

3.1 Summary of Continuous Monitoring within the London Borough of Richmond

- 3.1.1 Continuous monitoring of the NAQS pollutants is currently undertaken at mobile sites within the London Borough of Richmond upon Thames. However, at time of going to press this data is being calibrated and will be available early in the year 2000.
- 3.1.2 This section also considers measurements in other boroughs in order to assist the London Borough of Waltham Forest in establishing the context of the Borough's air pollution.

3.2 Summary of Air Pollution Measurements in London

- 3.2.1 During 1997 almost all sites in the LAQN exceeded the NAQS objectives for 2005. A comparison with previous pollution years shows very little trend in these statistics, as expected, due to the varying meteorological conditions during the different years. The comparison does however permit the selection of a 'worst case' year, which can then be used for the 2005 prediction. The key conclusions of this examination are as follows:
 - the annual average objective for NO₂ was exceeded at all sites in Greater London, except Sutton 3, and the maximum hour objective was exceeded at around half of the sites;
 - the objective for PM10 was exceeded at all sites in the LAQN by a large margin;
 - all sites measuring SO₂ in Greater London were below the objective in 1997, although Bexley and Greenwich sites exceeded the objective during 1996. These exceedences are associated with large industrial processes in the East Thames region;
 - the base year for predictions of the NAQS objectives in 2005 will be the years: 1996 for PM10, 1997 for annual average NO₂, 1991 for peak hour NO₂ and 1995 and 1996 for SO₂.

3.3 Detailed Analysis of the Monitoring Results in London

- 3.3.1 In the third stage of the review and assessment the Council is required to undertake an accurate and detailed review and assessment of current and future air quality. This section examines the current air quality within the Councils' area by focussing on the high quality monitoring that has taken place both within the Borough and across the wider London area, by the London Air Quality Network (LAQN).
- 3.3.2 The DETR guidance LAQM. TG1 (98) gives local authorities guidance on the standards and procedures for monitoring ambient air quality so as to demonstrate the significant risk of a prescribed objective being exceeded in a relevant location. The guidance relates to the NAQS pollutants and reflects the staged review and assessment approach recognising that the most sophisticated monitoring and higher standards of QA/QC apply to the more detailed stage 3 review and assessments.
- 3.3.3 The monitoring strategy of the LAQN is designed to maximise the information available to local authorities within the network, recognising that pollution is not restricted to local authority boundaries. This relates to both site locations and pollutant requirements. Thus the purpose of the LAQN is to provide a comprehensive network, which enables a high standard of comparability between sites and data.
- 3.3.4 In all instances continuous monitoring sites within the LAQN meet the requirements of

the above-mentioned guidance through meeting either the AUN and/or the London standard.

- 3.3.5 The LAQN was formed in 1993 to co-ordinate and improve air pollution monitoring in London. At the end of January 1999, 20 London Boroughs were supplying data to the LAQN. Increasingly these data are being supplemented by data from local authorities around London. The LAQN is facilitated by the Association of London Government on behalf of the thirty-three London Boroughs and is provided by the SEIPH-ERG.
- 3.3.6 The purpose of this section is to present results from the LAQN for the years 1994-1997. The results relate specifically to the NAQS objectives for NO₂, PM10 and SO₂, which are described in Table 3.1 below.

Table 3.1:The NAQS Existing and Proposed Objectives

Pollutant	Existing NAQS Objective	Proposed AQS Objective
To be achieved by 2005		
SO ₂	100 ppb, as 99.9 th percentile of 15 minute means	To be agreed
NO ₂	21 ppb annual mean 150 ppb, averaged over one hour	To be agreed
PM10	50 µg/m ³ , as 99 th percentile of 24 hour running means	50 µg/m ³ , as 24 hour means not to be exceeded 35 times/annum ¹

