Ashfield District Council

Local Air Quality Management Updating and Screening Assessment 2009

May 2009

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Executive Summary

The aim of this report is to collate and detail the progress on implementing local air quality management across Ashfield by presenting a comprehensive Updating and Screening Assessment (USA) of local air quality including new monitoring data and any new developments which might affect local air quality.

This assessment represents the tenth report on air quality produced by Ashfield District Council. It is recommended that the report is read in conjunction with the preceding reports.

A principal approach to the third round of review and assessment established by the Government and Devolved Administrations is the intention that local authorities undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. The review and assessment process is divided into two steps (i.e. two levels of assessment) these being an 'Updating and Screening Assessment' (USA) and a 'Detailed Assessment' (DA).

The Updating and Screening Assessment uses a checklist approach to identify those matters that have changed since the previous round of review and assessment, and which now require further assessment. To assist local authorities to maximise the lessons learnt through previous review and assessments Defra have published revised Technical Guidance, LAQM.TG (09). The Updating and Screening Assessment will address new monitoring data, new objectives, new sources of emissions or significant changes to existing sources, either locally or within neighbouring authorities, which might affect air quality. Where such changes are identified, simple screening tools have been made available to determine whether the exceedance of an air quality objective may occur.

Where the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority is then required to undertake a Detailed Assessment. The aim of the Detailed Assessment is to identify with reasonable certainty whether or not a likely exceedance would occur. The assumptions within a Detailed Assessment are therefore considered in greater detail than in the screening process and use data quality assured to a high standard. This is to ensure that the authority is confident in the decisions it reaches. Where a likely exceedance of a pollutant is identified, the assessment is required to be sufficiently detailed to determine both its magnitude and geographical extent. Local Authorities are restricted from declaring an Air Quality Management Area (AQMA) unless a Detailed Assessment has been completed.

Ashfield District Council has undertaken an Update and Screening Assessment of local air quality within the district and has demonstrated that all the air quality objectives continue to be achieved across Ashfield.

There is therefore no requirement to proceed to a Detailed Assessment for any of the Air Quality Strategy pollutants as a result of air quality data reported within this Update and Screening Report.

DEFRA advise that local authorities will not need to consult widely on local air quality reports however they have advised that results from this process should be made available to the public.

This report and associated appendices will be made available to the public via libraries in the district, at the Council Offices in Kirkby-in-Ashfield and on the Council's Web Site. The Nottinghamshire Air Quality Steering Group, established during the first round of review and assessment to co-ordinate consultation across Nottinghamshire authorities, will continue to be involved in Local Air Quality Management.

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Acknowledgements

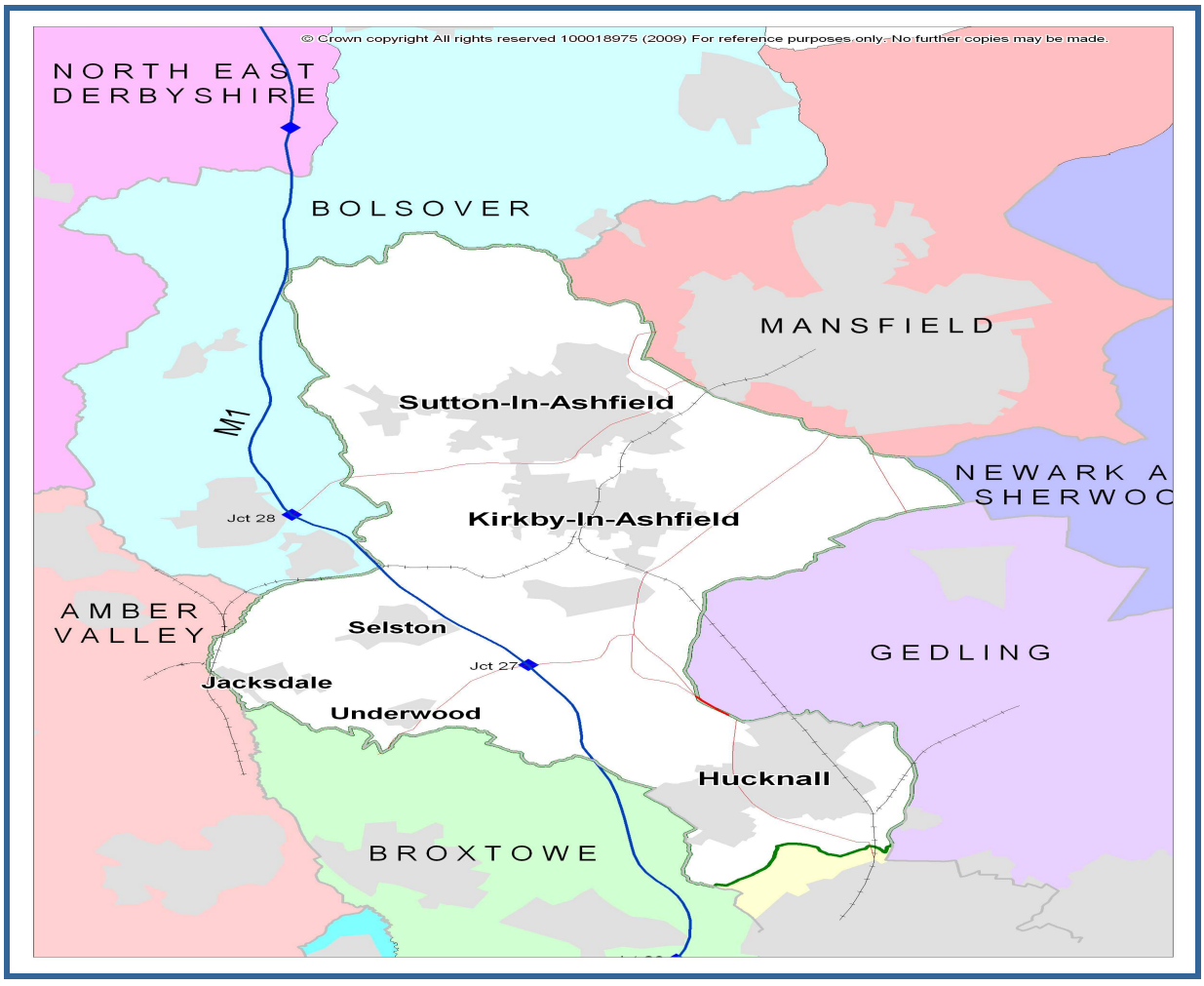
The Council would like to thank those who have provided help, co-operation, information and resources to enable Ashfield District Council to undertake this Updating and Screening Assessment.

1 Introduction

1.1 Description of Local Authority Area

Ashfield District Council was formed on the 1st April, 1974, and comprises the former Urban Districts of Hucknall, Kirkby-in-Ashfield and Sutton-in-Ashfield, together with the parishes of Annesley, Felley and Selston, which were part of the Basford Rural District.

The district covers an area of 10,956 hectares and is located on the western side of Nottinghamshire. It adjoins five Districts within the County, including Nottingham City to the south and Mansfield to the north, and also adjoins Derbyshire. It has an estimated population of 115,650 (mid-2006 ONS). The majority of this population, together with associated housing, jobs and services, are concentrated within the three main towns of Sutton-in-Ashfield, Hucknall and Kirkby-in-Ashfield, together with 3 large villages in the substantial rural area mainly to the west of the M1 motorway.



The District is well served by road links, notably the M1, A38 and the Mansfield Ashfield Regeneration Route (MARR). The Robin Hood railway line (which runs from Nottingham to Worksop) has stations at Kirkby-in-Ashfield, Hucknall and Sutton Parkway. Hucknall is also a terminus for the recently constructed Nottingham Express Transit (NET) tram route to Nottingham.

The main settlements share strong historic, economic and cultural links based around the growth and subsequent decline of coal mining, textiles and engineering industries. Approximately one third of the District lies within the Nottingham-Derby Green Belt. Large parts of the landscape have been recovered from the era of mineral extraction, with many areas successfully reclaimed for recreational use or development land. The District has three significant retail centres in each of the main towns.

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.

The aim of this report is to collate and detail the progress on implementing local air quality management across Ashfield by presenting a comprehensive Updating and Screening Assessment (USA) of local air quality including new monitoring data and any new developments which might affect local air quality.

This assessment represents the tenth report on air quality produced by Ashfield District Council. It is recommended that the report is read in conjunction with the preceding reports, Air Quality Review and Assessment August 2001, Updating and Screening Assessment May 2003, Detailed Assessment April 2004, Detailed Assessment December 2004 and Progress Report April 2005, Update and Screening Assessment May 2006 and Progress Reports 2007, 2008.

A principal approach to the assessment, established by the Government and Devolved Administrations, is to undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. The review and assessment process is divided into two steps (i.e. two levels of assessment) these being an 'Updating and Screening Assessment' (USA) and a 'Detailed Assessment' (DA).

The Updating and Screening Assessment uses a checklist approach to identify those matters that have changed since the previous round of review and assessment, and which now require further assessment. The Updating and Screening Assessment will address new monitoring data, new sources of emissions or significant changes to existing sources, either locally or within neighbouring authorities, and any other changes that might affect air quality. Where such changes are identified, simple screening tools have been made available to determine whether the exceedance of an air quality objective may occur. It should be noted that the format of this report differs slightly from previous reports. While the Updating and Screening checklists are broadly the same, this assessment follows a source by source approach as opposed to consideration of each pollutant in turn. This follows the guidance laid down in Technical Guidance LAQM.TG (09).

Where the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority is then required to undertake a Detailed Assessment. The aim of the Detailed Assessment is to identify with reasonable certainty whether or not a likely exceedance would occur. The assumptions within a Detailed Assessment are therefore considered in greater detail than in the screening process and use data quality assured to a high standard. This is to ensure that the authority is confident in the decisions it reaches. Where a likely exceedance of a pollutant is identified, the assessment is required to be sufficiently detailed to determine both its magnitude and geographical extent.

Public Exposure

The Regulations make clear that likely exceedances of the objectives should be assessed in relation to '*the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present.*' Review and assessments should thus be focussed on those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Authorities are advised not to consider exceedances of the objectives at any location where public exposure would not be realistic. Some examples of where the objectives should and should not apply are summarised in Table 1.1 below.

Table 1.1: Example where air quality objectives should/should not apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Residential Gardens. Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.

1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

1.3 Air Quality Objectives

Table 1.2 provides a summary of the sources and health effects of the regulated pollutants that are subject to assessment.

Table 1.2: Sources and health effects of pollutants

Pollutants	Sources	Health effects
Nitrogen Dioxide	Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. Nitric oxide is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidized, mainly by ozone (O3), to nitrogen dioxide (NO2), which can be harmful to health. Nitrogen dioxide and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NOX).	Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.
Fine Particles (PM10, PM2.5 and PM1)	Fine particles are composed of a wide range of materials arising from a variety of sources including: *combustion sources* (such as road traffic); *secondary particles,* mainly sulphate and nitrate formed by chemical reactions in the atmosphere,	Particles are measured in a number of size fractions. Most monitoring is currently focused on PM10, but the finer fractions such as PM2.5 and PM1 are becoming of increasing interest in terms of health effects. Fine particles can be carried deep into the lungs

	and often transported from far across Europe; *coarse particles,* suspended soils and dusts (eg, from the Sahara), sea salt, biological particles and particles from construction work.	where they can cause inflammation and a worsening of the condition of people with heart and lung diseases. In addition, they may carry surface-absorbed carcinogenic compounds into the lungs.
Sulphur Dioxide	Sulphur dioxide (SO2) is produced when a material, or fuel, containing sulphur is burned. Globally, much of the SO2 in the atmosphere comes from natural sources, but in the UK the predominant source are power stations burning fossil fuels, principally coal and heavy oils. Widespread domestic use of coal can also lead to high local concentrations of SO2.	Even moderate concentrations may result in a fall in lung function in asthmatics. Tightness in the chest and coughing occur at high levels, and lung function of asthmatics may be impaired to the extent that medical help is required. Sulphur dioxide pollution is considered more harmful when particulate and other pollution concentrations are high.
Benzene	Benzene is a volatile organic compound (VOC) which is a minor constituent of petrol. The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source (70% of total).	Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.
1,3-Butadiene	1,3-butadiene, like benzene, is a VOC emitted into the atmosphere principally from fuel combustion of petrol and diesel vehicles. 1,3-butadiene is also an important chemical in certain industrial processes, particularly the manufacture of synthetic rubber.	Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.
Carbon Monoxide	Carbon monoxide (CO) is a colourless, odourless poisonous gas produced by incomplete, or inefficient, combustion of fuel. It is predominantly produced by road transport, in particular petrol-engine vehicles.	This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.
Lead	Since the introduction of unleaded petrol in the UK there has been a significant reduction in urban lead levels. In recent years industry, in particular secondary non-ferrous metal smelters, have become the most significant contributors to emissions of lead. The highest concentrations of lead and heavy metals are now therefore found around these installations in industrial areas.	Even small amounts of lead can be harmful, especially to infants and young children. In addition, lead taken in by the mother can interfere with the health of the unborn child. Exposure has also been linked to impaired mental function, visual-motor performance and neurological damage in children, and memory and attention span.

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 1.3. This table shows the objectives in units of micrograms per cubic metre µg/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 1.3: Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/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 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/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

This Update and Screening Assessment represents the tenth report on air quality produced by Ashfield District Council. It is recommended that the report is read in conjunction with the preceding reports, Air Quality Review and Assessment August 2001, Updating and Screening Assessment May 2003, Detailed Assessment April 2004, Detailed Assessment December 2004, Progress Report April 2005, Update and Screening Assessment May 2006 and Progress Reports 2007, 2008.

Table 1.4 provides details of the abovementioned reports and highlights their respective outcomes.

Table 1.4: Previous Review and Assessments

Report	Date of Report	Outcomes
Stage One and Two Air Quality Assessment	May 2000	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead:** No need for further assessment **Nitrogen Dioxide:** Further review and assessment immediately adjacent to Rolls Royce Fuel Burning Engine Facility, Hucknall. **Particles PM_{10}:** Further review and assessment adjacent to M1 Motorway. **Sulphur Dioxide:** Further review and assessment immediately adjacent to Kings Mill Hospital Boiler Plant
Stage Three Air Quality Assessment	August 2001	**Nitrogen Dioxide:** Further review and assessment undertaken immediately adjacent to Rolls Royce Fuel Burning Engine Facility, Hucknall. Monitoring/Modelling identified no need to declare an AQMA. **Particles PM_{10}:** Further review and assessment undertaken at two locations adjacent to M1 Motorway. Monitoring/Modelling identified no need to declare an AQMA. **Sulphur Dioxide:** Further review and assessment undertaken immediately adjacent to Kings Mill Hospital Boiler Plant. Monitoring results were well below modelled predictions as the Hospital had switched to a low sulphur fuel source.

		In addition, the Hospital would be switching to a CHP plant in the near future. Therefore no need to declare an AQMA.
Update and Screening Assessment	May 2003	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide:** The updating and screening assessment for the above pollutants was completed against the checklist criteria contained in Technical Guidance LAQM.TG (03). It was concluded that the Air Quality Objectives prescribed for these pollutants would be achieved across Ashfield and therefore there was no requirement to undertake a detailed assessment for these pollutants. **Particles PM_{10}:** The updating and screening assessment for PM_{10} was completed against the criteria listed in Technical Guidance LAQM.TG (03). It was concluded that the Air Quality Objectives would be met across Ashfield, except in the location of Pinxton Green where the updating and screening assessment indicated that the 24-hour mean objective may be compromised. It was therefore recommended that a detailed assessment for PM_{10} be undertaken at this location.
Detailed Assessment	April 2004	Detailed assessment for Particles PM_{10} undertaken at Pinxton Green. Monitoring carried out adjacent to a single dwelling within close proximity to the M1 Motorway was completed against the criteria contained within the LAQM Technical Guidance (03). It was concluded that the air quality objectives for PM_{10} achieved in this location and no need to declare an AQMA.
Detailed Assessment	December 2004	An initial assessment was undertaken for Oakfield Avenue and presented in the Updating and Screening Assessment (USA) reported in May 2003. The report concluded that there was no requirement for Ashfield to go to a detailed assessment based upon the data evaluated at this location. However, subsequent monitoring at this location revealed that there were three significant episodes of PM_{10} recorded. Therefore, a detailed assessment was carried out for Particles PM_{10}. It was concluded that the air quality objectives for PM_{10} achieved in this location and no need to declare an AQMA.
Progress Report	April 2005	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide, Particles PM_{10}:** A review of air quality measurement during 2003/04 demonstrated that all the air quality objectives continued to be achieved across Ashfield. There was no requirement to proceed to a detailed assessment for any of the Air Quality Strategy pollutants as a result of air

		quality data reported within this Progress Report.
Update and Screening Report	April 2006	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide, Particles PM_{10}:** A review of air quality measurement during 2003/04 demonstrated that all the air quality objectives continued to be achieved across Ashfield. There was no requirement to proceed to a detailed assessment for any of the Air Quality Strategy pollutants as a result of air quality data reported within this Progress Report.
Progress Report	April 2007	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide, Particles PM_{10}:** A review of air quality measurement during 2003/04 demonstrated that all the air quality objectives continued to be achieved across Ashfield. There was no requirement to proceed to a detailed assessment for any of the Air Quality Strategy pollutants as a result of air quality data reported within this Progress Report.
Progress Report	April 2008	**Benzene, 1,3-Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide, Particles PM_{10}:** A review of air quality measurement during 2003/04 demonstrated that all the air quality objectives continued to be achieved across Ashfield. There was no requirement to proceed to a detailed assessment for any of the Air Quality Strategy pollutants as a result of air quality data reported within this Progress Report.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Ashfield District Council currently has a Chemiluminescence NO-NO_2-NO_x analyzer (Thermo model 43 C NO_X analyser - USA-EPA approved NO_2 analyser) and an ESM Sequential Particulate Sampler, Type FH-95-SEQ which are both approximately 8/9 years old. These are jointly housed within a "walk in" secure static trailer. Owing to their age, both pieces of air quality monitoring equipment have had a number of significant breakdowns, which are becoming increasingly common. More importantly the manufacturers have also stated that they will cease support for the particulate sampler unit. This unit is the only one of this type currently in use in England at the present time and the manufacturers have stated that sourcing the parts is not viable.

Historically, this has increasingly led to loss of a considerable number of readings and an inability to create a suitable local bias factor. Unfortunately, the Council has experienced major operational/mechanical problems with the equipment that has resulted in the monitoring equipment being out of service for 10 months of this previous year.

Consequently, there are no valid automatic monitoring data submitted within this report. Ashfield District Council submitted a bid to Defra's Air Quality Grant Scheme (April 2008) for the purchase of replacement automatic monitoring equipment. This was to enable the Council provide a reliable source of data for the reassessment on completion of the M1 works and to continue with accurate, reliable monitoring of air quality within the district. Unfortunately, the bid was unsuccessful.

2.1.2 Non-Automatic Monitoring

In addition to the automatic monitoring, the Council measures Nitrogen Dioxide by non-automatic means. This is carried out by number of diffusion tubes being placed at variety of locations throughout the district. Diffusion tubes are passive samplers: they consist of small plastic tubes containing a chemical reagent to absorb the pollutant to be measured directly from the air. They are categorised as an "indicative" monitoring technique. They are useful for indicating long-term average Nitrogen Dioxide concentrations and highlighting areas of high Nitrogen Dioxide concentration. This form of monitoring has relatively high uncertainty, in the case of diffusion tubes quoted as ± 25%. Although, it should be noted that a positive bias is more common than negative one (although the latter is certainly not rare).

Map 2.1 and Table 2.1 detail the location of relevant diffusion tubes within the district.

Map 2.1: Location of Non-Automatic Monitoring Sites

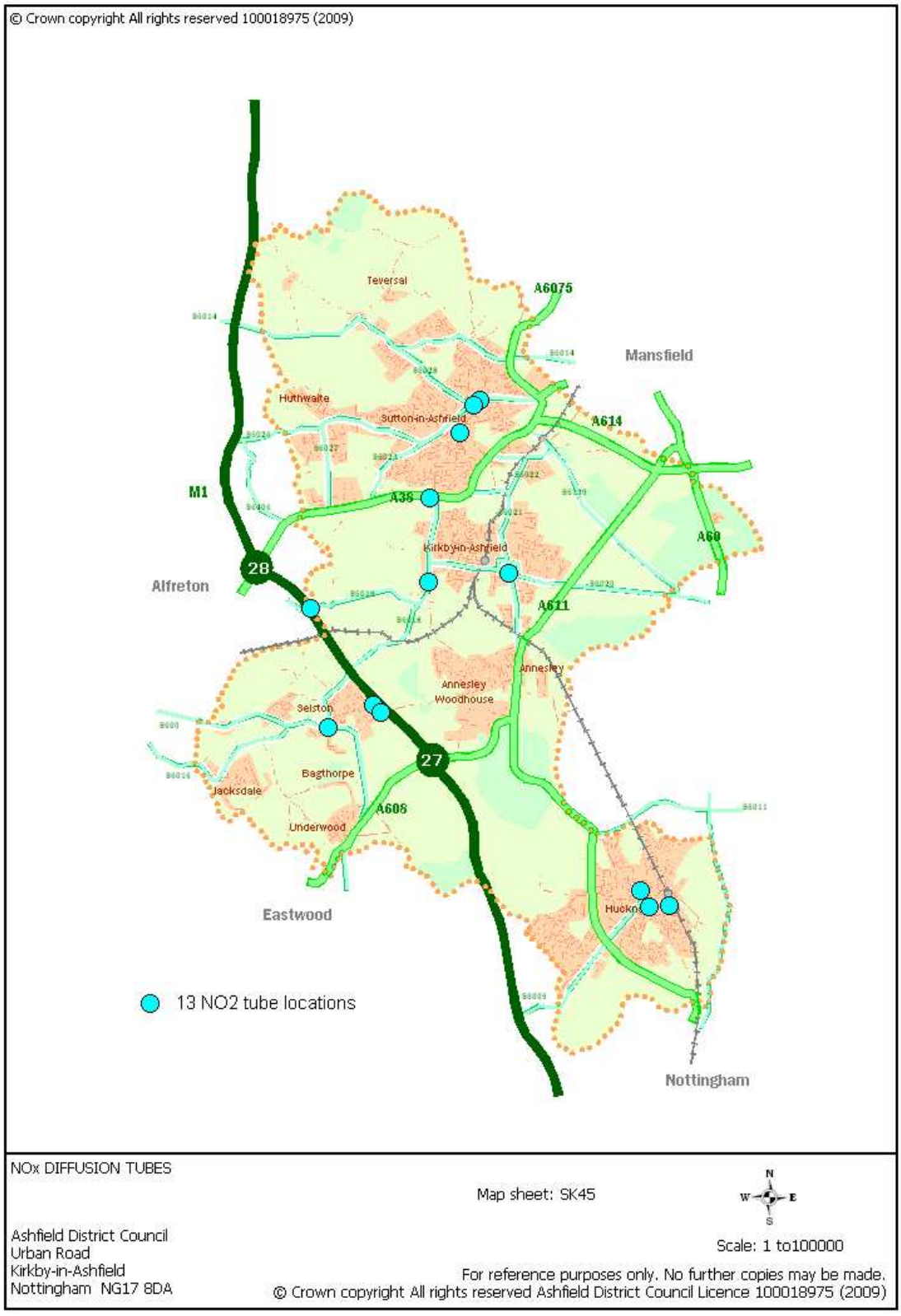


Table 2.1: Details of Non- Automatic Monitoring Sites

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	Worst-case Location ?
Sutton Outram Street	Roadside/ Urban Centre	449628 358967	NO_2	N	3	1.5	Y
A 38 Fire Station	Near Road	448987 357610	NO_2	N	5.6	10	Y
Selston Nottingham Road	Kerbside	446852 352754	NO_2	N	14	1	Y
Hucknall High Street	Roadside	453477 349315	NO_2	N	5.3	2	Y
Hucknall Croft/Beardall St	Urban background	453631 348972	NO_2	N	2.2	2	Y
Kirkby Naggs Head	Urban centre/Road side	450673 356017	NO_2	N	3.3	5	Y
Forest Close M1	Near Road	447968 353086	NO_2	N	5	109	Y
M1 Pinxton	Near Road	446492 355266	NO_2	N	8.5	20	Y
Kirkby Church Hill	Kerbside	448968 355816	NO_2	N	1.5	0.5	Y
Sutton Mansfield Road	Kerbside	449923 359563	NO_2	N	0	1.6	Y
Sutton Dalestorth Street	Kerbside	450062 359653	NO_2	N	1.7	1	Y
Selston Royal Oak	Near Road	447812 353244	NO_2	N	6.8	83	Y
Hucknall Ashgate Road	Roadside	454057 348989	NO_2	N	2.8	3.5	Y

Changes since Progress Report 2008

Previously, Ashfield District Council's supply and analysis of Nitrogen Dioxide diffusion tubes has been undertaken by Harwell Scientifics who have held this contract since October 1999. Nottinghamshire Authorities have since agreed to employ a single laboratory to undertake the supply and analysis of diffusion tubes over the next 3 years. All authorities have agreed to use Gradko Laboratories, utilising the 20% TEA in Water. This is to enable the authorities to effectively compare results over the whole of the county.

Consequently, Ashfield District Council started utilising Gradko Laboratories from April, 2008 onwards.

Diffusion Tube Network

Ashfield District Council procedures, with regards to the operation of its diffusion tube network, comply with the recommendations of the relevant guidance documents: *'Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance'*, AEAT/ENV/R/2504 - Issue 1 and *'NO2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities'*, AEAT/ENV/R/2140/Issue 1. In all cases local knowledge was used in the selection of the relevant sites.

All diffusion tubes are located in areas where there is relevant public exposure. Wherever possible, the area surrounding the tube is open, allowing free circulation of air. All tubes are sited at a height of between 2 -4m. Additionally, where it has been possible, care has been taken to ensure that areas of high turbulence have been avoided.

All diffusion tubes identified as *Kerbside* in Table 2.2, above, are located within 1 m of the kerb and those identified as *Roadside* are sited between 1 and 5 m from the kerb edge. It should be noted that measurements from the aforementioned sites are only representative of the immediate surrounding area as Nitrogen Dioxide concentrations can vary significantly with distance.

Those sites identified as *Near-Road* are sites where air quality is affected by a nearby major road, the M1 in this instance, being sited more than 5 m away from the road in question.

