

London Borough of Hammersmith & Fulham
Updating and Screening Assessment 2006

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Summary

As part of this Updating and Screening Assessment (USA), assessments have been undertaken for all 7 pollutants specified for local air quality management purposes in the government's Air Quality Strategy.

The results show that there is no significant risk of the borough exceeding the air quality objectives for the following pollutants:

- Carbon monoxide
- Benzene
- 1,3-butadiene
- Lead
- Sulphur dioxide

There is no requirement to assess these pollutants any further until the next round of USA work, which is currently planned for April 2009.

For the remaining pollutants:

- Nitrogen dioxide (NO₂)
- Particles (PM₁₀)

The assessment has shown that there continues to be a risk of the annual mean NO₂ objective being breached across the borough and also the hourly mean NO₂ objective, but in fewer locations. The annual mean PM₁₀ objective is not being breached in the borough, but the 24-hour objective is sometimes breached. If the provisional 2010 PM₁₀ objective is introduced, breaches of the 24-hour objective are likely to become more extensive and the annual mean objective could be exceeded across the whole borough.

The borough was designated as an Air Quality Management Area for both NO₂ and PM₁₀ in 2000. The findings of the USA are therefore consistent with this action and there is no need at this stage to consider revoking the Air Quality Management Area Order. This will be re-assessed as part of the Progress Report planned for April 2007.

Additionally, potentially new areas of exceedence for these 2 pollutants have been identified as a result of emissions from trains. As there is no formal guidance on how to proceed with an assessment of NO₂ and PM₁₀ exceedences caused by diesel train emissions, further advice will be sought on how best to investigate the potential impact.

Local Air Quality Management

The first round of air quality review and assessment work carried out by the London Borough of Hammersmith & Fulham consisted of 3 stages of progressively more Detailed Assessments, culminating in the designation of the borough as an Air Quality Management Area (AQMA) in 2000, for nitrogen dioxide and small particles.

The second round of review and assessment work started in 2003 with the first USA, followed by a Detailed Assessment and Progress Report in 2005.

The Updating and Screening Assessment Report

This report represents the second Updating and Screening Assessment. As before, the USA is based on a checklist which is used to identify those matters that have changed since the first USA in 2003. It covers new monitoring data, new objectives, new sources or significant changes to existing sources – either locally or in neighbouring authorities – or any other local changes that might affect air quality.

If any changes are noted, a simple screening assessment is carried out to determine whether or not there is a risk of any air quality objectives being breached in areas where there could be public exposure. If there is a risk, then a Detailed Assessment is required to assess the likelihood of breaches occurring.

The Local Air Quality Management system, introduced by the Environment Act in 1995, requires all Local Authorities to carry out a regular review and assessment of air quality. This is to be done with reference to the air quality standards and objectives specified in the USA requires assessment of the 7 pollutants specified in the national Air Quality Strategy, and then subsequently adopted via the Air Quality Regulations, with reference to the government's air quality standards and objectives. The pollutants to be assessed in the USA are:

- carbon monoxide
- benzene
- 1,3-butadiene
- lead
- nitrogen dioxide
- sulphur dioxide
- particles (PM₁₀)

The report follows the latest prescribed guidance given in web-based updates to the technical guidance LAQM.TG(03) – found at: http://www.uwe.ac.uk/aqm/review/mguidance_05.html

The guidance requires a phased approach to assessing each pollutant which allows local authorities to only undertake a level of assessment that is proportionate to the risk of an air quality objective being exceeded. Hence, for some pollutants, it may be clear from the initial screening assessment that the objectives will not be breached, so a full, Detailed Assessment is not always required.

Pollutant Specific Assessments

Carbon Monoxide

The air quality objective for carbon monoxide (CO) is 10mg/m³ as a maximum daily running 8-hour concentration to be achieved by the end of 2003 (UK objective) and by the end of 2005 (EU objective).

Background information

The main source of CO remains road transport. The most recent release of the London Atmospheric Emissions Inventory (LAEI) estimates that in 2003, 75% of CO emissions in Hammersmith & Fulham came from road transport.

No AQMAs have been designated for this pollutant in the UK as the air quality objective is not exceeded at any locations where public exposure could take place. Current projections are that emissions will continue to fall and the guidance provided in LAQM.TG(03) considers it highly unlikely that any local authority will need to carry out a Detailed Assessment for this pollutant.

Methodology Overview

The assessment for CO is split into 2 parts: (1) the analysis of monitoring data and (2) the assessment of very busy roads or junctions in built up areas. The screening of industrial sources is not required. Full details of the methodology employed can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring data

CO monitoring is not undertaken in Hammersmith & Fulham. However, analysis of data collected at other locations in London can be used to assess whether or not there is a likelihood of the CO air quality objective being exceeded in the borough.

Analysis of provisional data from the London Air Quality Network (LAQN) for 2005 suggests the highest CO levels in London were recorded at:

- Mile End Road (Tower Hamlets): 6.5ppm
- Wandsworth Town Hall: 4.6ppm
- Kingsbury (Brent): 4.4ppm
- Church Street (Enfield): 4.3ppm

The previous USA looked at CO data up to 2001. Analysis of data from 2002 to 2005 shows that there has not been a single exceedence of the 8-hour objective (10ppm) at these 4 sites, although levels have occasionally been elevated, particularly in the winter when dispersion can be low.

Table showing maximum rolling 8 hour mean CO concentrations (ppm) for 2002 – 2005 (mg/m³)

Monitoring site	2002	2003	2004	2005
Mile End Road (Tower Hamlets)	4.6	5.3	3.3	6.5
Wandsworth Town Hall	5.2	6.6	3.5	4.6
Kingsbury (Brent)	3.1	2.1	1.6	4.4
Church Street (Enfield)	4.1	3.5	3.5	4.3

All data fully ratified by ERG (except 2005 data, which is provisional)

Hammersmith & Fulham does not contain any unique locations where road traffic conditions are likely to be worse than any of the sites experiencing the highest CO levels in London. It is therefore reasonable to conclude that recent monitoring results for CO levels elsewhere show that CO levels do not breach the air quality objective in Hammersmith & Fulham.

(2) Very busy roads or junctions in built-up areas

As well as making an assessment of monitoring data to determine whether or not the CO objective may be breached, very busy roads and junctions also need to be assessed to see if exceedences are possible.

There are no 'very busy' roads in Hammersmith & Fulham as defined by the criteria in LAQM.TG(03/06) – i.e. there are no single carriageways with daily average traffic flows exceeding 80,000 vehicles per day and no dual carriageway roads exceeding 120,000 vehicles per day. Also, there are no motorways in the borough with more than 140,000 vehicles per day.

In terms of 'very busy' junctions, there are sections of road in the borough where the number of vehicle movements per day may exceed 100,000 (e.g. at the Westway (A40) intersection with the A3220 (former Great West cross Route), but none of these junctions or intersections trigger the criteria outlined above. Also, there have not been any roads with significant (>10%) increases in traffic flow or any new roads built since the last USA, with high daily traffic flows.

According to the estimated background pollution data available from the National Air Quality Archive (www.airquality.co.uk), the average background CO concentration in

Hammersmith & Fulham was 0.56mg/m³ in 2001. The highest estimate was 0.59mg/m³, which corresponds to the 1km² area around the busy junction identified above.

Using correction factors provided in LAQM.TG(03) and from the Air Quality Archive website, the following average background concentrations for the borough can be calculated for 2002 –2005:

Table showing estimated average background CO concentrations (mg/m³)

Year	Estimated background CO level
2002	0.51
2003	0.46
2004	0.42
2005	0.38

Even if the highest estimate from 2001 is used as the baseline figure, when corrected for the current year (2005) this suggests the highest background concentration of CO in Hammersmith & Fulham would be 0.41mg/m³. All corrected figures are therefore below the 1mg/m³ trigger criteria given in LAQM.TG(03/06), indicating that no further assessment is necessary.

With no very busy roads or junctions in the borough and generally low background levels of CO, it is reasonable to conclude that it is very likely that CO levels do not breach the air quality objective in Hammersmith & Fulham and there is no need to carry out a Detailed Assessment.

Conclusion

The Updating and Screening Assessment for carbon monoxide has not identified a risk of the objective being exceeded in Hammersmith & Fulham. There is therefore no need to carry out a Detailed Assessment for this pollutant.

Benzene

The air quality objective for benzene is $5\mu\text{g}/\text{m}^3$ as an annual mean to be achieved by the end of 2010 (England & Wales and EU objective), having previously been $16.25\mu\text{g}/\text{m}^3$ as an annual mean to be met by 2003 (UK).

Background information

The main source of benzene is road traffic, specifically petrol engine vehicles. Data from the LAEI suggests 55% of benzene emissions came from vehicles in 2003 in Hammersmith & Fulham, with the remainder from Part B processes (petrol filling stations), gas boiler emissions and natural sources.

No AQMAs have been designated for this pollutant in the UK as the air quality objective is not exceeded at any locations where public exposure could take place. Current projections are that emissions will continue to fall, but there may be some areas where the more stringent 2010 objective could be exceeded.

Methodology Overview

The assessment for benzene is split into 3 main parts: (1) the analysis of monitoring data; (2) the assessment of very busy roads or junctions in built up areas and (3) the assessment of industrial sources, including petrol stations and fuel storage depots. Full details of the methodology employed can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring Data

Benzene is regularly monitored in Hammersmith & Fulham at 5 locations. As can be seen from the table below, there have not been any exceedences of the benzene air quality objective in the last 4 years at any of our regular monitoring sites. Even if the tubes are performing at the worst allowable QC standard (i.e. under-reading by 20%), this would still suggest that none of the sites were close to exceeding the $5\mu\text{g}/\text{m}^3$ objective. (Details of QC procedures are outlined in the Appendix).

Using the correction factors specified in LAQM.TG(03), a 2010 prediction can be made for benzene levels at these locations, which shows that benzene concentrations are expected to fall further.

