Report

Air Quality Updating and Screening Assessment

A report produced for the London Borough of Hillingdon

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Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in the Environment Act, 1995. The Air Quality Strategy[1] provides a framework for air quality control through air quality management and air quality standards. These and other air quality standards[1] and their objectives[2] have been enacted through the Air Quality Regulations in 1997, 2000 and 2002. The Environment Act 1995 requires Local Authorities to undertake air quality reviews. In areas where an air quality objective is not anticipated to be met, Local Authorities are required to establish Air Quality Management Areas and implement action plans to improve air quality.

The first round of air quality review and assessments has been completed by the London Borough of Hillingdon. The Local Authority are now required to proceed to the second round of review and assessment in which sources of emissions to air are reassessed to identify whether the situation has changed since the first round, and if so, what impact this may have on predicted exceedences of the air quality objectives.

The second round of review and assessment is to be undertaken in two steps. The first step is an Updating and Screening Assessment, which updates the Stage 1 and 2 review and assessment previously undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment, equivalent to the previous Stage 3 assessments. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead.

This report is equivalent to an Updating and Screening Assessment for the London Borough of Hillingdon as outlined in the Government's published guidance.

In the last round of the review and assessment process Hillingdon undertook Stage 1, 2, 3 and 4 assessments and is currently finalising an action plan.

The stage one report produced in 1999 concluded that objectives for 1,3-butadiene, benzene and lead would be met in the borough. However, further assessment in the form of a stage 2 assessment was required for the other pollutants in the air quality strategy.

The results of the stage 2 report showed that it was unlikely that the objectives for nitrogen dioxide, sulphur dioxide and PM_{10} would be met. During consultation carbon monoxide was raised as a matter of concern and so this was also assessed in the stage 3 report.

For the stage 3 report, the London Borough of Hillingdon commissioned Cambridge Environmental Research Consultants Ltd (CERC) to undertake the detailed modelling and assessment of the four pollutants identified as of concern in the borough. The results of the work showed that the objectives for nitrogen dioxide and PM_{10} were unlikely to be met in areas of the borough. As a result Hillingdon declared an air quality management area for nitrogen dioxide and PM_{10} encompassing all the potential areas where the pollutant objectives would not be met. It was decided to declare the area on the basis of the annual mean nitrogen dioxide objective. However, in all cases, the provisional areas predicted to fail the particulate matter objective are well within the area covered by the AQMA. A further assessment in the form of a stage 4 report was carried out by CERC. In addition, an Action Plan is currently being prepared which will set out the actions that the borough intend to enforce to reduce nitrogen dioxide and PM_{10} emissions. The Stage 3 report also concluded that the sulphur dioxide and carbon monoxide objectives were likely to be met.

[1] Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.

[2] Refers to objectives in the Strategy for each of the eight pollutants. The objectives provide policy targets by outlining what should be achieved in the light of the air quality standards and other relevant factors and are expressed as a given ambient concentration to be achieved within a given timescale.

The general approach taken in this Updating and Screening Assessment was to:

- Identify the conclusions of the last round of review and assessment for each of the seven pollutants included in the air quality regulations;
- Identify significant sources of emissions to air for the seven pollutants included in the air quality regulations, including major roads and industrial plant;
- Identify new sources not previously considered in the first round of review and assessment;
- Identify any sources for which emissions have changed significantly since the last round of review and assessment;
- Identify and interpret the significance of air quality monitoring data made available since the last round of review and assessment;
- Assess the risk of exceedences of the air quality objectives in locations where relative public exposure may exist using screening models and nomograms; and
- Where necessary, identify locations and pollutants for which further detailed assessment of air quality will be required.

A checklist identifying the considerations in this report is shown in Appendix 4.

Conclusions of this report for the London Borough of Hillingdon

The air quality objectives for PM_{10} and NO_2 are predicted to be exceeded and so a detailed assessment of these pollutants is required.
For all of the remaining sources, the air quality objectives are predicted to be met and therefore there is no need to proceed to a detailed assessment for these pollutants.

Acronyms and definitions used in this report

AADTF	Annual Average Daily Traffic Flow
ADMS	an atmospheric dispersion model
AQDD	an EU directive (part of EU law) - Common Position on Air Quality Daughter Directives, commonly referred to as the Air Quality Daughter Directive
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AP	Action Plan
AURN	Automatic Urban and Rural Network (defra funded network)
CO	Carbon monoxide
d.f.	degrees of freedom (in statistical analysis of data)
DETR	Department of the Environment Transport and the Regions (now defra)
defra	Department of the Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
HA	Highways Agency
HDV	Heavy Duty Vehicles (includes buses, coaches and lorries).
HGV	Heavy Goods Vehicles
kerbside	0 to 1 m from the kerb
LA	Local Authority
LAEI	London Atmospheric Emissions Inventory
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
NAEI	National Atmospheric Emissions Inventory
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRTF	National Road Traffic Forecast
ppb	parts per billion
r	the correlation coefficient (between two variables)
receptor	In the context of this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
roadside	1 to 5 m from the kerb
SD	standard deviation (of a range of data)
SO_2	Sulphur dioxide
TEMPRO	A piece of software produced by the DfT used to forecast traffic flow increases

Contents

APPENDICES

1 Introduction to the Updating and Screening Assessment

This section outlines the purpose of this Updating and Screening Assessment and the scope of the assessment.

1.1 PURPOSE OF THE UPDATING AND SCREENING ASSESSMENT

The first round of air quality review and assessments is now complete and all local authorities should have completed all necessary stages. Where the likelihood of exceedences of air quality objectives have been identified in areas of significant public exposure, an air quality management area should have been declared, followed by a further Stage 4 review and assessment, and the formulation of an action plan to eliminate exceedences. Local authorities are now required to proceed to the second round of review and assessment in which sources of emissions to air are reassessed to identify whether the situation has changed since the first round of review and assessment, and if so, what impact this may have on predicted exceedences of the air quality objectives. Such changes might include significant traffic growth on a major road, which had not been foreseen, construction of a new industrial plant with emissions to air, or significant changes in the emissions of an existing plant.

The second round of review and assessment is to be undertaken in two steps. The first step is an Updating and Screening Assessment, which updates the Stage 1 and 2 review and assessments previously undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment, equivalent to the previous Stage 3 assessments. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead.

1.2 OVERVIEW OF APPROACH TAKEN

The general approach taken to this Updating and Screening Assessment was to:

- Identify the conclusions of the last round of review and assessment for each of the seven pollutants included in the air quality regulations;
- Identify significant sources of emissions to air for the seven pollutants included in the air quality regulations, including major roads and industrial plant;
- Identify new sources not previously considered in the first round of review and assessment;
- Identify any sources for which emissions have changed significantly since the last round of review and assessment;
- Identify and interpret the significance of air quality monitoring data made available since the last round of review and assessment;
- Assess the risk of exceedences of the air quality objectives in locations where relative public exposure may exist using screening models and nomograms; and
- Where necessary, identify locations and pollutants for which further detailed assessment of air quality will be required.

1.3 RELEVANT DEFRA DOCUMENTATION USED

This report takes into account the guidance in LAQM.TG(03), published January 2003.

1.4 POLLUTANTS CONSIDERED IN THIS REPORT

All pollutants included in the Air Quality Regulations for the purposes of Review and Assessment have been considered in this report.

1.5 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Chapter 1** summarises the aims of the updating and screening assessment, the approach adopted for the assessment, as well as relevant background information for Hillingdon, and relevant emissions-to-air sources;
- **Chapter 2** summarises the information used to support this assessment, identifies data used in support of this assessment and highlights significant changes in emissions to air within the borough since the first round of review and assessment;
- **Chapters 3-9** present the review and assessment for each of the seven pollutants included in the Air Quality Regulations;
- **Chapter 10** presents conclusions and recommendations for further work, where required, for each of the seven pollutants;
- **Chapter 11** presents the references and acknowledgements

The Objectives of the Air Quality strategy are shown in Table 1.1.

Table 1.1 Objectives included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene			
All authorities	16.25 μg/m^3	running annual mean	31.12.2003
Authorities in England and Wales only	5.00 μg/m^3	annual mean	31.12.2010
Authorities in Scotland and Northern Ireland only[a]	3.25 μg/m^3	running annual mean	31.12.2010
1,3-Butadiene	2.25 μg/m^3	running annual mean	31.12.2003
Carbon monoxide			
Authorities in England, Wales and Northern Ireland only[a]	10.0 mg/m^3	maximum daily running 8-hour mean	31.12.2003
Authorities in Scotland only	10.0 mg/m^3	running 8-hour mean	31.12.2003
Lead	0.5 μg/m^3	annual mean	31.12.2004
	0.25 μg/m^3	annual mean	31.12.2008
Nitrogen dioxide[b]	200 μg/m^3 not to be exceeded more than 18 times a year	1 hour mean	31.12.2005
	40 μg/m^3	annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)[c]			
All authorities	50 μg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31.12.2004
	40 μg/m^3	annual mean	31.12.2004
Authorities in Scotland only[d]	50 μg/m^3 not to be exceeded more than 7 times a year	24 hour mean	31.12.2010
	18 μg/m^3	annual mean	31.12.2010
Sulphur dioxide	350 μg/m^3 not to be exceeded more than 24 times a year	1 hour mean	31.12.2004
	125 μg/m^3 not to be exceeded more than 3 times a year	24 hour mean	31.12.2004
	266 μg/m^3 not to be exceeded more than 35 times a year	15 minute mean	31.12.2005

a. In Northern Ireland none of the objectives are currently in regulation. Air Quality (Northern Ireland) Regulations are scheduled for consultation early in 2003.
b. The objectives for nitrogen dioxide are provisional.
c. Measured using the European gravimetric transfer sampler or equivalent.
d. These 2010 Air Quality Objectives for PM_{10} apply in Scotland only, as set out in the Air Quality (Scotland) Amendment Regulations 2002.

1.5.1 The difference between 'standards' and 'objectives' in the UK AQS

Air quality *standards* (in the UK AQS) are the concentrations of pollutants in the atmosphere that can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive subgroups. The standards have been set at levels to avoid significant risks to health.

The *objectives* of the UK air quality policy are framed on the basis of the recommended standards. The objectives are based on the standards, but take into account feasibility, practicality, and the costs and benefits of fully complying with the standards.

Specific objectives relate either to achieving the full standard or, where use has been made of a short averaging period, objectives are sometimes expressed in terms of percentile compliance. The use of percentiles means that a limited number of exceedences of the air quality standard over a particular timescale, usually a year, are permitted. This is to account for unusual meteorological conditions or particular events such as November 5th. For example, if an objective is to be complied with at the 99.9th percentile, then 99.9% of measurements at each location must be at or below the level specified.

2 Information used to support this assessment

This section lists the key information used in this review and assessment.

2.1 CONCLUSIONS FROM THE FIRST ROUND OF REVIEW AND ASSESSMENT OF AIR QUALITY FOR THE LONDON BOROUGH OF HILLINGDON

The London Borough of Hillingdon has completed the following review and assessments of air quality to date:

- Stage 1: The report recommended that further examination was required for nitrogen dioxide, PM_{10}, sulphur dioxide and carbon monoxide.

