2010 Air Quality Progress Report for *North Norfolk District Council*

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

May 2010

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Executive Summary

North Norfolk District Council has met all the National Air Quality Objectives and there is no requirement to proceed to a detailed assessment for any of the monitored pollutants.

Further monitoring is proposed in Hoveton to provide greater confidence in meeting the nitrogen dioxide annual objective.

The Updating and Screening Assessment submitted by North Norfolk District Council in 2009 showed that no exceedances had been recorded but that the NO2 concentration in Hoveton continued to be close to objective. The authority expressed a desire to undertake a further detailed assessment in the Hoveton area due to the continued concern over this hotspot.

In October 2010 the air quality report was accepted by Defra with the recommendation that the authority undertake a more detailed assessment of the area to ensure compliance with the national objective.

The Authority has already increased the diffusion tube monitoring in Hoveton to determine the boundary of the hotspot and has applied for a Section 82 grant, under The Environment Act 1995, to undertake continuous monitoring in the area.

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1 Introduction

1.1 Description of Local Authority Area

North Norfolk District Council is a large rural Authority covering 550 square miles of the Norfolk coastline. Due to its location and rural nature, industry is generally small scale and most of the air pollution is attributed to road traffic.

The main population within North Norfolk is located around the market towns of Wells-Next-The-Sea, Fakenham, Holt, Sheringham, Cromer, North Walsham, and Stalham. The population varies significantly between the summer and winter due to tourism which is a major part of the local economy. The increase in population also means an increase in the numbers of vehicles and traffic.

Due to the coastal geographic location North Norfolk does not suffer from through traffic; all traffic is considered locally based.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

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

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

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

North Norfolk District Council has undertaken annual review and assessments of air quality since 2003 and during this time has not monitored any exceedances of the National Air Quality Objectives.

In the 2003 Updating and Screening Assessment and the 2004 Progress Report, North Norfolk identified one potential nitrogen dioxide hotspot within North Norfolk, located in the village of Hoveton. Although the 2005 target was expected to be met, further nitrogen dioxide tube monitoring was set up within the area to give a more detailed view.

In the 2005 Progress Report it was confirmed that the only nitrogen dioxide hotspot in North Norfolk is located in the village of Hoveton. Although the 2005 Air Quality Objective was expected to be met, the Authority committed to continue the monitoring in Hoveton. The Authority also committed to undertake benzene monitoring to confirm compliance with the stricter 2010 National Air Quality Objective

The Updating and Screening Assessment submitted in 2006 reviewed all the pollutants and demonstrated continued compliance with the National Air Quality Objectives. Having undertaken benzene monitoring the authority concluded that the concentration of benzene was low enough to not require further monitoring.

The progress reports submitted in 2007 and 2008 continued to show that the Air Quality Objectives would be met. The report also showed the new monitoring undertaken in Hoveton confirmed the area as a NOx hotspot and the authority began further investigations. The Authority undertook a review of the air quality management process.

The Updating and Screening Assessment submitted by North Norfolk District Council in 2009 showed that no exceedances had been recorded but that the NO2 concentration in Hoveton continued to be close to objective. The authority expressed a desire to undertake a further detailed assessment in the Hoveton area due to the continued concern over the Hotspot.

In October 2010 the air quality report was accepted by Defra with the recommendation that the authority undertake a more detailed assessment of the area to ensure compliance with the national objective.

The Policy Guidance states, ‘If a local authority identifies a risk of air quality objective exceedances at any time during the reporting years, it should proceed to carry out a Detailed Assessment to formally identify the need to declare an air quality management area and its appropriate size and location. Local authorities in this situation should not delay until the next full round of Review and Assessment”. (PG.09 section 1.11)

The Technical Guidance states that ‘Where the Updating and Screening Assessment has identified a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority will be required to undertake a Detailed Assessment following the guidance set out in this document. The aim of this Detailed Assessment should be to identify with reasonable certainty whether or not likely exceedances will occur’ (TG.09 section 1.19).

In May 2010 North Norfolk District Council submitted a grant application under section 82 of the Environment Act 1995, to undertake further monitoring in the area. The application is for the installation and running of a continuous monitoring station in the centre of the hotspot adjacent to the residential properties

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Bacton Air Quality Monitoring Station houses three continuous air pollutant monitors and is also the location of three diffusion tubes as part of a co-location study. The monitors used include two Air Pollution Instruments (API) monitors; one monitoring nitrogen dioxide and one monitoring sulphur dioxide. The station also houses a Rupprecht and Patashnick TEOM, continuously monitoring particulate matter in the PM_{10}, range (10 microns or less).

Equipment servicing and maintenance regimes
All pollutant analysers are maintained following manufacturer's instructions and have a full six monthly service and recalibration conducted by a professional engineer, under a service and maintenance contract. The station service and maintenance is carried out, under contract, by Environ Technology Services plc based in Stroud, Gloucestershire.

Calibration methods
The routine calibration and management of the station is undertaken by the Environmental Protection Team within the Environmental Health Service of North Norfolk District Council. The calibrations are completed approximately monthly and in line with the Automatic Urban and Rural Network (AURN) diffusion tube network calendar and carried out by Environmental Protection Officers trained to calibrate the individual monitors.

The methodology for the calibration procedure has been derived from the manufacturer's instruction handbooks. The calibration procedure involves a two point, zero and span calibration against a reference gas supply. The zero and span drift data is recorded for later data scaling. Calibration gases are supplied and certified by Air Liquide Ltd.

All the calibration data is stored using an electronic database of calibrations and used in the scaling and ratification process.

Data Scaling, Validation and Ratification
Since April 2006, the data from the continuous analysers has been collected and managed using the Opsis, Enviman air quality monitoring software.

Monitoring data is stored as either logger data or edited data. Logger data files are stored in monthly data files in binary packed logger data format. These logger data files are then automatically converted to edited data files in ASCII format. The edited data files are used for data scaling and ratification while the logger data files remain as the raw data.

