# AIR QUALITY IN LONDON

## Year Ending 31st March 2004

## Preliminary Report

Environmental Research Group
King's College London
May 2004

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# SUMMARY

The purpose of this report is to review air quality in London during the 1st quarter of 2004 and to report detailed measurement results for the year ended 31st March 2004.

During the quarter 2 new monitoring sites joined the London Air Quality Network (LAQN); Brent 5 and Lambeth 4.

The series of $PM_{10}$ incidents during the 1st quarter of 2003 were not repeated during the 1st quarter of 2004. The first widespread 'moderate' $O_3$ of the year was measured at the end of March for only the 3rd time in the 11 year history of the LAQN.

Measurements during the year ended 31st March 2004 have been compared to the Air Quality Strategy Objectives. Assessments of measurements for the 12 month period are dominated by pollution incidents during 2003:

- The CO Objective was met at all CO monitoring sites.
- The annual mean $NO_2$ Objective was exceeded at all road and kerbside sites in London.
- The annual mean $NO_2$ Objective was also exceeded at background sites in inner and west London.
- Incident based $PM_{10}$ Objective was exceeded at kerbside and roadside TEOM sites in inner London and at several such sites in outer London. All background and suburban TEOM sites met the incident based Objective. All BAM monitoring sites exceeded the Objective.
- The annual mean Objective of 40 $\mu gm^{-3}$ for $PM_{10}$ was exceeded at the roadside TEOM site Bexley 4 and at the kerbside TEOM site Marylebone Road. The annual mean Objective was also exceeded at all kerbside and roadside BAM sites.
- All sites met the Objective for $SO_2$.

# INTRODUCTION

The purpose of this report is to review air quality in London during the 1st quarter of 2004 and to report the detailed measurement results for the year ending 31st March 2004. This report represents a departure from the previous reporting timetable whereby reports were issued at quarterly intervals following the ratification of all air pollution measurements. However, ratification is a retrospective analysis of measurements within an established calibration history and draws on the results of additional tests carried out at 6 monthly audit. Ratification cannot therefore be completed until 6-9 months after a measurement is made. Following consultation with report recipients during October 2003, the reporting timetable has been rescheduled and, henceforth, preliminary reports will be issued soon after the end of each quarter. This change will enable prompt reporting of recent pollution incidents. Preliminary reports will be based on a mixture of ratified and unratified measurements. A preliminary annual report for 2003 was issued during March 2004 to bridge the gap between the old and new reporting timetable. Final annual reports will continue to be produced following the completion of measurement ratification.

Measurements have been analysed with specific reference to the AQS Objectives which are detailed in Appendix 4. Full details of the sites in the London Air Quality Network (LAQN) are presented in Appendix 1 and the detailed monitoring results are presented in Appendix 3.

The LAQN was formed in 1993 to coordinate and improve air pollution monitoring in London. Currently, thirty London boroughs are supplying data to the LAQN. Increasingly, these data are being supplemented by measurements from local authorities surrounding London, thereby providing an overall perspective of air pollution in South East England. The LAQN is operated and managed by the Environmental Research Group (ERG) at King's College London. Each borough funds monitoring in its own area. The core LAQN activities are funded by the ERG itself. The Department of Environment, Food and Rural Affairs (DEFRA) funds the ERG to operate the Marylebone Road site and to maintain 14 of the LAQN sites as affiliate sites to the UK Automatic Urban and Rural Network (AURN). This DEFRA support assists the operation of the overall LAQN.

In response to requests from air pollution modellers, this report includes annual mean $NO_X$ measurements for each $NO_2$ monitoring site in the LAQN. This report also presents gas measurements expressed as mass per unit volume ($\mu gm^{-3}$ and $mgm^{-3}$) using conversion factors at 293 K and 1.03 KPa as suggested in the Draft Guidance LAQM.TG(02) (DEFRA 2002). $NO_X$ measurements are reported as $NO_2$ equivalent.

To understand air pollution in London it is necessary to understand air pollution in the surrounding area, and vice-versa. The LAQN contains sites in Essex, Kent and Surrey. A more complete picture of air pollution in South East England can be obtained from the combined results of the LAQN, the Kent Air Quality Monitoring Network (KAQMN) and the Hertfordshire and Bedfordshire Air Pollution Monitoring Network (HBAPMN). Reports for these networks are available from the ERG.

Hourly updated measurements from the LAQN and neighbouring networks are published by the ERG on the Internet at:

www.erg.kcl.ac.uk

# AIR QUALITY JANUARY – MARCH 2004

## Network Changes

Two new monitoring sites joined the LAQN during the quarter.

The Brent 5 roadside site joined the network during February 2004. The site measures $NO_X$ and $PM_{10}$ by TEOM and is located in Neasden. The site was installed following concerns regarding the $PM_{10}$ arising from waste transfer stations; as highlighted by the measurement from the Bexley 4 monitoring site in Erith. The site is shown in Figure 1.

**Figure 1 The Brent 5 monitoring site**

The Lambeth 4 site joined the network at the start of the year though additional measurements have been included in the LAQN database for end of December 2003. The site is installed in a kerbside location in Brixton, alongside the busy A23, in an area with high pedestrian use. The site measures $NO_X$, $SO_2$ and $PM_{10}$ by BAM and is shown in Figure 2.

**Figure 2 The Lambeth 4 monitoring site.**

## Air Pollution Incidents

The 1st quarter of 2004 was a comparatively quiet pollution period compared to the 1st quarter of 2003. During the 1st quarter of 2003 London experienced 2 large $PM_{10}$ incidents caused mainly by the influx of secondary $PM_{10}$ from continental sources (ERG 2004). Figure 3 shows the daily mean concentration of $PM_{10}$ measured at the background site Kensington & Chelsea 1 during the first quarters of 2003 and 2004. The $PM_{10}$ incidents during February and March 2003 can be clearly seen. These incidents caused the site to measure daily mean $PM_{10}$ concentrations above 50 $\mu gm^{-3}$ (TEOM*1.3) on 13 days during the 1st quarter of 2003. Contrastingly, no such days were measured during the 1st quarter of 2004, although elevated $PM_{10}$ was measured on the 4th February and 2nd March 2004. The cause of the episode on the 4th February has not been determined. The episode on the 2nd March is due to the build up of primary $PM_{10}$ during poor dispersion conditions. Further elevated $PM_{10}$ can be seen at the end of March 2004 and was associated with photochemistry at this time.

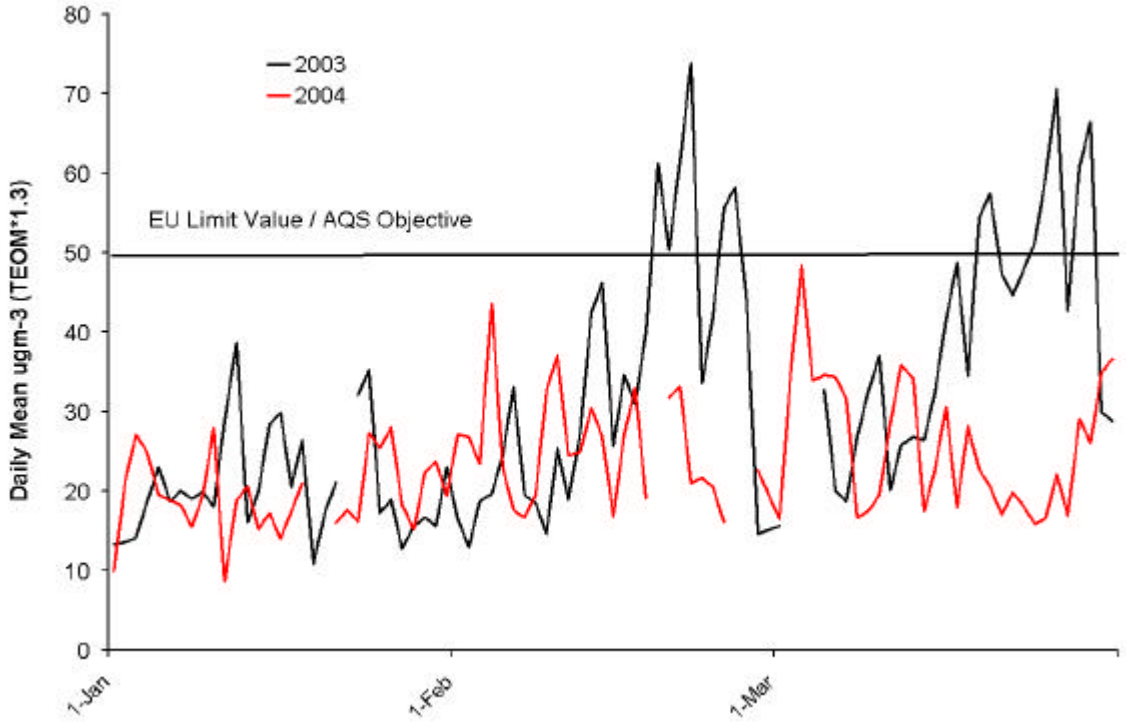


**Figure 3 Daily mean $PM_{10}$ measured at Kensington and Chelsea 1 during the 1st quarters of 2003 and 2004.**

The first widespread 'moderate' $O_3$ of the year was measured at the end of March for only the third time in the 11 year history of the LAQN; 'moderate' $O_3$ having been measured during March in 2002 (on the 30th) and in 2003 (on the 23rd). The early start to the $O_3$ season during 2004 (30th March) reflects the trend of increasing background concentrations of this pollutant. The temporal distribution of $O_3$ during the quarter is illustrated by measurements from the background site Croydon 3 as shown in Figure 4.

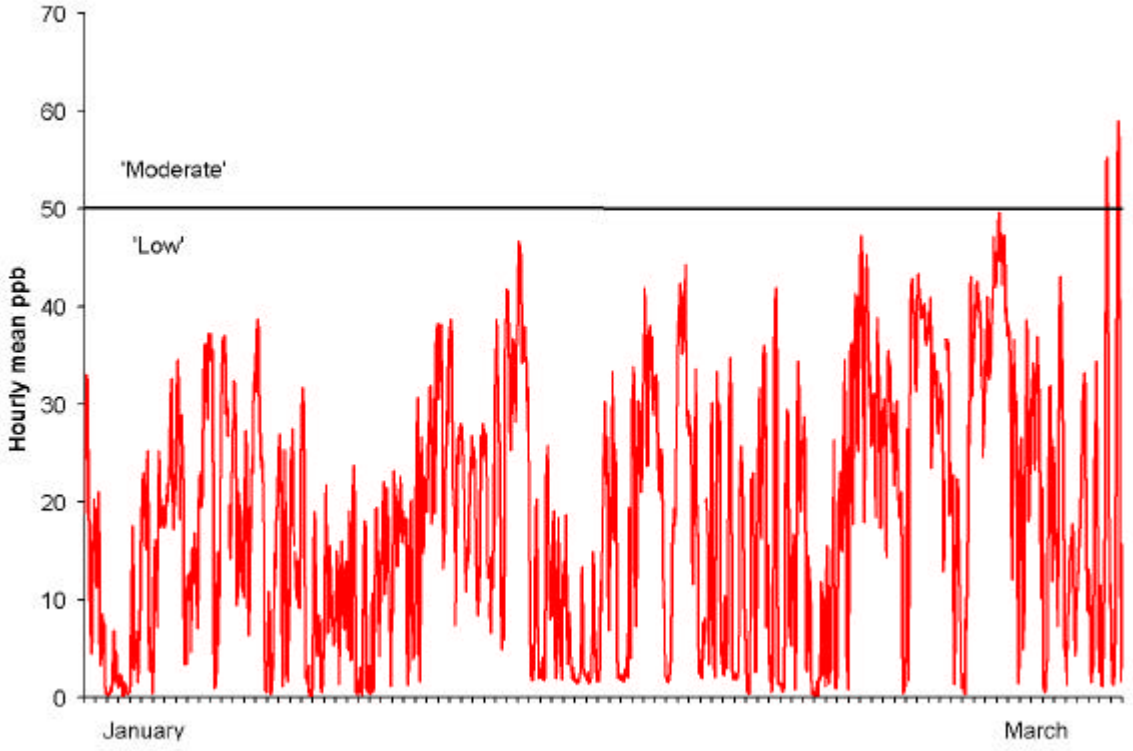


**Figure 4 Hourly mean $O_3$ measured at Croydon 3**

The temporal distribution of $NO_2$ during the quarter is illustrated by measurements at the Barnet 2 background site as shown in Figure 5. Figure 5 clearly shows the elevated $NO_2$ measured during two primary pollution episodes on the 9th February and overnight on the 1st and 2nd of March. Although concentrations measured at Barnet 2 did not exceed the 200 $\mu gm^{-3}$ hourly mean stipulated in the EU Limit Value, roadside sites in central London did measure hourly concentrations above this threshold. Elevated concentrations of $NO_2$ were also measured at Barnet 2 at the end of March and were associated with the photochemistry at this time.

