# Fourth Round Updating and Screening Assessment for London Borough of Ealing

**June 2009**

KING'S College LONDON
University of London

Ealing
www.ealing.gov.uk

**Acknowledgements**

The assistance of colleagues from the London Borough of Ealing is gratefully acknowledged in the production of this report.

**Contact at Ealing Council for enquiries regarding this report**

Dr John Freeman
Pollution – Technical Team
Regulatory Services Division
London Borough of Ealing
Perceval House
14-16 Uxbridge Road
London W5 2HL

E-mail: freemanj@ealing.gov.uk

# Executive Summary

The Council is required to review and assess air quality against the objectives in the Air Quality Regulations 2000 and amending regulations as part of a rolling three-year cycle ending in 2017. The air quality objectives to be assessed are for the following seven pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles ($PM_{10}$).

The role of the local authority Review and Assessment process is to identify any relevant areas where it is considered that the government's air quality objectives for the above air pollutants will be exceeded. The London Borough of Ealing has previously undertaken the earlier rounds of Review and Assessment of local air quality management and identified areas where some of the objectives are exceeded and where there is relevant public exposure.

This report concerns the fourth round Updating and Screening Assessment of air quality in the London Borough of Ealing area. It has re-examined pollution sources in its area in accordance with Defra LAQM guidance (released February 2009).

The report identifies that:

For carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide there is not a significant risk of the objectives being exceeded in the Council's area.

For nitrogen dioxide and particles $PM_{10}$ the Council has previously designated an AQMA across the Borough. The findings from this report indicate that the AQMA should be maintained.

In view of the findings from the report the Council will undertake the following actions:

1. Undertake consultation with the statutory and other consultees as required.

2. Maintain the existing and proposed monitoring and further extend the diffusion monitoring survey of those roads newly identified as being at risk.

3. Continue with the implementation of its Air Quality Action Plan in pursuit of the AQS objectives.

4. Prepare for the submission of its 2010 Progress Report.

This page has been left blank intentionally.

# CONTENTS

# List of Figures



# List of Tables

# 1. Introduction

## 1.1 Brief description of the London Borough of Ealing area

The London Borough of Ealing is situated in West London. It is an outer London Borough comprising a densely populated area with a population of just over 300,000. The Borough has seven main districts: Ealing, Hanwell, Acton, Southall, Greenford, Perivale and Northolt. The main centre of industry is at Park Royal, which is the largest industrial and business park in London. Approximately 50% of the estate is in Ealing. The Borough has a broad socio-economic range between generally affluent Ealing and less affluent Southall. The main roads that run through the Borough include A40, A406, A4020, A4127 and A4000. The main sources of air pollutants are the busy and congested roads. There are 108 Part B industrial and other minor processes that are regulated by the Council and no Part A installations in the Borough.

## 1.2 Purpose of report

This report provides the 2009 Updating and Screening Assessment of air quality for the London Borough of Ealing. The purpose of the report is to fulfil the Council's initial obligation under the fourth round review and assessment of air quality. In so doing it will determine whether or not a there is a risk that an air quality objective will be exceeded in the Borough and therefore whether or not the Council needs to undertake a Detailed Assessment of air quality.

Part IV of the Environment Act 1995 introduced new responsibilities to both national and local government throughout the UK. These responsibilities included the requirement upon the national government and devolved administrations to develop an Air Quality Strategy (AQS) for England, Wales, Scotland and Northern Ireland. The overall purpose of the AQS is to seek improvements in air quality for the benefit of public health. The most recent AQS was produced in 2007.

Local air quality management (LAQM) was also introduced by the Environment Act 1995. Under this local authorities are required to periodically review and assess air quality across their areas. The AQS confirms that LAQM provides a major component of the government's plan for air quality improvement across the UK.

Air quality objectives have been set for those air pollutants deemed to be of most concern and relevance by the AQS. Seven of these pollutants are included under the LAQM regime and regulations for these were introduced. The applicable air quality objectives for the relevant pollutants are given in Table 1. Additional objectives have been set for ozone, polyaromatic hydrocarbons (PAHs) and $PM_{2.5}$, although these have been deemed the responsibility of national government and therefore not applicable to the LAQM process.

The objectives are all based on health-based standards using current scientific advice taking into account the likely cost and benefits, as well as feasibility and practicality in meeting the objectives. The objectives are mostly in line with limit values prescribed by EU Directive, although additional objectives (including bringing forward the date for compliance) were included for some pollutants.

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928) and The Air Quality (England) (Amendment) Regulations 2002 (SI 3043) (see Table 1). This table shows the objectives in units of microgrammes per cubic metre $\mu g\ m^{-3}$ (and milligrammes per cubic metre, $mg\ m^{-3}$ for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

**Table 1** Air quality objectives (from the Air Quality Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002) applicable to the London Borough of Ealing area

| Pollutant | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Benzene** | 16.25 $\mu$g m$^{-3}$ | Running annual mean | 31.12.2003 |
| | 5.00 $\mu$g m$^{-3}$ | Annual mean | 31.12.2010 |
| **1,3-Butadiene** | 2.25 $\mu$g/m$^3$ | Running annual mean | 31.12.2003 |
| **Carbon monoxide** | 10.0 mg m$^{-3}$ | Maximum daily running 8-hour mean | 31.12.2003 |
| **Lead** | 0.5 $\mu$g m$^{-3}$<br>0.25 $\mu$g m$^{-3}$ | Annual mean<br>Annual mean | 31.12.2004<br>31.12.2008 |
| **Nitrogen dioxide ($NO_2$)** | 200 $\mu$g m$^{-3}$ not to be exceeded more than 18 times a year<br>40 $\mu$g m$^{-3}$ | 1-hour mean<br>Annual mean | 31.12.2005<br>31.12.2005 |
| **Particles (gravimetric)** | 50 $\mu$g m$^{-3}$, not to be exceeded more than 35 times a year<br>40 $\mu$g m$^{-3}$ | 24-hour mean<br>Annual mean | 31.12.2004<br>31.12.2004 |
| **Sulphur dioxide ($SO_2$)** | 350 $\mu$g m$^{-3}$, not to be exceeded more than 24 times a year<br>125 $\mu$g m$^{-3}$, not to be exceeded more than 3 times a year<br>266 $\mu$g m$^{-3}$, not to be exceeded more than 35 times a year | 1-hour mean<br>24-hour mean<br>15-minute mean | 31.12.2004<br>31.12.2004<br>31.12.2005 |

(Note – the provisional $PM_{10}$ objectives were not adopted in England as part of the revised 2007 AQS).

### 1.4 Summary of previous Reviews and Assessments of Air Quality in Ealing Borough

The Council completed its first round review and assessment of air quality during 2000. This found that the main issue with respect to local air quality was emissions emanating from road vehicles, specifically leading to predictions that the $NO_2$ and $PM_{10}$ AQS objectives would be exceeded. As a result of these findings the Council designated an Air Quality Management Area (AQMA) across the Borough for both $NO_2$ and $PM_{10}$ in December 2000. The findings for the other five LAQM pollutants however were that the relevant AQS objectives were likely to be met and therefore an AQMA for these was not needed.

As a result of designating its area an AQMA the Council then undertook a further assessment to refine understanding and inform its proposed air quality actions. These were set out in the Council's Air Quality Action Plan, which was produced in 2003.

The Council has also undertaken subsequent review and assessments of air quality. An additional risk was identified relating to $PM_{10}$ in the Horn Lane area of Acton. This related to the dust generated from industrial and commercial activities in the area. A Detailed Assessment of $PM_{10}$ in Horn Lane was therefore undertaken.

The third round of review and assessment, which started in 2006, confirmed that the air quality objectives for $NO_2$ and $PM_{10}$ were exceeded in the Borough (based on the Council's monitoring results). Based on the findings from these assessments the Council has maintained its AQMA as originally designated and continues to update and implement its Action Plan in pursuit of the AQS objectives.

### 1.5 Fourth Round Review and Assessment

This report concerns the fourth round of LAQM review and assessment (R & A), which is part of a three yearly cycle for review and assessment ending in 2017. It follows the new prescribed guidance given in Technical Guidance LAQM: TG(09) (Defra, 2009a), supported where necessary by new LAQM Tools. The guidance is designed to help local authorities undertake their duties under the Environment Act 1995 to review and assess air quality in their area from time to time.

It is recognised that most of the original TG03 guidance is still relevant, although some parts required revision to reflect the most up-to-date understanding, and to draw upon experience gained during the third round of Review and Assessment.

Updated guidance has been prepared to cover the following issues:

Background pollution concentrations and future year adjustments

New emission tools

Monitoring of $PM_{10}$ and use the volatile correction model

Emissions from narrow roads, railways, poultry farms, biomass combustion

Data ratification procedures

$NO_x$:$NO_2$ relationships

In addition, the Updating and Screening Assessment (USA) checklists provided in TG09 have been revised and re-issued to take account of all necessary changes.

The guidance requires a phased approach, as with the previous guidance and is undertaken source by source rather than using pollutant specific assessment. This however still requires local authorities to undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. It is considered that not every authority will need to proceed beyond the first step of the fourth round of review and assessment.

The findings from the USA determine the need for the Council to undertake the next steps of local air quality management *i.e.* a Detailed Assessment and then potentially progressing to the declaration of an air quality management area (AQMA) with a need for an air quality action plan (AQAP).

### 1.6 Updating Screening and Assessment – important considerations

As with the previous USAs, relevant considerations and sources of data include the following:

#### *Monitoring Data*

The Council's monitoring of air quality in its area provides an important source of information for understanding air quality in its area. This benefit can be further enhanced if the monitoring is undertaken as part of a wider e.g. national or regional network. It is however important to ensure that there is confidence in the data being produced and used. Hence QA/QC issues are considered and the data produced also need to be properly validated and preferably ratified.

#### *Background Pollutant Concentrations*

These are produced nationally for all local authorities in the UK and provide the estimated background annual mean air pollutant concentrations at a 1 km x 1 km grid resolution. For $NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$ for the 2006 base year with projections for all years to 2020. The data are available from http://www.airquality.co.uk/archive/laqm/tools.php

### *Industrial Sources*

Both the Environment Agency and the Council regulate industrial sources under the Environmental Permitting Regulations 2007. The Environment Agency is responsible for the largest industrial processes (Part A1 installations), whilst the Council is mainly responsible for smaller Part B and A2 processes. Those small industrial processes that fall outside of Part B/A2 regulation can also be of interest to LAQM. Details of the processes and installations are available from the Council's Public Register (see tables in the Appendix). Since the previous USA, four Part B vehicle re-sprayers and powder coating operations no longer require permits or have closed. New permits for concrete batching plants and mobile concrete crusher, plus forty-five dry cleaners have been issued. None of these changes however are considered to be important for the purposes of this USA.

### *Road Traffic*

Updated details of road traffic movements across the Borough have been made available from the London Atmospheric Emissions Inventory (2006) and the Council itself to check for significant changes from the previous USA.

## 1.7 Relevant exposure

The objectives relate to public exposure to the pollutants. More specifically any areas that may exceed the objectives should relate to "the quality of air at locations which are situated outside of buildings or other manmade structures above or below ground, and where members of the public are regularly present" (from the Air Quality regulations). TG09 advises further that the assessment should focus on those locations where members of the public are likely to be regularly present and are likely to be exposed over the period of the objective.

# 2. New Monitoring Data

## 2.1 Summary of Monitoring Undertaken

### 2.1.1 Automatic monitoring

The Council undertakes continuous monitoring at the following long-term sites:

- *Ealing Town Hall Air Quality Monitoring Station* (Ealing 1) – an urban background site located at Ealing Town Hall (towards the centre of the Borough). This monitoring site started operating in 1995 and is operated to London Air Quality Network (LAQN) standards. The data produced have traceability to national standards and the operational procedures defined for the LAQN are similar to AURN. **Nitrogen dioxide**, **sulphur dioxide** and ozone are monitored at the site.

- *Acton Town Hall Air Quality Monitoring Station* (Ealing 2) – a site located 3m from the roadside at Acton Town Hall, at the junction of High Street and Winchester Street. This in the east of the Borough and therefore closer to central London. This monitoring site opened in 1996 and is also operated to London Air Quality Network (LAQN) standards. The site monitors **carbon monoxide**, **nitrogen dioxide**, **particles ($PM_{10}$)** by TEOM, fine particles ($PM_{2.5}$) by TEOM and ozone. The site represents relevant exposure.

- *Ealing 2 FDMS* – this is the same site as above with **$PM_{10}$** monitored using the Filter Dynamics Measurement System (FDMS), which meets the European reference equivalent criteria. This instrument was installed in April 2005.

- *Hanger Lane Air Quality Monitoring Station* (Ealing 6) – a roadside site located 3m from the kerb, at its junction with Twyford Abbey Road, London NW10 on the Hanger Lane Gyratory. This towards the northeast of the Borough. The site opened in 2003 and is operated to LAQN standards. The site monitors **nitrogen dioxide**.

- *Blair Peach Primary School Air Quality Monitoring Station* (Ealing 7) – an urban background site located in Southall (towards the southwest of the Borough). It is located at the Blair Peach Primary School in Beaconsfield Road, Southall. This monitoring site started operating in 2004 and is operated to LAQN standards. **Nitrogen dioxide** and **particles ($PM_{10}$)** by TEOM are monitored at the site.

- *Horn Lane Air Quality Monitoring Station* (Ealing 8) – an industrial site located along Horn Lane in the east of the Borough. This monitoring site started operating in 2005 and is operated to LAQN standards. The site monitors **particles ($PM_{10}$)** by TEOM.

- *Allington Close Air Quality Monitoring Station* (Ealing 10) – an urban background site located in Greenford (towards the northwest of the Borough) close to several industrial particulate sources. This monitoring site started operating in March 2008 and closed in April 2009. It was operated to LAQN standards. The site monitored **particles ($PM_{10}$)** by TEOM.

The Council also operated a site in Court Way in Acton (Ealing 9) between April 2005 and June 2006. The sample inlet was located 15 m from the kerb of the A40. The site monitored nitrogen dioxide (note - the results for this site can be found in previous Council reports).

### 2.1.2 Non automatic monitoring for nitrogen dioxide

The Council has monitored nitrogen dioxide in its area, using passive diffusion tubes, since the 1990's. The monitoring survey for 2008 was based on 89 locations, including 10 sites with triplicate tubes. In total there were 109 diffusion tube monitoring sites, three of which (tubes 51, 55 and 89) were co-located with some of Ealing's continuous sites (i.e. Ealing 1, 2 and 7 respectively). The use of the triplicate tubes acts as a quality control measure and the co-located sites enable a comparison at the site and between the two methods of monitoring so that local bias adjustment factors for the

diffusion tubes can be calculated. Figure 9 to 11 in the appendix show the location of the monitoring sites.

The details of the sites are given in Table 2. The background and near road locations chosen are either close to residential facades (marked F) along minor roads; hence the worst-case location is noted as N (i.e. no) or sited on a lamppost (marked L) and then indicated as Y (i.e. yes). The kerbside locations are all sited at worst-case locations and are sited on lampposts (marked L) close to kerbsides. The roadside locations sited on lampposts (marked L), other street furniture (marked O) or facades (marked F) are also all considered worst case locations. In all cases the diffusion tubes are mounted using spacers and sited 2.5 to 3.1m above ground level (apart from tubes 6.1, 6.2, 6.3 and 6.4, which are sited on the ground, first, second and third floors of one residential block).

