

HERTSMERE BOROUGH COUNCIL

LOCAL AIR QUALITY MANAGEMENT UPDATING AND SCREENING  
ASSESSMENT 2009

AGGX1394684/BV/AQ

MAY 2009



**BUREAU  
VERITAS**

***Move Forward with Confidence***



**HERTSMERE**

This page is left blank intentionally

## DOCUMENT CONTROL SHEET

Issue/Revision	Issue 1	Issue 2	Final	
Remarks	1 <sup>st</sup> Draft		Final	
Date	May 2009		May 2009	
Submitted to	Sarah Hoggett		Sarah Hoggett	
Prepared by	Sharon Atkins		Sharon Atkins	
Signature				
Approved by	Lakhu Luhana		Lakhu Luhana	
Signature				
Project number	AGGX1394684		AGGX1394684	
File reference				

### Disclaimer

This Report was completed by Bureau Veritas on the basis of a defined programme of work and terms and conditions agreed with the Client. Bureau Veritas' confirms that in preparing this Report it has exercised all reasonable skill and care taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

Bureau Veritas accepts no responsibility to any parties whatsoever, following the issue of the Report, for any matters arising outside the agreed scope of the works.

This Report is issued in confidence to the Client and Bureau Veritas has no responsibility to any third parties to whom this Report may be circulated, in part or in full, and any such parties rely on the contents of the report solely at their own risk.

Unless specifically assigned or transferred within the terms of the agreement, the consultant asserts and retains all Copyright, and other Intellectual Property Rights, in and over the Report and its contents.

Any questions or matters arising from this Report should be addressed in the first instance to the Project Manager.

This page is left blank intentionally

## TABLE OF CONTENTS

Executive Summary .....	4
1 Introduction.....	6
1.1 Description of Local Authority Area .....	6
1.2 Purpose of Report.....	6
1.3 Air Quality Objectives .....	7
1.4 Local Air Quality Management (LAQM).....	9
1.5 Summary of Review and Assessment undertaken by Hertsmere Borough Council .....	9
2 Updating and Screening Assessment Methodology .....	16
2.1 Input Data .....	18
2.1.1 Traffic data.....	18
2.1.2 Background concentrations.....	18
3 New Monitoring Data.....	19
3.1 Summary of Monitoring Undertaken.....	19
3.1.1 Automatic Monitoring Sites.....	19
3.1.2 Non-Automatic Monitoring Data .....	20
3.2 Comparison of Monitoring Results with AQ Objectives.....	23
3.2.1 Nitrogen dioxide.....	23
3.2.2 Particles (PM <sub>10</sub> ) .....	26
4 Road Traffic Sources.....	28
4.1 Narrow congested streets with residential properties close to the kerb .....	28
4.2 Busy streets where people may spend 1-hour or more close to traffic .....	28
4.3 Roads with a high flow of buses and/or Heavy Goods Vehicles .....	29
4.4 Junctions.....	29
4.5 New roads constructed or proposed since the last round of Review and Assessment .....	30
4.6 Roads with significantly changed traffic.....	30
4.7 Bus and coach stations.....	30
5 Other Transport Sources.....	31
5.1 Airports.....	31
5.2 Railways (diesel and steam trains).....	31
5.2.1 Stationary Trains .....	31
5.2.2 Moving Trains .....	31
5.3 Ports (shipping).....	31
6 Industrial Sources.....	32
6.1 Industrial Installations .....	32
6.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out .....	32
6.1.2 Existing Installations where emissions have increased substantially or new relevant exposure has been introduced .....	32
6.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment ..	32

6.2	Major fuel (petrol) storage depots.....	32
6.3	Petrol stations.....	33
6.4	Poultry farms.....	33
7	Commercial and Domestic Sources.....	34
7.1	Biomass combustion.....	34
7.1.1	Biomass combustion - individual installations.....	34
7.1.2	Biomass combustion – combined impacts (PM <sub>10</sub> emissions).....	34
7.2	Domestic solid-fuel burning (sulphur dioxide emissions).....	34
8	Fugitive or Uncontrolled Sources.....	35
9	Conclusions and Proposed Actions.....	36
9.1	Conclusions from new monitoring data.....	36
9.2	Conclusions from assessment of sources.....	36
9.2.1	Road Sources.....	36
9.2.2	Other Sources.....	37
9.3	Proposed Actions.....	37
10	References.....	38
APPENDICES.....		39
Appendix 1	- Traffic data.....	39
Appendix 2	- Nitrogen dioxide diffusion tube results 2008.....	42
Appendix 3	- DMRB Assessment Inputs.....	45
Appendix 4	- DMRB Assessment Results.....	46
Appendix 5	- Maps of Locations DMRB Results indicate risk of exceedence of Air Quality Objectives.....	47
Appendix 6	- List of Industrial Processes.....	48