On a monthly basis the ASCII files for all the monitors are inspected, initially looking for errors and spurious or doubtful data, which are then removed. The time period for any removed data is flagged by changing the data to a set code number representing the reason why the data was removed (e.g. spurious or doubtful data is changed to 998).

The calibration factors are then applied to the data to correct the data due to the natural drift of the monitor. The monitor drift data, collected during the routine calibrations, is used in a time linear data correction to adjust the data progressively for the increasing monitor drift. (The calibration periods are changed to 999.)

The results of the servicing, maintenance and calibrations conducted are recorded and stored at the Authority's offices.

Volatile Correction Model for PM_{10}

Defra and the Devolved Administrations, has undertaken a detailed study on the equivalence of various samplers and instruments for measuring Particulate Matter (both PM_{10} and $PM_{2.5}$).

The study involved the comparison of six automatic and non-automatic instruments with European reference samplers. In the case of PM_{10}, the Kleinfiltergerat was used as the reference sampler; for $PM_{2.5}$ the Leckel sampler was selected. The six instruments tested were as follows:

- Tapered Element Oscillating Microbalance (TEOM) – PM_{10}
- Filter Dynamics Measurement System (FDMS) – both PM_{10} and $PM_{2.5}$
- Partisol 2025 Sequential Sampler - PM_{10}
- OPSIS SM200 (with both Beta and Mass configurations) – PM_{10}
- Met-One Beta Attenuation Monitor (BAM) – PM_{10}

The tests carried out were based on the Guidance for the Demonstration of Equivalence of Ambient Air Monitoring Methods issued by an EC Working Group. The tests were conducted at 4 sites within the UK, over both summer and winter seasons. The outcome of the study is summarised in the table below:

Instrument	Outcome of Test
TEOM	Fails the equivalence criteria
FDMS (PM_{10})	Meets the equivalence criteria
FDMS ($PM_{2.5}$)	Meets the equivalence criteria
Partisol 2025	Meets the equivalence criteria
OPSIS SM200	Beta - Meets the equivalence criteria Mass – Meets the equivalence criteria with correction for slope and intercept
BAM	Meets the equivalence criteria with correction for slope

One outcome of the study is that the TEOM analyser cannot be considered equivalent to the European reference method within the UK, even if a 1.3 slope correction factor (or any other factor) is applied.

Wherever it is practicable, local authorities are encouraged to use instruments meeting the equivalence criteria. This should be an important consideration when purchasing new instruments, or replacing existing equipment. It is also possible to upgrade the TEOM analyser to an FDMS instrument by a simple retrofit.

King's College London has been working on a Volatile Correction Model (VCM) to be used to correct the standard TEOM data. The VCM uses FDMS purge measurements to correct TEOM measurements for their loss of volatile material. This facility has been funded by Defra and will form part of their Local Air Quality Management Tools as a web portal.

The web portal requires users to input the location of their TEOM and the dates and time resolution of the measurements they wish to correct. The portal then identifies the closest FDMS instruments, which provide the input into the calculation and inserts the relevant measurements into a spreadsheet that can be downloaded or emailed. The user then pastes their TEOM measurements into the spreadsheet; corrected concentrations are calculated automatically.

Due to the low number of FDMS sites within the required area (150km) North Norfolk District Council is unable to correct the data using The King's College, London, Volatile Correction Model. The model requires two AURN network FDMS fitted monitors within 150km of the observation station.

Figure 2.1 Map(s) of Automatic Monitoring Sites (if applicable)

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	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?
Bacton	Rural Background	X633344	Y333667	NO_2, NO_x SO_2, PM_{10}	TEOM	N	Y	15m	N

2.1.2 Non-Automatic Monitoring

North Norfolk does not have any Air Quality Management Areas so the location of monitoring sites has been based on the maximum potential exposure. The sites were selected to give a maximum curbside concentration and background concentration for each of the major towns within the district.

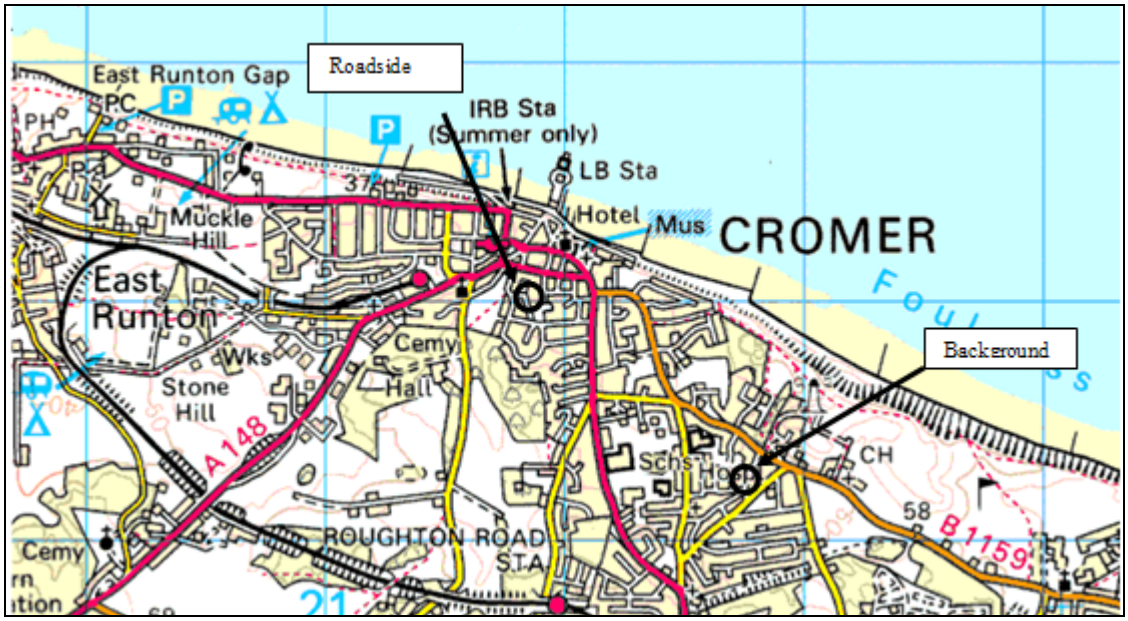
North Norfolk runs a comprehensive network of 10 monitoring sites with 14 diffusion tubes in total. All diffusion tubes are placed following the advice given in the Technical guidance LAQM.TG (09) Annex 1 Monitoring.