ppb = parts per billion, µg/m³ = micrograms per cubic metre

¹ Gravimetric measurement, to be achieved by the end of 2004

- 3.3.7 When examining data it is important to consider the location of the monitoring site e.g. kerbside, urban background, rural, etc. The implications of the quality assurance standard on data accuracy are discussed in the 1996 LAQN Annual Report (SEIPH, 1996). This report suggests that a working uncertainty of around 10 % should be considered when discussing high values and long-term averages such as the NAQS Objectives.
- 3.3.8 Each of the pollutants monitored by the LAQN require data, which is representative of the whole year. If insufficient data were available (i.e. a data capture of less than 75%), then comparison with the objective was not possible. This, for example, is the case for many of the new sites.
- 3.3.9 The following information relates to those sites which undertake continuous monitoring of the NAQS pollutants, which need further investigation under the Review and Assessment process. A short review of the continuous monitoring within the Council's area is followed by a more general London wide view of air quality.

3.4 Nitrogen Dioxide (NO₂)

- 3.4.1 The highest NO₂ concentrations are measured at roadside and central London locations. Lower concentrations were observed at urban background, suburban and rural areas. Generally, concentrations are found to decrease with distance from the central areas of London.
- 3.4.2 Figure 3.1 shows the annual average for sites in the network. The highest annual average (39 ppb) was measured at the kerbside in Camden. All sites within Greater London, except Sutton 3, exceeded the objective. Sites outside Greater London were equal to or below the objective.

Annual Mean Nitrogen Dioxide 1997

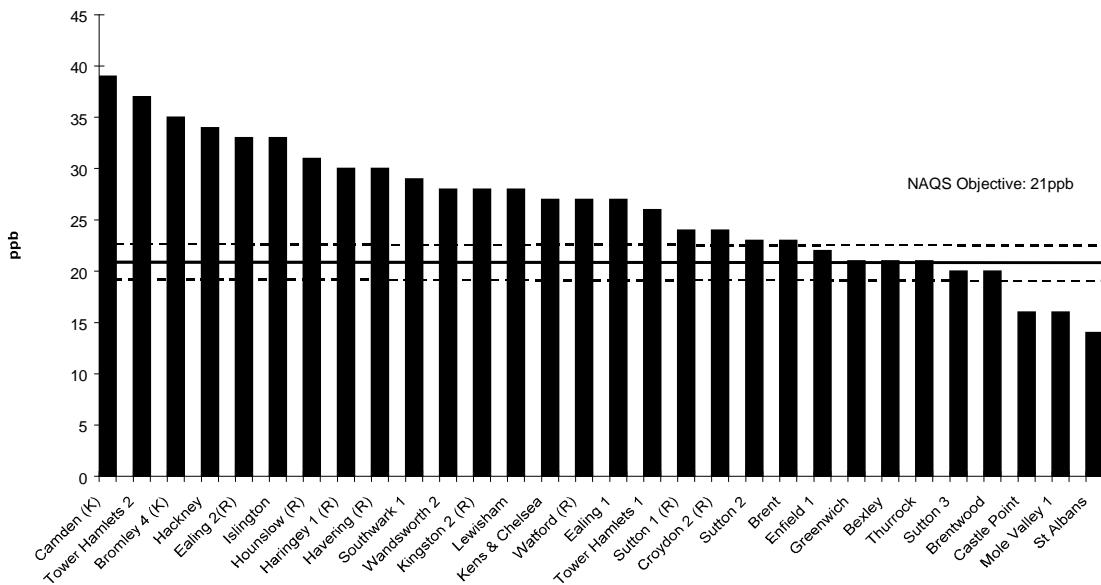


Figure 3.1: Annual Mean NO₂ (1997)

- 3.4.3 If a measurement uncertainty of 10 % is assumed, sites with annual averages above 23 ppb have exceeded the objective and those below 19 ppb are below the objective. A precautionary approach would therefore suggest that both Brentwood and Sutton 3 might also have exceeded the objective. Conversely, the exceedence at Enfield cannot be viewed as definite.
- 3.4.4 The distribution of the maximum hourly values for 1997 is different. The maximum hourly concentration at most sites occurred during the pollution incident in late October/early November or during the incident in mid November. The distribution is also affected by local incidents and the operational availability of each site during the episode e.g. if a site was not operating during an incident, the maximum hourly value may be lower than neighbouring sites that were operational.

