



2010 Air Quality Progress Report for *Stoke-on-Trent City Council*

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

April 2010

Local Authority Officer	Ann Beeston
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Department	Regulatory Services
Address	Town Hall Albion Street Stoke-on-Trent ST1 1XP
Telephone	01782 236575
e-mail	ann.beeston@stoke.gov.uk

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Executive Summary

New monitoring data

Air quality monitoring has been carried out in the city since 1995.

Nitrogen dioxide monitoring for 2009 revealed that there are areas of the city where the annual mean objective is being exceeded. The annual mean nitrogen dioxide Air Quality Management Area (AQMA) covers the whole of the city, therefore, all exceedances of the objective lie within the boundary of the AQMA and a detailed assessment is not required.

Monitoring shows:

- A downward trend at background sites.
- A downward trend at sites representative of relevant exposure in all areas with the exception of :
 - Etruria Road, Basford,
 - Dividy Road, Bucknall
 - Railway Road, Meir.
- A possible exceedance of the nitrogen dioxide 1-hour mean objective at Basford. The city-wide nitrogen dioxide annual mean AQMA will be amended in June, to include exceedance of the 1-hour mean objective.

PM₁₀ monitoring for 2009 revealed that there may no longer be an exceedance of the 24-hour mean objective within the Fenton PM₁₀ AQMA. However, steps to revoke the AQMA will not proceed until there is sufficient evidence to show that an exceedance of the 24-hour mean objective is unlikely in the long-term.

Air Quality Action Plan (AQAP) progress

Indicators for the city-wide AQAP for nitrogen dioxide show progress is being made.

Monitoring shows that significant progress has been made in the Fenton AQMA for particulates.

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1 Introduction

1.1 Description of Local Authority Area

Stoke-on-Trent covers an area of over 9,000 hectares located mid-way between Birmingham and Manchester and has a population of 239,000. The M6 motorway and the West Coast mainline provide the principle transport links to the north and south for the city. The A50 trunk road and the Crewe to Derby rail line provide links to the east and west of the area.

The neighbouring authorities are Newcastle-under-Lyme Borough Council, Stafford Borough Council and Staffordshire Moorlands District Council.

There are two pollutants of major concern for the city; nitrogen dioxide (NO₂) emitted from road traffic and particulates (PM₁₀) from an industrial source.

1.2 Purpose of Progress Report

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

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

1.3 Air Quality Objectives

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

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

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	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 (PM₁₀) (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

This Progress Report is written as part of the fourth round of review and assessment for air quality. Previous rounds of review and assessment concluded that several areas of the city were exceeding the 2005 annual mean nitrogen dioxide (NO₂) objective and one area was exceeding the 2004 24-hour mean objective for particulates (PM₁₀). The conclusions of previous rounds of review and assessment are summarised below.

Table 1.2 Summary of previous rounds of Local Air Quality Management (LAQM)

Round 1		
Stage 1	Dec-99	Only 1,3 butadiene expected to meet the specified objective in 2005. All others; benzene, carbon monoxide, lead, nitrogen dioxide, particles and sulphur dioxide were likely to fail to meet their respective objective(s) in one or more areas of the City. Furthermore, as a result of the widespread nature of airborne particles in the UK as a whole, every part of the City is likely to fail to meet the air quality objective for particles.
Stage 2/3	Dec-00	Likely breach of the nitrogen dioxide annual mean objective at Cliff Vale, and 24-hour PM ₁₀ objective at Fenton.
AQMA	Nov-01	AQMA declared for annual mean nitrogen dioxide at Cliff Vale. Map included in Appendix F.
AQMA	Aug-02	AQMA declared for PM ₁₀ at Fenton. Order and map included in Appendix F
Stage 4 NO ₂	Oct-03	Possible but not likely breach of nitrogen dioxide annual mean objective due to traffic emissions at: Cliff Vale (west), North Street, Copeland Street, Brook Street, Maclagan Street, Cobridge traffic lights, Hanley (Bucknall New Road Traffic lights), Bucknall Bridge, Joiners Square, Heron Cross, Meir. Breach of the objective was unlikely at Victoria Place.
Fenton AQAP	Apr-04	Fenton AQAP published. Map included in Appendix f
Stage 4 PM ₁₀	May-04	Stage 4 concluded breach of 24-hour PM ₁₀ objective likely to continue at Fenton.
Round 2		
USA	Dec-03	PM ₁₀ continuing to breach 24-hour objective and detailed assessment needed for NO ₂ at several areas of the city.
Detailed Assessment	May-05	Breach of nitrogen dioxide annual mean probable at: Burslem, Cobridge, Hanley, Bucknall Bridge, Joiners Square, Victoria Place and Meir. A beach unlikely at Heron Cross.
City-wide AQMA	Apr-06	City-wide nitrogen dioxide AQMA declared. Map included in Appendix F

Round 3		
USA	Jun-06	PM ₁₀ continuing to breach 24-hour objective. Two additional areas of exceedance of the nitrogen dioxide annual mean objective at Tunstall and Basford (areas covered by city-wide AQMA).
FA	Aug-07	Confirms exceedances of nitrogen dioxide annual mean objective.
Draft city-wide AQAP	Sep-07	
PR	Jan-08	Breach of nitrogen dioxide annual mean objective and 24-hour PM ₁₀ objective at locations previously identified.
Round 4		
USA	Apr-09	<p>PM₁₀ no longer breaches 24-hour objective, but AQMA will not be revoked until monitoring confirms that low concentrations are sustained.</p> <p>NO₂ The area of exceedance at Tunstall no longer exceeds the annual mean objective, following the opening of the Tunstall Northern By-pass.</p> <p>New monitoring data for nitrogen dioxide confirms that exceedances of the annual mean objective still exist in other areas identified in previous rounds of review and assessment.</p>

THE CITY OF STOKE-ON-TRENT

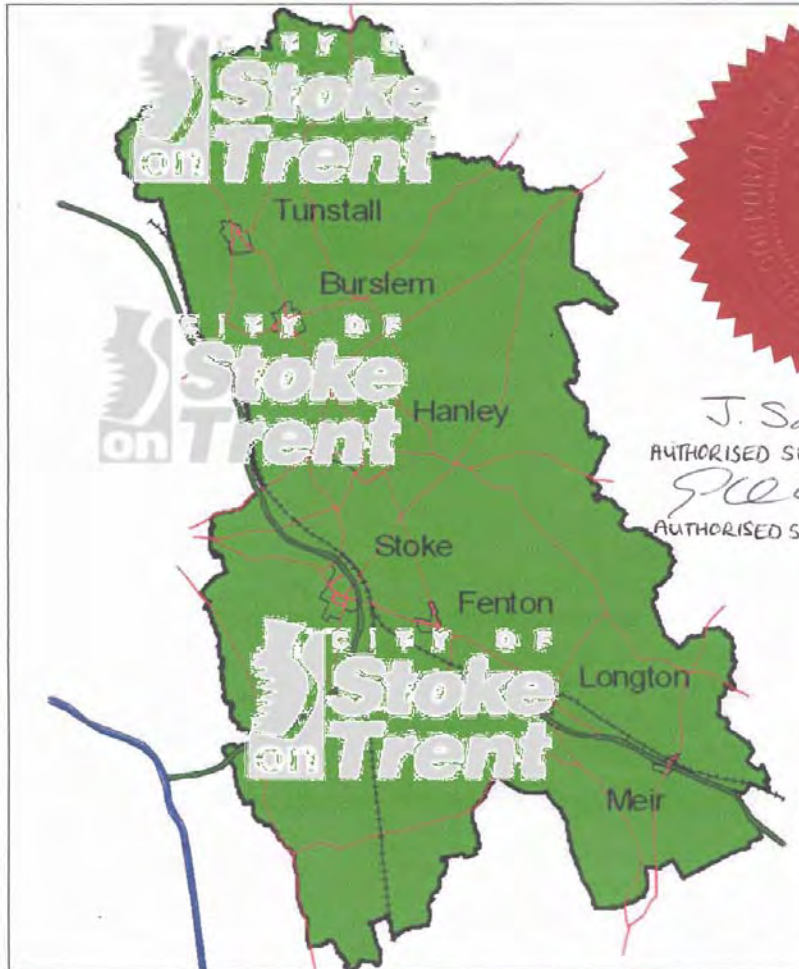
STOKE-ON-TRENT AIR QUALITY MANAGEMENT AREA ORDER 2006

The Area is designated in relation to likely breaches of the annual mean Nitrogen Dioxide air quality objective specified in the Air Quality (England) Regulations 2000.

For further details see the City Council's Detailed Assessment of Air Quality published May 2005



Community & Adult Services
Directorate
Regulatory Service Division
PO Box 2452
Floor 1, Town Hall
Albion Street, Hanley
Stoke-on-Trent
ST1 1XP



440462
J. Savage
AUTHORISED SIGNATORY
[Signature]
AUTHORISED SIGNATORY



Air Quality Management Area

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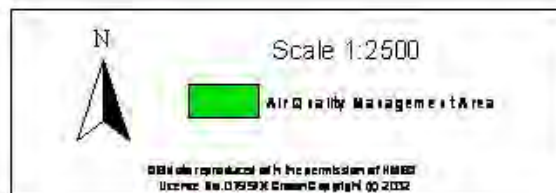
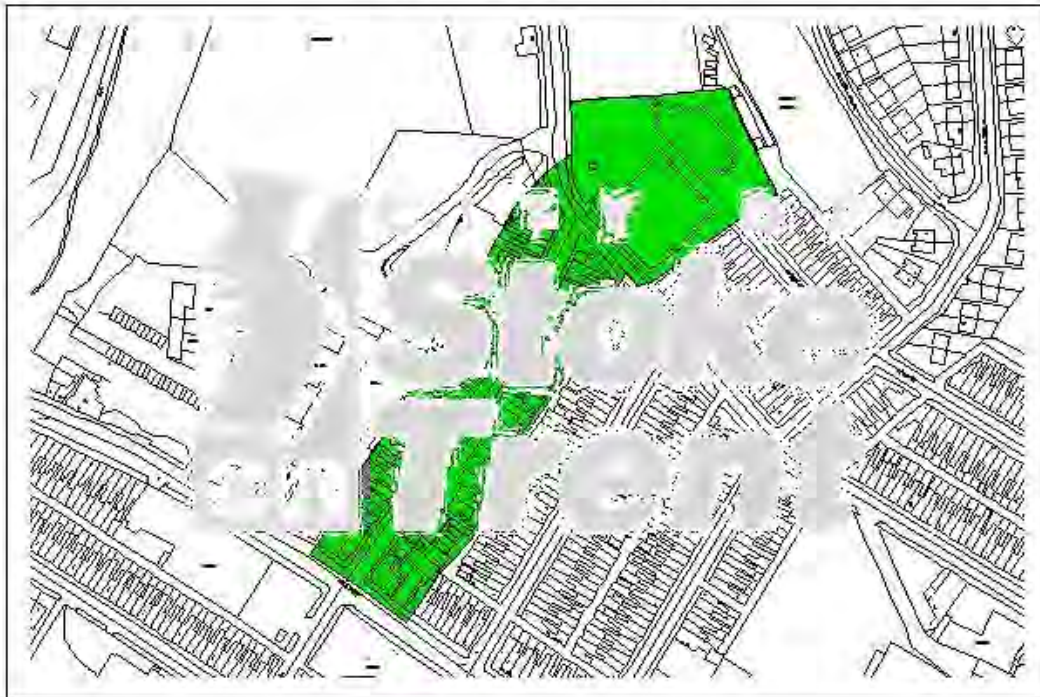
Figure 1.1 Map of City-wide NO₂ AQMA Boundaries

**City of Stoke-on-Trent
AIR QUALITY MANAGEMENT AREA**



**CITY OF STOKE-ON-TRENT, FENTON (BURNHAM STREET)
AIR QUALITY MANAGEMENT AREA ORDER 2002**

(Burnham Street, Part of Brocksford Street)



The Air Quality Management Area relates to the likely breach of the Particles (PM₁₀) 24-hour Mean Objective, specified in the Air Quality (England) Regulations 2000.

For further details see the City Council's:
 Stage 3 Review and Assessment of Air Quality - Consultation Document published December 2000, amended April 2001
 Environmental Monitoring Report 2001 published June 2002.

HOUSING AND CONSUMER PROTECTION DEPARTMENT
 Pollution Control Unit
 P. O. Box 834
 Civic Centre
 Stoke-on-Trent
 ST4 6SL

Telephone: 01782 232443
 Fax: 01782 238848

Ref: AQ MA 0010P Fenton (Burnham Street)

e-mail: pollutioncontrol@city.stoke.gov.uk

Date: August 2002

Figure 1.2 Map of Fenton PM₁₀ AQMA Boundaries

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Nitrogen dioxide (NO₂) was monitored at eight and particulates (PM₁₀) at three automatic sites operated by the council. In addition the Stoke-on-Trent Centre AURN site, located in the city-centre, monitors NO₂, PM₁₀, Ozone (O₂), black smoke and hydrocarbons.

Automatic monitoring site locations are shown in Figure 2.1 and in more detail in Appendix A Figures A.1 and A.2.

During 2009, two automatic monitoring sites, Cornwallis (NO₂) and Meir (NO₂ and PM₁₀), were closed down. Budget cuts forced a review of monitoring costs and consequently a reduction in the number of sites in operation. The Cornwallis and Meir sites were closed at the end of October 2009. The Cornwallis site was chosen because though it is representative of relevant receptors, it has consistently shown that there is no exceedance of the NO₂ annual mean objective. The Meir site had produced borderline results for NO₂ in previous years but is not representative of relevant receptors as it is located on the central reservation of the eastbound slip road of the A50 at Meir. A breach of the particulate objective has never been recorded at the Meir site. Results for the two decommissioned sites have been included in this report. The total number of council operated sited sites has been reduced from eight to six.

QA/QC

Routine, fortnightly calibrations were carried out on NO₂ analysers by local authority officers.

Tapered Element Oscillating Microbalance (TEOM) filters were changed and TEOM head cleaned when 80% of the filter loading was reached.

The King's College Volatile Correction Model (VCM) was applied to TEOM PM₁₀ data.

Forty-eight hour call-out and six monthly service contracts are held for each monitor.

Site audits have not been carried out.

Data validation and ratification of monitors for 2009 was performed by Casella ETi. Casella ETi procedures are included in Appendix B

Figure 2.1 Map(s) of Automatic Monitoring Sites

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
		X	Y						
AURN Stoke-on-Trent Centre	Urban background	X 388358	Y 347891	NO ₂ O ₃ PM ₁₀ PM _{2.5}	Chemiluminescence UV abs TEOM+FDMS TEOM+FDMS	Y N N N	Y (2m)	N/A	N
Meir	Roadside	X 392992	Y 342332	NO ₂ PM ₁₀	Chemiluminescence TEOM+VCM	Y N	N	N/A	Y
Joiner's Square	Roadside	X 388743	Y 346457	NO ₂	Chemiluminescence	Y	Y (0.4m)	4.4m	Y
Scrivener	Other (A500T)	X 386677	Y 346307	NO ₂	Chemiluminescence	Y	N (5.5m)	9m	Y
Cornwallis	Other (A500T)	X 387999	Y 344831	NO ₂	Chemiluminescence	Y	Y (1.7m)	41m	Y
Park Hall	Background	X 393019	Y 344734	NO ₂	Chemiluminescence	Y	N	N/A	N
Clarice Cliff (formerly Queen's Primary)	Industrial	X 390353	Y 344314	PM ₁₀	TEOM+VCM	Y	N 15m)	N/A	Y
Middleport	Roadside	X 385780	Y 349673	NO ₂ PM ₁₀	Chemiluminescence TEOM+VCM	Y N	N (16.6m)	4m	Y
Copeland	Roadside	X 387873	Y 345445	NO ₂	Chemiluminescence	Y	N (4.4m)	4.1m	Y

2.1.2 Non-Automatic Monitoring

Stoke-on-Trent City Council operated 70 nitrogen dioxide diffusion tube sites during 2009. Diffusion tubes were supplied and analysed by Staffordshire Scientific Services Laboratory using the 20% triethanolamine (TEA) in water method and following procedures set out in the Practical Guidance document.¹

Diffusion tubes were triple collocated with automatic analysers at the AURN Stoke-on-Trent Centre, Meir, Middleport and Copeland sites. Details of the collocations studies are included in Appendix B. A bias adjustment factor of 0.81 was applied to all diffusion tubes. The bias adjustment factor for Staffordshire Scientific Services was obtained from the Review and Assessment Helpdesk Website² and is included in Appendix B.

Results of the laboratory precision for Staffordshire Scientific Services for 2009 was 'good' results for the Workplace Analysis Scheme for Proficiency (WASP) scheme for the period October 2008 – October 2009 was good. Details of laboratory precision and WASP are included in Appendix B.

Diffusion tube site details are shown in Table 2.2. The location of diffusion tubes are shown in Figure 2.2, and in more detail in Appendix A.

Sixteen sites have been closed down since the previous report. The sites are shown in Table 2.3 together with the reason for closure.

Figure 2.2 Map of Non-Automatic Monitoring Sites

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
1994/01	Urban background	386394	343716	NO ₂	Y	Y (10m)	NA	N
1994/02	Other	387643	348557	NO ₂	Y	Y (0m)	20m	Y
1998/01	Roadside	386673	352388	NO ₂	Y	Y (0m)	1.7m	Y
1999/01	Roadside	389884	347289	NO ₂	Y	Y (0m)	2.2m	Y
1999/02	Urban background	390619	350782	NO ₂	Y	Y (6.5m)	112m	N
2001/01	Roadside	388093	347610	NO ₂	Y	N (20)	3m	Y
2001/04	Roadside	392705	342518	NO ₂	Y	Y (0m)	19.5m	Y
2001/13	Roadside	387180	345937	NO ₂	Y	Y (2m)	11.3m	Y
2002/01	Roadside	385740	349543	NO ₂	Y	Y (0.3)	3m	Y
2003/02 Triple collocated	Urban background	388356	347892	NO ₂	Y	Y (0)	10.5m	Y
2003/05 Triple collocated	Roadside	392992	342332	NO ₂	Y	N (19.4)	5m	N
2005/01	Roadside	387625	348516	NO ₂	Y	Y (0m)	4.8m	Y
2005/02	Roadside	386927	349854	NO ₂	Y	Y (0m)	3.8m	Y
2005/03	Roadside	386822	349811	NO ₂	Y	Y (0m)	4.4m	Y
2005/04	Roadside	385886	349757	NO ₂	Y	Y (0m)	5.5m	Y
2005/05	Roadside	386737	352528	NO ₂	Y	Y (0m)	2m	Y
2005/07	Roadside	392471	342631	NO ₂	Y	Y (3.1m)	10m	Y
2005/08	Roadside	392589	342576	NO ₂	Y	Y (1.5)	13m	Y
2005/11	Roadside	389335	344693	NO ₂	Y	Y (0.2m)	2.5m	Y
2005/13	Roadside	385974	346574	NO ₂	Y	Y (0)	2.6m	Y
2005/14	Roadside	386270	346782	NO ₂	Y	Y (0.6m)	2m	Y
2005/15	Roadside	386630	342853	NO ₂	Y	N (1.5m)	3m	Y