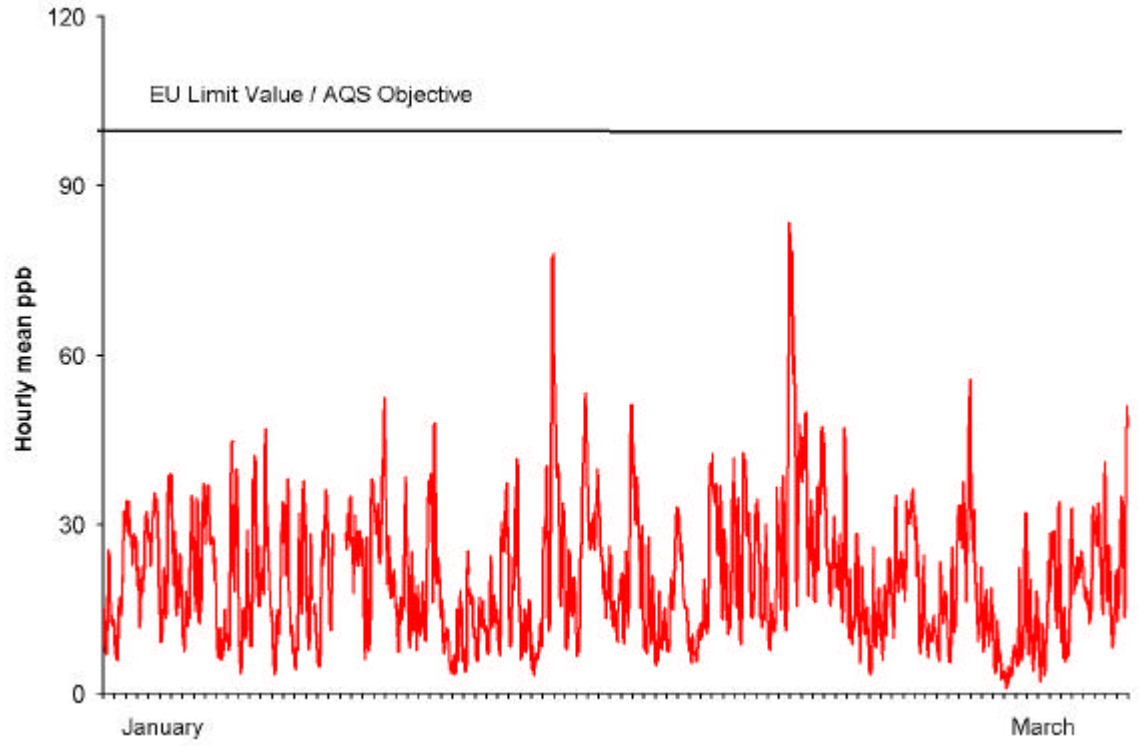


**Figure 5 Hourly mean $NO_2$ measured at Barnet 2**

# AIR QUALITY YEAR ENDING 31st MARCH 2004

## Discussion of Results

Comparisons of measurements with national Objectives and standards are shown in Appendix 3.

When examining data it is important to consider the location of the monitoring site; kerbside, urban background, rural, etc., and the data quality. The site type and quality assurance standard for each site is listed in Appendix 1 and 2 Sites are classified into three quality standards. Data from sites affiliated to the AURN and London Standard sites have traceabilty to National Metrological Standards, whereas for the Locality Standard sites there is insufficient information to demonstrate such traceability.

No scientific measurement is absolutely accurate or absolutely precise. The combination of accuracy and precision is termed the uncertainty. In order to place results in context, the uncertainty associated with each result has to be considered. Estimates of the uncertainty associated with air quality measurement are discussed in the 2001 LAQN annual report (ERG, 2003). This suggests that a working uncertainty of around 10% ($2\sigma$) should be considered when discussing high values and long-term averages of CO, $NO_2$ and $SO_2$ measured at London Standard sites. This is justified on the basis of both mathematical modelling and equipment performance tests. However, due to the statistical distribution of the data, a 10% uncertainty in measurements does not imply a 10% uncertainty in the number of exceedences of a standard. The uncertainty associated with the measurement of $PM_{10}$ is more complex since the results obtained are highly dependent on the measurement method used.

Data are subject to two quality assurance processes. Initially, data are validated using the best calibration and instrument performance information available at the time. Data are retrospectively examined during the ratification process, using long-term instrument histories and the results of further quality checks. Hence the data in this report will differ from those initially published. The measurements in this report are largely unratified. Further revisions are therefore likely before a final data set is published in the 2004 annual report.

The final data sets for the AURN sites are published by the DEFRA.

The Air Quality Regulations (DETR 2000b) specify Objectives in terms of mass / volume for all pollutants. However, continuous gas analysers and the calibration standards used are measured in terms of volume ratio. These are two entirely different bases of measurement with conversion between them being dependent on temperature and pressure conditions. Conversions have been made based on 293 K and 101.3 kPa, where appropriate, for comparison to the AQS Objectives, (DETR 2000c).

### *Carbon Monoxide*

CO emissions within the LAQN area are dominated by road transport sources. The AQS Objective of 8.6 ppm as a rolling 8 hour mean (DEFRA 2002) was met at all LAQN monitoring sites.

### *Nitrogen Dioxide*

$NO_2$ is largely a secondary pollutant formed by the oxidation of NO. In the LAQN area, road transport is the dominant source of $NO_X$. This is reflected in the general distribution of $NO_2$, with the greatest annual mean concentrations being measured near roads and in central London locations. Lower concentrations are observed in background and suburban areas.

The AQS stipulates two Objectives for $NO_2$: an annual mean of 21 ppb (40 $\mu gm^{-3}$) and an incident based Objective of 104.6 ppb (200 $\mu gm^{-3}$), as an hourly mean, not to be exceeded more than 18 times per year.

The annual mean $NO_2$ Objective was exceeded at all kerbside and roadside monitoring sites. This Objective was also exceeded at background sites in inner London. Background and suburban sites in outer London and the Home Counties achieved the Objective with the exception of sites in West London; Heathrow Airport, Hounslow 2 and Ealing 1.

The incident based Objective for $NO_2$ was exceeded at the kerbside sites Barnet 1, Camden 1, Croydon 5, Lambeth 4, Marylebone Road, Redbridge 2 and Sutton 4. The Objective was also exceeded at the roadside sites Brent 4, Ealing 6, Hammersmith & Fulham 1, Hillingdon 1, Hounslow 4, Kensington & Chelsea 3 and Kensington & Chelsea 4. The highest number of hourly means above 105 ppb was measured at the new Lambeth 4 site, which measured 927 since joining the network in late December 2003. During the year ended 31st March 2004, over 100 hours above 105 ppb were also measured at Barnet 1 (110), Kensington & Chelsea 3 (239), Marylebone Road (521) and Redbridge 2 (101) which closed in April 2003.

### *$O_3$*

$O_3$ is a seasonal pollutant with the highest concentrations being measured during the summer months. It is also a regional pollutant, with episodes extending over many hundreds of kilometres. $O_3$ exhibits local variation caused by the scavenging effect of NO close to $NO_X$ emission sources, for example at the roadside. Health-based standards are rarely exceeded at roadside and kerbside sites and $O_3$ monitoring is not generally undertaken in these locations. However, roadside monitoring of $O_3$ can lead to a better understanding of the mechanisms that determine roadside $NO_2$ concentrations (e.g. Clapp and Jenkins, 2001 and Carslaw and Beevers, 2004) and for this reason further $O_3$ monitoring at roadside sites in London would be encouraged.

The AQS has an Objective of 100 $\mu gm^{-3}$ (50 ppb), measured as a rolling 8 hour mean, which should not be exceeded on more than 10 days per year. The greatest concentrations of $O_3$ are generally measured at sites in outer London and in the Home Counties. During the 3 years 2000 to 2002, the majority of sites in outer London and the Home Counties exceeded the Objective whilst many sites in inner and west London met the Objective. During 2000 to 2002, outer London sites typically experienced around 20 to 30 days per year with peak concentrations above 100 $\mu gm^{-3}$, measured as a rolling 8 hour mean. Measurements from the photochemical incidents during summer 2003 (ERG 2004) continue to dominate the results for the year ending March 2004. During the summer of 2003, several sites measured over 40 days above 100 $\mu gm^{-3}$, expressed as a rolling 8 hour mean; almost double the number of days measured annually during 2000 to 2002. During the year ending March 2004, the AQS Objective was exceeded at all permanent $O_3$ measurement sites in London except the kerbside site Marylebone Road.

### *$PM_{10}$*

There are two AQS Objectives for $PM_{10}$. These are in line with the EU Daughter Directive Stage 1 Limit Value for $PM_{10}$. The AQS has an incident based Objective of 50 $\mu gm^{-3}$, measured as a daily mean not to be exceeded on more than 35 days per year, and an annual mean Objective of 40 $\mu gm^{-3}$.

$PM_{10}$ poses many measurement challenges. Rather than comprising a single, defined chemical compound, like CO or $SO_2$ for example, the composition of $PM_{10}$ varies with location, time of year and during episodes. $PM_{10}$ can be considered to comprise; primary particulates (mainly emitted from local sources), secondary particulates

(mainly from distant sources), and coarse particulates whose origin can be local or further afield. The variation in composition affects each measurement technique differently and therefore each measurement technique produces systematically different results. The EU Daughter Directive is based on a 'gravimetric' method where $PM_{10}$ is collected on a filter that is then weighed in a laboratory (CEN, 1998). There is ample evidence to suggest that the most common measurement methodology employed in the UK, the Tapered Element Oscillating Microbalance (TEOM), produces a result lower than the 'gravimetric' method (APEG, 1999; Green 1999, Green *et al*., 2000). DETR (1999) suggested that a correction factor of 1.3 be applied to TEOM results for comparison to the AQS Objective.

Beta Attenuation Monitors (BAM) are also used to measure $PM_{10}$ in the LAQN. Research at Marylebone Road (Green, 1999) sought to compare the results from TEOM, 'gravimetric' and BAM instruments. The BAM instrument tested produced higher results than the 'gravimetric' method at this location during the test period. However, no correction factor has been applied to the BAM measurements.

$PM_{10}$ measurements for the year ending March 2004 were affected by the series of $PM_{10}$ incidents during 2003, which are discussed in ERG (2004).

As a consequence of these episodes, the incident based $PM_{10}$ AQS Objective was exceeded at kerbside and roadside TEOM sites in inner London and at several such sites in outer London. The highest number of daily means above 50 $\mu gm^{-3}$ at TEOM sites was measured at the Marylebone Road kerbside site (139 days) and at the Bexley 4 roadside site (124 days) where the latter site was regularly affected by $PM_{10}$ arising from vehicles accessing nearby industrial sites. All background and suburban TEOM sites met the incident based Objective. The annual mean Objective of 40 $\mu gm^{-3}$ was exceeded at the roadside TEOM site Bexley 4 and at the kerbside TEOM site Marylebone Road.