Table showing measured 2002 – 2005 and forecast 2010 benzene diffusion tube annual mean measurements ($\mu\text{g}/\text{m}^3$)

Monitoring Site	Classification	2002	2003	2004	2005	Forecast 2010
Hammersmith Broadway	Roadside	3.44	3.63	2.15	2.12	1.70
Bishop's Park	Background	2.28	2.63	1.25	1.29	0.99
Eel Brook Common	Background	2.09	2.33	1.14	1.43	0.90
Bryony Road	Background	2.22	3.03	1.48	1.83	1.08
Cobbold Road	Background	2.18	3.28	1.59	1.68	1.26

As a result of the findings of the first USA conducted in 2004, a Detailed Assessment of benzene has been carried out. Some temporary monitoring was set up at 4 additional sites around the Shell service station in Fulham Palace Road, with data being collected from October 2004 to March 2005. The average monthly concentrations of benzene found for the monitoring period were as follows:

Table showing measured and forecast benzene mean diffusion tube data ($\mu\text{g}/\text{m}^3$)

Monitoring site	Classification	Measured Oct. '04 – Mar. '05	Forecast 2010
Ellaline Road	Background	3.08	2.51
Fulham Palace Road (next to Shell)	Roadside	3.13	2.56
Fulham Palace Road (away from Shell)	Roadside	3.45	2.88
Larnach Road	Background	1.76	1.44

Following DEFRA guidance, the data collected in 04/05 has been used to make a forecast of the likely 2010 levels at each monitoring site. It can be seen that none of the monitoring sites measured any levels of benzene that would be considered as high and no breach of the targets was found.

It is therefore reasonable to conclude that recent benzene monitoring results show that the annual mean air quality objective has not been breached in Hammersmith & Fulham. All sites are predicted to continue to meet the 2010 target as well.

(2) Very busy roads or junctions in built-up areas

This is a similar screening process to that carried out for CO. As outlined in the CO assessment, there are no 'very busy' roads or junctions in Hammersmith & Fulham as

defined by the criteria in LAQM.TG(03/06) and there have not been any roads with significant (>10%) increases in traffic flow or any new roads built since the last Updating and Screening Assessment.

Also, the www.airquality.co.uk site gives the estimated background levels of benzene for Hammersmith & Fulham for the years 2001, 2003 and 2010. The highest estimate is $1.37\mu\text{g}/\text{m}^3$ for a location in the south of the borough. The average estimates for the borough for 2001 and 2003 can be used along with the correction factors to calculate the estimated background levels of benzene in the borough for the years 2002 – 2005. These are shown in the table below.

Table showing estimated average background benzene concentrations ($\mu\text{g}/\text{m}^3$)

Year	Estimated background benzene level
2002	1.1974
2003	1.1218*
2004	1.0601
2005	1.0021

*this compares well with $1.1285\mu\text{g}/\text{m}^3$ estimated on the www.airquality.co.uk website for 2003

The estimated background levels of benzene are all below the $2\mu\text{g}/\text{m}^3$ trigger criteria given in LAQM.TG(03/06) suggesting that there are no areas of the borough where benzene reach levels that require further investigation as a result of traffic emissions on very busy roads or at busy junctions.

(3) Industrial sources

According to the LAEI (2003), Part B processes account for about 17% of benzene emissions in the borough. There are no petrochemical works in the borough or in neighbouring authorities close to our boundary. Since the last USA was carried out, no new industrial sources of benzene have been built and no new, relevant exposure has been introduced. As can be seen in the list of Part B processes reproduced in the Appendix, most of the industrial emissions in the area are likely to be from the 11 petrol stations in the borough, and others close to the borough boundary.

As already outlined above under section (1), some additional monitoring was carried out in 2004-05 to assess emissions adjacent to a petrol filling station in the borough. Although benzene levels were found to be slightly elevated above normal background levels, there was no concern about the air quality objectives being breached.

Detailed Assessments around petrol stations are only necessary if they meet certain criteria specified in LAQM.TG(03/06). There is only 1 station that meets that criteria and that has already been the subject of further assessment. No new petrol stations have been built in the interim and there has been no introduction of relevant exposure at any

of the existing petrol stations. In terms of major petrol storage depots, there are no such installations in the borough.

There are no new industrial sources of benzene in the borough and the only petrol station that triggers the LAQM.TG(03/06) criteria was assessed as part of the previous Detailed Assessment. Therefore, there is no need to proceed to a similar assessment this time.

Conclusion

The Updating and Screening Assessment for benzene has not identified a risk of the objective being exceeded in Hammersmith & Fulham. There is therefore no need to carry out a Detailed Assessment for this pollutant.

1,3-butadiene

The air quality objective for 1,3-butadiene is $2.25\mu\text{g}/\text{m}^3$ as a running annual mean to be achieved by the end of 2003 (UK). There is no EU objective for this pollutant, and no new objective has been set for the period beyond 2003.

Background information

According to data in the LAEI (2003), 100% of 1,3-butadiene emissions in Hammersmith & Fulham – 3 tonnes annually – comes from road traffic.

No AQMAs have been designated for this pollutant in the UK as the air quality objective has not been exceeded at any location for at least 5 years and current projections are that emissions will continue to fall as a result of the continued uptake of cleaner vehicle technologies.

Methodology Overview

The assessment for 1,3-butadiene is split into 2 parts: (1) the analysis of monitoring data and (2) the assessment of industrial sources. Full details of the methodology employed can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring Data

1,3-butadiene monitoring is not undertaken in Hammersmith & Fulham and there are few sites in London or the UK where this pollutant is monitored. However, analysis of data collected at the 2 London sites (Eltham and Marylebone Road) can be used to assess whether or not there is a likelihood of the 1,3-butadiene air quality objective being exceeded in the borough.

Hourly data is provided for these sites at the www.airquality.co.uk website. Data is available from the Eltham site for the period 2003-2005. Data is not available for 2002 for this site. 2002–2005 data is available for Marylebone Road. For both sites, part of the 2005 data set is still provisional at this stage.

At Eltham, there have been fewer than 10 occasions during the 2003-2005 monitoring period when 1,3-butadiene levels were recorded above $2.25\mu\text{g}/\text{m}^3$ for an hour. As the air quality objective is set at this level as a running annual mean, it is clear that the objective has not been breached and that it is highly unlikely to be breached in the future. At Marylebone Road, there have been more hourly periods where 1,3-butadiene

levels have been recorded above $2.25\mu\text{g}/\text{m}^3$ during the 2002-2005 period, particularly in 2002. However, despite these elevated readings, the air quality objective has still been met for each year.

According to the estimated background pollution data available from the National Air Quality Archive (www.airquality.co.uk), the average background 1,3-butadiene concentration in Hammersmith & Fulham was $0.4989\mu\text{g}/\text{m}^3$ in 2001 and $0.3941\mu\text{g}/\text{m}^3$ in 2003. The highest estimate was $0.531\mu\text{g}/\text{m}^3$, which corresponds to the 1km^2 area around the busy junction already identified as part of the CO and benzene assessments above.

Using correction factors provided in LAQM.TG (03) and from the Air Quality Archive website, the following background concentrations can be calculated for 2002 –2005:

Table showing estimated average background 1,3-butadiene concentrations ($\mu\text{g}/\text{m}^3$)

Year	Estimated background 1,3-butadiene level
2002	0.4350
2003	0.3821*
2004	0.3504
2005	0.3195

*this compares well with $0.3941\mu\text{g}/\text{m}^3$ estimated on the www.airquality.co.uk website for 2003

All estimated levels of 1,3-butadiene are well below the $2.25\mu\text{g}/\text{m}^3$ trigger criteria given in LAQM.TG(03/06) which would require further investigation.

Considering the estimated levels in the borough and also those levels being monitored elsewhere in London, it is reasonable to conclude that levels of 1,3-butadiene do not breach the air quality objective in Hammersmith & Fulham.

(2) Industrial Sources

The LAEI data already outlined in section (1) indicates that 100% of 1,3-butadiene comes from road traffic in the borough. There were no local industrial sources at the time of the previous USA and this remains the case in 2006. No further assessment necessary.

Conclusion

The Updating and Screening Assessment for 1,3-butadiene has not identified a risk of the objective being exceeded in Hammersmith & Fulham. There is therefore no need to carry out a Detailed Assessment for this pollutant.

Lead

The UK air quality objective for lead is $0.25\mu\text{g}/\text{m}^3$ as an annual mean to be achieved by the end of 2008, having previously been $0.5\mu\text{g}/\text{m}^3$ as an annual mean to be met by the end of 2004. There is also an EU objective for this pollutant of $0.5\mu\text{g}/\text{m}^3$ to be met by the end of 2005.

Background information

Emissions of lead are now restricted to a small number of industrial processes, following the phase out of leaded petrol which dramatically reduced lead emissions from road traffic. There are no AQMAs in the UK for lead and assessments carried out in the past in other parts of the country suggest only locations very close to major industrial sites are likely to be at risk of causing exceedences of the air quality objective.

Methodology Overview

The assessment for lead is split into 2 parts: (1) the analysis of monitoring data and (2) the assessment of industrial sources. Full details of the methodology employed can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring Data

Lead monitoring is not undertaken in Hammersmith & Fulham and there are only a limited number of sites in London where this pollutant is monitored.

Results from the national network in London (between 2002 to 2004) are shown below. 2005 data is not currently available. All data is sourced from the www.airquality.co.uk website and is fully ratified.

Table showing annual average lead concentrations ($\mu\text{g}/\text{m}^3$) for 2002 – 2004

Monitoring site	2002	2003	2004
Brent	0.022	0.025	0.020
Central London	0.022	0.021	0.015
Cromwell Road	0.027	0.022	0.017
Marylebone Road	0.028	0.028	0.018

These monitoring locations are considered to be representative for an inner London Borough such as Hammersmith & Fulham and the results indicate that local concentrations of lead will not have exceeded the 2005 air quality objective and are also very likely to meet the more stringent 2008 target.

(2) Industrial Sources

As for benzene and 1,3-butadiene, there are no new industrial processes or any existing processes with substantially increased emissions of lead within Hammersmith & Fulham since the last USA. Similarly, no significant new industrial sources or existing ones with increased emissions have been identified for neighbouring local authority areas.

