



2012 Air Quality Updating and Screening Assessment for

East Staffordshire Borough Council

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

July 2012



East Staffordshire Borough Council

Local Authority Officers	Craig Morris/Martyn Manning
Department	Environmental Health
Address	Environmental Health, Regulatory Services, The Maltsters, Wetmore Road, Burton upon Trent, Staffordshire, DE14 1LS
Telephone	01283 508848
e-mail	pollution.team@eaststaffsbc.gov.uk
Report Reference number	LAQM/USA/2012
Date	July 2012

GLOSSARY

Accuracy	The closeness of a measured value to an actual reference value.
Air Quality Objective	A concentration limit for each pollutant that must not be breached after a specified date.
AQMA	Air Quality Management Area
Bias factor	A factor used to correct a set of values for accuracy.
Correction factor	A value derived from the difference between the passive monitoring data and that from automatic monitoring to improve the accuracy of the results.
Detailed Assessment	An investigation which uses more detailed information relating to pollutants and their sources. Often utilises accurate monitoring and modelling to determine current and future pollutant impacts.
DEFRA	Department for Environment, Food and Rural Affairs.
Diffusion tube	A passive monitoring device used to give an average figure for concentrations of a pollutant at a specific location over a period of time.
DMRB	Design Manual for Roads & Bridges. The screening method used to calculate levels of pollutants coming from transport sources.
Emissions inventory	A catalogue of the sources of a pollutant in an area.
HGVs	Heavy goods vehicles
Further Assessment	An assessment which supplements the information supplied in the Detailed Assessment. Confirms the exceedence of Objectives and the improvement required to meet the limits. Helps confirm sources and extent of emission exceedences.
mg/m³	Milligrams per cubic metre.
Modelling	A process used to predict pollutant concentrations at locations that are not monitored. Can be used to predict current and future air quality.
Monitoring	The actual measuring of air quality using automatic or passive sampling equipment to provide current information on pollutant concentrations.

East Staffordshire Borough Council

NAEI	National Atmospheric Emissions Inventory.
NAQS	National Air Quality Strategy. The strategy devised by the Government with the aim of improving air quality by setting standards for specific pollutants.
NO²	Nitrogen dioxide
PM₁₀	Particulate matter less than 10 microns in diameter.
Precision	The closeness of a set of results obtained by the same method under the same conditions.
(Re) scaling factor	A value derived from the difference between the corrected monitored and modelled data to improve the accuracy of the modelled results.
Smoke Control Zone	A defined geographical area where only smokeless fuel can be utilised on domestic fireplaces.
SO²	Sulphur dioxide
µg/m³	Micro-grams per cubic metre
Ratification	A more thorough checking of the data than validation to ensure that the data is reliable before being used in the modelling process.
Receptor	Any person, animal, object or living thing that can be adversely affected by pollutants in the atmosphere.
Stationary source model	A simple model based on nomograms used to determine whether a point source is likely to exceed air quality objectives
Staffordshire Air Quality Forum	A group attended by all Staffordshire Authorities, aimed at harmonising approaches and sharing information regarding air quality Review and Assessment.
Technical Guidance	Note DEFRA technical guidance note (LAQM.TG(09))- produced in a checklist approach aimed at providing guidance to local authorities in completion of the Review and Assessment process.
UKAS	United Kingdom Accreditation Service
Updating and Screening Assessment	An assessment aimed at considering new and previous information to screen and prioritise areas that require more detailed investigation.
Validation	Screening of the raw data to check for any invalid readings

Executive Summary

This Updating and Screening Assessment marks the start of the 5th round of the Review and Assessment that is required as part of the Local Air Quality Management Process.

This Updating and Screening Assessment considers the most up to date monitoring data in relation to air quality and also the latest source information to identify any changes that may affect air quality within the borough of East Staffordshire.

Local monitoring for 2011 identifies the continued requirement for the two Air Quality Management Areas in Burton upon Trent for the annual NO₂ Objective, although there is a general continued improvement at many of the locations. Some sites, including those within the smaller St Peters Bridge Air Quality Management Area are now starting to fall below the Objective. There are no exceedences for NO₂ outside of the Air Quality Management Areas.

PM₁₀ monitoring at our automatic station shows no PM₁₀ Objective exceedences.

There are no new road and junction sources within the Borough not previously considered and DMRB screening shows any roads with significantly changed traffic flows are not at risk of Objective exceedences for either NO₂ or PM₁₀.

There are no other transport sources within the Borough with the potential to exceed the air quality Objectives.

No industrial sources previously considered have increased their emissions significantly enough to warrant consideration within this Updating and Screening Assessment. Several industrial installations have made either a planning or a permit application, although accompanying air quality assessments or consideration in this report have ruled out the likelihood of Objective exceedences.

With regards to other potential sources of emissions to air, there have either been no changes to those previously studied in earlier rounds of Review and Assessment, for example in relation to poultry farms, biomass combustion (and combined biomass combustion) and fugitive sources such as quarries. We continue to have no large fuel storage depots or relevant large service stations within the Borough.

This Updating and Screening Assessment confirms that there is no requirement to progress to a Detailed Assessment for any of the Air Quality Objectives.

Table of contents

GLOSSARY	3
1 Introduction	10
1.1 Description of Local Authority Area	10
1.2 Purpose of Report.....	12
1.3 Air Quality Objectives	13
1.4 Summary of Previous Review and Assessments	14
2 New Monitoring Data	21
2.1 Summary of Monitoring Undertaken	21
2.1.1 Automatic Monitoring Sites	21
2.1.2 Non-Automatic Monitoring Sites	24
2.2 Comparison of Monitoring Results with AQ Objectives	31
2.2.1 Nitrogen Dioxide (NO ₂)	31
2.2.2 PM ₁₀	42
2.2.3 Sulphur Dioxide.....	44
2.2.4 Benzene.....	44
2.2.5 Summary of Compliance with AQS Objectives	44
3 Road Traffic Sources	45
3.1 Narrow Congested Streets with Residential Properties Close to the Kerb	46
3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic.....	47
3.3 Roads with a High Flow of Buses and/or Heavy Goods Vehicles.	47
3.4 Junctions.....	48
3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment	49
3.6 Roads with Significantly Changed Traffic Flows.....	50
3.7 Bus and Coach Stations	53
4 Other Transport Sources.....	54
4.1 Airports.....	54
4.2 Railways (Diesel and Steam Trains)	54
4.2.1 Stationary Trains.....	55
4.2.2 Moving Trains	55
4.3 Ports (Shipping)	55
5 Industrial Sources.....	56
5.1 Industrial Installations	56
5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out	56
5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced.....	58
5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment... ..	59

5.2	Major Fuel (Petrol) Storage Depots	60
5.3	Petrol Stations.....	60
5.4	Poultry Farms.....	61
6	Commercial and Domestic Sources	62
6.1	Biomass Combustion – Individual Installations	62
6.2	Biomass Combustion – Combined Impacts.....	63
6.3	Domestic Solid-Fuel Burning	64
7	Fugitive or Uncontrolled Sources.....	65
8	Conclusions and Proposed Actions.....	67
8.1	Conclusions from New Monitoring Data	67
8.2	Conclusions from Assessment of Sources	68
8.3	Proposed Actions.....	69
9	References.....	70

List of Tables

Table 1.1	Air Quality Objectives included in Regulations for the purpose of LAQM in England.	12
Table 2.1	Details for the automatic monitoring site	21
Table 2.2	Details of non-automatic monitoring sites	25
Table 2.3a	Results of automatic monitoring of NO ₂ comparison with the Annual Mean Objective	31
Table 2.3b	Results of automatic monitoring of NO ₂ comparison with the 1-hour mean Objective	31
Table 2.4	Results for NO ₂ diffusion tubes in 2011	34
Table 2.5a	Results of automatic monitoring of PM ₁₀ comparison with the Annual Mean Objective	42
Table 2.5b	Results of automatic monitoring of PM ₁₀ comparison with the 24-hr mean Objective	42

List of Figures

Figure 1.1	Map of East Staffordshire Borough	10
Figure 1.2	AQMA 1. Burton-upon-Trent- Derby Rd, Derby St, part of Princess Way roundabout, Horninglow St, Horninglow Rd, Bridge St, Wellington St, part of Borough Road, part of Wellington St roundabout, part of Waterloo St and part of Byrkley St.	14
Figure 1.3	AQMA 2 – St Peters Bridge roundabout, Stapenhill, Burton-upon-Trent – St Peters Bridge roundabout and part of St Peters St.	15
Figure 2.1	Location of Derby Turn monitoring station	21
Figure 2.2	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along Wellington Street and the Borough Road / Derby Street / Byrkley Street / Waterloo Street gyratory.	37
Figure 2.3	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along Derby Street, including Derby Turn	37
Figure 2.4	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along Derby Road.	38
Figure 2.5	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along Horninglow Road.	38
Figure 2.6	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along Derby Road.	39
Figure 2.7	Trends in Annual Mean NO ₂ Concentration Measured at Diffusion Tube sites along St Peters Bridge roundabout and A444.	39

Appendices

Appendix 1	Quality Assurance (QA) & Quality Control (QC) of Data	72
Appendix 2	DMRB Results 2012	82

1 Introduction

1.1 Description of Local Authority Area

The Borough of East Staffordshire occupies a strategic position on the edge of the West Midlands and shares borders with South Derbyshire and Derbyshire Dales in the East Midlands.

The Borough covers an area of 39,000 hectares and had an estimated population of 113,600 in 2011. East Staffordshire is largely rural in which a significant area of the National Forest is located within the Borough, with the Weaver Hills adjoining the Derbyshire Dales in the north. The two main towns where industrial and commercial activities are concentrated are Burton upon Trent and Uttoxeter. Ward level projections indicate 60% of the Borough's population live in Burton upon Trent, while 12% live in Uttoxeter and the remainder dispersed across the many villages.

Burton upon Trent is the principal town where the bulk of employment for the Borough is provided and is a sub-regional centre serving the needs of its hinterland. Meanwhile, Uttoxeter is a small traditional market town with a sphere of influence extending into Derbyshire Dales and Staffordshire Moorlands.

East Staffordshire has thrived from a long legacy of manufacturing particularly in Burton upon Trent that includes the presence of companies such as Molson Coors Brewing Company (UK) Limited, Kerry Foods, JCB and Pirelli. Approximately 50 industrial processes exist that are subject to regulation under the Environmental Permitting Regulations 2010, which cover a wide range of activities. However, over the last decade the Borough has faced a substantial period of change, driven by industrial re-structuring, globalisation and the growth of a service led economy.

East Staffordshire Borough Council

There are no motorways in the Borough although there are two major trunk routes, namely:

- A38 between Birmingham and Derby
- A50 linking the M1 near Nottingham and the M6 at Stoke on Trent

The main commuter routes into Burton from Leicestershire, Warwickshire, Derbyshire and other parts of Staffordshire include;

- A511 linking the A50 to the north and the M1 near Coalville, Leicestershire
- A444 traversing the M42 and Nuneaton in North Warwickshire

A map showing the extent of the East Staffordshire Borough is shown in Figure 1.1 below.



Figure 1.1: Map of East Staffordshire Borough.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process (LAQM) 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 document (TG(09)). The LAQM process places a requirement on all Local Authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality Objectives are likely to be achieved. Where exceedences are considered likely, the Local Authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the Objectives.

The purpose of this Updating and Screening Assessment is to identify any matters that may have changed since previous rounds of Review and Assessment which may lead to risk of an air quality Objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The Updating and Screening Assessment report should provide an update of any outstanding information requested previously in Review and Assessment reports.

The LAQM is a rolling process, set out in stages with an Updating and Screening Assessment being undertaken on a 3 yearly basis, with this document being the start of the fifth round of Review and Assessment. Where an Updating and Screening Assessment highlights the need to look into an air quality issue further then the next stage of the LAQM process is a Detailed Assessment. In the years when an Updating and Screening Assessment is not completed Local Authorities are required to submit a Progress Report, which is intended to maintain continuity throughout the LAQM process.

1.3 Air Quality Objectives

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

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

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

1.4 Summary of Previous Review and Assessments

1.4.1 Air Quality Action Plan and Further Assessment

East Staffordshire Borough Council (ESBC) passed an Order for the declaration of two AQMAs for Nitrogen Dioxide (NO₂) from road traffic at the end of February 2007. The declarations came into effect within 3 months of the Order being made. In pursuit of improving air quality within the AQMAs, an Air Quality Action Plan (AQAP) was produced and remains in place now.

The cornerstone of the Action Plan was the Burton Urban Area Transport Management Study (BUATMS) that was originally established in 2001 by Staffordshire Highways Authority as part of the Local Transport Plan (LTP) for Staffordshire. Burton upon Trent was identified as one of the key strategic centres in the LTP, and as a result BUATMS was established to address traffic issues related to the town specifically. Some of the measures outlined in the BUATMS included for example, improved road signage, junction improvements and restriction of access to the inner area, bus prioritisation and access promotion, improvements to bus routes and stop infrastructure and promotion of non-car modes. BUATMS measures have since been completed.

ESBC also included a number of additional measures relating specifically to the Authority's own estates and activities. These measures included for example a policy for the implementation of a Green Fleet Review with support from the Energy Saving Trust, promotional campaigns such as car sharing and walk to work week and an overhaul of the Local Authority's Travel Plan to ensure a reduction in emissions from staff vehicles.

Maps showing the location of the two AQMA's are shown in Figures 1.2 and 1.3 respectively.

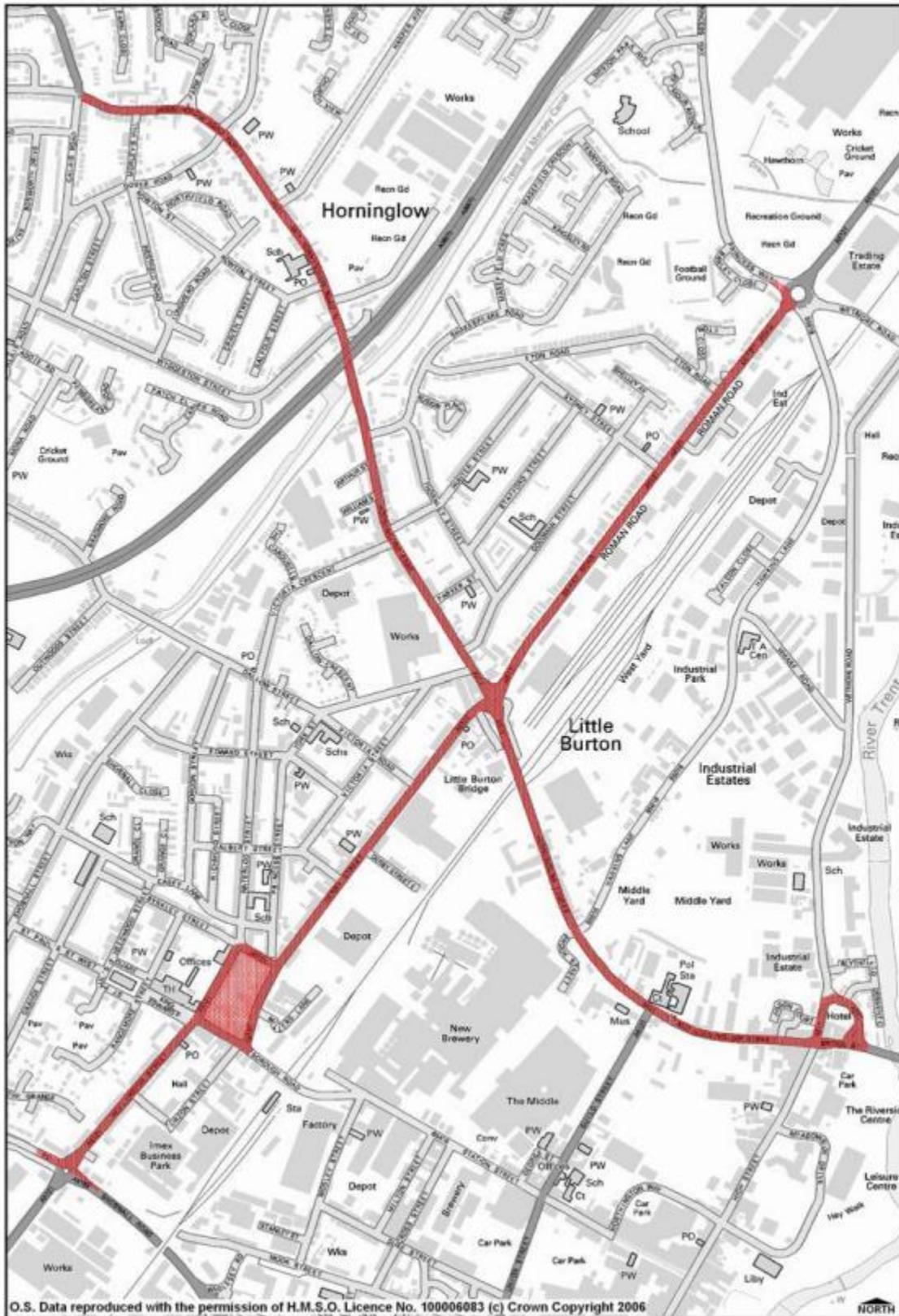


Figure 1.2: AQMA 1. Burton-upon-Trent- Derby Rd, Derby St, part of Princess Way roundabout, Horninglow St, Horninglow Rd, Bridge St, Wellington St, part of Borough Road, part of Wellington St roundabout, part of Waterloo St and part of Byrkley St.