2005/16	Roadside	388791	346320	NO2	Y	Y (1.8m)	3.5m	Y
2005/17	Roadside	388841	346641	NO2	Y	Y (0.2m)	2.5m	Y
2005/19	Roadside	389998	347181	NO2	Y	Y (0m)	2.3 m	Y
2005/20	Roadside	386729	349749	NO2	Y	Y (1.8m)	2.4m	Y
2005/22	Roadside	388676	347611	NO2	Y	Y (0m)	4m	Y
2005/23	Roadside	393201	342409	NO2	Y	Y (0)	1.6m	Y
2005/26	Roadside	388103	347617	NO2	Y	N (32)	1m	N
2005/27	Roadside	388103	347649	NO2	Y	N (38)	4m	N
2005/28	Roadside	386848	350135	NO2	Y	Y (0m)	1.8m	Y
2005/29	Roadside	386787	350289	NO2	Y	Y (0m)	2.1m	Y
2005/30	Roadside	386766	350336	NO2	Y	Y (0m)	2.0m	Y
2005/31	Roadside	386739	350393	NO2	Y	Y (3.3m)	2.8m	Y
2005/34	Roadside	386904	349828	NO2	Y	Y (0m)	2.9m	Y
2005/36	Roadside	387015	349894	NO2	Y	Y (0.5m)	3.4m	Y
2005/39	Roadside	387823	348317	NO2	Y	Y (0m)	1.7m	Y
2005/41	Roadside	388698	346421	NO2	Y	Y (2.6)	3.4m	Y
2005/44	Roadside	389153	345234	NO2	Y	N (4.5)	2m	Y
2005/45	Roadside	389228	345035	NO2	Y	Y (0.2m)	2m	Y
2005/47	Roadside	389409	344619	NO2	Y	Y (3.5m)	2.9m	Y
2005/48	Roadside	392837	342428	NO2	Y	Y (5.3m)	11.3m	Y
2005/50	Roadside	393260	342460	NO2	Y	Y (0)	5m	Y
2005/51	Roadside	393151	342331	NO2	Y	Y (0)	3m	Y
2005/53	Roadside	393310	342213	NO2	Y	N (17m) but equal distance from road source	17.3m	Y
2005/54	Roadside	393122	342248	NO2	Y	Y (0m)	4.3m	Y
2005/56	Roadside	392777	342409	NO2	Y	N (5.6)	15.2m	Y
2005/57	Roadside	392741	342435	NO2	Y	N (4.0)	12.9m	Y
2005/58	Roadside	392670	342481	NO2	Y	N (16.4) but equal distance to road source (14.5)	14.5m	Y
2005/59	Roadside	392611	342521	NO2	Y	N (19.5) but equal distance from road source (11m)	10.4m	Y
2005/62	Roadside	388704	347587	NO2	Y	Y (0m)	11.6m	Y
2006/06	Roadside	388924	347574	NO2	Y	N	2.4m	Y
2006/07	Roadside	389115	347556	NO2	Y	N	2.6m	Y

2006/08	Roadside	389215	347548	NO2	Y	N	2.1m	Y
2008/02 Triple collocated	Roadside	387873	345445	NO2	Y	N (4.4m)	4.1m	Y
2008/05 Triple collocated	Roadside	385780	349673	NO2	Y	N (16.6m)	4m	Y
2008/08	Roadside	390893	343404	NO2	Y	N	3.9 m	Y
2008/09	Roadside	388662	346707	NO2	Y	N	2.1 m	Y
2008/10	Roadside	388632	346850	NO2	Y	N	1.8 m	Y
2008/11	Roadside	388624	346903	NO2	Y	N	1.9 m	Y
2008/12	Roadside	388538	347100	NO2	Y	N	1.8 m	Y
2008/13	Roadside	388536	347143	NO2	Y	N	2.0 m	Y

Table 2.3 Diffusion tube site closed down since previous report

Site Name	Site Type	OS Grid Ref		Reason for closing site
1994/03	Roadside	387940	345384	Not representative of relevant exposure
2001/03	Roadside	387819	345433	Consistently below the NO2 annual mean objective
2001/006	Roadside	387984	344836	Consistently below the NO2 annual mean objective
2001/009	Roadside	388026	344822	Consistently below the NO2 annual mean objective
2001/011	Roadside	387850	345476	Consistently below the NO2 annual mean objective
2001/012	Roadside	387591	345649	Consistently below the NO2 annual mean objective
2003/013	Roadside	387979	345273	Consistently below the NO2 annual mean objective
2001/015	Roadside	389239	343776	Consistently below the NO2 annual mean objective
2005/010	Roadside	389288	343791	Consistently below the NO2 annual mean objective
2005/021	Roadside	388623	347590	Consistently below the NO2 annual mean objective
2005/024	Roadside	387813	345449	Consistently below the NO2 annual mean objective
2005/026	Roadside	388104	347617	Not representative of relevant exposure
2005/027	Roadside	388102	347650	Not representative of relevant exposure
2005/052	Roadside	393141	342285	Not representative of relevant exposure
2005/055	Roadside	393078	342264	Not representative of relevant exposure
2008/001	Roadside	386226	344796	Consistently below the NO2 annual mean objective

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Automatic monitoring results are shown in Table 2.4a.

Meir and Cornwallis monitoring sites operated between January and October only. Annual mean monitoring results for these two sites were annualised using the methodology in Defra's Local Air Quality Management Technical Guidance (LAQM.TG(09)) Box 3.2³. The 99.8th percentile was calculated to indicate whether the number of exceedances of the hourly mean was likely to have breached the nitrogen dioxide 1-hour mean objective.

The nitrogen dioxide annual mean objective was exceeded at two sites, Meir and Joiners Square.

The Meir site is not representative of relevant exposure, as the monitor is located on the central reservation of the eastbound exit slip-road of the A50 at Meir. In 2008, diffusion tube 2005/49, representative of the nearest relevant exposure to the Meir automatic site, indicated that a breach of an objective was unlikely.

The Joiners Square site does represent relevant exposure.

The Park Hall monitor is located at a background site. No monitoring data is available for 2009 as the monitor was returned to the supplier for a complete overhaul, following persistent faults.

Table 2.4a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2009 ^b %	Annual mean concentrations (µg/m ³)		
					2007 ^{c, d}	2008 ^{c, d}	2009 ^c
AURN Stoke-on-Trent Centre	Town Road Hanley	Y	97	97	26	26	26
Meir	A50(T) eastbound sliproad at Meir	Y	98	81	40.3	38.7	43.6
Joiner's Square	Junction of A50/A52	Y	98	98	45.4	39.3	48.2
Scrivener	Scrivener Road adj to A500	Y	100	100	38.0	42.6	37.8
Cornwallis	Cornwallis Street Adj to A500	Y	99	83	30.2	32.7	36.3
Park Hall	Park Hall Country Park	Y	0	0			
Middleport	Canal bridge B5999	Y	96	96	33.7	37.5	30.6
Copeland	Copeland Street Stoke	Y	100	100	38.9	26.8	38.6

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

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

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

^d Annual mean concentrations for previous years are optional.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

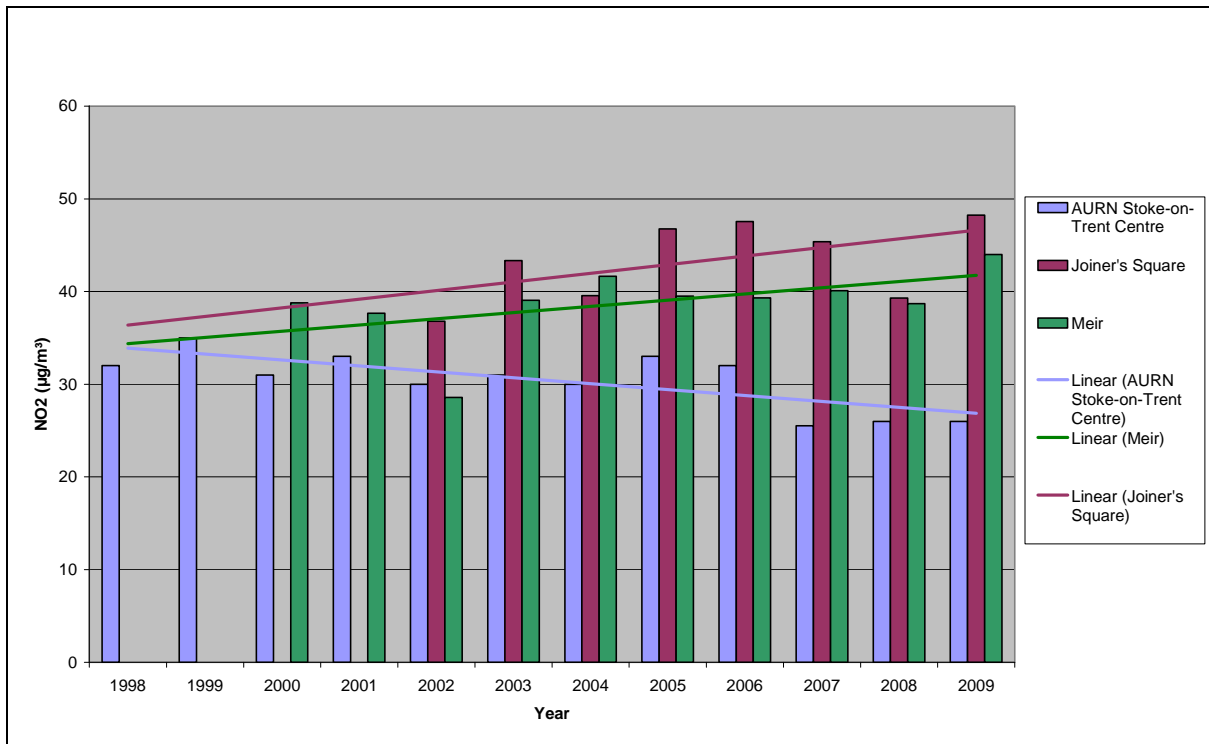


Table 2.4b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2009 ^b %	Number of Exceedences of hourly mean (200 µg/m ³) If the period of valid data is less than 90% of a full year, include the 99.8 th percentile of hourly means in brackets.		
					2007 ^c	2008 ^c	2009
AURN Stoke-on-Trent Centre		N	97	97	0	3	0
Meir	A50(T) eastbound sliproad at Meir	N	98	81	0	1	0 (137.4)
Joiner's Square	Junction of A50/A52	N	98	98	2	5	7
Scrivener	Scrivener Road adj to A500	N	100	100	1	6	0
Cornwallis	Cornwallis Street adj to A500	N	99	83	0	1	0 (133.2)
Park Hall	Park Hall Country Park	N	0	0			
Middleport	Canal bridge B5999	N	96	96	1	0 (142.8)	0
Copeland	Copeland Street Stoke	N	100	100	0	1	0

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

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

^c Numbers of exceedences for previous years are optional.

Diffusion Tube Monitoring Data

Diffusion tube monitoring results are shown in Table 2.5.

Short-term to long-term adjustment has been carried out for sites with less than 100% data capture, using the method shown in Box 3.2 of LAQM.TG(09)². Details of short-term to long term data adjustment are shown in Appendix B.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2009 ^b %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
					2007 ^{c, d}	2008 ^{c, d}	2009 ^c
1994/01	6 Robertson Square	Y	100	100	21	22	21
1994/02	2 Douglas Street	Y	100	100	32	30	30
1998/01	53 St Michaels Road	Y	100	100	42	31	23
1999/01	Lamppost 6/8 Dividy Road	Y	100	100	57	52	49
1999/02	31Trentfields Road	Y	100	100	20	20	20
2001/01	Marsh St North / Trinity Street blue lamppost (west side of street)	Y	100	100	42	44	38
2001/04	633 Uttoxeter Road, Meir	Y	100	100	38	46	38
2001/13	140 North Street	Y	100	100	38	39	38
2002/01	11 Station Street	Y	100	100	35	38	35
2003/02	AUN colocation	Y	92	92	30	28	29
2003/05	Meir Station colocation	Y	100	100	52	43	45
2005/01	Drainpipe 344 Waterloo Road, Cobridge	Y	92	92	51	54	48
2005/02	Red Lion Pub, Burslem Drainpipe on far left	Y	92	92	43	43	36
2005/03	Drainpipe near pub, Market Place, Burslem	Y	100	100	37	39	37
2005/04	Lamppost 5 adj 315 Newcastle Street, Middleport	Y	92	92	49	56	43
2005/05	Drainpipe between 113 & 115 St Michael's Road, Tunstall	Y	100	100	44	34	27
2005/07	Lamppost ST90 adj 513 Uttoxeter Road, Meir	Y	92	92	40	46	44
2005/08	Lamppost ST94 adj 571 Uttoxeter Road, Meir	Y	100	100	45	51	43
2005/11	Lamppost between 20 - 22 Victoria Place	Y	100	100	45	46	44

2005/13	Drainpipe Beauty Shop (525) Etruria Road, Basford	Y	100	100	55	64	52
2005/14	Lamppost adj 481 Etruria Road, Basford	Y	100	100	72	85	71
2005/15	Lamppost adj White House Hotel, Stone Road, Hanford	Y	92	92	42	39	42
2005/16	Lamppost 6 adj 401 Victoria Road	Y	100	100	42	47	39
2005/17	Lamppost 122 adj Village Tavern, Leek Road	Y	100	100	39	42	37
2005/19	Drainpipe 50 Dividy Road, Bucknall	Y	100	100		43	40
2005/20	Duke William, Newcastle Street, Burslem	Y	92	92	41	44	40
2005/22	17/19 Bucknall New Road, Hanley	Y	92	92	57	45	44
2005/23	64 Weston Road, Meir	Y	100	100	46	47	45
2005/28	Lamppost 4 adj 2 Scotia Road, Burslem	Y	100	100	41	43	39
2005/29	Lamppost 165 adj 72 Scotia Road / Wain St, Burslem	Y	100	100	36	36	33
2005/30	Lamppost 8 adj 88 Scotia Road / Barber St, Burslem	Y	100	100	32	38	32
2005/31	Lamppost 10 adj 104 Scotia Road, Burslem	Y	100	100	36	35	32
2005/34	Drainpipe Post Office Vaults, Burslem	Y	100	100	53	47	42
2005/36	Lamppost 7 adj 17 Moorland Road, Burslem	Y	100	100	38	36	36
2005/39	Lamppost 119 adj 421 Waterloo Road, Cobridge	Y	92	92	39	39	37
2005/41	Telegraph pole DP1161 adj 388/390 Leek Rd, Joiner's Square	Y	100	100	45	47	43
2005/44	Lamppost 48 adj 192 Manor Street, Fenton	Y	100	100	41	44	39
2005/45	Lamppost 56 adj 101/103 Victoria Road, Fenton	Y	100	100	50	54	52

2005/47	Telegraph pole DP996 Adj 7 Victoria Place	Y	100	100		41	46	43
2005/48	Lamppost ST121 adj 675 Uttoxeter Road, Meir	Y	92	92		44	43	43
2005/50	Lamppost 10, adj Wrights pie shop, Weston Rd, Meir	Y	100	100		47	52	48
2005/51	Lamppost 3 adj Harveys travel agent, Meir	Y	83	83		38	44	37
2005/53	Lamppost , Car park adj 863 Uttoxeter Rd, Meir	Y	100	100		38	41	40
2005/54	Lamppost 16R04 adj Pizza Hut, Meir	Y	83	83		39	42	42
2005/56	Telegraph pole 249 adj Kenilworth Grove. Meir	Y	100	100		38	46	40
2005/57	Telegraph pole 2512 adj Warwick Ave, Meir	Y	92	92		37	35	40
2005/58	Lamppost ST14 Meir Rd / Grosvenor Rd, Meir	Y	100	100		38	36	37
2005/59	Lamppost 26 adj Royal British Legion, Meir	Y	83	83		41	36	40
2005/62	Dainpipe 60 / 62 Bucknall New Road, Hanley	Y	100	100		35	34	34
2006/06	Lamppost adj 106-108 Bucknall New Road	Y	100	100		47	46	48
2006/07	No waiting sign adj Alias Quiff & Combs	Y	83	83		45	49	46
2006/08	No waiting sign adj former HSS	Y	92	92			41	36
2008/02	Co-location with Copeland St Monitor	Y	100	100			39	38
2008/05	Co-location with Middleport Monitor	Y	100	100			36	34
2008/08	Drainpipe, 44 The Strand, Longton	Y	100	100				33
2008/09	Lamppost 29 Lichfield St (by Hansons)	Y	100	100				43
2008/10	Lamppost 25 Lichfield St (by Bridgewater factory S)	Y	100	100				38

2008/11	Lamppost 23 Lichfield St (by Bridgewater factory N)	Y	100	100			38
2008/12	Lamppost 17 Lichfield St (by RNIB)	Y	100	100			46
2008/13	Lamppost 16 Lichfield St/Derby St	Y	100	100			40

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

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

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

^d Annual mean concentrations for previous years are optional.

Bias correction factor 2007 = 0.88

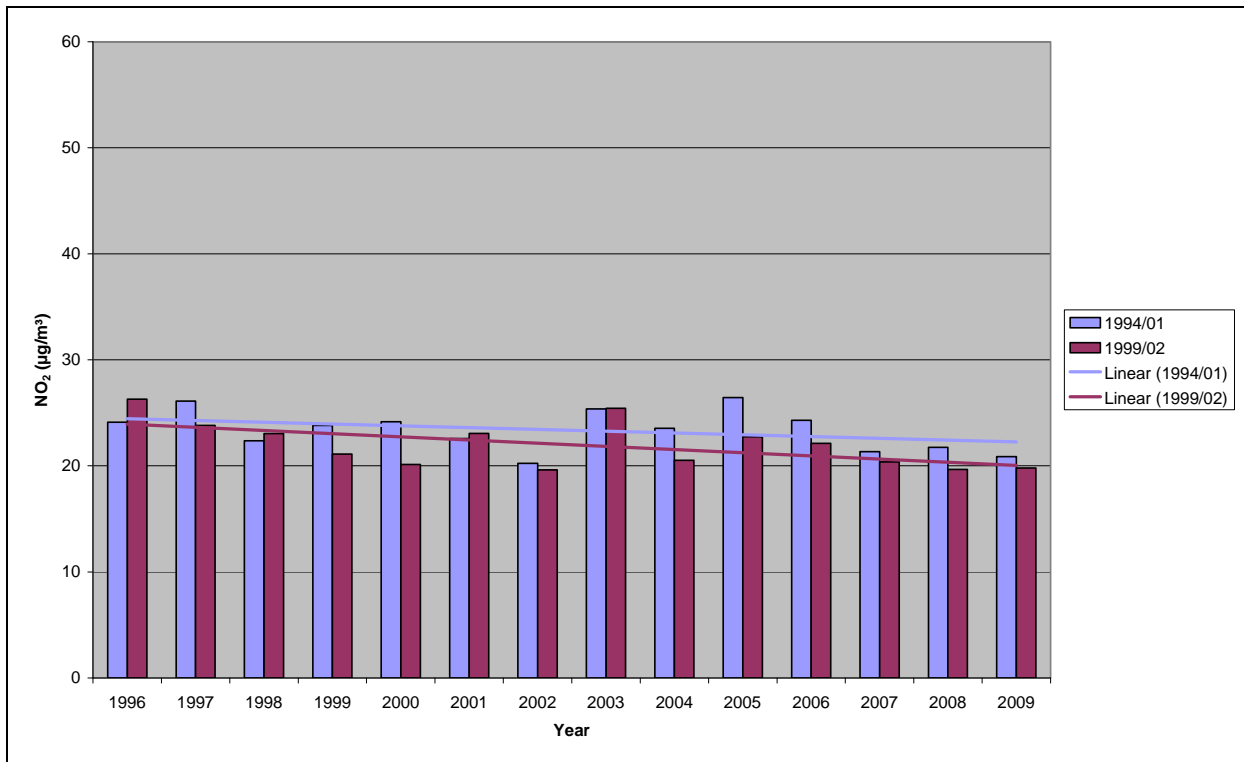
Bias correction factor 2008 = 1.03

Bias correction factor 2009 = 0.79

Background diffusion tube sites

Figure 2.4 shows that background sites 1994/01 and 1999/02 exhibit a downward trend over the previous 10 years.

