



2012 Air Quality Updating and
Screening Assessment for
Ipswich Borough Council

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

Local Authority Officer	Louise Burns
Department	Environmental Protection
Address	4 th Floor Grafton House 15-17 Russell Road Ipswich IP1 2DE
Telephone	01473 433093
e-mail	Louise.burns@ipswich.gov.uk
Report Reference number	LB/USA2012
Date	January 2013

Executive Summary

Diffusion tubes and continuous monitors located within the existing Air Quality Management Areas have shown exceedences of the nitrogen dioxide annual average objective level. There were 23 exceedences of the annual objective in 2011 within the Borough, 7 of which are currently outside of existing AQMA's. These 7 tubes were located along Woodbridge Road, around St Matthews St and on Yarmouth Road.

St Matthews St and Woodbridge Road have been subject to a detailed assessment and the results show that the objectives are being exceeded and more AQMA's will be declared. The Authority will now consider whether to merge the AQMA's in the town centre to form one large AQMA. Should this go ahead, the exact boundaries of the new AQMA will be subject to consultation with members and local residents.

The results from the diffusion tube assessment in 2011 indicated a slight decline in the majority of NO₂ levels in the Borough. This is in line with country wide trends (Air Pollution in the UK 2011). It is not possible at this stage to determine whether this will be an ongoing pattern therefore further comment will be made on the 2013 Progress Report.

Automatic monitors were used to measure PM₁₀ in the Borough at Cliff Lane, a site which is close to residential properties and upwind of potentially dusty commercial operations. AEA Consultants assessed the data and concluded that the site is unlikely to exceed the objective.

The next course of action is to submit the 2013 Progress Report.

DRAFT

Table of contents

1	Introduction	6
1.1	Description of Local Authority Area	6
1.2	Purpose of Report.....	6
1.3	Air Quality Objectives	7
1.4	Summary of Previous Review and Assessments	8
2	New Monitoring Data	15
2.1	Summary of Monitoring Undertaken	15
2.1.1	Automatic Monitoring Sites	15
2.1.2	Non-Automatic Monitoring Sites	18
2.2	Comparison of Monitoring Results with AQ Objectives	29
2.2.1	Nitrogen Dioxide	29
2.2.2	PM ₁₀	43
2.2.3	Summary of Compliance with AQS Objectives	44
3	Road Traffic Sources	45
3.1	Narrow Congested Streets with Residential Properties Close to the Kerb	45
3.2	Busy Streets Where People May Spend 1-hour or More Close to Traffic.....	45
3.3	Roads with a High Flow of Buses and/or HGVs.	46
3.4	Junctions.....	46
3.5	New Roads Constructed or Proposed Since the Last Round of R&A.....	46
3.6	Roads with Significantly Changed Traffic Flows.....	47
3.7	Bus and Coach Stations	47
4	Other Transport Sources.....	48
4.1	Airports.....	48
4.2	Railways (Diesel and Steam Trains)	48
4.2.1	Stationary Trains.....	48
4.2.2	Moving Trains	48
4.3	Ports (Shipping)	48
5	Industrial Sources.....	49
5.1	Industrial Installations	49
5.1.1	New or Proposed Installations for which an AQA has been Carried out.....	49
5.1.2	Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced.....	50
5.1.3	New or Significantly Changed Installations with No Previous Air Quality Assessment... ..	50
5.2	Major Fuel (Petrol) Storage Depots	50
5.3	Petrol Stations.....	50
5.4	Poultry Farms.....	51
6	Commercial and Domestic Sources	52
6.1	Biomass Combustion – Individual Installations	52

6.2	Biomass Combustion – Combined Impacts.....	53
6.3	Domestic Solid-Fuel Burning	53
7	Fugitive or Uncontrolled Sources.....	54
8	Conclusions and Proposed Actions.....	55
8.1	Conclusions from New Monitoring Data	55
8.2	Conclusions from Assessment of Sources	55
8.3	Proposed Actions.....	55
9	References.....	57

List of Tables

Table 1.1	Air Quality Objectives included in Regulations for the purpose of LAQM in England
Table 1.2	Summary of previous review and assessments carried out by Ipswich Borough Council
Table 2.1	Details of Automatic Monitoring Sites
Table 2.2	Details of Non-Automatic Monitoring Sites
Table 2.3	Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with <i>Annual Mean</i> Objective.
Table 2.4	Results of Automatic Monitoring for Nitrogen Dioxide: comparison with <i>1-hour mean</i> Objective.
Table 2.5	Results of Nitrogen Dioxide Diffusion Tubes in 2011
Table 2.6	Results with distance fall off applied.
Table 2.7	Results of Automatic Monitoring of PM ₁₀ : Comparison with Annual Mean Objective
Table 2.8	Results of Automatic Monitoring for PM ₁₀ : Comparison with 24-hour mean Objective

Appendices

- Appendix A: QA/QC Data
- Appendix B: DMRB Calculations
- Appendix C: Maps
- Appendix D: Annual NO₂ Trends
- Appendix E: Diffusion Tube Data

1 Introduction

1.1 Description of Local Authority Area

Ipswich is the county town of Suffolk and the fastest growing regional centre in the East of England.

It is a multi-cultural centre for business, culture, entertainment and sport, with a population of more than 130,000 and is home to University Campus Suffolk and Suffolk New College.

The main routes into and out of Ipswich are congested during typical rush hour times. Travel across Ipswich is restricted to certain routes by the River Orwell.

Transport and traffic management are key strategic priorities for the town as the Waterfront area and other areas of the town are undergoing significant redevelopment.

Continuing this economic prosperity is dependent on people being able to move around the town for work, shopping and leisure. At present a significant number of these journeys are made by car.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded.

A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004

	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Round 1

The first round of air quality review and assessment was completed in March 2001 and consisted of three stages, each reported separately and progressively looking into more detailed analysis when required;

Stage 1 comprised of an initial study to identify which pollutants required further investigation;

Stage 2 required estimating, modelling or measuring pollutants where there was an indication that national objectives would not be achieved; and

Stage 3 involved using advanced modelling techniques and emissions inventories. The final assessment (third stage report) concluded that the Air Quality Objectives would be met. There were, however, some areas of concern where levels of nitrogen dioxide from road traffic pollution were expected to be close to reaching the objective level and the need to keep these under review was recognised.

Round 2

In 2003, all local authorities were required to complete a second round of air quality reviews and assessments. The Government issued guidance to assist with this and to direct authorities on the methodology for completing the review. The first stage of the review was an Updating and Screening Assessment (USA). This was based on a checklist to identify those matters that had changed since the first review completed in 2001 and which required further assessment. The USA covered new monitoring data, new sources of pollution and other changes that affected air quality.

Ipswich Borough Council

The Council's USA, completed in December 2003, concluded that further detailed assessments of nitrogen dioxide from road traffic sources and particulate matter from an industrial source were required to determine whether air quality objectives would be exceeded in 2005. In July 2005, further detailed assessments were completed in respect of the impact of road traffic on concentrations of nitrogen dioxide in St Margaret's St, Norwich Road/Chevallier St junction and the Star Lane gyratory system/St Helen's St. The assessment was completed using a dispersion model, traffic and meteorological data and an ambient real time continuous monitor to produce concentration plots for 2005 and 2010.

The results of the detailed assessments for nitrogen dioxide indicated that the annual mean objective pollution level would be exceeded along most of the roads under study. In places, the exceedence of the 40µg/m³ annual mean standard extended 50 metres from the kerb into residential areas.

Under Section 83(1) of the Environment Act 1995, local authorities have to designate areas with a predicted exceedence of the Air Quality Objectives as Air Quality Management Areas (AQMAs). Ipswich Borough Council declared three AQMAs on the 11th of April 2006:

- *Ipswich Air Quality Management Order No 1, 2006: Norwich Road, Chevallier St and Valley Road*

This junction is located on one of the main routes into Ipswich town centre with four roads leading into a double mini roundabout (a map of the AQMA is shown in Figure 1). Generally, the area around this junction is open with some green space and buildings set back from the road. However, there is a public house (with flat above) and some residential flats that are both located adjacent to the junction. In addition, one road, Chevallier St, leading from the roundabout has terraced properties facing directly onto a pavement.

- *Ipswich Air Quality Management Order No 2, 2006: Junction of Crown St with Fonnereau Road and St Margaret's St and St Margaret's Plain*

This AQMA includes four roads all leading off each other (a map of the AQMA is shown in Figure 1). There are main traffic lights at the junction of St Margaret's St

and St Margaret's Plain and pedestrian crossing lights just beyond the junction of Crown St and Fonnereau Road. The area along St Margaret's St is partially canyoned. St Margaret's St has historically been flanked by flats on one side, and a vacant building on the other. The vacant building has recently been demolished but historic permission has been given for this to be turned into residential dwellings. There are residential buildings on all roads within the AQMA.

- *Ipswich Air Quality Management Order No 3, 2006: Star Lane gyratory system and St Helen's St/Grimwade St.*

The gyratory system is a circular network of one-way roads located next to the docks (a map of the AQMA is shown in Figure 1). There are many residential dwellings (mainly high-rise flats) within these areas and some commercial and office buildings. Further development of the Gyratory system and Dockside is ongoing, although slower in recent times. Traffic flow through many of the areas of this AQMA can be congested.

The Department for Environment, Food and Rural Affairs (DEFRA) also requires that local authorities should submit annual air quality (Progress Reports) in between three yearly USAs. This is to provide a means of ensuring that air quality review is a continuous process and act as a timely indication of the need for measures to improve air quality, rather than delaying for three years until a full review is carried out. Ipswich Borough Council completed a Progress Report in September 2005.

Round 3

The third round of review and assessment commenced in 2006 to enable local authorities to determine whether Air Quality Objectives in their areas would be met by specific target dates by means of a USA review. Ipswich Borough Council completed its USA in January 2008. The USA concluded that four of the seven prescribed pollutants were likely to meet their Air Quality Objectives and as such a Detailed Assessment was not required. However, it was found that further screening works for Benzene, Nitrogen Dioxide (NO₂) and particulates (PM₁₀) were required, as well as a Detailed Assessment of both NO₂ and PM₁₀ at the Yarmouth Road/ Bramford Road and Chevallier St Junction.

The Detailed Assessment, recommended in the USA, was completed in draft in

December 2009 and finalised August 2010, and concluded that there were likely to be exceedences of the annual mean NO₂ objective at this location. It was unlikely that the hourly objective will be exceeded. The predicted exceedences of the annual mean objective can be attributed to slow moving vehicles, congestion and queuing traffic.

A new AQMA was declared in December 2010 and is shown on figure 1:

- *Ipswich Air Quality Management Order No. 4, 2010: Bramford Road/Yarmouth Road/Chevallier St junction.*

For the pollutant PM₁₀, modelling indicated a very unlikely risk of exceeding the annual mean PM₁₀ objective in the base year and the future year of 2010.

The screening works resulting from the round 3 USA have been completed as part of round 4 USA. At the advice of DEFRA, the information usually included in a progress report has also been incorporated into the round 4 document.

Round 4

The fourth and current round of review and assessment began in 2009. The USA was completed in January 2010. The USA concluded that five of the seven prescribed pollutants were likely to meet the Air Quality Objectives. However, it was found that a Detailed Assessment for NO₂ was required for the Civic Drive/St Matthews St junction and St Helens St, along with a Detailed Assessment of both NO₂ and PM₁₀ at a Biomass Boiler on Nacton Road. The Detailed Assessment of NO₂ and PM₁₀ at a Biomass Boiler on Nacton Road was completed in September 2011 and concluded that there was no need for any further assessments of this process. Further screening for NO₂ and PM₁₀ at the Reg Driver Centre, Christchurch Park was also required and was reported in the 2010 Progress Report which was completed in October 2010. It was found that the emissions rates from the Reg Driver Centre were well below those requiring further investigation or screening.

The 2011 Progress Report highlighted a small number of locations outside of the existing Air Quality Management Areas, all of which are under investigation as part of ongoing assessments or very close to an Air Quality Management Area boundary where they will be reviewed as part of a Further Assessment.

Particulate monitoring in the Borough showed no exceedences of the PM₁₀ objectives over the course of 2010.

The detailed assessment of St Matthews Street round about area in 2010 indicated that concentrations of nitrogen dioxide are above air quality objective values along parts of St Matthews’s Street either side of the Civic Drive Roundabout.

Based on this detailed assessment and review of the monitoring data within the areas under assessment it is concluded that specific areas along St Matthew’s either side of the roundabout be declared as Air Quality Management Areas. Similarly, a detailed assessment undertaken in 2010 indicated that concentrations of nitrogen dioxide are above air quality objective values along parts of St Helen’s Street and Woodbridge Road. Based on this detailed assessment and review of the monitoring data within the areas under assessment it is concluded that further areas along St Helen’s Street and Woodbridge Road be declared as Air Quality Management Areas.

Summary

The various stages of the previous review and assessments are summarised in Table 1.2.

