UK Nitrogen Dioxide Network 2002

UK Nitrogen Dioxide Network 2002

Prepared by **netcen** as part of the Air Quality Research Programme of the Department for Environment, Food and Rural Affairs, the Scottish Executive, the Welsh Assembly Government and the Department of Environment in Northern Ireland.

Alison Loader
Diane Mooney
Tony Bush

July 2004

Title	UK Nitrogen Dioxide Network 2002
Customer	Department for Environment, Food and Rural Affairs, Scottish Executive, Welsh Assembly Government and the Department of Environment in Northern Ireland.
Customer reference	EPG 1/3/174
Confidentiality, copyright and reproduction	
File reference	ED 45005002
Report number	AEAT/ENV/R/1578
Report status	Issue 1

netcen
AEA Technology Environment
Culham Science Park
ABINGDON
Oxfordshire
OX14 3ED
Telephone +44 (0)870 190 6518
Facsimile +44 (0)870 190 6377

netcen is an operating division of AEA Technology plc
netcen is certificated to ISO9001 & ISO 14001

	Name	**Signature**	**Date**
Author	Alison Loader Diane Mooney Tony Bush		
Reviewed by	Ken Stevenson		
Approved by	Geoff Dollard		

Executive Summary

This is the tenth in a series of annual reports on the UK Nitrogen Dioxide Diffusion Tube Network (the NO_2 Network) covering calendar year 2002. This report also summarises the findings of the network over its ten years of operation, 1993 to 2002.

The network measures nitrogen dioxide (NO_2) in urban areas throughout the UK, in a collaborative effort between the Department for Environment, Food and Rural Affairs, the Scottish Executive, Welsh Assembly Government, the Department of Environment in Northern Ireland and Local/Unitary Authorities. Measurements are carried out using passive samplers (Palmes type diffusion tubes) at over 1200 sites. The network has two principal aims:

- to objectively assess the spatial and temporal distribution of NO_2 concentrations in a variety of urban environments in the UK
- to highlight areas where elevated concentrations of NO_2 occur and which may justify more detailed investigation using automatic techniques.

UK annual average NO_2 concentrations for 2002 were 39μg m^{-3} at roadside locations and 22μg m^{-3} at urban background locations. These UK average concentrations are consistent with previous years' results, and with road traffic emissions being the major emission source in urban areas. For the third consecutive year, the average NO_2 concentration at roadside locations has been below 40 μg m^{-3}, the Air Quality Strategy objective for annual mean NO_2 concentrations.

Estimates of the overall spatial distribution of NO_2 have been made for 2002, based on urban background sites. Areas of the UK with high NO_2 concentrations continue to match the geographical distribution of the major conurbations.

UK average concentrations at both site types have decreased gradually since the mid-1990s. A statistically significant downward trend in annual mean concentrations from 1993 to 2002 has been identified, in the case of both roadside and urban background sites. A similar pattern is shown by automatic measurements of NO_2 undertaken by the Automatic Urban and Rural Network. However, year-to-year variations in national average NO_2 concentrations throughout the period of operation of the NO_2 Network have been small, and may be affected by factors such as meteorology and variations in analytical performance. Further years' monitoring will identify whether or not this downward trend continues.

2002 was the first year since 1998 in which any sites in the UK were found to have an annual mean concentration equal to or greater than 91μg m^{-3}. This concentration represents a revised indicator for the EC Directive limit value for NO_2 (EC 85/203), which is not fully repealed until 2005.

It is estimated that 71 roadside sites, but no urban background sites, in the UK NO_2 Network may be at risk of exceeding the EC Daughter Directive objective for 2010. This estimate is based on measured concentrations during 2002, and recently revised emissions estimates and projections.

A total of 172 roadside sites, and 3 urban background sites, measured annual average NO_2 concentrations in excess of 40μg m^{-3}, during 2002. This concentration is an Air Quality Strategy objective, to be achieved by the end of 2005. Based on current predicted emissions reductions, it is estimated that almost all urban background locations will meet the Air Quality Strategy objective by the end of 2005: however, exceedence at roadside sites in 2005 may be widespread.

Contents

Executive Summary iii

Contents iv

1 Introduction 7

2 Monitoring Details 7

2.1 ORGANISATION OF THE NETWORK 7
2.2 DATA QUALITY PROCEDURES 8
2.3 FACTORS AFFECTING DIFFUSION TUBE PERFORMANCE 8

3 Results and Discussion 9

3.1 DATA CAPTURE 9
3.2 SPATIAL DISTRIBUTION OF NO_2 CONCENTRATIONS 9
3.2.1 National Average Roadside and Urban Background NO_2 Concentrations 9
3.2.2 Geographic Distribution of NO_2 Concentration 10
3.2.3 Regional Analysis 10
3.3 TEMPORAL VARIATION AND TRENDS 12
3.3.1 Seasonal Patterns 12
3.3.2 UK Trends 12
3.3.3 Trends in Roadside NO_2 Concentration 13
3.3.4 Trends in Urban Background Concentration 13
3.3.5 Regional Trends 13

4 Comparison With Limit Values And Objectives 14

4.1 COMPARISON WITH THE EC DIRECTIVE 85/203 FOR NO_2 14
4.2 COMPARISON WITH THE EC DAUGHTER DIRECTIVE LIMIT VALUES FOR NO_2 15
4.3 COMPARISON WITH THE AQS OBJECTIVE FOR ANNUAL AVERAGE NO_2 15

5 Comparison With Other Studies 16

5.1 COMPARISON WITH AUTOMATIC URBAN AND RURAL NETWORK 16
5.2 COMPARISON WITH ESTIMATED NO_X EMISSIONS 16

6 Future Initiatives 17

7 Conclusions 17

8 Acknowledgements 19

9 References 20

Appendices

APPENDIX A ANALYTICAL LABORATORY PERFORMANCE TESTING 2002
APPENDIX B REGIONAL DATA 2002

1 Introduction

The UK Nitrogen Dioxide Diffusion Tube Network (the NO_2 Network) is operated by **netcen** on behalf of the Department for Environment, Food and Rural Affairs (Defra), the Scottish Executive, the Welsh Assembly Government and the Department of Environment in Northern Ireland. The Network was established in 1993. Its objective is to assess the spatial and temporal distribution of nitrogen dioxide (NO_2) concentrations in a variety of urban areas of the UK, ranging from the major cities to smaller towns. This is done using NO_2 diffusion tubes: low-cost passive samplers ideal for indicative monitoring.

The current Network and previous more limited surveys[1,2] have acted as screening tools for identification of areas with high NO_2 concentrations. Areas identified in this way have been prioritised for further monitoring, with more sophisticated automatic techniques.

This report for 2002 is the tenth in a series of annual reports[3-11] of the UK Nitrogen Dioxide Diffusion Tube Network. It briefly documents the organisation and infrastructure of the network, which is more thoroughly covered in the previous reports. Concentrations measured in the UK during 2002 are presented in this report, together with national and regional statistics, and comparison with previous years' findings.

In this report, pollutant concentrations are expressed in microgrammes per cubic metre ($\mu g\ m^{-3}$). This is the unit used in the Air Quality Strategy. In reports for years prior to 1999, concentrations were expressed in part per billion by volume (ppb). To convert between these two units, the relationship is as follows:

1ppb = 1.91µg m^{-3} at 20°C and 101.3KPa

During 2002, the Network comprised a total of 1247 NO_2 diffusion tube monitoring sites, operated by 297 Local Authorities. Analysis of the diffusion tubes was carried out by 26 analytical laboratories, all of which took part in the NO_2 Network's Quality Assurance and Quality Control (QA/QC) systems. See Appendix A for more information on the Network's QA/QC. Ratification of the network's dataset was based on the data quality procedures set out in Section 2.2.

The full dataset for 2002 is included with the report on this CD ROM (or, for printed copies, on the CD ROM inside the back cover - see instructions on insert). This and previous years' data are also available on Defra's Air Quality Archive on the World Wide Web, at www.airquality.co.uk.

2 Monitoring Details

2.1 ORGANISATION OF THE NETWORK

Netcen, an operating body of AEA Technology Environment, acts as the co-ordinating body for the UK NO_2 Network and provides the framework under which monitoring of NO_2 by participating Local Authorities takes place. Diffusion tubes exposed by Local Authorities are analysed by analytical laboratories and the results forwarded to **netcen** for central collation and processing. In providing a centrally managed system for the monitoring of NO_2 on a national scale, **netcen**'s responsibilities involve the provision of the following services and deliverables:

- A framework for monitoring and instructions to participants in the form of the site operators' Instruction Manual[12], issued to all site operators and also available on the Air Quality Archive on the World Wide Web at http://www.airquality.co.uk/archive/reports/cat06/no2instr.pdf
- Central collation, checking and processing of data
- Data interpretation, advice and report production

- QA/QC systems for assessment and control of laboratory performance. There were substantial changes to the Network's laboratory performance testing scheme during 2002: these are detailed in Appendix A.

The information provided in the Instruction Manual to all network participants is instrumental in assuring the consistency of siting criteria and monitoring protocols for the network. As a consequence, it has been possible to establish a national survey that is optimised for monitoring of NO_2 concentrations in urban areas. Monthly measurements are routinely performed at four locations within each Local/Unitary Authority, in order to estimate the spatial distribution of NO_2 concentrations:

- **Roadside,** 1-5m from the kerb of a busy road (2 sampling locations).
- **Urban Background** (2 sampling locations), >50m from any busy road and typically in a residential area.

(Prior to 2001, the Network included a third site category, "Intermediate", comprising sites 20-30m from a busy road: this site category was discontinued at the end of December 2000, as it had been found to produce little additional information). Most Local Authorities operate two Roadside and two Urban Background sites, and the composition of the Network is now approximately 50% Roadside and 50% Urban Background sites. "Roadside" sites were formerly known as "Kerbside". The name was changed for better consistency with the "Roadside" site category as defined for automatic monitoring sites by the Local Air Quality Management Technical Guidance LAQM.TG(03)[13].

2.2 DATA QUALITY PROCEDURES

The following data quality assurance and control procedures were applied to the dataset in order to eliminate data with unsatisfactory accuracy, erroneously low measurements and data from sites with very low data capture:

- Data from laboratories whose performance failed to meet the required criteria in both the Health and Safety Laboratory's WASP programme for diffusion tubes *and* the Network Field Intercomparison Exercise are omitted from the network dataset. However, no laboratories failed to meet the criteria in 2002.
- All data below 3.82 $\mu g\ m^{-3}$ (2 ppb) have been eliminated, as such low values usually only occur in rural or remote locations. Such results are unlikely to be genuine at the urban sites comprising the Network.
- Tube changes must take place within $\pm$ 2 days of the dates specified in the exposure calendar supplied to all Local Authorities. Data are rejected if this is not the case.
- Annual averages are only calculated for sites with at least six months data from any period during the calendar year. Annex 1 of LAQM.TG(03) reports that, for urban non-roadside sites, six (consecutive) month mean NO_2 concentrations are usually within $\pm$ 15% of the annual mean[13].

2.3 FACTORS AFFECTING DIFFUSION TUBE PERFORMANCE

NO_2 diffusion tubes are an *indicative* monitoring technique: although ideal for screening studies and for identifying areas of high concentration, they do not offer the same accuracy as the automatic chemiluminescent analyser (which is defined by the EU as the reference method of measurement for this pollutant). Early research indicated that NO_2 measurements made with Palmes type diffusion tubes typically overestimated relative to chemiluminescent analyser measurements by up to around 30%[14,15]. However, NO_2 diffusion tubes are affected by several mechanisms which may cause them to exhibit positive bias (over-read), or negative bias (under-read) relative to the reference technique.

Over-read may be attributed to the individual and combined effect of three interfering factors;
- the shortening of the diffusive path length, by turbulence at the open end of the tube caused by wind[14,15].
- blocking of UV light by the tube material, resulting in reduced NO_2 photolysis in the tube[16]
- the interfering effects of peroxyacetyl nitrate (PAN)[15].

Some factors causing under-read are as follows:

- Increasing exposure period. It has been reported that the average of four consecutive one-week, or two consecutive two-week exposures is systematically greater than one four-week exposure[17,18]. This is thought to be caused by degradation of the absorbed nitrate over time[17].
- Insufficient extraction of nitrite from the grids.
- The photochemical degradation of the triethanolamine-nitrite complex by light. However, this has been largely minimised, by the widespread use of opaque diffusive end caps[5].
- In the specific case of tubes prepared using a 50% v/v solution of TEA in water, it has been reported that there may be a mechanism reducing NO_2 uptake, resulting in negative bias[19]. Tubes prepared using other methods (10% or 20% v/v solution of TEA in water, 50% solution of TEA in acetone) appear not to be affected.

Extensive validation exercises have been performed on the NO_2 diffusion tube methodology[14,20], which have shown a good agreement between diffusion tubes and the chemiluminescent technique. However, these exercises have largely been confined to urban background locations and the accuracy of diffusion tube measurements of NO_2 may be expected to be site specific, owing to the interference effect of reduced NO_2 photolysis[16]. In addition, the potential impact of other sampling artefacts such as differences in laboratory preparation and analysis must be considered[18,20]. The Technical Guidance LAQM.TG(03) recommends that Local Authorities making use of nitrogen dioxide diffusion tubes should carry out their own investigation of diffusion tube bias, by exposing tubes in triplicate at their own automatic site (or alternatively a suitable AURN site) for the duration of the study. If this is not possible they should seek verification from their laboratory.

3 Results and Discussion

3.1 DATA CAPTURE

Data capture rates by site location types and all sites returning valid monthly average concentrations are shown in Table 1 below. A total of 1247 sampler sites monitored nitrogen dioxide concentrations during 2002.

Table 1 Percentage of Sites Returning Valid Monthly Measurements from the UK NO_2 Network 2002

	Percentage Data Capture (%)												
	Jan	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Annual***
All Sites	84	85	86	87	84	84	86	83	88	89	89	86	95
Roadside	84	86	87	88	85	86	87	83	88	89	88	87	95
Urban Background	83	85	86	86	83	82	86	82	88	89	89	86	95

Annual averages are calculated for each site with at least 6 or more months' valid data. Therefore, "Annual" data capture figures in this table are higher than those for the individual months.

Data may be lost for a number of reasons, the most common being missing or vandalised tubes, and exposure periods differing from those specified by more than two days. However, in 2002 no data were rejected as a result of the laboratory QA/QC procedures (see Appendix A).

3.2 SPATIAL DISTRIBUTION OF NO_2 CONCENTRATIONS

3.2.1 National Average Roadside and Urban Background NO_2 Concentrations

Overall UK annual average NO_2 concentrations for 1993-2002 are shown in Table 2. UK annual concentrations during 2002 were higher at roadside locations (39μg m^{-3}), lower at urban background locations (22μg m^{-3}). This is consistent with previous years' findings, and with the expected urban pollutant distribution assuming road traffic as the major emissions source. Trends are discussed in section 3.3.

Table 2 National Annual Average NO_2 Concentrations from the UK NO_2 Diffusion Tube Network 1993-2002

	Annual Average NO_2 Concentration ($\mu g\ m^{-3}$)									
	1993	***1994***	***1995***	***1996***	***1997***	***1998***	**1999**	**2000**	**2001**	**2002**
Roadside	44	46	48	46	44	44	43	39	39	**39**
Urban Background	27	27	27	27	25	23	23	22	22	**22**

Table 3 presents the ratio of annual average NO_2 concentrations at roadside sites to annual average NO_2 concentrations at background sites. The ratio of roadside to urban background average concentrations appears to have remained consistent over the past 5 years.

Table 3 Average NO_2 Concentration Ratios by Location Type from the UK NO_2 Diffusion Tube Network 1993-2002

	1993	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***
Roadside : Urban Background	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8

3.2.2 Geographic Distribution of NO_2 Concentration

Figure 1 presents a map of annual average NO_2 concentrations at all roadside monitoring locations in the UK during 2002. Each site is represented by a dot: no attempt has been made to interpolate the data, as these roadside sites are only likely to be representative of their immediate vicinity. The highest values occurred mainly in the UK's major conurbations.

Figure 2 presents a 10 km by 10 km interpolated plot of average urban background NO_2 concentrations during 2002. This interpolated plot was produced using the same algorithm used in previous years' reports. The areas with higher NO_2 concentrations are generally consistent with the geographical distribution of the major conurbations within the UK. It should be noted that these maps are *not* representative of NO_2 concentrations at roadside locations or rural areas.

3.2.3 Regional Analysis

Table 4a and 4b present the regional annual average NO_2 concentration for the Government Office and Devolved Administrative Regions in the UK, for all years of the Network. Annual average NO_2 concentrations for each region during 2002 ranged from 27 $\mu g\ m^{-3}$ to 46 $\mu g\ m^{-3}$ at roadside locations. Concentrations at urban background locations ranged from 14 to 29 $\mu g\ m^{-3}$.

When comparing average NO_2 Network data between regions, some caution is needed. This is because there is some inter-regional variation in the mix of analytical laboratories used. For example many Scottish Local Authorities use laboratories in Scotland, while those in London and the South East typically use analysts based in southern England. Inter-laboratory differences may therefore contribute to observed regional differences. However, the region with the highest average roadside concentrations in 2002 was London (46 $\mu g\ m^{-3}$), followed by Yorkshire and the Humber (45 $\mu g\ m^{-3}$), the North West and Merseyside (44 $\mu g\ m^{-3}$), and the Eastern region (42 $\mu g\ m^{-3}$).

The region with the highest average urban background concentrations in 2002 was also London (29 $\mu g\ m^{-3}$), followed by Yorkshire and the Humber (26 $\mu g\ m^{-3}$) and the Eastern region (25 $\mu g\ m^{-3}$). Lowest average urban background concentrations (less than 20 $\mu g\ m^{-3}$) were measured in Scotland, Wales, the South West and Northern Ireland.

The twelve regions showed a mixture of increases and decreases in annual mean roadside NO_2 concentrations between 2001-2002. The largest apparent increase was for Scotland (from 32 $\mu g\ m^{-3}$ to 38 $\mu g\ m^{-3}$); considerably more roadside sites had annual means over 40 $\mu g\ m^{-3}$ than in 2001. The sites showing increases were not associated with any particular laboratory, hence this did not appear to be an analytical issue. Data from the eight AURN automatic monitoring sites in Scotland were examined to see if they showed similar increases: while some (Edinburgh Centre, Glasgow City Chambers, Glasgow Kerbside and Aberdeen) did show increases of upto 4$\mu g\ m^{-3}$ in annual mean NO_2 between 2001 and 2002, others (Glasgow Centre, Grangemouth, Inverness and Dumfries) showed no change or decreases of upto 2 $\mu g\ m^{-3}$.

Table 4a Summary of Regional Annual Average NO_2 Concentrations in the UK from the UK NO_2 Diffusion Tube Network 1993-2002.

Roadside

	Annual Average (µg m^{-3})									
	1993	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***
North East	34	25	34	32	36	36	34	32	31	32
North West & Merseyside	53	50	50	48	48	50	52	43	43	44
Yorkshire & The Humber	46	53	55	50	52	48	45	43	44	45
East Midlands	50	52	53	52	50	48	49	45	41	38
West Midlands	32	38	50	50	46	46	44	43	43	40
Eastern	48	52	52	50	44	42	48	44	41	42
London	50	57	55	57	50	48	50	45	47	46
South East	40	44	46	46	42	42	45	43	43	40
South West	42	46	40	42	42	38	37	35	37	33
Wales	38	38	40	38	36	36	37	32	31	33
Scotland	42	42	44	36	36	38	34	32	32	38
Northern Ireland	38	40	42	40	36	36	33	29	27	27

Table 4b Summary of Regional Annual Average NO_2 Concentrations in the UK from the UK NO_2 Diffusion Tube Network 1993-2002

Urban Background (& Intermediate up to 2000)

	Annual Average (µg m^{-3})									
	1993	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***
North East	23	23	27	23	21	21	20	20	19	22
North West & Merseyside	36	32	31	32	32	31	30	25	24	24
Yorkshire & The Humber	32	36	36	29	34	29	27	27	26	26
East Midlands	34	34	29	34	32	31	29	28	25	24
West Midlands	23	25	29	32	27	27	25	25	24	22
Eastern	31	34	32	32	29	27	30	29	25	25
London	36	40	38	38	36	36	35	32	29	29
South East	27	27	29	25	25	25	26	25	24	23
South West	23	23	23	23	25	23	20	19	17	16
Wales	23	23	23	31	19	19	18	16	15	17
Scotland	25	23	25	21	19	17	16	16	15	17
Northern Ireland	21	21	21	19	17	15	16	15	14	14

Note: the averages for 2001 onwards are based on Urban Background sites only.

The largest apparent decrease in the roadside category was for the South West (from 37 μg m^{-3} to 33 μg m^{-3}). Again, no obvious reason for this was identified.

A similar mixture of increases and decreases was seen in annual mean NO_2 concentrations at urban background locations between 2001-2002. However, in this case none of the changes were greater than 2μg m^{-3}.

Long term regional trends will be discussed in section 3.3.

3.3 TEMPORAL VARIATION AND TRENDS

3.3.1 Seasonal Patterns

Table 5a presents the monthly average NO_2 concentrations observed during 2002. There is a seasonal pattern, with the highest concentrations occurring in winter months for all location types. Table 5b shows the ratio of winter mean (October to March) to summer mean (April to September) for the years since 1993. Winter:summer ratios for 2001 and 2002 have been slightly higher than those measured in previous years.

Table 5a Monthly Average NO_2 Concentrations from the UK NO_2 Network 2002

	NO_2 Concentrations ($\mu g\ m^{-3}$)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
All sites	36	28	31	28	24	22	25	24	33	34	38	38
Roadside	43	36	40	38	34	31	34	33	43	43	47	45
Urban Background	29	21	22	18	15	14	16	16	23	25	30	31

Table 5b Winter: Summer Ratios of UK Average NO_2 Concentrations 2002

	Winter:Summer Ratio									
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
All sites	1.17	1.20	1.18	1.21	1.28	1.29	1.20	1.28	1.38	1.31
Roadside	1.05	1.05	1.03	0.99	1.09	1.14	1.06	1.13	1.24	1.19
Urban Background	1.28	1.37	1.33	1.29	1.46	1.45	1.34	1.44	1.66	1.54

3.3.2 UK Trends

Annual mean NO_2 concentrations for all site types, 1993 to 2002, are shown in Table 6 below. The 2002 data indicate that annual mean NO_2 concentrations for both roadside and urban background sites have remained stable since 2000. However, they remain generally lower than those measured during the 1990s. The mean for roadside sites was below $40\mu gm^{-3}$ for the third year running.

Throughout the operation of the Network, year-to-year changes have been small. However, linear regression analysis (Theil's non-parametric analysis) indicates a significant downward trend at the 95% confidence level, in annual mean NO_2 concentrations at both roadside and urban background sites since 1993.

Table 6 Annual Average NO_2 Concentrations as measured by the UK NO_2 Diffusion Tube Network

	Annual Average NO_2 Concentration ($\mu g\ m^{-3}$)									
	1993	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***
Roadside	44	46	48	46	44	44	43	39	39	39
Intermediate	32	32	34	32	31	29	29	27	-	-
Urban Background	27	27	27	27	25	23	23	22	22	22
Intermediate & Urban Background	29	29	29	29	27	25	25	23	-	-

Further evidence of trends in UK NO_2 concentrations is provided by an analysis of annual average data from a particular subset of sites. These are the sites that have remained in operation over the period 1994 to 2002. There are 614 such long-term operational sites (close to half the Network total), of which 218 are roadside and 396 are urban background.

These long-term sites show a similar pattern to the Network as a whole. The average annual mean NO_2 concentration for the 218 *long-running* roadside sites only has decreased from 44 $\mu g\ m^{-3}$ to 39 $\mu g\ m^{-3}$ between 1994 and 2002; a decrease of 11%. For the 396 *long-running* urban background sites only, the average Network annual mean NO_2 concentration has decreased from 27 $\mu g\ m^{-3}$ to 21

μg m^{-3} over the same period: a decrease of 22%. On average, concentrations at all 614 long-term sites have decreased by 12% between 1994 and 2002.

3.3.3 Trends in Roadside NO_2 Concentration

An analysis of the frequency distribution of roadside annual averages for 1993-2002 is provided in Figure 3. These ten years' data show the following patterns.

- The proportion of roadside sites with annual mean concentrations less than or equal to 38 μg m^{-3} has increased from around 30% in the mid 1990s to 58% in 2002.
- The proportion of roadside sites with annual mean concentrations in the range 38 to 48 μg m^{-3} has decreased slightly from around 30% to 27% over the duration of the Network.
- The proportion of roadside sites with annual mean concentrations greater than 57 μg m^{-3}, has decreased from around 20% in the mid-1990's to less than 10% during 2002.
- The proportion of roadside sites with annual mean concentrations greater than 76 μg m^{-3}, has remained small but constant at around 1-2% throughout 1993 - 2000. The proportion of sites in this category was 1% in 2002.

Figure 3 shows a gradual shift of the frequency distribution of annual average roadside measurements towards lower concentrations, between the mid-1990s and 2002.

3.3.4 Trends in Urban Background Concentration

Figure 4a and 4b present a series of 10 km by 10 km interpolated plots of the intermediate and urban background concentrations between 1993 and 2002 (background only from 2001 onwards). These were produced using a simple bilinear interpolation algorithm[21], identical to that used in previous years' reports. It should be noted that these maps are not representative of NO_2 concentrations at roadside locations or rural areas.

The areas with higher NO_2 concentrations correlate well with the geographical distribution of the major conurbations within the UK. The plots indicate a downward trend in NO_2 concentrations in many parts of the UK over the period of operation of the Network. Noticeably, areas with interpolated urban background concentrations in the range above 38μg m^{-3} decreased in size between 1993-1997, before disappearing in 1998. (Note: the

The changes in pollutant distribution are also reflected in the frequency distribution of annual average intermediate and urban background concentrations for 1993-2002 (Figure 5).
Figure 5, like Figure 3, shows a gradual shift of the frequency distribution of annual average measurements towards lower concentrations, between the mid 1990s and 2002.

3.3.5 Regional Trends

Table 4 above, and Figures 6a and 6b show how annual mean NO_2 concentrations for the twelve regions, as measured by the NO_2 Network, have changed over the past ten years. Roadside NO_2 concentrations in most regions increased slightly between 1993 and 1995, before decreasing in subsequent years. However, not all regions exhibited this pattern (exceptions being the North West and Merseyside, South East and North East – Figure 6a).

Figure 6b shows a general downward trend in intermediate and urban background NO_2 concentrations, between 1995 and 2002 in most regions. (Readers are reminded that the intermediate sites, which formerly comprised approximately one-third of this category, ceased operation at the end of 2000. This explains the noticeable decreases seen in all twelve regions between 2000 and 2001 for this joint site category.)

4 Comparison With Limit Values And Objectives

Ambient concentrations of nitrogen dioxide are covered by EC Directives, and by the UK's own Air Quality Strategy (AQS). Prior to 2001, within Europe this pollutant was covered by the 1985 NO_2 Directive (85/203/EC)[22]. This has been superseded by a new EC Directive (the 1st Daughter Directive, 1999/30/EC [23]) which came into force on 19 July 2001. However, the 1985 NO_2 Directive remains in force until fully repealed in January 2010, so demonstration of compliance is still required. In the UK, the Air Quality Regulations (2000) for England[24], Wales[25], and Scotland[26], and the Air Quality Limit Values Regulations (Northern Ireland) 2002[27] , include standards and objectives for NO_2. These are explained in the Air Quality Strategy (January 2000)[28]. Therefore, the following air quality standards for NO_2 were applicable to the UK in 2002:

1. EC 85/203.	Limit Value, 200 μg m^{-3} (105 ppb) as the 98th percentile of hourly averages Guide Value, 135 μg m^{-3} (70.6 ppb) as the 98th percentile of hourly averages Guide Value, 50 μg m^{-3} (26 ppb) as the 50th percentile of hourly averages
2. 1st Daughter Directive	200 μg m^{-3} (105 ppb) as an hourly average, not to be exceeded more than 18 times in a calendar year, to be achieved by 1 January 2010
1999/30/EC	40 μg m^{-3} (21 ppb) as an annual average, to be achieved by 1 January 2010 30 μg m^{-3} as an annual average for *total NOx*, for protection of vegetation in rural areas only. To be achieved by 19 July 2001
3. AQS Objectives	200 μg m^{-3} (105 ppb) as an hourly average not to be exceeded more than 18 times in a calendar year, to be achieved by 31 December 2005. 40 μg m^{-3} (21 ppb) as an annual average to be achieved by 31 December 2005 30 μg m^{-3} as an annual average for *total NOx*, for protection of vegetation in rural areas only. To be achieved by 19 July 2001

In the case of the AQS Objectives and Daughter Directive, "exceedence" is defined as "greater than".

Both the UK Air Quality Regulations and the EC Daughter Directive contain air quality standards for annual mean NO_2, which can be directly compared with diffusion tube measurement data. Appendix B identifies individual monitoring locations with annual average concentrations greater than the AQS objective of 40 μg m^{-3} (to be achieved by 2005).

4.1 COMPARISON WITH THE EC DIRECTIVE 85/203 FOR NO_2

The Limit and Guide Values of Directive 85/203 refer to hourly NO_2 measurements over a calendar year. Diffusion tube data cannot, therefore, be directly compared with these values. However, as explained in earlier reports a scaling factor of 2.2 has been derived for the UK[10], which can be used to scale the 98th percentile Limit Value, to produce surrogate statistics for annual average concentrations. This approach produces an EC Directive Limit Value surrogate statistic of approximately 91μg m^{-3}. During 2002 two roadside sites measured annual average NO_2 concentrations equal to or greater than 91 μg m^{-3}. This is the first time since 1998 that this value has been exceeded. The two sites are MANCHESTER 1N and GLASGOW 1N. Both are roadside sites in city centre locations; however both have shown substantial increases on 2001 annual means. In the case of MANCHESTER 1N, there have been significant changes to the quantity, type and speed of traffic on the adjacent road. In the case of Glasgow 1N, no obvious reason for the increase was identified, but it was noted that the nearby Glasgow Kerbside AURN site also showed an increase in annual mean NO_2 concentration, from 71 μg m^{-3} in 2001 to 75 μg m^{-3} in 2002.

4.2 COMPARISON WITH THE EC DAUGHTER DIRECTIVE LIMIT VALUES FOR NO_2

The first EC Daughter Directive (1999/30/EC) has set an annual mean Limit Value for NO_2 of 40μg m^{-3}, to be achieved by 2010. In 2002, 213 roadside sites (35% of all roadside sites), and just 6 urban background sites (0.9% of all urban background sites) measured annual average concentrations greater than 40μg m^{-3}.

LAQM.TG(03) provides a method for predicting locations that might have difficulty achieving compliance with AQS objectives or EC Directive Limit Value in future years. Based on modelling exercises and emission inventory predictions, it is estimated that annual mean NO_2 concentration for 2010 will be equivalent to the 2002 concentration multiplied by a factor of 0.757 for roadside sites, and equivalent to the 2002 concentration multiplied by a factor of 0.800 at urban background sites[13]. On this basis, it is estimated that, on average, roadside sites measuring in excess of 52.8 μg m^{-3}, and urban background sites measuring in excess of 50.0 μg m^{-3} during 2002 may be at risk of exceeding the EC Daughter Directive Limit Value of 40μg m^{-3} in 2010. A total of 71 roadside sites had annual mean NO_2 concentrations greater than 52.8 μg m^{-3} in 2002, and have therefore been identified as at risk of exceeding the EC Daughter Directive objective in 2010. No urban background sites had an annual mean of 50.0μg m^{-3} and therefore no Network sites of this type appear to be at risk of exceeding the EC Daughter Directive objective in 2010.

4.3 COMPARISON WITH THE AQS OBJECTIVE FOR ANNUAL AVERAGE NO_2

The Air Quality Regulations 2000 for England[24], Wales[25], and Scotland[26] formally prescribe the following air quality objectives for the end of 2005, (as set out by the AQS[28]), as part of UK legislation:

- 200 μg m^{-3} (105 ppb) as an hourly average not to be exceeded more than 18 times in a calendar year, to be achieved by the end of 2005.
- 40 μg m^{-3} (21 ppb) or less, when expressed as an annual average to be achieved by the end of 2005

The Air Quality Limit Values Regulations (Northern Ireland) 2002[27] formally prescribe the same limits for Northern Ireland, but to be achieved by the later data of 1st January 2010. These regulations trigger the duties of Local Authorities to review and assess the air quality in their locality, both for the present and for the end of 2005 or 2010 as appropriate. The focus of the review and assessment for the annual average NO_2 standard should be concentrated on non-occupational, near ground level outdoor locations where a person might reasonably be exposed over the relevant averaging period of the objective. For the annual NO_2 objective this includes background and roadside locations in the vicinity of housing, schools, hospitals, etc. Sites located very close to the kerb of a road are *not* included in this description of a relevant location. Many of the roadside sites in this network do not strictly conform to these location criteria. Nevertheless, comparisons of annual average concentrations at all sites are included here for completeness. This practice may result in an overestimation of the number of sites exceeding the annual average NO_2 objective.

It is recognised that at most locations the annual average objective is more stringent than the hourly average objective[13]: therefore in practice most sites that meet the former will also meet the latter (possible exceptions being locations affected by emissions from nearby large stationary sources). Annual average NO_2 concentrations from the UK NO_2 Network have been compared directly with the 40μg m^{-3} AQS objective. As this value is the same as the Daughter Directive annual mean Limit Value for NO_2 of 40μg m^{-3}, please refer to section 4.1.2 above for the number of sites with concentrations greater than 40μg m^{-3} during 2002.

As in the case of the EC Daughter Directive objectives above, threshold concentrations have been estimated for 2002, above which compliance with the AQS Limit Value of 40μg m^{-3} for NO_2 is unlikely to be achieved in 2005 [13]. It is estimated that, on average, roadside sites measuring in excess of 43.5 μg m^{-3}, and urban background sites measuring in excess of 42.8 μg m^{-3} during 2002 may be at risk of exceeding the AQS objective of 40μg m^{-3} in 2005. A total of 172 roadside sites had annual mean NO_2 concentrations greater than 43.5 μg m^{-3} in 2002, and are therefore identified as at risk of exceeding the AQS objective in 2005, *if there is relevant public exposure*. Three urban background

sites, in Walsall, Manchester and Brent, had annual means greater than 42.8 μg m^{-3} and are therefore also at risk of exceeding the AQS objective in 2005, but again, only if there is relevant public exposure.

This is consistent with the conclusions of the recent consultation draft report produced by the Air Quality Expert Group (AQEG)[29], which acknowledges that there are likely to be some exceedences of objectives and limit values for NO_2.

5 Comparison With Other Studies

5.1 COMPARISON WITH AUTOMATIC URBAN AND RURAL NETWORK

Oxides of nitrogen are also monitored by the Automatic Urban and Rural Network (AURN), using the chemiluminescent analyser. Figure 7 compares annual mean NO_2 concentrations at the following site categories in the Automatic Urban and Rural Network (AURN) and the NO_2 Network, over the years 1993-2002:

- AURN Roadside sites (1-5m from the kerb).
- AURN Urban Centre and Urban Background sites (these are situated at non-roadside locations in larger towns and cities).
- NO_2 Network roadside, intermediate (upto 2000) and urban background sites.

The annual means for the AURN sites are based on all sites with at least 75% data capture for the year. It should be noted that the two networks differ in three important respects:

- The monitoring methods used are different.
- There are relatively few AURN sites compared with the number of NO_2 Network sites. While the number of AURN roadside sites has risen from 7 in 1997 to 21 in 2002, and the number of AURN urban centre and urban background sites has risen from 11 in 1993 to 53 in 2002, these totals remain much lower than NO_2 Network site numbers.
- the AURN urban sites, particularly in the earlier years, were located predominantly in major towns and cities, while the NO_2 Network contains a substantial proportion of sites in small towns.

The mean NO_2 concentration at AURN roadside sites is consistently higher than the mean based on all NO_2 Network roadside sites. Similarly, the mean NO_2 concentrations based on all AURN urban centre and urban background sites are consistently higher than the means for all NO_2 Network urban background sites. This may be due to the AURN sites being mainly in major towns.

However, both networks show a small but consistent general downward trend since the early/mid 1990s. Both networks indicate that ambient concentrations of NO_2 in urban areas are gradually decreasing.

5.2 COMPARISON WITH ESTIMATED NO_X EMISSIONS

Estimates of total NO_x emissions in the UK from National Atmospheric Emissions Inventory (NAEI)[30] are given in Table 7 below, and show a decrease of 687 ktonnes (29% of 1993 total) between 1993-2001 (2002 figures are not available yet). Emissions of NO_x from road transport also show a reduction of approximately 31% over the same period, largely due to the increased use of catalytic converters on road vehicles.

Table 7 Estimated NO_x Emissions in the UK 1993-2001[30]

	Estimated NO_x Emission (ktonnes)								
Source	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***
Total (all sources)	**2367**	**2301**	**2174**	**2164**	**2012**	**1918**	**1810**	**1737**	**1680**
Total Road Transport	1144	1114	1067	1067	1024	958	915	848	781

UK mean ambient NO_2 concentrations, as measured by the NO_2 Network, have decreased by 19% (urban background sites) and 11% (roadside sites) over the same period. Estimated total NO_x emissions have therefore shown a considerably greater decrease than ambient NO_2 concentrations. The lack of direct correspondence between reductions in NO_x emissions and ambient NO_2 concentration may be explained by the secondary pollutant nature of NO_2; it is formed by oxidation of NO in the atmosphere. Also, at sites with high NO_x concentrations, atmospheric NO_2 concentrations are largely governed by the amount of oxidant available[1,13]. In urban areas the major atmospheric oxidant is ozone. Hence, for a given quantity of atmospheric oxidant, the percentage reduction in NO_2, as a result of a reduction in NO_x emissions, will be less than the percentage reduction in NO_x.

6 Future Initiatives

The UK NO_2 Network continues to provide information on the spatial distribution of NO_2 in a variety of urban areas throughout the UK. Additionally, as the survey's historical dataset has increased, long-term trends in NO_2 have been identified at national levels.

However, there is still a need for more information on the factors affecting performance of Palmes type diffusion tubes in the field. For this reason, in November 2002 the annual Field Intercomparison was substantially expanded.

Formerly, the Intercomparison was a short-term trial of one or two months duration, intended to provide information on the uncertainties arising from both the sampling and analysis phases of diffusive sampling in the field, for quality control purposes (see description in Appendix 1). However, its short-term nature meant it could only provide a "snapshot" of performance at any one time. More information is needed about how factors such as bias and precision might vary from month to month, and also how seasonal factors might affect tube performance.

Therefore, an ongoing monthly intercomparison trial has been set up, and will be operated independently by the Health and Safety Laboratory (HSL), who are currently responsible for the WASP programme. A triplet of tubes from each participating laboratory is exposed monthly at an urban background AURN-affiliated site, and the results compared with the on-site chemiluminescent NOx analyser. Participating laboratories will be informed of their performance with respect to the reference technique (the chemiluminescent analyser) on a monthly basis. From 2003 onwards, the full year's data will be compared with agreed performance criteria. However, the emphasis will be on investigating monthly and seasonal variations in performance, for a large number of laboratories, rather than purely testing performance.

7 Conclusions

The conclusions from the NO_2 Network for 2002 are as follows:

1. Overall annual average concentrations for 2002 at the sampler locations monitored were as follows: Roadside 39 μg m^{-3}, Urban Background 22μg m^{-3}. These annual averages are identical to those measured in the last two years (2000 and 2001). Average UK NO_2 concentrations as measured by this network appear to have remained stable over the past three years.

2. The ratio of roadside to urban background UK annual mean concentrations remains consistent with those found in previous years.

3. The spatial distribution of urban background NO_2 concentrations for 2002 has been plotted by interpolation of annual mean urban background results. Highest interpolated concentrations still correlate well with the major urban conurbations of the UK.

Over the ten years 1993 to 2002, the following conclusions are presented on long-term trends in ambient NO_2 concentrations in the UK:

4. A small but statistically significant downward trend has been identified in the annual means from 1993 to 2002, for both roadside and urban background site types. This trend remains significant at the 95% confidence level, despite the apparent stability in mean NO_2 concentrations as measured by this network during 2000-2002.

5. Analysis of data from long-term monitoring sites running between 1994 and 2002 indicates decreasing annual mean concentrations at the majority of such long-running sites, consistent with the pattern for the Network as a whole.

6. The series of interpolated maps of urban background NO_2 concentrations for 1993 to 2002 show that regions of relatively high concentration have reduced over this period.

7. Mean NO_2 concentrations measured at roadside and urban background sites in the Automatic Urban and Rural Network, while typically higher than those measured by the NO_2 Network, show a similar small downward trend over the NO_2 Network's period of operation.

8. However, observed year-to-year variations in national average NO_2 concentrations throughout the period of operation of the Network have been small, and may be influenced by factors such as meteorology and variations in analytical performance.

Comparison of NO_2 Network results for 2002 with applicable Limit Values and Air Quality Objectives led to the following conclusions:

9. Two roadside sites in the Network were found to have an annual average NO_2 concentration greater than the revised surrogate statistic for the EC Directive (EC 85/203) Limit Value (91μg m^{-3}) during 2002. This is the first time since 1998 that any sites have exceeded this surrogate value.

10. 71 roadside sites (but no urban background sites) were identified as being at risk of exceeding the EC Daughter Directive objective for 2010 based on current emissions projection scenarios.

11. A total of 175 sites, all but three of which were roadside, were identified as being at risk of exceeding the AQS objective for the end of 2005 based on current emissions projection scenarios. This is consistent with the conclusions of the recent AQEG consultation draft report, which predicts some exceedence of NO_2 objectives at roadside locations.

8 Acknowledgements

All of the measurement data presented in this series of reports from 1993 to 2002 have been collected by the participating Local Authorities, at their own expense, and supplied to **netcen** as part of the study. This contribution and co-operation from the Local Authorities over the past ten years is gratefully acknowledged.

The central organisation of the study, analysis of data and organisation of laboratory field intercomparisons has been funded by the Department for Environment, Food and Rural Affairs, the Scottish Executive, the Welsh Assembly Government and the Department of Environment in Northern Ireland as part of the Air Quality research programme.

The work of the Health and Safety Laboratory in the QA/QC programmes is also gratefully acknowledged.

9 References

1. Bower, J.S. et al. A Diffusion Tube Survey of NO_2 Levels in Urban Areas of the UK. Atmospheric Environment, Vol. 25B, No. 2, pp 255-265, 1991.
2. Campbell, G.W, Stedman J. R, and Stevenson K. J. A Survey of Nitrogen Dioxide Concentrations in the United Kingdom using Diffusion Tubes, July-December 1991. Atmospheric Environment. Vol. 28, No 3, pp 477-486, 1994.
3. Stevenson, K.J. and Bush, T. UK Nitrogen Dioxide Survey Results for the First Year-1993. AEA Technology, AEA/CS/RAMP/16419031/002, 1994.
4. Stevenson, K.J. and Bush, T. UK Nitrogen Dioxide Survey 1994. AEA Technology. AEAT - 0085, ISBN 0-7958-1711-3.
5. Stevenson, K.J., Bush, T. and Mooney D. UK Nitrogen Dioxide Survey 1995. AEA Technology, AEAT - 0912, ISBN 0-7058-1703-X.
6. Bush, T, Mooney D and Stevenson, K.J. UK Nitrogen Dioxide Survey 1996. AEA Technology. AEAT - 2279, ISBN 0-7058-1760-1.
7. Bush, T, Mooney D and Stevenson, K.J. UK Nitrogen Dioxide Survey 1997. AEA Technology. AEAT - 4565, ISBN 0-7058-1774-1.
8. Bush, T, Mooney D, Stevenson, K.J. UK Nitrogen Dioxide Survey 1998. AEA Technology. AEAT - 0047, ISBN 0-7058-1791-1.
9. Bush, T, Mooney D, Loader, A. UK Nitrogen Dioxide Survey 1999. AEA Technology. AEAT/ENV/R/0365, ISBN 0-7058-1799-7.
10. Bush, T, Mooney D, Loader, A. UK Nitrogen Dioxide Survey 2000. AEA Technology. AEAT/ENV/R/0669, ISBN 0-7058-1802-0.
11. Loader A, Mooney D and Bush T. UK Nitrogen Dioxide Survey 2001. AEA Technology. AEAT/ENV/R/1227.
12. Bush, T UK Nitrogen Dioxide Network Instruction Manual, AEAT/3675 November 2000. Available via http://www.aeat.co.uk/netcen/airqual/reports/no2man/no2man.html .
13. Part IV of Environment Act 1995: Local Air Quality Management Technical Guidance. LAQM.TG(03) Produced by Defra, 2003.
14. Campbell G. W, Stedman J. R, and Stevenson, K.J. A Survey of Nitrogen Dioxide Concentrations in the United Kingdom Using Diffusion Tubes, July - December 1991. Atmospheric Environment Vol. 28, No. 3, pp 477-486, 1994.
15. Atkins C.H.F, Sandalls J, Law D.V, Hough A.M, and Stevenson K.J. The Measurement of Nitrogen Dioxide in the Outdoor Environment Using Passive Diffusion Tube Samplers. Harwell Energy & Environment Report. No. AERE-R 12133. February 1986.
16. Heal M. R, O'Donoghue M. A, and Cape J. N. Overestimation of urban nitrogen dioxide by passive diffusion tubes: a comparative exposure and model study. Atmospheric Environment 33, pp 513-524, 1999.
17. MR Heal, C Kirby and JN Cape, Systematic Biases in Measurement of Urban Nitrogen Dioxide using Passive Diffusion Samplers, Environ. Monitoring and Assessment **62**: 39-54, 2000.
18. D Laxen, P Wilson: Compilation of Diffusion Tube Collocation Studies Carried Out by Local Authorities. Report prepared for Defra by Air Quality Consultants Ltd, Nov 2002.
19. C Kirby, M Fox, J Waterhouse. Reliability of nitrogen dioxide passive diffusion tubes for ambient measurement: in situ properties of the triethanolamine absorbent. J. Environ. Monit. , 2000, **2**, 307-312.
20. Bush T, Smith S , Stevenson K, Moorcroft S. Validation of Nitrogen Dioxide Diffusion Tube Methodology in the UK. Atmospheric Environment 35 (2001) 289-296.
21. Stedman J R. Revised High Resolution Maps of Background Air Pollutant Concentrations in the UK: AEA Technology1996.
    AEAT - 3133, Issue 2. March 1998.
22. The Council of the European Communities Directive on air quality standards for nitrogen dioxide, 85/203/EEC. 7 March 1985.
23. The Council of the European Union Directive relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, 1999/30/EC. 22 April 1999
24. The Air Quality (England) Regulations 2000 (Statutory Instrument 2000 No. 928), March 2000.

