	1.61	N	2.54
57	Berners Street	Roadside	615939	244980	NO2	N	1.4	7.87	N	2.55
58	Berners Street	Kerbside	615974	245032	NO2	N	7.55	0.44	N	2.46
59	St Matthews Street Roundabout	Roadside	615926	244835	NO2	N	N/A	2.98	N	2.5
60	St Matthews Street Roundabout	Roadside	615926	244835	NO2	N	N/A	2.98	N	2.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
61	St Matthews Street roundabout	Roadside	615926	244835	NO2	N	N/A	2.98	N	2.5
62	St Matthews Street	Roadside	615934	244798	NO2	N	4 (est)	2.31	N	2.62
63	St Matthews Street	Roadside	615949	244788	NO2	N	2 (est)	3.7	N	2.4
64	Norwich Road	Roadside	615686	244937	NO2	N	0.3	1.35	N	2.56
65	Norwich Road	Roadside	615686	244937	NO2	N	0.3	1.35	N	2.56
66	Woodbridge Road	Roadside	616807	244667	NO2	N	0	3.55	N	2.35

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
67	Woodbridge Road junction with Blanche Street	Roadside	616887	244672	NO2	N	7 (est)	1.4	N	2.62
68	Woodbridge Road	Roadside	616900	244656	NO2	N	0 (but 1 (est) to flats)	3.48	N	2.46
69	Argyle Street	Roadside	616974	244591	NO2	Y	2.5 (est)	4.84	N	2.83
70	Argyle Street	Roadside	616964	244574	NO2	Y	5.05	1.76	N	2.56
71	St Helens Street	Roadside	617027	244535	NO2	Y	0	13.77	N	2.46
72	St Helens	Roadside	617119	244533	NO2	Y	0.86	2.66	N	2.56

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
	Street									
73	Regent Street	Roadside	617122	244506	NO2	Y	1.19	1.07	N	2.51
74	Grimwade Street	Roadside	616949	244440	NO2	N	N/A	2.32	N	2.49
75	Grimwade Street	Roadside	616929	244360	NO2	N	1	3.41	N	2.52
76	St Helens Street	Roadside	616943	244519	NO2	Y	0	3.14	N	2.46
77	St Helens Street	Roadside	616900	244538	NO2	Y	0	4.73	N	2.4
78	Orchard Street	Roadside	616868	244585	NO2	N	1.49	1.59	N	2.47

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
79	Woodbridge Road	Roadside	617041	244674	NO2	N	7.76	5.45	N	2.43
80	St Helens Street	Roadside	616837	244541	NO2	Y	N/A	2.91	N	2.82
81	St Helens Street	Roadside	616837	244541	NO2	Y	N/A	2.91	N	2.82
82	St Helens Street	Roadside	616837	244541	NO2	Y	N/A	2.91	N	2.82
83	Bond Street	Roadside	616788	244494	NO2	N	1.61	1.88	N	2.34
84	Carr Street junction with Majors Corner	Roadside	616698	244597	NO2	N	N/A	4.41	N	2.48

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
85	Old Foundry Road	Roadside	616674	244625	NO2	N	Est 2	1.43	N	2.53

(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<sub>2</sub> Monitoring Results**

Site ID Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2011	2012	2013	2014	2015
Chevallier Street Urban Roadside	Automatic	N/A	78	31	34	<b>45<sup>(4)</sup></b>	29	N/A
St Margarets Street Urban Roadside	Automatic	80.5	80.5	<b>50</b>	<b>49</b>	<b>52</b>	N/A	N/A

Notes: Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 6 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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) The results for the monitoring obtained at Chevallier Street increased significantly in 2013. The likely cause is very high results during the months of January to April which have influenced the annual average. The machine was changed in May and concentrations reduced. It is not known why this occurred as both machines were serviced and data ratified to Defra specifications.

**Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results**

Site ID Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
				2011	2012	2013	2014	2015
Chevallier Street Roadside Urban Roadside	Automatic	N/A	78	1	3	0	0	N/A
St Margarets Street Urban Roadside	Automatic	N/A	80.5	1	0	8	N/A	N/A

Notes: Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

(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%).