Table 1.2 Summary of previous review and assessments carried out by Ipswich Borough Council

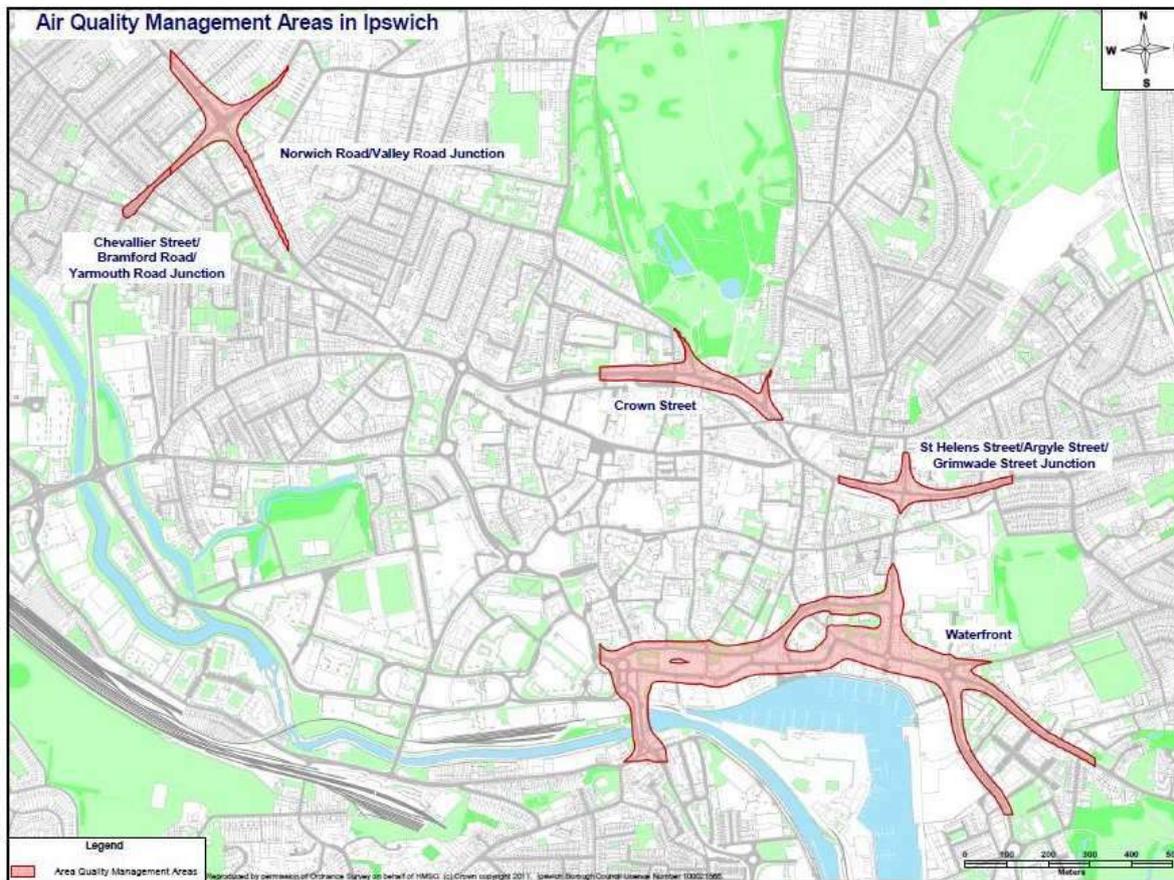
Round	Date	Type of Assessment	Outcome/Conclusion
1	March 2001	Final assessment	Predicted that the Air Quality Objectives would be met. Areas of concern where levels of nitrogen dioxide from road traffic pollution were expected to be close to reaching the objective level were kept under review.
2	December 2003	Updating and Screening Assessment	Concluded that further detailed assessments of nitrogen dioxide from road traffic sources and particulate matter from an industrial source was required to determine whether Air Quality Objectives would be exceeded in 2005.
	July 2005	Detailed Assessment	Concluded that the annual mean objective pollution level would be exceeded along most of the roads under study
	April 2006		Declaration of 3 Air Quality Management Areas.
3	January 2008	Updating and Screening Assessment	Concluded that four of the seven prescribed pollutants were likely to meet their Air Quality Objectives and as such a Detailed Assessment was not required. Recommended further screening works for Benzene, Nitrogen Dioxide (NO ₂) and particulates (PM ₁₀) and a Detailed Assessment of both NO ₂ and PM ₁₀ at the Yarmouth Road/ Bramford Road and Chevallier St Junction.

Ipswich Borough Council

	January 2008	Further Assessment	Data included in the 2009 Updating and Screening Report as requested by Defra
	September 2008	AQ Action Plan	
4	January 2010	Updating and Screening Assessment	Concluded that a Detailed Assessment for nitrogen dioxide is required at St-Matthew's St and St-Helen's St. A Detailed Assessment was also required for a 2.90MW biomass combustion plant on Nacton Road for particulate matter with consideration given to nitrogen dioxide. Particulate matter and nitrogen dioxide emissions from the Reg Driver Centre, Christchurch Park, Ipswich also required further screening work.
	August 2010	Detailed Assessment - Yarmouth Road	Concluded that there were likely to be exceedences of the annual mean NO ₂ objective at this location
	October 2010	Progress Report	Further investigation of emissions of particulate matter and nitrogen dioxide emissions from the Reg Driver Centre, Christchurch Park, Ipswich concluded that they are well below those requiring further investigation or screening. Particulate monitoring at one location within the borough shows no exceedences of the objective levels. Six new or previously unidentified local developments were acknowledged as requiring further investigation during the next USA, scheduled for 2012.
	December 2010		Declaration of AQMA – Bramford Road/Chevallier St junction
	January 2011	Progress Report	Small number of locations outside of the existing AQMA identified, all of which are under investigation as part of ongoing assessments or very close to an AQMA where they will be reviewed as part of a Further Assessment. Particulate monitoring in the Borough showed no exceedences of the PM ₁₀ objectives over the course of 2010.
	September 2011	Detailed Assessment	NO ₂ and PM ₁₀ at a Biomass Boiler on Nacton Road – concluded no exceedences of objective levels.
	August 2012	Detailed Assessment - St Matthews Street	It is concluded that specific areas along St Matthew's either side of the roundabout be declared as Air Quality Management Areas.
	August	Detailed	It is concluded that specific areas along St

	2012	Assessment - St Helen's Street	Helen's St and Woodbridge Road be declared as Air Quality Management Areas.
--	------	--------------------------------	---

Figure 1.1 Map of AQMA Boundaries



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

The data considered in this USA related to monitoring results obtained in for 2011. Results from previous years monitoring have been considered in the relevant Progress Report for that year.

2.1.1 Automatic Monitoring Sites

Ipswich Borough Council runs three Automatic Monitoring Stations. All three stations monitor Nitrogen Dioxide concentrations, and one monitors particulates (PM10). All three monitors were located within AQMAs until November 2010 when the Star Lane/Angel Lane monitor was relocated to a residential area outside of the AQMA [Cliff Lane]. Cliff Lane School playground was chosen for the siting of the monitor for two reasons:

1. The Star Lane/Angel lane monitoring results did not indicate a breach of the particulate objectives so it was deemed useful to test another residential area not within an AQMA. This site did exceed the objectives for NO₂ however and is part of an existing AQMA.
2. Cliff Lane School is situated in a downwind position from the port where potentially dusty operations take place. Complaints had been received over the last 2 years relating to dust from activities at the port. The area was therefore monitored to determine whether there is likely to be a breach of the objectives.

Suffolk County Council also runs a continuous monitor in Star Lane (monitoring Nitrogen Dioxide) that is intended to support the proposed Urban Traffic Management Control System (UTMC). Ipswich Borough Council provides the support to the Suffolk County council machine on the routine calibration visits.

Appendix A summarises frequency of calibrations, site audits and data validation and ratification procedures.

Figure 2.1 Map(s) of Automatic Monitoring Sites

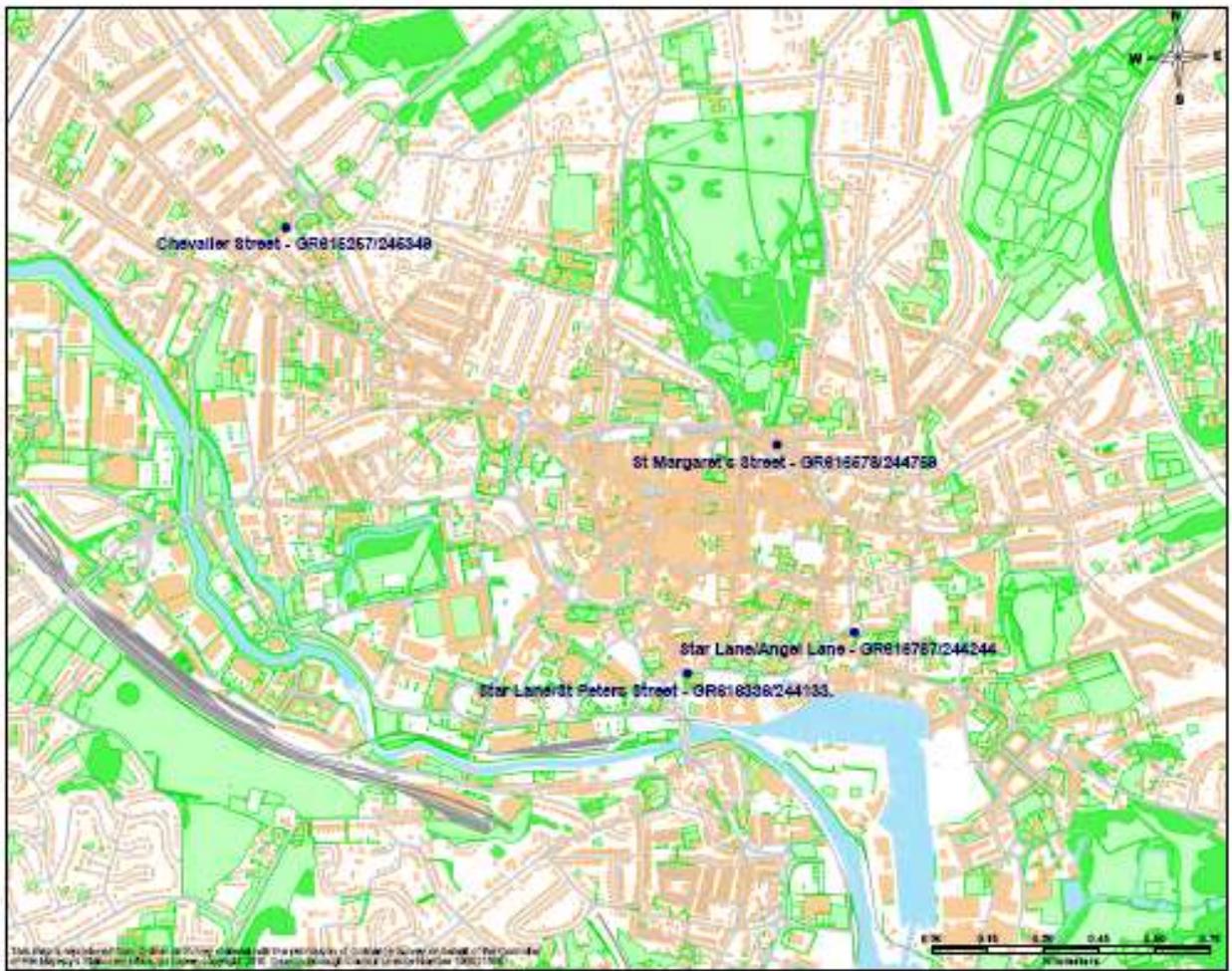


Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Chevallier St	Urban Roadside	615257	245349	NO2	Y	Y (next door residential properties equal distance from kerb, approx 2.5m)	2.5m	yes
St. Margaret's St	Urban Roadside	616578	244759	NO2	Y	Y (sited immediately adjacent to residential property 3m)	3m	yes
Star Lane/opp St Peters St	Urban Roadside	616336	244133	NO2	Y	N (placed alongside proposed development areas within AQMA). Hotel across road.	2.5m	Yes. Located on footpath near heavily used road which has frequent congestion.
Cliff Lane Primary School	Urban Background	617512	617512	NO2 and PM10	N	Y (in playground of school in residential area)	42m	No

2.1.2 Non-Automatic Monitoring Sites

During 2011, Ipswich Borough Council carried out non-automatic monitoring of NO₂ using diffusion tubes located in 74 different sites in the borough. 93 diffusion tubes monitor kerbside and roadside concentrations of NO₂ and 2 diffusion tubes monitor background concentrations of NO₂. Some of the tube locations were revised part way through the year and as such limited results have been obtained for 2011. Only the results for those sites with over 9 months worth of data have been included in this report. The results from the other monitoring locations will be listed in future reports.

During 2011 the tubes were supplied to Ipswich Borough Council from Environmental Scientifics Group. The preparation method was 50% TEA in Acetone. A summary of the QA/QC information is reported in Appendix A.

The bias adjustment figure applied to the most of the diffusion tube results is a local factor of 0.82, this has been based on Chevallier St and was thought to be more representative of the local situation than the national figure. Three sites were considered to be in an urban background location and therefore the bias adjustment used was 0.89 which was based on Cliff Lane.

A national co-location study gives a bias adjustment factor of 0.84. The application of which has no significant effect on the results of the tubes when comparing to the objective of 40ug/m³.