The incident based Objective was exceeded at all BAM sites irrespective of location. The greatest number of daily means above 50 $\mu gm^{-3}$ was measured at the roadside sites Enfield 4 (111 days) and Redbridge 4 (73 days). The Lambeth 4 kerbside site measured 50 days with mean $PM_{10}$ above 50 $\mu gm^{-3}$ since joining the LAQN during late December 2003. The annual mean Objective was also exceeded at all kerbside and roadside BAM sites.

### *Sulphur Dioxide*

The distribution of $SO_2$ concentrations is influenced by both road traffic and industrial point sources. Road traffic sources are the main factor influencing annual mean concentrations, whereas industrial point sources produce short term high values due to plume grounding. The annual mean concentrations of $SO_2$ do not vary to any large degree over the network.

The AQS Objective for $SO_2$ is based on 35 exceedences of a 15 minute mean of 266 $\mu gm^{-3}$ (100 ppb). This was not approached at any site in the network, although Brent 3, Bexley 1, Castle Point, Enfield 3, Hounslow 2, Lewisham 1, Tower Hamlets 1 and Thurrock 1 measured 15 minute means in excess of 266 $\mu gm^{-3}$. The AQS also has an hourly mean Objective of 350 $\mu gm^{-3}$ (132 ppb) which should not be exceeded on more than 24 occasions per year. A single hourly mean above 350 $\mu gm^{-3}$ was measured at Thurrock 1.

## References

Clapp, L. and Jenkin, M.E., 2001. Analysis of the relationship between ambient levels of $O_3$, $NO_X$ and NO as a function of $NO_X$ in the UK. Atmospheric Environment 35, 6391-6405.

Carslaw, D.C. and Beevers, S.D., 2003. Investigating the Potential Importance of Primary $NO_2$ in a Street Canyon, submitted to Atmospheric Environment, December 2003.

Department for the Environment, Transport and the Regions (DETR), 1999. Assistance with the review and assessment of $PM_{10}$ concentration in relation to the proposed EU Stage 1 limit values. HMSO.

Department for the Environment, Transport and the Regions (DETR) 2000a. The air quality strategy for England, Wales and Northern Ireland. HMSO.

Department for the Environment, Transport and the Regions (DETR), 2000b. The air quality regulations 2000. HMSO.

Department for the Environment, Transport and the Regions (DETR), 2000c. Review and assessment: monitoring air quality LAQM.TG1(00). HMSO.

Department for the Environment, Food and Rural Affairs (DEFRA), 2002. Report on the review of the National Air Quality Strategy; proposals to amend the strategy. HMSO.

Environmental Research Group (ERG), 2000a. Air quality in London April to June 1999. ERG, King's College London.

Environmental Research Group (ERG), 2000b. Air quality in London July to September 1999. ERG, King's College London.

Environmental Research Group (ERG), 2003. Air quality in London 2001. ERG, King's College London.

Environmental Research Group (ERG), 2004. Air quality in London 2003 – preliminary report. ERG, King's College London.

South East Institute of Public Health (SEIPH), 1994. Air quality in London, the first report of the London Air Quality Network. ERG, King's College London.

South East Institute of Public Health (SEIPH), 1995. Air quality in London, the second report of the London Air Quality Network. ERG, King's College London.

South East Institute of Public Health (SEIPH), 1999. Air quality in London 1997. ERG, King's College London.

# APPENDIX 1: LAQN MONITORING SITES

### *A.1.0 Details of Monitoring Sites*

The following tables detail the pollution monitoring sites in the LAQN at the end of this 12 month period. The start date of each site is shown along with the pollutants monitored and the data quality. In some cases a monitoring site was not operating during the 12 month period. The availability of data from a site is indicated in the data column in the tables below.

Sites are classified according to their location:

- Kerbside sites are those with sampling locations within 1 m of the kerbside and with a sampling height of 3 m or less.
- Roadside sites are those with sampling locations within 1-5 m of the roadside and with a sampling height of 3 m or less.
- Urban background sites are located to represent pollution conditions in the centre of an urban area. Sampling locations are away from the influence of individual pollution sources; 25 m from major roads for example.
- Suburban sites are typical of residential locations on the edge of a built up area. Sampling locations are away from the influence of individual pollution sources; 25 m from major roads for example.

### *A.1.1 Kerbside Sites*

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| **Barnet 1** | **Dec 98** | | ● | | | **T** | | **Yes** | ** |
| **Bromley 4** | **Feb 96** | **Closed Jul 98** | | | | | | | |
| **Camden 1** | **Apr 96** | | ● | | | **T** | | **Yes** | ** **A** |
| **Croydon 5** | **Oct 00** | | ● | | | | | **Yes** | ** |
| **Lambeth 4** | **Dec 03** | | ● | ● | | **B** | | **Yes** | ** |
| **Marylebone Road** | **Jun 97** | ● | ● | ● | ● | **TG** | ● | **Yes** | ** **A** |
| **Redbridge 2** | **Dec 99** | **Closed Apr 03** | | | | | | | |
| **Redbridge 3** | **Dec 99** | | ● | | | **B** | | **Yes** | * |
| **Richmond 5** | **Feb 01** | **Closed Aug 01** | | | | | | | |
| **Sutton 4** | **Jul 02** | | ● | | | **T** | | **Yes** | ** |

**Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, * Locality Standard, ** Traceability to National Standards**
**A= Affiliated to UK AURN- final data set published by DEFRA**

### *A.1.2 Roadside Sites*

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| Bexley 4 | May 99 | | | | | T | | Yes | ** |
| Brent 2 | Jun 01 | Closed Sep 02 | | | | | | | |
| Brent 3 | Dec 01 | | ● | ● | | T | | Yes | ** |
| Brent 4 | Jun 03 | | ● | ● | | T | | Yes | ** |
| Brent 5 | Feb 03 | | ● | | | T | | Yes | ** |
| Bromley 7 | July 98 | ● | ● | | | B | (B) | Yes | */** A |
| Camden 3 | Apr 00 | | ● | | | T | | Yes | ** |
| Croydon 2 | Sept 94 | | ● | | | | | Yes | ** |
| Croydon 4 | Sept 99 | | ● | ● | | T | | Yes | ** |
| Crystal Palace | Oct 99 | ● | ● | ● | | T | | Yes | ** |
| Ealing 2 | Sept 96 | ● | ● | | | T | T | Yes | ** |
| Ealing 4 | Dec 98 | Closed Mar 99 | | | | | | | |
| Ealing 5 | Mar 99 | Closed Jun 01 | | | | | | | |
| Ealing 6 | Aug 03 | | ● | | | | | Yes | ** |
| Enfield 2 | Jan 98 | ● | ● | | | B | | Yes | ** |
| Enfield 4 | Mar 00 | | ● | ● | | B | | Yes | ** |
| Greenwich 5 | Sept 97 | | ● | | | T | | Yes | * |
| Greenwich 7 | Mar 02 | | ● | | | T | | Yes | ** |
| Greenwich Bexley 6 | Oct 00 | | ● | | | T | T | Yes | ** |
| Hams & Fulham 1 | Aug 99 | | ● | ● | | T | | Yes | ** |
| Hackney 6 | Nov 02 | | ● | | | T | | Yes | ** |
| Haringey 1 | Dec 94 | | ● | ● | | T | | Yes | ** A |
| Haringey 3 | Apr 99 | Closed Mar 01 | | | | | | | |
| Harrow 2 | Jun 03 | | ● | | | T | | Yes | ** |
| Havering 1 | Dec 95 | | ● | | | | | Yes | ** |
| Havering 3 | Dec 98 | | ● | ● | | T | | Yes | ** |
| Hillingdon 1 | Sept 99 | | ● | | | T | | Yes | ** |
| Hillingdon 2 | Sept 02 | | ● | | | T | | Yes | ** |
| Hounslow 1 | Apr 93 | Closed Dec 02 | | | | | | | |

**Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards**
**A= Affiliated to UK AURN- final data set published by DEFRA**

## A.1.2 Roadside Sites (continued)

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| Hounslow 3 | Mar 99 | Closed Nov 02 | | | | | | | |
| Hounslow 4 | Aug 99 | | ● | ● | | T | | Yes | ** |
| Hounslow 5 | Aug 03 | ● | ● | | | T | | Yes | ** A |
| Islington 2 | Jul 00 | ● | ● | | | T | | Yes | ** |
| Ken & Chelsea 2 | May 98 | | | | | T | | Yes | ** |
| Ken & Chelsea 3 | Mar 00 | | ● | | | | | Yes | ** |
| Ken & Chelsea 4 | Sep 00 | | ● | | | | | Yes | ** |
| Ken & Chelsea 5 | May 02 | | | | | G | | Yes | * |
| Kingston 2 | Apr 96 | | ● | | | T | | No | |
| Lambeth 1 | Sep 00 | | ● | ● | | B | | Yes | * |
| Lambeth 2 | Dec 01 | | ● | ● | | B | | Yes | * |
| Redbridge 4 | Dec 99 | ● | ● | ● | | B | | Yes | * |
| Redbridge 5 | Nov 03 | ● | ● | | | B | | Yes | * |
| Richmond 1 | Jun 00 | | ● | | | T | | Yes | ** |
| Southwark 2 | Oct 94 | ● | ● | ● | | T | | Yes | */** A |
| Sutton 1 | May 95 | Closed May 02 | | | | | | | |
| Thurrock 2 | May 03 | | ● | | | | | Yes | ** |
| Thurrock 3 | Aug 03 | | ● | ● | | T | | Yes | ** |
| Tower Hamlets 2 | Mar 94 | ● | ● | | | | | Yes | ** A |
| Wandsworth 1 | Sept 94 | Closed Mar 96 | | | | | | | |
| Wandsworth 4 | Feb 98 | ● | ● | | | T | | Yes | ** |
| Waltham Forest 3 | Jul 03 | | ● | ● | | T | | Yes | ** |
| Westminster 2 | Jun 95 | Last data 95 | | | | | | | |

**Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards**
**A= Affiliated to UK AURN- final data set published by DEFRA**

### A.1.3 Urban Background Sites

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| Barnet 2 | Aug 00 | | ● | | | T | | Yes | ** |
| Barnet 3 | Aug 00 | | ● | | | T | | No | |
| Brent 1 | Aug 95 | ● | ● | ● | ● | T | | Yes | * A |
| Bromley 1 | Jan 93 | Closed Feb 96 | | | | | | | |
| Castle Point | May 96 | | ● | ● | | | | Yes | ** |
| City of London 1 | Oct 01 | | ● | ● | ● | | | Yes | * |
| Croydon 3 | May 97 | | | | ● | T | | Yes | ** |
| Ealing 1 | Mar 95 | (●) | ● | ● | ● | | | Yes | ** |
| Enfield 3 | Nov 98 | ● | ● | ● | ● | B | | Yes | ** |
| Greenwich 4 | Sept 93 | | ● | ● | ● | T | | Yes | ** A |
| Hackney 4 | Oct 93 | ● | ● | | ● | | T | Yes | */** A |
| Hams & Fulham 2 | Aug 03 | | ● | | | T | | Yes | ** |
| Heathrow Airport | Mar 99 | ● | ● | | | T | | Yes | * |
| Hillingdon (O) | Oct 94 | Last Data Apr 95 | | | | | | | |
| Ken & Chelsea 1 | Mar 95 | ● | ● | ● | ● | TG | G | Yes | ** A |
| Islington 1 | Sep 94 | (●) | ● | | | T | | Yes | ** |
| Lambeth 3 | Dec 01 | | ● | ● | | B | | Yes | * |
| Lewisham 1 | Jan 95 | | ● | ● | ● | | | Yes | ** A |
| Mole Valley 3 | Oct 01 | | ● | | | T | | Yes | ** |
| Redbridge 1 | Dec 99 | | ● | | ● | B | | Yes | * |
| Sevenoaks 2 | Feb 98 | ● | ● | ● | ● | T | | Yes | ** |
| Southwark 1 | Mar 93 | ● | ● | ● | ● | T | | Yes | */** A |
| Thurrock 1 | Feb 95 | ● | ● | ● | ● | TG | | Yes | * A |
| Tower Hamlets 1 | Jan 94 | | ● | ● | ● | T | | Yes | ** |
| Tower Hamlets 3 | Oct 99 | | ● | ● | | T | | Yes | ** |
| Waltham Forest 1 | Jul 98 | | ● | ● | | T | | Yes | ** |
| Wandsworth 2 | Oct 94 | ● | ● | ● | ● | | | Yes | ** A |
| Westminster 1 | Jan 93 | Last Data 96 | | | | | | | |

**Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, * Locality Standard, ** Traceability to National Standards**
**A = final data set published by DEFRA**

### A.1.4 Suburban Sites

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| Bark & Dag 1 | Sep 93 | | ● | ● | | | | Yes | ** |
| Bark & Dag 2 | Oct 99 | | | | | T | | Yes | ** |
| Bexley 1 | Jan 93 | ● | ● | ● | ● | T | | Yes | *A |
| Bexley 2 | Jan 98 | | ● | | | T | T | Yes | ** |
| Bexley 3 | Jan 98 | | | | | T | T | Yes | ** |
| Bexley 5 | Nov 99 | ● | ● | ● | | | | Yes | ** |
| Brentwood 1 | Aug 95 | | ● | | | | | Yes | ** |
| Bromley 5 | Mar 96 | | | | ● | | | Yes | ** |
| Croydon 6 | Jan 01 | | ● | | | | | Yes | ** |
| Enfield 1 | Jul 95 | | ● | | | | | Yes | ** |
| Haringey 2 | Apr 96 | | ● | | ● | B | | Yes | **A |
| Havering 2 | Apr 98 | Closed Nov 00 | | | | | | | |
| Harrow 1 | Apr 99 | | ● | ● | | T | | Yes | ** |
| Hounslow 2 | Apr 99 | | ● | ● | ● | T | | Yes | ** |
| Kingston 1 | Mar 96 | | | | ● | | | Yes | ** |
| Mole Valley 2 | Apr 97 | | ● | | | T | | Yes | ** |
| Reigate & Bans 1 | Jul 00 | | ● | | | T | | Yes | ** |
| Reigate & Bans 2 | Aug 03 | | ● | | | | | Yes | ** |
| Richmond 2 | Apr 01 | | ● | | ● | T | | Yes | ** |
| Sutton 2 | May 95 | Closed May 02 | | | | | | | |
| Sutton 3 | May 95 | Closed May 02 | | | | | | | |
| Wandsworth 3 | Oct 94 | Closed Nov 00 | | | | | | | |

### A.1.5 Rural Sites

| | Start | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ | Data | Quality |
|---|---|---|---|---|---|---|---|---|---|
| Mole Valley 1 | Mar 96 | Closed Mar 99 | | | | | | | |
| S'oaks Scudders H | Sept 95 | Closed Sept 97 | | | | | | | |

**Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards A= Affiliated to UK AURN- final data set published by DEFRA.**

**Deployments of the Richmond mobile site (Richmond 3+) are not individually listed.**

# APPENDIX 2: DEFRA DIRECTLY FUNDED SITES

Measurements from these monitoring sites are included in the LAQN database following the completion of ratification. A full dataset for the 12 month period has not yet been processed and measurements from these sites have therefore not been included in this report.

### *A.2.0 Roadside Sites*

| | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| **A3** | ● | ● | | | T | |
| **Cromwell Rd** | ● | ● | ● | | # | |

### *A.2.1 Background Sites*

| | CO | $NO_2$ | $SO_2$ | $O_3$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| **Bloomsbury** | ● | ● | ● | ● | T | T |
| **Hillingdon** | ● | ● | ● | ● | T | |
| **Teddington** | | ● | ● | ● | | |
| **Westminster** | ● | ● | ● | ● | G | |
| **West London** | ● | ● | | | | |

**# Reported as LAQN site Kensington & Chelsea 2.**
**T = TEOM. G = Gravimetric.**

# APPENDIX 3: SUMMARY OF MONITORING RESULTS YEAR ENDED 31ST MARCH 2004

Monitoring results are summarised below compared to the AQS Objectives and the UK Air Quality Information System descriptors. Many AQS Objectives require data representative of the whole year. If insufficient data are available, then comparison with the Objective is not possible. This, for example, may be the case for sites installed during the year or those that experienced serious and prolonged instrument failure. A data capture Objective of 90% is recommended in LAQM.TG(02) (DEFRA 2002) in line with EU Directive requirements. The UK Air Quality Information System for $PM_{10}$ only applies to TEOM measurements; results from other methods are included in parenthesis for information only.

## *A.3.0 Carbon Monoxide*

| Carbon Monoxide | Type | Capture Rate (%) | Days Moderate and Above |
|---|---|---|---|
| **Bexley 1** | U | 95 | 0 |
| **Bexley 5** | S | 6 | 0 |
| **Brent 1** | U | 97 | 0 |
| **Bromley 7** | R | 81 | 0 |
| **Crystal Palace 1** | R | 98 | 0 |
| **Ealing 2** | R | 96 | 0 |
| **Enfield 2** | R | 86 | 0 |
| **Enfield 3** | U | 95 | 0 |
| **Hackney 4** | U | 97 | 0 |
| **Heathrow Airport** | U | 87 | 0 |
| **Hounslow 5** | R | 57 | 0 |
| **Islington 2** | R | 95 | 0 |
| **Kens and Chelsea 1** | U | 93 | 0 |
| **Marylebone Rd** | K | 98 | 0 |
| **Redbridge 2** | K | 7 | 0 |
| **Redbridge 4** | R | 93 | 0 |
| **Redbridge 5** | R | 19 | 0 |
| **Richmond 13** | R | 13 | 0 |
| **Richmond 15** | R | 63 | 0 |
| **Richmond 17** | U | 15 | 0 |
| **Sevenoaks 2** | U | 97 | 0 |
| **Southwark 1** | U | 97 | 0 |

| Carbon Monoxide | Type | Capture Rate (%) | Days Moderate and Above |
|---|---|---|---|
| **Southwark 2** | R | 39 | 0 |
| **Thurrock 1** | U | 96 | 0 |
| **Tower Hamlets 2** | R | 99 | 0 |
| **Wandsworth 2** | U | 88 | 0 |
| **Wandsworth 4** | R | 96 | 0 |

| Carbon Monoxide | Type | No occurrences of rolling 8hr mean >=10mgm $^{-3}$ (8.6ppb) | Achieved |
|---|---|---|---|
| **Bexley 1** | U | 0 | YES |
| **Bexley 5** | S | 0 | NA |
| **Brent 1** | U | 0 | YES |
| **Bromley 7** | R | 0 | NA |
| **Crystal Palace 1** | R | 0 | YES |
| **Ealing 2** | R | 0 | YES |
| **Enfield 2** | R | 0 | NA |
| **Enfield 3** | U | 0 | YES |
| **Hackney 4** | U | 0 | YES |
| **Heathrow Airport** | U | 0 | NA |
| **Hounslow 5** | R | 0 | NA |
| **Islington 2** | R | 0 | YES |
| **Kens and Chelsea 1** | U | 0 | YES |
| **Marylebone Rd** | K | 0 | YES |
| **Redbridge 2** | K | 0 | NA |
| **Redbridge 4** | R | 0 | YES |
| **Redbridge 5** | R | 0 | NA |
| **Richmond 13** | R | 0 | NA |
| **Richmond 15** | R | 0 | NA |
| **Richmond 17** | U | 0 | NA |
| **Sevenoaks 2** | U | 0 | YES |
| **Southwark 1** | U | 0 | YES |
| **Southwark 2** | R | 0 | NA |
| **Thurrock 1** | U | 0 | YES |
| **Tower Hamlets 2** | R | 0 | YES |
| **Wandsworth 2** | U | 0 | NA |
| **Wandsworth 4** | R | 0 | YES |

### A.3.1 Nitrogen Oxides

| Nitrogen Oxides | Type | Capture Rate (%) |
|---|---|---|
| **Barking & Dagenham 1** | S | 98 |
| **Barnet 1** | K | 91 |
| **Barnet 2** | U | 96 |
| **Bexley 1** | U | 91 |
| **Bexley 2** | S | 97 |
| **Bexley 5** | S | 98 |
| **Brent 1** | U | 96 |
| **Brent 3** | R | 79 |
| **Brent 4** | R | 53 |
| **Brent 5** | R | 5 |
| **Brentwood 1** | U | 96 |
| **Bromley 7** | R | 98 |
| **Camden 1** | K | 97 |
| **Camden 3** | R | 97 |
| **Castle Point 1** | U | 95 |
| **City of London 1** | U | 89 |
| **Croydon 2** | R | 97 |
| **Croydon 4** | R | 94 |
| **Croydon 5** | K | 98 |
| **Croydon 6** | S | 98 |
| **Crystal Palace 1** | R | 98 |
| **Ealing 1** | U | 90 |
| **Ealing 2** | R | 87 |
| **Ealing 6** | R | 22 |
| **Enfield 1** | S | 79 |
| **Enfield 2** | R | 90 |
| **Enfield 3** | U | 95 |
| **Enfield 4** | R | 99 |
| **Greenwich 4** | U | 98 |
| **Greenwich 5** | R | 99 |
| **Greenwich 7** | R | 89 |

| Nitrogen Oxides | Type | Capture Rate (%) |
|---|---|---|
| **Greenwich Bexley 6** | R | 94 |
| **Hackney 4** | U | 92 |
| **Hackney 6** | R | 66 |
| **Haringey 1** | R | 88 |
| **Haringey 2** | S | 83 |
| **Harrow 1** | U | 91 |
| **Harrow 2** | R | 45 |
| **Havering 1** | R | 99 |
| **Havering 3** | R | 86 |
| **Heathrow Airport** | U | 87 |
| **Hillingdon 1** | R | 99 |
| **Hillingdon 2** | R | 69 |
| **Hounslow 2** | S | 93 |
| **Hounslow 4** | R | 91 |
| **Hounslow 5** | R | 66 |
| **H'smith and Fulham 1** | R | 68 |
| **H'smith and Fulham 2** | U | 39 |
| **Islington 1** | U | 99 |
| **Islington 2** | R | 99 |
| **Kens and Chelsea 1** | U | 94 |
| **Kens and Chelsea 3** | R | 99 |
| **Kens and Chelsea 4** | R | 99 |
| **Lambeth 1** | R | 96 |
| **Lambeth 2** | R | 17 |
| **Lambeth 3** | U | 98 |
| **Lambeth 4** | K | 26 |
| **Lewisham 1** | U | 99 |
| **Lewisham 2** | R | 99 |
| **Marylebone Rd** | K | 94 |
| **Mole Valley 2** | S | 99 |
| **Mole Valley 3** | U | 99 |
| **Redbridge 1** | U | 99 |
| **Redbridge 2** | K | 7 |

| Nitrogen Oxides | Type | Capture Rate (%) |
|---|---|---|
| **Redbridge 3** | K | 95 |
| **Redbridge 4** | R | 83 |
| **Redbridge 5** | R | 34 |
| **Reigate and Banstead 1** | S | 99 |
| **Reigate and Banstead 2** | S | 44 |
| **Richmond 1** | R | 95 |
| **Richmond 13** | R | 8 |
| **Richmond 15** | R | 62 |
| **Richmond 17** | U | 11 |
| **Richmond 2** | S | 99 |
| **Sevenoaks 2** | U | 96 |
| **Southwark 1** | U | 93 |
| **Southwark 2** | R | 91 |
| **Sutton 4** | K | 96 |
| **Thurrock 1** | U | 91 |
| **Thurrock 2** | R | 68 |
| **Thurrock 3** | R | 59 |
| **Tower Hamlets 1** | U | 99 |
| **Tower Hamlets 2** | R | 98 |
| **Tower Hamlets 3** | U | 95 |
| **Waltham Forest 1** | U | 73 |
| **Waltham Forest 3** | R | 61 |
| **Wandsworth 2** | U | 96 |
| **Wandsworth 4** | R | 95 |

