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

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KING'S College LONDON

**Acknowledgements**

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# Executive Summary

The Council are required to review and assess air quality against the objectives in the Air Quality Regulations 2000 and the amendment 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 Merton has previously undertaken the earlier rounds of Review and Assessment of local air quality management and identified areas where these objectives are exceeded and where there is relevant public exposure.

This report concerns the fourth round Updating and Screening Assessment and is the 2009 Updating and Screening Assessment of air quality in the London Borough of Merton 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 a Borough-wide 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. To maintain the diffusion monitoring survey of the area.

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.

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# 1. Introduction

## 1.1 Description of the London Borough of Merton area

The London Borough of Merton is situated in inner London and is a densely populated area with a population of approximately 197,600 (mid 2006). The Borough is mostly residential with areas of employment around the main commercial centres of Wimbledon, Morden, Mitcham, Colliers Wood and Raynes Park. The Borough has a broad socio-economic range between generally affluent Wimbledon and less affluent Mitcham. The main roads that run through the Borough include A3, A24 and A217 and A297. The main sources of air pollutants are the busy and congested roads. There are about -57 minor industrial processes that are regulated by the Council, plus other processes regulated by the Environment Agency.

## 1.2 Purpose of report

This report is the 2009 Updating and Screening Assessment of air quality for the London Borough of Merton ("the Council"). 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 (Defra, 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. Additional objectives have been set for ozone, polyaromatic hydrocarbons (PAHs) and $PM_{2.5}$, although these have been deemed the responsibility of national government.

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), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1. This table shows the objectives in units of micrograms 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 Air Quality Regulations 2000 and Amendment Regulations 2002) applicable to the London Borough of Merton 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** | 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 ($PM_{10}$) (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** | 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 outlined on the third round USA report were not adopted in England as part of the revised 2007 AQS).

### 1.4 Summary of previous R&A in London Borough of Merton

The Council undertook previous rounds of Review and Assessment of air quality. The main issue with respect to local air quality was found to be emissions (relating to $NO_2$ and $PM_{10}$) emanating from road vehicles. Based on the monitoring and assessments undertaken it was found that some of the air quality objectives would be exceeded in areas where there was relevant exposure. As a consequence the Council designated the whole of its area an Air Quality Management Area (AQMA) for annual mean objective and 24 hour mean $PM_{10}$ objective.

The Council has since undertaken the third round of Review and Assessment. The 2006 USA (Merton, 2006) included updated monitoring and this showed that the air quality objectives were still exceeded. Thus there was no change in the findings from the USA and the Council therefore maintained its AQMA.

### 1.5 Fourth Round Review and Assessment

This report concerns the fourth round of LAQM Review and Assessment, 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 of 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 step 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) OR alternatively amending/ revoking an AQMA.

### 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 (quality assurance/quality control) 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 Pollution Prevention and Control Act 1999 and Environmental Protection Act 1990. The Environment Agency is responsible for the largest industrial processes (Part A processes), whilst the Council is mainly responsible for smaller Part B and A2 processes. Those small industrial processes that fall outside of Part B/ A2 Process control 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 operations have closed (mobile crusher, two vehicle refinishers and a petrol station) and three new ones opened (including 2 vehicle refinishers and one surface cleaning of metals installation). In addition, thirty-three new permits for dry cleaners have 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 are available from the most recent London Atmospheric Emissions Inventory (2006), which has been used to check for significant changes from the previous USA.

## 1.7 Relevant exposure

The objectives relate to public exposure to the pollutants. More specifically these are any areas that may exceed the government's air quality objectives and relate to "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 Non automatic monitoring

The Council currently only undertakes monitoring of air quality using non-continuous methods of measurement and therefore has not undertaken a co-location study. The details of the nitrogen dioxide ($NO_2$) monitoring sites in the Borough are provided in Table 2.

Previously it has monitored $PM_{10}$ using Osiris monitors in its area, ending most recently in 2006.

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

| Site Name | Site Type | Relevant Exposure? *(Y/N)* | Distance to kerb of nearest road *(N/A if not applicable)* | Worst-case Location? |
|---|---|---|---|---|
| School New Malden (BA) | Urban background | Y | N/A | N |
| Bardney Road, Morden (CA) | Urban background | Y | N/A | N |
| Worple Road, Raynes Park (DA) | Roadside | N | 1m | Y |
| Garth Road, Morden (GA) | Urban background | Y | N/A | N |
| High St., Colliers Wood (HA) | Roadside | Y | 5m | Y |
| Leonard Avenue, Morden (LA) | Urban background | Y | N/A | N |
| Lavender Avenue, Morden (MA) | Urban background | Y | N/A | N |
| Pepys Road, Raynes Park (RA) | Urban background | Y | N/A | N |
| Town centre, Mitcham (TA) | Urban background | Y | N/A | N |
| Woodside, Wimbledon (WA) | Urban background | N | N/A | N |
| Plough Lane, Wimbledon Park (PA) | Roadside | N | 1m | Y |

(See also Figure 5 in the Appendix)

The diffusion tubes used were supplied and analysed by Lambeth Scientific Services using a preparation method of 50% TEA in acetone. In the most recent round of Annual Performance Criteria for $NO_2$ Diffusion Tubes used in LAQM (Defra, 2009b), the laboratory demonstrated satisfactory performance in a recent QA/QC scheme for analysis of $NO_2$ diffusion tubes. Lambeth Scientific Services participate 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 11).

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."

The bias adjustment factor for each year reported has been obtained from the default bias adjustment factors (based on the March 2009 spreadsheet derived from the government's Review and Assessment website). The default factors are based on statistical analyses of reported data provided by other local authorities. The factors used for all years, other than 2008, indicate that the monitored results under estimate concentrations. For 2008 the correction indicates that the monitoring over estimates concentrations, although this is only marginal.