Maps of all diffusion tube sites can be found at Appendix C

Detail of all diffusion tube results can be found at Appendix E

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Tube No	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure?	Estimated distance of diffusion tube to kerb of nearest road	Worst-case Location?
Civic Drive	1	Urban Roadside	615999/244399	NO ₂	N	Yes. Residential properties located equal distance from kerb.	3.8m	Y
Chevallier St o/s no. 6&8	2	Urban Roadside	615142/245242	NO ₂	Y	Yes. On façade of property	1.7m	Y
Dock St	3	Urban Roadside	616379/243894	NO ₂	Y	Yes. Residential properties located approximately 4.6m from kerb.	2.8m	Y
Berners St o/s No.31	4	Urban Roadside	615923/244923	NO ₂	N	Yes. Residential properties located 1.7m from kerb.	1.7m	Y
Fore St	5	Urban Roadside	616860/244147	NO ₂	Y	No.	1.7m	Y
Kings Avenue	6	Urban Background	617299/244412	NO ₂	N	Located in park as background reading.	14.6m	N/A
Nacton Road [Jan- Aug]	7	Urban Roadside	618974/242291	NO ₂	N	Yes. Residential properties located approximately 8.5m from kerb.	3.8m	Y
Bramford Rd [Sept-Dec]	7	Urban Roadside	615004/245237	NO ₂	N	Yes. Residential downpipe attached to no. 205	3m	Y
Nacton Rd/A14 junct [Jan- Aug]	8	Suburban	620078/241263	NO ₂	N	Yes. Residential properties located approximately 35.8m from the kerb.	30.3m	Y

122 Bramford Rd [Sept-Dec]	8	Urban Roadside	615133/245201	NO ₂	N	Yes. Residential properties 3 m from kerb	1.5m	Y
Nacton Rd/A14 junc. [Jan- Aug]	9	Suburban	620078/241263	NO ₂	N	Yes. Residential properties located approximately 35.8m from the kerb.	30.3m	Y
122 Bramford Rd [Sept-Dec]	9	Urban Roadside	615133/245201	NO ₂	N	Yes. Residential properties 3 m from kerb	1.5m	Y
122 Bramford Rd [Sept-Dec]	9	Urban Roadside	615133/245201	NO ₂	N	Yes. Residential properties 3 m from kerb	1.5m	Y
Woodbridge Rd East [Jan- Aug]	10	Suburban	619294/245109	NO ₂	N	Yes. Residential properties located approximately 12m from the kerb.	10.2m	Y
St Margaret's St, Pipers Court	11	Urban Roadside	616578/244759	NO ₂	Y	Yes. Residential properties located approximately 2.2m from kerb.	2.2m	Y
St Margaret's St, Pipers Court co- location	12	Urban Roadside	616578/244759	NO ₂	Y	Yes. Residential properties located approximately 2.2m from kerb.	2.2m	Y
Valley/Norwich Road	13	Urban Roadside	615361/245436	NO ₂	Y	Yes. Residential approximately 5.5m from the kerb.	2.9m	Y
Chevallier St, outside number 63	14	Urban Roadside	615283/245391	NO ₂	Y	Yes. Residential properties located approximately 2.6m from kerb.	2.6m	Y
Tavern St	15	Urban Centre background	616277/244641	NO ₂	N	Yes (background). Shops located approximately 0.5m from kerb. Pedestrian-only road with limited traffic	On pedestrianised street	N/A

						flow in the morning and evening for loading and unloading.		
Valley/Norwich Road	16	Urban Roadside	615361/245436	NO ₂	Y	Yes. Residential properties located approximately 2.6m from the kerb.	2.9m	Y
Chevallier St, outside number 63	17	Urban Roadside	615283/245391	NO ₂	Y	Yes. Residential properties located approximately 2.6m from kerb.	2.6m	Y
Norwich/Blenheim Road [Jan-Aug]	18	Urban Roadside	615269/245460	NO ₂	Y	Yes. Residential properties located approximately 3.2m from kerb.	1.5m	Y
5 Yarmouth Rd [Sept-Dec]	18	Urban Roadside	615092/245177	NO ₂	N	Yes. Residential property located 2m from kerb.	2m	Y
St Margaret's St, Pipers Court co-location	19	Urban Roadside	616578/244759	NO ₂	Y	Yes. Residential properties located approximately 2.2m from kerb.	2.2m	Y
St Margaret's Plain/Fonnereau Road	20	Urban Roadside	616455/244824	NO ₂	Y	Yes. Flats and shops located approximately 2.2m from kerb.	2.2m	Y
St Margaret's Plain	21	Urban Roadside	616490/244806	NO ₂	Y	Yes. Residential located approximately 1.7m from kerb, 9m down road from tube.	1.7m	Y
St Margaret's Plain/Northgate St	22	Urban Roadside	616477/244790	NO ₂	Y	Yes. Public house located approximately 1.5m from kerb.	1.6m	Y
St Margaret's Green/ St	23	Urban Roadside	616641/244781	NO ₂	Y	Yes. Residential properties located	3m	Y

Margaret's St						approximately 3m from kerb.		
St Margaret's St	24	Urban Roadside	616659/244689	NO ₂	Y	Yes. Residential properties located 3.2m from kerb o/s no.33	3.3m	Y
St Helen's St	25	Urban Roadside	616750/244578	NO ₂	N	Yes. Flats located approximately 2.2m from kerb.	1.3m	Y
St Helen's St/Grimwade St	26	Urban Roadside	616968/244510	NO ₂	Y	Yes. Residential properties located approximately 3.6m from kerb.	3.6m	Y
St Helen's St/Argyle St	27	Urban Roadside	616961/244536	NO ₂	Y	Yes. Flats located approximately 1.7m from kerb.	1.5m	Y
St Helen's St/Dove Street [Jan-Aug]	28	Urban Roadside	617023/244508	NO ₂	Y	Yes. Public house and flats located approximately 1.9m from kerb.	1.5m	Y
32/34 Chevallier St [Sept-Dec]	28	Urban Roadside	615192/245289	NO ₂	Y	Yes. Residential properties located approximately 3m from kerb	1.5m	
Fore Hamlet	29	Urban Roadside	617102/244077	NO ₂	Y	Yes. Flats located approximately 2.2m from kerb.	2.2m	Y
Fore St	30	Urban Roadside	616963/244106	NO ₂	Y	Yes. Flats located approximately 7.7m from kerb.	4m	Y
Star Lane (opp St Peters St)	31	Urban Roadside	616336/244133	NO ₂	Y	No. Hotel located across road. Proposed development sites in area.	2.4m	N
Star Lane (opp St Peters St)	32	Urban Roadside	616336/244133	NO ₂	Y	No. Hotel located across road.	2.4m	N

						Proposed development sites in area.		
Star Lane (opp St Peters St)	33	Urban Roadside	616336/244133	NO ₂	Y	No. Hotel located across road. Proposed development sites in area.	2.4m	N
College St	34	Urban Roadside	616466/244072	NO ₂	Y	Yes. Residential properties located 1.7m from kerb.	1.7m	Y
Cobden Place	35	Urban Roadside	616743/244692	NO ₂	Y	Yes. Residential properties located 1.1m from kerb.	5.5m	Y
Franciscan Way/Wolsey St	36	Urban Roadside	616153/244242	NO ₂	N	Yes. Residential properties located 1.85m from kerb.	1.9m	Y
Lower Brook St	37	Urban Roadside	616480/244163	NO ₂	Y	No. Offices located 3.5m from kerb.	2.8m	Y
Civic Drive by Victoria PH [Jan-Aug]	38	Urban Roadside	615898/244789	NO ₂	N	Yes. Residential properties located 7.2m from kerb.	1m	Y
Civic Drive opp no.1 [Sept-Dec]	38	Urban Roadside	615910/244822	NO ₂	N	Road sign o/s drug rehab centre	1.5m	Y
Star Lane/Fore St	39	Urban Kerbside	616730/244246	NO ₂	Y	No.	0.6m	Y
Cliff Lane	40	Urban Roadside	617531/243134	NO ₂	Y	Y (in playground of school in residential area)	42m	N
Cliff Lane	41	Urban Roadside	617531/243134	NO ₂	Y	Y (in playground of school in residential area)	42m	N

Cliff lane	42	Urban Roadside	617531/243134	NO ₂	Y	Y (in playground of school in residential area)	42m	N
Yarmouth Rd/Bramford Rd	43	Urban Roadside	615107/245197	NO ₂	N	Yes. Residential properties located approximately 4.8m from kerb.	3.8m	Y
Bramford Road	44	Urban Roadside	615049/245234	NO ₂	N	Yes. Residential properties located approximately 1.4m from kerb.	1.4m	Y
Chevallier St, Wellington Centre	45	Urban Roadside	615257/245349	NO ₂	Y	Yes. Residential properties short distance along road 6.4m from kerb.	4.1m	Y
Chevallier St, Wellington Centre co-location	46	Urban Roadside	615257/245349	NO ₂	Y	Yes. Residential properties short distance along road 6.4m from kerb	4.1m	Y
Chevallier St, Wellington Centre co-location	47	Urban Roadside	615257/245349	NO ₂	Y	Yes. Residential properties short distance along road 6.4m from kerb.	4.1m	Y
Norwich Rd/Anglesea Road	48	Urban Roadside	615397/245337	NO ₂	Y	Yes. Residential located approximately 1.8m from kerb.	1.8m	Y
St Matthews St	49	Urban Roadside	615803/244872	NO ₂	N	Yes. Residential properties located approximately 1.9m from kerb.	1.8m	Y
Barrack Lane/St Matthews St	50	Urban Roadside	615758/244885	NO ₂	N	Yes. Residential above shops, on post 2m from receptor	7m	Y
St Matthews	51	Urban	615765/244865	NO ₂	N	Yes. Residential	0.9m	Y

St/Portman Rd		Kerbside				Lamp post 650 located 5.4m from receptor		
St Matthews St	52	Urban Roadside	615822/244869	NO ₂	N	Yes. Residential above shops Downpipe o/s no.60 located 2.26m from receptor	2.14m	Y
St Matthews St	53	Urban Roadside	615817/244856	NO ₂	N	Yes. Residential above shops Downpipe o/s no.67 Located 2.15m from receptor	2.15m	Y
St Matthews St/Berners St	54	Urban Roadside	615891/244863	NO ₂	N	Yes. Residential above shops	8.95 m	Y
Berners St	55	Urban Roadside	615912/244893	NO ₂	N	Yes. Residential Downpipe no.21 located 2.4m from receptor	2.25m	Y
Berners St	56	Urban Roadside	615928/244908	NO ₂	N	No.Hotel 1.6m from receptor Downpipe no32 Grosvener	1.42m	Y
Berners St	57	Urban Roadside	615936/244977	NO ₂	N	No. Hotel downpipe 41-43 Carlton	8m	Y
Berners St	58	Urban Roadside	615975/245034	NO ₂	N	Yes. Residential Street lamp A779 o/s no.58 located 5m from receptor	4.1m	Y
St. Matthews St Roundabout	59	Urban Roadside	615921/244841	NO ₂	N	No. Shop 12.7m to receptor Sign o/s no.26	2.8m	Y
St. Matthews St Roundabout	60	Urban Roadside	615921/244841	NO ₂	N	No. Shop 12.7m to receptor Sign o/s no.26	2.8m	Y

Ipswich Borough Council

St. Matthews St Roundabout	61	Urban Roadside	615921/244841	NO ₂	N	No. Shop 12.7m to receptor Sign o/s no.26	2.8m	Y
St. Matthews St	62	Urban Roadside	615926/244804	NO ₂	N	No. Offices above shop located 6.7m to receptor Signpost o/s Iceland	1.8m	Y
St Matthews St o/s no. 17	63	Urban Roadside	615955/244783	NO ₂	N	No. Offices above shop located 3.4m to receptor Downpipe no.19	3.4m	Y
St Georges St/St Matthews St	64	Urban Kerbside	616006/244798	NO ₂	N	No. Offices above shop located 1m to receptor Road sign	0.97m	Y
St Georges St/St Matthews St	65	Urban Kerbside	616006/244798	NO ₂	N	No. Offices above shop located 1m to receptor Road sign	0.93m	Y
30 Woodbridge Rd	66	Urban Roadside	616804/244667	NO ₂	N	Yes. Façade of residential property no.30A	3.5m	Y
Woodbridge Rd/Blanch St	67	Urban Roadside	616886/244672	NO ₂	N	Yes. Residential lamp post 6.8m to receptor	1.3m	Y
62 Woodbridge Rd	68	Urban Roadside	616901/244655	NO ₂	N	Yes. Residential above shop on downpipe at no.62	3.2m	Y
Argyle St	69	Urban Roadside	616974/244589	NO ₂	Y	Yes. Residential on downpipe garage o/s Nos. 2-4	4.5m	Y
Argyle St	70	Urban	616962/244572	NO ₂	Y	Yes. Residential	1.2m	Y

		Roadside				Lamp post 716 o/s no.11		
St. Helens St	71	Urban Roadside	617027/244536	NO ₂	Y	Yes. Downpipe attached to IBH Flat no.93	1.5m	Y
St. Helens St	72	Urban Roadside	617119/244534	NO ₂	Y	Yes. Downpipe No.125	1.5m	Y
Regent St/St Helens St	73	Urban Roadside	617120/244518	NO ₂	Y	Lamp post A3175	1m	Y
Grimwade St	74	Urban Roadside	616948/244438	NO ₂	N	Yes.Downpipe o/s No. 25	3m	Y
Grimwade St	75	Urban Roadside	616928/244360	NO ₂	N	Yes.Downpipe at façade of residential property	3.15m	Y
St Helen's St/Grimwade St	76	Urban Roadside	616948/244518	NO ₂	Y	Downpipe o/s No.44	3m	Y
St Helen's St	77	Urban Roadside	616899/244539	NO ₂	Y	Downpipe o/s No.41 Albury court	1.5m	Y
Orchard St	78	Urban Roadside	616867/244583	NO ₂	Y	Yes. Lamp post o/s no.7	1.4m	Y
Orchard St	78	Urban Roadside	616867/244583	NO ₂	Y	Yes. Lamp post o/s no.7	1.4m	Y
St Helen's St	80	Urban Roadside	616819/244543	NO ₂	Y	No. Empty commercial property. Downpipe entrance county hall	2m	Y
St Helen's St	80	Urban Roadside	616819/244543	NO ₂	Y	No. Empty commercial property. Downpipe entrance county hall	2m	Y
St Helen's St	80	Urban Roadside	616819/244543	NO ₂	Y	No. Empty commercial property. Downpipe entrance county hall	2m	Y