The Updating Screening Assessment completed in 2005 reported a hotspot in the village of Hoveton, resulting in a co-location and additional monitoring site, to give a more accurate picture.

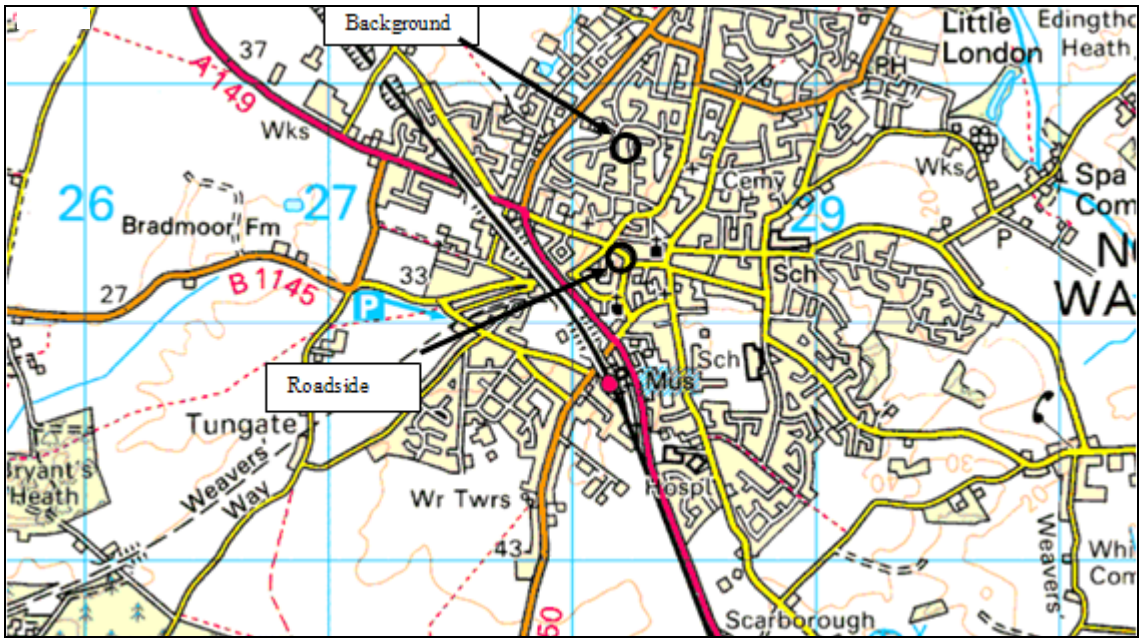
The monitoring program is intended to provide data over the long term while also providing short term information on local pollution hotspots.

Figure 2.2 Map(s) of Non-Automatic Monitoring Sites (if applicable)