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Background Diffusion Tube Monitoring Sites

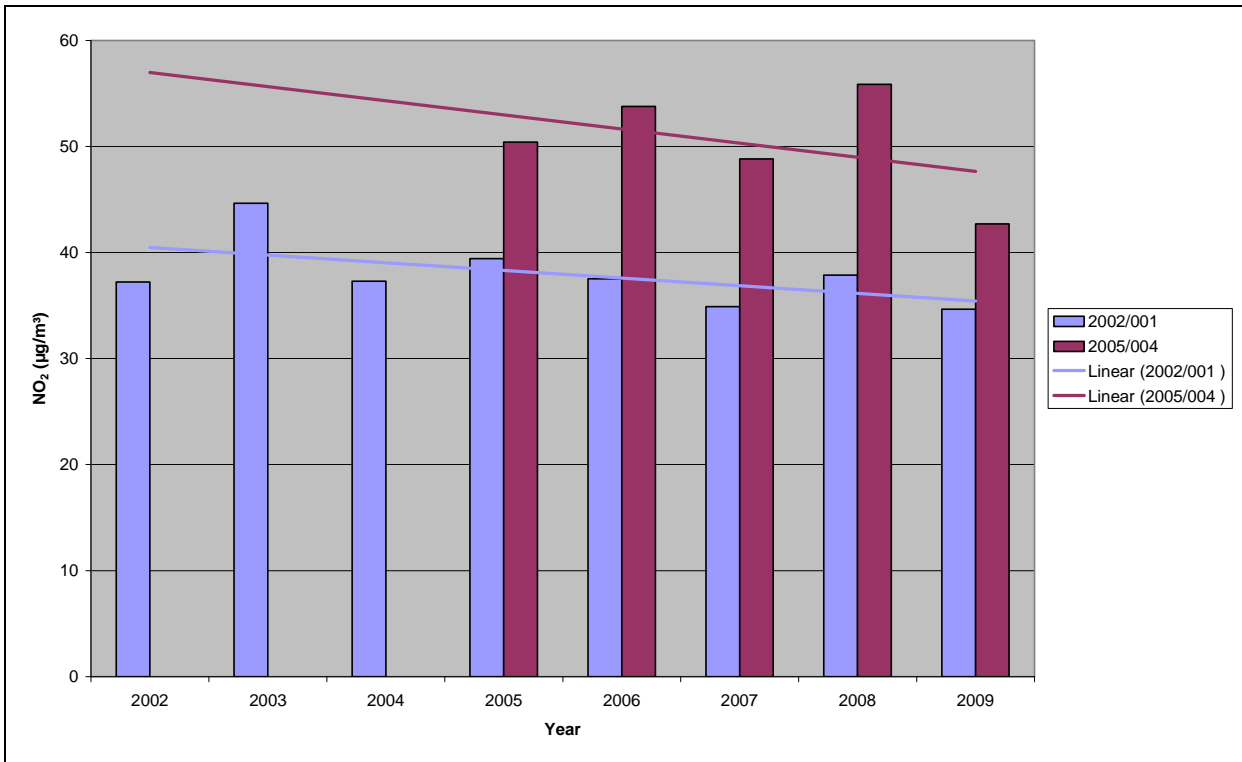


Middleport

Site 2005/04, representative of relevant receptors, is on the B5999 main route from the A500 trunk road to the north of the city. It has consistently shown an exceedance of the objective.

Figure 2.5 shows a downward trend in concentrations since 2002.

Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Middleport Diffusion Tube Monitoring Sites

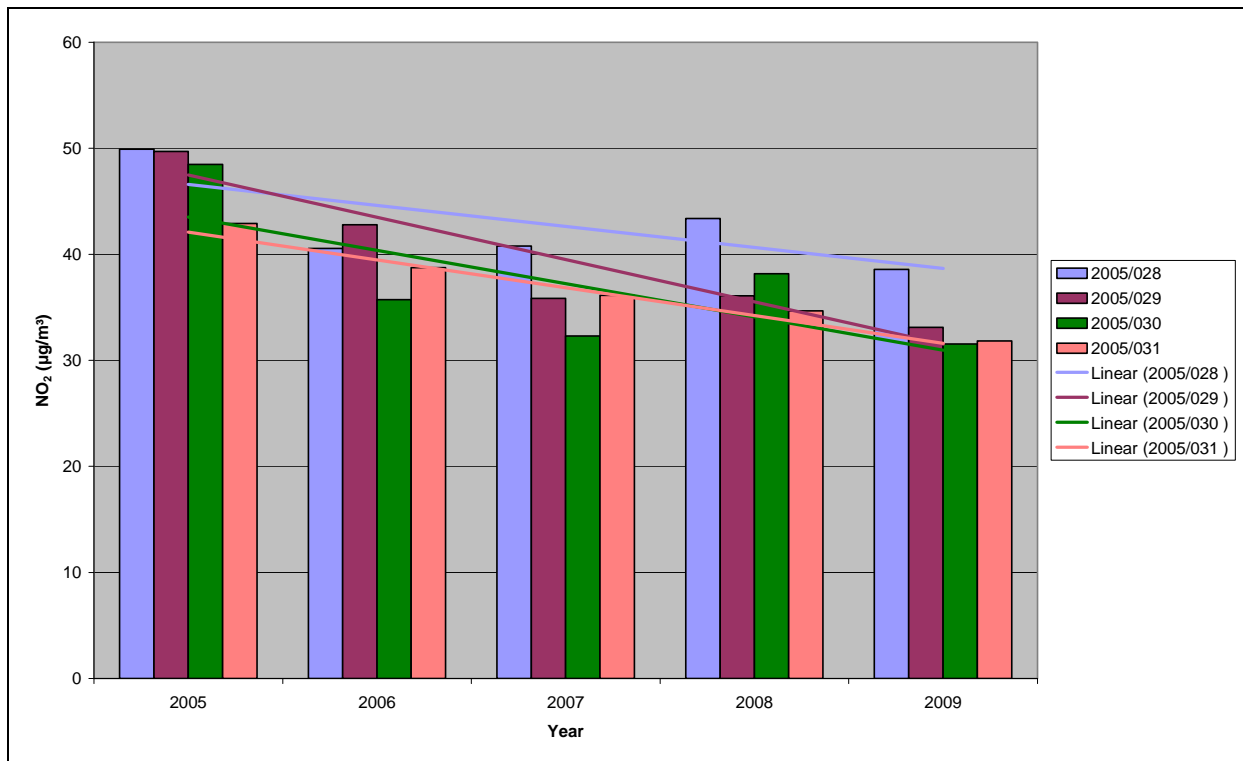


Burslem

Scotia Road is part of the main A50 route through the city from north to south. Site 2005/28, representative of relevant receptors, was border-line in 2009 but has shown a breach of the objective in previous years.

Figure 2.6 shows a downward trend in concentrations since 2005 at Scotia Road, Burslem.

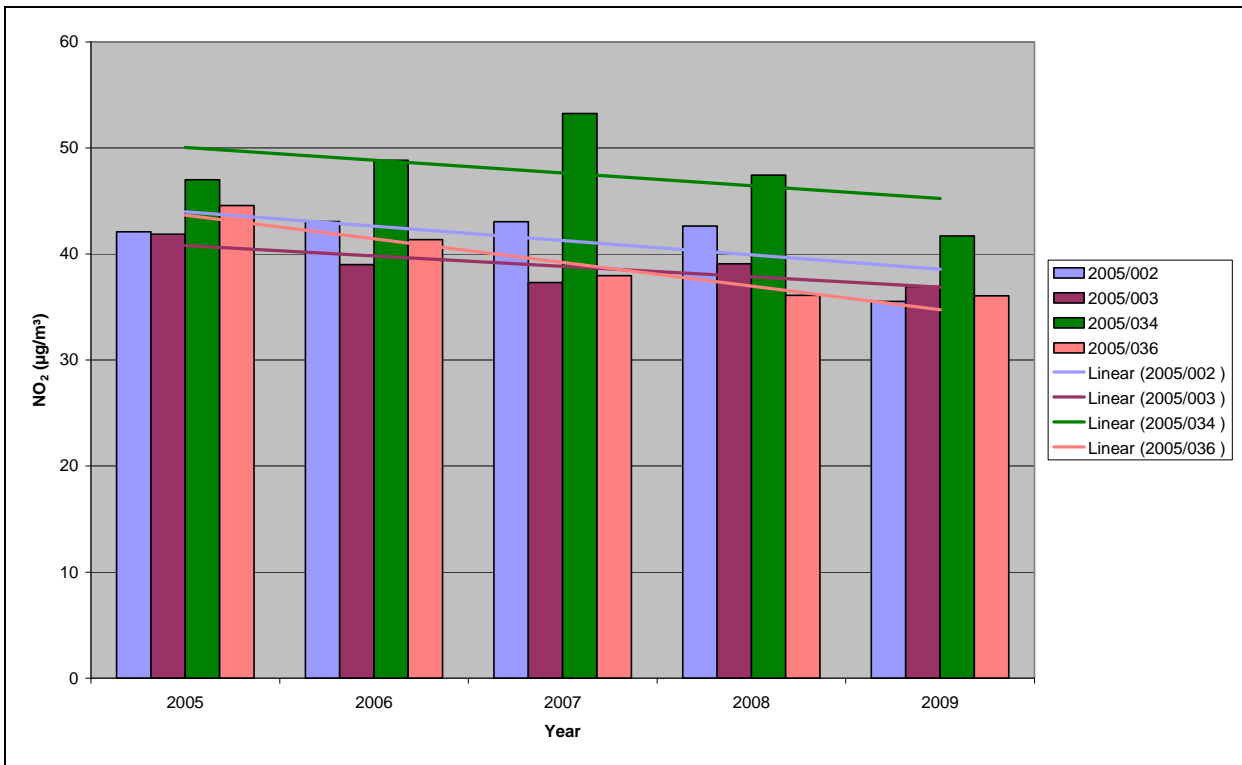
Figure 2.6 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Burslem (Scotia Road) Diffusion Tube Monitoring Sites



Site 2005/34, representative of relevant receptors, is situated at the junction of the A50 and B5051. It has consistently shown an exceedance of the objective.

Figure 2.7 shows a downward trend in concentrations since 2005 at Market Place/Moorland Road, Burslem.

Figure 2.7 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Burslem (Market Place/Moorland Road) Diffusion Tube Monitoring Sites

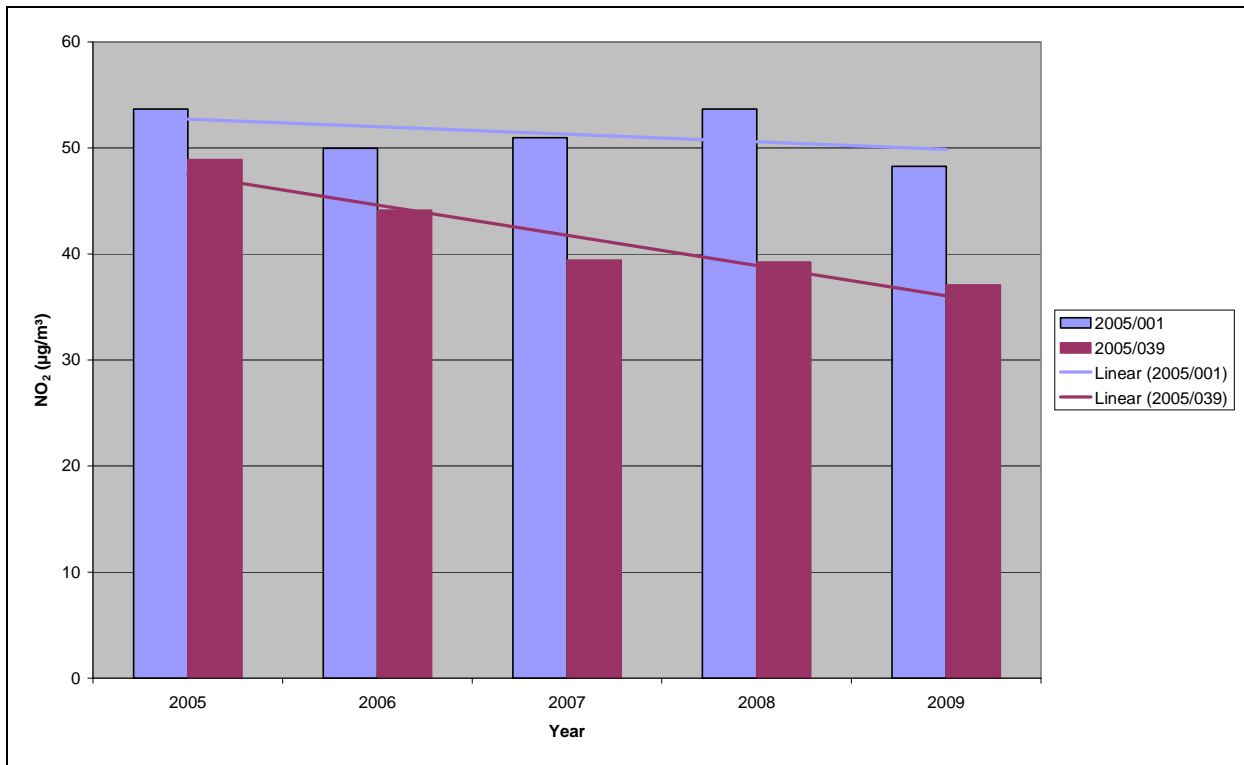


Cobridge

Site 2005/01, representative of relevant receptors, is situated at the junction of the A50 and A53. It has consistently shown an exceedance of the objective.

Figure 2.8 shows a downward trend in concentrations since 2005 at Cobridge

Figure 2.8 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Cobridge Diffusion Tube Monitoring Sites



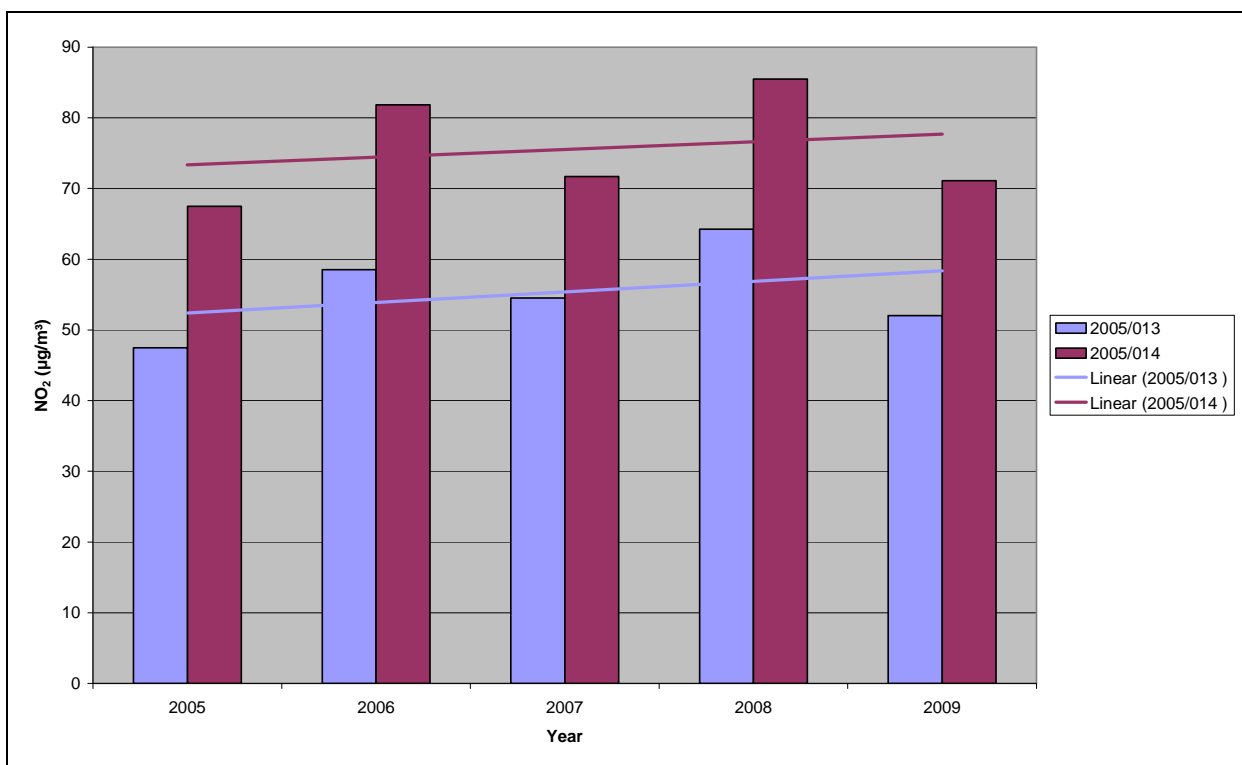
Basford

Sites 2005/14 and 2005/15 are located on the A53 main route between Stoke-on-Trent and Newcastle-under-Lyme. Both sites have consistently shown an exceedance of the annual mean objective. Site 2005/14, located close to residential properties in a 'canyon' has consistently exceeded $60 \mu\text{g}/\text{m}^3$; indicating a possible breach of the 1-hour objective. The local authority is in the process of amending the City-wide Air Quality Management Area (AQMA) to include the 1-hour objective and will bid for a Defra air quality grant to cover the cost of purchasing an automatic analyser to assess whether the 1-hour mean is being breached at this location. Additional diffusion tube monitoring sites have been added to the area for 2010 to assess the geographical extent of the breach of the objectives.

2005/14 is located closer to the road source than the nearest relevant exposure, therefore the calculation in Box 2.3 of TG (09) was used to estimate the concentration at the nearest relevant exposure³. Predicted concentrations at the nearest relevant receptors are shown in Table 2.5.

Figure 2.9 shows an increase in concentrations since 2005 at Basford.

Figure 2.9 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Basford Diffusion Tube Monitoring Sites

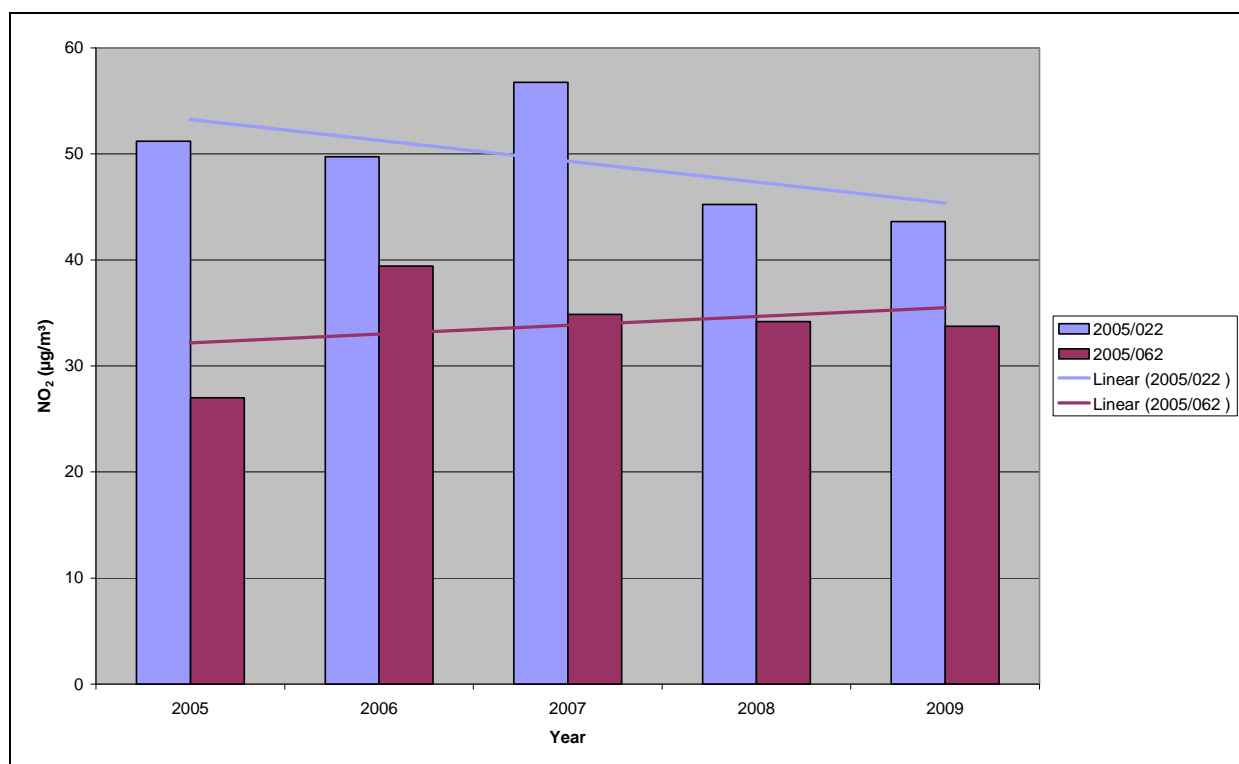


Hanley - Bucknall New Road

Sites 2005/22, 2006/06 and, 2006/07 located on the A5008 main routes from the east to the city-centre, have consistently shown an exceedance of the objective. 2005/22 is representative of relevant exposure. 2006/06 and 2006/07 were originally representative of relevant exposure, but residential properties have been cleared as part of the RENEW housing clearance project.

Figure 2.10 shows a downward trend in concentrations at site 2005/22 since 2005 at Bucknall New Road, Hanley.