It is worth noting that the 2008 factor has been based on 7 studies only at this stage and that the number of studies is likely to increase later in the year. This may well lead to a change in the factor. From the default spreadsheet, the precision for the seven studies includes 3 with good performance and 4 with poor performance. The 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.

| Year | Bias adjustment factor |
|---|---|
| 2003 | 1.05 |
| 2004 | 1.19 |
| 2005 | 1.24 |
| 2006 | 1.28 |
| 2007 | 1.07 |
| 2008 | 0.98 |

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.

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.

## 2.2 Comparison of Monitoring Results with AQ Objectives

### 2.2.1 Nitrogen Dioxide

The Council monitored $NO_2$ across its area using passive diffusion tubes. The diffusion tubes are exposed at 11 locations across the Borough. The sites have been monitored since before 2000, although the results shown only represent the years 2003 to 2008 inclusive.

The results for the Borough of Merton are shown in data capture exceeded 80% for all sites. The bias adjusted results for the five-year period from 2003 to 2008 inclusive are also shown in Figure 1.

**Table 3** Bias adjusted annual mean $NO_2$ concentrations (μg $m^{-3}$) for Merton (2003 – 2008)

| Site | Type | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| BA | B | 38.6 | **43.1** | **46.3** | **41.4** | **42.9** | 38.2 |
| CA | B | **46.9** | **48.9** | **43.7** | **46.5** | **51.0** | **47.3** |
| DA | R | **57.5** | **50.5** | **53.5** | **58.0** | **51.3** | **58.4** |
| GA | B | 38.4 | **40.8** | **41.0** | **43.7** | **50.8** | **42.5** |
| HA | R | **54.5** | **46.4** | **47.8** | **55.7** | **60.9** | **70.6** |
| LA | B | 31.3 | 36.7 | **41.6** | 32.6 | 28.0 | 29.9 |
| MA | B | **41.2** | **41.7** | **44.0** | **39.3** | **41.1** | **41.7** |
| RA | B | **41.7** | **42.5** | **43.3** | **43.1** | **45.0** | **43.0** |
| TA | B | **48.4** | **47.2** | **45.3** | **45.7** | **50.2** | **45.1** |
| WA | B | **43.4** | **47.0** | **44.0** | **42.7** | 38.8 | **41.0** |
| PA | R | **60.2** | **64.1** | **56.9** | **69.6** | **64.0** | **69.4** |

(Notes: R is roadside; B is background; bold indicates > AQS objective; italics represent less than 9 months monitoring)

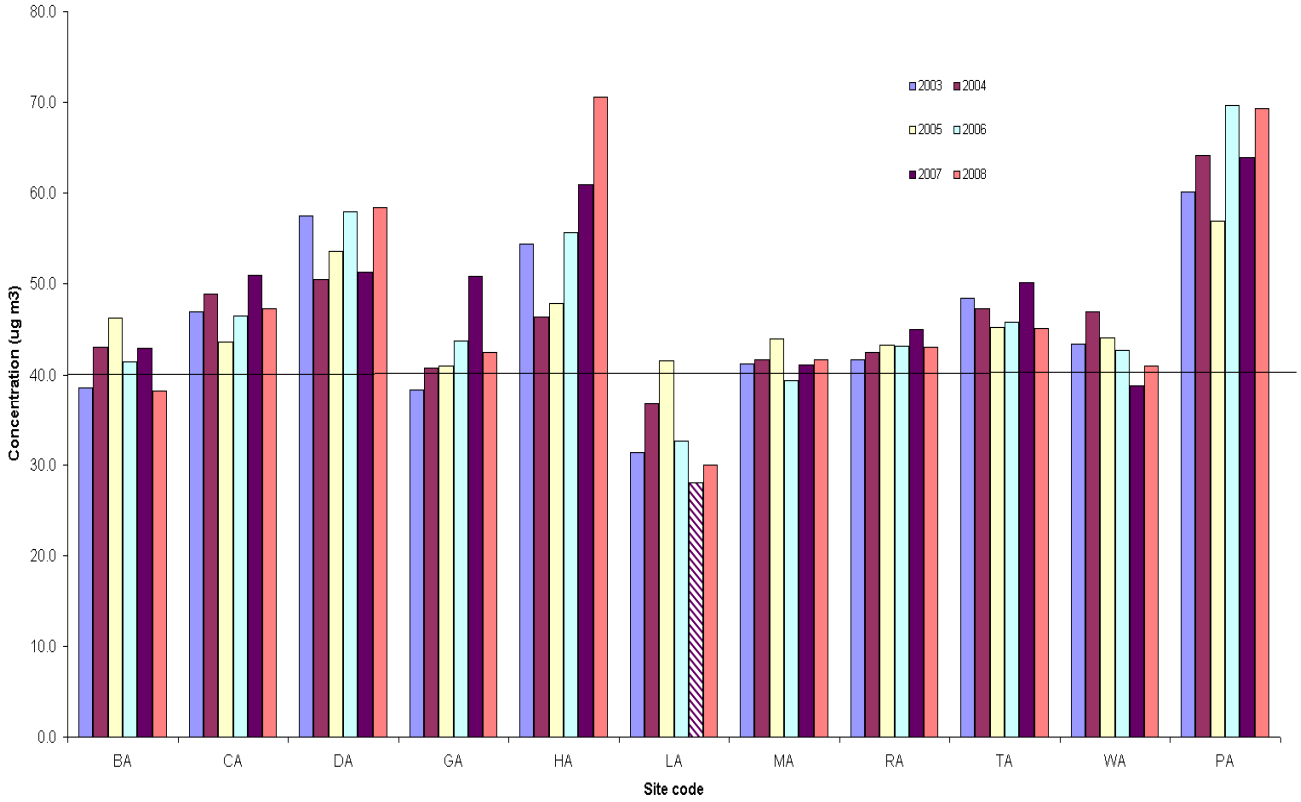
The bias adjusted annual concentrations for 2008 indicate that the government's air quality objective of 40 μg $m^{-3}$ was exceeded at all monitoring locations in the Borough, apart from the two background sites located in New Malden (BA) and Leonard Avenue in Morden (LA).