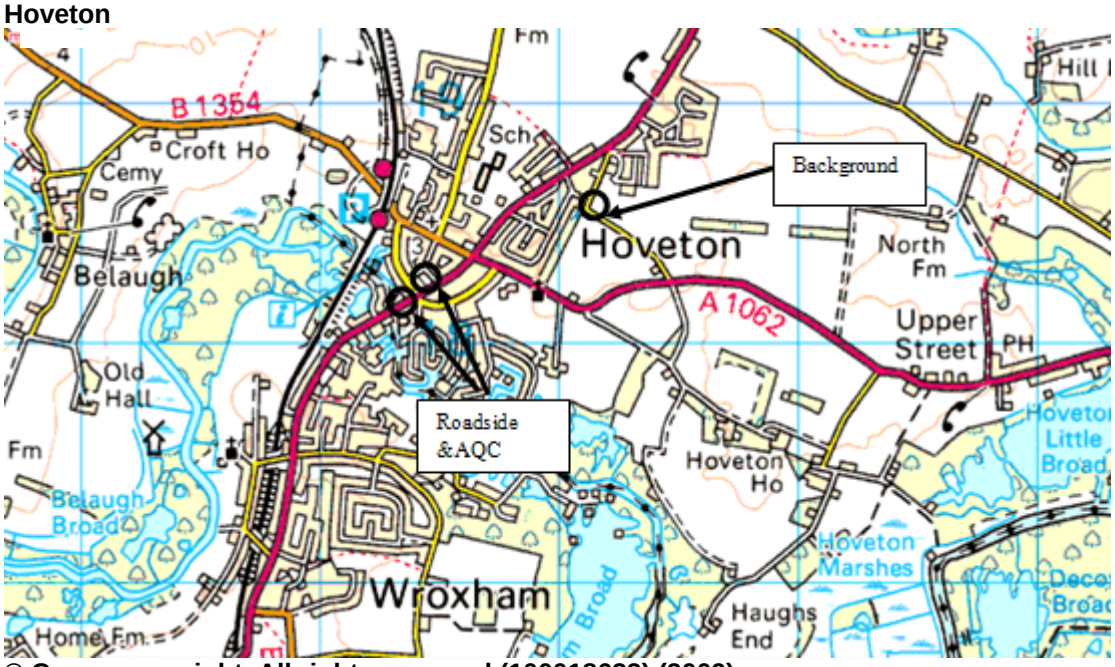
Cromer



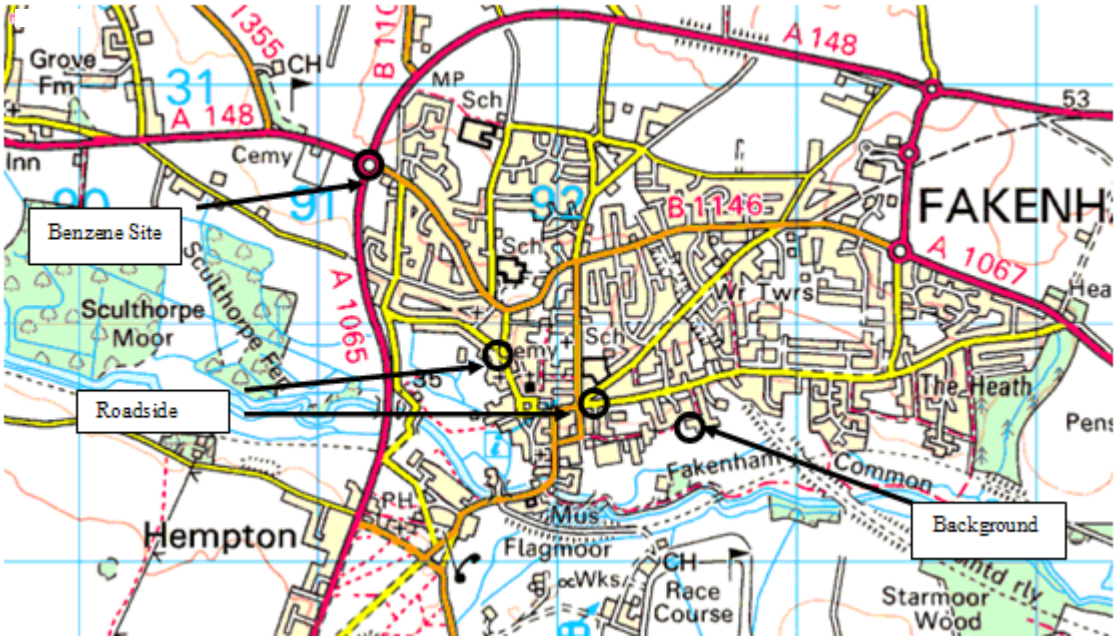
North Walsham



Hoveton



Fakenham



The diffusion tubes used by the Authority are supplied and analysed by Gradko International Limited based in Winchester. The tubes are prepared using 20% TEA / Water.

Gradko have provided the following statement regarding their procedure and accreditation.

'Our Nitrogen dioxide diffusion tube procedures have been amended to follow the guidelines of the Defra Harmonisation document related to the preparation, extraction, analysis and calculation procedures for NO2 passive diffusion tubes. As most of the procedures were already carried out before the introduction of the Guidelines, the amendments are minimal.

Our internal analysis procedures are assessed by UKAS on an annual basis for compliance to ISO17025'.

Gradko have also provided the Nitrogen dioxide Field Intercomparison Project 2008 data, showing that for Jan 08, March 08, July 08, and Jan 09, the Workplace Analysis Scheme for Proficiency (WASP) results were satisfactory. (Further information about WASP and the data supplied is presented in the appendix.)

The bias adjustment factor used to adjust the diffusion tube data, (which was 0.92), was obtained from Air Quality Consultants in the 'Changes to Diffusion Tube Bias Adjustment Factors with 03/09 Issue of the Spreadsheet document supplied by the Review and Assessment Helpdesk.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	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)*	Worst-case Location?
Cromer 1	Roadside	TG 217 422	NOx	N	Y (1m)	1.5m	Y
Cromer 6	Background	TG 227 412	NOx	N	Y (10m)	2m	N
North Walsham 8	Roadside	TG 281 303	NOx	N	Y (5)	1m	Y
North Walsham 7	Background	TG 283 309	NOx	N	Y (10)	1.5m	N
Fakenham 9	Roadside	TF 921 296	NOx	N	Y (1m)	1m	Y
Fakenham 9a	Roadside AQC	TF01868 29640	NOx	N	Y (5m)	1m	Y
Fakenham 4	Background	TF 926 296	NOx	N	Y (10)	30m	N
Hoveton10a	Roadside	TG30318 1	NOx	N	Y (1m)	1m	Y
Hoveton10b	Roadside AQC	TG30918 6	NOx	N	Y (1m)	1m	Y
Hoveton 10c	Roadside	TG30155 18285	NOx	N	Y (1m)	1m	Y
Hoveton 11	Background	TG31133 18622	NOx	N	Y (10m)	25m	N
Bacton 12	Background co-location AQC	TG33344 33667	NOx	N	Y (15m)	15m	N
Bacton 13	Background co-location AQC	TG33344 33667	NOx	N	Y (15m)	15m	N
Bacton 14	Background co-location AQC	TG33344 33667	NOx,	N	Y (15m)	15m	N

New Monitoring Sties (April 2010)

Hoveton15	Roadside	TG 217 422	NOx	N	Y (1m)	1m	Y
Hoveton16	Roadside	TG 227 412	NOx	N	Y (1m)	1m	Y
Hoveton 17	Roadside	TG 281 303	NOx	N	Y (1m)	1m	Y
Hoveton 18	Background	TG 283 309	NOx	N	Y (1m)	25m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

The air pollutant data collected demonstrates that North Norfolk District Council has met all the objectives at all of the monitoring sites. No Detailed Assessment is required for any of the air pollutants.

Automatic Monitoring Data

The data shows that annual mean concentration at all of the monitoring sites is below the 40 µg/m^3 Air Quality Objective. The continuous monitor located at Bacton recorded no exceedances of the 1 hour mean Air Quality Objective (200 µg/m^3).