(3) If the period of valid data is less than 90%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

## Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2015

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
Civic Drive	1	40.5		32.5	33.6	29.1	28.6	29.5	28.3	30.6	34.8	36.4	33.1	32.45	26.29
Chevallier St o/s No's 6 to 8	2	56.3	42.4	53.3	52.4	44.9	42.1	53.8	54.9	54.4	50.3	48	52.2	50.42	<b>40.84</b>
Corprolite St/Duke St Junc	3	42.6	35.1	36.8	29.2	27.5	27.3	29.9	31.4	35	36.7	39	36.6	33.93	27.48
Berners Street o/s No. 31	4	53.7	50.4	45.3	34.3	39	33.6	32.1	36	42	42.7	47.8	43.5	41.70	33.78
Fore Street	5	54.7	51.8	54.4	49.8	49.4	49	52.9	50.2	53.8	51.3	50.8	52.6	51.73	<b>41.90</b>
Kings Avenue	6	32	28.1	22.7	21.6	12.4	13.1	13.3	15.6	18.3	24.1	21.2	19.9	20.19	16.36
Bramford Road o/s No 205	7	49.6	37.8	42	43.4	37	33.8	37.6	38.6	39.5	36.5	44.7	43	40.29	32.64
Bramford Road o/s No 122	8	51.5	40.9	47.1	41.8	35.2	37.2	37.8	39.5	48.4		42.7	35.4	41.59	33.69
Bramford Road o/s No 122	9	53.7	49.9	43	47.9	35.3	35.9	36	36.9	48.1		43	36.8	42.41	34.35
Bramford Road o/s No 122	10	51.6	45.8	49.4	45.3	41.7	36.3	29	37.6	46.9		43.5	31.8	41.72	33.79
St Margaret's Street	11	54.9	48.1	62.4	57.9	59.2	58.4	66.9	60	56.8	54.8	59		58.04	<b>47.01</b>
St Marg St co locat	12	58	52.6	55.1	61.1		57.1	66.7	64.9	56.3	54.3	71.3	69.2	60.60	<b>49.09</b>
Bramford Road o/s No 18	13	38.7	33.6	32.6	27.4	21.2	17.4	15.2	21.8	30.6	33	27.8	31.3	27.55	22.32
Chevalier Street	14	71.4	60.1		64.6	52.8	53.4	57.4	50.9	60.2	67.3	60	49.1	58.84	<b>47.66</b>
Cornhill o/s No 17	15	37.6	38.9	24.4	28.1	24.6	21.5	21.3	25.6	29.5	34.2	36.4	33.1	29.60	23.98
Valley/Norwich Road	16	51.8	45.6		37.5	44.2	38.8	49.7	40.6	46.6	43.3	48.8	47.4	44.94	36.40