- Stage 2: Further assessment of nitrogen dioxide, PM_{10}, sulphur dioxide and carbon monoxide were carried out as recommended in the Stage 1 Review and Assessment. The report concluded that the air quality objectives for NO_2, PM_{10}, CO and SO_2 would not be met in Hillingdon and that a stage 3 assessment was required.

- Stage 3: Detailed modelling of nitrogen dioxide, PM_{10}, carbon monoxide and sulphur dioxide were carried out. The report concluded that the annual mean nitrogen dioxide and 24 hour mean PM_{10} objectives would not be met in the borough and that an air quality management area should be declared.

- Stage 4: Further modelling and source apportionment were undertaken in the form of a stage 4 assessment.

As a result, the London Borough of Hillingdon has declared an air quality management area.

2.2 PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY

Any new developments in the local authority area, or outside the LA that may impact on local air quality need to be considered. Key considerations should include:

- Industry
- Housing and redevelopment
- Road Network changes

There are no significant industrial, housing or road transport development schemes planned in Hillingdon, which will be completed in the timescale relevant to the air quality objectives. The current widening of the M25 may affect future traffic levels around the south of Hillingdon on the M4 and M25 however this is not due for completion until 2006. This development will be considered in the next round of review and assessment. The construction of terminal 5 is currently underway and has planning conditions attached to it for the suppression of dust and particulate matter. A full years data from the associated monitoring stations is not yet fully ratified. The terminal is due to be operational by 2008 and so would not take place within the timeframe of the local air quality objectives.

2.3 ROAD TRAFFIC DATA

This section summarises the information used in this report; more detailed information is given in Section 7.7.

Data were collated from a range of sources, including:

- data provided by the London Borough of Hillingdon from the London Emissions Inventory
- data held in the National Atmospheric Emissions Inventory (NAEI, 2000) (where no other data was available from either Hillingdon or the Highways Agency).

Where no average speed data were available, estimated speeds were used near receptors and junctions. Speeds slower than the national speed limits have been assigned to sections of roads in areas close to junctions and adjustments made to take account of congestion.

2.3.1 Fraction of HDVs

Percentages of Cars, LGVs, HGV and buses were available from the London Emissions Inventory. For other road links, the percentage of HDVs was calculated from the data held in the 2000 National Atmospheric Emissions Inventory.

2.3.2 Traffic growth

Traffic projections for 2005 were obtained from the London Atmospheric Emissions Inventory (LAEI). No data was available for 2004 and so a conservative estimate was taken and data for 2005 was used. For 2010, growth factors from Tempro / NRTF were used.

2.3.3 Distance from the centre of the road to the kerbside and to the receptors

Initially a minimum distance for the receptor to the road was assumed. This therefore tests the road contribution to receptors as a worst-case scenario. Where any problems were identified the distances of receptors from the road were then taken from digital landline maps of the Council area. This strategy is a conservative approach.

2.4 PART A AND B PROCESSES

There are Part A and Part B Industrial processes in the Borough of Hillingdon. A full list of Part A processes is given in Appendix 2.

2.5 AMBIENT MONITORING

2.5.1 Diffusion tubes

Diffusion tube monitoring was carried out at 18 locations in the London Borough of Hillingdon as part of the UK National Diffusion tube survey in 2002. Analysis and preparation of the tubes has been carried out by Casella Stanger using 50% TEA in Acetone. In addition three diffusion tubes were co-located with each continuous monitor in the borough. The locations of the diffusion tubes are shown in figure 1.

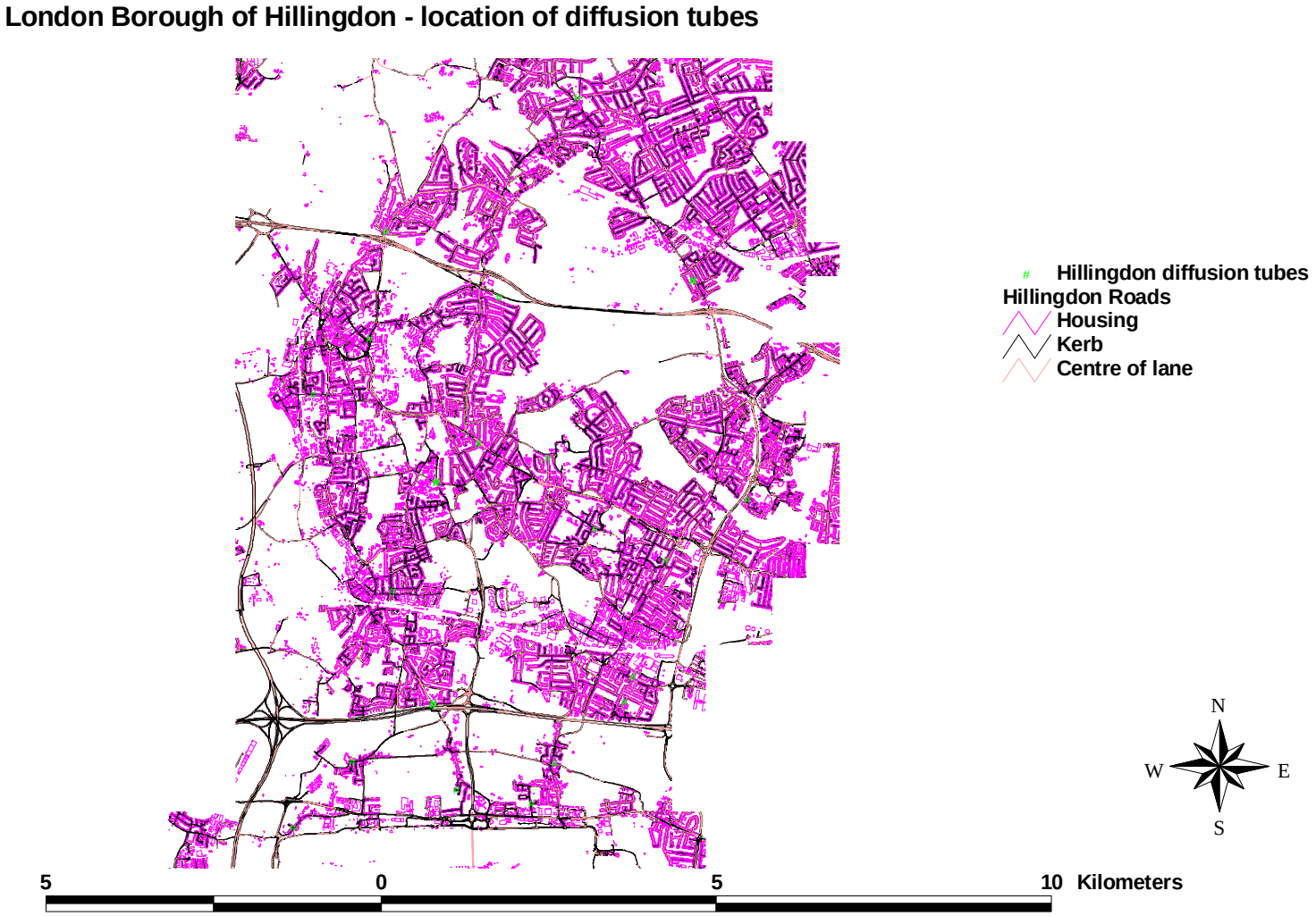

Figure 1 NO_2 Diffusion tube locations

2.5.2 Continuous monitoring

There is continuous monitoring of nitrogen dioxide, PM_{10}, sulphur dioxide, carbon monoxide and ozone at West Drayton. Continuous monitoring of nitrogen dioxide and PM_{10} is also carried out at Hillingdon hospital and South Ruislip.

The monitoring station at West Drayton is within a self-contained, air-conditioned housing located on an open grass area approximately 2.5 metres from the kerb of a residential road. The site is bordered on three sides by residential roads and on the fourth by the busy M4 motorway, approximately 30 metres distance. The manifold inlet is approximately 3 metres high. The general area is open and protected from the M4 by trees. The site is at the junction of Keats Way and Sipson Road, West Drayton, Middlesex. Its location is shown in the map, figure 2 and the station is shown in figure 3.

Figure 2 Location of the Continuous monitor

Figure 3 Continuous Monitoring station

3 Updating and Screening Assessment for Carbon Monoxide

3.1 THE NATIONAL PERSPECTIVE

The main source of carbon monoxide in the United Kingdom is road transport, which accounted for 67% of total releases in 2000. Annual emissions of carbon monoxide have been falling steadily since the 1970s, and are expected to continue to do so. Current projections indicate that road transport emissions will decline by a further 42% between 2000 and 2005. Existing policies will be sufficient to reduce maximum daily 8-hour mean concentrations of carbon monoxide below 10 mgm^{-3} by about 2003.

3.2 STANDARD AND OBJECTIVE FOR CARBON MONOXIDE

The Government and the Devolved Administrations have adopted an 8-hour running mean concentration of 11.6 mgm^{-3} as the air quality standard for carbon monoxide. The new objective has been set at a slightly tighter level of 10 mgm^{-3} as a maximum daily running 8-hour mean concentration to be achieved by the end of 2003, bringing it into line with the second Air Quality Daughter Directive limit value.

3.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR CARBON MONOXIDE

The following conclusions were given for carbon monoxide in the earlier stages of Review and Assessment for the London Borough of Hillingdon

- Carbon monoxide was assessed in Stage 3 of the first round of the Review and Assessment process. The report concluded that the air quality objectives for carbon monoxide will be met in the London Borough of Hillingdon.

3.4 SCREENING ASSESSMENT OF CARBON MONOXIDE

The Technical Guidance LAQM TG (03) requires assessment of carbon monoxide to consider the following sources, data or locations:

- Monitoring Data
- Very Busy Roads

These are described in the following sections.

3.5 BACKGROUND CONCENTRATIONS FOR CARBON MONOXIDE

The average background carbon monoxide concentration estimated from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) was 0.4mgm^{-3} in 2001 with a maximum concentration of 0.5mgm^{-3} in 2001.

3.6 SCREENING ASSESSMENT OF MONITORING DATA

There is continuous monitoring of carbon monoxide at West Drayton in the borough. In 2002 concentrations were well below the 10 mg/m^3 objective as a maximum daily eight hour mean. The site is in a suburban area close to the M4. Table 3.6 below shows the annual mean CO concentrations over the past 6 years for Hillingdon.

Table 3.6 – Annual mean CO concentrations

Year	Annual Mean CO (mg m^{-3})	Exceedence of 8 hour running mean > 10 mg m^{-3}
1998	0.8	No
1999	0.7	No
2000	0.6	No
2001	0.6	No
2002	0.5	No
2003	0.5	No

3.7 SCREENING ASSESSMENT OF VERY BUSY ROADS

The guidance document LAQM TG (03) requires assessment of CO only at 'very busy roads' (See Box 2.2 in the Guidance) where the 2003 background concentration is expected to be above 1mgm^{-3}. The maximum predicted background CO concentration in the borough in 2001 is 0.5 mgm^{-3}. When predicted forward using the figures provided in Box 2.3 in the Guidance an estimate of 0.42 mgm^{-3} is obtained for 2003. Consequently, the CO objective is likely to be met in the London Borough of Hillingdon.