**Table 2 Details of $NO_2$ diffusion tube sites**

| Site No. | Site Type | Easting | Northing | Relevant exposure (Y/N with distance (m) to relevant exposure) | Distance to nearest road (m) | Worst-case location |
|---|---|---|---|---|---|---|
| 1 | Roadside | 521587 | 182684 | Y (F) | 5.00 | N |
| 2 | Background | 521238 | 181942 | Y (F) | 2.20 | N |
| 3 | Roadside | 520724 | 181552 | N (L) | 2.00 | Y |
| 4 | Near Road | 520532 | 181517 | Y (F) | 11.00 | N |
| 5 | Background | 521139 | 181436 | Y (F) | 7.00 | N |
| 6.1 | Near Road | 519997 | 182178 | Y (F) | 11.00 | N |
| 6.2 | Near Road | 519997 | 182178 | Y (F) | 11.00 | N |
| 6.3 | Near Road | 519997 | 182178 | Y (F) | 11.00 | N |
| 6.4 | Near Road | 519997 | 182178 | Y (F) | 11.00 | N |
| 7 | Background | 518600 | 183000 | Y (L) | 1.80 | Y |
| 8 | Background | 518970 | 182964 | Y (L) | 33.00 | Y |
| 9 | Roadside | 519117 | 183379 | N (L) | 2.10 | Y |
| 10 | Background | 521557 | 180996 | Y (F) | 11.00 | N |
| 11 | Kerbside | 521381 | 180946 | N (L) | 0.60 | Y |
| 12.1 | Roadside | 521602 | 180856 | Y (L) | 5.00 | Y |
| 12.2 | Roadside | 521602 | 180856 | Y (L) | 5.00 | Y |
| 12.3 | Roadside | 521602 | 180856 | Y (L) | 5.00 | Y |
| 13 | Background | 521112 | 180617 | Y (F) | 29.00 | N |
| 14 | Background | 521761 | 180132 | Y (L) | 4.00 | Y |
| 15 | Near Road | 521088 | 180046 | N (L) | 0.60 | Y |
| 17 | Near Road | 520754 | 180316 | Y (F) | 8.00 | N |
| 19 | Background | 519883 | 180459 | Y (L) | 1.00 | Y |
| 20 | Roadside | 519928 | 180173 | Y (F) | 3.00 | N |
| 21 | Near Road | 520128 | 180016 | Y (F) | 10.00 | N |
| 22 | Kerbside | 519547 | 179948 | N (L) | 0.50 | Y |
| 23 | Near Road | 520180 | 180896 | Y (F) | 6.00 | N |
| 24 | Roadside | 516089 | 182400 | Y (F) | 5.00 | N |
| 25 | Near Road | 515255 | 183098 | Y (L) | 1.20 | Y |
| 26 | Roadside | 514866 | 183116 | Y (L) | 2.50 | Y |
| 27 | Near Road | 514259 | 182234 | Y (F) | 8.00 | N |
| 28 | Background | 513182 | 182741 | Y (F) | 16.00 | N |
| 29 | Background | 512603 | 182837 | Y (L) | 28.50 | Y |
| 30 | Roadside | 512108 | 183540 | N (L) | 0.50 | Y |
| 32 | Background | 512499 | 183805 | Y (L) | 0.50 | Y |
| 33 | Background | 512050 | 184073 | Y (O) | 165.00 | N |
| 34 | Kerbside | 517887 | 180914 | N (L) | 0.60 | Y |

| Site No. | Site Type | Easting | Northing | Relevant exposure (Y/N with distance (m) to relevant exposure) | Distance to nearest road (m) | Worst-case location |
|---|---|---|---|---|---|---|
| 35 | Kerbside | 519373 | 179593 | N (L) | 0.70 | Y |
| 36 | Background | 515242 | 180158 | Y (F) | 12.00 | N |
| 37 | Background | 514705 | 180022 | Y (L) | 0.80 | Y |
| 38 | Background | 515477 | 181081 | Y (F) | 43.00 | N |
| 39 | Roadside | 512206 | 180522 | N (L) | 5.00 | Y |
| 40.1 | Near Road | 512673 | 180069 | Y (F) | 10.00 | N |
| 40.2 | Near Road | 512673 | 180069 | Y (F) | 10.00 | N |
| 40.3 | Near Road | 512673 | 180069 | Y (F) | 10.00 | N |
| 41 | Near Road | 512657 | 179712 | N (L) | 12.00 | Y |
| 44 | Background | 516166 | 183578 | Y (F) | 44.70 | N |
| 45 | Roadside | 520915 | 182464 | Y (F) | 6.00 | N |
| 46 | Roadside | 512690 | 183983 | N (L - 10m) | 3.00 | Y |
| 47 | Background | 513229 | 181513 | Y (L) | 44.00 | Y |
| 48 | Background | 514740 | 180643 | Y (F) | 30.00 | N |
| 49 | Near Road | 515680 | 180360 | Y (F) | 6.00 | N |
| 50 | Roadside | 512768 | 180400 | Y (F) | 4.00 | N |
| 51.1 | Background | 517534 | 180737 | Y (F) | 38.00 | N |
| 51.2 | Background | 517534 | 180737 | Y (F) | 38.00 | N |
| 51.3 | Background | 517534 | 180737 | Y (F) | 38.00 | N |
| 52 | Near Road | 517440 | 180677 | Y (F) | 14.00 | N |
| 53 | Roadside | 517644 | 180613 | Y (F) | 2.70 | N |
| 54 | Background | 517750 | 178860 | Y (F) | 32.00 | N |
| 55.1 | Roadside | 520306 | 180055 | N (O) | 5.00 | N |
| 55.2 | Roadside | 520306 | 180055 | N (O) | 5.00 | N |
| 55.3 | Roadside | 520306 | 180055 | N (O) | 5.00 | N |
| 56 | Roadside | 518540 | 182700 | N (L) | 1.00 | Y |
| 57 | Background | 518577 | 179865 | Y (L) | 0.60 | Y |
| 58 | Kerbside | 520481 | 178826 | N (L - 8m) | 0.70 | Y |
| 59 | Background | 518153 | 178709 | Y (F) | 138.00 | N |
| 60 | Near Road | 521573 | 180932 | Y (F) | 9.00 | N |
| 61 | Background | 516703 | 179728 | Y (L) | 0.40 | Y |
| 62 | Roadside | 516700 | 180522 | N (L) | 1.10 | Y |
| 63 | Background | 516992 | 181698 | Y (F) | 20.00 | N |
| 64 | Background | 517072 | 182912 | Y (F) | 46.50 | N |
| 65 | Roadside | 516368 | 182978 | Y (F) | 5.00 | N |
| 66 | Near Road | 518633 | 181314 | N (L) | 0.70 | Y |
| 67.1 | Background | 514753 | 183342 | Y (F) | 64.00 | N |
| 67.2 | Background | 514753 | 183342 | Y (F) | 64.00 | N |
| 67.3 | Background | 514753 | 183342 | Y (F) | 64.00 | N |
| 68 | Near Road | 515395 | 185292 | Y (F) | 5.30 | Y |
| 69 | Roadside | 516858 | 184691 | Y (F) | 2.40 | N |
| 70 | Near Road | 513794 | 185348 | Y (F) | 9.00 | N |
| 71 | Roadside | 514102 | 184521 | N (L - 7m) | 5.20 | Y |
| 72 | Roadside | 513587 | 178915 | N (L - 7m) | 1.50 | Y |
| 73.1 | Kerbside | 511468 | 178898 | Y (L) | 0.50 | Y |
| 73.2 | Kerbside | 511468 | 178898 | Y (L) | 0.50 | Y |
| 73.3 | Kerbside | 511468 | 178898 | Y (L) | 0.50 | Y |
| 74 | Kerbside | 511173 | 179203 | N (L - 6m) | 0.60 | Y |
| 75 | Near Road | 516277 | 178882 | Y (F) | 10.00 | N |

| Site No. | Site Type | Easting | Northing | Relevant exposure (Y/N with distance (m) to relevant exposure) | Distance to nearest road (m) | Worst-case location |
|---|---|---|---|---|---|---|
| 76 | Near Road | 516100 | 179300 | N (O) | 10.00 | Y |
| 77 | Near Road | 512753 | 180478 | Y (F) | 7.00 | N |
| 78 | Roadside | 519275 | 180869 | N (L) | 1.60 | Y |
| 79 | Background | 512234 | 179201 | Y (F) | 16.00 | N |
| 80 | Roadside | 521549 | 180923 | Y (F) | 4.00 | N |
| 81 | Near Road | 521391 | 180922 | Y (F) | 6.00 | N |
| 82 | Near Road | 521173 | 180981 | Y (F) | 10.00 | N |
| 83 | Roadside | 521646 | 180800 | Y (F) | 4.00 | N |
| 84 | Background | 521200 | 179500 | Y (F) | 8.00 | N |
| 85.1 | Roadside | 518541 | 182707 | Y (F) | 4.00 | N |
| 85.2 | Roadside | 518541 | 182707 | Y (F) | 4.00 | N |
| 85.3 | Roadside | 518541 | 182707 | Y (F) | 4.00 | N |
| 86 | Background | 521305 | 181966 | Y (F) | 5.00 | N |
| 87 | Near Road | 520780 | 182775 | Y (F) | 6.00 | N |
| 88 | Roadside | 514985 | 183770 | Y (F) | 2.30 | N |
| 89.1 | Background | 511680 | 180071 | Y (O) | 50.00 | N |
| 89.2 | Background | 511680 | 180071 | Y (O) | 50.00 | N |
| 89.3 | Background | 511680 | 180071 | Y (O) | 50.00 | N |
| 90.1 | Background | 512514 | 179795 | Y (L) | 1.50 | Y |
| 90.2 | Background | 512514 | 179795 | Y (L) | 1.50 | Y |
| 90.3 | Background | 512514 | 179795 | Y (L) | 1.50 | Y |
| 91.1 | Roadside | 516405 | 180710 | N (L) | 2.00 | Y |
| 91.2 | Roadside | 516405 | 180710 | N (L) | 2.00 | Y |
| 91.3 | Roadside | 516405 | 180710 | N (L) | 2.00 | Y |

The diffusion tubes used were analysed by Gradko International using a preparation method of 20% TEA in water. In the most recent round of Annual Performance Criteria for $NO_2$ Diffusion Tubes used in LAQM (Defra, 2009b), the laboratory demonstrated good performance in a QA/QC scheme for analysis of $NO_2$ diffusion tubes. Gradko International participates in the Workplace Analysis Scheme for Proficiency (WASP), which is an independent analytical performance testing scheme. The scheme is an important QA/QC exercise for laboratories supplying diffusion tubes to local authorities for use in the context of Local Air Quality Management (LAQM). The Health and Safety Laboratory (HSL) operate the WASP scheme independently and the cost of operation is borne by the laboratories, which pay an annual fee to HSL.

The 2008 unbiased results of the diffusion tube monitoring in the Borough are given in the Appendix (see Table 12).

Monitoring using diffusion tubes has advantages over continuous monitoring in that it is far cheaper and therefore more sites can be established and assessed. The main disadvantage is that the method is less precise and accurate than continuous monitoring. The recommended methods to reduce these errors include the use of good QA/QC practices and bias adjustment factors that are derived from co-location studies between continuous analysers and diffusion tubes.

The bias adjustment factors are specific to each year, analysing laboratory, method of analysis and location. The factors are therefore also limited to the data supplied. The Review and Assessment website advises that “in many cases, using an overall correction factor derived from as many co-location studies as possible will provide the ‘best estimate’ of the ‘true’ annual mean concentration, it is important to recognise that there will still be uncertainty associated with this bias adjusted annual mean. One analysis has shown that the uncertainty for tubes bias adjusted in this way is ± 20% (at 95% confidence level). This compares with a typical value of ± 10% for chemiluminescence monitors subject to appropriate QA/QC procedures.”

A default bias adjustment factor for 2008 has been obtained from the government's Review and Assessment website (based on the March 2009 spreadsheet). The default factor is based on statistical analyses of reported data provided by other local authorities. The factor for 2008, based on 11 studies, indicates that the diffusion tube results slightly over estimate continuously monitored concentrations.

From the default spreadsheet, the precision for the 2008 studies indicates mostly good performance from the co-location studies that are included. The term "precision" indicates how well the diffusion tubes produce similar results from the duplicate and triplicate studies undertaken. The criterion is somewhat arbitrary and it reflects both the laboratory's performance in preparing and analysing the tubes, plus the handling of the tubes in the field. The precision is based on an assessment of the coefficient of variation. "Good" precision is defined as achieving a coefficient of variation less than 20% for eight or more periods in a year and the average is less than 10%.

The local co-location studies using triplicate tubes were undertaken over 12 months at the Ealing 1 background site in Ealing, Ealing 2 roadside site Acton and Ealing 7 background site in Southall. The diffusion tubes were all located within 0.5m of the inlet sampler of the chemiluminescent analysers at the continuous sites. The studies compared equivalent exposure periods, although the continuous results are provisional. The results for the three sites are as follows:

Ealing 1 – the data precision had 10 out of 11 monitoring periods having a CV (coefficient of variation) score of less than 20 and a mean CV that just exceeded 10, indicating that there was overall poor data precision. The data capture for the continuous analyser was good (i.e. > 90%). The local bias adjustment factor indicates that the diffusion tube results greatly over estimate continuously monitored concentrations, based on all data with good precision. From a preliminary investigation it is not clear why there is such a large difference between sets of results for this site for this year. Previous years have not found similar problems. A further investigation is necessary to try to determine the reason for this difference.

Ealing 2 – there was good data precision with 10 out of 12 monitoring periods having a CV (coefficient of variation) score of less than 20. The data capture for the continuous analyser was poor (i.e. 87%). The local bias adjustment factor indicates that the diffusion tube results slightly under estimate continuously monitored concentrations, based on all data with good precision.

Ealing 7 – the data precision had 10 out of 11 monitoring periods having a CV (coefficient of variation) score of less than 20 and a mean CV that exceeded 10, indicating that there was overall poor data precision. The data capture for the continuous analyser was poor (i.e. 78%). The local bias adjustment factor indicates that the diffusion tube results slightly over estimate the continuously monitored concentrations, based on all data with good precision only.

| 2008 | Bias adjustment factor |
|---|---|
| *Local (EA1) background* | *0.68* |
| Local (EA2) roadside | 1.03 |
| Local (EA7) background | 0.98 |
| Default | 0.92 |

The results of a nation-wide survey of nitrogen dioxide diffusion tube co-location studies were further used to improve current understanding of diffusion tube bias (AQC, 2006). The data suggested that tubes close to a road were more likely to underestimate concentrations, once they have been adjusted for laboratory bias, and conversely tubes further away from roads were more likely to overestimate concentrations. (Note this is similar to the above local findings reported here).

Further analysis of the results suggested that it was not the distance from roads that mattered; rather it was the different concentrations of nitric oxide, nitrogen dioxide and ozone in the atmosphere. The different concentrations influenced the chemistry taking place within the diffusion tube, in particular the formation of additional nitrogen dioxide from a reaction of ozone with nitric oxide.

A relationship was identified between diffusion tube bias and the measured annual mean nitrogen dioxide concentration that can be used to further adjust the diffusion tube result. The effect of this 'tube-chemistry' adjustment depends on the measured concentration: thus a laboratory bias adjusted result of 20.0 would become 18.1 µg $m^{-3}$ after adjustment for bias due to tube chemistry. A value of 40.0 µg $m^{-3}$ would remain at 40.0 µg $m^{-3}$ and 60.0 µg $m^{-3}$ would become 65.1 µg $m^{-3}$. As shown the effect of this adjustment is minimal at concentrations close to the objective of 40.0 µg $m^{-3}$ and so it will not have a material effect on exceedences of the objective identified using diffusion tubes. Although adjusting for tube chemistry can reduce the uncertainty of diffusion tube results, it was not however recommended that this adjustment be applied routinely for the reporting of results.

The choice of bias factor for use is not straightforward; hence the two factors (local and default) are reported above to provide context. Box 3.3 of the TG 09 guidance provides some suggestions as to which factor might be the most appropriate. In this instance the unusual result for the Ealing 1 site rules out its use. For both other local sites the data capture for the continuous analyser was less than 90%. In this instance it is considered that the default factor may be more appropriate.

### 2.1.3 Non-automatic monitoring for benzene

In addition to the $NO_2$ diffusion tube monitoring the Council also undertakes the monitoring of benzene using passive diffusion tubes at three sites. The tubes are supplied and analysed by Gradko International Ltd, a UKAS accredited laboratory. The Council however does not operate continuous analyser for benzene and hence no bias correction has been undertaken.

The monitored sites are all at roadsides and co-located with $NO_2$ diffusion tube sites; these are the three sites at Acton, Northolt and on the Hanger Lane gyratory (site numbers 55, 46 and 85 in Table 2).

## 2.2 Comparison of Monitoring Results with AQ Objectives

### 2.2.1 Nitrogen Dioxide

The results for the four continuous sites operated in the Borough of Ealing are shown in Table 3 (for the years 2003 to 2008 inclusive). The results include details relating to the annual mean and daily mean objectives, as well as data capture. All the data reported are fully ratified apart from 2008, part of which is still provisional. Data capture exceeded 75% for all years reported at all sites, other than Ealing 6 in 2003 (year of opening), 2004, 2007 and 2008 when there were instrument problems as reported in the Council's most recent AQ Progress Report. Ealing 7 also had reduced data capture in 2004, which was the year of opening and 2007 when there was 74% data capture at the site.