Those sites identified in Table 2.2 as *Urban Centre* are considered representative of typical population exposure in towns or city centres, e.g. pedestrian precincts and shopping areas. *Urban Background* is considered broadly representative of town-wide background conditions, e.g. urban residential areas. They are located more than 50m away from any busy roads in order to obtain a representative value of a much larger area. Great care has been exercised in the selection of these sites to ensure that the meet the criteria recommended in the relevant guidance document. Namely that that are located:

- Greater than 50 m from any major source of NO2.
- Greater than 30 m from any very busy road (> 30,000 vehicles per day).
- Greater than 20 m from a busy road (10,000 – 30,000 vehicles per day) or from any medium sized sources, e.g. petrol stations or ventilation outlets from catering establishments;
- Greater than10 m from any main road.

- Greater than 5 m from anywhere where vehicles may stop with their engines idling.

Great care is taken by Ashfield District Council that the deployment, exposure and collection of the diffusion tubes is carried out with appropriate Quality Assurance to ensure that the resultant monitoring data is as reliable as is possible. All tubes are stored in suitable refridgerated conditions prior to deployment and on collection. The Council utilise a unique identification system for each individual diffusion tube and record all relevant details on deployment/collection.

The exposure period of the diffusion tubes is 4 – 5 weeks, with the exposure months meeting those detailed by the Local Authority Air Quality Support Network.

Laboratory Performance

There can be considerable differences in diffusion tube performance due to a number of factors. One of the issues affecting diffusion tubes is the exposure procedures employed.

Such exposure factors have been reduced as much as possible by Ashfield District Council implementing the Quality Assurance procedures, detailed above, in the deployment, exposure and collection of the tubes. However, another factor in diffusion tube performance is related to the way in which the diffusion tubes are prepared and analysed. Accordingly, it is important the Council utilise the services of a Laboratory that operates its own QA/QC systems to ensure reliability and consistency of analysis results.

Ashfield District Council, along with all other Nottinghamshire Councils, utilise the services of Gradko Laboratories for the supply and analysis of Nitrogen Dioxide diffusion tubes. Gradko is UKAS accredited for Nitrogen Dioxide diffusion tube analysis. Additionally, they participate in a centralised QA/QC scheme, namely the Workplace Analysis Scheme for Proficiency (WASP). WASP is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). It is recommended that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme. From the report *'Annual Performance Criteria for NO2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 98-102' (February 2009)*, it is shown that Gradko's performance has been rated as **Good**.

Gradko Laboratories NO2 diffusion tube procedures have been amended to follow the guidelines of the DEFRA document related to the preparation, extraction, analysis and calculation procedures for NO2 passive diffusion tubes. These amendments are minimal because they already carried the out most of the procedures before the introduction of the Guidelines. Their internal analysis procedures are assessed by U.K.A.S. on an annual basis for compliance to ISO17025.

Precision and Bias

Diffusion tube performance is generally described by the terms precision and bias. Precision is a description of the consistency of the measurements i.e. the ability of the measurement to be consistently reproduced, whereas bias describes the tendency of the diffusion tubes to depart from the true value i.e. the tendency to under or over-read.

Precision

Assessing the precision of the diffusion tubes is an indication of the overall performance of both the Council's procedures in exposing the tubes and the laboratory's in their preparation and analysis.

Ashfield District Council calculates the precision of the diffusion tubes by carrying out duplicate exposure at all locations, apart from the Selston Royal Oak location which had triplicate exposure.

Precision is considered to be good where the co-efficient of variation (CV) for eight or more periods during the year is less than 20% and the average CV of all monitoring periods is less than 10%. Poor precision is considered to be where the CV of four or more periods is greater than 20% and/or the average CV is greater than 10%.

The results of Ashfield District Council's duplicate/triplicate monitoring were entered into a spreadsheet tool, http://www.airquality.co.uk/archive/laqm/tools.php, to assess the precision of the monitoring undertaken.

Table 2.2: Precision of Diffusion Tube Monitoring Undertaken

Site Name	Site Type	Overall Performance	No of Months Poor Precision
Sutton Outram Street	Roadside/ Urban Centre	Good	0
A 38 Fire Station	Near Road	Good	0
Selston Nottingham Road	Kerbside	Good	2
Hucknall High Street	Roadside/Urban Centre	Good	1
Hucknall Croft/Beardall St	Urban Background	Good	0
Kirkby Naggs Head	Urban Centre	Good	2
Forest Close M1	Near Road	Good	0
M1 Pinxton	Near Road	Good	0
Kirkby Church Hill	Kerbside	Good	0
Sutton Mansfield Road	Kerbside	Good	1
Sutton Dalestorth Street	Roadside	Good	2
Selston Royal Oak	Near Road	Good	0
Hucknall Ashgate Road	Kerbside	Good	1

Copies of the relevant spreadsheets can be found in Appendix 1

Bias

Diffusion tubes generally under or over-read when compared to a reference automatic analyser. This is referred to as bias. This bias can be corrected by applying a correction factor that is derived either from a local study or from a nationally derived database. Local Authorities are advised to report on both local and national adjustment factors and thereafter decide which to utilise, depending on a number of factors.

Ashfield have not completed a suitable recent co-location study to calculate a local bias factor representing the type of diffusion tube exposure. Therefore the bias adjustment factor derived from the national database has been utilised for the purpose of this report.

It was considered that this would provide a reasonable adjustment factor until a suitable co-location study can be undertaken by Ashfield. Annual diffusion tube results for 2008/09 have therefore been adjusted for each monitored location utilising the derived factor.

Table 2.3 details the use of the national database to obtain the relevant bias adjustment factor to be utilised for the purposes of this report.

Table 2.3: Diffusion Tube Bias Adjustment Factor

Spreadsheet Version Number: 03/09

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

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

Whenever presenting adjusted data, you should state the adjustment factor used

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

This spreadsheet will be updated in late September 2009 on the R&A website

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

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

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

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

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in Water	2008	UC	Belfast CC	11	41	33	26.7%	G	0.79
Gradko	20% TEA in Water	2008	R	Crewe and Nantwich BC	10	33	32	4.2%	G	0.96
Gradko	20% TEA in Water	2008	R	Dudley MBC	12	49	42	17.6%	G	0.85
Gradko	20% TEA in Water	2008	B	Dudley MBC	12	30	28	6.9%	P	0.94
Gradko	20% TEA in Water	2008	Rural	Dudley MBC	12	18	17	4.7%	G	0.96
Gradko	20% TEA in Water	2008	R	Ellesmere Port & Neston BC	12	45	42	7.4%	G	0.93
Gradko	20% TEA in Water	2008	R	Rhondda Cynon Taf CBC	12	35	35	0.0%	G	1.00
Gradko	20% TEA in Water	2008	R	South Hams DC	10	41	40	2.6%	G	0.97
Gradko	20% TEA in Water	2008	R	Rushmoor BC	12	42	38	9.3%	G	0.91
Gradko	20% TEA in Water	2008	K	AEA Tech Intercomparison	12	117	116	1.2%	G	0.99
Gradko	20% TEA in Water	2008	R	Blackburn with Darwen BC	12	31	26	19.5%	P	0.84
Gradko	20% TEA in Water	2008		Overall Factor[3] (11 studies)				Use		0.92

Therefore the bias adjustment factor applied is **0.92.**

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Nitric Oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. Nitric Oxide is not considered to be harmful to health.

However, once released to the atmosphere, NO is usually very rapidly oxidized, mainly by Ozone (O3), to Nitrogen Dioxide (NO2), which can be harmful to health. Nitrogen Dioxide and NO are both oxides of Nitrogen and together are referred to as Nitrogen Oxides (NOX).

Table 2.4: Nitrogen Dioxide Objectives

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

Automatic Monitoring Data

As stated in Section in 2.1.1, no automatic monitoring of Nitrogen Dioxide has been carried out this year.

Nitrogen Dioxide Diffusion Tube Monitoring Data

Ashfield District Council measures Nitrogen Dioxide by non-automatic means. This is carried out by number of diffusion tubes being placed at variety of locations throughout the district. Diffusion tubes are passive samplers: they consist of small plastic tubes containing a chemical reagent to absorb the pollutant to be measured directly from the air. They are categorised as an "indicative" monitoring technique. They are useful for indicating long-term average Nitrogen Dioxide concentrations and highlighting areas of high Nitrogen Dioxide concentration.

Sutton Outram Street – Kerbside/Urban Centre

This is a roadside/urban centre location. The diffusion tube is situated at the beginning of Outram Street, directly after pedestrian lights. The road experiences traffic going to and from Mansfield and Kirkby entering Sutton Town Centre.

Map 2.2: Location of Nitrogen Dioxide Diffusion Tube Sutton Outram Street

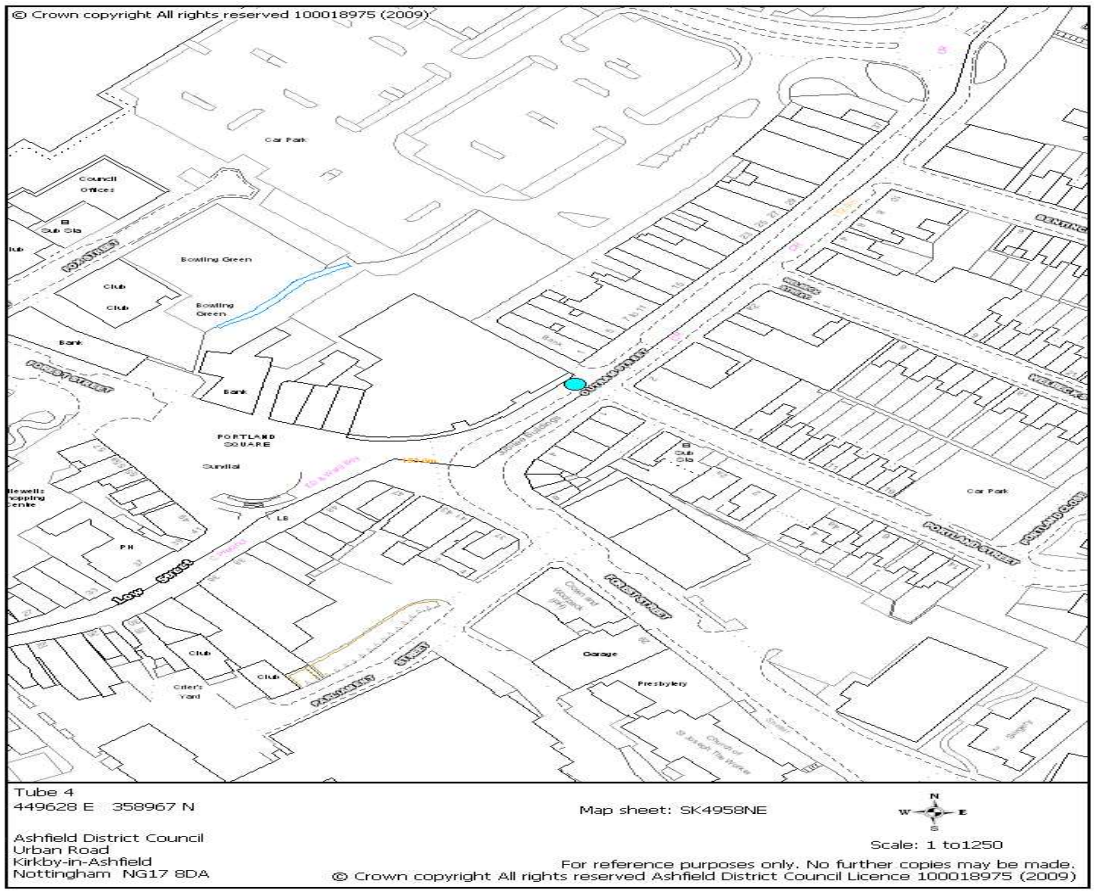


Table 2.5: Nitrogen Dioxide Diffusion Tube Monitoring Results Sutton Outram Street

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	39.7	39.7	40
01/05/2008	28/05/2008	35.2		35
28/05/2008	02/07/2008	30.2	30.8	34
02/07/2008	30/07/2008	30.8	30.9	31
30/07/2008	03/09/2008	30	29.7	30
03/09/2008	02/10/2008	33.7	30.2	32
02/10/2008	29/10/2008	41.9	40.8	41
29/10/2008	03/12/2008	44.3	44.6	44
03/12/2008	07/01/2009	50.9	46.5	49
07/01/2009	04/02/2009	55	45.7	50
04/02/2009	04/03/2009	57.5	53.7	56
04/03/2009	03/04/2009	38.8	40	39

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
40	**36**

Chart 2.1: Nitrogen Dioxide Diffusion Tube Sutton Outram Street

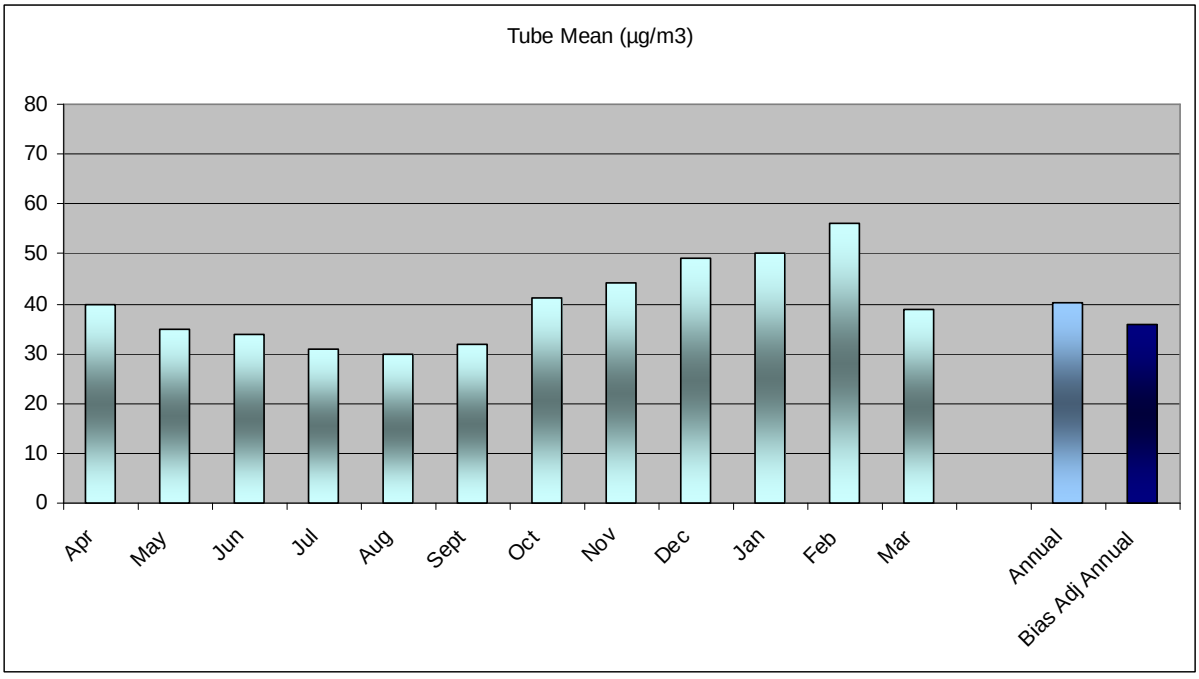
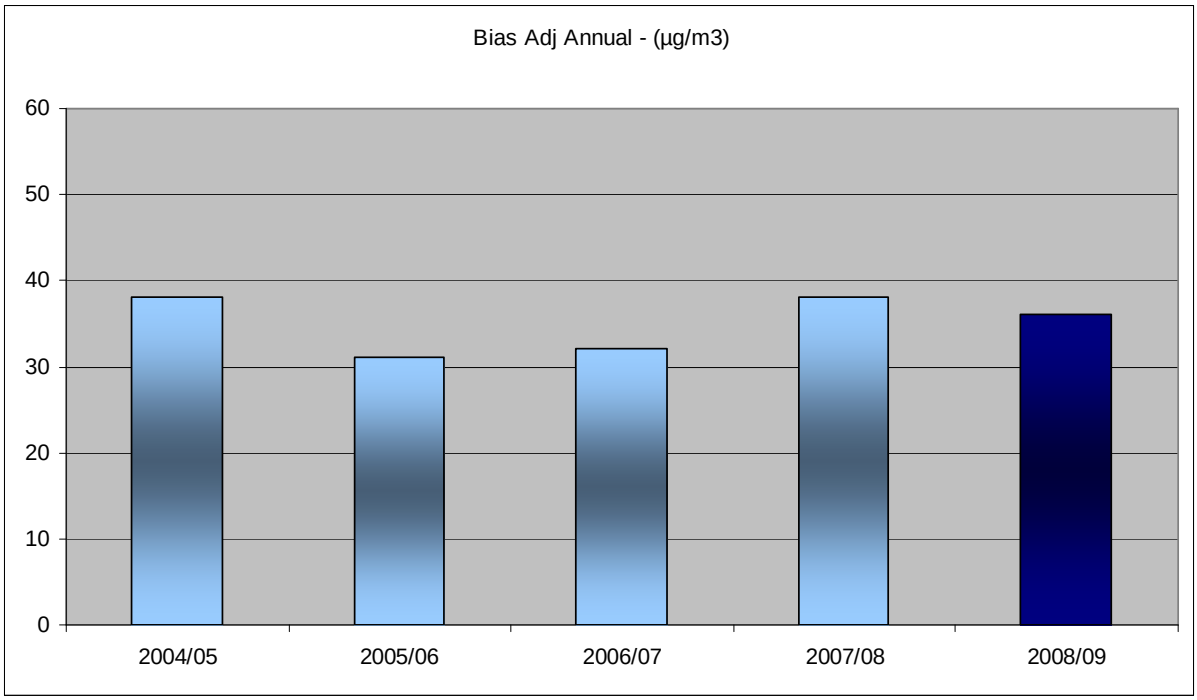


Chart 2.2: Trend Analysis Nitrogen Dioxide Diffusion Tube Sutton Outram Street



Distance Fall-off Calculation

It is necessary for exceedences of objectives to be assessed on locations where the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

Concentrations of Nitrogen Dioxide drop of with regards to distance from a road and therefore it is essential to predict levels at the relevant receptor when monitoring has been undertaken at a different distance from the road source.

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **32µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

A38 Fire Station – Near Road

This is a near road location. The diffusion tube is located immediately adjacent to the A38. The A38 is the major route for traffic going between Derby and Mansfield.

Map 2.3: Location of Nitrogen Dioxide Diffusion Tube A38 Fire Station

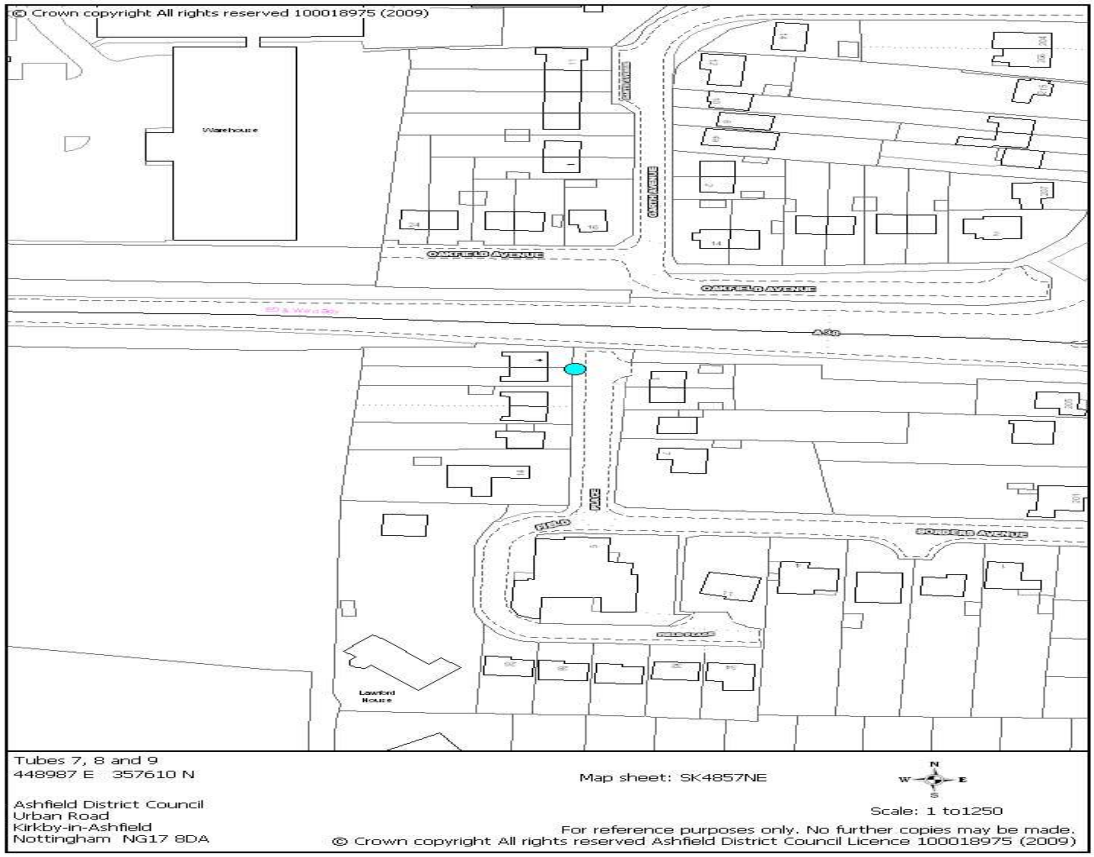


Table 2.6: Nitrogen Dioxide Diffusion Tube Monitoring Results A38 Fire Station

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	33.9	39.5	37
01/05/2008	28/05/2008	50.2	43.2	47
28/05/2008	02/07/2008	34.1	34.6	34
02/07/2008	30/07/2008	27	25.5	26
30/07/2008	03/09/2008	21.5	20.2	21
03/09/2008	02/10/2008	27.7	23.6	26
02/10/2008	29/10/2008	30.4	30.9	31
29/10/2008	03/12/2008	40.8	39.6	40
03/12/2008	07/01/2009	42.6	40.7	42
07/01/2009	04/02/2009	46	48.1	47
04/02/2009	04/03/2009	53.3	54.8	54
04/03/2009	03/04/2009	37.1	39.6	38

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
37	**33**

Chart 2.3: Nitrogen Dioxide Diffusion Tube A38 Fire Station

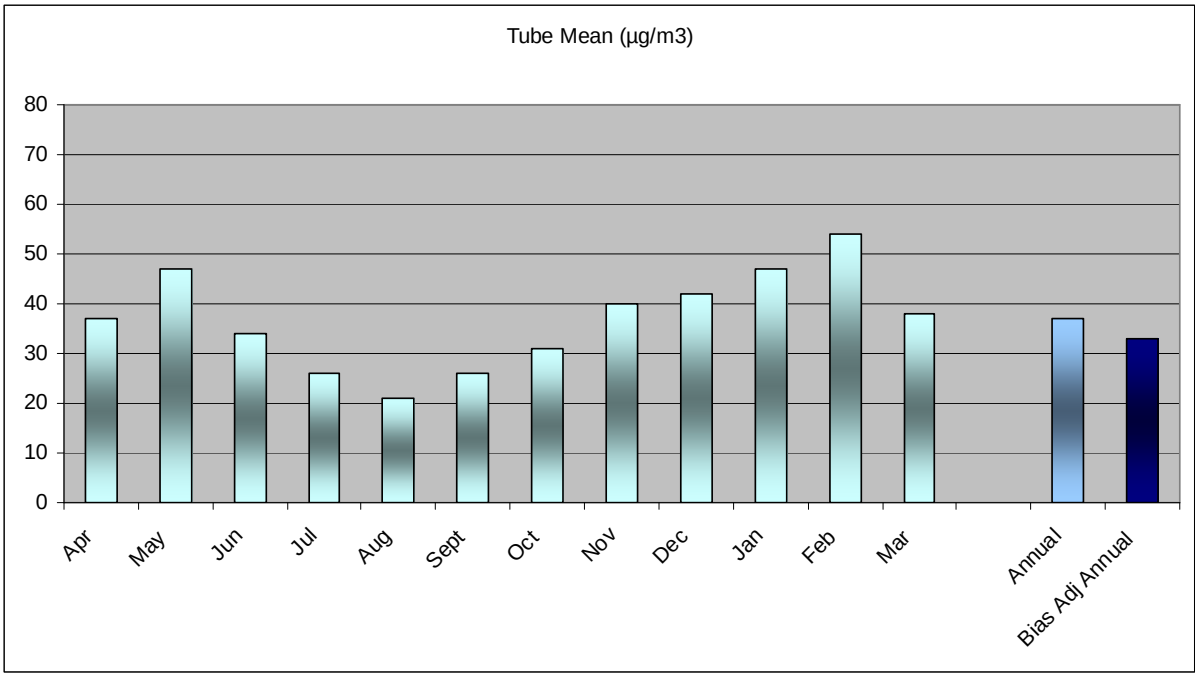
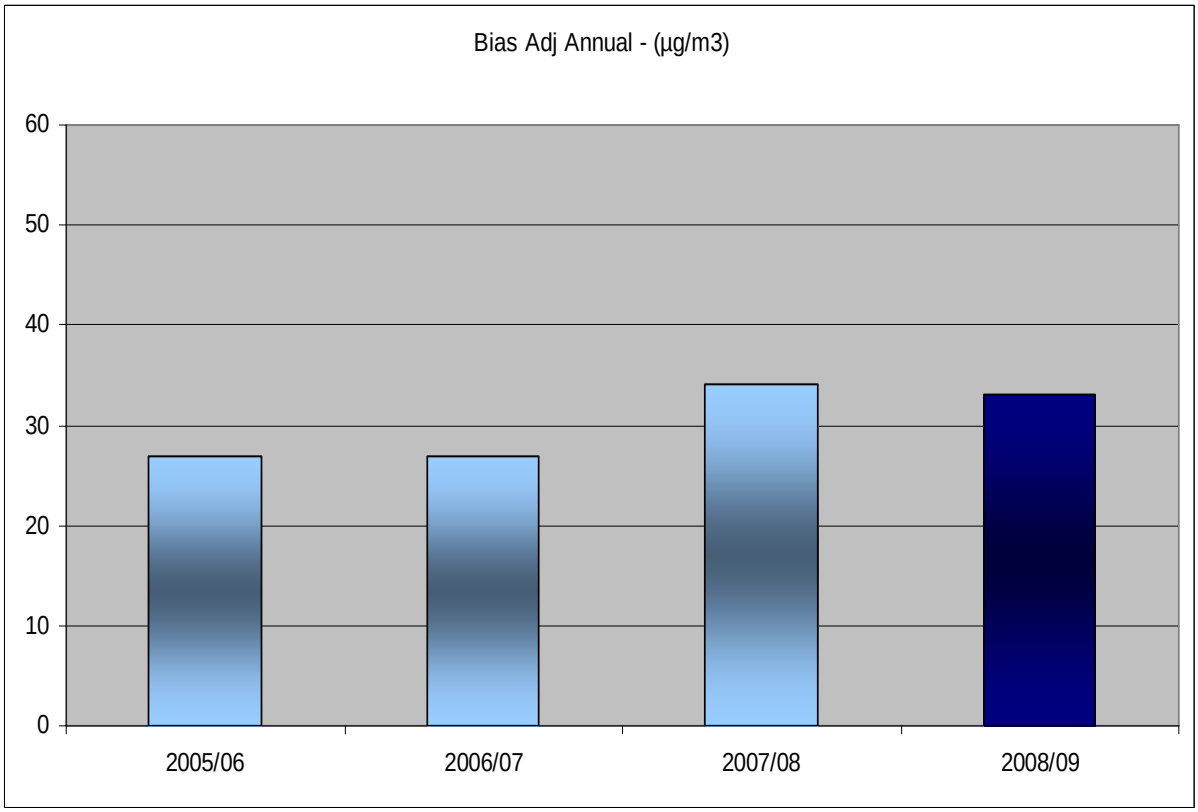


Chart 2.4: Trend Analysis Nitrogen Dioxide Diffusion Tube A38 Fire Station



Distance Fall-off Calculation

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **36µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Selston Nottingham Road - Kerbside

This is a kerbside location. The diffusion tube is located adjacent to the main road running through Selston from Kirkby in Ashfield.