Maximum Hourly Nitrogen Dioxide 1997

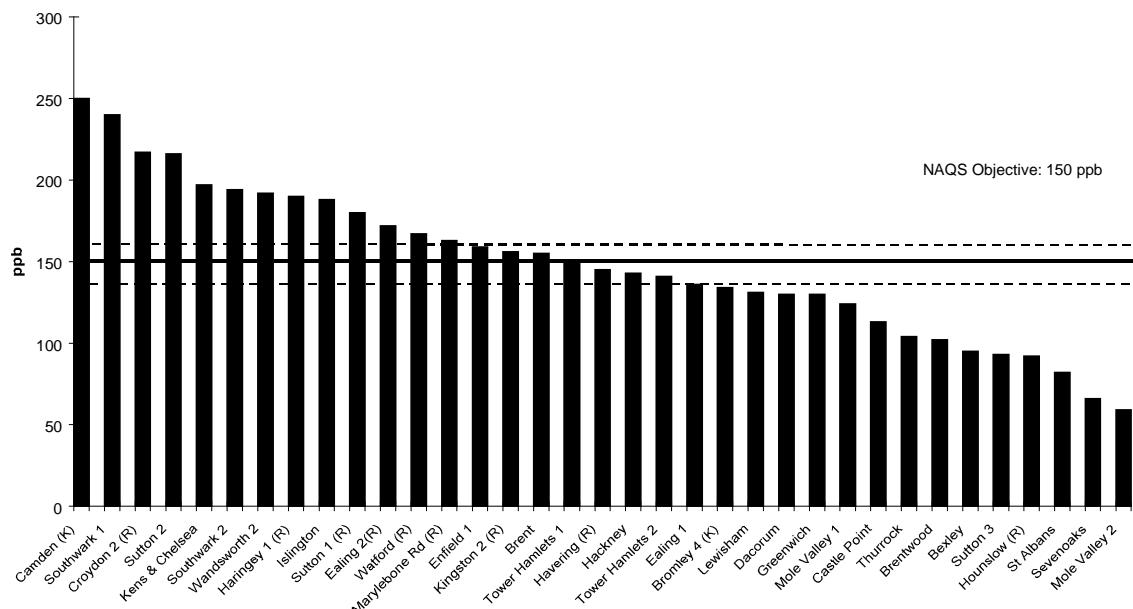


Figure 3.2: Maximum Hourly NO₂ Concentrations (1997)

3.4.5 The maximum hourly average objective was exceeded at around half of the LAQN sites during 1997, all within Greater London. The highest value (250 ppb) was measured at the roadside in Camden. Concentrations of over 200 ppb were also measured at the roadside in Croydon and at the background sites Southwark 1 and Sutton 2. Once again, if a measurement uncertainty of 10 % is assumed, we can be confident that those sites with an annual maximum below 135 ppb are below the objective and those above 165 ppb are above. This suggests that the exceedences of this objective at Brent and Enfield cannot be viewed as definite.