25. The Air Quality (Wales) Regulations 2000 (Statutory Instrument 2000 No. 1940 (W.138)), July 2000.
26. The Air Quality (Scotland) Regulations 2000 (Scottish Statutory Instrument 2000 No. 97), March 2000.
27. The Air Quality Limit Values Regulations (Northern Ireland) 2002 (Statutory Rule 2002 No. 94), March 2002.
28. The Air Quality Strategy for England , Scotland, Wales and Northern Ireland. DETR, Scottish Executive, National Assembly for Wales and the Department of Environment in Northern Ireland, January 2000. ISBN 0-10-145482-1, HMSO publication.
29. Nitrogen Dioxide in the United Kingdom: draft document for consultation, produced for Defra by the Air Quality Expert Group, May 2003, http://www.defra.gov.uk/corporate/consult/aqeg-no2
30. National Atmospheric Emissions Inventory (NAEI). http://www.naei.org.uk/

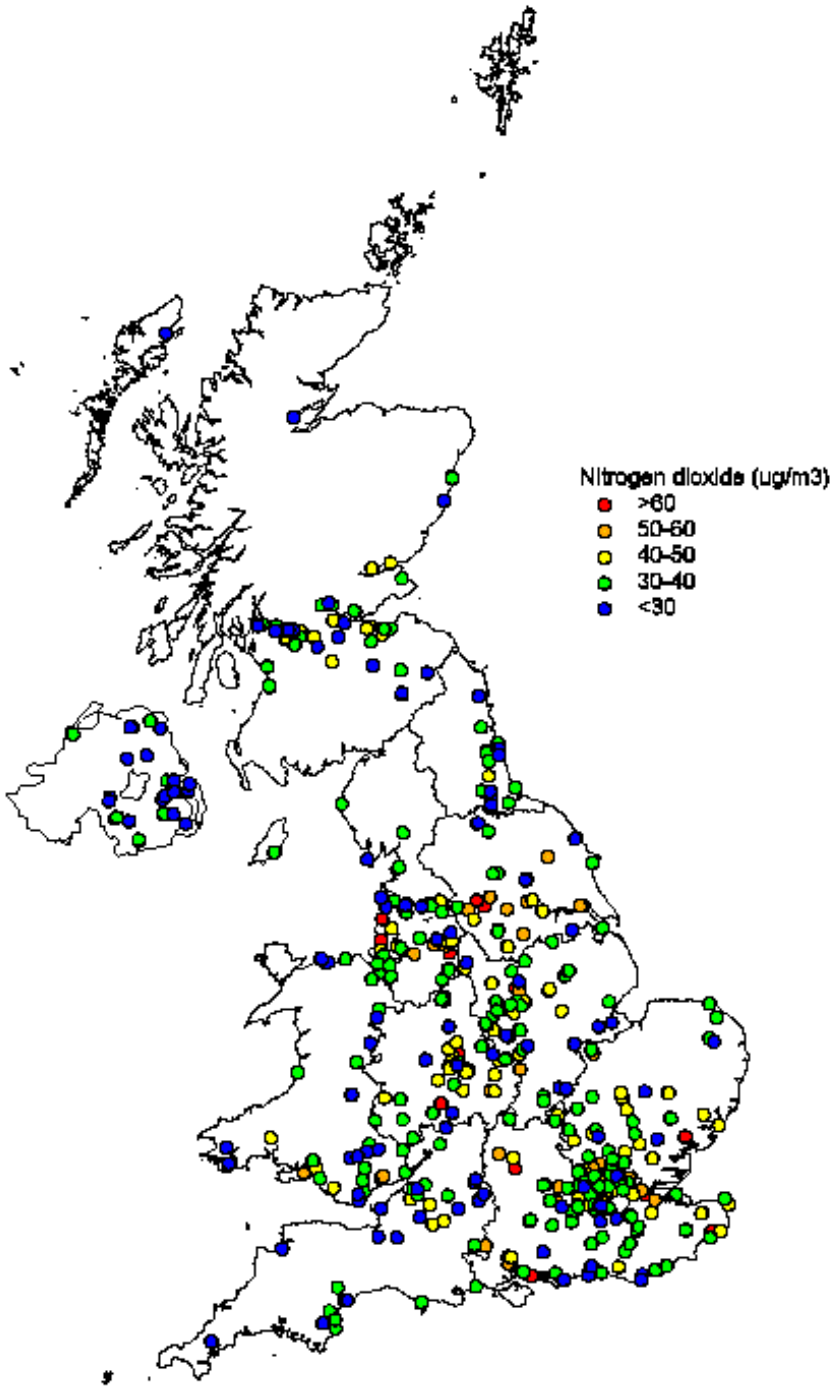


Figure 1 **Annual Average Roadside NO_2 Concentrations in the UK NO_2 Network 2002**

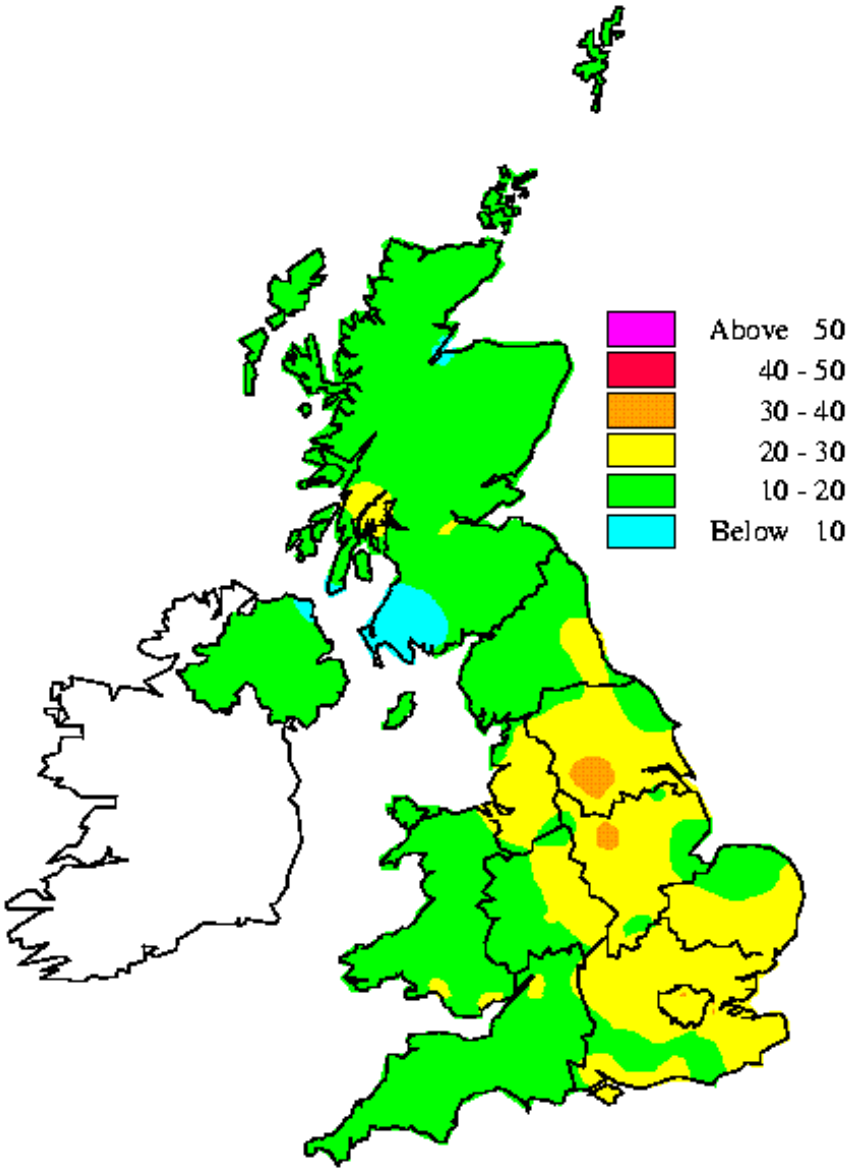


Figure 2 **Interpolated Plot of Annual Average Urban Background NO_2 Concentrations in the UK NO_2 Network 2002 (μg m^{-3})**

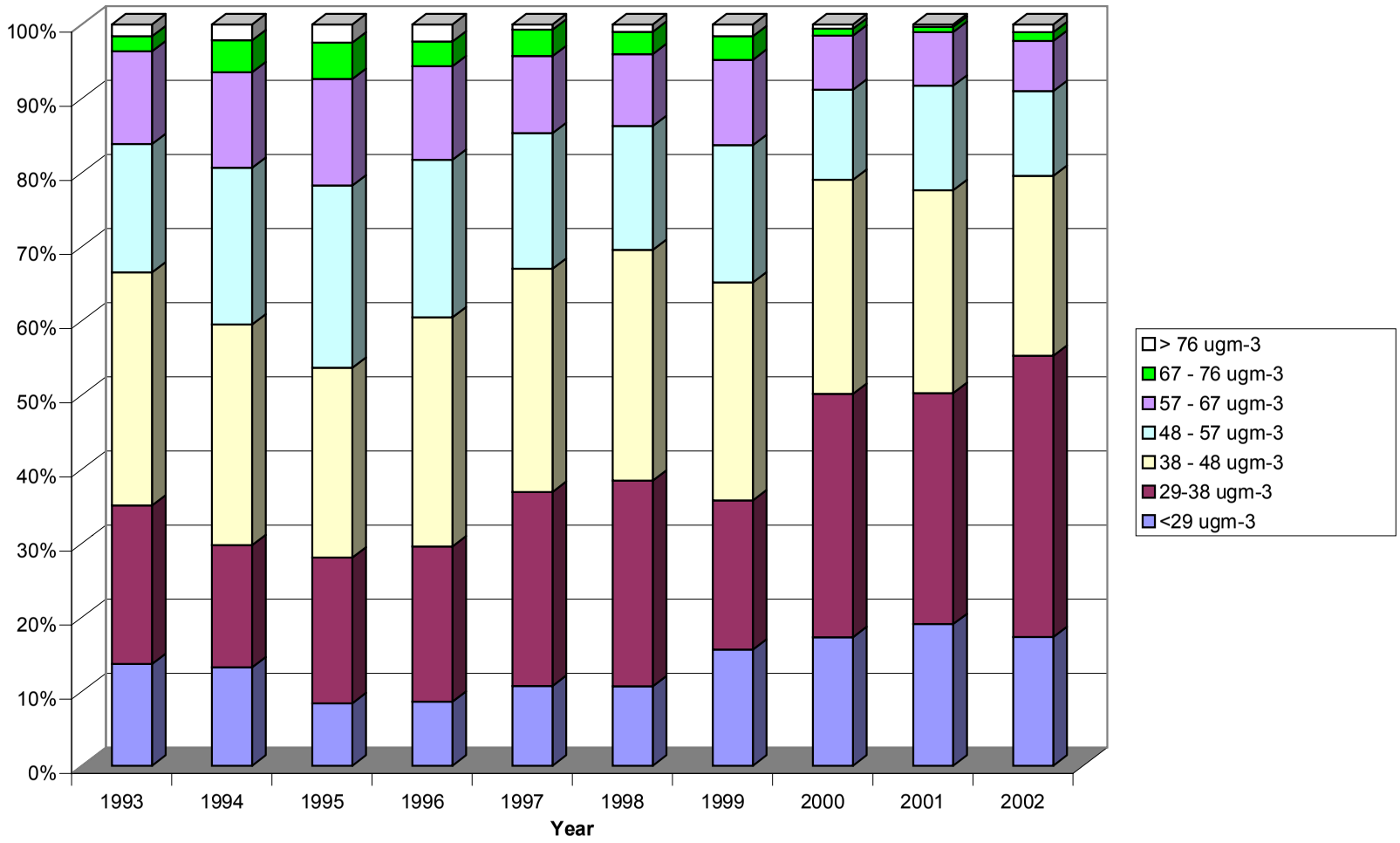


Figure 3 Frequency Distribution of Annual Mean Roadside Nitrogen Dioxide Concentration, 1993 – 2002.

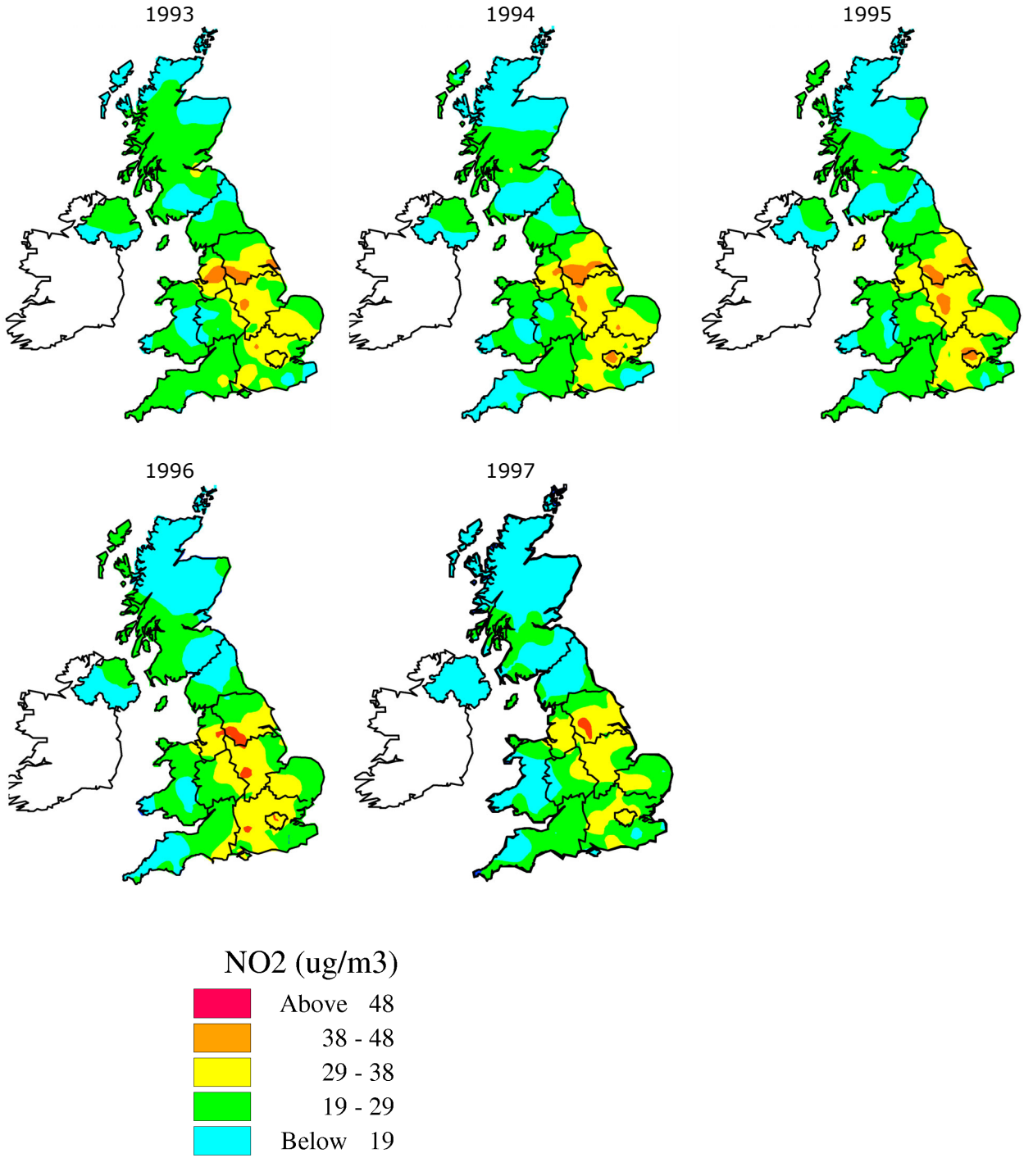


Figure 4a **Interpolated plots of annual average intermediate and urban background NO_2 concentrations in the UK NO_2 Network 1993-1997**

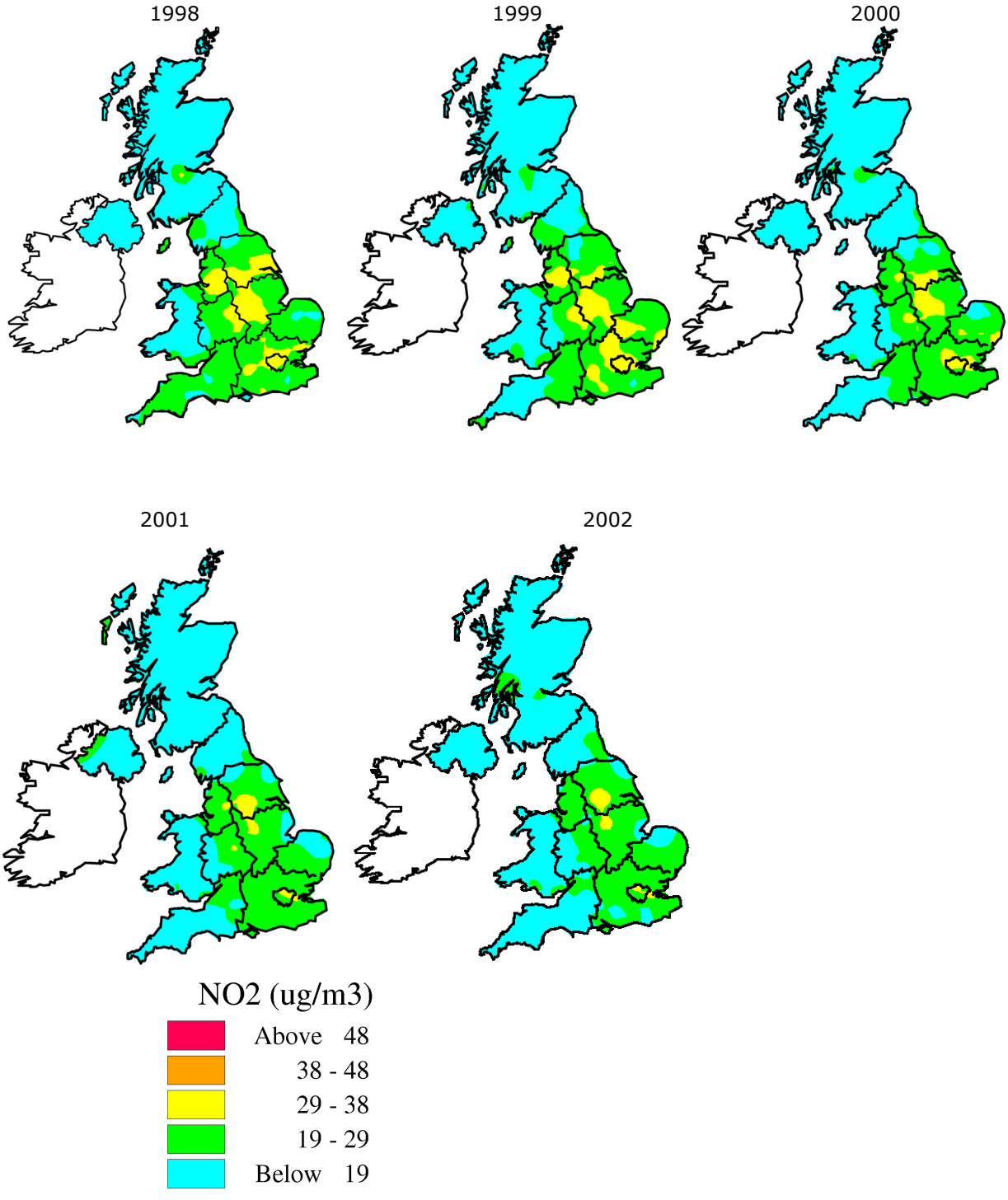


Figure 4b **Interpolated plots of annual average intermediate and urban background NO_2 concentrations in the UK NO_2 Network 1998-2002.**

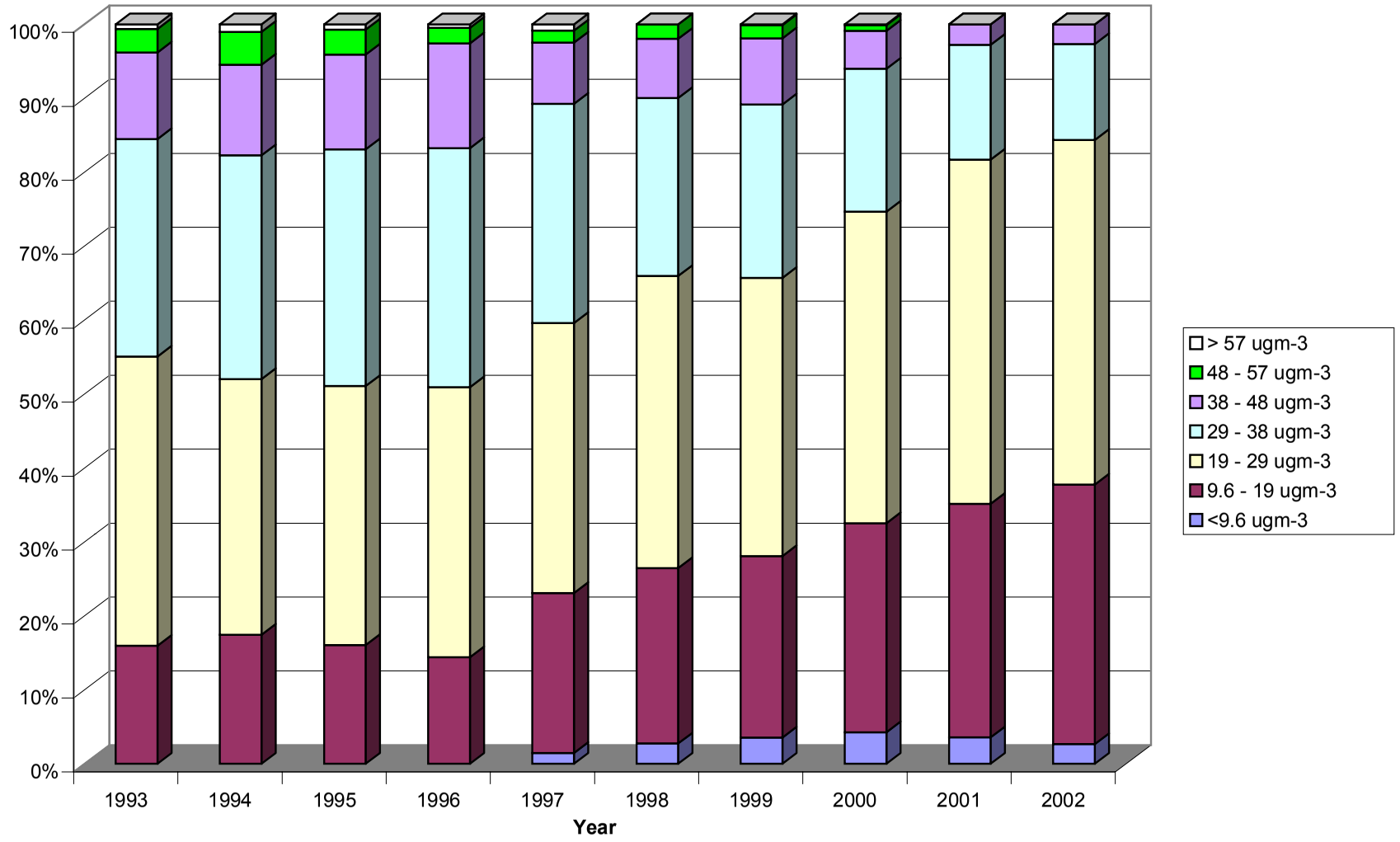


Figure 5. Frequency Distribution of Annual Mean Urban Background* Nitrogen Dioxide Concentration, 1993 – 2002.
**** including Intermediate until 2000.***

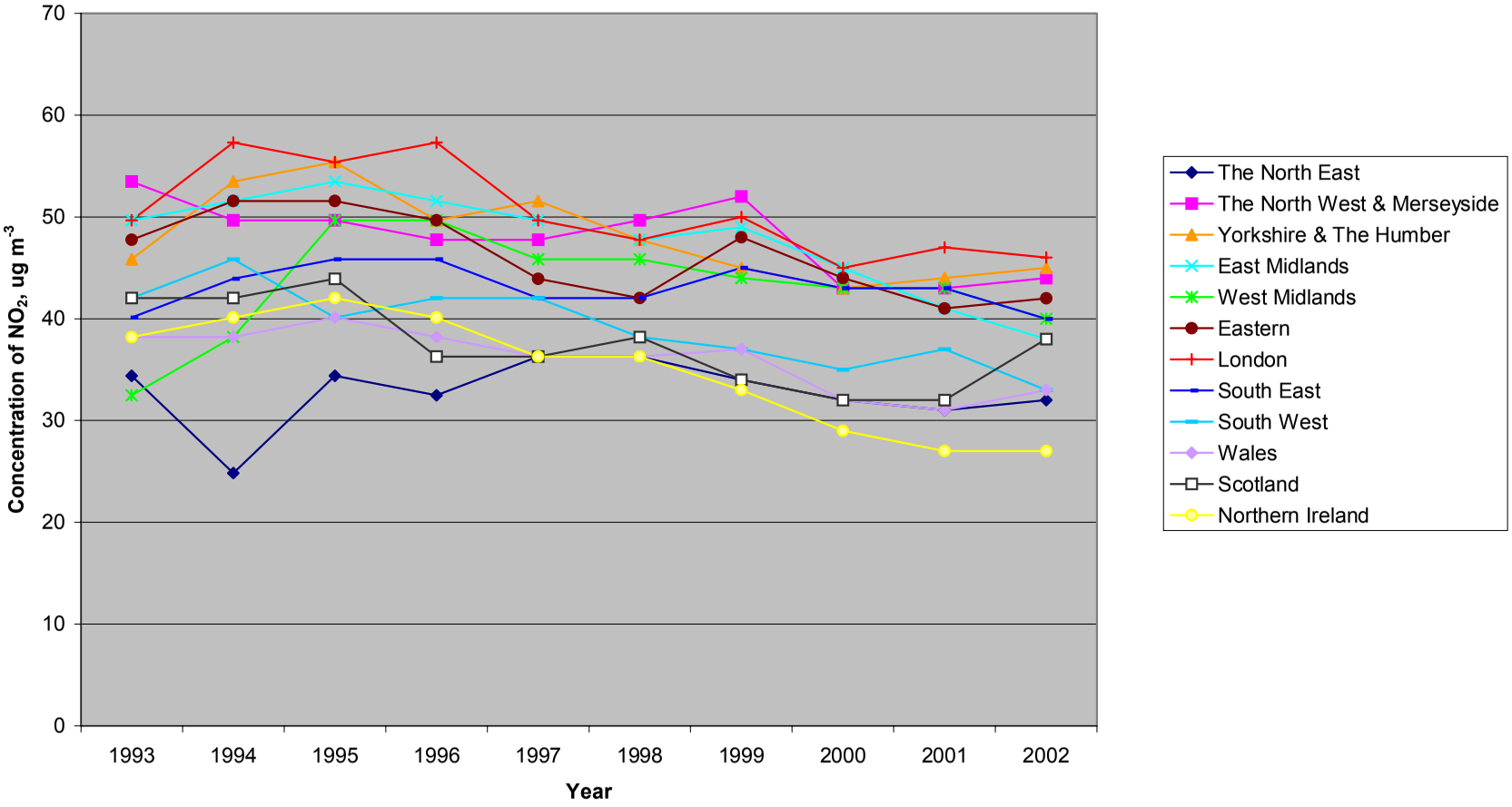


Figure 6a. Regional Average NO_2 Concentrations at Roadside Sites in the UK, as measured by the UK NO_2 Diffusion Tube Network 1993-2002.

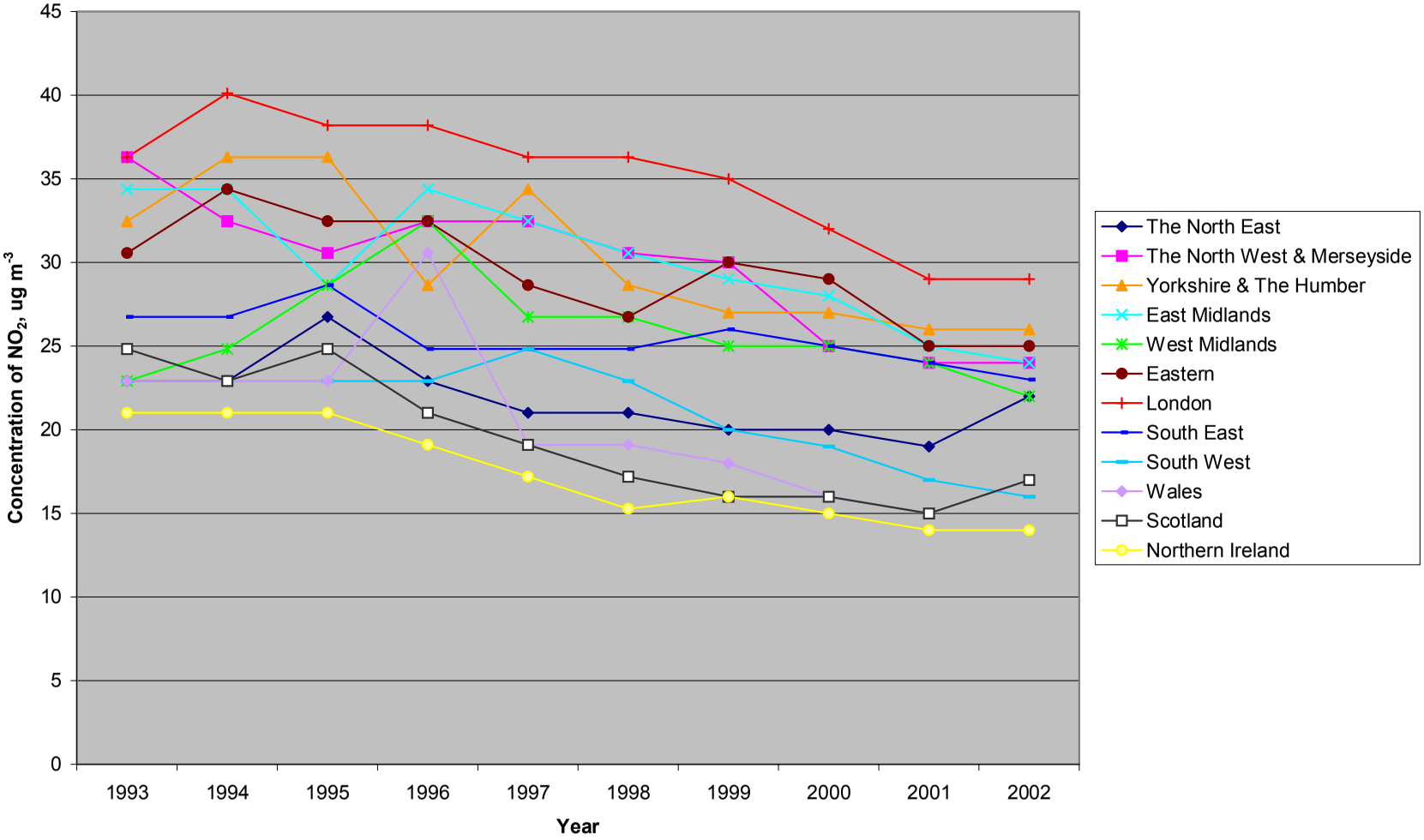


Figure 6b. **Regional Average NO_2 Concentrations at Urban Background Sites in the UK, as measured by the UK NO_2 Diffusion Tube Network 1993-2002.**

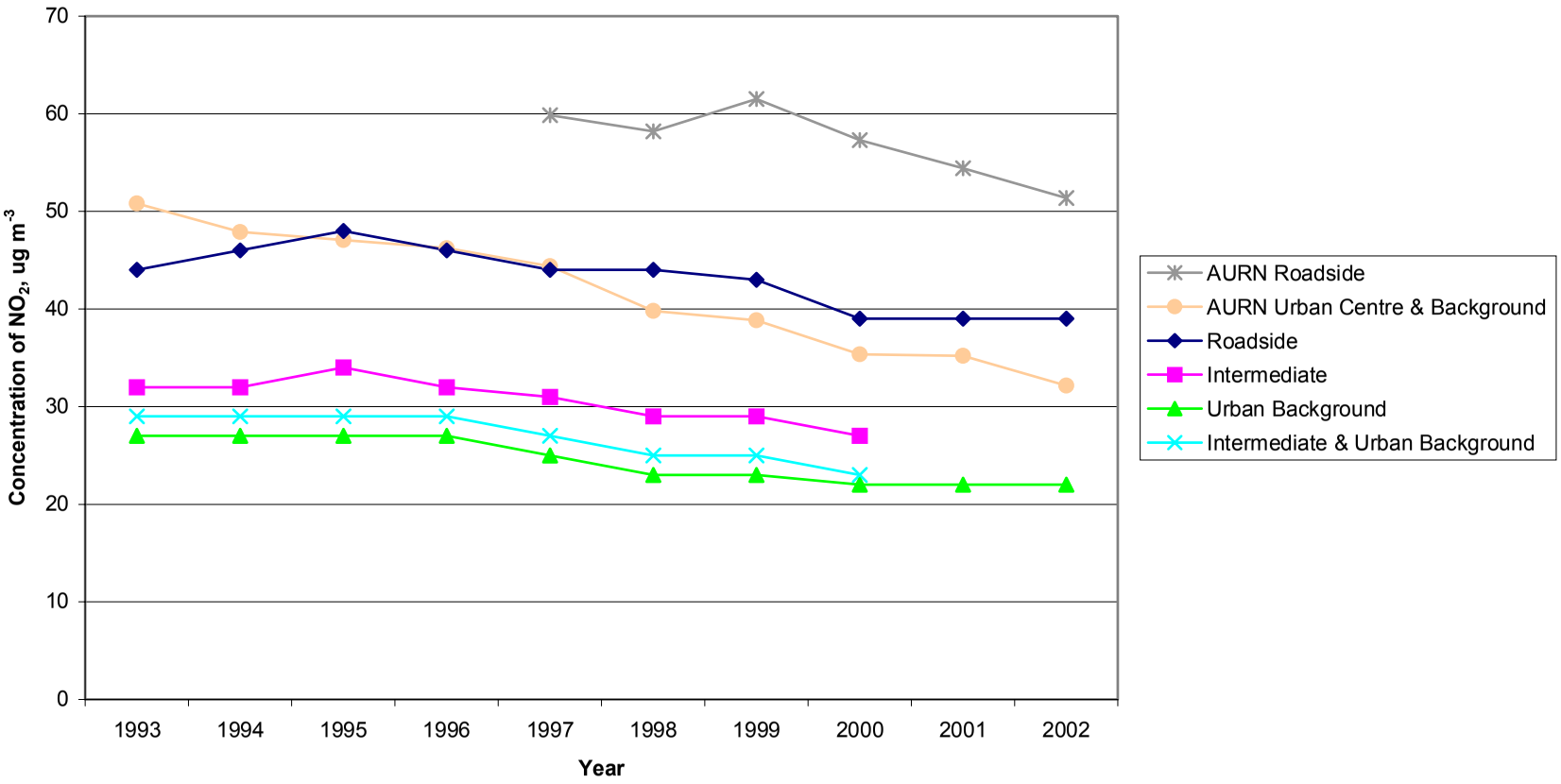


Figure 7 Trends in Annual Mean NO_2 Concentration, as Measured by the NO_2 Network and by the AURN, 1993 – 2002.

Appendices

CONTENTS

Appendix A Analytical Laboratory Performance Testing
Appendix B Regional Network Data 2002

Appendix A
Analytical Laboratory Performance Testing 2002

A1 Analytical Laboratory Performance Testing

The control and minimisation of uncertainty in the data reported by the UK NO_2 Network is an important role of the co-ordinating body. The number of laboratories performing analyses as part of the network also makes this a substantial task. Currently, there is no British or ISO standard method specifically covering NO_2 diffusion tube analysis. An assessment of uncertainties and variation in analytical performance is therefore important, as variations in laboratory methodologies and performance are likely to be reflected in the final survey dataset.

There are four parts comprising the UK NO_2 Network Quality Assurance/Quality Control programme. These are as follows:

1. The Workplace Analysis Scheme for Proficiency (WASP) programme for NO_2 diffusion tube analysis. This independent performance testing scheme makes use of artificial analytes (doped tubes) to test the quality of laboratory analyses on a monthly basis. The scheme provides excellent tracking of analytical performance throughout the year and minimises the response time between identification and correction of analytical problems. It is operated independently by the Health and Safety Laboratory (HSL).

2. **The Field Intercomparison Exercise.** Formerly an annual field trial, from November 2002 this has become an ongoing monthly exercise, operated by Health and Safety Laboratory. It is designed to complement the monthly performance testing scheme described in (1) above by providing information on the uncertainties arising from both the sampling and analysis phases of diffusive sampling in the field.

3. **QC Solution Testing Scheme** This involves the monthly analysis of a nitrite solution of known concentration by all participating laboratories. Every six months approximately 150ml of a stock nitrite solution is distributed to each laboratory. The laboratories analyse a sample of this stock solution on a monthly basis and return the result to **netcen** for checking.

4. **Routine Data Screening.** Experienced operators carefully screen the data supplied by our participating Local Authorities. Suspect values and possible errors are highlighted and checked with the site operators.

Criteria for data acceptance are set on the basis of items 1 and 2 above. Laboratories unable to demonstrate satisfactory performance in these two key quality systems are identified and the measurement data supplied by these laboratories may be excluded from the UK NO_2 Network report.

A1.1 WASP SCHEME FOR NO_2 DIFFUSION TUBES

All laboratories carrying out diffusion tube analysis for the UK NO_2 Network must participate in the Health and Safety Laboratory's Workplace Analysis Scheme for Proficiency (WASP) for diffusion tube analysis. The WASP scheme is different from other parts of the Network's QA/QC in that it is an independent, internationally recognised performance testing programme. The other parts remain informal testing schemes, run purely for the UK NO_2 Network. Contact WASP via Peter Stacey on 0114 289 2645 or email peter.stacey@hsl.gov.uk for details.

A1.1.1 WASP Performance Criteria

The WASP scheme involves the analysis of a Quality Control (QC) analyte of known concentration by each participating analytical laboratory. Each month a solution doped diffusion tube (Doped Tube) is distributed to participants, who analyse the tube and report the results to HSL. The mass of nitrite on the doped tubes is different each month, and is intended to reflect the range encountered in actual monitoring. Performance scores are assigned to the analyses, based on their deviation from the known mass of nitrite in the analyte, in terms of the standard deviation. Results are classified as follows:

Good	$\leq$ 2 Standard deviations from actual value
Warning	2-3 Standard deviations from actual value
Action	$\geq$ 3 Standard deviations from actual value

HSL advise that the doping levels are accurate, with standard deviations around 0.5%. It should be possible for a good analyst to obtain results within ±10% of the assigned value.

Performance test results are normally disseminated to participating laboratories by post, but in order to provide rapid response to potential problems, 'Warning' and 'Action' performances scores are faxed. Table A1 (at the end of Appendix A) shows the monthly performance classifications obtained by each laboratory during 2002. For the total of 308 doped tube analyses reported in 2002, 3.5% of all analyses received 'Action' scores and a further 4% received 'Warning' scores.

Performance for the full year 2002 have been assessed by **netcen** according to the following criteria, which have been agreed with Defra and HSL. (Please note, these apply only to the NO_2 Network).

1. Where a laboratory joins or leaves the WASP programme part way through the year, its data are only acceptable to the NO_2 Network for the months during which it was a participant of the WASP programme.
2. Apart from laboratories joining or leaving WASP during the year, participating laboratories will be allowed to miss no more than 2 of the 12 monthly WASP rounds.
3. If a participating laboratory *does* miss more than 2 rounds in the year, results from the preceding or following year may be taken into account.
4. The year's **single** worst result for the laboratory is discarded. This makes some limited allowance for one-off problems with analytical equipment etc.
5. Each laboratory's monthly results is then combined to give a standard uncertainty for the full year, expressed as a relative standard deviation (%RSD) using the following formula:

$$\%RSD = \left(\sqrt{\frac{\sum_{i=1}^{n} \left(\frac{x_i}{\bar{x}} - 1 \right)^2}{n}} \right) \times 100$$

- where x_i are the monthly results obtained by the laboratory, x"bar" is the assigned value and n is the number of results.

6. If the relative standard deviation is greater than 25%, the laboratory's performance for the year in the WASP scheme is deemed unsatisfactory.

A1.1.2 WASP Programme Performance Test Results 2002

The monthly performance scores for 2002 were assessed according to these criteria. The relative standard deviations are shown in Table A2. Two laboratories failed to meet the criteria above for satisfactory performance: Northampton Borough Council by a very small margin (RSD = 25.4%), Ruddock and Sherratt by a considerable margin (RSD = 40%). Both these laboratories showed a tendency to underestimate the assigned value; one possible cause of such underestimation is inefficient extraction of nitrite from the grids.

Table A2 Overall Relative Standard Deviations for Laboratories in WASP, 2002

Laboratory Name	2002 %RSD
Bristol City Council Scientific Services	9.0
Cardiff Scientific Services	15.3
Clyde Analytical Ltd	6.2
Dundee City Council	6.4
City of Edinburgh Council	4.3
GRADKO International Ltd	3.3
Casella CRE	7.5
Harwell Scientifics *	3.9
Rotherham Metropolitan Borough Council	3.4
Worcestershire Scientific Services	18.2
Kent Scientific Services	13.4
Lambeth Scientific Services Ltd	16.1
Lancashire County Analyst	10.8
Glasgow Scientific Services	7.4
Jesmond Dene Laboratory	12.0
Somerset Scientific Services	7.5
Walsall Metropolitan Borough Council	15.1
West Yorkshire Analytical Services	5.2
University of Essex	7.5
Milton Keynes Borough Council	5.8
Staffordshire County Council	7.0
Ruddock & Sherratt	**40.6**
Northampton Borough Council	**25.4**
Aberdeen City Council Public Analyst	3.0
STL Bridgend	3.2
Kirklees Environmental Services	10.2
City of Liverpool Public Analyst	10.8

** Participated from April only.*

It is also interesting to investigate overall variability of results reported by all laboratories in the WASP scheme. The monthly average coefficient of variation (CoV) of results from all laboratories has been calculated. An estimate of the variation in laboratory analyses can be derived, by calculating the overall average of the monthly CoVs during the year. Estimates of analytical variability obtained between 1993-2002 are compared in Table A3 below.

Table A3 Summary of Laboratory Performance in the UK NO_2 Network Analytical Laboratory Performance Testing Scheme 1993-2002

	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Number of Laboratories	38	43	38	38	37	38	37	31	30	27
Overall CoV of Doped Tube Analyses	38%	-	24%	24%	21%	23%	17%	20%	21%	21%

NB. Doped Tube analyses were not performed during 1994.

The overall variability of results reported by laboratories in this programme has decreased since the early years of the Network, reflecting a general improvement in laboratory performance.

A1.2 QC SOLUTION ANALYSES

The QC Solution Testing Scheme involves the monthly analysis of a nitrite solution of known concentration by all participating laboratories. Every six months approximately 150ml of a stock nitrite solution is distributed to each laboratory. The laboratories analyse a sample of this stock solution on a monthly basis and return the result to **netcen** for checking. Performance scores are assigned to the analyses based on the principles of Shewhart control charts and z-scores[A1], for demonstrating statistical process control. Under this system an estimate of the expected coefficient of variation (CoV) has been established for the QC Solution analyses, according to the empirical formula developed by Horwitz[A2]. Hence, for a QC Solution of concentration range 1500-2000 mg/l (as nitrite) the average expected CoV is approximately 5%. Performance scores are classified as "Good", Warning" or "Action" in the same way as the WASP Doped Tube analysis.

Although the QC solution analyses are not used to assess satisfactory performance, this exercise provides the laboratories with a useful means of checking their analytical procedures. Table A4 (at the end of this Appendix) shows the results of the QC Solution Analyses for 2002, and Table A5 shows the performance scores assigned to them. Table A6 (below) compares overall variability of the results reported by laboratories for QC solution analysis, with results in previous years.

Table A6 Summary of Laboratory Performance in the UK NO_2 Network QC Solution Analysis Exercise 1993-2002

	1993	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***
Number of Laboratories	38	43	38	38	37	38	37	32	30	27
Overall CoV of QC Solution Analyses	9%	-	12%	5%	3%	3%	3%	3%	2%	3%

The overall coefficient of variation obtained in 2002 was 3%, consistent with previous recent years.

A1.3 FIELD INTERCOMPARISON EXERCISE

Although the WASP scheme, and the QC Solutions testing scheme, provide a regular check of each laboratory's performance with respect to analysis of diffusion tubes, neither scheme provides any information on how the diffusion tubes themselves perform under actual exposure conditions. Therefore, a field intercomparison exercise is also undertaken, with the objective of estimating bias and precision, under normal field operating conditions, for diffusion tubes from each laboratory performing analysis in the NO_2 Network. The principle of this intercomparison, is that diffusion tubes from each laboratory are exposed simultaneously, upon purpose-made exposure racks, close to one of the monitoring sites in Defra's Automatic Urban and Rural Network (AURN). The automatic chemiluminescent NO_x monitoring equipment at the site provides a reference measurement, with which the diffusion tube results can be compared.

Until 2002, this field intercomparison consisted of just one or two months. However, such short studies only provide a "snapshot" of performance at the time of the test. Also, there is increasing demand for more robust information on precision and bias of diffusion tube measurements, particularly where the results will be used for purposes of Local Authority Air Quality Management.

Therefore, as of November 2002, the Field Intercomparison has been operated on a monthly basis, and is managed by HSL. Each laboratory sends a triplet of tubes plus a travel blank, for exposure at an AURN-affiliated site in the Greater Manchester area. The tubes are exposed simultaneously for the pollution calendar month, before being returned (with the travel blank) to the supplying laboratories for analysis. The travel blanks are isolated in sealed sample bags, and refrigerated throughout the exposure period. The participating laboratories send their analytical results to HSL for collation, and **netcen** provides the reference value from the AURN site chemiluminescent analyser. HSL calculate the precision and bias of each laboratory's tubes, and report the complete dataset to **netcen**.