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
Woodbridge Rd o/s Atlas Hse	17	61.5	62.9	53	56	47.4	38	50	53.9	58.5	61.6	49.3	49.4	53.46	<b>43.30</b>
Yarmouth Rd o/s flat 2 No 5	18	44.1	36.1	42.1	39.5	28.5	34.8	31.9	28.6	37.3	46.2	35.4	26.3	35.90	29.08
St Marg St co locat	19	54.1	42.6	60.3	57.1	61.4	57.3	69.2	57.3	57	56.6	69.9	64.4	58.93	<b>47.74</b>
St Margaret's Plain/Fonnereau Road	20	48.6	48.3	35.9	35.8	40.3	36.8	37.8	36.9	39.5	37.9	41.4	47.8	40.58	32.87
St Margaret's Plain	21	58.6	38.3	52.3	38.2	48.2	39.4	39.9	37.9	49.1	50.7	45.9	43.1	45.13	36.56
St Margaret's Plain/Northgate St	22	47.8	51.6	50.2	51.2	42.2	37.2	41.5	47.3	47.4	52	47.7	41.7	46.48	37.65
St Margarets Green	23	33.2	31.7	31.1	29.1	23.5	23.3	23.7	25.9	27	27.5	32.8	32.2	28.42	23.02
St Margaret's Street	24	54.9	48.7	51.8	49.2	41.3	45.1	49.1	43.8	48.5	48.2	50.7	56.9	49.02	39.70
St Helen's Street	25	59.9	53.8	38.6	50.8	44.4	47.3	46	49.5	50.6	52.5	54.9	50.8	49.93	<b>40.44</b>
St Helen's St/Grimwade Street	26	46.5	38.2	42.1	33.8	38.2	30.9	37.1	36.4	39.3	49.4	33.2	33.5	38.22	30.96
St Helen's St/Argyle Street	27	33.8	47.4	48.5	38.2	37.7	39.5	43.7	40.5	49.2	50.7	44.3	49.6	43.59	35.31
Chevallier St o/s Nos 32/34	28	52.1	48.5	47.3	45.4	37.6	32.4	38.1	42.4	45.3	49.6	55.1	57.1	45.91	37.19
Fore Hamlet	29	45.7	35.3	37.4	45.1	31.2	35.3	34.1	32.5	43.7	51.3	36.2	29.7	38.13	30.88
Fore Street	30	65.7	59.4	45.3	57.6	53.5	43.2	58.8		61.4	62.2	69.8	67.1	58.55	<b>47.42</b>
Star Lane opp St Peters St	31	43	46.1	45.1	46.3	32.8	33.2	38.7	41.6	44.7	45.5	42.3	40.6	41.66	33.74
Spring Road o/s No 8	32	48	51	38.6	36.7	35.2	31.4	38.6	28.7	36.1	30.6	49.3	46.9	39.26	31.80
Key Street/Premier Inn	33	44.3	48.1	43.5	39.3	38.2		36.4	35.3	41.6	52.2	36.6	31	40.59	32.88
College Street	34	61.6	50.1	49.1	48.3	43.6	43.3	44.1	45.1	48.2	36.7	50.4	45	47.13	38.17
Cobden Place	35	40.8	38.8	33.6	32.7	22.8	26.2	30.5	30.7	31	35.6	42.4	40.1	33.77	27.35

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
Franciscan Way/Wolsey St	36	50.2	45.8	37	35.5	30.8	25.2	30.1	31	37.8	39.8	43.6	34.2	36.75	29.77
Lower Brook Street	37	38.8	36.2	34.9	28	26.2	22.7	26.1	27.4	30.5	40	31.2	27.4	30.78	24.93
Civic Drive by Drugs Centre	38		37.4	39.8	43.6	33.7	33.5	26.6	45.2	42.9	50.8	50.1	46.4	40.91	33.14
Star Lane/Fore Street	39	61.2	55.6	58.1	54.2	44	40.1	49.4	44.3	53.6	64.8	55.1	45.4	52.15	<b>42.24</b>
Norwich Road o/s No. 131	40	45.7	35.3		30.5	26.5	24.8	27.1	30.1	32.9	39.8	41.9	28.9	33.05	26.77
Norwich Road o/s No. 69	41	51.2	43.1	47.4	40.3	40.8	38.9	43.1	47.2	45.8	49.3	45	51.2	45.28	36.67
Norwich Road between 8 & 10	42	44.9	45.4	48.6	48.9	29.9	34.8	37	37.9	49.2	62.2	37.9	33	42.48	34.40
Yarmouth Rd/Bramford Road	43	57.9	50.4	54	52.6	46.9	41.7	47.4	48.9	50.5	48.8	52.8	46.1	49.83	<b>40.37</b>
Bramford Road	44	48.7	53.1	46.8	47.3	36.1	34.9	31.9	41.7	51.8	64	45.6	40.3	45.18	36.60
Chevallier Street	45	37.2	41.1	39.6	37.6	30.2	29	30	29.9	37.2	47.9	36	35.4	35.93	29.10
Chevallier Street - co locate	46	42.4	38.8	42.3	35	28.9	28.8	27.8	32.4	36.6	41.7	33.4	32.2	35.03	28.37
Chevallier Street - co locate	47	35.6	29.3	34.4	38.6	29.5	28.3	30.9	32.6	38.8	45.3	35.7	35.6	34.55	27.99
Valley Road o/s No 14	48	43.4	35.4	40.5	30.3	22.2	24	28.3	27.2	35.2	41.8	42.1	35.8	33.85	27.42
St Matthews Street	49	54.7	51.2		61.3	45.2	30	44.3	55	63.4	62.3	49.2	48.2	51.35	<b>41.59</b>
Barrack lane/St Matthews St	50	43.6	42	36.5	30.6	21.8	24.2	28.4		33.2		42	40.1	34.24	27.73
St Matthews St/Portman Rd	51	51.2	45.6	49.1	50.8	36.3	35.4	33.9	44.9	52.1	67.7	45.6	48.2	46.73	37.85
St Matthews St o/s No. 60	52	66.6	64.1	63.9	57.4	51	45.3	39.5	48.9	69.5	78.4	52.9	51.6	57.43	<b>46.51</b>
St Matthews St o/s No. 67	53	63.1	60.3	44.3	50.3	57.5	42.6	67.1	54.3	56.7	55.3	59.2	64.1	56.23	<b>45.55</b>