Conclusion

The updating and screening assessment for lead has not identified a risk of the air quality objectives being exceeded in Hammersmith & Fulham. There is therefore no need to carry out a Detailed Assessment for this pollutant.

Nitrogen Dioxide

The current UK air quality objectives for nitrogen dioxide are $40\mu\text{g}/\text{m}^3$ as an annual mean to be achieved by the end of 2005, and a one hour mean concentration of $200\mu\text{g}/\text{m}^3$ not be exceeded more than 18 times per year. The EU objectives are the same, but with a target date of 2010.

Background information

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse health effects.

The whole of Hammersmith & Fulham was designated as an AQMA for NO_2 in 2000 and this was confirmed by the USA completed in 2003. Over 100 local authorities have designated all or part of their areas as an AQMA for NO_2 , including almost every London Borough. The 2003 LAEI identifies 3 main sources of NO_x in the borough: gas boiler use, road transport and rail transport. These activities account for 98% of emissions between them, with almost 50% coming from boilers and 35% from road transport.

NO_x emissions are generally in decline thanks to vehicle technology improvements and the introduction of more efficient gas boilers. However, the objectives, especially the annual mean objective, will still be difficult to meet throughout London, including Hammersmith & Fulham without policies and actions targeted at reducing emissions further and at a faster rate.

Methodology Overview

A checklist approach is used for the USA, based on the following areas: (1) monitoring data; (2) roads; (3) bus stations; (4) industrial sources and (5) aircraft. (6) Trains have also been added to the assessment, although not currently specified in the DEFRA checklist – see the relevant section for more details on why this is necessary this year. Full details of the methodology employed for (1) to (5) can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring data

Automatic Monitoring Stations

The council runs 2 permanent automatic monitoring stations in the borough which are currently located at Hammersmith Broadway and Brook Green. A third (temporary) station was installed from March to October 2005 at Scrubs Lane as part of a Detailed Assessment of industrial emissions. All 3 sites monitor NO_x (as well as other pollutants), operating 24-hours a day and collect data for each 15-minute period. This 'real-time' data is reported daily on the London Air Quality Network alongside data from other London Boroughs: www.londonair.org.uk. Maps showing the locations of each station are provided in the Appendix.

As well as monitoring NO_x via the automatic stations, passive diffusion tubes are used to monitor nitrogen dioxide at 20 locations in the borough. A range of sites are monitored, from very busy roads such as the Westway, Talgarth Road and Fulham Palace Road, to quiet areas away from traffic such as Bishop's Park and Eel Brook Common.

Results from the automatic monitoring stations are shown below. The monitored data from the Scrubs Lane station has been used to estimate the annual exceedences. Further information is available in the separate Detailed Assessment report.

Table showing annual mean NO₂ measurements for 2002 – 2005 and 2010 forecast (µg/m³)

Site / Year	2002	2003	2004	2005*	Forecast 2010
Hammersmith Broadway	58	92	<u>78</u>	74	63
Brook Green	No data	<u>38</u>	40	39	32
Scrubs Lane	No data	No data	No data	<u>44</u>	Not available

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

The data shows that the annual mean NO₂ objective has been exceeded at the Hammersmith Broadway monitoring station each year since the previous USA was carried out. The 2010 forecast (based on 2004 ratified data) also suggests the exceedences will continue. The Brook Green site has not breached the annual mean objective in the last 3 years since it was established in 2003, but has been on the borderline of exceedence. The temporary site at Scrubs Lane did show an exceedence,

but well below that found at Hammersmith Broadway. Levels of NO₂ are predicted to fall at Brook Green so that by 2010 they meet the objective fairly easily. A 2010 forecast for Scrubs Lane is not possible because the 2005 data is still provisional so there is no fully ratified data to use for this calculation. However, the relatively low concentration found in 2005, albeit an exceedence, suggests levels should be below the objective level by 2010.

The data for the number of hours in a year when the NO₂ levels exceeded 200µg/m³ are shown in the table below. Hammersmith Broadway has exceeded the hourly objective in each of the last 3 years, with a particularly high rate of exceedence measured in 2003. Neither of the other 2 monitoring stations have measured an exceedence of the hourly objective.

Table showing number of hours when NO₂ concentrations exceeded 200 µg/m³ (2002 – 2005)

Site / Year	2002	2003	2004	2005*
Hammersmith Broadway	0	110	<u>28</u>	29
Brook Green	No data	<u>0</u>	1	0
Scrubs Lane	No data	No data	No data	<u>7</u>

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

Data from real-time monitoring sites in neighbouring authorities in the LAQN (plus some of the London based AURN sites) have also been analysed for the 2002 – 2005 period. All data shown in the table below is fully ratified, except 2005, which remains provisional at this stage.

The results show a very similar pattern to those found in Hammersmith & Fulham in that those sites close to busy roadsides have consistently failed to meet the 40µg/m³ annual mean objective. Many background sites also exceed the objective. The findings for these LAQN sites are considered indicative of the NO₂ levels found in Hammersmith & Fulham – i.e. high concentrations of NO₂ are liable to arise across the borough next to busy roadside areas, with exceedences also possible in some background areas as well.

Data on hourly exceedences of the NO₂ objective are also provided for the same LAQN sites in neighbouring boroughs. There are far fewer exceedences of this objective than the annual mean, with many sites frequently recording only a small number (often none).

Only those sites adjacent to some of the very busiest roads in London frequently exhibit consistently high numbers of exceedence hours. This suggests there are unlikely to be many similar locations in Hammersmith & Fulham where such high exceedence levels are to be found, and whilst 2003 did see the highest number of hourly exceedences that year in London being recorded at Hammersmith Broadway, this level of exceedence is not typical for this site and is unlikely to be found at a large number of locations across the borough.

Table showing monitored 2002 – 2005 nitrogen dioxide annual mean measurements ($\mu\text{g}/\text{m}^3$) in neighbouring boroughs

LAQN Monitoring Site	Site Classification	2002	2003	2004	2005*
Brent 1 (Kingsbury)	Background	29	34	29	34
Brent 2 (Ikea car park)	Roadside	69	n/a	n/a	n/a
Brent 3 (Harlseden)	Background	47	52	57	53
Brent 4 (Ikea)	Roadside	n/a	59	63	69
Brent 5 (Neasden Lane)	Industrial	n/a	n/a	48	42
Ealing 1 (Ealing Town Hall)	Background	37	43	41	39
Ealing 2 (Acton Town Hall)	Roadside	51	62	55	58
Ealing 6 (Hangar Lane)	Roadside	n/a	91	98	94
Ealing 7 (Southall)	Background	n/a	n/a	39	33
Ealing 9 (Court Way Acton)	Roadside	n/a	n/a	n/a	38
Hounslow 1 (Brentford)	Roadside	58	n/a	n/a	n/a
Hounslow 2 (Cranford)	Suburban	43	52	36	41
Hounslow 4 (Chiswick High Road)	Roadside	58	82	78	71
Hounslow 5 (Brentford)	Roadside	n/a	52	54	48
RBK&C 1 (North Kensington)	Background	39	44	40	40
RBK&C 2 (Cromwell Road)	Roadside	72	75	80	78
RBK&C 3 (Knightsbridge)	Roadside	85	93	87	90
RBK&C 4 (Kings Road)	Roadside	84	98	92	91
Richmond 1 (Castlenau)	Roadside	44	48	41	41
Richmond 2 (Barnes Wetlands)	Suburban	32	37	31	29
Richmond 25 (Twickenham)	Roadside	n/a	n/a	n/a	38
Wandsworth 2 (Town Hall)	Background	51	62	54	54
Wandsworth 4 (High Street)	Roadside	44	52	47	46
Bloomsbury (AURN)	Roadside	42	56	58	56
Hillingdon (AURN)	Suburban	45	54	47	44
Marylebone Road - Baker Street	Roadside	80	107	110	106
Teddington (AURN)	Background	25	28	25	26
West London (AURN)	Background	46	55	50	50
Hammersmith Broadway	Roadside	58	92	78	74
Brook Green	Background	n/a	38	40	39
Scrubs Lane	Roadside	n/a	n/a	n/a	44

Table showing monitored 2002 – 2005 exceedences of the hourly nitrogen dioxide objective in neighbouring boroughs

LAQN Monitoring Site	Site Classification	2002	2003	2004	2005*
Brent 1 (Kingsbury)	Background	0	3	0	0
Brent 2 (Ikea car park)	Roadside	<u>1</u>	n/a	n/a	n/a
Brent 3 (Harlseden)	Background	0	6	24	<u>2</u>
Brent 4 Ikea)	Roadside	n/a	<u>0</u>	10	8
Brent 5 (Neasden Lane)	Industrial	n/a	n/a	0	0
Ealing 1 (Ealing Town Hall)	Background	0	0	0	0
Ealing 2 (Acton Town Hall)	Roadside	0	3	0	7
Ealing 6 (Hangar Lane)	Roadside	n/a	<u>6</u>	93	157
Ealing 7 (Southall)	Background	n/a	n/a	<u>0</u>	0
Ealing 9 (Court Way Acton)	Roadside	n/a	n/a	n/a	<u>0</u>
Hounslow 1 (Brentford)	Roadside	4	n/a	n/a	n/a
Hounslow 2 (Cranford)	Suburban	0	1	0	0
Hounslow 4 (Chiswick High Road)	Roadside	0	85	29	22
Hounslow 5 (Brentford)	Roadside	n/a	<u>0</u>	8	2
RBK&C 1 (North Kensington)	Background	0	0	0	1
RBK&C 2 (Cromwell Road)	Roadside	0	6	3	7
RBK&C 3 (Knightsbridge)	Roadside	154	235	254	288
RBK&C 4 (Kings Road)	Roadside	0	50	56	82
Richmond 1 (Castlenau)	Roadside	0	0	0	5
Richmond 2 (Barnes Wetlands)	Suburban	0	0	0	0
Richmond 25 (Twickenham)	Roadside	n/a	n/a	n/a	<u>0</u>
Wandsworth 2 (Town Hall)	Background	0	8	2	5
Wandsworth 4 (High Street)	Roadside	0	0	0	2
Bloomsbury (AURN)	Roadside	0	0	1	2
Hillingdon (AURN)	Suburban	<u>0</u>	<u>0</u>	0	1
Marylebone Road - Baker Street	Roadside	0	0	0	<u>0</u>
Teddington (AURN)	Background	2	464	529	696
West London (AURN)	Background	0	0	0	0
Hammersmith Broadway	Roadside	0	110	28	29
Brook Green	Background	n/a	<u>0</u>	1	0
Scrubs Lane	Roadside	n/a	n/a	n/a	<u>7</u>

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

Diffusion Tube Monitoring

The results of the diffusion tube monitoring for the most recent years (i.e. for 2002 to 2005) are given in the table below. There are currently 20 sites in the borough where nitrogen dioxide is monitored using diffusion tubes. Nine of the sites are classified as 'roadside' sites either on or next to busy roads, and the remainder are 'background' sites away from busy roads, but still in important areas in terms of potential exposure. The council's diffusion tubes are supplied by Bureau Veritas (formerly Casella Stanger) with analysis undertaken by Gradko Scientifics. The method of preparation used is 50% TEA in acetone. A map showing the tube locations and further details on the QA/QC procedures employed for their analysis are provided in the Appendix.