While the majority of laboratories participate monthly, this is not feasible for some of the smaller laboratories, due to economic constraints. Therefore, the laboratories were given the option of

participating quarterly (in March, June, September and December) as a minimum sufficient for Network QA/QC purposes. The full year's intercomparison results for 2003 will be compared with performance criteria (to be finalised). Appropriate performance criteria will be set for both monthly and quarterly options.

As well as its QA/QC function, it is intended that monthly participation in the Field Intercomparison will provide an ongoing indication of how diffusion tube performance (especially bias and uncertainty) varies from month to month, and seasonally. It will be useful to users of diffusion tubes who require information on bias and precision, potentially fulfilling the criteria of LAQM.TG(03) for the collocation study required to correct for diffusion tube bias.

However, it is **not** intended that this Intercomparison be used to generate "default" bias adjustment factors.

A1.3.1 Results of December 2002 Field Intercomparison

The monthly Field Intercomparison began in November 2002. The only round during 2002 in which all laboratories (both monthly and quarterly participants) took part, was December 2002. Therefore, performance in the Field Intercomparison for 2002 have been assessed on the basis of this month, in the same way as previous years "snapshot" Field Intercomparisons. (In 2003 and future years, the full year will be used). The exposure period was from 14:00 on 3rd December 2002 to 14:00 on 7th January 2003. The average NO_2 concentration as measured by the reference technique (the chemiluminescent analyser) was 36 μg m^{-3}, and the data capture achieved by this analyser was 94.6%.

Table A7 shows the mean NO_2 concentration as measured by each laboratory's triplet of tubes, also the coefficient of variation (the standard deviation expressed as a percentage of the mean, also termed the relative standard deviation or RSD.) Table A7 also shows the mean percentage bias exhibited by the triplet of tubes.

The target for percentage bias is that the mean diffusion tube value should be within $\pm$25% of the reference value. Three laboratories' tubes were outside this range: Harwell Scientifics, City of Liverpool and West Yorkshire Analytical Services.

The results presented here are not suitable for use as bias adjustment factors for Review and Assessment or other purposes. This is because these data cover only one month, and the bias shown by diffusion tubes can vary greatly from month to month.

Rather, according to Technical Guidance LAQM.TG(03), any LA using diffusion tubes for Review and Assessment should carry out their own intercomparison, with a chemiluminescent NO_2 analyser at a suitable monitoring site in their area. The duration should be at least 9 months.

Alternatively, the results of suitable co-location studies carried out by other organisations can be used. Over the past year, such results have become much more readily available. Air Quality Consultants have compiled a database of results from diffusion tube intercomparison studies (carried out by Local Authorities and others), available on Defra's Air Quality Review and Assessment web site, see http://www.uwe.ac.uk/aqm/review/no2dtbiasdatabase.xls This spreadsheet is updated regularly.

If there are no suitable data in this spreadsheet, then contact your analytical laboratory as they may be aware of a co-location study not included in the database.

Table A7. Results of December 2002 Exposure Period in Field Intercomparison

Lab Name	Measured NO_2 Concentration			Mean $\mu g\ m^{-3}$	CoV, %	Mean Bias %
	Tube 1 $\mu g\ m^{-3}$	Tube 2 $\mu g\ m^{-3}$	Tube 3 $\mu g\ m^{-3}$			
Harwell Scientifics	51	51	51	50.9	0.2	41%
Glasgow Scientific Services	45	44	44	44.3	1.3	23%
Kent Scientific Services	47	43	42	43.9	5.39	22%
Aberdeen City Public Analyst	43	43	44	43.3	1.45	20%
Cardiff Scientific Services	42	45	43	43.4	4.39	20%
Dundee City Council Scientific Services	42	42	46	43.3	5.8	20%
Rotherham Metropolitan Borough Council	45	38	45	42.7	9.47	19%
Jesmond Dene Laboratory	39	41	44	41.4	5.56	15%
Kirklees Environmental Services	41	40	41	40.8	2.01	13%
Gradko International (tube type A)	38	40	44	40.7	7.22	13%
Bristol City Council Analytical Services	40	42	38	40.1	4.5	11%
City of Edinburgh Council	39	37	41	38.9	4.39	8%
Gradko International (tube type C)	38	39	38	38.7	1.34	8%
Gradko International (tube type B)	35	38	40	37.8	6.51	5%
Lancashire County Analyst	45	19 [3]	48	37.3	42.72	4%
Milton Keynes Council	37	40	33	36.7	9.95	2%
STL Bridgend	35	34	37	35.2	3.39	-2%
Worcestershire Scientific Services	34	37		35.5	N/A	-1%
Walsall MBC	34	36	33	34.3	4.45	-5%
Clyde Analytical Ltd	31	33	33	32.5	3.02	-10%
Staffordshire County Council	31	26	31	29.4	9.83	-18%
Casella CRE Air	19 [3]	30	32	27.0	25.93	-25%
City of Liverpool Public Analyst	25	14	39	26.0	48.19	-28%
West Yorkshire Analytical Services	25	24	26	25.0	4	-31%
Lambeth Scientific Services	*Tubes not received* [4]					
University of Essex	*Tubes not received* [4]					
Ruddock and Sherratt	*Tubes not received* [4]					
Northampton Borough Council	*Tubes not received* [4]					
Mean						**5%**

Footnotes:

1. The exposure period was from 14:00 on 3rd December 2002 to 14:00 on 7th January 2003. Reference value (average NO_2 concentration as measured by chemiluminescent analyser) was 36 µg m^{-3}, and the data capture achieved by this analyser was 94.6%.

2. N/A – not applicable: indicates that there were less than 3 valid tube results, so no CoV calculated.

3. Possible outlying values have been underlined, but are included in average.

4. Four laboratories did not participate in the December round, because their tubes did not reach HSL on time or went missing in the post after exposure. In these cases the QA/QC assessment has been based on the results from the next round in which the laboratory participated, as follows:

University of Essex: mean bias -19%, CoV 15% in March 2003.
Ruddock and Sherratt: mean bias -22%, CoV 5% in February 2003.
Northampton: mean bias 12%, CoV 7% in January 2003.
Lambeth Scientific Services: did not participate in any of these rounds, but began regular monthly participation later in 2003. Performance therefore assessed on WASP alone.

All laboratories are now participating regularly on a monthly or quarterly basis.

A1.4 IDENTIFICATION OF LABORATORIES WITH UNSATISFACTORY ANALYTICAL PERFORMANCE

Objectives for overall accuracy of measurement data derived from diffusive samplers are defined by the European Union Daughter Directive (1999/30/EC)[A3]. These objectives recommend that, to enable accurate comparison of long-term average Limit Value with measurement data derived from indicative monitoring (i.e. diffusion measurements), indicative measurement data should have an overall accuracy of ±25% or less. It should be noted however, that there is no recognised method available for determination of accuracy of diffusion tube samplers in accordance with the Daughter Directive. This issue is currently the subject of European Committee for Standardisation Working Group (CEN/TC 246/WG12).

As a full evaluation to the CEN protocol has not yet been carried out, the results of (i) the NO_2 Network Laboratory Performance Testing Scheme, and (ii) the Field Intercomparison Exercise have been used to determine satisfactory data quality for the network. Overall uniformity of data throughout the year is demonstrated by the analysis of the doped tubes from the WASP Scheme. The bias and precision (under field conditions) are demonstrated by the Field Intercomparison Exercise.

The relevant performance statistics for each laboratory are presented in Tables A2 (WASP programme) and Table A7 (Field Intercomparison). As in previous years, a few laboratories passed one test but failed the other. This may arise from the fact that these tests investigate different components of uncertainty in the diffusion tube measurement system, which contribute to the overall variability in measurements. The WASP programme tests uncertainty resulting from the analytical phase throughout the year, and the Field Intercomparison provides an annual "snapshot" test of combined uncertainty arising from both analytical and sampling phases.

As in previous years, as a best practicable approach, the following criteria were established to test for satisfactory laboratory performance and therefore data quality. According to the existing data quality objectives of the UK NO_2 Network, data from laboratories that failed *both* criteria are eliminated.

(i) WASP Programme 2002.
Laboratories must achieve a relative standard deviation (%RSD) of ± 25% on the basis of the year's performance, having discarded the single worst result. Two laboratories did not meet this requirement during the 2002 WASP programme: Northampton Borough Council (by a very small margin) and Ruddock and Sherratt (by a substantial margin).

(ii) Field Intercomparison Exercise 2002.
The target set for the Field Intercomparison in December 2002 was that the mean diffusion tube result should be within ± 25% of the reference concentration. Three laboratories exhibited an average bias outside the target range of ±25%, relative to the automatic analyser, three failed to participate in this round, so subsequent rounds' results were used for the assessment. Lambeth Scientific Services did not begin regular participation until later in 2003, so performance was assessed on their WASP results only.

However, no laboratories demonstrated unsatisfactory performance in both the WASP programme and the field intercomparison. Therefore, according to the agreed criteria, no laboratories had their 2002 data rejected.

A1.5 OBSERVATIONS AND RECOMMENDATIONS

Laboratories should note that the performance criteria are to be tightened. As of 2003, all laboratories must meet the performance criteria set for the WASP scheme. Any laboratory failing to demonstrate satisfactory performance in WASP may have data for part or all of the year rejected, regardless of its performance in the Field Intercomparison.

Now that the Field Intercomparison is carried out on a continuous monthly basis, performance in this exercise will be assessed on the basis of criteria (to be agreed) set for the full year.

A2 REFERENCES

A1. Mullins, E. Introduction of Control Charts in the Analytical Laboratory. Analyst, March 1994, Vol. 119, pp369-375.

A2. Horwitz, W. Evaluation of Analytical Methods used for Regulation of Food and Drugs. Analytical Chemistry Vol. 54, No 1, January 1986.

A3. The Council of the European Union Directive relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, 1999/30/EC. 22 April 1999.

Table A1: Performance Scores Assigned to Doped Tube Analysis, 2002.

	Performance Score											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Laboratory Name	WASP R33	WASP R34	WASP R35	WASP R36	WASP R37	WASP R38	WASP R39	WASP R40	WASP R41	WASP R42	WASP R43	WASP R44
Bristol City Council Scientific Services	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Cardiff Scientific Services	Good	Good	Good	Good	Good	Good	Warning	Good	Good	Good	no result	Warning
Clyde Analytical Ltd	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Dundee City Council	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
City of Edinburgh Council	Good	no result	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
GRADKO International Ltd	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Casella CRE	Good	Good	Good	Good	Good	Good	Good	no result	no result	Warning	Good	Good
Harwell Scientifics	NP	NP	NP	NP	Good	Good	Action	Good	Good	Good	Good	Good
Rotherham Metropolitan Borough Council	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Worcestershire Scientific Services	Good	Good	Good	Good	Warning	Good	Action	Good	Good	Good	Warning	Good
Kent Scientific Services	Good	Good	Good	Good	Good	Good	Action	Good	Good	Good	Good	Good
Lambeth Scientific Services Ltd	Good	Good	Good	Good	Good	Warning	Good	Warning	Good	Good	no result	Good
Lancashire County Analyst	Good	Good	Good	Good	Good	Good	Good	Good	Good	no result	Good	Good
Glasgow Scientific Services	Good	no result	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Jesmond Dene Laboratory	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Somerset Scientific Services	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Walsall Metropolitan Borough Council	Good	Good	Good	Good	Good	Good	Good	Warning	Good	Good	Good	Good
West Yorkshire Analytical Services	Good	no result	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
University of Essex	Good	no result	Good	Good	Good	Good	Good	Good	no result	Good	Good	Good
Milton Keynes Borough Council	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Staffordshire County Council	Good	Good	Good	Good	Warning	Good	no result	Good	Good	Good	Good	Good
Ruddock & Sherratt	Action	Good	Action	Good	Action	Action	Action	no result	Action	Good	Good	Good
Northampton Borough Council	Good	Good	Good	Good	Action	Action	Good	Good	Good	Good	Good	Action
Aberdeen City Council Public Analyst	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
STL Bridgend	Good	no result	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Kirklees Environmental Services	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
City of Liverpool Public Analyst	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

NP = Not Participating

Table A4 UK NO_2 Network Laboratory Performance Testing Scheme QC Solution Analyses 2002

	Concentration of QC Solution Reported (mg/l)											
Laboratory Name	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
Bristol City Council Scientific Services		1925	1925	1935	1937	1931	1932	1920	1917	1933	1934	1928
Cardiff Scientific Services	1967	1978	1996	1954	1901	1974	1981	1976	1998	2000	1986	1991
Clyde Aalytical Ltd		1927		1920	1850	2033	1980	2080	1840	1960	1917	2010
Dundee City Council Scientific Services	1958	1962	1969	1970	1936	1933	1950	1966	1926	1924	1945	1986
City of Edinburgh Council	1925			1995	1768		1910	1805	2007	2053	2017	1987
Gradko International Ltd		1967	1943	1943	1914	1944	1972	1944	1944	1943	1944	1943
Casella CRE Air	1960						2046	1980	2052	2032	2046	2034
Harwell Scientifics Ltd		1932		1960	1900	1947		1917	1905	1946	1938	1948
South Yorkshire Laboratories	1928	1942	1938	1929	1926	1941	1929	1941	1931	1935	1928	1928
Worcestershire Scientific Services	1888	1900	2010	2000	1930	1920	2030	1930	1910	1990	1990	1990
Kent Scientific Services		1965	1963	1928	1943		1969	1913	1937	1954	1941	1901
Lambeth Scientific Services Ltd		2000	1960	1920	1880	1890	1935	1983	1935	2010	1975	1970
Lancashire County Analyst		1941	1939	1941	1941	1930	1970	2000	1922	2002		1931
Glasgow Scientific Services	1912	2072	1963	1870	1876	1943	1992	1846	1837	1954	1974	1872
Jesmond Dene Laboratory	1931		1955	1928	1971	1999	2013	2030	2152	2280	2070	1900
Walsall Metropolitan Borough Council		1916	1845	1952	1901	1935	1980	1936	1949	1880	1930	1930
West Yorkshire Analytical Services		1905		1918	1954	1991	1879	1914	1885	1897	1900	1995
University of Essex			1935	1927	1938		1929	1931	1930	1929	1930	1929
Milton Keynes Council		1946	1972	1967	1931	1939	1948	1930	1927	1921	1963	1952
Staffordshire County Council	2014	1995	1944	2010	2017	1934	1990	1946	1932	1973	2000	1926
Ruddock and Sherratt	1938	1922		1922		1914	1905	1951		1934	1947	1939
Northampton Borough Council		1948	1842	1941	1903	1935	1975	1927	1916	1975	1858	1854
Aberdeen City Council Public Analyst	1950	1945	1918	1944	1953	1965	1952	1936	1941	1958	1945	
STL Bridgend	2000	2060	1990	1990	1974	2060	2200	2030	2030	1970	2050	2520
Kirklees Environmental Services		1930	1930	2000	2000	1920	2070	1940	1970	1860	2010	1890
City of Liverpool Public Analysts	1895	1986	1918	1978	1877	1914	1918	1947	1978	1917	1955	1883
Average	1944	1957	1943	1950	1922	1950	1974	1947	1947	1967	1964	1965
Standard Deviation	37	44	42	33	51	40	65	54	65	78	49	124
Coefficient of Varation (%)	1.9	2.3	2.2	1.7	2.7	2.1	3.3	2.8	3.4	3.9	2.5	6.3

Table A5 Performance Scores Assigned to 2002 QC Solution Analyses

	Assigned Performance Scores											
Laboratory Name	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
Bristol City Council Scientific Services	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Cardiff Scientific Services	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Clyde Aalytical Ltd	No Data	Good (0)	No Data	Good (0)	Good (0)	Good (1)	Good (0)	Good (1)	Good (0)	Good (0)	Good (0)	Good (0)
Dundee City Council Scientific Services	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
City of Edinburgh Council	Good (0)	No Data	No Data	Good (0)	Good (1)	No Data	Good (0)	Good (1)	Good (0)	Good (1)	Good (0)	Good (0)
Gradko International Ltd	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Casella CRE Air	Good (0)	No Data	No Data	No Data	No Data	No Data	Good (1)	Good (0)	Good (1)	Good (1)	Good (1)	Good (1)
Harwell Scientifics Ltd	No Data	Good (0)	No Data	Good (0)	Good (0)	Good (0)	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
South Yorkshire Laboratories	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Worcestershire Scientific Services	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Kent Scientific Services	No Data	Good (0)	Good (0)	Good (0)	Good (0)	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Lambeth Scientific Services Ltd	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Lancashire County Analyst	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	No Data	Good (0)
Glasgow Scientific Services	Good (0)	Good (1)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (1)	Good (0)	Good (0)	Good (0)
Jesmond Dene Laboratory	Good (0)	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Warning (2)	Action (3)	Good (1)	Good (0)
Walsall Metropolitan Borough Council	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
West Yorkshire Analytical Services	No Data	Good (0)	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
University of Essex	No Data	No Data	Good (0)	Good (0)	Good (0)	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Milton Keynes Council	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Staffordshire County Council	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Ruddock and Sherratt	Good (0)	Good (0)	No Data	Good (0)	No Data	Good (0)	Good (0)	Good (0)	No Data	Good (0)	Good (0)	Good (0)
Northampton Borough Council	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
Aberdeen City Council Public Analyst	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	No Data
STL Bridgend	Good (0)	Good (1)	Good (0)	Good (0)	Good (0)	Good (1)	Warning (2	Good (0)	Good (0)	Good (0)	Good (1)	Action (6)
Kirklees Environmental Services	No Data	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (1)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)
City of Liverpool Public Analysts	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)	Good (0)

Appendix B
Regional Data 2002

B1.1 Scotland (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for Scotland are shown in Figure B1.1. Table B1.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B1.2.

Table B1.1 Roadside Sites in Scotland with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Glasgow 1N	93 μgm^{-3}
Paisley 7N	59 μgm^{-3}
Aberdeen 1N	55 μgm^{-3}
Dundee 7N	52 μgm^{-3}
Perth 1N	51 μgm^{-3}
Paisley 8N	50 μgm^{-3}
Irvine 1N	49 μgm^{-3}
Dalkeith 1N	48 μgm^{-3}
Dundee 8N	46 μgm^{-3}
Bishopbriggs 12N	45 μgm^{-3}
Edinburgh 7N	45 μgm^{-3}
Edinburgh 5N	45 μgm^{-3}
Bishopbriggs 6N	44 μgm^{-3}
Dunfermline 9N	44 μgm^{-3}
Coatbridge 1N	44 μgm^{-3}
Ayr 5N	43 μgm^{-3}
Perth 7N	43 μgm^{-3}
Falkirk 13N	43 μgm^{-3}
Lanark 1N	41 μgm^{-3}

Table B1.2 Roadside Sites in Scotland

				Nitrogen Dioxide Concentrations 2002 (ug m^{-3})														
Site Name	**Local Authority**	**Location**	**Status**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Min**	**Max**	**Mean**
ABERDEEN 1N	Aberdeen City	R	A	49	61	45	67	51	66	53	47	51	55	53	58	**45**	**67**	**55**
ABERDEEN 5N	Aberdeen City	R	A	41	43	42	35	38	36	33	38	47	40	38	34	**33**	**47**	**39**
STONEHAVEN 1N	Aberdeenshire	R	A		17	18	24	27	19	28	24	39	23	29	26	**17**	**39**	**25**
DUNDEE 7N	City of Dundee	R	A	66	58	59	47	49	50	48	45	56	47	60	43	**43**	**66**	**52**
DUNDEE 8N	City of Dundee	R	A		45	45	44	39	36	42	43	49	50	57	56	**36**	**57**	**46**
EDINBURGH 5N	City of Edinburgh	R	A		31	57	58	44	48	46	40	31		48	44	**31**	**58**	**45**
EDINBURGH 7N	City of Edinburgh	R	A		33	48	50	59	42	40	52	27	24	70	49	**24**	**70**	**45**
GLASGOW 1N	City of Glasgow	R	A	89	87	90	97	102	97	24	94	98	89	111	135	**24**	**135**	**93**
GLASGOW 6N	City of Glasgow	R	A	33	37	27	40	20	34	34	40	53	53	54	53	**20**	**54**	**40**
ALLOA 1N	Clackmannanshire	R	A		36	36	34	34	34	33	34	36	36	38	34	**33**	**38**	**35**
TULLIBODY 8N	Clackmannanshire	R	A		25	31	23	27	23	19	27	34	34	40	36	**19**	**40**	**29**
BEARSDEN 10N	East Dunbartonshire	R	A	34	35	38	32	31	26	29		35	37	47	45	**26**	**47**	**35**
BEARSDEN 1N	East Dunbartonshire	R	A	32	31	30	29	30	21	19	26	33		39	40	**19**	**40**	**30**
BISHOPBRIGGS 12N	East Dunbartonshire	R	A	38	33	40			29		40	51	56	54	68	**29**	**68**	**45**
BISHOPBRIGGS 6N	East Dunbartonshire	R	A	41	42	46	42	40	35	42	45	52	45	50	51	**35**	**52**	**44**
MUSSELBURGH 1N	East Lothian	R	A				42	38	49	33	30	38	37	48	24	**24**	**49**	**38**
TRANENT 1N	East Lothian	R	A				45	36	36	35	30	42	37	46	40	**30**	**46**	**39**
GIFFNOCK 3N	East Renfrewshire	R	A	19	31	38	36	38	30	34	34	37	55	59	62	**19**	**62**	**39**
THORNLIEBANK 1N	East Renfrewshire	R	A		19	28	26	27	21	22	25		41	45	50	**19**	**50**	**30**
FALKIRK 13N	Falkirk	R	A	52	66	25	46	40	27	27	17	42	63	58	50	**17**	**66**	**43**
CUPAR 1N	Fife	R	A	42	32	41	40	41	33	33	40	46	41	50	46	**32**	**50**	**40**
DUNFERMLINE 5N	Fife	R	A		35	34	34	28	26	30	29	33	37	38	35	**26**	**38**	**33**
DUNFERMLINE 9N	Fife	R	A	51	35	46	44	39	39	37	38	47	46	54	54	**35**	**54**	**44**
ST ANDREWS 1N	Fife	R	A	27		35	33	31	24	30	37	39	35	37	40	**24**	**40**	**33**
DINGWALL 12N	Highland	R	A	26						37	28		43	23	21	**21**	**43**	**30**
DINGWALL 13N	Highland	R	A							19	13	25	32	38	25	**13**	**38**	**25**
DINGWALL 5N	Highland	R	C	18												**18**	**18**	
GREENOCK 5N	Inverclyde	R	A	72		29	40	36	18	29	23	29	31	46		**18**	**72**	**35**
GREENOCK 7N	Inverclyde	R	A	22		19	25	24	17	25	20	23	28	36	41	**17**	**41**	**25**
DALKEITH 1N	Midlothian	R	A			40			46	43	61	50	46	63	37	**37**	**63**	**48**
PENICUIK 3N	Midlothian	R	A		22	25	32		24	34	34	34	29	101	30	**22**	**101**	**37**
IRVINE 1N	North Ayrshire	R	A		46		49	42	45	50		58	50	55	46	**42**	**58**	**49**
IRVINE 5N	North Ayrshire	R	A	38	38	34	32	36	27	29		43	41	43	37	**27**	**43**	**36**
COATBRIDGE 1N	North Lanarkshire	R	A	40	27	38	34	38	33	36	42		54	48	94	**27**	**94**	**44**
COATBRIDGE 3N	North Lanarkshire	R	A			31		27		23			42		44	**23**	**44**	
MOTHERWELL 9N	North Lanarkshire	R	A	21	12	25	23	23	17	17			33	12	36	**12**	**36**	**22**
PERTH 1N	Perth & Kinross	R	A	57	41	51	55	47	44			48	50	53	62	**41**	**62**	**51**
PERTH 7N	Perth & Kinross	R	A	40	44	37	50	46	36	38	38	47	46	46	52	**36**	**52**	**43**
PAISLEY 7N	Renfrewshire	R	A	52	48	57	43	52	44	49	76	69	70	70	75	**43**	**76**	**59**
PAISLEY 8N	Renfrewshire	R	A	48	41	42	51	47	35	39	46	53	59	71	66	**35**	**71**	**50**
GALASHIELS 1N	Scottish Borders	R	A	32	26	31	34	31	22	23	26	37	34	39	40	**22**	**40**	**31**
HAWICK 2N	Scottish Borders	R	A	42	41	37	33	35	33	34		36	32	37	35	**32**	**42**	**36**
HAWICK 4N	Scottish Borders	R	A	43	35	38	34	33	29	29	22	34	34	40	40	**22**	**43**	**34**
HAWICK 5N	Scottish Borders	R	A	17	10	11	9	8	7	6	6	9	12	18	20	**6**	**20**	**11**
HAWICK 6N	Scottish Borders	R	A	36	28	29		26	20	19	20	28	27	30	35	**19**	**36**	**27**
KELSO 1N	Scottish Borders	R	A	24	19	22	20	20	18	17	18		22	27	27	**17**	**27**	**21**
PEEBLES 5N	Scottish Borders	R	A	30	25	27	27	27	24	21	19	31	30	33	33	**19**	**33**	**27**
AYR 1N	South Ayrshire	R	A	32	24	36	36	41	29	28		43	40	44	44	**24**	**44**	**36**
AYR 5N	South Ayrshire	R	A	43	42	44	43	39	39	35			47		58	**35**	**58**	**43**
EAST KILBRIDE 1N	South Lanarkshire	R	A			31				18		31		41	52	**18**	**52**	
HAMILTON 1N	South Lanarkshire	R	A	31				37		15		42				**15**	**42**	
LANARK 1N	South Lanarkshire	R	A		21				37	41		33		57	57	**21**	**57**	**41**
STIRLING 1N	Stirling	R	A	51	30	39	33		10	36	34	49	21	24	36	**10**	**51**	**33**

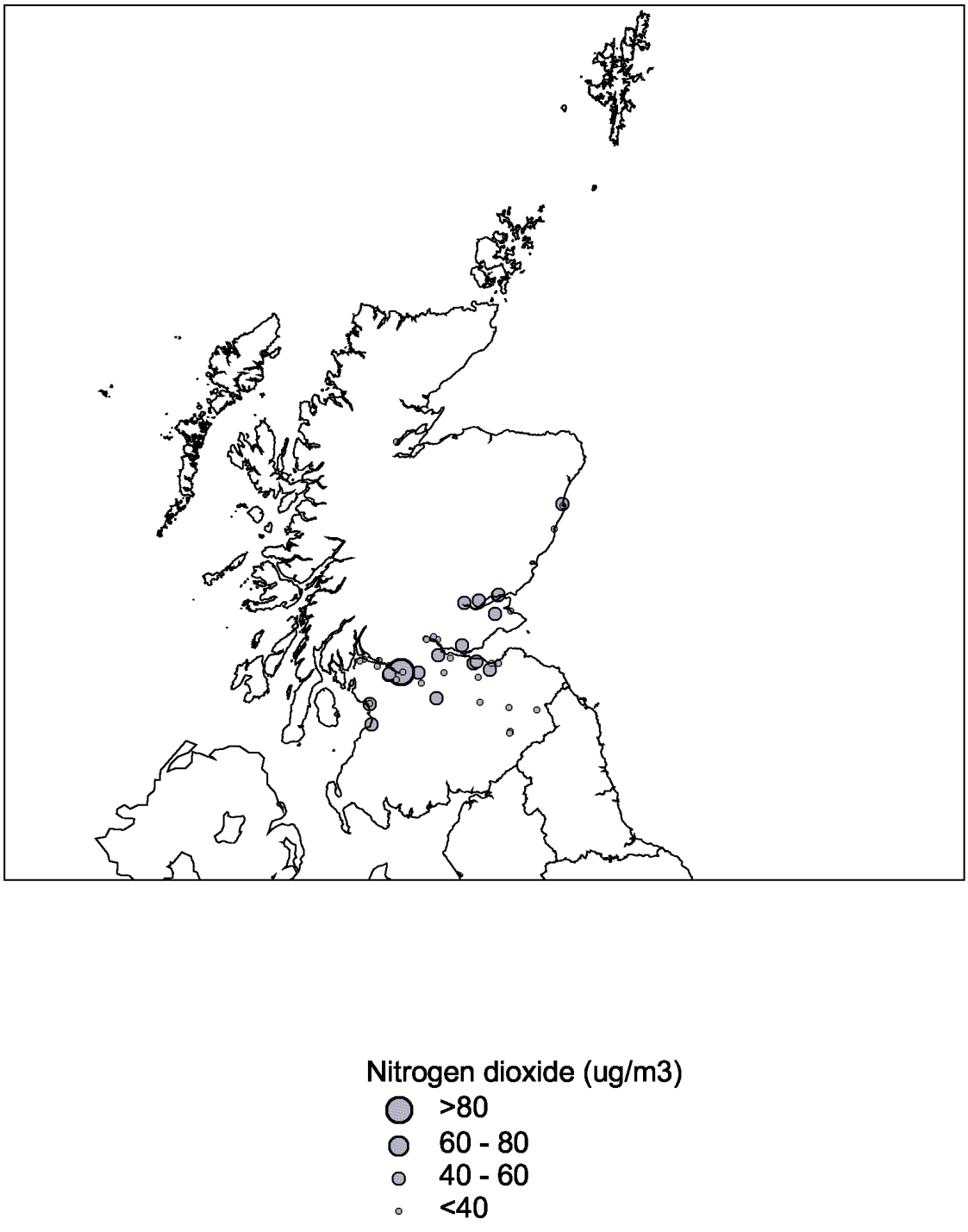
Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
STIRLING 7N	Stirling	R	A	44	30	38	40	37		37	27	37	50	54	33	**27**	**54**	**39**
BALLOCH 1N	West Dunbartonshire	R	A	16	16	19	13		13		18	22	24	27		**13**	**27**	**19**
CLYDEBANK 1N	West Dunbartonshire	R	A	42	35	36	36		30		30	36	35	42	29	**29**	**42**	**35**
CLYDEBANK 5N	West Dunbartonshire	R	A	22	15	25	20		14		12	29	33	36	43	**12**	**43**	**25**
DUMBARTON 1N	West Dunbartonshire	R	A	36	40	39	41		35		36	34	42	49	41	**34**	**49**	**39**
LINLITHGOW 6N	West Lothian	R	A	23	13	36	32	25	27	31	31	26	38	46	23	**13**	**46**	**29**
WHITBURN 1N	West Lothian	R	A	14	17	21	25	20	20	25	15	24	31	32	25	**14**	**32**	**23**
STORNOWAY 1N	Comhairle Nan Eilean Siar	R	A	21	23			20	23	21		20	23	24		**20**	**24**	**22**

REGIONAL SUMMARY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Regional Monthly Mean	37	33	36	38	36	31	31	33	40	40	46	45
Regional Monthly Min	14	10	11	9	8	7	6	6	9	12	12	20
Regional Monthly Max	89	87	90	97	102	97	53	94	98	89	111	135

Regional Annual Mean	37
Regional Annual Min	11
Regional Annual Max	93
Number of Sites	61
% With Valid Data	93

Figure B1.1 Annual Average Roadside Nitrogen Dioxide Concentrations in Scotland



B1.2 Scotland (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for Scotland are shown in Figure B1.2. The validated 2002 dataset for the region is detailed in Table B1.3. No urban background sites in Scotland exceeded the Air Quality Strategy Objective of 40μgm^{-3}.

Table B1.3 Urban Background Sites in Scotland

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

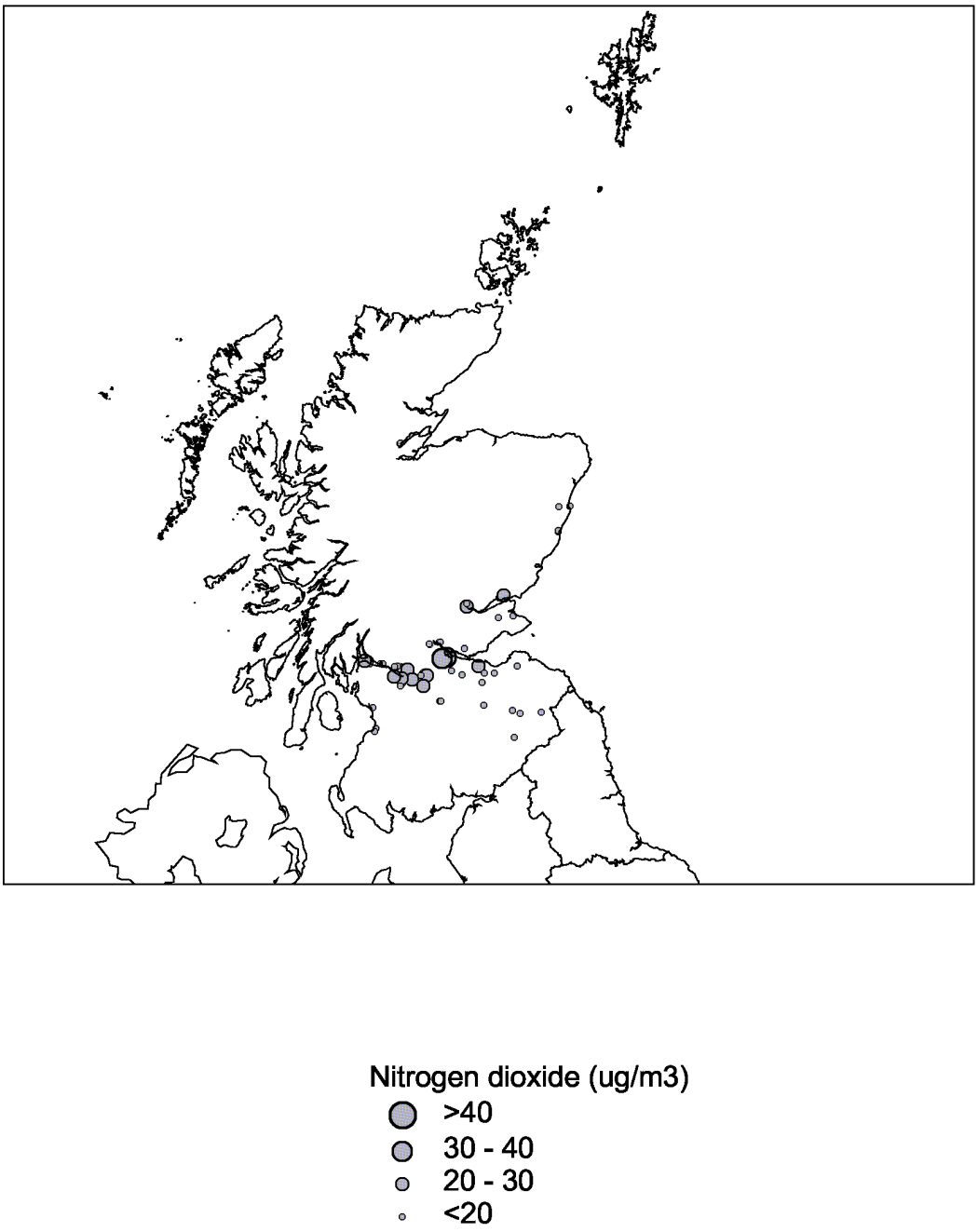
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
ABERDEEN 3N	Aberdeen City	B	A	21	17	15	14	9	11	9	9		15	16	14	**9**	**21**	**14**
ABERDEEN 4N	Aberdeen City	B	A	24	15		17	12	13	10	11	11	15	13	24	**10**	**24**	**15**
STONEHAVEN 3N	Aberdeenshire	B	A		10	9	8	7	6	8	8	19	11	18	16	**6**	**19**	**11**
STONEHAVEN 6N	Aberdeenshire	B	A		13	8	5	8		8	5	37	10	17	17	**5**	**37**	**13**
DUNDEE 3N	City of Dundee	B	A	24	17	16	13	9	9	10	11	14	16	25	25	**9**	**25**	**16**
DUNDEE 5N	City of Dundee	B	A	29	24	24	18	18	17	15	19	26	20	36	33	**15**	**36**	**23**
EDINBURGH 3N	City of Edinburgh	B	A		23	28	27	19	15	14	19	19	22	25	35	**14**	**35**	**22**
EDINBURGH 4N	City of Edinburgh	B	A		10	19	22	19	11	12	15	15	12	29	14	**10**	**29**	**16**
GLASGOW 4N	City of Glasgow	B	A	24	16	43	22	6	13	11	22	26	32	35	50	**6**	**50**	**25**
GLASGOW 5N	City of Glasgow	B	A	21	16	23	15	6	10	15	21	28	34	29	46	**6**	**46**	**22**
ALLOA 4N	Clackmannanshire	B	A		10	13	10	12	8	10	10	13	17	25	19	**8**	**25**	**13**
ALLOA 6N	Clackmannanshire	B	A		13	13	13		13	12	10		19		21	**10**	**21**	**14**
BEARSDEN 3N	East Dunbartonshire	B	A	19	17	18	18	18	15	13	16	23	29	39	42	**13**	**42**	**22**
BEARSDEN 4N	East Dunbartonshire	B	A		8	12	9					15	17	29	30	**8**	**30**	**17**
BISHOPBRIGGS 5N	East Dunbartonshire	B	A	24	17	15	17	12	11	13	14	24	26	32	35	**11**	**35**	**20**
BISHOPBRIGGS 8N	East Dunbartonshire	B	A	25	19	20	19	16	12	11	10	22	26	35	39	**10**	**39**	**21**
HADDINGTON 5N	East Lothian	B	A				16	12	7	9	10	13	17	24	15	**7**	**24**	**14**
GIFFNOCK 1N	East Renfrewshire	B	A	32		16	11	11	7	9	11	16	25	30	37	**7**	**37**	**19**
NEWTON MEARNS 1N	East Renfrewshire	B	A	35	6	12	9	10	5	8	7	28	20	26	28	**5**	**35**	**16**
FALKIRK 3N	Falkirk	B	A	40	53	19	13			21		27	46	49		**13**	**53**	**34**
FALKIRK 4N	Falkirk	B	A	38			23		15	23	17	31	42	39	47	**15**	**47**	**31**
CUPAR 4N	Fife	B	A	26	13	14	12	10	8	9	10	13	12	23	22	**8**	**26**	**15**
DUNFERMLINE 6N	Fife	B	A	27	20	22	16	13	12	13	16	16	19	33	29	**12**	**33**	**20**
DUNFERMLINE 8N	Fife	B	A	24	18	17	13	12	12	14	16	18	19	31	26	**12**	**31**	**18**
ST ANDREWS 4N	Fife	B	A	19	8	10	7	7	6	6	7	7	8	16	16	**6**	**19**	**10**
DINGWALL 11N	Highland	B	A	10						7	6	10	17	14	16	**6**	**17**	**11**
DINGWALL 9N	Highland	B	A	10						6	4	9	12	13	14	**4**	**14**	**10**
GREENOCK 3N	Inverclyde	B	A	24		20	20	17	10	11	9	12	20	33	24	**9**	**33**	**18**
GREENOCK 6N	Inverclyde	B	A	32		23	22	25	16	21	14	24	23	25	31	**14**	**32**	**23**
DALKEITH 2N	Midlothian	B	A			19	19	14	8	15	17	15	9	17	25	**8**	**25**	**16**
PENICUIK 2N	Midlothian	B	A			8	10	8	5	7	8	10	16	48	13	**5**	**48**	**13**
IRVINE 3N	North Ayrshire	B	A	18	13	15	15	12	11	10		19	25	26	33	**10**	**33**	**18**
IRVINE 4N	North Ayrshire	B	A	16	11	14	11	9	8	8		19	22	23	43	**8**	**43**	**17**
AIRDRIE 1N	North Lanarkshire	B	A		19	21	27	19	17	21	23		33	42	40	**17**	**42**	**26**
AIRDRIE 3N	North Lanarkshire	B	A	21	19	17	21	17	15	15	19		29	33	33	**15**	**33**	**22**
MOTHERWELL 6N	North Lanarkshire	B	A	19	8	19	25	17	12	13	17		27	31	34	**8**	**34**	**20**
MOTHERWELL 7N	North Lanarkshire	B	A	6	6	15	13	12	8	10	13		23	21	27	**6**	**27**	**14**
PERTH 3N	Perth & Kinross	B	A	31	20	20	21	17	16	16	18	23	23	32	33	**16**	**33**	**23**
PERTH 6N	Perth & Kinross	B	A	25	16	15			10	10	9	15	14	21	19	**9**	**25**	**15**
PAISLEY 3N	Renfrewshire	B	A	16	7	16	18	10	4	7	12	13		49	36	**4**	**49**	**17**
PAISLEY 6N	Renfrewshire	B	A	23	13	19	17	15		12	15	25	33	35	41	**12**	**41**	**23**
GALASHIELS 2N	Scottish Borders	B	A	19	11	13	11	9	7	8	6	11	14	21	21	**6**	**21**	**13**
HAWICK 3N	Scottish Borders	B	A	15	9	9	8	6		5	7	9	12	17	19	**5**	**19**	**11**
KELSO 2N	Scottish Borders	B	A	16	8	10	7	6	4	5	5	9	10	18	17	**4**	**18**	**10**
MELROSE 1N	Scottish Borders	B	A	16	8	11	9	6	8	6	6	12	11	19	18	**6**	**19**	**11**
PEEBLES 6N	Scottish Borders	B	A	18	12	12		18		8	7	10	13	18	18	**7**	**18**	**13**
AYR 3N	South Ayrshire	B	A	8	5	8	6	6	4	6		10	10	12	16	**4**	**16**	**8**
AYR 4N	South Ayrshire	B	A	5	4	5	5			4		8	8	10	17	**4**	**17**	**7**
EAST KILBRIDE 3N	South Lanarkshire	B	A			14				10		22			37	**10**	**37**	
EAST KILBRIDE 4N	South Lanarkshire	B	A			17				10		23		24	32	**10**	**32**	
HAMILTON 6N	South Lanarkshire	B	A	8				14		7						**7**	**14**	
LANARK 5N	South Lanarkshire	B	A		6				7	6		17		16	23	**6**	**23**	**13**
LANARK 6N	South Lanarkshire	B	A		4				4	5		19		11	15	**4**	**19**	**10**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
STIRLING 3N	Stirling	B	A	15	20	15			9	23	9	18		29	29	**9**	**29**	**19**
STIRLING 6N	Stirling	B	A			17	12			16		24	20		21	**12**	**24**	**18**
CLYDEBANK 3N	West Dunbartonshire	B	A	20	14	15	14		11		12	17	23	28	29	**11**	**29**	**18**
CLYDEBANK 4N	West Dunbartonshire	B	A		16	15	21		13		11		21			**11**	**21**	**16**
DUMBARTON 7N	West Dunbartonshire	B	A	9	5	10	7		4		6	11	14	25	24	**4**	**25**	**12**
DUMBARTON 9N	West Dunbartonshire	B	A	16	16	16	11		10		8	10	21		66	**8**	**66**	**19**
BATHGATE 4N	West Lothian	B	A	19	12	15	13	8	10	13	13	11	23	31	13	**8**	**31**	**15**
LIVINGSTON 3N	West Lothian	B	A	13	13	15	19	15	12	15	17	17	24	29	15	**12**	**29**	**17**
STORNOWAY 3N	Comhairle Nan Eilean Siar	B	A									24		7		**7**	**24**	
STORNOWAY 4N	Comhairle Nan Eilean Siar	B	A	7				5		4			8	9		**4**	**9**	

REGIONAL SUMMARY		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Regional Monthly Mean	20	14	16	15	12	10	11	12	17	20	26	27
	Regional Monthly Min	5	4	5	5	5	4	4	4	7	8	7	13
	Regional Monthly Max	40	53	43	27	25	17	23	23	37	46	49	66
	Regional Annual Mean	17											
	Regional Annual Min	7											
	Regional Annual Max	34											
	Number of Sites	63											
	% With Valid Data	92											

Figure B1.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in Scotland



B2.1 The North East (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the North East are shown in Figure B2.1. Table B2.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B2.2.