Table 2.3a Results of Automatic Monitoring for Nitrogen dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2009 [b] %	Annual mean concentrations (µg/m^3)		
					2007 [c, d]	2008 [c,d]	2009 [c]
BAC	Bacton	N	90.66	90.66	10.11µg	8.19µg	8.25µg/

[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.
[d] Annual mean concentrations for previous years are optional.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean (200 µg/m^3) *If the period of valid data is less than 90% of a full year, include the 99.8th %ile of hourly means in brackets.*		
				2006	2007	2008
BAC	Bacton	N	90.66	0	0	0

Table 2.3b Results of Automatic Monitoring for Nitrogen dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2009 [b] %	Number of Exceedences of hourly mean (200 μg/m^3)		
					2007 [c]	2008 [c]	2009
BAC	Bacton	N	90.66	90.66	0	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] Numbers of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

The data shows that annual mean concentration at all of the monitoring sites is below the 40 μg/m^3 Air Quality Objective. The data for Hoveton shows that the site is just below the air quality objective.

The Authority has suffered some data losses due to human error and third party interference with the diffusion tubes.

Table 2.4 Results of Nitrogen dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture %	Annual mean concentrations (μg/m^3) Adjusted for bias		
				2007	2008	2009
1	Cromer	N	50	26.84	31.69	32.35
6	Cromer	N	58.33	10.04	16.96	13.46
8	North Walsham	N	83.33	29.89	31.44	30.60
7	North Walsham	N	75	11.95	16.70	15.05
9	Fakenham	N	83.33	24.25	24.46	24.74
9a	Fakenham	N	50	18.86	21.32	22.40
4	Fakenham	N	58.33	9.27	13.23	10.68
10a	Hoveton	N	75	35.17	36.80	39.89
10b	Hoveton	N	75	37.16	35.84	39.11
10c	Hoveton	N	66.66	37.44	34.03	36.10
11	Hoveton	N	83.33	12.64	15.68	12.89
12	Bacton	N	83.33	13.01	15.39	13.16
13	Bacton	N	83.33	12.09	12.51	12.65
14	Bacton	N	83.33	12.43	15.64	11.33

PM_{10}

In 2006 North Norfolk District Council installed a Rupprecht and Patashnick TEOM, into the Bacton Air Quality Monitoring Station. The TEOM continuously monitor's the concentration of particulate matter in the range of PM_{10} (10 microns or less).

Due to the low number of FDMS sites within the required area (150km) North Norfolk District Council is unable to correct the data using The King's College, London, Volatile Correction Model. The model requires two AURN network FDMS fitted monitors within 150km of the observation station. As a result the previous standard correction factor of 1.3 has been used.

Table 2.5a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2009 [b] %	Annual mean concentrations (μg/m^3)		
					2007 [c, d]	2008 [c,d]	2009 [c]
BAC	Bacton	N	94.78	100	**15.63μg**	**15.85μg**	**14.85μg**

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture 2009 [b] %	Number of Exceedences of daily mean objective (50 μg/m^3)		
					2007 [c]	2008 [c]	2009 [c]
BAC	Bacton	N	94.78	94.78	0	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] Numbers of exceedences for previous years are optional.

Sulphur Dioxide

The Bacton Air Quality Monitoring Station houses a continuous monitor for SO_2,

Bacton Gas Terminals are the only major industrial processes in the District that emit significant amounts of SO_2. Constant monitoring of this pollutant in and around the Bacton area both by the North Norfolk District Council and the terminal operator has shown that the Gas Terminals do not significantly elevate background SO_2 levels.

All other recognised potential hot spots for SO_2, including coal/oil fired boilers of >5MW, conglomerations of domestic solid fuel burning houses and diesel and steam driven train terminus's, were found to be within the statistical thresholds.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations ($\mu g/m^3$)	
				2008	2009
BAC	Bacton	N	98.5	**1.98$\mu g/m^3$**	**2.25$\mu g/m^3$**

Table 2.6 Results of SO_2 Automatic Monitoring: Comparison with Objectives

Site	Location	Within AQMA	Data Capture for monitoring period [a] %	Data Capture 2009 [b] %	Number of Exceedences of: ($\mu g/m^3$)		
					15-minute Objective (266 $\mu g/m^3$)	1-hour Objective (350 $\mu g/m^3$)	24-hour Objective (125 $\mu g/m^3$)
BAC	Bacton	N	98.5	98.5	0	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] This column shows 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%

Other pollutants monitored

During the Updating and Screening Assessment undertaken in 2003 and 2006 it was concluded that there was no evidence to indicate that further pollutant monitoring was required. Since the last Updating and Screening Assessment in 2006 there have been no new industrial or commercial processes that would indicate any increase in the ambient concentration of any of the remaining pollutants (1-3 Butadiene, Lead or Carbon monoxide).

2.2.1 Summary of Compliance with AQS Objectives

North Norfolk District Council has examined the results from monitoring in the district. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

In the last Updating and Screening Assessment North Norfolk District Council reported on the proposed combined heat and power developments at Tattersett and West Raynham on the western side of North Norfolk. The proposals were at a pre-planning discussion stage and are still ongoing. There is no further detail to report at this stage.