Figure 2.10 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Hanley (Bucknall New Road) Diffusion Tube Monitoring Sites



Hanley - Lichfield Street (A50 into city centre)

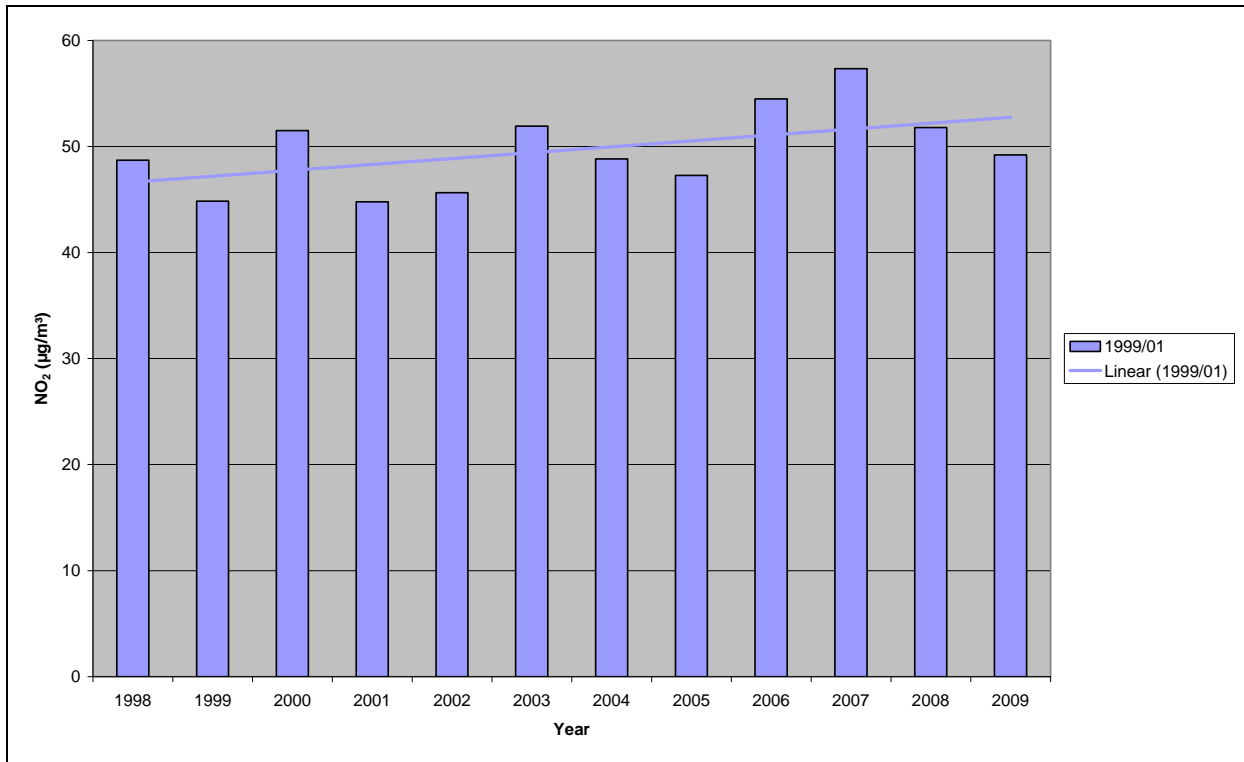
Sites 2008/09, 2008/10, 2008/11, 2008/12 and 2008/13 are not representative of relevant exposure, but planning application 49916/OUT for mixed commercial/residential use on the eastern side of the Lichfield Street has been received by the council. Exceedance of the objective is indicated at sites 2008/09 and 2008/12 on the west side of the carriageway.

Bucknall

Dividy Road site 1999/01 exceeded the objective in this and previous years. Site 2005/19 was borderline in 2009 but had exceeded the objective in previous years. Both sites are representative of relevant exposure.

Figure 2.11 shows an increase in concentrations since 1998 at Bucknall.

Figure 2.11 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Bucknall Diffusion Tube Monitoring Sites

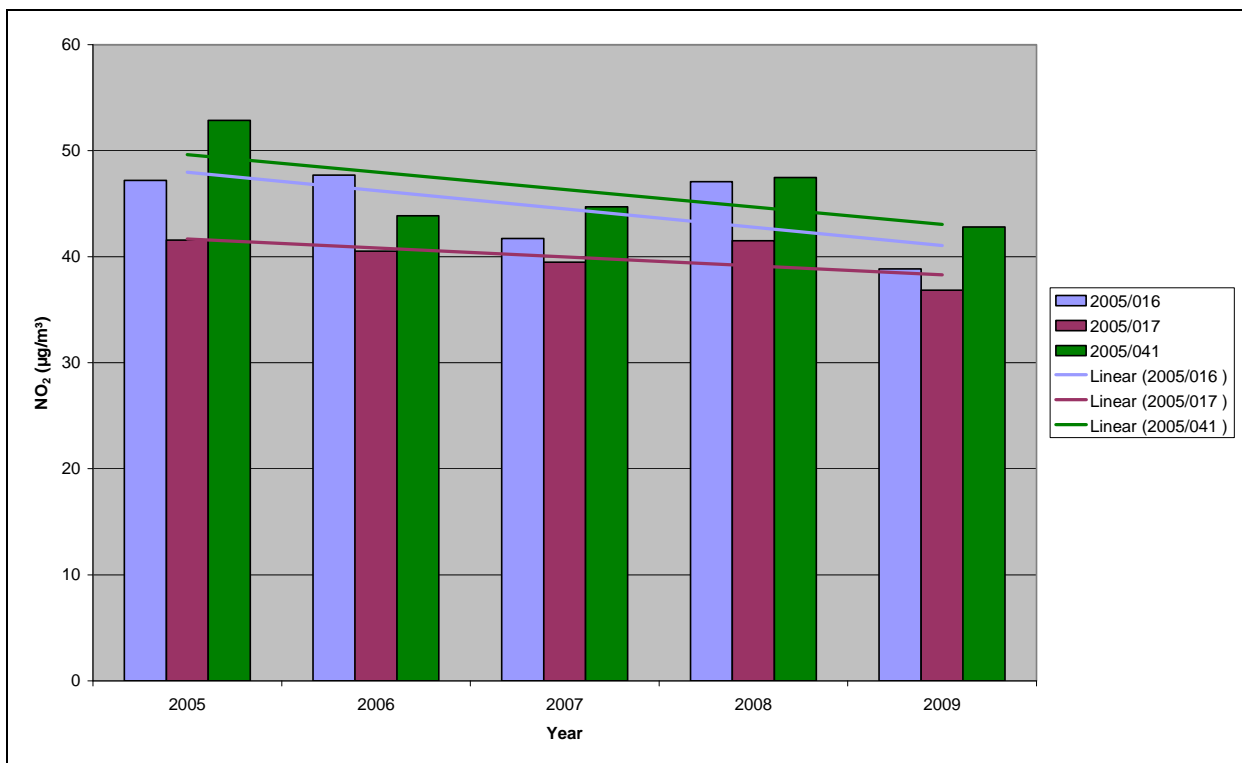


Joiners Square

Site 2005/41 is located on the A52 near its junction with the A50. This site has consistently shown an exceedance of the objective.

Figure 2.12 shows a downward trend in concentrations since 2005 at Joiners Square.

Figure 2.12 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Joiners Square Diffusion Tube Monitoring Sites



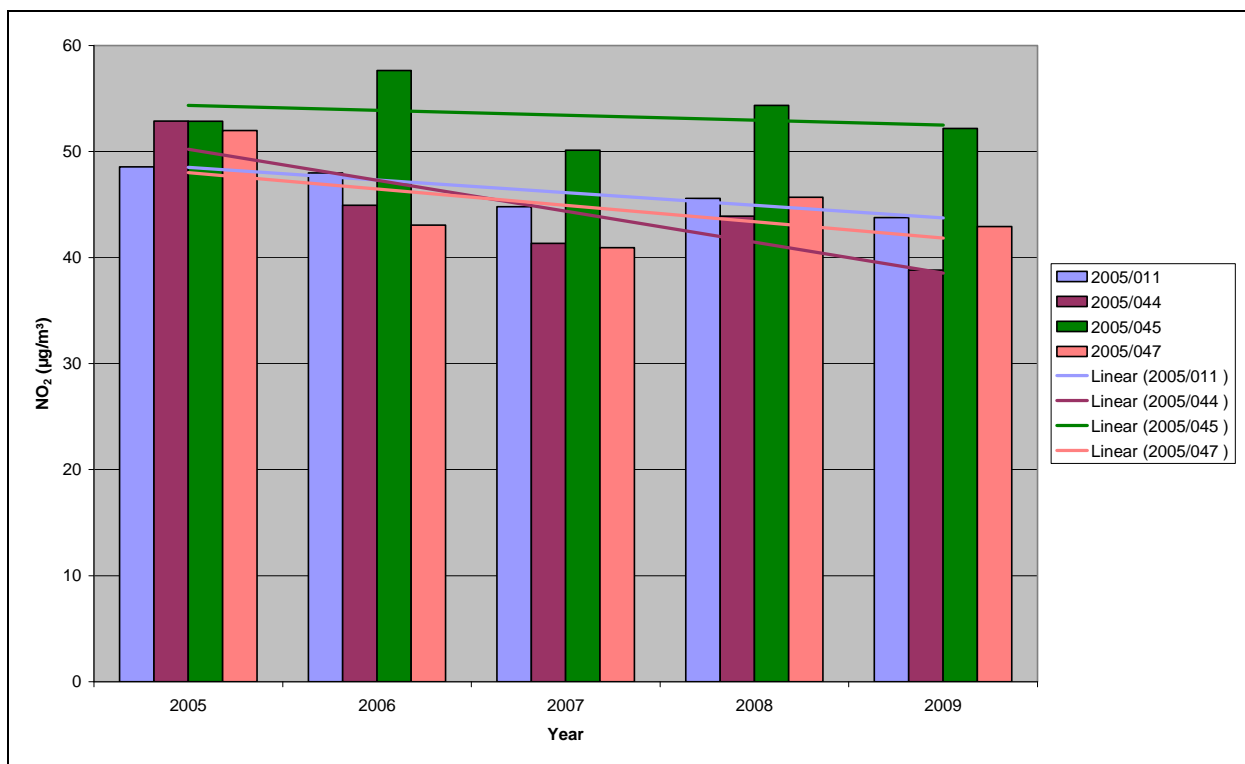
Fenton (Victoria Place/Victoria Road)

Sites 2005/11, 2005/44, 2005/45 and 2005/47 are located on the A50 main link between the A50 trunk road and the City Centre. Sites 2005/11, 2005/45 and 2005/47 have consistently shown an exceedance of the objective. 2005/44 is borderline, but has shown exceedances in the past.

Sites 2005/44 and 2005/47 are located closer to the road source than the nearest relevant exposure, therefore the calculation in Box 2.3 of TG (09) was used to estimate the concentration at the nearest relevant exposure³. Predicted concentrations at the nearest receptors, shown in Table 2.6, are below the objective.

Figure 2.13 shows a downward trend in concentrations since 2005 at Fenton.

Figure 2.13 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Fenton (Victoria Road/Victoria Place) Diffusion Tube Monitoring Sites



Meir - Sites adjacent to the A50 trunk road

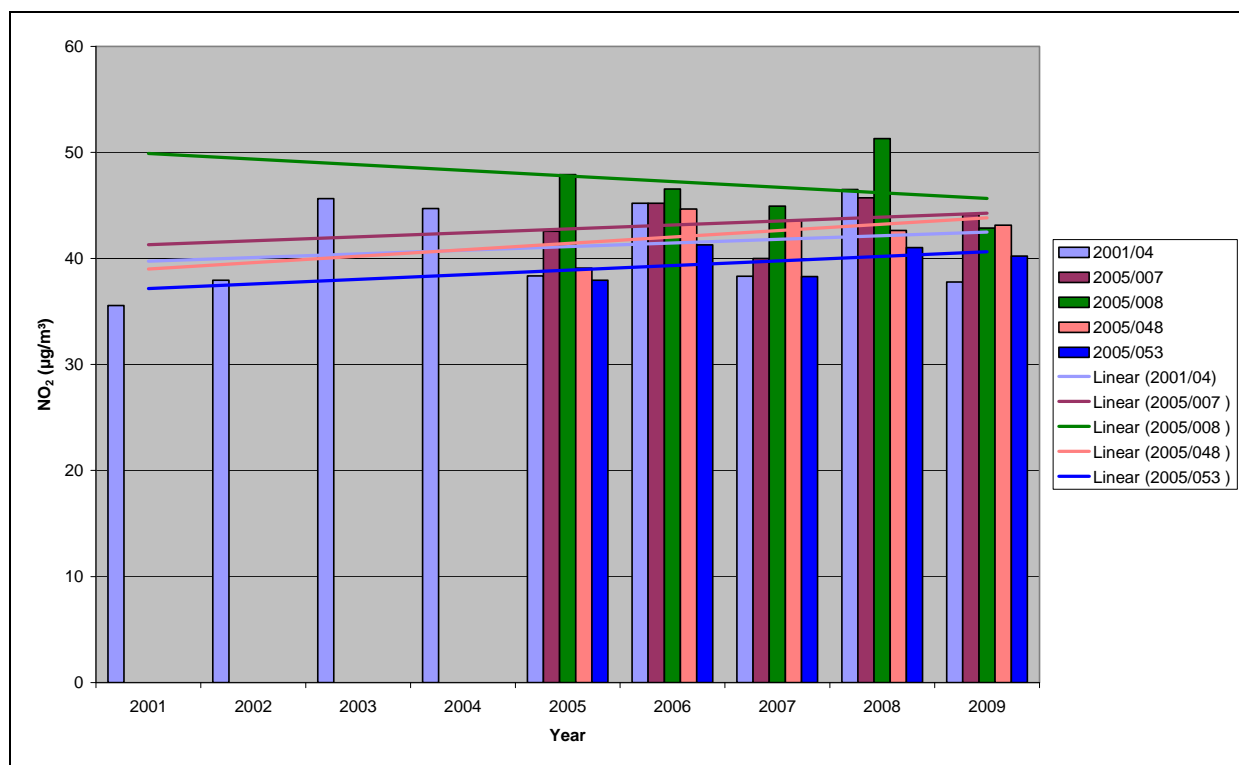
Site 2003/05 is triple collocated with the Meir automatic monitor and is not representative of relevant exposure as the monitor is located on the east-bound exit slip-road of the A50 at Meir. Diffusion tubes placed at the nearest relevant exposure in previous years have confirmed there is no breach of the objective.

Sites 2005/07, 2005/08, 2005/41, 2005/48 and 2005/53 are located on a road adjacent and to the north of the A50 trunk road at Meir.

2005/07, 2005/08 and 2005/41 located closer to the road source than the nearest relevant exposure, therefore the calculation in Box 2.3 of TG (09) was used to estimate the concentration at the nearest relevant exposure⁴. Predicted concentrations at the nearest relevant receptors to 2005/07 and 2005/08 exceed the objective. Predicted concentrations are shown in Table 2.6

Figure 2.14 shows an increase in concentrations at four of the five sites to the north of the A50 trunk road.

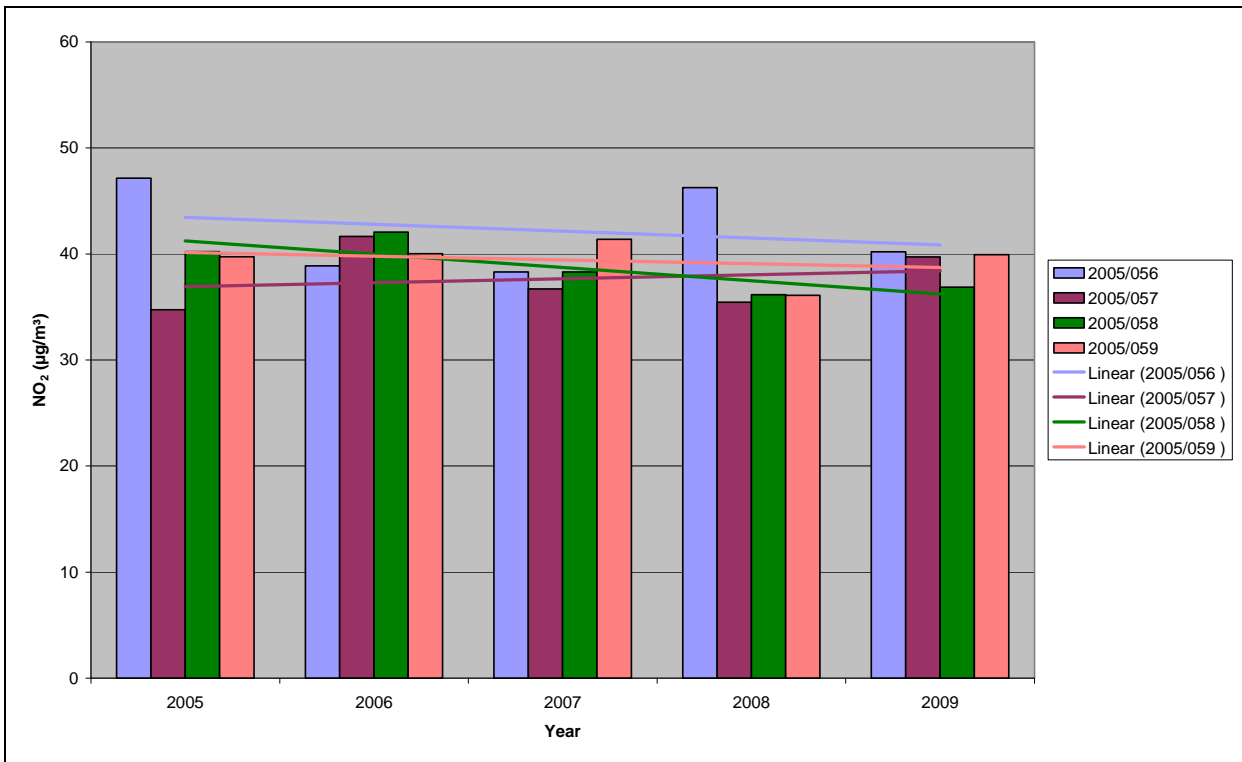
Figure 2.14 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Meir (north of A50 trunk road) Diffusion Tube Monitoring Sites



Sites 2005/56, 2005/57, 2005/58 and 2005/59 are located on properties adjacent and to the south of the A50 trunk road. 2005/56, 2005/57 and 2005/59 are border-line.

Figure 2.15 shows a downward trend in concentrations at three of the four sites to the south of the A50 trunk road.

Figure 2.15 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Meir (south of A50 trunk road) Diffusion Tube Monitoring Sites



Meir - Sites on Weston Road A520 near to the junction with the A50 trunk road

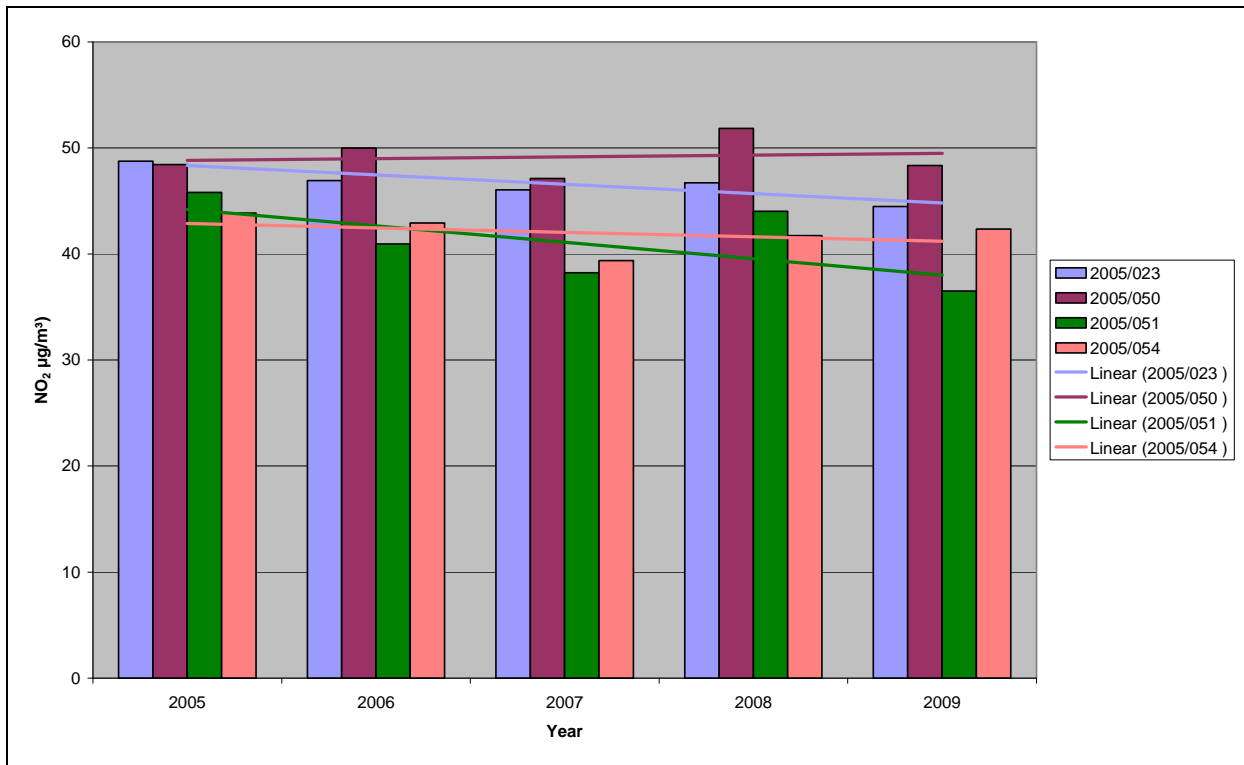
Site 2005/50 has consistently shown an exceedance of the objective.