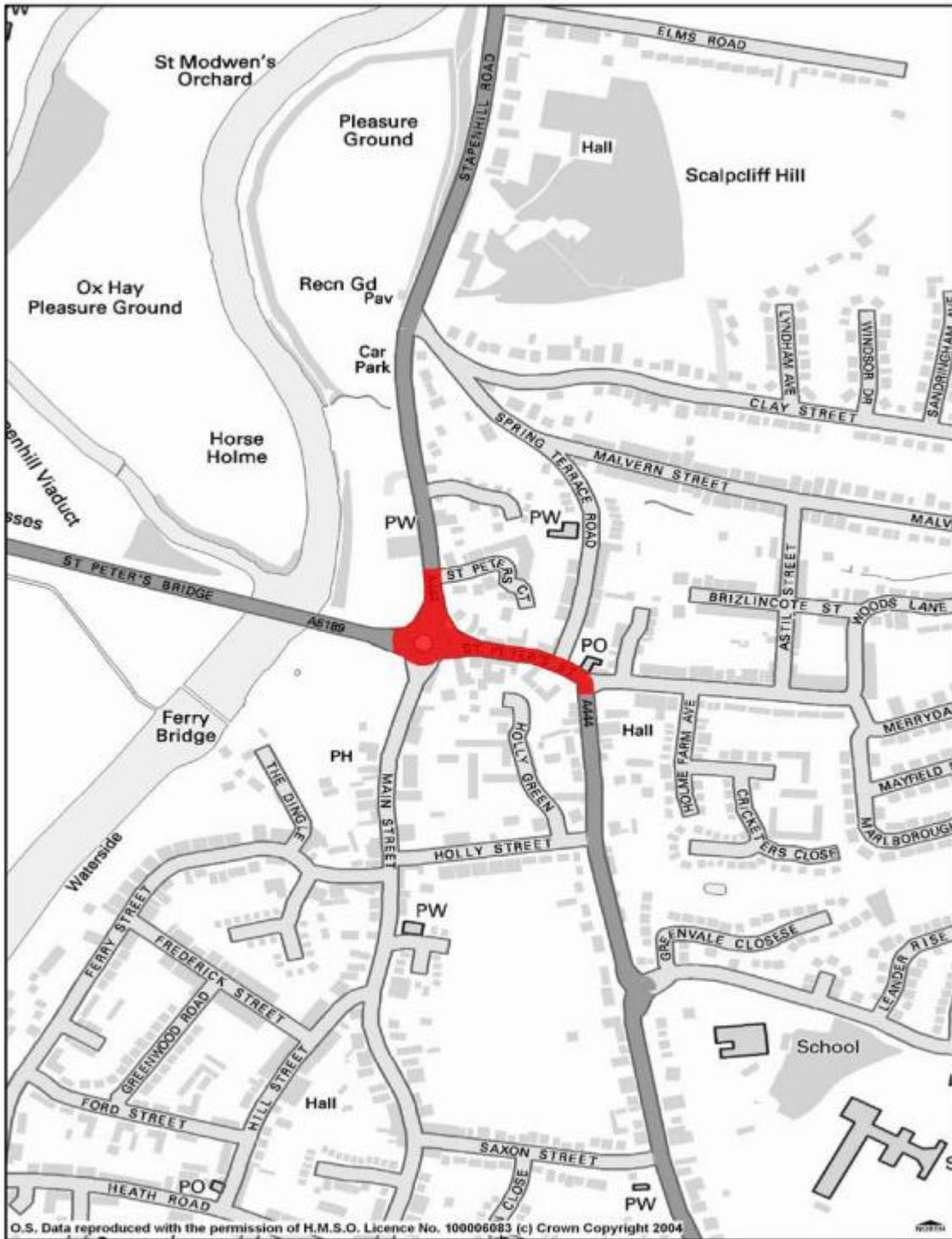


Figure 1.3: AQMA 2 – St Peter's Bridge roundabout, Stapehill, Burton-upon-Trent – St Peter's Bridge roundabout and part of St Peter's St.

East Staffordshire Borough Council

Prior to the Action Plan, a Further Assessment was completed at the end of February 2008. Detailed modelling justified the Authority's decision in declaring the two AQMA's with regard to the annual NO₂ Objective. It also highlighted two other locations where the A38 trunk road traverses Dallow Street / Belvedere Road and Shobnall Road where NO₂ Objectives could potentially have been exceeded. During 2008, NO₂ diffusion tubes were placed in these locations to monitor air quality on a long-term basis and are still in use now, although no exceedences of the Objectives have so far been recorded. The 2010 annual average modelled concentrations also highlighted predicted exceedences of the EU Limit Value at receptors along Wellington Street, Derby Street and Waterloo Street. Source apportionment of NO₂ concentrations were modelled at receptors for both traffic and industrial related sources. Vehicle sources accounted for over 90% of NO₂ concentrations at receptors, confirming that the focus of the Action Plan should be based on the road traffic sector.

1.4.2 Updating and Screening Assessment 2009

For the 2009 Updating and Screening Assessment, roads previously not considered were assessed for concentrations of NO₂ and PM₁₀, using the latest screening modelling tools, traffic data and background air quality data at that time. Although no exceedences were predicted, annual average NO₂ levels at three junctions were only 1 or 2 µg/m³ below the 40 µg/m³ annual NO₂ Objective. These junctions were;-

1. Evershed Way / Anglesey Road / Shobnall Road / Moor Street roundabout.
2. Orchard Street / Evershed Way roundabout.
3. Branston Road / Orchard Street / Lichfield Street / St Peters Bridge roundabout.

Each junction is located along a corridor of routes that connect the two AQMAs. It was therefore proposed to review the existing diffusion tube network during 2010 by adding new tubes along this corridor to monitor over the long-term. This has since been carried out and so far no exceedences have been recorded.

NO₂ levels from diffusion tube results for 2008 confirmed there were fewer exceedences within the two AQMAs compared to previous years.

No new industrial sources were identified that were likely to give rise to significant emissions. As far as existing installations were concerned, all had been adequately considered in previous rounds and no substantial changes had occurred that were likely to give rise to increased emissions.

Overall, none of the sources assessed in the 2009 Updating and Screening Assessment, were found to require a Detailed Assessment in the following year.

1.4.3 Progress Report 2010

In the absence of the requirement to produce a Detailed Assessment, a Progress Report was completed in 2010.

NO₂ diffusion tube data showed exceedences at 11 locations within the AQMAs during 2009. The highest concentrations were found at Derby Turn and some locations along Wellington Street. Meanwhile in some parts of the AQMAs; mainly Horninglow Road, there were no exceedences at all during 2009 and in the case of the smaller AQMA in Stapenhill, NO₂ levels dropped below the annual Objective of 40 µg/m³ for the first time during 2009.

Upon inspection of temporal trends, it became clear that there had been a marked decline in NO₂ levels over time across the whole Borough. However, it was reported that the NO₂ diffusion tube network would be reviewed during 2010.

In terms of automatic monitoring data, no exceedences were recorded for either NO₂ or PM₁₀.

1.4.4 Progress Report 2011

During 2011, ESBC produced a further Progress Report which presented updated monitoring data, discussed new local developments in the 12 months leading up to the completion of the Report and provided an update on progress with the implementation of AQAP measures.

Diffusion tube data showed an overall slight increase during 2011 on the previous year. The exact cause of this increase was unknown but the two cold winters of 2009/10 and 2010/11 may have contributed. The highest NO₂ levels were found to occur at Derby Turn and some locations along Wellington Street, consistent with the previous year's data. When averaged over 5 years, a general decline was found, despite the slight increase in NO₂ levels during 2010. Also for the second consecutive year, no exceedences were recorded at locations along the Derby Road and Horninglow Road sections of the AQMA. No exceedences were recorded at any locations outside of the existing AQMA's.

During the summer of 2010, the St Peters Bridge monitoring station was decommissioned due to a number of terminal faults that meant the station was uneconomical to continue to operate. Triplicate tubes have since been transferred to the Derby Turn station.

A 12-month monitoring exercise for PM₁₀ emissions from Molson Coors (Shobnall Maltings) was also reported in the 2011 Report. No exceedences were found to occur as a result of this final monitoring exercise. However, Molson Coors remained committed to monitoring themselves to ensure standards were met in line with Environment Agency (EA) permit conditions. For an update on emissions from Molson Coors, see Section 5.1.1.

A number of new local developments during 2010/11 were reported, but none of them were found to have any adverse impacts on air quality where further considerations would be required.

With regard to the AQAP the final BUATMS measures were completed by early 2011. These included;-

- Enhanced Passenger Information implemented on the route 3 bus service
- New 'Dash' bus service that links the Regents Park Estate (Branston) to the town centre and Centrum 100 was implemented
- Improved bus access to Queens Hospital
- National Cycle Network (NCN) route 63 was completed, and;-
- Bridge strengthening works and scheme designs were completed to enable future forecourt improvements at Burton Railway Station

A new Transport Plan for Burton was outlined in the 2011 Progress Report, but at that time the Plan was in the early stages of development.

A number of 'in house' measures had also been implemented, for example the adoption of a new Travel Plan for the Local Authority, a review of the home working policy and green/grey fleet review was completed.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

This Updating and Screening Assessment requires ESBC to report on the monitoring that was undertaken during the 2011 calendar year. During 2011, ESBC monitored the following;-

- NO₂ by diffusion tubes and an automatic chemiluminescent analyser
- PM₁₀ through a Beta Attenuation Monitor (BAM)

Diffusion tubes provide a good spatial resolution, they are cheaper and simple to use and they can identify hotspots of high NO₂ concentrations. However they do not offer the same degree of accuracy as automatic monitoring data. The chemiluminescent monitor located within the Borough's automatic monitoring station, provides more accurate data. A good monitoring program incorporates the use of both methods of monitoring, with the more accurate automatic data being used to validate the diffusion tube data.

2.1.1 Automatic Monitoring Sites

During 2011, ESBC operated one automatic monitoring station which is located at Derby Turn. This station comprises a Nitrogen Oxides (NO_x) chemiluminescent analyser and a Beta Attenuation Monitor (Met-One BAM with unheated inlet) for PM₁₀ within a Romon 300 enclosure. The station has been in operation since July 2009 and is located approximately 3m from the kerb of the Derby Turn junction, which takes a central position in the larger of the two AQMAs (see Figure 2.1). ESBC previously operated an automatic monitoring station at St Peters Bridge, but due to terminal failures, the station was decommissioned in 2010, as outlined in the 2011 Progress Report.

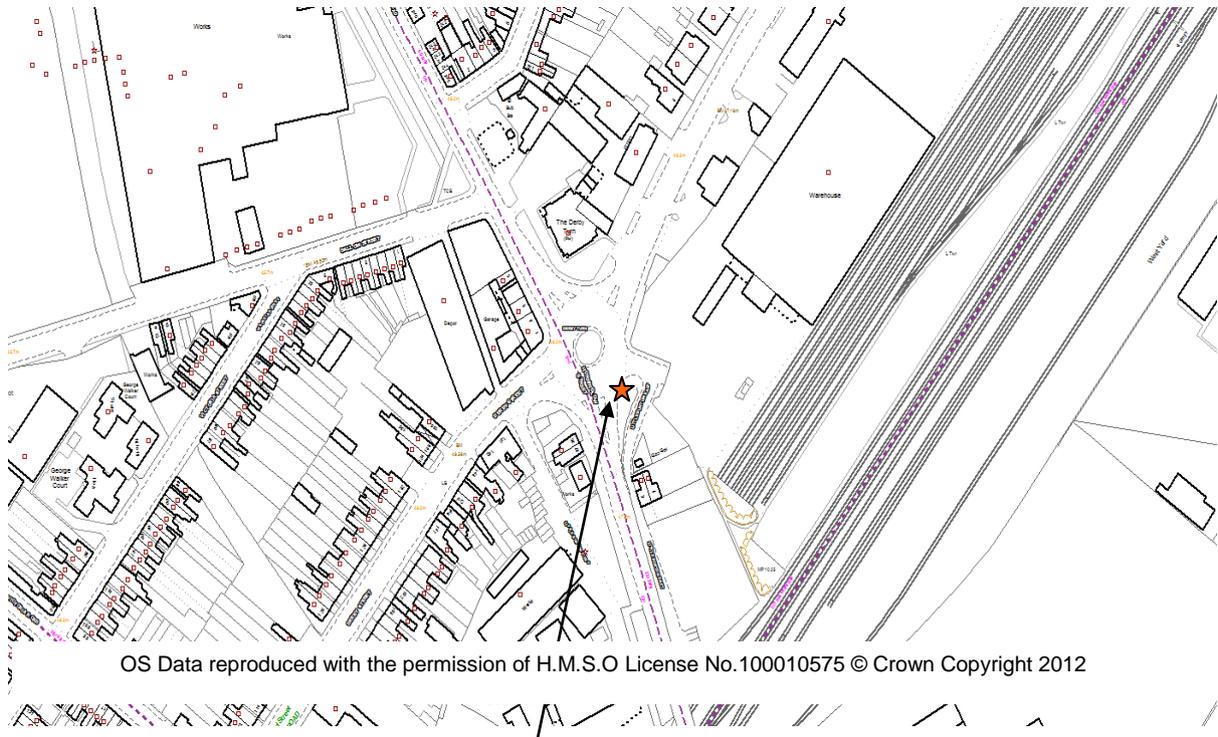


Figure 2.1: Location of Derby Turn monitoring station.

Table 2.1: Details of Automatic Monitoring Site.

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
		X	Y						
Derby Turn	Roadside	424671	324011	NO ₂ & PM ₁₀	Yes	NO ₂ via chemiluninescence PM ₁₀ via Met-One BAM (with unheated inlet)	No (21m)	3m	Yes

Data collected from the monitoring station is in a raw format and no adjustments are made at this stage to correct for any errors. Quality assurance and quality control (QA/QC) for the 2011 Derby Turn monitoring station data continued to be undertaken by Casella Measurement.

Data from the Derby Turn station was downloaded by Casella to make the necessary corrections. Correction of the data was applied in two stages. The first stage is known as rescaling, the second is a data validation and ratification stage to check for any obvious errors or spikes in the data. This form of data management not only improves the reliability in the data, but also ensures that any problems that arise with the analysers are identified and corrected promptly, with minimal data loss (Appendix 1(f)).

Casella Measurement also maintained the monitoring station at Derby Turn during 2011, and a service was carried out roughly every 6 months to check and review the entire system. In addition, the monitoring station was visited at least monthly, where manual calibrations of the chemiluminescent analyser were undertaken and the gaseous filter replaced. Meanwhile, the BAM Tape was replaced approximately every 3 months. Any analyser faults that were encountered were passed on to the attention of an engineer at Casella Measurement, who would attend as soon as possible to minimise loss of data.

Unlike TEOM monitors, the Met-One BAM analyser meets equivalence tests (i.e. it is equivalent to gravimetric methods) as long as adjustments are applied to correct for slope, which is explained in more detail in Appendix 1(d).

2.1.2 Non-Automatic Monitoring Sites

During 2011, ESBC used 57 NO₂ diffusion tubes located at roadside, kerbside and background sites, as detailed in Table 2.2.