Bond St	83	Urban Roadside	616788/244497	NO ₂	N	Yes. Road Sign no.345 o/s no.29	1.65m	Y
Carr St/Majors Corner	84	Urban Kerbside	616697/244595	NO ₂	N	No. commercial	0.5m	Y
Old Foundry Rd	85	Urban Roadside	616677/244622	NO ₂	N	Yes, Residential on Pole A1640 o/s no.5	1.4m	Y
Bramford Road o/s No 170 [Jan-Aug]	86	Urban Roadside	615004/245257	NO ₂	N	Yes. Downpipe at no.170	1.6m	Y
Bramford Road o/s No 205	87	Urban Roadside	615004/245237	NO ₂	N	Yes, façade of residential property	4.3m	Y
Yarmouth Rd o/s flat 2 No 5	88	Urban Roadside	615092/245137	NO ₂	Y	Yes, façade of residential property	7.6m	Y
Bramford Road o/s No 122	89	Urban Roadside	615133/245201	NO ₂	N	Yes, 3m from façade of residential property	1.6m	Y
Bramford Rd - Co locate	90	Urban Roadside	615133/245201	NO ₂	N	Yes, 3m from façade of residential property	1.6m	Y
Bramford Rd - Co locate	91	Urban Roadside	615133/245201	NO ₂	N	Yes, 3m from façade of residential property	1.6m	Y
Chevallier St o/s Nos 32/34	92	Urban Roadside	615192/245289	NO ₂	Y	Yes, 1.9m from façade of residential property	1.9m	Y
Waterloo Rd/Chevallier St 43 [Jan-Aug]	93	Urban Roadside	615200/245319	NO ₂	Y	Yes, 1m from façade of residential property	0.5m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

In 2010 and 2011, Ipswich Borough Council monitored NO₂ using automatic and non-automatic equipment.

2.2.1 Nitrogen Dioxide

The Government's Air Quality Objectives for NO₂ are:

- An annual mean concentration of 40ug/m³. This objective was to be achieved by the end of 2005;
- A 1-hour mean of 200ug/m³, not to be exceeded more than 18 times in a year. This objective was to be achieved by the end of 2005.

The first Air Quality Daughter Directive also sets limit values for nitrogen dioxide, which have been transposed into UK legislation. The Directive includes:

- An annual mean limit value of 40ug/m³ to be achieved by 1 January 2010.
- A 1-hour limit value of 200ug/m³, not to be exceeded more than 18 times in a year, to be achieved by 1 January 2010.

Updated total NO_x emissions estimates for 2010 showed that road transport accounted for the largest proportion (33.5%) of total UK NO_x emissions (Figure 1). Energy industries remained the second largest contributor. Road transport emissions have declined significantly since peaking in 1990 as a consequence of various policy measures, with total emissions reducing by 65% between 1990 and 2010. Further reductions are expected in future years.

Emissions from industrial sources have also declined significantly, due to the fitting of low NO_x burners, and the increased use of natural gas plant. Industrial sources generally make a small contribution to ground level NO₂ levels, although breaches of the hourly NO₂ objective may occur under rare meteorological conditions due to emissions from these sources.

The annual mean objective of 40µg/m³ is currently widely exceeded at roadside sites throughout the UK, with exceedences also reported at urban background locations in major conurbations. The number of exceedences of the 1-hour objective show considerable year-to-year variation, driven by meteorological conditions, which give rise to winter episodes of poor dispersion and summer oxidant episodes.

Monitoring data for 2011 indicate that the mandatory EU limit value was exceeded at many urban background sites in London, and at roadside locations in other cities throughout the UK.

Automatic Monitoring Data

The annual average objective was exceeded at two of the four automatic monitoring stations in 2011. The trend in the annual mean nitrogen dioxide concentration generally appears to be decreasing across all monitoring sites. However two of the sites recorded a single exceedence of the hourly mean.

Chevallier St

The monitor at Chevallier Street recorded no exceedence of the 40 $\mu\text{g}/\text{m}^3$ annual mean NO_2 objective and only 1 exceedence of the Hourly Mean (200 $\mu\text{g}/\text{m}^3$) in 2011 although the data capture for the year was only 83.2%. The consultant commissioned to undertake the data ratification explained that there was a combination of power cuts, air conditioning issues, and instrument faults that contributed to reducing valid data capture for the year.

The consultant [AEA] has confirmed however that the site is unlikely to exceed the daily objective ($>200\mu\text{g}/\text{m}^3$ more than 18 times a year) as the 99.8 percentile for the daily NO_2 mean is $143\mu\text{g}/\text{m}^3$, i.e. below the objective.

Chevallier St is within an AQMA, the boundaries of which will be reviewed as part of the ongoing consideration of the AQMA's in Ipswich.

Cliff Lane

The monitoring results show very low results for 2011, there are no concerns regarding the NO_2 levels in this location. This monitoring station has since been decommissioned.

St. Margaret's St [Pipers Court]

There was a $1\mu\text{g}/\text{m}^3$ drop in the annual average NO_2 result from 2011 compared to 2010 at this site. Whilst the $1\mu\text{g}/\text{m}^3$ drop is relatively insignificant, it could be partially attributed to the fact that a nearby tall garage building was demolished in April 2011, thereby opening out the area. Generally speaking however, the NO_2 levels at this

site have increased dramatically since 2007 with a year on year increase until 2011. The 2007 results were $42\mu\text{g}/\text{m}^3$ compared to $51\mu\text{g}/\text{m}^3$ in 2010 which is a steep rise.

Star Lane

Very good data capture for this year allows us to suggest with some confidence that the average levels are reducing in this location with a drop from $51.3\mu\text{g}/\text{m}^3$ to $48.6\mu\text{g}/\text{m}^3$. This is a vast improvement following the jump of $10\mu\text{g}/\text{m}^3$ from 2009 to 2010.

Table 2.3 gives the Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with *Annual Mean* Objective.

Table 2.4 gives the Results of Automatic Monitoring for Nitrogen Dioxide: comparison with *1-hour mean* Objective.

Table 2.3 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring % ^a	Valid Data Capture 2011 % ^b	Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
					2007* ^c	2008* ^c	2009* ^c	2010* ^c	2011 ^c
Chevallier St	Urban Roadside	Y	n/a	83.2	32	31	32	34	31
Cliff lane	Urban Roadside	Y	86.8	80	-	-	-	-	21
St. Margaret's St [Pipers Court]	Urban Roadside	Y	n/a	98.8	43	46	48	51	50
Star Lane	Urban Roadside	Y	n/a	99	-	-	41.6	51.3	48.6

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.

*Annual mean concentrations for previous years are optional.

Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring % ^a	Valid Data Capture 2011 % ^b	Number of Exceedences of Hourly Mean (200 µg/m ³)				
					2007* ^c	2008* ^c	2009* ^c	2010* ^c	2011 ^c
Chevallier St	Urban Roadside	Y	n/a	83.2	-	0	3	0	1
Cliff lane	Urban Roadside	Y	86.8	80	-	-	-	-	0
St. Margaret's St [Pipers Court]	Urban Roadside	Y	n/a	98.8	-	0	0	0	1
Star Lane	Urban Roadside	Y	n/a	99	-	0	1	0	0

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c If the period of valid data is less than 90%, include the 99.8th percentile of hourly means in brackets

*Number of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

The results of diffusion tube monitoring in 2011 is detailed in Table 2.5. Tubes with only 3 months data capture have not been commented on in the USA but will be considered in the 2013 Progress Report.

There were 23 exceedences of the annual objective in 2011 within the Borough, 8 of which are currently outside of existing AQMA's. These sites are discussed further below:

Yarmouth Road/Bramford Road 1 tube

This tube [no.43] is currently on the border of an AQMA at a very busy junction. The 2011 results show an exceedence of the objective at this point ($41.1\mu\text{g}/\text{m}^3$). The objective was also exceeded in the years 2009-2010. As a consequence of this, further tubes were positioned at 122 Bramford Road, which is approximately 100ft away from the original tube. The results of these three co-located tubes do not exceed the objective of $40(\mu\text{g}/\text{m}^3)$. [tube nos.89-91 in table 2.5]. The result is also further reduced once the fall off for distance is calculated.

There is no requirement to undertake a detailed assessment in this area.

St Matthews Street 5 tubes in various locations along street.

This area has been subject to a Detailed Assessment which was submitted in 2012. The results of which indicated that concentrations of nitrogen dioxide were above air quality objective values along parts of St Matthews's Street either side of the Civic Drive Roundabout and that an **AQMA shall be declared**.

30 and 62 Woodbridge Road 2 tubes

In 2010, two new diffusion tubes were placed in relevant exposure points at 30 and 62 Woodbridge Road. Results from the last three years have shown exceedences of the national objective for NO^2 at these locations. This area has been subject to a Detailed Assessment which was submitted in 2012. The results of which indicated that concentrations of nitrogen dioxide were above air quality objective values and that an **AQMA shall be declared**.

Fall off with distance calculations have been applied to three of the results [table 2.6]

Table 2.6 Results with distance fall off applied.

Tube ID & Location	Distance from kerb to receptor	Distance from kerb to tube	Measured Result ug/m ³	Result with fall off for distance ug/m ³
25 – St Helens St	2.2	1.3	45.3	42.4
43 – Yarmouth/Bramford Rd	3.3	4.8	41.4	43.8
62 – 27 St. Matthews St	6.6	1.8	42.0	35.3

Note: [http://laqm.defra.gov.uk/documents/Table1LAQMToolsList.doc-\(1\).pdf](http://laqm.defra.gov.uk/documents/Table1LAQMToolsList.doc-(1).pdf)

Borderline Measurements

Borderline measurements [$>39\mu\text{g}/\text{m}^3$] were obtained at four locations, three of which fall within existing AQMA's. The fourth location at which the result was borderline is not positioned within an existing AQMA but is close by. This tube (no.44) along Bramford Road gave a high average mean of $39.3\mu\text{g}/\text{m}^3$ in 2011. This is a lower result than in previous years when the results exceeded the objective. Despite this reduction in the result, this exceedence will be considered as part of the Further Assessment of the nearby AQMA.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Tube No.	Location	Site Type	Within AQMA	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Local Bias Adjustment factor = 0.82) (1) = 0.96 based on AEA Ltd data
								2011 ($\mu\text{g}/\text{m}^3$)
1	Civic Drive	Urban Roadside	N	N	12	-	N	29.2
2	Chevallier St o/s no. 6&8	Urban Roadside	Y	N	12	-	N	45.3
3	Dock St	Urban Roadside	Y	N	12	-	N	31.9
4	Berners St o/s No.31	Urban Roadside	N	N	12	-	N	38.6
5	Fore St	Urban Roadside	Y	N	12	-	N	39.3
6	Kings Avenue	Urban Background	N	N	12	-	N	18.3
7	Nacton Road [Jan- Aug]	Urban Roadside	N	N	8	29.4 $\mu\text{g}/\text{m}^3$	N	21.9
8	Nacton Rd/A14 junct [Jan- Aug]	Suburban	N	Y	8	29.4 $\mu\text{g}/\text{m}^3$	N	23.3
9	Nacton Rd/A14 junc. [Jan- Aug]	Suburban	N	Y	8	29.4 $\mu\text{g}/\text{m}^3$	N	24.8
10	Woodbridge Rd East [Jan- Aug]	Suburban	N	N	8	33 $\mu\text{g}/\text{m}^3$	N	24.6
11	St Margaret's St,	Urban	Y	Y	8	54 $\mu\text{g}/\text{m}^3$	N	51.8⁽¹⁾

Ipswich Borough Council

	Pipers Court	Roadside						
12	St Margaret's St, Pipers Court co-location	Urban Roadside	Y	Y	8	54µg/m ³	N	49.8⁽¹⁾
13	Valley/Norwich Road	Urban Roadside	Y	N	12	-	N	39.7
14	Chevallier St, outside number 63	Urban Roadside	Y		12	-	N	48.3
15	Cornhill/Tavern st	Urban Centre background	N	N	12	-	N	29.0
16	Valley/Norwich Road	Urban Roadside	Y	N	12	-	N	38.7
17	Chevallier St, outside number 63	Urban Roadside	Y	N	12	-	N	53.0
18	Norwich/Blenheim Road [Jan-Aug]	Urban Roadside	Y	N	8	36.4µg/m ³	N	27.2
19	St Margaret's St, Pipers Court co-location	Urban Roadside	Y	Y	8	54µg/m ³	N	48.8⁽¹⁾
20	St Margaret's Plain/Fonnereau Road	Urban Roadside	Y	N	12	-	N	35.8
21	St Margaret's Plain	Urban Roadside	Y	N	11	-	N	37.4
22	St Margaret's Plain/Northgate St	Urban Roadside	Y	N	11	-	N	39.8
23	St Margaret's Green/ St Margaret's St	Urban Roadside	Y	N	12	-	N	24.3
24	St Margaret's St	Urban Roadside	Y	N	12	-	N	42.3
25	St Helen's St	Urban Roadside	Y	N	12	-	N	45.3
26	St Helen's St/Grimwade St	Urban Roadside	Y	N	12	-	N	35.5