**Table 3** $NO_2$ continuous monitoring in Ealing Borough (2003–2008)

| LAQN site | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| Ealing 1 | Annual mean | ***43*** | **41** | 39 | **40** | 39 | **40** |
| *(Urban background)* | No of hours >200 µg $m^{-3}$ | *0* | 0 | 0 | 0 | 8 | 1 |
| | Data capture % | *86* | 99 | 99 | 91 | 97 | 99 |
| Ealing 2 | Annual mean | **62** | **55** | **58** | **63** | **57** | *59* |
| (*Roadside)* | No of hours >200 µg $m^{-3}$ | 3 | 0 | 6 | **29** | **31** | ***45*** |
| | Data capture % | 93 | 91 | 93 | 95 | 94 | *87* |
| Ealing 6 | Annual mean | *91* | ***98*** | ***93*** | ***95*** | *90* | *103* |
| (*Roadside)* | No of hours >200 µg $m^{-3}$ | *6* | ***93*** | ***157*** | ***244*** | ***64*** | ***84*** |
| | Data capture % | *5* | *73* | *88* | *86* | *45* | *22* |
| Ealing 7 | Annual mean | | *39* | 34 | 33 | *31* | *31* |
| *(Urban background)* | No of hours >200 µg $m^{-3}$ | | *0* | 0 | 0 | *0* | *0* |
| | Data capture % | | *24* | 95 | 93 | *74* | *77* |

(Note – italics indicates < 90% data capture)

The results indicate that the annual mean objective was easily exceeded at the two roadside sites for all years monitored. Previously the highest concentrations of $NO_2$ arose in 2003 (for the sites with full data capture), this level was however exceeded in 2006 at Ealing 2 site. At the background site at Ealing 1, 2003 remains the year with highest concentrations. This site exceeded the annual mean objective in 2003, 2004, 2006 and 2008, with both 2005 and 2007 recording concentrations just below the objective. The background Ealing 7 site in Southall met the objective for all years reported.

The hourly objective was exceeded at the two roadside sites; at the Ealing 6 site located at Hanger Lane it was easily exceeded, for all years (apart from 2003; the site opened in the latter part of that year) and despite only reduced data capture in the two most recent years. The Ealing 2 site in Acton previously met the objective up to 2005; however since then it has exceeded the objective, with the highest number of periods exceeding the one hour standard occurring in 2008. There were also 8 periods that exceeded the hourly standard of 200 µg $m^{-3}$ in 2007 at the background site in Ealing. For other years the standard has mostly not been exceeded. The results provide some evidence to confirm that emissions of $NO_2$ directly emitted from road vehicles have increased (Carslaw D.C and Beevers, S. D, 2005 and AQEG, 2007).

In addition a widespread primary pollution episode arose in December 2007. At this time weather conditions were cold and calm, with very light winds. An initial analysis suggests that this was the most significant nitrogen dioxide incident for 10 years, when $NO_2$ was elevated across the region, The hourly mean AQS of not more than 18 hours per year above 200 µg $m^{-3}$ was breached at 9 other sites across London, and equalled at 2 sites, on the basis of measurements during this episode alone. The west and central areas of London saw the most elevated levels.

Rolling annual mean plots can be used to indicate changing annual concentrations over time. The use of rolling annual mean concentrations, based on averaged hourly means, largely removes any seasonal influences and provides a guide to changing trends. $NO_2$ is a mainly secondary pollutant formed by chemical reactions in the atmosphere from $NO_x$ emissions produced by combustion sources. These reactions also involve ozone, which is scavenged by NO. The relationship between $NO_x$ and $NO_2$ however is non linear and it is also further complicated by direct emissions of $NO_2$ from some road vehicles.

The rolling annual mean plots of both $NO_x$ and $NO_2$ concentrations of the Ealing sites are shown in Figures 1 and 2 respectively. This analysis is for the period from 1996 through to 2008 (including some provisional data for the latter period).

**Figure 1** Rolling annual mean $NO_x$ trends for Ealing sites (1996 to 2008)

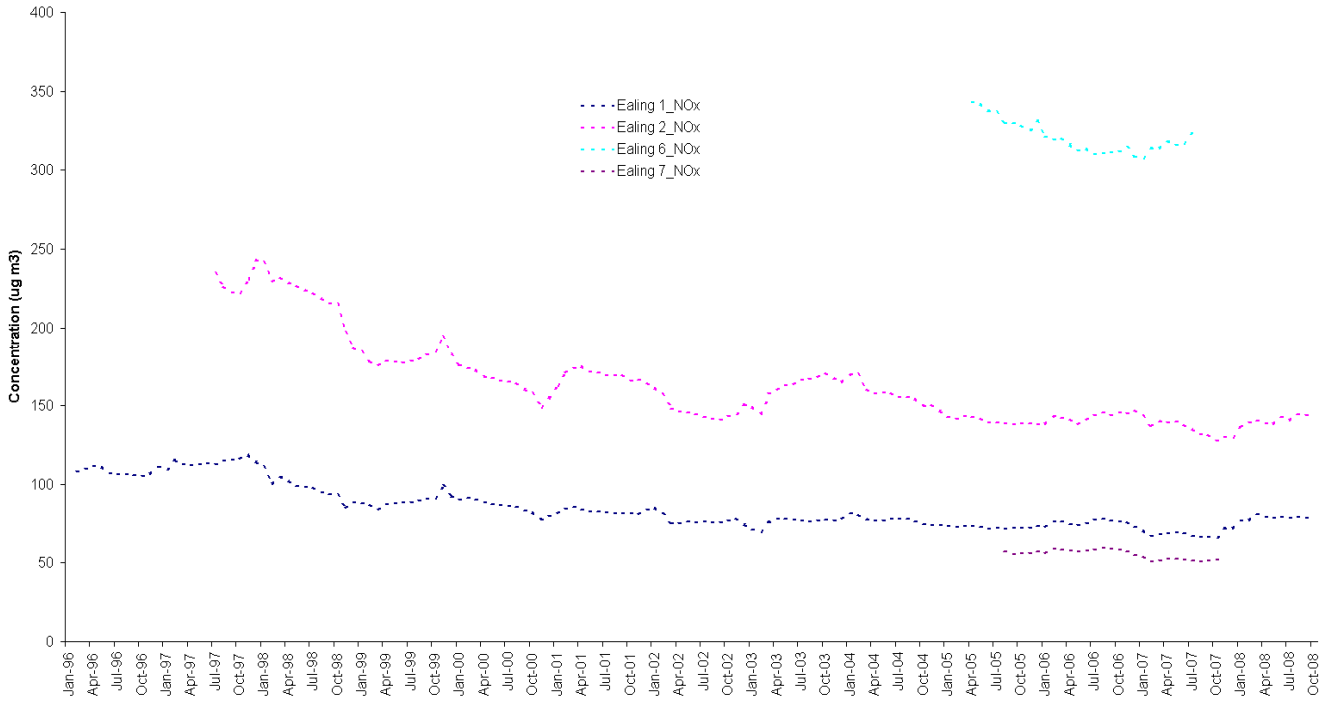
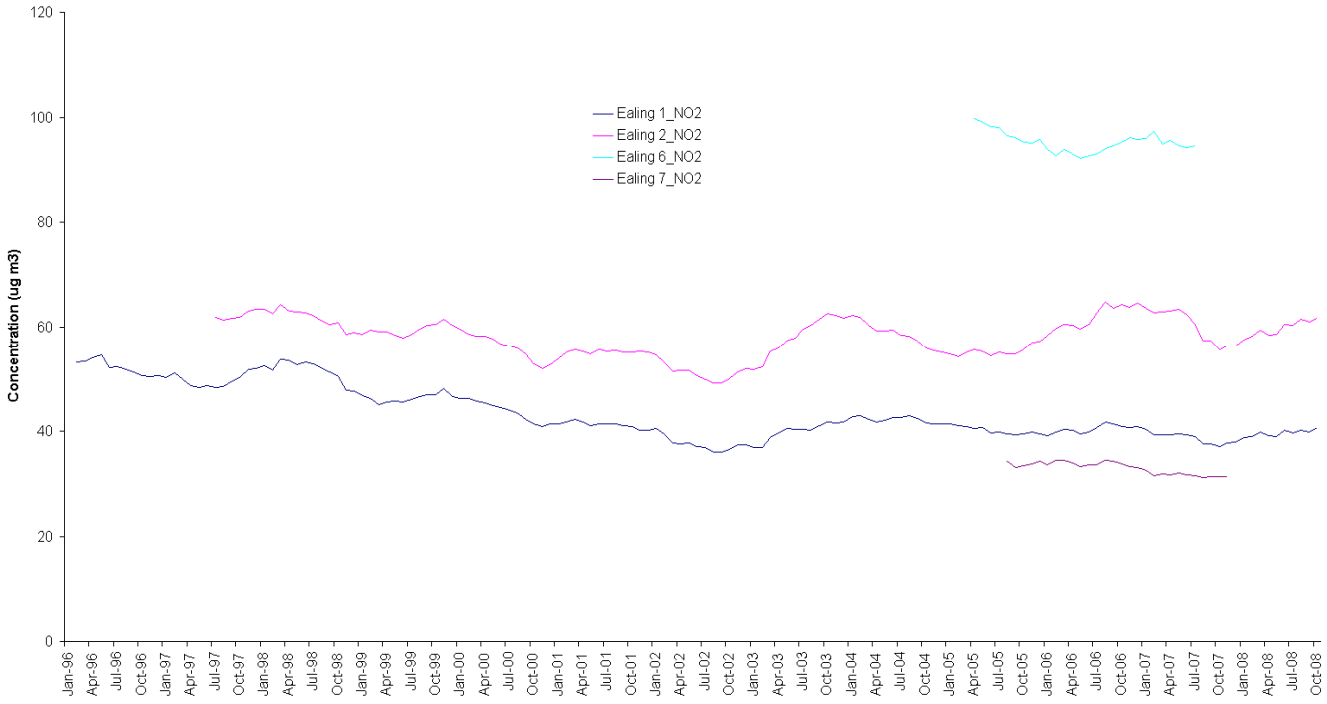


**Figure 2** Rolling annual mean $NO_2$ trends for Ealing sites (1996 to 2008)




The Ealing 1 background and Ealing 2 roadside sites provide the longest datasets. The rolling annual mean concentrations of $NO_x$ for both sites indicate a reduction in concentrations over time in line with the expected reductions in emissions. The reduction of $NO_x$ (approximately 90 µg $m^{-3}$) as the primary emission is pronounced at Ealing 2, although since 2002 there has been almost no change in $NO_x$ and the present day concentrations are almost equivalent with those of 2002.

The trend for $NO_2$ however is much less clear, particularly for the Ealing 2 site, which, although fluctuating slightly between years, has remained constant over the period of monitoring. At the Ealing 1 site, $NO_2$ has remained constant between 2001 and the end of the period reported. This illustrates the difference between pollutants and the difficulty in reducing $NO_2$, which is mostly a secondary pollutant that is largely determined by the oxidising capacity of the atmosphere. In addition it again highlights the recent research, which indicates that direct $NO_2$ emissions may also be increasing.

The other two sites opened more recently and hence have had less time for any trend to develop. The Ealing 6 roadside site shows a small reduction for $NO_x$, although this is not as clear for the Ealing 7 background site, which is a much less polluted site that meets the annual mean objective for $NO_2$. The trend for $NO_2$ at both sites is also marginally downward; although this may simply reflect inter-annual variation.

For the 2008 diffusion tube survey, the data capture at the majority of sites exceeded 75%, although there were six sites with lower data capture. Small adjustments were made to represent a full year where there was 67% or better data capture. This adjustment was made using a ratio of annual mean to period mean using continuously monitored data derived from three nearby LAQN background sites in Ealing 1, Brent 1 and Harlington. All three of these sites had greater than 90% data capture for 2008 and the adjustments made were mostly small, i.e. less than 5%. The details of the adjustments are provided in the Appendix. (Note the results for the co-located sites are not included in the tables of results). As reported above the default value of 0.92 was used for the bias correction. The values for the triplicate sites (site numbers 12, 40, 67, 73, 85, 90 and 91) are all reported as the mean of the three tubes. Those concentrations exceeding the annual mean objective are shown in **bold**.

**Table 4** Bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing background sites (2008)

| Site No | Annual mean | Data capture % |
|---|---|---|
| 2 | 38.7 | 100 |
| 5 | *33.9* | *67* |
| 7 | **52.3** | 92 |
| 8 | **40.7** | 100 |
| 10 | **61.1** | 100 |
| 13 | 33.2 | 75 |
| 14 | **51.6** | 100 |
| 19 | 34.3 | 83 |
| 28 | **47.5** | 92 |
| 29 | **45.4** | 92 |
| 32 | **47.5** | 92 |
| 33 | **45.2** | 83 |
| 36 | **45.8** | 75 |
| 37 | **44.1** | 92 |
| 38 | 31.8 | 100 |
| 44 | *23.8* | *67* |
| 47 | *39.8* | *58* |
| 48 | 27.8 | 100 |
| 54 | 32.6 | 100 |
| 57 | 33.9 | 100 |
| 59 | 35.1 | 100 |
| 61 | 34.5 | 100 |
| 63 | 31.4 | 92 |
| 64 | **47.9** | 75 |
| 67 | **41.1** | 92 |
| 79 | **41.6** | 100 |
| 84 | *41.3* | *58* |
| 86 | **42.0** | 92 |
| 90 | **45.1** | 94 |

The bias adjusted 2008 annual mean concentrations for the Ealing background sites indicate that the government's air quality objective of 40 µg $m^{-3}$ was met at around half of the background monitoring locations in the Borough. It was however exceeded at the other half. These included sites at background locations close to the kerbsides of minor roads, as well as sites located on facades at sites of relevant exposure. Most noticeable of these latter sites was site 10. This site on Old Oak Common Lane, which is located 84 m from a major road (A40), recorded the highest concentration of all the background sites at 61.1 µg $m^{-3}$. Whereas some of the other sites, that were fixed to the facades of buildings and exceeded, mostly recorded concentrations only slightly more than the objective (sites 67, 79, 84 and 86). The results for these background sites are also shown in Figure 3.

The annual mean concentrations for the kerbside and near road sites are shown in Table 5. All sites exceeded the annual mean objective of 40 µg $m^{-3}$, apart from 6 near road sites. These six sites were fixed to the facades of locations with relevant exposure (site numbers 17, 21, 52, 70, 75 and 77). The near road site (site 25) with the highest concentrations, exceeding 80 µg $m^{-3}$ was located close to the A40 and the Greenford Roundabout junction. The kerbside site with the highest concentrations, also approaching 80 µg $m^{-3}$ was located at the Broadway in Ealing, close to the tube station. The results for these sites are also shown in Figure 4.

**Table 5** Bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing kerbside/near road sites (2008)

| Site No | Annual mean | Data capture % |
|---|---|---|
| 11 | **52.3** | 100 |
| 22 | **52.3** | 92 |
| 34 | **71.7** | 100 |
| 35 | **47.6** | 92 |
| 58 | **58.6** | 75 |
| 73 | **55.6** | 67 |
| 74 | **54.7** | 83 |
| 4 | **49.0** | 92 |
| 6.1 | **61.4** | 75 |
| 6.2 | **55.7** | 83 |
| 6.3 | **57.5** | 83 |
| 6.4 | **53.0** | 83 |
| 15 | **57.6** | 92 |
| 17 | 34.7 | 75 |
| 21 | 37.3 | 100 |
| 23 | **52.2** | 100 |
| 25 | **80.6** | 100 |
| 27 | **44.1** | 100 |
| 35 | **51.1** | 92 |
| 40 | **51.8** | 81 |
| 41 | **41.3** | 100 |
| 49 | **40.5** | 100 |
| 52 | 39.5 | 100 |
| 60 | **61.8** | 100 |
| 66 | **49.4** | 92 |
| 68 | **43.5** | 92 |
| 70 | 37.5 | 100 |
| 75 | 38.4 | 75 |
| 76 | **57.3** | 67 |
| 77 | 39.9 | 100 |
| 81 | **54.1** | 100 |
| 82 | **56.7** | 100 |
| 87 | **42.6** | 100 |

These results also include the four tubes (6.1 to 6.4) located on the residential block at Wendover Court on the Western Avenue (A40). The tubes are individually located on the ground, first, second and third floors. The results indicate concentrations decrease with height between the ground and third floors. The second floor had a slightly higher concentration than the first floor, but both recorded levels between those recorded at the ground and third floors. For all sites the annual mean was easily exceeded.

The annual mean concentrations for the roadside sites are given in Table 6. All sites exceeded 40 µg $m^{-3}$, apart from four sites (site numbers 45, 69, 71 and 72). Three of these sites are located close to minor roads (71, 72 and 45). Sites 69 and 71 are also located close to the north boundary of the borough near Sudbury, whereas site 72 is close to the southern boundary. The site at Hanger Lane (56) had the highest annual mean concentration (117 µg $m^{-3}$), although it was noted that one month's recorded concentration was greater than 300 µg $m^{-3}$, which may be suspect. However even without this month the annual mean concentration would have just exceeded 90 µg $m^{-3}$. The site was fixed to

a lamppost and therefore was not at a site with relevant exposure. Other sites with levels greater than 70 µg $m^{-3}$ included sites 12, 80 and 85. Of these sites 80 and 85 were fixed at facades, with the triplicate site 85 close to site 56 at Hanger Lane. A further nine sites exceeded 50 µg $m^{-3}$. The results for these sites are also shown in Figure 5.