The sites with the highest concentrations are the roadside sites at the High Street in Colliers Wood (HA), Plough Lane in Wimbledon Park (PA) and at Raynes Park (DA). These consistently easily exceeded the 40 μg $m^{-3}$ objective over the period reported. The sites however do not represent relevant public exposure for this objective as described in the government's TG09 guidance. Typical relevant public exposure for the annual mean objective relates to facades of buildings such as houses, hospitals and schools.

All the other sites, including the background sites at Morden, Mitcham, Raynes Park and Wimbledon do represent relevant exposure. These sites also consistently exceeded the 40 μg $m^{-3}$ objective over the period reported, although to a lesser extent than the roadside sites.

The results over this period do not show any clear trend, other than there appears to be little change over the period, indicating that concentrations from the diffusion tube monitoring alone do not show any reduction, e.g. as might be expected in view of the predicted reduction in emissions as outlined in the LAQM guidance and AQS. (This lack of change is more clearly shown in Figure 1).

**Figure 1** Bias adjusted annual mean $NO_2$ concentrations (µg $m^{-3}$) in the Borough of Merton (2003 – 2008) (Note – sites with less than 9 months data capture are shown with a downward diagonal pattern)




Although the Council does not undertake continuous monitoring itself there are continuous monitoring sites nearby that are operated in the neighbouring London Boroughs of Sutton and Croydon. The sites are part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the government's AURN sites. Regular calibrations are carried out, 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 includes some provisional data. The results of the monitoring at these sites are given in Table 4.

**Table 4** $NO_2$ continuous monitoring in neighbouring Boroughs (2003 – 2008)

| LAQN site | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| Sutton 3 | Annual mean | - | *35.8* | 30 | *30* | 33 | 30 |
| *(Suburban)* | No of hours >200 µg $m^{-3}$ | - | *0* | 0 | 0 | 2 | 0 |
| | Data capture % | - | *24* | 99 | 87 | 98 | 98 |
| Sutton 4 | Annual mean | **71** | **80** | **83** | **78** | **83** | **77** |
| *(Kerbside)* | No of hours >200 µg $m^{-3}$ | **39** | **131** | **189** | **100** | **264** | **171** |
| | Data capture % | 96 | 92 | 97 | 97 | 95 | 99 |
| Croydon 4 | Annual mean | **74** | **64** | **60** | **54** | **59** | **49** |
| *(Kerbside)* | No of hours >200 µg $m^{-3}$ | 17 | 4 | 5 | 0 | **22** | 0 |
| | Data capture % | 98 | 93 | 79 | 93 | 99 | 98 |

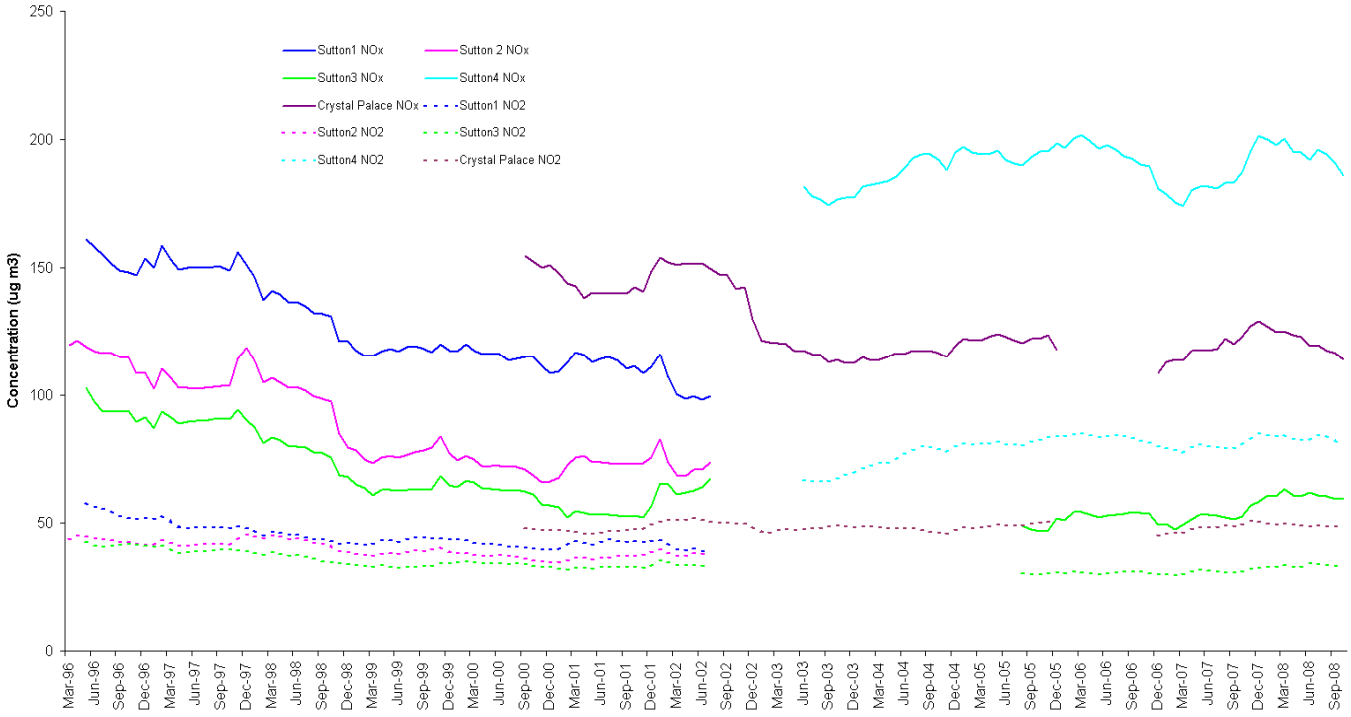
(Note – **bold** exceeds objective; *italics* < 90% data capture)