Ipswich Borough Council

27	St Helen's St/Argyle St	Urban Roadside	Y	N	12	-	N	45.5
28	St Helen's St/Dove Street [Jan-Aug]	Urban Roadside	Y	N	8	31.9µg/m ³	N	26.1
28	32/34 Chevallier St [Sept-Dec]	Urban Roadside	Y	N	3	-	N	n/a
29	Fore Hamlet	Urban Roadside	Y	N	12	-	N	32.8
30	Fore St	Urban Roadside	Y	N	12	-	N	29.7
31	Star Lane (opp St Peters St)	Urban Roadside	Y	Y	12	-	N	36.7
32	Star Lane (opp St Peters St)	Urban Roadside	Y	Y	12	-	N	35.4
33	Star Lane (opp St Peters St)	Urban Roadside	Y	Y	12	-	N	36.8
34	College St	Urban Roadside	Y	N	12	-	N	41.8
35	Cobden Place	Urban Roadside	Y	N	12	-	N	27.8
36	Franciscan Way/Wolsey St	Urban Roadside	N	N	12	-	N	32.4
37	Lower Brook St	Urban Roadside	Y	N	12	-	N	27.7
38	Civic Drive by Victoria PH [Jan-Aug]	Urban Roadside	N	N	11	-	N	35.6
39	Star Lane/Fore St	Urban Kerbside	Y	N	12	-	N	41.2
40	Cliff Lane	Urban Roadside	N	Y	12	-	N	20.6

Ipswich Borough Council

41	Cliff Lane	Urban Roadside	N	Y	12	-	N	20.8
42	Cliff lane	Urban Roadside	N	Y	12	-	N	19.8
43	Yarmouth Rd/Bramford Rd	Urban Roadside	N	N	11	-	N	41.4
44	Bramford Road	Urban Roadside	N	N	12	-	N	39.3
45	Chevallier St, Wellington Centre	Urban Roadside	Y	Y	12	-	N	31.7
46	Chevallier St, Wellington Centre co-location	Urban Roadside	Y	Y	12	-	N	31.6
47	Chevallier St, Wellington Centre co-location	Urban Roadside	Y	Y	12	-	N	31.5
48	Norwich Rd/Anglesea Road	Urban Roadside	Y	N	12	-	N	28.8
49	St Matthews St	Urban Roadside	N	N	12	-	N	42.1
50	Barrack Lane/St Matthews St	Urban Roadside	N	N	10	-	N	27.9
51	St Matthews St/Portman Rd	Urban Kerbside	N	N	12	-	N	37.2
52	St Matthews St	Urban Roadside	N	N	12	-	N	48.3
53	St Matthews St	Urban Roadside	N	N	12	-	N	49.3
54	St Matthews St/Berners St	Urban Roadside	N	N	12	-	N	32.2
55	Berners St 21	Urban Roadside	N	N	12	-	N	31.4

Ipswich Borough Council

56	Berners St 32	Urban Roadside	N	N	11	-	N	32.3
57	Berners St 41	Urban Roadside	N	N	12	-	N	30.4
58	Berners St 58	Urban Roadside	N	N	12	-	N	30.5
59	St. Matthews St Roundabout	Urban Roadside	N	Y	12	-	N	37.2
60	St. Matthews St Roundabout	Urban Roadside	N	Y	12	-	N	36.2
61	St. Matthews St Roundabout	Urban Roadside	N	Y	12	-	N	34.7
62	St. Matthews St 27	Urban Roadside	N	N	12	-	N	42.0
63	St Matthews St o/s no. 17	Urban Roadside	N	N	8	67.87µg/m³	N	50.6
64	St Georges St/St Matthews St	Urban Kerbside	N	Y	11	-	N	27.2
65	St Georges St/St Matthews St	Urban Kerbside	N	Y	11	-	N	27.4
66	30A Woodbridge Rd	Urban Roadside	N	N	12	-	N	41.6
67	Woodbridge Rd/Blanch St	Urban Roadside	N	N	12	-	N	32.7
68	62 Woodbridge Rd	Urban Roadside	N	N	11	-	N	48.5
69	2 Argyle St	Urban Roadside	Y	N	12	-	N	30.0
70	11 Argyle St	Urban Roadside	Y	N	12	-	N	35.8
71	93 St. Helens St	Urban Roadside	Y	N	12	-	N	25.3

Ipswich Borough Council

72	125 St. Helens St	Urban Roadside	Y	N	12	-	N	38.6
73	Regent St/St Helens St	Urban Roadside	Y	N	12	-	N	25.0
74	25 Grimwade St	Urban Roadside	N	N	11	-	N	29.2
75	28 Grimwade St	Urban Roadside	N	N	12	-	N	25.2
76	St Helen's St/Grimwade St	Urban Roadside	Y	N	11	-	N	40.1
77	St Helen's St	Urban Roadside	Y	N	11	-	N	31.7
78	7 Orchard St	Urban Roadside	N	Y	12	-	N	27.3
78	7 Orchard St	Urban Roadside	N	Y	12	-	N	25.9
80	St Helen's St	Urban Roadside	Y	Y	12	-	N	39.7
80	St Helen's St	Urban Roadside	Y	Y	12	-	N	43.2
80	St Helen's St	Urban Roadside	Y	Y	12	-	N	40.0
83	Bond St	Urban Roadside	N	N	11	-	N	32.1
84	Carr St/Majors Corner	Urban Kerbside	N	N	12	-	N	29.1
85	Old Foundry Rd	Urban Roadside	N	N	12	-	N	32.5
86	Bramford Road o/s No 170 [Jan-Aug]	Urban Roadside	N	N	8	35.9µg/m³	N	26.7
87	Bramford Road o/s No 205	Urban Roadside	N	N	12	-	N	37.0
88		Urban	Y	N	12	-	N	29.6

	Yarmouth Rd o/s flat 2 No 5	Roadside						
89	Bramford Road o/s No 122	Urban Roadside	N	Y	12	-	N	35.2
90	Bramford Rd - Co locate	Urban Roadside	N	Y	12	-	N	36.0
91	Bramford Rd - Co locate	Urban Roadside	N	Y	11	-	N	34.3
92	Chevallier St o/s Nos 32/34	Urban Roadside	Y	N	12	-	N	42.3
93	Waterloo Rd/Chevallier St 43 [Jan-Aug]	Urban Roadside	Y	N	8	38.05µg/m³	N	30.6

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.

2.2.2 PM₁₀

Ipswich Borough Council had an automatic monitor that monitored concentrations of PM₁₀ along with NO₂.

This monitor was a TEOM FDMS with a type C drier. It was re-located in November 2010 to Cliff Lane, an area where complaints of dust had been received, upwind from a number of potential sources of particulates.

The data capture for 2011 was only 68.6% due to a combination of power cuts, air conditioning issues and instrument faults. For a strict comparison against the objectives there must be a data capture of >90%. However, AEA Consultants have assessed the data and concluded that the site is unlikely to exceed the objective for daily PM₁₀ (>50ug/m³ not to be exceeded more than 35 times a year) as the 90th percentile for the daily PM₁₀ was 37ug/m³.

Table 2.7 Results of Automatic Monitoring of PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period % ^a	Valid Data Capture 2011 % ^b	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m ³ 2011
Cliff Lane	Road side	N	68.6	68.6	Y	22.0

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period % ^a	Valid Data Capture 2011 % ^b	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedences of 24-Hour Mean (50 µg/m ³) 2011
Cliff Lane	Road side	N	68.6	68.6	Y	7

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

2.2.3 Summary of Compliance with AQS Objectives

Ipswich Borough Council has examined the results from monitoring in the Borough. Concentrations outside of the AQMA's are all below the objective levels and there is no need to proceed to a Detailed Assessment.

The Authority has not undertaken monitoring for any other pollutants.

DRAFT

3 Road Traffic Sources

Ipswich has seen a steady rise in traffic levels. Traffic modelling undertaken by Suffolk County Council has shown that with the anticipated level of growth, traffic could increase by over 15% by 2021. Significant development within Ipswich, particularly employment, is anticipated to be focussed around the central area, and so could potentially increase the transport pressures that currently exist within the town, which could lead to deterioration in air quality. In response to this, the county council has developed a major transport scheme for Ipswich called '*Ipswich – Fit For The 21st Century*'. The aim of the scheme is to improve travel systems around the town and to help support future employment and housing growth. The scheme includes rebuilt bus stations, a state of the art computerised traffic management and information system, real time bus information and improvements to make it easier to walk and cycle around Ipswich and thereby reducing traffic levels and congestion. The impact of the effects of the proposed development will be considered in future assessments.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Ipswich Borough Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Ipswich Borough Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Whilst there have been no new/newly identified roads with high flows of buses/HDVs in Ipswich in 2011, a DRMB assessment was carried out for a residential road in Ipswich which has a high number of bus movements throughout the day. The modelling was undertaken in response to an enquiry from a resident regarding the air quality in the area.

The modelling results show that the annual mean for NO₂ levels at the receptor would only reach 19.87ug/m³ against the national objective of 40ug/m³. Similarly, the results for PM10 levels would reach a level of 17ug/m³ against a national objective of 40ug/m³.

There will be no need to undertake any further investigations at this location.

3.4 Junctions

Ipswich Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

A new road layout opened in the Duke St area of Ipswich in 2011. The existing roundabout was replaced with a signalled junction with changes to the access onto/off of Back Hamlet and Duke Street and a new 'no right turn' order onto Fore Hamlet. The changes were implemented to allow the traffic to flow more smoothly. The pedestrian crossing facilities in the area were also modernised to include including bus priority measures, cycle lanes, bus lanes and the widening of the pavement.

Ipswich Borough Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

Ipswich Borough Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Ipswich Borough Council confirms that there are no relevant bus stations in the Local Authority area.

DRAFT

4 Other Transport Sources

4.1 Airports

Ipswich Borough Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

Evidence has shown that NO₂ and SO₂ concentrations alongside rail lines with heavy traffic are often elevated. These line only need to be considered where the background annual mean nitrogen dioxide concentration is above 25µg/m³. This is only expected to occur within 35 local authority areas, Ipswich Borough Council is not included.

4.2.1 Stationary Trains

Ipswich Borough Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Ipswich Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

The Port of Ipswich is located within the Borough. The Port is equipped to handle containers, dry bulks, forest products, general cargo, liquid bulks and ro-ros. Relevant exposure is present within 1km of the berths and main areas of manoeuvring. The berthing officer confirmed that the Port Of Ipswich handled 1008 shipping movements in 2011.

Ipswich Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

There are no new or proposed installations in the vicinity of the IBC boundary as confirmed by officers of Babergh District Council, Mid Suffolk District Council and Suffolk Coastal District Council. A new crematorium has been built in a neighbouring district and has been assessed in the Suffolk Coastal Progress Report 2010. It was not considered to be a significant emitter of any pollutants of concern therefore no assessment was required.

- Anglian water Services Ltd installed a sludge treatment centre at Cliff Quay in 2011. The environmental risk assessment states that the risk from dust exposure at the nearest residential property [440m away] is not significant. An advanced anaerobic digestion plant was installed, which converts part of the sludge solids into 'biogas' containing methane, which can be used to fuel a Combined Heat and Power engine to generate 'renewable' energy. At this stage, the Pollution Inventory that may indicate their emissions has not been received by the EA, therefore this will be commented on in the next Progress Report.
- In 2011, a new biomass combustion plant was installed at the Environment Agency site, Cobham Road, Ipswich. At the time of installation an assessment was made of the emission rate in accordance with section 5.77 of TG (09). The calculation determined that there was no need to proceed to a detailed assessment.
- The Environment Agency has confirmed that there have been no new Part A processes within the Borough in 2011.

Ipswich Borough Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Ipswich Borough Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

- A new waste oil burner was installed at Donald's Garage, West End road Ipswich in 2011. This installation has been inspected and fully complies with the Environmental Permitting Regulations 2010.
- Four new applications for development were mentioned in the most recent Progress Report as potentially being significant in relation to air quality. However, none of these proposals have commenced as yet. The sites were:
 1. *Grafton Way – mixed use development.*
 2. *2-32 St Matthews Street – planning application for residential development*
 3. *Kennings Site, Duke Street – planning application for mixed use development*
 4. *7-11 Great Whip Street – application for mixed use and heating/power plant.*

Ipswich Borough Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area although there is one small waste oil storage depot.

5.3 Petrol Stations

Ipswich Borough Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

Ipswich Borough Council confirms that there are no poultry farms meeting the specified criteria.

DRAFT

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

The 2009 Updating and Screening Assessment Report determined that a Detailed Assessment was required for a 2.90MW biomass combustion plant on Nacton Road, Ipswich for particulate matter and nitrogen dioxide.

AAquire 6.2 was used to model the impacts on air quality of emissions emitted from the boiler. The maximum modelled concentrations modelled in a 1km x 1km grid entered on the stack were 24ug/m³ annual mean for PM₁₀ and 31ug/m³ annual mean for NO₂. The results indicate that the boiler emissions will not result in any exceedences of the air quality objectives for particulate matter and nitrogen dioxide, with process contributions being very low. The results obtained were based on conservative assumptions and therefore represent a worse case scenario.

Therefore no further assessment is required regarding this plant. The installation closed in 2012.