| Nitrogen Oxides | Type | Annual Mean $NO_X$ ppb | Annual Mean $NO_X$ as $NO_2$ $\mu gm^{-3}$ |
|---|---|---|---|
| **Barking & Dagenham 1** | S | 26 | 50 |
| **Barnet 1** | K | 109 | 208 |
| **Barnet 2** | U | 34 | 65 |
| **Bexley 1** | U | 33 | 63 |
| **Bexley 2** | S | 30 | 57 |
| **Bexley 5** | S | 24 | 46 |
| **Brent 1** | U | 30 | 58 |
| **Brent 3** | R | 68 | 130 |
| **Brent 4** | R | 164 | 314 |
| **Brent 5** | R | 57 | 109 |
| **Brentwood 1** | U | 26 | 50 |
| **Bromley 7** | R | 42 | 80 |
| **Camden 1** | K | 79 | 151 |
| **Camden 3** | R | 79 | 150 |
| **Castle Point 1** | U | 19 | 36 |
| **City of London 1** | U | 45 | 86 |
| **Croydon 2** | R | 75 | 143 |
| **Croydon 4** | R | 60 | 116 |
| **Croydon 5** | K | 115 | 220 |
| **Croydon 6** | S | 37 | 70 |
| **Crystal Palace 1** | R | 63 | 121 |
| **Ealing 1** | U | 40 | 77 |
| **Ealing 2** | R | 83 | 158 |
| **Ealing 6** | R | 186 | 355 |
| **Enfield 1** | S | 30 | 57 |
| **Enfield 2** | R | 44 | 84 |
| **Enfield 3** | U | 29 | 55 |
| **Enfield 4** | R | 58 | 110 |
| **Greenwich 4** | U | 26 | 50 |
| **Greenwich 5** | R | 52 | 99 |
| **Greenwich 7** | R | 73 | 140 |
| **Greenwich Bexley 6** | R | 78 | 149 |
| **Hackney 4** | U | 52 | 100 |

| Nitrogen Oxides | Type | Annual Mean $NO_X$ ppb | Annual Mean $NO_X$ as $NO_2$ $\mu gm^{-3}$ |
|---|---|---|---|
| **Hackney 6** | R | 81 | 154 |
| **Haringey 1** | R | 52 | 99 |
| **Haringey 2** | S | 30 | 57 |
| **Harrow 1** | U | 26 | 51 |
| **Harrow 2** | R | 71 | 135 |
| **Havering 1** | R | 44 | 84 |
| **Havering 3** | R | 52 | 99 |
| **Heathrow Airport** | U | 65 | 125 |
| **Hillingdon 1** | R | 70 | 133 |
| **Hillingdon 2** | R | 43 | 81 |
| **Hounslow 2** | S | 43 | 82 |
| **Hounslow 4** | R | 97 | 185 |
| **Hounslow 5** | R | 90 | 172 |
| **H'smith and Fulham 1** | R | 116 | 221 |
| **H'smith and Fulham 2** | U | 34 | 65 |
| **Islington 1** | U | 39 | 74 |
| **Islington 2** | R | 96 | 184 |
| **Kens and Chelsea 1** | U | 35 | 67 |
| **Kens and Chelsea 3** | R | 120 | 230 |
| **Kens and Chelsea 4** | R | 130 | 248 |
| **Lambeth 1** | R | 63 | 120 |
| **Lambeth 2** | R | 59 | 113 |
| **Lambeth 3** | U | 34 | 65 |
| **Lambeth 4** | K | 288 | 550 |
| **Lewisham 1** | U | 55 | 106 |
| **Lewisham 2** | R | 67 | 127 |
| **Marylebone Rd** | K | 154 | 294 |
| **Mole Valley 2** | S | 22 | 42 |
| **Mole Valley 3** | U | 24 | 47 |
| **Redbridge 1** | U | 35 | 67 |
| **Redbridge 2** | K | 156 | 297 |
| **Redbridge 3** | K | 78 | 150 |
| **Redbridge 4** | R | 61 | 117 |

| Nitrogen Oxides | Type | Annual Mean $NO_X$ ppb | Annual Mean $NO_X$ as $NO_2$ $\mu gm^{-3}$ |
|---|---|---|---|
| **Redbridge 5** | R | 69 | 133 |
| **Reigate and Banstead 1** | S | 25 | 48 |
| **Reigate and Banstead 2** | S | 39 | 74 |
| **Richmond 1** | R | 47 | 90 |
| **Richmond 13** | R | 52 | 99 |
| **Richmond 15** | R | 62 | 119 |
| **Richmond 17** | U | 35 | 67 |
| **Richmond 2** | S | 26 | 49 |
| **Sevenoaks 2** | U | 20 | 39 |
| **Southwark 1** | U | 45 | 85 |
| **Southwark 2** | R | 79 | 150 |
| **Sutton 4** | K | 96 | 183 |
| **Thurrock 1** | U | 34 | 65 |
| **Thurrock 2** | R | 115 | 219 |
| **Thurrock 3** | R | 56 | 108 |
| **Tower Hamlets 1** | U | 32 | 61 |
| **Tower Hamlets 2** | R | 90 | 171 |
| **Tower Hamlets 3** | U | 37 | 72 |
| **Waltham Forest 1** | U | 33 | 63 |
| **Waltham Forest 3** | R | 43 | 82 |
| **Wandsworth 2** | U | 61 | 116 |
| **Wandsworth 4** | R | 54 | 102 |

### A.3.2 Nitrogen Dioxide

| Nitrogen Dioxide | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Barking & Dagenham 1** | S | 98 | 0 |
| **Barnet 1** | K | 91 | 0 |
| **Barnet 2** | U | 96 | 0 |
| **Bexley 1** | U | 91 | 0 |
| **Bexley 2** | S | 97 | 0 |
| **Bexley 5** | S | 98 | 0 |
| **Brent 1** | U | 96 | 0 |
| **Brent 3** | R | 79 | 1 |
| **Brent 4** | R | 53 | 0 |
| **Brent 5** | R | 5 | 0 |
| **Brentwood 1** | U | 96 | 0 |
| **Bromley 7** | R | 98 | 0 |
| **Camden 1** | K | 97 | 2 |
| **Camden 3** | R | 97 | 0 |
| **Castle Point 1** | U | 95 | 0 |
| **City of London 1** | U | 89 | 0 |
| **Croydon 2** | R | 97 | 0 |
| **Croydon 4** | R | 94 | 0 |
| **Croydon 5** | K | 98 | 1 |
| **Croydon 6** | S | 98 | 0 |
| **Crystal Palace 1** | R | 98 | 0 |
| **Ealing 1** | U | 90 | 0 |
| **Ealing 2** | R | 87 | 0 |
| **Ealing 6** | R | 22 | 0 |
| **Enfield 1** | S | 79 | 0 |
| **Enfield 2** | R | 90 | 0 |
| **Enfield 3** | U | 95 | 0 |
| **Enfield 4** | R | 99 | 0 |
| **Greenwich 4** | U | 98 | 0 |
| **Greenwich 5** | R | 99 | 0 |
| **Greenwich 7** | R | 89 | 0 |
| **Greenwich Bexley 6** | R | 94 | 0 |

| Nitrogen Dioxide | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Hackney 4** | U | 92 | 0 |
| **Hackney 6** | R | 66 | 0 |
| **Haringey 1** | R | 88 | 0 |
| **Haringey 2** | S | 83 | 0 |
| **Harrow 1** | U | 91 | 0 |
| **Harrow 2** | R | 45 | 0 |
| **Havering 1** | R | 99 | 0 |
| **Havering 3** | R | 86 | 0 |
| **Heathrow Airport** | U | 87 | 0 |
| **Hillingdon 1** | R | 99 | 2 |
| **Hillingdon 2** | R | 69 | 0 |
| **Hounslow 2** | S | 93 | 0 |
| **Hounslow 4** | R | 91 | 3 |
| **Hounslow 5** | R | 66 | 0 |
| **H'smith and Fulham 1** | R | 68 | 1 |
| **H'smith and Fulham 2** | U | 39 | 0 |
| **Islington 1** | U | 99 | 0 |
| **Islington 2** | R | 99 | 0 |
| **Kens and Chelsea 1** | U | 94 | 0 |
| **Kens and Chelsea 3** | R | 99 | 11 |
| **Kens and Chelsea 4** | R | 99 | 0 |
| **Lambeth 1** | R | 96 | 1 |
| **Lambeth 2** | R | 17 | 0 |
| **Lambeth 3** | U | 98 | 0 |
| **Lambeth 4** | K | 26 | 59 |
| **Lewisham 1** | U | 99 | 0 |
| **Lewisham 2** | R | 99 | 0 |
| **Marylebone Rd** | K | 94 | 10 |
| **Mole Valley 2** | S | 99 | 0 |
| **Mole Valley 3** | U | 99 | 0 |
| **Redbridge 1** | U | 99 | 0 |
| **Redbridge 2** | K | 7 | 10 |
| **Redbridge 3** | K | 95 | 0 |

| Nitrogen Dioxide | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Redbridge 4** | R | 83 | 0 |
| **Redbridge 5** | R | 34 | 0 |
| **Reigate and Banstead 1** | S | 99 | 0 |
| **Reigate and Banstead 2** | S | 44 | 0 |
| **Richmond 1** | R | 95 | 0 |
| **Richmond 13** | R | 8 | 0 |
| **Richmond 15** | R | 62 | 0 |
| **Richmond 17** | U | 11 | 0 |
| **Richmond 2** | S | 100 | 0 |
| **Sevenoaks 2** | U | 96 | 0 |
| **Southwark 1** | U | 93 | 0 |
| **Southwark 2** | R | 91 | 0 |
| **Sutton 4** | K | 96 | 0 |
| **Thurrock 1** | U | 91 | 0 |
| **Thurrock 2** | R | 68 | 0 |
| **Thurrock 3** | R | 59 | 0 |
| **Tower Hamlets 1** | U | 99 | 0 |
| **Tower Hamlets 2** | R | 98 | 0 |
| **Tower Hamlets 3** | U | 95 | 0 |
| **Waltham Forest 1** | U | 73 | 0 |
| **Waltham Forest 3** | R | 61 | 0 |
| **Wandsworth 2** | U | 96 | 0 |
| **Wandsworth 4** | R | 95 | 0 |

| Nitrogen Dioxide | Type | Annual Mean less than 21ppb | Annual Mean less than 40µgm $^{-3}$ | Achieved |
|---|---|---|---|---|
| **Barking & Dagenham 1** | S | 16 | 31 | YES |
| **Barnet 1** | K | 44 | 85 | NO |
| **Barnet 2** | U | 19 | 37 | YES |
| **Bexley 1** | U | 19 | 35 | YES |
| **Bexley 2** | S | 18 | 35 | YES |
| **Bexley 5** | S | 16 | 31 | YES |
| **Brent 1** | U | 19 | 36 | YES |
| **Brent 3** | R | 34 | 66 | NA |
| **Brent 4** | R | 42 | 81 | NA |
| **Brent 5** | R | 26 | 50 | NA |
| **Brentwood 1** | U | 18 | 34 | YES |
| **Bromley 7** | R | 22 | 42 | NO |
| **Camden 1** | K | 34 | 65 | NO |
| **Camden 3** | R | 35 | 67 | NO |
| **Castle Point 1** | U | 13 | 25 | YES |
| **City of London 1** | U | 28 | 53 | NA |
| **Croydon 2** | R | 28 | 53 | NO |
| **Croydon 4** | R | 29 | 55 | NO |
| **Croydon 5** | K | 38 | 73 | NO |
| **Croydon 6** | S | 20 | 38 | YES |
| **Crystal Palace 1** | R | 25 | 48 | NO |
| **Ealing 1** | U | 22 | 42 | NO |
| **Ealing 2** | R | 31 | 59 | NA |
| **Ealing 6** | R | 50 | 96 | NA |
| **Enfield 1** | S | 17 | 32 | NA |
| **Enfield 2** | R | 22 | 42 | NO |
| **Enfield 3** | U | 17 | 32 | YES |
| **Enfield 4** | R | 26 | 49 | NO |
| **Greenwich 4** | U | 16 | 31 | YES |
| **Greenwich 5** | R | 25 | 47 | NO |
| **Greenwich 7** | R | 29 | 56 | NA |
| **Greenwich Bexley 6** | R | 27 | 51 | NO |
| **Hackney 4** | U | 26 | 49 | NO |