Site 2005/53 showed a border-line result in 2009 but has exceeded the objective in previous years.

Site 2005/54 has consistently shown an exceedance of the objective.

Figure 2.16 shows a downward trend in concentrations at three of the four sites at Weston Road.

Figure 2.16 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Meir (Weston Road) Diffusion Tube Monitoring Sites



Hanford

Site 2005/15 is situated on the A34 close to the junction with the A500 trunk road. Results for this site have shown exceedances or been border-line.

Figure 2.17 shows a downward trend in concentrations at since 2005.

Figure 2.17 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Hanford Diffusion Tube Monitoring Site

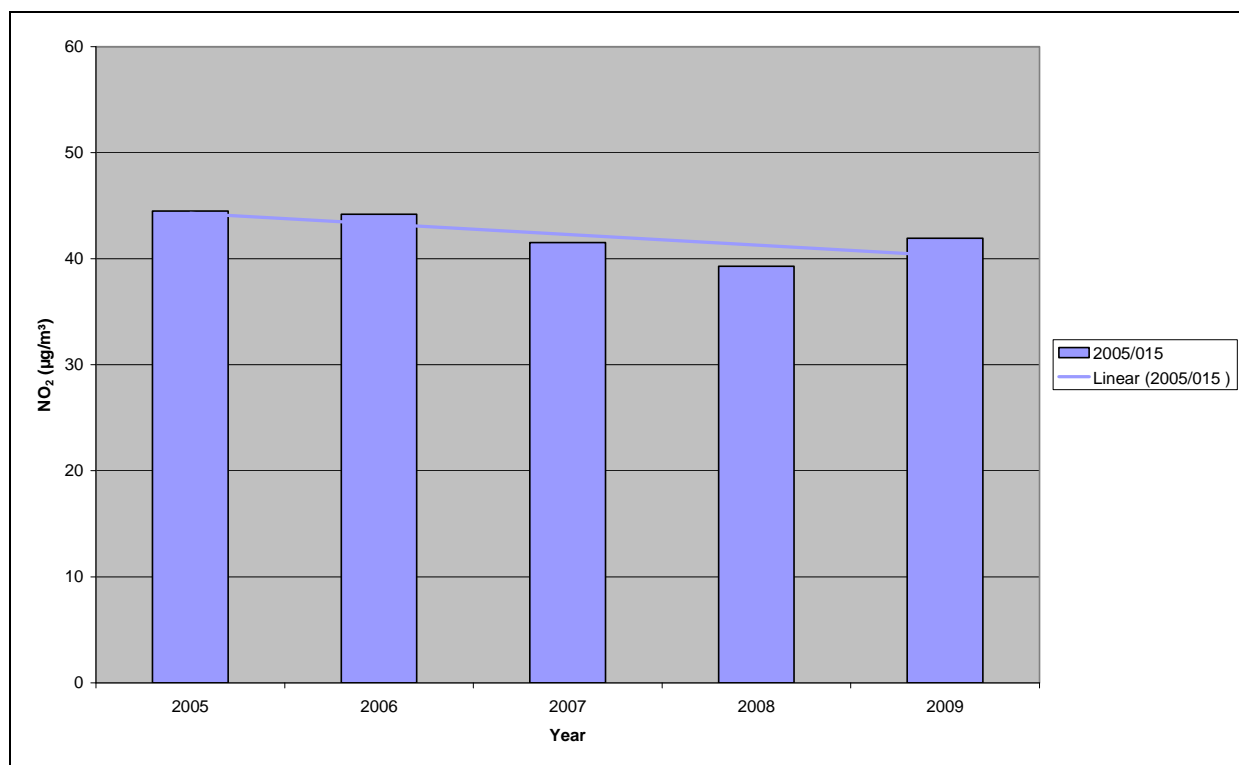


Table 2.6 Predicted concentration of NO₂ at nearest receptor

Site	DT distance from kerb (m)	Receptor distance from kerb (m)	Background annual mean NO ₂ (µg/m ³)	Measured NO ₂ (µg/m ³)	Predicted NO ₂ at receptor (µg/m ³)
2005/07	10	13.1	20	44	42
2005/08	13	14.5	20	43	42
2005/14	2	0.6	20	71	69
2005/41	3.4	6	20	43	40
2005/44	2	6.5	20	39	35
2005/47	3.5	6.4	20	43	39
2005/48	11.3	16.3	20	43	40

2.2.2 PM₁₀

All monitoring results have been adjusted to gravimetric equivalent using the King's College London Volatile Correction Model (VCM) applied.⁵

The annual mean was not greater than 40 µg/m³ at any of the monitoring sites. The number of times that the 24-hour mean exceeded 50 µg/m³ was not more than 35 at any site. The 90th percentile was not greater than 50 µg/m³ at any site.

The AURN site is an urban centre site located at the edge of the main city-centre shopping area and therefore, representative of public exposure.

The Meir site is situated on the eastbound exit slip-road of the A59 trunk road and therefore not representative of public exposure.

The Clarice Cliff site is located on a former school site, as close to residential properties as is practicable.

The Middleport site is located equal distance from the road to residential properties on the B5999, main route from the A500 to areas in the north of the city.

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2009 ^b %	Annual mean concentrations (µg/m ³)		
					2007 ^{c, d}	2008 ^{c, d}	2009 ^c
AURN Stoke-on-Trent Centre	Town Road Hanley	N	96	96	NA	19	19
Meir	A50(T) eastbound sliproad at Meir	N	89	73 (NB no VCM for January)	25	19	19 (31)
Clarice Cliff (formerly Queen's Primary)	Former school site Brocksford Street	Y	99	91 (NB no VCM for January)	26	22	20
Middleport	Canal bridge B5999	N	90	90 (NB no VCM for January)	24	23	23

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

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

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

^d Annual mean concentrations for previous years are optional.

Table 2.7b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture 2009 ^b %	Number of Exceedences of daily mean objective (50 µg/m ³) If data capture < 90%, include the 90 th percentile of daily means in brackets.		
					2007 ^c	2008 ^c	2009 ^c
AURN Stoke-on-Trent Centre	Town Road Hanley	N	96	96	0	0	0
Meir	A50(T) eastbound sliproad at Meir	N	89	73 (NB no VCM for January)	11	8	6 (90 th ile 3)

Clarice Cliff (formerly Queen's Primary	Former school site Brocksford Street	Y	99	99 (NB no VCM for January	22	6	5
Middleport	Canal bridge B5999	N	90	90 (NB no VCM for January	13	13	15

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

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

^c Numbers of exceedences for previous years are optional.

2.2.3 Sulphur Dioxide

No sulphur dioxide monitoring was carried out in 2009.

2.2.4 Benzene

Pumped benzene was monitored at the AURN Stoke-on-Trent Centre monitoring station. Annual maximum results, summarised in Table 2.6, indicate that the running annual mean objective is unlikely to have been breached at this site. Data for the site is available from the UK Air Quality Archive. ⁶

Table 2.8 Results of Non-Automatic Monitoring for Benzene

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture 2009 ^b %	Annual maximum		
					2007 ^c	2008 ^c	2009 ^c
AURN Stoke-on-Trent Centre	Town Road Hanley	N	100	100	2.31	2.18	1.46

2.2.5 Other pollutants monitored

Ozone

The Stoke-on-Trent Centre AURN monitoring station has an automatic ozone monitor. Data is available on the UK Air Quality Archive website.⁵

Table 2.9 Results of Automatic Monitoring for Ozone

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture 2009 ^b %	Daily maximum 8-hour running mean > 100 µgm ⁻³ on more than 10 days		
					2007 ^c	2008 ^c	2009 ^c
AURN Stoke-on-Trent Centre	Town Road Hanley	N	75	75	15	0	13

Black Smoke

The Stoke-on-Trent Centre AURN monitoring station has an aethelometer monitor measuring black smoke. No data is available on the UK Air Quality Archive website.⁵

2.2.6 Summary of Compliance with AQS Objectives

Stoke-on-Trent City Council has examined the results from monitoring in the city. 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 New Local Developments

3.1 Road Traffic Sources

There have been no new/newly identified road traffic sources since the last Updating and Screening Assessment.

3.2 Other Transport Sources

There have been no new/newly identified non-road traffic sources since the last Updating and Screening Assessment.

3.3 Industrial Sources

There has been one new/newly identified industrial source since the last Updating and Screening Assessment: Permit Reference Number 170, Mincrete concrete batching installation. This will be considered in the next Updating and Screening Assessment.

3.4 Commercial and Domestic Sources

There have been no new/newly identified commercial and domestic sources since the last Updating and Screening Assessment.

3.5 New Developments with Fugitive or Uncontrolled Sources

There have been no new/newly identified uncontrolled sources since the last Updating and Screening Assessment.

Stoke-on-Trent City Council has identified the following new or previously unidentified local development which may impact on air quality in the Local Authority area.

Permit Reference Number 170 – Mincrete Ltd – concrete batching installation.

These will be taken into consideration in the next Updating and Screening Assessment, scheduled for 2012.

4 Local / Regional Air Quality Strategy

Air Quality Strategy for North Staffordshire

The Air Quality Strategy for North Staffordshire is incorporated into the North Staffordshire Local Transport Plan (LTP2), Chapter 8: Improvements in Air Quality. ⁷

5 Planning Applications

Planning application 49755 submitted for construction of a new campus for Stoke-on-Trent Cauldon College including a biomass boiler has been granted planning permission with conditions. Details of the specification of the boiler have not been finalised. The affect on air quality will be discussed in the next Updating and Screening Assessment (USA).

Planning application 49916/OUT submitted for residential, commercial and industrial development together with associated infrastructure and open space (outline) has not yet been determined. An air quality assessment has been requested in support of this application and will be discussed in the next USA.

6 Air Quality Planning Policies

An Air Quality Supplementary Planning Document is currently being developed.

7 Local Transport Plans and Strategies

The Staffordshire Local Transport Plan LTP2 sets out the strategies, targets, investment and spending programmes for the Major Urban Area of North Staffordshire for the period April 2006 until March 2011 as part of a long term strategy.⁶

8 Climate Change Strategies

The council's Carbon Reduction Delivery Plan (NI 186) is expected to be published later this year.

In addition, each council directorate has a Directorate Carbon Reduction Action plan which is monitored for progress against carbon reduction targets.

The council has been selected to participate in the next phase of the Carbon Trust Local Authority Carbon Management programme which begins in May 2010.

9 Implementation of Action Plans

Indicators for the city-wide AQAP for nitrogen dioxide show progress is being made. However, the AQAP will be reviewed and amended during 2010 to ensure that actions target areas where the largest numbers of receptors are affected by poor air quality.

Monitoring shows that the 24-hour PM₁₀ objective has not been breached in the Fenton PM₁₀ AQMA during 2009.

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.4	Divert Traffic	Provide clear route signage on major routes through city	SoTCC	2010-11	2011			Signage Strategy currently being developed.	Signage Strategy currently being developed.		Emission reduction unlikely to be seen in hot-spot areas. General reduction in congestion around city-centre likely.
1.10	Enforce 'school run' parking restrictions	Reduce emissions through idling vehicles close to schools.	SoTCC		Current	Not finalised					Emission reduction unlikely to be seen in hot-spot areas.
1.11	Increase number of no stopping zones outside schools	Reduce emissions through idling vehicles close to schools.	SoTCC	2010-11	2011	Not finalised					Emission reduction unlikely to be seen in hot-spot areas.
1.12	Reduce road congestion at key traffic signal junctions using Remote Monitoring	Reduce emissions at major junctions	SoTCC	2009-10	2010	LTP L6 LTP M16 LTP M17	1%	On target On target Average vehicle delay time	No data On target Average vehicle delay time	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	System (RMS) to improve fault response time.					NI 167		maintained No data	maintained No data		
1.13	Reduce congestion along key routes using ANPR to inform UTMC.	Reduce emissions along major routes				LTP L6 LTP M16 LTP M17 NI 167	1%	On target On target Average vehicle delay time maintained No data	No data On target Average vehicle delay time maintained No data	Ongoing	
1.14	Reduce congestion caused by roadworks using Highways Asset Management Plan (HAMP) to prioritise works.	Reduce emissions caused by congestion due to roadworks	SoTCC		Current	LTP L6 LTP M16 LTP M17 NI 167		On target On target Average vehicle delay time maintained No data	No data On target Average vehicle delay time maintained No data	Ongoing	
2	Transport Alternatives										
2.1	Develop priority bus route from Keele to Kidsgrove via	Increase bus patronage	SoTCC	Complete	2015	LTP L2		On target	On target		Emission reduction may not be measurable

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	Stoke rail station and city-centre (streetcar)										
2.2	Develop a bus priority route from Stoke Station to City Centre	Increase bus patronage	SoTCC	Complete	2013	LTP L2		On target	On target		Emission reduction may not be measurable
2.3	Develop a bus priority route at Bucknall New Road	Increase bus patronage	SoTCC	Complete	2013	LTP L2		On target	On target		
2.4	Improve efficiency and perceived unreliability of bus service using SPRITE (real time passenger information)	Increase bus patronage	SoTCC	Complete	Unknown - scheme put on hold – funding unavailable				Scheme put on hold – funding unavailable		
2.5	Provide alternative transport information through Traveline	Encourage alternative transport	SoTCC	Complete	Ongoing	LTP L2		On target	On target	Ongoing	
2.6	Reduce anti-social behaviour, crime and fear of crime on	Increase bus patronage	SoTCC	Complete	Ongoing	LTP M8		On target	On target	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
2.10	Improve cycle access to the canal system.	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.11a	Implement the Governments 'Cycle to Work' Scheme for council employees.	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.11b	Promote the the Governments 'Cylce to work' scheme through Green Travel Plans	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.12	Expand cycling proficiency schemes in schools	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.13	Expand cycling network	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.14	Promote 'Cycling Journey Planner'	Increase cycle use	SoTCC		Current	LTP M13 LTP M14		On target On target	On target On target	Ongoing	
2.15	Promote use and increase security of	Increase cycle use	SoTCC		Current	NI 175		Under target	Under target	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
2.21	Encourage businesses to promote sustainable transport by providing cycle storage, lockers, shower facilities	Increase cycle use	SoTCC		Current	NI 175		Under target	Under target	Ongoing	
2.22	Promote green travel plans	Encourage alternative transport	SoTCC		Current	NI 175		Under target	Under target	Ongoing	
2.23	Promote safer routes to school	Increase walking and cycling	SoTCC		Current	NI 198		Under target	Under target	Ongoing	
2.24	Promote rail travel & publicise train operating companies' services & information through sustainable travel plan	Encourage alternative transport	SoTCC		Current	NI 175		Under target	Under target	Ongoing	
3	Reducing emissions										
3.1	Enforce emissions limits from industrial (Part A2 and Part B)	Reduce industrial emissions	SoTCC		Current	Defra Returns for emissions from processes			92%	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	processes.					compliant with permit					
3.2	Control smoky vehicles through 'smog-buster' campaign	Reduce emissions from poorly maintained vehicles	SoTCC		Current	No indicator				Ongoing	
3.3	Promote grants for transport operators to improve vehicles	Encourage retrofitting	SoTCC								
3.4	Limit the age of vehicles licensed as Taxis	Reduce emissions from taxis and private hire vehicles	SoTCC	Complete	Complete	No indicator		Taxi and Private Hire Age Policy implemented		Complete	
3.5	Introduce car fleet renewal initiatives for general public	Reduce emissions from vehicles	BIS		Complete	Local uptake of scheme		Unknown	Unknown	Feb 2010	
3.6	Include Travel Plans as part of Section 106 agreements	Encourage alternative transport	SoTCC		Current	No indicator					
3.8	Improve council fleet	Reduce emissions from council fleet	SoTCC	2010-11	2012	Under consideration				There is currently no fleet renewal policy	
3.9	Develop quality bus partnership to	Reduce emissions from buses	SoTCC			No indicator		No progress toward an agreement on	No progress toward an agreement	Unkown	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	include minimum Euro standard buses on all routes and use of alternative fuels.							EURO standard	on EURO standard		
4	Education, Training & Publicity										
4.1	Produce museum exhibit aimed at families and supported by school teaching pack.	Educate 7-11 year olds on pollution sources and encourage alternative transport	SoTCC	2009-10	2010	Number of competition entries and feedback forms		Museum exhibit from end October 2009 to end May 2010. Education booklets delivered to all city schools for year 4 pupils		Initial project complete. Defra funding sought to enable further booklets to be distributed to schools	
4.2	Ongoing high level marketing of sustainable travel under Travelwise branding (e.g. eco-driving, problems with short journeys, health benefits	Encouraging alternative transport	SoTCC	Complete	Current	NI 175		Under target	Under target	Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	of walking/cycling etc.)										
4.3	Promote Green Travel Plans for schools and businesses	Encouraging alternative transport	SoTCC	Complete	Current	NI175		Under target	Under target	Ongoing	
4.4	Monitor & publish air quality data throughout the city	Educate public on air quality issues	SoTCC	Complete	Current	Number of hits on web page		Air quality published on council website	Quantification beginning	Ongoing	
4.5	Provide priority parking for car-sharing in employers car parks	Encourage car sharing	SoTCC	Complete	Current	Number of staff using scheme		Included in green travel plan information	Quantification beginning	Ongoing	
4.6	Provide alternative transport information packs for new developments	Encourage alternative transport	SoTCC	Complete	Ongoing	No indicator		S106 agreements sought for new developments to fund information packs	Quantification beginning	Ongoing	
4.7	Encourage businesses to have flexible working hours. Stagger start times with neighbouring schools to	Reduce congestion	SoTCC	Complete	Ongoing	No indicator		Included in green travel plan information			

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
	allow walks between schools										
5	Land Use Planning										
5.1	Provide supplementary planning documents with regard air quality	Provide information regarding when an air quality assessment is required	SoTCC	2009-10		No indicator		Supplementary Planning Document currently being written		2011	
5.2	Ensure early consultation between Master Planning, Highways and Planning Departments	Ensure relevant consultation	SoTCC		Ongoing	No indicator		Consultation procedures in place		Ongoing	
5.3	Demolish or change land-use for residential properties in areas of poor air quality.	Remove receptors from areas of poor air quality	SoTCC			No indicator		Demolition and land-use change would only be considered as a last resort and only if appropriate funding were available			

Table 9.2 Action Plan Progress for Fenton PM₁₀ AQMA

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.	Enforce Environmental Permit Conditions	Control and minimise emissions of particulate matter within the AQMA	City Council (PPC Permit for Crusher), Environment Agency (PPC Permit for Waste Site)	Ongoing				Suspension Notice for breaches of City Council permit issued April 2009. Review of City Council (Crushing) Permit already effected	Review of Environment Agency (Waste Transfer) permit in draft stage undergoing statutory consultation	Ongoing	Notice served by City Council resulted in installation of fence mounted spray points that have dramatically improved "damping down" operations and general environmental management

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.1	Road sweeping of site roads and public highways	Control local emissions of particulates from vehicles associated with the Waste Transfer Station operation	City Council, Waste Transfer Station Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Sweeping has been irregular at times due to financial aspects of providing service	On-site conditions have improved resulting in less off-site "tracking" of materials	Ongoing	Improvements have contributed to the reduction of the number of days exceedance measured
1.1.2	On-site speed limitation	Control local emissions of particulates from vehicles associated with the Waste Transfer Station operation	City Council, Waste Transfer Station Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Limit of 10mph for site vehicles enforced by operator and complied with		Ongoing	