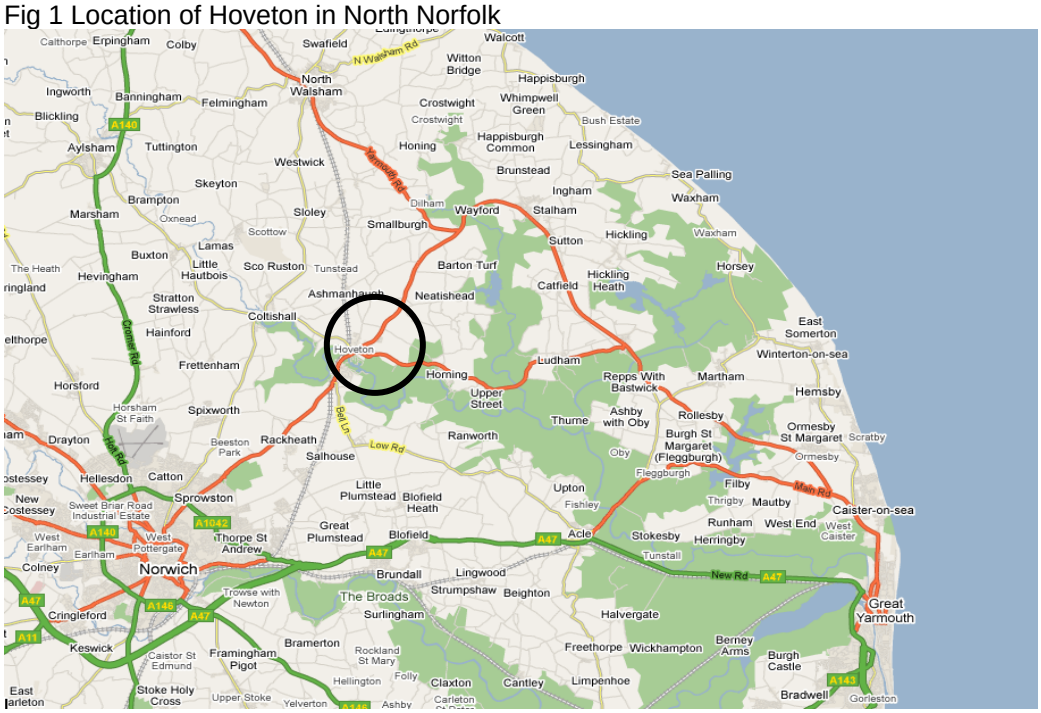
3.1 Road Traffic Sources

Norfolk County Council, who are the local Transport Authority have provided Annual Average Daily traffic flows for the major roads into and out of the District. These are the A1151 North of Hoveton, the A149 North Walsham to Cromer, the A140 Norwich to Cromer, and both the A148 and A1067 at Fakenham. The data shows that, generally, the traffic volumes are very low with the A149 in Cromer having the highest average daily traffic flows of between 11,484 (Prince of Wales Road) and 11,855 (Mount Street) vehicles. The bypasses round North Walsham and Fakenham both have average daily traffic flows of approximately 11,100 vehicles.

Since the last Updating and Screening assessment in 2006 and the subsequent progress reports in 2007 and 2008 there have been no significant road developments in the North Norfolk area.

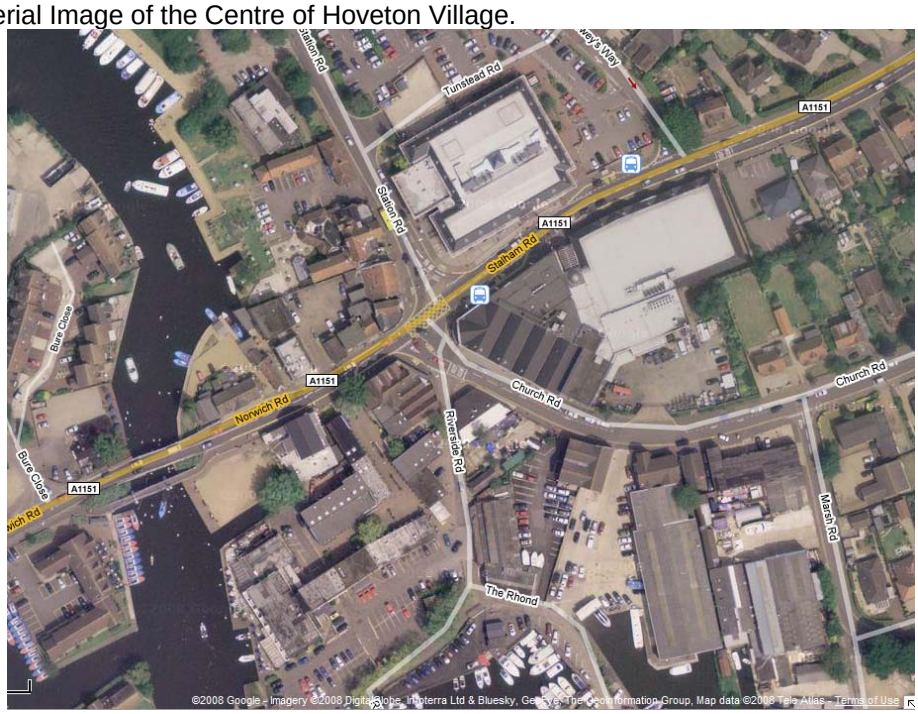
The eastern side of North Norfolk is cut off from road access by a system of freshwater rivers and lakes known as The Norfolk Broads. Access to the eastern side of North Norfolk is restricted to one of three river crossings, Acle Bridge, Coltishall Bridge and Wroxham Bridge, which crosses the River Bure and forms both the boundary and centre of the villages Wroxham and Hoveton. Wroxham and Hoveton are popular tourist villages and are considered to be the home of the Norfolk Broads.

Fig 1 Location of Hoveton in North Norfolk



The two villages have grown from the tourist attraction provided by the Norfolk Broads. The area is a popular holiday location with a mixture of permanent residential and holiday accommodation. The centre of Hoveton is the main hub for both villages with a mixture of hotels, restaurants, cafés, pubs and retail including food. The area surrounding the river and bridge crossing is dominated by leisure based facilities as well as being a main starting point for boating holidays and river daytrips.

Fig 2 Aerial Image of the Centre of Hoveton Village.



The nitrogen dioxide hotspot is located on a busy road junction on the Hoveton side of Wroxham bridge (see fig 2) The traffic flowing through the junction is restricted at both ends; firstly by the Wroxham Bridge which has a 20mph speed restriction and on the other side of the junction a signal operated pedestrian crossing, closely followed by two mini roundabouts. See fig 3.

Vehicles using the junction against the flow of traffic cause queues of stationary traffic to build up towards the bridge. When this blockage occurs in conjunction with the pedestrian crossing and delays at the two mini roundabouts, stationary traffic can build up all the way through the centre and back over the Wroxham Bridge and into Wroxham village.

While the area is popular all year the summer months show a significant rise in tourist population and general visitors to the area.