The results indicate that the annual mean objective was exceeded at the Sutton 4 and Croydon 4 kerbside sites. The hourly mean objective was also easily exceeded in every year reported at the Sutton 4 site. The Croydon 4 site however exceeded the hourly objective in 2007 only. The suburban background Sutton 3 site however met both objectives for all years monitored. (Note – this site was not in operation during 2003).

The high number of hourly mean periods exceeding 200 µg $m^{-3}$ at the Sutton 4 site is a reflection of its close proximity (i.e. 2m from the kerbside) to the A237 in Woodcote Road in Wallington. It is thus responding to the emissions of $NO_2$ directly emitted from road vehicles nearby. It is worth noting that this street runs through the shopping area of Wallington and therefore may be representative of similar areas in Merton.

An analysis of rolling annual mean $NO_x$ and $NO_2$ concentrations is provided for all the Sutton monitoring sites (including Sutton 1 and 2 that closed in 2002) to increase the dataset and indicate any trend over time. The Crystal Palace roadside site is also included for comparison purposes. The analysis is for the period from 1996 through to 2008. Figure 2 illustrates changing concentrations over time, based on changing annual averaged hourly mean concentrations. The use of rolling annual concentrations in this way largely removes seasonal influences and provides a guide to changing trends over time.

**Figure 2** Rolling annual mean $NO_X$/ $NO_2$ trends for Sutton monitoring sites (1996 to 2008)




The rolling annual mean concentrations of $NO_x$ and $NO_2$ indicate a downward trend at the Sutton 1 roadside site over time in line with reductions in emissions over time. The downward trend for $NO_x$ (approximately 50 µg $m^{-3}$) as the primary emission is more pronounced than that for $NO_2$ (approximately 10 µg $m^{-3}$). Similarly the Sutton 2 (urban background) site shows similar reductions, with $NO_x$ reducing more than $NO_2$. The Sutton 3 (suburban) site also showed similar trends to the Sutton 2 site until 2002, and then following re-opening after a period of closure the site showed increased $NO_x$ and $NO_2$ concentrations (between the period identified as Jun-05 and Sept-08).

A similar trend to the most recent part of the Sutton 3 can be seen with the Sutton 4 roadside site, which has been open for less time than the other sites. At this site concentrations increased following

opening and for $NO_2$ remained almost constant since 2006. The Crystal Palace roadside site shows a reduction in $NO_x$ concentrations, albeit with a pronounced effect caused by a wintertime period of high pollution. $NO_2$ at the site has remained almost constant and appears in 2005 to be increasing marginally. 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 that direct $NO_2$ emissions may also be increasing.

### 2.2.2 $PM_{10}$

The Council previously operated two continuous $PM_{10}$ analysers in the area. One was located at a kerbside site on Grand Drive in Raynes Park, whilst the other was located at a background location in Liberty School on Western Road, Mitcham. Both sites opened in 2003 and closed in Spring 2006 and both also used Osiris instruments to monitor $PM_{10}$. The TG09 guidance indicates that such light scattering instruments may only be used for screening purposes.

The results for the sites are given in the Table 5 below. The instruments are all calibrated using a local factor in accordance with the TG09 guidance. A factor to equate to a gravimetric equivalent is not applicable to this type of instrument.

**Table 5** Monitoring at the Merton $PM_{10}$ monitoring sites (2003 to Spring 2006)

| Site | | 2003 | 2004 | 2005 | 2005-6 |
|---|---|---|---|---|---|
| Grand Drive, Raynes Park | Annual mean (µg $m^{-3}$) | 24.2 | *23.2* | *29.5* | *25.7* |
| | Days > 50 µg $m^{-3}$ | 23 | *7* | *16* | *18* |
| | Data capture % | 100 | *88.5* | *83.3* | *83.4* |
| Liberty School, Mitcham | Annual mean (µg $m^{-3}$) | *26.4* | *15.3* | *18.3* | *23* |
| | Days > 50 µg $m^{-3}$ | *16* | *1* | *1* | *17* |
| | Data capture % | *80.5* | *83.8* | *84.2* | *92.6* |

(Note – bold indicates objective exceeded; italics < 90% data capture)

The results also include the12 month period (April 2005 to March 2006). The results indicate that the 2004 daily mean standard of more than 50 µg $m^{-3}$ was exceeded at both sites during the years reported. The annual mean objective however was not exceeded. For both sites there was also an increase in concentrations in 2006. During this time there were a number of periods of calm settled weather conditions during February and March leading to the recording of “moderate” episodes at other sites in London (see http://www.londonair.org.uk/london/asp/publicepisodes.asp?region=0).