Map 2.4: Location of Nitrogen Dioxide Diffusion Tube Selston Nottingham Road

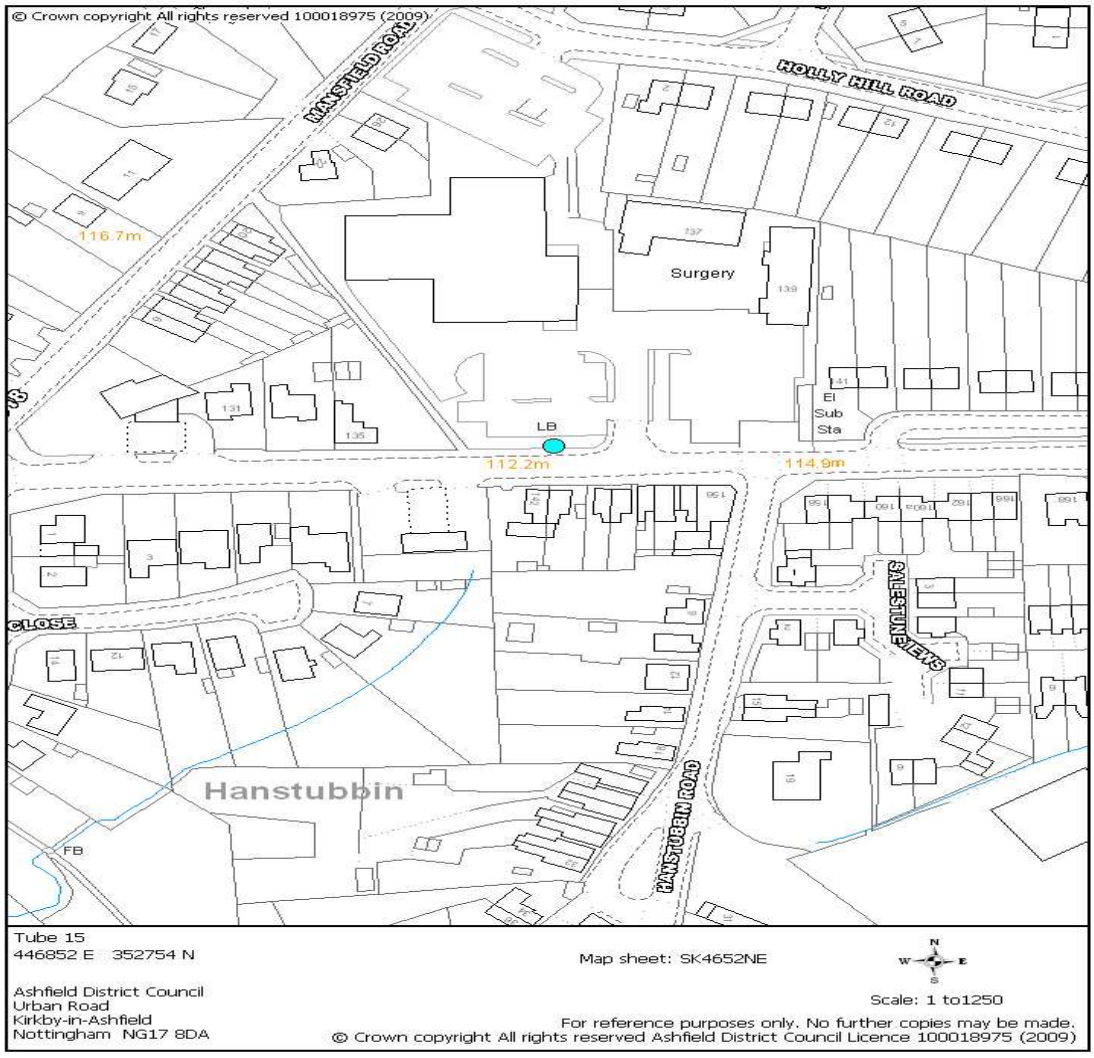


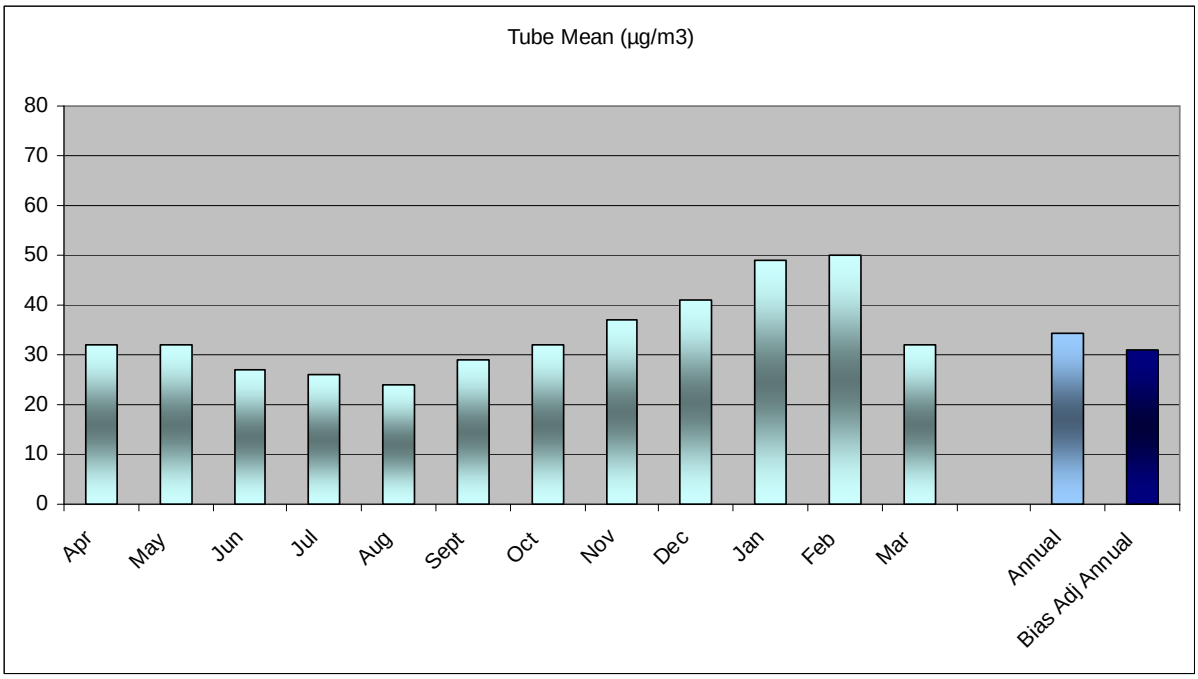
Table 2.5: Nitrogen Dioxide Diffusion Tube Monitoring Results Selston Nottingham Road

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	22.5	32.3	32
01/05/2008	28/05/2008	30	33.1	32
28/05/2008	02/07/2008	28	25.5	27
02/07/2008	30/07/2008	26.5	26.2	26
30/07/2008	03/09/2008	24	23.6	24
03/09/2008	02/10/2008	29.2	19.3	29
02/10/2008	29/10/2008	32.2		32
29/10/2008	03/12/2008	36.8	37.6	37
03/12/2008	07/01/2009	40.6	40.9	41
07/01/2009	04/02/2009	49.2		49
04/02/2009	04/03/2009	51.2	48.4	50
04/03/2009	03/04/2009	32.2	31.4	32

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
34	**31**

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.5: Nitrogen Dioxide Diffusion Tube Selston Nottingham Road



Distance Fall-off Calculation

The receptor nearest the diffusion tube location is 16.3m from the road, however there are properties adjacent to the diffusion tube location that are closer to the road, however, they do not have a suitable location for the diffusion tube to be sited. Therefore, the distance fall-off calculation has been carried out using the distance of the residential properties closest to the road to give an indication of likely levels. The resultant Nitrogen Dioxide level at the receptor is **28µg/m^3.** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Hucknall High Street – Roadside/Urban Centre

This is an urban centre location. The diffusion tube is located adjacent to the main road running through Hucknall town centre, directly adjacent to a junction that experiences traffic going to Mansfield, Nottingham, Annesley Road and the Hucknall bypass. This location has a number of commercial properties and is a busy shopping area.

Map 2.5: Location of Nitrogen Dioxide Diffusion Tube Hucknall High Street

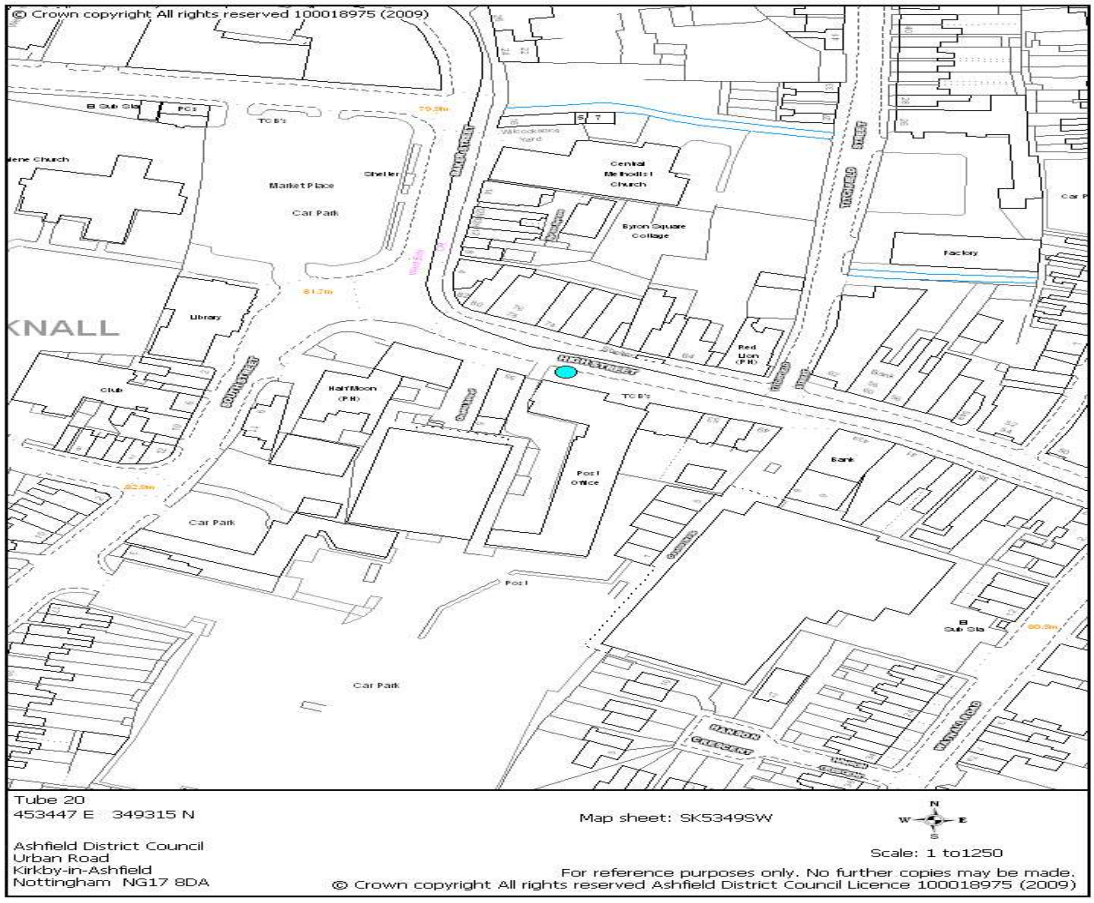


Table 2.8: Nitrogen Dioxide Diffusion Tube Monitoring Results Hucknall High Street

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	42.9	44.6	44
01/05/2008	28/05/2008	46.9	43.6	45
28/05/2008	02/07/2008	42.8	46.3	45
02/07/2008	30/07/2008	37.9	34.9	36
30/07/2008	03/09/2008	34	39.7	37
03/09/2008	02/10/2008	31.9	35.2	34
02/10/2008	29/10/2008	24.2	43.3	43
29/10/2008	03/12/2008	45.1	48.1	47
03/12/2008	07/01/2009	52.5	50.3	51
07/01/2009	04/02/2009	56.5	61	59
04/02/2009	04/03/2009	58.8	61.1	60
04/03/2009	03/04/2009	43.9	42.9	43

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
45	**41**

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.6: Nitrogen Dioxide Diffusion Tube Hucknall High Street

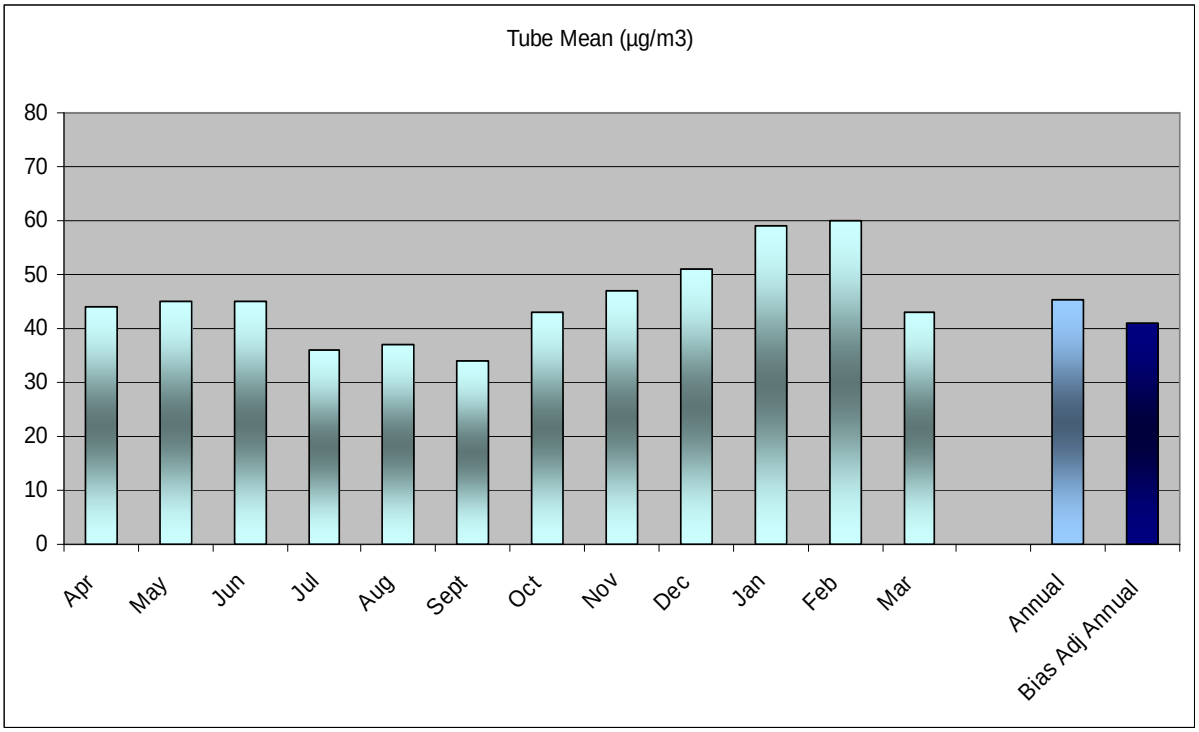
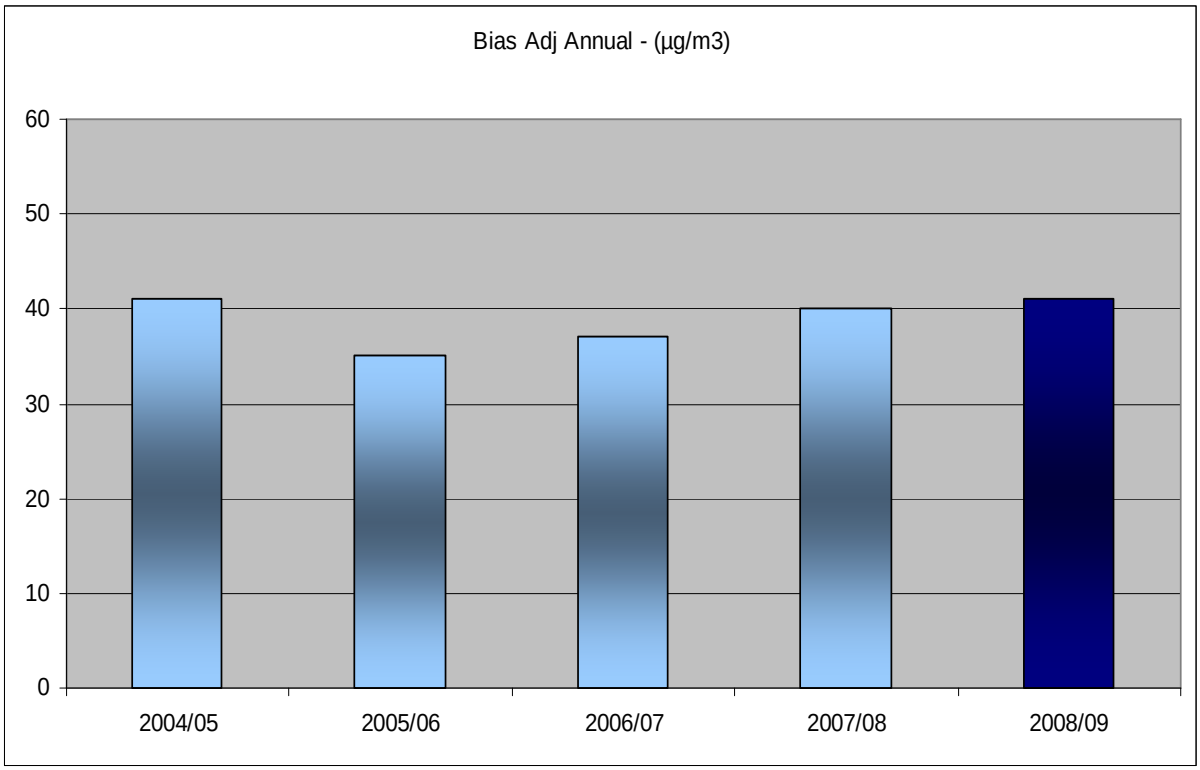


Chart 2.7: Trend Analysis Nitrogen Dioxide Diffusion Tube Hucknall High Street



This is a town centre roadside location where it is unlikely that people will be exposed to levels of NO_2 over a full 24 hour period. The annual level recorded indicates that the 1-hour mean value for Nitrogen Dioxide is unlikely to be exceeded. It does however provide an indication of annual spatial concentration for this area. A 13 million pound investment in the town centre will incorporate the pedestrianisation of the main high street.

Hucknall Croft/Beardhall Street – Urban Background

This is an urban background location. The diffusion tube is located on Beardall Street, some distance from the town centre.

Map 2.6: Location of Nitrogen Dioxide Diffusion Tube Hucknall Croft/Beardhall Street

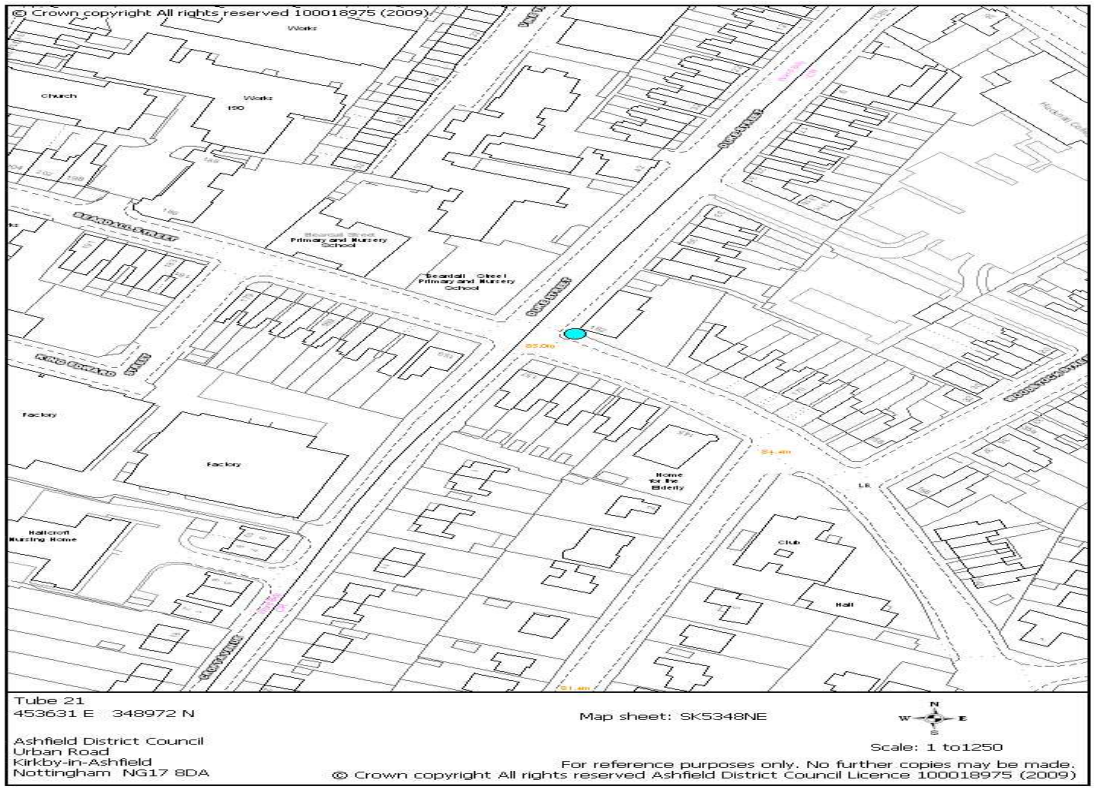


Table 2.9: Nitrogen Dioxide Diffusion Tube Monitoring Results Hucknall Croft/Beardhall Street

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	31.3	27.4	29
01/05/2008	28/05/2008	23.6	22.2	23
28/05/2008	02/07/2008	24.8		25
02/07/2008	30/07/2008	21.7	20.3	21
30/07/2008	03/09/2008	23.6	23.5	24
03/09/2008	02/10/2008	18.3	18.5	18
02/10/2008	29/10/2008	28.4	29.5	29
29/10/2008	03/12/2008	37.8	32.7	35
03/12/2008	07/01/2009	43	35.7	39
07/01/2009	04/02/2009	46.4	47.1	47
04/02/2009	04/03/2009	48.7	48.3	49
04/02/2009	03/04/2009	33	33.9	33

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
31	**28**

Chart 2.8: Nitrogen Dioxide Diffusion Tube Hucknall Croft/Beardhall Street

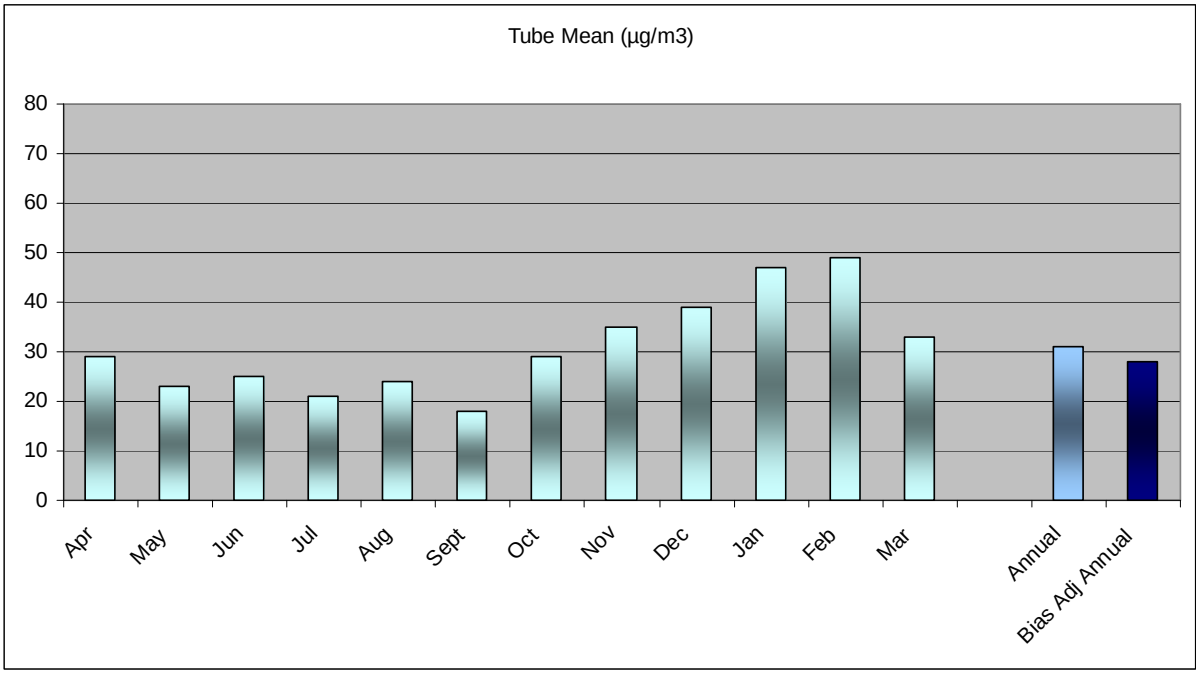
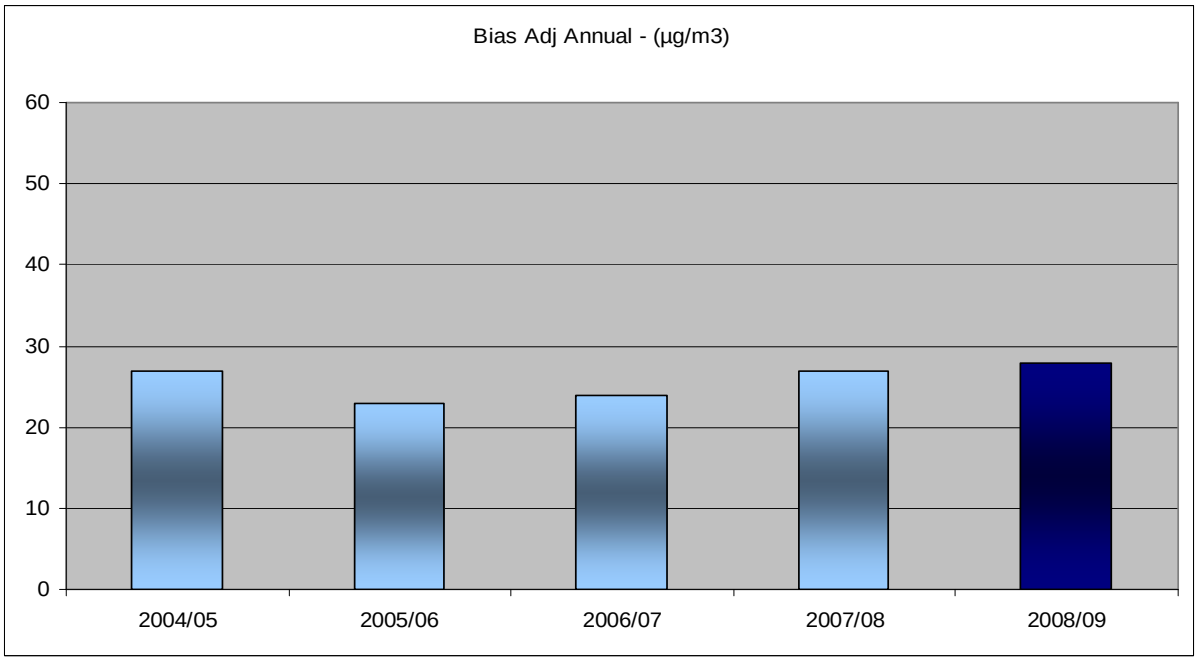


Chart 2.9: Trend Analysis Nitrogen Dioxide Diffusion Tube Hucknall Croft/Beardhall Street



This is an urban background location that is used to provide an indication of annual spatial concentration for this area.