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
St Matthews St/Berners St	54	42.8	41	39.9	34.9	32.6	32.7	31.7	37.5	36.8	43.8	39.5	41	37.85	30.66
Berners St o/s No. 21	55	49.1	46.8	43.3	38.4	28.9	27.6	29.1	32.8	38.5	48.3	41.3	38.6	38.56	31.23
Berners St o/s No. 32	56	48.2	38	38.8	30.4	22.4	29.3	28	33.9	37.4	44	38	33.7	35.18	28.49
Berners St o/s No. 41-43	57	40.8	35.3	36.4	28.8	26.3	23.8	26.5	22.7	32.3	37.9	36.8	35.4	31.92	25.85
Berners St o/s No. 58	58	42.3	37.9	35.8	25.1	21.1		23.1	28.4	30.4	39.2	38.4	40.2	32.90	26.65
St Matthews St rbt co-locate	59	53.2	48.1	36.2	40	37.9	34.3	31.2	37.7	44.4	48.6	46.6	42.9	41.76	33.82
St Matthews St rbt co-locate	60	49.8	47.1	45.6	40	35	30.9	28.6	35	47.4	49.9	46.8	48.5	42.05	34.06
St Matthews St rbt co-locate	61	52.6	47.5	36.3	40.4	35	32.2	30.3	34.2	46.4	50.9	47.2	44.4	41.45	33.57
St Matthews St o/s No. 27	62	61.9	44.9	45.7	45.5	42.3	40.6	41	44.8	46.6	46.3	55.3	55.2	47.51	38.48
St Matthews St o/s No. 19	63	53.4	49.2	46.1	42.7	33.6	40.6	45.6	46	48.2	51.3	49.4	50.2	46.36	37.55
Norwich Rd btwn No's. 13/15	64	83.9	80.7	65.7	61.4	59.8	61	66.6	54.4	68.8	63.1	72.2	70.3	67.33	<b>54.53</b>
Norwich Rd btwn No's. 13/15	65	77.7	60.4	65.7	61	64.4	57.2	59.2	53.9	51.6	66.8	75.5	66.4	63.32	<b>51.29</b>
Woodbridge Rd o/s No 30A	66	54.4	42.3	48.3	52.2	44.8	43.3	48.6	47.4	42.8	46.7	49.6	49.6	47.50	38.48
Woodbridge Rd/Blanche St	67	44.4	34.4	37.6	36.8	23.2	21.6	26.4	33	33.7	31	36.3	42.6	33.42	27.07
Woodbridge Rd o/s No. 62	68	59.2	49.9	57.9	56	47.6	44.4	44.7	48.8	56.8	64.7	50.3	51.6	52.66	<b>42.65</b>
Argyle Street o/s Nos. 2-4	69	41.2	40.3	35.8	30.5	26	21.4	22.1	31.4	31.3	38.3	35.8	36.3	32.53	26.35