The neighbouring London Borough of Sutton operates a TEOM continuous analyser at a kerbside site (Sutton 4) in Wallington. This site opened in 2003 and is part of the London Air Quality Network. 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, for which some data are still provisional. The site uses a TEOM instrument and therefore the results have been factored to a gravimetric equivalent (x 1.3) for the period up to 2007. It should be noted however that for 2008 the correction 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 Filter Dynamics Measurement System (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.

**Table 6** Monitoring at the Sutton 4 site (2003 to 2008)

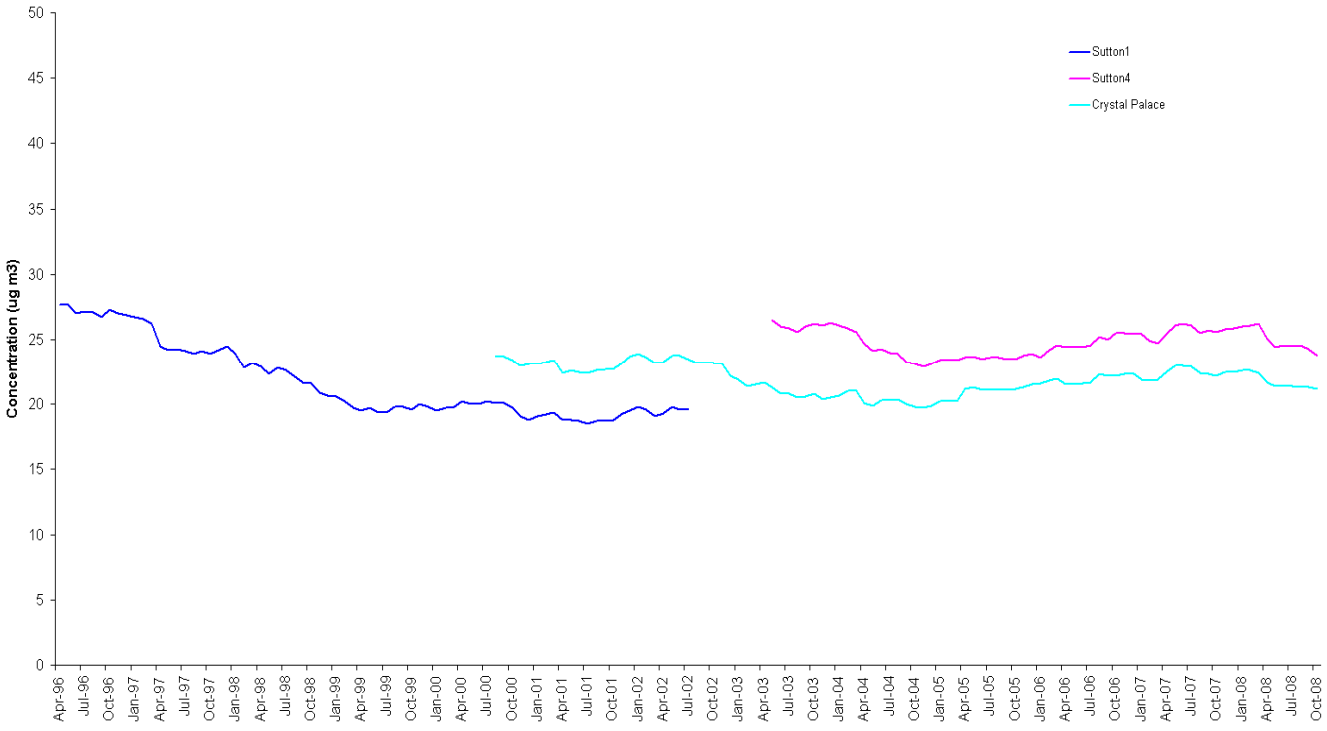
| Site | | 2003[a] | 2004[a] | 2005[a] | 2006[a] | 2007[a] | 2008[b] |
|---|---|---|---|---|---|---|---|
| Sutton 4 | Annual mean | 34 | 30 | 31 | 33 | 34 | 27 |
| | No of days > 50 µg $m^{-3}$ | **37** | 9 | 14 | 21 | **40** | 10 |
| | Data capture | 99 | 99 | 95 | 98 | 99 | 98 |

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

The results for the site indicate that the 2004 daily mean objective of more than 50 µg $m^{-3}$ was exceeded in 2003 and 2007. The annual mean objective however was not exceeded, although the highest annual mean concentration also arose during both 2003 and 2007. 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 episodes with high concentrations in both March and December. The monitoring results for 2008 did not exceed the objectives.

An analysis of rolling annual mean $PM_{10}$ concentrations and daily mean $PM_{10}$ exceedences is provided for the Sutton monitoring sites to indicate any trend over time that is likely to occur in Merton. (The analysis also includes the closed Sutton 1, a roadside site close to Sutton town centre). The analysis is for the period from 2000 through to 2008. Figure 3 illustrates changing concentrations over time, based on changing rolling annual mean $PM_{10}$ concentrations and Figure 4 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. The Crystal Palace roadside site is also included for comparison purposes. (Note – these results are not factored).