Kirkby Naggs Head – Urban Centre

This is an urban centre location. The tube is located adjacent to a road junction, where Station Road filters onto Diamond Avenue and Kingsway. This location experiences traffic going to and coming from Mansfield, and Nottingham (via Hucknall). The tube is situated next to a shopping precinct.

Map 2.7: Location of Nitrogen Dioxide Diffusion Tube Hucknall Croft/Beardhall Street

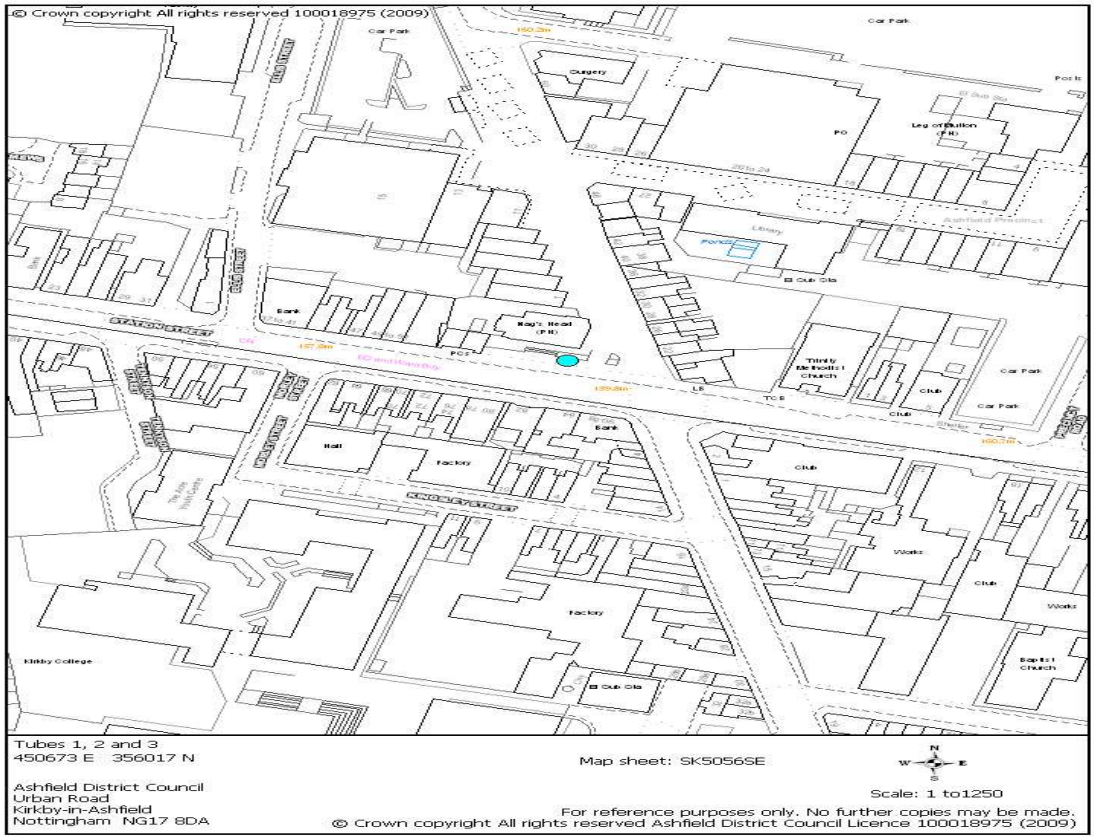


Table 2.10: Nitrogen Dioxide Diffusion Tube Monitoring Results Kirkby Naggs Head

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	38.1	39.2	39
01/05/2008	28/05/2008	36.4	35.5	36
28/05/2008	02/07/2008	32.7	36	34
02/07/2008	30/07/2008	28.2	32.8	31
30/07/2008	03/09/2008	33.1	20.6	33
03/09/2008	02/10/2008	25.8	34.2	34
02/10/2008	29/10/2008	39.7	42.9	41
29/10/2008	03/12/2008	43.2	36.3	40
03/12/2008	07/01/2009	38.5	42.6	41
07/01/2009	04/02/2009	57	53	55
04/02/2009	04/03/2009	51.4	62.4	57
04/03/2009	03/04/2009	39.8	39.8	40

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
40	36

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.10: Nitrogen Dioxide Diffusion Tube Kirkby Naggs Head

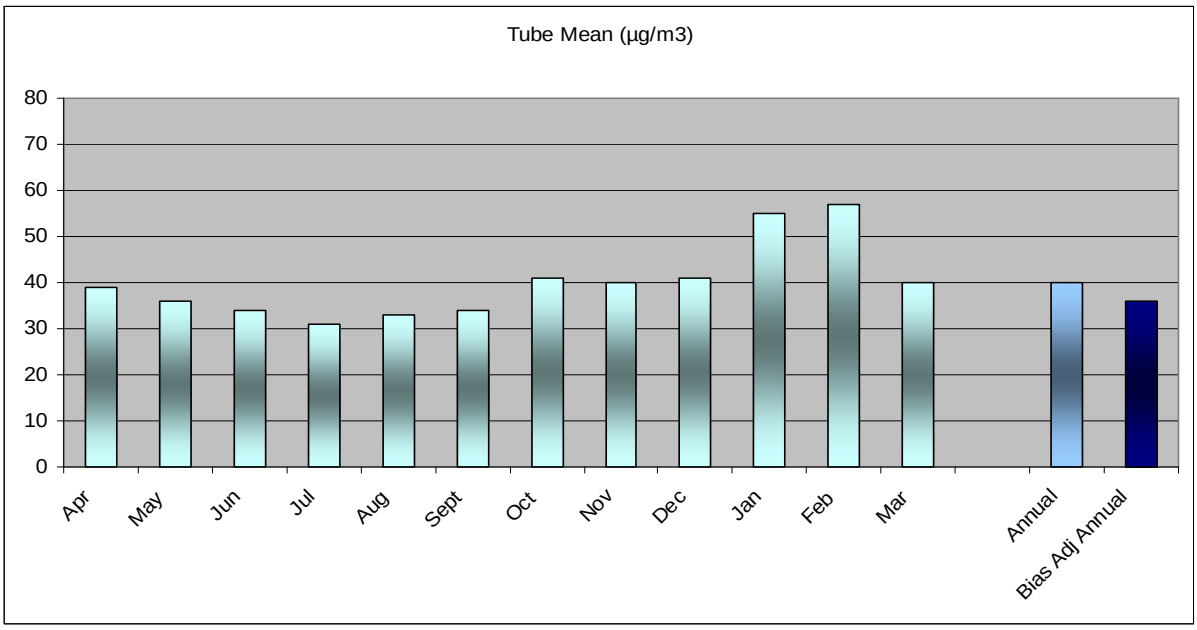
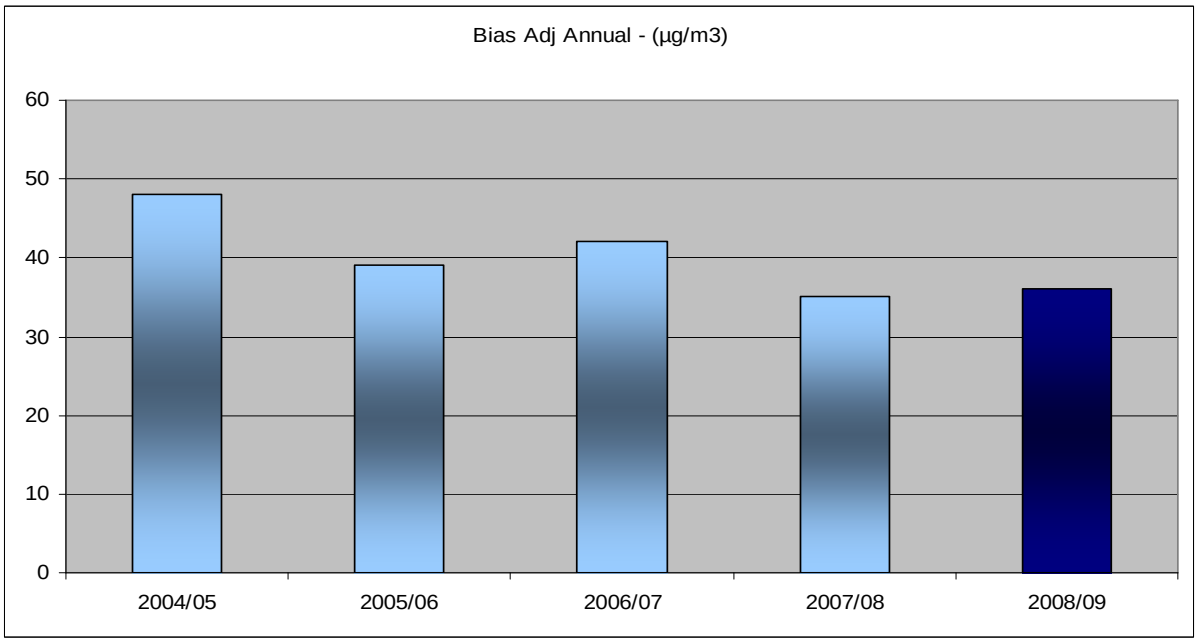


Chart 2.11: Trend Analysis Nitrogen Dioxide Diffusion Tube Kirkby Naggs Head



Distance Fall-off Calculation

The receptor nearest the actual diffusion tube location is 8.8m from the road, however there are properties adjacent to the location that are closer to the road. These properties do not have a suitable location for the diffusion tube to be sited. Therefore, the distance fall-off calculation has been carried out using the distance of the residential properties closest to the road to give an indication of likely levels. The resultant Nitrogen Dioxide level at the receptor is **38µg/m^3** (Appendix 2). However, it should be noted that the residential receptors in question are located further from the busy junction where the tube is currently located.

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location. Ashfield District Council are currently assessing the location in order to site a diffusion tube at a location that is more representative of those properties that are situated close to the road.

Forest Close M1 – Near Road

This is a near road location. The diffusion tube is located in a residential estate adjacent to the M1 and will act as the new co-location study for the new location of the Air Quality Monitoring Station.

Map 2.8: Location of Nitrogen Dioxide Diffusion Tube Forest Close M1

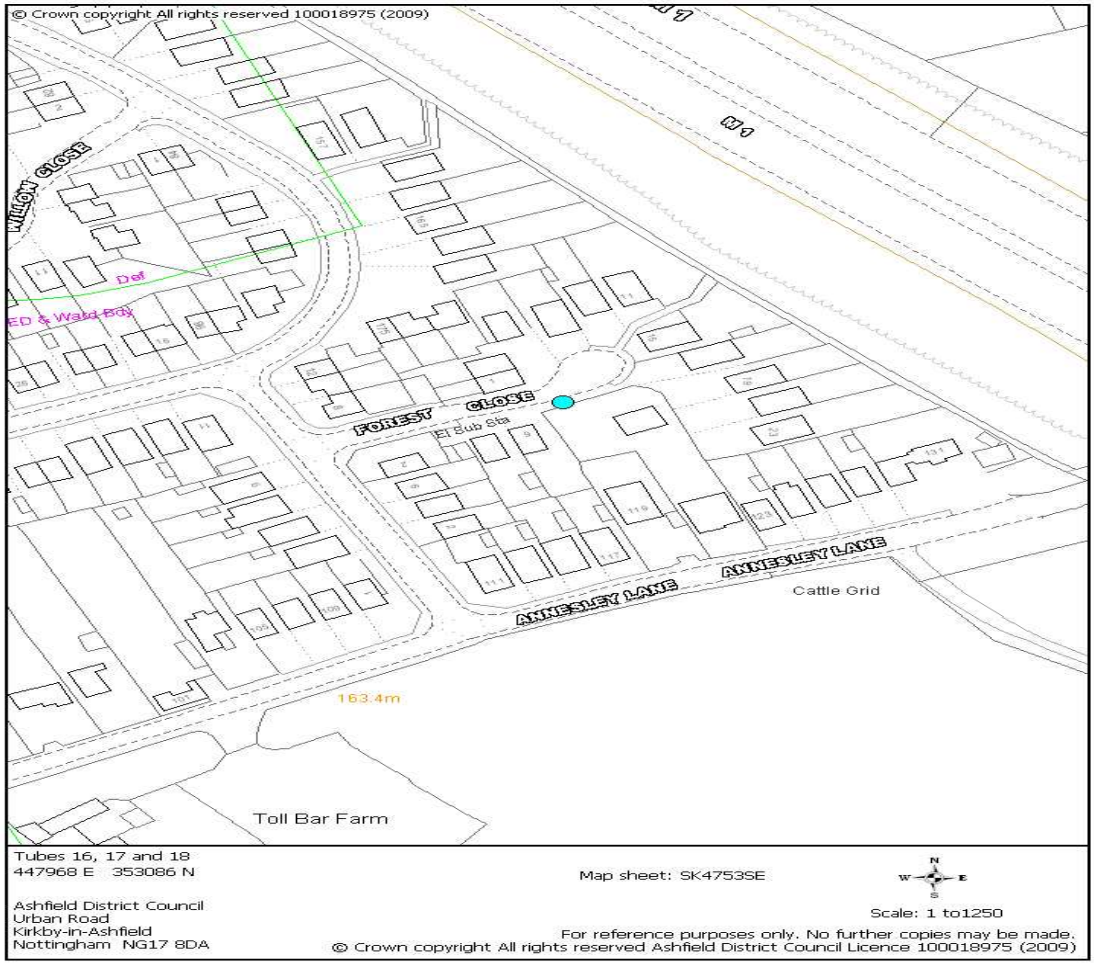
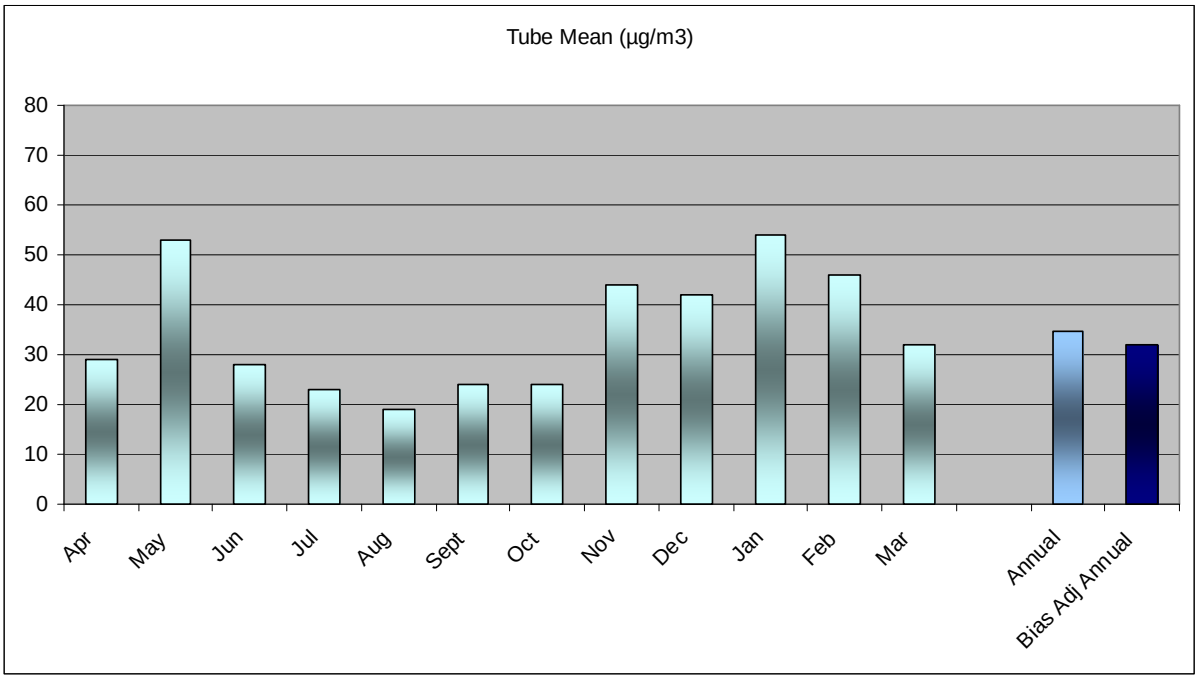


Table 2.11: Nitrogen Dioxide Diffusion Tube Monitoring Results Forest Close M1

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	30,9	26.8	29
01/05/2008	28/05/2008	47.8	57.2	53
28/05/2008	02/07/2008	28.5	28	28
02/07/2008	30/07/2008	22.5	24.1	23
30/07/2008	03/09/2008	19.4	18.1	19
03/09/2008	02/10/2008	25.5	23.1	24
02/10/2008	29/10/2008	25.1	23	24
29/10/2008	03/12/2008	44.9	42.2	44
03/12/2008	07/01/2009	40.1	44	42
07/01/2009	04/02/2009	8.6	58.8	54
04/02/2009	04/03/2009	47.7	44.5	46
04/03/2009	03/04/2009	34.5	29.3	32

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
35	**32**

Chart 2.12: Nitrogen Dioxide Diffusion Tube Kirkby Forest Close M1



This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

M1 Pinxton – Near Road

This is a near road location. The diffusion tube is located in a residential area adjacent to the M1 at Pinxton, on the boundary of the District

Map 2.9: Location of Nitrogen Dioxide Diffusion Tube M1 Pinxton

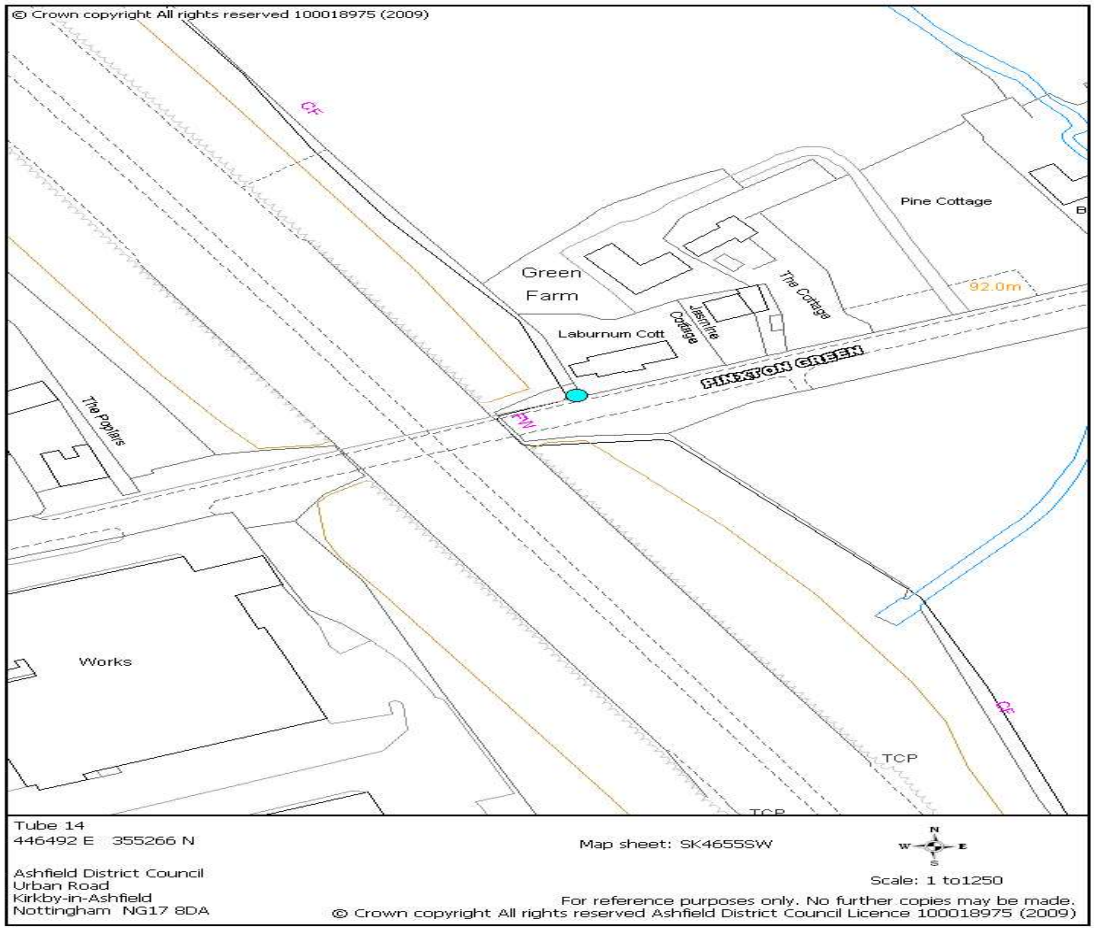


Table 2.12: Nitrogen Dioxide Diffusion Tube Monitoring Results M1 Pinxton

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	37.4	37.1	37
01/05/2008	28/05/2008	17.8	18.3	18
28/05/2008	02/07/2008	28.3	32.5	30
02/07/2008	30/07/2008	28.4	26.9	28
30/07/2008	03/09/2008	32.2	26.6	29
03/09/2008	02/10/2008	28.4	29.4	29
02/10/2008	29/10/2008	48.7	47.3	48
29/10/2008	03/12/2008	48.1	44.3	46
03/12/2008	07/01/2009	43.3	41.8	43
07/01/2009	04/02/2009	64.5	67.0	66
04/02/2009	04/03/2009	63.9	67.1	66
04/03/2009	03/04/2009	44.4	40.8	43

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
40	36

Chart 2.13: Nitrogen Dioxide Diffusion Tube Kirkby M1 Pinxton

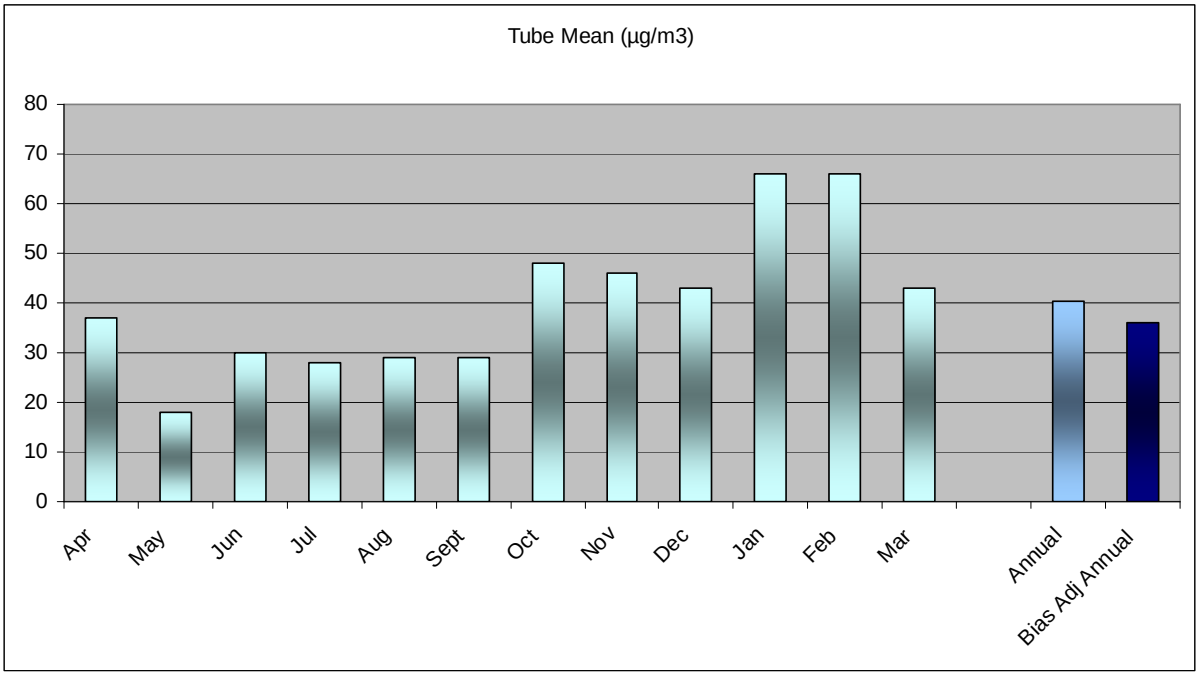
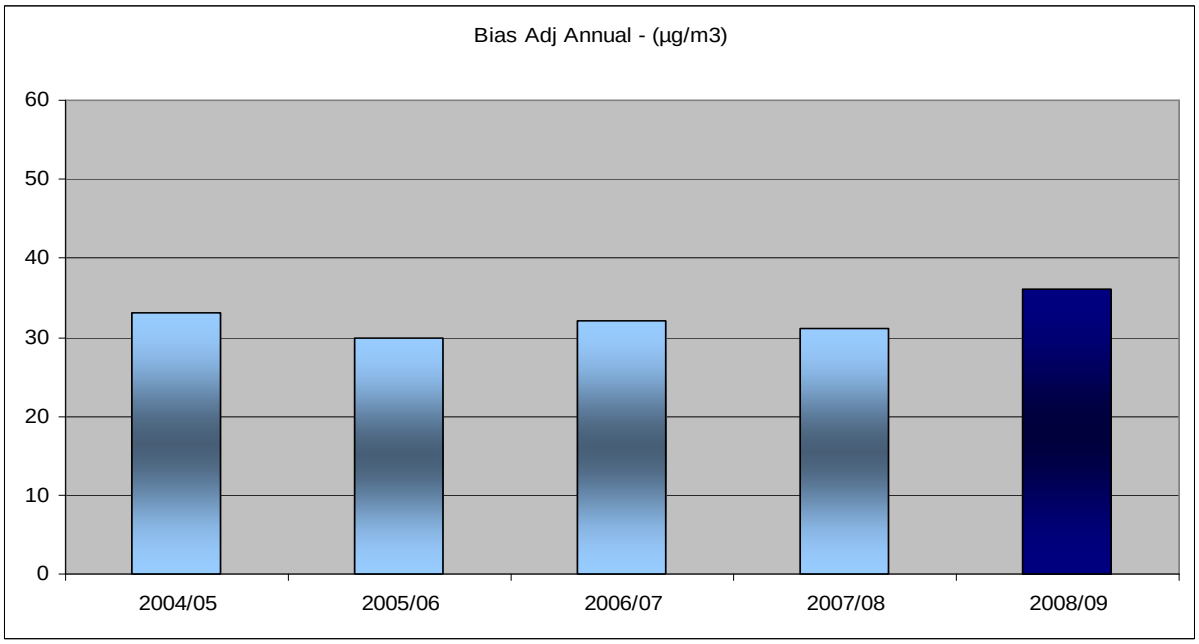


Chart 2.14: Trend Analysis Nitrogen Dioxide Diffusion Tube Kirkby M1 Pinxton



Distance Fall-off Calculation

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **32µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Kirkby Church Hill - Kerbside

This is a kerbside location. The diffusion tube is located on a hill that is taking traffic from Selston to Kirkby. The location is near a busy roundabout that can experience traffic build-up during peak times.