Diffusion tubes often under or over read the levels of pollution present at any particular location and Government guidance is to calculate and apply a correction factor to the collected data. Correction factors have been applied to the 2002 – 2004 data (as obtained from the Air Quality Consultants co-location study) to give the 'corrected' data. Interim 2005 data is included for comparison, although at the time of writing no correction factor is available.

Hammersmith Broadway 2 is the diffusion tube which is co-located on the real-time monitoring station at Hammersmith Broadway. The 2004 corrected diffusion tube reading of $81\mu\text{g}/\text{m}^3$ is in good agreement with the real-time nitrogen dioxide annual mean of $78\mu\text{g}/\text{m}^3$.

In broad terms, as can be seen from the table, there are regular exceedences at most of the monitoring sites. In 2004, 15 out of the 20 diffusion tube sites (75%) exceeded the nitrogen dioxide annual mean target. Although corrected 2005 data is not available at the time of writing, early consideration of the raw data collected so far suggests there have been fewer exceedences with a drop in concentrations at most sites. However, this may change, depending on the correction factor that needs to be applied, which will only become available later in 2006. Most of the sites classified as 'roadside' currently exceed the $40\mu\text{g}/\text{m}^3$ objective, whilst the sites that tend to meet the target are the 'background' sites well away from busy roads.

The 2010 forecasts have been made using the correction factors published in the Government's technical guidance. The forecasts suggest that air quality at 5 of the 15 sites that currently exceed the objectives could improve sufficiently to meet the $40\mu\text{g}/\text{m}^3$ objective by 2010. To achieve the target at the other sites, a combination of additional local, regional and national measures are required beyond the current levels to reduce emissions. It should also be noted that as the forecasts have been made using national correction factors, they cannot take account of any traffic flow changes as a result of local conditions.

Table showing monitored 2002 – 2005 and forecast 2010 nitrogen dioxide diffusion tube (bias corrected) annual mean measurements ($\mu\text{g}/\text{m}^3$)

Monitoring Site	2002	2003	2004	2005	Forecast 2010
Roadside monitoring sites					
Hammersmith B'way	61	70	61	68	49
Lillie Road	46	60	53	53	43
Fulham Broadway	58	78	63	62	51
Hammersmith B'way 2	65	89	81	83	65
Westway	58	68	74	77	59
Uxbridge Road	57*	47	51	50	41
Talgarth Road	62*	56	57	60	46
North End Road	62*	54	53	65	43
Fulham Palace Road	49*	45	44	44	35
Background monitoring sites					
Bishop's Park	29	31	30	28	24
Eel Brook Common	36	43	40	39	32
Bryony Road	41	41	40	38	32
Cobbold Road	34	39	42	38	34
Wulfstan Road	34	41	46	45	37
Townmead Road	49	50	51	53	41
Addison Gardens	44	41	44	43	35
Waldo Road	52*	41	42	34	34
Cardross Road	49*	41	40	38	32
Radipole Road	49*	37	42	37	34
Daisy Lane	49*	37	34	35	27

Notes:

- n/a – no data as site not set up until 2002
- **bold text** represents an exceedence of the air quality objective
- * new site, less than 12 months worth of data collected - adjusted to annual mean using technical guidance correction factor

The assessment of NO_2 based on monitoring results confirms that there are areas across the borough where the annual mean objective will be exceeded. The hourly objective has also been shown to be exceeded at one of the busiest parts of the road network in the borough and monitoring at similar locations in neighbouring boroughs suggests there may be other locations in Hammersmith & Fulham where the 1-hour objective may be exceeded.

(2) Roads

As part of the initial round of air quality review and assessment work, a large amount of work was carried out to model emissions from traffic on the road network in Hammersmith & Fulham. DEFRA has examined the results from local authorities for these initial assessments and has structured the USA checklist for this part of the assessment on their conclusions. Some new exceedence maps for 2005 and 2010 have been produced using the most up to date emissions data. These are provided in the Appendix. Widespread exceedences of the NO₂ annual mean objective were predicted for 2005. The 2010 map shows that the exceedence areas are predicted to recede, but all of the main roads in the borough are forecast to continue to breach the objective. However, whereas most of the borough is predicted to exceed the annual mean objective in 2005, by 2010 most of the borough is predicted to just comply.

Narrow congested streets

Concentrations of NO₂ in narrow congested streets have been assessed previously in the first USA report. Under the guidance in LAQM.TG(03/06), there is therefore no need to make any further assessment at this stage. For information, the previous assessment showed that busy, narrow and congested streets in the borough where residential properties are close to the kerb were extremely common across the borough and use of a screening pollution model (the DMRB) showed that exceedences of the annual mean NO₂ objective are expected on all of the main roads in the borough.

Busy junctions

Specific assessment of busy junctions in the borough has also been undertaken as part of the previous review and assessment work, and therefore does not need to be included in this USA report. In summary, the previous assessment followed a more detailed modelling method where each road was divided into 10m sections rather than being dealt with as single stretches of road. This allowed more detailed assessment to be carried out, particularly around junctions. Within a short distance of each junction it was assumed that vehicle idling increases and the average speed reduces significantly. The effect of low speeds and idling engines (from various vehicle types) was integrated into the final modelling results to show where exceedences were predicted to occur in the borough. This effect can be seen in the pollution maps around the major junctions in the borough, where the predicted exceedence areas spread out over larger areas than around single roads.

Busy streets and short-term exposure

A separate assessment is required as part of the USA for busy streets where people may spend 1 hour or more close to traffic – e.g. streets with many shops, streets with outdoor cafes and bars etc. Places where people are only exposed as a result of their occupation are not included as occupational exposure is dealt with under Health and Safety at Work legislation, not the local air quality management regulations.

The potential for exposure of this type in the 3 town centre areas in the borough – Hammersmith, Shepherd's Bush and Fulham – has previously been identified and

assessed as part of the first USA. In summary, some roads (mostly those around Hammersmith and Fulham town centres) exceeded or were close to exceeding the trigger value which would indicate that the hourly mean NO₂ objective could be breached. However, all of those roads had already been identified as likely to breach the annual mean objective as well, so there were no new locations identified as part of this assessment.

Roads with high numbers of buses and HGVs

The impact of emissions from HGVs and buses on total emissions along particular roads was assessed as part of the 1st round of review and assessment. However, this was not done in the detail now required by the new USA checklist.

Working through the revised checklist provided in LAQM.TG(03/06), only those roads where traffic flows are not high but where there is an unusually high proportion of HGVs and/or buses need to be assessed further to determine the NO₂ annual mean. Only roads which satisfy the following criteria need to be assessed further:

- where more than 25% of vehicles on a road are HGVs and/or buses
- where the flow of HGVs or buses is higher than 2,500 vehicles per day
- where exposure can occur within 20m of the road

In terms of HGVs, local knowledge suggests that there are parts of the borough where the presence of industrial estates and business units means that there is a higher than average proportion of HGVs on the road network leading to/from these areas. It is possible that some access roads have a higher than 25% level of HGVs on them, particularly where the road does not provide a through route for other traffic and only serves an industrial estate. However, for more than 2,500 HGV movements to be evident, this would require a constant flow of about 2 HGVs a minute for the whole 24-hour period. In reality, HGV movements are more likely to occur over a shorter period of the day (e.g. a 12-hour period from 6am to 6pm) which would require more than 200 movements an hour or more than 3 per minute to breach the 2,500 trigger level. Checking the traffic data previously provided as part of the first USA report shows that it is unlikely that such high levels of HGV activity will be found in the borough, and where it is most likely to occur, in dedicated industrial areas, there are no locations such as residential properties where people might be exposed to pollution from this specific source.

Similarly for buses, whilst there are a limited number of roads in the borough which are bus-only, or predominantly buses, an assessment of the number of services and their timetabled frequency shows that they are not present in high enough numbers to trigger the 2,500 threshold to require further assessment at this stage. The same is true for locations where there might be a high mix of both HGV and bus traffic on the same route.

New roads

There have not been any roads with significant (>10%) increases in traffic flow or any new roads built since the last Updating and Screening Assessment.

(3) Bus stations

There is one main open-to-air bus station in the borough at Hammersmith Broadway where, if a precautionary approach is taken, there could be relevant exposure for the short-term 1-hour NO₂ objective. The annual mean objective is not relevant for this location as the bus station is located in the middle of the Hammersmith Broadway shopping centre and there are no relevant receptors (such as housing) within 20m. An extension to this bus station on an adjacent plot of land is planned, which will also be open air. However this is not yet operational so is not included in this assessment.

The previous USA work assessed NO₂ levels at Hammersmith Broadway bus station and it was concluded that there was not a risk of the hourly objective being exceeded and therefore no further assessment was required at the time. As services may have increased since that assessment, the screening assessment has been revisited.

Twenty nine bus routes currently operate at the station, including some 24-hour services and some running as frequently as every 7-8 minutes during peak hours. A quick assessment of the available timetable information suggests that many of the routes have more than 300 movements per day at the bus station. The daily flow of buses has been estimated at about 5,000 movements in and out of the station. This is more than the trigger point of 1,000 buses per day specified in the guidance, so a further assessment has been carried out using the DMRB screening model to calculate the NO₂ annual mean.