3.8 CONCLUSIONS FOR CARBON MONOXIDE CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON AREA

There are no areas in the London Borough of Hillingdon where the estimated background CO concentration in 2003 is greater than 1mg^{-3}. A detailed assessment is not required for carbon monoxide in the London Borough of Hillingdon.

4 Updating and Screening Assessment for Benzene

4.1 THE NATIONAL PERSPECTIVE

The main sources of benzene emissions in the UK are petrol-engined vehicles, petrol refining, and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems. A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene. Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol are controlled by vapour recovery systems. Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective at all urban background and roadside/kerbside locations. Whilst the 2010 objectives are expected to be met at all urban background, and most roadside locations, there is the possibility for some remaining exceedences, which will require additional measures at a local level.

4.2 STANDARD AND OBJECTIVE FOR BENZENE

The Government and the Devolved Administrations have adopted a running annual mean concentration of 16.25 μgm^{-3} as the air quality standard for benzene, with an objective for the standard to be achieved by the end of 2003. However, in light of the health advice from EPAQS and the Department of Health's Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) to reduce concentrations of benzene in air to as low a level as possible, additional tighter objectives have also been set. The additional objective is for an annual mean of 5 μgm^{-3} to be achieved by the end of 2010 in England and Wales. In Scotland and Northern Ireland, a running annual mean of 3.25 μgm^{-3} has been adopted as an additional objective, to be achieved by the end of 2010.

4.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR BENZENE

The following conclusions were given for benzene in the earlier stages of Review and Assessment for the London Borough of Hillingdon.

- Benzene was assessed in Stage 1 of the first round of the Review and Assessment process. The report concluded that the air quality objectives for benzene will be met in the London Borough of Hillingdon.

4.4 SCREENING ASSESSMENT OF BENZENE

The Technical Guidance LAQM.TG (03) requires assessment of benzene to consider the following sources, data or locations:

- Monitoring Data
- Very Busy Roads or Junctions in Built-up Areas
- Industrial Sources
- Petrol Stations
- Major Fuel Storage Depots (Petroleum only)

These are described in the following sections.

4.5 BACKGROUND CONCENTRATIONS FOR BENZENE

The average background benzene concentration estimated from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) was 0.8 μgm^{-3} in 2001 with a maximum concentration of 1 μgm^{-3}. In 2003 average concentrations are expected to be 0.7 μgm^{-3}, with a maximum of 0.9μgm^{-3}; and in 2010 an average of 0.5μgm^{-3} and maximum of 0.7μgm^{-3} are expected.

4.6 SCREENING ASSESSMENT OF MONITORING DATA

There have been monitoring of benzene by diffusion tubes at five sites in Hillingdon since November 2002. Data is available up until September 2003. Whilst ideally results would be presented for a whole year, the average over 10 months of monitoring is presented here. This is sufficient to demonstrate that the risk of exceedence of the objectives is negligible. A summary of the results is shown in Table 4.6 below.

Table 4.6 Average benzene concentrations recorded by diffusion tubes in Hillingdon between November 2002 and September 2003 ($\mu g/m^3$).

Location	Easting (X)	Northing (Y)	Site type	Annual mean concentration
AURN Monitoring Station	506940	178601	S	1.8
South Ruislip Monitoring Station	510821	184923	R	2.5
Citizens Advice, High Street, Ruislip	509094	187645	B	2.4
Hillingdon Hospital Monitoring Station	506989	181920	R	2.1
Brendon Close, Harlington	508414	177125	B	2.0

Note: the results from January 2003 have been excluded from the data set due to possible contamination of the tubes. The very high reading (33 μgm^{-3}) obtained in May 2003 from the diffusion tube located at the AURN monitoring site has also been excluded from the data set.

The results show that where monitoring is taking place there are no exceedences of the running annual mean objective of 16.25 $\mu g/m^3$ to be achieved by 31st December 2003 or the annual mean of 5 $\mu g/m^3$ to be achieved by 2010. Please see figure 4.6 for a map of the monitoring locations.

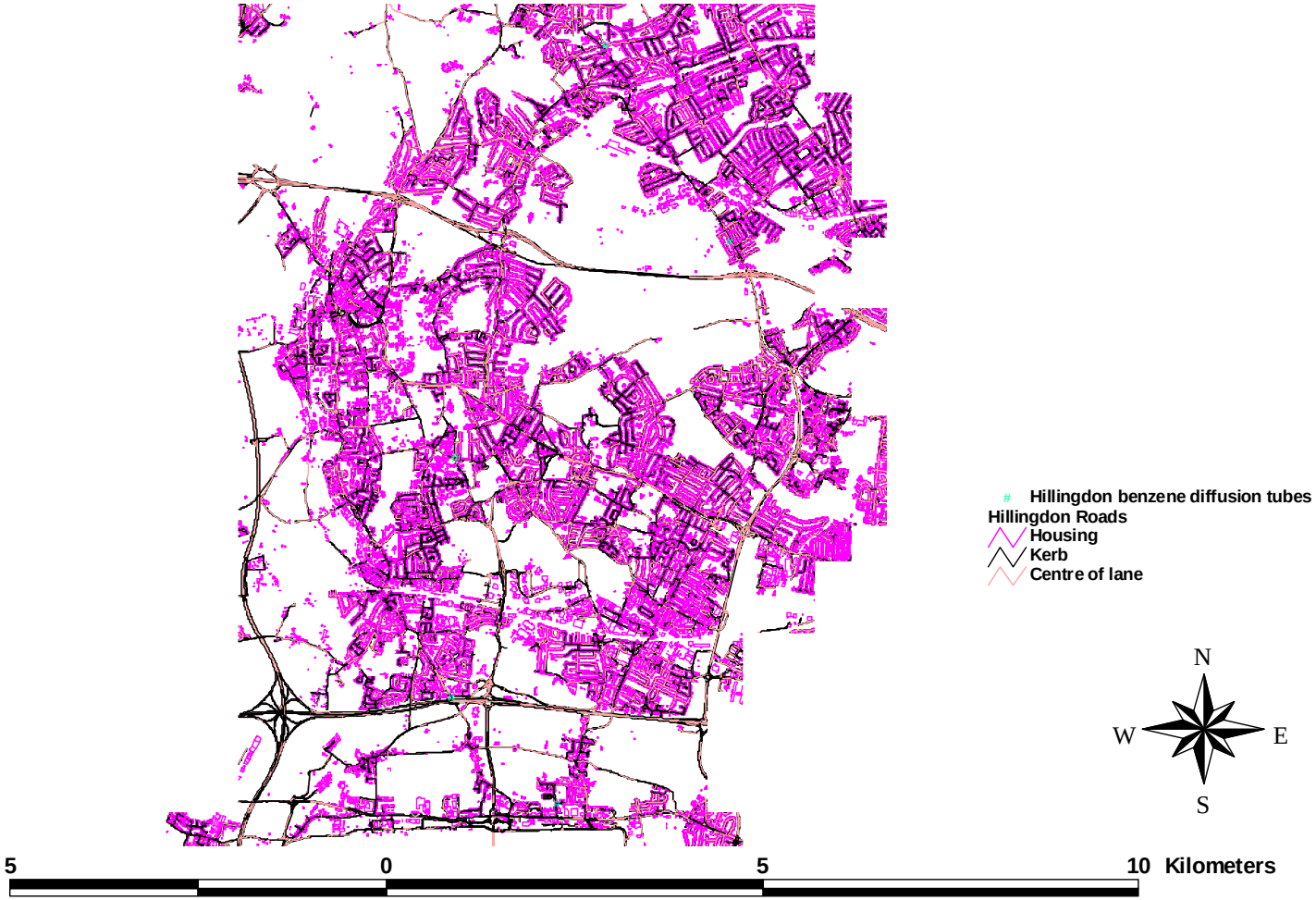

Figure 4.6 Locations of benzene diffusion tubes in the London Borough of Hillingdon

4.7 SCREENING ASSESSMENT OF VERY BUSY ROADS

The guidance document LAQM.TG (03) requires assessment of benzene only at 'very busy roads' where the 2010 background concentrations are expected to be above 2 μgm^{-3}. In the London Borough of Hillingdon background concentrations in 2010 are not expected to exceed 0.7 μgm^{-3} (see section 4.5). Therefore, no further assessment is required for this source.

4.8 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM.TG (03) lists the following processes as significant potential sources of benzene:

Part A (The number provided in brackets is the percentage of total emissions from all UK plant in this sector to the total UK Part A emissions)
Petroleum processes (73)
Petrochemical processes (2)
Carbonisation processes (12)
Cement/lime manufacture (7)
Gasification processes (5)

Part B
Processes for the storage and unloading of petrol at terminals

The part A and B processes in the London Borough of Hillingdon and neighbouring authorities have been checked against Tables A2.181 and A2.182 respectively in the Technical guidance. Astor-Stag Ltd operated petroleum processes in Tavistock Road, West Drayton. However, this industry has now ceased to operate and therefore no assessment is required.

4.9 SCREENING ASSESSMENT OF PETROL STATIONS

There are petrol stations in Hillingdon authorised as Part B processes. The guidance requires petrol stations to be considered only if they are near a busy road, i.e. with more than 30,000 vehicles per day, a throughput greater than 2 million litres and a relevant exposure within 10m of the pumps. Petrol stations with Stage 2 recovery systems can be ignored. It is not thought that any of the petrol stations in the London Borough of Hillingdon fulfil the criteria necessary to warrant a detailed assessment therefore a detailed assessment for benzene is not required.

4.10 SCREENING ASSESSMENT OF FUEL STORAGE DEPOTS

There are no major fuel storage depots in the London Borough of Hillingdon.

4.11 CONCLUSIONS FOR BENZENE CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON

There are no significant industrial sources of benzene in the London Borough of Hillingdon. Also, monitoring of benzene in 2002/2003 indicates that the objective for benzene is likely to be met in the London Borough of Hillingdon.

A detailed assessment is, therefore, not required for benzene in the London Borough of Hillingdon.

5 Updating and Screening Assessment for 1,3-Butadiene

5.1 THE NATIONAL PERSPECTIVE

The main source of 1,3-butadiene in the United Kingdom is emissions from motor vehicle exhausts. 1,3-butadiene is also an important industrial chemical and is handled in bulk at a small number of industrial premises. Maximum running annual mean concentrations of 1,3-butadiene measured at all urban background/centre and roadside locations in the national network are already well below the 2003 objective of 2.25 μgm^{-3}. The increasing numbers of vehicles equipped with three way catalysts will significantly reduce emissions of 1,3-butadiene in future years. Recently agreed further reductions in vehicle emissions and improvements to fuel quality are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts. These measures are expected to deliver the air quality objective by the end of 2003.