The diffusion tubes were supplied and analysed by Leicester & Staffordshire Scientific Services. They were prepared by pipetting a 20% solution of TEA in deionised water, where the solution is pipetted onto grids already placed in the end cap (see Appendix 1(a)).

The laboratory also takes part in QA/QC schemes; notably the Workplace Analysis Scheme for Proficiency (WASP) that is managed by the Health & Safety Laboratory (HSL) and a monthly field inter-comparison exercise managed by the National Physical Laboratory (NPL), which regularly check the laboratories performance. The WASP scheme uses artificially spiked Palmes type diffusion tubes to test each laboratory's analytical performance every quarter based on a Z_{score} performance indicator. During the most recent WASP Rounds 112-115 (January 2011 – December 2011), 100% of all Leicester & Staffordshire Scientific Services results were determined to be of satisfactory quality. Further details of the WASP Scheme methodology are provided in Appendix 1(g).

Diffusion tubes regularly exhibit bias (i.e. they under or over-read) compared to the reference chemiluminescence analyser (at the automatic monitoring station). It is therefore necessary to correct for such bias, when tube results are used for Review and Assessment purposes. This is done using either a locally derived bias adjustment factor or a national factor, in line with the technical guidance.

ESBC took part in both a local bias adjustment exercise and a national exercise. In terms of the national exercise, each local authority submits their diffusion tube and automatic monitoring station data to the NPL. A collective bias adjustment factor for each laboratory analyst is then uploaded onto the national bias adjustment spreadsheet available for viewing from the LAQM section of the Defra website. Each Authority is then required to make a choice of which factor to use taking into account a number of criteria set out in Box 3.3 of TG(09). For the purpose of this Updating and Screening Assessment, ESBC's diffusion tube network largely meets the criteria

East Staffordshire Borough Council

for the national bias factor rather than the locally derived one. The national bias factor is therefore used in this Updating and Screening Assessment. For more information about how each factor was calculated and reasons for which factor should be used, see Appendix 1(b) and 1(c).

The 2011 Progress Report outlined a number of new tubes that had been added to the network along the A5189 / B5017 corridor that links the two AQMA's in 2010. New tubes were also installed outside a cluster of residential properties part way down Hawkins Lane and also on the corner of Horninglow Street and Guild Street. A full year's worth of data is now available for these new sites. During 2011, 4 tubes were removed from the network due to consistent compliance over 5 years or more and in two cases due to poor data coverage as a result of frequent theft of these tubes. There have otherwise been no further amendments to the tube network during 2011.

Table 2.2: Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
T1&T2	Trent Bridge (Duplicates)	Roadside	425362	323339	NO ₂	Y	N	Y (0.5m)	2.1m	Y
T3 & T4	St Peters Bridge (Duplicates)	Roadside	425362	322028	NO ₂	Y	N	Y (6.4m)	2.5m	Y
T5 & T6	Shobnall Playing Fields (Duplicates)	Urban Background	423592	323918	NO ₂	N	N	N (N/A)	N/A	N/A
T7	Horninglow Croft	Roadside	424367	324781	NO ₂	Y	N	Y (2.2m)	1.6m	Y
T8, T9, T10	Monitoring Station – Derby Turn (Co-located Triplicates)	Roadside	424671	324019	NO ₂	Y	N	N (8.2m)	5m	Y
T11 & T12	Wellington St (Duplicates)	Kerbside	423952	323281	NO ₂	Y	N	Y (1.7m)	0.5m	Y
T13	Horninglow St	Roadside	424796	323624	NO ₂	Y	N	Y (2m)	2.5m	Y
T14	Derby Turn	Roadside	424632	324043	NO ₂	Y	N	Y (<0.5)	3.6m	Y
T15	Derby Turn	Kerbside	424636	324037	NO ₂	Y	N	Y (3.2m)	<0.5m	Y
T16	Horninglow Rd – nr junc. Balfour St	Roadside	424295	324892	NO ₂	Y	N	Y (2.1m)	3.7m	Y
T17	Brookside - Winshill	Urban Background	426742	324155	NO ₂	N	N	N (N/A)	N/A	N/A

East Staffordshire Borough Council

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
T18	Stretton School	Urban Background	424328	326070	NO ₂	N	N	N (N/A)	N/A	Y
T19 & T20	A38 Slip Rd (Duplicates)	Roadside	421135	319527	NO ₂	N	N	N (18.5)	3.5m	Y
T21	Horninglow Rd – appr. Shakespeare Rd junc.	Roadside	424416	324483	NO ₂	Y	N	Y (2.8)	1.7m	Y
T22	Horninglow Rd – opp. Morris Homes	Roadside	424537	324228	NO ₂	Y	N	Y (1m)	4.5m	Y
T23	Derby St – nr. to derby Turn	Roadside	424581	323963	NO ₂	Y	N	Y (<0.5)	1.8m	Y
T24	Horninglow Rd North – appr. Junc. Morley's Hill	Roadside	423990	325224	NO ₂	Y	N	Y (3.1m)	0.7m	Y
T25	Derby St / Byrkley St junction	Roadside	424212	323473	NO ₂	Y	N	Y (3.8m)	1.7m	Y
T26	A444 – Stapenhill appr. Violet Way	Roadside	425706	321902	NO ₂	Y	N	Y (3.2)	1.5m	Y
T27	Princess Way roundabout	Roadside	425235	324854	NO ₂	Y	N	N (10.3m)	1.8m	Y

East Staffordshire Borough Council

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
T28	Derby Rd – appr. Princess Way roundabout	Roadside	425161	324737	NO ₂	Y	N	Y (5.7m)	4m	Y
T29	Derby Rd / Eton Rd junction	Roadside	425107	324668	NO ₂	Y	N	Y (2.9m)	2.4m	Y
T30	Derby Rd – appr. Derby Turn	Roadside	424708	324140	NO ₂	Y	N	N (5.8m)	3.2m	Y
T31	Derby St – appr. Derby Turn	Roadside	424547	323940	NO ₂	Y	N	Y (3.4m)	2m	Y
T32	Derby St Maltings Court	Roadside	424351	323660	NO ₂	Y	N	Y (2.8m)	2.3m	Y
T33	Derby St appr. Little Burton West	Roadside	424453	323794	NO ₂	Y	N	N (5m)	2.7m	Y
T34	Waterloo St / Byrkley St corner	Roadside	424116	323483	NO ₂	Y	N	Y (0.5)	4.1m	Y
T35	Derby St / Borough Rd junc.	Kerbside	424149	323344	NO ₂	Y	N	Y (2.9)	<0.5m	Y
T36	Wellington St - crossing	Kerbside	423993	323308	NO ₂	Y	N	Y (2m)	<0.5m	Y
T37	Wellington St roundabout	Roadside	423812	323077	NO ₂	Y	N	N (12.9m)	2.5m	Y

East Staffordshire Borough Council

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
T38	Wellington St - appr. roundabout	Roadside	423807	323115	NO ₂	Y	N	Y (<0.5m)	1.9m	Y
T39	Wellington St / Shobnall Rd roundabout	Roadside	423784	323099	NO ₂	Y	N	N (8.7m)	2.8m	Y
T40	Rolleston Rd – nr. Junc. Horninglow Rd	Roadside	424113	325209	NO ₂	Y	N	Y (0.5m)	1.4m	Y
T41	Shakespeare rd – nr. Junc. Horninglow Rd	Roadside	424417	324579	NO ₂	Y	N	N (13.5m)	1.5m	Y
T42	Dallow St – nr. Junc. Horninglow Rd	Roadside	424531	324076	NO ₂	Y	N	Y (2m)	0.5m	Y
T43	Horninglow St / Guild St corner	Roadside	424984	323388	NO ₂	Y	N	Y (1.2m)	1.3m	Y
T44	Horninglow St – nr. Junc. Wetmore Rd	Roadside	425270	323346	NO ₂	Y	N	Y (0.5m)	3.1m	Y
T45	Horninglow St – nr. Junc. High St	Roadside	425275	323327	NO ₂	Y	N	Y (<0.5m)	2.7m	Y
T46	Bridge St – nr. Old Bridge	Roadside	425345	323321	NO ₂	Y	N	Y (0.5m)	2.6m	Y

East Staffordshire Borough Council

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
T47	High St – junc. Station St	Kerbside	425052	322856	NO ₂	N	N	N (N/A)	0.5m	Y
T48	High St – appr. New St junc.	Roadside	424963	322714	NO ₂	N	N	N (N/A)	0.8m	Y
T49	Belvedere Rd – A38 flyover	Roadside	422908	323540	NO ₂	N	N	N (6.8m)	2.3m	Y
T50	Shobnall Rd – A38 flyover	Roadside	423834	324316	NO ₂	N	N	N (10m)	2.7m	Y
T51	Anglesey Rd / Evershed Way corner	Roadside	424096	322774	NO ₂	N	N	Y (1.9m)	2.2m	Y
T52	Orchard St – Caxton Court	Roadside	424559	322376	NO ₂	N	N	N (4.8m)	2.7m	Y
T53	Branston Rd / St Peters Bridge roundabout	Roadside	424648	322300	NO ₂	N	N	N (9.1m)	3.2m	Y
T54	Grange St / Shobnall Rd junc.	Roadside	423611	323176	NO ₂	N	N	N (7.6m)	2.9m	Y
T55	Shobnall Rd – nr. Marstons	Roadside	423264	323358	NO ₂	N	N	Y (3.8m)	1.5m	Y
T56	Forest Rd – Fred Brewer Way	Roadside	422129	323906	NO ₂	N	N	Y (2.1m)	1.0m	Y
T57	Hawkins Lane – opp. Pipe Centre	Roadside	424969	323802	NO ₂	N	N	Y (1.7m)	1.5m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

Each year, Local Authorities are required to report any new monitoring data to assess whether any NO₂, PM₁₀, SO₂, benzene (C₆H₆) or any other relevant pollutant Objectives are likely to be exceeded. For NO₂, it is the annual Objective of 40 µg/m³ and the 1-hour Objective of 200 µg/m³, which must not be exceeded more than 18 times in any 12-month calendar year that is considered. For PM₁₀, the number of exceedences of the 24-hour Objective of 50 µg/m³ and the annual Objective of 40 µg/m³ needs to be assessed. If any of these Objectives are found to be exceeded then that Local Authority would need to consider declaring an AQMA, subject to a Further Assessment. If a Local Authority has an existing AQMA for NO₂ or PM₁₀, and all Objectives have consistently been achieved then that Local Authority should investigate further, with a view to determining whether to revoke part or all of an AQMA. Should any of the annual mean NO₂ concentrations measured using diffusion tubes in an AQMA be greater than 60 µg/m³, then the Local Authority can assume an exceedence of the 1-hour mean Objective. The Authority would therefore need to amend their AQMA order and Action Plan to cover the 1-hour Objective.

2.2.1 Nitrogen Dioxide (NO₂)

Automatic Monitoring Data

Annual average concentrations of NO₂ from the Derby Turn automatic monitoring station are shown in Table 2.3a for 2011 and are compared with data for 2009 and 2010 to assess any trends with respect to the annual Objective of 40µg/m³. A further requirement of this Updating and Screening Assessment with respect to NO₂ monitoring is to assess whether more than 18 exceedences of the 1-hour Objective of 200µg/m³ have occurred in the most recent calendar year. Results of the number of 1-hour exceedences for the Derby Turn station are shown in Table 2.3b. Comparisons are made between 2011 data and 2009-2010 data. No data is shown for the former St Peters Bridge monitoring station due to its decommissioning in 2010, plus adequate data has already been provided in previous Review and Assessment reports for this station.

Table 2.3a: Results of Automatic Monitoring of NO₂: Comparison with Annual Mean Objective.

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %	Valid Data Capture 2011 %	Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
					2007	2008	2009	2010	2011
A1: Derby Turn	Roadside	Y	100%	100%	N/A	N/A	37.6*	41.7	38.9

Note:

* Means have been "annualised" as in Box 3.2 of TG(09), as the monitoring was not carried out for the full year.

Table 2.3b: Results of Automatic Monitoring for NO₂: Comparison with 1-hour mean Objective.

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %	Valid Data Capture 2011 %	Number of Exceedences of Hourly Mean ($200 \mu\text{g}/\text{m}^3$)				
					2007	2008	2009	2010	2011
A1: Derby Turn	Roadside	Y	100%	100%	N/A	N/A	0	0	0

East Staffordshire Borough Council

Table 2.3a clearly shows that the Derby Turn monitoring station recorded NO₂ levels that exceeded the annual Objective during 2010 by 1.7µg/m³. The data indicates that NO₂ levels increased between 2009 and 2010. However, it is important to note that NO₂ levels for 2009 were only based on 6 month's worth of data collection as the station was only installed in July 2009. Despite being corrected for short-term monitoring, there is still a degree of uncertainty. During 2011, it is clear that NO₂ levels dropped back below the Annual Objective of 40µg/m³. However a degree of caution is needed here as the levels are only just below the Objective. In order to make any meaningful conclusions over temporal trends, at least 5 years worth of data would be needed. The 2011 Progress Report included trend analysis for NO₂ concentrations at the former St Peters Bridge monitoring station over a period of 8 years (2003-2010). This showed a general decline in NO₂ which helped justify its decommissioning. However with regard to the Derby Turn station, data only extends back to July 2009. Trend analysis has therefore not been performed this time round.

Diffusion Tube Monitoring Data

Annual average NO₂ concentrations for each diffusion tube located in and around Burton upon Trent throughout 2011 are shown in Table 2.4. Results for 2011 are compared with 2007-2010 data to assess for temporal trends. Annual means in excess of the 40µg/m³ Objective are highlighted in bold and diffusion tube locations within the AQMA are highlighted in red.

TG(09) recommends that for diffusion tubes with data capture below 90%, adjustments should be made to estimate the annual mean NO₂ concentration; using a simple calculation as set out in Box 2.3 of the Guidance. TG(09) recommends that Authorities identify two to four nearby long-term continuous monitoring sites, that ideally form part of the national network (i.e. AURN), are background sites and wherever possible lie within a 50 mile radius of the diffusion tube location. In the case of ESBC there are not enough continuous monitors that form part of the national network and which are within a 50 mile radius of any of the diffusion tubes. TG(09) does offer an alternative to using continuous monitoring data when there are not enough appropriate sites to adjust the data. TG(09) states that other nearby diffusion tube results can be used to adjust short-term diffusion tube data, but to allow for the greater uncertainty in the results, it is recommended that four or more diffusion tube sites are used. In the case of ESBC, results for diffusion tubes below 90% were adjusted using other diffusion tubes sites with >90% data capture. The methodology for this procedure is set out in Appendix 1(e).

Measurements of pollutant concentrations are not always possible at the desired location or receptor for a range of practical reasons, for example continuous monitoring equipment requires space, security and electricity and diffusion tubes require a suitable surface to be attached to. TG(09) therefore recommends that adjustments are made to diffusion tube data, where a relevant receptor is located some distance away from the diffusion tubes. An air quality tool is available to local authorities to estimate concentrations at the façade of a relevant receptor, either using Box 2.3 of TG(09) or the electronic version available to download from the air quality tools page of the Defra website (<http://laqm.defra.gov.uk/tools-monitoring-data/tool-monitoring-data.html>). Excluding background locations, ESBC has a number of diffusion tubes that due to practical reasons are not located at the facades

East Staffordshire Borough Council

of receptors; therefore the electronic version of this tool was used to estimate the fall off of NO₂ concentrations with distance from the kerb. Tubes where distance corrections have been applied are indicated in Table 2.4. For a monthly breakdown of NO₂ concentrations during 2011, see Appendix 1(h).

Table 2.4: Results of NO₂ Diffusion Tubes in 2011.