The assumptions used for the model were as follows:

DMRB Parameter	Input
Assessment year	2004
Distance from road to receptor	2m
Vehicle flow	5,000
Vehicle speed	20kph
Vehicle composition	100% buses
Road type	D (indicating that traffic composition is known and used – i.e. 100% buses)
Background concentrations	NO _x – 67.8µg/m ³ ; NO ₂ – 38.5µg/m ³ (from the www.airquality.co.uk website)

Using these assumptions, the NO₂ annual mean concentration at the bus station has been calculated to be 55.47µg/m³. As there are no nearby receptors who can be exposed over the long-term (i.e. throughout the year), it is not of concern that this is

above the annual mean objective of $40\mu\text{g}/\text{m}^3$. The DMRB model cannot be used to calculate exceedences of the hourly objective, but the annual mean can be used as a proxy. Following the guidance in the LAQM.TG(03/06) update, an annual mean of less than $60\mu\text{g}/\text{m}^3$ indicates that there should be no more than 18 hours when NO_2 levels are above $200\mu\text{g}/\text{m}^3$, representing compliance with the hourly objective. Therefore, the assessment shows that the bus station complies with the objective and a Detailed Assessment is not required at this stage.

(4) Industrial sources

There are no new IPC/ Part B/ A2 processes or existing processes with substantially increased emissions of NO_x within or close to the council's area since the last round of review and assessment. Therefore, no further assessment is required.

(5) Aircraft

There is no airport within Hammersmith and Fulham or within a distance of 1000m, so there is no relevant exposure in the borough due to aircraft emissions. Emissions from aircraft flying over the borough do not have any significant impact on ground level concentrations as they are higher than 200m above ground – this is the height beyond which emissions are regarded as making a negligible contribution to pollution levels on the ground. Therefore, in line with the guidance in LAQM.TG(03/06), no further assessment is needed.

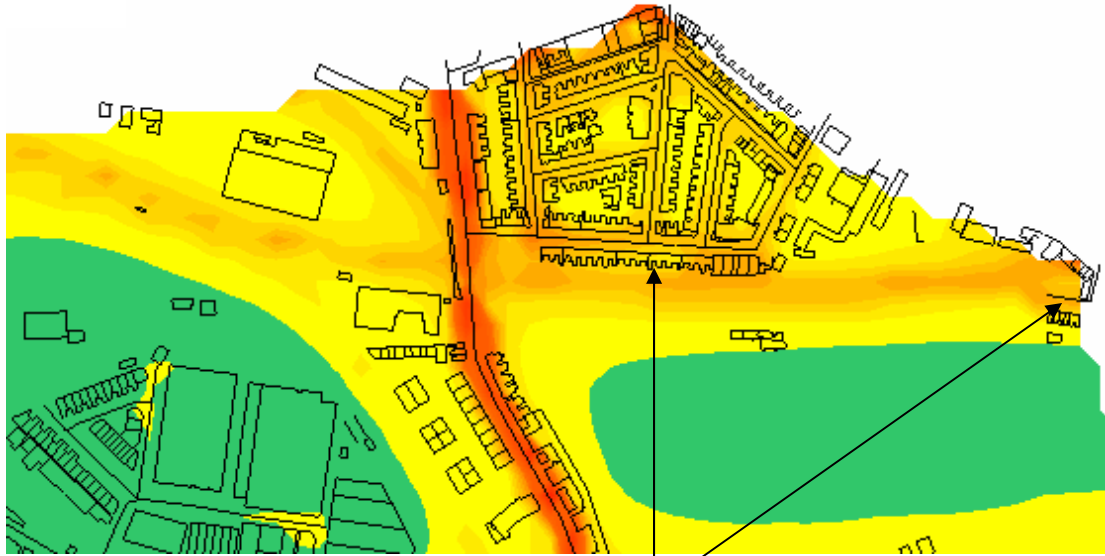
(6) Trains

Trains have not normally been regarded as a major source of pollution in the borough, and guidance suggests that it is only emissions from coal or diesel powered trains that are stationary for prolonged periods (15 minutes or more) at locations such as signals, stations, depots etc that might pose a risk of exceeding air quality objectives – and then only for sulphur dioxide, not the other pollutants. As such, no checklist guidance for the assessment of other pollutants such as NO_2 (or PM_{10}) currently exists.

However, in January 2006, the GLA circulated modelled Londonwide air quality maps (based on the 2002 LAEI) which showed exceedences for the annual mean NO_2 objective along those tracks in the north of the borough used by diesel Intercity 125 trains operating out of Paddington station. More detailed exceedence maps for the borough have also been produced since then (reproduced in the Appendix), and in both 2005 and 2010, exceedences of the NO_2 annual mean have been predicted along some additional tracks which serve mainline and local train services out of Euston station. There is no potential for exposure adjacent to the Paddington mainline tracks, but there are houses adjacent to the other line, as shown in the maps below.

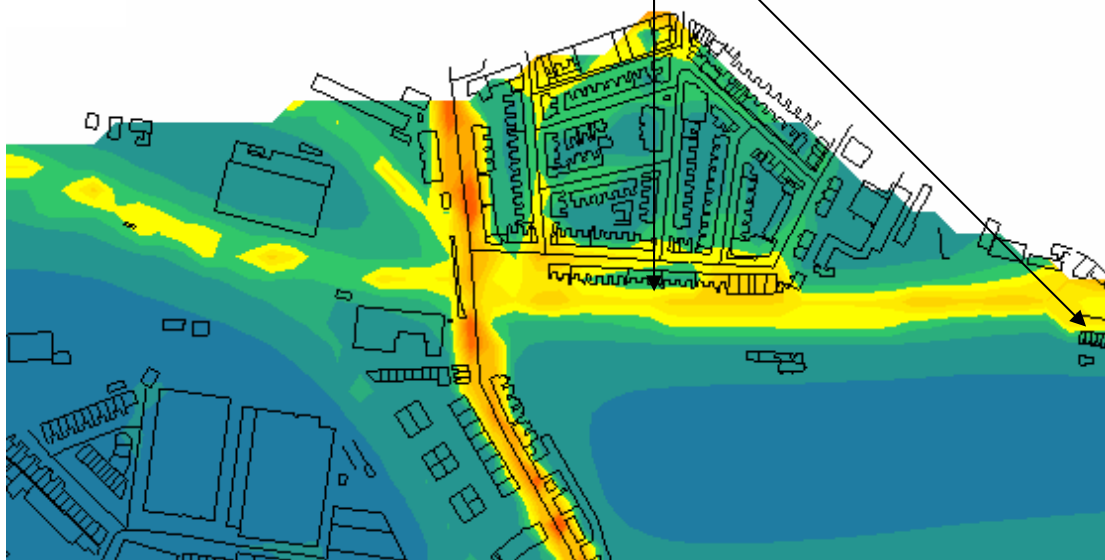
Maps showing 2005 and 2010 annual mean nitrogen dioxide forecasts and potential areas of exposure

2005



Houses next to rail lines forecast to exceed the annual mean nitrogen dioxide objective in 2005 and 2010

2010



These exceedences have not shown up in previous review and assessment work, but for these recently produced maps, new, more accurate data on emissions from diesel trains have been used, leading to predicted exceedence areas along the mainline track – due to the frequency of diesel powered trains on these routes and also because of the relatively high emissions from each train.

There is currently no guidance or checklist information on how to assess NO₂ emissions from trains. Further advice will be sought from DEFRA on an appropriate approach to assessing the potential impact of these emissions and to establish whether or not a Detailed Assessment is required.

Conclusion

The assessment of NO₂ based on monitoring confirms that there are areas across the borough (roadside and background locations) where the annual mean objective continues to be exceeded. The hourly objective has also been exceeded at one of the busiest parts of the road network in the borough and monitoring at similar locations in neighbouring boroughs suggests there may be other locations in Hammersmith & Fulham where the 1-hour objective may be exceeded. These findings suggest that the current boroughwide AQMA for NO₂ is justified and although exceedence levels are predicted to reduce by 2010, a Detailed Assessment to assess whether or not the AQMA should be revoked or varied is not currently necessary. The other assessments for roads and other sources of NO₂ have shown that there is no need for any additional assessments, although further advice will be sought on how best to investigate the potential exceedences from train emissions in the north of the borough.

The updating and screening assessment for NO₂ has identified a continued risk of the air quality objectives being exceeded in Hammersmith & Fulham. The AQMA designation should remain in place and there is currently no requirement to carry out a Detailed Assessment for this pollutant.

Sulphur dioxide

2 of the UK sulphur dioxide air quality objectives are set for 2004: (i) a 1-hour mean concentration of $350\mu\text{g}/\text{m}^3$ not to be exceeded more than 24 times per year and (ii) a 24-hour mean concentration of $125\mu\text{g}/\text{m}^3$ not to be exceeded more than 3 times per year. The remaining objective, set for 2005, is a 15-minute mean concentration of $266\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times per year. The EU objectives are equivalent to (i) and (ii) above, but with a deadline of 2005 instead of 2004.

Background information

Nationally, the main source of sulphur dioxide in the UK is energy generation by power stations, which accounted for just over 71% of emissions in 2003 (www.naei.org.uk). There are also significant emissions from other industrial combustion sources. Domestic sources account for less than 5% of emissions and road transport accounts for less than 1%.

According to the LAEI (2003), 29 tonnes of SO_2 are emitted annually in Hammersmith & Fulham. Rail emissions account for almost 50% of the total SO_2 emissions in the borough. The 2 other main sources are combustion of oil (29%) and road transport (15%).

Only a small number of AQMAs were declared in the UK during the first round of review and assessment and these related to a number of coal-fired boilers, domestic coal burning and activities at a major port. Current projections are that emissions will continue to fall.

Methodology Overview

The assessment for SO_2 is split into 6 parts: (1) the analysis of monitoring data; (2) industrial emissions; (3) domestic coal burning; (4) small boilers; (5) shipping and (6) trains. Full details of the methodology employed can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03/06).