**Figure 3** Rolling annual mean $PM_{10}$ trends for Sutton monitoring sites (1996 to 2008)



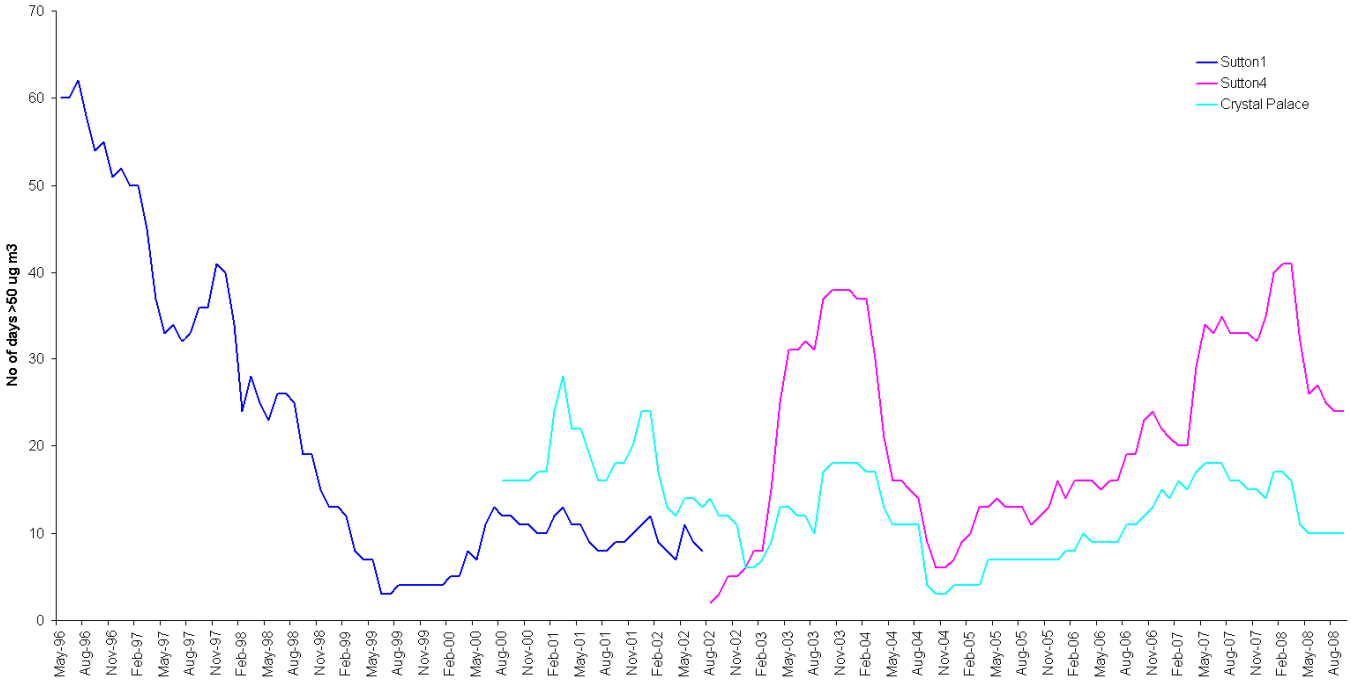

The rolling annual mean trend for the Crystal Palace site provides the longest dataset. The site shows a similar trend to that of the Sutton 4 site for the period that overlaps, albeit the concentrations at the suburban background at Sutton 4 are higher than for the Crystal Palace site shown. The data for the

Sutton 4 site represent a shorter time period and reflect the start of operations in 2002. The Sutton 1 site shows a steady reduction in concentrations from the start of operations at the site in 1995, however from1999 to its closure in 2002 concentrations were mainly constant.

The use of trends in this way highlights that although concentrations dropped in 2004, this was mainly as a result of the pollution incidents in 2003 not being repeated in 2004. Overall levels have dropped to pre 2003 levels and do not appear to be further reducing; indeed for some sites there may be a slight increase, possibly as a result of increasing primary $PM_{10}$ emissions (ERG, 2006) rather than the predicted decrease in emissions.

The rolling trend of $PM_{10}$ exceedences similarly shows the effect of the pollution episodes in 2003, 2006 and 2007. As a result the levels, although fluctuating, appear to have remained similar over the period of time since 2001 for these sites. Averages based on 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 (ERG, 2006).

**Figure 4** Rolling number of days $PM_{10}$ > 50 µg $m^{-3}$ for Sutton monitoring sites (2000 to 2008)



# 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.

### 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 (Merton, 2004) 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 within the Council's AQMA and this situation has not changed across the Borough.

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 in such locations are not included, as they are not covered by the regulations). This assessment is for $NO_2$ only and no new busy streets have been identified in the Borough.

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 10m 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

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 10m of the kerbside. No change to the previously reported situation concerning junctions was identified.

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 10m 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 $PM_{10}$.

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).

The Council confirms that the bus station in Merton was 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 airport is outside the Borough and therefore was not 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.

There are however no lines, with a high usage of diesel locomotives in the Borough based on the list in Table 5.1 of TG09. Previous rounds of Review and Assessment also 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 15m of 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 Council confirms that there are no locations where there are large movements of diesel locomotives and potential long-term relevant exposure within 30m.

## 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.

# 5. Industrial sources

The Council and Environment Agency (EA) control industrial sources within the Borough under the Pollution Prevention and Control Act 1999. The Council also has control over 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 (two for vehicle refinishing and one for surface cleaning), plus thirty-three 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 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 aerosol formation from 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 biomass combustion plant was found in the Borough.

The Council confirms that there is no relevant biomass combustion plant in the Borough.

### 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 currently no biomass combustion plant was found in the Borough.

The Council confirms that there is no relevant biomass combustion plant in the Borough.

## 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).

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: quarrying and mineral extraction sites, landfill sites, coal and material stockyards, or materials handling, major construction works and waste management sites. Dust arises from the passage of vehicles over unpaved ground and from the passage of vehicles along public roads that have been affected by dust and dirt tracked out from dusty sites. It also arises from the handling of dusty materials, the cutting of concrete etc. There is also wind-blown dust from stockpiles and dusty surfaces.