Site ID	Location	Site Type	Within AQMA ?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2011 (µg/m ³)
T1&T2	Trent Bridge	Roadside	Y	Duplicates	17%	Y	N	35.1
T3 & T4	St Peters Bridge	Roadside	Y	Duplicates	75%	Y	Y	37.6
T5 & T6	Shobnall Playing Fields	Urban Background	N	Duplicates	92%	N/A	N/A	24.6
T7	Hornnglow Croft	Roadside	Y	Single	100%	N	N	34.8
T8, T9, T10	Monitoring Station – Derby Turn	Roadside	Y	Triplicates & Co-located	100%	N	N	46.2
T11 & T12	Wellington St	Kerbside	Y	Duplicates	92%	N	Y	46.9
T13	Horninglow St	Roadside	Y	Single	75%	Y	Y	41.5
T14	Derby Turn	Roadside	Y	Single	100%	N	Y	47.9
T15	Derby Turn	Kerbside	Y	Single	100%	N	N	53.8
T16	Horninglow Rd – nr junc. Balfour St	Roadside	Y	Single	33%	Y	Y	32.2
T17	Brookside - Winshill	Urban Background	N	Single	100%	N/A	N/A	17.5
T18	Stretton School	Urban Background	N	Single	92%	N/A	N/A	24.6
T19 & T20	A38 Slip Rd (Duplicates)	Roadside	N	Duplicates	100%	N	Y	27.0
T21	Horninglow Rd – appr. Shakespeare Rd junc.	Roadside	Y	Single	100%	N	Y	35.8
T22	Horninglow Rd – opp. Morris Homes	Roadside	Y	Single	92%	N	Y	32.1
T23	Derby St – nr. to Derby Turn	Roadside	Y	Single	100%	N	Y	48.5
T24	Horninglow Rd North – appr. Junc. Morley's Hill	Roadside	Y	Single	100%	N	Y	24.6
T25	Derby St / Byrkley St junction	Roadside	Y	Single	42%	Y	Y	44.2
T26	A444 – Stapenhill appr. Violet Way	Roadside	Y	Single	67%	Y	Y	37.7
T27	Princess Way roundabout	Roadside	Y	Single	100%	N	Y	29.8

East Staffordshire Borough Council

Site ID	Location	Site Type	Within AQMA ?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88)
								2011 ($\mu\text{g}/\text{m}^3$)
T28	Derby Rd – appr. Princess Way roundabout	Roadside	Y	Single	100%	N	Y	34.1
T29	Derby Rd / Eton Rd junction	Roadside	Y	Single	100%	N	Y	34.3
T30	Derby Rd – appr. Derby Turn	Roadside	Y	Single	100%	N	Y	35.0
T31	Derby St – appr. Derby Turn	Roadside	Y	Single	75%	Y	Y	41.8
T32	Derby St Maltings Court	Roadside	Y	Single	100%	N	Y	40.4
T33	Derby St appr. Little Burton West	Roadside	Y	Single	100%	N	Y	35.0
T34	Waterloo St / Byrkley St corner	Roadside	Y	Single	75%	Y	Y	43.6
T35	Derby St / Borough Rd junc.	Kerbside	Y	Single	100%	N	Y	43.5
T36	Wellington St - crossing	Kerbside	Y	Single	92%	N	Y	49.3
T37	Wellington St roundabout	Roadside	Y	Single	100%	N	Y	35.6
T38	Wellington St - appr. roundabout	Roadside	Y	Single	92%	N	N	45.4
T39	Wellington St / Shobnall Rd roundabout	Roadside	Y	Single	17%	Y	Y	45.5
T40	Rolleston Rd – nr. Junc. Horninglow Rd	Roadside	Y	Single	100%	N	N	37.3
T41	Shakespeare rd – nr. Junc. Horninglow Rd	Roadside	Y	Single	92%	N	Y	26.4
T42	Dallow St – nr. Junc. Horninglow Rd	Roadside	Y	Single	83%	N	Y	27.4
T43	Horninglow St / Guild St corner	Roadside	Y	Single	100%	N	Y	46.4
T44	Horninglow St – nr. Junc. Wetmore Rd	Roadside	Y	Single	50%	Y	N	43.2
T45	Horninglow St – nr. Junc. High St	Roadside	Y	Single	100%	N	N	47.6
T46	Bridge St – nr. Old Bridge	Roadside	Y	Single	100%	N	N	38.5
T47	High St – junc. Station St	Kerbside	N	Single	100%	N	N/A	33.8
T48	High St – appr. New St junc.	Roadside	N	Single	67%	Y	N/A	37.9
T49	Belvedere Rd – A38 flyover	Roadside	N	Single	100%	N	Y	31.2
T50	Shobnall Rd – A38 flyover	Roadside	N	Single	50%	Y	Y	28.6

East Staffordshire Borough Council

Site ID	Location	Site Type	Within AQMA ?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88)
								2011 ($\mu\text{g}/\text{m}^3$)
T51	Anglesey Rd / Evershed Way corner	Roadside	N	Single	42%	Y	Y	38.6
T52	Orchard St – Caxton Court	Roadside	N	Single	50%	Y	Y	30.4
T53	Branston Rd / St Peters Bridge roundabout	Roadside	N	Single	75%	Y	Y	30.5
T54	Grange St / Shobnall Rd junc.	Roadside	N	Single	58%	Y	Y	33.4
T55	Shobnall Rd – nr. Marstons	Roadside	N	Single	50%	Y	Y	29.2
T56	Forest Rd – Fred Brewer Way	Roadside	N	Single	83%	Y	Y	26.3
T57	Hawkins Lane – opp. Pipe Centre	Roadside	N	Single	75%	Y	Y	36.1

Table 2.4 above shows there were 17 exceedences of the annual NO_2 Objective during 2011, 13 of these were at roadside locations. Excluding kerbside locations, the highest NO_2 levels were recorded at the Derby Turn junction and on the approach to this junction from Derby Street with concentrations of $47.9\mu\text{g}/\text{m}^3$ and $48.5\mu\text{g}/\text{m}^3$ respectively at tube locations T14 and T23. NO_2 levels were also in breach of the annual Objective along the approach to the Wellington Street / Shobnall Road junction and at the roundabout itself, with concentrations of $45.4\mu\text{g}/\text{m}^3$ and $45.5\mu\text{g}/\text{m}^3$ respectively at tube locations T38 and T39 for example. None of the tube locations recorded concentrations greater than $60\mu\text{g}/\text{m}^3$; therefore exceedences of the hourly NO_2 Objective of $200\mu\text{g}/\text{m}^3$ are very unlikely. Furthermore, no exceedences were recorded at any location outside of the AQMA's. However tube T51, located at the Anglesey Road / Evershed Way junction recorded NO_2 concentrations of $38.6\mu\text{g}/\text{m}^3$, which is only $1.3\mu\text{g}/\text{m}^3$ below the annual Objective. While a more conservative (worst case) approach was taken by using the national bias factor, it is prudent to continue to closely monitor future NO_2 levels at this location.

It is also prudent to assess the long term trend in NO_2 concentrations, which in order to be reliable should extend back at least 5 years. Figures 2.2 to 2.7 show temporal trends in NO_2 levels since 2006, which are divided up into specific sections of the AQMA's to analyse for any spatial trends in NO_2 levels over time. Kerbside sites

although not representative locations are also included to demonstrate the general NO₂ trend.

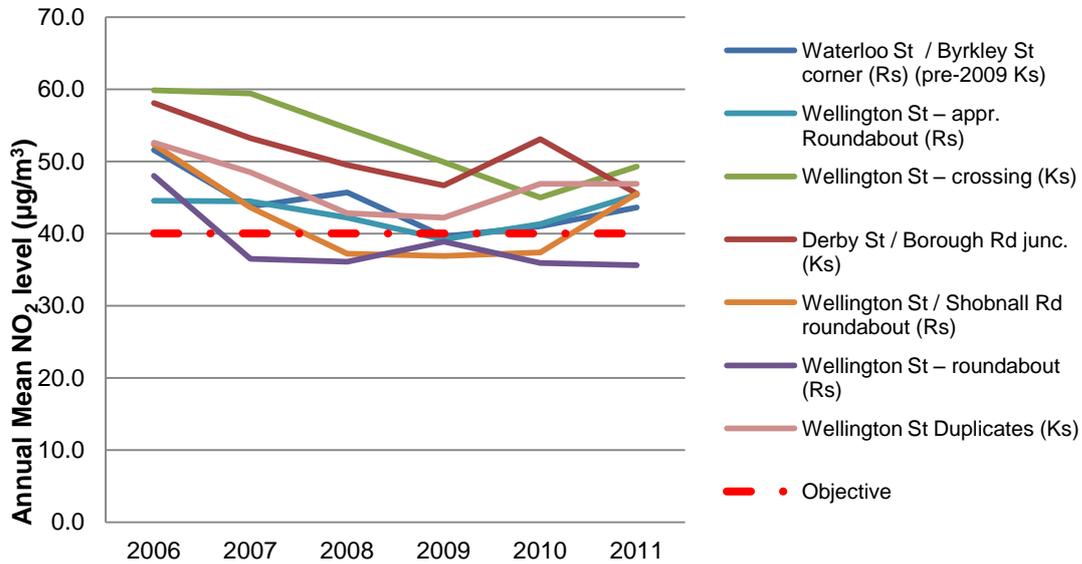


Figure 2.2: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along Wellington Street and the Borough Road / Derby Street / Byrkley Street / Waterloo Street gyratory.

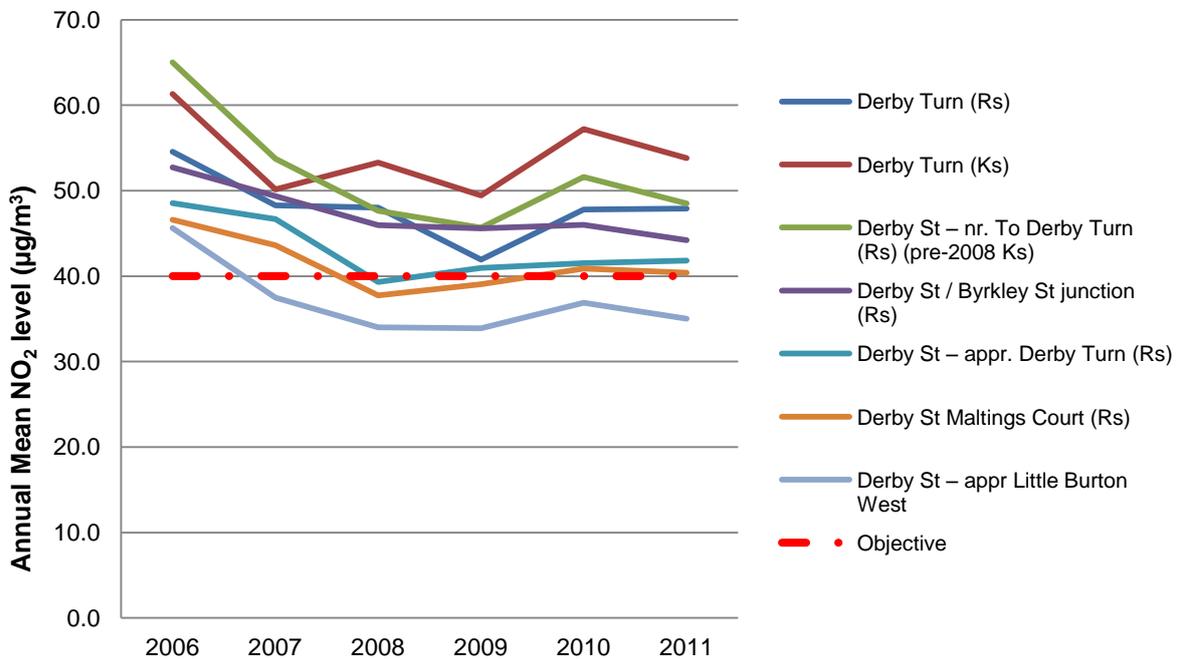


Figure 2.3: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along Derby Street, including Derby Turn.



Figure 2.4: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along Horninglow Street.

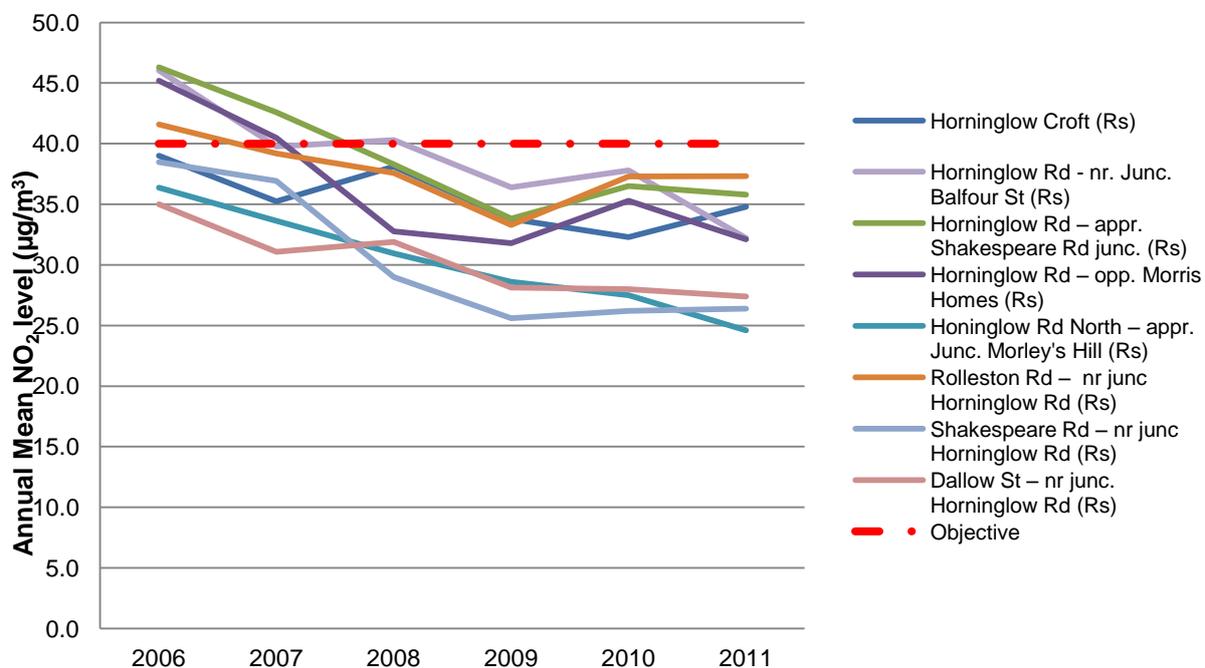


Figure 2.5: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along Horninglow Road.

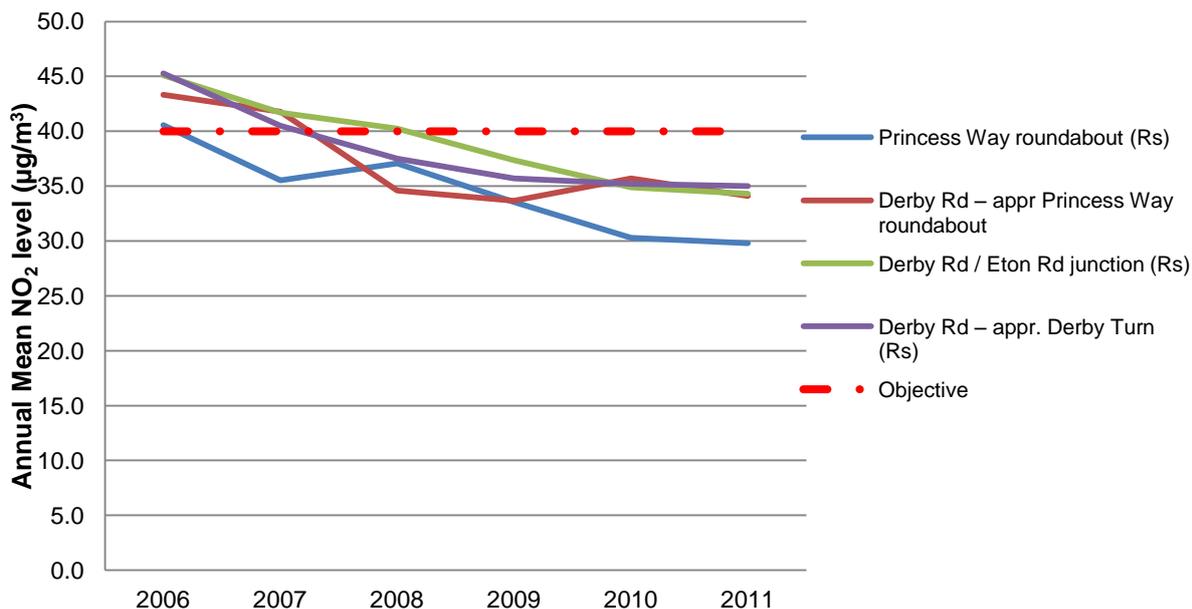


Figure 2.6: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along Derby Road.