Assessment

(1) Monitoring data

SO_2 monitoring is carried out at the Hammersmith Broadway monitoring station. The monitor was installed in 2001 as at the time there was concern that emissions from power stations in the East Thames corridor could be dispersed over the borough when there were easterly winds. However, despite occasional elevated readings, no exceedences of the daily, hourly or 15-minute objectives have ever been measured and

all objectives have been met at this location. No calculations have been undertaken to forecast future levels of sulphur dioxide as it is very unlikely that any of the objectives will be breached at this location in the future.

As there is only limited monitoring data available for the borough, data from neighbouring boroughs has also been checked via the London Air Quality Network website: www.londonair.org.uk. No exceedences of the SO₂ objectives have been recorded for the period 2002 to 2005. This is true not just for neighbouring boroughs, but for all those London Boroughs where SO₂ is monitored.

(2) Industrial emissions

There are no new relevant IPC/ Part B/ A2 processes within the borough or nearby in neighbouring authorities since the last round of review and assessment. There are also no existing relevant IPC/ Part B/ A2 processes where there have been substantially increased emissions. No further assessment is required.

(3) Domestic coal burning

The whole of Hammersmith & Fulham is covered by a smoke control order. Local knowledge and professional judgement indicates that significant domestic coal burning does not occur in the borough.

(4) Boilers

No new boilers of the type identified in LAQM.TG(03/06) have been installed in the borough since the last round of review and assessment.

(5) Shipping

The borough's southern boundary is the River Thames and several wharves remain in operation. However, in terms of the size of the vessels and number of movements specified in LAQM.TG(03/06), assessments are only likely to be necessary for large commercial ports where 5,000+ movements of large ships such as ferries, container ships etc are common. The level of shipping activity in the borough is well below the level which requires further assessment.

(6) Trains

According to guidance in LAQM.TG(03), moving diesel trains do not make a significant contribution to short-term concentrations and do not need to be considered further. It is

only where trains may be stationary that exposure may be more significant. Although there are locations in the borough where diesel powered trains pass through next to residential areas (as identified in the NO₂ assessment), there are no locations where such trains are stationary for prolonged periods.

Conclusion

The updating and screening assessment for sulphur dioxide has not identified a risk of the objectives being exceeded in the borough. There is no need to proceed on to a Detailed Assessment for this pollutant.

Particles (PM₁₀)

There are 2 air quality objectives for PM₁₀: (i) an annual mean concentration of 40µg/m³ and (ii) a 24-hour mean concentration of 50µg/m³ not to be exceeded more than 35 times a year. The UK compliance date for these objectives was 2004. The EU set similar objectives with a target date of 2005.

London also has a set of provisional objectives as follows, which are not currently set in UK regulations: (i) an annual mean concentration of 23µg/m³ and (ii) a 24-hour mean concentration of 50µg/m³ not to be exceeded more than 10 times per year. Both objectives have a target date of 2010. A further objective has been set for 2015: an annual mean of 15µg/m³.

Background information

Data from the LAEI (2003) show that almost 50% of PM₁₀ emitted in the borough comes from road traffic. Other sources include gas boilers (20%), rail (14%) and industry (13%). These are responsible for primary emissions – i.e. the PM₁₀ particles are emitted directly to the air as a result of combustion. There are 2 other ways in which PM₁₀ can be present in the air: (i) secondary particles – these are not emitted directly from any source, but are formed through the chemical reactions of other pollutants in the atmosphere and (ii) coarse particles – these come from a range of sources such as construction sites, quarries, wind-blown soils and sea salt etc and can be carried over long distances.

As for NO₂, the whole of Hammersmith & Fulham was designated as an AQMA in 2000 for PM₁₀ as exceedences of the air quality objectives were expected across the borough, particularly adjacent to the main road network across the borough.

Levels of PM₁₀ are expected to reduce nationally in the future, however if the provisional objectives are adopted, these more stringent targets could still be difficult to meet in the borough.

Methodology Overview

The assessment for PM₁₀ is split into 7 parts: (1) monitoring data; (2) roads; (3) industrial sources; (4) domestic coal burning; (5) quarries/landfills or similar (6) aircraft. As for the NO₂ assessment, (7) trains have also been added to the list, although not currently specified in the DEFRA checklist – see the relevant section for more details on why this is necessary this year. Full details of the methodology employed for (1) to (6) can be found in the updated version of the DEFRA technical guidance document LAQM.TG(03).

Assessment

(1) Monitoring data

The council runs 2 permanent automatic monitoring stations in the borough which are currently located at Hammersmith Broadway and Brook Green. A third (temporary) station was installed from March to October 2005 at Scrubs Lane as part of a Detailed Assessment of industrial emissions. All 3 sites monitor PM₁₀ (as well as other pollutants), operating 24-hours a day and collect data for each 15-minute period. This 'real-time' data is reported daily on the London Air Quality Network alongside data from other London Boroughs: www.londonair.org.uk

Results from the automatic monitoring stations for 2002 – 2005 are shown below, along with a forecast for 2010 for the annual mean. The monitored data from the Scrubs Lane station has been used to estimate the annual exceedences. Further information is available in the separate Detailed Assessment report.

Table showing annual mean PM₁₀ measurements for 2002 – 2005 and 2010 forecast (µg/m³)

Site / Year	2002	2003	2004	2005*	Forecast 2010
Hammersmith Broadway	35	37	<u>35</u>	36	32
Brook Green	No data	<u>35</u>	24	24	22
Scrubs Lane	No data	No data	No data	<u>35</u>	Not available

Table showing number of days when PM₁₀ concentrations exceeded 50µg/m³ (2002 – 2005 and 2010 forecast)

Site / Year	2002	2003	2004	2005*	Forecast 2010
Hammersmith Broadway	24	54	<u>29</u>	41	35
Brook Green	No data	<u>0</u>	6	6	6
Scrubs Lane	No data	No data	No data	48	Not available

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

The annual mean data show that each site has monitored PM₁₀ at levels below the annual mean objective of 40µg/m³. Over the last 4 years, the annual average at Hammersmith Broadway has been very similar, consistently at about 35µg/m³. The typical average at Brook Green appears to be about 10µg/m³ less at 24µg/m³. The 2003 measurement at this site appears to be the exception rather than the norm, but we need more data to make a better judgement on any long-term trends. The Scrubs Lane reading for 2005 is similar to that found at Hammersmith Broadway and appears to be typical for a busy roadside location. Further information on the PM₁₀ data collected at this site is provided in the separate Detailed Assessment report.

In terms of the 24-hour mean objective, the Brook Green site easily meets the target in each of the years when data have been collected. Hammersmith Broadway regularly has a higher number of exceedence days and has breached the objective in 2003 and 2005. Scrubs Lane showed 48 days above 50µg/m³ in 2005, which represents an exceedence and is higher than that measured at Hammersmith Broadway.

Using the correction factors provided in LAQM TG(03) and using 2004 as the reference year, 2010 forecasts have been made for the 2 permanent monitoring locations at Hammersmith Broadway and Brook Green. In summary, Hammersmith Broadway is predicted to continue to exceed the (provisional 2010) objectives and Brook Green to comply.

Data from real-time monitoring sites in neighbouring authorities in the LAQN (plus some of the London based AURN sites) have also been analysed for the 2002 – 2005 period. All data shown in the table below is fully ratified, except 2005, which remains provisional at this stage.

The results show that only one site (Marylebone Road) has consistently breached the PM₁₀ annual mean objective. The only other sites where breaches have happened are at Brent 4 (very busy roadside) and the 2 sites classified as 'industrial' due to their proximity to dust generating industrial activities (waste transfer stations). Exceedences of the daily mean objective are more widespread across neighbouring boroughs, although not as common as exceedences of the NO₂ objectives. Only 1 of the background or suburban sites has measured an exceedence of the daily mean in one year. The levels monitored at Brook Green therefore appear to be fairly typical of background sites in west London.

The pattern of intermittent exceedences of the daily mean objective at Hammersmith Broadway is broadly similar to the levels measured at the other nearby roadside sites and it is possible that other busy roadside locations in the borough could exceed the daily PM₁₀ objective. As for the annual mean measurements, it is the 2 industrial sites that tend to monitor the highest levels of exceedence in the region. The Scrubs Lane site was set up in 2005 to help determine how much of a contribution local industry was making to PM₁₀ levels in the area. Readings from the Brent and Ealing industrial sites show much higher levels than those found at Scrubs Lane.

Table showing monitored 2002 – 2005 PM₁₀ annual mean measurements ($\mu\text{g}/\text{m}^3$) in neighbouring boroughs

LAQN Monitoring Site	Site Classification	2002	2003	2004	2005*
Brent 1 (Kingsbury)	Background	29	26	22	20
Brent 2 (Ikea car park)	Roadside	<u>38</u>	n/a	n/a	n/a
Brent 3 (Harlesden)	Background	31	34	30	30
Brent 4 (Ikea)	Roadside	n/a	41	39	43
Brent 5 (Neasden Lane)	Industrial	n/a	n/a	65	62
Ealing 2 (f) (Action Town Hall)	Roadside	n/a	n/a	n/a	<u>24</u>
Ealing 2 (Acton Town Hall)	Roadside	30	34	30	29
Ealing 7 (Southall)	Background	n/a	n/a	<u>21</u>	23
Ealing 8 (Horn Lane)	Industrial	n/a	n/a	n/a	84
Hounslow 2 (Cranford)	Suburban	24	27	22	22
Hounslow 3 (Brentford)	Roadside	33	n/a	n/a	n/a
Hounslow 4 (Chiswick High Road)	Roadside	<u>32</u>	36	30	30
Hounslow 5 (Brentford)	Roadside	n/a	<u>36</u>	35	37
RBK&C 1 (North Kensington)	Background	25	28	24	24
RBK&C 2 (Cromwell Road)	Roadside	37	39	35	36
Richmond 1 (Castlenau)	Roadside	25	28	26	26
Richmond 2 (Barnes Wetlands)	Suburban	24	28	22	22
Richmond 25 (Twickenham)	Roadside	n/a	n/a	n/a	<u>26</u>
Wandsworth 4 (High Street)	Roadside	27	32	28	27
Bloomsbury (AURN)	Roadside	<u>37</u>	<u>30</u>	26	26
Hillingdon (AURN)	Suburban	25	30	27	<u>27</u>
Marylebone Road - Baker Street	Roadside	44	48	43	43
Hammersmith Broadway	Roadside	35	37	<u>35</u>	36
Brook Green	Background	n/a	<u>35</u>	24	24
Scrubs Lane	Roadside	n/a	n/a	n/a	<u>35</u>