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
Argyle Street o/s No. 11	70			38.2	36	37	31.2	32.7	37.1	48.7	51.2	50.5	42.4	40.50	32.81
St Helens Street o/s No. 93	71	35.5	34.1	35.6	26.1	45	37.8	23.9		34.9	39.5	32.5	27.6	33.86	27.43
St Helens St o/s No. 125	72	62	52.4	51.7	51.2	28	21	42.3	37.3	53.2	57.4	43.3	39.3	44.93	36.39
Regent St/St Helens St	73	35.5	33.8	30	28.7	22.3	18.3	19.8	23.4	31.7	36.7	32	26	28.18	22.83
Grimwade St o/s No. 25	74	42.8	40.7	34.4	35.9	27.5	25.2	23.1	29.1	33.6	36.7	34.9	36.1	33.33	27.00
Grimwade St o/s No. 28	75	34.3	32.1	35.4	29.3	28	26.1	28.4	27	33.8	30.9	36.4	35.9	31.47	25.49
St Helens St/Grimwade St 44	76	53	50.4	46.7	51.8	43.3	39.6	42.4	43	48.7	42.5	49.4	42.1	46.08	37.32
St Helens St - Albury Ct	77	41.5	36.1	38.9	33.3	29.5	26.4	26.2	32.7	40.6	44.4	30.4	29.6	34.13	27.65
Orchard St o/s No. 7	78	40.2	28.5	32.8	24	24.5	20.3	21	23.9	28.2	33.5	40.1	38.6	29.63	24.00
Woodbridge Rd/St Helens Sch	79	42.4	48.2	38.9	38.3	33.7	29.7	32	29.7	36.4	39	35.1	34	36.45	29.52
St Helens St - County Hall	80	50	48.6	37.3	42.4	40.2	37.9	41.6	42.7	42.1	40.2	45.2	51.1	43.28	35.05
St Helens St - co-locate	81	48.6	44.8	43.6	40.8	40.8	37.2	42.4	42.1	44	39.4	45.9	50.1	43.31	35.08
St Helens St - co-locate	82	46.5	48.4	42	39.5	43.7	35.4	40.4	38.9	43.1	41.3	46.2	48	42.78	34.65
Bond Street o/s No. 29	83	39.7	42	38.3	39.5	30.2	29.8	28.9	35	36.8	44.2	38.7	39	36.84	29.84
Carr Street/Majors Corner	84	38	34.9	35.6	36.1	29.8	23.1	27.1	27.5	30.8	37.1		31	31.91	25.85

Site ID	Site ID No.	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
		Raw Data	Bias Adjusted <sup>(1)</sup>												
Old Foundry Road o/s No. 5	85	38.9	43.5	39.6	41.3	34.5	35.5	33.8	36.3	40.4	40.6	42.2	44.6	39.27	31.81

(1) See Appendix C for details on bias adjustment

A number of results have been distance corrected and reported in the table below. It is the intention that all results will be reported as distance corrected in future but due to time limitations, only those showing exceedance of the objective level and requiring the correction have been considered:

Tube Number	Bias Adjusted Result	Distance Corrected Result
2	40.84	37.9
5	41.9	<b>39.9</b>
14	47.66	<b>46.2</b>
17	43.3	38.7

25	40.44	36.0
30	47.42	<b>43.3</b>
43	40.37	<b>39.9</b>
64	54.53	<b>52.9</b>
65	51.29	<b>49.8</b>

## **Appendix C: Air Quality Monitoring Data QA/QC and Bias Adjustment Factor**

### **Air Quality Monitoring Data QA/QC**

#### **Diffusion tube preparation method**

Nitrogen dioxide diffusion tubes are supplied by Environmental Scientifics Group. The exposed tubes are analysed in accordance with Environmental Scientifics Group standard operating procedure which complies with the guidelines set out in DEFRA's 'Diffusion Tubes For Ambient NO<sub>2</sub> Monitoring: Practical Guidance'. The analysis of diffusion tube samples to determine the amount of nitrogen dioxide present on the tubes is within the scope of their UKAS schedule. Environmental Scientifics Group participates in the WASP scheme and is currently ranked as a category good laboratory.