Map 2.10: Location of Nitrogen Dioxide Diffusion Kirkby Church Hill

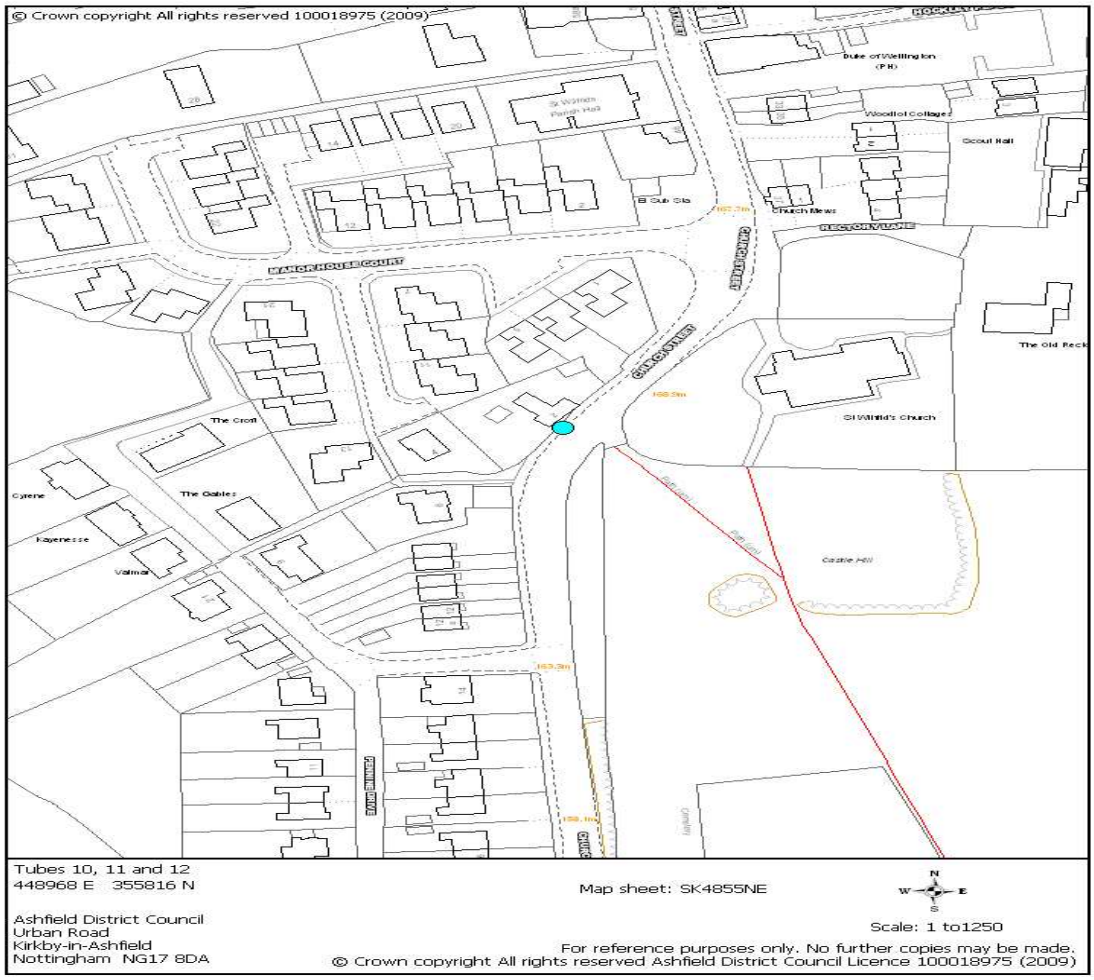


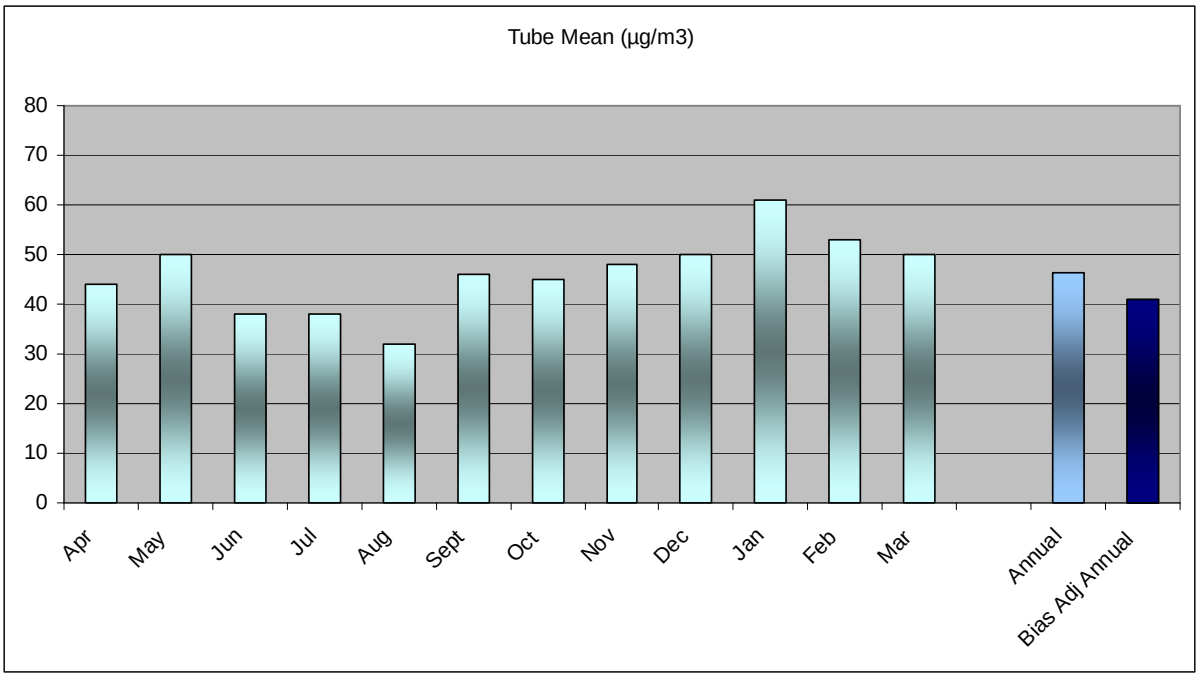
Table 2.13: Nitrogen Dioxide Diffusion Tube Monitoring Results Kirkby Church Hill

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	46	41.3	44
01/05/2008	28/05/2008	50.2	49.6	50
28/05/2008	02/07/2008	40.7	34.4	38
02/07/2008	30/07/2008	38.2	38.6	38
30/07/2008	03/09/2008	29.1	35	32
03/09/2008	02/10/2008	44.2	47.9	46
02/10/2008	29/10/2008	45.4	44.7	45
29/10/2008	03/12/2008	45.6	49.6	48
03/12/2008	07/01/2009	47.4	52.5	50
07/01/2009	04/02/2009	58.2	63.3	61
04/02/2009	04/03/2009	58.7	47.2	53
04/03/2009	03/04/2009	37.6	50.5	50

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
46	41

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.15: Nitrogen Dioxide Diffusion Tube Kirkby Church Hill



Distance Fall-off Calculation

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **35µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Sutton Mansfield Road - Kerbside

This is a kerbside location. The diffusion tube is located between two busy junctions of Mansfield Road, Dalestorth Street and Outram Street and the junction between Mansfield Road, Stoneyford Road and Preistic Road. This location experiences traffic build-up, particularly at peak times.

Map 2.11: Location of Nitrogen Dioxide Diffusion Sutton Mansfield Road

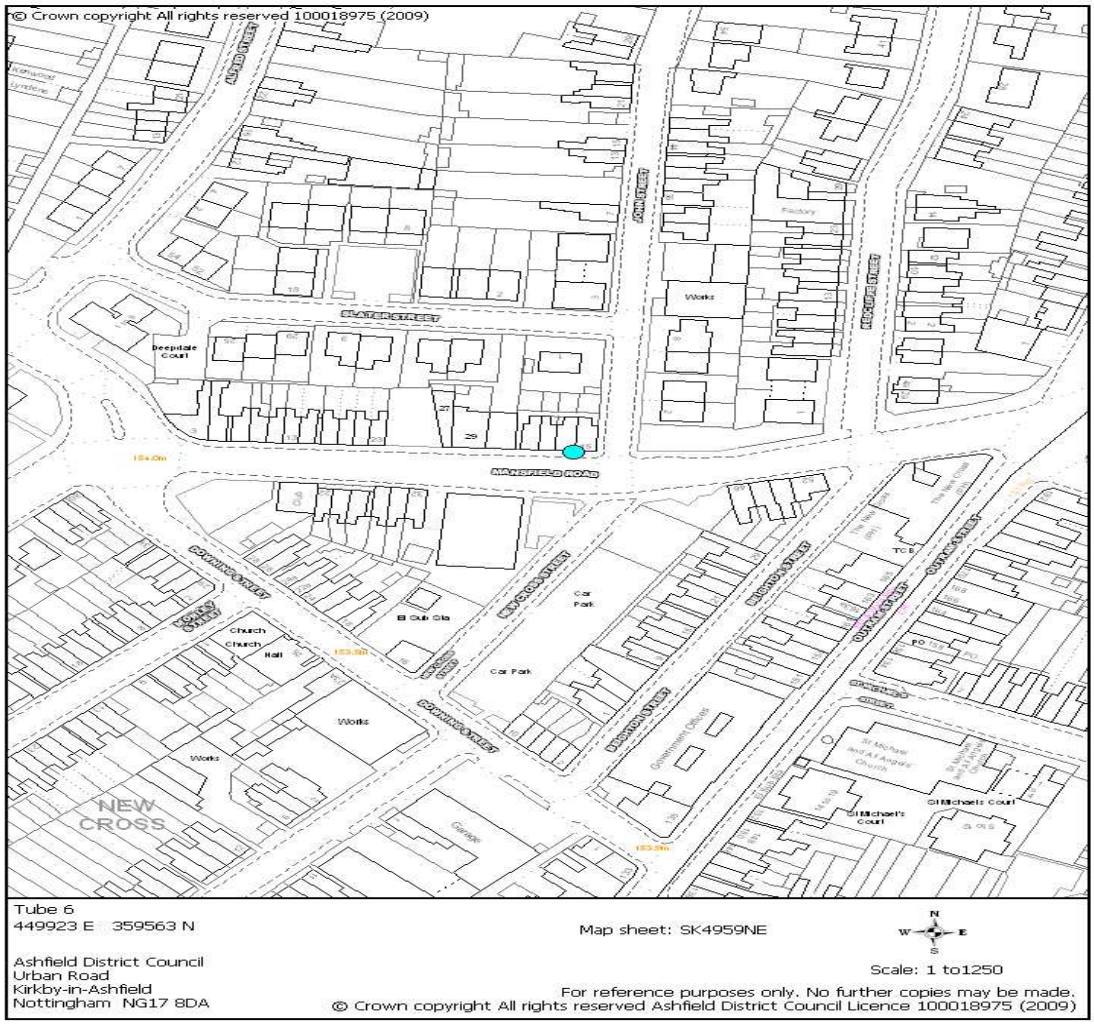


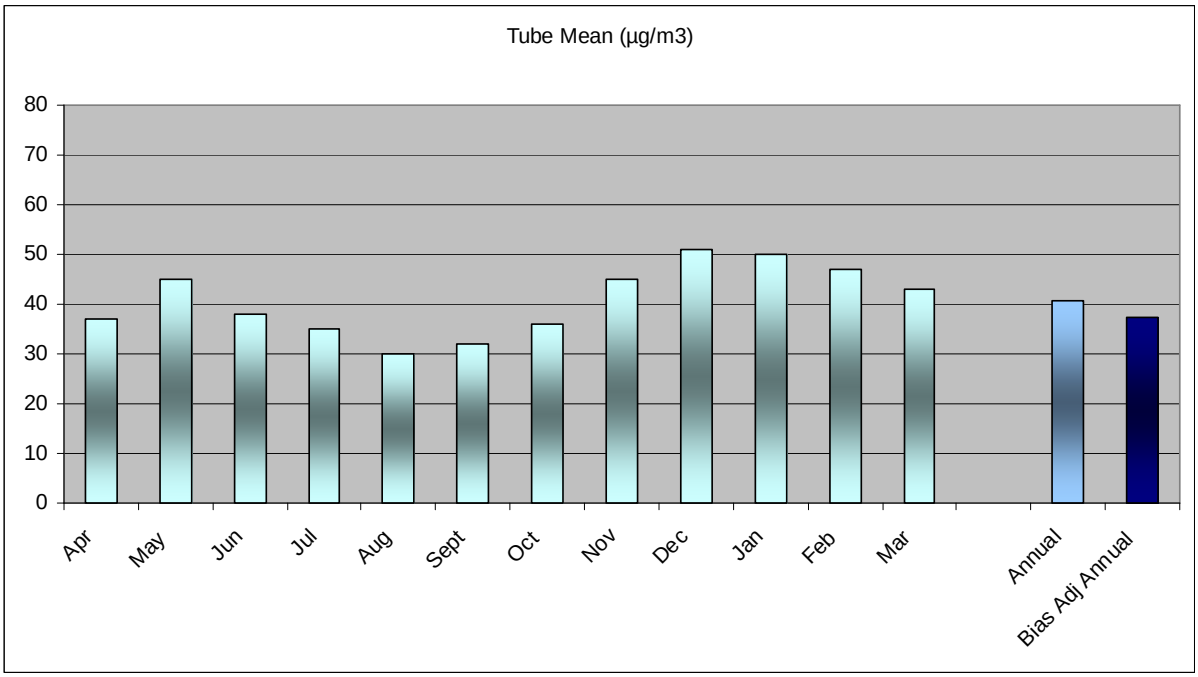
Table 2.13: Nitrogen Dioxide Diffusion Tube Monitoring Results Sutton Mansfield Road

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	36.5	36.6	37
01/05/2008	28/05/2008	46.7	44.2	45
28/05/2008	02/07/2008	40.1	35.9	38
02/07/2008	30/07/2008	33.7	35.4	35
30/07/2008	03/09/2008	29.2	30.7	30
03/09/2008	02/10/2008	31.8	32.4	32
02/10/2008	29/10/2008	34.4	37	36
29/10/2008	03/12/2008	48.1	41.9	45
03/12/2008	07/01/2009	50.9	52	51
07/01/2009	04/02/2009	49.1	50.3	50
04/02/2009	04/03/2009	56.2	37.2	56
04/03/2009	03/04/2009	39	46.5	43

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
41	**37**

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.16: Nitrogen Dioxide Diffusion Tube Kirkby Sutton Mansfield Road



Distance Fall-off Calculation

No distance fall-off calculation has been carried out as the diffusion tube is located directly at the nearest receptor. Therefore, the relevant annual mean value at the receptor is **37µg/m^3.**

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Sutton Dalestorth Street - Kerbside

This is a kerbside location. The diffusion tube is located after the junction between Mansfield Road, Dalestorth Street and Outram Street. This location experiences traffic coming to and from Mansfield and entering Sutton Town Centre.

Map 2.12: Location of Nitrogen Dioxide Diffusion Sutton Dalestorth Street

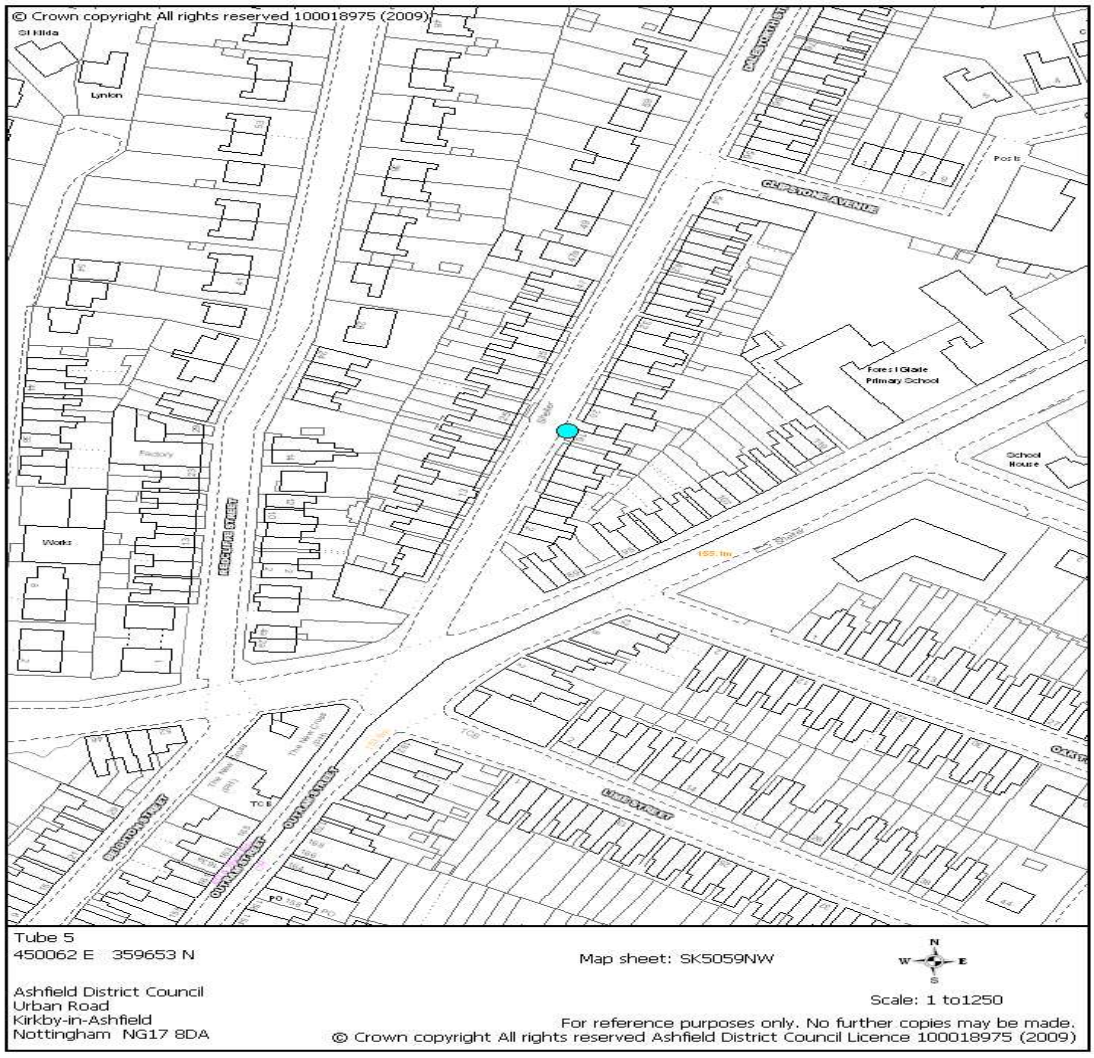


Table 2.14: Nitrogen Dioxide Diffusion Tube Monitoring Results Sutton Dalestorth Street

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	38.5	42.8	41
01/05/2008	28/05/2008	40.4	43.8	42
28/05/2008	02/07/2008	29.5	31.3	30
02/07/2008	30/07/2008	19.5	28.1	28
30/07/2008	03/09/2008	29.6	34.9	32
03/09/2008	02/10/2008	34.9	21.9	35
02/10/2008	29/10/2008	47.9	48.1	48
29/10/2008	03/12/2008	39.6	40.9	40
03/12/2008	07/01/2009	46.6	44.8	46
07/01/2009	04/02/2009	69.6	69.5	70
04/02/2009	04/03/2009	50.5	45.2	48
04/03/2009	03/04/2009	40.5	38.5	39

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
42	**38**

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.17: Nitrogen Dioxide Diffusion Tube Kirkby Sutton Dalestorth Street

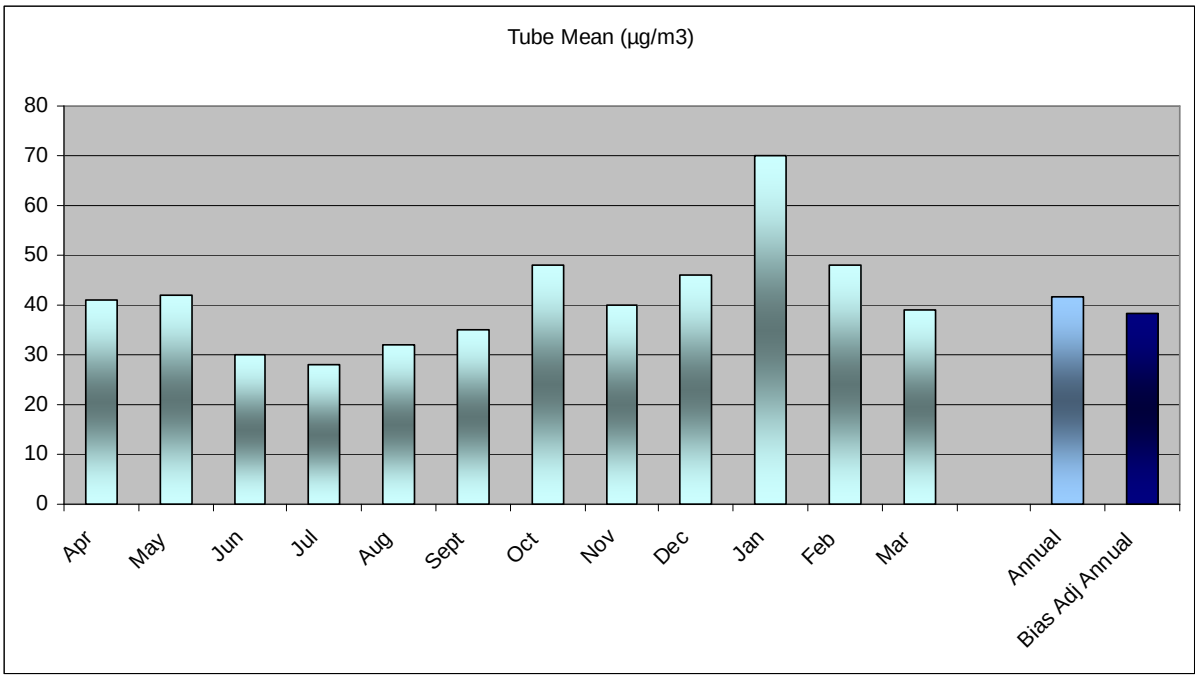
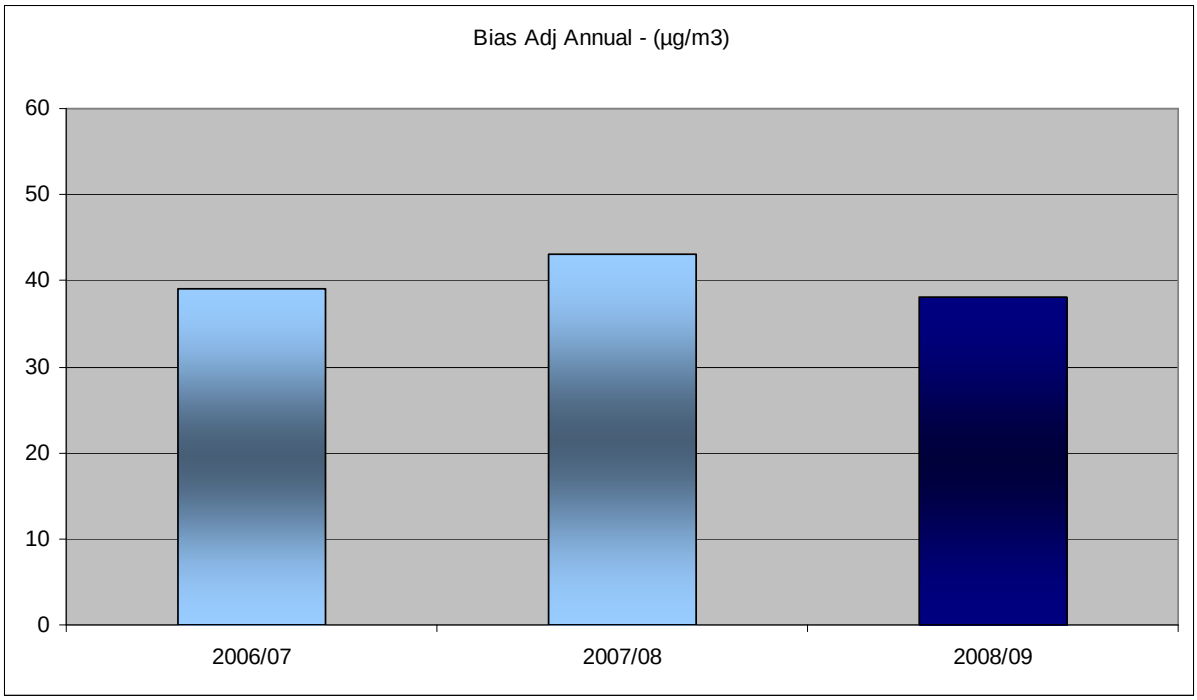


Chart 2.18: Trend Analysis Nitrogen Dioxide Diffusion Tube Kirkby Sutton Dalestorth Street



Distance Fall-off Calculation

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **35µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Selston Royal Oak – Near Road

This is a near road location. The diffusion tube is located in a residential area adjacent to the M1. It was the original location of the co-location study with Air Quality Monitoring Station.