5.2 STANDARD AND OBJECTIVE FOR 1,3-BUTADIENE

The Government and the Devolved Administrations have adopted a maximum running annual mean concentration of 2.25 μgm^{-3} as an air quality standard for 1,3-butadiene. The objective is for the standard to be achieved by the end of 2003.

5.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR 1,3-BUTADIENE

The following conclusions were given for 1,3-butadiene in the earlier stages of Review and Assessment for Hillingdon:

- 1,3-Butadiene was assessed in Stage 1 of the first round of the Review and Assessment process. The report concluded that the air quality objective for 1,3-Butadiene will be met in the London Borough of Hillingdon.

Emissions from vehicles are expected to decrease over the relevant period. National policy measures are expected to deliver the national air quality objective for 1,3-butadiene by the end of 2003.

5.4 SCREENING ASSESSMENT OF 1,3-BUTADIENE

The Technical Guidance LAQM.TG (03) requires assessment of 1,3-butadiene to consider the following sources, data or locations:

- Monitoring Data
- New Industrial Sources
- Existing Industrial Sources with Significantly Increased Emissions

These are described in the following sections.

5.5 BACKGROUND CONCENTRATIONS FOR 1,3-BUTADIENE

The average background 1,3-butadiene concentration estimated from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) was 0.4μgm^{-3} in 2001 with a maximum concentration of 0.6μgm^{-3}. In 2003, the average was 0.3 μgm^{-3} and the maximum 0.5 μgm^{-3}.

5.6 SCREENING ASSESSMENT OF MONITORING DATA

No monitoring of 1,3-butadiene has been undertaken in the London Borough of Hillingdon.

5.7 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM TG. (03) lists the following processes as significant potential sources of 1,3-butadiene:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Petroleum processes (2)
Petrochemical processes (95)
Organic chemical manufacture (3)

Part B
Rubber processes

The part A and B processes have been checked against Tables A2.181 and A2.182 in the Technical Guidance. Astor-Stag Ltd operated petroleum processes in Tavistock Road, West Drayton. However, this site has now ceased to operate and therefore no longer needs to be assessed.

There are no other industrial processes, current or proposed, in neighbouring areas that have the potential to emit 1,3-butadiene.

5.8 CONCLUSIONS FOR 1,3-BUTADIENE CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON AREA

Estimated background concentrations and data from national monitoring stations indicate that the objective for 1,3-butadiene is likely to be achieved by the end of 2003. There are no industrial processes, current or proposed, in Hillingdon that have the potential to emit 1,3-butadiene. A detailed assessment is not required for 1,3-butadiene in the London Borough of Hillingdon.

6 Updating and Screening Assessment for Lead

6.1 THE NATIONAL PERSPECTIVE

The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels (part of the Auto-Oil Programme) has led to the ban on sales of leaded petrol in the United Kingdom with effect from 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

Detailed assessments of the potential impact of lead emissions from industrial processes have been undertaken by the Government and the Devolved Administrations, based upon both monitoring and sector analysis studies. The former has included a 12-month monitoring survey in the vicinity of 30 key industrial sites in the UK, which has been used to supplement information already provided from the non-automatic monitoring networks. These monitoring data have generally indicated no exceedences of the 2004 or 2008 objectives, although locations in proximity to non-ferrous metal production and foundry processes were deemed to be at risk.

6.2 STANDARD AND OBJECTIVE FOR LEAD

The Government and the Devolved Administrations have adopted an annual mean concentration of 0.5 μgm^{-3} as the air quality standard for lead, with an objective for the standard to be achieved by the end of 2004. In addition, a lower air quality objective of 0.25 μgm^{-3} to be achieved by the end of 2008 has also been set.

6.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR LEAD

The following conclusions were given for lead in the earlier Stages of Review and Assessment for the London Borough of Hillingdon.

- Lead was assessed in Stage 1 of the first round of the Review and Assessment process. The report concluded that the air quality objectives for Lead will be met in the London Borough of Hillingdon.

6.4 SCREENING ASSESSMENT OF LEAD

The Technical Guidance LAQM TG (03) requires assessment of lead to consider the following sources, data or locations:

- Monitoring Data outside an AQMA
- New Industrial Sources
- Existing Industrial Sources with Significantly Increased Emissions

These are described in the following sections.

6.5 SCREENING ASSESSMENT OF MONITORING DATA

No monitoring of lead has been undertaken in the London Borough of Hillingdon.

6.6 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM.TG (03) lists the following processes as significant potential sources of lead:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (37)

Non-ferrous metals (23)
Manufacture of organic chemicals (35)

Part B
Non-ferrous metal furnaces
Electrical furnaces
Blast cupolas
Aluminium processes
Zinc Processes
Copper processes
Lead glass manufacture

The part A and B processes have been checked against Tables A2.181 and A2.182 in the Technical guidance. New Pro Foundries and Harvern Form Foundries have the potential to emit lead. However, there has been no substantial change in their emissions since the last review and assessment was carried out and therefore no further assessment is required.

There are no industrial processes, current or proposed, in neighbouring areas that have the potential to emit lead.

6.7 CONCLUSIONS FOR LEAD CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON

Emissions of lead from industrial processes in Hillingdon are not likely to exceed the objectives for lead to be achieved in 2004 and 2008. A detailed assessment is not required for lead in the London Borough of Hillingdon.

7 Updating and Screening Assessment for Nitrogen Dioxide

7.1 INTRODUCTION

The principal source of NOx emissions is road transport, which accounted for about 49% of total UK emissions in 2000. Major roads carrying large volumes of high-speed traffic (such as motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic. Within most urban areas, the contribution of road transport to local emissions will be much greater than for the national picture.

Meeting the annual mean objective in 2005, and the limit value in 2010, is expected to be considerably more demanding than achieving the 1-hour objective. National studies have indicated that the annual mean objective is likely to be achieved at all urban background locations outside of London by 2005, but that the objective may be exceeded more widely at roadside sites throughout the UK in close proximity to busy road links. Projections for 2010 indicate that the EU limit value may still be exceeded at urban background sites in London, and at roadside locations in other cities.

7.2 STANDARDS AND OBJECTIVES FOR NITROGEN DIOXIDE

The Government and the Devolved Administrations have adopted two Air Quality Objectives for nitrogen dioxide, as an annual mean concentration of 40 μgm^{-3}, and a 1-hour mean concentration of 200 μgm^{-3} not to be exceeded more than 18 times per year. The objectives are to be achieved by the end of 2005.

7.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR NITROGEN DIOXIDE

The following conclusions were given for nitrogen oxides in the earlier stages of the Review and Assessment reports for the London Borough of Hillingdon:

- The Stage 1 report concluded that further assessment was required in the form of a stage 2 for nitrogen dioxide. The Stage 2 report was subsequently completed. This reviewed industrial and road traffic sources and monitoring data. The conclusion of that report was that it was likely that air quality objectives for NO_2 would not be met in Hillingdon and therefore a stage 3 assessment was carried out which involved detailed modelling. That report concluded that the nitrogen dioxide objective would be exceeded in Hillingdon and as a result an air quality management area was declared. With the inclusion of new traffic emissions factors in the Stage 4 modelling review, the AQMA was increased to encompass all areas of exceedence. This is shown in figure 7.1 below.

Figure 7.1 AQMA in the London Borough of Hillingdon

7.4 SCREENING ASSESSMENT OF NITROGEN DIOXIDE

The Technical Guidance LAQM TG.(03) requires assessment of nitrogen dioxide to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- Narrow congested streets with residential properties close to the kerb
- Junctions
- Busy streets where people may spend 1-hour or more close to traffic
- Roads with high flow of buses and/or HGVs
- New roads constructed or proposed since first round of review and assessment
- Roads close to the objective during the first round of review and assessment
- Roads with significantly changed traffic flows
- Bus Stations
- New industrial sources
- Industrial sources with substantially increased emissions
- Aircraft

These are evaluated in the following sections.

7.5 BACKGROUND CONCENTRATIONS FOR NITROGEN DIOXIDE

The average background nitrogen dioxide concentration estimated from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) was 36.9 μgm^{-3} in 2001 with a maximum concentration of 48.7 μgm^{-3}. In 2005 the estimated annual average was 33 μgm^{-3} with a maximum of 45 μgm^{-3}. In 2010 the estimated average is 29 μgm^{-3} with a maximum of 44 μgm^{-3}.

7.6 SCREENING ASSESSMENT OF MONITORING DATA

7.6.1 Diffusion tube monitoring

Nitrogen dioxide was measured at 18 sites in the London Borough of Hillingdon (details in Appendix 1) by diffusion tubes.

Diffusion tubes can under or over read and if possible should be referred to continuous measurements. This may be done in two ways: either by using results from tubes co-located with a continuous analyser or by using the results from a study carried out by Laxen et al (2002). There have been diffusion tubes co-located with the continuous monitors at the South Ruislip Monitoring Station, Hillingdon Hospital monitoring station and the AURN site. Both South Ruislip and the Hillingdon Hospital are roadside sites. However, only data from South Ruislip has been used when calculating bias for roadside sites as the data capture from the Hillingdon Hospital site is very low (26%). The AURN site is in a suburban location. The following table shows the bias calculation.

Table 7.6.1A Bias calculation. Concentrations are shown in $\mu g/m^3$.

Name of monitoring site	Average conc. recorded by cont. monitor from Oct 2002 - Sept 2003	Average conc. recorded by diffusion tubes from Oct 2003 - Sept 2003	Bias
S. Ruislip (roadside)	52	49	=52/49 = 1.06
AURN site (suburban)	53	40	=53/40 = 1.31

The figures shown in the above table have been used to bias correct the diffusion tube results in Hillingdon. The diffusion tubes located at roadside sites have been corrected by multiplying by

1.06. Those diffusion tubes located in background or suburban locations have been corrected by multiplying by 1.31.

The Guidance LAQM.TG (03) provides factors to project forward concentrations, based on the concentrations measured in recent years. The following factors have been used in this assessment for nitrogen dioxide:

Roadside
- 2003 to 2005 0.892/0.941 = 0.95
- 2003 to 2010 0.734/0.941 = 0.78

Background
- 2002 to 2005 0.908/0.948 = 0.96
- 2002 to 2010 0.778/0.948 = 0.82

The measurement data for October 2002 - September 2003 (the latest 12 month period available) is shown in Table 7.6.1B below. Results are only shown where there are more than 9 months of data available as recommended in TG (03). Appendix 1 provides data for other years where available and a breakdown on a monthly basis.

Table 7.6.1B Diffusion tube measurements in the London Borough of Hillingdon between October 2002 and September 2003 corrected for bias and predictions for 2005 and 2010. All results are in μgm^{-3}.