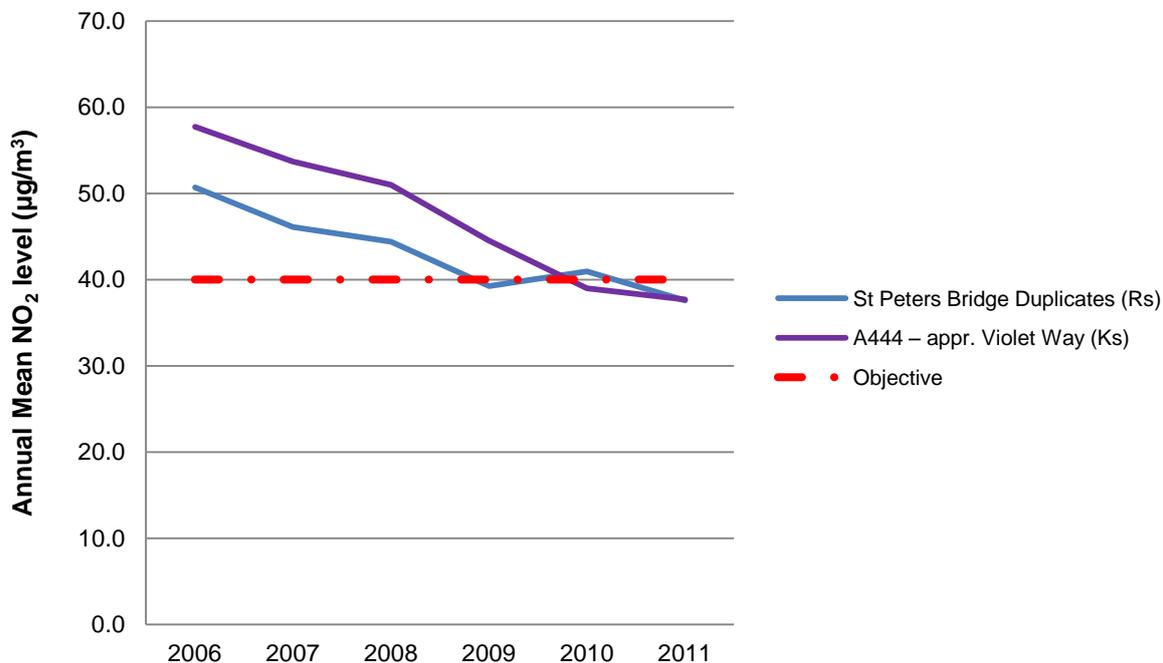


Figure 2.7: Trends in Annual Mean NO₂ Concentration Measured at Diffusion Tube sites along St Peters Bridge roundabout and A444.

Figures 2.2 to 2.7 clearly show the general downward trend in NO₂ levels within the AQMA's over the last 6 years. The number of locations that have breached the annual Objective has declined from 31 in 2006 to 25 in 2007, 17 during 2008, 11 during 2009 and an increase to 21 in 2010. For 2011, the number of exceedences dropped back down to 2008 levels with a total of 17. NO₂ levels reached an all time low during 2009, but with a marked increase in 2010. The exact cause of the increase in NO₂ levels during 2010 is unknown but meteorological effects such as the two cold winters of 2009/10 and 2010/11 may have contributed. Periods of sustained high pressure with frequent freezing conditions and temperature inversions are known to elevate pollution levels. The increase in levels during 2010 was also mirrored in the NO₂ data from the automatic monitoring station at Derby Turn and in neighbouring Local Authorities.

Spatially, Wellington Street and the Borough Road / Derby Street / Byrkley Street / Waterloo Street gyratory and Derby Street including the Derby Turn junction are the sections with the highest NO₂ levels with 3 and 6 exceedences of the annual NO₂ Objective respectively during 2011. For Horninglow Street, 4 out of 5 tubes recorded NO₂ levels that exceeded the Objective during 2011, compared to all 5 in 2010.

For the third consecutive year, there were no NO₂ exceedences at any location along both the Horninglow Road and Derby Road sections of the main AQMA. Levels ranged between 24.6µg/m³ and 37.3µg/m³ along the Horninglow Road section and between 29.8µg/m³ and 35.0µg/m³ along the Derby Road section during 2011.

With regard to the small AQMA in Stapenhill, NO₂ levels during 2011 dropped just below the annual Objective at all locations. Historically, elevated NO₂ concentrations were sustained from 2006 to 2009 and during 2010 hovered around the 40µg/m³ Objective.

During 2011 a consultation document on air quality plans issued by Defra, highlighted that nationally, NO₂ levels are declining at a slower rate than was originally anticipated. This is believed to be due to the NO₂ contribution of total NO_x being higher than originally thought and the underperformance of vehicle abatement technology compared to projections. This is why there are wide concerns that EU limit values for NO₂ will not be achieved in a number of major UK conurbations and why air quality plans were submitted for each of the 40 zones as part of the UK's time extension notification to the European Commission for meeting the NO₂ EU limit value to a new deadline of 2015.

2.2.2 PM₁₀

Annual average concentrations of PM₁₀ from the Derby Turn monitoring station are shown in Table 2.5a for 2011 and are compared with data for 2009 and 2010 to assess for trends with respect to the annual Objective of 40µg/m³. With respect to the BAM particulate monitor at the Derby Turn station, the results were corrected for slope as per TG(09) to meet the equivalence criteria for gravimetric methods for PM₁₀ monitoring (Appendix (d)).

A further requirement of this Updating and Screening Assessment with respect to PM₁₀ monitoring is to assess whether more than 35 exceedences of the 24 hour Objective of 50µg/m³ have occurred in the most recent calendar year. Results of the number of 24 hour exceedences of PM₁₀ are shown in Table 2.5b. Data is displayed for 2011 and comparisons are made with 2009 and 2010 data.

No data is shown for the former St Peters Bridge monitoring station due to its decommissioning in 2010, plus adequate data has already been provided in previous Review and Assessment reports for this station.

Table 2.5a: Results of Automatic Monitoring of PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
						2007	2008	2009	2010	2011
A1: Derby Turn	Roadside	Y	82.2%	82.2%	Y	N/A	N/A	20.4*	23.7	26.9

Note:

* Means have been “annualised” as in Box 3.2 of TG(09), as the monitoring was not carried out for the full year.

Table 2.5b: Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean ($50 \mu\text{g}/\text{m}^3$)				
						2007	2008	2009	2010	2011
A1: Derby Turn	Roadside	Y	82.2%	82.2%	Y	N/A	N/A	0	2	12

Over the past 3 years, PM₁₀ levels have increased gradually, as shown in Table 2.5a, but remain well within the annual Objective. This is mirrored in the number of exceedences of the daily mean Objective (Table 2.5b), which has increased from 0 in 2009, 2 in 2010 to 12 during 2011. In contrast, NO₂ levels reported earlier in this document have decreased slightly over the past three years. The exact reasons for these shifts in pollution patterns is not exactly known, but a general shift towards diesel vehicles from petrol driven vehicles can lead to higher PM₁₀ levels compared with NO₂.

2.2.3 Sulphur Dioxide

During previous rounds of Review and Assessments, ESBC considered a range of sources in order to find out if any of the SO₂ Objectives were likely to be breached. No breaches were identified, therefore at ESBC does not monitor for this pollutant.

2.2.4 Benzene

This Authority does not currently monitor for benzene within the Borough. Previous rounds of Review and Assessment highlighted that there are no relevant locations within the Borough where Objectives are likely to be breached, therefore monitoring is not considered necessary.

2.2.5 Other pollutants monitored

At present ESBC does not monitor for any other pollutants. Only NO₂ and PM₁₀ are monitored at the current time.

2.2.5 Summary of Compliance with AQS Objectives

ESBC has examined the results from monitoring in the Borough. Concentrations outside of the AQMA are all below the Objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

Local Authorities are required to focus their attention on the likely impacts of road traffic sources on relevant receptors close to busy roads. This is particularly the case along congested roads and near to junctions where emissions will be higher, together with built up areas where the road can have a canyon effect, where buildings either side restrict dispersion and dilution of pollutants. Attention is required with regards to NO₂ in all cases and PM₁₀ in some. This Updating and Screening Assessment report considers locations that have not been addressed in previous rounds of Review and Assessment, locations where conditions may have significantly changed since being previously assessed such as locations with new development.

To assess the road traffic sources for the latest round of the Review and Assessment, the latest road traffic data was supplied by the Highway Data Team at Staffordshire County Council. This helps identify any new or changed road sources.

Using the checklist approach from TG (09) the following categories were considered to determine if more detailed assessment was required in relevance to the appropriate pollutants.

In some instances screening modelling may be required using the latest version of the DMRB (Design Manual for Roads & Bridges). This model is described in more detail in Appendix B, but considers factors such as the distance of a receptor from a road, the daily traffic flow along the road, the proportion of HGVs and the general background concentration of the pollutant under consideration.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Concentrations of NO₂ tend to be higher where traffic is slow moving, with stop/start driving and along canyon like streets with buildings either side that reduce dispersion. TG(09) requires Local Authorities to identify narrow congested streets with annual average daily traffic flows (AADF) of around 5,000 vehicles per day or more.

A congested street is defined as one with slow moving traffic that is frequently stopping and starting due to pedestrian crossings, parked vehicles throughout much of the day and not just peak rush hours. The average speed down such streets is likely to be less than 25 kph (15 mph).

A narrow street is defined as one with residential properties within 2m of the kerb and buildings on both sides (the buildings on the opposite side of the road may be further from the road than 2m). Also the buildings height tends to be greater than the width of the road.

Using knowledge of the Borough and up-to-date traffic data supplied by Staffordshire County Council, the street that matches the criteria outlined above most closely is Wellington Street. However, this street has already been considered in previous Review and Assessment work and it forms part of the larger AQMA where an Action Plan has been in place since 2009 and we currently monitor. To the best of ESBC's knowledge, there are no other streets where the above criteria apply.

ESBC 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

TG(09) recognises that there are some street locations where individuals may regularly spend 1-hour or more, for example, streets with many shops or outdoor cafes and bars. Local Authorities are required to identify all busy streets (i.e. those with an annual average daily traffic flow (AADF) of >10,000) where individuals may be exposed within 5 metres of the kerb for 1-hour or more, that are new, or have not previously been assessed. Using detailed information on traffic flows, Local Authorities are then required to run the most up to date version of DMRB for NO₂ to predict concentrations. The DMRB screening model does not calculate 1-hour concentrations; therefore TG(09) states that if the annual mean does not exceed 60µg/m³ then there should be fewer than 18 1-hour exceedences of the 200µg/m³ Objective.

Traffic data from Staffordshire County Council highlights no new highlighted street locations that have not previously been considered.

ESBC 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 Heavy Goods Vehicles.

TG(09) requires roads with high flows of buses and heavy goods vehicles to be assessed in relation to both NO₂ and PM₁₀.

Previous rounds of the Review and Assessment process have considered roads of this nature and did not require more detailed assessment.

For this round of the assessment consideration was given to roads with greater than 20% of buses and HGVs that were not previously considered or may have changed in the 3 years since the previous Updating and Screening Assessment.

If there are roads with high percentages of these larger vehicles and there is sufficient vehicle flow and exposure then DMRB screening modelling is required to predict NO₂ and PM₁₀ concentrations. Exposure is considered relevant when people spend more than 1-hour and are within 10m of the road in question.

After reviewing the most recent traffic data received from Staffordshire County Council there are still no roads with sufficiently high buses and HGVs to require a Detailed Assessment for NO₂ or PM₁₀.

ESBC confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.4 Junctions

Junctions are considered in relation to both NO₂ and PM₁₀ and are significant due to the combined effect of traffic from more than one road and stop start driving.

The Updating and Screening Assessment is required to consider “busy” junctions where combined traffic levels are greater than 10,000 vehicles per day. A number of junctions were considered in previous rounds of the Review and Assessment and therefore only new junctions or junctions with significantly increased traffic flows were required for consideration. This was also the case for junctions with new receptors with relevant exposure, which in this case is within 10m.

Where busy junctions are identified and there is relevant exposure within 10m of the kerb then DMRB screening modelling is required.

After considering the latest road traffic data supplied by Staffordshire County Council it was concluded that there are no relevant junctions that have not already been assessed previously and that there was also no new exposure at these junctions. There were also no junctions with significant increased traffic amounts.

ESBC confirms that there are no new/newly identified busy junctions and therefore there is no requirement to proceed to a Detailed Assessment.

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

TG(09) states that Local Authorities must review any new roads constructed or proposed since the last round of Review and Assessment in order to assess for any likely exceedences of the NO₂ and PM₁₀ Objectives. It requires information to be gathered from air quality assessments carried out prior to construction or planning permission being granted. Where no air quality assessment has been completed then new roads with greater than 10,000 vehicles per day should be subject to DMRB modelling to predict NO₂ and PM₁₀ concentrations.

No new roads have been constructed since the previous Updating and Screening Assessment in 2009 which required an air quality assessment or are greater than 10,000 vehicles per day; therefore there is no further need for consideration in this Updating and Screening Assessment or at a subsequent Detailed Assessment stage.

Existing roads with significantly altered traffic flows are considered in Section 3.6 below.

ESBC confirms that there are no new/proposed roads or developments where a Detailed Assessment would be required.

3.6 Roads with Significantly Changed Traffic Flows

The guidance highlights the need to consider both NO₂ and PM₁₀ for roads where traffic flows have changed significantly since the previous Updating and Screening Assessment in 2009.

A significant change is defined as any roads with more than 10,000 vehicles per day that have experienced a “large” increase in traffic flow greater than 25% since the previous round of Review and Assessment.

If large increases in traffic are highlighted and have previously been identified as being at risk of exceeding Objectives then screening modelling is required to determine whether potential Objective exceedences could occur and therefore require more detailed assessment. At risk of exceeding Objectives is described as roads where the previous predicted NO₂ concentrations were above 36µgm³.

The most up to date road traffic data provided by the Highway Data Team at Staffordshire County Council highlights several roads in East Staffordshire that have experienced a significant increase in traffic flow since the previous Updating and Screening Assessment in 2009.

These roads were- Burton Road, Branston; a stretch of the A50; Shobnall Road; and the junction of Horninglow Road North and Calais Road.

These roads may not necessarily have had a significant traffic flow increase in reality as in some instances traffic count location variation from previous assessments can show variability. In any case, the above four roads were screened using the DMRB screening tools using the increased traffic flow data and the results can be seen in Appendix 2.

None of the four roads modelled were close to exceeding the annual or hourly Objectives for either PM₁₀ or NO₂ and therefore no further detailed consideration is required.

A number of planning applications have also been considered in this section, where air quality assessments were completed as part of a planning application. These assessments were requested predominately due to increased traffic flows on nearby roads (or potential impact on an AQMA) or due to the introduction of new receptors near to existing roads as part of the proposed development. Air quality assessments in relation to planning applications are considered annually as part of the Review and Assessment process and were reported in 2011 as part of the Progress Report. More recent applications since this time are covered in this Updating and Screening Assessment.

In August 2011, ESBC's Environmental Health Department was consulted for an application to erect 8 Class A1 retail units and 3 Class A3 units with associated car park and service yard works as part of an extension to the existing Coopers Square Shopping Centre in Burton upon Trent. Coopers Square currently provides approximately 37,750m² of retail floor space. The development would lead to an additional 11,221m² Gross Internal Area (GIA) of retail floor space, together with a 5,157m² GIA anchor store adjacent to Station Street. The extension to the shopping centre would take place on the existing surface level car park and a new car park has been proposed for the roof space of the extended section. The proposal would lead to a total of 657 car parking spaces over three car parks (i.e. existing surface level car park, existing roof level car park and proposed additional roof level car park) but with a reduction of 128 spaces from the existing situation. The existing junction on Station Street has been proposed for service vehicle access only, therefore reducing the number of public access points to the centre to 2 (i.e. Union Street signalised junction and the existing priority junction into the roof top car park from New Street). A transport assessment carried out by URS Scott Wilson (July 2011) concluded that the additional traffic that is likely to be generated and the reconfiguration of the car park / access points is unlikely to have a detrimental impact on nearby highway capacity. Furthermore, a travel plan has been proposed for all employees at Coopers Square Shopping Centre, together with improvements to cycling and pedestrian facilities. An air quality assessment was therefore not required in this case. Full planning consent has not yet been granted for this development. Any further

amendments to this proposal will be considered if necessary in any future review and assessment work.