Map 2.13: Location of Nitrogen Dioxide Diffusion Selston Royal Oak

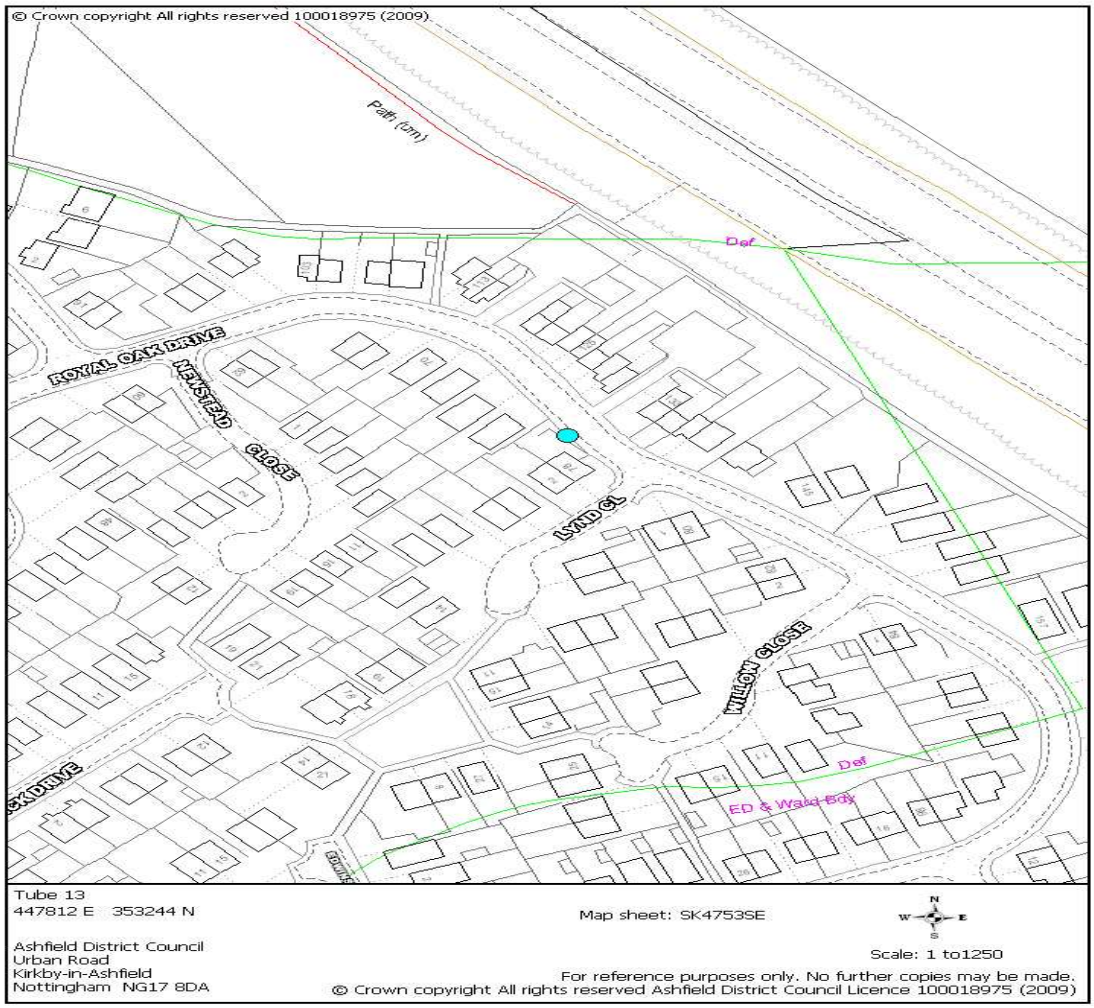
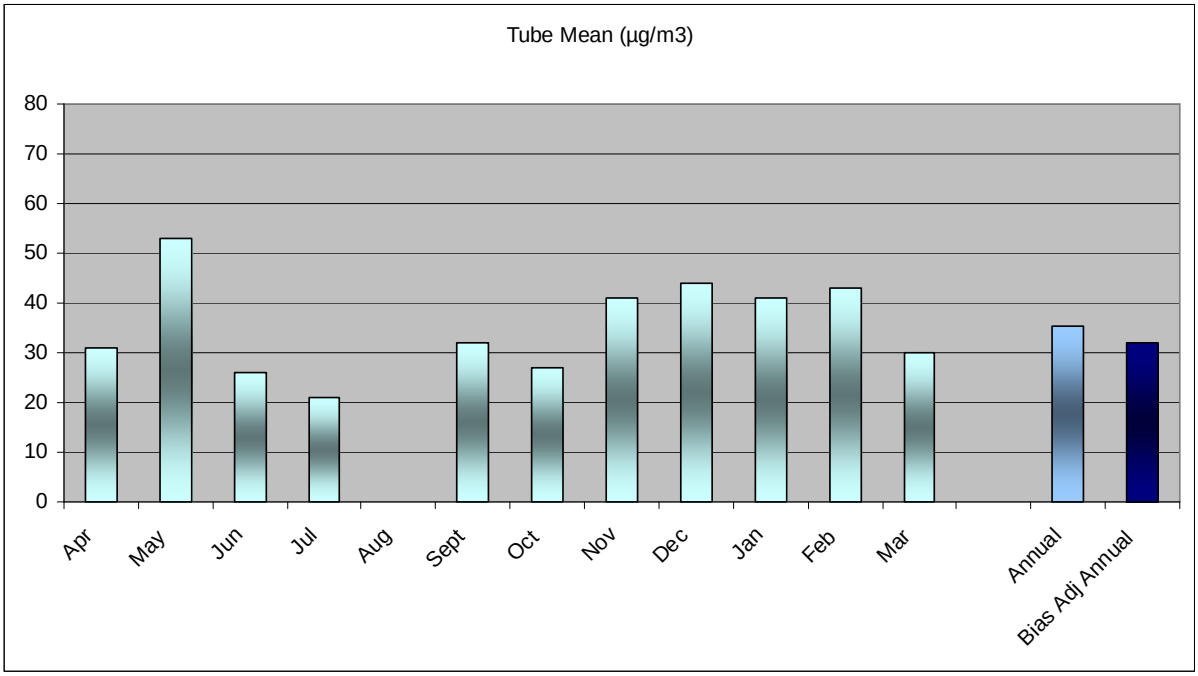


Table 2.15: Nitrogen Dioxide Diffusion Tube Monitoring Results Selston Royal Oak

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Tube 2 (µg/m^3)	Triplicate Mean (µg/m^3)
03/04/2008	01/05/2008	31.2	28.6	32.1	31
01/05/2008	28/05/2008	52.8	51.6	55.2	53
28/05/2008	02/07/2008	26.3			26
02/07/2008	30/07/2008	22	20	20.7	21
30/07/2008	03/09/2008				
03/09/2008	02/10/2008	33.1	28.7	33.8	32
02/10/2008	29/10/2008	29.9	25.4	26.7	27
29/10/2008	03/12/2008	39.7	38.8	43.4	41
03/12/2008	07/01/2009	44	44	42.6	44
07/01/2009	04/02/2009	44.9	37.6		41
04/02/2009	04/03/2009	42.8	44.8	41.7	43
04/03/2009	03/04/2009	29.5	31.5	30	30

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
35	32

Chart 2.18: Nitrogen Dioxide Diffusion Tube Kirkby Selston Royal Oak



This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Hucknall Ashgate Road - Kerbside

This is a kerbside location. The diffusion tube is located adjacent to a new housing estate on Ashgate Road where new developments such as the Nottingham Tram Station and Tesco Superstore may be contributing to increased levels of traffic. The tube also provides background data prior to the Huckall Town Centre Improvement Scheme.

Map 2.14: Location of Nitrogen Dioxide Diffusion Hucknall Ashgate Road

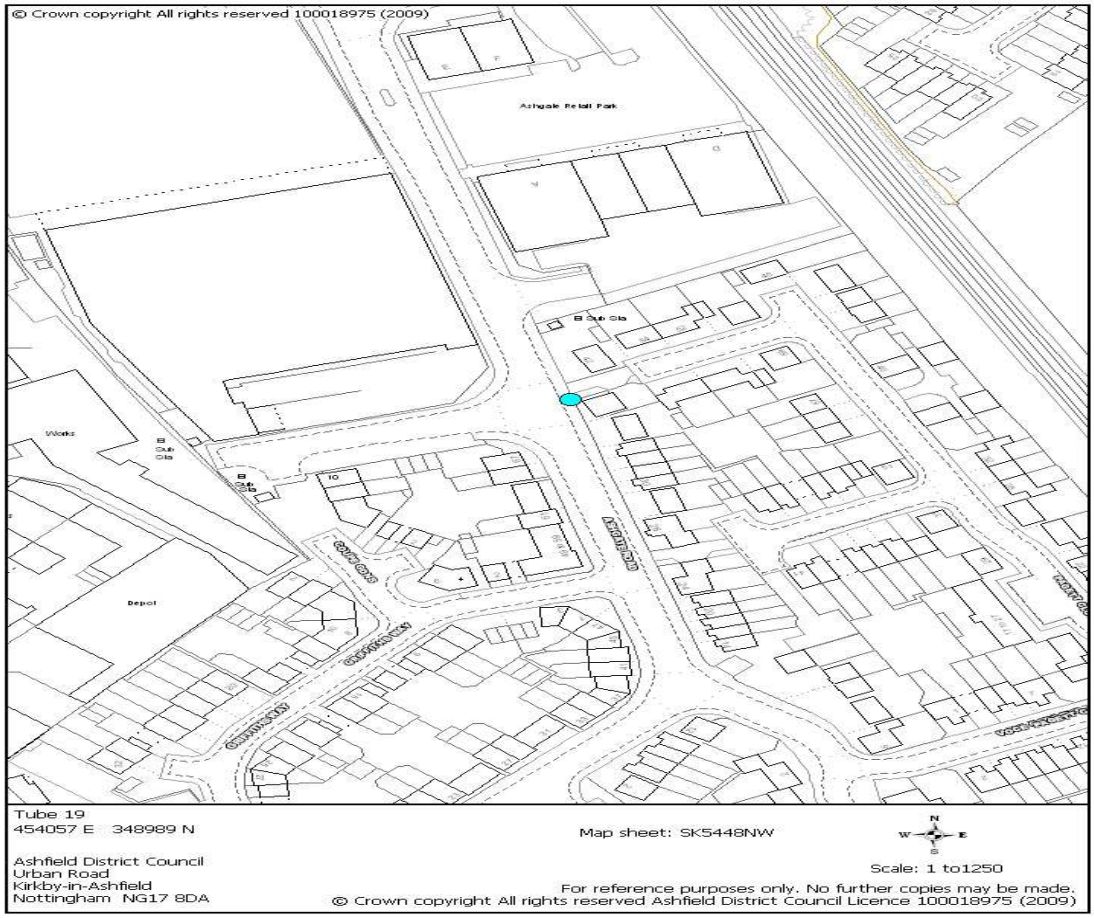


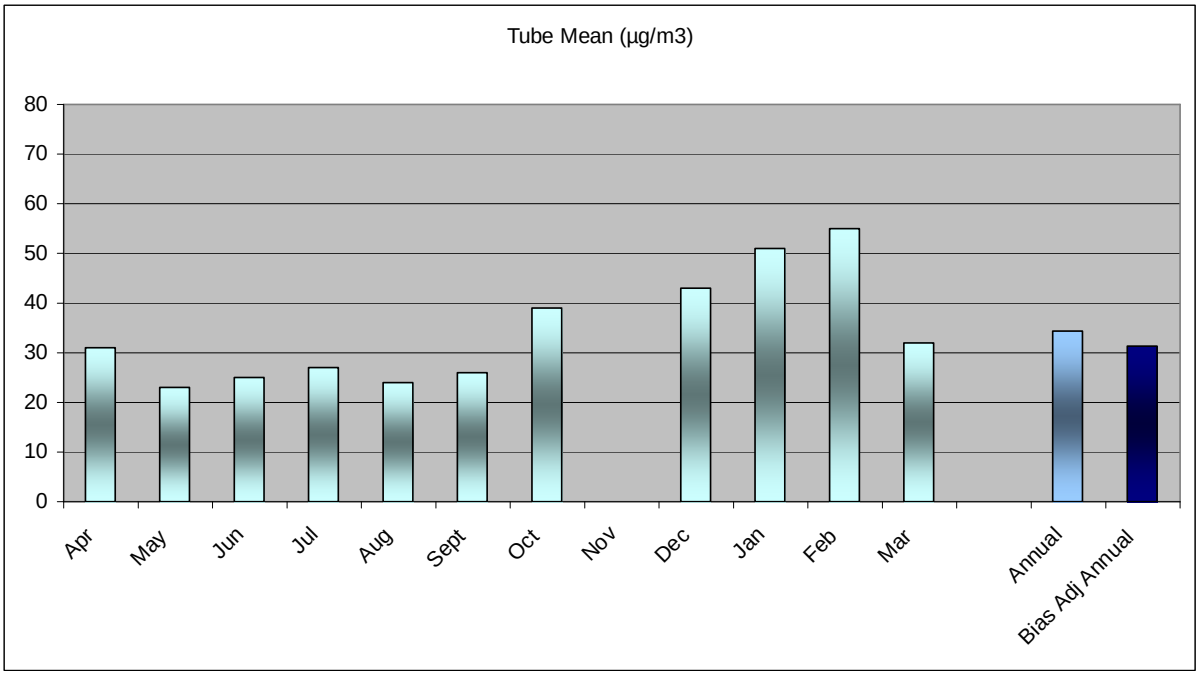
Table 2.16: Nitrogen Dioxide Diffusion Tube Monitoring Results Hucknall Ashgate Road

Start Date	End Date	Tube 1 (µg/m^3)	Tube 2 (µg/m^3)	Duplicate Mean (µg/m^3)
03/04/2008	01/05/2008	31	22.5	31
01/05/2008	28/05/2008	22.9	22.4	23
28/05/2008	02/07/2008	24.4	25.3	25
02/07/2008	30/07/2008	26.6	26.9	27
30/07/2008	03/09/2008	22.6	26.2	24
03/09/2008	02/10/2008	26.8	25.9	26
02/10/2008	29/10/2008	38.2	38.8	39
29/10/2008	03/12/2008			
03/12/2008	07/01/2009	43.1	42.6	43
07/01/2009	04/02/2009	52.4	49	51
04/02/2009	04/03/2009	58.8	50.9	55
04/03/2009	03/04/2009	33.6	29.4	32

Measured Annual Mean For 2006 Based on 12 months Data (µg/m^3)	Bias Adjusted Annual Mean (Factor 0.9) (µg/m^3)
34	31

Those figures highlighted in red indicate where tube precision was poor – assumptions made to most reasonable figure.

Chart 2.19: Nitrogen Dioxide Diffusion Tube Kirkby Hucknall Ashgate Road



Distance Fall-off Calculation

Undertaking the relevant calculation for distance fall-off, the resultant Nitrogen Dioxide level at the receptor is **29µg/m^3** (Appendix 2).

This value is below the annual mean objective of 40µg/m^3 and therefore there is no need to proceed to a detailed assessment for this location.

Nitrogen Dioxide Diffusion Tube Study Summary

Table 2.17: Summary of Results of Nitrogen Dioxide Diffusion Tubes

Site Name	Within AQMA?	Data Capture 2008 %	Annual mean concentrations 2008 ($\mu g/m^3$) Adjusted for bias	Annual mean concentrations 2008 ($\mu g/m^3$) Distance Fall-Off Calculated Level at Receptor
Sutton Outram Street	N	100%	36	32
A38 Fire Station	N	100%	33	36
Selston Nottingham Road	N	100%	31	28
Hucknall High Street	N	100%	41	-
Hucknall Croft/Beardhall Street	N	100%	28	-
Kirkby Naggs Head	N	100%	36	38
Forest Close M1	N	100%	32	-
M1 Pinxton	N	100%	36	32
Kirkby Church Hill	N	100%	41	35
Sutton Mansfield Road	N	100%	37	37
Sutton Dalestorth Street	N	100%	38	35
Selston Royal Oak	N	92%	33	-
Hucknall Ashgate Road	N	92%	31	29

Nitrogen Dioxide: Additional Information

Air Quality Emission Inventory

A nitrogen dioxide emission inventory for Ashfield has been revised since the second round of review and assessment, undertaken by consultants acting on behalf of Nottinghamshire authorities and based upon 2004 data. Considerable data relating to emissions of nitrogen dioxide has been compiled and entered into the inventory. The inventory clearly demonstrates a reduction in nitrogen dioxide levels across Ashfield and Nottinghamshire since the second round.

Table 2.18*:* Emission reductions of Nitrogen Dioxide from Road Transport within Nottinghamshire 1997 –2004 (tonnes/year)

Pollutant	Emissions from Road Transport			
	1997 (tonnes /year)	2001 (tonnes /year)	2004 (tonnes /year)	% Reduction*
Nitrogen Oxides (NOx)	16812	12993	10223	23

Nitrogen Dioxide: Conclusions

It is therefore concluded that there is no need to proceed to a detailed assessment for Nitrogen Dioxide at any monitoring location within the district.

2.2.2 Fine Particles - PM_{10}

No monitoring of fine particles has been carried out since that reported in Ashfield District Council's Progress Report, 2008. This has been due to operational difficulties relating to the Council's Automatic Monitoring Station.

2.2.3 Sulphur Dioxide

No monitoring of Sulphur Dioxide is carried out within the district.

2.2.4 Benzene

No monitoring of Benzene is carried out within the district.

2.2.5 Other pollutants monitored

No other pollutants are monitored within the district.

3 Road Traffic Sources

Ashfield District Council has focused attention on the following locations:

- Busy roads, especially in congested areas and near junctions, where emissions are likely to be higher.

- Roads in built up areas where there is a possible canyon effect due to the adjacent buildings restricting dispersion and dilution of pollutants.

Specific locations have only been addressed where conditions have changed significantly from previous assessments.

Where no monitoring information is available for a particular site of interest, a screening assessment has been carried out utilising the latest version of Design Manual for Roads and Bridges (DMRB), Highways Agency.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Pollutant concentrations can be higher at locations that experiences slow moving traffic and where the nature of the location may lead to a canyon effect. A canyon effect may occur where buildings adjacent to the road restrict dispersion and dilution of the pollutant. This section of the screening assessment only considers Nitrogen Dioxide.

Daily traffic flow (ADDT) data has been obtained from Nottingham County Council. Where no traffic flow data was available, Ashfield District Council undertook its own studies in order to ascertain an estimate of traffic flow.

Traffic flow data and local knowledge was then utilised to identify whether any roads within the district met with both of the following criteria:

- Traffic is slow moving and is starting/stopping due to crossings/parked vehicles throughout the day. Roads with an ADDT of around 5,000 vehicles and with average speeds likely to be less than 15m.p.h.

- Residential properties within 2m of the kerb and buildings on both sides of the road.

From gathered traffic flow data, the following streets were identified as potentially meeting the above criteria:

Table 3.1: Potential Streets – Narrow Congested

Location	ADDT
Kirkby - Station Street	11,350
Kirkby – Lowmoor Road	Approx 5000
Sutton – Dalestorth Street	Approx 5000
Sutton – Outram Street	Approx 5000
Sutton – Priestic Street/Mansfield Road	23100
Hucknall – South Street	5150
Hucknall – High Street	12100

These sites were then investigated further in order to ascertain whether they fully meet the required criteria.

Off the sites identified above, Lowmoor Road and South Street do not meet all of the criteria laid down. Station Street, Dalestorth Street, Outram Street, Priestic Street/Mansfield Road and High Street are currently being monitored by the use of Nitrogen Dioxide Diffusion Tubes, and this report has concluded that there is no need to proceed to a detailed assessment at any of these sites. In addition, automatic monitoring equipment was utilised to assess Nitrogen Dioxide levels on Priestic Road/Mansfield Road, the results of which were reported within Ashfield District Council's 2007 Progress Report. The levels monitored were below the relevant objectives.

Therefore, Ashfield District 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

Local authorities are only required to undertake review and assessment against this section where there are busy street locations identified where members of the public might regularly spend 1-hour or more, e.g. streets with many shops, streets with outdoor cafes/bars. Ashfield District Council has considered all busy streets where individuals may be exposed within 5m of the kerb.

There are no streets within Ashfield, which meet all the criteria of this section and therefore no further assessment has been undertaken.

Ashfield District 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.

Authorities are only required to undertake an updating and screening assessment for this section where roads are identified as having an unusually high proportion of buses or HGVs. An 'unusual high proportion of Buses or HGVs' is taken to be greater than 20% of the AADT

There are no roads determined as having an unusually high proportion of buses or HGV's.

Ashfield District Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Local authorities are required to undertake assessment of busy junctions within their districts. A 'busy' junction is defined as '*one with more than 10,000 vehicles per day*'. Additionally there should be a relevant exposure within 10 metres of the kerb. A comprehensive assessment of busy junctions was undertaken during the 2nd Round USA utilising GIS software and local knowledge. Seven busy junctions were evaluated using the DMRB model which demonstrated that the air quality objective would not be compromised at these locations. These busy junctions were then re-evaluated during the 3rd Round of USA, having considered revised AADT traffic flow data for 2004, updated UK background concentration maps and a re-assessment for relevant exposure, and again demonstrated that air quality objectives would not be compromised at these locations. The following Junctions were considered:

Table 3.2: Identified Busy Junctions

Coordinates	Busy Junctions
450,180 358,594	A38 – B6022
448,969 356,303	B6018 – B6020
450,814 353,809	A611 – Forest Road
448,800 358,684	B6023 – B6026
449,295 358,973	B6023 – Lammas
449,295 358,973	B6023 – B6028
448,323 360,747	B6014 – B6028

Apart from these seven junctions, Ashfield District Council has not identified any "busy junctions" that are new.

Ashfield District 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

It is only necessary to consider proposed roads for which planning permission has been granted. Ashfield District Council has reviewed this matter and has identified no such new/proposed roads.

Ashfield District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Authorities are only required to undertake the assessment of roads with traffic flows greater than 10,000 vehicles per day that have experienced a large increase in traffic. 'large increase' as '*more than a 25% increase in traffic*'.

The aim of the assessment is to establish whether there is a risk of exceedances along the existing roads with a significant change in flows.

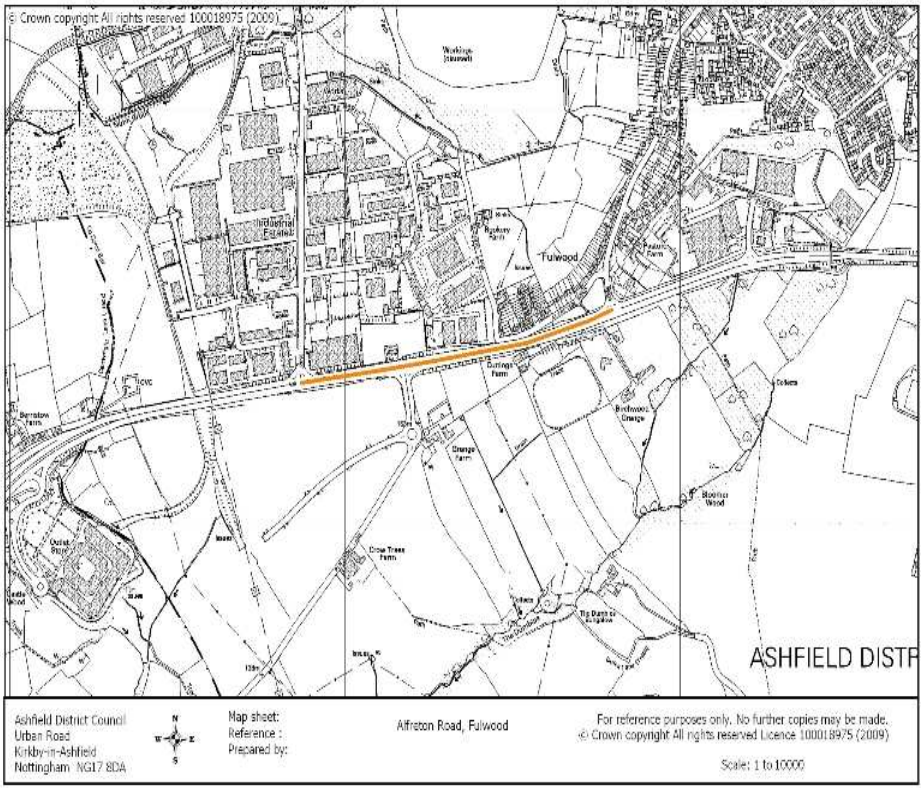
Improved AADT traffic data for 2007 was compared with 2004 AADT data to identify roads which had experienced an increase in traffic flow above 25%. The following roads were re-evaluated in respect of significantly changed traffic flows.