Location	Site Type	Annual average	Annual average corrected for bias	Prediction for 2005	Prediction for 2010
83 Hayes End Drive	B	30	40	38	33
Uxbridge Day Nursery	R	46	49	**46**	38
Barra Hall	B	28	37	36	31
Uxbridge Technical College	R	40	42	**40**	33
Citizens Advice Bureau	B	37	48	**46**	39
4 Colham Avenue	R	38	41	39	32
101 Cowley Mill Road	B	41	53	**51**	**44**
Warren Road	B	38	50	**48**	**41**
Harold Avenue	B	49	64	**61**	**53**
15 Phelps Way	B	41	54	**52**	**44**
25 Cranford Lane	B	39	52	**50**	**42**
Brendan Close	B	46	60	**58**	**49**
7 Bomber Close	B	42	55	**52**	**45**
Harmondsworth Green	B	36	47	**45**	38
Heathrow Close	B	40	52	**50**	**43**

R = Roadside
B = background
S = Suburban
Note: Figures in bold denote a predicted exceedence of the NO_2 annual mean objective.

12 diffusion tube locations show a predicted exceedence in 2005 of the annual mean nitrogen dioxide objective when corrected for bias. In 2010, 8 exceedences of the 40 μgm^{-3} objective as an annual mean are predicted.

7.6.2 Automatic Monitoring

There has been continuous monitoring at three locations in the London Borough of Hillingdon for nitrogen dioxide. The three chemiluminescence monitors are located at Hillingdon Hospital, South Ruislip and West Drayton. The concentrations recorded by the monitors are shown in Table 7.6.2 below. Results for Hillingdon Hospital are not presented as there was very low data capture at this site (26%) during October 2002 - September 2003.
The data from the three continuous monitors are ratified to the QA/QC standards used in the DEFRA network by ERG, King's College London.

Table 7.6.2 Concentrations recorded by continuous monitors in the London Borough of Hillingdon between October 2002 and September 2003. All results are in μgm^{-3}.

Location	Site Type	Annual average (Oct 02 - Sept03)	Number of exceedences of hourly mean	Prediction for 2005	Prediction for 2010
South Ruislip	R	52	0	**49**	**42**
West Drayton	S	53	0	**47**	39

S = suburban
R = roadside

The concentrations recorded at both sites show that it is likely that the annual mean NO_2 objective in 2005 will be exceeded.

7.7 SCREENING ASSESSMENT OF ROAD TRAFFIC SOURCES

Traffic flow data for 2005 was taken from the 2001 LAEI. For 2010 traffic flows were estimated from TEMPRO. Table 7.7A & B show predicted nitrogen dioxide concentrations in 2005 and 2010 calculated using DMRB for roads in the London Borough of Hillingdon. All roads in the LAEI have been assessed. This therefore covers narrow congested streets with residential properties close to the kerb, busy streets where people spend an hour or more close to traffic, roads with a high proportion of HGVs and buses, roads close to the objective in the last round and those with significantly changed traffic flows.

Table 7.7A Predicted nitrogen dioxide concentrations in 2005 calculated using DMRB for roads in the London Borough of Hillingdon (μgm^{-3}).

Road name	AADTF	% HDV	Predicted annual mean NO_2 concentration 2005
Hatton Road Housing estates by Heathrow	20475	2.81	**43**
Junction of Bath Road and Nettleton Road	16688	1.29	**47**
Junction of Holloway and Harmondsworth Lane	14447	2.60	**51**
Honey Hill and Hercies Road	22252	4.36	39
Cowley Road - The Greenway	14841	6.77	**46**
Hercies Road / slip to H	14247	2.10	39
Swakeleys / Park Road / A40 roundabout	16183	3.68	**44**
Swakeleys Road	16224	2.23	35
Swakeleys Road/Harvil Road	19106	3.46	**40**
Swakeleys Road/Harvil Road with acc distances	19106	3.46	37
Ickenham Road / Kingsend	17402	1.78	34
Windmill / Elm/Victoria Road	18589	1.15	38
Elm Avenue / North view	21824	1.81	35
Oxford Road	30371	2.61	39
A408 High Road	31356	1.78	**41**
Trumper Way	28108	3.59	**48**
Hillingdon Road A4020	48021	1.73	**41**
M4 houses on Keats Way	82777	0.79	**42**
M4 worst case - highest traffic and closest houses - Magnolia Way	161344	4.44	**47**
A4 Colnbrook	40961	3.22	**49**
Hatch Lane	18762	2.70	**47**
Bath Road /Hatch Lane A4	32788	3.08	**52**
Sipson Road A408	13356	0.71	**44**
A40 (no junctions/location specified)	117338	4.61	**42**
Uxbridge I A4020	29448	1.09	38
Uxbridge II A4020	39731	3.16	**40**
Uxbridge III A4020	42158	2.64	**40**
A437 North Hyde Road	21943	2.36	**40**

Road name	AADTF	% HDV	Predicted annual mean NO_2 concentration 2005
Eastcote Road B466 / Windmill Hill	20143	1.06	34
Bury Street / Eastcote	19859	1.23	37
Pinner Road	31194	1.35	34
Holloway Road A408	20584	2.40	**40**
Rickmansworth Road	26766	0.99	34
The Parkway A312	68712	3.79	**46**
Great South Road A30	71810	1.56	**52**
Station Road	19470	1.67	**41**
High Street A4180	20956	1.24	35
A4180	29939	5.38	39
M25	196166	8.65	**59**
Watford Road A4125	17391	0.35	32
A3113	50392	6.81	**50**
Long Lane / A4020 junction	32351	1.05	**41**
A3044	28056	5.52	**47**

Note: a distance to road centre of 2 m was modelled as a worst-case scenario. Where an exceedence was found, the area was remodelled with actual distances. Speed data were taken from the LAEI 2001. Those roads / junctions where the annual mean NO_2 concentration in 2005 is predicted to be greater then 40μg/m^3 are shown in bold.

Table 7.7B Predicted nitrogen dioxide concentrations in 2010 calculated using DMRB for roads in the London Borough of Hillingdon (μgm^{-3}).

Road name	AADTF	% HDV	Predicted annual mean NO_2 concentration 2010
Hatton Road Housing estates by Heathrow	21826	2.81	35
Junction of Bath Road and Nettleton Road	21269	7.20	38
Junction of Holloway and Harmondsworth Lane	15401	2.60	**42**
Honey Hill and Hercies Road	23721	4.36	32
Cowley Road - The Greenway	15821	6.77	38
Hercies Road / slip to H	15187	2.1	27
Swakeleys / Park Road / A40 roundabout	17251	3.68	31
Swakeleys Road	17295	3.19	30
Swakeleys Road/Harvil Road	20367	3.50	29
Swakeleys Road/Harvil Road with acc distances	20367	3.50	29
Ickenham Road / Kingsend	18551	1.78	27
Windmill / Elm/Victoria Road	23264	1.80	31
Elm Avenue / North view	21568	1.82	29
Oxford Road	32375	2.61	31
A408 High Road	33425	1.78	33
Trumper Way	31996	1.85	32
Hillingdon Road A4020	51190	1.73	32
M4 houses on Keats Way	88240	0.79	36
M4 worst case - highest traffic and closest houses - Magnolia Way	171993	4.44	**41**
A4 Colnbrook	43664	3.22	**42**
Hatch Lane	20000	2.70	**41**
Bath Road /Hatch Lane A4	54954	5.80	**42**
Sipson Road A408	14237	0.71	39
A40 (no junctions/location specified)	125082	4.61	30
Uxbridge I A4020	51190	1.73	31
Uxbridge II A4020	31392	1.09	31
Uxbridge III A4020	42353	3.16	32

Road name	AADTF	% HDV	Predicted annual mean NO_2 concentration 2010
Long Lane / A4020 junction	65744	5.60	36
Eastcote Road B466 / Windmill Hill	15187	2.10	30
Bury Street / Eastcote	21170	1.23	30
Pinner Road	33253	1.35	28
Holloway Road A408	21943	2.40	33
Rickmansworth Road	22245	1.26	27
The Parkway A312	67668	4.93	**46**
Great South Road A30	76549	1.56	37
Station Road	20755	1.67	35
High Street A4180	22339	1.24	30
A4180	31915	5.38	34
M25	209113	8.65	**51**
Watford Road A4125	18539	0.35	27
A3113	53718	6.81	**42**
A3044	29908	5.52	39
Eastcote Road B466 / Windmill Hill	20143	1.06	34
Bury Street / Eastcote	19859	1.23	37
Pinner Road	31194	1.35	34
Holloway Road A408	20584	2.40	**40**
Rickmansworth Road	26766	0.99	34
The Parkway A312	68712	3.79	**46**
Great South Road A30	71810	1.56	**52**
Station Road	19470	1.67	**41**
High Street A4180	20956	1.24	35
A4180	29939	5.38	39
M25	196166	8.65	**59**
Watford Road A4125	17391	0.35	32
A3113	50392	6.81	**50**
A3044	28056	5.52	**47**
A437 North Hyde Road	23391	2.36	30

7.7.1 Street Canyons

The DMRB model may significantly under-predict concentrations of nitrogen dioxide alongside urban city-centre roads classified as 'street canyons'. In this context a street canyon may be described as a relatively narrow street with buildings on either sides, where the height of the buildings is generally greater than the width of the road. To avoid missing potential exceedences of the objective in such locations the predicted annual mean NO_2 'road traffic component' concentration, in the 'local output' sheet of DMRB, is increased by a factor of 2, to take account of the model under-prediction. This is then added to the background to give total concentration (as advised in TG.(03)). There are no street canyon locations in the London Borough of Hillingdon.

7.7.2 Busy Junctions

Annual average NO_2 concentrations at the busiest road junctions in the London Borough of Hillingdon have been estimated for 2005 and 2010 using DMRB (See Table 7.7A & B above).

7.8 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM TG (03) lists the following processes as significant potential sources of nitrogen dioxide:

Part A (the number provided in brackets is the percentage of total emissions from all UK plant in this sector to the UK Part A total)

Iron and steel (19)
Petroleum processes (16)
Combustion processes (34)
Cement/lime manufacture (9)
Carbonisation (6)
Gasification (4)
Inorganic chemicals (4)

Part B
Glass manufacture

Industrial sources were assessed in the Stage 2 Review and Assessment in round one. None of the sources were shown to be a problem in terms of the NO_2 objectives. There are no new sources or any sources that have significantly changed since the last round of the review and assessment process in the London Borough of Hillingdon.

7.9 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

7.9.1 Bus Stations

The bus station at Heathrow airport has 531,900 movements per annum. A flow of 1000 per day is given in the Guidance as the level requiring further investigation. Further investigation in an USA requires the use of DMRB to predict the NO_2 annual mean at relevant locations. When DMRB is applied to this bus station an annual average NO_2 concentration of 46.5 $\mu g/m^3$ is obtained. The DMRB screening model does not estimate the hourly concentrations. However, the guidance states that if the annual mean does not exceed 40 $\mu g/m^3$, then there should be no more than 18 hours above 200 $\mu g/m^3$ (the objective to be achieved by 31st December 2005). In this case, DMRB predicts an annual mean concentration over 40 $\mu g/m^3$ and therefore it is recommended that the London Borough of Hillingdon proceed to a detailed assessment for this source.