Table B2.1 Roadside Sites in the North East with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Newcastle Upon Tyne 9N	48 µgm^{-3}
Durham 1N	43 µgm^{-3}
Newcastle Upon Tyne 10N	41 µgm^{-3}

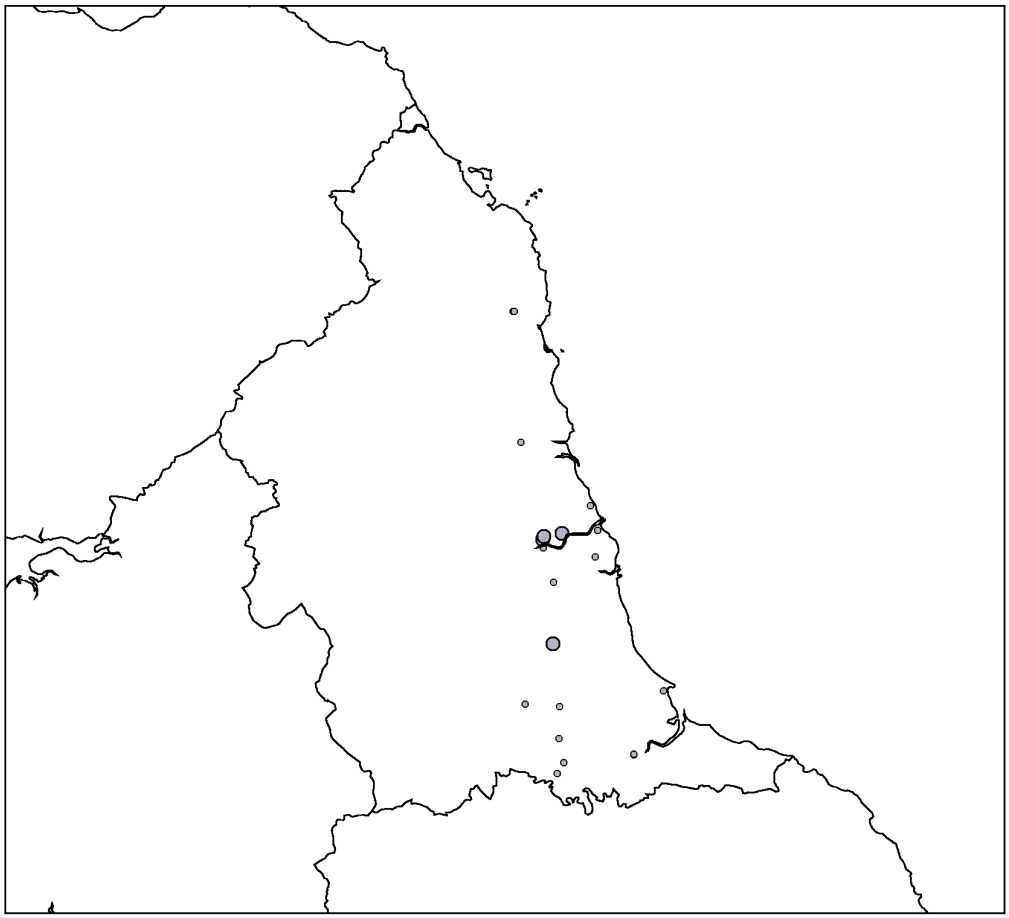
Table B2.2 Roadside Sites in the North East

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
ALNWICK 1N	Alnwick	R	A		16	21	19	16	15	12	15	19	21	21	29	**12**	**29**	**18**
ALNWICK 7N	Alnwick	R	A		25	25	18	30	20	5	25	33	31	41	39	**5**	**41**	**27**
DARLINGTON 1N	Darlington	R	A	48		22	20		33	41		56	42	54		**20**	**56**	**39**
DARLINGTON 7N	Darlington	R	A	39		20	29	14	18		15	22	28		30	**14**	**39**	**24**
DURHAM 1N	Durham	R	A		20	16	49	58	49	9	51	59		64	55	**9**	**64**	**43**
GATESHEAD 5N	Gateshead	R	A	36	40	29	38	22	17	23	24	34	34	43	34	**17**	**43**	**31**
GATESHEAD 9N	Gateshead	R	A	48	13	43	40	35	30	10	35	36	46	45	45	**10**	**48**	**36**
HARTLEPOOL 1N	Hartlepool	R	A			44	37	41	20	12	34	37				**12**	**44**	**32**
NEWCASTLE UPON TYNE 10N	Newcastle Upon Tyne	R	A	63	31	35	52	31	20	35	29	54	41	49	46	**20**	**63**	**41**
NEWCASTLE UPON TYNE 9N	Newcastle Upon Tyne	R	A	51	27	37	32	55	40	19	54	71	59	62	67	**19**	**71**	**48**
WALLSEND 3N	North Tyneside	R	A				25	31	19		25	48	46	67	63	**19**	**67**	**40**
WHITLEY BAY 2N	North Tyneside	R	A				29	17	23	23	19	36	44	46	46	**17**	**46**	**31**
SEDGEFIELD 1N	Sedgefield	R	A	30	7	21				6	13	24	29	33	27	**6**	**33**	**21**
SEDGEFIELD 5N	Sedgefield	R	A	44	23	26				20	12	37	36	41	33	**12**	**44**	**30**
EAST BOLDON 5N	South Tyneside	R	A	29	18	27	19	5	21	26	14	25	37	36	26	**5**	**37**	**24**
SOUTH SHIELDS 8N	South Tyneside	R	A	28	26	28	13	26	13	25	16	32	31	28	29	**13**	**32**	**25**
STOCKTON 4N	Stockton-On-Tees	R	A	39	29	24	17	24	44	16	47	67	55	59	43	**16**	**67**	**39**
STOCKTON 8N	Stockton-On-Tees	R	A	33	17	15	22	50	17	14	25	40	36	44	63	**14**	**63**	**31**
BISHOP AUCKLAND 1N	Wear Valley	R	A		38	13			31			36	36	51	44	**13**	**51**	**36**
BISHOP AUCKLAND 4N	Wear Valley	R	A	45	42	20	26	26	28	34		33	33	53	43	**20**	**53**	**35**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	41	25	26	29	30	25	19	27	40	38	46	42
	Regional Monthly Min	28	7	13	13	5	13	5	12	19	21	21	26
	Regional Monthly Max	63	42	44	52	58	49	41	54	71	59	67	67
	Regional Annual Mean	32											
	Regional Annual Min	18											
	Regional Annual Max	48											
	Number of Sites	20											
	% With Valid Data	100											

Figure B2.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the North East



B2.2 The North East (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the North East are shown in Figure B2.2. No urban background sites in the North East exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B2.3.

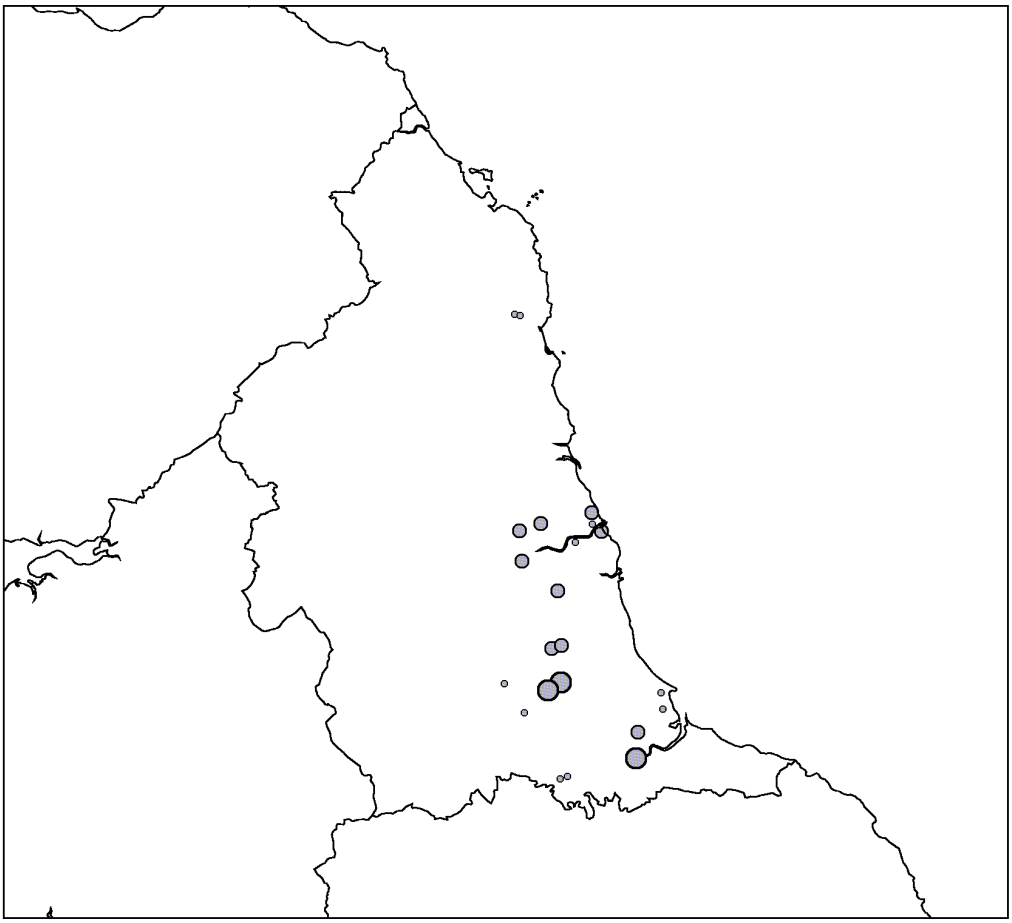
Table B2.3 Urban Background Sites in the North East

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
ALNWICK 3N	Alnwick	B	A		10	18	10	8	6	22	7	9	14	24	26	**6**	**26**	**14**
ALNWICK 4N	Alnwick	B	A		14	19	14	7	7	23	6	8	12	27	19	**6**	**27**	**14**
DARLINGTON 3N	Darlington	B	A	26	6	13	15	10	11	32	12	24	26	31	21	**6**	**32**	**19**
DARLINGTON 4N	Darlington	B	A	19		14	8	7	7	8	14	20	20	27	20	**7**	**27**	**15**
DURHAM 3N	Durham	B	A		20	45	31	12	10	48	11	19	22	26	26	**10**	**48**	**25**
DURHAM 4N	Durham	B	A		37	45	39	12	8	25	12	18	23	33	32	**8**	**45**	**26**
GATESHEAD 7N	Gateshead	B	A	22	11	33	25	17	9	22	15	26	27	34	37	**9**	**37**	**23**
GATESHEAD 8N	Gateshead	B	A	55	41	25	38	10	6	25	7	19	20	24	23	**6**	**55**	**24**
HARTLEPOOL 3N	Hartlepool	B	A			18	14	12	8	12	9	14				**8**	**18**	**12**
HARTLEPOOL 4N	Hartlepool	B	A			24	19	20	10		16	22				**10**	**24**	**18**
NEWCASTLE UPON TYNE 5N	Newcastle Upon Tyne	B	A	60	19	29	38	11	13	15	20	28	28	38	39	**11**	**60**	**28**
NEWCASTLE UPON TYNE 6N	Newcastle Upon Tyne	B	A	31	18	24		17	8	15	13	24	24	35	28	**8**	**35**	**22**
NORTH SHIELDS 1N	North Tyneside	B	A				23	12	12	10	13	15	27	27	36	**10**	**36**	**19**
WHITLEY BAY 5N	North Tyneside	B	A				15	12	8	13	13	17	31	42	34	**8**	**42**	**21**
SEDGEFIELD 3N	Sedgefield	B	A	44	17	28				23	12	23	28	54	52	**12**	**54**	**31**
SEDGEFIELD 4N	Sedgefield	B	A	47	22	47				19	14	39	39	34	46	**14**	**47**	**34**
HEBBURN 4N	South Tyneside	B	A	22	16	16	12	7	9	11	8	17	22	32	32	**7**	**32**	**17**
SOUTH SHIELDS 7N	South Tyneside	B	A	40	26	24	9	7		14		16	22	38	27	**7**	**40**	**22**
STOCKTON 6N	Stockton-On-Tees	B	A	33	16	53	25	17	20	76	24	35	38	40	35	**16**	**76**	**35**
STOCKTON 7N	Stockton-On-Tees	B	A	25	43	20	32	23	10	15	13	21	31	34	41	**10**	**43**	**26**
BISHOP AUCKLAND 3N	Wear Valley	B	A	24	13	9	11	11	5	9				33	32	**5**	**33**	**16**
CROOK 1N	Wear Valley	B	A		13	14	11	11	7	8	10	10	10	35	16	**7**	**35**	**13**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	34	20	26	20	12	9	21	12	20	24	33	31
	Regional Monthly Min	19	6	9	8	7	5	8	6	8	10	24	16
	Regional Monthly Max	60	43	53	39	23	20	76	24	39	39	54	52
	Regional Annual Mean	22											
	Regional Annual Min	12											
	Regional Annual Max	35											
	Number of Sites	22											
	% With Valid Data	100											

Figure B2.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the North East



B3.1 The North West and Merseyside (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the North West and Merseyside are shown in Figure B3.1. Table B3.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B3.2.

Table B3.1 Roadside Sites in the North West and Merseyside with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Manchester 1N	100 μgm^{-3}
Manchester 6N	82 μgm^{-3}
Southport 4N	68 μgm^{-3}
Lancaster 1N	66 μgm^{-3}
Stockport 14N	65 μgm^{-3}
Crosby 1N	63 μgm^{-3}
Stockport 18N	54 μgm^{-3}
Warrington 1N	54 μgm^{-3}
Ormskirk 6N	53 μgm^{-3}
Trafford 6N	51 μgm^{-3}
Rossendale 13N	51 μgm^{-3}
Burnley 5N	50 μgm^{-3}
Ormskirk 1N	50 μgm^{-3}
Ashton 3N	49 μgm^{-3}
Burnley 1N	45 μgm^{-3}
Blackburn 5N	45 μgm^{-3}
Prescot 1N	44 μgm^{-3}
Kendal 4N	44 μgm^{-3}
Clayton-le-Moors 5N	43 μgm^{-3}
Birkenhead 1N	42 μgm^{-3}
Dukinfield 1N	41 μgm^{-3}
Douglas IOM 5N	41 μgm^{-3}

Table B3.2 Roadside Sites in the North West and Merseyside

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

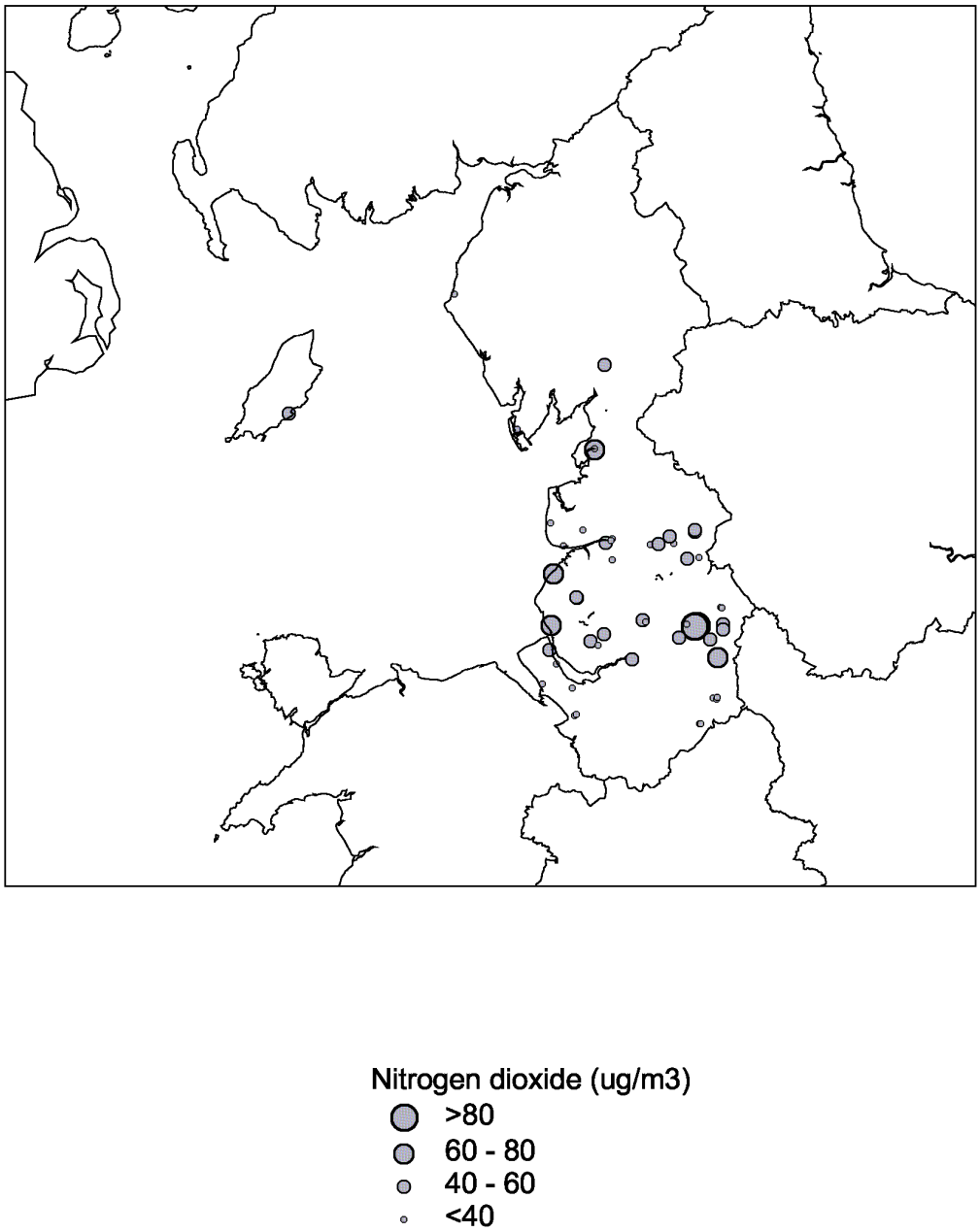
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARROW-IN-FURNESS 1N	Barrow in Furness	R	A	29	14	27	19	11	12	17	16	25	22	29	23	**11**	**29**	**20**
BARROW-IN-FURNESS 5N	Barrow in Furness	R	A	27	14	19	20	13	7	12	15	25	25	35	27	**7**	**35**	**20**
BLACKBURN 1N	Blackburn with Darwen	R	A		23	38	33	33	10	23	31					**10**	**38**	**27**
BLACKBURN 5N	Blackburn with Darwen	R	A		71	31		38	40	48	42					**31**	**71**	**45**
BLACKPOOL 1N	Blackpool	R	A	26	10	20	30	20			30	29	37	45		**10**	**45**	**28**
BLACKPOOL 5N	Blackpool	R	A	47	34	39	40	22	25		40			49		**22**	**49**	**37**
BOLTON 1N	Bolton	R	A											78		**78**	**78**	
BOLTON 9N	Bolton	R	A											65		**65**	**65**	
BURNLEY 1N	Burnley	R	A	47	40	54	48	35	39	40	42	46	41	63	51	**35**	**63**	**45**
BURNLEY 5N	Burnley	R	A	58	51	59	50	39	39	42	44	53	34	78	53	**34**	**78**	**50**
CARLISLE 1N	Carlisle	R	A	33	59	50										**33**	**59**	
CARLISLE 4N	Carlisle	R	A	8	46	36										**8**	**46**	
CARLISLE 5N	Carlisle	R	A	17	4	34										**4**	**34**	
CHESTER 1N	Chester	R	A	41	7	41	42	43	34	29			38	16	30	**7**	**43**	**32**
CHESTER 5N	Chester	R	A	59	36	40	43	25	26	32	37	37	39	29	75	**25**	**75**	**40**
CHORLEY 7N	Chorley	R	A			31						15	8	58	22	**8**	**58**	
CHORLEY 8N	Chorley	R	A									16			21	**16**	**21**	
CONGLETON 1N	Congleton	R	A	38	38	33	21	37	31	13	32	33	38	36	41	**13**	**41**	**33**
CONGLETON 6N	Congleton	R	A	33		38	31	16	34	34	29	29	35	33	30	**16**	**38**	**31**
WHITEHAVEN 1N	Copeland	R	A			28	40	29				28	35	42	35	**28**	**42**	**34**
WHITEHAVEN 5N	Copeland	R	A			28	35	34				28	41	48	24	**24**	**48**	**34**
ELLESMERE PORT 2N	Ellesmere Port	R	A		26	27		27	19	33	33	30	43	35	46	**19**	**46**	**32**
ELLESMERE PORT 7N	Ellesmere Port	R	A	27	29	30	31	24	22	35	39	24	37	37	49	**22**	**49**	**32**
LYTHAM ST ANNES 1N	Fylde	R	A	36					25	27	19	25	34	34	31	**19**	**36**	**29**
ACCRINGTON 1N	Hyndburn	R	A	46	38	46	38	17	34	42	29	21	21	21	40	**17**	**46**	**33**
CLAYTON-LE-MOORS 5N	Hyndburn	R	A	52	48	48	44	33	27	10	50	46		67	52	**10**	**67**	**43**
PRESCOT 1N	Knowsley	R	A	80		23	50	43	36	39	40	41	48	44		**23**	**80**	**44**
LANCASTER 1N	Lancaster	R	A	140	56	47	62		44	48			58		76	**44**	**140**	**66**
LANCASTER 5N	Lancaster	R	A	29	28	50	47	24	15	43	25	54	41	14	62	**14**	**62**	**36**
MACCLESFIELD 1N	Macclesfield	R	A	16		29	21	38	35			38	44	40	55	**16**	**55**	**35**
MACCLESFIELD 2N	Macclesfield	R	A	46	38	36	34	42	31		25		17	24		**17**	**46**	**33**
MACCLESFIELD 8N	Macclesfield	R	A	52		28	39	45	43	27	44	58	28	21		**21**	**58**	**39**
MANCHESTER 1N	Manchester	R	A	106	108	109	101	141	94	72	85	78	64	126	116	**64**	**141**	**100**
MANCHESTER 6N	Manchester	R	A	99	99	88	67	71	83	70	44	56	79	86	138	**44**	**138**	**82**
OLDHAM 1N	Oldham	R	A		35		18	25	24	36	35	36	34	33	30	**18**	**36**	**31**
OLDHAM 5N	Oldham	R	A		27		19	22	19	22	23	25	24	21	23	**19**	**27**	**23**
PRESTON 1N	Preston	R	A	43	30	28	21	28	31	4	20	27	40	48	35	**4**	**48**	**30**
PRESTON 7N	Preston	R	A	25	31	26	17	16	28	8	15	44	36	32	37	**8**	**44**	**26**
ROCHDALE 1N	Rochdale	R	A	71	72	58	52									**52**	**72**	
ROSSENDALE 13N	Rossendale	R	A	68	36	47		36	35	53	53	65	54		60	**35**	**68**	**51**
ROSSENDALE 14N	Rossendale	R	A	49	16	25		32	33	39	26	18	39	39	36	**16**	**49**	**32**
CROSBY 1N	Sefton	R	A	72	55	65	64	55	44	50	53	74	67	91	69	**44**	**91**	**63**
SOUTHPORT 4N	Sefton	R	A	74	70	72	68	55	64	62	64	79	67	72	71	**55**	**79**	**68**
KENDAL 1N	South Lakeland	R	A	48	45	43	48	33	22	33		26	20	27	37	**20**	**48**	**35**
KENDAL 4N	South Lakeland	R	A	66	58	54	75	40	28	36	42	24	29	39	38	**24**	**75**	**44**
LEYLAND 1N	South Ribble	R	A	42	26	22	38	28	24	31	29	42	40	32	43	**22**	**43**	**33**
PENWORTHAM 5N	South Ribble	R	A	40	44	47	32	26	37	36	17	47	45	63	49	**17**	**63**	**40**
ST HELENS 8N	St Helens	R	A	50	19	38	36	42	27	34	40	55	46		54	**19**	**55**	**40**
ST HELENS 9N	St Helens	R	A	38		36	36	29	27	36	36	48	40	44	48	**27**	**48**	**38**
STOCKPORT 14N	Stockport	R	A	51	56		72	71	76	57	71	56	71			**51**	**76**	**65**
STOCKPORT 18N	Stockport	R	A	47	69		54	49	58	61	46	54	51			**46**	**69**	**54**
ASHTON 3N	Tameside	R	A	33	38	31	51	50	50	97	41	51	55	51	41	**31**	**97**	**49**
DUKINFIELD 1N	Tameside	R	A	12	72	14	44			69	42	39	45	48	25	**12**	**72**	**41**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
TRAFFORD 1N	Trafford	R	A	17	32	35	26	18	26	27		40	28	25		**17**	**40**	**27**
TRAFFORD 6N	Trafford	R	A	43	12	176	34			42	30	36	46	43		**12**	**176**	**51**
WARRINGTON 1N	Warrington	R	A	56	66	69	62	51	40	62	51	61	30	52	48	**30**	**69**	**54**
ORMSKIRK 1N	West Lancashire	R	A	62	36	56	45	39	25	33		58	57	74	63	**25**	**74**	**50**
ORMSKIRK 6N	West Lancashire	R	A	59	43	50	53	47	36	47	46	60	63	71	58	**36**	**71**	**53**
LEIGH 1N	Wigan	R	A	46	31	44	38	42					50	32		**31**	**50**	**40**
LEIGH 8N	Wigan	R	A	38	25	32	32	37					30	47		**25**	**47**	**35**
BIRKENHEAD 1N	Wirral	R	A	32	49		34	27	70	29	19	45	50	63	40	**19**	**70**	**42**
PORT SUNLIGHT 1N	Wirral	R	A	38	39	12	48	52	37	39	29	58	26	51	41	**12**	**58**	**39**
DOUGLAS IOM 1N	Isle of Man	R	A	9	46	40	47	26	8	29	30	52	24	31	98	**8**	**98**	**37**
DOUGLAS IOM 5N	Isle of Man	R	A	37	41	43	64	40	42	33	28	69	23	41	26	**23**	**69**	**41**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	46	41	43	43	37	35	38	36	42	40	47	48
	Regional Monthly Min	8	4	12	17	11	7	4	15	15	8	14	21
	Regional Monthly Max	140	108	176	101	141	94	97	85	79	79	126	138
	Regional Annual Mean	44											
	Regional Annual Min	20											
	Regional Annual Max	100											
	Number of Sites	64											
	% With Valid Data	88											

Figure B3.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the North West and Merseyside



B3.2 The North West and Merseyside (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the North West and Merseyside are shown in Figure B3.2. Table B3.3 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B3.4.

Table B3.3 Urban Background Sites in the North West and Merseyside with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Manchester 3N	44 µgm^{-3}

Table B3.4 Urban Background Sites in the North West and Merseyside

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

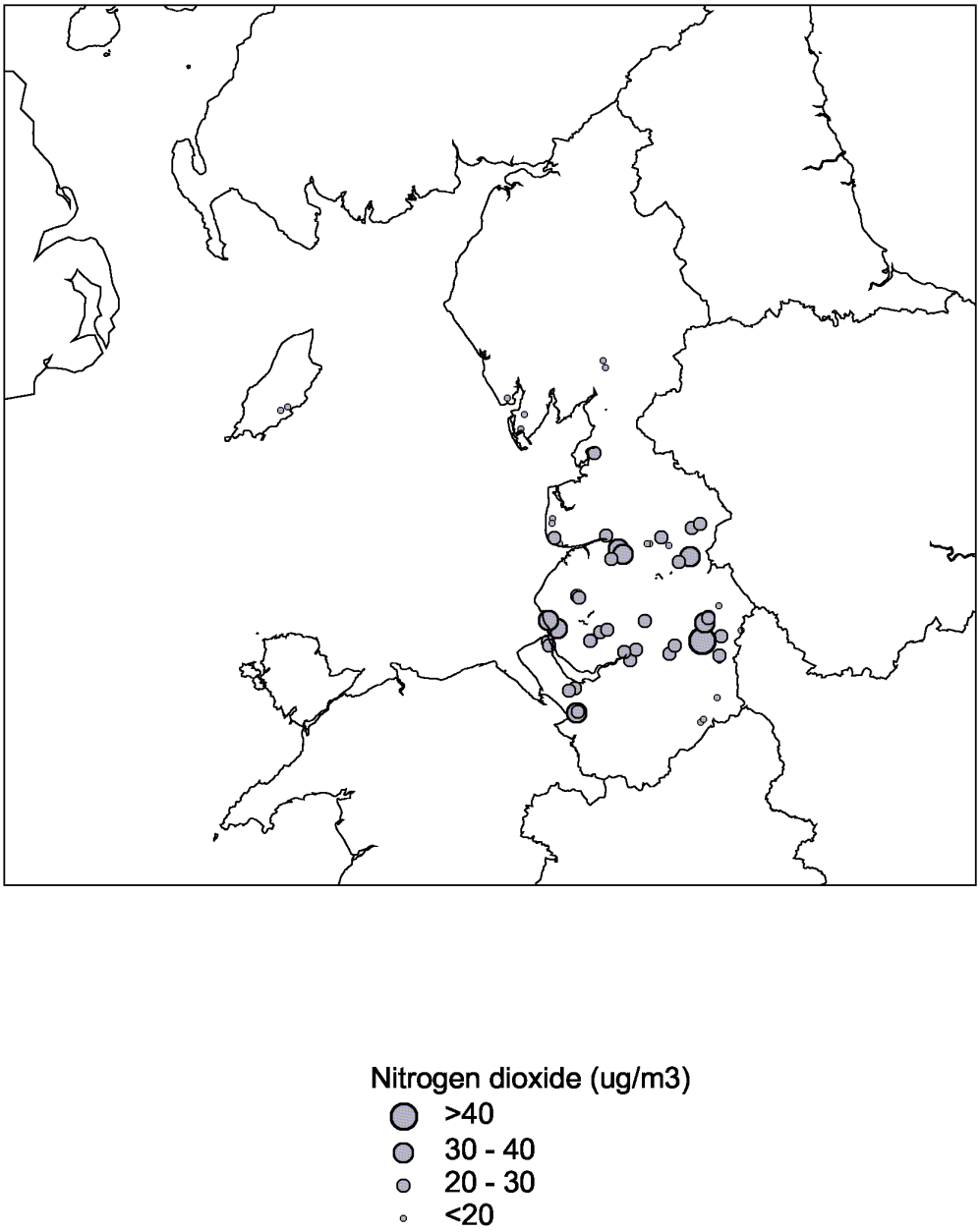
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARROW-IN-FURNESS 3N	Barrow in Furness	B	A	21	12	10	9	5	7	7	6	29	14	23	18	**5**	**29**	**13**
BARROW-IN-FURNESS 4N	Barrow in Furness	B	A	18	6	10	5	7	4	4	5	15	13	17	13	**4**	**18**	**10**
BLACKBURN 3N	Blackburn with Darwen	B	A		19	25	21	19	15	21	15					**15**	**25**	**19**
BLACKBURN 4N	Blackburn with Darwen	B	A		23	29	15	15	10	12	15					**10**	**29**	**17**
BLACKPOOL 3N	Blackpool	B	A	22	14	26	20	6	11		5	19	7	36		**5**	**36**	**17**
BLACKPOOL 4N	Blackpool	B	A	23		24	17	9					7	22		**7**	**24**	**17**
BOLTON 6N	Bolton	B	A											39		**39**	**39**	
BOLTON 8N	Bolton	B	A											35		**35**	**35**	
BURNLEY 3N	Burnley	B	A	31	21	30	23	13	16	15	19	24	28	46	33	**13**	**46**	**25**
BURNLEY 4N	Burnley	B	A	33	25	30	20	12	15	14	16	20	27	45	31	**12**	**45**	**24**
CHESTER 3N	Chester	B	A	46	27	34	22	25	15	17	35	35	33	36	62	**15**	**62**	**32**
CHESTER 4N	Chester	B	A	31		28	22	39	13	19	40	40	33	15	44	**13**	**44**	**29**
CHORLEY 4N	Chorley	B	A			20			23				25	63	26	**20**	**63**	
CHORLEY 6N	Chorley	B	A			40			19			35	33	44	50	**19**	**50**	**37**
CONGLETON 3N	Congleton	B	A	26	19	23		10	14	8	15	18	20	20	25	**8**	**26**	**18**
CONGLETON 4N	Congleton	B	A	21	15	18	11	11	10	8	9	13	16	20	20	**8**	**21**	**14**
WHITEHAVEN 3N	Copeland	B	A				12	15					17	19	17	**12**	**19**	
WHITEHAVEN 4N	Copeland	B	A			12	11	10				12	12	22	12	**10**	**22**	**13**
ELLESMERE PORT 4N	Ellesmere Port	B	A	32	20	25	27	16	12	23	27	22	30	38	51	**12**	**51**	**27**
ELLESMERE PORT 6N	Ellesmere Port	B	A	27	20	24	19	13	9	15	19	26	32	29	41	**9**	**41**	**23**
LYTHAM ST ANNES 3N	Fylde	B	A	27	15	15	10	10			10	10	12	29	12	**10**	**29**	**15**
LYTHAM ST ANNES 4N	Fylde	B	A	17	13	25	15	8	65		10	13	31	34	12	**8**	**65**	**22**
ACCRINGTON 4N	Hyndburn	B	A	21	8		12					19	12	29	29	**8**	**29**	**18**
RISHTON 3N	Hyndburn	B	A	31	23	25	23	17	15	17		19	17	19	36	**15**	**36**	**22**
PRESCOT 3N	Knowsley	B	A	49		25	31	19	17	18	19	35	48	19		**17**	**49**	**28**
PRESCOT 4N	Knowsley	B	A	48		25	26	18	11	16	14	38	33	17		**11**	**48**	**25**
LANCASTER 2N	Lancaster	B	A	41	7		6	23	11	24	21		12	14	35	**6**	**41**	**19**
LANCASTER 4N	Lancaster	B	A	39	22	22	7	14	11	18		40	30	4	37	**4**	**40**	**22**
MACCLESFIELD 10N	Macclesfield	B	A		29	16	14	18	15	17	15	29	18	16	30	**14**	**30**	**20**
MANCHESTER 3N	Manchester	B	A	45	32	38	34	44	41	34	36	32	61	85	48	**32**	**85**	**44**
MANCHESTER 5N	Manchester	B	A	57	56	48	38	31	27	25	30	30	33	56	45	**25**	**57**	**40**
OLDHAM 3N	Oldham	B	A		28		21	16	21	20	20	32	25	24	14	**14**	**32**	**22**
OLDHAM 4N	Oldham	B	A		20		17	12	11	16	15	21	19	23	21	**11**	**23**	**18**
OLDHAM 6N	Oldham	B	A		28		19	18	19	20	21	31	24	23	20	**18**	**31**	**22**
PRESTON 5N	Preston	B	C	33	18	17			11							**11**	**33**	
PRESTON 6N	Preston	B	A	20	20		11		11		7	28	27	33	29	**7**	**33**	**21**
ROCHDALE 3N	Rochdale	B	A	69	40	41	27									**27**	**69**	
ROCHDALE 4N	Rochdale	B	A	52	34	40	24									**24**	**52**	
ROSSENDALE 15N	Rossendale	B	A	75	71	29		17	23	20	13	28			36	**13**	**75**	**35**
ROSSENDALE 16N	Rossendale	B	A	39				17	17	19	10	37	17	37	33	**10**	**39**	**25**
BOOTLE 2N	Sefton	B	A	68	34	47	33	28	24	17	21	45	55		61	**17**	**68**	**40**
CROSBY 3N	Sefton	B	A	51	22	30	20	16	27	11	13	32	38	62	53	**11**	**62**	**31**
KENDAL 2N	South Lakeland	B	A	23	14	17	16	11	9	11	14	12	16	24	21	**9**	**24**	**16**
KENDAL 3N	South Lakeland	B	A	24	12	15	11	10	6	8	10	36	33	40	24	**6**	**40**	**19**
BAMBER BRIDGE 4N	South Ribble	B	A	44	13	25	29		27	20	16	25	31	49	86	**13**	**86**	**33**
LEYLAND 3N	South Ribble	B	A	38	21	36	20	25	26	17	21	28	29	40	50	**17**	**50**	**29**
ST HELENS 6N	St Helens	B	A	29	31	31	23	21	13	17	17	40	23	31	42	**13**	**42**	**26**
ST HELENS 7N	St Helens	B	A	31	33	15	19	19	15	13	21	27	27	31	31	**13**	**33**	**23**
STOCKPORT 16N	Stockport	B	A	16	19	31	15	15	14	12	13	18	23			**12**	**31**	**18**
STOCKPORT 17N	Stockport	B	A	18	26	17	20	16	15	25	25	40	25			**15**	**40**	**23**
DENTON 9N	Tameside	B	A	22		58	21			59	20	21	24	21	22	**20**	**59**	**30**
HOLLINGWORTH 5N	Tameside	B	A	29	21	9	21	20	20	27	16	14	15	23	21	**9**	**29**	**20**
TRAFFORD 4N	Trafford	B	A	14	5	96	14	25	10	21	18	19	15	27		**5**	**96**	**24**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
TRAFFORD 5N	Trafford	B	A	12	14	111	18	12	19	25	25	16	40	25		**12**	**111**	**29**
WARRINGTON 3N	Warrington	B	A		31	31	16	22	15	21	18	31	30	19	37	**15**	**37**	**25**
WARRINGTON 4N	Warrington	B	A	30	19	24	17	25	22	17	20	29	26	19	37	**17**	**37**	**24**
WARRINGTON 5N	Warrington	B	A	39			24	16	17	17	16	28	24		40	**16**	**40**	**25**
ORMSKIRK 3N	West Lancashire	B	A		25	34	27	21	12	12	17	32	38	52	46	**12**	**52**	**29**
ORMSKIRK 5N	West Lancashire	B	A	31	19	24	22	17	12	13	15	26	30	42	33	**12**	**42**	**24**
LEIGH 4N	Wigan	B	A	48	40	23	23	20								**20**	**48**	
LEIGH 6N	Wigan	B	A	38	13	25	25	19					19			**13**	**38**	**23**
LISCARD 4N	Wirral	B	A	33	25	20	27	17	25	13	9	24	38	43	43	**9**	**43**	**26**
WALLASEY 9N	Wirral	B	A	27			52	16	32	16	10	33		37	21	**10**	**52**	**27**
DOUGLAS IOM 3N	Isle of Man	B	A	17	15	12	15	10	12	6		14	6	12		**6**	**17**	**12**
DOUGLAS IOM 4N	Isle of Man	B	A	31	13	13	16	5	7		6	9	8	10	13	**5**	**31**	**12**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	33	23	29	20	17	17	18	17	26	25	31	33
	Regional Monthly Min	12	5	9	5	5	4	4	5	9	6	4	12
	Regional Monthly Max	75	71	111	52	44	65	59	40	45	61	85	86
	Regional Annual Mean	24											
	Regional Annual Min	10											
	Regional Annual Max	44											
	Number of Sites	65											
	% With Valid Data	88											

Figure B3.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the North West and Merseyside



B4.1 Yorkshire and the Humber (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for Yorkshire and the Humber are shown in Figure B4.1. Table B4.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B4.2.

Table B4.1 Roadside Sites in Yorkshire and the Humber with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Birstall X 5N	83 μgm^{-3}
Bradford 5N	67 μgm^{-3}
Bradford 1N	64 μgm^{-3}
Hull 8N	59 μgm^{-3}
Doncaster 1N	59 μgm^{-3}
Doncaster 6N	59 μgm^{-3}
Castleford 1N	56 μgm^{-3}
Malton 10N	56 μgm^{-3}
Selby 7N	56 μgm^{-3}
Halifax 5N	54 μgm^{-3}
Rotherham 5N	54 μgm^{-3}
Leeds 5N	54 μgm^{-3}
Malton 1N	53 μgm^{-3}
Hull 1N	52 μgm^{-3}
Barnsley 7N	52 μgm^{-3}
Goole 8N	51 μgm^{-3}
Wakefield 1N	51 μgm^{-3}
York 1N	49 μgm^{-3}
Rotherham 7N	43 μgm^{-3}
Huddersfield X 1N	43 μgm^{-3}
Goole 1N	42 μgm^{-3}
Harrogate 1N	41 μgm^{-3}
Northallerton 6N	41 μgm^{-3}

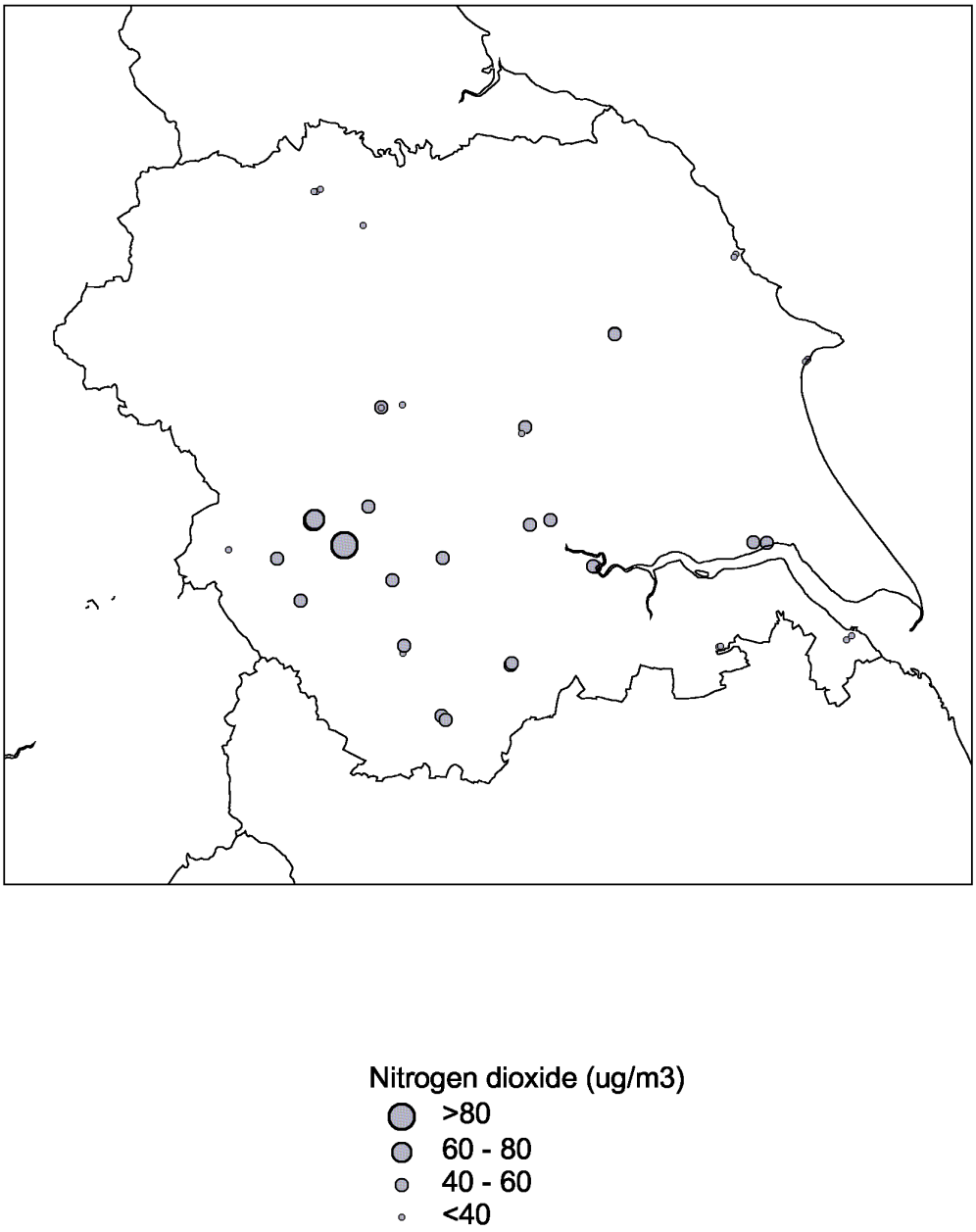
Table B4.2 Roadside Sites in Yorkshire and the Humber

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARNSLEY 1N	Barnsley	R	A	43	30	45	36	25	23	34	36	42	41	49	46	**23**	**49**	**38**
BARNSLEY 7N	Barnsley	R	A		53	43	47	53	37	43	48	61	56	61	66	**37**	**66**	**52**
BRADFORD 1N	Bradford	R	A	59	59	48	54	115		52	57	61	67	78	57	**48**	**115**	**64**
BRADFORD 5N	Bradford	R	A	59	54	52	54	115		48		50	84	90	71	**48**	**115**	**67**
HALIFAX 5N	Calderdale	R	A	61	52	65	55	54	46	54	48	54	55	61	46	**46**	**65**	**54**
HEBDEN BRIDGE 1N	Calderdale	R	A	46	44	42	44	27	31	42	29	29	42	52	38	**27**	**52**	**39**
HULL 1N	Kingston Upon Hull	R	A	59	40	45	53	38	47	57	54	62	54	60	59	**38**	**62**	**52**
HULL 8N	Kingston Upon Hull	R	A	71	64	39	49	59	50	55		80	58	63		**39**	**80**	**59**
YORK 1N	City of York Council	R	A	66	64	78	10	31	26	35	26	44	50	72	88	**10**	**88**	**49**
YORK 6N	City of York Council	R	A	40	19	38	32	29	24	13	9	25	40	27	59	**9**	**59**	**30**
DONCASTER 1N	Doncaster	R	A	93	37	63	60	64	36	46	55	27	72	85	67	**27**	**93**	**59**
DONCASTER 6N	Doncaster	R	A	75	41	52	53	52	38	54	57	78	65	66	71	**38**	**78**	**59**
BRIDLINGTON 1N	East Riding of Yorkshire	R	A	40	33	34	31	31	27	29	29	34	31	44	38	**27**	**44**	**33**
BRIDLINGTON 5N	East Riding of Yorkshire	R	A	40	29	33	27	23	23	27	31	27	31	46	33	**23**	**46**	**31**
GOOLE 1N	East Riding of Yorkshire	R	A	53	48	43	40	42	36	32					43	**32**	**53**	**42**
GOOLE 8N	East Riding of Yorkshire	R	A	53	64	55	54	41	43	44					54	**41**	**64**	**51**
NORTHALLERTON 1N	Hambleton	R	A	46	36	41	39	34	33	33	35	42	43		37	**33**	**46**	**38**
NORTHALLERTON 6N	Hambleton	R	A	52	43	46	16	14	35	36	43	51	43	61	53	**14**	**61**	**41**
HARROGATE 1N	Harrogate	R	A	52	65	23	19	22	39	40		52	40	58	43	**19**	**65**	**41**
HARROGATE 6N	Harrogate	R	A	43	40	27	16	24	57	23		30	31	46	33	**16**	**57**	**34**
KNARESBOROUGH 1N	Harrogate	R	A	32	18	34	20	31	30	44		60	32	50	54	**18**	**60**	**37**
BIRSTALL X 5N	Kirklees	R	A	87		71	59	12	58	87	40	123	96	169	109	**12**	**169**	**83**
HUDDERSFIELD X 1N	Kirklees	R	A	33	41	52	11	36	38	39	34	58	53	59	61	**11**	**61**	**43**
LEEDS 5N	Leeds	R	A	65	55				42	48	42	67	29	75	61	**29**	**75**	**54**
GREAT GRIMSBY 17N	NE Lincolnshire	R	A	40	42	29	40	27	29	29	36	34	38	54	34	**27**	**54**	**36**
GREAT GRIMSBY 1N	NE Lincolnshire	R	A	42	50	34	40	33	29	36	40	25	4	105	36	**4**	**105**	**40**
BRIGG 1N	North Lincolnshire	R	A	34	28	31	25	17	20	24	21	27	28	34		**17**	**34**	**26**
BRIGG 5N	North Lincolnshire	R	A	43	39	38	36	28	39	37	30	40	34	46	37	**28**	**46**	**37**
RICHMOND N.YORKS 2N	Richmondshire	R	A	34	31		35	16	17	30	29	39	33	39	29	**16**	**39**	**30**
RICHMOND N.YORKS 7N	Richmondshire	R	A	40	24	33	29	28	23	29	20		29	35	22	**20**	**40**	**28**
RICHMOND N.YORKS 8N	Richmondshire	R	A	46	36	28	22	13	12	10	19	28	22	34	35	**10**	**46**	**25**
ROTHERHAM 5N	Rotherham	R	A	59		52	62	50	47	46	54	60	53	58	54	**46**	**62**	**54**
ROTHERHAM 7N	Rotherham	R	A	45	40		53	35	31	37	44	51	46	51	40	**31**	**53**	**43**
MALTON 10N	Ryedale	R	A	45			50	54	45	53	56	68	58	71		**45**	**71**	**56**
MALTON 1N	Ryedale	R	A	63			53	49	49	22	56	62	59	62		**22**	**63**	**53**
SCARBOROUGH 1N	Scarborough	R	A	6	23	43	28		24	33	23	29	28	42	14	**6**	**43**	**27**
SCARBOROUGH 5N	Scarborough	R	A	40	4	38	21		24	33	17	36	12	32	31	**4**	**40**	**26**
SELBY 7N	Selby	R	A	55	18	68	45	51	54	106	32	62		63	56	**18**	**106**	**56**
CASTLEFORD 1N	Wakefield	R	A	66	57	55	59	33	41	60	50	47	67	72	69	**33**	**72**	**56**
WAKEFIELD 1N	Wakefield	R	A	51	44	55	47	44	40	48	53	47	54	68	58	**40**	**68**	**51**