At the end of October 2011 an outline application was submitted to ESBC for mixed use development comprising residential, Class B1, B2 and B8 industrial units, a hotel, public house and restaurant, together with associated service and car park works on land off Beech Lane, Princess Way and Derby Road in Burton upon Trent. The proposed application site is within close proximity to the existing Pirelli tyre manufacturing process regulated by ESBC as a Part B process. The site to the north of Pirelli is proposed to accommodate 300 residential properties and associated internal road infrastructure that will be accessed from Princess Way. The site to the south of Pirelli is proposed to be developed to include office space, industrial units, a hotel, public house and restaurants. The south site will have two access points off Derby Road and one access off Beech Lane for pedestrian and vehicular use. The operational Pirelli factory and associated offices will be centrally located within the overall development site. As part of the outline application an air quality assessment was submitted by Halcrow (Ref: PIEPRB406/01 V03). The report concluded that operational air quality impacts from traffic associated with the development would be of negligible significance at existing receptors and at receptors introduced on the application site as part of the proposed development. The impact of industrial and odour emissions from the existing nearby Pirelli factory were also determined to be of negligible significance. Furthermore, none of the Objectives were found to be exceeded as a result of the development. However, in order to protect nearby properties from construction / demolition dust a scheme of dust prevention and mitigation measures has been recommended. A formal decision on this application has not yet been made. Any further amendments to this proposal will therefore be considered if necessary in any future Review and Assessment work.

ESBC 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

TG(09) states that NO₂ concentrations can sometimes be elevated close to bus stations or sections of bus stations that are not enclosed and where there are relevant exposures nearby. Relevant exposure is judged mainly with regard to the 1-hour NO₂ Objective (i.e. those parts of the bus station that are not enclosed or nearby shopping areas where members of the public may reasonably spend 1 hour or more). Attention also needs to be paid with regard to the NO₂ annual mean, if there are residential properties close by too. Local Authorities are required to determine whether the number of bus movements to and from bus stations exceeds 2,500 movements per day and whether there are relevant exposures within 10m of any part of the bus station where buses are present. Should this be the case, Local Authorities are then required to use the DMRB screening model to determine whether NO₂ Objectives are likely to be exceeded.

Within the Borough, there are two main bus stations, one on New Street in Burton upon Trent and the other just off Bradley Street (B5028) in Uttoxeter. Data was gathered from Staffordshire County Council on the numbers of bus movements in 2011 for both locations. Although there are residential properties within 10m of the Uttoxeter bus station together with the likelihood of people spending 1 hour or more in the vicinity, the number of bus movements to and from the station is just 176, which is well below the 2,500 movement threshold. New Street is located in a shopping area with no residential properties, where people could reasonably spend 1 hour or more. The number of bus movements here is 1,213 which again are below the 2,500 threshold. No further considerations are therefore required.

ESBC confirms that there are no relevant bus stations within the Borough and therefore a Detailed Assessment is not required.

4 Other Transport Sources

The Updating and Screening Assessment also requires consideration of non-road related transport sources including airports; railways, particularly stations and depots, but also alongside some busy lines with a large number of diesel locomotives; and ports due to shipping emissions.

4.1 Airports

Aircraft are widely known to be potentially significant sources of NO₂ emissions, particularly during takeoff. Local Authorities that have airports in their area are therefore required to assess NO₂ concentrations at relevant exposures located within 1000m of the airport boundary. ESBC only has 1 aerodrome within its area and therefore no further consideration is required.

ESBC confirms that there are no airports within its area and a Detailed Assessment is therefore not required.

4.2 Railways (Diesel and Steam Trains)

Stationary diesel and coal-fired locomotives can give rise to high levels of sulphur dioxide (SO₂) close to the point of emissions. A requirement of the Updating and Screening Assessment is to consider locations where diesel or steam locomotives are regularly stationary for 15 minutes or more and where individuals may be regularly exposed within 15m of these locomotives. NO₂ concentrations tend to be elevated alongside railway lines with a large number of diesel locomotive movements and emissions can be equivalent to those from a busy road. There is therefore a new requirement that applies to some Local Authorities to assess railway lines in their district with a high usage of diesel locomotives and whether there are relevant exposures nearby. Table 5.1 in TG(09) outlines which railway lines should be considered. However, TG(09) states that these lines only need to be considered where the background NO₂ concentration is above 25 µg/m³.

4.2.1 Stationary Trains

ESBC 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

ESBC 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)

TG(09) states that Local Authorities with shipping / ports must assess potential exposures to SO₂ as large ships generally burn oils with high sulphur content in their main engines. If there are sufficient movements in a port they can give rise to a sufficient number of 15-minute periods above 266 µg/m³ to exceed the 15-minute Objective. Since ESBC is an inland Local Authority, this requirement does not apply.

ESBC confirms that there are no ports or shipping that meets the specified criteria within our area.

5 Industrial Sources

5.1 Industrial Installations

Whilst industrial sources are unlikely to make significant local contributions to annual mean concentrations, they could be significant with regards to the short-term Objectives and consideration should be given to combined impacts. TG(09) utilises a checklist approach divided into four sections;-

1. Industrial installations either regulated by the Environment Agency (i.e. A1 processes) or Local Authorities (i.e. A2 and Part B processes).
2. Major fuel (petrol) storage depots
3. Petrol filling stations
4. Poultry farms

Poultry farms were a new addition in the previous round of Review & Assessment three years ago, due to a number of Local Authorities discovering exceedences of the PM₁₀ Objectives associated with emissions from the keeping of chickens, turkeys, ducks and guinea fowl at large installation.

In order to help Local Authorities to identify potential significant sources, nomograms have been developed for a number of pollutants. TG(09) states that all of the pollutants under the regulations should be considered but those most at risk of requiring further work are SO₂, NO₂, PM₁₀ and benzene. TG(09) also recommends Local Authorities consider sources in neighbouring Authorities.

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

TG(09) requires Local Authorities to obtain details of any air quality assessments, where relevant, that have been carried out for new or proposed industrial installations.

Although Molson Coors (Shobnall Malting's) is not a new process, it has historically had a number of air quality studies carried out in relation to particulate emissions over the past 6 years including modelling work and more recently, off-site particulate monitoring at the Pumphouse site located close to the junction of the B5017 and B5121. This monitoring exercise took place over a 12-month period from December 2009 to December 2010.

As reported in the previous Progress Report (2011) PM₁₀ levels were found to be well within all the Objectives. However, Molson Coors (Shobnall Malting's) made a further commitment to carry out their own monitoring on site near to the northern boundary with Bass Cottages. Molson Coors (Shobnall Malting's) appointed SKM Enviros to carry out this monitoring exercise which began on 16 November 2010 and ended on 23 November 2011, largely as part of the work required to fulfil the requirements of related improvement conditions under the site's Environmental Permit (Permit number BP3139BX), regulated by the Environment Agency.

The results of the monitoring exercise indicated that the PM₁₀ Objectives were not being exceeded at the Bass Cottages location. The overall measured annual mean concentration was 26.9 µg/m³ relative to the annual mean Objective of 40µg/m³. The 24-hour mean Objective of 50µg/m³ was exceeded on just 11 days, relative to the permitted number of exceedences of 35 days annually. Further work indicated that most of the exceedences were not due to emissions associated with activities at the Shobnall Malting's site. The final report concluded that the Shobnall Malting's site may have contributed to 4 of the exceedences although other local sources of pollution may have also contributed. The final report also indicates that the previous dispersion modelling results may have been overestimates of the PM₁₀ concentrations in the area around the Bass Cottages. Overall, it can now be concluded that particulate emissions from the Shobnall Malting's site is not causing a breach of the UK Air Quality Objectives for PM₁₀ at the Bass Cottages. Unless circumstances change, no further air quality considerations are considered necessary with respect to the Shobnall Malting's site.

ESBC 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

Another requirement for Updating and Screening Assessments is to determine whether any of the sources identified during previous rounds of Review and Assessment have experienced a substantial increase in emissions or received new relevant exposure in their vicinity. A substantial increase is taken to be one greater than 30%. Should any industrial installation be found to have increased emissions of more than 30% then information would need to be gathered on the total annual emission of the pollutant in question as well as the height of the emission, which should then be used through the relevant nomogram to see if relevant thresholds are likely to be exceeded.

All industrial point sources previously assessed were reconsidered, along with any existing processes that have become regulated in the last 3 years, to identify any significant emissions. None of the Part B processes regulated by this Authority have been identified as having increased emissions.

For the A1 installations, information from the Environment Agency's ("What's in your backyard?") pollution inventory for all their regulated processes was used. None of these were identified as having substantial increases in emissions since the Updating and Screening Assessment in 2009. These larger installations have been assessed previously and therefore did not require further consideration this time around.

ESBC 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

This section looks at any new or significantly changed installations with no previous history of air quality assessments. In the absence of previous air quality assessments, Local Authorities are required to determine whether the installation in question is likely to give rise to significant pollutant emissions, and if so, gather detailed information on the emission characteristics of that source to determine if thresholds are exceeded in the relevant nomogram.

An application for firing of ceramics under the Environmental Permitting Regulations 2010 was submitted to ESBC for Beta Research Limited, Units D2, C2 and C3, Sovereign Business Park, Hawkins Lane, Burton upon Trent in May 2011.

The premises were already permitted for the spray drying of beta alumina for use as a solid electrolyte in batteries; therefore the application was for a significant variation to the Permit, due to additional potential emissions. Two gas fired kilns with a maximum power output of 600 KW and 880 KW have now been installed. The kilns are fitted with afterburners, which ensure volatile compounds are destroyed. The Environmental Permit was formally issued in January 2012. Stack emissions monitoring is required as part of the Environmental Permit which so far has confirmed that emissions are meeting required standards. No further considerations are considered necessary at this current time.

No other applications have been submitted for new industrial installations and other existing regulated processes have changed very little.

ESBC confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in neighbouring Authorities which need to be considered in a Detailed Assessment.

5.2 Major Fuel (Petrol) Storage Depots

There is some evidence to suggest that major petrol fuel depots can emit sufficient levels of benzene to put the 2010 annual Objective at risk of being exceeded, particularly if combined with higher levels from nearby busy roads.

ESBC can confirm that there are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

There is also evidence to suggest that petrol stations with an annual throughput of more than 2,000m³ of petrol that are close to busy roads with more than 30,000 vehicles per day and a sensitive receptor within 10m are at risk of exceeding the annual 2010 benzene Objective. This Updating and Screening Assessment has considered all petrol service stations within the Borough that are permitted under the Environmental Permitting (England and Wales) Regulations 2010 (as amended). None of the larger petrol stations which have throughputs of greater than 2,000m³ are located close by to roads in excess of 30,000 vehicles per day, nor do they have relevant receptors within 10m. TG(09) states that if all three of the criteria outlined above are met then exceedences are likely and a Detailed Assessment would need to be carried out.

ESBC can confirm that there are no petrol stations meeting the specified criteria, therefore a Detailed Assessment is not required in this respect.

5.4 Poultry Farms

A further requirement for Updating and Screening Assessment's is the consideration of poultry farms (defined as chickens (laying hens and broilers), turkeys, ducks and guinea fowl) with regards to PM₁₀ emissions. Local Authorities are required to establish whether they have any relevant exposures within 100m of poultry farms with greater than 400,000 birds if mechanically ventilated, 200,000 birds if naturally ventilated and 100,000 birds for any turkey units. If any of the above criteria are met the Local Authority must proceed to a Detailed Assessment.

ESBC reported on an application for a poultry farm at Dodsleigh, Leigh near Uttoxeter in the last Updating and Screening Assessment. This poultry farm is subject to an Environmental Permit regulated by the Environment Agency. Since the last Updating and Screening Assessment the Environmental Permit has been varied to increase the number of broiler rearing chickens from 118,650 to 158,649. As these are mechanically ventilated, they still do not exceed the 400,000 threshold that would require a Detailed Assessment. ESBC also has two other poultry farms in its area with 35,000 and 2,500 birds respectively which are all mechanically ventilated. None of these therefore match the criteria for further consideration.

ESBC confirms that there are no poultry farms meeting the specified criteria to require consideration in an Updating and Screening Assessment.

6 Commercial and Domestic Sources

Another requirement for Updating and Screening Assessments is the consideration of emissions from biomass burning from both the domestic and commercial sectors, including the service sectors (for example commercial offices, education, government, health, hotels, sport and leisure, retail and warehousing). Attention is also required with regards to solid fuel-burning from domestic sources.

It is widely recognised that biomass burning together with some combined heat and power systems (CHP) can lead to an increase in particulate emissions during combustion. Aerosol formation from volatile materials distilled from the wood is also considered to be a potential issue. However, in contrast to gas-burning, biomass burning can also result in an increase in the overall NO_x emissions due to the fuel-derived portion not present in gas combustion.

6.1 Biomass Combustion – Individual Installations

Local Authorities are required to identify individual plant burning biomass in 50 KW to 2MW units using information under the Clean Air Act 1993 together with any recent planning consultations that have included biomass boilers. Biomass combustion needs to be considered in relation to both NO₂ and PM₁₀. TG(09) also suggests looking at previous Review and Assessment work on boilers >5 MW for SO₂ which could help in making any assessment. Once individual plant has been identified, further information on stack heights, diameters, dimensions of buildings within 5 times the stack height, maximum emission rates (g/sec) etc, needs to be gathered. This information would then be used to calculate an effective stack height, which together with a calculation of background emission rates can then be modelled using the nomograms set out in TG(09), to determine whether further assessments are required. Should the source exceed the threshold in the relevant nomogram a Detailed Assessment would be required.

For the purposes of this Updating and Screening Assessment the only relevant source relates to an EA Environmental Permit application for the Unilever UK Ltd site at Wellington Road, in Burton upon Trent. The application was consulted on in October 2011 and included an anaerobic digester and biogas plant. This application included a H1 screening assessment for air quality, which concluded that emissions, including NO₂ were insignificant. The overall process contribution was predicted to be 2.32 µgm³ in relation to the annual Objective of 40 µgm³, and 23.2 µgm³ in relation to the hourly Objective limit of 200 µgm³. The average background concentration in the area was identified using background maps to be 16.6 µgm³ and combined with the process contributions were well within the allowable headroom between the background concentration and Objective limits at 9.90% and 13.9% for the annual and hourly Objectives respectively.

ESBC has assessed biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

It is now widely recognised that many small biomass combustion plants (including domestic solid-fuel burning), are individually acceptable but when combined, could lead to unacceptably high PM₁₀ concentrations, particularly in areas where PM₁₀ concentrations are close to or above the Objectives. The significance of domestic solid-fuel burning is thought to be relatively small but may become more significant in the future. TG(09) sets out a series of checklists, which includes identifying areas in 500m² × 500m² squares with the highest densities of houses and service sector biomass combustion appliances and the type of appliance used which then through a series of calculations is used to estimate an emission density for the square to determine if it exceeds the threshold in the nomogram. If the relevant threshold is exceeded then it would be necessary for the Local Authority to proceed to a Detailed Assessment. A significant proportion of Burton upon Trent is designated as a Smoke Control Area and since it is likely that the vast majority of people without central heating will be using gas or an alternative fuel, there is not the required density of solid fuel burning to justify a Detailed Assessment. An emissions inventory carried

out in 1996 indicated that following the designation of the Area, there was a shift towards households using predominantly electricity together with some gas rather than solid fuel. This further indicates that only a small proportion of households not using central heating will be using solid fuel.

There are however, a number of predominantly rural wards within the Borough where the burning of solid fuel was still fairly commonplace until recently. One such area is the village of Rocester, with approximately 700 households. Most of the village did not have access to a gas supply and solid fuel consumption remained relatively high. A Detailed Assessment was therefore undertaken during the second round of Review and Assessment in 2004 for both SO₂ and PM₁₀. Since 2004, a significant number of properties have now converted to natural gas or electricity as their fuel source; therefore no further consideration is needed in this regard.

There are no other significant densities of commercial biomass combustion that would require further investigation at this current time.

ESBC confirms that there are no locations within the borough where the combined effect of biomass burning is considered significant enough to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

TG(09) recommends that solid fuel burning can be a significant source of SO₂, particularly on a local scale.