The 2009 Updating and Screening Assessment identified a need for further screening of the Biomass boiler at the Reg Driver Centre, Christchurch Park. Details of the boiler were obtained and it is listed on the Defra list of compliant boilers for smoke control areas. Actual emission rates were not available and so further screening was undertaken out using estimates of emissions from the EMEP/EEA guidebook and the guidance within LAQM.TG(09). Background adjusted emission rates of PM₁₀ are 2.99 –4 g/s and for NO_x are 6.2 –4 g/s. Stack diameter is 30cm, and stack height is 5.5m (with no need to calculate effective stack height). Using nomograms 5.19 and 5.20, the emission rates are well below those requiring further investigation or screening.

Ipswich Borough Council has assessed the biomass combustion plants on Nacton Road and The Reg Driver Centre, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

The Defra guidance requires the identification of areas in 500x500m squares with the highest densities of houses and service sector biomass combustion appliances in order to determine the annual service sector and annual domestic emissions. There has been a trend for the installation of wood burners and a return to the use of coal fires in recent years although it is unlikely that the increase is significant. However, in accordance with the guidance [TG(09)] table D.1b, an assessment will be undertaken and reported on in the 2012 Progress Report.

6.3 Domestic Solid-Fuel Burning

There are no areas in the Borough where significant coal burning takes place. The Coal Merchants Federation (Great Britain) Ltd confirmed that the number of coal merchants in Suffolk has reduced from 12 to 10 and of the existing 10 merchants, there had not been an increase in tonnage.

Ipswich Borough Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

Dust emissions from a number of uncontrolled and fugitive sources can give rise to elevated PM₁₀ concentrations. Areas to consider are:

- Quarrying and mineral extractions
- Landfill sites
- Coal and material stockyards or materials handling
- Major construction works
- Waste management sites

Suffolk county council has confirmed that there are no new quarries, mineral extraction sites, waste management sites or active landfill sites within the Borough.

Whilst there were no new known unmade haulage roads in Ipswich in 2011, the Council did receive a number of dust complaints, none of which amounted to a statutory nuisance.

There are a number of Part B permitted processes that have the potential to create dust, particularly around the port area. These have been considered in previous assessments and are not relevant to this USA.

There have been no dust complaints that have resulted in statutory nuisance in 2011.

Ipswich Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

As expected, there were exceedences of the annual average NO₂ measured in the existing AQMA's consequently, none of the AQMA's can be revoked at this time.

Exceedences were also measured in Yarmouth Road, St. Matthews St and Woodbridge Road. Further monitoring was undertaken close to the Yarmouth Rd exceedence, the results of which were not significant and it was determined that a detailed assessment will not be undertaken at this time. However, St Matthews Street and Woodbridge Road are both areas where NO₂ results were high. These areas have therefore undergone a detailed assessment and as a result AQMA's will be declared.

The results from the diffusion tube assessment in 2011 indicated a slight decline in the majority of NO₂ levels in the Borough. This is in line with country wide trends (Air Pollution in the UK 2011). It is not possible at this stage to determine whether this will be an ongoing pattern therefore further comment will be made on the 2013 Progress Report. A table showing the results is at Appendix D.

Cliff Lane was an area where it was suspected that dust may be a significant pollutant, however, results indicated that there are no concerns regarding the PM₁₀ & NO₂ levels in this location. This monitoring station has since been decommissioned.

8.2 Conclusions from Assessment of Sources

The assessment of pollution sources in the Borough in 2011 did not identify any potential exceedences of air quality objectives outside of the existing AQMA's.

8.3 Proposed Actions

This Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment for any pollutant however, the results of the detailed assessments undertaken for St Helen's and St Matthew's areas have led to an extension of the tube network. Both of these areas will be declared although the Authority is currently considering whether to combine all existing AQMA's and these newly identified areas into one large AQMA. Should this go ahead, the exact

boundaries of the new AQMA will be subject to consultation with members and local residents.

The next course of action is to submit the 2013 Progress Report.

DRAFT

9 References

Air Quality Action Plan (2008)
Air Quality (England) Regulations 2000 (SI 928)
Air Quality Daughter Directive
Air Pollution in the UK 2011
Defra website <http://smokecontrol.defra.gov.uk/appliances.php>
Detailed Assessment (April 2005)
Detailed Assessment (2010)
Bramford Road/Chevallier Street Detailed Assessment (2010)
Environment Act (1995)
Further Assessment Report (August 2008)
Ipswich Air Quality Management Order No 1, 2006
Ipswich Air Quality Management Order No 2, 2006
Ipswich Air Quality Management Order No 3, 2006
National Atmospheric Emissions Inventory Database
Progress Report (2010)
Progress Report (2011)
Technical Guidance LAQM.TG (09)
The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
Updating and Screening Assessment (2008)
Updating and Screening Assessment (2009)

Appendices

Appendix A: QA/QC Data

Appendix B: DMRB Calculations

Appendix C: Maps

Appendix D: Annual NO₂ Trends

DRAFT

Appendix A: QA:QC Data

Factor from Local Co-location Studies (if available)

The bias adjustment figure applied to the diffusion tube results is a local factor of 0.82 as a local average unless the site is very similar to one of the continuous monitors used to calculate the bias when a factor of 0.96 was used based on AEA data obtained from the St Margaret's Street monitor. A factor of 0.89 was used for 3 sites with were similar to the Cliff Lane co-located tubes. The national bias adjustment figure for 2011 was 0.87.

Diffusion Tube Bias Adjustment Factors

Supplier:	Environmental Scientifics Group Ltd, Unit 12, Moorbrook, Southmead Industrial Estate, Didcot, Oxfordshire, OX11 7HP
Tube Type:	50% Acetone : 50% TEA
Uncertainty:	Under European guidelines, diffusion tubes are considered an indicative method, and as such the uncertainty is defined as <20%. (In field intercomparisons ESG's diffusion tubes perform at <10% uncertainty.)
Quality Control:	A quality control sample of known concentration is run every 10 samples. The data generated is compared to acceptable limits as determined statistically using a Shewhart Chart control system.
Analytical Repeatability:	In 2011 several thousand QC samples were analysed, achieving a relative standard deviation of 1.09%
Confidence Intervals:	Assuming a normal distribution, 95.45% of results should fall within 2σ ($\pm 2.18\%$) and 99.73% of results should fall within 3σ ($\pm 3.18\%$) of the expected value.
Limit Of Detection:	0.03 μg NO ₂ on the tube. Over a 4-week exposure this would equate to 0.6 $\mu\text{g}/\text{m}^3$, or 0.3ppb
Analytical Information:	
Analytical Technique:	Colorimetric
Instrument:	Continuous Flow Auto-analyser
Principle:	Nitrite ions react with Sulphanilamide to form a diazonium compound. In acidic conditions, this couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a purple azo dye. Utilising spectrophotometric analysis at 540nm, the NO ₂ concentration is calculated by quantification of the colour change in comparison to that produced by known standards.
Calibration:	Standards are made from brought in 1000ppm standard – These standards hold ISO Guide 34 and ISO/IEC 17025 certification The instrument is calibrated every run The instrument calibration must achieve a coefficient of linearity >0.999 to be considered acceptable.

System Suitability Checks: System suitability checks are used to ensure performance within expected criteria. These include baseline, peak height and gain.

Extraction: To ensure complete, homogeneous extraction, tubes are mixed on a vibrating tray for not less than 30 minutes.

Changes to Diffusion Tube Bias Adjustment Factors with 09/12 Issue of the Spreadsheet				New (09/12) Update			
Laboratory	Method	Year	Previous Number of Studies	No. Studies Added	Total No. of Studies	Factor	Change in Factor
Aberdeen CC	20% TEA in water	2011	6	0	6	0.83	0.00
Bristol Scientific Services	20% TEA in water	2011	10	0	10	0.82	0.00
Cardiff Scientific Services	50% TEA in acetone	2011	3	0	3	0.86	0.00
Edinburgh Scientific Services	50% TEA in acetone	2011	8	0	8	0.84	0.00
ESG Glasgow	20% TEA in water	2011	1	0	1	0.84	0.00
ESG Glasgow	50% TEA in acetone	2011	1	3	4	0.87	0.05
Exova	20% TEA in water	2011	1	0	1	0.78	0.00
Glasgow Scientific Services	20% TEA in water	2011	7	0	7	0.94	0.00
Gradko	20% TEA in water	2011	40	1	41	0.90	0.00
Gradko	50% TEA in acetone	2011	24	1	25	0.95	0.00
ESG Didcot	20% TEA in water	2011	1	0	1	0.77	0.00
ESG Didcot	50% TEA in acetone	2011	44	1	45	0.83	0.00
Kent Scientific Services	20% TEA in water	2011	1	0	1	0.77	0.00
Kirklees Council	50% TEA in acetone	2011	5	0	5	0.75	0.00
Lambeth Scientific Services	50% TEA in acetone	2011	6	0	6	1.06	0.00
Milton Keynes Council	20% TEA in water	2011	1	3	4	0.84	0.02
Northampton BC	20% TEA in water	2011	3	0	3	0.71	0.00

Discussion of Choice of Factor to Use

The bias adjustment factor being applied to the annual means from the diffusion tubes is 0.82. This figure was calculated by AEA Energy and Environment using the monthly values collected from the triplicate tubes co-located with the automatic analysers at Chevallier Street. All monitors have good quality service contracts and ratification. Whilst the local factor gave slightly lower results than the national figure of 0.84, the difference in the results was insignificant.

QA/QC of automatic monitoring

The automatic monitors are routinely calibrated once every 2 weeks by an Ipswich Borough Council Environmental Protection Officer and serviced twice a year by contractors.

All data collected from the automatic monitors is managed by external consultants (AEA) 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, including thorough additional data quality checks that include site UKAS quality control audits and a final data ratification process that corrects data for instrument sensitivity drift between routine calibrations.

QA/QC of diffusion tube monitoring

Quality Assurance

The manufacture and analysis of NO₂ diffusion tubes is covered by our UKAS accreditation.

The method meets the requirements laid out in DEFRA's "Diffusion Tubes For Ambient NO₂ Monitoring: A Practical Guidance."

The laboratory has taken part in the WASP proficiency scheme since its inception, and has maintained the highest ranking of 'Satisfactory'.

Component part control: 20 tubes from each batch of newly manufactured tubes are measured to ensure the diffusion tube factor remains accurate. The internal diameter of both ends of the tube is measured to ensure the tube is square, as well as the tube length.

DRAFT

Appendix B: DMRB Calculations

Current receptor				
Receptor Name	boyton road		Receptor number	1
Assessment year	2011			

Results							
Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.01	0.01	mg/m ³	Annual mean*	0.01	mg/m ³
Benzene	0.00	0.01	0.01	µg/m ³	Annual mean	0.01	µg/m ³
1,3-butadiene	0.00	0.01	0.01	µg/m ³	Annual mean	0.01	µg/m ³
NO _x	0.0	1.5	1.5	µg/m ³	Not applicable		
NO ₂	0.0	0.7	0.7	µg/m ³	Annual mean*	0.7	µg/m ³
PM ₁₀	0.0	0.14	0.14	µg/m ³	Annual mean	0.1	µg/m ³
					Days >50µg/m ³	0	Days

Local Authority: Ipswich			Year: 2011						
			Traffic Mix: All other urban UK traffic						
Receptor ID	Easting, m	Northing, m	Road increment NO _x µg m ⁻³	Background µg m ⁻³		Fraction emitted as NO ₂	Total NO ₂ µg m ⁻³	Road NO ₂ µg m ⁻³	Notes
				NO _x	NO ₂				
bo			1.5		19.13		19.87	0.74	

Verification

Verification of the DRMB model in accordance with TG(09) guidance has not been possible in this instance as there was no monitoring undertaken in 2011. However, when comparing the DRMB results for 2011 with the bias adjusted diffusion tubes results from 2009-2010, they are very similar.

2009 21.74µg/m³

2010 24.30µg/m³

2011 19.87µg/m³

The modelled figure of 19.87µg/m³ is also very close to the background level of 19.13µg/m³ and is highly unlikely to meet the national objective.