**Table 6** Bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing roadside sites (2008)

| Site No | Annual mean | Data capture % |
|---|---|---|
| 1 | **51.4** | 100 |
| 3 | **53.4** | 100 |
| 9 | **46.6** | 100 |
| 12 | **71.4** | 100 |
| 20 | **59.8** | 83 |
| 24 | **41.2** | 100 |
| 26 | **43.0** | 100 |
| 30 | **47.8** | 92 |
| 39 | **43.7** | 67 |
| 45 | 39.6 | 100 |
| 46 | **61.7** | 100 |
| 50 | **65.8** | 92 |
| 53 | **57.3** | 100 |
| 56 | ***117.5*** | 75 |
| 62 | **54.3** | 92 |
| 65 | **61.8** | 100 |
| 69 | 35.8 | 100 |
| 71 | 38.3 | 100 |
| 72 | 36.5 | 100 |
| 78 | **58.6** | 92 |
| 80 | **75.4** | 92 |
| 83 | **48.4** | 100 |
| 85 | **74.3** | 92 |
| 88 | **43.9** | 100 |
| 91 | **44.4** | 100 |

Comparisons of bias adjusted annual mean concentrations between 2007 and 2008 are shown in Figure 3, 4 and 5 (for background, kerbside and roadside sites). For both 2007 and 2008 there were 16 background sites that exceeded the objective (although not the same sites for both years). The 2007 mean for the background sites was 48.4 µg $m^{-3}$ and that for 2008 was 40.4 µg $m^{-3}$. The number of sites exceeding for the kerbside, near road and roadside sites was 52 in 2007 and 47 in 2008. These findings indicate that annual mean concentrations were lower in 2008 compared to 2007, although some care is required with this interpretation, especially as this conclusion does not agree with the earlier findings based on the continuous monitoring results (see Table 3).

The main overall conclusion is that the majority of monitoring sites throughout the borough (including sites with relevant exposure) continued to record annual mean concentrations in excess of the air quality objective.

**Figure 3** Chart of bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing background sites (2007-2008)

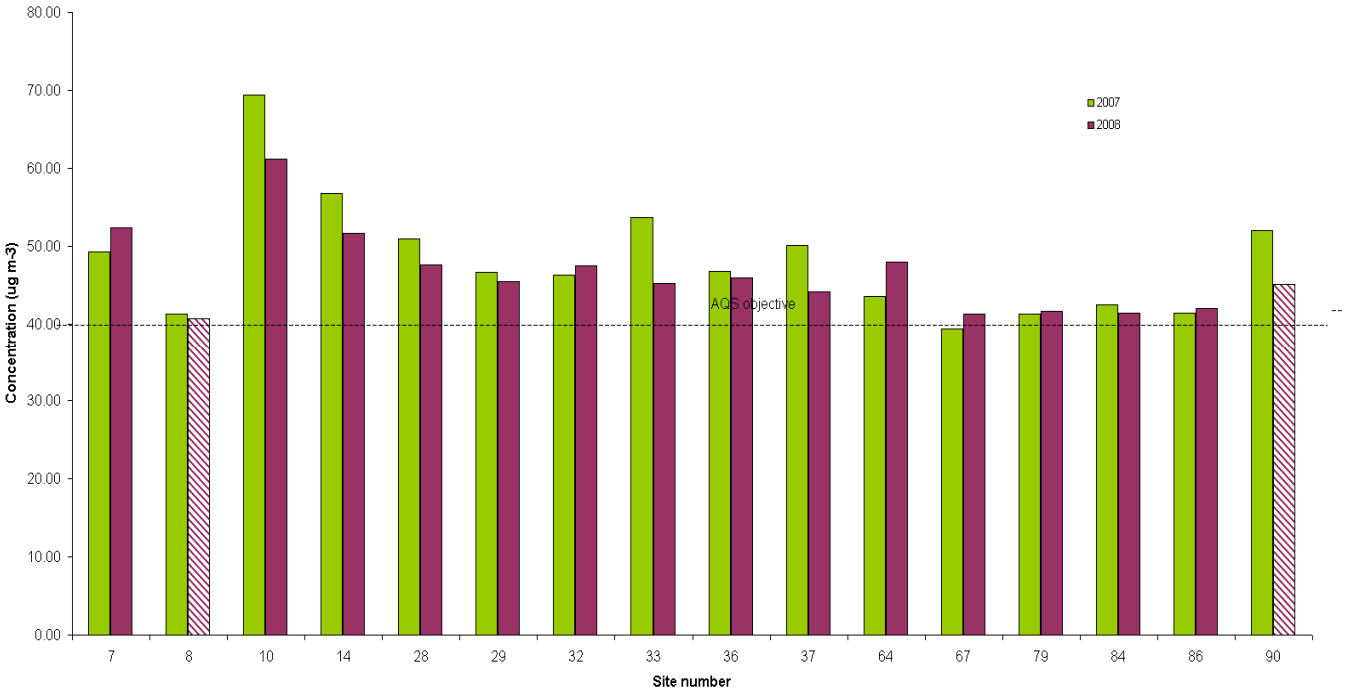



**Figure 4** Chart of bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing kerbside/near road sites (2007-2008)

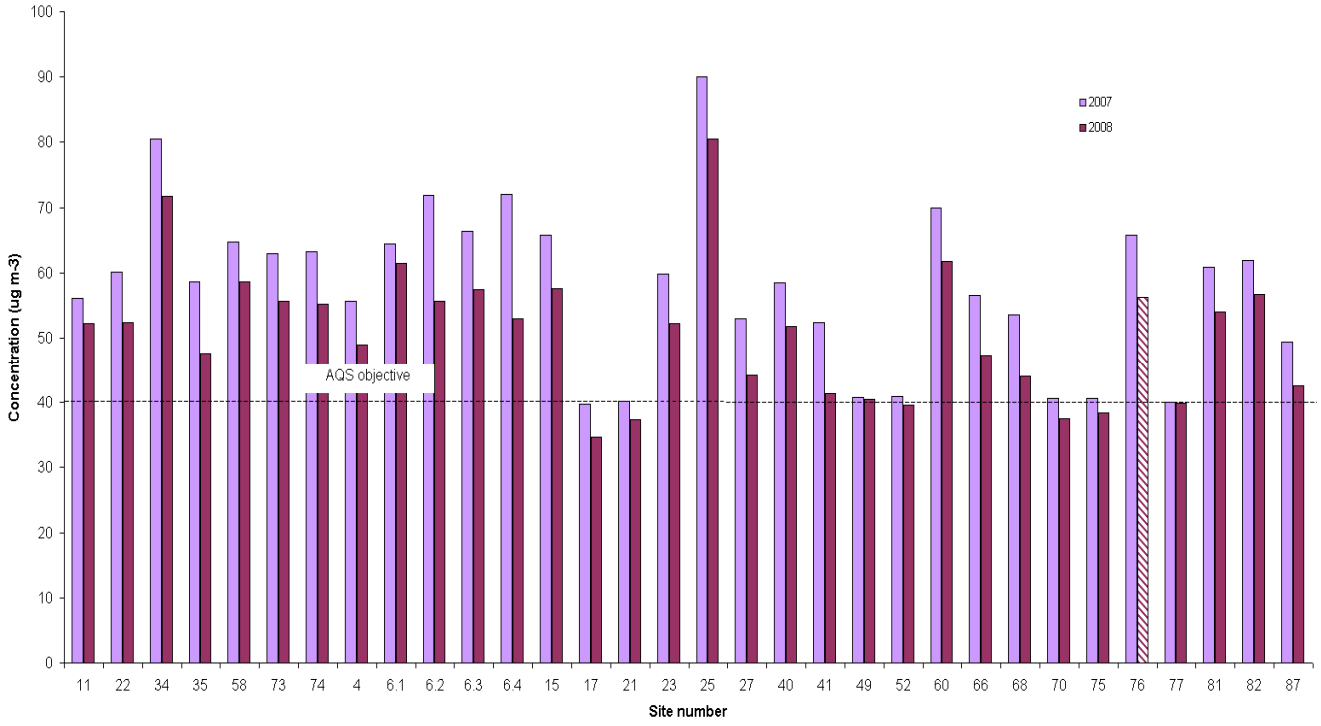
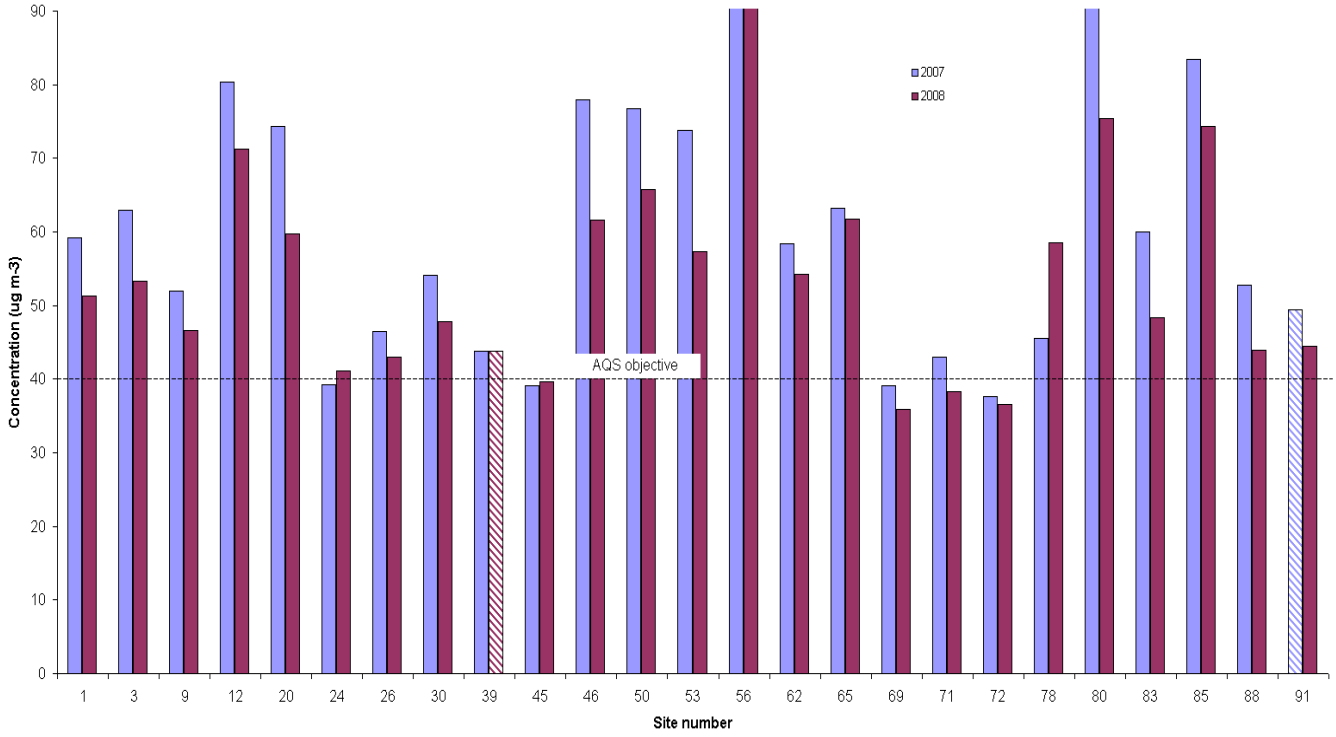


**Figure 5** Chart of bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) for Ealing roadside sites (2007-2008)




### 2.2.2 Carbon monoxide

Carbon monoxide (CO) was monitored at the Ealing 2 roadside site in Acton, close to the southeast corner of the Borough. The site opened in 1996 and details of recent monitoring from 2003 to 2008, including data capture, are given in Table 7 based on scaled and ratified data (apart from 2008 which are still provisional).

There were no periods exceeding the CO objective at the site over the period 2003 to 2008, in common with findings from other sites in the U.K.

Details of annual mean and maximum one-hour concentrations are also provided for information purposes. The annual mean concentrations are low in comparison with the objective.

**Table 7** CO concentrations (mg $m^{-3}$) for Ealing (2003 – 2008)

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Max 8 Hour | 3.6 | 3.7 | 3.1 | 2 | 3.7 | 2.6 |
| Annual mean | 1.1 | 0.8 | 0.8 | 0.7 | 0.6 | 0.4 |
| Max 1 Hour | 6.6 | 4.7 | 4 | 3.4 | 5 | 3 |
| Data capture % | 96 | 98 | 93 | 92 | 98 | 98 |

The results from the monitoring site are considered representative of busy roadsides in the Council's area. These indicate that the objective is being met and therefore a Detailed Assessment of CO based on monitoring is not required. The results also indicate a fall in concentrations over time.

### 2.2.3 Sulphur dioxide

The Council monitors $SO_2$ at its Ealing 1 urban background site in Ealing. The site opened in 1995 and is located towards the middle of the Borough.

The maximum 15-minute concentrations for each year at the sites are given in Table 8, along with details of data capture. In all cases the data are fully ratified, apart from the 2008, which include some provisional data.

These results indicate that the 15-minute standard of 266 μg $m^{-3}$ was not exceeded at all during the period reported.

**Table 8** $SO_2$ monitoring in Ealing (2003 to 2008)

| Site | Data reported | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| Ealing 1 | Maximum 15 minute μg $m^{-3}$ | 171.7 | 159.4 | 168.1 | 165.6 | 49 | 85.2 |
| | Data capture % | 92 | 98 | 95 | 92 | 95 | 84 |

As a result of the low levels monitored the 15-minute objective of more than 35 such periods was not exceeded. The stricter hourly and daily standards were also not exceeded in any year. Hence these results also confirm that the hourly and daily $SO_2$ objectives also were not exceeded over this period of monitoring. These results are considered representative of the entire Borough.

### 2.2.4 $PM_{10}$

Continuous $PM_{10}$ analysers are operated at the Ealing 2, 7, 8 and 10 monitoring sites, located in Acton, Southall, North Acton and Greenford respectively. The Ealing 2 site first monitored $PM_{10}$ in 1997 and is located at the roadside. The Ealing 7 site opened in 2004 and is sited at a background location near the southwest of the Borough (i.e. closest to Heathrow). The Ealing 8 site opened following concerns relating to dust close to the industrial area at Horn Lane, Acton. and Ealing 10 was sited at a background location near the north of the Borough for approximately 12 months during 2008/9. The sites are all part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the government's AURN sites, with subsequent data ratification undertaken by the ERG at King's College London. In all cases the data are fully ratified, apart from the 2008, which include provisional data.

At the Ealing 2 site there is also a Filter Dynamics Measurement System (FDMS) analyser, which was installed in 2005. Apart from this instrument, all four sites used TEOM instruments and the results were factored to a gravimetric equivalent (x 1.3) for the period up to 2007. It should be noted however that for 2008 the correction for these instruments was undertaken using the VCM (Volatile Correction Model), based on TG09 guidance.

The TG09 guidance highlights that the TEOM instruments cannot be strictly used to measure $PM_{10}$ concentrations for comparison with the air quality objectives, as the instrument was not found to conform to the equivalence criteria relating to the gravimetric European reference method. Previously a correction using a factor of 1.3 was accepted; now however the VCM has been adopted. This method is based on the assumption that the volatile component of $PM_{10}$ lost during the heated sampling of PM with the standard TEOM is consistent across a defined geographical area. The model uses the FDMS purge measurement as an indicator of this volatile component. FDMS instruments have met the equivalence criteria and thus the VCM correction is also considered equivalent to the European reference method. (Note the VCM correction is undertaken against a range of sites, not just the Ealing 2 FDMS site; hence the 2008 Ealing 2 TEOM site results differ slightly from those for the Ealing 2 FDMS site).

**Table 9** $PM_{10}$ monitoring in Ealing using TEOMs (2003 to 2008)

| Site | | 2003[a] | 2004[a] | 2005[a] | 2006[a] | 2007[a] | 2008[b] |
|---|---|---|---|---|---|---|---|
| Ealing 2 | Annual mean | 34 | 30 | *29* | 30 | 30 | 26 |
| | No of days > 50 µg $m^{-3}$ | **61** | 24 | *20* | 20 | 26 | 22 |
| | Data capture | 98 | 99 | *89* | 96 | 97 | 99 |
| Ealing 7 | Annual mean | | *21* | 23 | *25* | 24 | *20* |
| | No of days > 50 µg $m^{-3}$ | | *2* | 5 | *4* | 15 | *4* |
| | Data capture | | *41* | 95 | *39* | 92 | *86* |
| Ealing 8 | Annual mean | | | ***84*** | **74** | **63** | **42** |
| | No of days > 50 µg $m^{-3}$ | | | ***230*** | **224** | **173** | **103** |
| | Data capture | | | *84* | 98 | 96 | 94 |
| Ealing 10 | Annual mean | | | | | | *22* |
| | No of days > 50 µg $m^{-3}$ | | | | | | *4* |
| | Data capture | | | | | | *76* |

(Note – bold indicates objective exceeded; italics < 90% data capture; [a] indicates TEOM x1.3; [b] indicates $TEOM_{VCM}$)

**Table 10** $PM_{10}$ monitoring in Ealing using FDMS (2005 to 2008)

| Site | | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Ealing 2 | Annual mean | *28* | 26 | 26 | *23* |
| | No of days > 50 µg $m^{-3}$ | *11* | 24 | 27 | *14* |
| | Data capture | *30* | 99 | 97 | *82* |

(Note – bold indicates objective exceeded; italics < 90% data capture; plus no correction applied)

The results indicate that the 2004 daily mean objective of more than 50 µg $m^{-3}$ was exceeded for all years at the Ealing 8 site and during 2003 only at the Ealing 2 site. The annual mean objective however was only exceeded at the Ealing 8 site. The highest annual mean concentration also arose during 2003 at the Ealing 2 site, but did not exceed the objective. It should be noted that 2003 was a year with high pollutant concentrations in many areas of the UK, due to the long periods of high pressure that arose during the hot summer months. Such periods are conducive to secondary particle formation over wide areas.