| Nitrogen Dioxide | Type | Annual Mean less than 21ppb | Annual Mean less than 40µgm $^{-3}$ | Achieved |
|---|---|---|---|---|
| **Hackney 6** | R | 33 | 63 | NA |
| **Haringey 1** | R | 26 | 49 | NA |
| **Haringey 2** | S | 18 | 34 | NA |
| **Harrow 1** | U | 16 | 30 | YES |
| **Harrow 2** | R | 24 | 45 | NA |
| **Havering 1** | R | 22 | 42 | NO |
| **Havering 3** | R | 21 | 40 | NA |
| **Heathrow Airport** | U | 30 | 57 | NA |
| **Hillingdon 1** | R | 27 | 51 | NO |
| **Hillingdon 2** | R | 21 | 40 | NA |
| **Hounslow 2** | S | 26 | 49 | NO |
| **Hounslow 4** | R | 42 | 80 | NO |
| **Hounslow 5** | R | 22 | 42 | NA |
| **H'smith and Fulham 1** | R | 46 | 87 | NA |
| **H'smith and Fulham 2** | U | 22 | 42 | NA |
| **Islington 1** | U | 24 | 47 | NO |
| **Islington 2** | R | 34 | 65 | NO |
| **Kens and Chelsea 1** | U | 22 | 42 | NO |
| **Kens and Chelsea 3** | R | 48 | 91 | NO |
| **Kens and Chelsea 4** | R | 50 | 95 | NO |
| **Lambeth 1** | R | 29 | 55 | NO |
| **Lambeth 2** | R | 33 | 63 | NA |
| **Lambeth 3** | U | 21 | 40 | NO |
| **Lambeth 4** | K | 94 | 179 | NA |
| **Lewisham 1** | U | 27 | 52 | NO |
| **Lewisham 2** | R | 29 | 56 | NO |
| **Marylebone Rd** | K | 55 | 104 | NO |
| **Mole Valley 2** | S | 14 | 26 | YES |
| **Mole Valley 3** | U | 14 | 28 | YES |
| **Redbridge 1** | U | 20 | 39 | YES |
| **Redbridge 2** | K | 70 | 133 | NA |
| **Redbridge 3** | K | 33 | 63 | NO |
| **Redbridge 4** | R | 26 | 50 | NA |

| Nitrogen Dioxide | Type | Annual Mean less than 21ppb | Annual Mean less than 40µgm $^{-3}$ | Achieved |
|---|---|---|---|---|
| **Redbridge 5** | R | 25 | 48 | NA |
| **Reigate and Banstead 1** | S | 16 | 30 | YES |
| **Reigate and Banstead 2** | S | 20 | 38 | NA |
| **Richmond 1** | R | 24 | 45 | NO |
| **Richmond 13** | R | 24 | 45 | NA |
| **Richmond 15** | R | 23 | 45 | NA |
| **Richmond 17** | U | 20 | 37 | NA |
| **Richmond 2** | S | 16 | 31 | YES |
| **Sevenoaks 2** | U | 12 | 24 | YES |
| **Southwark 1** | U | 24 | 46 | NO |
| **Southwark 2** | R | 34 | 66 | NO |
| **Sutton 4** | K | 39 | 74 | NO |
| **Thurrock 1** | U | 19 | 36 | YES |
| **Thurrock 2** | R | 41 | 78 | NA |
| **Thurrock 3** | R | 22 | 43 | NA |
| **Tower Hamlets 1** | U | 21 | 39 | NO |
| **Tower Hamlets 2** | R | 33 | 64 | NO |
| **Tower Hamlets 3** | U | 24 | 46 | NO |
| **Waltham Forest 1** | U | 19 | 36 | NA |
| **Waltham Forest 3** | R | 21 | 40 | NA |
| **Wandsworth 2** | U | 31 | 60 | NO |
| **Wandsworth 4** | R | 26 | 50 | NO |

| Nitrogen Dioxide | Type | No more than 18 occurrences of hourly mean >=200µgm $^{-3}$ (104.6ppb) | Achieved |
|---|---|---|---|
| **Barking & Dagenham 1** | S | 0 | YES |
| **Barnet 1** | K | 110 | NO |
| **Barnet 2** | U | 0 | YES |
| **Bexley 1** | U | 1 | YES |
| **Bexley 2** | S | 0 | YES |
| **Bexley 5** | S | 0 | YES |
| **Brent 1** | U | 1 | YES |
| **Brent 3** | R | 16 | NA |
| **Brent 4** | R | 23 | NO |
| **Brent 5** | R | 0 | NA |
| **Brentwood 1** | U | 0 | YES |
| **Bromley 7** | R | 0 | YES |
| **Camden 1** | K | 30 | NO |
| **Camden 3** | R | 0 | YES |
| **Castle Point 1** | U | 0 | YES |
| **City of London 1** | U | 0 | NA |
| **Croydon 2** | R | 5 | YES |
| **Croydon 4** | R | 2 | YES |
| **Croydon 5** | K | 23 | NO |
| **Croydon 6** | S | 0 | YES |
| **Crystal Palace 1** | R | 4 | YES |
| **Ealing 1** | U | 0 | YES |
| **Ealing 2** | R | 4 | NA |
| **Ealing 6** | R | 43 | NO |
| **Enfield 1** | S | 1 | NA |
| **Enfield 2** | R | 0 | YES |
| **Enfield 3** | U | 0 | YES |
| **Enfield 4** | R | 2 | YES |
| **Greenwich 4** | U | 0 | YES |
| **Greenwich 5** | R | 0 | YES |
| **Greenwich 7** | R | 0 | NA |

| Nitrogen Dioxide | Type | No more than 18 occurrences of hourly mean >=200µgm $^{-3}$ (104.6ppb) | Achieved |
|---|---|---|---|
| **Greenwich Bexley 6** | R | 1 | YES |
| **Hackney 4** | U | 14 | YES |
| **Hackney 6** | R | 0 | NA |
| **Haringey 1** | R | 0 | NA |
| **Haringey 2** | S | 0 | NA |
| **Harrow 1** | U | 0 | YES |
| **Harrow 2** | R | 9 | NA |
| **Havering 1** | R | 2 | YES |
| **Havering 3** | R | 0 | NA |
| **Heathrow Airport** | U | 0 | NA |
| **Hillingdon 1** | R | 21 | NO |
| **Hillingdon 2** | R | 2 | NA |
| **Hounslow 2** | S | 0 | YES |
| **Hounslow 4** | R | 92 | NO |
| **Hounslow 5** | R | 0 | NA |
| **H'smith and Fulham 1** | R | 47 | NO |
| **H'smith and Fulham 2** | U | 0 | NA |
| **Islington 1** | U | 0 | YES |
| **Islington 2** | R | 2 | YES |
| **Kens and Chelsea 1** | U | 0 | YES |
| **Kens and Chelsea 3** | R | 239 | NO |
| **Kens and Chelsea 4** | R | 43 | NO |
| **Lambeth 1** | R | 1 | YES |
| **Lambeth 2** | R | 0 | NA |
| **Lambeth 3** | U | 0 | YES |
| **Lambeth 4** | K | 927 | NO |
| **Lewisham 1** | U | 2 | YES |
| **Lewisham 2** | R | 2 | YES |
| **Marylebone Rd** | K | 521 | NO |
| **Mole Valley 2** | S | 0 | YES |
| **Mole Valley 3** | U | 0 | YES |
| **Redbridge 1** | U | 0 | YES |

| Nitrogen Dioxide | Type | No more than 18 occurrences of hourly mean >=200µgm $^{-3}$ (104.6ppb) | Achieved |
|---|---|---|---|
| **Redbridge 2** | K | 101 | NO |
| **Redbridge 3** | K | 17 | YES |
| **Redbridge 4** | R | 0 | NA |
| **Redbridge 5** | R | 1 | NA |
| **Reigate and Banstead 1** | S | 0 | YES |
| **Reigate and Banstead 2** | S | 0 | NA |
| **Richmond 1** | R | 2 | YES |
| **Richmond 13** | R | 0 | NA |
| **Richmond 15** | R | 0 | NA |
| **Richmond 17** | U | 0 | NA |
| **Richmond 2** | S | 0 | YES |
| **Sevenoaks 2** | U | 0 | YES |
| **Southwark 1** | U | 0 | YES |
| **Southwark 2** | R | 3 | YES |
| **Sutton 4** | K | 72 | NO |
| **Thurrock 1** | U | 1 | YES |
| **Thurrock 2** | R | 18 | NA |
| **Thurrock 3** | R | 0 | NA |
| **Tower Hamlets 1** | U | 0 | YES |
| **Tower Hamlets 2** | R | 8 | YES |
| **Tower Hamlets 3** | U | 0 | YES |
| **Waltham Forest 1** | U | 8 | NA |
| **Waltham Forest 3** | R | 0 | NA |
| **Wandsworth 2** | U | 8 | YES |
| **Wandsworth 4** | R | 0 | YES |

### A.3.3 Ozone

| Ozone | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Bexley 1** | U | 97 | 58 |
| **Brent 1** | U | 95 | 52 |
| **Bromley 5** | S | 95 | 65 |
| **City of London 1** | U | 85 | 35 |
| **Croydon 3** | S | 92 | 53 |
| **Ealing 1** | U | 99 | 55 |
| **Enfield 3** | U | 91 | 61 |
| **Greenwich 4** | U | 91 | 47 |
| **Hackney 4** | U | 97 | 39 |
| **Haringey 2** | S | 85 | 45 |
| **Hounslow 2** | S | 58 | 69 |
| **Kens and Chelsea 1** | U | 99 | 45 |
| **Kingston 1** | S | 99 | 74 |
| **Lewisham 1** | U | 90 | 27 |
| **Marylebone Rd** | K | 96 | 6 |
| **Redbridge 1** | U | 99 | 40 |
| **Richmond 13** | R | 13 | 3 |
| **Richmond 15** | R | 65 | 30 |
| **Richmond 17** | U | 15 | 2 |
| **Richmond 2** | S | 99 | 67 |
| **Sevenoaks 2** | U | 98 | 75 |
| **Southwark 1** | U | 98 | 45 |
| **Thurrock 1** | U | 98 | 55 |
| **Tower Hamlets 1** | U | 99 | 61 |
| **Wandsworth 2** | U | 95 | 26 |

| Ozone | Type | No more than 10 days where maximum rolling 8hr mean >=100µgm $^{-3}$ (50ppb) | Achieved |
|---|---|---|---|
| **Bexley 1** | U | 35 | NO |
| **Brent 1** | U | 39 | NO |
| **Bromley 5** | S | 48 | NO |
| **City of London 1** | U | 25 | NO |
| **Croydon 3** | S | 38 | NO |
| **Ealing 1** | U | 32 | NO |
| **Enfield 3** | U | 43 | NO |
| **Greenwich 4** | U | 31 | NO |
| **Hackney 4** | U | 22 | NO |
| **Haringey 2** | S | 36 | NO |
| **Hounslow 2** | S | 50 | NO |
| **Kens and Chelsea 1** | U | 30 | NO |
| **Kingston 1** | S | 55 | NO |
| **Lewisham 1** | U | 14 | NO |
| **Marylebone Rd** | K | 4 | YES |
| **Redbridge 1** | U | 29 | NO |
| **Richmond 13** | R | 1 | NA |
| **Richmond 15** | R | 26 | NO |
| **Richmond 17** | U | 0 | NA |
| **Richmond 2** | S | 47 | NO |
| **Sevenoaks 2** | U | 56 | NO |
| **Southwark 1** | U | 31 | NO |
| **Thurrock 1** | U | 40 | NO |
| **Tower Hamlets 1** | U | 41 | NO |
| **Wandsworth 2** | U | 12 | NO |