As explained in Section 6.2, Rocester historically had a large density of solid fuel burning until recently. As a significant number now use electricity or natural gas as their fuel source, no further consideration is needed with respect to SO₂ emissions.

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

7 Fugitive or Uncontrolled Sources

Dust emissions from uncontrolled and fugitive sources can give rise to elevated PM₁₀ concentrations. Sources include quarrying and mineral extraction sites, landfill sites, coal and material stockyards, waste management sites and major construction sites.

Emissions are not well quantified from these sites; therefore predicting PM₁₀ levels with any degree of accuracy is a difficult task. The first step in identifying any potential exceedences, is to determine whether there have been any air quality assessments carried out for the particular source in question. If so, the Local Authority would need to determine whether it is of adequate quality for Review and Assessment purposes. In the absence of an existing assessment, Local Authorities need to establish whether there is relevant public exposure near to the source of the dust emissions. On site sources may be haul roads, crushers, skips, stockpiles etc. Off-site sources may also be important, for instance access routes to the site where dust and dirt can be tracked out by vehicles leaving the site, deposited on the public highway and then picked up by passing traffic.

TG(09) states that if the relevant exposure is away from off-site roads used as access routes to the site, then 'near' should be defined with regards to the local background PM₁₀ concentrations. For 2004 Objectives 'near' is within 1000m for a background >28 µg/m³; 400m for a background >26 µg/m³ and 200m for any background. Furthermore if the relevant exposure is within 50m of an off-site road used to access the site and there are visible deposits on the road, then these sections of road which may extend up to 1000m are regarded as 'near' providing the background is >25 µg/m³ for the 2004 Objectives.

Local Authorities are further required to assess whether there are dust concerns associated with the individual facilities / sites through visual inspections and any history of dust complaints. Should all criteria be met, then it would be necessary to proceed to a Detailed Assessment.

Major construction sites also have the potential for significant dust emissions. However, no major construction activities have taken place within the Borough within the past three years where there has been a cause for concern. Construction activities that have taken place have either been short-lived or dust has been adequately controlled. ESBC's Pollution Team is consulted for planning applications. Should any major developments be proposed that will involve long-term work and which are likely to give rise to significant dust emissions, recommendations will be made for dust to be considered through air quality assessments or dust management plans.

None of the existing quarries within East Staffordshire where there may be relevant exposure give rise to concerns or complaints and therefore are not considered to require a Detailed Assessment.

A further large quarry at Cauldon operated by Lafarge Cement UK PLC has been considered previously in relation to its potential trans-boundary impact on air quality from particulates. The "What's in my backyard" section of the Environment Agency's website highlights that emissions in 2010 (the latest available) were lower than previous years and the last round of Review and Assessment had no issues or complaints in relation to dust therefore a Detailed Assessment is not required.

Other smaller localised sites with the potential to emit PM₁₀ are often regulated by this Local Authority or have some form of waste permit by the Environment Agency and are not considered an issue. Any complaints received tend to be isolated incidents rather than ongoing prolonged air quality issues and at this stage it is not considered necessary to proceed to a Detailed Assessment and specific monitoring.

ESBC confirms that there are no potential sources of fugitive particulate matter emissions in our area that require consideration at a Detailed Assessment stage.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

NO₂ – concentrations at our automatic monitoring station remain around the annual Objective limit of 40µg/m³, although this year was just below at 38.9µg/m³. There remain no hourly 200µg/m³ exceedences. With only 2-3 years of monitoring data from this location it is too early to identify any temporal trends.

In relation to the diffusion tube network there continues to be a downward trend in concentrations since 2006 (with the exception of a slight increase in 2010, possibly caused by meteorological conditions). There were 17 locations exceeding in 2011, which is the lowest number of exceedences since 2006 when data collection began, with the exception of 2009.

There are still locations within the larger AQMA that are exceeding the annual Objective, although for the third year running there were no exceedences along Horninglow Road or Derby Road. During 2011, there were no exceedences within the smaller AQMA at St Peter's Bridge, the first year this has occurred since monitoring began.

There were no diffusion tube exceedences outside of the AQMAs, although one road junction was close to the limit bearing in mind the conservative national bias adjustment factor that was used- further monitoring will continue at this location.

There were no 60µg/m³ exceedences, indicating no likely hourly Objective breaches.

PM₁₀ concentrations have increased at the automatic monitoring site since it was installed in 2009, with the latest value being 26.9µg/m³. Concentrations are still well within the 40µg/m³ annual Objective however. Likewise, the number of exceedences of the hourly 50µg/m³ Objective has increased to 12 in 2011, although this is still well below the 35 permitted annually.

No Detailed Assessment is required in relation to any monitoring exercises.

8.2 Conclusions from Assessment of Sources

Transport- there have been no newly identified roads that have not already been considered in previous rounds of Review and Assessment. A number of planning applications have been considered where potential changes to traffic flow may have affected air quality although the requirement for a Detailed Assessment was ruled out.

Roads and junctions with significantly changed traffic flows were also considered and screened in some instances, although after investigation, no requirement for a Detailed Assessment is necessary.

Other transport- there are no applicable airports or ports in our area, so consideration in the Review and Assessment was not required. There are also no relevant areas of exposure in relation to stationary or moving trains.

Industrial- no industrial sources have been identified through the Updating and Screening Assessment that require Detailed Assessment. One site considered in a previous round of Review and Assessment continued to be monitored and it has been confirmed that there is no requirement for a more detailed assessment. There were no existing sites with significantly increased emissions and one “new” process at an existing installation was also considered, but identified as not requiring further consideration.

Fuel Storage Depots and large service stations- there are no fuel storage depots in the Borough and any petrol service stations do not have the relevant exposure to require consideration.

Poultry Farms- the existing poultry farms in the borough are not large enough to require consideration in the Updating and Screening Assessment.

Biomass combustion from individual and combined sources- an application for an Industrial Permit relating to an anaerobic digester and biogas plant identified no significant air quality impact. Combined effects of biomass burning (solid fuel) was considered previously for a local village, although there are no other combined sources that required consideration within this Updating and Screening Assessment.

Fugitive sources

There are no new or significantly changed fugitive sources since the previous Updating and Screening Assessment.

8.3 Proposed Actions

This Updating and Screening Assessment has identified no need to proceed to a Detailed Assessment for any pollutant.

The Updating and Screening Assessment has not identified the need for additional monitoring or changes to the existing monitoring regime. ESBC will continue to monitor however, at a junction location outside of the AQMAs where NO₂ concentrations are currently just below the Objective limits.

Whilst some of the roads within the larger AQMA have not exceeded the NO₂ Objectives for the last 3 years and in the smaller AQMA over the last year, these periods are still too short a duration to justify changes to the current AQMAs. Likewise, no areas outside of the AQMAs are exceeding Objectives and therefore there is no requirement to extend these areas.

The next stage following the submission of this 2012 Updating & Screening report will be submission of the 2013 Progress Report. ESBC will also be commencing the review of the current Air Quality Action Plan to update it in relation to the Local Transport Plan 3 for Staffordshire.

9 References

Defra 2009 Technical Guidance Note (LAQM.TG(09)) Local Air Quality Management.

East Staffordshire Borough Council, 2007, Detailed Assessment.

East Staffordshire Borough Council, 2008, Further Assessment.

East Staffordshire Borough Council, 2009, Air Quality Action Plan.

East Staffordshire Borough Council, 2009, Updating & Screening Assessment.

East Staffordshire Borough Council, 2010, Progress Report.

East Staffordshire Borough Council, 2011, Progress Report.

Highways Agency. 2007. Design Manual for Roads and Bridges (DMRB)- Screening Method 1.03c

Highway Data Team - Staffordshire County Council –Traffic Figures (2012)

Molson Coors Limited. Burton Brewery (Station Street). Public Register File

Molson Coors Limited. Shobnall Maltings. Public Register File

<http://laqm.defra.gov.uk/>

<http://www.environment-agency.gov.uk/homeandleisure/124274.aspx>

Appendices

Appendix 1: QA/QC Data

Appendix 2: DMRB Results 2012

Appendix 1: Quality Assurance (QA) & Quality Control (QC) of Data

(a) Diffusion Tube Bias Adjustment Factors

Throughout 2011, NO₂ diffusion tubes were supplied and analysed by Leicester & Staffordshire Scientific Services. They were prepared by pipetting a 20% solution of TEA in deionised water, where the solution is pipetted onto grids already placed in the end cap. During previous years (i.e. until 2009) the diffusion tubes were prepared by pipetting a 50% v/v solution of triethanolamine (TEA) in deionised water onto the grids.

(b) Factors from Local / National Co-location Studies

As mentioned in Section 2.1.2, ESBC takes part in the national bias adjustment exercise, where co-location and automatic data was submitted to the National Physical Laboratory (NPL) for upload on national bias spreadsheet which can be downloaded from the Defra website (<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>). For 2011, an overall bias adjustment factor of 0.88 was derived from the collation of diffusion tube results for all participants that use Leicester and Staffordshire Scientific Services. ESBC also took part in the local bias adjustment exercise to calculate the accuracy and precision of diffusion tubes that were compared with automatic data at Derby Turn. These in turn were used to calculate a bias adjustment factor that was applied to all other NO₂ diffusion tube data. Calculations were made using the spreadsheet available for download from the Defra website (<http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>). A locally derived bias correction of 0.74 was derived from this exercise. Results of both the national and local bias exercises are shown below;-

National Bias Adjustment Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet							Spreadsheet Version Number: 03/12				
<p>Follow the steps below <u>in the correct order</u> to show the results of <u>relevant</u> co-location studies</p> <p>Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods</p> <p>Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet</p> <p>This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.</p>							<p>This spreadsheet will be updated at the end of September 2012</p> <p>LAQM Helpdesk Website</p>				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.					Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.						
Step 1:		Step 2:	Step 3:	Step 4:							
<p>Select the Laboratory that Analyses Your Tubes from the Drop-Down List</p> <p>If a laboratory is not shown, we have no data for this laboratory.</p>		<p>Select a Preparation Method from the Drop-Down List</p> <p>If a preparation method is not shown, we have no data for this method at this laboratory.</p>	<p>Select a Year from the Drop-Down List</p> <p>If a year is not shown, we have no data²</p>	<p>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 factor³ shown in blue at the foot of the final column.</p> <p>If you have your own co-location study then see footnote⁴. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953</p>							
Analysed By ¹		Method	Year ⁵	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁶	Bias Adjustment Factor (A) (Cm/Dm)
Staffordshire Scientific Services		20% TEA in water	2011	UB	Stoke-on-Trent City Council	12	32	32	0.5%	G	0.99
Staffordshire Scientific Services		20% TEA in water	2011	R	East Staffordshire Borough Council	12	52	39	34.5%	G	0.74
Staffordshire Scientific Services		20% TEA in water	2011	R	Stoke-on-Trent City Council	12	40	39	4.3%	G	0.96
Staffordshire Scientific Services		20% TEA in water	2011	O	South Staffordshire Council	11	36	34	7.0%	G	0.93
Staffordshire Scientific Services		20% TEA in water	2011	K	Marylebone Road Intercomparison	12	119	100	18.8%	G	0.84
Staffordshire Scientific Services		20% TEA in water	2011	R	Cannock Chase Coujncil	13	47	45	3.3%	G	0.97
Staffordshire Scientific Services		20% TEA in water	2011	UB	WIGAN	11	30	23	29.9%	G	0.77
Staffordshire Scientific Services		20% TEA in water	2011	SU	Manchester City Council	12	30	23	32.4%	G	0.76
Staffordshire Scientific Services		20% TEA in water	2011	K	Manchester City Council	12	77	66	16.8%	G	0.86
Staffordshire Scientific Services		20% TEA in water	2011	UB	Manchester City Council	12	48	44	8.3%	G	0.92
Staffordshire Scientific Services		20% TEA in water	2011	R	Stockport MBC	11	31	29	6.4%	G	0.94
Staffordshire Scientific Services		20% TEA in water	2011		Overall Factor ³ (11 studies)				Use	0.88	

Local Bias Adjustment Spreadsheet

Checking Precision and Accuracy of Triplicate Tubes


AEA Energy & Environment
 From the AEA group

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	20/01/2011	03/02/2011	70.7	70.6	69.1	70	0.9	1	2.2
2	03/02/2011	03/03/2011	51.2	53.7	57.5	54	3.2	6	7.9
3	03/03/2011	29/03/2011	48.2	45.9	49.7	48	1.9	4	4.8
4	29/03/2011	09/05/2011	40.5	42.5	40.8	41	1.1	3	2.7
5	09/05/2011	02/06/2011	49.4	50.2	52.2	51	1.4	3	3.6
6	02/06/2011	30/06/2011	51.8	50.1	48.9	50	1.5	3	3.6
7	30/06/2011	05/08/2011	51.3	51.3	52.2	52	0.5	1	1.3
8	05/08/2011	31/08/2011	47.5	53.2	47.2	49	3.4	7	8.4
9	31/08/2011	28/09/2011	46.5	56.5	43.1	49	7.0	14	17.3
10	28/09/2011	03/11/2011	59.8	59.8	55.0	58	2.8	5	6.9
11	03/11/2011	01/12/2011	51.1	51.7	53.2	52	1.1	2	2.7
12	01/12/2011	08/01/2011	52.9	54.8	58.9	56	3.1	6	7.6
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
55.7	100	Good	Good
39.2	100	Good	Good
47.1	100	Good	Good
40.0	100	Good	Good
38.7	100	Good	Good
32.2	100	Good	Good
32.6	100	Good	Good
29.8	100	Good	Good
28.1	100	Good	Good
34.6	100	Good	Good
49.1	100	Good	Good
41.2	100	Good	Good
Overall survey -->		Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Derby Turn
-----------------------	-------------------

Accuracy (with 95% confidence interval)

without periods with CV larger than 20%

Bias calculated using 12 periods of data

Bias factor A **0.74 (0.66 - 0.85)**

Bias B **34% (18% - 51%)**

Diffusion Tubes Mean: **52 μgm^{-3}**

Mean CV (Precision): **5**

Automatic Mean: **39 μgm^{-3}**

Data Capture for periods used: **100%**

Adjusted Tubes Mean: **39 (35 - 45) μgm^{-3}**

Accuracy (with 95% confidence interval)

WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A **0.74 (0.66 - 0.85)**

Bias B **34% (18% - 51%)**

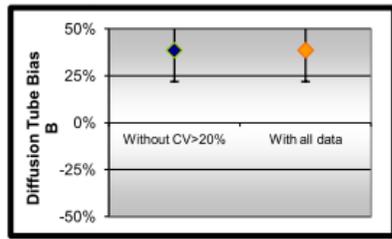
Diffusion Tubes Mean: **52 μgm^{-3}**

Mean CV (Precision): **5**

Automatic Mean: **39 μgm^{-3}**

Data Capture for periods used: **100%**

Adjusted Tubes Mean: **39 (35 - 45) μgm^{-3}**



Diffusion Tube Bias

Jaume Targa, for AEA
Version 04 - February 2011

(c) Discussion of Choice of Factor to Use

Local Authorities using diffusion tubes as part of their review and assessment are required to report both the locally derived bias adjustment factor and the bias adjustment factor from the national database. However, the decision on which factor to use will depend on a number of factors, for example;-

- Tube exposure time (1 week, 2 weeks, 1 month)
- Length of the monitoring study
- QA/QC of the chemiluminescence analyser
- QA/QC of diffusion tubes
- Siting of co-located tubes
- Siting of other tubes in the survey

For the purpose of this USA, ESBC took the decision to use the national bias factor rather than the locally derived one even though data capture from the automatic monitor at Derby Turn was good and co-location and laboratory precision was also satisfactory. In the case of ESBC's diffusion tube network the exposure time throughout 2011 was monthly and the diffusion tubes were positioned in a range of settings some of which differ from the co-located site. These are strong criteria where the national bias factor should be applied in accordance with Box 3.3 of TG(09). Furthermore, the national bias correction factor of 0.88 produced higher NO₂ levels than the locally derived factor of 0.74. Even though this is a conservative approach, ESBC feels it is better to err on the side of caution here, which further justifies the use of the national bias factor.