Fig 3 Photographs of Hoveton Village Centre.
Fig 3a View east from Wroxham Bridge towards the centre of Hoveton

Fig 3b View west from the roundabouts towards the centre of Hoveton

Norfolk County Council provides traffic data for use in the air quality assessment. The A1151 Norwich to Stalham road is the main road that goes through Hoveton and carries the bulk of traffic through the village. The village is connected to neighbouring communities along the River Bure by two roads, the B1354 Belaugh Road which becomes the Coltishall Road and heads west towards Coltishall and the A1062 Horning Road leading to Horning and the majority of the broads system to the east of Hoveton.

Traffic data for the area is limited and the closest data collection point is the A1151 Stalham Road, situated just north of Hoveton. Unfortunately the monitoring point is just north of the junctions with the B1354 Belaugh Road and the A1062 Horning Road.

The data provided was collected in 2007-8 and showed an Annual Average Daily Traffic count of 9260 vehicles of which 3% were HGVs.

Hoveton experiences a significant seasonal variation in traffic flows with higher concentration in the summer months due to the volume of tourists to the area. Additionally the area experiences variations in weekly traffic flows with the highest traffic flows experienced during boating holiday change over periods (Friday and Monday)

While some of the tourists may only visit the village there is also a large range of local holiday homes and hotels.

The area is popular with local and regional visitors looking to use the facilities offered by the broads and surrounding area

While the increase in local population during the summer months, results in an increase in traffic volumes it also has a side effect of slowing the traffic and increasing the number of uses of the pedestrian crossing resulting in stationary and queuing traffic.

Other local developments proposed for the future include the provision of more housing in the immediate area under the Local Development Framework (400 homes), the building of an Eco Town 4 miles south of Hoveton (5000 homes) and the ear marking of a development triangle north east of Norwich (30,000 homes). These proposals have increased the level of concern as the increasing population within such a small geographical area will lead to an increase in traffic not only visiting the village but also accessing the eastern side of North Norfolk and the Great Yarmouth area.

3.2 Other Transport Sources

Airports

North Norfolk does not have any passenger airports within the boundary of the District. The area is home to a number of small airfields, predominantly with grass landing strips.

The uncertainty over the end use of the closed RAF Coltishall site has now been removed with the development of HMP Coltishall, currently under construction

Railways

According to LAQM.TG(09), diesel and coal fired steam trains can cause elevated SO2 levels when trains are stationary, with engines idling, for periods of 15 minutes or more, such as at terminus.

Within North Norfolk there is a small railway network linking Holt, Sheringham, Cromer, North Walsham and Hoveton on a single line to Norwich. The passenger trains on this line are diesel engines but do not rest at any of the stations and so do not idle for up to 15 minutes at any location.

Freight wagons from the British Pipeline Agency (BPA) at North Walsham, which transports the condensate produced at the Bacton Gas Terminal, are hauled by diesel trains. For Health & Safety reasons, the trains at no time leave their engines idling at the BPA site and again the line is single track.

Between Holt and Sheringham the North Norfolk Railway operates a combination of diesel and steam locomotives mainly for the tourist industry. The station is situated on the edge of Sheringham Town Centre and close to residential housing. The line is single track and there is only ever one train operating at any one time. Having contacted the operator they have confirmed that trains do not leave their engines idling for up to 15 minutes.

3.3 Industrial Sources

North Norfolk District Council is in the process of consultation over a proposed waste vehicle tyre recycling plant to be located on the Tattersett Business Park near Fakenham. The application looks to resolve a serious problem with a large number of vehicle tyres that are already located on the site and pose a significant environmental and public hazard. The consultation is at a pre-planning stage and is also related to another pre planning consultations for other waste recycling / processing facilities and a biomass combined heat and power plant combusting a compost like product formed from processed domestic waste.

Additionally the initial proposal includes a mechanical and biological treatment plant to separate domestic waste into plastics, metals and biological material. Discussions are underway with the developers to ensure emissions do not cause a significant deterioration to local air quality. It is anticipated that this will form part of further air quality reports.

3.4 Commercial and Domestic Sources

North Norfolk District Council is in the process of pre planning consultation for two biomass combined heat and power plants, one to be located on the Raynham Business Park and the other to be located on the Tattersett Business park, both near Fakenham.

The two plants will operate very differently with the Raynham plant combusting clean wood produced as waste by local saw mills; the Tattersett plant will combust a compost like material produced by the processing of domestic waste.

While discussions on air quality issues are already underway, It is expected that the progress of this application will be reported in future air quality reports.

Nowhere in North Norfolk does the density of houses burning solid fuel as a primary source of heating, exceed 100 per 500m x 500m,-the threshold criteria documented in LAQM.TG (03). There is therefore no concern over SO2 levels resulting from domestic fires.

North Norfolk District Council has, in the last 12 months, responded to 5 applications for IPPC statements supporting grants for funding of small scale domestic biomass combustion heating systems to replace individual domestic boilers and for use on agricultural estates to provide heat. The applications are based on energy efficiency and the combustion system design is aimed at achieving complete combustion through high temperature treatment of processed virgin fuels.

3.5 New Developments with Fugitive or Uncontrolled Sources

North Norfolk District Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4 Conclusions and Proposed Actions

4.1 Conclusions from New Monitoring Data

The Authority has met all the National Air Quality Objectives and there is no requirement to proceed to a detailed assessment for any of the monitored pollutants.

Further monitoring is required in Hoveton to provide confidence in meeting the nitrogen dioxide annual objective. The Authority has already increased the diffusion tube monitoring to determine the boundary of the hotspot and has applied for a Section 82 grant to undertake continuous monitoring in the area.

The current reported annual mean is considered to be high and this is due to data losses experienced during October and December 2009 which would normally help to lower the annual mean.

4.2 Conclusions relating to New Local Developments

THe authority will continue with the pre-planning discussions on the Tattersett and West Raynham developments and will report any significant developments in future reports.