Previous rounds of Review and Assessment investigated fugitive and uncontrolled sources in the Borough and found no potential sources with relevant exposure nearby. Based on professional experience and local knowledge this situation has not changed since the previous assessment. There have also been no complaints relating to potentially relevant sources in the Borough.

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The Council confirms that there are no potential sources of fugitive particulate matter emissions in the Borough.

# 8. Conclusions and Proposed Actions

**Conclusions from New Monitoring Data**

Monitoring within the Borough confirmed that the annual mean nitrogen dioxide objective has been exceeded at nine locations; all three roadside sites and at six background sites. The background sites are considered to represent relevant exposure. Two other 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 near to Merton 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 will maintain its diffusion tube monitoring at all of its monitoring sites.

**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.

## 8.1 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 a Borough-wide AQMA. The findings from this report indicate that the AQMA should be maintained.

The UK Government has notified the European Commission (24th April 2009) that it requires additional time to meet the limit values for particulate matter for certain zones/ agglomerations including London and has sought an exemption until 2011 to meet the requirements of the European Council Directive 2008/50/EC

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. To maintain the diffusion monitoring survey of the Borough.

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

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.

London Borough of Merton (2004). Local Air Quality Management – Updating and Screening Assessment 2003

London Borough of Merton (2006). Local Air Quality Management – Updating and Screening Assessment 2006

London Borough of Merton (2004). Local Air Quality Management – Detailed Assessment 2004

London Borough of Merton (2006) Local Air Quality Management – Progress Report. 2006

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.

# Appendices

**Table 7** List of permitted petrol stations in the Council's area

| REF NO. | NAME/ADDRESS |
|---|---|
| 023 | Tesco, 300 Beverley Way, New Malden, Surrey, KT3 4PJ |
| 025 | Savacentre Ltd, 1 Merton High Street, London SW19 1DD |
| 027 | Total Convenience Store Western Road, 231 Western Road, London SW19 2QE |
| 030 | Colliers Wood Service Station, 164- 168 High Street, Colliers Wood, London SW19 2BN |
| 033 | Shell Pepys Corner, Worple Road, London, SW20 8RE |
| 034 | Kingston Auto way Centre, Shannon Corner, New Malden, Surrey, KT3 6HM |
| 038 | Shell Plough Lane, 53 Plough Lane, Wimbledon, London SW17 8HA |
| 042 | Martin Way Service Station, Martin Way, Morden, Surrey, SM4 4AW |
| 044 | Wimbledon Chase Service Station, 314 Kingston Road, London, SW20 8LR |
| 045 | Haydons Road Service Station, 298 Haydons Road, London, SW19 1ED |
| 048 | Total Convenience Store, Rowan Road, London, SW16 5JM |
| 050 | Wandle Service Station, Bishopsford Road, Morden, Surrey, SM4 6AP |
| 054 | Tesco, 195 – 210 Merton Road, London, SW19 1EG |

**Table 8** Part B processes in the Council's area

| REF NO. | NAME/ADDRESS | PROCESS |
|---|---|---|
| 001 | South London Crematorium, Rowan Road, Streatham, SW16 | Crematorium |
| 002 | North East Surrey Crematorium, Lower Morden Lane, Morden, Surrey SM4 4EU | Crematorium |
| 003 | A.W. Champion Ltd, Champion House, Burlington Road, New Malden Surrey KT3 4NB | Timber Process |
| 005 | Tarmac Ltd, 77 Weir Road, Durnsford Industrial Estate, London, SW19 8UG | Concrete Batching |
| 007 | Allen Concrete Ltd, 38 Willow Lane, Mitcham, Surrey, CR4 4NA | Concrete Batching |
| 008 | Hanson Premix, Archway Close, Endeavour Way, London, SW19 8UH | Concrete Batching |
| 026 | Morden Repair Centre Ltd, 141 Garth Road, Morden, Surrey, SM4 4LF | Vehicle Re-spraying |
| 049 | Link Vehicle Solutions Ltd, Unit 2, Greenlea Industrial Park, Prince Georges Road, Colliers Wood, SW19 2RB | Vehicle Re-spraying |
| 052 | Whites Accident Repair Centre Ltd, 2 Prince Georges Road, Merton Abbey, London, SW19 2 PX | Vehicle Re-spraying |
| 062 | DWS Bodyworks Mitcham, 11/11A Bunting Close, Mitcham, CR4 4ND | Vehicle Re-spraying |
| 063 | Bodycote Heat Treatments, Garth Road, Lower Morden, SM4 4LT | Surface cleaning of metals |
| 064 | F M Conway Ltd, Wandle Way, Willow Lane, Mitcham, CR4 4NB | Concrete Batching |