The bus station at Hatton Cross is estimated to have 167,000 bus movements a year (Source: Transport for London). This averages out at 456 bus movements per day. This is below the threshold set out in the guidance for requiring further assessment and therefore Hillingdon Borough Council do not need to proceed for to a detailed assessment for this source.

7.9.2 Airports

Heathrow airport is located within the London Borough of Hillingdon. It will have total equivalent passenger throughput in 2005 greater than 5 million passengers per annum (mppa). The monitoring being carried out within the airport boundary (LHR2) shows that the annual mean nitrogen dioxide objective in 2002 was 52 $\mu g/m^3$. In 2002 a new Emissions Inventory was released for Heathrow which indicates changes in NOx emissions from the Inventory used in the Stage 4 review. A detailed assessment should be carried out for this source utilising this most recent information.

7.10 CONCLUSIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON

Predicted concentrations of nitrogen dioxide indicate that the annual average objective is likely to be exceeded in 2005 in various locations in the borough. This has been confirmed by the diffusion tube and continuous monitoring.

A detailed assessment is required for nitrogen dioxide for Heathrow Airport including the bus station at Heathrow and for road traffic sources at the following locations:

- Hatton Road Housing estates by Heathrow
- Junction of Bath Road and Nettleton Road
- Junction of Holloway and Harmondsworth Lane
- Cowley Road - the Greenway
- Swakeleys Road / Park Road / A40 Roundabout

- Swakeleys Road / Harvil Road
- A408 High Road
- Trumper Way
- Hillingdon Road A4020
- M4 houses on Keats Way
- M4 houses on Magnolia Way
- A4 Colnbrook
- Hatch Lane
- Bath Road / Hatch Lane
- Sipson Road A408
- A40
- A437 North Hyde Road
- Long Lane / A4020 junction
- Holloway Road A408
- The Parkway A312
- The Great South Road A30
- Station Road
- M25
- A3113
- A3044

8 Updating and Screening Assessment for Sulphur Dioxide

8.1 INTRODUCTION

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions.

Local exceedences of the objectives (principally the 15-minute mean objective) may occur in the vicinity of small combustion plant (less than 20 MW) which burn coal or oil, in areas where solid fuels are the predominant form of domestic heating, and in the vicinity of major ports.

8.2 STANDARD AND OBJECTIVE FOR SULPHUR DIOXIDE

The Government and the Devolved Administrations have adopted a 15-minute mean of 266 μgm^{-3} as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005.
Additional objectives have also been set which are equivalent to the EU limit values specified in the First Air Quality Daughter Directive. These are for a 1-hour mean objective of 350 μgm^{-3}, to be exceeded no more than 24 times per year, and a 24-hour objective of 125 μgm^{-3}, to be exceeded no more than 3 times per year, to be achieved by the end of 2004.

8.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE

The following conclusions were given for SO_2 in the earlier stages of Review and Assessment for the London Borough of Hillingdon

- The Stage 1 report concluded that further assessment was required in the form of a stage 2 for sulphur dioxide. The Stage 2 report was subsequently completed. The conclusion of that report was that a detailed assessment was required in the form of a stage 3. The stage 3 assessment concluded that the sulphur dioxide objectives would be met and that there was no need to declare an air quality management area for this pollutant.

8.4 SCREENING ASSESSMENT OF SULPHUR DIOXIDE

The Technical Guidance LAQM.TG (03) requires assessment of sulphur dioxide to consider the following sources, data or locations:

- Monitoring data within an AQMA
- Monitoring data outside an AQMA
- New industrial sources
- Industrial sources with substantially increased emissions
- Areas of domestic coal burning
- Small boilers (>5MW (thermal) burning coal or oil
- Shipping
- Railway Locomotives

These are evaluated in the following sections.

8.5 BACKGROUND CONCENTRATIONS FOR SULPHUR DIOXIDE

The estimated average background sulphur dioxide concentration taken from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) for 2001 was 5.9 μgm^{-3}, the maximum concentration was 33 μgm^{-3}.

8.6 SCREENING ASSESSMENT OF MONITORING DATA

There is continuous monitoring of sulphur dioxide at the West Drayton site. A comparison with the SO_2 objectives is shown in Table 8.6 below.

Table 8.6 Comparison with the SO_2 objectives at West Drayton in 2002.

Pollutant	Objective	Result	Objective achieved
Sulphur dioxide	No more than 24 occurrences of hourly mean >=132ppb	0	YES
Sulphur dioxide	No more than 3 days where daily mean >=47ppb	0	YES
Sulphur dioxide	No more than 35 occurrences of 15min mean >=100ppb	0	YES

8.7 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM.TG (03) lists the following processes as significant potential sources of sulphur dioxide:

Part A (percentage of total emissions from all UK plant in this sector to the UK Part A total in brackets)
Iron and steel (9)
Petroleum processes (15)
Combustion processes (45)
Cement/lime manufacture (3)
Carbonisation (10)
Non-ferrous metals (7)
Ceramic Production (9)

Part B
Combustion plant 20-50 mwth
Furnaces 20-50 mwth
Copper processes
Refractory goods
Glass manufacture
Roadstone coating

There are no new industrial sources or sources with substantially increased emissions in the London Borough of Hillingdon since the last review was completed.

8.7.1 Small Boilers

No small boiler processes were identified by the London Borough of Hillingdon greater than 5MW which are relevant to this assessment.

8.8 SCREENING ASSESSMENT OF DOMESTIC SOURCES

8.8.1 Domestic coal burning

There is no data for domestic coal burning available but solid fuel use continues to decline throughout the area. It believed that there are no areas with over 50 houses using these fuels in a 500m x 500m square.

8.9 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

8.9.1 Railways

According to information supplied there are no areas where railway engines are run for more than 15 minutes continuously and where members of the public might be exposed.

8.10 CONCLUSIONS FOR SULPHUR DIOXIDE CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON

There are no significant industrial or domestic sources of sulphur dioxide in the London Borough of Hillingdon that are expected to exceed the SO_2 objectives. A detailed assessment is not required for sulphur dioxide.

9 Updating and Screening Assessment for PM_{10}

9.1 THE NATIONAL PERSPECTIVE

National UK emissions of primary PM_{10} have been estimated as totalling 196000 tonnes in 2000 The main sources of primary PM_{10} are road transport (all road transport emits PM10, but diesel vehicles emit a greater mass of particulate per vehicle kilometre), stationary combustion (domestic coal combustion has traditionally been the major source of particulate emissions in the UK) and industrial processes (including bulk handling, construction, mining and quarrying). Emissions of PM10 from the UK have declined since 1970. This is due mainly to the reduction in coal use.

The Government established the Airborne Particles Expert Group (APEG) to advise on sources of PM_{10} in the UK and current and future ambient concentrations. Their conclusions were published in January 1999 (APEG, 1999). APEG concluded that a significant proportion of the current annual average PM_{10} is due to the secondary formation of particulate sulphates and nitrates, resulting from the oxidation of sulphur and nitrogen oxides. These are regional scale pollutants and the annual concentrations do not vary greatly over a scale of tens of kilometres. There are also natural or semi-natural sources such as wind-blown dust and sea salt particles. The impact of local urban sources is superimposed on this regional background. Such local sources are generally responsible for winter episodes of hourly mean concentrations of PM_{10} above 100 µg m^{-3} associated with poor dispersion. However, it is clear that many of the sources of PM_{10} are outside the control of individual local authorities and the estimation of future concentrations of PM_{10} are in part dependent on predictions of the secondary particle component.

9.2 STANDARD AND OBJECTIVE FOR PM_{10}

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles (PM_{10}), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives vary depending on whether the Local Authority is in Scotland or the remainder of the UK. The objectives relevant to the London Borough of Hillingdon are 40 µgm^{-3} as the annual mean, and 50 µgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. In 2010 there is a provisional objective of an annual mean of 23 µgm^{-3} and a 24-hour mean of 50 µgm^{-3} not to be exceeded more than 7 times a year.

9.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR PM_{10}

The following conclusions were given for PM_{10} in the earlier stages of Review and Assessment for the London Borough of Hillingdon:

- The Stage 2 report recommended that further assessment was required in the form of a stage 3 for PM_{10} in areas adjacent to some busy roads. Detailed modelling was undertaken as part of the stage 3 report which showed that it was likely that PM_{10} concentrations would exceed the 24 hour mean objective in the borough as a result of road traffic emissions. As a result an air quality management area for PM_{10} was declared in the borough.

9.4 SCREENING ASSESSMENT OF PM_{10}

The Technical Guidance LAQM.TG (03) requires assessment of PM_{10} to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- Junctions
- Roads with high flow of buses and/or HGVs
- New roads constructed or proposed since first round of review and assessment
- Roads close to the objective during the first round of review and assessment
- Roads with significantly changed traffic flows
- New industrial sources
- Industrial sources with substantially increased emissions
- Areas with domestic solid fuel burning
- Quarries, landfill sites, opencast coal, handling of dusty cargoes at ports etc
- Aircraft

These are evaluated in the following sections.

9.5 BACKGROUND CONCENTRATIONS FOR PM_{10}

The estimated average background and maximum PM_{10} concentrations estimated from the UK background maps (http://www.airquality.co.uk/archive/laqm/tools.php) in μgm^{-3} are:

Table 9.5 Estimated Current and Future Background PM_{10} Concentrations in the London Borough of Hillingdon

Background PM_{10} ($\mu g/m^3$)	2001	2004	2010
Maximum	22.5	21.6	19.7
Average	24.4	23.2	21.1

9.6 SCREENING ASSESSMENT OF MONITORING DATA

Monitoring for PM_{10} has been undertaken at 3 locations in the London Borough of Hillingdon. A comparison with the objectives is shown in Table 9.6 below. This monitoring is based on TEOM instrumentation, which was multiplied by 1.3 to derive estimated gravimetric concentrations.

Table 9.6 Comparison with the PM_{10} objectives in 2002.

Site	Pollutant	Objective	Result	Objective achieved
Hillingdon - AURN	PM_{10} Particulate	Annual Mean less than 40$\mu g/m^3$	25	YES
Hillingdon - AURN	PM_{10} Particulate	No more than 35 days where daily mean >=50$\mu g/m^3$	7	YES
South Ruislip	PM_{10} Particulate	Annual Mean less than 40$\mu g/m^3$	28	YES
South Ruislip	PM_{10} Particulate	No more than 35 days where daily mean >=50$\mu g/m^3$	16	YES
Hillingdon Hospital	PM_{10} Particulate	Annual Mean less than 40$\mu g/m^3$	37	YES
Hillingdon Hospital	PM_{10} Particulate	No more than 35 days where daily mean >=50$\mu g/m^3$	1	YES
Heathrow LHR2	PM_{10} Particulate	Annual Mean less than 40$\mu g/m^3$	21	YES
Heathrow LHR2	PM_{10} Particulate	Annual Mean less than 40$\mu g/m^3$	5	YES

9.7 SCREENING ASSESSMENT OF ROAD TRAFFIC SOURCES

Traffic flow data were taken from manual and automatic traffic count data in the London Emission Inventory. The results of the DMRB modelling are shown in Table 9.7A below. Both the annual mean and 24 hour mean PM_{10} results are presented for 2004. Results are also shown for 2010. All the roads provided in the LAEI have been assessed using DMRB. Therefore this will cover roads with a high proportion of HGVs / buses, roads that have significantly changed traffic flows since the last assessment, roads close to the PM_{10} objectives in the last assessment and any new roads.