Annual Mean NO₂ 1994 - 1997

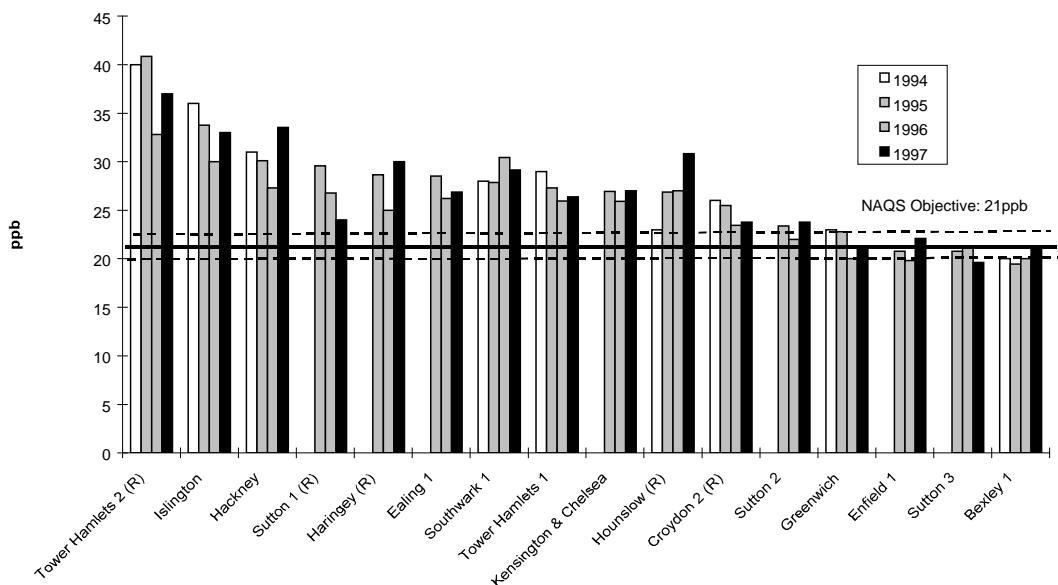


Figure 3.3: Annual Mean NO₂ (1994-1997)

- 3.4.6 Figure 3.3 demonstrates the inter-annual variability at the LAQN sites and, as expected, no trend in either direction can be seen between the pollution years 1994 to 1997. The majority of sites indicate 1997 to be the most polluted year, and therefore this will be chosen as the basis for the Stage 3 assessment.

3.5 Sulphur Dioxide (SO_2)

- 3.5.1 The annual average concentrations of SO_2 do not vary to any significant degree over the network.
- 3.5.2 The majority of the sites in the LAQN measured moderate SO_2 during 1997. High SO_2 was measured at Bexley, Castle Point and Sevenoaks (Scudders Hill). The NAQS objective was exceeded at the Castle Point site on Canvey Island in Essex only. This is almost certainly due to its proximity to industrial sources in the East Thames Corridor. Results from 1996 and 1997 are shown for comparison in Figure 3.4.