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

Table showing number of daily exceedences of 50µg/m³ in neighbouring boroughs (2002 – 2005)

LAQN Monitoring Site	Site Classification	2002	2003	2004	2005*
Brent 1 (Kingsbury)	Background	11	25	5	3
Brent 2 (Ikea car park)	Roadside	<u>37</u>	n/a	n/a	n/a
Brent 3 (Harlesden)	Background	16	37	20	17
Brent 4 (Ikea)	Roadside	n/a	<u>41</u>	68	86
Brent 5 (Neasden Lane)	Industrial	n/a	n/a	165	180
Ealing 2 (f) (Action Town Hall)	Roadside	n/a	n/a	n/a	<u>11</u>
Ealing 2 (Acton Town Hall)	Roadside	19	61	24	20
Ealing 7 (Southall)	Background	n/a	n/a	<u>2</u>	5
Ealing 8 (Horn Lane)	Industrial	n/a	n/a	n/a	230
Hounslow 2 (Cranford)	Suburban	7	22	4	3
Hounslow 3 (Brentford)	Roadside	27	n/a	n/a	n/a
Hounslow 4 (Chiswick High Road)	Roadside	<u>18</u>	49	22	25
Hounslow 5 (Brentford)	Roadside	n/a	<u>28</u>	43	56
RBK&C 1 (North Kensington)	Background	8	29	6	6
RBK&C 2 (Cromwell Road)	Roadside	36	56	29	39
Richmond 1 (Castlenau)	Roadside	4	29	10	6
Richmond 2 (Barnes Wetlands)	Suburban	6	34	5	4
Richmond 25 (Twickenham)	Roadside	n/a	n/a	n/a	<u>3</u>
Wandsworth 4 (High Street)	Roadside	17	46	21	16
Bloomsbury (AURN)	Roadside	<u>23</u>	<u>14</u>	7	6
Hillingdon (AURN)	Suburban	7	32	13	<u>3</u>
Marylebone Road - Baker Street	Roadside	111	161	99	119
Hammersmith Broadway	Roadside	24	54	<u>29</u>	41
Brook Green	Background	n/a	<u>0</u>	6	6
Scrubs Lane	Roadside	n/a	n/a	n/a	48

Notes:

- underlined text shows less than 75% data capture
- **bold text** represents an exceedence of the air quality objective
- *2005 data is provisional and may change when fully ratified

The assessment of PM₁₀ based on monitoring results confirms that it is unlikely that any parts of the borough exceed the annual mean objective. However, if the provisional 2010 objective is introduced, this could be exceeded as it is much more stringent. The daily objective has been exceeded at Hammersmith Broadway which is one of the busiest parts of the road network in the borough as well as Scrubs Lane. Monitoring at similar locations in neighbouring boroughs suggests there may be other locations in Hammersmith & Fulham where this objective could be exceeded, particularly alongside busy roads. As for the annual mean, the provisional 2010 objective is much more stringent, and if this is adopted large parts of the borough are likely to breach it.

(2) Roads

Specific assessment of busy junctions in the borough has been undertaken as part of the previous review and assessment work, and therefore does not need to be included in this USA report. In summary, the previous assessment followed a more detailed modelling method where each road was divided into 10m sections rather than being dealt with as single stretches of road. This allowed a more detailed assessment to be carried out, particularly around junctions. Within a short distance of each junction it was assumed that vehicle idling increases and the average speed reduces significantly. The effect of low speeds and idling engines (from various vehicle types) was integrated into the final modelling results to show where exceedences were predicted to occur in the borough. This effect can be seen in the pollution maps around the major junctions in the borough, where the predicted exceedence areas spread out over larger areas than around single roads. PM₁₀ exceedence maps are provided in the Appendix for 2005 and 2010. The annual mean objective was predicted to exceed only on a limited number of busy roads in 2005 (e.g. the Westway, Talgarth Road, Hammersmith Bridge Road, part of the Great West Road, the south-side of Shepherd's Bush Green and Putney Bridge Approach). By 2010, exceedences are predicted to be much more widespread due to the proposed tightening up of the objective (from 40µg/m³ to 23µg/m³). Exceedences of the daily objective in 2005 were predicted for all of the main roads in the borough. By 2010, exceedences are much more widespread, again due to the proposed introduction of another more stringent objective (from 35 exceedences allowed to just 10).

Roads with high numbers of buses and HGVs

The impact of emissions from HGVs and buses on total emissions along particular roads was assessed as part of the 1st round of review and assessment. However, this was not done in the detail now required by the USA checklist.

Working through the checklist provided in LAQM.TG(03/06), only those roads where there is an unusually high proportion of HGVs and/or buses need to be assessed further to determine the PM₁₀ annual mean and number of daily exceedences of 50µg/m³. Only roads which satisfy the following criteria need to be assessed further:

- where more than 20% of vehicles on a road are HGVs and/or buses
- where the flow of HGVs or buses is higher than 2,000 vehicles per day

- where exposure can occur within 20m of the road

In terms of HGVs, local knowledge suggests that there are parts of the borough where the presence of industrial estates and business units mean that there is a higher than average proportion of HGVs on the road network leading to/from these areas. It is likely that some access roads have a higher than 20% level of HGVs on them, particularly where they do not provide a through route for other traffic and only serve industrial estate areas. However, for more than 2,000 HGV movements to be evident, this would require a constant flow of about 1 HGV a minute for the whole 24-hour period. In reality, HGV movements are more likely to occur over a shorter period of the day (e.g. a 12-hour period from 6am to 6pm) which would require more than 160 movements an hour or almost 3 per minute to breach the 2,000 trigger level. Checking the traffic data previously provided as part of the first USA report shows that it is unlikely that such high levels of HGV activity will be found in the borough, and where it is most likely to occur, in dedicated industrial areas, there are no locations such as residential areas where people might be exposed to pollution from this specific source.

Similarly for buses, whilst there are a limited number of roads in the borough which are bus-only, or predominantly buses, they are not present in high enough numbers to trigger the 2,000 threshold and require further assessment at this stage.

New roads

There have not been any roads with significant (>10%) increases in traffic flow or any new roads built since the last Updating and Screening Assessment.

Roads close to the objective

Since the previous round of review and assessment, the data on background levels of PM₁₀ have been revised and in some areas the concentrations have increased. This may be enough for local emissions to cause an exceedence in areas where previously no exceedences had been predicted. A check of background PM₁₀ predictions for the borough on the www.airquality.co.uk website shows that the expected background levels have increased by about 10%. When comparing some previously prepared PM₁₀ exceedence maps with the new maps in the Appendix, it has been noted that the exceedence areas are now larger than before, and there are more exceedence areas. However, as the borough has already been declared as a whole borough AQMA for PM₁₀, this adjustment does not have any significant impact, so no further action is required at this stage.

(3) Industrial sources

No new relevant processes have started in or close to the council's area since the last round of review and assessment. However, planning permission has been given for a new waste transfer station to be built in the north of the borough at Old Oak Sidings, close to the boundary with the London Borough of Ealing. This is expected to become operational later in 2006. The expected PM₁₀ emissions from the activities and

processes on this site were assessed as part of the planning application procedure and a number of conditions were put in place to prevent and minimise nuisance dust and PM₁₀ emissions. The potential impact of the PM₁₀ emissions from the site once it is operational have been assessed and judged not to be significant. The most likely outcome is that the site could add a small amount (2-3µg/m³) to the average annual mean PM₁₀ levels in the area and 5-6 additional exceedence days over the year. However, although there will be an increase in local emissions, this is not sufficient to cause any breaches of the PM₁₀ objectives which are expected to continue to be met in this area once the waste transfer station is up and running. Therefore, there is no need to assess this source any further.

A Detailed Assessment was carried out last year into PM₁₀ emissions from existing processes in the industrialised part of the borough with the intention of determining whether or not they are making a significant contribution to PM₁₀ levels in the local area.

Full details of the monitoring work carried out and the source apportionment study are provided in a separate Detailed Assessment report. In summary, only a small amount of PM₁₀ was identified as being possibly from the neighbouring industrial estate. A higher level of PM₁₀ in the local area is likely to come from emissions on Scrubs Lane itself, due to re-suspension of deposited dust on the road from dirty vehicles and their loads. Some of the local industries play a part in contributing to this source of pollution as it is the movement of vehicles in and out of the waste transfer station and on the access road to a large metal recycling plant that appears to be helping to soil the road surface with dirt and dust, which is then carried up Scrubs Lane and is dispersed further afield. Only 6µg/m³ out of an annual average of 35µg/m³ are attributable to these local, not tail-pipe emissions.

There are no other existing processes with substantially increased emissions of PM₁₀ within the borough or in neighbouring local authority areas since the last round of review and assessment.

(4) Domestic coal burning

As stated earlier in the section for sulphur dioxide, the whole borough is covered by a smoke control order and local knowledge and professional judgement indicates that significant domestic burning of solid fuels is not undertaken across the Council's area. There is therefore no need for further assessment.

(5) Quarries/landfills or similar

There are no quarries, landfill sites or similar large-scale processes where dusty cargoes are handled within the borough. See (3) for a summary of the Detailed Assessment carried out in 2005 on PM₁₀ emissions on Scrubs Lane around the Hythe Road industrial estate.

(6) Aircraft

As stated earlier in the section for nitrogen dioxide, there is not an airport in the borough or in the immediate vicinity and no further assessment of this source is necessary.

(7) Trains

As for the NO₂ assessment, trains have not normally been regarded as a major source of pollution in the borough. Guidance suggests that it is only emissions from coal or diesel powered trains that are stationary for prolonged periods (15 minutes or more) at locations such as signals, stations, depots etc that might pose a risk of exceeding air quality objectives – and then only for sulphur dioxide, not the other pollutants. As such, no checklist guidance for the assessment of other pollutants such as PM₁₀ (or NO₂) currently exists.