A control tube is sent with each month's tubes.

#### **Diffusion tube bias adjustment factors**

Where possible a local bias adjustment factor is used – but this is reliant on obtaining good data capture from the local continuous monitors and on the placement of the tubes being at locations comparable to the analyser site. Where a local factor is not available, national data, which is available on the air quality review website, is used to bias adjust the diffusion tubes.

#### **QA/QC of Automatic Monitoring**

Although during 2015 Ipswich Borough Council did not carry out any automatic air quality monitoring, historically the automatic monitors are routinely calibrated every 4 weeks by an Ipswich Borough Council Environmental Protection Officer. They are audited and serviced twice a year by contractors.

All data collected from the automatic monitors is managed by external consultants to quality procedures developed under the UK National Network. The data management

processes represent best practice and fully meet the requirements set out in LAQM TG (09).

All data are screened and scaled (on the basis of site calibrations) and the final data sets presented within this report have benefited from a full process of data ratification.

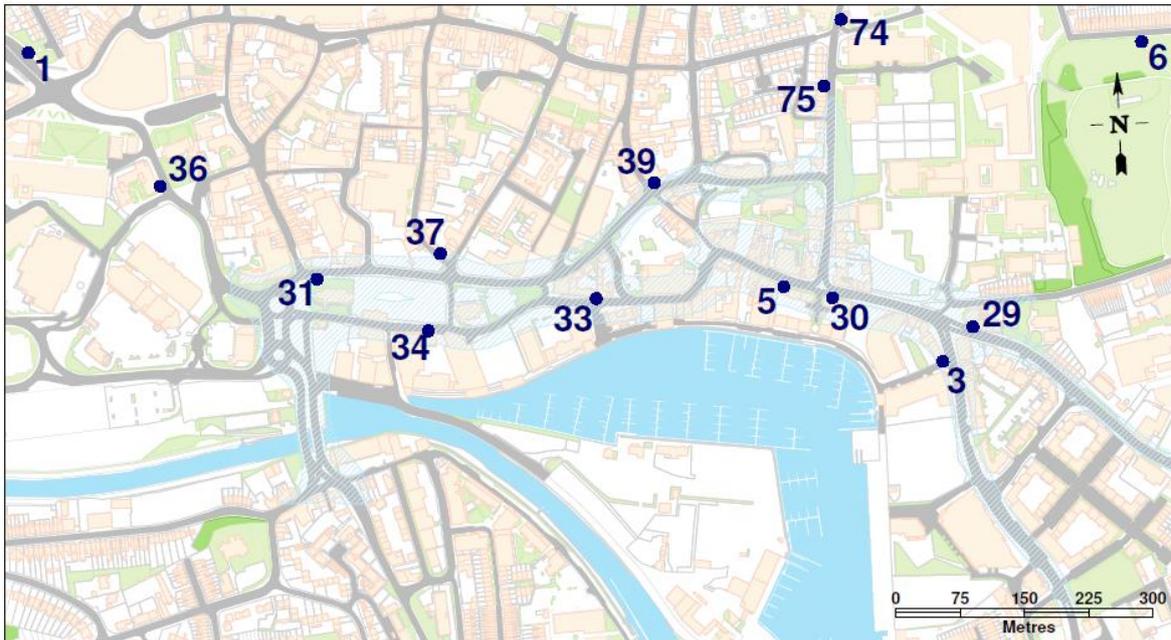
## **Bias Adjustment Factor 2015**

A bias adjustment factor was taken from the national database on the DEFRA LAQM Support website. It was not possible to use a locally derived figure due to an absence of continuous monitoring.