**Table 9** List of permitted dry cleaners in the Council's area

| Process Name | Ref Number | Post Code |
|---|---|---|
| Bond | DC/001 | SW19 1LX |
| Bourjois Cleaners | DC/002 | KT3 6NB |
| Kingsmere Cleaners | DC/004 | SW19 7PA |
| Dry Cleaning By Mona | DC/005 | CR4 4BE |
| Du Cane | DC/006 | SW19 2NX |
| Dudley Dry Cleaners | DC/007 | SW19 8JZ |
| Elegance Dry Cleaners | DC/009 | SW20 0BA |
| Galaxy Dry Cleaners | DC/010 | SW19 7BD |
| Grand Dry Cleaners | DC/011 | SW20 9NQ |
| High Quality | DC/012 | SW19 1EE |
| Johnson Cleaners UK Limited | DC/013 | SW19 5DW |
| Crown Dry Cleaners | DC/014 | SM4 5HJ |
| Master John (Dry cleaners) | DC/016 | SW19 3NT |
| Morden Dry Cleaners | DC/017 | SM4 5BL |
| Parrisianne Cleaners | DC/018 | SM4 5SQ |
| Pisces Dry Cleaning | DC/019 | CR4 4BE |
| Rendezvous | DC/020 | SW20 8LX |
| Rosestock | DC/021 | KT3 6JF |
| Serena Dry Cleaners | DC/022 | CR4 3NB |
| Smarty Dry Cleaning Services | DC/023 | SW19 1QN |
| Swan Cleaners | DC/024 | SW20 9NQ |
| London Quality Cleaners | DC/025 | CR4 2JB |
| Top Clean | DC/026 | CR4 1RB |
| Unit 4 London Dry Cleaners Ltd | DC/027 | SW20 0RH |
| Whistle And Flute | DC/029 | CR4 1AB |
| Get Smart Dry Cleaners | DC/030 | SM4 4AH |
| Perry de Montaignac | DC/032 | SW19 3TZ |
| Regi's Dry Cleaners | DC/033 | SM4 4PD |
| Claremar Cleaners | DC/034 | SW20 9NE |
| M & M Dry Cleaners | DC/035 | SM4 5HT |
| Nicholson And Freelander Dry Cleaners | DC/036 | SW20 0TW |

**Table 10** Part A processes for the London Borough of Merton

| Operator name | Process name | Site address |
|---|---|---|
| REICHHOLD UK LTD | MANUFACTURE AND USE OF ORGANIC CHEMICALS | WILLOW LANE, MITCHAM, SURREY |

**Table 11** Unbiased 2008 monthly results

| FROM | TO | BA | CA | DA | GA | HA | LA | MA | RA | TA | WA | PA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/01/2008 | 24/01/2008 | 65 | 24 | 51 | 41 | 59 | 26 | 38 | 36 | 44 | 43 | 79 |
| 24/01/2008 | 11/02/2008 | 53 | 56 | 53 | 56 | 61 | 38 | 51 | 40 | 72 | 49 | 77 |
| 11/02/2008 | 19/02/2008 | 58 | 70 | 98 | 84 | 77 | 59 | 67 | 74 | 56 | 59 | 86 |
| 19/02/2008 | 04/03/2008 | 31 | 43 | 60 | 44 | 71 | 28 | 43 | 45 | 39 | 40 | 75 |
| 04/03/2008 | 18/03/2008 | 38 | 53 | 55 | 42 | 77 | 69 | 37 | 48 | 60 | 37 | 86 |
| 18/03/2008 | 01/04/2008 | 43 | 70 | 76 | 36 | N/A | 43 | 49 | 51 | 65 | 54 | 83 |
| 01/04/2008 | 15/04/2008 | 45 | 51 | 60 | 41 | 80 | N/A | 45 | 38 | 43 | 45 | 74 |
| 15/04/2008 | 29/04/2008 | 29 | 51 | 49 | 39 | 80 | N/A | 88 | 75 | 50 | 71 | 51 |
| 29/04/2008 | 15/05/2008 | 42 | 56 | 79 | 59 | 89 | N/A | 44 | 54 | 53 | 38 | 93 |
| 15/05/2008 | 27/05/2008 | 32 | 41 | 79 | 46 | 50 | 24 | 27 | 42 | 46 | 31 | 97 |
| 27/05/2008 | 10/06/2008 | 45 | 60 | 46 | 44 | 105 | 35 | 49 | 66 | 41 | 48 | 84 |
| 10/06/2008 | 24/06/2008 | 34 | 35 | 42 | 30 | 71 | 19 | 37 | 26 | 31 | 37 | 68 |
| 24/06/2008 | 09/07/2008 | 21 | 27 | 42 | 27 | 63 | 13 | 22 | 27 | 26 | 25 | 61 |
| 09/07/2008 | 22/07/2008 | 25 | 30 | 36 | 25 | 31 | 15 | 30 | 23 | 29 | 26 | 55 |
| 22/07/2008 | 05/08/2008 | N/A | 39 | 50 | 32 | 77 | 22 | 34 | 36 | 43 | 33 | 72 |
| 05/08/2008 | 19/08/2008 | 24 | 23 | 43 | 26 | 53 | 15 | 23 | 25 | 31 | 26 | 51 |
| 19/08/2008 | 02/09/2008 | N/A | 34 | 42 | N/A | 72 | 15 | 22 | 30 | 29 | 32 | 56 |
| 02/09/2008 | 17/09/2008 | 25 | 38 | 59 | 39 | 75 | 24 | 35 | 41 | 43 | 37 | 71 |
| 17/09/2008 | 30/09/2008 | 30 | 63 | 72 | 51 | 89 | 33 | 35 | 45 | 49 | 42 | 66 |
| 30/09/2008 | 14/10/2008 | | | | | | | | | | | |
| 14/10/2008 | 28/10/2008 | 48 | 47 | 53 | 48 | 98 | N/A | 42 | 42 | 58 | 44 | 82 |
| 28/10/2008 | 11/11/2008 | 39 | 64 | 75 | 5 | 61 | 21 | 39 | 44 | 46 | 39 | 51 |
| 11/11/2008 | 26/11/2008 | 43 | 55 | 52 | 44 | 70 | 39 | 48 | 42 | 41 | 42 | 51 |
| 26/11/2008 | 11/12/2008 | 48 | 66 | 77 | 57 | 84 | 40 | 63 | 53 | 63 | 51 | 57 |
| 11/12/2008 | 24/12/2008 | N/A | 62 | 81 | 82 | 63 | 33 | 53 | 50 | N/A | 55 | 73 |

**Figure 5** Nitrogen dioxide monitoring sites in Merton (shown as blue dots)