However, in January 2006, the GLA circulated modelled Londonwide air quality maps (based on the 2002 LAEI) which showed exceedences for the annual mean and daily PM₁₀ objectives along those tracks in the north of the borough used by diesel Intercity 125 trains operating out of Paddington station. More detailed exceedence maps for the borough have also been produced since then (reproduced in the Appendix), and in both 2005 and 2010, exceedences of both of the PM₁₀ objectives have been predicted along the Paddington route. However, the 2010 maps show additional exceedences along the tracks which serve mainline and local train services out of Euston station. There is no potential for exposure adjacent to the Paddington mainline tracks, but there are houses adjacent to the other line, as shown in the maps below.

These exceedences have not shown up in previous review and assessment work, but for these recently produced maps, new, more accurate data on emissions from diesel trains have been used, leading to predicted exceedence areas along the mainline tracks – due to the frequency of diesel powered trains on these routes and also because of the relatively high emissions from each train.

There is currently no guidance or checklist information on how to assess PM₁₀ emissions from trains. Further advice will be sought from DEFRA on an appropriate approach to assessing the potential impact of these emissions and to establish whether or not a Detailed Assessment is required.

Maps showing 2010 PM₁₀ annual mean and daily exceedance forecasts and potential areas of exposure

Daily exceedences



Houses next to rail lines forecast to exceed the annual mean and daily exceedence objectives in 2010

Annual mean



Conclusion

The assessment of PM₁₀ based on monitoring confirms that there are areas across the borough (roadside locations) where there are likely to be exceedences of the daily objective. The annual mean objective is unlikely to be exceeded except possibly in isolated roadside locations. However, by 2010, if the provisionally more stringent objectives are introduced, exceedences will become considerably more widespread. These findings suggest that the current boroughwide AQMA for PM₁₀ is justified and a Detailed Assessment to assess whether or not the AQMA should be revoked or varied is not currently necessary. The other assessments for roads and other sources of PM₁₀ have shown that there is no need for any additional assessments, although further advice will be sought on how best to investigate the potential exceedences from train emissions in the north of the borough.

The updating and screening assessment for PM₁₀ has identified a continued risk of the air quality objectives being exceeded in Hammersmith & Fulham. The AQMA designation should remain in place and there is currently no requirement to carry out a Detailed Assessment for this pollutant.

Updating and Screening Assessment Conclusions

This report has followed the technical guidance – LAQM.TG(03) – and the updated version issued in 2006 and available online.

The results show that there is no significant risk of the borough exceeding the air quality objectives for the following pollutants:

- Carbon monoxide
- Benzene
- 1,3-butadiene
- Lead
- Sulphur dioxide

There is no requirement to assess these pollutants any further until the next round of USA work, which is currently planned for April 2009.

For the remaining pollutants:

- Nitrogen dioxide (NO₂)
- Particles (PM₁₀)

The assessment has shown that there continues to be a risk of the annual mean NO₂ objective being breached across the borough and also the hourly mean NO₂ objective, but in fewer locations. The annual mean PM₁₀ objective is being breached in several locations next to very busy roads, but the 24-hour objective is sometimes breached over a wider area. If the provisional 2010 PM₁₀ objectives are introduced, breaches of the 24-hour objective are likely to become more extensive and the annual mean objective could be exceeded across the whole borough.

The council has previously designated the whole of the borough as an AQMA both for NO₂ and PM₁₀ in 2000. The findings of the new USA are therefore consistent with this action. The current borough-wide AQMA for both of these 2 pollutants is still regarded as valid and there is no need to revoke the AQMA Order.

Additionally, potentially new areas of exceedence for these 2 pollutants have been identified as a result of emissions from trains. As there is no formal guidance on how to proceed with an assessment of NO₂ and PM₁₀ exceedences caused by diesel train emissions, further advice will be sought on how best to investigate the potential impact.

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Appendix

Table showing the current list of industrial processes authorised by the council (Part B processes)

Company Name	Address of Process	Authorised Processes
<u>Adel Rootstein Ltd</u>	9 Beaumont Avenue London W14 9LP	Coating of Metal and Plastic PG6/23(04)
Bardley Auto Services	Du Cane Road Service Station Du Cane Road London	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Bush Centre Service Station	37 Shepherd's Bush Green London W12 8PS	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Cromwell North Service Station	Great West Road London W6 9TQ	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Cromwell South Service Station	Great West Road London W6 9TQ	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Edward Barber & Co Ltd	28 Salter Street London NW10 6UN	Iron, Steel and Non Ferrous Metal Foundry Processes PG2/4(04) Copper and Copper Alloy Processes PG2/8(04)

Company Name	Address of Process	Authorised Processes
Flyover Service Station	161 Talgarth Road London W14 9DA	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Four Seasons Service Station	601-615 King's Road London SW6 2EL	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
General Cemetery Company Ltd	Kensal Green Cemetery West London Crematorium Harrow Road London W10 4RA	Crematoria PG5/2(04)
Jet Petrol Station	176-182 Goldhawk Road London W12 9NS	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Klasse of Fulham	238 Dawes Road London SW6 7RG	Waste Oil Burner PG1/1(04)
RMC Readymix Ltd	London and South East RMC House 15 Townmead Road London SW6 2QL	Blending, Packing Loading and use of Bulk Cement PG3/1(04)
S&J Motors	65 Tasso Road London W6 8LY	Re-Spraying of Road Vehicles PG6/34(04)

Company Name	Address of Process	Authorised Processes
Scrubs Lane Service Station	235A Scrubs Lane London W10 6AH	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Shell Fulham	923-931 Fulham Road London SW6 5HY	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Shell Fulham Cross	222-224 Fulham Palace Road London W6 9NT	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
White City Service Station	62 Wood Lane London W12 7RH	Unloading of Petrol into Stationary Storage at Service Stations PG1/14(04)
Yamaha Service Centre	1A Grimston Road London SW6 3QL	Waste Oil Burner PG1/1(04)

Maps showing the location of Hammersmith Broadway monitoring station

[See separate map file]

Maps showing the location of Brook Green monitoring station

[See separate map file]

Maps showing the location of Scrubs Lane monitoring station

[See separate map file]

Map showing the location of diffusion tube monitoring sites

[See separate map file]

**Map showing the predicted annual mean NO₂ concentrations in 2005
(2003 met. year)**

[See separate map file]

**Map showing the predicted annual mean NO₂ concentrations in 2010
(2003 met. year)**

[See separate map file]

**Map showing the predicted annual mean PM₁₀ concentrations in 2005
(2003 met. year)**

[See separate map file]

**Map showing the predicted annual mean PM₁₀ concentrations in 2010
(2003 met. year)**

[See separate map file]

**Map showing the predicted number of daily exceedences of PM₁₀ in 2005
(2003 met. year)**

[See separate map file]

**Map showing the predicted number of daily exceedences of PM₁₀ in 2010
(2003 met. year)**

[See separate map file]

QA/QC of Monitoring Equipment and Data

Automatic Monitoring Stations

The council's automatic monitoring stations are part of the London Air Quality Network (LAQN), which is run by the Environmental Research Group at King's College London. All real-time data from the monitoring stations is therefore independently collected and validated on a daily basis. A combination of automatic and manual checks are used to assess data, identify and diagnose potential equipment faults and adjust data to take account of calibration tests. The procedures used conform to the requirements of the UK Automatic Urban and Rural Network Management and Co-ordination Units.

All data is also formally ratified. During this process the validation decisions can be ratified with the benefit of hindsight and using greater information, such as service records, calibration records and the results of station audits. Station audits are carried out every 6 months by the National Physical Laboratory who are UKCAS (United Kingdom Accreditation Service) accredited.

Data ratification is a lengthy process and has not yet been completed for all of the 2005 data set. Therefore, some of the results presented from the monitoring stations are identified as 'provisional' or 'interim' data until the full ratification procedure has been completed.

Nitrogen Dioxide Diffusion Tubes

The nitrogen dioxide diffusion tubes used for the passive monitoring work are supplied by Casella Stanger and analysed by Gradko International Ltd. The laboratory preparation and analysis of the tubes is strictly controlled and Gradko participate in 2 major independent schemes to assess their performance. For example, they take part in the nitrogen dioxide national Network Field Inter-comparison Exercise, which tests the performance of the diffusion tubes and lab analysis procedures. In 2004, the uncertainty of measurement for Gradko's analysis of diffusion tubes has been calculated at +/-1.67%, which is regarded as a good performance, signifying a high level of accuracy.

Diffusion tubes frequently exhibit bias (i.e., they either over- or under-read) compared to the readings taken by real-time analysers in the same location (the reference technique for measuring nitrogen dioxide). For this reason, correction factors are calculated by comparing results from tubes co-located with real-time monitoring equipment. The correction factor spreadsheet devised by Air Quality Consultants has been used to correct the diffusion tube data presented in this report.

Benzene Diffusion Tubes

As part of the QA/QC procedures for the benzene diffusion tubes, boroughs are chosen at random and sent 1 or 2 extra tubes for exposure alongside another tube at one of the designated monitoring sites. Results from these 'duplicate exposures' can be compared to assess the uncertainty of the monitoring method. Tubes are also sent to DEFRA's Marylebone supersite which is part of the Hydrocarbon Network where they are exposed alongside

automatic monitors. Analysis of the results for both the duplicate exposure and comparison with the data collected at the supersite show good agreement.

Analysis of the tubes is performed and determined by an internal standard technique with formal native compound calibration. As part of the analysis, a QC standard solution is spiked on to a blank tube together with the internal standard. The validity of the internal calibration can then verified by the analysis of the sample. A variation of +/- 20% is considered acceptable for the analysis of samples. Detection limits are also assessed using a low standards sample i.e. 1ng on the tube. The detection limit has been determined to be better than 1ng for benzene, based on the minimum detectable peak on the mass chromatogram.

Map highlighting railway lines predicted to cause NO₂ and PM₁₀ exceedences

[See separate map file]