In 2007 there were also episodes with high concentrations in both March and December leading to higher daily concentrations, which resulted in higher concentrations for that year at the background Ealing 7 site.

An analysis of rolling annual mean $PM_{10}$ concentrations and daily mean $PM_{10}$ exceedences is provided for the Ealing sites to indicate any trend over time. The analysis is for the period from 1999 through to 2008.

Figure 6 illustrates changing concentrations over time, based on changing rolling annual mean $PM_{10}$ concentrations and Figure 7 the rolling daily mean $PM_{10}$ exceedences. The use of rolling data in this way largely removes seasonal influences and thus provides a guide to changing trends over time. (Note – the annual mean results are not factored).

The rolling annual mean trend for the Ealing 2 site provides the longest dataset. The site shows a constant trend from 1999 to 2008 over this period. The data for the Ealing 7 site show a similar pattern of little change to that of the Ealing 2 site for the period where the sites overlap. For Ealing 2 there is also inter annual variations between years that lead to increases in concentrations (e.g. as result of the particle episodes during 2003).

For the Ealing 8 site however, concentrations decreased markedly during 2005, although they have since remained roughly constant, around the 40 µg $m^{-3}$ level. The reduction in concentrations coincides with measures have been introduced by both the London Borough of Ealing and the Environment Agency to help reduce emissions from industrial premises at Horn Lane (as highlighted in the Council's 2008 Progress Report). These measures are ongoing.

The use of trends in this way highlights that although concentrations dropped in 2004 at Ealing 2 and elsewhere across London, this was mainly as a result of the pollution incidents in 2003 not being repeated in 2004. Levels have dropped just below pre 2003 levels and do not appear to be further reducing; indeed for some sites in London there may be a slight increase, possibly as a result of increasing primary $PM_{10}$ emissions (ERG, 2008) rather than the predicted decrease in emissions.

**Figure 6** Rolling annual mean $PM_{10}$ trends for Ealing sites (1999 to 2008)

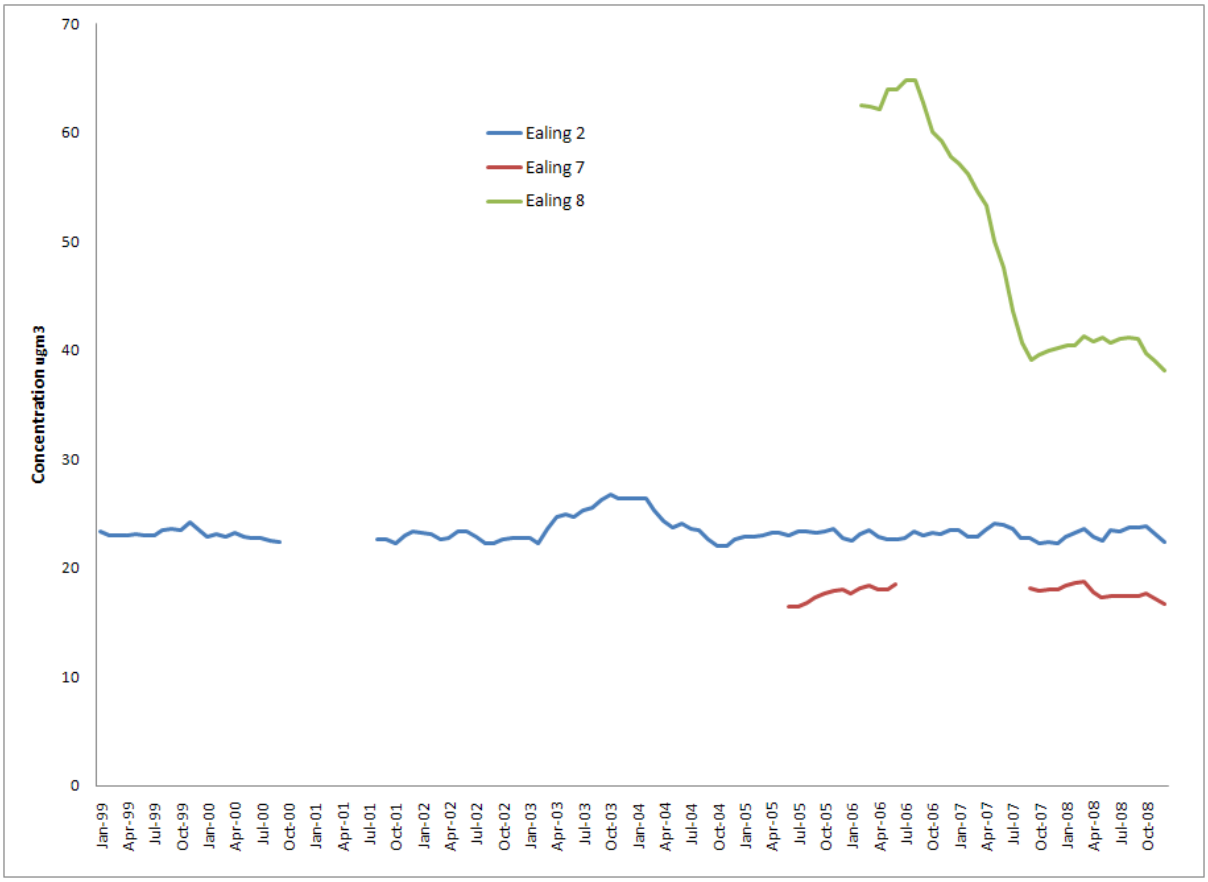
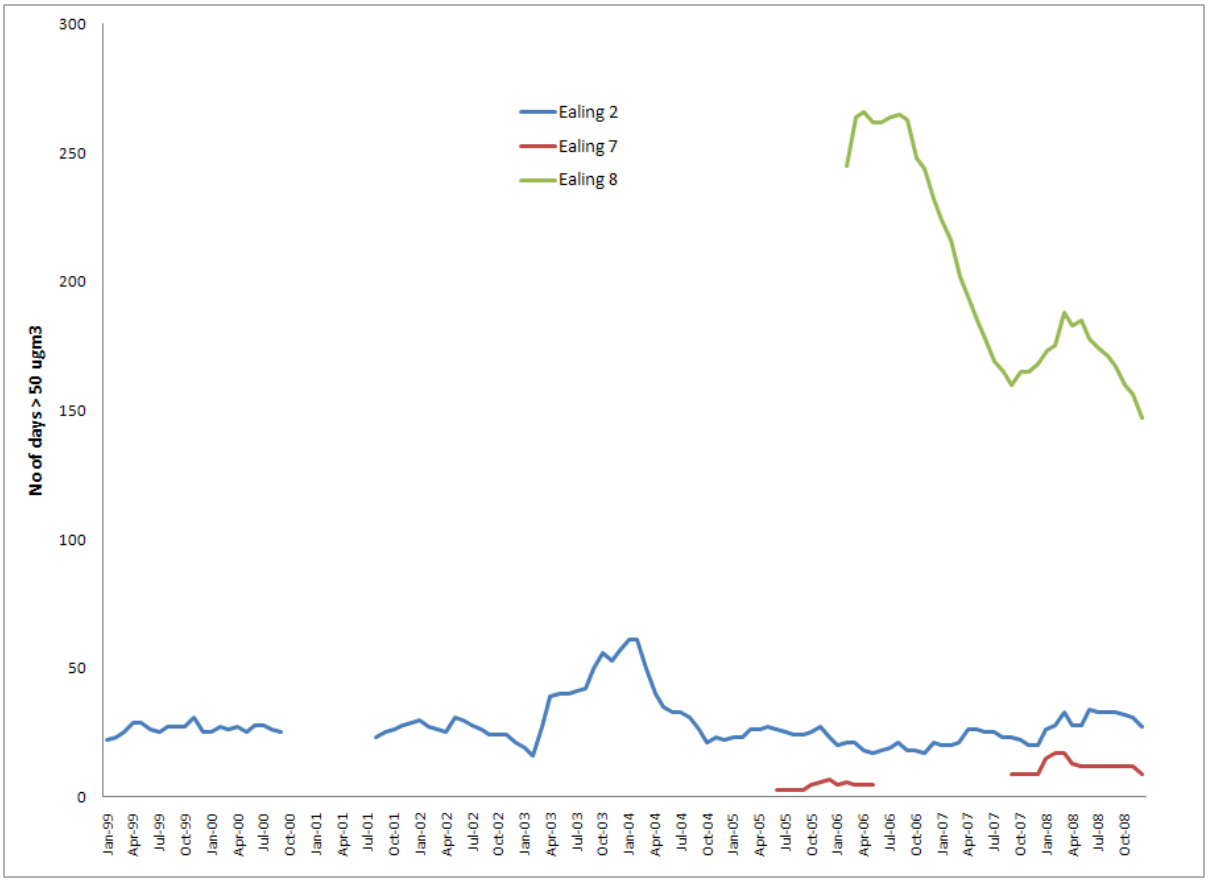


**Figure 7** Rolling number of days $PM_{10}$ > 50 µg $m^{-3}$ for Ealing sites (1999 to 2008)




The rolling trend of $PM_{10}$ exceedences highlights the effect of the pollution episodes in 2003 for the Ealing 2 site. The effect for the Ealing 2 site for the whole dataset is less pronounced. This site shows that, despite fluctuating, levels appear not to have decreased markedly over this period.

Averages based on selected London sites for the period from 1995 to 2000 show a downward trend from around 50 days above 50 µg $m^{-3}$ to 10 days in 2002. By the end of 2004 the number of days exceeding the standard at background sites was comparable to that measured at the start of 2001, whereas inner London roadside sites had a higher number of days exceeding in 2004 than 2001. This did not change during 2005 and levels increased during 2006. In 2006 mainly roadside sites were affected it has been suggested that it has been due to an increase in $PM_{10}$ from primary sources (ERG, 2008).

The very high levels of pollution at the Ealing 8 industrial site can be clearly seen. The plot shows the decrease in the number of days as a result of the measures implemented to reduce emissions in the area.

### 2.2.5 Benzene

The Council monitors benzene using diffusion tubes at three roadside sites in the Borough (Acton Town Hall, Church Lane in Northolt and the Hanger Lane Gyratory). The annual mean results for the period 2003 to 2008 are given in Table 11. Data capture for the three sites in 2008 was 91%, 83% and 83% respectively.

The monitored results indicate that the 2003 AQS objective (of 16.25 µg $m^{-3}$) was not exceeded during the period of monitoring. The benzene monitoring also confirms that the stricter 2010 objective (of 5 µg $m^{-3}$) was also not exceeded over this period. The monitoring indicates that concentrations have decreased over time. The Council's 2008 Air Quality Progress report highlights that

concentrations dropped from more than 8 µg $m^{-3}$ at the three sites in 1998 to around 2 µg $m^{-3}$ in 2007. This is due to stricter emission controls, particularly with regard to road transport sources.

**Table 11** Annual mean benzene monitoring (µg $m^{-3}$) in the London Borough of Ealing (2003 to 2008)

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Acton Town Hall (site 55) | 2.3 | 2.4 | 2.2 | 1.8 | 1.8 | 1.5 |
| Church Lane, Northolt (site 46) | 2.5 | 2.5 | 2.2 | 2.0 | 2.1 | 1.7 |
| Hanger Lane gyratory (site 89) | 2.5 | 2.7 | 2.6 | 2.4 | 2.2 | 2.1 |

# 3. Road Traffic Sources

The focus of attention for road traffic sources is on those relevant locations close to busy roads, especially in congested areas and near to junctions, where traffic emissions are higher, and in built up areas where the road is canyon like and buildings restrict the dispersion and dilution of pollutants. Only those locations, which have not been assessed during the earlier rounds or where there has been a change or new development, are assessed.

As reported earlier the Council previously designated the whole of the Borough as an AQMA.

### 3.1 Narrow congested streets with residential properties close to the kerb

Concentrations are often higher where traffic is slow moving, with stop/start driving, and where buildings on either side reduce dispersion. Screening models so far have not proved helpful at identifying potential exceedences, which have only been identified by monitoring. This assessment is for $NO_2$ only.

Previous Review and Assessments undertaken by the Council (Ealing, 2004 and 2006) investigated the presence of narrow roads with residential properties close to the kerb. The revised TG09 guidance requires the identification of residential properties within 2 m of the kerb. The roads previously identified are all within the Council's AQMA and this situation has not changed.

The Council's AQMA is Borough wide and it is confirmed that there are no new or newly identified congested streets with a flow above 5,000 vehicles per day with residential properties close to the kerb that have not been adequately considered in previous rounds of Review and Assessment.

### 3.2 Busy streets where people may spend 1 hour or more close to traffic

These include some street locations where individuals may regularly spend 1-hour or more, for example, streets with many shops and streets with outdoor cafes and bars, close to road traffic where there may be high concentrations of $NO_2$. (Note – that those people that are occupationally exposed are not included, as they are not covered by the regulations). This assessment is for $NO_2$ only.

Busy streets where people may spend an hour or more close to traffic were examined in the second round USA. There has been no change to the previous findings since then and no new roads have been constructed with traffic flows greater than 10,000 vpd in the Council's area since the first round of R & A where there is relevant exposure arising.

The Council confirms that there are no new or newly identified busy streets where people may spend 1 hour or more close to traffic in the Borough.

### 3.3 Roads with high flow of buses and/or HGVs

These include street locations in the Borough where traffic flows are not necessarily high (i.e. fewer than 20,000 vehicles per day) but where there are an unusually high proportion of buses and/or HGVs. The assessment is for both $NO_2$ and $PM_{10}$ and is dependent on the proximity of relevant exposure within 10 m of the kerbside.

Those roads within the Borough with high flows of heavy duty vehicles were previously identified by the Council in earlier Review and Assessments. No new roads relevant to this section have been built in the Borough.

The Council confirms that there are no new or newly identified roads with high flows of buses or HGVs in the Borough that have not been adequately considered in previous rounds of Review and Assessment.

### 3.4 Junctions

Air pollutant concentrations are usually higher close to junctions, due to the combined impact of traffic emissions on roads forming the junction, and to the higher emissions due to stop start driving. The assessment is for both $NO_2$ and $PM_{10}$ and is dependent on the proximity of relevant exposure within 10 m of the kerbside.

There is no change to the previously reported situation concerning junctions and no new or newly identified junctions with relevant exposure within 10 m.

The Council confirms that there are no new or newly identified busy junctions in the Borough that have not been adequately considered in previous rounds of Review and Assessment.

### 3.5 New roads constructed or proposed since the last round of review and assessment

The approach to considering new roads depends on whether or not an assessment was carried out in advance of building the new road. The assessment is for both $NO_2$ and $PM_{10}$ and is dependent on the proximity of relevant exposure within 10 m of the kerbside.

There have been no new or proposed roads in the Borough where an air quality assessment was required.

The Council confirms that there are no relevant new or proposed roads in the Borough.

### 3.6 All roads with significantly changed traffic flows

Only roads with significantly changed traffic flows that have not already been considered above were investigated. The assessment is for both $NO_2$ and $PM_{10}$.

A comparison of traffic flows from the latest version of the London Atmospheric Emissions Inventory confirms that there are no new roads with significantly changed traffic flows.

The Council confirms that there are no new or newly identified roads not considered previously with significantly changed traffic flows in the Borough.

### 3.7 Bus and coach stations

This section only applies to bus stations or sections of bus stations that are not enclosed, and where there is relevant exposure, including at nearby residential properties. The assessment is for both the annual mean and the 1-hour $NO_2$ objectives. (Note - the term “bus” in this instance is used to signify both buses and coaches).

Bus stations in Ealing were examined in previous USAs and found not to require further investigation. Based on the TG09 guidance if such sources were previously considered and are within an existing AQMA there is no need to proceed further.

The Council confirms that bus stations in Ealing were assessed in previous rounds of review and assessment. These found that there are no relevant bus stations in the Borough.