Table 3.3: Identified Roads with Significantly Increased Traffic

Road Description	2004	2007	% Increase
Alfreton Road: B 6027 Common Road, Huthwaite - B 6023	27300	35,150	**28.7**
Sutton Bypass: B 6018 Sutton Road - B 6021 Oddicroft Lane	23900	31,200	**30.5**
Sutton Bypass: B 6022 Station Road - B 6139 Coxmoor Road	22950	29,850	**30.0**
Derby Road: Cauldwell Road, Mansfield - B6139 Coxmoor Road, Sutton in Ashfield	9950	12,550	**26.1**
Derby Road: B6139 Coxmoor Road, Sutton - B6020 Diamond Avenue, Kirkby	13150	16,950	**28.9**
Hucknall Bypass: B6011 Annesley Road - B6009 Watnall Road	11,300	14,450	**27.9**
B 6009, Watnall - Nabbs Lane, Hucknall	9,600	14,400	**50.0**

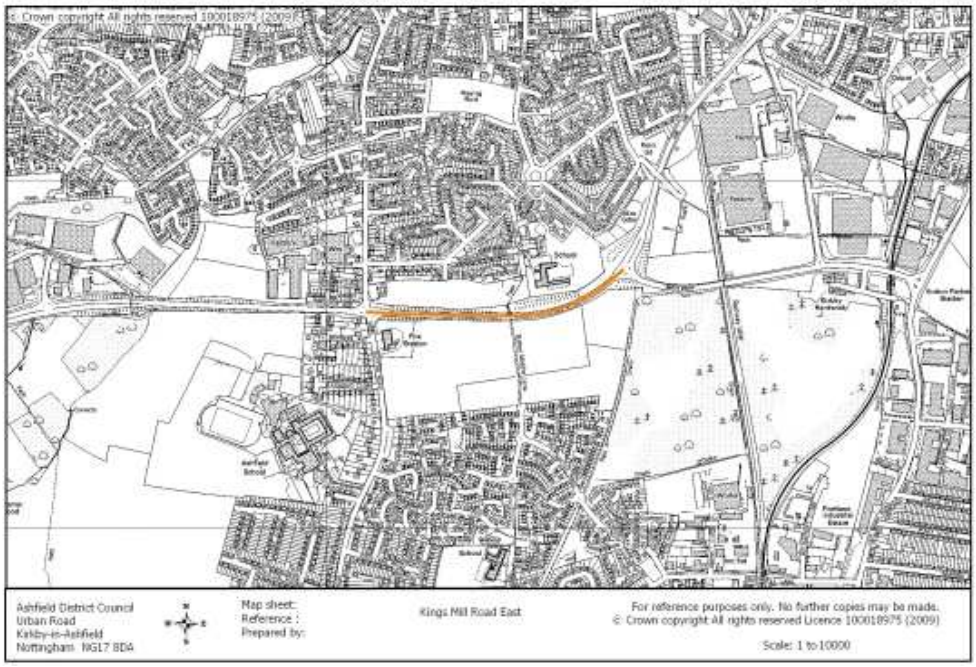
Map 3.1: Alfreton Road: B 6027 Common Road, Huthwaite - B 6023

GIS evaluation has determined that there is no relevant exposure to this section of road and therefore no further assessment has been undertaken.



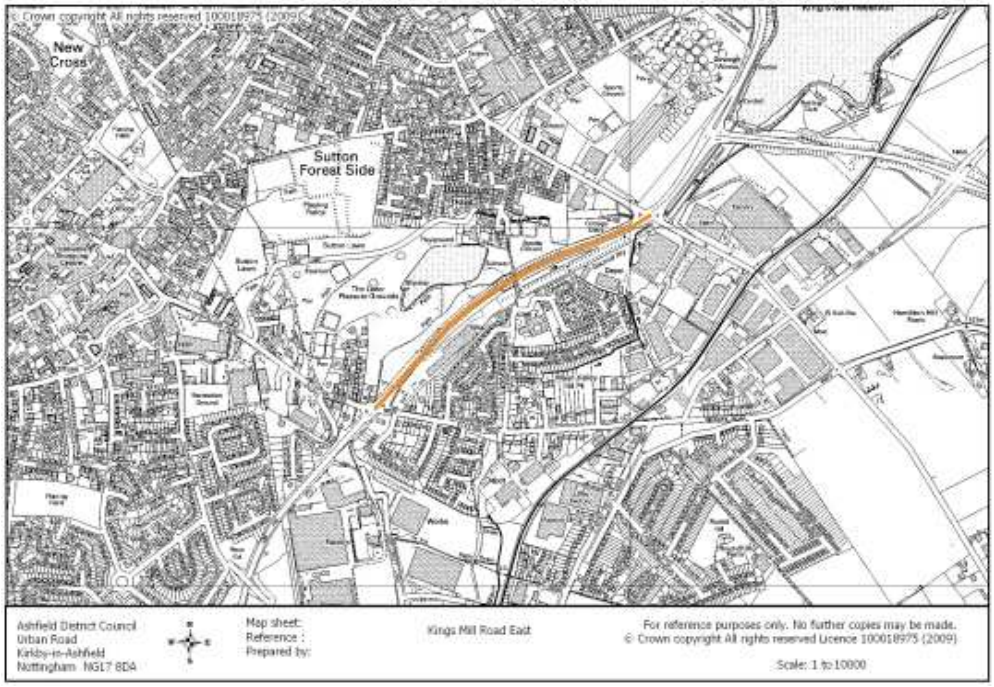
Map 3.2: Sutton Bypass: B 6018 Sutton Road - B 6021 Oddicroft Lane

GIS evaluation has determined that there is no relevant exposure to this section of road and therefore no further assessment has been undertaken.



Map 3.4: Sutton Bypass: B 6022 Station Road - B 6139 Coxmoor Road

GIS evaluation has determined that there one relevant exposure on this section of road and therefore further assessment was undertaken.



A screening assessment for road traffic sources may be carried out using the screening model which has been prepared for the Design Manual for Roads and Bridges (DMRB) and has been published by the Highways Agency. The DMRB screening model can be run to predict pollutant concentrations at receptor locations near to roads. It can be used to predict annual mean concentrations of nitrogen dioxide (NO2) and PM10, as well as oxides of nitrogen (NOx), carbon monoxide, benzene and 1,3-butadiene. It also predicts the number of exceedences of 50 µg/m3 as a 24-hour mean PM10 concentration.

A DMRB assessment was carried out and the following pollution levels were predicted:

Map 3.5: DMRB – 77 Station Road

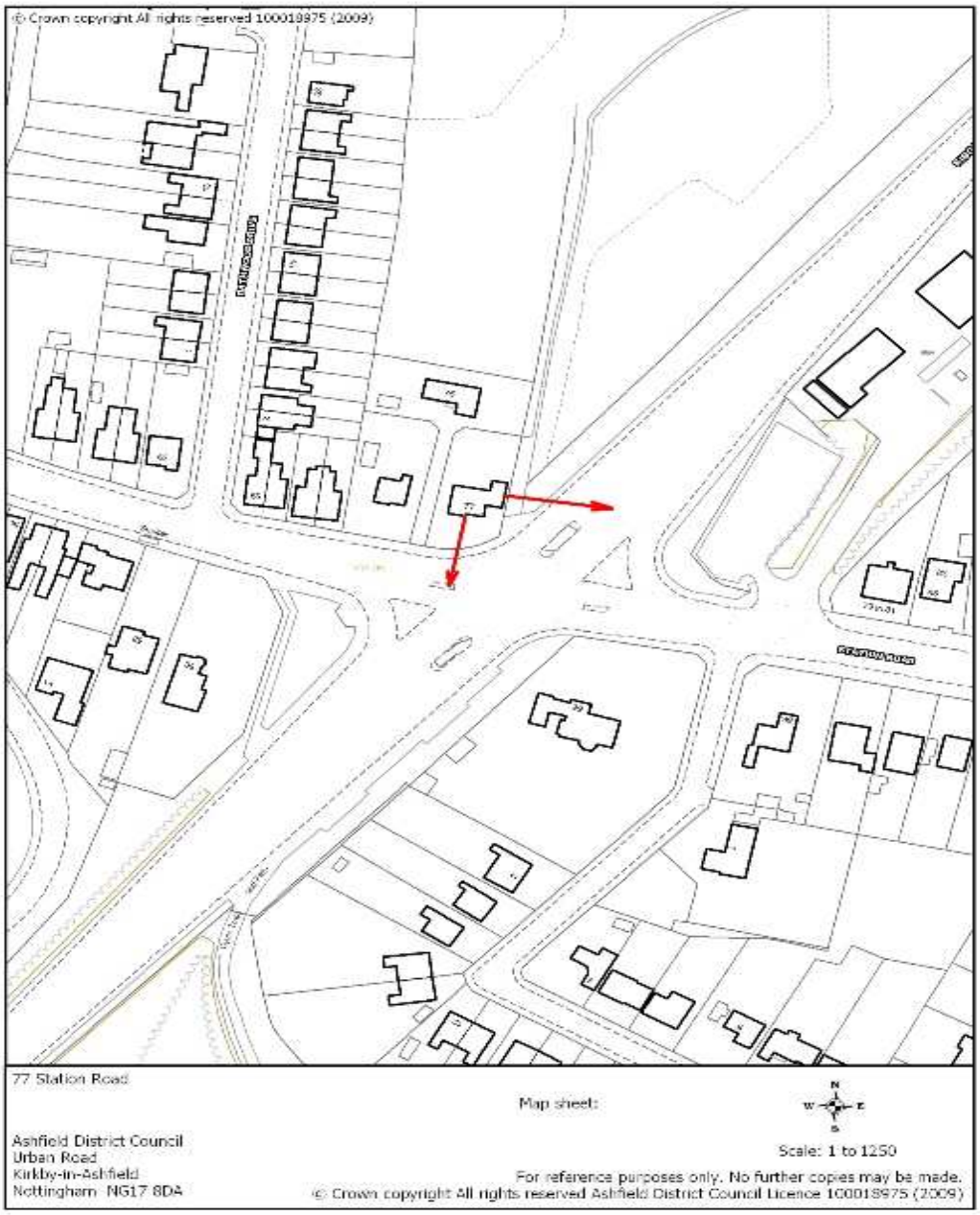


Table 3.4: DMRB Input Data - Sutton Bypass: B 6022 Station Road - B 6139 Coxmoor Road

Location/ Receptor	Grid Ref	Background Concentrations			
		Year	NOx	NO_2	PM_{10}
A	450287,358523	2008	32.14	22.48	19.88

Table 3.5: DMRB Model - Sutton Bypass: B 6022 Station Road - B 6139 Coxmoor Road

Location/ Receptor	Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition		
			AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Total % LDV (<3.5t GVW)	Total % HDV (>3.5t GVW)
A	1	16.8	29,850	32.2	D	93	7
	2	20.5	14,950	32.2	D	96.2	3.8
	3						
	4						
B	1						
	2						
	3						
	4						

Table 3.6.: DMRB Output for Sutton Bypass: B 6022 Station Road - B 6139 Coxmoor Road

Results							
Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
NO_x	32.1	37.2	69.4	$\mu g/m^3$	Not applicable		
NO_2	22.5	8.9	31.4	$\mu g/m^3$	Annual mean*	31.4	$\mu g/m^3$
PM_{10}	19.9	3.38	23.26	$\mu g/m^3$	Annual mean	23.26	$\mu g/m^3$
					Days >50$\mu g/m^3$	9	Days

Recent evidence shows that the proportion of primary NO2 in vehicle exhaust has increased. This means that the relationship between NOx and NO2 at the roadside has changed from that currently used in the DMRB model.

A NOx to NO2 calculator, provided by Defra, has therefore been utilised to convert the above resultant NOx levels to NO2. The background levels for NOx and NO2 utilised within the DMRB model were set to zero and the calculation re-run. The resultant NOx result was then utilised with the conversion model. The resultant predicted annual Nitrogen Dioxide Level is:

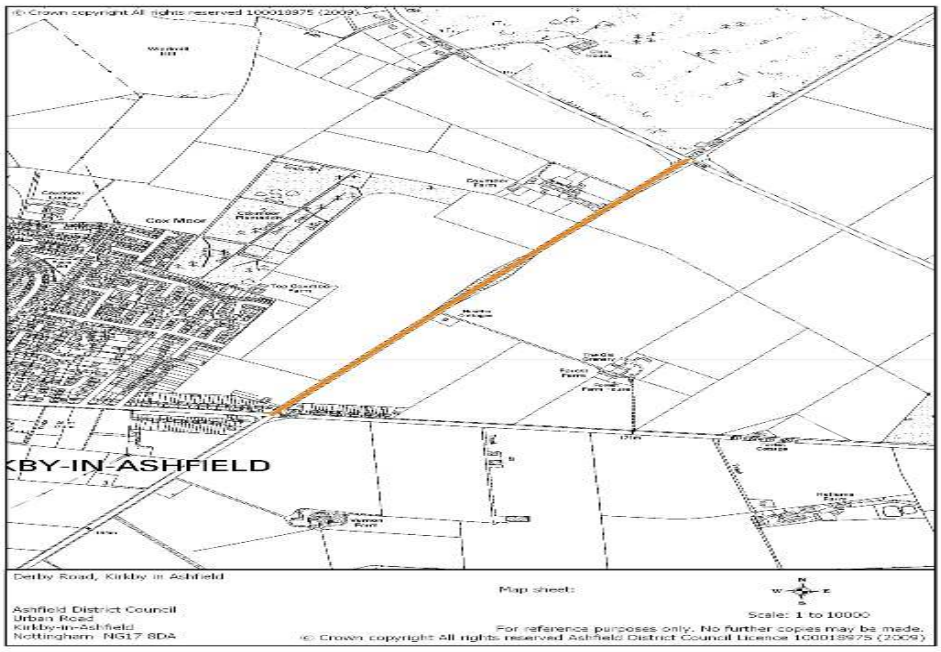
Table 3.7: Results for B 6018 Sutton Road - B 6021 Oddicroft Lane

Location/ Receptor	Name	Year	Total NO_x	Rd NOx	Adj Rd NOx	Adj Total NOx	Adj Rd NO_2	Adj Total NO_2
			Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$
1	77 Station Road	2008	69.2	37.2	-	69.2	14.94	36.1

Therefore there is no need to proceed to a detailed assessment for this location.

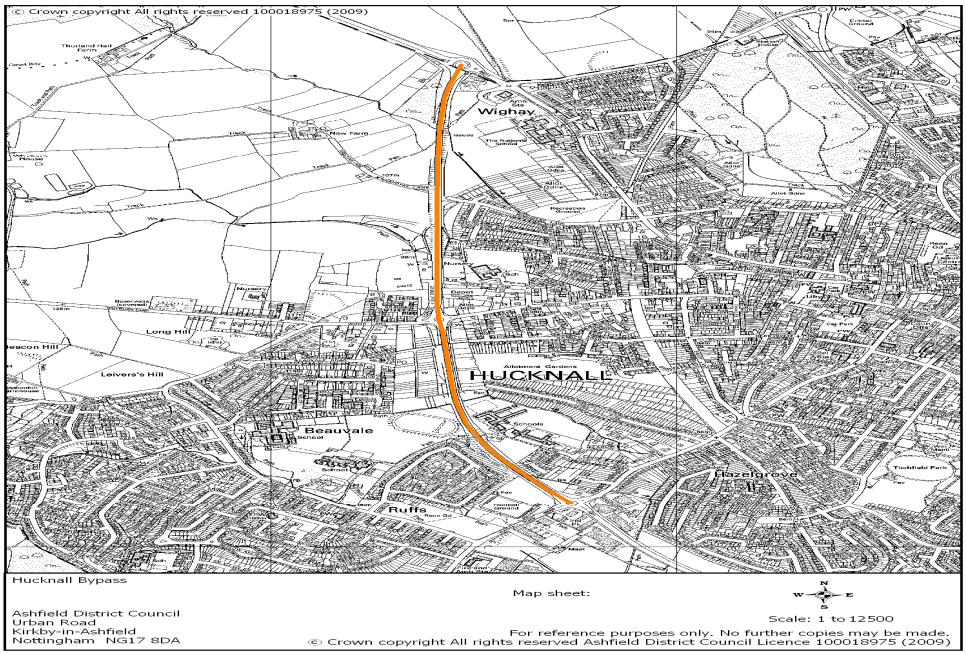
Map 3.6: Derby Road: Cauldwell Road, Mansfield - B6139 Coxmoor Road, Sutton in Ashfield

GIS evaluation has determined that there is no relevant exposure to this section of road and therefore no further assessment has been undertaken.



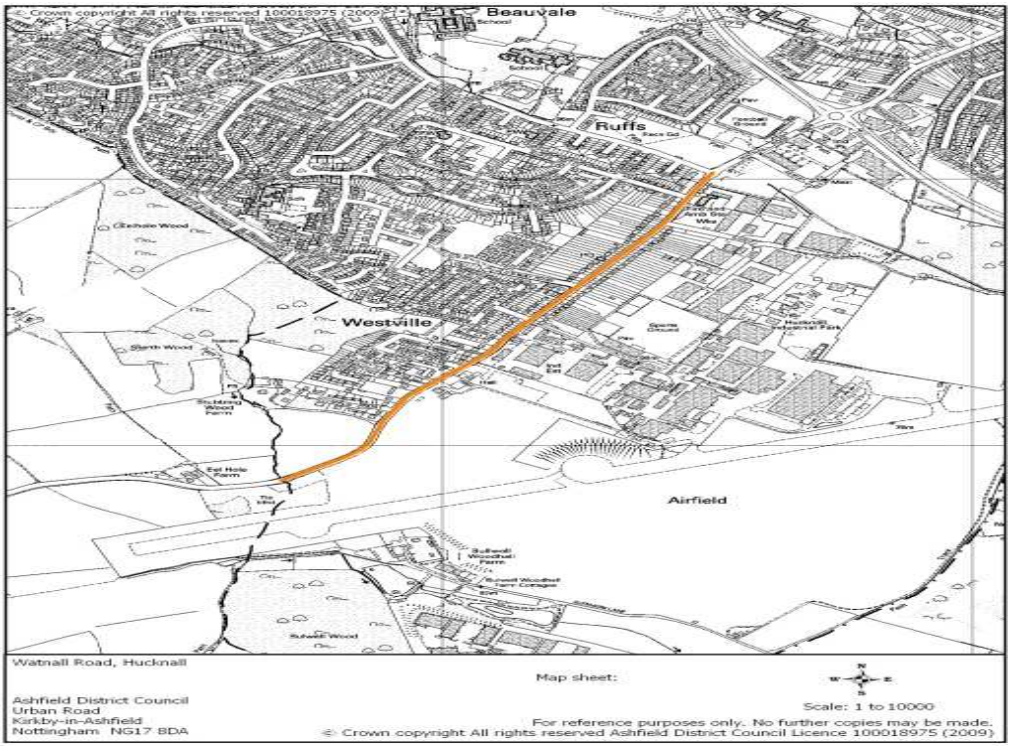
Map 3.7: Hucknall Bypass: B6011 Annesley Road - B6009 Watnall Road

GIS evaluation has determined that there is no relevant exposure to this section of road and therefore no further assessment has been undertaken.

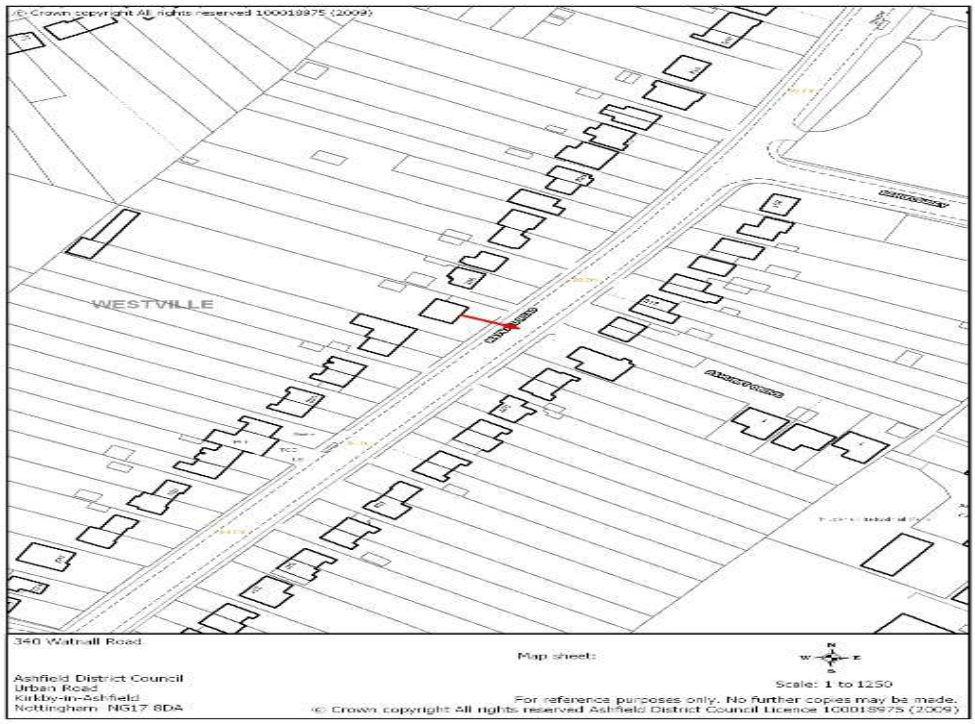


Map 3.8: B 600, Watnall - Nabbs Lane, Hucknall

GIS evaluation has determined that there are a number of premises that represent relevant exposure on this section of road and therefore further assessment was undertaken. The properties nearest the road were assessed utilising the DMRB model and the NOx/NO2 conversion model.



Map 3.9: DMRB – 340 Watnall Road



Map 3.10: DMRB – 440 Watnall Road

Table 3.8: DMRB Input Data - B 600 Watnall - Nabbs Lane, Hucknall

Location/ Receptor	Grid Ref	Background Concentrations			
		Year	NOx	NO_2	PM_{10}
A	452348,347762	2008	27.6	20	18.9
B	452030,347308	2008	27.6	20	18.9

Table 3.9: DMRB Model - B 600 Watnall - Nabbs Lane, Hucknall

Location/ Receptor	Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition		
			AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Total % LDV (<3.5t GVW)	Total % HDV (>3.5t GVW)
A	1	15.4	13,850	48.3	D	95.7	4.3
	2						
	3						
	4						
B	1	11.4	13,850	48.3	D	95.7	4.3
	2						
	3						
	4						

Table 3.10: Receptor A – DMRB Output B 600 Watnall - Nabbs Lane, Hucknall

Results							
Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
NO_x	27.6	12.7	40.3	$\mu g/m^3$	Not applicable		
NO_2	20.0	3.5	23.5	$\mu g/m^3$	Annual mean*	23.5	$\mu g/m^3$
PM_{10}	18.9	1.04	19.94	$\mu g/m^3$	Annual mean	19.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	3	Days

Table 3.11: Receptor B – DMRB Output B 600 Watnall - Nabbs Lane, Hucknall

Results							
Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
NO_x	27.6	14.2	41.8	$\mu g/m^3$	Not applicable		
NO_2	20.0	3.9	23.9	$\mu g/m^3$	Annual mean*	23.9	$\mu g/m^3$
PM_{10}	18.9	1.16	20.06	$\mu g/m^3$	Annual mean	20.6	$\mu g/m^3$
					Days >50$\mu g/m^3$	3	Days

Table 3.12: Results for B 600 Watnall - Nabbs Lane, Hucknall

Location/ Receptor	Name	Year	Total NO_x	Rd NOx	Adj Rd NOx	Adj Total NOx	Adj Rd NO_2	Adj Total NO_2
			Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$
A	340 Watnall Road	2008	40.3	12.7	-	40.3	5.68	24.8
B	440 Watnall Road	2008	41.8	14.2	-	41.8	6.31	25.4

There is therefore no need to carry out a further assessment at these locations.

Ashfield District Council has assessed new/newly identified roads with significantly changed traffic flows, and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.7 Bus and Coach Stations

There is only one bus station within Ashfield located at Sutton-in-Ashfield. The guidance only requires the updating and screening process to be undertaken if bus movements exceed 2,500 movements a day, and if there is a relevant receptor within 10m, assessed against the 1-hour objective. An evaluation of the bus station has determined that there are well below 2,500 bus movements per day. It is also very unlikely that any members of the public would remain in this location for over an hour.

No further review and assessment has been undertaken for this section.

Ashfield District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Aircraft are potentially significant sources of Nitrogen Oxides emissions, especially during take-off. There are no airports within the district that require to be considered as part of this assessment.

Ashfield District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

Stationary locomotives, both diesel and coal fired, can give rise to high levels of Sulphur Dioxide close to the point of emissions.

4.2.1 Stationary Trains

Authorities are only required to undertake assessment at locations where there is relevant exposure to diesel or coal fired locomotives, which are regularly stationary for periods of 15-minutes or more. There are no locations identified within Ashfield, which meet these criteria, and therefore no further assessment has been undertaken.

Ashfield District 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

It is now considered that moving diesel trains, in sufficient numbers, can also give rise to high emissions of Nitrogen Dioxide close to the track. A number of rail lines have been identified within the relevant technical guidance document, LAQM.TG(09) that should be considered where the background annual mean concentration of Nitrogen Dioxide is greater than 25 $\mu g/m^3$.

None of the lines identified are located within this district.

Ashfield District 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)

There are no relevant air quality issues relating to shipping within Ashfield. No further assessment has been undertaken for this section.

Ashfield District Council confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

Due to the existence of other regulatory controls over industrial sources there are very few sources that are of relevance to local authorities under the Local Air Quality Management regime. The focus of current review and assessments are on new installations and/or those with significantly changed emissions.

In assessing, industrial sources, Ashfield District Council has consulted with, and given consideration to, neighbouring local authorities.

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

A review has been carried out by Ashfield District Council and there are no new industrial sources identified within the district. Consideration has only been given to any installation that has been granted planning permission. No such installations have been identified in neighbouring districts.

Ashfield District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

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

Ashfield District Council has undertaken a review to identify any industrial sources, considered in previous assessments, which have relevant emissions that have increased substantially or where a new relevant exposure has been introduced in the vicinity of the installation. A substantial increase in emissions is taken as being greater than 30%.

There are no such installations within the district or within neighbouring authorities.

Ashfield District 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

Ashfield District Council has undertaken a review and no new or significantly changed installations, which have had no previous air quality assessment, have been identified, either within the district or with neighbouring authorities.

Ashfield District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel storage depots located within Ashfield or within adjacent authorities close to the district boundary.

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

When located adjacent to busy roads, there is evidence that some petrol stations can emit levels of Benzene that could be sufficient to cause a risk of the relevant objective being breached. Consequently, Ashfield District Council has undertaken a review to identify all petrol stations within the district that:

- Have an annual throughput of 2000m^3 of petrol and are located adjacent to a busy road.
- Have relevant exposure within 10m of the pumps.