(d) PM Monitoring Adjustment

TG(09) states that the Met-One BAM (with unheated inlet) meets the equivalence criteria for PM₁₀ monitoring so long as the results are corrected for slope. Data from the Derby Turn Met-One BAM for 2011 were corrected for slope, whereby the measured PM₁₀ concentrations were divided by a factor of 1.21. For example, if the reported PM₁₀ mass concentration were 25 µg/m³, the corrected PM₁₀ mass would be $25/1.2 = 20.7 \mu\text{g}/\text{m}^3$.

(e) Short-term to Long-term Data adjustment

As explained in the main body of the USA (Section 2.2.1) adjustments need to be made to short-term monitoring results (i.e. if data capture is below 90%). Long term monitoring sites therefore need to be used to correct for short term monitoring results. In the absence of relevant automatic monitoring sites that form part of the national network and which are within a 50 mile radius, diffusion tube sites with >90% data capture were chosen to correct other diffusion tube data in agreement with Box 3.2 in TG(09). The diffusion tube sites used to make these adjustments were;-

T5: Shobnall Playing Fields 1

T6: Shobnall Playing Fields 2

T14: Derby Turn

T21: Horninglow Road approaching Junction with Shakespeare Road

T22: Horninglow Road – opposite Morris Homes

T23: Derby Street – near to Derby Turn

T24: Horninglow Road – approaching junction with Morley’s Hill

T32: Derby Street – Maltings Court

T33: Derby Street – approaching Little Burton West

T35: Derby Street / Borough Road junction

T36: Wellington Street - crossing

T37: Wellington Street – roundabout

T38: Wellington Street – approaching roundabout

T43: Horninglow Street / Guild Street corner

T45: Horninglow Street near junction with High Street

T46: Bridge Street – near Old Bridge

T47: High Street – junction with Station Street

T49: Bevedere Road – A38 Flyover

Box 3.2 of TG(09) sets out a calculation method for correcting short-term monitoring data whereby for each case annual means for the calendar year and period means for the period of interest were gathered for 5 of the diffusion tube sites outlined above. To ensure results were as accurate as possible, similar diffusion tube sites or nearby tubes were chosen to correct those with less than 90% data capture. Ratios between the two means were then calculated followed by an overall average. For each diffusion tube site below 90%, the measured period mean is then multiplied by this overall ratio. An example of the workings of the calculations is shown below for T42: Dallow Street – near junction with Horninglow Road.

Long Term Site	Annual Mean 2011 (AM)	Period Mean 2011 (PM)	Ratio (AM/PM)
Derby Turn (Rs)	48.3	48.1	1.004207061
Horninglow Rd – appr Shakespeare Rd junc. (Rs)	42.1	41.3	1.017631616
Horninlow Rd- opp Morris Homes (Rs)	33.0	32.5	1.013502433
Derby St - Maltings Court (Rs)	43.5	43.3	1.005554427
Derby St – appr Little Burton West (Rs)	37.7	37.7	1.00066153
			1.008311413

(f) QA/QC of automatic monitoring

As stated in the main body of the USA (Section 2.1.2), Casella Measurement have been commissioned over the past 3 years to carry out data management of the automatic monitoring data at the Derby Turn station and previously for the St Peters Bridge monitoring station between 2006 and 2010.

(g) QA/QC of diffusion tube monitoring

As already stated this Authority uses tubes prepared by pipetting a 20% solution of TEA in deionised water, where the solution is pipetted onto grids already placed in the end cap. Leicester & Staffordshire Scientific Services who provide the tubes also takes part in two QA/QC schemes; the Workplace Analysis Scheme for Proficiency (WASP) that is managed by the Health & Safety Laboratory (HSL) and a monthly field inter-comparison exercise managed by The National Physical Laboratory (NPL), which regularly check the laboratories performance. The WASP scheme uses artificially spiked diffusion tubes to test each laboratory's analytical performance on a quarterly basis (roughly January, April, July and October each year). Every quarter each laboratory receives four diffusion tubes doped with a known amount of nitrite to the HSL, but not to the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO₂ ambient monitoring in the UK when using such diffusion tubes. The participants analyse the test samples and report the results to the HSL. The HSL then assign a performance score to each laboratory's result, based on how far their results deviate from the reference values for each test sample. The reference values are best estimates of the levels of nitrite doped onto the test sample tubes. At the completion of the round, laboratories receive a report detailing how they have performed and how their results relate to those of their peers. The performance indicator is based on a Zscore which can be interpreted as;-

- z score $< \pm 2$ – satisfactory laboratory result
- z score $\geq \pm 2$ and $< \pm 3$ – questionable (warning) laboratory result
- z score $\geq \pm 3$ – unsatisfactory laboratory result

East Staffordshire Borough Council

(h) Monthly NO2 Diffusion Tube Data for 2011.

Tube No	Location address	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Annual Average	Bias Corrected (local bias adjustment)	Bias Correncted (national bias adjustment)
1	Trent Bridge (Rs)	Missing	44.5	44.2	44.4	32.8	39.0									
2	Trent Bridge (Rs)	Missing	44.9	44.7	44.8	33.2	39.4									
3	St Peters Bridge (Rs)	67.6	57.7	52.3	Missing	39.2	Missing	57.2	Missing	48.6	58.4	56.7	61.2	55.4	41.0	48.8
4	St Peters Bridge (Rs)	61.6	55.8	54.1	52.8	61.6	63.6	Missing	54.5	Missing	63.7	53.1	61.7	58.3	43.1	51.3
5	Shobnall Playing Fields (B)	36.7	37.3	29.1	22.2	16.8	23.0	25.1	22.7	23.7	32.8	39.0	Invalid	28.0	20.7	24.7
6	Shobnall Playing Fields (B)	40.9	33.3	29.9	24.2	19.6	18.2	22.3	19.9	30.9	31.3	36.9	Invalid	27.9	20.7	24.6
7	Horninglow Croft (Rs)	58.4	52.3	44.5	39.1	35.7	35.7	35.7	33.4	43.4	54.7	51.2	43.4	44.0	32.5	38.7
8	Monitoring Station Derby Turn (Rs)	70.7	51.2	48.2	40.5	49.4	51.8	51.3	47.5	46.5	59.8	51.1	52.9	51.7	38.3	45.5
9	Monitoring Station Derby Turn (Rs)	70.6	53.7	45.9	42.5	50.2	50.1	51.3	53.2	56.5	59.8	51.7	54.8	53.4	39.5	47.0
10	Monitoring Station Derby Turn (Rs)	69.1	57.5	49.7	40.8	52.2	48.9	52.2	47.2	43.1	55.0	53.2	58.9	52.3	38.7	46.0
11	Wellington St (Ks)	67.4	52.2	58.5	49.3	48.5	53.5	47.4	48.7	45.3	59.8	50.2	57.0	53.2	39.3	46.8
12	Wellington St (Ks)	70.8	51.3	54.9	44.7	52.4	50.6	52.3	49.5	Missing	55.2	53.6	52.6	53.4	39.5	47.0
13	Horninglow St (Rs)	61.2	53.5	59.0	47.8	43.4	49.0	44.5	Missing	Missing	Missing	50.1	43.2	50.2	37.1	44.2
14	Derby Turn (Rs)	68.4	51.5	54.8	45.5	52.8	57.5	50.0	46.8	52.3	64.2	54.6	60.4	54.9	40.6	48.3
15	Derby Turn (Ks)	82.4	59.1	61.0	53.6	61.8	58.7	55.4	53.3	55.5	67.4	64.1	61.3	61.1	45.2	53.8
16	Horninglow School (Rs)	invalid	44.3	47.3	30.5	32.0	Missing	38.5	28.5	33.9						
17	Winshill - Brookside (B)	29.4	25.3	21.5	14.2	12.9	14.6	14.4	15.1	18.3	23.1	26.3	22.9	19.8	14.7	17.5
18	Stretton School (Urban Background) (N)	67.2	35.7	30.2	19.9	14.9	15.4	17.0	Missing	17.5	27.6	40.1	21.4	27.9	20.6	24.6
19	A38 Lichfield Rd Slip Rd (Rs)	61.6	64.2	55.8	49.4	27.2	39.9	42.6	35.3	40.1	50.4	59.5	36.5	46.9	34.7	41.3
20	A38 Lichfield Rd Slip Rd (Rs)	39.0	67.0	53.6	42.0	27.7	40.0	42.5	33.5	35.4	53.6	61.0	34.3	44.1	32.7	38.8
21	Horninglow Rd - 173 (Rs)	61.9	57.1	54.9	47.8	32.5	43.8	45.1	41.1	36	54.0	60.1	39.4	47.8	35.4	42.1
22	Horninlow Rd- opp Morris Homes (Rs)	Missing	41.8	41.7	32.9	23.7	34.4	36.7	32.1	39	46.2	45.0	38.5	37.5	27.7	33.0
23	Derby St-Antique shop (Rs)	73.4	65.5	64.9	64.2	36.0	52.9	48.3	43.2	48.8	65.1	70.1	49.2	56.8	42.0	50.0

East Staffordshire Borough Council

24	Horninglow Rd Nrth- Castle Court (Rs)	48.9	42.5	40.2	31.4	24.9	31.2	32.5	30.5	27.9	36.6	42.1	28.0	34.7	25.7	30.6
25	Derby St- Lidl (Rs)	69.8	64.7	63.9	52.7	Missing	Missing	Missing	Missing	Missing	Missing	Invalid	58.0	61.8	45.7	54.4
26	A444- Glebe School (Rs)	63.0	46.3	52.5	44.5	40.0	51.6	Missing	Missing	Missing	49.0	Invalid	79.0	53.2	39.4	46.8
27	Burton Albion Roundabout (Rs)	58.2	62.8	45.9	38.9	27.4	37.2	37.1	34.9	36.6	48.8	54.1	36.1	43.2	31.9	38.0
28	Derby Rd – opp. Coytes (Rs)	66.7	53.8	46.0	37.5	32.1	36.5	36.0	32.8	40.4	48.9	59.5	40.4	44.2	32.7	38.9
29	Derby Rd/Eton Rd junction (Rs)	57.2	48.2	49.0	38.0	30.9	40.0	37.4	32.6	41.6	48.4	51.4	42.1	43.1	31.9	37.9
30	Derby Rd – Delter Hotel (Rs)	66.1	55.8	48.0	41.8	36.1	38.2	34.4	42.8	44.9	56.8	54.8	49.1	47.4	35.1	41.7
31	Derby St – approaching Bevan Building Supplies (Rs)	68.8	57.3	Missing	41.9	46.7	50.8	47.2	Missing	Missing	56.8	53.8	51.6	52.8	39.0	46.4
32	Derby St - Maltings Court (Rs)	66.0	58.4	48.8	43.8	38.2	45.5	38.9	42.2	46.9	61.1	56.2	47.8	49.5	36.6	43.5
33	Derby St – Briggs (Rs)	61.7	53.3	51.0	37.5	32.1	38.0	35.3	37.3	35.8	42.0	48.0	42.3	42.9	31.7	37.7
34	Waterloo St – Byrkley Arms (Ks)	70.4	60.2	51.4	46.3	31.5	44.4	41.0	Missing	Missing	Missing	56.5	52.2	50.4	37.3	44.4
35	Derby St – Furniture King (Ks)	77.7	65.2	65.2	49.5	51.4	57.8	51.0	50.4	47	64.1	63.8	58.0	58.4	43.2	51.4
36	Wellington St – crossing (Ks)	78.9	74.4	66.3	63.4	59.8	66.4	59.0	49.5	56.1	Missing	73.8	57.8	64.1	47.5	56.4
37	Wellington St – Imex Business Park (Rs)	66.1	50.2	47.7	43.9	42.6	44.8	41.3	45.8	40.5	56.6	51.4	45.2	48.0	35.5	42.2
38	Wellington St – opp Protrade (Rs)	97.8	59.6	50.0	46.3	38.9	47.4	42.1	40.5	43	59.9	Missing	42.1	51.6	38.2	45.4
39	Wellington St – Carlton Court (Rs)	Missing	63.6	60.8	62.2	46.0										
40	Rolleston Rd – nr junc Horninglow Rd (Rs)	59.1	47.9	47.0	39.2	34.8	38.3	37.0	37.5	36.4	44.4	49.1	38.2	42.4	31.4	37.3
41	Shakespeare Rd – nr junc Horninglow Rd (Rs)	55.1	48.4	37.7	31.8	Missing	29.5	30.9	33.3	43.3	46.8	41.1	36.6	39.5	29.2	34.8
42	Dallow St – nr junction Horninglow Rd (Rs)	46.8	40.2	40.2	28.3	21.5	Missing	37.1	21.7	27.7	35.5	Invalid	51.4	35.0	25.9	30.8
43	Horninglow St - Charrington House (Rs)	69.8	54.8	51.0	48.1	39.7	44.5	48.8	49.6	47.1	74.6	88.9	58.3	56.3	41.6	49.5
44	Horninglow St – Jee Ja Jeas (Rs)	65.4	56.5	54.3	Missing	Missing	Missing	Missing	Missing	Missing	45.6	53.3	41.5	52.8	39.0	46.4
45	Horninglow St – Ever After (Rs)	70.7	59.7	59.1	45.5	48.2	53.2	47.6	45.6	45.3	61.5	56.2	56.8	54.1	40.0	47.6
46	Bridge St - Burton Bridge Brewery (Rs)	57.7	45.0	45.8	36.2	41.8	39.4	30.8	38.6	44.3	49.3	46.7	49.9	43.8	32.4	38.5
47	High St - Natwest (Ks)	56.1	46.5	43.5	33.5	28.2	29.4	32.9	33.0	32.5	42.3	45.2	38.0	38.4	28.4	33.8
48	High St - Primark (Ks)	54.3	41.8	39.5	32.6	46.9	Missing	Missing	Missing	Missing	45.1	40.2	48.7	43.6	32.3	38.4
49	Belvedere Rd - A38 Flyover (Rs)	59.7	50.9	49.1	40.4	42.1	40.2	32.3	36.7	45.3	48.7	51.4	45.5	45.2	33.4	39.8

East Staffordshire Borough Council

50	Shobnall Rd - A38 Flyover (Rs)	65.0	49.7	46.4	Missing	Missing	Missing	Missing	Missing	Missing	46.9	52.4	46.3	51.1	37.8	45.0
51	Evershed Way / Anglesey Rd (Rs)	58.1	48.5	51.2	Missing	Missing	Missing	Missing	Missing	Missing	49.3	Missing	74.4	56.3	41.7	49.5
52	Orchard Street - Caxton Court (Rs)	58.7	50.4	45.0	Missing	Missing	Missing	Missing	Missing	Missing	43.2	42.8	33.8	45.7	33.8	40.2
53	Branston Rd / St Peters Bridge (Rs)	59.7	Missing	47.9	39.1	Missing	Missing	44.6	38.0	34.2	45.7	44.0	39.8	43.7	32.3	38.4
54	Grange St / Shobnall Rd Corner (Rs)	65.7	50.5	46.3	35.2	41.8	37.9	Missing	Missing	Missing	Missing	Missing	60.4	48.3	35.7	42.5
55	Shobnall Rd - Marstons (Rs)	Missing	46.4	Missing	33.4	34.2	30.4	Missing	Missing	Missing	Missing	46.9	37.6	38.2	28.2	33.6
56	Forest Rd - Fred Brewer Way (Rs)	45.4	43.0	Missing	27.2	23.7	27.4	28.9	25.8	30.7	42.6	44.7	Missing	33.9	25.1	29.9
57	Hawkins Lane - opp. Pipe Centre (Rs)	54.8	48.2	44.3	35.2	33.5	27.3	Missing	Missing	Missing	48.4	49.7	43.9	42.8	31.7	37.7

Appendix 2. DMRB Results 2012

All receptors			Pollutant concentrations at receptor						
Receptor number	Name	Year	CO *	Benzene	1,3-butadiene	NO _x	NO ₂ *	PM ₁₀	
			Annual mean mg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Days >50µg/m ³
1	Burton Road	2012	0.06	0.06	0.05	43.62	24.38	17.08	0.79
2	A50	2012	0.04	0.05	0.08	58.61	28.68	19.15	2.44
3	Shobnall Rd	2012	0.08	0.11	0.07	44.33	24.57	17.34	0.94
4	Horninglow Rd N	2012	0.07	0.08	0.07	43.50	23.34	17.42	0.99

Highways Agency 2007 Design Manual for Roads and Bridges (DMRB)- Screening Method 1.03c