# 4. Other Transport Sources

## 4.1 Airports

Aircraft are potentially significant sources of nitrogen oxides ($NO_X$) emissions, especially during takeoff. The revised guidance has used new information, which has resulted in the criteria to trigger a Detailed Assessment being relaxed, while the requirement to assess $PM_{10}$ has been removed. Thus this section only applies to $NO_2$. (Note – any road traffic using airports was considered in the previous section.) In the Council's previous rounds of Review and Assessment it was confirmed that the nearest major airport, at Heathrow, is outside the Borough and sufficiently distant as not to be relevant. This situation has not changed.

The Council confirms that there are no relevant airports in the Borough.

## 4.2 Railways (diesel and steam trains)

Stationary locomotives, both diesel and coal fired, can give rise to high levels of sulphur dioxide ($SO_2$) close to the point of emission. Recent evidence also suggests that moving diesel locomotives, in sufficient numbers, can also give rise to high $NO_2$ concentrations close to the track where, along busy lines, emissions can be equivalent to those from a busy road.

Diesel locomotives use rail lines that run through Ealing and these are included within the list of lines (from Table 5.1 of TG09), which identify those with a "high" usage of diesel locomotives. Previous rounds of Review and Assessment however found that there are no areas within the Borough where diesel or steam locomotives are stationary for periods of 15 minutes or more and within 15 m of locations where regular outdoor exposure arises. This situation has not changed.

### 4.2.1 Stationary Trains

The Council confirms that there are no locations where relevant exposure to emissions from steam or diesel trains arises within the Borough.

### 4.2.2 Moving Trains

The Paddington to Swansea rail line (identified from Table 5.1 of the TG09 guidance), runs through the south of Borough along an east-west axis (see Figure 8). It therefore is within the Council's Borough wide AQMA for annual mean $NO_2$. Measurements at the Ealing 7 background site in the south west of the Borough also confirm that the annual mean background concentrations in the area exceed 25 g $m^{-3}$ (see Table 3). It is further considered that there is the potential for relevant exposure within the 30 m of the edge of the tracks, although large parts of the railway line within the Borough lie in a deep cutting.

The Council's diffusion tube monitoring sites numbers 90 and 91 are located, respectively, in The Straight, Southall and Manor Road, West Ealing, both of which are close to the Paddington to Swansea line. These sites do not however represent relevant exposure, which is located further across the roads concerned from the monitoring sites. From Table 6 the 2008 bias corrected annual means for the sites were 45.1 µg $m^{-3}$ (The Straight) and 44.9 µg $m^{-3}$ (Manor Road).

The Council confirms that there are relevant locations where there are large movements of diesel locomotives and potential long-term relevant exposure within 30 m. This railway line already lies within the Borough wide AQMA and the Council therefore notes this potential source and will seek to incorporate these findings and any future findings within its Action Plan.

### 4.3 Ports (shipping)

The assessment for shipping needs to consider $SO_2$ only. The Borough is land locked and therefore there are no ports or shipping within the Borough.

The Council confirms that there is no port or any shipping that meet the specified criteria within the Borough.

**Figure 8** Route of Paddington to Swansea rail line through Ealing

# 5. Industrial sources

The Council and the Environment Agency (EA) control industrial sources within the Borough under the Environmental Permitting Regulations (England and Wales) 2007, as amended. The Council also has control over some smaller industrial and commercial sources, largely through the Clean Air Act, with its associated control of the stack heights. As a result of these controls, there are relatively few sources that may be relevant under the Local Air Quality Management (LAQM) regime. Many of these sources were also addressed during previous rounds of Review and Assessment. The focus is thus on new installations and those with significantly changed emissions.

## 5.1 New or Proposed Industrial Processes

Industrial sources are considered unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives in the Borough. Sources in neighbouring authorities and the combined impact of several sources are considered. The approach used is based on use of the planning and permitting processes. The assessment considers all the LAQM pollutants, including those most at risk of requiring further work ($SO_2$, $NO_2$, $PM_{10}$ and benzene).

### 5.1.1 New or Proposed Processes for which an Air Quality Assessment has been carried out

Since the last round of Review and Assessment three non-reduced fee applications have been received for new sources (for concrete batching plants and mobile concrete crusher), plus forty-five dry cleaners. None of these however has required an air quality assessment.

The Council confirms that there are no relevant new or proposed industrial processes for which planning approval has been granted.

### 5.1.2 Existing Processes where emissions have increased substantially or new relevant exposure has been introduced

The lists of existing Part B processes that are regulated under the Environmental Permitting regime are provided in the Appendix. These are all processes with low emissions of LAQM pollutants. None of these have increased emissions by greater than 30% and no new relevant exposure has been introduced nearby.

The Council confirms that there are no existing processes with substantially increased emissions or new relevant exposure.

### 5.1.3 New or significantly changed processes with no previous Air Quality Assessment

Since the last round of Review and Assessment no applications have been received for new or proposed sources where it has been determined that the installation is likely to give rise significant pollutant emissions.

The Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

### 5.2 Major fuel (petrol) storage depots

This was previously assessed in earlier rounds of Review and Assessment and it was found that there are no major petrol storage depots in the Borough. This situation has not changed.

There are no major fuel (petrol) storage depots within the Council's area.

### 5.3 Petrol stations

There is some evidence that petrol stations could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined with higher levels from nearby busy roads.

The previous round of Review and Assessment assessed all petrol stations with a throughput of more than 2000 $m^3$ of petrol, and with a busy road nearby. None were found to have relevant exposure within 10m of the pumps and therefore it was not necessary to go to a Detailed Assessment. There has been no change in this situation for this round.

The Council confirms that there are no petrol stations meeting the specified criteria in the Borough.

### 5.4 Poultry farms

Some local authorities in England have identified potential exceedences of the $PM_{10}$ objectives associated with emissions from poultry farms (defined as chickens (laying hens and broilers), turkeys, ducks and guinea fowl). These relate to large farms (> 100,000 birds) that are regulated by the EA. None however exist within the Council's area.

The Council confirms that there are no poultry farms meeting the specified criteria in the Borough.

# 6. Commercial and Domestic Sources

## 6.1 Biomass combustion – Individual Installations

Biomass burning can lead to an increase in $PM_{10}$ emissions, from the combustion process itself and also by aerosol formation from the volatile materials distilled from the wood. Compared to conventional gas burning, biomass burning can also result in an increase in $NO_X$ emissions due to the fuel-derived portion that is not present in gas combustion.

### 6.1.1 Individual installations

The Council has assessed for individual combustion plant burning biomass ranging from 20 MW down to 50 kW units. No existing biomass combustion plant was found in the Borough, although planning permission granted was granted for a 56kW wood chip boiler in the southwest of the Borough. The Clean Air Act 1993 (s.4) application is currently awaited. Based on the assumption of emission rates from TG09 for wood pellet burners the adjusted emission rate is 0.0006 g $s^{-1}$. This is the minimum emission rate in the table, which requires that the effective stack height is at least 1 m for 0.1 m diameter stack. Based on this information the planned boiler will not need further assessment.

The Council has assessed the above planned wood chip boiler and concluded that it will not be necessary to proceed to a Detailed Assessment.

### 6.1.2 Combined impacts

There is the potential that many small biomass combustion installations (including domestic solid-fuel burning), whilst individually acceptable, could in combination lead to unacceptably high $PM_{10}$ concentrations, particularly in areas where $PM_{10}$ concentrations are close to or above the objectives. The impact of domestic biomass combustion in most areas is thought to be small at the time of writing, but could become more important in future. However as reported above there is only the one planned biomass combustion plant in the Borough. The potential for combined impacts will be assessed should future plant be proposed. Currently there is minimal domestic solid fuel burning as discussed in the next section.

The Council has assessed for the combined impact of biomass combustion and concluded that it will not be necessary to proceed to a Detailed Assessment.

## 6.2 Domestic Solid-Fuel Burning

The previous rounds of Review and Assessment identified areas where domestic solid fuel burning gives rise to exceedences of the objective for $SO_2$. $PM_{10}$ from domestic solid fuel burning was also covered above (6.1.2 Biomass combustion – combined impacts).

The whole of the Borough has been designated a Smoke Control Area and there are no areas of significant domestic solid fuel use in the Borough. This position has not changed from the previous USA in 2006, which confirmed that no areas of significant domestic solid fuel burning were identified. Gas is widely available across the Borough and it remains the predominant fuel used for domestic water and space heating.

The Council confirms that there are no areas of significant domestic solid fuel use in the Borough.

# 7. Fugitive or Uncontrolled Sources

Dust emissions from uncontrolled and fugitive sources can give rise to elevated $PM_{10}$ concentrations. These sources can include, but are not limited to the following sites: quarrying and mineral extraction sites, landfill sites, coal and material stockyards, or materials handling, major construction works and waste management sites. Dust can arise from the passage of vehicles over unpaved ground and along public roads that have been affected by dust and dirt tracked out from dusty sites. Other sources of dust are from the handling of dusty materials, the cutting of concrete, etc and wind-blown dust from stockpiles and dusty surfaces.

The Council have previously investigated dust deposits on the road along Horn Lane, towards the northeast of the Borough and within the Council's existing AQMA (for $PM_{10}$). No other fugitive and uncontrolled particulate matter emissions have been identified based on local professional knowledge, recent air quality assessments or recent complaints to the Council.

.
The Council confirms that there are no new or potential sources of fugitive particulate matter emissions in the Borough that have not been previously investigated.

# 8. Conclusions and Proposed Actions

## 8.1 Conclusions from New Monitoring Data

Monitoring within the Borough confirmed that the annual mean nitrogen dioxide objective has been widely exceeded at roadside and background locations. The Council monitors 89 locations across the Borough. Many of the sites monitored are considered to represent relevant exposure. Twelve background sites in the Borough monitored for nitrogen dioxide meet the relevant annual mean objectives (based on 2008 results).

Based on these findings the Council does not need to undertake a Detailed Assessment as no new potential or actual exceedences at relevant locations were established.

An analysis of trends from continuous monitoring sites in and near to Ealing indicates that there have been no other significant reductions to $NO_2$ concentrations in the Borough since the previous round of Review and Assessment.

The Council's most recent $PM_{10}$ monitoring indicates that the daily and annual mean objectives have been exceeded recently within the Borough at the Ealing 8 site. Other sites within the Borough have met the objectives. An analysis of trends however confirms that concentrations do not appear to be reducing and there is also evidence indicating that close to roadsides $PM_{10}$ from primary sources may be increasing.

The 2008 monitoring of carbon monoxide, sulphur dioxide and benzene confirms that the objectives for these pollutants have been met.

## 8.2 Conclusions from Assessment of Sources

The Council has assessed the likely impacts of local developments for road transport, other transport, industrial processes, commercial/domestic, fugitive emissions, residential and commercial sources. The findings have indicated that there are no new changes that require the Council to undertake a Detailed Assessment.

## 8.3 Proposed Actions

This report follows the technical guidance (TG09) produced for this part of the third round of Review and Assessment. It therefore fulfils this part of the continuing LAQM process.

The results, from following this methodology, are that the Council has not identified an additional risk of the air quality objectives for the LAQM pollutants: carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide, being exceeded anywhere in the Council's area. Thus the Council need not proceed beyond the updating and screening assessment for these pollutants. For nitrogen dioxide and particles ($PM_{10}$) the Council has previously designated the Borough as an AQMA. The findings from this report indicate that the AQMA should be maintained.

The Council will therefore undertake the following actions:

1. Undertake consultation on the findings arising from this report with the statutory and other consultees as required.

2. Maintain the existing and proposed monitoring. It will also further extend the diffusion monitoring survey of those roads newly identified as being at risk.

3. Continue with the implementation of its Air Quality Action Plan in pursuit of the AQS objectives.

4. Prepare for the submission of its 2010 Progress Report.

# 9. References

Air Quality Consultants. “The Relationship Between Diffusion Tube Bias and Distance from the Road”. Report prepared for Defra, July 2006. AQC reference 211.

Air Quality Expert Group, 2007. Trends in Primary Nitrogen Dioxide in the UK. DEFRA, London.

Carslaw D.C and Beevers S.D, 2005. Evidence of an increasing $NO_2$/NOx emissions ratio from road traffic emissions. Atmospheric Environment 39, 2049-2059.

Defra, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). Defra, London. Cm 7169.

Defra, 2009a. Local Air Quality Management, Technical guidance LAQM.TG09. Defra, London.

Defra, 2009b. WASP – Annual Performance Criteria for $NO_2$ Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards and Summary of Laboratory Performance in Rounds 98-102. AEA February 2009.

Ealing Borough Council (2004). Local Air Quality Management – Updating and Screening Assessment 2004

Ealing Borough Council (2005) Local Air Quality Management – Progress Report. April 2005

Ealing Borough Council (2006). Local Air Quality Management – Updating and Screening Assessment 2006

ERG, 2008. Air Quality in London 2005-6. London Air Quality Network Report 13. ERG, King’s College London 2008.

Fuller, G.W., and Green, D., 2006. Evidence for increasing primary $PM_{10}$ in London. Atmospheric Environment 40, 6134 - 6145.