9.7.1 Street Canyons

The DMRB model may significantly under-predict concentrations of nitrogen dioxide alongside urban city-centre roads classified as 'street canyons' but there is no clear evidence that this is the case for PM_{10} (Section 8.32 TG (04)) and therefore no correction should be made for PM_{10} in street canyons. It is not thought that there are any street canyon environments in the London Borough of Hillingdon.

Table 9.7 Predicted PM_{10} concentrations in 2004 and 2010 calculated using DMRB for roads in the London Borough of Hillingdon (μgm^{-3}).

Road Name	Predicted annual mean PM_{10} concentration in 2004	Predicted number of exceedences of 24 hr objective in 2004.	Predicted annual mean PM_{10} concentration in 2010	Predicted number of exceedences of 24 hr objective in 2010.
Hatton Road Housing estates by Heathrow	26	16	21	6
Junction of Bath Road and Nettleton Road	28	20	22	6
Junction of Holloway & Harmondsworth Ln	29	22	**23**	9
Honey Hill and Hercies Road	26	15	**23**	7
Cowley Road - The Greenway	31	30	**25**	**12**
Hercies Road / slip to H	27	17	20	3
Swakeleys / Park Road / A40 roundabout	30	29	22	6
Swakeleys Road	25	11	21	5
Swakeleys Road/Harvil Road	28	21	20	4
Swakeleys Road/Harvil Road	25	14	20	4
Ickenham Road / Kingsend	24	11	22	6
Windmill / Elm/Victoria Road	27	18	20	4
Elm Avenue / North view	25	12	21	5
Oxford Road	26	16	21	5
A408 High Road	25	12	22	6
A408 High Road	25	13	21	5
Trumper Way	34	**42**	**24**	**10**
Hillingdon Road A4020	26	15	22	6
M4 houses on Keats Way	25	13	22	6
M4 - Magnolia Way	27	18	22	6
A4 Colnbrook	26	15	23	8
Hatch Lane	25	12	22	6
Bath Road /Hatch Lane	28	21	21	4

Road Name	Predicted annual mean PM_{10} concentration in 2004	Predicted number of exceedences of 24 hr objective in 2004.	Predicted annual mean PM_{10} concentration in 2010	Predicted number of exceedences of 24 hr objective in 2010.
Sipson Road A408	25	12	22	6
A40 (no junctions/location specified)	28	19	22	6
Uxbridge I A4020	25	13	22	6
Uxbridge II A4020	26	15	22	6
Uxbridge III A4020	26	16	**25**	**12**
A437 North Hyde Road	26	16	22	6
Long Lane / A4020 junction	29	24	21	5
Eastcote / Windmill Hill	24	10	22	6
Bury Street / Eastcote	26	15	21	4
Pinner Road	24	10	20	4
Holloway Road A408	25	12	21	5
Rickmansworth Road	24	9	**24**	9
The Parkway A312	29	23	**23**	8
Great South Road A30	33	**38**	22	7
Station Road	26	15	21	4
High Street A4180	24	10	22	7
A4180	26	15	**25**	**11**
M25	29	24	**25**	**11**
Watford Road A4125	23	8	20	3
A3113	29	23	22	6
A3044	27	17	21	5

Note: a distance to road centre of 2 m was modelled as a worst-case scenario but was then refined to actual distances where exceedences were located. Speed data was taken from the LAEI 2001.

The DMRB run shows two exceedences of the 24-hour PM_{10} objective in 2004 (The 2004, annual mean objective is 40 μg m^{-3} or more than 35 predicted 24 hour exceedences of the 50 μg m^{-3} level). The two exceedences occur on Trumper Way and the A30, Great South Road. The maximum predicted annual mean concentration by DMRB in Hillingdon is 42 μg m^{-3} along Trumper Way.
There is also the possibility of exceeding the annual mean 2010 objective. The PM_{10} annual mean objective for 2010 is 23μg m^{-3}. DMRB predicts that at 9 locations assessed that the 2010 annual mean objective will be exceeded. The 24-hour objective in 2010 is 50 μg m^{-3} with 10 exceedences allowed. DMRB predicts that at 5 of the locations assessed for the 24-hour objective will be exceeded.

9.7.2 Busy Junctions

Annual average PM_{10} concentrations at the busiest road junctions in the London Borough of Hillingdon have been estimated for 2004 and 2010 using DMRB (See Table 9.7 above).

9.8 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM TG (03) lists the following processes as significant potential sources of PM_{10}:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (61)

Petroleum processes (4)
Combustion processes (13)
Cement/lime manufacture (7)
Carbonisation (2)
Gasification (4)
Non-ferrous metals (4)
Fertilizer production

Part B
Combustion plant 20-50 mwth
Furnaces 20-50 mwth
Coal and coke processes
Quarry Process
Roadstone coating
Rubber processes
China and clay processes
Coating powder
Coil coating

There are no new industrial sources of PM_{10} or any sources with substantially increased emissions since the last round of the review and assessment process.

9.9 SCREENING ASSESSMENT OF FUGITIVE AND UNCONTROLLED SOURCES

9.9.1 Quarries and landfill sites

There are no recorded quarries or landfill sites with relevant locations for public exposure within 200m.

9.9.2 Domestic solid fuel burning

There are no data for domestic coal burning available but solid fuel use continues to decline throughout the area. It is believed that there are no areas with 50 or more houses using these fuels in a 500m square.

9.10 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

9.10.1 Airports

Heathrow airport lies within the London Borough of Hillingdon. There is relevant exposure within 500 metres of the airport boundary and there are predicted to be more than 10 million passengers per annum in 2004.
There is considerable construction work at the airport due to the construction of terminal five. This development has planning conditions attached to it for the suppression of dust and particulate matter however, data from the associated monitoring stations is not yet fully ratified
Therefore, it is recommended that a detailed assessment is carried out for this source.

9.11 CONCLUSIONS FOR PM_{10} CONCENTRATIONS IN THE LONDON BOROUGH OF HILLINGDON

The DMRB screening model indicates that the annual mean objective for PM_{10} will be not met in 2004, and that exceedences of the 2010 objective are very likely. It is not yet possible to declare an AQMA for the 2010 PM_{10} objective, as it is not yet in regulation. Therefore it is advised that the London Borough of Hillingdon proceed to a Detailed Assessment for this source based on the 2004 objective. It is also recommended that they bear in mind the possibility of having to comply with the 2010 objective and how this may affect their monitoring strategies in the region.

A detailed assessment is also required for PM_{10} from Heathrow Airport.

10 Conclusions

10.1 CARBON MONOXIDE

It is concluded that the strategy objectives for carbon monoxide are likely to be achieved by 2003. There is no need to progress to a detailed review and assessment for this pollutant.

10.2 BENZENE

It is concluded that the strategy objectives for benzene are likely to be achieved by 2003. There is no need to progress to a detailed review and assessment for this pollutant.

10.3 1,3-BUTADIENE

It is concluded that the strategy objectives for 1,3-Butadiene are likely to be achieved by 2003. There is no need to progress to a detailed review and assessment for this pollutant.

10.4 LEAD

It is concluded that the strategy objectives for lead are likely to be achieved by 2004. There is no need to progress to a detailed review and assessment for this pollutant.

10.5 NITROGEN DIOXIDE

It is concluded that the strategy objectives for nitrogen dioxide are not likely to be achieved by 2005. There is a need to progress to a detailed review and assessment for this pollutant.

10.6 SULPHUR DIOXIDE

It is concluded that the strategy objectives for sulphur dioxide are likely to be achieved by 2004/5. There is no need to progress to a detailed review and assessment for this pollutant.

10.7 PM_{10}

It is concluded that the strategy objectives for PM_{10} from road transport are not likely to be achieved by 2004 or 2010. The 2010 assessment is for information purposes as at the present time the 2010 objectives are not in the Regulations. However, there is a need to progress to a detailed review and assessment for this source and for Heathrow Airport. Compliance with the 2010 objectives should be re-assessed in the next round of the review and assessment process in 2006.

10.8 SUMMARY AND RECOMMENDATIONS

For all pollutants apart from NO_2 and PM_{10} the air quality objectives are predicted to be met and therefore there is no need to proceed to a detailed assessment. A detailed assessment of NO_2 and PM_{10} should be undertaken.

References

Part IV of the Environment Act 1995. Local Air Quality Management. LAQM.TG (03) January 2003.

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Design Manual for Roads and Bridges. Highways Agency 2003

LAQM. TG(03). Part IV of the Environment Act 1995. Local Air Quality Management. Technical Guidance.

CERC (2002). Air quality modelling for west London: Hillingdon, Hounslow, Spelthorne and Slough. August 2002.

Appendices

CONTENTS

Appendix 1
Monitoring data

CONTENTS

LOCATION	TUBE REF	GRID REF	TYPE	Oct 02	Nov 02	Dec 02	Jan 03	Feb 03	Mar 03	April 03	May 03	June 03	July 03	Aug 03	Sept 03	ANNUAL MEAN ug/m3
83 Hayes End Drive	HD49	508651 182274	B	21	38	38	24	36	33	31	18	23	29	30	44	**30**
Uxbridge Day Nursery	HD43	505996 184058	R	37	49		38			55	32	65	34	60	48	**46**
Barra Hall	HD41	509358 181215	B	31	32	30	26	32	27	31	17	22	26	24	40	**28**
Uxbridge Technical College	HD42	510417 180752	R			48	28	50	36	42	31	28	42		51	**40**
Citizens Advice Bureau	HD48	509094 187645	B	31	22	33	29	50	42	38	25	41	56	24	49	**37**
Hillingdon Primary School	HD47	507617 182506	R	36	41	35		69	43	39				37	55	
4 Colham Avenue	HD51	506333 180294	R		33	34			41	41	40	41	34	43	39	**38**
101 Cowley Mill Road	HD52	505159 183232	B		42	33	29	42	43	30	37	47	47	43	55	**41**
Warren Road	HD53	506243 185653	B		50	26	33	46	27	32	31	33		43	56	**38**
Harlequin Close	HD54	511636 181652	B			38	37	40	34	41						
Harold Avenue	HD55	509918 179015	B		67	53	41	59	56	40	30	47	52	34	59	**49**
15 Phelps Way	HD56	509798 178634	B		45	43	33	59	51	34	27	44	26	37	52	**41**
25 Cranford Lane	HD57	508758 177718	B		48	33	29	46	39	40	31	32	30	46	58	**39**
Brendan Close	HD58	508414 177125	B		45	54	47	45	42	45	29	48		37	66	**46**
7 Bomber Close	HD59	507296 177323	B		43	46	38	61	43	45	27	31	31	41	50	**42**
Harmonsworth Green	HD60	505736 177752	B		45	32	41	53	42	32	21	41	23	35	27	**36**
Heathrow Close	HD61	504851 176770	B		36	41	31	62	43	44	24	40	29	36	49	**40**