Results

Location/ Receptor	Name	Year	Rd NO _x ¹	Verification Factor	Adj Rd NO _x ²	Adj Total NO _x ³	Total NO ₂ ⁴	PM ₁₀
-----------------------	------	------	------------------------------------	------------------------	---	--	---------------------------------------	------------------

			Annual mean $\mu\text{g}/\text{m}^3$		Annual mean $\mu\text{g}/\text{m}^3$	Annual mean $\mu\text{g}/\text{m}^3$	Annual mean $\mu\text{g}/\text{m}^3$	Annual mean $\mu\text{g}/\text{m}^3$	Days $>50\mu\text{g}/\text{m}^3$
1	Boyton Road	2011	1.5				19.87		

¹ Rd NO_x = Road NO_x direct from DMRB local output sheet (following Box 1 from DMRB guidance note provided at <http://laqm.defra.gov.uk/laqm-faqs/>)

² Adj Rd NO_x = Rd NO_x x verification factor (state verification factor used)

³ Adj Total NO_x = Adj Rd NO_x + Background NO_x

⁴ Total NO₂ = from NO_x to NO₂ calculator (available at from LAQM Support website)

DRAFT

Appendix C: Maps

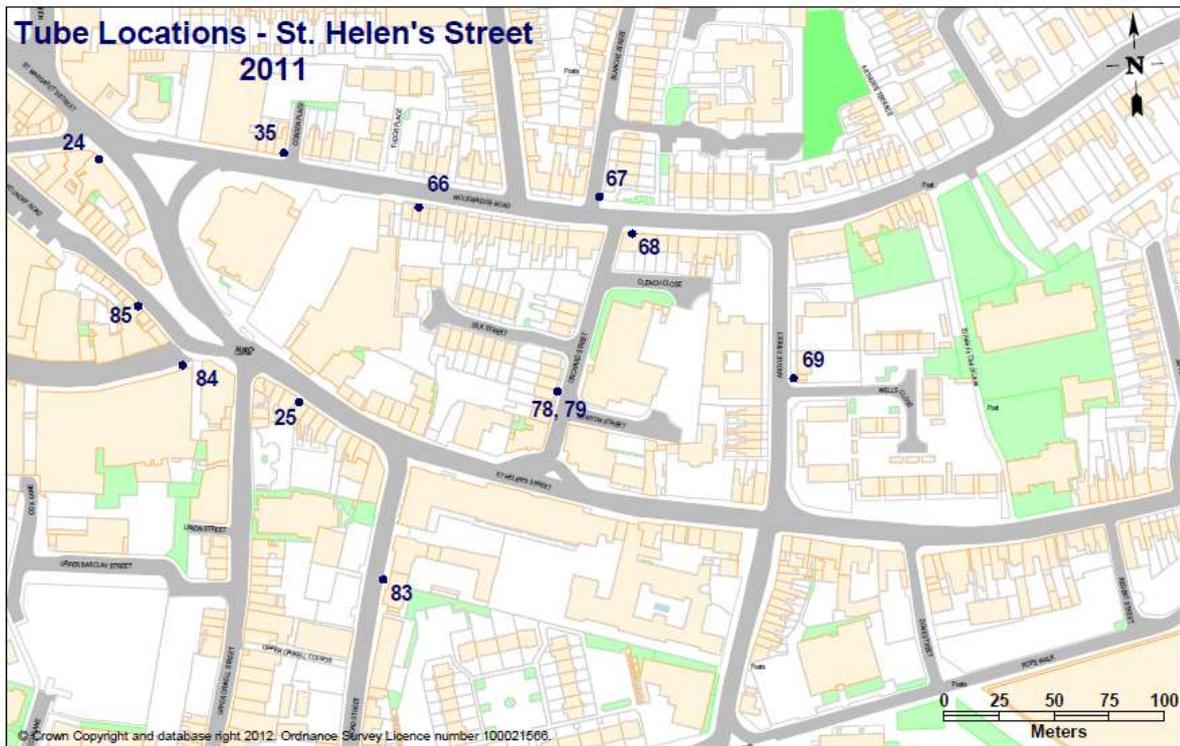
Tube Locations - Civic Drive /St. Matthew's Street
2011



Tube Locations - Star Lane
2011



Tube Locations - St. Helen's Street
2011





Appendix D: Annual NO₂ Trends

Site ID	Location	Within AQMA?	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)			
			2008	2009	2010 ¹	2011 ²
1	Civic Drive	N	28	29	29.9	29.2
2	Chevallier St	Y	N/A	N/A	45.8	45.3
3	Dock Street	Y	N/A	N/A	35.6	31.9
4	Berners Street	N	N/A	N/A	41.1	38.6
5	Fore Street	Y	39	43	52.1	39.3
6	Kings Avenue	N	18	20	19.7	18.3
7	Nacton Road	N	N/A	26	29.7	21.9
8	Nacton Rd/A14	N	N/A	27	27.8	23.3
9	Nacton Rd/A14	N	N/A	28	29.4	24.8
10	Woodbridge Rd East	N	N/A	25	28.4	24.6
11	St Margaret's St	Y	46	51	50	51.8
12	St Margaret's St	Y	45	50	51.4	49.8
19	St Margaret's St	Y	42	50	49.8	48.5
13	Valley Rd/Norwich Rd	Y	38	38	39.9	39.7
14	Chevallier St	Y	44	46	54.7	48.3
17	Chevallier St	Y	43	48	56.6	53
15	Cornhill	N	25	32	30.9	29
16	Valley/Norwich Rd	Y	37	40	41.9	38.7
18	Norwich/Blenheim Rd	Y	28	32	34.7	27.2
20	St Margaret's Plain/Fonn Rd	Y	34	36	34.8	35.8
21	St Margaret's Plain	Y	32	40	41.3	37.4
22	St Margaret's Plain/Northgate	Y	37	39	45	39.8
23	St Margaret's Green	Y	N/A	N/A	26.9	24.3
24	St Margaret's St	N	42	45	51	42.3
25	St Helens St	N	45	47	49.6	45.3
26	St Helens St/Grimwade St	Y	N/A	40	43.2	35.5
27	St Helens St/Argyle St	Y	40	43	48.7	45.5
28	St Helens St/Dove St	Y	29	32	31.4	26.1
29	Fore Hamlet	Y	32	36	40.4	32.8
30	Fore Street	Y	39	34	34.3	29.7
31	Star Lane	Y	N/A	39	40	36.7
32	Star Lane	Y	N/A	39	39.1	35.4
33	Star Lane	Y	N/A	38	39.8	36.8
34	College St	Y	N/A	N/A	45.5	41.8
35	Cobden Place	N	N/A	N/A	30	27.8
36	Franciscan Way/Wolsey St	N	N/A	N/A	37.3	32.4
37	Lower Brook St	Y	28	30	30.6	27.7
38	Civic Drive	N	N/A	N/A	41.7	35.6
39	Star Lane/Fore St	Y	45	48	48.5	41.2
43	Yarmouth Rd/Bramford Rd	Y	40	43	45.5	41.4
44	Bramford Rd	N	34 ³	43	46.4	39.3
45	Chevallier St	Y	30	35	35.3	31.7
46	Chevallier St	Y	32	34	34.4	31.6
47	Chevallier St	Y	32	34	34.2	31.5
48	Norwich Rd/Anglesea Rd	N	28	32	33.1	28.8
49	St Matthews St	N	46	47	51.3	42.1

¹Local average bias adjusted 0.8,0.87,0.94 applied dependent on location of tube.²Local average bias adjusted 0.96 based on AEA Ltd data

Appendix E: Diffusion Tube Results

2011 Nitrogen Dioxide Levels in ug/m3																							
Local Authority: Ipswich Borough Council																							
Location: K - Kerbside																							
I - Intermediate																							
B - Background																							
Diffusion Tube Data			Grid																				
Street	Post Code	Locn.	Ref x/y	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Count	Min	Max	Mean	Bias			
				National		Local																	
Civic Drive		(K)	1 615999/244399	38.1	44.2	42.2	39	29.3	27.9	21.7	28.8	30.2	43.1	47.3	36	12	21.7	47.3	35.7	29.9	29.2		
Chevallier St o/s No's 6 to 8		(K)	2 615142/245242	62.3	65.8	55.8	50	49.7	54.7	46.7	46.5	53.4	65.2	66.9	46.2	12	46.2	66.9	55.3	46.4	45.3		
Dock Street		(K)	3 616379/243894	52.4	48.3	38.7	43.6	31.3	34.8	30.3	33.2	35	40.4	43.4	35.2	12	30.3	52.4	38.9	32.7	31.9		
Berners Street o/s No. 31		(K)	4 615923/244923	58.1	53.6	46.7	49	35.2	45.8	33.4	39.6	43.9	49.4	57.1	52.5	12	33.4	58.1	47.0	39.5	38.6		
Fore Street		(K)	5 616860/244147	56.1	53.3	50	57.7	40.7	43.6	38.2	43.7	44.3	48.3	55.1	44.4	12	38.2	57.7	48.0	40.3	39.3		
Kings Avenue		(B)	6 617299/244412	30.9	32.1	19.3	21.5	12.7	14.5	10.3	14.5	17.3	21	32.4	19.8	12	10.3	32.4	20.5	17.2	18.3		
Nacton Road		(K)	7 618974/242291	40.1		38.6	28.4	16.9	20.6	19.7	22.3	Tube Removed from September onwards				7	16.9	40.1	26.7	22.4	21.9		
Nacton Rd/A14 junct		(K)	8 620078/241263	33.8	37.7	41.2	28.1	17.2	26.1	20.9	22.2	Tube Removed from September onwards				8	17.2	41.2	28.4	23.9	23.3		
Nacton Rd/A14 junct		(K)	9 620078/241263	36	42.3	42.6	29	20.7	26.9	19.5	25	Tube Removed from September onwards				8	19.5	42.6	30.3	25.4	24.8		
Woodbridge Rd East		(K)	10 619294/245109	41.6	34.9	34.4	34.6	23.2	25.6	21.8	23.6	Tube Removed from September onwards				8	21.8	41.6	30.0	25.2	24.6		
St Margaret's Street		(K)	11 616578/244759	58	64	52	56	44.5	54		49.3					7	44.5	64	54.0	45.3	51.8		
St Marg St co locat		(K)	12 616578/244759	53.4	54.8	53.3	58.1	50.6	51.5	43.9	49.3					8	43.9	58.1	51.9	43.6	49.8		
Valley/Norwich Road		(K)	13 615361/245436	51.8	56.9	49	48.4	42.5	40.1	29.1	46.1	49.6	56.2	56.4	54.5	12	29.1	56.9	48.4	40.6	39.7		
Chevallier Street		(K)	14 615283/245391	82.1	71.4	66.8	63.6	37.4	52	42.9	56.3	56	61.8	78	38.1	12	37.4	82.1	58.9	49.4	48.3		
Cornhill o/s No 17		(B)	15 616277/244641	56.3	45.7	40.6	30.9	24.6	28.6	22.4	27.6	30.5	38.2	47.4	32.2	12	22.4	56.3	35.4	29.8	29.0		
Valley/Norwich Road		(K)	16 615361/245436	52.6	54.1	46.4	50.4	43.7	44.5	36.1	40.2	53.8	49.6	55.7	39.6	12	36.1	55.7	47.2	39.7	38.7		
Chevallier Street		(K)	17 615283/245391	85.1	73.3	74.2	73.7	55	60.4	53.4	53.5	56.3	61.7	67	61.3	12	53.4	85.1	64.6	54.2	53.0		
Norwich/Blenheim Road		(K)	18 615269/245460	41.6	44.1	42.3	33.4	24.6	28.3	26.9	23.9	Tube Removed from September onwards				8	23.9	44.1	33.1	27.8	27.2		
St Marg St co locat		(K)	19 616578/244759	48.3	60.7	48.8	57.5	45	52.6	41.8	49.5					8	41.8	60.7	50.5	42.4	48.5		
St Margaret's Plain/Fonnereau		(K)	20 616455/244824	45	49	42.1	43.8	38.7	41	32.6	36.4	43.3	48.5	49.9	53.9	12	32.6	53.9	43.7	36.7	35.8		
St Margaret's Plain		(K)	21 616490/244806	50.5	52.5	50	44.4		43.6	35.6	40.3	41.9	45.7	52.8	44.4	11	35.6	52.8	45.6	38.3	37.4		
St Margaret's Plain/Northgate		(K)	22 616477/244790	58.2	57.9	55.8	53.6	43	39.1	37.2	41.9	42.9		59.5	44.9	11	37.2	59.5	48.5	40.8	39.8		
St Margarets Green		(K)	23 616641/244781	39.7	37.9	35.9	27.1	27.2	24.2	19.1	25.6	27.2	34.4	34	23.9	12	19.1	39.7	29.7	24.9	24.3		
St Margaret's Street		(K)	24 616659/244689	59.6	60.7	52.4	54.8	42.1	48.4	36.1	47	49.7	59.3	59.4	49.9	12	36.1	60.7	51.6	43.4	42.3		
St Helen's Street		(K)	25 616750/244578	63.6	62.5	56.9	60.6	45	51.7	40.1	47.6	56.6	60	63.1	55.7	12	40.1	63.6	55.3	46.4	45.3		
St Helen's St/Grimwade Street		(K)	26 616968/244510	53.8	52	57.6	47.5	36.4	39.4	30.7	36.1	40.4	42.3	51.3	32.3	12	30.7	57.6	43.3	36.4	35.5		
St Helen's St/Argyle Street		(K)	27 616961/244/536	72.7	68.4	59	47.4	42.8	49.7	37	46.1	54.7	59.7	66	61.8	12	37	72.7	55.4	46.6	45.5		
St Helen's St/Dove Street		(K)	28 617023/244508	44.8	39.1	41.4	31.8	24.1	25	21.9	26.8	Tube Removed from September onwards				8	21.9	44.8	31.9	26.8	26.1		
Fore Hamlet		(K)	29 617102/244077	58.6	48.7	54.2	39.7	28.8	31.4	31.6	29.1	32.4	39.5	50.9	35.2	12	28.8	58.6	40.0	33.6	32.8		
Fore Street		(K)	30 616963/244106	44	42.9	44.3	37.4	24.1	32.2	25.1	27.8	32	42.5	48.9	32.9	12	24.1	48.9	36.2	30.4	29.7		
Star Lane opp St Peters St		(K)	31 616336/244133	51.7	54.3	56.5	44.3	37.3	38.5	34.5	38.5	40.4	49.6	52.2	38.4	12	34.5	56.5	44.7	37.5	36.7		
Star Lane co locate as 31		(K)	32 616336/244133	36.2	37.7	56.9	53.1	39.2	38.2	31.7	38.1	41.1	50.5	58.4	37.5	12	31.7	58.4	43.2	36.3	35.4		
Star Lane co locate as 31		(K)	33 616336/244133	52.6	55.1	55.7	53.3	30.8	36.2	36.6	37.3	40.9	43.6	55.8	41.2	12	30.8	55.8	44.9	37.7	36.8		
College Street		(K)	34 616466/244072	54.1	58.1	51.6	51.7	44.2	52.6	35.8	44	48.6	59.8	60.2	51.5	12	35.8	60.2	51.0	42.9	41.8		
Cobden Place		(K)	35 616743/244692	28	43.3	32.7	34	27.7	34.3	21.7	28.5	33	41.5	46	36.2	12	21.7	46	33.9	28.5	27.8		
Franciscan Way/Wolsey St		(K)	36 616153/244242	51.9	47.2	44.8	43.5	28.7	35.5	25.7	33	33.6	42.1	53.8	35	12	25.7	53.8	39.6	33.2	32.4		
Lower Brook Street		(K)	37 616480/244163	41.8	42.7	39.3	38.8	24.5	28.5	21.5	28	29.1	37.5	46.3	27.6	12	21.5	46.3	33.8	28.4	27.7		
Civic Drive by Victoria PH		(K)	38 615898/244789	52	49.9		52.1	32.8	40.8	38.1	35.3	37.8	47.4	58.5	32.7	11	32.7	58.5	43.4	36.5	35.6		
Star Lane/Fore Street		(K)	39 616730/244246	8.5	68.7	64.9	49	46.6	47.2	32.9	47.1	50.7	60.4	68.4	58.4	12	8.5	68.7	50.2	42.2	41.2		
Cliff Lane Primary School		(B)	40 617531/243134	28.5	30.9	25.2	25.1	14.6	17.5	12.7	14.5	19.7	26.8	36.6	25.3	12	12.7	36.6	23.1	19.4	20.6		
Cliff Lane Primary School		(B)	41 617531/243134	31.3	30.7	26.5	24.4	16.1	16.9	13.3	15.4	20.1	28	32.9	24.9	12	13.3	32.9	23.4	19.6	20.8		