REGIONAL SUMMARY		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Regional Monthly Mean	51	41	45	39	39	35	41	38	49	45	60	50
	Regional Monthly Min	6	4	23	10	12	12	10	9	25	4	27	14
	Regional Monthly Max	93	65	78	62	115	58	106	57	123	96	169	109
	Regional Annual Mean	45											
	Regional Annual Min	25											
	Regional Annual Max	83											
	Number of Sites	40											
	% With Valid Data	100											

Figure B4.1 Annual Average Roadside Nitrogen Dioxide Concentrations in Yorkshire and the Humber



B4.2 Yorkshire and the Humber (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for Yorkshire and the Humber are shown in Figure B4.2. No urban background sites in Yorkshire and the Humber exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B4.3

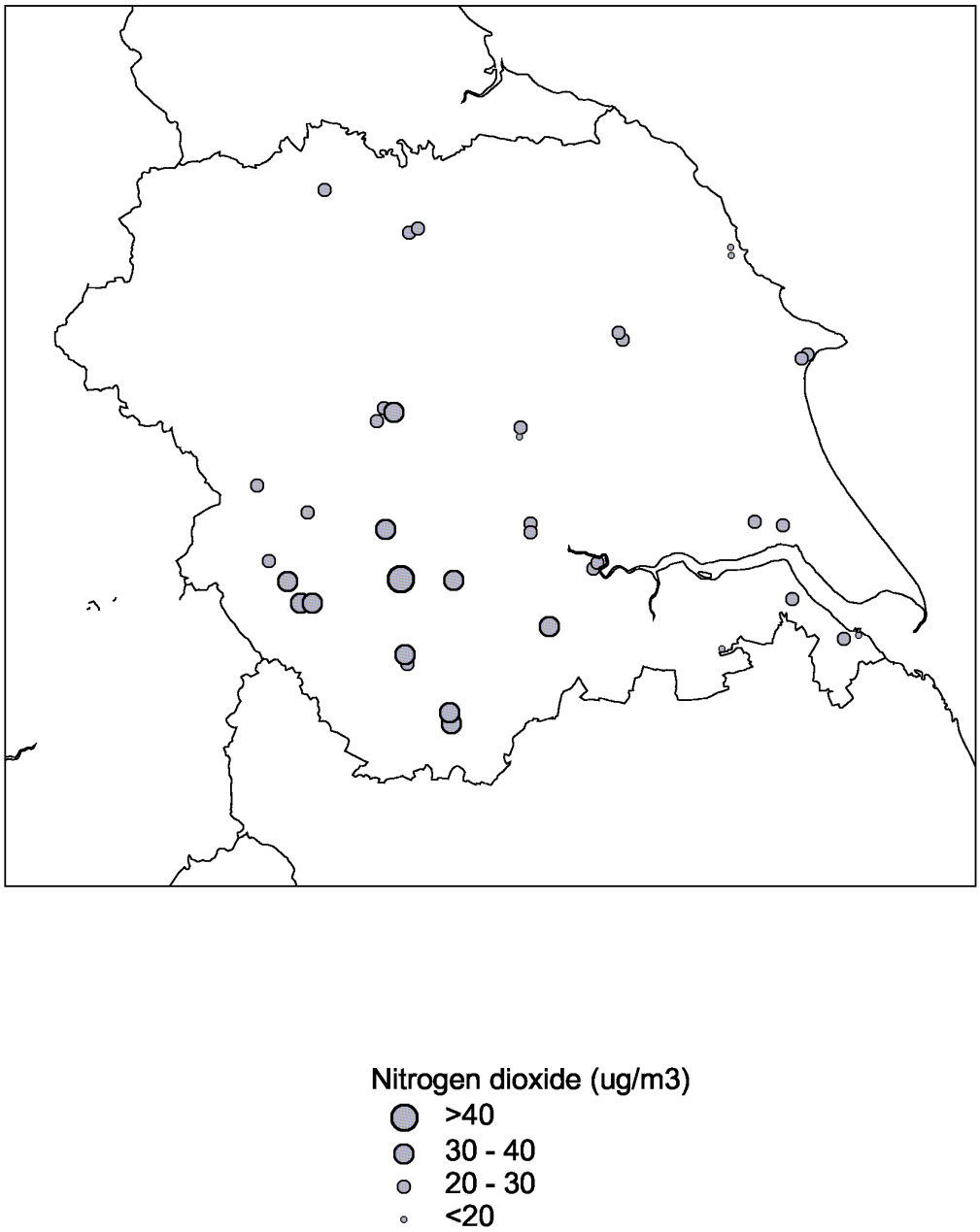
Table B4.3 Urban Background Sites in Yorkshire and the Humber

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARNSLEY 4N	Barnsley	B	A	39	18	31	24	20	14	17	25	32	32	44	46	**14**	**46**	**29**
BARNSLEY 6N	Barnsley	B	A	47	32	36	33	24	20	23	28	37	43	52	49	**20**	**52**	**35**
BRADFORD 3N	Bradford	B	A		19	27		19		17	21	27	31	42	23	**17**	**42**	**25**
BRADFORD 4N	Bradford	B	A	33	19	23	15	13		12	12	19	27	36	15	**12**	**36**	**20**
ELLAND 4N	Calderdale	B	A	44	29	36	29	23	19	23	23	33	36	44	34	**19**	**44**	**31**
HALIFAX 2N	Calderdale	B	A	36	25	34	33	25	19	23	21	31	33	40	34	**19**	**40**	**29**
HULL 5N	Kingston Upon Hull	B	A	38	60	18	23	22	16	18	40	22	28	32	33	**16**	**60**	**29**
HULL 6N	Kingston Upon Hull	B	A	32	33	20	12	17	17	9	14	22	21		27	**9**	**33**	**20**
YORK 3N	City of York Council	B	A	38	38	32	14	8	11	21	7	14	23	38	72	**7**	**72**	**26**
YORK 5N	City of York Council	B	A	33	21	15	13	11	12	15	4	15	24	28	5	**4**	**33**	**16**
DONCASTER 4N	Doncaster	B	A	44	18		8		12	21	22	70	36	53	34	**8**	**70**	**32**
BRIDLINGTON 3N	East Riding of Yorkshire	B	A	31	24	24	15	17	15	13	12	15	21	33	33	**12**	**33**	**21**
BRIDLINGTON 4N	East Riding of Yorkshire	B	A	33	24	22	15	13	13	12	13	17	19	34	31	**12**	**34**	**21**
GOOLE 5N	East Riding of Yorkshire	B	A	39	37	25	25	19	24	17					35	**17**	**39**	**28**
GOOLE 6N	East Riding of Yorkshire	B	A	38	36	23	21	17	19	18					34	**17**	**38**	**26**
NORTHALLERTON 4N	Hambleton	B	A	36	14	21	39	36	14	12	16	23	27	43	34	**12**	**43**	**26**
NORTHALLERTON 5N	Hambleton	B	A	33	20	21	18	15	12	12	16	20	24	40	31	**12**	**40**	**22**
HARROGATE 3N	Harrogate	B	A	26	34	22	8	16	63	18		25	29	45	26	**8**	**63**	**28**
HARROGATE 5N	Harrogate	B	A	23	25	28	5	14	49	12		23	22	36	26	**5**	**49**	**24**
HARROGATE 7N	Harrogate	B	A					23	22	26		51	37	52	46	**22**	**52**	**37**
HUDDERSFIELD X 3N	Kirklees	B	A	81	20	26	8	13	47	20	45	91	33	48	47	**8**	**91**	**40**
HUDDERSFIELD X 4N	Kirklees	B	A	41	27	32	15				26	39	32	39	43	**15**	**43**	**33**
LEEDS 3N	Leeds	B	A	36	34	34			25	31	33	34	42	52	46	**25**	**52**	**37**
GREAT GRIMSBY 3N	NE Lincolnshire	B	A			21	19	8	17		21	23	25	31	15	**8**	**31**	**20**
GREAT GRIMSBY 4N	NE Lincolnshire	B	A	29	21		15	33	21	17	17	23	23	33	61	**15**	**61**	**27**
BRIGG 3N	North Lincolnshire	B	A	25	19	16		10	13	15	4	17	21			**4**	**25**	**16**
KILLINGHOLME 4N	North Lincolnshire	B	A	34	21	26	19	19	15	17	16	18		43	31	**15**	**43**	**24**
RICHMOND N.YORKS 6N	Richmondshire	B	A	38	21	19	33	20	4	12	6	17	18	24	30	**4**	**38**	**20**
ROTHERHAM 3N	Rotherham	B	A	45	38	38			28	12	35		42	51	13	**12**	**51**	**34**
ROTHERHAM 6N	Rotherham	B	A	49	40		34	27	31	30	30	35	39	45	39	**27**	**49**	**36**
MALTON 8N	Ryedale	B	A	29				13	10	14	25	23	23	35		**10**	**35**	**22**
MALTON 9N	Ryedale	B	A				16	15	10	16	17	22	24	41		**10**	**41**	**20**
SCARBOROUGH 4N	Scarborough	B	A		10	6	17		7	8	9	4	12	24	16	**4**	**24**	**11**
SCARBOROUGH 6N	Scarborough	B	A	4	5	17	9		14	10	6	6	4	17	24	**4**	**24**	**11**
SELBY 3N	Selby	B	A	45	34	32	17	20	19	24	12	22	31	43	32	**12**	**45**	**28**
SELBY 9N	Selby	B	A	40	31	28	13	20	15	24	9	18	27	44	33	**9**	**44**	**25**
PONTEFRACT 1N	Wakefield	B	A		29	32	31	35	21		31		36	77	57	**21**	**77**	**39**
WAKEFIELD 3N	Wakefield	B	A	50	39	38	32	27	30	32	32	30	48	60	63	**27**	**63**	**40**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	37	27	26	20	19	20	18	20	27	28	41	35
	Regional Monthly Min	4	5	6	5	8	4	8	4	4	4	17	5
	Regional Monthly Max	81	60	38	39	36	63	32	45	91	48	77	72
	Regional Annual Mean	26											
	Regional Annual Min	11											
	Regional Annual Max	40											
	Number of Sites	38											
	% With Valid Data	100											

Figure B4.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in Yorkshire and the Humber



B5.1 The East Midlands (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the East Midlands are shown in Figure B5.1. Table B5.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B5.2.

Table B5.1 Roadside Sites in the East Midlands with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Arnold 3N	63 μgm^{-3}
Ashfield 7N	62 μgm^{-3}
Loughborough 1N	58 μgm^{-3}
Ashfield 8N	58 μgm^{-3}
Harborough 1N	53 μgm^{-3}
Harborough 5N	52 μgm^{-3}
Arnold 1N	49 μgm^{-3}
Matlock 9N	48 μgm^{-3}
Blaby 5N	48 μgm^{-3}
Newark 1N	48 μgm^{-3}
Matlock 5N	47 μgm^{-3}
Derby 7N	47 μgm^{-3}
Buxton Derbyshire 1N	46 μgm^{-3}
Leicester 1N	45 μgm^{-3}
Grantham 11N	45 μgm^{-3}
Swadlincote 8N	43 μgm^{-3}
Newark 5N	43 μgm^{-3}
Rushden 1N	42 μgm^{-3}
Long Eaton 1N	42 μgm^{-3}
Hinckley 1N	41 μgm^{-3}

Table B5.2 Roadside Sites in the East Midlands

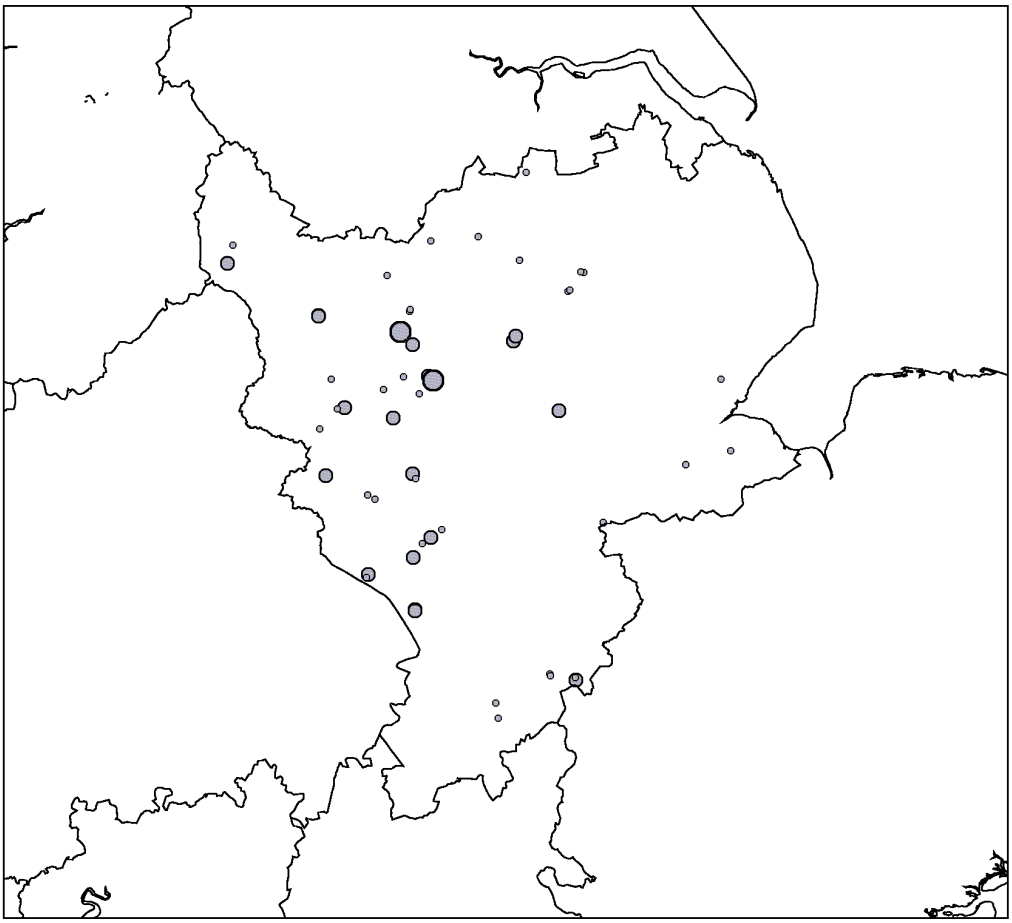
				Nitrogen Dioxide Concentrations 2002 (ug m^{-3})														
Site Name	**Local Authority**	**Location**	**Status**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Min**	**Max**	**Mean**
ASHFIELD 7N	Ashfield	R	A	64	67	72	62	54	51	61	50	71	60	77	60	**50**	**77**	**62**
ASHFIELD 8N	Ashfield	R	A	61	53	61	56	42	51	51	51	64	64	77	60	**42**	**77**	**58**
DUNHAM 1N	Bassetlaw	R	A	41	27	29	29	30	28	13	35	43	21	39	31	**13**	**43**	**30**
RETFORD 1N	Bassetlaw	R	C	40	23	33	24	21	18	30	29	38	29	39	43	**18**	**43**	**30**
WORKSOP 7N	Bassetlaw	R	A	44	38	42	39	18	29	19	38	49	41	39	43	**18**	**49**	**37**
BLABY 1N	Blaby	R	A	52	60	39		20		21				26	28	**20**	**60**	**35**
BLABY 5N	Blaby	R	A	53	65	56		43		27				47	44	**27**	**65**	**48**
BOLSOVER 5N	Bolsover	R	A	42	34	38	38	32	24	37	23	35	36	53	50	**23**	**53**	**37**
BOLSOVER 6N	Bolsover	R	A									26		48		**26**	**48**	
BOSTON 1N	Boston	R	A	49	15	29	39	14	22	41	28	64	38	50	52	**14**	**64**	**37**
BOSTON 6N	Boston	R	A	37	6	22	38	19	36	39	21	54	30	44	45	**6**	**54**	**33**
BROXTOWE 1N	Broxtowe	R	A	46	41	40	36	24	27	33	36	43	41	50	43	**24**	**50**	**38**
BROXTOWE 5N	Broxtowe	R	A	34	27	34	36	27	26	37	32	46	36	44	39	**26**	**46**	**35**
LOUGHBOROUGH 1N	Charnwood	R	A	63	61	57	75	27	41	80	65	58	57	61	59	**27**	**80**	**58**
LOUGHBOROUGH 7N	Charnwood	R	A	37	40	29	46	20	26	47	45	55	46	49	39	**20**	**55**	**40**
DERBY 7N	Derby City	R	A	54	22	21	50	47	50	41	50		57	73	48	**21**	**73**	**47**
DERBY 8N	Derby City	R	A			42	23	30	22	32	19	38	46		38	**19**	**46**	**32**
MATLOCK 5N	Derbyshire Dales	R	A	47	47	44	50	38	37	45	48	49	49	61	54	**37**	**61**	**47**
MATLOCK 9N	Derbyshire Dales	R	A	44	38	50	50	44	37	45	53	54	50	63	50	**37**	**63**	**48**
LOUTH 5N	East Lindsey	R	A	36	26											**26**	**36**	
LOUTH 6N	East Lindsey	R	A	48	31											**31**	**48**	
RUSHDEN 1N	East Northamptonshire	R	A	66	57	72	33	34	26	31	37		33	36	39	**26**	**72**	**42**
RUSHDEN 5N	East Northamptonshire	R	A	42	35	40		12	8	20	12	29	22	31	28	**8**	**42**	**25**
LONG EATON 1N	Erewash	R	A	50	45	40	40	33		38	42	52	38	44	41	**33**	**52**	**42**
LONG EATON 5N	Erewash	R	A	41	28	37	18	24	43	34	28	38	37	44	30	**18**	**44**	**34**
ARNOLD 1N	Gedling	R	A	62	54	44	53	36	32	41	42	61	45	62	52	**32**	**62**	**49**
ARNOLD 3N	Gedling	R	A	82	56	56	68	56	62	66	61	67	59	52	66	**52**	**82**	**63**
HARBOROUGH 1N	Harborough	R	A		40	59	55	42	54	55		56	48	97	25	**25**	**97**	**53**
HARBOROUGH 5N	Harborough	R	A	50	54	38	61			50		49	67		48	**38**	**67**	**52**
BUXTON DERBYSHIRE 1N	High Peak	R	A	42	48	62	57	7	55	25	48	62	49	48	51	**7**	**62**	**46**
DOVE HOLES 1N	High Peak	R	A	25	25	36	39	14	22	24	27	40	33	40	22	**14**	**40**	**29**
HINCKLEY 1N	Hinckley & Bosworth	R	A	52		54	38	44	36	40	42	25	54	29		**25**	**54**	**41**
HINCKLEY 7N	Hinckley & Bosworth	R	A	55	38	38	31	31	27	29	27	44	38			**27**	**55**	**36**
KETTERING 1N	Kettering	R	A									55	69	79	71	**55**	**79**	
LEICESTER 1N	Leicester City	R	A	46	50	61	48	33	38	44	27	44	57	48		**27**	**61**	**45**
LEICESTER 6N	Leicester City	R	A	54	60	12	19	25	19	17	17	23	50	27		**12**	**60**	**29**
LINCOLN 3N	Lincoln	R	A	57	57	55	21	15	15	16	27	26	36	24	30	**15**	**57**	**32**
LINCOLN 6N	Lincoln	R	A	50	51	46	18	16	10	29	18	40	39	37	40	**10**	**51**	**33**
MANSFIELD 1N	Mansfield	R	A	40	19	38	34	17	32	33	32	41	33	39	42	**17**	**42**	**33**
MANSFIELD 5N	Mansfield	R	A	27	19		28	20	18	26	31	41	33	46	41	**18**	**46**	**30**
NEWARK 1N	Newark	R	A	59	56	48	46	40	42	38	36	46	51	63	46	**36**	**63**	**48**
NEWARK 5N	Newark	R	A	53	47	42	52	35	39	44	29	33	45	59	36	**29**	**59**	**43**
NORTH HYKEHAM 1N	North Kesteven	R	A	84	36	48	48	26	19		5	41			29	**5**	**84**	**37**
NORTH HYKEHAM 6N	North Kesteven	R	A	80	42	33	44	11	25	16	6	28	36	42	36	**6**	**80**	**33**
COALVILLE 10N	NW Leicestershire	R	A	31	24	21	25	16	33	24		59	28	51	51	**16**	**59**	**33**
COALVILLE 1N	NW Leicestershire	R	A	34	24	22	23	18		17	16	5	11	44	44	**5**	**44**	**23**
NORTHAMPTON 1N	Northampton	R	A	19	48	47	45	21	29	37	41	28	27	36	52	**19**	**52**	**36**
NORTHAMPTON 7N	Northampton	R	A	39	44	29	28	23	18	29	26	34	45		41	**18**	**45**	**32**
NOTTINGHAM 1N	Nottingham	R	A	44	40	36	29	33	23	33	38	40		17	38	**17**	**44**	**34**
SWADLINCOTE 7N	South Derbyshire	R	A		22	40	35	67		18	22	36		43	39	**18**	**67**	**36**
SWADLINCOTE 8N	South Derbyshire	R	A	36	42	32	41	75	25	39	39	63	55	47	27	**25**	**75**	**43**
SPALDING 2N	South Holland	R	A	20	11	19		10	6	13	4	16	18	22	22	**4**	**22**	**15**
SPALDING 7N	South Holland	R	A	38		15	21	9	6			23	19	30	26	**6**	**38**	**21**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
GRANTHAM 11N	South Kesteven	R	A		47	65	54	47	28	44	7	15	35	109	45	**7**	**109**	**45**
GRANTHAM 21N	South Kesteven	R	C		70		64									**64**	**70**	
GRANTHAM SK 50N	South Kesteven	R	A									25	43	101	38	**25**	**101**	
STAMFORD 1N	South Kesteven	R	A	18	53	46	37	64	24	54		7	28	74	29	**7**	**74**	**39**
STAMFORD 31N	South Kesteven	R	A	24	11	46	36	47	17	30	8		25	59	26	**8**	**59**	**30**
WELLINGBOROUGH 10N	Wellingborough	R	A	51	40	39	15	14	10	5	15	27	33	36		**5**	**51**	**26**
WELLINGBOROUGH 1N	Wellingborough	R	A	50	40	53	20	22	12	28	24	24	29	38		**12**	**53**	**31**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	46	40	42	39	30	29	34	31	41	41	50	42
	Regional Monthly Min	18	6	12	15	7	6	5	4	5	11	17	22
	Regional Monthly Max	84	70	72	75	75	62	80	65	71	69	109	71
	Regional Annual Mean	38											
	Regional Annual Min	15											
	Regional Annual Max	63											
	Number of Sites	60											
	% With Valid Data	90											

Figure B5.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the East Midlands



B5.2 The East Midlands (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the East Midlands are shown in Figure B5.2. Table B5.3 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B5.4.

Table B5.3 Urban Background Sites in the East Midlands with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Ashfield 4N	42 μgm^{-3}

Table B5.4 Urban Background Sites in the East Midlands

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

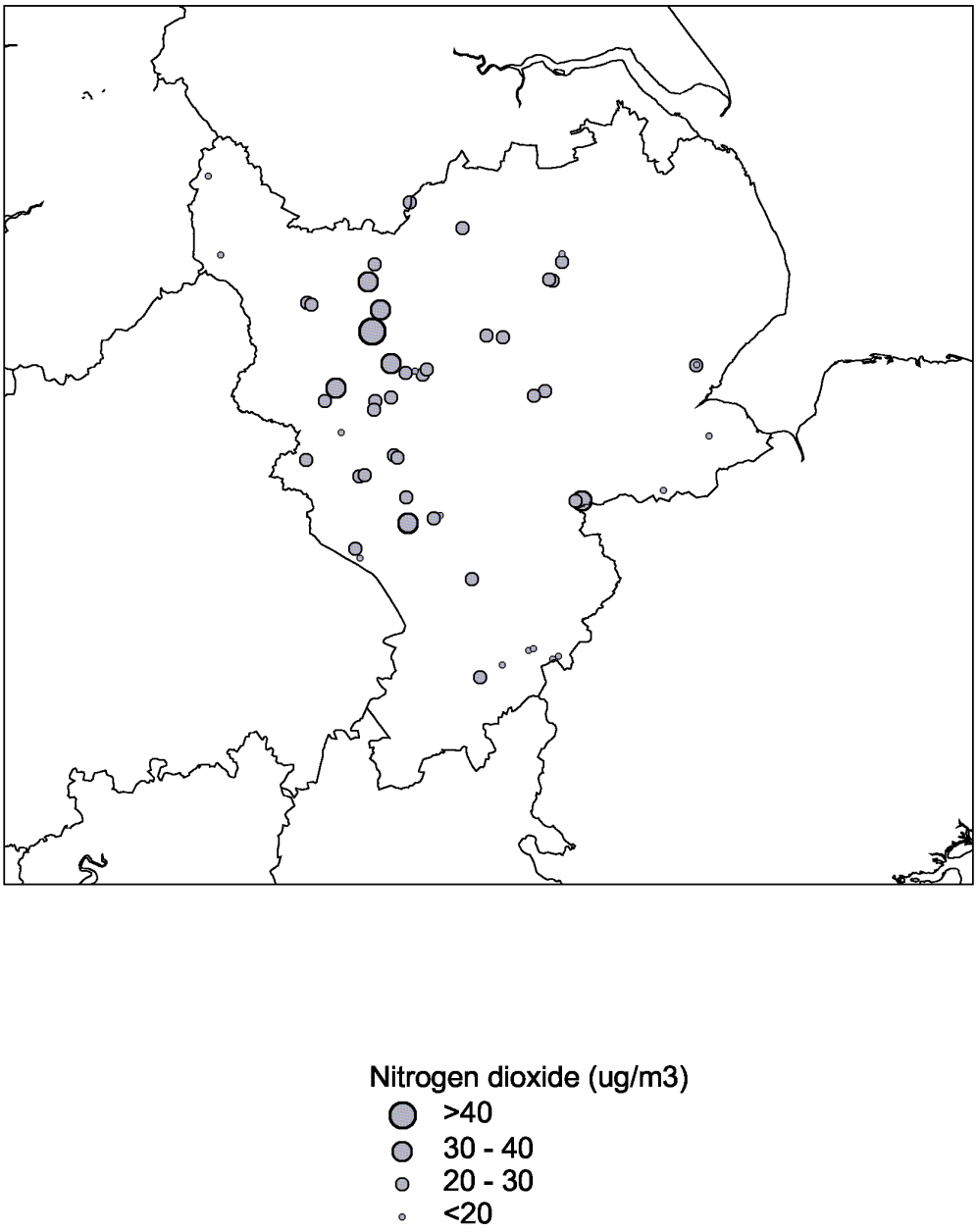
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
ASHFIELD 2N	Ashfield	B	A	56	37	41	34	28	26	28	32	43	46	52	48	**26**	**56**	**39**
ASHFIELD 4N	Ashfield	B	A	47	36	47	39	26	30	34	36	49	50	61	52	**26**	**61**	**42**
RETFORD 2N	Bassetlaw	B	A	29	26	27	12	19	16	9	19	30	18	33	29	**9**	**33**	**22**
BLABY 3N	Blaby	B	A	38	44	31		24						34	41	**24**	**44**	**35**
BLABY 4N	Blaby	B	A	43	37	31		28		29				25	31	**25**	**43**	**32**
BOLSOVER 3N	Bolsover	B	A	25	23	27	21	15	18	17	18	29	26	37	33	**15**	**37**	**24**
BOLSOVER 4N	Bolsover	B	A	41	35	35	30	30	27	26	29	53	47	45	43	**26**	**53**	**37**
BOSTON 3N	Boston	B	A	35		18	23	11		13	10	28	25	29	26	**10**	**35**	**22**
BOSTON 5N	Boston	B	A	24	7	10	21	6	6	10	12	13	12	24		**6**	**24**	**13**
BROXTOWE 3N	Broxtowe	B	A	28	35	29	24	23	19	26	28	30	28	36	35	**19**	**36**	**29**
BROXTOWE 6N	Broxtowe	B	A	46	40	29	31	26	29	33	29	33	39	48	36	**26**	**48**	**35**
LOUGHBOROUGH 4N	Charnwood	B	A		24	14	24	16	12	23	22	29	24	33		**12**	**33**	**22**
LOUGHBOROUGH 5N	Charnwood	B	A	25	24	19	21	9	12	21	19	24	30	31	28	**9**	**31**	**22**
DERBY 5N	Derby City	B	A	38		24	47	27	24	21	11		37	75	37	**11**	**75**	**34**
DERBY 6N	Derby City	B	A	33	24		22		17	36		21	36	33	29	**17**	**36**	**28**
MATLOCK 7N	Derbyshire Dales	B	A	26	17	18	18	14	12	14	16	23	25	37	29	**12**	**37**	**21**
MATLOCK 8N	Derbyshire Dales	B	A	28	20	22	19	13	12	17	17	23	25	39	32	**12**	**39**	**22**
LOUTH 3N	East Lindsey	B	A	38	16											**16**	**38**	
LOUTH 7N	East Lindsey	B	A	28	15											**15**	**28**	
RUSHDEN 3N	East Northamptonshire	B	A	31	29	27	11	8	7	14	7	12	20	29	25	**7**	**31**	**18**
RUSHDEN 4N	East Northamptonshire	B	A	32	20	25	12	7	4	21	7	17	18	28	25	**4**	**32**	**18**
LONG EATON 3N	Erewash	B	A	37	30	29	17	12	33	23	23	26			4	**4**	**37**	**23**
LONG EATON 4N	Erewash	B	A	32	24	24	17	16	28	20	19	26	26	41	30	**16**	**41**	**25**
CARLTON 3N	Gedling	B	A	55	37	29	32	23	28	23	21	27	23	18	40	**18**	**55**	**30**
CARLTON 4N	Gedling	B	A	64	35	27	24	21	21	23	13	24	24	26	34	**13**	**64**	**28**
HARBOROUGH 3N	Harborough	B	A	19	19	21	19	12	13				21	31	38	**12**	**38**	**21**
HARBOROUGH 4N	Harborough	B	A	19	23	19	19	13	13	15		16	23	25	13	**13**	**25**	**18**
BUXTON DERBYSHIRE 4N	High Peak	B	A	6	5	23	17		15	15	13		15	7	15	**5**	**23**	**13**
GLOSSOP 3N	High Peak	B	A	17	16	41	17		14	14	12	15	14			**12**	**41**	**18**
HINCKLEY 5N	Hinckley & Bosworth	B	A	27	13	27	15	15	12	19	15	27		25		**12**	**27**	**20**
HINCKLEY 6N	Hinckley & Bosworth	B	A	8		29		15	12	19	17	59	15	25		**8**	**59**	**22**
KETTERING 3N	Kettering	B	A						19			22	41	57	42	**19**	**57**	
KETTERING 4N	Kettering	B	A						23			26	45	60	46	**23**	**60**	
LEICESTER 3N	Leicester City	B	A	38	40	23	12	19	13	19	19		23	33		**12**	**40**	**24**
LEICESTER 5N	Leicester City	B	A	38	36	15	13	13	25	15	10	21	48	27		**10**	**48**	**24**
LINCOLN 4N	Lincoln	B	A	34	30	26	11		14	12	8	17	24	49	25	**8**	**49**	**23**
LINCOLN 5N	Lincoln	B	A	36	30	26		7	6	15	9	10	24	25	28	**6**	**36**	**20**
MANSFIELD 3N	Mansfield	B	C	31	26	26	18									**18**	**31**	
MANSFIELD 4N	Mansfield	B	A	25	22	23	18	8	11	18	19	27	18	32	27	**8**	**32**	**21**
NEWARK 3N	Newark	B	A	34	26	29	26	15		18	25	28	35	39	40	**15**	**40**	**29**
NEWARK 4N	Newark	B	A	37	29	28	26	18	13	12	15	14	25	35	31	**12**	**37**	**24**
NORTH HYKEHAM 3N	North Kesteven	B	A	71	33		23		8	10		22	20	29	21	**8**	**71**	**26**
NORTH HYKEHAM 4N	North Kesteven	B	A	42	19	25	19	11	8	9			21	25	22	**8**	**42**	**20**
COALVILLE 6N	NW Leicestershire	B	A	34	22	19	17	14		23		33		29	29	**14**	**34**	**25**
COALVILLE 9N	NW Leicestershire	B	A	30	16	17	8	12	15	13		60	20		23	**8**	**60**	**21**
NORTHAMPTON 3N	Northampton	B	A	20	18	13	13	7	5	5	12	15	15	11	37	**5**	**37**	**14**
NORTHAMPTON 5N	Northampton	B	A	29	25	20	20	10	7	5	18	18	20	37	38	**5**	**38**	**21**
NOTTINGHAM 3N	Nottingham	B	A	31	23	17	27	27	21	27	23	31	23	44	44	**17**	**44**	**28**
NOTTINGHAM 4N	Nottingham	B	A	12		23	17		6	6	12		13	13	25	**6**	**25**	**14**
SWADLINCOTE 5N	South Derbyshire	B	A	37	24	25	17	33	13	19	21	27	20		19	**13**	**37**	**23**
SWADLINCOTE 9N	South Derbyshire	B	A	23	16	24	12	26	18	8	14	21	19	37	13	**8**	**37**	**19**
SPALDING 5N	South Holland	B	A	33		11	16	9	6	9		12	17	27	23	**6**	**33**	**16**
SPALDING 6N	South Holland	B	A	17	7	20	16	10	8	10		16	18	28	21	**7**	**28**	**16**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
GRANTHAM 13N	South Kesteven	B	A	17		25	20	39	9	19	6	15		56	23	**6**	**56**	**23**
GRANTHAM 14N	South Kesteven	B	A	19	24		20	20	15	18		31		67	26	**15**	**67**	**27**
STAMFORD 13N	South Kesteven	B	A	19	27		18	73	7			30	22	56	25	**7**	**73**	**31**
STAMFORD 24N	South Kesteven	B	A	22	44	35	22	36	12	20		31	24	45	27	**12**	**45**	**29**
WELLINGBOROUGH 3N	Wellingborough	B	A	32	22	24	10	7			9	12		20		**7**	**32**	**17**
WELLINGBOROUGH 4N	Wellingborough	B	A	36	26	27	10		6	7	13	15	22	38		**6**	**38**	**20**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	32	25	25	20	19	15	18	17	26	25	35	30
	Regional Monthly Min	6	5	10	8	6	4	5	6	10	12	7	4
	Regional Monthly Max	71	44	47	47	73	33	36	36	60	50	75	52
	Regional Annual Mean	24											
	Regional Annual Min	13											
	Regional Annual Max	42											
	Number of Sites	59											
	% With Valid Data	92											

Figure B5.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the East Midlands



B6.1 The West Midlands (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the West Midlands are shown in Figure B6.1. Table B6.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B6.2.

Table B6.1 Roadside Sites in the West Midlands with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Walsall 1N	71 μgm^{-3}
Worcester 1N	68 μgm^{-3}
Walsall 8N	61 μgm^{-3}
Leamington Spa 6N	53 μgm^{-3}
Birmingham 538N	52 μgm^{-3}
Leominster 6N	49 μgm^{-3}
Leamington Spa 1N	49 μgm^{-3}
Stoke On Trent 6N	48 μgm^{-3}
Nuneaton 5N	48 μgm^{-3}
Bilston 1N	47 μgm^{-3}
Wolverhampton 5N	47 μgm^{-3}
Redditch 5N	47 μgm^{-3}
Coventry 6N	46 μgm^{-3}
Dudley 7N	46 μgm^{-3}
Hereford 7N	45 μgm^{-3}
Birmingham 536N	45 μgm^{-3}
Birmingham 534N	45 μgm^{-3}
Wolverhampton 10N	44 μgm^{-3}
Wolverhampton 9N	43 μgm^{-3}
Coventry 1N	43 μgm^{-3}
Nuneaton 1N	42 μgm^{-3}
Kidderminster 1N	42 μgm^{-3}
Newcastle Under Lyme 1N	42 μgm^{-3}
Bridgnorth 1N	41 μgm^{-3}
Dudley 5N	41 μgm^{-3}
Codsall 9N	41 μgm^{-3}
Ross-On-Wye 6N	41 μgm^{-3}

Table B6.2 Roadside Sites in the West Midlands

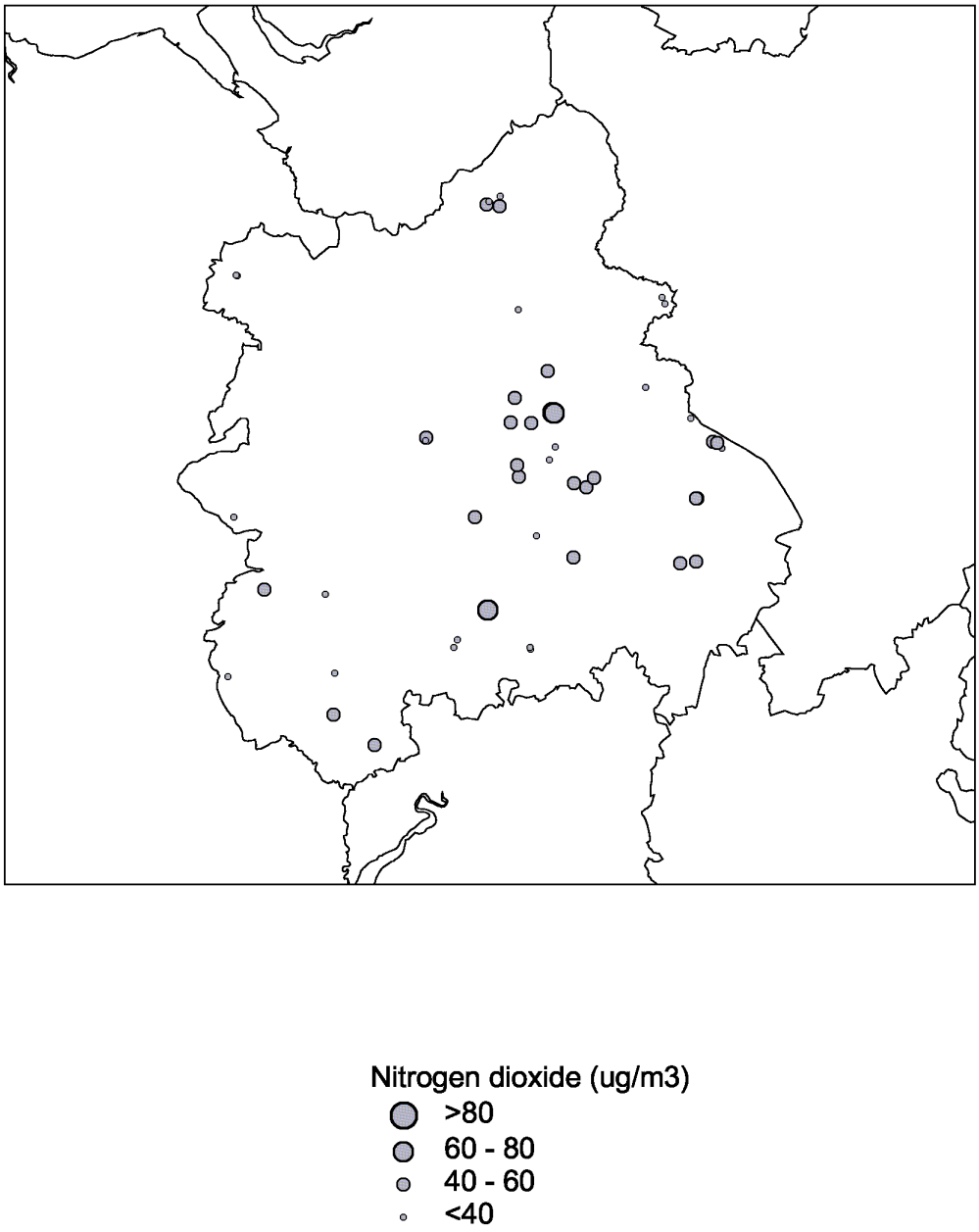
Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BIRMINGHAM 534N	Birmingham	R	A	40	36	30	36	30	43	55	51	61	49	56	46	**30**	**61**	**45**
BIRMINGHAM 536N	Birmingham	R	A	27	22	35	49	40	38	51	58	57	58	59	48	**22**	**59**	**45**
BIRMINGHAM 538N	Birmingham	R	A	26	24	56	40	46	39	48	58	76	71	74	62	**24**	**76**	**52**
BRIDGNORTH 1N	Bridgnorth	R	A	36	41	42	40		24	44	41	57	40	44	45	**24**	**57**	**41**
BRIDGNORTH 5N	Bridgnorth	R	A	32	24	28	27	30	16	31	34	35	30	34	37	**16**	**37**	**30**
BROMSGROVE 1N	Bromsgrove	R	A	30	37	42		27	6	11	35	33	48	45	50	**6**	**50**	**33**
BROMSGROVE 5N	Bromsgrove	R	A	31	20	48	40	21	12	9	39	41	46	43	42	**9**	**48**	**33**
COVENTRY 1N	Coventry	R	A	43	34	39	38	38	34	49	39	49	48	58	46	**34**	**58**	**43**
COVENTRY 6N	Coventry	R	A	51	46	48	43	38	41	52	46	39	43	63	46	**38**	**63**	**46**
DUDLEY 5N	Dudley	R	A	49	41	50	39	50	31	23	41	31	53	48	37	**23**	**53**	**41**
DUDLEY 7N	Dudley	R	C	44	50	53	53	34	31	43	45	49	56	53	41	**31**	**56**	**46**
BURTON 1N	East Staffordshire	R	A	42	34	40	30	35	24	30	35	42	35	48	43	**24**	**48**	**36**
BURTON 6N	East Staffordshire	R	A	37	31	35	30	22	32	31	31	40	33	50	37	**22**	**50**	**34**
HEREFORD 1N	Herefordshire	R	A	54		44	48		13			44	34	50	12	**12**	**54**	**37**
HEREFORD 7N	Herefordshire	R	A	46	36	65	59		17	19		46	42	69	54	**17**	**69**	**45**
LEOMINSTER 5N	Leominster	R	A				50	38	38	17		46	27	38	46	**17**	**50**	**38**
LEOMINSTER 6N	Leominster	R	A	52	40	55	57	54	42	25		48	59	54	50	**25**	**59**	**49**
MALVERN 5N	Malvern Hills	R	A	65	17	39	26	23	10	16	29	34	30	43	37	**10**	**65**	**31**
MALVERN 6N	Malvern Hills	R	A	44	12	31	34	33	22	30	35	36	36	33	41	**12**	**44**	**32**
NEWCASTLE UNDER LYME 1N	Newcastle Under Lyme	R	A	43	43	47	35	21	32	37	36	57	46	56	44	**21**	**57**	**42**
NEWCASTLE UNDER LYME 8N	Newcastle Under Lyme	R	A	37	32	37	36	27	24	27	28	48	35	45	22	**22**	**48**	**33**
NORTH WARWICKSHIRE 1N	North Warwickshire	R	A	52	37	48	30	31	30	45	36	53	35	41	9	**9**	**53**	**37**
NORTH WARWICKSHIRE 5N	North Warwickshire	R	A	26	24	32	22	15		28	28	34	34	33	33	**15**	**34**	**28**
NUNEATON 1N	Nuneaton	R	A	44	33	38	39	34	45	45	37	52	48	48		**33**	**52**	**42**
NUNEATON 5N	Nuneaton	R	A	48	47	55	47	35	54	54	46	62	31	51		**31**	**62**	**48**
OSWESTRY 1N	Oswestry	R	A	32	12	30	24			32	26	40	40	39	41	**12**	**41**	**32**
OSWESTRY 6N	Oswestry	R	A	30	33	26	26	15	20	29	26	35	37	41	36	**15**	**41**	**29**
REDDITCH 5N	Redditch	R	A	35		46	52	46	41	31	60	40	54	56	53	**31**	**60**	**47**
SANDWELL 5N	Sandwell	R	A	39	10	35	23	25	18	31	14	35	27	44	36	**10**	**44**	**28**
SANDWELL 8N	Sandwell	R	A	34	34	30	21	24	22	34	28	53	22	31	84	**21**	**84**	**35**
ROSS-ON-WYE 1N	South Herefordshire	R	A	50	36	42	44	27	23	12		40	44	44	42	**12**	**50**	**37**
ROSS-ON-WYE 6N	South Herefordshire	R	A		34	42	48	40		13		52	54	52	31	**13**	**54**	**41**
CODSALL 2N	South Staffordshire	R	A	34	31	31	16	24	25	31	27	32	38	47	36	**16**	**47**	**31**
CODSALL 9N	South Staffordshire	R	A	45	22	39	39	36	37	20	46	58	53	61	38	**20**	**61**	**41**
STAFFORD 7N	Stafford	R	A	39			15		33	23	27			37	34	**15**	**39**	**30**
STOKE ON TRENT 1N	Stoke-On-Trent	R	A	39	37	29	34	23	32	30	30	44	43	50	54	**23**	**54**	**37**
STOKE ON TRENT 6N	Stoke-On-Trent	R	A	51	43	50	43	33	40	85	48	53	40	54	37	**33**	**85**	**48**
TAMWORTH 1N	Tamworth	R	A		27	40	25			25	31	45			32	**25**	**45**	**32**
WALSALL 1N	Walsall	R	A	74	78	76	88	55	65	76	56	95	49	68	75	**49**	**95**	**71**
WALSALL 8N	Walsall	R	A	58	44	77	63	57	46		61	83	50	59	73	**44**	**83**	**61**
LEAMINGTON SPA 1N	Warwick	R	A	57	55	47	56	46	40	46	41	51	41	53	49	**40**	**57**	**49**
LEAMINGTON SPA 6N	Warwick	R	A	62	60	56	54	51	49	51	39	59	46	64	42	**39**	**64**	**53**
BILSTON 1N	Wolverhampton	R	A	30	37	44		38	36	47	65	71	32	59	60	**30**	**71**	**47**
WOLVERHAMPTON 10N	Wolverhampton	R	A	27	50	41	44	38	41	47	46	46	52	46	50	**27**	**52**	**44**
WOLVERHAMPTON 5N	Wolverhampton	R	A	37	37	43	43			41	50	59	52	54	52	**37**	**59**	**47**
WOLVERHAMPTON 9N	Wolverhampton	R	A	19	44	42	43	38	36	40	46	55	47	62	48	**19**	**62**	**43**
WORCESTER 1N	Worcester	R	A	44	72	69	67	77		56	65	82	79	66	67	**44**	**82**	**68**
PERSHORE 1N	Wychavon	R	A	32	28	32	34	32	23	22	15	26	35	9	37	**9**	**37**	**27**
PERSHORE 5N	Wychavon	R	A	10	8	19	21		20		34	31		43	20	**8**	**43**	**23**
KIDDERMINSTER 1N	Wyre Forest	R	A	34	41	28	46	30	23	45	40	63	48	49	55	**23**	**63**	**42**
KIDDERMINSTER 8N	Wyre Forest	R	A	25	32	30	24	18	18	31	29	39	41	37	40	**18**	**41**	**30**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
REGIONAL SUMMARY			**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**			
	Regional Monthly Mean		40	36	42	40	35	31	36	39	49	43	49	44			
	Regional Monthly Min		10	8	19	15	15	6	9	14	26	22	9	9			
	Regional Monthly Max		74	78	77	88	77	65	85	65	95	79	74	84			
	Regional Annual Mean		40														
	Regional Annual Min		23														
	Regional Annual Max		71														
	Number of Sites		51														
	% With Valid Data		100														

Figure B6.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the West Midlands



B6.2 The West Midlands (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the West Midlands are shown in Figure B6.2. Table B6.3 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B6.4.