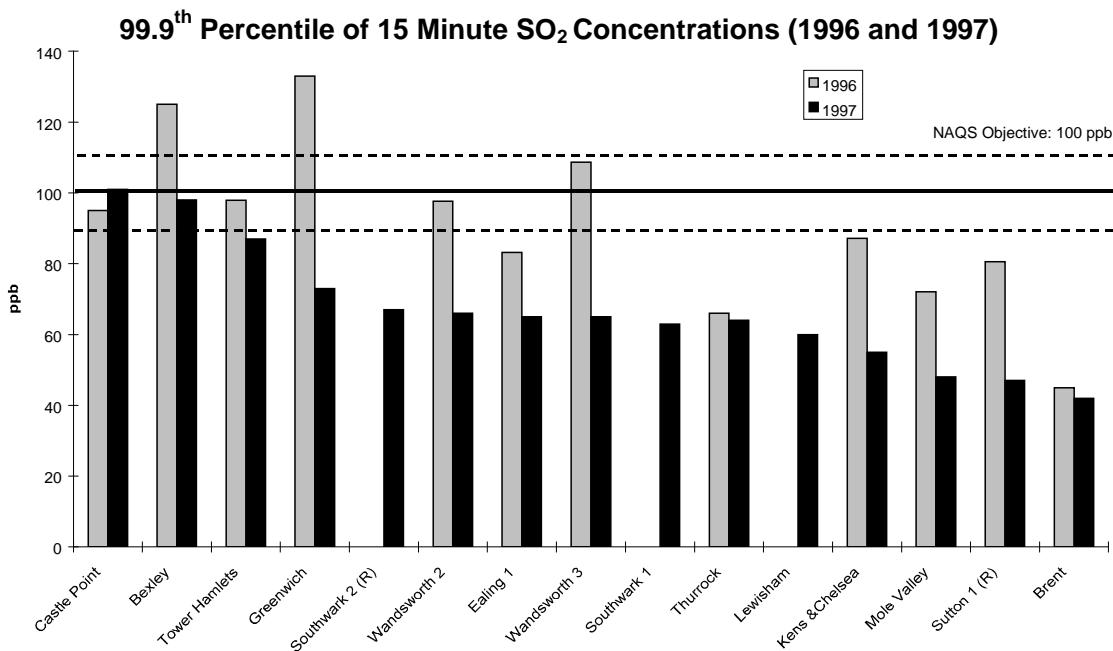


Figure 3.4: 99.9th Percentile of 15 Minute SO_2 Concentrations (1996-1997)

- 3.5.3 All sites except Castle Point show a reduction in 1997 compared with 1996. The NAQS objective is measured against the 99.9th percentile of 15 minutes averages during the year and is therefore mainly determined by a small number of plume grounding incidents. Although results for 1997 are very much less than 1996 at most sites, it is not possible to infer that it is solely due to a reduction in emissions. It is considered that meteorological factors will provide the most likely explanation for this reduction.
- 3.5.4 If the measurement uncertainty of 10 % is applied then it is not possible to state with certainty that Castle Point exceeded the objective or that Bexley was below the objective.
- 3.5.5 Comparison between 1996, 1997 and the year 1995 shows that the 'worst case' year for the east Thames area was 1995, with the highest result being Bexley (153 ppb as a 99.9th percentile of 15 minute averages). The largest sources of SO_2 are also found in this area and therefore the greatest impact expected in this area. On this basis 1995 was chosen for the Stage 3 assessment.

3.6 Particles (PM10)

- 3.6.1 All sites in the LAQN exceeded the NAQS objective during 1997. The variation between sites is considered to be due to differences in the directly emitted component, within the LAQN area, mainly from road transport. This is reflected in the results below, with the greatest exceedence of the objective being seen at roadside and central areas.

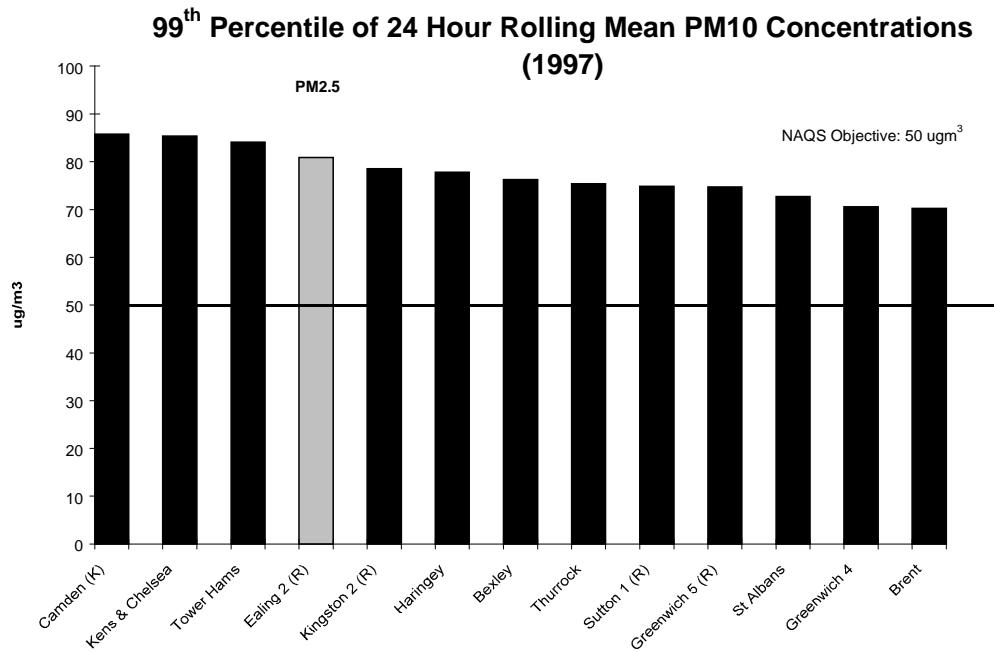


Figure 3.5: 99th Percentile of 24 Hour Rolling Mean PM10 Concentrations (1997)