North Norfolk District Council is not aware of any other new developments that are considered to have an impact on air quality

4.3 Proposed Actions

North Norfolk District Council is waiting to hear the response to the Section 82 grant application and should this be approved, it will undertake the continuous roadside monitoring of nitrogen oxides and particulate matter air pollution resulting from motor vehicles. The Authority seeks to install a roadside PR4 enclosure housing a Teledyne API M200E Chemiluminescent Ambient NOx Analyser and a Met One Beta-attenuation PM10 mass monitor.

The Authority has already installed four new diffusion tube monitoring sited surrounding the area to determine the boundary of the hotspot.

5 References

David Green, Timothy Baker and Gary Fuller, (May 2007) “King’s College London Volatile Correction Model for PM_{10}“King’s College London

Part IV of the Environment Act 1995, Local Air Quality Management (2009), Policy Guidance LAQM. PG (09). DEFRA

Part IV of the Environment Act 1995, Local Air Quality Management (2009), Technical Guidance LAQM. TG (09). DEFRA

Workplace Analysis Scheme for Proficiency information taken from the Health and Safety Laboratory Website: http://www.hsl.gov.uk/centres/pt/prof_intro.html

Internet Sites Used

http://www.airquality.co.uk

http://www.hsl.gov.uk/centres/pt/prof_intro.html

http://www.defra.gov.uk/environment/airquality/local/eval/index.htm

Appendices

Appendix A: QA:QC of Diffusion Tube Data

Gradko Statement

'Our Nitrogen dioxide diffusion tube procedures have been amended to follow the guidelines of the Defra Harmonisation document related to the preparation, extraction, analysis and calculation procedures for Nitrogen dioxide passive diffusion tubes. As most of the procedures were already carried out before the introduction of the Guidelines, the amendments are minimal. Our internal analysis procedures are assessed by UKAS on an annual basis for compliance to ISO17025'

Proficiency Testing (WASP)

All analytical laboratories should operate a quality assurance system which includes internal quality control procedures, participation in proficiency testing schemes, use of reference standards and certification/accreditation to a recognised standard such as ISO 9001 or BS EN ISO/IEC 17025. Of these approaches, only proficiency testing schemes or the use of certified reference materials can establish the bias and accuracy of the results.

Proficiency testing schemes operate by providing participating laboratories with samples containing specified material but the actual quantity of the substance is known only to the organisers. The laboratory analyses the samples, preferably as part of their normal routine, and reports the results to the scheme organisers. The laboratory is then provided with a report showing how closely their results agree with the accepted value and, where necessary, can then take appropriate action to improve performance.

Regular participation in a proficiency-testing scheme provides independent verification of the analytical competence of a laboratory and shows a commitment to the maintenance and improvement of performance. It demonstrates to the public, customers, accreditation bodies, regulators, and management that analytical procedures are under control and gives analysts confidence that the service which they provide will withstand scrutiny.

The Proficiency Testing Schemes is run by the Heath and Safety Laboratory who assesses the performance of laboratories making roadside measurements of environmental nitrogen dioxide concentrations. Four samples are sent to participants every 3 months. Laboratories have one month to analyse the sample (preferably alongside real samples) and report the results.

Gradko WASP Data

Gradko have also provided the NO_2 Field Intercomparison Project 2008 data showing

WASP results for 01.08 to 01.09 were as follows:
Jan08 Round 100 : Ref Value : 1.36ugNO2 Measured Value : 1.34 ugNO2 Z score -0.1 Satisfactory
1.47ugNO2 Measured Value : 1.50 ugNO2 Z score 0.2 Satisfactory

March08 Round 101 Ref Value : 0.92ug NO2 Measured Value : 0.95ugNO2 Z Score 0.2 Satifactory
Ref Value : 1.86ugNO2 Measured Value : 1.85ugNO2 Z Score 0 Satisfactory

July 08 Round 102 Ref Value : 1.37ugNO2 Measured Value : 1.42ugNO2 Z Score 0.3 Satisfactory
Ref value : 2.28ugNO2 Measured Value : 2.21ugNO2 Z score -0.2 Satisfactory

Jan09 Round 104 Ref Value : 2.02ugNO2 Measured Value : 1.85ugNO2 Z Score -0.7 Satisfactory
Ref Value : 1.22ug NO2 Measured Value : 1.21ugNO2 Z Score - 0.1 Satisfactory

Appendix B: Bias Adjustment Factor

Diffusion Tube Bias Adjustment Factors

The Bias factor used was 0.99 and obtained using the spreadsheet supplied by the National Air Quality Review and Assessment Website. In order to obtain an appropriate bias adjustment factor the following information was used

Laboratory that supplied the diffusion tubes: Gradko International
Preparation method: 50% TEA in Acetone.

http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube310310.xls

Appendix C: Hoveton Diffusion Tube Data

NO_2 Diffusion Tube Monitoring Data 2008 - 2009

Monitoring Site	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Mean	Corrected
														0.89
Hoveton 10a	40.90			40.01	37.05	39.36	42.54	45.59	44.77	40.13	35.86	33.82	40.00	36.80
Hoveton 10b	38.91			36.28	35.78	34.04	40.08	40.56	43.80	44.81	42.94	32.34	38.95	35.84
Hoveton 10c	36.88			40.14	32.93		32.00	40.90	38.07	49.79		25.18	36.99	34.03
Hoveton 11	13.59			11.33	11.11	10.24	18.72	19.78	24.11	25.25	20.42	15.85	17.04	15.68

NO_2 Diffusion Tube Monitoring Data 2009 – 2010

Monitoring Site	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Mean	Corrected
														1.05
Hoveton 10a	35.61	33.72	41.39	38.14	34.70	44.66		38.03		40.32	40.32	33.06	38.00	39.89
Hoveton 10b	32.34			36.77	35.07	47.54		37.75		37.64	37.64	33.26	37.25	39.11
Hoveton 10c	32.33	34.57	38.92	33.26		31.91		34.97		34.98	34.98	33.54	34.38	36.10
Hoveton 11	11.98	9.99	7.48	9.07	10.53	12.73		15.53		16.48	16.48	12.53	12.28	12.89