# Appendices

**Table 12** 2008 Unadjusted $NO_2$ diffusion tube results for Ealing

| Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 62.5 | 72.6 | 51.9 | 62.78 | 71.68 | 49.44 | 50.61 | 25.04 | 52.23 | 60.00 | 53.20 | 57.74 |
| **2** | 45.5 | 62.0 | 43.0 | 43.76 | 60.42 | 32.34 | 34.77 | 20.91 | 33.39 | 35.69 | 45.11 | 47.50 |
| **3** | 76.2 | 79.9 | 57.0 | 62.46 | 59.53 | 51.96 | 46.54 | 19.40 | 45.12 | 67.94 | 66.30 | 63.67 |
| **4** | 59.5 | 70.5 | 52.7 | 52.32 | 69.62 | 48.61 | 48.15 | 33.87 | 45.43 | 41.59 |  | 58.34 |
| **5** | 42.0 | 55.8 | 41.1 |  |  |  | 31.24 | 22.97 | 22.31 | 35.32 | 44.66 |  |
| **6.1** | 67.2 | 86.4 | 69.4 | 74.16 |  |  | 55.92 |  | 70.65 | 57.18 | 77.06 | 88.12 |
| **6.2** | 64.9 | 86.5 | 57.7 | 69.37 |  |  | 50.91 | 26.83 | 58.74 | 56.78 | 72.29 | 80.65 |
| **6.3** | 55.5 | 90.3 | 61.1 | 68.52 |  |  | 54.46 | 49.23 | 63.53 | 58.72 | 67.09 | 77.00 |
| **6.4** | 52.4 | 89.3 | 56.1 | 68.74 |  |  | 61.76 | 40.74 | 57.92 | 55.45 | 74.77 | 37.55 |
| **7** | 101.4 | 79.9 | 47.9 | 57.69 |  | 47.23 | 49.24 | 29.10 | 48.29 | 51.79 | 50.61 | 61.36 |
| **8** | 50.5 | 61.6 | 43.6 | 42.27 | 38.93 | 35.49 | 36.99 | 31.43 | 39.53 | 49.54 | 48.53 | 52.58 |
| **9** | 50.1 | 67.0 | 48.9 | 55.97 | 60.02 | 48.64 | 42.02 | 28.03 | 32.64 | 54.27 | 54.62 | 66.07 |
| **10** | 68.8 | 83.7 | 68.1 | 67.94 | 63.67 | 71.01 | 69.74 | 47.44 | 44.58 | 71.39 | 71.14 | 69.71 |
| **11** | 58.3 | 68.9 | 60.2 | 66.66 | 41.58 | 49.34 | 60.42 | 59.33 | 36.28 | 61.26 | 63.68 | 55.54 |
| **12.1** | 71.4 | 90.3 | 68.7 | 70.99 | 108.27 | 67.07 | 72.28 | 65.08 | 63.52 | 83.93 | 85.92 | 89.12 |
| **12.2** | 64.1 | 81.5 | 63.1 | 77.23 | 106.64 | 63.73 | 70.81 | 62.09 | 70.47 | 82.53 | 74.01 | 81.98 |
| **12.3** | 71.3 | 100.1 | 74.9 | 85.00 | 95.86 | 75.41 | 65.26 | 70.23 | 80.18 | 69.67 | 84.34 | 84.89 |
| **13** | 39.6 | 52.0 | 36.0 |  |  |  | 29.48 | 23.70 | 28.09 | 40.12 | 43.33 | 43.91 |
| **14** | 56.6 | 78.7 | 54.1 | 66.07 | 78.18 | 45.77 | 49.65 | 36.10 | 30.28 | 51.55 | 63.05 | 62.78 |
| **15** | 67.6 | 78.6 | 63.1 |  | 63.71 | 65.93 | 58.74 | 50.42 | 45.22 | 63.87 | 59.54 | 71.39 |
| **17** | 43.3 | 48.5 | 40.9 | 32.45 |  |  | 33.82 | 30.69 | 31.72 | 39.71 |  | 46.95 |
| **19** | 37.5 | 57.0 | 36.2 | 30.98 | 38.12 |  | 22.82 | 26.45 | 35.50 | 34.03 |  | 64.40 |
| **20** | 64.0 | 77.4 | 72.6 | 77.99 |  |  | 64.71 | 57.43 | 50.43 | 58.65 | 66.49 | 80.93 |
| **21** | 34.7 | 56.4 | 38.0 | 46.26 | 61.54 | 32.88 | 27.11 | 29.27 | 31.14 | 34.46 | 42.90 | 51.81 |
| **22** | 50.1 | 74.6 | 53.6 |  | 72.28 | 54.71 | 46.93 | 40.88 | 63.77 | 50.83 | 54.28 | 62.92 |
| **23** | 64.8 | 81.4 | 54.6 | 65.99 | 66.68 | 49.65 | 47.47 | 30.54 | 58.15 | 38.09 | 55.85 | 67.24 |
| **24** | 50.0 | 65.2 | 36.3 | 44.84 | 51.13 | 37.03 | 37.84 | 32.58 | 49.39 | 43.51 | 44.95 | 44.33 |
| **25** | 58.6 | 103.4 | 99.5 | 100.29 | 83.46 | 79.11 | 102.79 | 72.34 | 65.11 | 105.84 | 84.87 | 95.50 |
| **26** | 46.3 | 65.7 | 48.6 | 48.05 | 55.17 | 46.18 | 34.84 | 21.48 | 43.78 | 42.87 | 58.66 | 49.30 |
| **27** | 47.9 | 62.8 | 48.8 | 56.40 | 51.12 | 50.67 | 46.79 | 26.43 | 39.67 | 42.58 | 49.90 | 52.43 |
| **28** | 49.0 | 68.1 | 41.2 | 56.17 | 55.87 |  | 82.41 | 30.08 | 43.25 | 50.72 | 53.89 | 55.69 |
| **29** | 64.5 | 64.7 | 44.8 | 46.70 | 37.26 | 36.81 | 43.55 | 40.34 | 48.95 |  | 52.34 | 54.56 |
| **30** | 67.3 | 71.7 | 51.3 | 52.57 |  | 40.63 | 44.06 | 36.26 | 40.53 | 52.98 | 52.68 | 60.03 |
| **32** |  | 91.8 | 49.9 | 43.58 | 87.41 | 67.74 | 35.92 | 16.43 | 35.03 | 37.09 | 50.58 | 50.47 |
| **33** | 54.6 | 65.5 | 49.9 | 54.18 |  |  | 32.40 | 26.08 | 54.02 | 50.71 | 59.28 | 60.71 |
| **34** | 57.2 | 100.5 | 19.3 | 87.78 | 95.60 | 85.01 | 79.51 | 60.11 | 69.70 | 97.65 | 90.94 | 92.06 |
| **35** | 51.8 | 74.7 |  | 55.23 | 64.97 | 46.03 | 44.81 | 32.78 | 35.27 | 42.70 | 51.94 | 68.29 |
| **36** | 50.9 | 66.9 | 51.8 | 55.44 |  |  |  | 52.54 | 37.28 | 58.21 | 49.21 | 57.19 |
| **37** | 60.4 | 83.0 | 57.6 | 51.77 | 60.08 |  | 35.66 | 21.95 | 26.88 | 39.01 | 47.69 | 59.79 |
| **38** | 44.5 | 52.1 | 38.0 | 33.58 | 33.78 | 21.86 | 27.38 | 18.70 | 27.90 | 37.64 | 33.14 | 46.69 |
| **39** | 60.6 | 73.0 | 49.9 | 49.84 |  |  |  |  | 45.27 | 46.52 | 44.10 | 57.64 |
| **40.1** | 61.6 | 78.8 | 55.7 | 54.60 |  |  | 50.68 | 37.34 | 54.96 | 57.20 | 55.45 | 53.81 |
| **40.2** | 62.6 | 77.9 | 52.4 | 58.07 |  |  | 46.79 | 46.58 | 67.01 | 55.04 | 57.13 | 58.41 |
| **40.3** | 63.5 |  | 58.2 | 63.61 |  |  | 48.13 | 48.20 | 60.78 | 55.37 | 55.68 | 59.55 |
| **41** | 49.3 | 58.9 | 34.6 | 53.67 | 45.12 | 47.07 | 38.51 | 32.61 | 35.89 | 45.38 | 50.37 | 47.26 |

| Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **44** | 34.7 | 37.3 | 27.6 | 26.74 | | | | 16.71 | | 24.02 | 28.04 | 27.54 |
| **45** | 50.3 | 47.8 | 44.2 | 43.57 | 47.66 | 41.18 | 39.23 | 20.37 | 32.73 | 45.22 | 49.38 | 54.73 |
| **46** | 102.6 | 62.5 | 67.6 | 78.24 | 52.59 | 41.53 | 79.68 | 53.83 | 63.38 | 61.76 | 68.37 | 72.02 |
| **47** | 39.1 | 51.4 | 36.5 | | | 23.63 | | | | 46.22 | 53.13 | 52.55 |
| **48** | 36.2 | 46.7 | 29.6 | 28.73 | 28.26 | 21.52 | 22.97 | 19.36 | 25.38 | 31.48 | 34.27 | 38.50 |
| **49** | 51.6 | 61.1 | 44.9 | 43.67 | 40.36 | 38.12 | 37.83 | 26.24 | 40.24 | 45.23 | 48.35 | 50.89 |
| **50** | 86.9 | 96.2 | 79.1 | 72.76 | 84.31 | | 70.51 | 55.32 | 53.17 | 70.97 | 63.73 | 78.33 |
| **51.1** | 44.5 | 55.0 | 50.0 | 43.44 | | 75.48 | 63.79 | 23.82 | 95.35 | 40.29 | 94.39 | 49.06 |
| **51.2** | 41.1 | 61.4 | 39.3 | 42.20 | | 80.64 | 76.18 | 26.69 | 66.88 | 41.87 | 102.61 | 49.43 |
| **51.3** | 38.1 | 66.7 | 27.9 | 40.55 | | 73.58 | 66.87 | 26.25 | 92.88 | 39.12 | 112.82 | 50.45 |
| **52** | 39.6 | 59.1 | 29.8 | 41.44 | 61.25 | 34.18 | 35.13 | 21.89 | 43.78 | 45.94 | 48.88 | 54.55 |
| **53** | 91.6 | 69.8 | 54.0 | 65.21 | 61.02 | 63.95 | 54.26 | 51.08 | 59.88 | 58.07 | 59.83 | 58.56 |
| **54** | 40.4 | 49.4 | 38.7 | 30.23 | 28.62 | 29.01 | 24.12 | 25.12 | 34.67 | 37.04 | 41.18 | 47.28 |
| **55.1** | 62.7 | 64.4 | 57.6 | 61.06 | 72.84 | 57.05 | 59.60 | 41.96 | 45.25 | 49.13 | 57.52 | 63.61 |
| **55.2** | 57.3 | 83.4 | 57.9 | 61.97 | 85.43 | 47.99 | 56.40 | 45.71 | 67.55 | 56.21 | 30.79 | 62.47 |
| **55.3** | 59.2 | 77.9 | 44.0 | 59.60 | 73.77 | 48.82 | 59.01 | 46.78 | 46.88 | 49.94 | 43.09 | 61.01 |
| **56** | 92.0 | 97.5 | 89.0 | | 86.27 | 94.16 | 112.00 | | | 105.02 | 303.92 | 100.74 |
| **57** | 38.7 | 58.2 | 36.2 | 34.49 | 43.99 | 27.09 | 22.45 | 21.91 | 38.40 | 31.67 | 42.78 | 46.78 |
| **58** | 69.2 | 85.9 | 64.0 | | 76.76 | | 51.37 | 54.56 | | 60.98 | 62.58 | 69.05 |
| **59** | 48.8 | 57.9 | 40.1 | 39.48 | 36.41 | 27.84 | 30.40 | 25.02 | 33.08 | 29.74 | 43.74 | 45.78 |
| **60** | 64.3 | 80.9 | 69.4 | 77.26 | 58.59 | 67.01 | 72.37 | 65.19 | 48.73 | 69.01 | 67.72 | 65.84 |
| **61** | 38.7 | 60.5 | 28.4 | 35.07 | 49.96 | 27.38 | 25.01 | 25.61 | 23.25 | 38.75 | 45.28 | 52.19 |
| **62** | 59.3 | 75.2 | 51.6 | 60.79 | | 61.90 | 59.31 | 29.07 | 49.79 | 68.59 | 63.61 | 68.56 |
| **63** | 38.6 | 52.4 | 31.8 | 34.20 | | 24.19 | 30.40 | 19.84 | 27.61 | 30.60 | 41.24 | 43.73 |
| **64** | 88.3 | | 53.0 | 50.50 | | | 51.94 | 30.47 | 36.83 | 40.43 | 50.45 | 57.69 |
| **65** | 76.1 | 82.7 | 74.2 | 76.49 | 57.58 | 77.58 | 72.53 | 49.17 | 63.74 | 49.41 | 57.53 | 68.68 |
| **66** | 54.2 | 65.4 | 50.7 | | 71.40 | 37.49 | 48.94 | 32.30 | 41.30 | 45.33 | 59.51 | 59.42 |
| **67.1** | 53.1 | 59.4 | 44.7 | 49.44 | | 36.15 | 39.06 | 36.99 | 36.69 | 39.81 | 42.83 | 45.75 |
| **67.2** | 55.6 | 59.4 | 46.2 | 44.17 | | 37.93 | 45.01 | 27.80 | 24.73 | 51.91 | 45.50 | 47.21 |
| **67.3** | 51.9 | 64.2 | 44.4 | 45.16 | | 36.44 | 43.10 | 46.08 | 38.24 | 44.57 | 43.43 | 47.22 |
| **68** | 63.8 | 58.8 | | 51.06 | 42.92 | 45.15 | 45.25 | 35.12 | 25.51 | 56.97 | 44.44 | 56.88 |
| **69** | 41.2 | 57.5 | 42.0 | 34.26 | 40.39 | 28.78 | 31.63 | 20.69 | 35.60 | 37.52 | 42.91 | 54.97 |
| **70** | 52.3 | 59.8 | 42.3 | 41.57 | 33.42 | 31.27 | 39.03 | 18.62 | 30.77 | 45.60 | 45.21 | 49.42 |
| **71** | 54.9 | 56.8 | 39.8 | 38.69 | 43.56 | 27.88 | 29.73 | 25.95 | 40.28 | 43.80 | 46.51 | 51.66 |
| **72** | 41.1 | 58.8 | 39.0 | 42.64 | 44.09 | 32.88 | 29.95 | 27.33 | 33.63 | 33.08 | 43.59 | 49.90 |
| **73.1** | 64.0 | 76.2 | 63.9 | 49.59 | | | 56.92 | 46.20 | 50.52 | 59.61 | 58.40 | 64.35 |
| **73.2** | 70.9 | 78.1 | 67.6 | 71.07 | | | 62.37 | 48.97 | 51.05 | 58.42 | 60.75 | 63.22 |
| **73.3** | 75.9 | 80.3 | 35.5 | 65.54 | | | 55.31 | 55.26 | 59.31 | 57.94 | 65.65 | 68.14 |
| **74** | 72.1 | 85.5 | 64.7 | 61.88 | 50.36 | 52.69 | 46.66 | 34.71 | 65.22 | 59.77 | 56.07 | 69.58 |
| **75** | 47.0 | 60.1 | 43.9 | 48.82 | | | 34.07 | 27.01 | 35.88 | 36.71 | | 51.70 |
| **76** | 68.0 | 83.0 | 55.6 | | | | 53.97 | 26.63 | | 57.77 | 79.44 | 83.91 |
| **77** | 46.1 | 59.1 | 40.1 | 35.91 | 38.72 | 62.77 | 32.85 | 29.53 | 46.08 | 38.61 | 43.79 | 46.83 |
| **78** | 38.3 | 66.2 | 42.1 | 54.12 | | 33.62 | 30.60 | 20.64 | 28.09 | 34.71 | 263.71 | 87.12 |
| **79** | 49.9 | 64.7 | 41.0 | 39.86 | 52.07 | 41.99 | 37.70 | 22.43 | 46.13 | 46.01 | 48.98 | 51.72 |
| **80** | 74.9 | 95.6 | 83.1 | 83.63 | 85.11 | 94.38 | 84.44 | 66.79 | 51.79 | 87.18 | | 87.61 |
| **81** | 64.9 | 68.1 | 46.2 | 64.57 | 63.88 | 48.90 | 59.49 | 54.29 | 49.48 | 61.20 | 60.25 | 63.90 |
| **82** | 55.4 | 78.1 | 60.7 | 67.99 | 85.88 | 61.33 | 41.85 | 52.61 | 39.52 | 58.44 | 70.11 | 67.27 |
| **83** | 49.9 | 67.7 | 41.7 | 51.59 | 64.05 | 48.36 | 32.14 | 43.81 | 46.81 | 57.51 | 66.10 | 61.75 |
| **84** | 41.2 | 58.1 | 37.3 | 37.60 | | | | | | 36.07 | 45.34 | 58.87 |

| Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **85.1** | 82.6 | 84.1 | 82.8 | 84.18 | | 69.94 | 97.03 | 63.72 | 60.34 | 79.96 | 85.48 | 88.42 |
| **85.2** | 90.4 | 92.6 | 83.1 | 82.47 | | 72.91 | 89.75 | 70.52 | 63.73 | 88.31 | 82.96 | 80.49 |
| **85.3** | 57.5 | 113.1 | 73.5 | 83.33 | | 86.97 | 96.66 | 64.58 | 58.61 | 80.70 | 84.77 | 82.75 |
| **86** | 45.8 | 63.1 | 37.7 | 48.58 | 67.83 | 35.82 | | 39.84 | 53.10 | 34.22 | 40.55 | 48.92 |
| **87** | 51.2 | 60.6 | 46.0 | 47.14 | 41.25 | 46.93 | 43.35 | 37.14 | 31.93 | 46.04 | 50.01 | 54.42 |
| **88** | 56.3 | 63.0 | 54.6 | 50.41 | 39.09 | 42.17 | 35.54 | 31.09 | 49.75 | 46.67 | 54.71 | 49.48 |
| **89.1** | 38.1 | 50.9 | 33.5 | 31.40 | 34.43 | | 25.27 | 18.99 | 29.05 | 35.71 | 29.69 | 40.83 |
| **89.2** | 40.8 | 51.9 | 42.6 | 35.41 | 35.06 | | 25.68 | 17.32 | 35.40 | 36.52 | 37.69 | 44.14 |
| **89.3** | 43.7 | 47.9 | 33.3 | 33.22 | 33.87 | | 27.00 | 6.86 | 28.04 | 33.96 | 36.98 | 45.24 |
| **90.1** | 58.6 | 67.9 | 35.2 | 45.93 | 60.88 | | 43.77 | 40.78 | 49.08 | 48.54 | 49.41 | 62.90 |
| **90.2** | 65.0 | 66.0 | 46.5 | 40.91 | 49.52 | | 42.76 | 28.62 | 48.72 | 40.17 | 46.61 | 59.66 |
| **90.3** | 71.6 | 73.9 | 37.3 | 50.59 | 52.52 | 33.23 | 40.59 | 32.83 | 51.44 | 51.10 | 55.07 | 55.14 |
| **91.1** | 50.2 | 61.0 | 46.1 | 48.02 | 64.15 | 39.34 | 40.06 | 32.42 | 41.11 | 52.19 | 52.64 | 54.16 |
| **91.2** | 51.7 | 68.5 | 40.2 | 48.46 | 56.15 | 31.24 | 44.02 | 37.75 | 33.60 | 50.36 | 51.20 | 56.40 |
| **91.3** | 56.4 | 68.5 | 46.0 | 52.64 | 56.17 | 35.37 | 37.85 | 45.27 | 26.25 | 53.11 | 48.95 | 61.48 |