LOCATION	TUBE REF	GRID REF	TYPE	Oct 02	Nov 02	Dec 02	Jan 03	Feb 03	Mar 03	April 03	May 03	June 03	July 03	Aug 03	Sept 03	ANNUAL MEAN ug/m3
AURN Monitoring Station	HD31	506940 178601	S	31	45	27	38	38	38	43	35	9	36	35	59	**36**
AURN Monitoring Station	HD31	506940 178601	S	46	45	32	34	48	43	32	37	37	35	35	48	**39**
AURN Monitoring Station	HD31	506940 178601	S	45	46	40	29	67	42	43	52	44	38	47	52	**45**
South Ruislip Monitoring Station	HD46	510821 184923	R	42	42	48	36	57	27	55	28	41	57	55	50	**45**
South Ruislip Monitoring Station	HD46	510821 184923	R	38	46	46	45	69	53	47	37	53	52	48	67	**50**
South Ruislip Monitoring Station	HD46	510821 184923	R	48	54	55	44	63	51	55	53	54	36	42	62	**51**
Hillingdon Hospital Monitoring Station	HD50	506989 181920	R	35		43	32	60	33	26	31	44	36	36	48	**38**
Hillingdon Hospital Monitoring Station	HD50	506989 181920	R	33		30	32	55	42	26	30	31	35	50	59	**39**
Hillingdon Hospital Monitoring Station	HD50	506989 181920	R			33	28	43	43	38	41	33	28	29	42	**36**

Appendix 2

List of Part A Processes in the London Borough of Hillingdon

CONTENTS

Authorisation	Flue No.	Operator	Process		Address	Easting	Northing	Size	Throughput
AA3506	1	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	2	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	3	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	4	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	11.3 MW	Main fuel: Gas
AA3506	5	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	6	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	7	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	8	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	9	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AA3506	10	Heathrow Airport Ltd	1.3	COMBUSTION PROCESSES	HEATHROW AIRPORT NORTH	508600	176900	15 MW	Main fuel: Gas
AF8106	1	Nestle UK Ltd	1.3	COMBUSTION PROCESSES	NESTLE GROCERY DIVISION, NESTLES AVENUE	510150	179250	24MW	HFO
AF8106	2	Nestle UK Ltd	1.3	COMBUSTION PROCESSES	NESTLE GROCERY DIVISION, NESTLES AVENUE	510150	179250	24MW	HFO
AF8106	3	Nestle UK Ltd	1.3	COMBUSTION PROCESSES	NESTLE GROCERY DIVISION, NESTLES AVENUE	510150	179250	31MW	coffee

Authorisation	Flue No.	Operator	Process		Address	Easting	Northing	Size	Throughput
AG8675	1	Clinical Energy Ltd	5.1	INCINERATION	THE HILLINGDON HOSPITAL TRUST, PIELD HEATH ROAD	506900	182100	-	-
AF6898	1	Astor Stag Ltd	1.4	PETROLEUM PROCESSES	TAVISTOCK ROAD, WEST DRAYTON	505700	180500	-	-
AO0130	1	Hawker Pacific Aeropsace Ltd	4.5	INORGANIC CHEMICAL PROCESSES	HEATHROW AIRPORT, TBA S337 PO BOX 10	509500	176500	-	-

Authorisation	Rate of	Units	Output	Height	Diameter	Velocity	Stack.cond	Temperature	SO2, t/y	NOx, t/y	CO, t/y	NMVOC, t/y	Benzene, t/y	1,3 butadiene, t/y	PM10, t/y
AA3506	-	-	-	-	0.8	6.6	-	467	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	1.2	3.6	-	419	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	0.5	9.73	-	428	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	0.7	8.46	-	485	0	2.384	0.596	0.273	0.023	-	0
AA3506	-	-	-	-	0.6	11.97	-	492	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	1.8	5.67	-	499	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	0.7	5.76	-	491	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	-	-	-	-	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	-	-	-	-	0	3.165	0.791	0.362	0.031	-	0
AA3506	-	-	-	-	-	-	-	-	0	3.165	0.791	0.362	0.031	-	0
AF8106	36288	kg/hr	steam	43	1.4	1.9	1.7	449.5	0.001	0.002	0.000	0	-	-	0
AF8106	36288	kg/hr	steam	43	1.4	2	1.8	454.2	0	0	0.000	0	-	-	0
AF8106	13608	kg/hr	steam	37	2.2	2.8	7.7	393	0.001	0.001	-	-	-	-	
AG8675	-	-	-	-	-	-	-	-	0	0	0.000	0	0.1	-	0
AF6898	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-
AO0130	-	-	-	-	-	-	-	-	-	-	-	5.530	-	-	-

Appendix 3
Descriptions of selected models and tools

CONTENTS

Design Manual for Roads and Bridges (DMRB) - This screening method was formulated by the Highways Agency. The method gives a preliminary indication of air quality near roads. It is a simple procedure based on a tabulated input interface, which produces an estimate of concentrations at receptor locations defined by the user.

The DMRB method requires information on vehicle flow, HGV mix, vehicle speed and receptor-road distances. It contains a useful database of vehicular emission factors for future years. All the relevant AQS pollutants can be estimated.
More details of the model can be found at:
http://www.highways.gov.uk/contracts/index.htm

Appendix 4
Report Checklist

USA Checklist from http://www.uwe.ac.uk/aqm/review/checklists/usalist.doc

Criteria…	Included?
Brief Outcomes of Previous Round summarised?	√
Which objectives are being taken to a Detailed Assessment?	√
Carbon Monoxide	√
A) Monitoring data (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) Very Busy Roads/Junctions (Background? Roads/ junctions? Exposure? Data? Calculations? Exceedences?)	√
CONCLUSION (Detailed assessment? For What?)	√
Benzene	√
A) Monitoring data (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) Very Busy Roads/Junctions (Background? Roads/ junctions? Exposure? Data? Calculations? Exceedences?)	√
C) Industrial Sources (Emissions data? Nomogram? Exceedences? Neighbouring authorities?)	√
D) Petrol Stations (Throughput? Busy Road? Exposure?)	√
E) Major fuel storage depots (petrol only) (Emissions? Exposure? Fugitive? Nomogram?)	√
CONCLUSION (Detailed assessment? For what?)	√
1,3-butadiene	√
A) Monitoring data (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) New Industrial Sources (Air Quality Assessments? Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
C) Industrial Sources with Substantially Increased Emissions (Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
CONCLUSION (Detailed assessment? For what?)	√
Lead	√
A) Monitoring data (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) New Industrial Sources (Air Quality Assessments? Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
C) Industrial Sources with Substantially Increased Emissions (Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
CONCLUSION (Detailed assessment? For what?)	√
Nitrogen Dioxide	√
A) Monitoring data outside an AQMA (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) Monitoring data inside an AQMA (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Compliance?)	√

C) Narrow congested streets with residential properties close to the kerb (Background? Roads? Exposure? Data? Calculations? Width? Canyon Factor? Exceedences?)	√
D) Junctions (Background? Junctions? Exposure? Data? Calculations? Exceedences?)	√
E) Busy streets where people may spend 1hour or more close to traffic (Background? Roads 10 000 vpd? Exposure? Distance 5m or less? Data? Calculations? Exceedences?)	√
F) Roads with a high flow of buses and/or HGVs (Background? Roads >2500 HDV? Exposure? Data? Calculations? Exceedences?)	√
G) New roads constructed or proposed since the first round of R&A (Background? Roads/ junctions? Air Quality Assessments? Exposure? Data? Calculations? Exceedences?)	√
H) Roads close to the objective during the first round of R&A (Roads/ junctions 36-40 g/m3? Exposure?)	√
I) Roads with significantly changed traffic flows (Background? Roads with 25% increase? Exposure? Data? Calculations? Exceedences?)	√
J) Bus stations (>1,000 buses per day? Data? Calculations? Exposure? Exceedences?)	√
K) New Industrial Sources (Air Quality Assessments? Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
L) Industrial Sources with Substantially Increased Emissions (Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
M) Aircraft (Exposure < 1000m from boundary? Passenger throughput > 5mppa?)	√
CONCLUSION (Detailed assessment? For what?)	√
	√
Sulphur Dioxide	
A) Monitoring data outside an AQMA (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) Monitoring data inside an AQMA (New data? No of sites? Equipment/ QA/QC/ Exposure/ Worst case? Compliance?)	√
C) New Industrial Sources (Air Quality Assessments? Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
D) Industrial Sources with Substantially Increased Emissions (Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
E) Areas of Domestic Coal Burning (>100 premises by 0.5 km2?)	√
F) Small Boilers > 5 MW(thermal) (coal / fuel oil burning boilers? Exposure within 500m? Emissions? Nomogram?)	√
G) Shipping (Exposure within 1km? > 5000 movements per year?)	√
H) Railway Locomotives (stationary diesel locomotives for >15min? Exposure <15m?)	√
CONCLUSION (Detailed assessment? For what?)	√
PM10	√
A) Monitoring data outside an AQMA (New data? No of sites? Equipment/ Gravimetric/ QA/QC/ Exposure/ Worst case? Projected Exceedences?)	√
B) Monitoring data inside an AQMA (New data? No of sites? Equipment/ Gravimetric/ QA/QC/ Exposure/ Worst case? Compliance?)	√

C) Busy Roads and junctions (Scotland only) (Background? Roads/ junctions? Exposure? Data? Calculations? Exceedences?)	√
D) Junctions (Not Scotland) (Background? Junctions? Exposure? Data? Calculations? Exceedences?)	√
E) Roads with a high flow of buses and/or HGVs (Background? Roads >20% HDV? Exposure? Data? Calculations? Exceedences?)	√
F) New roads constructed or proposed since the first round of R&A (Background? Roads/ junctions? Air Quality Assessments? Exposure? Data? Calculations? Exceedences?)	√
G) Roads close to the objective during the first round of R&A (Roads/ junctions 30-36 24-hour exceedences of 50μg/m3? Exposure?)	√
H) Roads with significantly changed traffic flows (Background? Roads/ junctions? Exposure? Data? Calculations? Exceedences?)	√
I) New Industrial Sources (Air Quality Assessments? Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
J) Industrial Sources with Substantially Increased Emissions (Emissions data? Nomogram? Fugitive? Exceedences? Neighbouring authorities?)	√
K) Areas of Domestic Coal Burning (>50 premises by 0.5 km2?)	√
L) Quarries/landfill sites/opencast coal/handling of dusty cargoes at ports etc. (Exposure? Dust concerns? Background?)	√
M) Aircraft (Exposure < 500m from boundary? Passenger throughput > 10 mppa? > 5 mppa in Scotland?)	√
CONCLUSION (Detailed assessment? For what?)	√