For the ESC Didcot laboratory, preparation method 50% TEA in acetone, for the year 2015, a bias adjustment figure of 0.81 was obtained based on 21 studies.

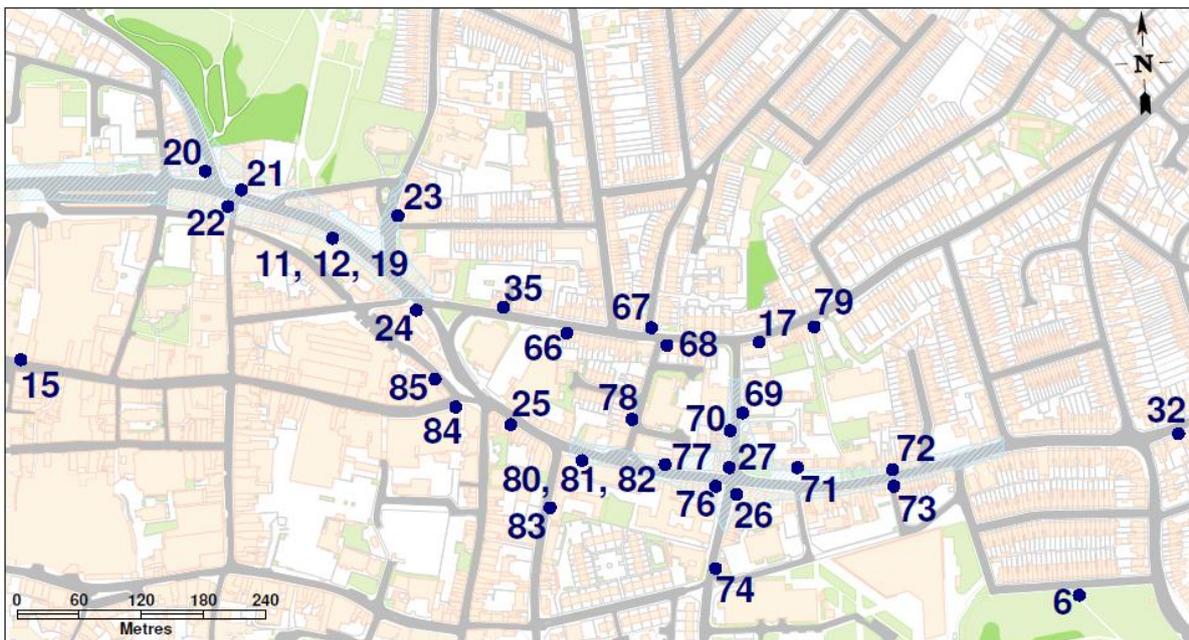


### Tube Locations 2015 Star Lane, College Street



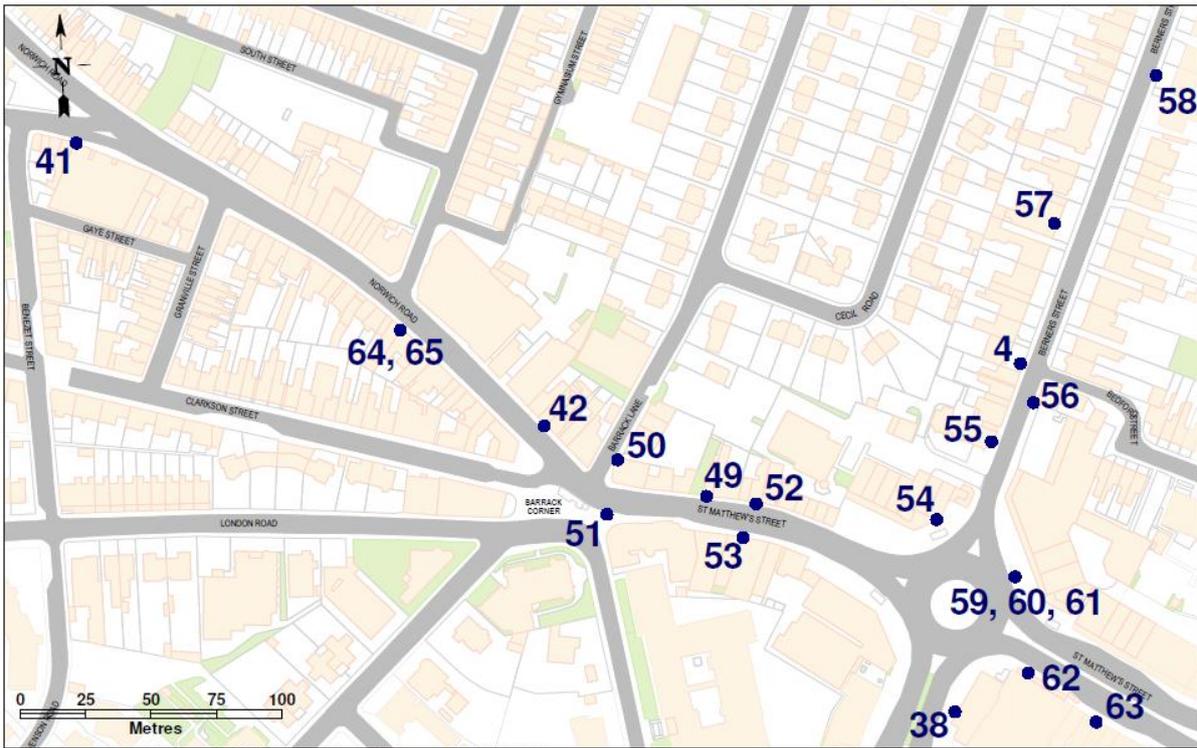
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### Tube Locations 2015 St. Margaret's Street, St. Helen's Street



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### Tube Locations 2015 - St Matthew's Street



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## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>1</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>1</sup> The units are in micrograms of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Appendix F: Long Term Trends Nitrogen Dioxide (NO<sub>2</sub>)

WSP| Parsons Brinckerhoff was commissioned by Ipswich Borough Council to undertake an air quality modelling study for the Ipswich Urban area<sup>5</sup>. The objective of the study was to indicate locations on the highway network where there is high, medium or low risk of non-compliance with current standards for air quality in relation to locations identified for future development under the Ipswich Core strategy and Policies Development Plan Document (the Ipswich Local Plan). Locations indicated to have medium to high risk can then be prioritised for further investigation and/or mitigation as appropriate.<sup>5</sup>