### A.3.4 $PM_{10}$

| $PM_{10}$ | Type | Instrument | Capture Rate (%) | Days moderate and above |
|---|---|---|---|---|
| **Barking & Dagenham 2** | S | T | 99 | 15 |
| **Barnet 1** | K | T | 87 | 12 |
| **Barnet 2** | U | T | 99 | 7 |
| **Bexley 1** | U | T | 96 | 10 |
| **Bexley 2** | S | T | 99 | 10 |
| **Bexley 4** | R | T | 98 | 134 |
| **Brent 1** | U | T | 97 | 6 |
| **Brent 3** | R | T | 83 | 19 |
| **Brent 4** | R | T | 65 | 32 |
| **Brent 5** | R | T | 8 | 8 |
| **Bromley 7** | R | B | 60 | (31) |
| **Camden 1** | K | T | 99 | 22 |
| **Camden 3** | R | T | 97 | 25 |
| **Croydon 3** | S | T | 93 | 2 |
| **Croydon 4** | R | T | 95 | 13 |
| **Crystal Palace 1** | R | T | 85 | 1 |
| **Ealing 2** | R | T | 99 | 19 |
| **Enfield 2** | R | B | 90 | (103) |
| **Enfield 3** | U | B | 93 | (44) |
| **Enfield 4** | R | B | 92 | (152) |
| **Greenwich 4** | U | T | 99 | 12 |
| **Greenwich 5** | R | T | 99 | 13 |
| **Greenwich 7** | R | T | 92 | 20 |
| **Greenwich Bexley 6** | R | T | 96 | 22 |
| **Hackney 6** | R | T | 78 | 16 |
| **Haringey 1** | R | T | 98 | 8 |
| **Haringey 2** | S | B | 95 | (68) |
| **Harrow 1** | U | T | 94 | 5 |
| **Harrow 2** | R | T | 77 | 15 |
| **Havering 3** | R | T | 87 | 5 |
| **Heathrow Airport** | U | T | 88 | 11 |
| **Hillingdon 1** | R | T | 95 | 19 |

| $PM_{10}$ | Type | Instrument | Capture Rate (%) | Days moderate and above |
|---|---|---|---|---|
| **Hillingdon 2** | R | T | 85 | 14 |
| **Hounslow 2** | S | T | 95 | 6 |
| **Hounslow 4** | R | T | 78 | 17 |
| **Hounslow 5** | R | T | 80 | 22 |
| **H'smith and Fulham 1** | R | T | 83 | 21 |
| **H'smith and Fulham 2** | U | T | 21 | 0 |
| **Islington 1** | U | T | 97 | 10 |
| **Islington 2** | R | T | 84 | 21 |
| **Kens and Chelsea 1** | U | T | 98 | 12 |
| **Kens and Chelsea 2** | R | T | 91 | 19 |
| **Lambeth 1** | R | B | 92 | (129) |
| **Lambeth 2** | R | B | 23 | (32) |
| **Lambeth 3** | U | B | 98 | (74) |
| **Lambeth 4** | K | B | 26 | (63) |
| **Lewisham 2** | R | T | 87 | 16 |
| **Marylebone Rd** | K | T | 98 | 71 |
| **Mole Valley 2** | S | T | 99 | 3 |
| **Mole Valley 3** | U | T | 81 | 5 |
| **Redbridge 1** | U | B | 94 | (58) |
| **Redbridge 3** | K | B | 63 | (93) |
| **Redbridge 4** | R | B | 97 | (107) |
| **Redbridge 5** | R | B | 35 | (46) |
| **Reigate and Banstead 1** | S | T | 99 | 6 |
| **Richmond 1** | R | T | 95 | 6 |
| **Richmond 13** | R | T | 13 | 5 |
| **Richmond 15** | R | T | 56 | 12 |
| **Richmond 17** | U | T | 15 | 1 |
| **Richmond 2** | S | T | 98 | 12 |
| **Sevenoaks 2** | U | T | 99 | 4 |
| **Southwark 1** | U | T | 99 | 13 |
| **Southwark 2** | R | T | 66 | 14 |
| **Sutton 4** | K | T | 99 | 15 |
| **Thurrock 1** | U | T | 96 | 17 |

| $PM_{10}$ | Type | Instrument | Capture Rate (%) | Days moderate and above |
|---|---|---|---|---|
| **Thurrock 3** | R | T | 57 | 0 |
| **Tower Hamlets 1** | U | T | 96 | 15 |
| **Tower Hamlets 3** | U | T | 94 | 6 |
| **Waltham Forest 1** | U | T | 78 | 2 |
| **Waltham Forest 3** | R | T | 67 | 7 |
| **Wandsworth 4** | R | T | 96 | 15 |

**Instrument type; T = TEOM, B = BAM.**

| $PM_{10}$ | Type | Instrument | No more than 35 days where daily mean >=50µgm$^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Barking & Dagenham 2** | S | T | 29 | YES |
| **Barnet 1** | K | T | 29 | NA |
| **Barnet 2** | U | T | 15 | YES |
| **Bexley 1** | U | T | 18 | YES |
| **Bexley 2** | S | T | 15 | YES |
| **Bexley 4** | R | T | 124 | NO |
| **Brent 1** | U | T | 13 | YES |
| **Brent 3** | R | T | 30 | NA |
| **Brent 4** | R | T | 58 | NO |
| **Brent 5** | R | T | 11 | NA |
| **Bromley 7** | R | B | 20 | NA |
| **Camden 1** | K | T | 49 | NO |
| **Camden 3** | R | T | 52 | NO |
| **Croydon 3** | S | T | 9 | YES |
| **Croydon 4** | R | T | 24 | YES |
| **Crystal Palace 1** | R | T | 13 | NA |
| **Ealing 2** | R | T | 39 | NO |
| **Enfield 2** | R | B | 70 | NO |
| **Enfield 3** | U | B | 26 | YES |
| **Enfield 4** | R | B | 111 | NO |
| **Greenwich 4** | U | T | 15 | YES |
| **Greenwich 5** | R | T | 18 | YES |
| **Greenwich 7** | R | T | 40 | NO |
| **Greenwich Bexley 6** | R | T | 30 | YES |

| $PM_{10}$ | Type | Instrument | No more than 35 days where daily mean >=50µgm $^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Hackney 6** | R | T | 22 | NA |
| **Haringey 1** | R | T | 17 | YES |
| **Haringey 2** | S | B | 49 | NO |
| **Harrow 1** | U | T | 8 | YES |
| **Harrow 2** | R | T | 30 | NA |
| **Havering 3** | R | T | 19 | NA |
| **Heathrow Airport** | U | T | 21 | NA |
| **Hillingdon 1** | R | T | 34 | YES |
| **Hillingdon 2** | | T | 20 | NA |
| **Hounslow 2** | S | T | 14 | YES |
| **Hounslow 4** | R | T | 36 | NO |
| **Hounslow 5** | R | T | 42 | NO |
| **H'smith and Fulham 1** | R | T | 40 | NO |
| **H'smith and Fulham 2** | U | T | 0 | NA |
| **Islington 1** | U | T | 17 | YES |
| **Islington 2** | R | T | 36 | NO |
| **Kens and Chelsea 1** | U | T | 16 | YES |
| **Kens and Chelsea 2** | R | T | 37 | NO |
| **Lambeth 1** | R | B | 100 | NO |
| **Lambeth 2** | R | B | 23 | NA |
| **Lambeth 3** | U | B | 50 | NO |
| **Lambeth 4** | K | B | 50 | NO |
| **Lewisham 2** | R | T | 30 | NA |
| **Marylebone Rd** | K | T | 139 | NO |
| **Mole Valley 2** | S | T | 9 | YES |
| **Mole Valley 3** | U | T | 11 | NA |
| **Redbridge 1** | U | B | 39 | NO |
| **Redbridge 3** | K | B | 62 | NO |
| **Redbridge 4** | R | B | 73 | NO |
| **Redbridge 5** | R | B | 31 | NA |
| **Reigate and Banstead 1** | S | T | 9 | YES |
| **Richmond 1** | R | T | 14 | YES |
| **Richmond 13** | R | T | 7 | NA |

| $PM_{10}$ | Type | Instrument | No more than 35 days where daily mean >=50µgm$^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Richmond 15** | R | T | 22 | NA |
| **Richmond 17** | U | T | 1 | NA |
| **Richmond 2** | S | T | 18 | YES |
| **Sevenoaks 2** | U | T | 9 | YES |
| **Southwark 1** | U | T | 19 | YES |
| **Southwark 2** | R | T | 31 | NA |
| **Sutton 4** | K | T | 21 | YES |
| **Thurrock 1** | U | T | 20 | YES |
| **Thurrock 3** | R | T | 9 | NA |
| **Tower Hamlets 1** | U | T | 26 | YES |
| **Tower Hamlets 3** | U | T | 13 | YES |
| **Waltham Forest 1** | U | T | 5 | NA |
| **Waltham Forest 3** | R | T | 10 | NA |
| **Wandsworth 4** | R | T | 26 | YES |

**Instrument type; T = TEOM, B = BAM.**

| $PM_{10}$ | Type | Instrument | Annual Mean less than 40µgm$^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Barking & Dagenham 2** | S | T | 29 | YES |
| **Barnet 1** | K | T | 32 | NA |
| **Barnet 2** | U | T | 25 | YES |
| **Bexley 1** | U | T | 25 | YES |
| **Bexley 2** | S | T | 24 | YES |
| **Bexley 4** | R | T | 46 | NO |
| **Brent 1** | U | T | 24 | YES |
| **Brent 3** | R | T | 33 | NA |
| **Brent 4** | R | T | 40 | NA |
| **Brent 5** | R | T | 46 | NA |
| **Bromley 7** | R | B | 29 | NA |
| **Camden 1** | K | T | 35 | YES |
| **Camden 3** | R | T | 38 | YES |
| **Croydon 3** | S | T | 25 | YES |
| **Croydon 4** | R | T | 30 | YES |

| $PM_{10}$ | Type | Instrument | Annual Mean less than 40µgm$^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Crystal Palace 1** | R | T | 26 | NA |
| **Ealing 2** | R | T | 32 | YES |
| **Enfield 2** | R | B | 40 | NO |
| **Enfield 3** | U | B | 27 | YES |
| **Enfield 4** | R | B | 47 | NO |
| **Greenwich 4** | U | T | 25 | YES |
| **Greenwich 5** | R | T | 28 | YES |
| **Greenwich 7** | R | T | 33 | YES |
| **Greenwich Bexley 6** | R | T | 31 | YES |
| **Hackney 6** | R | T | 35 | NA |
| **Haringey 1** | R | T | 27 | YES |
| **Haringey 2** | S | B | 34 | YES |
| **Harrow 1** | U | T | 22 | YES |
| **Harrow 2** | R | T | 31 | NA |
| **Havering 3** | R | T | 26 | NA |
| **Heathrow Airport** | U | T | 29 | NA |
| **Hillingdon 1** | R | T | 30 | YES |
| **Hillingdon 2** | R | T | 30 | NA |
| **Hounslow 2** | S | T | 25 | YES |
| **Hounslow 4** | R | T | 33 | NA |
| **Hounslow 5** | R | T | 37 | NA |
| **H'smith and Fulham 1** | R | T | 35 | NA |
| **H'smith and Fulham 2** | U | T | 22 | NA |
| **Islington 1** | U | T | 27 | YES |
| **Islington 2** | R | T | 36 | NA |
| **Kens and Chelsea 1** | U | T | 27 | YES |
| **Kens and Chelsea 2** | R | T | 37 | YES |
| **Lambeth 1** | R | B | 43 | NO |
| **Lambeth 2** | R | B | 45 | NA |
| **Lambeth 3** | U | B | 34 | YES |
| **Lambeth 4** | K | B | 59 | NA |
| **Lewisham 2** | R | T | 33 | NA |
| **Marylebone Rd** | K | T | 46 | NO |