Table B6.3 Urban Background Sites in the West Midlands with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Walsall 7N	44 µgm^{-3}

Table B6.4 Urban Background Sites in the West Midlands

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

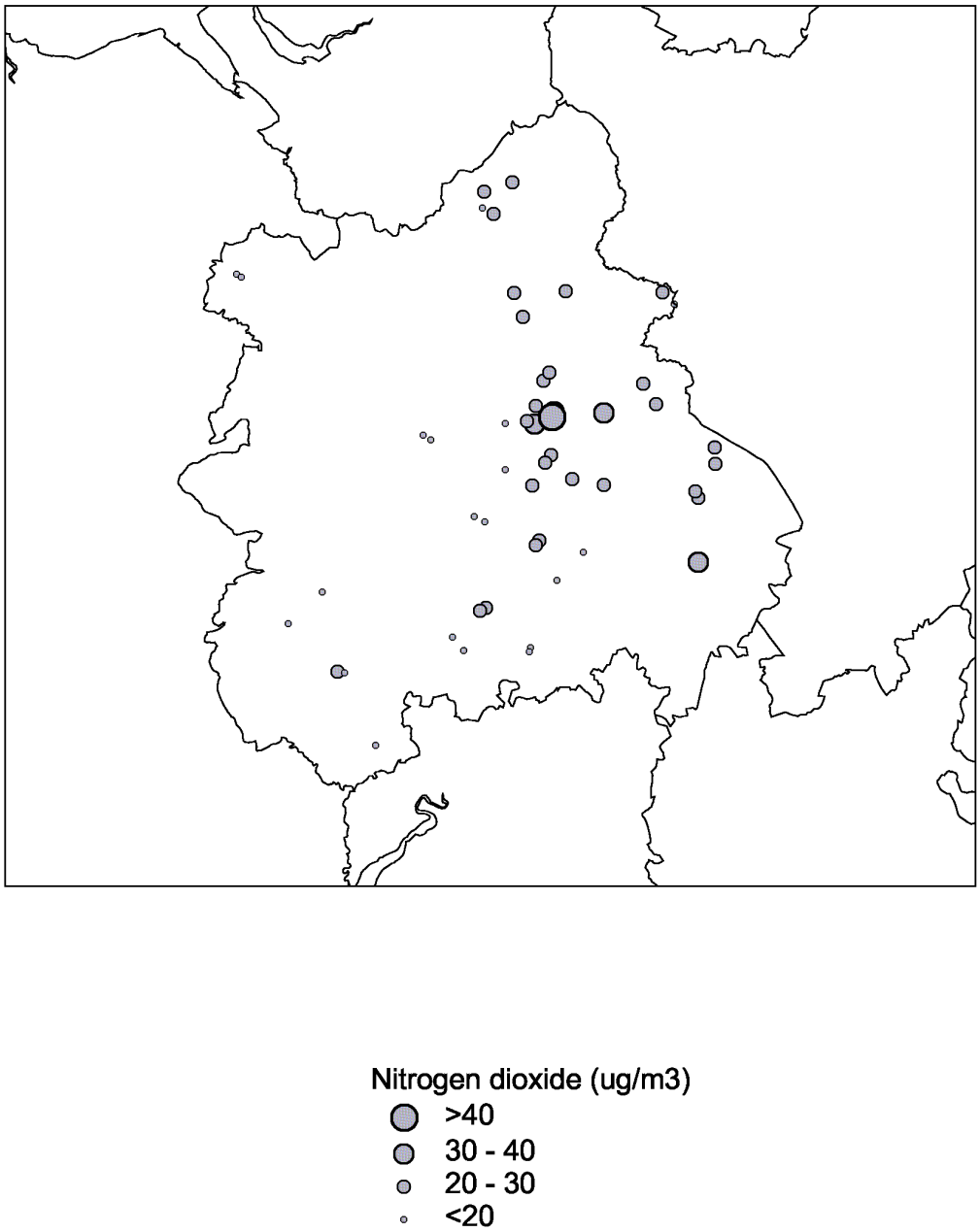
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BIRMINGHAM 524N	Birmingham	B	A	12	17	19	20	15	12	14	26	33	34	29	31	**12**	**34**	**22**
BIRMINGHAM 528N	Birmingham	B	A	24	14	20	16	15	13	22	26	33	30	30	30	**13**	**33**	**23**
BRIDGNORTH 3N	Bridgnorth	B	A	22	10	17	12	11	7	10	11	20	15	22	29	**7**	**29**	**16**
BRIDGNORTH 4N	Bridgnorth	B	A	26	14	17	12	12	8	14	12	22	21	28	29	**8**	**29**	**18**
BROMSGROVE 3N	Bromsgrove	B	A	13	23	29	20	16	5	8	23	27	25	36	38	**5**	**38**	**22**
BROMSGROVE 4N	Bromsgrove	B	A	22	20	25	17	16	10		23	22	24	27		**10**	**27**	**21**
COVENTRY 3N	Coventry	B	A	29		27	19	14	14	23	24	22	33	40	32	**14**	**40**	**25**
COVENTRY 5N	Coventry	B	A	27	24	23	22	15	12	18	22	28	32	41	37	**12**	**41**	**25**
DUDLEY 3N	Dudley	B	C	25	14	20	15	12	7	9						**7**	**25**	**15**
DUDLEY 6N	Dudley	B	A	26	22	24	19	13	10	11	19	20	29	29	29	**10**	**29**	**21**
DUDLEY 8N	Dudley	B	A								17	21	23	28	53	**17**	**53**	
BURTON 3N	East Staffordshire	B	A	27	23	22	8	11	12	13	16	20	19	25		**8**	**27**	**18**
BURTON 4N	East Staffordshire	B	A	26	19	22	14			13	13	22	20	35	30	**13**	**35**	**21**
HEREFORD 3N	Herefordshire	B	A	33	13	21	13					15	25	31	25	**13**	**33**	**22**
HEREFORD 6N	Herefordshire	B	A	17	17	13	12					10	12	23	25	**10**	**25**	**16**
LEOMINSTER 4N	Leominster	B	A	8	10	13	15	8	6			13	21	19	19	**6**	**21**	**13**
WEOBLEY 3N	Leominster	B	A		4	8		4				10	13	17	21	**4**	**21**	**11**
MALVERN 3N	Malvern Hills	B	A	25	5	17	5	7			10	17	23	17	26	**5**	**26**	**15**
MALVERN 4N	Malvern Hills	B	A	17		13		6		4	6	13	14	15	27	**4**	**27**	**13**
NEWCASTLE UNDER LYME 4N	Newcastle Under Lyme	B	A	29	25	24	19	14	14	14	17	27	25	36	26	**14**	**36**	**22**
NEWCASTLE UNDER LYME 7N	Newcastle Under Lyme	B	A	24	20	20	16		11	12	14	24	24	29	24	**11**	**29**	**20**
NORTH WARWICKSHIRE 3N	North Warwickshire	B	A	39	28	41	24	23	22	32	31	27	29	41	34	**22**	**41**	**31**
NORTH WARWICKSHIRE 4N	North Warwickshire	B	A	27	24	25	16	14	11	21	22	24	22	22	28	**11**	**28**	**21**
NUNEATON 3N	Nuneaton	B	A	25	23	27	16	18	20	20	23	32	32	39		**16**	**39**	**25**
NUNEATON 4N	Nuneaton	B	A	37	25	31	18	12	21	21	22	31	33	42		**12**	**42**	**27**
OSWESTRY 3N	Oswestry	B	A	12	7	10	6	5		7	9	13	17	21	23	**5**	**23**	**12**
OSWESTRY 5N	Oswestry	B	A	14	9	14	10	7	5	9	10	17	22	38	27	**5**	**38**	**15**
REDDITCH 1N	Redditch	B	A	10	15	21			11		22	15		22	26	**10**	**26**	**18**
REDDITCH 2N	Redditch	B	A	12	17	23	16	11	13	17	22	23	23	29	33	**11**	**33**	**20**
SANDWELL 3N	Sandwell	B	A	39	31	35	19	15	16	19	17	29	20		39	**15**	**39**	**25**
SANDWELL 7N	Sandwell	B	A	24	24	26	23	14	13	19	19	28	17	30	35	**13**	**35**	**23**
ROSS-ON-WYE 3N	South Herefordshire	B	A	19	12	17	19	8				17	21	21	27	**8**	**27**	**18**
CODSALL 6N	South Staffordshire	B	A	38	22	20	20	14	12	18	14	30	31	41	31	**12**	**41**	**24**
CODSALL 8N	South Staffordshire	B	A	25	22	16	20	11	13	22	20	28	28	35	23	**11**	**35**	**22**
STAFFORD 3N	Stafford	B	A	27			14		26	15	17			30	31	**14**	**31**	**23**
STAFFORD 4N	Stafford	B	A				14		36	18	22			33	24	**14**	**36**	**25**
STOKE ON TRENT 4N	Stoke-On-Trent	B	A	24	22	24	16	13	14	11	17	23	26	31	28	**11**	**31**	**21**
STOKE ON TRENT 5N	Stoke-On-Trent	B	A	20	27	21	14	14	18	14	33					**14**	**33**	**20**
TAMWORTH 3N	Tamworth	B	A		25	30	17			22	16	19			26	**16**	**30**	**22**
TAMWORTH 6N	Tamworth	B	A		27	33	19			24	18	20			29	**18**	**33**	**24**
WALSALL 6N	Walsall	B	A	43	49		36	32	32	34	28	44	31	41	44	**28**	**49**	**38**
WALSALL 7N	Walsall	B	A	61	45	55	44	39	34	41	33	50	34	50	38	**33**	**61**	**44**
LEAMINGTON SPA 4N	Warwick	B	A	32	28	21	22	20	17	23	23	37	27	26	37	**17**	**37**	**26**
LEAMINGTON SPA 5N	Warwick	B	A		34	32	36	26	24	20	26	35	32	44	34	**20**	**44**	**31**
BILSTON 3N	Wolverhampton	B	A	23	31	35	31	21	20	27	28	35	32	45	44	**20**	**45**	**31**
BILSTON 4N	Wolverhampton	B	A	20	26	27	30	21	15	19	29	40	36	43	46	**15**	**46**	**29**
WOLVERHAMPTON 3N	Wolverhampton	B	A	15	14	18	17	13	8	14	17	27	25	30		**8**	**30**	**18**
WOLVERHAMPTON 8N	Wolverhampton	B	A	17	22	25	20	18	13	14	20	33	29	42	42	**13**	**42**	**25**
WORCESTER 3N	Worcester	B	A	24	30	12	21	18		9	14		29	38	39	**9**	**39**	**23**
WORCESTER 4N	Worcester	B	A	24	25	8	19	17		7	10	19	30	31	89	**7**	**89**	**25**
PERSHORE 3N	Wychavon	B	A	11	14	15	17	17	16	16	16	17	27	35	20	**11**	**35**	**18**
PERSHORE 4N	Wychavon	B	A	17	18		13	9		4		13	21	27		**4**	**27**	**15**
KIDDERMINSTER 4N	Wyre Forest	B	A	26	13	14	28	16	7	12	9	23	29	26	34	**7**	**34**	**20**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
KIDDERMINSTER 6N	Wyre Forest	B	A	34	11	19		13	8	12	15	25	24	25	31	**8**	**34**	**20**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	24	21	22	19	15	15	17	19	24	25	31	32
	Regional Monthly Min	8	4	8	5	4	5	4	6	10	12	15	19
	Regional Monthly Max	61	49	55	44	39	36	41	33	50	36	50	89
	Regional Annual Mean	22											
	Regional Annual Min	11											
	Regional Annual Max	44											
	Number of Sites	54											
	% With Valid Data	98											

Figure B6.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the West Midlands



B7.1 Wales (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for Wales are shown in Figure B7.1. Table B7.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B7.2.

Table B7.1 Roadside Sites in Wales with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Swansea 1N	67 μgm^{-3}
Newport Gwent 5N	63 μgm^{-3}
Newport Gwent 8N	58 μgm^{-3}
Swansea 5N	54 μgm^{-3}
Cardiff 1N	51 μgm^{-3}
Neath 1N	45 μgm^{-3}
Bridgend 5N	42 μgm^{-3}

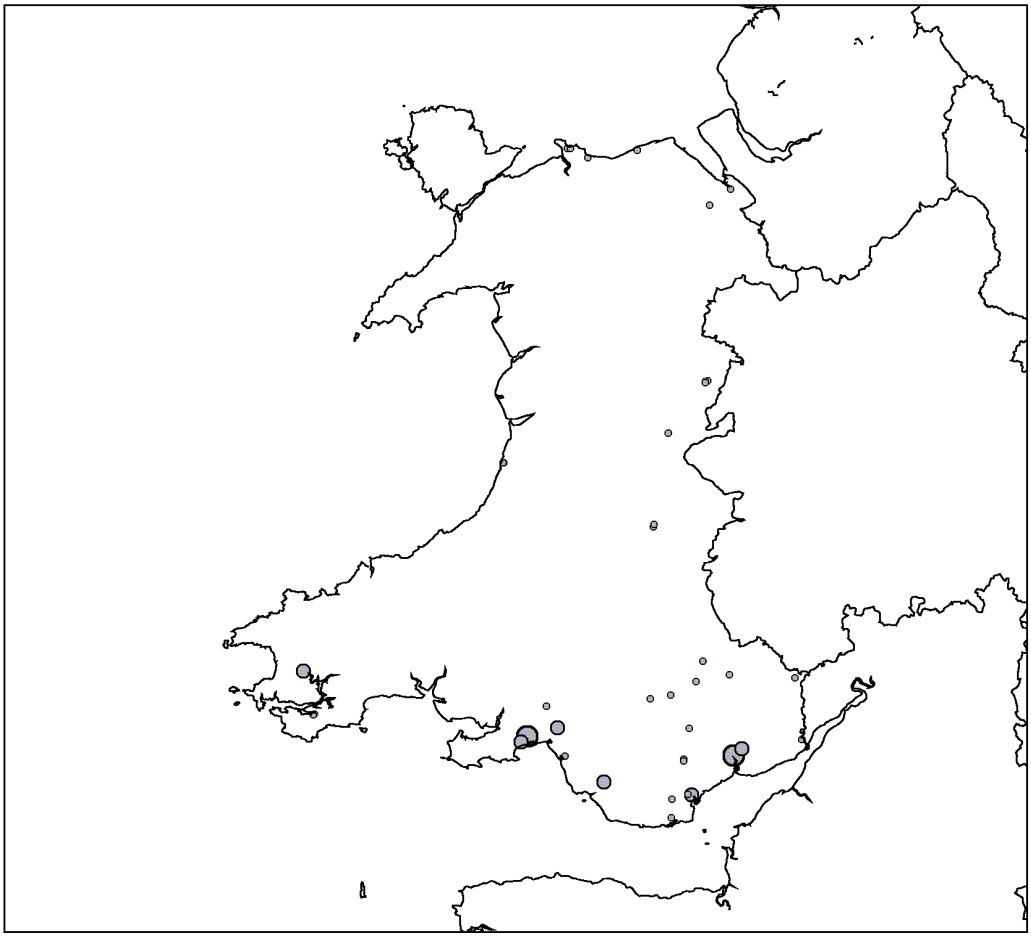
Table B7.2 Roadside Sites in Wales

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BRYNMAWR 2N	Blaenau Gwent	R	A	24	16	24	10	19	15	16	22	30	25	32	18	**10**	**32**	**21**
BRYNMAWR 4N	Blaenau Gwent	R	A	29	20	28	12	20	21	17	20	29	27		26	**12**	**29**	**23**
BRIDGEND 5N	Bridgend	R	A	43	38	43	47	39	33	34	41	48	42	56		**33**	**56**	**42**
BLACKWOOD 1N	Caerphilly	R	A	40	23	48	41	32	34	23	40	50	29		49	**23**	**50**	**37**
CAERPHILLY 5N	Caerphilly	R	A	40	30	48	35	30	27	22	41	57	47	51	49	**22**	**57**	**40**
CAERPHILLY 8N	Caerphilly	R	A	36	27	34	24	27	29	22	31	37	41	33	40	**22**	**41**	**32**
RHYMNEY 1N	Caerphilly	R	A		19	27	15	13	14	7	15	23	21	27	21	**7**	**27**	**18**
CARDIFF 1N	Cardiff County	R	A	52	44	73	53	50	45	39	38	48	48	55	65	**38**	**73**	**51**
CARDIFF 5N	Cardiff County	R	A	48	34	45	40	35	31	29	30	37	25	52	39	**25**	**52**	**37**
ABERYSTWYTH 1N	Cardiganshire	R	A	54	32	37	40	29	5	25	31	46	70	44	57	**5**	**70**	**39**
ABERYSTWYTH 6N	Cardiganshire	R	A	29		29	38	24		29		33		23	37	**23**	**38**	**30**
COLWYN BAY 1N	Conwy	R	A	29	18	17	35	10	15	19	23	38		25	35	**10**	**38**	**24**
LLANDUDNO 5N	Conwy	R	A	14	5	22	14	17	12	16	9	20	21	17	28	**5**	**28**	**16**
LLANDUDNO 6N	Conwy	R	A	14	10		11		8		7	14	18	19	20	**7**	**20**	**13**
RHYL 1N	Denbighshire County	R	A	31	34	13	38	45	32	32	21	35	55	42	60	**13**	**60**	**37**
RHYL 6N	Denbighshire County	R	A	36	11	14	45		42	34	25	42	28	72	47	**11**	**72**	**36**
MOLD 5N	Flintshire County	R	A	32	15	37	36	32	26	30	31	48	29	35	47	**15**	**48**	**33**
SHOTTON CLWYD 1N	Flintshire County	R	A	29		34	38	21	24	33	33	37	31	41	50	**21**	**50**	**34**
MERTHYR 1N	Merthyr Tydfil	R	A	35	18	29	20	15						27		**15**	**35**	**24**
MERTHYR 5N	Merthyr Tydfil	R	A						15	14	21	18	14			**14**	**21**	
ABERGAVENNY 1N	Monmouthshire	R	C	30	17	33	23	19	24	16	26	37	29	47		**16**	**47**	**27**
CHEPSTOW 1N	Monmouthshire	R	A	46	45	51	9	37	39	32	41	37	25	53	35	**9**	**53**	**38**
MONMOUTH 1N	Monmouthshire	R	A			47	29	31	36	22		51	32	56	26	**22**	**56**	**37**
NEATH 1N	Neath & Port Talbot	R	A	58			31	35	50	34	36	51	54	54	51	**31**	**58**	**45**
PONTARDAWE 1N	Neath & Port Talbot	R	A	41	34	41	32			28		36	35	43	40	**28**	**43**	**37**
PORT TALBOT 1N	Neath & Port Talbot	R	A	34	28	34			29	33	31	40	47	54	43	**28**	**54**	**37**
NEWPORT GWENT 5N	Newport	R	A	64	58	74	67	52		46	52	75	69	71	66	**46**	**75**	**63**
NEWPORT GWENT 8N	Newport	R	A	75	54	70	60	51	46		51	73	74	70	15	**15**	**75**	**58**
HAVERFORDWEST 1N	Pembrokeshire	R	A	24	14	33	27	12	16	23	23	36	28	29	36	**12**	**36**	**25**
HAVERFORDWEST 8N	Pembrokeshire	R	A	45	21	48	46	42	43	43	32	44	41	45	36	**21**	**48**	**40**
PEMBROKE 11N	Pembrokeshire	R	A	37	24	48	48	39	30	24	30	47	29	40	38	**24**	**48**	**36**
PEMBROKE 15N	Pembrokeshire	R	A	12	11	20	23	17	11	15	14	21	20	16	27	**11**	**27**	**17**
CRICKHOWELL 1N	Powys	R	A		31	32	38	37	32	34	34	44	32	36	33	**31**	**44**	**35**
LLANDRINDOD WELLS 1N	Powys	R	A	23	18	20	19	14	12	17	13	24	19	20	24	**12**	**24**	**18**
LLANDRINDOD WELLS 8N	Powys	R	A		12	19	20	17	13	17	12	24	13	12	24	**12**	**24**	**17**
NEWTOWN 1N	Powys	R	A	35	26	30	42	20	18	33	6	47	37	47	48	**6**	**48**	**32**
WELSHPOOL 1N	Powys	R	A	15	14	18	11	16	11	16		27	16	26		**11**	**27**	**17**
WELSHPOOL 5N	Powys	R	A	20	10	15		14	11	12			24	26	24	**10**	**26**	**17**
WELSHPOOL 6N	Powys	R	A	16	9	18	18	7	6	13		25	18	25	29	**6**	**29**	**17**
SWANSEA 1N	Swansea	R	A	77	63	70	68	54	54	53	64	68	80	76	71	**53**	**80**	**67**
SWANSEA 5N	Swansea	R	A	57	50	56	53		38	35	43	56	65	63	76	**35**	**76**	**54**
BARRY 1N	Vale of Glamorgan	R	A	29	22	34	26	27	29	12	26		32	26	53	**12**	**53**	**29**
RHUR CROSS 1N	Vale of Glamorgan	R	A	36	14		21	25	19	7	21	31	34	23	47	**7**	**47**	**25**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	37	26	36	33	28	26	25	29	40	36	40	40
	Regional Monthly Min	12	5	13	9	7	5	7	6	14	13	12	15
	Regional Monthly Max	77	63	74	68	54	54	53	64	75	80	76	76
	Regional Annual Mean	33											
	Regional Annual Min	13											
	Regional Annual Max	67											
	Number of Sites	43											
	% With Valid Data	98											

Figure B7.1 Annual Average Roadside Nitrogen Dioxide Concentrations in Wales



B7.2 Wales (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for Wales are shown in Figure B7.2. No urban background sites in Wales exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B7.3.

Table B7.3 Urban Background Sites in Wales

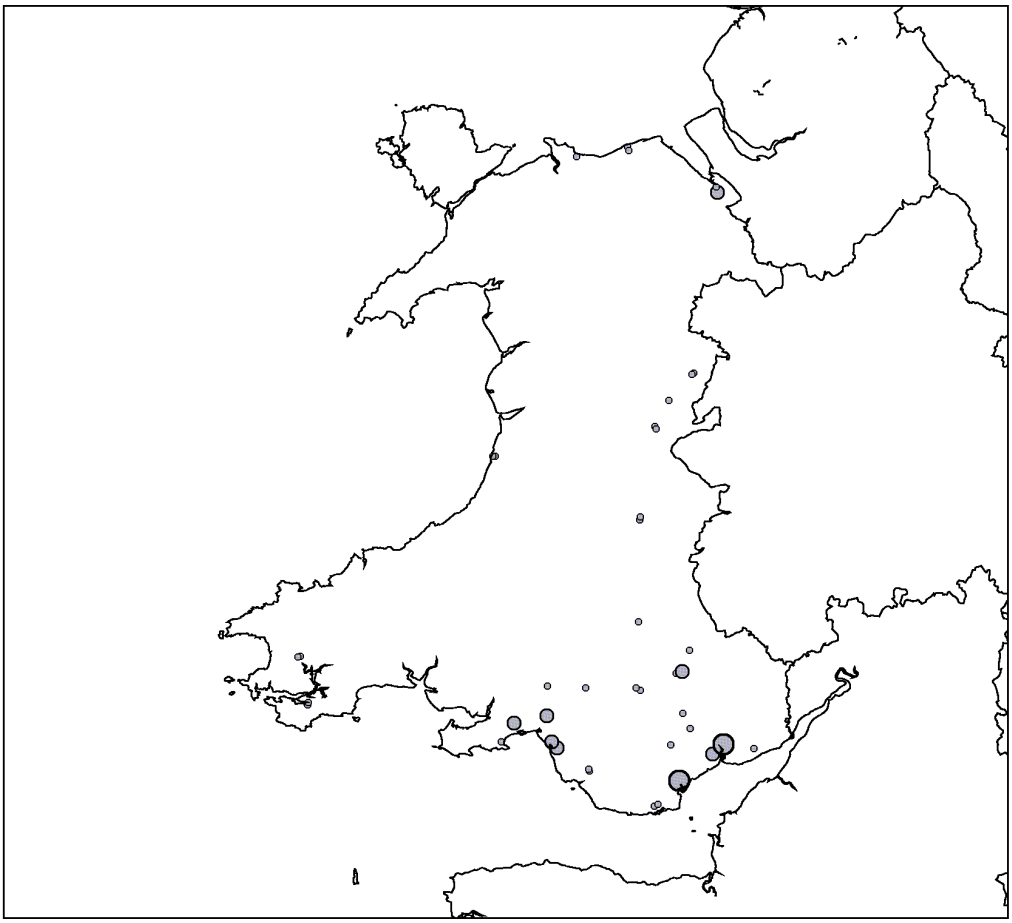
Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BEAUFORT 1N	Blaenau Gwent	B	A	23	14	17		10	9	6	7	14	19	26	26	**6**	**26**	**16**
BRYNMAWR 1N	Blaenau Gwent	B	A	29	17	24	10		12	12	13	24	26	33	26	**10**	**33**	**20**
BRIDGEND 3N	Bridgend	B	A	16	10	41	15		6	7	12	18	23	23		**6**	**41**	**17**
BRIDGEND 4N	Bridgend	B	A	23	11		21	16	7	8	15	24	25	32		**7**	**32**	**18**
BARGOED 3N	Caerphilly	B	A	20	10	25				4	8	17	19	29	18	**4**	**29**	**17**
CAERPHILLY 7N	Caerphilly	B	A	23	10	25	12	12	8	10		31	19	30	27	**8**	**31**	**19**
CROESPENMAEN 3N	Caerphilly	B	A	5	9	22	6	11	6				19	12	21	**5**	**22**	**12**
CWMCARN 4N	Caerphilly	B	A	19	9	16	6	8	7	6	8	15	15	22	24	**6**	**24**	**13**
CARDIFF 3N	Cardiff County	B	A	34	29	24	14	20	5	13	17		32	24	42	**5**	**42**	**23**
CARDIFF 6N	Cardiff County	B	A		36	42	33	32	24	23	37	34	40	40	63	**23**	**63**	**37**
ABERYSTWYTH 3N	Cardiganshire	B	A	17	13	17	14	8	25	9	10	14	27	13	19	**8**	**27**	**15**
ABERYSTWYTH 5N	Cardiganshire	B	A	24	11	18	15	10		6	11	19	48		22	**6**	**48**	**18**
COLWYN BAY 4N	Conwy	B	A	23	7	13	15		7	10	12	18	19	18	40	**7**	**40**	**17**
RHYL 4N	Denbighshire County	B	A	22	11	18	17	16	11	9	10	16	16	21	34	**9**	**34**	**17**
RHYL 5N	Denbighshire County	B	A	19	16	6	17	13	12	13	10	20	20	19	25	**6**	**25**	**16**
ASTON CLWYD 2N	Flintshire County	B	A	23	25	16	16	8	16	20	18	20	22	32	37	**8**	**37**	**21**
SHOTTON CLWYD 4N	Flintshire County	B	A	21	18	18	14	9	10	13	8	27	23	26	36	**8**	**36**	**19**
MERTHYR 3N	Merthyr Tydfil	B	A	29	11	15	4	7	8	7	9	12	11	27		**4**	**29**	**13**
MERTHYR 4N	Merthyr Tydfil	B	A	28	18	16	9	7	7	5		14	11	27		**5**	**28**	**14**
MAGOR 2N	Monmouthshire	B	C	26	18	21	15	14	13	10	17	23	17	24	24	**10**	**26**	**19**
NEATH 3N	Neath & Port Talbot	B	A	42	27	35	25	18	30	18	18	29	34	36	33	**18**	**42**	**29**
NEATH 4N	Neath & Port Talbot	B	A	24	13	19	14	11	7		12	18	5	26		**5**	**26**	**15**
PONTARDAWE 3N	Neath & Port Talbot	B	C	23	13	19	13	10	5							**5**	**23**	**14**
PORT TALBOT 3N	Neath & Port Talbot	B	A		24	22	17	13	12	16	17	25	26	23	25	**12**	**26**	**20**
PORT TALBOT 4N	Neath & Port Talbot	B	A	32	25	29	19	18	13	16	17	25	26	34	28	**13**	**34**	**23**
NEWPORT GWENT 4N	Newport	B	A	27	22	25	19	14	16	12	19	27	33	28	37	**12**	**37**	**23**
NEWPORT GWENT 6N	Newport	B	A	49	38	37	27	23	23	19	21	31	32	32	33	**19**	**49**	**31**
HAVERFORDWEST 3N	Pembrokeshire	B	A	14	7	16	29	9	10	7	5	12	14	14	19	**5**	**29**	**13**
HAVERFORDWEST 9N	Pembrokeshire	B	A	10	6		7	5		5		9	11	9	18	**5**	**18**	**9**
PEMBROKE 13N	Pembrokeshire	B	A	8	6	10	8	5		43	7	12	11	8	18	**5**	**43**	**12**
PEMBROKE 14N	Pembrokeshire	B	A	10	6	12	8	6	4	7	5	9	11	9	17	**4**	**17**	**9**
BRECON 4N	Powys	B	A	13	9	12	9	7	5	7	6	13	4	13	19	**4**	**19**	**10**
CRICKHOWELL 3N	Powys	B	A	19	11	15	7	9	8	9		13	12	12	21	**7**	**21**	**12**
LLANDRINDOD WELLS 4N	Powys	B	A		5	10	11	8	5	5	7	10	6	11	15	**5**	**15**	**8**
LLANDRINDOD WELLS 7N	Powys	B	A	10	6	10	29	7	4	5		10	14	12	16	**4**	**29**	**11**
NEWTOWN 3N	Powys	B	A	14	5	7	7	4				12	13	15	21	**4**	**21**	**11**
NEWTOWN 4N	Powys	B	A	15	4	5	7					13	12	16	21	**4**	**21**	**12**
WELSHPOOL 3N	Powys	B	A	12	4	8	5	4				11	9	13	12	**4**	**13**	**9**
WELSHPOOL 4N	Powys	B	A	9	5	7		4				11	8			**4**	**11**	**7**
SWANSEA 3N	Swansea	B	A	42	28	40	29	23	18	17	22	38	43	21		**17**	**43**	**29**
SWANSEA 4N	Swansea	B	A	23	11		12	9	5	6	10	20	24	13	33	**5**	**33**	**15**
BARRY 6N	Vale of Glamorgan	B	A	20	9	16	8	12	5		11	19	17	19	27	**5**	**27**	**15**
BARRY 7N	Vale of Glamorgan	B	A	25	11	22		13	4		6	17	11	20	38	**4**	**38**	**17**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	22	14	19	14	11	10	11	13	19	20	21	27
	Regional Monthly Min	5	4	5	4	4	4	4	5	9	4	8	12
	Regional Monthly Max	49	38	42	33	32	30	43	37	38	48	40	63

Regional Annual Mean	17
Regional Annual Min	7
Regional Annual Max	37
Number of Sites	43
% With Valid Data	100

Figure B7.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in Wales



B8.1 Eastern (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the Eastern region are shown in Figure B8.1. Table B8.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B8.2.

Table B8.1 Roadside Sites in the Eastern region with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Colchester 5N	68 μgm^{-3}
Colchester 9N	63 μgm^{-3}
Grays 5N	61 μgm^{-3}
Potters Bar 1N	60 μgm^{-3}
Borehamwood 1N	59 μgm^{-3}
Cambridge 1N	59 μgm^{-3}
Grays 1N	58 μgm^{-3}
Sudbury 4N	58 μgm^{-3}
Peterborough 1N	56 μgm^{-3}
Waltham Cross 1N	54 μgm^{-3}
Watford 5N	50 μgm^{-3}
Hitchin 8N	50 μgm^{-3}
Bury St Edmunds 8N	49 μgm^{-3}
Harlow 1N	48 μgm^{-3}
Dunstable 5N	48 μgm^{-3}
St Neots 1N	48 μgm^{-3}
Bury St Edmunds 9N	48 μgm^{-3}
Rickmansworth 5N	47 μgm^{-3}
Cambridge 5N	47 μgm^{-3}
Sawston 1N	46 μgm^{-3}
Histon 5N	45 μgm^{-3}
Dunstable 6N	45 μgm^{-3}
Felixstowe 8N	45 μgm^{-3}
Chelmsford 1N	43 μgm^{-3}
Felixstowe 1N	42 μgm^{-3}
Ipswich 6N	42 μgm^{-3}
Biggleswade 1N	41 μgm^{-3}

Table B8.2 Roadside Sites in the Eastern Region

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

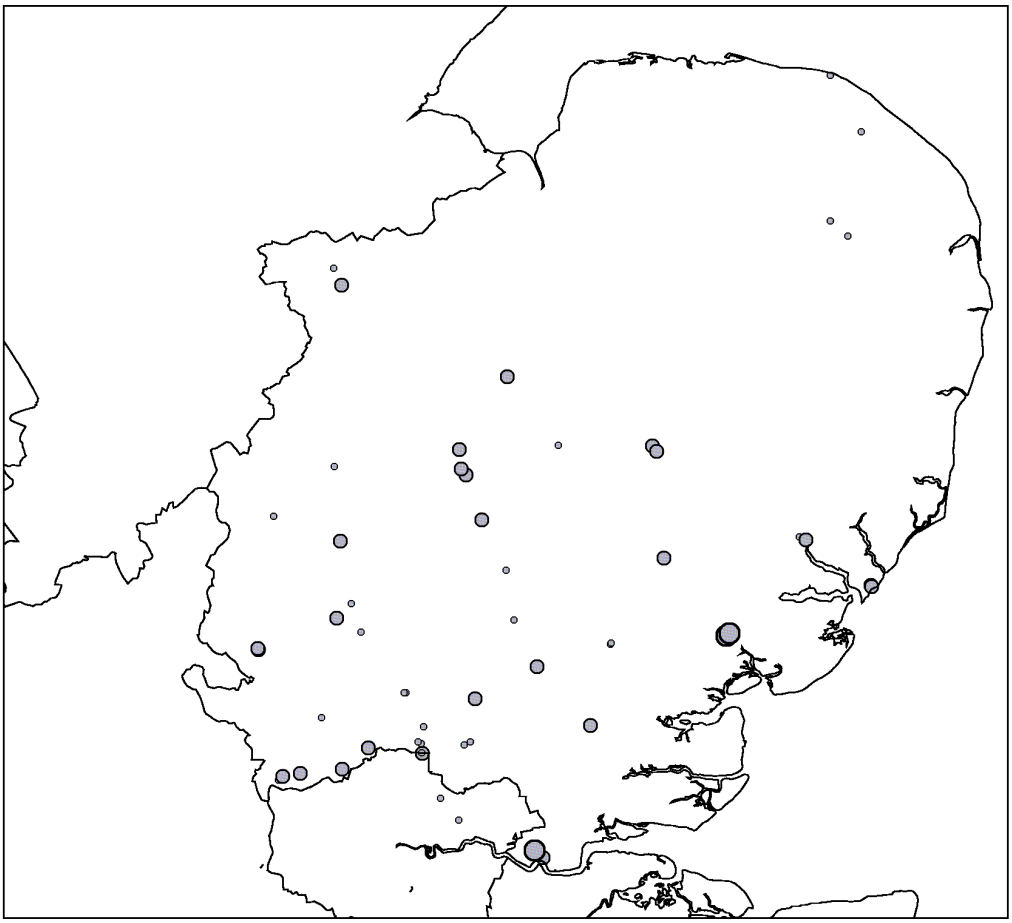
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
SUDBURY 1N	Babergh	R	A	41	30	29	31	29	26	23	31	42	43	42	41	**23**	**43**	**34**
SUDBURY 4N	Babergh	R	A	55	59	55	64	46	56	51	56	62	63	68	57	**46**	**68**	**58**
BEDFORD 5N	Bedford	R	A	25	24		28	17	21	38	38	35	41	49	46	**17**	**49**	**33**
BRAINTREE 1N	Braintree	R	A	42	38	27	28	29	42	20	20	41	31	42	29	**20**	**42**	**32**
BRAINTREE 5N	Braintree	R	A	31	21	23	19	22	35	20	14	26	24	29	26	**14**	**35**	**24**
BROADLAND 1N	Broadland	R	A	47	23	27	25	17	27	50	19	39	29	54	36	**17**	**54**	**33**
THORPE 1N	Broadland	R	A	27	18	16		10	20	24	20	26	26	36	30	**10**	**36**	**23**
CHESHUNT 1N	Broxbourne	R	A	41	24	32	36	24	19	17	15	43	37	42	37	**15**	**43**	**31**
CHESHUNT 5N	Broxbourne	R	A	57	24	42	33	19	16	55	23	68	38	56	42	**16**	**68**	**39**
WALTHAM CROSS 1N	Broxbourne	R	A	74	47	38	83	51	39	36	31	67	51	79		**31**	**83**	**54**
WALTHAM CROSS 4N	Broxbourne	R	A	49	27	26	52	32	18	21	21	46	50	59		**18**	**59**	**37**
WORMLEY 1N	Broxbourne	R	A	39	31	25		33	33	24	22	45	34	36	39	**22**	**45**	**33**
CAMBRIDGE 1N	Cambridge	R	A		58	58		43	48	48	56	66	67	73	70	**43**	**73**	**59**
CAMBRIDGE 5N	Cambridge	R	A		46	46		36	38	38	45	52	46	64	55	**36**	**64**	**47**
CHELMSFORD 1N	Chelmsford	R	A	38	36	44	52	38	38	23	44	55	38	48	61	**23**	**61**	**43**
COLCHESTER 5N	Colchester	R	A	43	53	75	75		52	62	85	77	78	75	69	**43**	**85**	**68**
COLCHESTER 9N	Colchester	R	A	60	63	69	78	56	52	63	70	60	55	76	51	**51**	**78**	**63**
ELY CAMBS 1N	East Cambridgeshire	R	A	45	35	28	31	23	27	30	30	36	36	48	46	**23**	**48**	**35**
ELY CAMBS 5N	East Cambridgeshire	R	A	58	38	37	36	27	24	32	34	33	44	64	54	**24**	**64**	**40**
HERTFORD 1N	East Hertfordshire	R	A	31	38	21	19	21	46	48	36	27	44	50	61	**19**	**61**	**37**
HERTFORD 5N	East Hertfordshire	R	A	48	31	29	23	21	42	36	25	50	50	46	71	**21**	**71**	**39**
EPPING 1N	Epping Forest	R	A	50	31	26	27		33	30	9	38	47	48	31	**9**	**50**	**34**
EPPING 5N	Epping Forest	R	A	52	30	26	41	24	24	24	5	47	49	45	41	**5**	**52**	**34**
NEWMARKET 1N	Forest Heath	R	A			59	36	38	33					34		**33**	**59**	
NEWMARKET 7N	Forest Heath	R	A	21		52	21	10	21	25	27	23	48	46		**10**	**52**	**29**
HARLOW 1N	Harlow	R	A						41	38	44	37	52	64	62	**37**	**64**	**48**
BOREHAMWOOD 1N	Hertsmere	R	A	63	75	46	71	65	61	46	65	76	38	55	52	**38**	**76**	**59**
POTTERS BAR 1N	Hertsmere	R	A	75	82	59	54	54	57	52	33	71	65	73	46	**33**	**82**	**60**
ST NEOTS 1N	Huntingdon	R	A		40	60	43	48	31	46	46	53	57	65	36	**31**	**65**	**48**
ST NEOTS 5N	Huntingdon	R	A		33	40	29	25	29	31	32	39	43	51	45	**25**	**51**	**36**
IPSWICH 1N	Ipswich	R	A					24		12	26		31	46	45	**12**	**46**	**31**
IPSWICH 5N	Ipswich	R	A							20	11		15	39	36	**11**	**39**	
IPSWICH 6N	Ipswich	R	A	50		31				38	20	59	35	53	46	**20**	**59**	**42**
BIGGLESWADE 1N	Mid Bedfordshire	R	A	36	36	46	52	45	31	50	41	15	41	54	43	**15**	**54**	**41**
HITCHIN 8N	North Hertfordshire	R	A	66	54	59	50	43	46	43	34					**34**	**66**	**50**
LETCHWORTH 1N	North Hertfordshire	R	A	51	38	40	37		33	34						**33**	**51**	**39**
CROMER 1N	North Norfolk	R	A	54	35	46	32	34	27	41	39	24	31	41	42	**24**	**54**	**37**
NORTH WALSHAM 8N	North Norfolk	R	A	49	45	47	42	33	20	41	45	32	29	42	40	**20**	**49**	**39**
PETERBOROUGH 1N	Peterborough	R	A	56	41		58	43		48	47	69	69		73	**41**	**73**	**56**
PETERBOROUGH 5N	Peterborough	R	A		32	41	37	28	23	31	38	43	43	56	51	**23**	**56**	**39**
ILFORD 1N	Redbridge	R	A	59	34	42	37	26	37	8	6	50	61	26	46	**6**	**61**	**36**
ILFORD 5N	Redbridge	R	A	51	28	36	22	15	14	18	12	48	47	22	46	**12**	**51**	**30**
DUNSTABLE 5N	South Bedfordshire	R	A	44	35	53	60	43	24	57	54	64	41	47	52	**24**	**64**	**48**
DUNSTABLE 6N	South Bedfordshire	R	A	45	38	47	51	40	28	41	42	58	44	54	50	**28**	**58**	**45**
HISTON 5N	South Cambridgeshire	R	A	53	40	55	43	42	43	38	41	41	46	57	45	**38**	**57**	**45**
SAWSTON 1N	South Cambridgeshire	R	A	51	38	50	46	42	35	42	41	52	46	60	51	**35**	**60**	**46**
ST ALBANS 1N	St Albans	R	A	47	38	48	14	35	33	41	29	35	44	60		**14**	**60**	**39**
BURY ST EDMUNDS 8N	St Edmundsbury	R	A	50	43	57	51	41	43	39	39	51	58	57	56	**39**	**58**	**49**
BURY ST EDMUNDS 9N	St Edmundsbury	R	A	44	37	51	51	44	37	36	48	61	51	58	54	**36**	**61**	**48**
STEVENAGE 1N	Stevenage	R	A	32	28	26	22	19	11	25	11	33	40	48	37	**11**	**48**	**28**
FELIXSTOWE 1N	Suffolk Coastal	R	A	55	48	47	38	35	41	32	29	32	49	52	46	**29**	**55**	**42**
FELIXSTOWE 6N	Suffolk Coastal	R	C	52	44	45										**44**	**52**	
FELIXSTOWE 8N	Suffolk Coastal	R	A				42	40	42	35	37		51	59	51	**35**	**59**	**45**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
RICKMANSWORTH 1N	Three Rivers	R	A	50	41	49	36	36	19	22	25	28	52	60	49	**19**	**60**	**39**
RICKMANSWORTH 5N	Three Rivers	R	A	62	49	49	49	49	28	40	32	38	53	66	49	**28**	**66**	**47**
GRAYS 1N	Thurrock	R	A	57	42	70	64	48	54	53	55	66	62	73	58	**42**	**73**	**58**
GRAYS 5N	Thurrock	R	A	58	58	64	68	55	67	55	59	70	61	62	55	**55**	**70**	**61**
SAFFRON WALDEN 1N	Uttlesford	R	A	61		34		21	34		4	34	50	44	38	**4**	**61**	**36**
WATFORD 5N	Watford	R	A	53	42	60	51	39	40	37	46	55	59	65	52	**37**	**65**	**50**

REGIONAL SUMMARY		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Regional Monthly Mean	49	40	44	43	34	34	36	34	47	46	53	48
	Regional Monthly Min	21	18	16	14	10	11	8	4	15	15	22	26
	Regional Monthly Max	75	82	75	83	65	67	63	85	77	78	79	73
	Regional Annual Mean	42											
	Regional Annual Min	23											
	Regional Annual Max	68											
	Number of Sites	59											
	% With Valid Data	95											

Figure B8.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the Eastern Region



B8.2 Eastern (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the Eastern region are shown in Figure B8.2. No urban background sites in the Eastern region exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B8.3.