NO<sub>2</sub> annual average monitoring data was provided by Ipswich Borough Council for the period 2005 to 2015 inclusive. WSP| Parsons Brinckerhoff analysed the long term trends using the Mann-Kendall test to indicate whether or not the trend is statistically significant, and the Sens's method for determining the slope of the linear trend line. The data was screened to remove annual average concentrations that were based on inadequate data capture and were bias adjusted to national figures for the appropriate lab to ensure consistency between years. Sixty two sites had sufficient data capture and were in operation for 5 years. The annual average NO<sub>2</sub> concentration data for the 62 sites were then analysed using the 'MAKESENS' spreadsheet application.

At 59 of the 62 monitoring sites considered, long term trends in annual average NO<sub>2</sub> concentrations appear to have been falling, as indicated by negative Sens's slope values. Considering monitoring from 2005, in 22 cases there are statistically significant falling trends. There is some evidence for concentrations peaking around 2010. Taking data from 2009 onwards there are statistically significant falling trends at 28 sites. At three of the 62 sites there are contrary increasing trends for measurements between 2006 and 2013 at two and 2011 and 2015 at one. These trends are not statistically significant with a greater than 10% chance of the pattern in the data being random.<sup>5</sup>

<sup>5</sup> WSP| Parsons Brinckerhoff; Ipswich Core Strategy Air Quality Report; Report No 70007052-OF7; May 2016

## 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
ASL	Advanced Stop Lines
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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
UTMC	Urban Traffic Management Control