| $PM_{10}$ | Type | Instrument | Annual Mean less than 40µgm$^{-3}$ (TEOM *1.3, BAM *1) | Achieved |
|---|---|---|---|---|
| **Mole Valley 2** | S | T | 22 | YES |
| **Mole Valley 3** | U | T | 25 | NA |
| **Redbridge 1** | U | B | 32 | YES |
| **Redbridge 3** | K | B | 42 | NA |
| **Redbridge 4** | R | B | 38 | YES |
| **Redbridge 5** | R | B | 40 | NA |
| **Reigate and Banstead 1** | S | T | 24 | YES |
| **Richmond 1** | R | T | 26 | YES |
| **Richmond 13** | R | T | 31 | NA |
| **Richmond 15** | R | T | 33 | NA |
| **Richmond 17** | U | T | 26 | NA |
| **Richmond 2** | S | T | 25 | YES |
| **Sevenoaks 2** | U | T | 21 | YES |
| **Southwark 1** | U | T | 28 | YES |
| **Southwark 2** | R | T | 35 | NA |
| **Sutton 4** | K | T | 32 | YES |
| **Thurrock 1** | U | T | 27 | YES |
| **Thurrock 3** | R | T | 27 | NA |
| **Tower Hamlets 1** | U | T | 29 | YES |
| **Tower Hamlets 3** | U | T | 24 | YES |
| **Waltham Forest 1** | U | T | 21 | NA |
| **Waltham Forest 3** | R | T | 25 | NA |
| **Wandsworth 4** | R | T | 30 | YES |

**Instrument type; T = TEOM, B = BAM.**

### A.3.5 $PM_{2.5}$

| $PM_{2.5}$ | Type | Instrument | Capture Rate (%) | Annual Mean µgm $^{-3}$ |
|---|---|---|---|---|
| **Bexley 2** | S | T | 99 | 12 |
| **Bexley 3** | S | T | 98 | 12 |
| **Bloomsbury** | U | T | 47 | 14 |
| **Ealing 2** | R | T | 34 | 15 |
| **Greenwich Bexley 6** | R | T | 99 | 15 |
| **Hackney 4** | U | T | 80 | 17 |

**Instrument type; T = TEOM.**

### A.3.6 Sulphur Dioxide

| Sulphur Dioxide | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Barking & Dagenham 1** | S | 98 | 0 |
| **Bexley 1** | U | 91 | 1 |
| **Bexley 5** | S | 98 | 0 |
| **Brent 1** | U | 97 | 0 |
| **Brent 3** | R | 76 | 1 |
| **Brent 4** | R | 51 | 0 |
| **Castle Point 1** | U | 96 | 1 |
| **City of London 1** | U | 87 | 0 |
| **Croydon 4** | R | 97 | 0 |
| **Crystal Palace 1** | R | 95 | 0 |
| **Ealing 1** | U | 93 | 0 |
| **Enfield 3** | U | 95 | 2 |
| **Enfield 4** | R | 96 | 0 |
| **Greenwich 4** | U | 99 | 0 |
| **Haringey 1** | R | 96 | 0 |
| **Harrow 1** | U | 91 | 0 |
| **Havering 3** | R | 86 | 0 |
| **Hounslow 2** | S | 94 | 1 |
| **Hounslow 4** | R | 91 | 0 |
| **H'smith and Fulham 1** | R | 70 | 0 |
| **Kens and Chelsea 1** | U | 97 | 0 |
| **Lambeth 1** | R | 97 | 0 |
| **Lambeth 2** | R | 17 | 0 |
| **Lambeth 3** | U | 99 | 0 |
| **Lambeth 4** | K | 26 | 0 |
| **Lewisham 1** | U | 99 | 1 |
| **Lewisham 2** | R | 97 | 0 |
| **Marylebone Rd** | K | 95 | 0 |
| **Redbridge 4** | R | 95 | 0 |
| **Richmond 13** | R | 13 | 0 |
| **Richmond 15** | R | 60 | 0 |
| **Richmond 17** | U | 15 | 0 |

| Sulphur Dioxide | Type | Capture Rate (%) | Days moderate and above |
|---|---|---|---|
| **Sevenoaks 2** | U | 99 | 0 |
| **Southwark 1** | U | 98 | 0 |
| **Southwark 2** | R | 91 | 0 |
| **Thurrock 1** | U | 91 | 5 |
| **Thurrock 3** | R | 59 | 0 |
| **Tower Hamlets 1** | U | 99 | 1 |
| **Tower Hamlets 3** | U | 83 | 0 |
| **Waltham Forest 1** | U | 71 | 0 |
| **Waltham Forest 3** | R | 44 | 0 |
| **Wandsworth 2** | U | 94 | 0 |

| Sulphur Dioxide | Type | No more than 35 occurrences of 15min mean >=350µgm $^{-3}$ (100ppb) | Achieved |
|---|---|---|---|
| **Barking & Dagenham 1** | S | 0 | YES |
| **Bexley 1** | U | 1 | YES |
| **Bexley 5** | S | 0 | YES |
| **Brent 1** | U | 0 | YES |
| **Brent 3** | R | 1 | NA |
| **Brent 4** | R | 0 | NA |
| **Castle Point 1** | U | 1 | YES |
| **City of London 1** | U | 0 | NA |
| **Croydon 4** | R | 0 | YES |
| **Crystal Palace 1** | R | 0 | YES |
| **Ealing 1** | U | 0 | YES |
| **Enfield 3** | U | 2 | YES |
| **Enfield 4** | R | 0 | YES |
| **Greenwich 4** | U | 0 | YES |
| **Haringey 1** | R | 0 | YES |
| **Harrow 1** | U | 0 | YES |
| **Havering 3** | R | 0 | NA |
| **Hounslow 2** | S | 1 | YES |
| **Hounslow 4** | R | 0 | YES |
| **H'smith and Fulham 1** | R | 0 | NA |

| Sulphur Dioxide | Type | No more than 35 occurrences of 15min mean >=350µgm $^{-3}$ (100ppb) | Achieved |
|---|---|---|---|
| **Kens and Chelsea 1** | U | 0 | YES |
| **Lambeth 1** | R | 0 | YES |
| **Lambeth 2** | R | 0 | NA |
| **Lambeth 3** | U | 0 | YES |
| **Lambeth 4** | K | 0 | NA |
| **Lewisham 1** | U | 2 | YES |
| **Lewisham 2** | R | 0 | YES |
| **Marylebone Rd** | K | 0 | YES |
| **Redbridge 4** | R | 0 | YES |
| **Richmond 13** | R | 0 | NA |
| **Richmond 15** | R | 0 | NA |
| **Richmond 17** | U | 0 | NA |
| **Sevenoaks 2** | U | 0 | YES |
| **Southwark 1** | U | 0 | YES |
| **Southwark 2** | R | 0 | YES |
| **Thurrock 1** | U | 9 | YES |
| **Thurrock 3** | R | 0 | NA |
| **Tower Hamlets 1** | U | 1 | YES |
| **Tower Hamlets 3** | U | 0 | NA |
| **Waltham Forest 1** | U | 0 | NA |
| **Waltham Forest 3** | R | 0 | NA |
| **Wandsworth 2** | U | 0 | YES |

# APPENDIX 4: AIR QUALITY STRATEGY OBJECTIVES & UK AIR QUALITY INFORMATION SYSTEM

The following Objectives are set out in the Air Quality Regulations 2000 for the purposes of Local Air Quality Management.

| Pollutant | Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Benzene** | 5 $\mu gm^{-3}$ (1 ppb) | Running Annual Mean | 31 Dec 2010 |
| **1, 3 Butadiene** | 2.25 $\mu gm^{-3}$ (1 ppb) | Running Annual Mean | 31 Dec 2003 |
| **Carbon Monoxide** | 10 $\mu gm^{-3}$ (8.6 ppb) | Running 8 hour mean | 31 Dec 2003 |
| **Lead** | 0.5$\mu gm^{-3}$ | Annual Mean | 31 Dec 2003 |
| | 0.25 $\mu gm^{-3}$ | Annual Mean | 31 Dec 2008 |
| **Nitrogen Dioxide (provisional)** | 200 $\mu gm^{-3}$ (105 ppb) not to be exceeded more than 18 times a year | 1 hour mean | 31 Dec 2005 |
| | 40 $\mu gm^{-3}$ (21 ppb) | Annual Mean | 31 Dec 2005 |
| **Particles ($PM_{10}$)** | 50 $\mu gm^{-3}$ not to be exceeded more than 35 times a year | 24 hour mean | 31 Dec 2004 |
| | 40 $\mu gm^{-3}$ | Annual Mean | 31 Dec 2004 |
| **Sulphur Dioxide** | 350 $\mu gm^{-3}$ (132 ppb) not to be exceeded more than 24 times a year | 1 hour mean | 31 Dec 2004 |
| | 125 $\mu gm^{-3}$ (47 ppb) not to be exceeded more than 3 times a year | 24 hour mean | 31 Dec 2004 |
| | 266 $\mu gm^{-3}$ (100 ppb) not to be exceeded more than 35 times a year | 15 minute mean | 31 Dec 2005 |

The following Objectives are not included in the Air Quality Regulations 2000 for the purposes of Local Air Quality Management.

| Pollutant | Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Objectives for the protection of human health** | | | |
| **Ozone (provisional)** | 100 $\mu gm^{-3}$ (50 ppb) not to be exceeded more than 10 times per year | Daily maximum of running 8 hour mean | 31 Dec 2005 |
| **Objectives for the protection of vegetation and ecosystems** | | | |
| **Nitrogen Oxides (assuming $NO_X$ is taken as $NO_2$)** | 30 $\mu gm^{-3}$ (16 ppb) | Annual mean | 31 Dec 2000 |
| **Sulphur Dioxide** | 20 $\mu gm^{-3}$ (8 ppb)<br>20 $\mu gm^{-3}$ (8 ppb) | Annual Mean<br>Winter Mean (1 Oct- 31 Mar) | 31 Dec 2000<br>31 Dec 2000 |

DETR, 2000; The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – A consultation Document.

DETR, 2000; Air Quality Regulations 2000.

DEFRA, 2002; Report on the Review of the National Air Quality Strategy; Proposals to Amend the Strategy.

The 'descriptors' applied to air pollution concentrations are defined by the UK Air Quality Information system.

| Pollutant / Band | LOW | MODERATE | HIGH | VERY HIGH |
|---|---|---|---|---|
| **Sulphur Dioxide** | below 100ppb, averaged over 15 minutes | 100ppb, averaged over 15 minutes | 200ppb, averaged over 15 minutes | 400ppb, averaged over 15 minutes |
| **Ozone** | below 50ppb, as an 8 hour running average and below 50ppb averaged over one hour | 50ppb, as an 8 hour running average or<br><br>50ppb averaged over one hour | 90 ppb, averaged over one hour | 180 ppb, averaged over one hour |
| **Carbon Monoxide** | below 10 ppm, as an 8 hour running average | 10 ppm, as an 8 hour running average | 15 ppm, as an 8 hour running average | 20 ppm, as an 8 hour running average |
| **Nitrogen Dioxide** | below 150 ppb, averaged over one hour | 150 ppb, averaged over one hour | 300 ppb, averaged over one hour | 400 ppb, averaged over one hour |
| **$PM_{10}$ Particles (by TEOM)** | below 50 ug/$m^3$, as a 24 hour running average | 50 ug/$m^3$, as a 24 hour running average | 75 ug/$m^3$, as a 24 hour running average | 100 ug/$m^3$, as a 24 hour running average |