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.3	Sheeting of vehicles	Control local emissions of particulates from vehicles associated with the Waste Transfer Station operation	Environment Agency, Waste Transfer Operator, City Council	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Progress slow due to concerns regarding health & safety implications for drivers – no control over visiting drivers and vehicles	Recent improvements to vehicle fleet with “automatic sheeting mechanism” in addition to existing vehicles with such equipment	Ongoing	Emission reductions minimal due to improvement but perceived by local residents as important
1.1.4	Hard surface site roads and operational areas	Control local emissions of particulates from vehicles associated with the Waste Transfer Station operation	City Council, Waste Transfer Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Plans to hard surface operational areas agreed with company and completed	Revision to operational areas resulted in retro-grade step of siting crusher on un-surfaced area		Suspension Notice requirements and improvements to 1.1.8 have mitigated any detrimental effects of the new crusher location

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.5	Provision of wheel-wash facilities	Control local emissions of particulates from vehicles associated with the Waste Transfer Station operation	City Council, Waste Transfer Station Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		No wheel wash provided. Requirement for wheel wash included in EPA 1990 Section 80 Abatement Notice (served August 2007) was successfully appealed by operator	Environment Agency permit review includes stricter controls on condition of vehicles leaving site	None	Wheel wash facilities not provided due to successful appeal of notice
1.1.6	Materials handling	Control local emissions of particulates at source	Environment Agency, Waste Transfer Station Operator, City Council	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Reinforcement of good general environmental management has minimised emissions from this source	Suspension Notice requirements have resulted in stockpiles being maintained in damp condition	Ongoing	Improved general management has helped contain emissions at source

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.7	Use dust control fencing	Control local emissions of particulates at source	Environment Agency, Waste Transfer Operator, City Council	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Progress slow due to boundary uncertainties	Enforcement of permit conditions has resulted in provision of more complete boundary fence	Next 12 months	Emission reductions minimal due to improvement but perceived by local residents as important
1.1.8	Use water sprays	Control local emissions of particulates at source	City Council, Waste Transfer Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Minimal take-up consisting of single spray point on yard providing damp area through which all vehicles passed	Major improvements with provision of 6 further spray points to control dust from roads, yards and stockpiles	Completed	Sprays provided in response to Suspension Notice issued for breaches of conditions in Crusher permit

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.1.9	Enclose inherently dusty operations	Control local emissions of particulates at source	City Council, Waste Transfer Station Operator, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		No enclosure provided. Requirement for enclosure included in EPA 1990 Section 80 Abatement Notice (served August 2007) was successfully appealed by operator	None	None	
1.2 & 1.2.1	Liaise with internal and external regulatory bodies	Unify all regulatory functions into a single "authority" message	City Council, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Group consisting of Councillors, Environmental Health, Planning, Highways, Regeneration Dept and Environment Agency established	Further meetings held between all bodies involved. Progress towards full review of site permits and permissions ongoing	Ongoing	Unified regulatory body has resulted in added impetus in assessing the issues affecting local residents and improved "customer" satisfaction

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1.2.2 & 1.3.1	Ensure compliance of other businesses holding environmental permits	Minimise particulate emissions within AQMA from other sources	City Council, Environment Agency	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Nearby Part A(1) and Part B industrial installation have ceased operation	None	Completed	Emission reductions minimal as high rate of compliance was achieved at previously permitted installations
1.4.1	Ensure compliance with local smoke control orders	Minimise particulate emissions within AQMA from other sources	City Council	Ongoing		Reduction in number of days of elevated (above 24hr air quality objective) particulate matter measured within AQMA		Compliance rates high. Complaints concerning local smoke emissions minimised		Ongoing	Emission reductions minimal due to improvement
2.1	Redevelop land, remove or relocate businesses identified as "significant" sources of particulates	Minimise particulate emissions within AQMA and reduce exposure of local population	City Council	Ongoing				Nearby school has merged and relocated to new site outside AQMA.	Assessment of suitable sites for relocation of business activities has advanced	Next 2 years	Relocation of school has reduced exposure of "sensitive receptors" and

No.	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		to particulate matter									reduced traffic movements
2.2 & 2.3	Use planning laws to control development likely to impact air quality	Minimise particulate emissions within AQMA and reduce exposure of local population to particulate matter	City Council	Ongoing				New sources of particulate matter have been controlled by refusal of planning permission or implementation of conditions	Large scale extension of waste transfer station has been averted through planning enforcement action	Ongoing	
3.1	Provide alternative access road to site	Minimise particulate emissions within AQMA and reduce exposure of local population to particulate matter	City Council	Ongoing		Reduction in exposure of local residents to vehicle related emissions		None due to amenity, financial, planning and engineering constraints	Further investigation into feasible routes ongoing by Highway Authority	Next 12 months	

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

Monitoring has shown that several areas of the city exceed the nitrogen dioxide (NO₂) annual mean objective. However, all areas are within the city-wide AQMA. A downward trend in concentrations of NO₂ is evident in all but three areas of the city.

Diffusion tube monitoring indicates a possible exceedance of the NO₂ 1-hour mean objective at Basford. The city-wide AQMA will be amended in June, to include an exceedance of the 1-hour mean objective. A funding bid will be submitted to Defra for a grant to enable the purchase/hire and operation of an automatic monitor to confirm whether the 1-hour mean is being breached.

10.2 Conclusions relating to New Local Developments

One newly permitted industrial permit has been issued to Mincrete Ltd, permit reference 170. This will be considered in more detail in the next Updating and Screening Assessment.

10.3 Other Conclusions

Indicators for the city-wide AQAP for nitrogen dioxide show progress is being made. The AQAP will be reviewed and amended to include the targeting specific areas where objectives are breached.

The Fenton AQMA will not be revoked until there is sufficient evidence to show that low concentrations are sustainable.

The effect on air quality of a proposed biomass boiler Stoke-on-Trent Cauldon College will be discussed in the next Updating and Screening Assessment (USA).

An air quality assessment in support of Planning application 49916/OUT will be discussed in the next USA.

10.4 Proposed Actions

Monitoring has shown that there is no need to proceed to a detailed assessment for any pollutant.

Monitoring data has identified the need for automatic monitoring of nitrogen dioxide at Basford to assess whether the 1-hour mean objective is being breached.

The city-wide AQMA will be amended in June, to include the nitrogen dioxide 1-hour mean objective.

The city-wide nitrogen dioxide AQAP and the Fenton particulates AQAP will be reviewed and amended as appropriate during 2010.

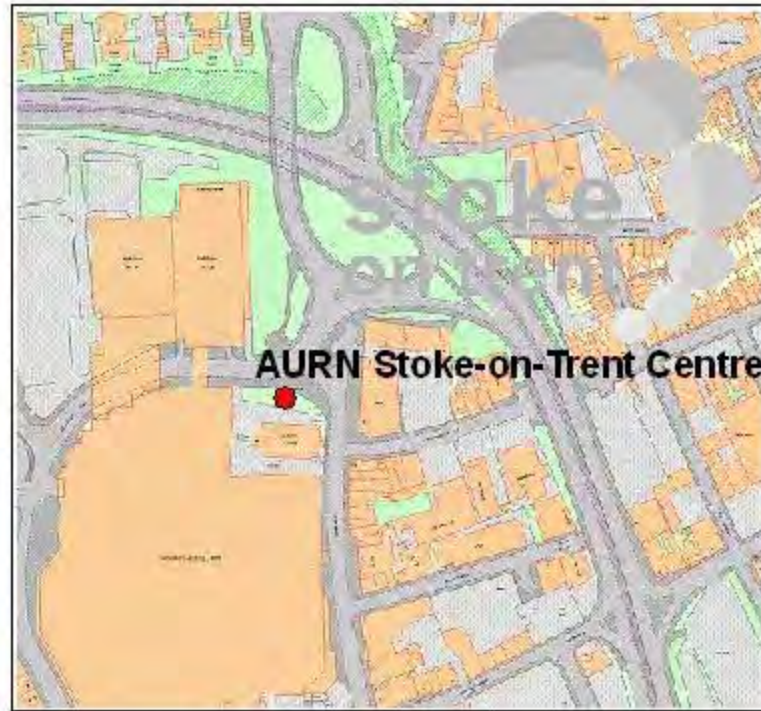
Monitoring of nitrogen dioxide and particulates will continue and will be reported in the Progress Report 2011.

11 References

- ¹ Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users, operated by AEAT on behalf of Defra, available online at http://www.airquality.co.uk/reports/cat05/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf accessed April 2009
- ² Air Quality Review & Assessment Helpdesk, operated by UWE on behalf of Defra, online at <http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusontube310310.xls> Accessed April 2010
- ³ Defra Local Air Quality Management Technical Guidance LAQM.TG(09) available online at <http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/tech-guidance-laqm-tg-09.pdf> Accessed April 2010
- ⁴ NO₂ Distance from Roads Calculator, operated by AQC on behalf of Defra, online at <http://www.airquality.co.uk/laqm/tools/NO2withDistancefromRoadsCalculatorIssue2.xls> Accessed April 2010
- ⁵ Volatile Correction Model, operated by King's College London, online at <http://www.volatile-correction-model.info/Default.aspx> Accessed April 2010
- ⁶ UK Air Quality Archive, operated by AEA on behalf of Defra, online at http://www.airquality.co.uk/data_and_statistics.php Accessed April 2010
- ⁷ North Staffordshire Local Transport Plan 2006 – 2011 prepared jointly by Stoke-on-Trent City Council and Staffordshire County Council, online at <http://www.stoke.gov.uk/ccm/content/rc/LTP/provisional-north-staffordshire-ltp.en> Accessed April 2010
- ⁸ Review & Assessment Support, operated by UWE, on behalf of Defra, online at [http://www.uwe.ac.uk/aqm/review/R&Asupport/Tube_Precision2009\(Mar2010\).pdf](http://www.uwe.ac.uk/aqm/review/R&Asupport/Tube_Precision2009(Mar2010).pdf) Accessed April 2010
- ⁹ Local Authority Air Quality Support, operated AEA, BV and AQC on behalf of Defra, online at http://www.laqmsupport.org.uk/Summary_of_Laboratory_Performance_in_WASP_R103-107.pdf Accessed April 2010

Appendices

Appendix A: Monitoring Locations



Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

Automatic
monitoring
sites



Figure A.1





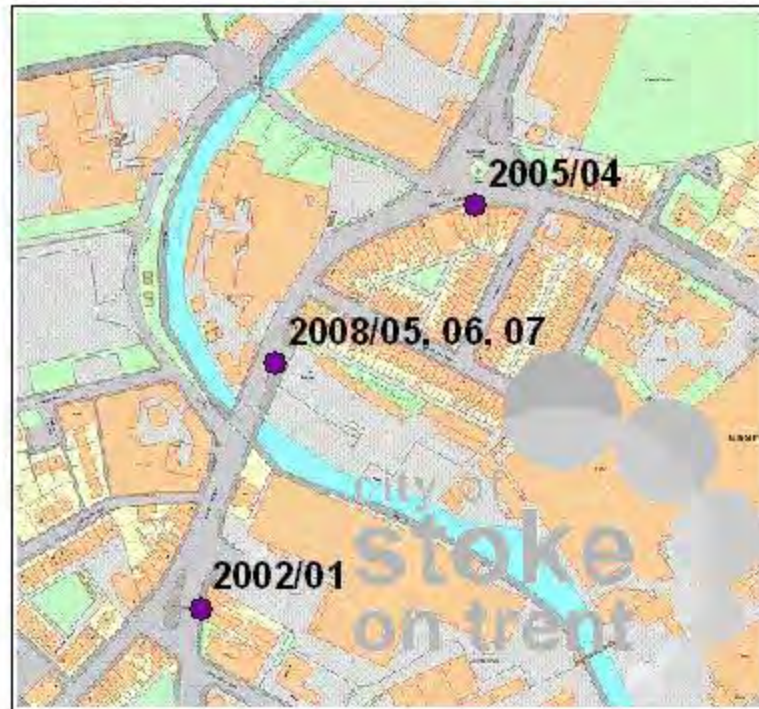
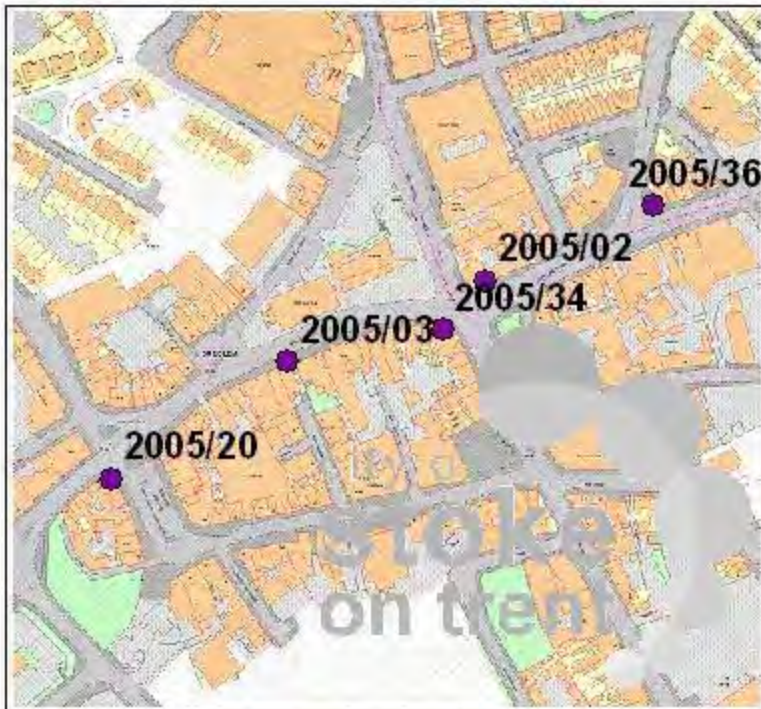
Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

Automatic
monitoring
sites



Figure A.2





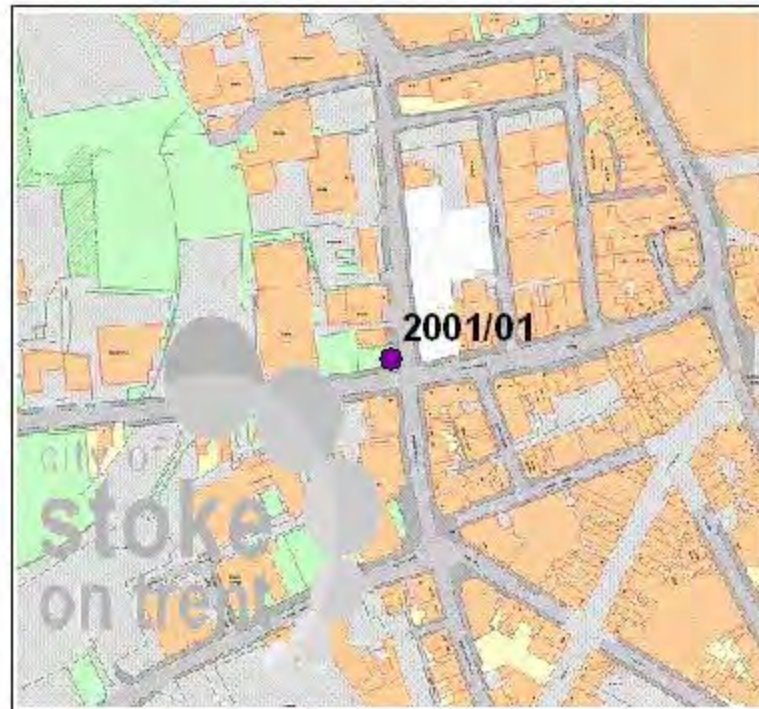
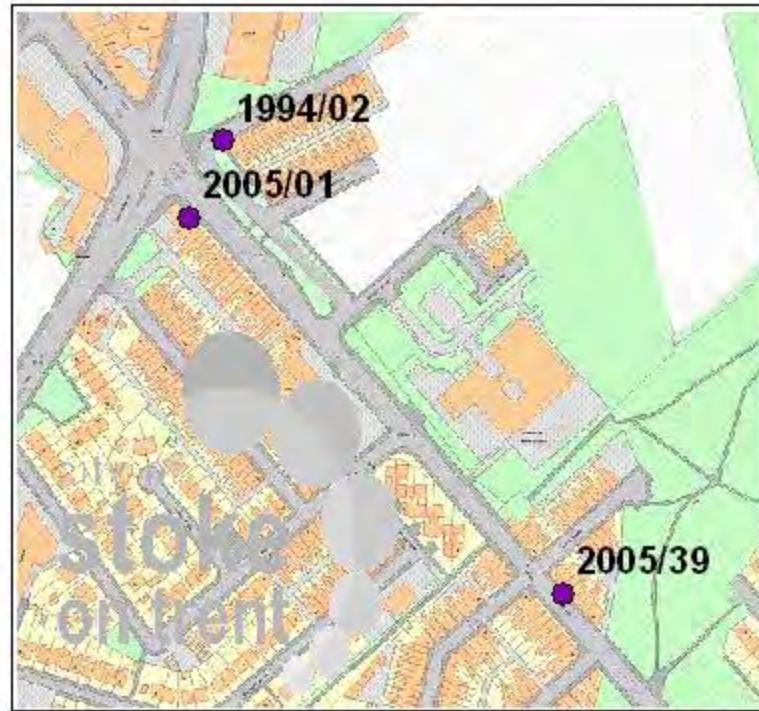
Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

**Diffusion tube
monitoring
sites**



Figure A.3





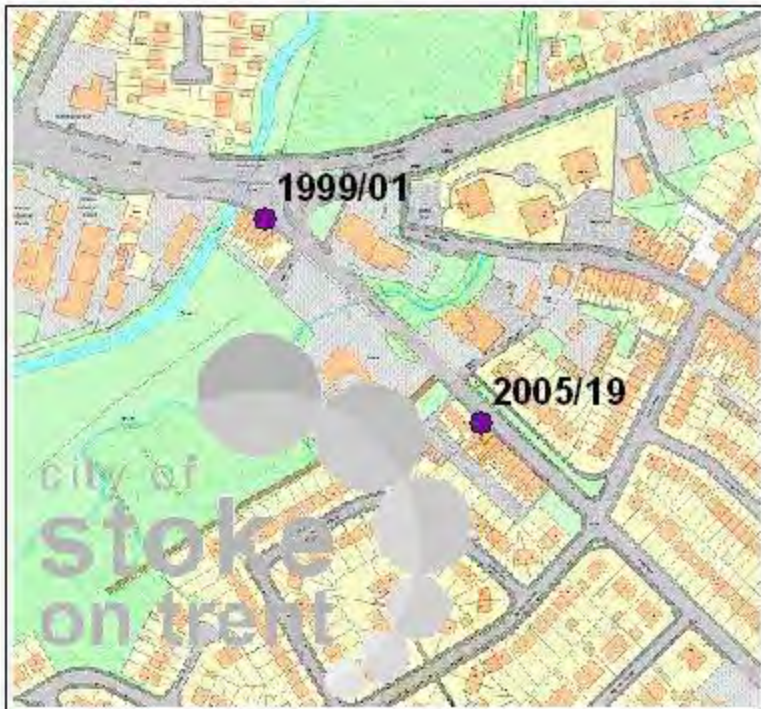
Stoke-on-Trent City Council
 Regulatory Services Division
 Town Hall
 Albion Street
 Hanley
 Stoke-on-Trent
 ST1 1QL
 Tel: 01782 232065