Ipswich Borough Council

Cliff Lane Primary School	(B)	42	617531/243134	17.1	32.7	24.2	26.4	17.4	17.6	11.7	13.2	21.2	26.3	34	25.6	12	11.7	34	22.3	18.7	19.8
Yarmouth Rd/Bramford Road	(K)	43	615107/245197	58.2	57.8	45.2	57.9	43	44.5		45.6	49.8	55	49.4	49.6	11	43	58.2	50.5	42.5	41.4
Bramford Road	(K)	44	615049/245234	64.8	57.9	53.1	45.2	34.5	40.8	34.7	40.4	41.5	54.1	62.1	46.7	12	34.5	64.8	48.0	40.3	39.3
Chevallier Street	(K)	45	615257/245349	50	48.3	46.4	42.6	24.3	38.4	26.5	30.7	34.6	41.8	47.9	32.5	12	24.3	50	38.7	32.5	31.7
Chevallier Street - co locate	(K)	46	615257/245349	49.1	44.9	44.3	34.9	30.7	36.1	25.8	32.6	35.5	42.8	49.1	36	12	25.8	49.1	38.5	32.3	31.6
Chevallier Street - co locate	(K)	47	615257/245349	50.6	45.6	43.5	42.3	27.1	31.4	28.4	32.5	36.5	39.7	49.3	34.3	12	27.1	50.6	38.4	32.3	31.5
Norwich Road/Anglesea Road	(K)	48	615397/245337	44.6	41.6	38.8	37	28.5	29.2	26.8	28.1	30.2	38.6	44.9	33.7	12	26.8	44.9	35.2	29.5	28.8
St Matthews Street	(K)	49	615803/244872	66.5	56	70.7	50.1	41.7	37.5	46.7	39.5	42.6	58.4	67	38.8	12	37.5	70.7	51.3	43.1	42.1
Barrack lane/St Matthews St	(K)	50	615758/244885		46.9		30.7	23.6	27.2	19.7	30	33.5	40.6	47.1	40.5	10	19.7	47.1	34.0	28.5	27.9
St Matthews St/Portman Rd	(K)	51	615765/244865	61.6	62.2	60.6	39.4	35.3	30.1	31.6	33.9	39.4	50.3	70.2	30.4	12	30.1	70.2	45.4	38.2	37.2
St Matthews St o/s No. 60	(K)	52	615822/244869	73.5	69.7	72.6	60.4	43.7	49.6	39.5	53.5	52.7	67.2	71.8	52.3	12	39.5	73.5	58.9	49.5	48.3
St Matthews St o/s No. 67	(K)	53	615817/244856	64.3	73.3	58.3	63.9	47.8	58.9	40.7	48.6	62.6	66.7	73.2	62.5	12	40.7	73.3	60.1	50.5	49.3
St Matthews St/Berners St	(K)	54	615891/244863	47.5	49.5	46.2	41.3	29.3	33.4	25.4	31.6	34.2	39.9	54.5	38.7	12	25.4	54.5	39.3	33.0	32.2
Berners St o/s No. 21	(K)	55	615912/244893	58.8	51.1	44.2	31.5	21.8	34.5	26.2	31	35.5	42.4	48.6	34.5	12	21.8	58.8	38.3	32.2	31.4
Berners St o/s No. 32	(K)	56	615928/244908	49.8	50.3	48.9	34.5	33.4	31	23.4	26.1	38.1	44.9	52.6		11	23.4	52.6	39.4	33.1	32.3
Berners St o/s No. 41-43	(K)	57	615936/244977	45.6	45	36.2	33.6	24.4	27.7	17.7	26.7	32.6	37.8	45.9	37.1	12	17.7	45.9	34.2	28.7	30.4
Berners St o/s No. 58	(K)	58	615975/245034	44.9	49	36.5	33.3	22.8	25	17.3	24.8	31.3	40.1	57.3	28.4	12	17.3	57.3	34.3	28.8	30.5
St Matthews St rbt co-locate	(K)	59	615921/244841	62.2	53.6	47.9	39.8	34.4	39.6	27.2	37	43.7	52.6	55.5	51.3	12	27.2	62.2	45.4	38.1	37.2
St Matthews St rbt co-locate	(K)	60	615921/244841	55.7	54.7	52.2	40.7	28.8	41.5	19.6	40.7	45.2	51	53.5	46.6	12	19.6	55.7	44.2	37.1	36.2
St Matthews St rbt co-locate	(K)	61	615921/244841	57	50.4	43.2	45.5	27	36.8	25.8	34.4	41	50.7	51.2	45	12	25.8	57	42.3	35.6	34.7
St Matthews St o/s No. 27	(K)	62	615926/244804	56.5	58.7	52	45.6	47.1	52.4	32.1	45.7	54.2	58.7	61.7	49.8	12	32.1	61.7	51.2	43.0	42.0
St Matthews St o/s No. 17	(K)	63	615955/244783	71.8	73.1	64	65.2	49.5				57.2	60.6	52.4		8	49.5	73.1	61.7	51.8	50.6
St Georges St/St Matthews St	(K)	64	616006/244798	45.2	42.7	39.4	35.3	23.8	27.4	17.8	21.7	29.2	37.3	44.5		11	17.8	45.2	33.1	27.8	27.2
St Georges St - co-locate	(K)	65	616006/244798	42.1	42.4	38	38.4	23.1	26	18.4	24.8	28	37.5	48.3		11	18.4	48.3	33.4	28.0	27.4
Woodbridge Rd o/s No 30A	(K)	66	616804/244667	49.3	57.2	51.7	54.9	43.5	46.6	36.5	46.1	54.8	58.7	57.1	52.4	12	36.5	58.7	50.7	42.6	41.6
Woodbridge Rd/Blanche St	(K)	67	616886/244672	43.8	50.3	46	44.8	29.9	33.1	24.2	31.7	36.9	48.3	53.4	36.4	12	24.2	53.4	39.9	33.5	32.7
Woodbridge Rd o/s No. 62	(K)	68	616901/244655	71.6	61	67.2	64.1	46.6	48.7	45.2		55.1	66.7	70.1	54.7	11	45.2	71.6	59.2	49.7	48.5
Argyle Street o/s Nos. 2-4	(K)	69	616974/244589	49.6	46	47	35.1	26.1	32.3	23.5	26.9	28.5	39.8	46.9	37.4	12	23.5	49.6	36.6	30.7	30.0
Argyle Street o/s No. 11	(K)	70	616962/244572	58.3	54	50.7	39.9	24.7	38.6	27.2	37.4	44.9	48.3	54.8	45.8	12	24.7	58.3	43.7	36.7	35.8
St Helens Street o/s No. 93	(K)	71	617027/244536	43.2	39.6	36.5	30.8	21	25.1	21.3	25.9	27.8	29.6	38.6	31.2	12	21	43.2	30.9	25.9	25.3
St Helens St o/s No. 125	(K)	72	617119/244534	62	55.6	49.7	43.7	31.7	42.2	34.7	38.8	42.3	52	57.4	54.6	12	31.7	62	47.1	39.5	38.6
Regent St/St Helens St	(K)	73	617120/244518	37.7	36	36.1	32.2	17	24.7	19.4	23.9	25.5	36	43.1	33.6	12	17	43.1	30.4	25.6	25.0
Grimwade St o/s No. 25	(K)	74	616948/244438	47.5	48.6	47.9	38.4	23.9	27.7	22.2	29.5	32.8	37.2		35.6	11	22.2	48.6	35.6	29.9	29.2
Grimwade St o/s No. 28	(K)	75	616928/244360	34.3	40.1	38.5	33.2	18.4	26.4	17.5	24.1	30.5	35.5	44	26.7	12	17.5	44	30.8	25.8	25.2
St Helens St/Grimwade St 44	(K)	76	616948/244518	56.2	55.6	56.3	51.1	36.4	43		42	47.5	55.5	44.8	49.1	11	36.4	56.3	48.9	41.0	40.1
St Helens St - Albury Ct	(K)	77	616899/244539	50.6	45.1	52	35.1	29	31.6		28.1	32.3	37.5	47.7	36.4	11	28.1	52	38.7	32.5	31.7
Orchard St o/s No. 7	(K)	78	616867/244583	45.7	45.2	40.7	30	20.2	22.9	19.1	25.4	31.2	37.5	41.5	40.8	12	19.1	45.7	33.4	28.0	27.3
Orchard St - co-locate	(K)	79	616867/244583	43.6	42.2	39.4	34.5	20.8	26.8	15.6	22.9	26.4	32.7	43.8	30.4	12	15.6	43.8	31.6	26.5	25.9
St Helens St - County Hall	(K)	80	616819/244543	46.5	55.1	50.9	50.4	43.7	42.1	36.2	40.9	52	54.5	55.7	52.5	12	36.2	55.7	48.4	40.6	39.7
St Helens St - co-locate	(K)	81	616819/244543	52.6	54	51.6	50.1	34.6	42.4		85.9	48.8	55.1	57.3	46.5	11	34.6	85.9	52.6	44.2	43.2
St Helens St - co-locate	(K)	82	616819/244543	48.3	54	52.1	52.3	41.7	41.5	35.6	43.9	51.2	58.2	57.1	49.9	12	35.6	58.2	48.8	41.0	40.0
Bond Street o/s No. 29	(K)	83	616788/244497	47.6		52.2	41.8	28.9	33	29.1	30.4	33.1	45.5	53.8	35.7	11	28.9	53.8	39.2	32.9	32.1
Carr Street/Majors Corner	(K)	84	616697/244595	45.5	43	41.3	37	27.5	25.2	28.7	25.5	31.3	39.2	48.1	33	12	25.2	48.1	35.4	29.8	29.1
Old Foundry Road o/s No. 5	(K)	85	616677/244622	46.1	48.6	39.8	38.6	26.6	31.5	33.1	33.7	34.7	49.3	48.8	44.3	12	26.6	49.3	39.6	33.3	32.5
Bramford Road o/s No 170	(K)	86	615004/245257	47.6	44.6	44.3	32.1	19.7	28	20.4	24	Tube Removed from September onwards				8	19.7	47.6	32.6	27.4	26.7
Bramford Road o/s No 205	(K)	87	615004/245237	55.3	54.4	47.3	50.5	34.2	41.7	35.4	35.9	44.6	49.9	53.2	39.5	12	34.2	55.3	45.2	37.9	37.0
Yarmouth Rd o/s flat 2 No 5	(K)	88	615092/245137	52.6	43.7	41.9	34.4	29.3	32.1	34.9	34.9	19	34.7	41.6	33.4	12	19	52.6	36.0	30.3	29.6
Bramford Road o/s No 122	(K)	89	615133/245201	57.2	50.7	48.6	44.7	32.8	39.8	38.3	34.9	32.3	46.1	54.4	35.8	12	32.3	57.2	43.0	36.1	35.2
Bramford Rd - Co locate	(K)	90	615133/245201	62.4	52.9	51.4	45.2	28.8	36.7	40.2	28.9	35.4	46.2	55.2	43.4	12	28.8	62.4	43.9	36.9	36.0
Bramford Rd - Co locate	(K)	91	615133/245201	60.4	50.4	41.4	41.9		35.8	34.3	34.1	36.8	38.2	46	40.4	11	34.1	60.4	41.8	35.1	34.3
Chevallier St o/s Nos 32/34	(K)	92	615192/245289	63	65	59.5	52.7	41.3	39.8	30.3	42.2	53	58.8	64.8	47.9	12	30.3	65	51.5	43.3	42.3
Waterloo Rd/Chevallier St 43	(K)	93	615200/245319	51.5	52.1	42.8	34.5	28.2	33.8	26.8	28.7	Tube Removed from September onwards				8	26.8	52.1	37.3	31.3	30.6

DRAFT