None of the petrol stations in Ashfield meet these criteria.

Ashfield District Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

It has been identified that there may be potential exceedences of the PM_{10} objectives linked to poultry farms. Consequently, Ashfield District Council is required to review the district to identify any farms housing in excess of: 4000,000 birds if mechanically ventilated, 200,000 birds if naturally ventilated, 100,000 birds for any turkey unit, where there is relevant exposure within 100m of the poultry unit.

Consultation was carried out with the Environment Agency and it has been identified that no such units operate within the district.

Ashfield District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

Although there are potential benefits for the reduction of greenhouse gas production by utilising biomass to generate energy, there have been concerns that an increase in biomass combustion can have a detrimental effect on local air quality.

Therefore, Ashfield District Council is required to give consideration to the use of biomass combustion in both the commercial and domestic sectors.

Ashfield District Council is also required to consider other forms of solid fuel combustion in the domestic sector.

6.1 Biomass Combustion – Individual Installations

The Council is required to identify any plant burning biomass in 50kW to 20WM units. A review was carried out utilising data from the Nottingham Air Quality Emission Inventory, data held under the Clean Air Act, information on planning permissions, previous local air quality studies and local knowledge.

After reviewing the relevant data Ashfield District Council are satisfied that there are no plants burning biomass in 50Kw to 20Mw units.

Ashfield District Council confirms that there are no biomass combustion plants in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

It is considered that there is the potential for there to be unacceptably high PM_{10} concentrations to arise in areas where there are many small biomass combustion installations located, particularly in areas where PM_{10} concentrations are close to or above the objectives.

Ashfield District Council has utilised local knowledge and data held by the authority (development control, housing etc) to consider whether combined biomass combustion is an issue that requires further detailed assessment. Possible indicators of higher than average emissions densities resulting from solid fuel burning have been considered including:

- Complaints about nuisance dust or odour relating to burning;
- Visual signs of chimney smoke being emitted from several properties near to each other;
- Smell of burning solid fuel;

- Known high levels of sales of solid fuel via home delivery or local outlets; and
- Areas known to have limited or no access to mains gas.

There are no areas within the district that have been identified as having PM10 concentrations that are close to or above the relevant objectives. Considering that the background levels within the district range from 16μg/m^3 to 20μg/m^3, this would entail there having to be minimum number of 200 to 280 households burning wood in a fireplace as their principal source of heat to lead to an exceedence of the UK 2004 daily mean objective for PM10 as a function of annual mean background concentration. If advanced wood-burning stoves were being used as the principal source of heat then a much larger number of households would need to be using them to trigger a Detailed Assessment. This information was utilised to aid in the decision as to whether these sorts of densities of biomass burning are likely in any given area within the district.

Similarly, for commercial premises in a small town in England using biomass for heating, within an area with a background PM10 concentration of 17 mg/m3, a floorspace of 65,000m2 within a 500m by 500m area would be required to trigger a Detailed Assessment. This is roughly equivalent to 12 large superstores, and is based on a worst-case assumption that wood is burnt in a boiler of power rating between 50kWth and 1MWth as the *primary* source of heat.

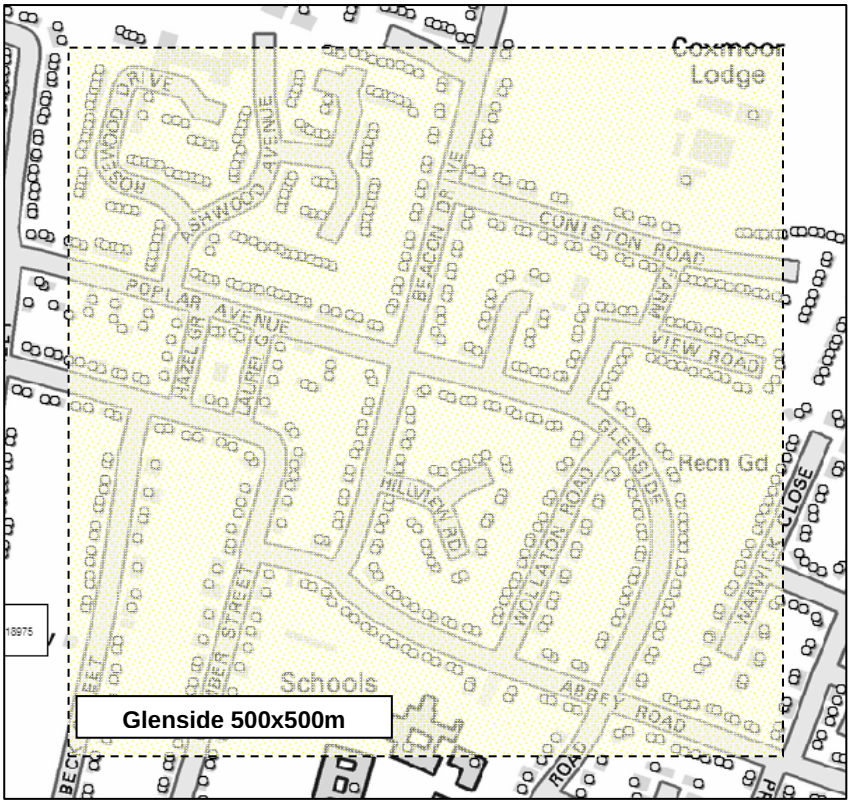
No such areas have been identified within the district.

Ashfield District Council confirms that there are no biomass combustion plants in the Local Authority area requiring detailed assessment with regards to combined impacts.

6.3 Domestic Solid-Fuel Burning

Consideration of results from the first round of review and assessment has indicated that areas of densely populated houses burning solid fuel could constitute significant sources of sulphur dioxide, even if smokeless fuel is consumed. The LAQM Technical Guidance (03) has determined 'significant coal burning' as '*any area of 500x500m which contains more than 100 houses burning solid fuel as their primary source of heating*.

Ashfield undertook a comprehensive district wide survey of all potential solid fuel burning areas based upon the above criteria during the 2nd Round USA. The survey demonstrated that there was no significant solid fuel burning taking place within Ashfield. However, diffusion tube analysis results for 2005 indicated that one area at Glenside, within Kirby-in-Ashfield had risen in concentration. As this location had not been subject to previous assessment a review of this area was undertaken.



Within an area of 500 x 500m there were a total of 47 houses which were identified as using solid fuel burning. There is therefore no significant coal burning in this area. During the evaluation it was determined that a local school was using solid fuel for heating and that the plume from the chimney was within the prevailing wind direction of the diffusion tube.

No further assessment has been undertaken as there are no 500m x 500m areas identified that would potentially have more than 50 houses burning coal/smokeless fuel as their primary source of heating. It is envisaged that solid fuel burning will continue to decrease throughout the district.

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

7 Fugitive or Uncontrolled Sources

Authorities are only expected to undertake a detailed assessment for PM_{10} in regard to this section where locations with relevant exposure and substantiated problems associated with dust have been determined.

There is only one location within Ashfield, which meets the criteria of this section. This is Sutton landfill site. It has been determined that the landfill site has areas of relevant exposure, as residential properties are located close to the site boundary. The site has recently withdrawn its IPPC application and is in the process of submitting a closure plan.

There have been no recent complaints concerning dust originating from site operations or any indication of significant dust problems. There is therefore no requirement for Ashfield to proceed to a detailed assessment for PM_{10} in respect of this location.

Ashfield District 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

Automatic Monitoring

Ashfield District Council currently has a Chemiluminescence NO-NO_2-NO_x analyzer (Thermo model 43 C NO_X analyser - USA-EPA approved NO_2 analyser) and an ESM Sequential Particulate Sampler, Type FH-95-SEQ which are both approximately 8/9 years old. These are jointly housed within a "walk in" secure static trailer. Owing to their age, both pieces of air quality monitoring equipment have had a number of significant breakdowns, which are becoming increasingly common. More importantly the manufacturers have also stated that they will cease support for the particulate sampler unit. This unit is the only one of this type currently in use in England at the present time and the manufacturers have stated that sourcing the parts is not viable.

Historically, this has increasingly led to loss of a considerable number of readings and an inability to create a suitable local bias factor. Unfortunately, the Council has experienced major operational/mechanical problems with the equipment that has resulted in the monitoring equipment being out of service for 10 months of this previous year. Consequently, there are no valid automatic monitoring data submitted within this report.

Non-Automatic Monitoring

In addition to the automatic monitoring, the Council measures Nitrogen Dioxide by non-automatic means. This is carried out by number of diffusion tubes being placed at variety of locations throughout the district.

Analysis of the monitoring results indicates that there is no need to proceed to a detailed assessment at any of the locations where monitoring has been undertaken.

8.2 Conclusions from Assessment of Sources

The following table details the sources assessed as part of the review and highlights whether a detailed assessment has been identified as being required.

Table 8.1: Conclusions from Assessment of Sources

Source	Assessed	No Detailed Assessment Required	Detailed Assessment Required
Narrow congested streets with residential properties close to kerb	√	√	

Busy streets where people may spend 1-hour or more close to traffic	√	√	
Roads with high flows of buses and/or HGVs	√	√	
Junctions	√	√	
New roads constructed or proposed since the last round of review and assessment	√	√	
Roads with significantly changed traffic flows	√	√	
Bus and coach stations	√	√	
Airports	√	√	
Railways (diesel and steam trains)	√	√	
Ports (shipping)	√	√	
New or proposed industrial installations for which an air quality assessment has been carried out	√	√	
Existing industrial installations where emissions have increased substantially or new relevant exposure has been introduced	√	√	

New or significantly changed installations with no previous air quality assessment	√	√	
Major fuel (petrol) storage depots	√	√	
Petrol stations	√	√	
Poultry Farms	√	√	
Biomass combustion – individual installations	√	√	
Biomass combustion – combined impacts	√	√	
Domestic solid-fuel burning	√	√	
Fugitive or uncontrolled sources	√	√	

8.3 Proposed Actions

Consequently, this Update and Screening Assessment has not identified the need for Ashfield District Council to proceed to a Detailed Assessment for any relevant pollutants at any assessed locations.

However, it is hoped that the Council's current bid for funding from Defra to purchase automatic monitoring equipment will prove to be successful. This will allow the Council to undertake more accurate/in-depth monitoring for future assessments and fully participate in the Nottinghamshire Air Quality Group.

The next course of action will be the preparation and submission of a Progress Report in 2010.

Appendices

Appendix 1
Diffusion Tube Precision

Sutton Outram Street

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	39.7	39.7		40	0.0	0	0.0
2	01/05/2008	28/05/2008	35.2						
3	28/05/2008	02/07/2008	30.2	38.0		34	5.5	16	49.7
4	02/07/2008	30/07/2008	30.8	30.9		31	0.1	0	0.8
5	30/07/2008	03/09/2008	30.0	29.7		30	0.2	1	2.0
6	03/09/2008	02/10/2008	33.7	30.2		32	2.5	8	22.6
7	02/10/2008	29/10/2008	41.9	40.8		41	0.8	2	7.2
8	29/10/2008	03/12/2008	44.3	44.6		44	0.2	0	1.7
9	03/12/2008	07/01/2009	50.9	46.5		49	3.1	6	27.8
10	07/01/2009	04/02/2009	55.0	45.7		50	6.5	13	58.8
11	04/02/2009	04/03/2009	57.5	53.7		56	2.7	5	24.0
12	04/03/2009	03/04/2009	38.8	40.0		39	0.8	2	7.6
13									

Over All Survey - Good Precision

A38 Fire Station

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	33.9	39.5		37	4.0	11	35.9
2	01/05/2008	28/05/2008	50.2	43.2		47	4.9	11	44.5
3	28/05/2008	02/07/2008	34.1	34.6		34	0.4	1	3.2
4	02/07/2008	31/07/2008	27.0	25.5		26	1.1	4	9.5
5	31/07/2008	03/09/2008	21.5	20.2		21	0.9	5	8.5
6	03/09/2008	02/10/2008	27.7	23.6		26	2.8	11	25.6
7	02/10/2008	29/10/2008	30.4	30.9		31	0.4	1	3.4
8	29/10/2008	03/12/12008	40.8	39.6		40	0.8	2	7.4
9	03/12/12008	07/01/2009	42.6	40.7		42	1.4	3	12.3
10	07/01/2009	04/02/2009	46.0	48.1		47	1.5	3	13.3
11	04/02/2009	04/03/2009	53.3	54.8		54	1.0	2	9.4
12	04/03/2009	03/04/2009	37.1	39.6		38	1.8	5	16.3
13									

Over All Survey - Good Precision

Selston Nottingham Road

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	22.5	32.3		27	6.9	25	62.3
2	01/05/2008	28/05/2008	30.0	33.1		32	2.2	7	19.7
3	28/05/2008	02/07/2008	28.0	25.5		27	1.8	7	15.9
4	02/07/2008	31/07/2008	26.5	26.2		26	0.2	1	1.9
5	31/07/2008	03/09/2008	24.0	23.6		24	0.3	1	2.5
6	03/09/2008	02/10/2008	29.2	19.3		24	7.0	29	62.9
7	02/10/2008	29/10/2008	32.2						
8	29/10/2008	03/12/12008	36.8	37.6		37	0.6	2	5.1
9	03/12/12008	07/01/2009	40.6	40.9		41	0.2	1	1.9
10	07/01/2009	04/02/2009	49.2						
11	04/02/2009	04/03/2009	51.2	48.4		50	2.0	4	17.8
12	04/03/2009	03/04/2009	32.2	31.4		32	0.6	2	5.6
13									

Over All Survey - Good Precision

Hucknall High Street

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	42.9	44.6		44	1.2	3	10.8
2	01/05/2008	28/05/2008	46.9	43.6		45	2.3	5	21.0
3	28/05/2008	02/07/2008	42.8	46.3		45	2.5	6	22.2
4	02/07/2008	31/07/2008	37.9	34.9		36	2.1	6	19.1
5	31/07/2008	03/09/2008	34.0	39.7		37	4.0	11	36.2
6	03/09/2008	02/10/2008	31.9	35.2		34	2.3	7	21.0
7	02/10/2008	29/10/2008	24.2	43.3		34	13.5	40	121.3
8	29/10/2008	03/12/12008	45.1	48.1		47	2.1	5	19.1
9	03/12/12008	07/01/2009	52.5	50.3		51	1.6	3	14.0
10	07/01/2009	04/02/2009	56.5	61.0		59	3.2	5	28.6
11	04/02/2009	04/03/2009	58.8	61.1		60	1.6	3	14.6
12	04/03/2009	03/04/2009	43.9	42.9		43	0.7	2	6.6
13									

Over All Survey - Good Precision

Hucknall Croft/Beardhall Street

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	31.3	27.4		29	2.8	9	24.8
2	01/05/2008	28/05/2008	23.6	22.2		23	1.0	4	8.9
3	28/05/2008	02/07/2008	24.8						
4	02/07/2008	31/07/2008	21.7	20.3		21	1.0	5	8.9
5	31/07/2008	03/09/2008	23.6	23.5		24	0.1	0	0.6
6	03/09/2008	02/10/2008	18.3	18.5		18	0.1	1	1.3
7	02/10/2008	29/10/2008	28.4	29.5		29	0.8	3	7.0
8	29/10/2008	03/12/12008	37.8	32.7		35	3.6	10	32.4
9	03/12/12008	07/01/2009	43.0	35.7		39	5.2	13	46.4
10	07/01/2009	04/02/2009	46.4	47.1		47	0.5	1	4.4
11	04/02/2009	04/03/2009	48.7	48.3		49	0.3	1	2.5
12	04/03/2009	03/04/2009	33.0	33.9		33	0.7	2	6.0
13									

Over All Survey - Good Precision

Kirkby Naggs Head

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	38.1	39.2		39	0.8	2	7.0
2	01/05/2008	28/05/2008	36.4	35.5		36	0.6	2	5.7
3	28/05/2008	02/07/2008	32.7	36.0		34	2.3	7	21.0
4	02/07/2008	31/07/2008	28.2	32.8		31	3.3	11	29.2
5	31/07/2008	03/09/2008	33.1	20.6		27	8.8	33	79.4
6	03/09/2008	02/10/2008	25.8	34.2		30	5.9	20	53.4
7	02/10/2008	29/10/2008	39.7	42.9		41	2.3	5	20.3
8	29/10/2008	03/12/12008	43.2	36.3		40	4.9	12	43.8
9	03/12/12008	07/01/2009	38.5	42.6		41	2.9	7	26.0
10	07/01/2009	04/02/2009	57.0	53.0		55	2.8	5	25.4
11	04/02/2009	04/03/2009	51.4	62.4		57	7.8	14	69.9
12	04/03/2009	03/04/2009	39.8	39.8		40	0.0	0	0.1
13									

Over All Survey - Good Precision

Forest Close M1

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	30.9	26.8		29	2.9	10	26.0
2	01/05/2008	28/05/2008	47.8	57.2		53	6.6	13	59.7
3	28/05/2008	02/07/2008	28.5	28.0		28	0.4	1	3.2
4	02/07/2008	31/07/2008	22.5	24.1		23	1.1	5	10.2
5	31/07/2008	03/09/2008	19.4	18.1		19	0.9	5	8.3
6	03/09/2008	02/10/2008	25.5	23.1		24	1.7	7	15.2
7	02/10/2008	29/10/2008	25.1	23.0		24	1.5	6	13.3
8	29/10/2008	03/12/12008	44.9	42.2		44	1.9	4	17.2
9	03/12/12008	07/01/2009	40.1	44.0		42	2.8	7	24.8
10	07/01/2009	04/02/2009	48.6	58.8		54	7.2	13	64.8
11	04/02/2009	04/03/2009	47.7	44.5		46	2.3	5	20.3
12	04/03/2009	03/04/2009	34.5	29.3	33.5	32	2.8	9	6.9
13									

Over All Survey - Good Precision

M1 Pinxton

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	37.4	37.1		37	0.2	1	1.9
2	01/05/2008	28/05/2008	17.8	18.3		18	0.4	2	3.2
3	28/05/2008	02/07/2008	28.3	32.5		30	3.0	10	26.7
4	02/07/2008	31/07/2008	28.4	26.9		28	1.1	4	9.5
5	31/07/2008	03/09/2008	32.2	26.6		29	4.0	13	35.6
6	03/09/2008	02/10/2008	28.4	29.4		29	0.7	2	6.4
7	02/10/2008	29/10/2008	48.7	47.3		48	1.0	2	8.9
8	29/10/2008	03/12/12008	48.1	44.3		46	2.7	6	24.1
9	03/12/12008	07/01/2009	43.3	41.8		43	1.1	2	9.5
10	07/01/2009	04/02/2009	64.5	67.0		66	1.8	3	15.9
11	04/02/2009	04/03/2009	63.9	67.1		66	2.3	3	20.3
12	04/03/2009	03/04/2009	44.4	40.8		43	2.6	6	23.2
13									

Over All Survey - Good Precision

Kirkby Church Hill

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	46.0	41.3		44	3.3	8	29.9
2	01/05/2008	28/05/2008	50.2	49.6		50	0.4	1	3.8
3	28/05/2008	02/07/2008	40.7	34.4		38	4.5	12	40.0
4	02/07/2008	31/07/2008	38.2	38.6		38	0.3	1	2.5
5	31/07/2008	03/09/2008	29.1	35.0		32	4.2	13	37.5
6	03/09/2008	02/10/2008	44.2	47.9		46	2.6	6	23.5
7	02/10/2008	29/10/2008	45.4	44.7		45	0.5	1	4.4
8	29/10/2008	03/12/12008	45.6	49.6		48	2.8	6	25.4
9	03/12/12008	07/01/2009	47.4	52.5		50	3.6	7	32.4
10	07/01/2009	04/02/2009	58.2	63.3		61	3.6	6	32.4
11	04/02/2009	04/03/2009	58.7	47.2		53	8.1	15	73.1
12	04/03/2009	03/04/2009	37.6	50.5		44	9.1	21	81.9
13									

Over All Survey - Good Precision

Sutton Mansfield Road

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	36.5	36.6		37	0.1	0	0.6
2	01/05/2008	28/05/2008	46.7	44.2		45	1.8	4	15.9
3	28/05/2008	02/07/2008	40.1	35.9		38	3.0	8	26.7
4	02/07/2008	31/07/2008	33.7	35.4		35	1.2	3	10.8
5	31/07/2008	03/09/2008	29.2	30.7		30	1.1	4	9.5
6	03/09/2008	02/10/2008	31.8	32.4		32	0.4	1	3.8
7	02/10/2008	29/10/2008	34.4	37.0		36	1.8	5	16.5
8	29/10/2008	03/12/12008	48.1	41.9		45	4.4	10	39.4
9	03/12/12008	07/01/2009	50.9	52.0		51	0.8	2	7.0
10	07/01/2009	04/02/2009	49.1	50.3		50	0.8	2	7.6
11	04/02/2009	04/03/2009	56.2	37.2		47	13.4	29	120.7
12	04/03/2009	03/04/2009	39.0	46.5		43	5.3	12	47.6
13									

Over All Survey - Good Precision

Sutton Dalestorth Street

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	38.5	42.8		41	3.0	7	27.3
2	01/05/2008	28/05/2008	40.4	43.8		42	2.4	6	21.6
3	28/05/2008	02/07/2008	29.5	31.3		30	1.3	4	11.4
4	02/07/2008	31/07/2008	19.5	28.1		24	6.1	26	54.6
5	31/07/2008	03/09/2008	29.6	34.9		32	3.7	12	33.7
6	03/09/2008	02/10/2008	34.9	21.9		28	9.2	32	82.6
7	02/10/2008	29/10/2008	47.9	48.1		48	0.1	0	1.3
8	29/10/2008	03/12/12008	39.6	40.9		40	0.9	2	8.3
9	03/12/12008	07/01/2009	46.6	44.8		46	1.3	3	11.4
10	07/01/2009	04/02/2009	69.6	69.5		70	0.1	0	0.6
11	04/02/2009	04/03/2009	50.5	45.2		48	3.7	8	33.7
12	04/03/2009	03/04/2009	40.5	38.5		39	1.5	4	13.2
13									

Over All Survey - Good Precision

Selston Royal Oak

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	31.2	28.6	32.1	31	1.8	6	4.5
2	01/05/2008	28/05/2008	52.8	51.6	55.2	53	1.8	3	4.6
3	28/05/2008	02/07/2008	26.3						
4	02/07/2008	31/07/2008	22.0	20.0	20.7	21	1.0	5	2.5
5	31/07/2008	03/09/2008							
6	03/09/2008	02/10/2008	33.1	28.7	33.8	32	2.8	9	6.9
7	02/10/2008	29/10/2008	29.9	25.4	26.7	27	2.3	8	5.8
8	29/10/2008	03/12/12008	39.7	38.8	43.4	41	2.4	6	6.1
9	03/12/12008	07/01/2009	44.0	44.0	42.6	44	0.8	2	2.0
10	07/01/2009	04/02/2009	44.9	37.6		41	5.2	13	46.4
11	04/02/2009	04/03/2009	42.8	44.8	41.7	43	1.6	4	3.9
12	04/03/2009	03/04/2009	29.5	31.5		30	1.4	5	12.6
13									

Over All Survey - Good Precision

Hucknall Ashgate Road

Diffusion Tubes Measurements									
Period	**Start Date** dd/mm/yyyy	**End Date** dd/mm/yyyy	**Tube 1** μgm^{-3}	**Tube 2** μgm^{-3}	**Tube 3** μgm^{-3}	**Triplicate Mean**	**Standard Deviation**	**Coefficient of Variation (CV)**	**95% CI of mean**
1	03/04/2008	01/05/2008	31.0	22.5		27	6.0	22	54.0
2	01/05/2008	28/05/2008	22.9	22.4		23	0.4	2	3.2
3	28/05/2008	02/07/2008	24.4	25.3		25	0.6	3	5.7
4	02/07/2008	31/07/2008	26.6	26.9		27	0.2	1	1.9
5	31/07/2008	03/09/2008	22.6	26.2		24	2.5	10	22.9
6	03/09/2008	02/10/2008	26.8	25.9		26	0.6	2	5.7
7	02/10/2008	29/10/2008	38.2	38.8		39	0.4	1	3.8
8	29/10/2008	03/12/12008							
9	03/12/12008	07/01/2009	43.1	42.6		43	0.4	1	3.2
10	07/01/2009	04/02/2009	52.4	49.0		51	2.4	5	21.6
11	04/02/2009	04/03/2009	58.8	50.9		55	5.6	10	50.2
12	04/03/2009	03/04/2009	33.6	29.4		32	3.0	9	26.7
13									

Over All Survey - Good Precision

Appendix 2
Nitrogen Dioxide – Distance Fall-Off Calculations

Sutton Outram Street

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**1.5**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**4.5**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)		**21**	µg/m^3
Step 4		**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)		**36**	µg/m^3
Result		**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)		**32.4**	µg/m^3

A38 Fire Station

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**10**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**5.5**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)		**19.4**	µg/m^3
Step 4		**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)		**33**	µg/m^3
Result		**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)		**36.1**	µg/m^3

Selston Nottingham Road

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**1**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**3.5**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)		**19.4**	µg/m^3
Step 4		**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)		**31**	µg/m^3
Result		**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)		**28.1**	µg/m^3

Kirkby Naggs Head

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**5.5**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**3.8**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**19.3**	$\mu g/m^3$
Step 4		**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**36**	$\mu g/m^3$
Result		**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)		**37.9**	$\mu g/m^3$

M1 Pinxton

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**8.5**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**28.5**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**27.2**	$\mu g/m^3$
Step 4		**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**36**	$\mu g/m^3$
Result		**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)		**32.2**	$\mu g/m^3$

Kirkby Church Hill

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**0.5**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**2**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**16.9**	$\mu g/m^3$
Step 4		**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)		**41**	$\mu g/m^3$
Result		**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)		**35.1**	$\mu g/m^3$

Sutton Dalestorth Street

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**1**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**2.7**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)		**20.7**	µg/m^3
Step 4		**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)		**38**	µg/m^3
Result		**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)		**34.5**	µg/m^3

Hucknall Ashgate Road

Step 1		**How far from the KERB was your measurement made (in metres)?**	(Note 1)		**3.5**	metres
Step 2		**How far from the KERB is your receptor (in metres)?**	(Note 1)		**6.3**	metres
Step 3		**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)		**17**	µg/m^3
Step 4		**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)		**31**	µg/m^3
Result		**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)		**28.8**	µg/m^3