**Diffusion tube
 monitoring
 sites**



Figure A.4

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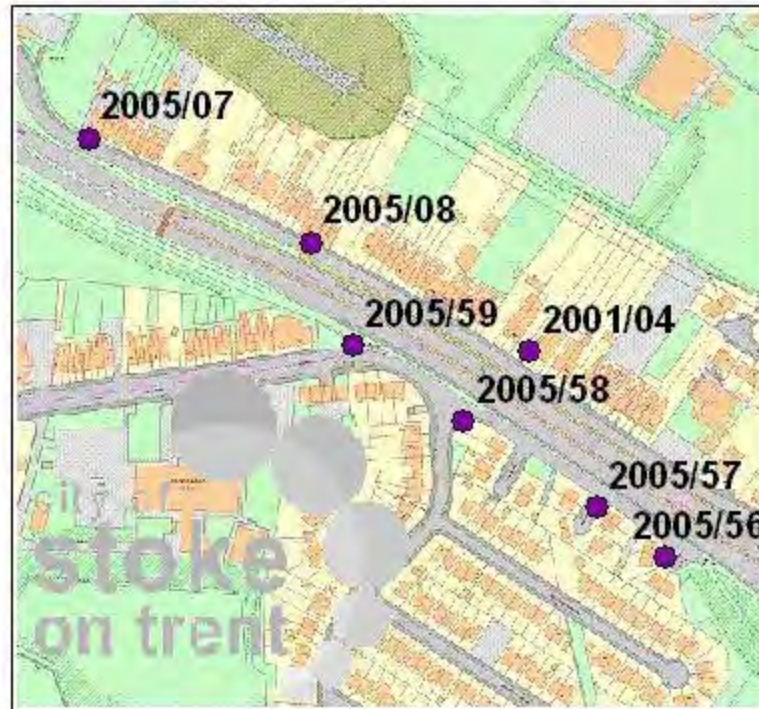
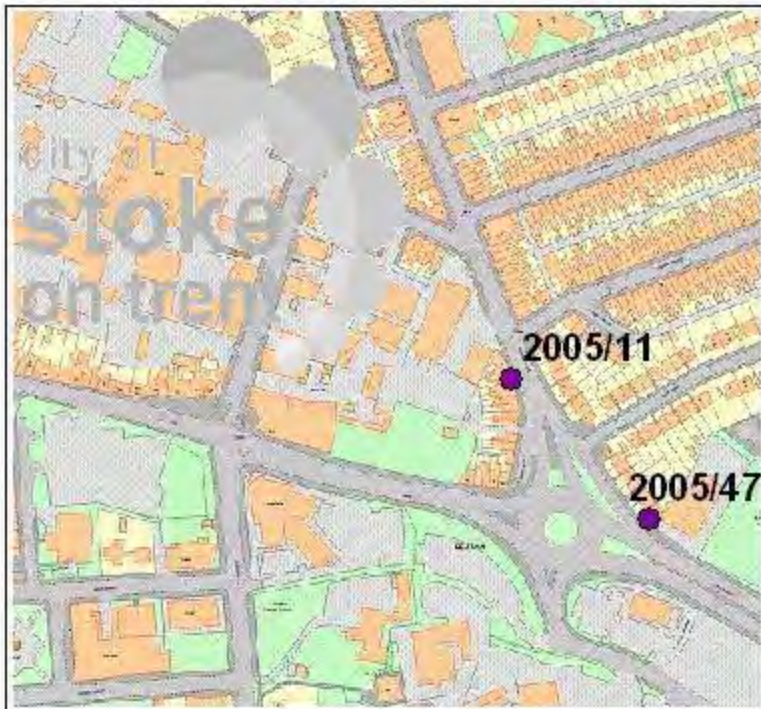
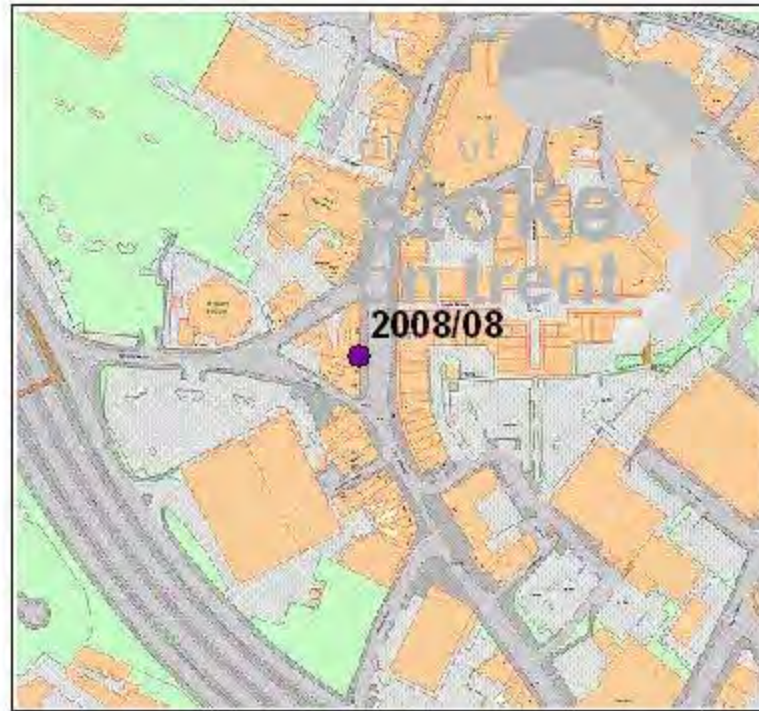
Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

Diffusion tube
monitoring
sites



Figure A.5

1:4,000



Stoke-on-Trent City Council
 Regulatory Services Division
 Town Hall
 Albion Street
 Hanley
 Stoke-on-Trent
 ST1 1QL
 Tel: 01782 232065

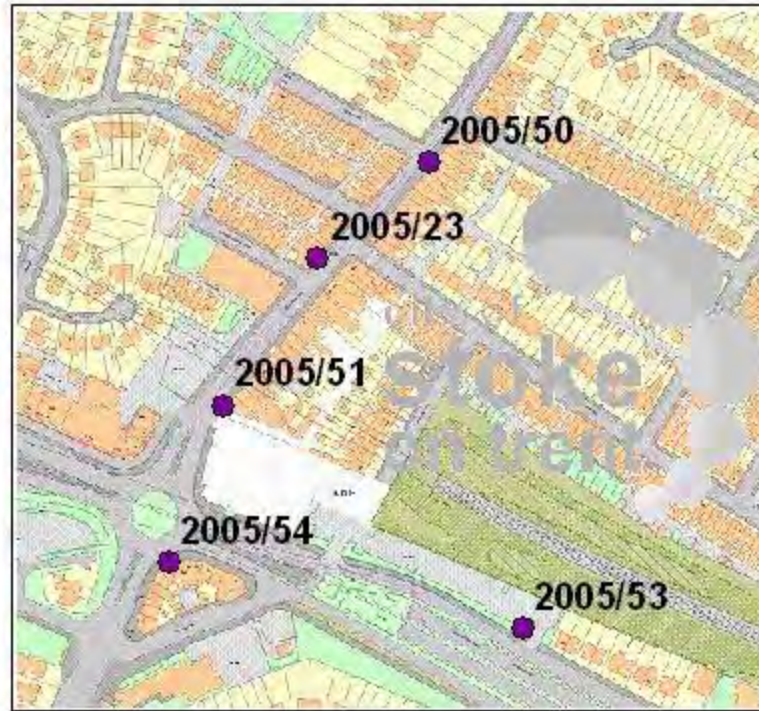
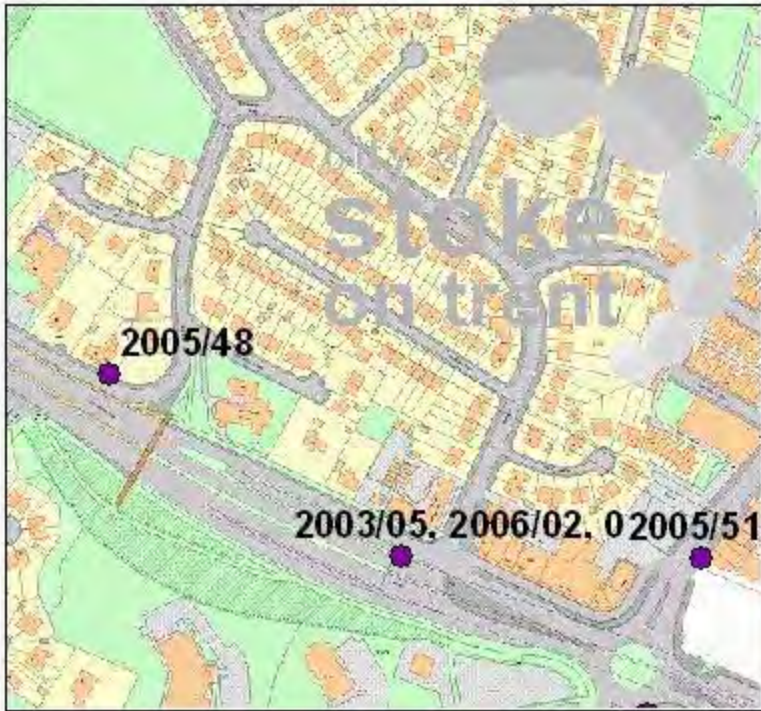
Diffusion tube
 monitoring
 sites



Figure A.6



1:4,000



Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

Diffusion tube
monitoring
sites

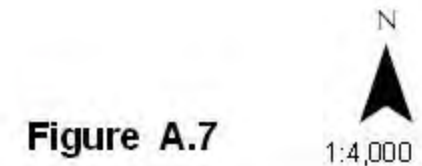
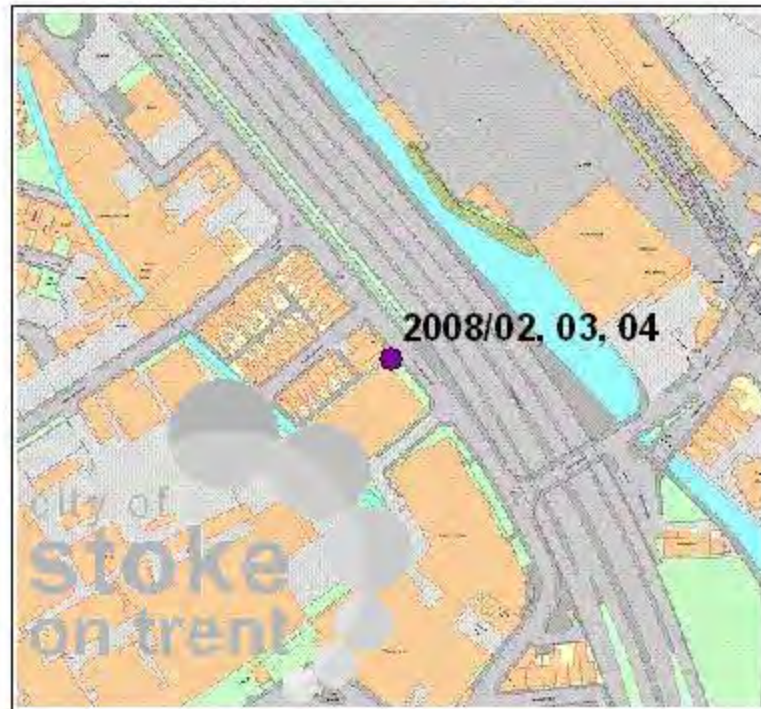
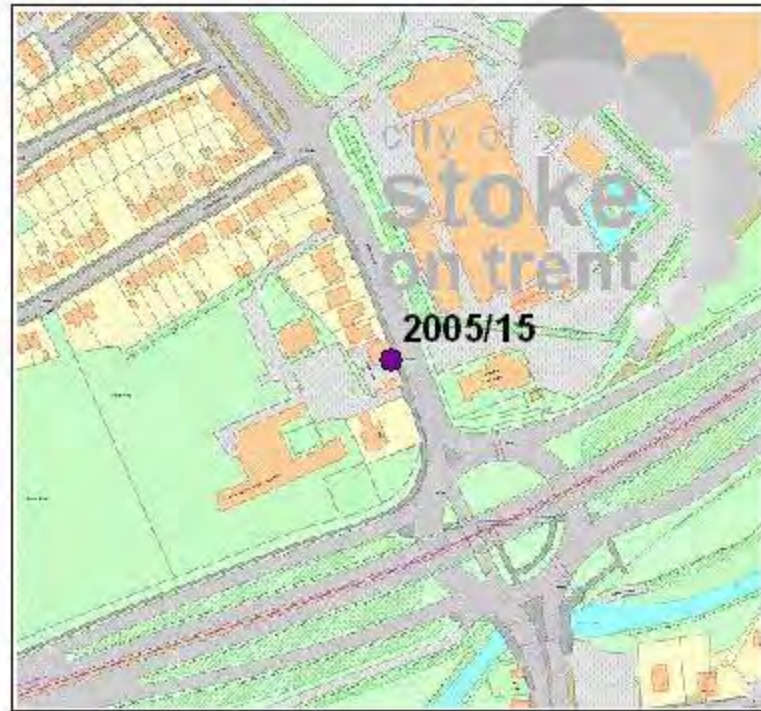
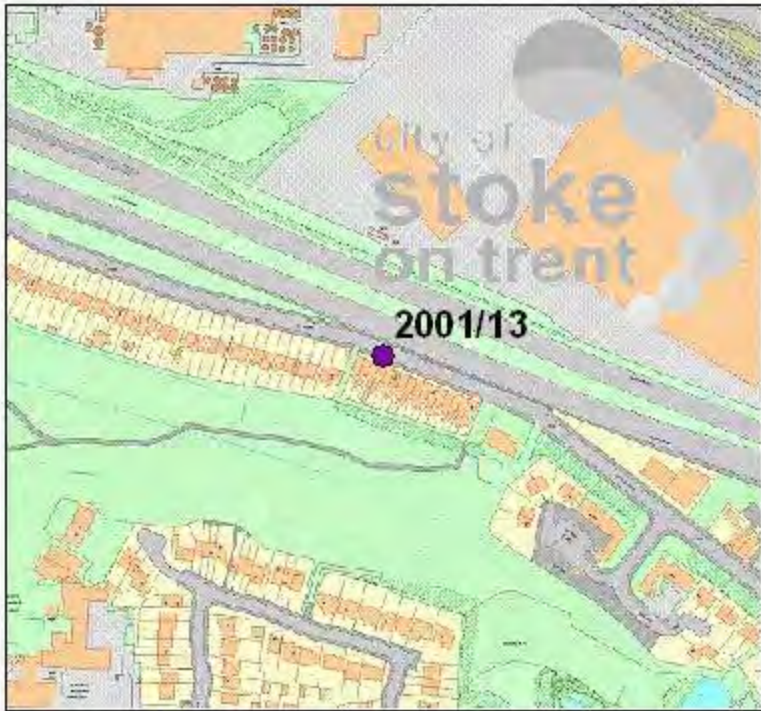


Figure A.7

1:4,000



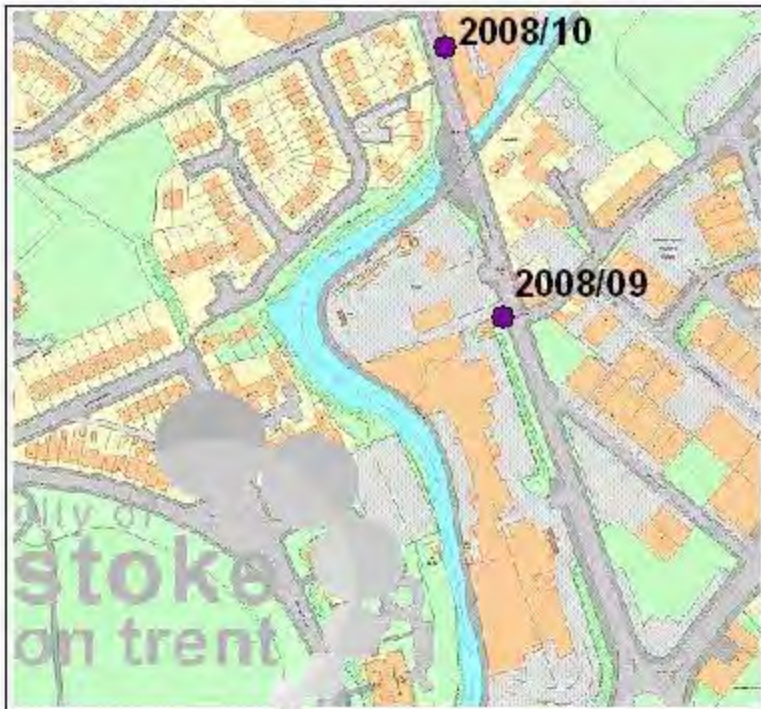
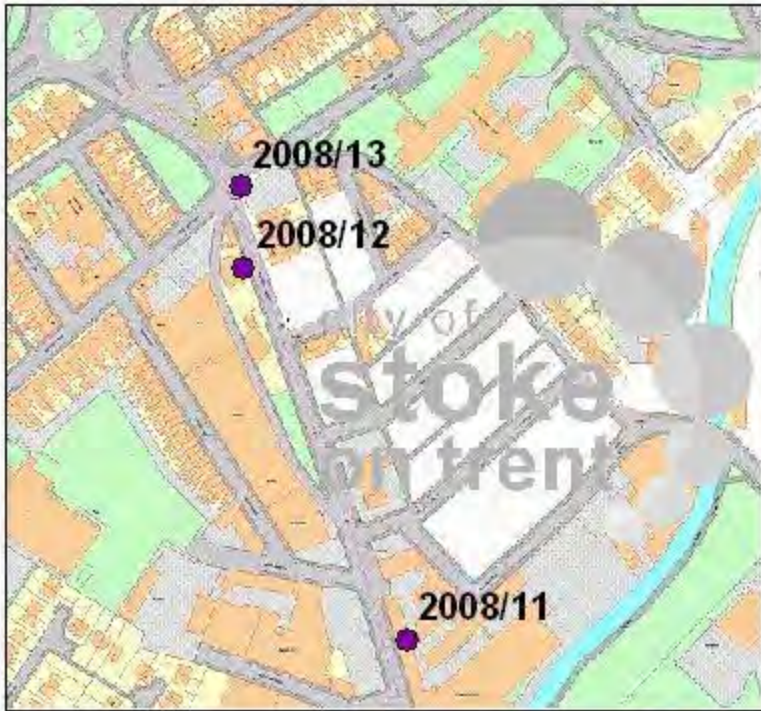
Stoke-on-Trent City Council
 Regulatory Services Division
 Town Hall
 Albion Street
 Hanley
 Stoke-on-Trent
 ST1 1QL
 Tel: 01782 232065

**Diffusion tube
 monitoring
 sites**



Figure A.8





Stoke-on-Trent City Council
Regulatory Services Division
Town Hall
Albion Street
Hanley
Stoke-on-Trent
ST1 1QL
Tel: 01782 232065

**Diffusion tube
monitoring
sites**



N



Figure A.9

1:4,000

Appendix B: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes were supplied and analysed by Staffordshire Scientific Services Laboratory using the 20% triethanolamine (TEA) in water method and following procedures set out in the Practical Guidance document. ¹

The bias adjustment factor supplied by the R&A Helpdesk Database for Staffordshire Scientific Services for 2009 was 0.81.

Factor from Local Co-location Studies

Annual mean and bias factor for each collocation site, together with type of site are shown in Table B.1 below.

Table B.1 Staffordshire Scientific Services Laboratory Bias Factor

Step 1:							Step 2:				Step 3:		Step 4:							
<p>Select the Laboratory that Analyses Your Tubes from the Drop-Down List</p>							<p>Select a Preparation Method from the Drop-Down List</p>				<p>Select a Year from the Drop-Down List</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 Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.</p>							
<p>If a laboratory is not shown, we have no data for this laboratory.</p>							<p>If a preparation method is not shown, we have no data for this method at this laboratory.</p>				<p>If a year is not shown, we have no data²</p>									
Analysed By ¹							Method				Year ⁵		Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m3)	Automatic Monitor Mean Conc. (Cm) (µg/m3)	Bias (B)	Tube Precision ⁶	Bias Adjustment Factor (A) (Cm/Dm)
Staffordshire Scientific Services							20% TEA in Water				2009		O	South Staffordshire DC	12	38	34	12.0%	G	0.89
Staffordshire Scientific Services							20% TEA in Water				2009		UB	Stoke-on-Trent City Council	9	35	30	16.5%	G	0.86
Staffordshire Scientific Services							20% TEA in Water				2009		R	Cannock Chase Council	12	49	43	14.4%	G	0.87
Staffordshire Scientific Services							20% TEA in Water				2009		S	Cannock Chase Council	12	27	22	24.4%	G	0.80
Staffordshire Scientific Services							20% TEA in Water				2009		R	Stoke-on-Trent City Council	12	42	30	38.5%	G	0.72
Staffordshire Scientific Services							20% TEA in Water				2009		R	Stoke-on-Trent City Council	12	47	38	22.8%	G	0.81
Staffordshire Scientific Services							20% TEA in Water				2009		R	Stoke-on-Trent City Council	10	57	41	39.4%	G	0.72
Staffordshire Scientific Services							20% TEA in Water				2009		R	East Staffordshire BC	12	35	25	42.5%	G	0.70
Staffordshire Scientific Services							20% TEA in Water				2009		K	AEA Tech Intercomparison	12	116	107	8.1%	G	0.93
Staffordshire Scientific Services							20% TEA in Water				2009		Overall Factor ³ (9 studies)				Use		0.81	

Spreadsheet Version Number: 03/10

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

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used

This spreadsheet will be updated in late September 2010 on the

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

[R&A website](#)

Published by Air Quality Consultants Ltd on behalf of Defra, the Welsh Assembly Government, the Scottish Government and the Department of the Environment Northern Ireland

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

Step 2: Select a Preparation Method from the Drop-Down List

Step 3: Select a Year from the Drop-Down List

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor³ shown in blue at the foot of the final column.