Table B8.3 Urban Background Sites in the Eastern Region

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

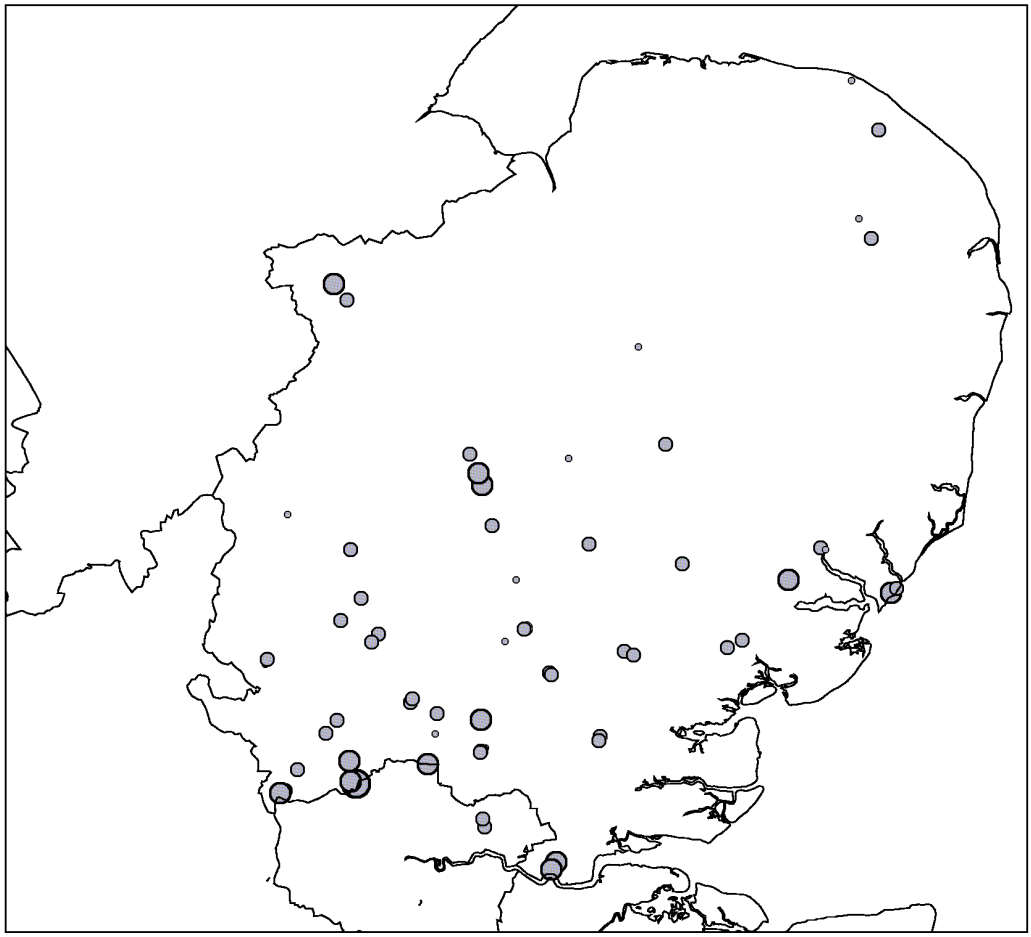
Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
CAPEL ST MARY 1N	Babergh	B	A	48	29	33	23	23	19	20	21	26	37	45	45	**19**	**48**	**31**
SUDBURY 3N	Babergh	B	A	38	25	24	19	18	17	15	16	20	49	40	31	**15**	**49**	**26**
BEDFORD 8N	Bedford	B	A	22	13		12		9	16	8	20	27	33	32	**8**	**33**	**19**
BEDFORD 9N	Bedford	B	A	34	12		15	12	7	13	7	18	25	32	29	**7**	**34**	**19**
BRAINTREE 4N	Braintree	B	A	38	24	27	24	12	29	14	19	22	24	35	30	**12**	**38**	**25**
BRAINTREE 6N	Braintree	B	A	34	22	26	24	13	38	12	12	26	31	38	38	**12**	**38**	**26**
BROADLAND 3N	Broadland	B	A	24	16	10	10	8	8	9	12	39	39	26	16	**8**	**39**	**18**
BROADLAND 4N	Broadland	B	A	26	14	11			6	10	8	47	47	22	18	**6**	**47**	**21**
HODDESDON 2N	Broxbourne	B	A	29	15	22	21	7	10	12	16	28	20	28	23	**7**	**29**	**19**
HODDESDON 3N	Broxbourne	B	A	32	20	14	31	14	10	14	11	21	32	35	27	**10**	**35**	**22**
WALTHAM CROSS 3N	Broxbourne	B	A	48	27	24	41	22	19	13	20	41	33	46		**13**	**48**	**30**
CAMBRIDGE 3N	Cambridge	B	A		31	31		24	23	23	25	32	39	50	43	**23**	**50**	**32**
CAMBRIDGE 4N	Cambridge	B	A		33	33		26	23	23	25	32	43	51	46	**23**	**51**	**33**
CHELMSFORD 3N	Chelmsford	B	A	38	34	38	17	23	23	21	23	25	36	25	38	**17**	**38**	**29**
CHELMSFORD 5N	Chelmsford	B	A	31	29	25	25	21	17	13	19	23	38	13	36	**13**	**38**	**24**
COLCHESTER 7N	Colchester	B	A	38	24	29	37	23	10	22	10	24	22	22	37	**10**	**38**	**25**
COLCHESTER 8N	Colchester	B	A	39	27	28	29	14	16	12	13	24	28	36	29	**12**	**39**	**25**
ELY CAMBS 3N	East Cambridgeshire	B	A	39	27	24		14	16	12	13	18	30	33	34	**12**	**39**	**24**
ELY CAMBS 4N	East Cambridgeshire	B	A	38	24	26	20	12	16	16	17	23	33	40	39	**12**	**40**	**25**
HERTFORD 3N	East Hertfordshire	B	A	21	19	17	12	4	21	23	13	15	29	33	44	**4**	**44**	**21**
HERTFORD 4N	East Hertfordshire	B	A	25	21	17	10	8	25	15	27	21	25	31	42	**8**	**42**	**22**
EPPING 3N	Epping Forest	B	A	40	20	12	11	9	13	14		16	25	35	25	**9**	**40**	**20**
EPPING 4N	Epping Forest	B	A	35	20	17	8	16	15	24		20	27	29	32	**8**	**35**	**22**
BRANDON 4N	Forest Heath	B	A	21		38	8	10	12	19	25	10	17	17		**8**	**38**	**18**
NEWMARKET 3N	Forest Heath	B	A	25		29	17		13	21	10	17		19		**10**	**29**	**19**
HARLOW 3N	Harlow	B	A							27	28	31	43	54	47	**27**	**54**	**38**
HARLOW 5N	Harlow	B	A						24	23			41	60	45	**23**	**60**	
BOREHAMWOOD 3N	Hertsmere	B	A	55	40	36		33	29	19	27	42	50	67	44	**19**	**67**	**40**
BOREHAMWOOD 4N	Hertsmere	B	A	46	34	29	27	25	21	19	29	34	29	48	34	**19**	**48**	**31**
ST NEOTS 3N	Huntingdon	B	A		29	36	22	19	19	20	22	25	38	49	40	**19**	**49**	**29**
ST NEOTS 4N	Huntingdon	B	A		29	31	21	19	16	19	22	25	39	46	39	**16**	**46**	**28**
IPSWICH 3N	Ipswich	B	A	30		15	13			18	11		22		33	**11**	**33**	**20**
IPSWICH 4N	Ipswich	B	A	27		16	10	10	13	7	11		17	27	24	**7**	**27**	**16**
BIGGLESWADE 3N	Mid Bedfordshire	B	C	25	24											**24**	**25**	
BIGGLESWADE 4N	Mid Bedfordshire	B	A		21	25	37	19	10	15	14	14	25	36	28	**10**	**37**	**22**
HITCHIN 5N	North Hertfordshire	B	A	36	26	30	23	22	14	18	21					**14**	**36**	**24**
LETCHWORTH 6N	North Hertfordshire	B	A	45	30	27	21	23	16	17	18					**16**	**45**	**25**
CROMER 6N	North Norfolk	B	A	26	13	19	12			13	12	9	16	24	29	**9**	**29**	**17**
NORTH WALSHAM 7N	North Norfolk	B	A	42	25	24	13	15	9	14	12	12	22	30	31	**9**	**42**	**21**
PETERBOROUGH 3N	Peterborough	B	A	40	25	33		18				27	27	47	47	**18**	**47**	**33**
PETERBOROUGH 4N	Peterborough	B	A	31	23	25	22	20	18	19	21	20	26	31	34	**18**	**34**	**24**
ILFORD 3N	Redbridge	B	A	37	18	31	22	29	11	8	7	29	34	17	31	**7**	**37**	**23**
ILFORD 4N	Redbridge	B	A	36	15	18	24	13	22	9		30	35	19	31	**9**	**36**	**23**
DUNSTABLE 3N	South Bedfordshire	B	A	23	13	17	17	10	7	13	16	22	20	29	28	**7**	**29**	**18**
DUNSTABLE 4N	South Bedfordshire	B	A	26	22	27	24	18	11	20	23	30	27	30	31	**11**	**31**	**24**
HISTON 3N	South Cambridgeshire	B	A	39	25	29	20	20	20	17	18	22	32	49	35	**17**	**49**	**27**
SAWSTON 2N	South Cambridgeshire	B	A	29	21	25	20	14	25	15	17	20	24	34	34	**14**	**34**	**23**
ST ALBANS 5N	St Albans	B	A	36	30	32	10	25	15	27	26		35	46		**10**	**46**	**28**
ST ALBANS 6N	St Albans	B	A	35	19	27	8	16	12	18	16	24	29	37		**8**	**37**	**22**
BURY ST EDMUNDS 7N	St Edmundsbury	B	A	42	25	28	20	16	16	14	16	19	35	41	38	**14**	**42**	**26**
HAVERHILL 7N	St Edmundsbury	B	A	42	23			16	15	12	15	17	30	39	37	**12**	**42**	**25**
STEVENAGE 3N	Stevenage	B	A	33	19	18	12	6	5	36	4	20	27	37	26	**4**	**37**	**20**
STEVENAGE 4N	Stevenage	B	A	36	16	20	15	10	5	15	7	26	31	45	29	**5**	**45**	**21**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
FELIXSTOWE 5N	Suffolk Coastal	B	A	49	33	33	26	24	24	21	20	18	39	46	45	**18**	**49**	**31**
FELIXSTOWE 7N	Suffolk Coastal	B	C	44	33	36										**33**	**44**	
FELIXSTOWE 9N	Suffolk Coastal	B	A				24	20		18	17	15	32	40	40	**15**	**40**	**26**
RICKMANSWORTH 3N	Three Rivers	B	A	44	29	31	18	18	12	14	13	25	41	50	39	**12**	**50**	**28**
RICKMANSWORTH 6N	Three Rivers	B	A	41	30	37	33	33	17	23	24	24	41	49	47	**17**	**49**	**33**
GRAYS 3N	Thurrock	B	A	38	33	41	38	26	35	30	32	32	42	46	38	**26**	**46**	**36**
GRAYS 4N	Thurrock	B	A	38	32	38	32	18	24	23	26	26	38	39	34	**18**	**39**	**31**
SAFFRON WALDEN 3N	Uttlesford	B	A	20		12	8	8	8		4	15	12	25	23	**4**	**25**	**13**
STANSTED 4N	Uttlesford	B	A	24		13	12	8			12	17	25	23	21	**8**	**25**	**17**
WATFORD 4N	Watford	B	A	35	23	25	24	18	13		16	26	31	40	36	**13**	**40**	**26**
WATFORD 7N	Watford	B	A	44	32				23	29	28	32	42	55	41	**23**	**55**	**36**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	35	24	26	20	17	16	18	17	24	31	37	34
	Regional Monthly Min	20	12	10	8	4	5	7	4	9	12	13	16
	Regional Monthly Max	55	40	41	41	33	38	36	32	47	50	67	47
	Regional Annual Mean	25											
	Regional Annual Min	13											
	Regional Annual Max	40											
	Number of Sites	64											
	% With Valid Data	95											

Figure B8.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the Eastern region



B9.1 London (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for London are shown in Figure B9.1. Table B9.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B9.2.

Table B9.1 Roadside Sites in London with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Hackney 1N	77 μgm^{-3}
Haringey 5N	70 μgm^{-3}
Havering 1N	68 μgm^{-3}
Haringey 1N	67 μgm^{-3}
Islington 1N	64 μgm^{-3}
Brent 55N	62 μgm^{-3}
Southwark 8N	58 μgm^{-3}
Lambeth 5N	58 μgm^{-3}
Lambeth 1N	55 μgm^{-3}
Havering 5N	54 μgm^{-3}
Islington 6N	54 μgm^{-3}
Kensington 5N	49 μgm^{-3}
Waltham Forest 4N	48 μgm^{-3}
Southwark 9N	48 μgm^{-3}
Westminster 1N	48 μgm^{-3}
Greenwich 35N	46 μgm^{-3}
Ealing 1N	45 μgm^{-3}
London City 39N	45 μgm^{-3}
Ealing 5N	45 μgm^{-3}
Barnet 8N	44 μgm^{-3}

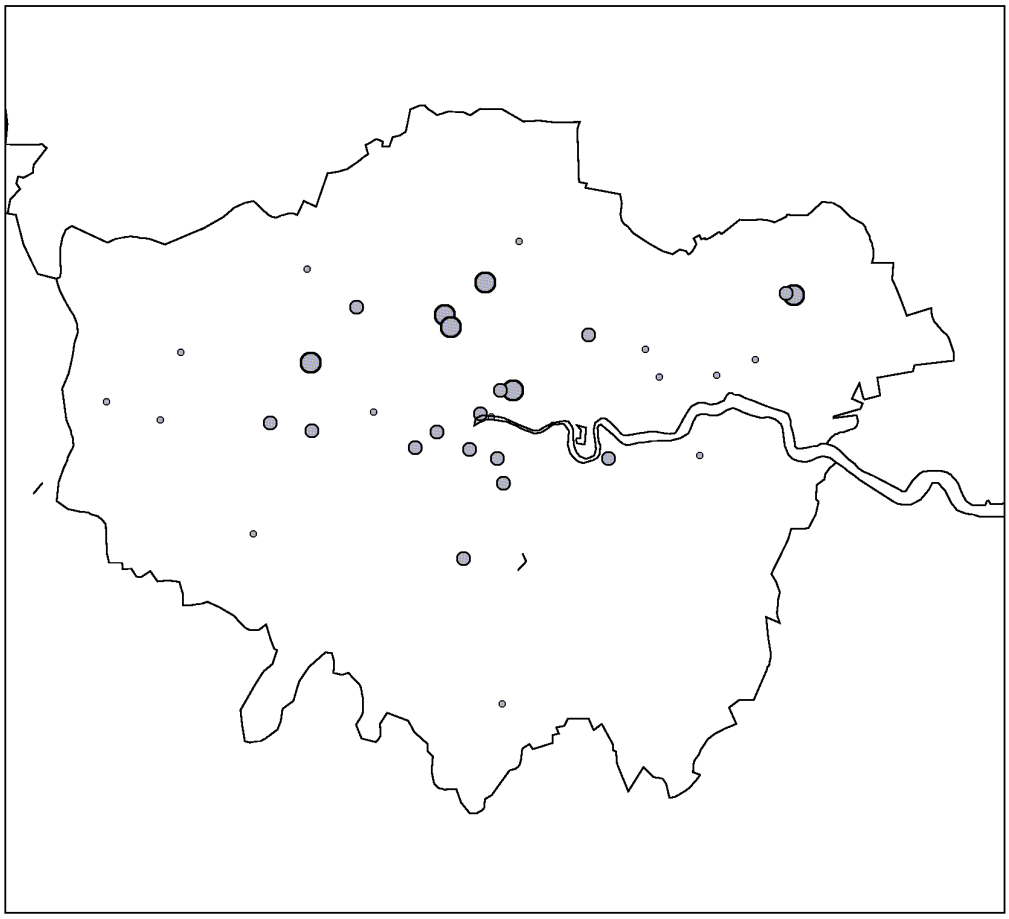
Table B9.2 Roadside Sites in London

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARKING 1N	Barking	R	A	55	31	37	27	33	12	21	41		34	55	62	**12**	**62**	**37**
BARKING 6N	Barking	R	A	60	31	40	29	23	24	53	40		38	50	39	**23**	**60**	**39**
BARNET 5N	Barnet	R	A	29	26	25	48	26		33		33	51		21	**21**	**51**	**32**
BARNET 8N	Barnet	R	A	59	33	35	57		30	52		34	35	58		**30**	**59**	**44**
BRENT 55N	Brent	R	A	59	95	65	39	58				58	50	58	77	**39**	**95**	**62**
BRENT 56N	Brent	R	A	61	18	22	29	20	18	34	7	43	27	72	56	**7**	**72**	**34**
LONDON CITY 38N	City of London	R	A	57	41		15	24	27	51	35	32	37	34	29	**15**	**57**	**35**
LONDON CITY 39N	City of London	R	A	62		48	45	36	46	51	19	66	47	44	32	**19**	**66**	**45**
EALING 1N	Ealing	R	A	44	23	40		39	38	31	61	42	59	66	56	**23**	**66**	**45**
EALING 5N	Ealing	R	A	46	16	41	35	35	46	45	58	39	60	61	54	**16**	**61**	**45**
ENFIELD 1N	Enfield	R	A	46	34	31	27	36	25	38	29	54	63	42	44	**25**	**63**	**39**
ENFIELD 5N	Enfield	R	A	41	24	33	19	34	31	25	31	34	54	38	44	**19**	**54**	**34**
GREENWICH 34N	Greenwich	R	A			23		21	37	20		26	45	27	50	**20**	**50**	**31**
GREENWICH 35N	Greenwich	R	A			33	40	38	60	55	23	24	77	41	66	**23**	**77**	**46**
HACKNEY 1N	Hackney	R	A				77	37			70	110	78		88	**37**	**110**	**77**
HARINGEY 1N	Haringey	R	A	68	55	37	48	80	62		70	71	97	71	73	**37**	**97**	**67**
HARINGEY 5N	Haringey	R	A	52	69	51	51	70	60	64	100	80	97	69	71	**51**	**100**	**70**
HAVERING 1N	Havering	R	A	70	84	79	60	55	55	61		70	75	61	81	**55**	**84**	**68**
HAVERING 5N	Havering	R	A	61	47	65	51	29	29	40	52	61	66	75	77	**29**	**77**	**54**
HILLINGDON 1N	Hillingdon	R	A	37	27	18	18	16	27	17		42			48	**16**	**48**	**28**
HILLINGDON 6N	Hillingdon	R	A	51			16	18		31		46	36	41	35	**16**	**51**	**34**
ISLINGTON 1N	Islington	R	A	80	66	68	43	72	49	22	53	45	103	83	88	**22**	**103**	**64**
ISLINGTON 6N	Islington	R	A	73	43	42	35	60	65	8	27	61	84	93	60	**8**	**93**	**54**
KENSINGTON 1N	Kensington & Chelsea	R	A	46	29	9	16		39	30	23	38	49	47	54	**9**	**54**	**35**
KENSINGTON 5N	Kensington & Chelsea	R	A	54	54	61	31	45	36	50	37	35	70	44	73	**31**	**73**	**49**
LAMBETH 1N	Lambeth	R	A	88	58	57	71	42	42	52	33	49	53			**33**	**88**	**55**
LAMBETH 5N	Lambeth	R	A	86	71	71	103	29	29	37	43	53	56			**29**	**103**	**58**
NEWHAM 1N	Newham	R	A	39	29	25	24	31	8	31	34	51	25	39		**8**	**51**	**31**
NEWHAM 5N	Newham	R	A	51	26		27	29	17		14	38	43	45		**14**	**51**	**32**
RICHMOND UPON THAMES 1N	Richmond Upon Thames	R	A	46	27	32	32	31	37	25	27	40	38		36	**25**	**46**	**34**
RICHMOND UPON THAMES 5N	Richmond Upon Thames	R	A									85	57		84	**57**	**85**	
SOUTHWARK 8N	Southwark	R	A	64	34	75	67	48	32	60	40	82	67	76	56	**32**	**82**	**58**
SOUTHWARK 9N	Southwark	R	A	48	42	64	24		32	29	34	59	78	54	64	**24**	**78**	**48**
TOWER HAMLETS 1N	Tower Hamlets	R	A				40				24	33				**24**	**40**	
WALTHAM FOREST 4N	Waltham Forest	R	A	57	45	56	36	54	47	30					63	**30**	**63**	**48**
WESTMINSTER 1N	Westminster	R	A		13	41						48	73	60	51	**13**	**73**	**48**

REGIONAL SUMMARY		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Regional Monthly Mean	56	41	44	40	39	37	38	39	51	58	56	58
	Regional Monthly Min	29	13	9	15	16	8	8	7	24	25	27	21
	Regional Monthly Max	88	95	79	103	80	65	64	100	110	103	93	88
	Regional Annual Mean	46											
	Regional Annual Min	28											
	Regional Annual Max	77											
	Number of Sites	36											
	% With Valid Data	94											

Figure B9.1 Annual Average Roadside Nitrogen Dioxide Concentrations in London



B9.2 London (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for London are shown in Figure B9.2. Table B9.3 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B9.4.

Table B9.3 Urban Background Sites in London with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Brent 57N	43 µgm^{-3}
Hackney 3N	42 µgm^{-3}

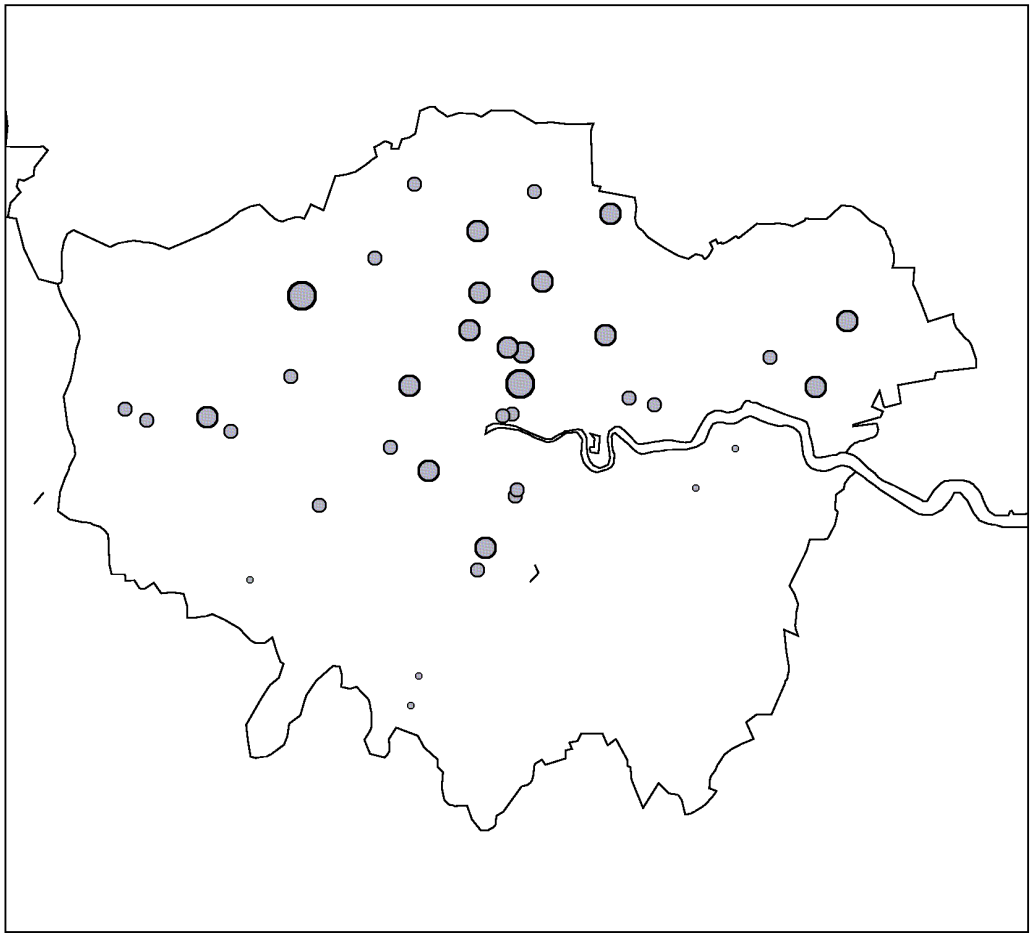
Table B9.4 Urban Background Sites in London

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BARKING 5N	Barking	B	A	33	11	24	11	21	20	17	30		25	29	27	**11**	**33**	**23**
BARNET 4N	Barnet	B	A	39	18	14	14	10	15	16		32		28	29	**10**	**39**	**21**
BARNET 7N	Barnet	B	A	28	16	20	13		12	22		28		38	38	**12**	**38**	**24**
BRENT 41N	Brent	B	A	40	25	17	19	17		24	6	39	30	29	39	**6**	**40**	**26**
BRENT 57N	Brent	B	A	54	28	31	22		21	32	20	46	54	92	74	**20**	**92**	**43**
LONDON CITY 3N	City of London	B	A		25			34	21	18	25	32	30	52	25	**18**	**52**	**29**
LONDON CITY 5N	City of London	B	A	59	25	25	28	20	16	18	16	25	45	30	21	**16**	**59**	**27**
EALING 3N	Ealing	B	A	46	22		22			12	29	27	34		48	**12**	**48**	**30**
EALING 4N	Ealing	B	A	29	19	21	39	21	20	9	27	28	31	38	38	**9**	**39**	**27**
ENFIELD 3N	Enfield	B	A	52	23	36	19	19	21	12	23	23	36	36	48	**12**	**52**	**29**
ENFIELD 4N	Enfield	B	A	34	27	40	38	25	19	15	17	38	54	27	50	**15**	**54**	**32**
GREENWICH 37N	Greenwich	B	A			14	16	16	20	11	7	14	22	40	34	**7**	**40**	**19**
GREENWICH 40N	Greenwich	B	A			27	7	8	11	11	20	7	24	50	29	**7**	**50**	**19**
HACKNEY 3N	Hackney	B	A				40	31	26	20	20	64	50	67	61	**20**	**67**	**42**
HACKNEY 4N	Hackney	B	A				31	34	37	23	31	49	48	53	48	**23**	**53**	**39**
HARINGEY 3N	Haringey	B	A	36	33	37	34	22	23	29	29	35	44	35	47	**22**	**47**	**34**
HARINGEY 4N	Haringey	B	A	49	54	29	24	33	15	21	22	35	47	37	61	**15**	**61**	**36**
HAVERING 3N	Havering	B	A	53	51	48	33	24	23	24	24	31	53	62	52	**23**	**62**	**40**
HAVERING 4N	Havering	B	A	39	35	40	36	22	19	23	23	29	35	39	36	**19**	**40**	**31**
HILLINGDON 3N	Hillingdon	B	A	31	19	12	21	16	15	20		30	31	32	30	**12**	**32**	**23**
HILLINGDON 7N	Hillingdon	B	A	38	26	16	16	14	20	16		16	21	38	38	**14**	**38**	**24**
ISLINGTON 3N	Islington	B	A	54	24	12	35	24	42	16		29	34	44	45	**12**	**54**	**33**
ISLINGTON 4N	Islington	B	A	38	36	21	36	27	31	21	17	29	50	59	50	**17**	**59**	**35**
KENSINGTON 3N	Kensington & Chelsea	B	A	52	20	11	21	17	34	25		58	36	37	45	**11**	**58**	**32**
KENSINGTON 4N	Kensington & Chelsea	B	A	34	12	9	13	28	13	14	17	30	17	30	41	**9**	**41**	**22**
LAMBETH 3N	Lambeth	B	A	36	38	48	32	27	27	21	25	27	30			**21**	**48**	**31**
LAMBETH 4N	Lambeth	B	A	53	52	42	25	13	13	20	18	19	26			**13**	**53**	**28**
NEWHAM 3N	Newham	B	A	55	10	20	26	9			19	29	31	37		**9**	**55**	**26**
NEWHAM 4N	Newham	B	A	33	13	21	35	16	18		14	42	27			**13**	**42**	**24**
RICHMOND UPON THAMES 3N	Richmond Upon Thames	B	A	28	23	23	19	17	13	12	39	37	47		33	**12**	**47**	**26**
RICHMOND UPON THAMES 4N	Richmond Upon Thames	B	A	24	17	24	10	10	12	15	16	26	27		36	**10**	**36**	**20**
SOUTHWARK 6N	Southwark	B	A	39	34	17	24	22	19	28	15	39	35	56	28	**15**	**56**	**30**
SOUTHWARK 7N	Southwark	B	A	38	21		28	20	18	15	18	42		51	48	**15**	**51**	**30**
SUTTON 4N	Sutton	B	A	19	12	6	12	13	7	15	42	14	25	26	30	**6**	**42**	**18**
SUTTON 7N	Sutton	B	A	23	16	8	15	9	8	17		12	21	26	25	**8**	**26**	**16**
TOWER HAMLETS 3N	Tower Hamlets	B	A				18				16	33				**16**	**33**	
WALTHAM FOREST 1N	Waltham Forest	B	A	42	27	33	46	27	22	21	22	29	41	48		**21**	**48**	**32**
WALTHAM FOREST 6N	Waltham Forest	B	A	39	41	48	32	22	23	22	24	28	44	44	47	**22**	**48**	**35**
WESTMINSTER 3N	Westminster	B	A	46	18	34						36	34	45	38	**18**	**46**	**36**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	40	26	25	25	20	20	19	22	31	35	42	41
	Regional Monthly Min	19	10	6	7	8	7	9	6	7	17	26	21
	Regional Monthly Max	59	54	48	46	34	42	32	42	64	54	92	74
	Regional Annual Mean	29											
	Regional Annual Min	16											
	Regional Annual Max	43											
	Number of Sites	39											
	% With Valid Data	97											

Figure B9.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in London



B10.1 The South East (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the South East are shown in Figure B10.1. Table B10.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B10.2.

Table B10.1 Roadside Sites in the South East with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Bracknell 5N	77 μgm^{-3}
Portsmouth 1N	65 μgm^{-3}
Witney 8N	64 μgm^{-3}
Abingdon 1N	63 μgm^{-3}
Gravesend 1N	63 μgm^{-3}
Dover 9N	62 μgm^{-3}
Hastings 5N	61 μgm^{-3}
Rochester 1N	60 μgm^{-3}
Staines 4N	59 μgm^{-3}
Southampton 10N	59 μgm^{-3}
Canterbury 1N	58 μgm^{-3}
Witney 6N	57 μgm^{-3}
Maidenhead 1N	57 μgm^{-3}
Southampton 5N	54 μgm^{-3}
Bracknell 1N	52 μgm^{-3}
Brighton 11N	51 μgm^{-3}
Tunbridge Wells 1N	51 μgm^{-3}
Gillingham Kent 1N	51 μgm^{-3}
Guildford 10N	50 μgm^{-3}
Eastleigh 1N	48 μgm^{-3}
Milton Keynes 5N	48 μgm^{-3}
Larkfield 1N	46 μgm^{-3}
Woking 10N	46 μgm^{-3}
Esher 1N	45 μgm^{-3}
Henley 1N	45 μgm^{-3}
Eastleigh 5N	45 μgm^{-3}
Dover 6N	44 μgm^{-3}
Dartford 1N	44 μgm^{-3}
Canterbury 7N	44 μgm^{-3}
Abingdon 5N	44 μgm^{-3}
Ramsgate 5	43 μgm^{-3}
Lewes 1N	42 μgm^{-3}
Ashford Middlesex 2N	41 μgm^{-3}
Hove 1N	41 μgm^{-3}
Brighton 1N	41 μgm^{-3}

Table B10.2 Roadside Sites in the South East

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BOGNOR REGIS 1N	Arun	R	A		30		35			27	27	35	36		40	**27**	**40**	**33**
BOGNOR REGIS 5N	Arun	R	A	29	22		27		20	20	22	34	30		29	**20**	**34**	**26**
ASHFORD 4N	Ashford	R	C	43	34	47		37	30	35		44	44	44		**30**	**47**	**40**
ASHFORD 7N	Ashford	R	A	42	26	35	32	29	26		33	32	38	39	46	**26**	**46**	**34**
BASINGSTOKE 1N	Basingstoke	R	A	39	36	46		14	32	27	42	47				**14**	**47**	**35**
BASINGSTOKE 6N	Basingstoke	R	A	40	40	52	36	20	29	33	45	57	35	40	6	**6**	**57**	**36**
BRACKNELL 1N	Bracknell	R	A	42	37	53	58	37	44	67	48	54	54	69	61	**37**	**69**	**52**
BRACKNELL 5N	Bracknell	R	A	60	80	78	92	85	90	80	65	69	78	74	77	**60**	**92**	**77**
BRIGHTON 11N	Brighton & Hove	R	A	62	42	64	47	66	38	54	21	67	50		47	**21**	**67**	**51**
BRIGHTON 1N	Brighton & Hove	R	A	53	27	46	40	19	44	37	30	62	39	44	49	**19**	**62**	**41**
HOVE 1N	Brighton & Hove	R	A	42	28	47	41	36	20	35	39	64	54	42	41	**20**	**64**	**41**
HOVE 5N	Brighton & Hove	R	A	38	15	45	46	43	21		29	58	44	50	50	**15**	**58**	**40**
CANTERBURY 1N	Canterbury	R	A	69	58	68	51	60	46	51	46	48	62	61	74	**46**	**74**	**58**
CANTERBURY 7N	Canterbury	R	A	41	39	53	51			30	40	39		33	69	**30**	**69**	**44**
BANBURY 1N	Cherwell	R	A	45	10	46		44		28	35	35		37	46	**10**	**46**	**36**
CHICHESTER 1N	Chichester	R	A	10	31	46	41	37	30	34	43	46	40	35	34	**10**	**46**	**36**
CHICHESTER 5N	Chichester	R	A	17	18	50	41	39	29	29	36	49	43	21	37	**17**	**50**	**34**
CRAWLEY 1N	Crawley	R	A	36	36	39	37	22	26	30	23	41	39	33	44	**22**	**44**	**34**
DARTFORD 1N	Dartford	R	A		43		48	42	9	47		61	37	54	55	**9**	**61**	**44**
DOVER 6N	Dover	R	A	42	41	54	46	44	33	33	37	54		54	46	**33**	**54**	**44**
DOVER 9N	Dover	R	A	62	57		65	69	46			65	68		64	**46**	**69**	**62**
ALTON 5N	East Hampshire	R	A	20	17	20	13	13	14	23	11		13	30		**11**	**30**	**17**
PETERSFIELD 6N	East Hampshire	R	A	16	22	23	23	13		26	18		14	28		**13**	**28**	**20**
EASTBOURNE 1N	Eastbourne	R	A	26	19		27		14	16		35		32	28	**14**	**35**	**25**
EASTBOURNE 6N	Eastbourne	R	A		26	28	29	24		26			33	24	33	**24**	**33**	**28**
EASTLEIGH 1N	Eastleigh	R	A	62	47	52	52	47	31	37	38	48	53	58	50	**31**	**62**	**48**
EASTLEIGH 5N	Eastleigh	R	A	46	22	51	47	49	45	44	45	48	52	48	38	**22**	**52**	**45**
ESHER 1N	Elmbridge	R	A	30	29	40	41	50	50	53	46	62	50	37	54	**29**	**62**	**45**
EPSOM 1N	Epsom & Ewell	R	A	32	30	27	30			30	23	43	49	43	47	**23**	**49**	**35**
EPSOM 6N	Epsom & Ewell	R	A		32	8				37	24	21	32	29	59	**8**	**59**	**30**
EPSOM 7N	Epsom & Ewell	R	A	29	36	32	14			49	32		28	52	29	**14**	**52**	**34**
FAREHAM 11N	Fareham	R	A	30	37	31	35	28	35	40	41	27			37	**27**	**41**	**34**
FAREHAM 1N	Fareham	R	A	38	27	32	26	37	32	36	39	29			37	**26**	**39**	**33**
GRAVESEND 1N	Gravesham	R	A	67	55	73	63	52	48	65	57	71	67	75	67	**48**	**75**	**63**
GUILDFORD 10N	Guildford	R	A							31	44	50	58	58	61	**31**	**61**	**50**
GUILDFORD 1N	Guildford	R	C	46	52	32	49									**32**	**52**	
GUILDFORD 9N	Guildford	R	A	28	36	19	25	39	30	42	24	43	64	30	48	**19**	**64**	**36**
HASTINGS 4N	Hastings	R	A	40	37	45	35	37	30	33	33	30	28	43	42	**28**	**45**	**36**
HASTINGS 5N	Hastings	R	A	56	61	64	66	63	43	71	45	65	63	62	68	**43**	**71**	**61**
HAVANT 1N	Havant	R	A	38												**38**	**38**	
HORSHAM 1N	Horsham	R	A	39	30	49	38	40	25	41	32	41	43	4	33	**4**	**49**	**35**
STEYNING 2N	Horsham	R	C	29	15	60	22									**15**	**60**	
STEYNING 3N	Horsham	R	A					17	18	7	16	24	32	5	29	**5**	**32**	**19**
LEWES 1N	Lewes	R	A	44		46	40	44	36	32	31	44	49	47	52	**31**	**52**	**42**
LEWES 5N	Lewes	R	A	36		33	26	35	21	19	20	49	31	34	30	**19**	**49**	**30**
MILTON KEYNES 1N	Milton Keynes	R	A	40	24	30	32	25	22	29	33	44	25	42	45	**22**	**45**	**33**
MILTON KEYNES 5N	Milton Keynes	R	A	60		44	26	47	42	43	48	55	58		55	**26**	**60**	**48**
DORKING 1N	Mole Valley	R	A										52			**52**	**52**	
PORTSMOUTH 1N	Portsmouth	R	A	82	85	75	78	50	26		67	40	80			**26**	**85**	**65**
HORLEY 1N	Reigate & Banstead	R	A				19	21	28	44			29	44		**19**	**44**	**31**
REIGATE 1N	Reigate & Banstead	R	A				21	19	16	46			25	9		**9**	**46**	**23**
GILLINGHAM KENT 1N	Medway	R	A		57	57	52	37	41	39	45	46	58	62	62	**37**	**62**	**51**
ROCHESTER 1N	Medway	R	A	70	56	66	62	32	48	45	52	59	84	79	64	**32**	**84**	**60**

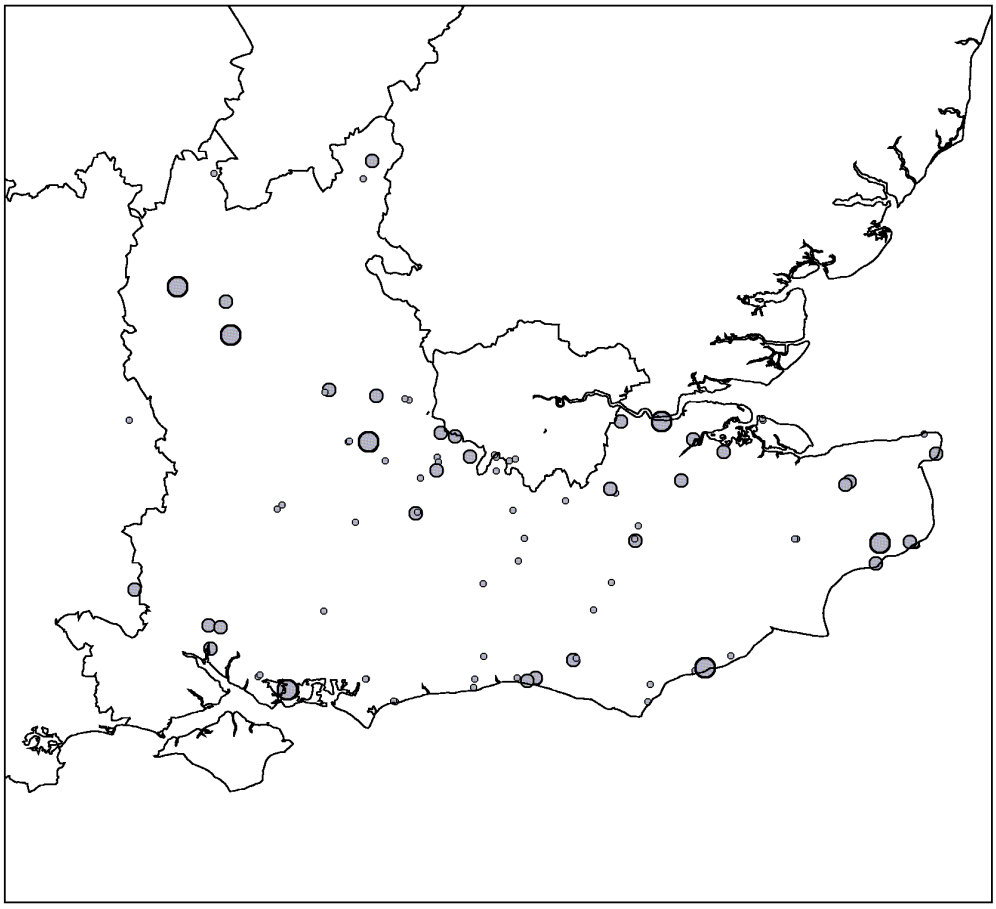
Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
BEXHILL 5N	Rother	R	A	48	29	45		34	22		32	40		31	47	**22**	**48**	**36**
BEXHILL 8N	Rother	R	A	38	29	47	38		20		38	50	50	41		**20**	**50**	**39**
ADDLESTONE 1N	Runnymede	R	A	22	39	30	33	24	25	44	21	42	59	42	50	**21**	**59**	**36**
ADDLESTONE 6N	Runnymede	R	A	26	39	23	51	30	26	34	25	39	42	21	57	**21**	**57**	**34**
SEVENOAKS 1N	Sevenoaks	R	A	43	32	36	33	28	24		35	37	44	45		**24**	**45**	**36**
SEVENOAKS 21N	Sevenoaks	R	A	21			48		33		14		61	63		**14**	**63**	**40**
FOLKESTONE 1N	Shepway	R	A	32	24	37	37	25	20	33		38	41	33	43	**20**	**43**	**33**
FOLKESTONE 7N	Shepway	R	A	50	38	50	32	33	28	34		40	49	32	54	**28**	**54**	**40**
SLOUGH 1N	Slough	R	A	43	37	16	20	14	31	31	18		44	40	46	**14**	**46**	**31**
SLOUGH 7N	Slough	R	A	41	33	25	33	27	22	34	13	11	43	56	39	**11**	**56**	**31**
HENLEY 1N	South Oxfordshire	R	A			40	58		42	35	40	53			48	**35**	**58**	**45**
HENLEY 9N	South Oxfordshire	R	A	40	33		39	39	41	23	31	49	30	46	44	**23**	**49**	**38**
SOUTHAMPTON 10N	Southampton	R	A	75	88	71	84	49	31		49	56	43	53	54	**31**	**88**	**59**
SOUTHAMPTON 5N	Southampton	R	A	71	58	68	53	31	24	54	51	63	63	55	55	**24**	**71**	**54**
ASHFORD MIDDLESEX 2N	Spelthorne	R	A	24	30	26	44	21	34	47	34	42	58	76	58	**21**	**76**	**41**
STAINES 4N	Spelthorne	R	A	71	27	72	50	65	41	53	35	69	94	49	86	**27**	**94**	**59**
BAGSHOT 1N	Surrey Heath	R	A	23	22	25	18	29	30	35	31	32	32	30	44	**18**	**44**	**29**
SUTTON 1N	Sutton	R	A	32	21	26	26	24	26	23	21	18	37	44	44	**18**	**44**	**28**
SUTTON 8N	Sutton	R	A	43	18	22	30	47	34	27	21	21	43	52	38	**18**	**52**	**33**
SHEERNESS 1N	Swale	R	A		33	36	34	22	26	27	26	27	44	40	38	**22**	**44**	**32**
SHEERNESS 5N	Swale	R	A	39	31	42	34	25	21	27	24	35	50	42	40	**21**	**50**	**34**
OXTED 1N	Tandridge	R	A	21	32		22	32	15	22	27	28	58	35	37	**15**	**58**	**30**
MARGATE 1N	Thanet	R	A	45	32	56		35	11	26	42		49	47	52	**11**	**56**	**40**
RAMSGATE 5N	Thanet	R	A		38	51	43	40	29	33	43	44	49	50	48	**29**	**51**	**43**
LARKFIELD 1N	Tonbridge & Malling	R	A	43	35		51	36	31	41	46	65	55	48	60	**31**	**65**	**46**
TONBRIDGE 1N	Tonbridge & Malling	R	A	46	22	44	38	33	28	33	37	41	36	46	46	**22**	**46**	**37**
TUNBRIDGE WELLS 1N	Tunbridge Wells	R	A	45	56	55	38	49	46	45	41	47	63	67	56	**38**	**67**	**51**
TUNBRIDGE WELLS 7N	Tunbridge Wells	R	A	45	36	36	36	28	39	40	42	35	50	50	33	**28**	**50**	**39**
ABINGDON 1N	Vale of White Horse	R	A	65		62	57	51	54	63	62		74	87	59	**51**	**87**	**63**
ABINGDON 5N	Vale of White Horse	R	A	46	39	50	45	35	27	35	41	65	57		42	**27**	**65**	**44**
FARNHAM 5N	Waverley	R	A	49	40	41	37	39	19	18	37	46			50	**18**	**50**	**37**
CROWBOROUGH 1N	Wealden	R	A	39	29	37	37	29	18	29	34	37	43	39	39	**18**	**43**	**34**
UCKFIELD 5N	Wealden	R	A	39	38	30	32	32	29	34	35	35	42	30	41	**29**	**42**	**35**
WITNEY 6N	West Oxfordshire	R	A	67	45	71	63	56	42	50	57	47	55	74	57	**42**	**74**	**57**
WITNEY 8N	West Oxfordshire	R	A	61	48	57	46	48	37	34		120	65	88	93	**34**	**120**	**64**
MAIDENHEAD 1N	Windsor & Maidenhead	R	A		41	60	52	56	58	47	36	69	72	91	44	**36**	**91**	**57**
WOKING 10N	Woking	R	A	51	60	23	33	43	53	40	42		46	48	67	**23**	**67**	**46**
WOKING 9N	Woking	R	A	58	37	15	21	29	34	44	44		49	28	58	**15**	**58**	**38**
WOKINGHAM 1N	Wokingham	R	C	42	23	25	48	27	21	36	31	57			33	**21**	**57**	**34**
WOKINGHAM 52N	Wokingham	R	C			38	31	27	25	31	25	42		33	38	**25**	**42**	**32**
WORTHING 1N	Worthing	R	A	46	36	51	12	27	27	11	15	37	26	36	35	**11**	**51**	**30**
WORTHING 6N	Worthing	R	A	45	46	59	30	27	20	35	21	36	32	39	66	**20**	**66**	**38**

REGIONAL SUMMARY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Regional Monthly Mean	43	37	44	40	36	31	37	35	46	48	45	48
Regional Monthly Min	10	10	8	12	13	9	7	11	11	13	4	6
Regional Monthly Max	82	88	78	92	85	90	80	67	120	94	91	93

Regional Annual Mean	40
Regional Annual Min	17
Regional Annual Max	77
Number of Sites	95
% With Valid Data	96

Figure B10.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the South East



B10.2 The South East (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the South East are shown in Figure B10.2. Table B10.3 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B10.4.