**Table 13** Annualised adjustment factors for 2008

| Site | Factor | Site | Factor |
|---|---|---|---|
| 4 | 1.01 | 51.2 | 1.00 |
| 5 | 1.00 | 51.3 | 1.00 |
| 6.1 | 0.93 | 58 | 0.96 |
| 6.2 | 0.97 | 62 | 1.00 |
| 6.3 | 0.97 | 63 | 1.00 |
| 6.4 | 0.97 | 64 | 1.02 |
| 7 | 1.00 | 66 | 1.00 |
| 13 | 0.97 | 67.1 | 1.00 |
| 15 | 1.00 | 67.2 | 1.00 |
| 17 | 0.97 | 67.3 | 1.00 |
| 19 | 0.97 | 68 | 0.99 |
| 20 | 0.97 | 73.1 | 0.97 |
| 22 | 1.00 | 73.2 | 0.97 |
| 28 | 0.97 | 73.3 | 0.97 |
| 29 | 1.02 | 75 | 0.97 |
| 30 | 1.00 | 76 | 0.96 |
| 32 | 1.00 | 78 | 1.00 |
| 33 | 0.97 | 80 | 1.01 |
| 35 | 0.99 | 85.1 | 1.00 |
| 36 | 0.94 | 85.2 | 1.00 |
| 37 | 0.97 | 85.3 | 1.00 |
| 39 | 0.89 | 86 | 0.97 |
| 40.1 | 0.97 | 89.1 | 0.97 |
| 40.2 | 0.97 | 89.2 | 0.97 |
| 40.3 | 1.02 | 89.3 | 0.97 |
| 44 | 0.93 | 90.1 | 0.97 |
| 50 | 0.97 | 90.2 | 0.97 |
| 51.1 | 1.00 | | |

**Table 14** List of permitted petrol stations in the Council's area

| Operator | Address | Postcode | Permit |
|---|---|---|---|
| Alahma Ltd Filling Stn | Greenford Tower Roundabout, Western Avenue, Greenford, | UB6 8ST | P-000146 |
| BP Gunnersbury Park Connect | 119 Gunnersbury Avenue, Ealing, London | W5 4LR | P-000114 |
| BP Mandeville Service Station | 42-44 Mandeville Road, Northolt, Middx. | UB5 5BH | P-000124 |
| BP Northolt Park Service Station | Petts Hill, Northolt, Middx. | UB5 4NP | P-000123 |
| BP Perivale Connect | Western Avenue, Perivale, Greenford, Middx. | UB6 8TF | P-000122 |
| BP Yeading Connect | 529 Yeading Lane, Northolt, Middx. | UB5 6LW | P-000156 |
| BP Western Avenue Connect | 612 Western Avenue, Acton, London | W3 0TE | P-000116 |
| Mr J. Hindocha | Greenford Park Service Station, 57 Greenford Road, Greenford, Middle | UB6 9BA | P-000143 |
| Mr P.A. Kumar | Star Northolt Service Station, Target Roundabout, Western Avenue, Northolt, Middx. | UB5 2LQ | P-000127 |
| Murco Petroleum Ltd | Murco Service Station, 70 South Parade, Chiswick, London | W4 5LG | P-000139 |
| NEM Petroleum Co Ltd | Horn Lane Filling Station, 162-164, Horn Lane, Acton, London | W3 6PH | P-000141 |
| Pace Petroleum Ltd | Bridge Garage, 301 Uxbridge Road, Southall, Middx. | UB1 3DD | P-000106 |
| ROC UK Ltd | Mead Service Station, 309 Ruislip Road, Greenford, Middx. | UB6 9RP | P-000128 |
| ROC UK Ltd | North Acton Service Station, Victoria Road, London | W3 6UN | P-000142 |
| Shell U.K. Oil Products Ltd | Shell Ealing, 35 Hanger Lane, Ealing, London | W5 3HJ | P-000130 |
| Shell U.K. Oil Products Ltd | Shell Hanwell, 4-6 Church Road, Hanwell | W7 3BA | P-000131 |
| Shell U.K. Oil Products Ltd | Shell Park Royal, Royale Leisure Park, Kendal Avenue, Acton, London | W3 0PA | P-000132 |
| Shell U.K. Oil Products Ltd | Shell Roundabout, adj 750 Greenford Road, Greenford, Middx. | UB6 8QQ | P-000133 |
| Snax 24 Ltd | Studley Grange Service Station, 167, Boston Road, Hanwell, London | W7 3QJ | P-000110 |
| Somerfield Stores Limited | Oldfield Service Station, 1091 Greenford Road, Greenford, Middx. | UB6 0EJ | P-000140 |
| Tesco Stores Ltd | Old Hoover Building, Western Avenue, Perivale, Greenford, Middx. | UB6 8DW | P-000121 |
| Tesco Stores Ltd | 355-363 Uxbridge Road, Acton, London | W3 9RH | P-000120 |
| Total UK Ltd | 30 The Vale, Acton, London | W3 7RS | P-000117 |
| Total UK Ltd | 213-217 The Vale, Acton, London | W3 7QS | P-000118 |
| Triangle Ealing Ltd | 35-39 South Ealing Road, Ealing, London | W5 4QT | P-000138 |
| Triangle Estate and Petroleum (Southall) Ltd | Petrol Filling Station, Merrick Road, Southall, Middx. | UB2 4AU | P-000137 |

**Table 15** Part B installations in the Council's area

| Operator | Address | Postcode | PG Note Activity | Permit |
|---|---|---|---|---|
| Accident Repair Centre (Park Royal) Ltd | 50 Minerva Road, Park Royal, London | NW10 6HJ | PG6/34b(06) Respraying of road vehicles | P-000059 |
| ADP Coachcraft Ltd | 14 Wadsworth Road, Perivale, Greenford, | UB6 7LD | PG6/34b(06) Respraying of road vehicles | P-000090 |
| Arkmead Ltd T/A Oldfield Tyre and Exhaust | 119-121 Norwood Road, Southall, Middx. | UB2 4DY | PG1/1(04) Waste oil burner | P-000280 |
| Autohaus (UK) Ltd | 61 Aintree Road, Perivale, Greenford, Middx. | UB6 7LA | PG6/34b(06) Respraying of road vehicles | P-000069 |
| Bilton Automotive Services Ltd T/A Prestige Coachworks | 9 Aintree Road, Perivale, Greenford, Middx. | UB6 7LE | PG6/34b(06) Respraying of road vehicles | P-000151 |
| Dyn-Metal Ltd | 25-29 Chase Road, Park Royal, London | NW10 6TA | PG2/04(04) and PG2/08(04) Melting and casting of nonferrous metals | P-000026 |
| Hanson Quarry Products Europe Limited | Acton Plant, EWS Goods Yard, 305 Horn Lane, Acton, London | W3 0BP | PG3/1(04) Concrete batching (bulk cement) | P-000009 |
| Ivo Textiles Ltd | 3 Trident Way, Southall, Middx. | UB2 5LF | PG6/16(04) Print works | P-000053 |
| J. & J. Transport Ltd | 928 Greenford Road, Greenford, Middx. | UB6 8QN | PG3/16(04) Mobile crushing | P-000112 |
| J. & J. Transport Ltd | 928 Greenford Road, Greenford, Middx. | UB6 8QN | PG3/16(04) Mobile crushing | P-000175 |
| J. & J. Transport Ltd | Unit 7, Station Approach, Oldfield Lane North, Greenford, Middx. | UB6 0AL | PG3/1(04) Concrete batching (bulk cement) | P-000167 |
| Jetpoint Services Ltd | Unit 6A, 23-35 Gorst Road, Park, Royal, London | NW10 6LA | PG1/1(04) Waste oil burner | P-000277 |
| Metropolitan Police Transport Service Division | Main Repair Depot, Rowdell Road, Northolt | UB5 5QP | PG6/34b(06) Respraying of road vehicles | P-000030 |
| Monorep Limited | Poplar Avenue, Southall, Middx. | UB2 4PN | PG6/34b(06) Respraying of road vehicles | P-000152 |
| Mr D. Nicoll T/A Burlington Motors | 52 Birkbeck Road, Acton, London | W3 6BQ | PG1/1(04) Waste oil burner | P-000096 |
| Mr G. Singh T/A Pargan Autos | 167 Dukes Road, Acton, London | W3 0SL | PG1/1(04) Waste oil burner | P-000279 |
| Mr M. Keenoy T/A Chiswick Car Craft | 337 Acton Lane, Acton, London | W3 8NU | PG1/1(04) Waste oil burner | P-000278 |
| Mr S. Christoforou T/A Spiros Motor Technicians | 4 Sunbeam Road, Park Royal, London | NW10 6JL | PG1/1(04) Waste oil burner | P-000282 |
| Quattro UK Ltd | Regency Street, Park Royal, London | NW10 6NR | PG3/1(04) Concrete batching (bulk cement) | P-000180 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000097 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000098 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000099 |

| Operator | Address | Postcode | PG Note Activity | Permit |
|---|---|---|---|---|
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000105 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000150 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000154 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000155 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000159 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000164 |
| Quattro UK Ltd | Regency Street, Park Royal, London (principal place of business) | NW10 6NR | PG3/16(04) Mobile crushing and screening | P-000176 |
| REAGROUP Ltd | Renault London West, Western Avenue, Acton, London | W3 0RZ | PG6/34b(06) Respraying of road vehicles | P-000014 |
| Shine Motors Ltd | 7A Coronation Road, Park Royal, London | NW10 7PQ | PG1/1(04) Waste oil burner | P-000286 |
| Solus (London) Ltd | 1-9 Chase Road, Park Royal, London | NW10 6LX | PG6/34b(06) Respraying of road vehicles | P-000103 |
| Suri Motors Ltd | 50A Overdale Road, Ealing, London | W5 4TT | PG1/1(04) Waste oil burner | P-000265 |
| Tarmac Ltd | 24 Park Royal Road, Park Royal, London | NW10 7JW | PG3/1(04) Concrete batching (bulk cement) | P-000088 |
| Tarmac Ltd T/A Buxton Lime and Cement | Channel Gate Road, Willesden, London | NW10 6UQ | PG3/1(04) Bulk cement | P-000157 |
| The Bodyshop (West London) Limited | 13 Wadsworth Road, Perivale, Greenford, Middx. | UB6 7JD | PG6/34b(06) Respraying of road vehicles | P-000012 |
| Veetec Repairs Ltd | Western Avenue Business Park, 9 Mansfield Road, Acton, London | W3 0BZ | PG6/34b(06) Respraying of road vehicles | P-000065 |
| W. Hanson (Iron Bridge) Ltd | Uxbridge Road, Southall, Middx. | UB1 3EQ | PG6/02(04) Manufacture of timber and wood based products | P-000017 |
| Yeoman Aggregates Ltd | Stone Terminal, Horn Lane, Acton, London (principal place of business) | W3 9EH | PG3/16(04) Mobile screening | P-000050 |
| Yeoman Aggregates Ltd | Stone Terminal, Horn Lane, Acton, London (principal place of business) | W3 9EH | PG3/16(04) Mobile screening | P-000153 |

Table 16 Part B dry cleaners in the Council's area

| Operator | Address | Postcode | Permit |
|---|---|---|---|
| AAA Linen Services Ltd | 31-33 Sunbeam Road, Park Royal, London | NW10 6JR | P-000195 |
| Akshar Drycleaning Ltd | Ocean Blue Dry Cleaning, 60 Church Road, Northolt, Middx. | UB5 5AE | P-000205 |
| Athena Dry Cleaners Ltd T/A Elegant Dry Cleaners | 36-38 Chase Road, Park Royal, London | NW10 6QN | P-000209 |
| Carmen Cleaning Services Ltd | 381 Uxbridge Road, Acton, London | W3 9SA | P-000197 |
| Cornwall Dry Cleaners Ltd | 23 Haven Lane, Ealing, London | W5 2HZ | P-000203 |
| Green Turn'em Clean Ltd | 11 Bedford Corner, The Avenue, Chiswick, | W4 1LZ | P-000255 |
| Messrs O. Sharma and S.S. Mangat | Snowhite Drycleaners, 84 South Road, Southall, Middx. | UB1 1RD | P-000248 |
| Messrs P.S. Kooner and S.S. Gill | New Merit Dry Cleaners, 193 The Broadway, Southall, Middx. | UB1 1LZ | P-000230 |
| Montague's Laundries Ltd | Unit 5c, Heron Trading Estate, Alliance Road, Acton, London | W3 0RA | P-000267 |
| Mr A. Moran and Mrs S. Moran | Salisbury Dry Cleaners, 153 Pitshanger Lane, Ealing, London | W5 1RH | P-000243 |
| Mr A.K. Sharda | New Embassy Dry Cleaners, 487 Yeading Lane, Northolt, Middx. | UB5 6LN | P-000229 |
| Mr D. Said | Castle Dry Cleaning, 5 Castle Hill Parade, The Avenue, West Ealing, London | W13 8JP | P-000186 |
| Mr B. Amany | Northfield Laundrette and Drycleaners, 125 Northfield Avenue, West Ealing, L | W13 9QR | P-000245 |
| Mr D. Shepherd | The Press Gang, 323 Greenford Avenue, Hanwell, London | W7 1JH | P-000252 |
| Mr G. Ameen | Fresh as a Daisy, 70 Southfield Road, Chiswick, London | W4 1BD | P-000275 |
| Mr G. Stepanian | Flamingo Dry Cleaners, 76 South Ealing Road, Ealing, London | W5 4QB | P-000216 |
| Mr H. Bakhshad | Quality Dry Cleaners, 319 Horn Lane | W3 0BU | P-000237 |
| Mr I. Wahab | Aqua Clean, Europa House, Hanger Lane, Ealing, London | W5 1DP | P-000272 |
| Mr J.A. Gage | Aristocat Dry Cleaners, 149 Pitshanger Lane, Ealing, London | W5 1RH | P-000191 |
| Mr J.M. Najib | 2000 Dry Cleaners, 255 Acton Lane, Chiswick, London | W4 5DG | P-000271 |
| Mr M. Javid | Reeves Dry Cleaners, 74 Pitshanger Lane, Ealing, London | W5 1QX | P-000238 |
| Mr M. Rahim | Honia Dry Cleaning, 74 The Broadway, Greenford, Middx. | UB6 9QA | P-000240 |
| Mr M.L. Seda and Mrs P.K. Seda | Bri-Clean Dry Cleaners, 1b Argyle Corner, Argyle Road, West Ealing, London | W13 0LL | P-000194 |
| Mr M.N. Shaikh | Excelsior Dry Cleaners, 1 Bordars Road, Hanwell, London | W7 1AG | P-000214 |
| Mr N. Hussain | Style Cleaners, 19 Boston Road, Hanwell, London | W7 3SJ | P-000250 |
| Mr N. Sehra | Northolt Dry Cleaners, 11 Station Parade, Northolt, Middx. | UB5 5HR | P-000231 |
| Mr P.K. Dewan | Tri-Star Dry Cleaners, 308 Northfield Avenue, Ealing, London | W5 4UB | P-000254 |
| Mr R. Chohan | Elegance Dry Cleaners, 81 New Broadway, Ealing, London | W5 5AL | P-000208 |
| Mr R. Thaddeus | Hanger Lane Dry Cleaning, 14 Ashbourne Parade, Hanger Lane, Ealing, London | W5 3QS | P-000220 |
| Mr R.A. Rehman | Professional Network Dry Clean, 73 Old Oak Common Lane, Acton, London | W3 7DD | P-000236 |

| Operator | Address | Postcode | Permit |
|---|---|---|---|
| Mr S. Chohan | World of Dry Cleaning, 5 Horn Lane, Acton, London | W3 9NJ | P-000263 |
| Mr S. Hussain | Hanwell Dry Cleaners, 27 Boston Road, Hanwell, London | W7 3SH | P-000221 |
| Mr S.A. Ladha | Pearl Dry Cleaners, 23 Oldfield Circus, Northolt, Middx. | UB5 4RR | P-000234 |
| Mr V.K. Khanna | Whitehall Dry Cleaners, 12 The Mall, Ealing, London | W5 2PJ | P-000261 |
| Mr W. Nabizada | Ealing Soapy Suds Laundrette, 161 Uxbridge Road, West Ealing, London | W13 9AU | P-000207 |
| Mr Z. Diwan | Regent Dry Cleaners, 24 Trading Estate Road, Park Royal, London | NW10 7LU | P-000269 |
| Mr Z. Rahmani | Acton Town Drycleaners, 7 Central Parade, Gunnersbury Lane, Acton | W3 8HL | P-000241 |
| Mrs C. De Silva | Arcadia Dry Cleaners, 59 Greenford Avenue, Hanwell, London | W7 1LL | P-000190 |
| Mrs K. Gupta | Express Dry Cleaners, 10 Broadway, West Ealing, London | W13 0SR | P-000215 |
| Mrs S. Warner | The Valet, 470 Greenford Road, Greenford, Middx. | UB6 8SQ | P-000253 |
| Norwood Dry Cleaners Ltd | 14 Norwood Road, Southall, Middx. | UB2 4DL | P-000232 |
| Pearls Dry Cleaners Ltd | 22 Churchfield Road, Acton, London | W3 6EG | P-000273 |
| Quattro Construction Ltd T/A Seven Dry Cleaners | 17 Leeland Road, West Ealing, London | W13 9HH | P-000283 |
| Sylvia Grey (Laundries) Ltd | Unit 5, 25-35 Gorst Road, Park Royal, London | NW10 6LE | P-000264 |

**Figure 9** Map showing location of background diffusion tube sites

**Figure 10** Map showing location of roadside diffusion tube sites

**Figure 11 Map** showing location of kerbside/ near road diffusion tube sites