If you have your own co-location study then see footnote⁴. If uncertain what to do then contact the Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.

Discussion of Choice of Factor to Use

The combined bias adjustment factor for Staffordshire Scientific Services was used as this laboratory supplied and analysed the diffusion tubes used during 2009.

PM Monitoring Adjustment

All monitoring results have been adjusted to gravimetric equivalent using the King's College London Volatile Correction Model (VCM) applied.⁵ Summary tables for each site are included below.

Table B.2 Clarice Cliff VCM Summary

Summary	Text	Value
		0.00
Site Name	Fenton	
Organisation	Stoke-on-Trent	
Start Date	01/01/2009	
End Date	01/01/2010	
TEOM data already corrected with 1.3 factor	No	
EPA Constant A		3
EPA Constant B		1.03
Instrument Temperature		25
Instrument Pressure		1013
Instrument reports to local ambient readings	No	
Timescale	Hourly	
Pressure Site	Local	
Pressure Site Warning		
Temperature Site	Local	
Temperature Site Warning		
FDMS Site 1	Stoke-on-Trent Centre (SR0)	
FDMS Site 1 Warning	FDMS1 Data capture 78%. FDMS1 Correction includes unratified data.	
FDMS Site 2	Liverpool (LP0)	
FDMS Site 2 Warning	FDMS2 Data capture 79%. FDMS2 Correction includes unratified data.	
FDMS Site 3	Average of remaining sites within range	
FDMS Site 3 Warning	FDMS3 Data capture 82%. FDMS3 Correction includes unratified data.	

Table B.3 Meir VCM Summary

Summary	Text	Value
		0.00
Site Name	Meir	
Organisation	Stoke-on-Trent City Council	
Start Date	01/01/2009	
End Date	01/01/2010	
TEOM data already corrected with 1.3 factor	No	
EPA Constant A		3

EPA Constant B		1.03
Instrument Temperature		25
Instrument Pressure		1013
Instrument reports to local ambient readings	No	
Timescale	Hourly	
Pressure Site	Local	
Pressure Site Warning		
Temperature Site	Local	
Temperature Site Warning		
FDMS Site 1	Stoke-on-Trent Centre (SR0)	
FDMS Site 1 Warning	FDMS1 Data capture 78%. FDMS1 Correction includes unratified data.	
FDMS Site 2	Liverpool (LP0)	
FDMS Site 2 Warning	FDMS2 Data capture 79%. FDMS2 Correction includes unratified data.	
FDMS Site 3	Average of remaining sites within range	
FDMS Site 3 Warning	FDMS3 Data capture 82%. FDMS3 Correction includes unratified data.	

Table B.4 Middleport VCM Summary

Summary	Text	Value
		0.00
Site Name	Middleport	
Organisation	Stoke-on-Trent City Council	
Start Date	01/01/2009	
End Date	01/01/2010	
TEOM data already corrected with 1.3 factor	No	
EPA Constant A		3
EPA Constant B		1.03
Instrument Temperature		25
Instrument Pressure		1013
Instrument reports to local ambient readings	No	
Timescale	Hourly	
Pressure Site	Local	
Pressure Site Warning		
Temperature Site	Local	
Temperature Site Warning		
FDMS Site 1	Stoke-on-Trent Centre (SR0)	
FDMS Site 1 Warning	FDMS1 Data capture 78%. FDMS1 Correction includes unratified data.	
FDMS Site 2	Liverpool (LP0)	
FDMS Site 2 Warning	FDMS2 Data capture 79%. FDMS2 Correction includes unratified data.	
FDMS Site 3	Average of remaining sites within range	
FDMS Site 3 Warning	FDMS3 Data capture 82%. FDMS3 Correction includes unratified data.	

Short-term to Long-term Data adjustment

Short to long term adjustment has been applied to automatic monitoring where data capture is less than 90% and to diffusion tube data where monitoring data is less than 100%. A table showing short-term to long-term adjustment factors is shown below.

Table B.5 Short-term to Long-term Adjustment

Long term site	Site type	Annual mean 2009 (Am)	Pm (Feb-Dec)	Ratio	Pm (Jan-Jun Aug-Dec)	Ratio	Pm (Jan-Nov)	Ratio	Pm (Jan-May Jul-Dec)	Ratio	Pm (Jan-Aug Oct-Dec)	Ratio
Chesterfield	Urban Background	18.82	17.83	1.06	19.43	0.97	17.92	1.05	26.44	0.71	19.27	0.98
Reading New Town	Urban Background	25.51	25.12	1.02	26.10	0.98	23.71	1.08	23.43	1.09	25.58	1.00
Warrington	Urban Background	22.81	21.72	1.05	23.72	0.96	20.67	1.10	30.63	0.74	23.27	0.98
Stoke-on-Trent Centre	Urban Centre	29.75	29.64	1.00	30.40	0.98	27.78	1.07	19.26	1.54	30.00	0.99
		Average (Ra)		1.03		0.97		1.08		1.02		0.99
Long term site	Site type	Annual mean 2009 (Am)	Pm (Jan Mar-Dec)	Ratio	Pm (May-Dec)	Ratio	Pm (Jan Apr-Dec)	Ratio	Pm (Jan-Mar Jun-Dec)	Ratio	Pm (Jan-Feb Apr-Dec)	Ratio
Chesterfield	Urban Background	18.80	18.15	1.04	16.23	1.16	18.14	1.04	19.20	0.98	18.87	1.00
Reading New Town	Urban Background	25.48	24.85	1.03	24.63	1.04	24.67	1.03	27.60	0.92	25.41	1.00
Warrington	Urban Background	22.79	22.14	1.03	20.28	1.12	22.20	1.03	23.33	0.98	22.92	1.00
Stoke-on-Trent Centre	Urban Centre	29.70	28.88	1.03	28.73	1.04	28.75	1.03	30.72	0.97	29.71	1.00
		Average (Ra)		1.03		1.09		1.03		0.96		1.00

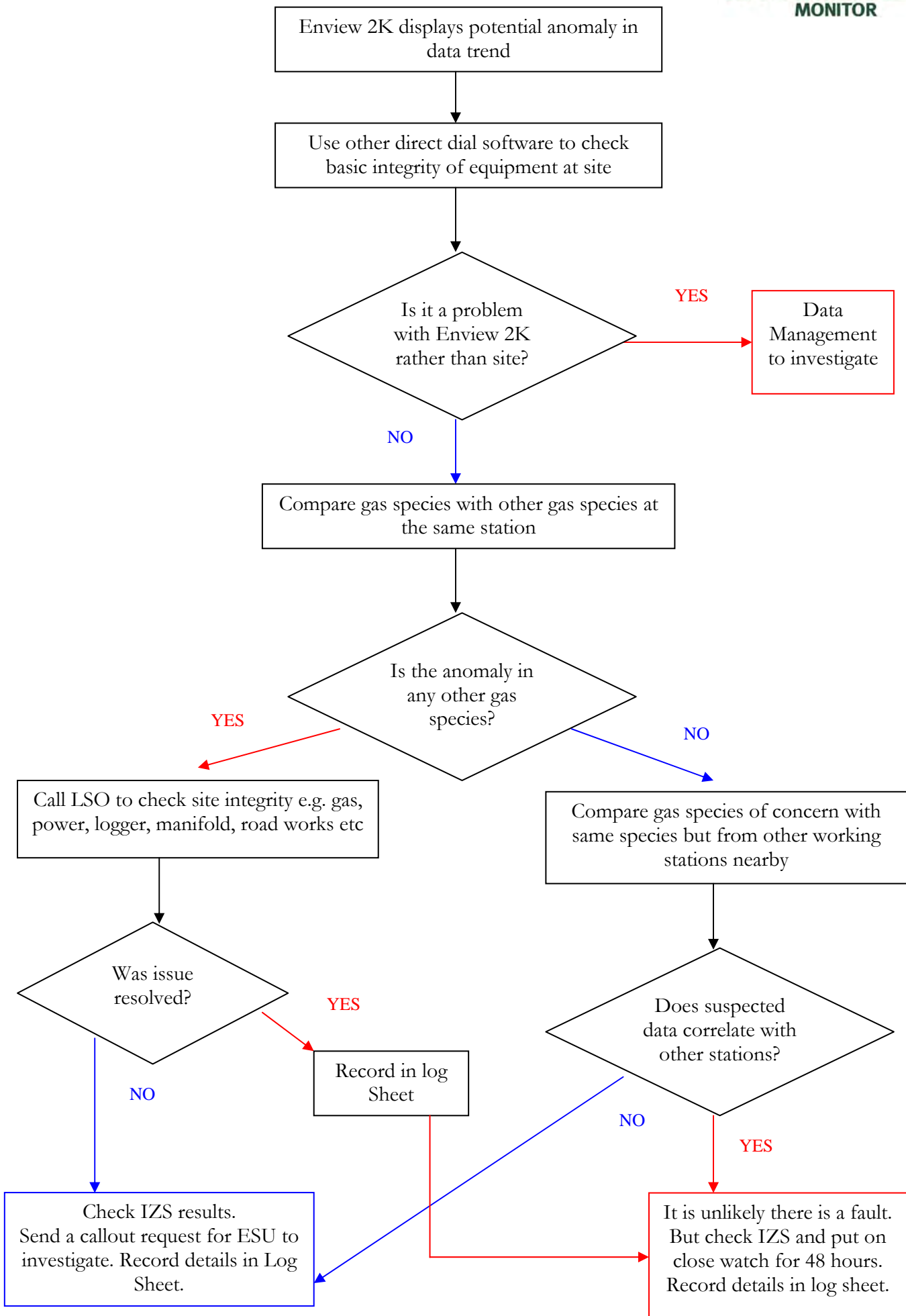
Long term site	Site type	Annual mean 2009 (Am)	Pm (Jan-Feb May-Dec)	Ratio	Pm (Feb-Sep Nov-Dec)	Ratio	Pm (Jan- Oct Dec)	Ratio
Chesterfield	Urban Background	18.78	18.52	1.02	17.66	1.07	18.92	0.99
Reading New Town	Urban Background	25.46	25.94	0.98	23.30	1.09	25.39	1.00
Warrington	Urban Background	22.76	22.61	1.01	21.61	1.06	25.03	0.91
Stoke-on-Trent Centre	Urban Centre	29.68	30.01	0.99	28.80	1.03	29.70	1.00
		Average (Ra)		1.00		1.06		0.98

QA/QC of automatic monitoring

Calibrations are carried out every two weeks by local authority officers.

Data management is carried out by Casella. Casella procedure notes are included below.

Procedure for Resolving Anomaly



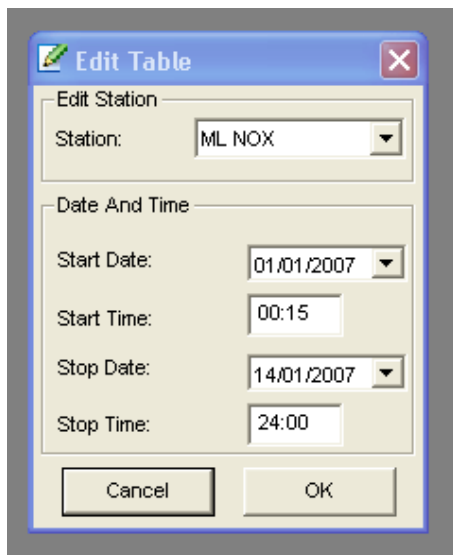
Rescaling NOx data using Enview 2000.

1. Identify database structure.

Prior to being able to rescale the data the database structure must be understood to enable a simple calculation of NO₂ from NO_x – NO = NO₂.

Select **Edit**, **Edit Table** from the menu at the top of the Enview screen.

If you are prompted for a Username/Password then simply select OK. The following screen appears:



The screenshot shows a dialog box titled "Edit Table" with a close button (X) in the top right corner. The dialog is divided into two sections. The first section, "Edit Station", contains a label "Station:" followed by a dropdown menu currently displaying "ML NOX". The second section, "Date And Time", contains four fields: "Start Date:" with a dropdown menu showing "01/01/2007", "Start Time:" with a text box containing "00:15", "Stop Date:" with a dropdown menu showing "14/01/2007", and "Stop Time:" with a text box containing "24:00". At the bottom of the dialog are two buttons: "Cancel" and "OK".

Select the Station for which you are rescaling the NOx data and any time period that contains data. Select OK. The following screen (or similar) appears:

Edit Table ML NOX [01/01/2007 00:15 - 15/01/2007 00:00]

Station: ML NOX Time Base: 15 Min

Date Time	NO	S_NO	NOx	S_NOx	NO2	S_NO2	Wdir	S_Wdir	Wsp	S_Wsp
	ppb		ppb		ppb		Deg		m/s	
01/01/2007 00:15	10.8	OK	23	OK	12.2	OK	-9999	NoData	-9999	NoData
01/01/2007 00:30	9.5	OK	19.7	OK	10.2	OK	-9999	NoData	-9999	NoData
01/01/2007 00:45	10.4	OK	21.5	OK	11.1	OK	-9999	NoData	-9999	NoData
01/01/2007 01:00	12.4	OK	24.8	OK	12.4	OK	-9999	NoData	-9999	NoData
01/01/2007 01:15	12.6	OK	23.6	OK	11	OK	-9999	NoData	-9999	NoData
01/01/2007 01:30	13.3	OK	26.2	OK	12.9	OK	-9999	NoData	-9999	NoData
01/01/2007 01:45	24.9	OK	41.6	OK	16.8	OK	-9999	NoData	-9999	NoData
01/01/2007 02:00	16.3	OK	30.3	OK	14	OK	-9999	NoData	-9999	NoData
01/01/2007 02:15	18.7	OK	33.5	OK	14.8	OK	-9999	NoData	-9999	NoData
01/01/2007 02:30	16.9	OK	33.9	OK	17	OK	-9999	NoData	-9999	NoData
01/01/2007 02:45	17.5	OK	34.7	OK	17.2	OK	-9999	NoData	-9999	NoData
01/01/2007 03:00	15.6	OK	30.5	OK	14.9	OK	-9999	NoData	-9999	NoData
01/01/2007 03:15	15.6	OK	30.5	OK	14.9	OK	-9999	NoData	-9999	NoData
01/01/2007 03:30	19.2	OK	36.2	OK	17	OK	-9999	NoData	-9999	NoData
01/01/2007 03:45	13.8	OK	29.9	OK	16	OK	-9999	NoData	-9999	NoData
01/01/2007 04:00	13.3	OK	27.9	OK	14.6	OK	-9999	NoData	-9999	NoData
01/01/2007 04:15	15.1	OK	31.2	OK	16.1	OK	-9999	NoData	-9999	NoData
01/01/2007 04:30	16.6	OK	33.2	OK	16.6	OK	-9999	NoData	-9999	NoData
01/01/2007 04:45	11.6	OK	22.6	OK	11	OK	-9999	NoData	-9999	NoData

Note the column order for the NO and NOx components, in this case the columns are:

- NO – column 1 (identified as column M01 by Envieu)
- NOx – column 2 (identified as column M02 by Envieu)

Please note that the Status columns S_NO and S_NOx can be considered as being the same column as the numerical NO and NOx columns.

Once you have noted the column numbers this procedure will not need to be repeated for this monitoring station as the column identities do not change. The column identity may differ for different monitoring stations and should be checked and noted using the above procedure.

Close the window down in the usual manner and select **Yes** when prompted to **Run Calc.Avg** (No can also be selected as operations have not yet taken place on the data).

2. Rescaling NO values

To rescale the NO_x, NO and NO₂ data it is assumed that fortnightly calibration checks have been performed at the relevant air quality monitoring station and the following data is known:

- Date of calibration check
- Cylinder calibration gas **actual** concentration (normally in ppb), the nominal value can be ignored for this procedure.
- NO_x and NO values noted following the span calibration check.
- Zero offset values noted following the NO_x and NO calibration checks.

Select **Edit**, **Edit Block** from the menu at the top of the Enview screen.

If you are prompted for a Username/Password then simply select OK. The following screen appears:

Select/input the following parameters:

- Station
- Check the **NO** monitor only
- Ensure timebase is set to **15 Min.**
- Choose the **start** and **stop** dates and times that correspond to the period you are rescaling the data for
- Check the **Calc Value**, button – this is where the rescaling values are input.
- The **a** value is calculated using the following:
$$a = \frac{\text{actual NO cylinder concentration}}{\text{NO value noted during span check- measured zero offset}}$$
- The **b** value is the ppb value required to return the analyser to zero e.g. if the zero offset was noted to be -5 ppb at the analyser (following a calibration / zero check) then the b value entered should be +5.
- The Enviro software insists that a description is entered prior to any rescaling being performed, anything can be entered here however it is good practise to make a note of the **a** and **b** values entered, see above.
- Select **OK**, and select **Yes** when prompted to **Run Calc.Avg**
- The NO data has now been rescaled.

Worked example:

In this example, the actual NO cylinder concentration taken from the certificate on the NO cylinder is 451 ppb. The NO reading noted following the on-site calibration check was 454ppb. The zero offset noted at the analyser following the NO calibration checks was 3ppb.

$$\text{Therefore } a = 451/(454-(-3)) = 451/457 = 0.9869$$
$$b = -3$$

3. Rescaling NOx values

Repeat the above procedure for rescaling the NOx data but substituting the relevant values obtained from the calibration checks obtained at the monitoring site.

The screenshot shows the 'Edit Block' window with the following settings:

- Station: ML NOX
- Filter: None
- Set Data - Status: Calc Value (Status: OK)
- New Value = 0.9956 * Value + -2
- Description: A=0.9956 B=-2

Worked example:

In this example, the actual NO cylinder concentration taken from the certificate on the NO cylinder is 451 ppb (the same as the previous example as the same NO cylinder is used to perform the NOx calibration check). The NOx reading noted following the on-site calibration check was 455ppb. The zero offset noted at the analyser following the NO calibration checks was 2ppb.

Therefore $a = 451 / (455 - 2) = 0.9956$
 $b = -2$

4. Rescaling NO₂ values

Select **Edit**, **Edit Block** from the menu at the top of the Enview screen.

In this procedure you will instruct Enview to perform the following calculation: NO_x – NO. This results in a calculated value of NO₂ which is based on the newly rescaled NO_x and NO values.

If you are prompted for a Username/Password then simply select OK. The following screen appears:

Select/input the following parameters:

- Station
- Check the **NO₂** monitor only
- Ensure timebase is set to **15 Min.**
- Choose the **start** and **stop** dates and times that correspond to the period you are rescaling the data for

- Check the **Formula**, button – this is where the column identities are input.
- Type the following code into the Formula box:

M02-M01

Please note that “0” is a zero and the “2” and “1” correspond to the column identities found in Section 1. These column identities may differ from your set-up. To confirm; M02-M01 is equivalent to NO_x- NO.

- The Enview software insists that a description is entered prior to any calculation being performed, anything can be entered here.
- Select **OK**, and select **Yes** when prompted to **Run Calc.Avg**
- The NO₂ data has now been recalculated using the rescaled NO_x and NO values previously entered into the system.

QA/QC of diffusion tube monitoring

Diffusion tube precision for collocated studies for Staffordshire Scientific Services Laboratory for 2009 was good.⁸

WASP Performance for Staffordshire Scientific Services Laboratory on basis of RPI, OLD CRITERIA, best 4 out of the 5 rounds 103-107 was good

WASP Performance Staffordshire Scientific Services Laboratory on basis of RPI, NEW CRITERIA, best 4 out of the 5 rounds 103-107 was good⁹