Table B10.3 Urban Background Sites in the South East with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Gravesend 6N	42 µgm^{-3}

Table B10.4 Urban Background Sites in the South East

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
LANCING 4N	Adur	B	A	30	27	34	29	21	16	19	23	26	31	32	47	**16**	**47**	**28**
SHOREHAM-BY-SEA 3N	Adur	B	A	31	25	33	25	20	19	20	23	29	29	31	36	**19**	**36**	**27**
BOGNOR REGIS 3N	Arun	B	A	33	22		21		16	16	20	20	24		30	**16**	**33**	**23**
BOGNOR REGIS 4N	Arun	B	A	29	15		24		16	16	19	19	26		36	**15**	**36**	**22**
ASHFORD 5N	Ashford	B	A	35	25	37		22	15	20	17	27		29	43	**15**	**43**	**27**
ASHFORD 6N	Ashford	B	A	31	21	33	28	21	14	20	24	26	34	25	37	**14**	**37**	**26**
BASINGSTOKE 3N	Basingstoke	B	A	36	26	24	15	22		11	15	22	23	20	26	**11**	**36**	**22**
BASINGSTOKE 4N	Basingstoke	B	A	12	23	26	19	19	14	16	14	29	24	16		**12**	**29**	**19**
BRACKNELL 3N	Bracknell	B	A	29	21	28	21	19	16	20	20	29	26	32	33	**16**	**33**	**24**
BRACKNELL 4N	Bracknell	B	C	30	19	28	21	17	17	17	16	23	27	30	34	**16**	**34**	**23**
BRIGHTON 4N	Brighton & Hove	B	A	31	27	22	27	22	12	22	13	22	23	46	30	**12**	**46**	**25**
BRIGHTON 9N	Brighton & Hove	B	A	40	24	31	31	21	20	22	27	34	36	34	38	**20**	**40**	**30**
HOVE 3N	Brighton & Hove	B	A	31	20						14	26	32	29	39	**14**	**39**	**27**
HOVE 4N	Brighton & Hove	B	A	29	17	19	22	21	9	17	15	24	24	22	37	**9**	**37**	**21**
CANTERBURY 5N	Canterbury	B	A	35	19	27	18	11		11		15	27	25	38	**11**	**38**	**23**
CANTERBURY 6N	Canterbury	B	A	29	32	37	16	11	7	10	14	14	26	19	40	**7**	**40**	**21**
BANBURY 6N	Cherwell	B	A	28	19	23			11	9	16	25	17	29	30	**9**	**30**	**21**
BANBURY 8N	Cherwell	B	A	23	17	12		10	4	9	14	21	21	20	18	**4**	**23**	**15**
CHICHESTER 3N	Chichester	B	A	10	12	32	25	15	20	13	19	25	30	26	16	**10**	**32**	**20**
CHICHESTER 4N	Chichester	B	A	16		35	21	19	16	18	14	23	28	33	8	**8**	**35**	**21**
CRAWLEY 3N	Crawley	B	A	27	20	27	21	21	16	18	21	29	28	26	31	**16**	**31**	**24**
CRAWLEY 4N	Crawley	B	A	23	20	22	21	21	11	19	25	35	24	28	27	**11**	**35**	**23**
CRAWLEY 5N	Crawley	B	A	22	18	21	17	14	16	15	16	26	23	20	36	**14**	**36**	**20**
DARTFORD 5N	Dartford	B	A	32	28	35	28	23	17	24	25	37	43	36	45	**17**	**45**	**31**
DARTFORD 7N	Dartford	B	A	44	36	41	34	25	12	19	33	40	27	44	40	**12**	**44**	**33**
DOVER 3N	Dover	B	A	30	21	27	20	22	16	11	13	27	27	32	25	**11**	**32**	**22**
DOVER 8N	Dover	B	A	35	23	17	23	21	16	14		26	31	47	35	**14**	**47**	**26**
ALTON 3N	East Hampshire	B	A	15	15	14	10	11	9	14	14		10	21	29	**9**	**29**	**15**
PETERSFIELD 3N	East Hampshire	B	A	16	12	12	14		7		9		6	20	31	**6**	**31**	**14**
EASTBOURNE 4N	Eastbourne	B	A	17	10	38	12	11	11	9	7	14	17	12	23	**7**	**38**	**15**
EASTBOURNE 5N	Eastbourne	B	A	17	10	14	15	14	14	14	7	15	17	16	21	**7**	**21**	**14**
EASTLEIGH 3N	Eastleigh	B	A	26	11	22	16	9	7	8	16	15	20	24	26	**7**	**26**	**17**
EASTLEIGH 4N	Eastleigh	B	A	35	22	33	23			22		17	30	28	36	**17**	**36**	**27**
ESHER 3N	Elmbridge	B	A	22	18	21	24	17	14	30	16	24	27	30	50	**14**	**50**	**24**
WALTON ON THAMES 1N	Elmbridge	B	A	29	19	38	39	11	11	6	13	24	24	26	31	**6**	**39**	**23**
EPSOM 3N	Epsom & Ewell	B	A	24	9	27	8			28	12	24	22	17	40	**8**	**40**	**21**
EPSOM 5N	Epsom & Ewell	B	A	27	7	23	23			29	15	26	17	31	33	**7**	**33**	**23**
FAREHAM 10N	Fareham	B	A	16	14	25	16		16	23	18	21			24	**14**	**25**	**19**
FAREHAM 7N	Fareham	B	A	22	14	16	22	12	11	15	19	20			23	**11**	**23**	**17**
GRAVESEND 5N	Gravesham	B	A	34	25	34	29	19	17	31	29	34		42	40	**17**	**42**	**30**
GRAVESEND 6N	Gravesham	B	A	52	42	42	34	31	34	38	29	36	52	61	50	**29**	**61**	**42**
GUILDFORD 11N	Guildford	B	A							46	16	33	32	32	37	**16**	**46**	**33**
GUILDFORD 3N	Guildford	B	A	14	31	21	10	15	18	24	12	41	43	30	23	**10**	**43**	**24**
GUILDFORD 5N	Guildford	B	C		48	18	5									**5**	**48**	
HASTINGS 1N	Hastings	B	A	30	21	31		18	14	19	21	15	25	26	29	**14**	**31**	**23**
HASTINGS 3N	Hastings	B	A	25	20	26	21	11	11	13	16	18	20	22	29	**11**	**29**	**19**
HAVANT 3N	Havant	B	A	34					20							**20**	**34**	
HAVANT 4N	Havant	B	A	30								15				**15**	**30**	
HORSHAM 3N	Horsham	B	A	18	27	17	18	10	7	11	13	22	19	13	22	**7**	**27**	**16**
HORSHAM 4N	Horsham	B	A			17	9	12	6	9	21	36	19	9	18	**6**	**36**	**16**
LEWES 3N	Lewes	B	A	22		18	18	14	11	10	11	19	17	22	29	**10**	**29**	**17**
LEWES 4N	Lewes	B	A	26		17	20	14	9	12	13	17	20	21	24	**9**	**26**	**17**
MILTON KEYNES 3N	Milton Keynes	B	A	36	22	23	27	17	17	24	25	32	19	38	38	**17**	**38**	**26**

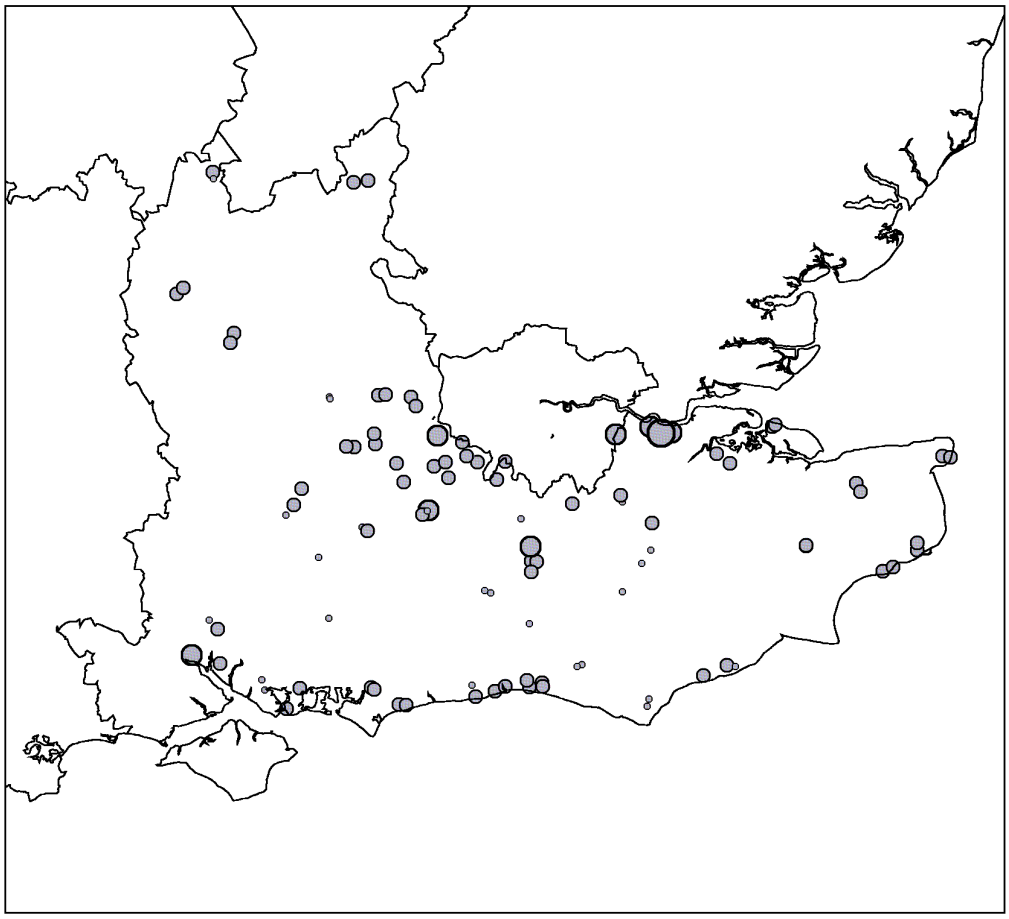
Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
MILTON KEYNES 4N	Milton Keynes	B	A	18	17	19	16	15	11	14	20	23	26	28	33	**11**	**33**	**20**
DORKING 3N	Mole Valley	B	A										36			**36**	**36**	
FETCHAM 3N	Mole Valley	B	A										36			**36**	**36**	
PORTSMOUTH 3N	Portsmouth	B	A	29	27	26	27	22	17	24	24	30	30			**17**	**30**	**26**
PORTSMOUTH 4N	Portsmouth	B	A	34	28	34	22	19			24	31	32			**19**	**34**	**28**
HORLEY 2N	Reigate & Banstead	B	A				18	13	27	39			54	36		**13**	**54**	**31**
REIGATE 3N	Reigate & Banstead	B	A				20	5	31	16			12	6		**5**	**31**	**15**
GILLINGHAM KENT 4N	Medway	B	A	36	25	31	24		15	16	23	22	36	32	39	**15**	**39**	**27**
ROCHESTER 3N	Medway	B	A	37	24	24	25	35	12	13	22	22	36	32	38	**12**	**38**	**27**
BEXHILL 6N	Rother	B	A	23	17	24	19	13	9		13	17	27	25		**9**	**27**	**19**
BEXHILL 7N	Rother	B	A	26	16	27	19	13	12		16		25	27	35	**12**	**35**	**21**
ADDLESTONE 3N	Runnymede	B	A	15	22	29	29	14	6	18	7	27	40	18	42	**6**	**42**	**22**
ADDLESTONE 5N	Runnymede	B	A	16	29	20	17	16		27	14	22	34	15	33	**14**	**34**	**22**
SEVENOAKS 3N	Sevenoaks	B	A	25	20	16	17	9	6			16	22	25		**6**	**25**	**17**
SEVENOAKS 9N	Sevenoaks	B	C	45	21	24	21	12	8		43	21				**8**	**45**	**24**
FOLKESTONE 3N	Shepway	B	A	33	16	26	23	8		14		21	32	26	34	**8**	**34**	**23**
FOLKESTONE 5N	Shepway	B	A	38	26	32	25	19	13	17		18	36	31	41	**13**	**41**	**27**
SLOUGH 5N	Slough	B	A	32	24	15	10	13	10	17	11	51	18	26	32	**10**	**51**	**22**
SLOUGH 6N	Slough	B	A	42	19	12	20	17	21	19	15	39	38	26	29	**12**	**42**	**25**
HENLEY 3N	South Oxfordshire	B	A	22	9	15	20	35	7	9	13	20	24	25	25	**7**	**35**	**19**
HENLEY 7N	South Oxfordshire	B	A		7	17	14	11	10	9	10	18	21	16	30	**7**	**30**	**15**
SOUTHAMPTON 7N	Southampton	B	A	49	46	46		24	16	29		37	43	43	43	**16**	**49**	**38**
SOUTHAMPTON 9N	Southampton	B	A	31	29	30		11	9	20	24	29	29	29	40	**9**	**40**	**26**
STAINES 5N	Spelthorne	B	A	24	31	28	37	32	19			19	77	43	48	**19**	**77**	**36**
SUNBURY ON THAMES 1N	Spelthorne	B	A	26	13	17	13	17	13	15	26	27	50	17	48	**13**	**50**	**24**
BISLEY 1N	Surrey Heath	B	A	31						17	17	20	16		31	**16**	**31**	**22**
WINDLESHAM 1N	Surrey Heath	B	A	31	26	18	18			6	18	22	25	26	36	**6**	**36**	**23**
SHEERNESS 3N	Swale	B	A		21	24	24	14	17	17	18	16	33	20	33	**14**	**33**	**22**
SHEERNESS 4N	Swale	B	A	31	29	29	26	17	18	20	20	19	34	35	36	**17**	**36**	**26**
OXTED 3N	Tandridge	B	A	20	18	16	20	14	16	19	5	19	32	20	33	**5**	**33**	**19**
OXTED 9N	Tandridge	B	A	30	28	10	27	7	19		8	17	35	26	41	**7**	**41**	**23**
RAMSGATE 4N	Thanet	B	A	38	11	28	20	14	9	13	14	14	35	37	44	**9**	**44**	**23**
RAMSGATE 6N	Thanet	B	A	30	20	25	19	14	20	11	16		33	23	34	**11**	**34**	**22**
TONBRIDGE 3N	Tonbridge & Malling	B	A	29	37	23	20	13	9	14	16	13	29	32	34	**9**	**37**	**22**
WEST MALLING 3N	Tonbridge & Malling	B	A	23	20	27	22	15	10	18	20	19		32	46	**10**	**46**	**23**
TUNBRIDGE WELLS 4N	Tunbridge Wells	B	A	29	21	24	17	10	9	12	15	16	27	33	17	**9**	**33**	**19**
TUNBRIDGE WELLS 6N	Tunbridge Wells	B	A		16	17	16	8	6	7	12	16	22	10	27	**6**	**27**	**14**
ABINGDON 3N	Vale of White Horse	B	A	39	30	31	24	15	20	15	22	28	33	41	40	**15**	**41**	**28**
ABINGDON 4N	Vale of White Horse	B	A	29		26	18	15	14	14	18	23	32	36	36	**14**	**36**	**24**
FARNHAM 3N	Waverley	B	A	25	31	14	14	7	11	6	15	10	24	16	33	**6**	**33**	**17**
FARNHAM 4N	Waverley	B	A	29	39	26	16	11	12	16	16	16	22	20	29	**11**	**39**	**21**
CROWBOROUGH 6N	Wealden	B	A	23	20	18		14	5	8	11	14	25	14	25	**5**	**25**	**16**
UCKFIELD 4N	Wealden	B	A	27	22	24	21	14	5	9	12	13	24	25	35	**5**	**35**	**19**
WITNEY 4N	West Oxfordshire	B	A	32	24	28	17	14	10	13	16	19	28	40	39	**10**	**40**	**23**
WITNEY 7N	West Oxfordshire	B	A	39	25	24	14	15	11	10	13	22	27	36	40	**10**	**40**	**23**
MAIDENHEAD 5N	Windsor & Maidenhead	B	A		16	30	22	17		17	16	30	43	52	40	**16**	**52**	**28**
MAIDENHEAD 6N	Windsor & Maidenhead	B	A		16	24	21	19	20	12	12	24	30	44	25	**12**	**44**	**22**
WOKING 11N	Woking	B	A	31	23	8	8	11	9	14	12		25	21	33	**8**	**33**	**18**
WOKING 12N	Woking	B	A	36	29	20	18	28	15	13	6		33	23	42	**6**	**42**	**24**
WOKINGHAM 3N	Wokingham	B	C	31	21		59	15	10	13		23	23	31	19	**10**	**59**	**24**
WOKINGHAM 4N	Wokingham	B	C	23	10	13	36	61	10	17	13	12	27	42	8	**8**	**61**	**23**
WORTHING 4N	Worthing	B	A	32	25	26	18	9	8	20	26	14	19	21	32	**8**	**32**	**21**
WORTHING 5N	Worthing	B	A	35	26	28	10	11	6	13	11	17	17	24	30	**6**	**35**	**19**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
REGIONAL SUMMARY			**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**			
	Regional Monthly Mean		29	22	25	21	17	13	17	17	23	28	28	33			
	Regional Monthly Min		10	7	8	5	5	4	6	5	10	6	6	8			
	Regional Monthly Max		52	48	46	59	61	34	46	43	51	77	61	50			
	Regional Annual Mean		23														
	Regional Annual Min		14														
	Regional Annual Max		42														
	Number of Sites		106														
	% With Valid Data		95														

Figure B10.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the South East



B11.1 The South West (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for the South West are shown in Figure B11.1. Table B11.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B11.2.

Table B11.1 Roadside Sites in the South West with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 μgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Bristol 1N	58 μgm^{-3}
Exeter 1N	50 μgm^{-3}
Bath 1N	49 μgm^{-3}
Westbury 6N	47 μgm^{-3}
Newton Abbot 6N	46 μgm^{-3}
Bristol 5N	46 μgm^{-3}
Frome 1N	45 μgm^{-3}
Westbury 1N	42 μgm^{-3}
Jersey 6N	42 μgm^{-3}

Table B11.2 Roadside Sites in the South West

				Nitrogen Dioxide Concentrations 2002 (ug m^{-3})														
Site Name	**Local Authority**	**Location**	**Status**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Min**	**Max**	**Mean**
BATH 1N	Bath & NE Somerset	R	A	49	47	38	46	52		42	45	53	52	78	36	**36**	**78**	**49**
MIDSOMER NORTON 5N	Bath & NE Somerset	R	A	19	27	24	20	15	14	22	20		26	25	36	**14**	**36**	**22**
BRISTOL 1N	Bristol	R	A	57	64		67	57	59	31	46	65	60	73	56	**31**	**73**	**58**
BRISTOL 5N	Bristol	R	A	45	45	42	44	42	44	44	39	56	41	60	48	**39**	**60**	**46**
DOBWALLS 1N	Caradon	R	A								42	47		31	39	**31**	**47**	
SALTASH 7N	Caradon	R	A								8	51		39	48	**8**	**51**	
TRURO 1N	Carrick	R	A	41	30	39	29	33	28	24	24	42	35	47	38	**24**	**47**	**34**
TRURO 5N	Carrick	R	A	32	27	32	25	20	20	17	18	32	32	40	31	**17**	**40**	**27**
CHRISTCHURCH 4N	Christchurch	R	A	32	29	40	32	32	29	30	36	37	34	32	19	**19**	**40**	**32**
EXMOUTH 1N	East Devon	R	A	32		33	31	22	23	22	10	29	21	26	15	**10**	**33**	**24**
EXMOUTH 5N	East Devon	R	A	22	22	21	21	15	17	19	15	22	15	21	9	**9**	**22**	**18**
EXETER 1N	Exeter	R	A	57	43	56	53	39	39	54	46	60	49	56	54	**39**	**60**	**50**
EXETER 5N	Exeter	R	A	37	37	44	35	28	21	31	27	44	46		41	**21**	**46**	**36**
GLOUCESTER 5N	Gloucester	R	A	36	31	29	61			30	7	23	29	35	33	**7**	**61**	**31**
GLOUCESTER 6N	Gloucester	R	A	55	39	36	50	37	26	26	21	41	54	50	47	**21**	**55**	**40**
DEVIZES 1N	Kennet	R	A	44	17	18	7	19	18	11	21	23	18	37	56	**7**	**56**	**24**
MARLBOROUGH 1N	Kennet	R	A	18	22	36	27	16	25	16	8	38	30	28	77	**8**	**77**	**28**
FROME 1N	Mendip	R	A	46	41		45	39	37	38	43	61	53	51		**37**	**61**	**45**
WALTON 1N	Mendip	R	A	31	19	30	22	23	20	19	20	38	37		35	**19**	**38**	**27**
WESTON-SUPER-MARE 1N	North Somerset	R	A	33	27	37	30	25	25	20	26	41	28	27	31	**20**	**41**	**29**
WESTON-SUPER-MARE 5N	North Somerset	R	A	28	27	27	25	11	18	20	22	34	30	24	31	**11**	**34**	**25**
CHIPPENHAM 5N	North Wiltshire	R	A					28	25		15	40	40		35	**15**	**40**	**31**
CHIPPENHAM 8N	North Wiltshire	R	A					32	27	29	25	37	37		32	**25**	**37**	**31**
POOLE 3N	Poole	R	A	36	21	35	30	40								**21**	**40**	
POOLE 6N	Poole	R	A	39	15		27	32								**15**	**39**	
SALISBURY 6N	Salisbury	R	A	29	25	32	41	26	17	36	25	46	32	38	24	**17**	**46**	**31**
SALISBURY 7N	Salisbury	R	A	35	36	32	32		20	27	26	46	42	41	33	**20**	**46**	**34**
BRIDGWATER 1N	Sedgemoor	R	A		11	22	23	22	26	24	29	25	28	30	33	**11**	**33**	**25**
BRIDGWATER 6N	Sedgemoor	R	A		30	42	32	33	28	19	38	38	42	45	47	**19**	**47**	**36**
KINGSWOOD 1N	South Gloucestershire	R	A	42	50	51	40	31	28	27			24	32	34	**24**	**51**	**36**
SOUTH GLOUCESTERSHIRE 1	South Gloucestershire	R	A	50	37	34	45	33			19	38	50		43	**19**	**50**	**39**
SOUTH GLOUCESTERSHIRE 2	South Gloucestershire	R	A					30	19		24	33	30	27	33	**19**	**33**	**28**
YATE 1N	South Gloucestershire	R	A	41	35	36	29	29	27	22	29	42	30	33	37	**22**	**42**	**33**
TOTNES 6N	South Hams	R	A	31	31	32	35	24	27	31	40	48	43	39	43	**24**	**48**	**35**
TOTNES 9N	South Hams	R	A		28		38		40	18	22	29	28	21	28	**18**	**40**	**28**
SWINDON 1N	Swindon	R	A	35	24	35	39		21	29	29	29	29	20	21	**20**	**39**	**28**
SWINDON 6N	Swindon	R	A	44	19	36	24	23	16		23					**16**	**44**	**26**
NEWTON ABBOT 1N	Teignbridge	R	A	42	36	33	29	34	26				45	45	37	**26**	**45**	**36**
NEWTON ABBOT 6N	Teignbridge	R	A	43	43	51	52	50	30	54	36		54	54	42	**30**	**54**	**46**
TEWKESBURY 5N	Tewkesbury	R	A	43	34	41	30	19	13	32	28	21	20	16		**13**	**43**	**27**
TEWKESBURY 6N	Tewkesbury	R	A	52	52	47	26	31	18	41	30	23	16	13	30	**13**	**52**	**32**
BRIXHAM 6N	Torbay	R	A	36	36		40	38	42	30	17	47	21	37	18	**17**	**47**	**33**
TORQUAY 1N	Torbay	R	A			53	30	38	19	22	11	51	16	36	38	**11**	**53**	**32**
BIDEFORD 6N	Torridge	R	A	24	22	16	22	16	12	17	18	23	24	23	29	**12**	**29**	**21**
BIDEFORD 8N	Torridge	R	A	32	29	30	35	22	27	28	27	25	31	31		**22**	**35**	**29**
WESTBURY 1N	West Wiltshire	R	A	29		37	46	46	32	39	37	62	55	41	42	**29**	**62**	**42**
WESTBURY 6N	West Wiltshire	R	A	36	32	39	50	57	45	40	47	58	56	53	52	**32**	**58**	**47**
WEYMOUTH 10N	Weymouth & Portland	R	A	35	28	26	35	26	32	39	40	32	30	45	39	**26**	**45**	**34**
WEYMOUTH 8N	Weymouth & Portland	R	A	24	25	22	37	22	21	38		66	29	37	34	**21**	**66**	**32**
JERSEY 6N	Jersey	R	A	42	38		43	38	37	40	48	42	43	42	44	**37**	**48**	**42**
JERSEY 9N	Jersey	R	A	37	36	38	34	28	34	37	39	37	43	41	42	**28**	**43**	**37**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
REGIONAL SUMMARY				**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**			
	Regional Monthly Mean			37	32	35	35	30	27	29	28	40	35	38	37			
	Regional Monthly Min			18	11	16	7	11	12	11	7	21	15	13	9			
	Regional Monthly Max			57	64	56	67	57	59	54	48	66	60	78	77			
	Regional Annual Mean			33														
	Regional Annual Min			18														
	Regional Annual Max			58														
	Number of Sites			51														
	% With Valid Data			92														

Figure B11.1 Annual Average Roadside Nitrogen Dioxide Concentrations in the South West

B11.2 The South West (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for the South West are shown in Figure B11.2. No urban background sites in the South West exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B11.3.

Table B11.3 Urban Background Sites in the South West

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
KEYNSHAM 3N	Bath & NE Somerset	B	A	18	13	11	14	11	7	9		16	18	14	31	**7**	**31**	**15**
MIDSOMER NORTON 4N	Bath & NE Somerset	B	A	13	16	13	15	11	9	9	12	18	18	15	26	**9**	**26**	**15**
BRISTOL 3N	Bristol	B	A	21	16	19	17	14	12	13	16	23	10	28	23	**10**	**28**	**18**
BRISTOL 4N	Bristol	B	A			21	18	36	14	12			33	29	26	**12**	**36**	**23**
CALLINGTON 4N	Caradon	B	A								42	12		13	19	**12**	**42**	
SALTASH 3N	Caradon	B	A								11	19		14	20	**11**	**20**	
TRURO 3N	Carrick	B	A	26	18	18	13	28	11	9	8	18	21	24	22	**8**	**28**	**18**
TRURO 4N	Carrick	B	A	20	17	14	16	17	11	10	11	20		20	23	**10**	**23**	**16**
CHRISTCHURCH 3N	Christchurch	B	A	6	7	11	17	4	5		7	11	9	7	9	**4**	**17**	**8**
CHRISTCHURCH 5N	Christchurch	B	A	6	6	8	9	21	7	5	8	12	9	7	8	**5**	**21**	**9**
EXMOUTH 3N	East Devon	B	A	17	10	15	13	10	6	9	9	14	11	14	26	**6**	**26**	**13**
EXMOUTH 4N	East Devon	B	A	15	12	11	10	11	5	6	10	14	13	12	20	**5**	**20**	**12**
EXETER 3N	Exeter	B	A	29	21	21	16	10	10	11	12	23	25	29	28	**10**	**29**	**20**
EXETER 4N	Exeter	B	A	22	15	22	17	12		11	10	25		23	28	**10**	**28**	**19**
GLOUCESTER 3N	Gloucester	B	A	24	19			14	15	13	16	21			23	**13**	**24**	**18**
GLOUCESTER 4N	Gloucester	B	A	34	21			18	12		19	17	25	21	32	**12**	**34**	**22**
DEVIZES 5N	Kennet	B	A	28		14	9	6	12	11	19	9	5	15	24	**5**	**28**	**14**
DEVIZES 7N	Kennet	B	A	21	8	13	5	10	13	8	19	15	7	22	50	**5**	**50**	**16**
MARLBOROUGH 2N	Kennet	B	A	23	8	9	11	14	22	19	11	13	14	19	34	**8**	**34**	**16**
FROME 3N	Mendip	B	A	23	18	26		10	14	15	17	28	28	33	33	**10**	**33**	**22**
STREET 4N	Mendip	B	A	20	16	17	16	9	10	11	12	20	21	25	27	**9**	**27**	**17**
WESTON-SUPER-MARE 3N	North Somerset	B	A	21	19	20	16	13	11	11	10	22	21	17	22	**10**	**22**	**17**
WESTON-SUPER-MARE 4N	North Somerset	B	A	19	13	18	13	9	10	10	9	21	19	16	17	**9**	**21**	**14**
CHIPPENHAM 6N	North Wiltshire	B	A					13	10	13	11	19	19	23	30	**10**	**30**	**17**
CHIPPENHAM 7N	North Wiltshire	B	A					13	8	13	13	16	17	20	33	**8**	**33**	**17**
POOLE 4N	Poole	B	A	18	11		16	10								**10**	**18**	
POOLE 5N	Poole	B	A	17	10	9	10	8								**8**	**17**	
SALISBURY 3N	Salisbury	B	A	29	22	18	23	16	16	16	12	28	30	21	31	**12**	**31**	**22**
SALISBURY 4N	Salisbury	B	A	24	17	13	20	15	18	12	14	22	22	20	29	**12**	**29**	**19**
BRIDGWATER 3N	Sedgemoor	B	A		4	12	9	9	7	8	11	18	22	23	24	**4**	**24**	**13**
BRIDGWATER 5N	Sedgemoor	B	A		9	17	13	13	8	9	12	15	23	25	29	**8**	**29**	**16**
FRAMPTON COTTERELL 1N	South Gloucestershire	B	A	34	27	21	21	14	18	14	24	19	28	27	38	**14**	**38**	**24**
KINGSWOOD 3N	South Gloucestershire	B	A	25		24	21	13	14	16	13	20	16	23	21	**13**	**25**	**19**
KINGSWOOD 4N	South Gloucestershire	B	A	31		25	24	10	14	14	20	24	24	23	34	**10**	**34**	**22**
YATE 3N	South Gloucestershire	B	A	23	20	21	16	15	9	12	19	23	26	20	31	**9**	**31**	**20**
TOTNES 4N	South Hams	B	A	19	11	12	13		6	11	26	21		15	24	**6**	**26**	**16**
TOTNES 5N	South Hams	B	A	16	9	12	12	5	7	10	13	15	19	14		**5**	**19**	**12**
SWINDON 4N	Swindon	B	A	31	23	18	18	12	16	15	13	23	24	27	11	**11**	**31**	**19**
SWINDON 5N	Swindon	B	A	27			16	20	8	18	17	21	25	26	40	**8**	**40**	**22**
NEWTON ABBOT 5N	Teignbridge	B	A		16	19	12	12	8	15	7		21	21	27	**7**	**27**	**16**
NEWTON ABBOT 7N	Teignbridge	B	A	14		14	12	9	5	10	6		13	13		**5**	**14**	**11**
TEWKESBURY 3N	Tewkesbury	B	A	29	16	23	12	8	9	12	13	22	10	8	22	**8**	**29**	**15**
TEWKESBURY 4N	Tewkesbury	B	A	25	17	21	15	9	4	12	11	19			20	**4**	**25**	**15**
BRIXHAM 5N	Torbay	B	A	11		12	9	6	6	5	8	9	7	5	8	**5**	**12**	**8**
TORQUAY 3N	Torbay	B	A	21	19		14	14	13	8	5	18	8	8	15	**5**	**21**	**13**
BIDEFORD 4N	Torridge	B	A	12	8	5	9	7	4	5	6	9	13	9	22	**4**	**22**	**9**
BIDEFORD 5N	Torridge	B	A	12	8	7	8	5		5	5	10	12	7	24	**5**	**24**	**9**
WESTBURY 3N	West Wiltshire	B	A	4	16	33	13	8	9	12	14	16	19	14	8	**4**	**33**	**14**
WESTBURY 5N	West Wiltshire	B	A	15	14	14	16	10	13	12	12	21	23	17	27	**10**	**27**	**16**
WEYMOUTH 4N	Weymouth & Portland	B	A	10	7	9	9	7	4	8	8	12	12	10	21	**4**	**21**	**10**
WEYMOUTH 9N	Weymouth & Portland	B	A	18	12	16	8	9	7	15	14	19	18	19	22	**7**	**22**	**15**
JERSEY 7N	Jersey	B	A	25	20	19	16	12	12	13	14	14	20	17	23	**12**	**25**	**17**
JERSEY 8N	Jersey	B	A	13	12	10	9	7	6	8	9	8	12	9	15	**6**	**15**	**10**

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
REGIONAL SUMMARY			**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**			
	Regional Monthly Mean		20	14	16	14	12	10	11	13	18	18	18	24			
	Regional Monthly Min		4	4	5	5	4	4	5	5	8	5	5	8			
	Regional Monthly Max		34	27	33	24	36	22	19	42	28	33	33	50			
	Regional Annual Mean		16														
	Regional Annual Min		8														
	Regional Annual Max		24														
	Number of Sites		53														
	% With Valid Data		92														

Figure B11.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in the South West

B12.1 Northern Ireland (Roadside Sites)

Roadside sampler locations and annual average NO_2 concentrations for Northern Ireland are shown in Figure B12.1. Table B12.1 identifies all sampler locations with annual average NO_2 concentrations greater than 40µgm^{-3}. The validated 2002 dataset for the region is detailed in Table B12.2.

Table B12.1 Roadside Sites in Northern Ireland with High Concentrations according to the Air Quality Strategy Objectives

Sites > 40 µgm^{-3} Air Quality Strategy Objective NO_2 Annual Mean	
Londonderry 8N	52 µgm^{-3}

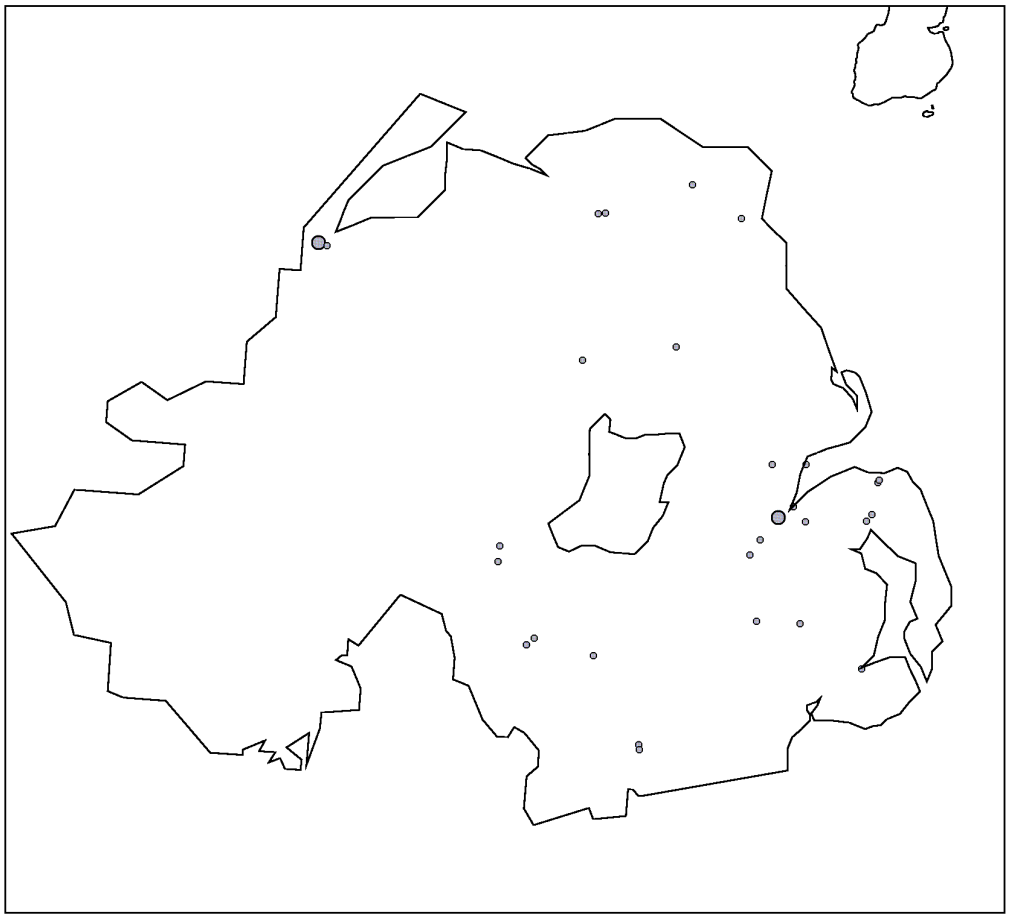
Table B12.2 Roadside Sites in Northern Ireland

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
NEWTOWNARDS 1N	Ards	R	A	13	20	20	36			22	24	34	26	29	25	**13**	**36**	**25**
NEWTOWNARDS 7N	Ards	R	A	21	25	28	23		26	17	22	30	27	28	29	**17**	**30**	**25**
ARMAGH 1N	Armagh	R	A	46	45	35	31	25	31	29	17	29	48	19	46	**17**	**48**	**33**
ARMAGH 5N	Armagh	R	A	41	36	40	43	37	39	21	12	36	46	44	50	**12**	**50**	**37**
BALLYMENA 2N	Ballymena	R	A	50	38	27	12	12	23	21	25	10	44	15	50	**10**	**50**	**27**
BALLYMENA 5N	Ballymena	R	A	27	19	25	33	19	27	34			27		42	**19**	**42**	**28**
BALLYMONEY 1N	Ballymoney	R	A	27	23	15	19	28	19	21	24	18	39	33	43	**15**	**43**	**26**
BALLYMONEY 5N	Ballymoney	R	A	29	5	7	14	19	7	11	18	13	33	28	46	**5**	**46**	**19**
BELFAST 1N	Belfast	R	A	36	48	31	27	42	12	42	33	36	40	48	38	**12**	**48**	**36**
BELFAST 5N	Belfast	R	A	65	84	25	33	21	54	13	29	29	42	34	57	**13**	**84**	**40**
CARRICKFERGUS 1N	Carrickfergus	R	A	12	10	12	12	13	10	10		17	18			**10**	**18**	**13**
CASTLEREAGH 1N	Castlereagh	R	A	6	9	11	9	12	8	10	11	20	20	19	20	**6**	**20**	**13**
CRAIGAVON 5N	Craigavon	R	A			23	21		13	26	11	19	18	46	41	**11**	**46**	**24**
CRAIGAVON 9N	Craigavon	R	A			38	15		14	33	15	32	33	49	52	**14**	**52**	**31**
BALLYNAHINCH 9N	Down	R	A		20	18					16	25	25	24	13	**13**	**25**	**20**
DOWNPATRICK 1N	Down	R	A		29	15					18	33	25	32	20	**15**	**33**	**25**
DUNGANNON 1N	Dungannon	R	A	31	10	6	31	19	13	21	15	23	35	23	38	**6**	**38**	**22**
DUNGANNON 5N	Dungannon	R	A	10	6	10	19	4	8	23	13	27	18	23	42	**4**	**42**	**17**
LISBURN 1N	Lisburn	R	A	18	26		21	13	18	22	25	26	26	26	26	**13**	**26**	**23**
LISBURN 7N	Lisburn	R	A	12	7	21	17	18	11		11	20	23	23	26	**7**	**26**	**17**
LONDONDERRY 8N	Derry City Council	R	A	73	79		36	8	17	17		53	58		127	**8**	**127**	**52**
LONDONDERRY 9N	Derry City Council	R	A				29	13	19		33	21	57	35	55	**13**	**57**	**33**
NEWRY 10N	Newry & Mourne	R	A	27	36	40	31	36	19	42	25	34	46	27	57	**19**	**57**	**35**
NEWRY 6N	Newry & Mourne	R	A	21	38	23		33	31	50	36	46	61	29	52	**21**	**61**	**38**
NEWTOWNABBEY 11N	Newtownabbey	R	A	43	5	41	30	27	38	30	11	30	58	54	48	**5**	**58**	**35**
NEWTOWNABBEY 12N	Newtownabbey	R	A	22	15	25	13	15	28	25	11	15	33	14	39	**11**	**39**	**21**
NEWTOWNABBEY 1N	Newtownabbey	R	A	46	27	21	50	26	34	27	17	21	62	26	36	**17**	**62**	**33**
BANGOR NI 6N	North Down	R	A	14	17	17	22	16	11	13	18	26	21	23	22	**11**	**26**	**18**
BANGOR NI 7N	North Down	R	A	6	9	16			12		18	22	20	19	38	**6**	**38**	**18**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	29	26	23	25	21	21	24	20	27	35	30	42
	Regional Monthly Min	6	5	6	9	4	7	10	11	10	18	14	13
	Regional Monthly Max	73	84	41	50	42	54	50	36	53	62	54	127
	Regional Annual Mean	27											
	Regional Annual Min	13											
	Regional Annual Max	52											
	Number of Sites	29											
	% With Valid Data	100											

Figure B12.1 Annual Average Roadside Nitrogen Dioxide Concentrations in Northern Ireland



B12.2 Northern Ireland (Urban Background Sites)

Urban background sampler locations and annual average NO_2 concentrations for Northern Ireland are shown in Figure B12.2. No urban background sites in Northern Ireland exceeded the Air Quality Strategy Objective of 40μgm^{-3}. The validated 2002 dataset for the region is detailed in Table B12.3.

Table B12.3 Urban Background Sites in Northern Ireland

Nitrogen Dioxide Concentrations 2002 (ug m^{-3})

Site Name	Local Authority	Location	Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Min	Max	Mean
NEWTOWNARDS 3N	Ards	B	A		7	9	7	7		4	5	9	9	11	12	**4**	**12**	**8**
NEWTOWNARDS 6N	Ards	B	A	7	8		17				5	11	11	11	14	**5**	**17**	**11**
ARMAGH 3N	Armagh	B	A		14	15	15	12	12	17	15	13	33	6	23	**6**	**33**	**16**
ARMAGH 4N	Armagh	B	A	17	19	18	17	14	15	27	17		21	13	29	**13**	**29**	**19**
BALLYMENA 1N	Ballymena	B	A	21	6	4	8	12	15	19	15	12	10	17	33	**4**	**33**	**14**
BALLYMENA 4N	Ballymena	B	A	23	8	4	8	12	13	10	12	12	13	15	46	**4**	**46**	**15**
BALLYMONEY 3N	Ballymoney	B	A	20	4	4	8	7	5	9	16	10		15	20	**4**	**20**	**11**
BALLYMONEY 4N	Ballymoney	B	A	21	6		12	8	5	4	8	13	11	14	26	**4**	**26**	**12**
BELFAST 3N	Belfast	B	A	36	25	13	21	17	17	17	19	31	27	23	36	**13**	**36**	**24**
BELFAST 4N	Belfast	B	A	23	25		10	10	17	17	12	10	33	10	42	**10**	**42**	**19**
CARRICKFERGUS 3N	Carrickfergus	B	A			7	4	4				10	10			**4**	**10**	
CARRICKFERGUS 4N	Carrickfergus	B	A		4	10	7	7		5		14	12			**4**	**14**	**9**
CASTLEREAGH 5N	Castlereagh	B	A	7							6	14	17	15	22	**6**	**22**	**13**
CASTLEREAGH 6N	Castlereagh	B	A		8		6	6		6	8	11	16	13	16	**6**	**16**	**10**
CRAIGAVON 7N	Craigavon	B	A			11	26		10	16	8	11	27	26	38	**8**	**38**	**19**
CRAIGAVON 8N	Craigavon	B	A			9	6		8	23	11	8	19	30	21	**6**	**30**	**15**
DOWNPATRICK 3N	Down	B	A			7					6	12	25	35	12	**6**	**35**	**16**
DOWNPATRICK 4N	Down	B	A			5						8	9	10	9	**5**	**10**	
DUNGANNON 3N	Dungannon	B	A	6	10	6	6	8	19	19	12	17	36	15	19	**6**	**36**	**14**
DUNGANNON 4N	Dungannon	B	A	15	4	6	13	10	4	19	8	10	19	12	29	**4**	**29**	**12**
LISBURN 3N	Lisburn	B	A		6	5	6	5		4	4	12	12	12	20	**4**	**20**	**9**
LISBURN 6N	Lisburn	B	A	5		9	7			7	5	13	13	13	20	**5**	**20**	**10**
LONDONDERRY 10N	Derry City Council	B	A	34	31		6	13	8	12	12	18	35	14	19	**6**	**35**	**18**
LONDONDERRY 11N	Derry City Council	B	A	18	18		19	12	17	6	12	9	34	10	24	**6**	**34**	**16**
NEWRY 11N	Newry & Mourne	B	A	6	4	10		12	6	4	8	12	13	19	33	**4**	**33**	**11**
NEWRY 9N	Newry & Mourne	B	A	19	12	10	8	8	4	23		13	13	10	29	**4**	**29**	**13**
NEWTOWNABBEY 13N	Newtownabbey	B	A					9	17	16	9	11	27	12	26	**9**	**27**	**16**
BANGOR NI 4N	North Down	B	A	10	8	7	7	5		6	9	10	10	12	13	**5**	**13**	**9**
BANGOR NI 8N	North Down	B	A		7	7	18	6			10		11	12	14	**6**	**18**	**11**

REGIONAL SUMMARY		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Regional Monthly Mean	17	11	8	11	9	11	13	10	12	19	15	24
	Regional Monthly Min	5	4	4	4	4	4	4	4	8	9	6	9
	Regional Monthly Max	36	31	18	26	17	19	27	19	31	36	35	46
	Regional Annual Mean	14											
	Regional Annual Min	8											
	Regional Annual Max	24											
	Number of Sites	29											
	% With Valid Data	93											

Figure B12.2 Annual Average Urban Background Nitrogen Dioxide Concentrations in Northern Ireland