- 3.6.2 Exceedences of the NAQS objective are more widespread than suggested here; the objective was also exceeded at all sites in the Kent Air Quality Monitoring Network. For comparison the results from the PM2.5 (a sub group of PM10) monitoring at the Ealing 2 roadside site have been included.
- 3.6.3 All sites would still exceed the objective even with a 10 % measurement uncertainty, since all measurements were far in excess of the objective.
- 3.6.4 An inter-annual comparison of data between 1995 and 1997 for the objective is shown in Figure 3.6. This shows that there was a marginal improvement in 1997 over 1996 results for most sites with 1995 results mostly either similar or below the 1997 results. 1996 was therefore chosen as the basis for the Stage 3 assessment.

99th Percentile of 24 Hour Rolling Mean Concentrations (1995-1997)

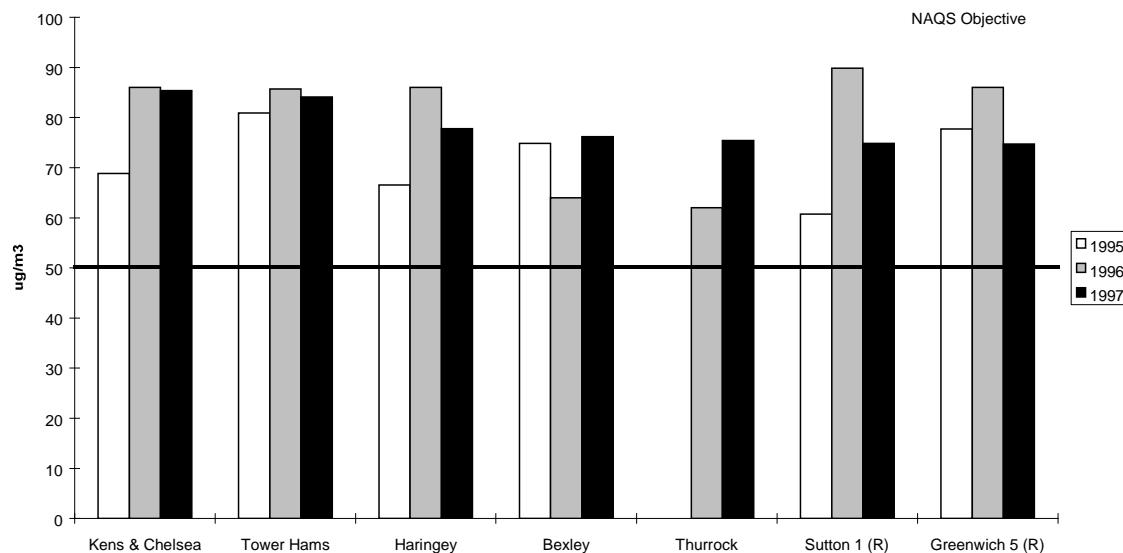


Figure 3.6: 99th Percentile of 24 Hour Rolling Mean PM10 Concentrations (1995-1997)

References

- Barratt, B (1998) **SEIPH The Kent Air Quality Monitoring Network Annual Report 1997**
- SEIPH (1995) **SEIPH Air Quality in London 1994**
- SEIPH (1996) **SEIPH Air Quality in London 1995**
- SEIPH (1997) **The AIM Project and Air Quality in London 1996**
- Stedman J (1998) **The Secondary Particle Contribution to Elevated PM10 Concentrations in the UK**