## LIST OF TABLES

Table 1– Air Quality Objectives included in the Air Quality Regulations for the purpose of Local Air Quality Management.....	8
Table 2– Summary of emission sources and relevant pollutants to be considered as part of the Updating and Screening Assessment.....	17
Table 3– Details of Automatic Monitoring Sites .....	19
Table 4– Details of Non- Automatic Monitoring Sites .....	21
Table 5– Results of Automatic Monitoring for Nitrogen dioxide: Comparison with Annual Mean Objective .....	23
Table 6– Results of nitrogen dioxide diffusion tubes ( $\mu\text{g}/\text{m}^3$ ) .....	25
Table 7– Summary Sheet from Volatile Correction Model.....	26
Table 8– Results of $\text{PM}_{10}$ Automatic Monitoring: Comparison with Annual Mean Objective.....	27
Table 9– Results of $\text{PM}_{10}$ Automatic Monitoring: Comparison with 24-hour Mean Objective .....	27

## LIST OF FIGURES

Figure 1 – Hertsmere AQMA No. 1.....	10
Figure 2 – Hertsmere AQMA No. 2.....	11
Figure 3 – Hertsmere AQMA No. 3.....	12
Figure 4 – Hertsmere AQMA No. 4.....	13
Figure 5 – Hertsmere AQMA No. 5.....	14
Figure 6 – Hertsmere AQMA No. 6.....	14
Figure 7 – Map of monitoring sites in Hertsmere.....	19

## Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work.

The Updating and Screening Assessment (USA) provides an update with respect to air quality issues within the Borough. There have been a number of changes since the last (third) round of review and assessments which have been taken into account in this assessment; including revised Local Air Quality Management (LAQM) Guidance, modelled background concentration maps, updated NO<sub>x</sub>:NO<sub>2</sub> conversion calculator, updated future year calculation tools and updates on specific sources (rail, poultry farms, biomass). The USA has included consideration of new monitoring data and emissions sources, in addition to any significant changes to existing emission sources identified in the previous rounds. The USA considers the seven priority health based air quality objectives as laid down in Regulations and assesses the likelihood that the air quality objectives will be met by their target dates. If the air quality objectives are unlikely to be met, a detailed assessment will be required.

Having considered each emission source and presented evidence to support the assessment of each, it is concluded that the air quality objectives for benzene, 1, 3-butadiene, carbon monoxide, lead, particulates (PM<sub>10</sub>) and sulphur dioxide will be met. There is no requirement to undertake a detailed assessment for these pollutants.

The USA review of new monitoring data has shown that exceedences of annual mean nitrogen dioxide (NO<sub>2</sub>) continue to occur in the Hertsmere six Air Quality Management Areas (AQMA) and in the emerging AQMA at The Broadway, Potters Bar. Outside the AQMA, exceedences of the annual mean NO<sub>2</sub> objective were measured at six monitoring sites, where there is nearby relevant exposure:

- HM49 Elstree Crossroads 2
- HM50 Elstree Crossroads 3
- HM65 Hatfield Road, Potters Bar
- HM66 Bus Garage 2, Potters Bar
- HM69 Southgate Road, Potters Bar
- HM71/72/73 Park Road junction, Radlett

The assessment of NO<sub>2</sub> with distance from roads has indicated a risk of exceedence of the annual mean objective at these six locations. It is therefore recommended that the Council proceed to a detailed assessment for annual mean NO<sub>2</sub>.

High Street Bushey has been identified as a narrow congested street and has been assessed using the DMRB model. The predicted results indicate that the annual mean NO<sub>2</sub> objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m<sup>3</sup>. However, it is recommended that monitoring be undertaken to confirm compliance with the objective.

Traffic data assessed for the USA showed two roads with high flows of buses and heavy goods vehicles >20%: M1 Junction 4-5, Bushey and A1 Barnet Bypass, Dyrham Park. The nearest relevant exposure to these roads have been assessed through DMRB. The model predictions indicate a risk of exceedence of the annual mean NO<sub>2</sub> objective outside an AQMA near the M1 at Bushey. It will therefore be necessary to proceed to a detailed assessment at this location. Prescribed objectives are predicted to be met at the nearest receptors to the A1 Barnet Bypass, Dyrham Park.

Three busy junctions have been identified, which have nearby relevant exposure: Elstree Crossroads (High Street/Barnet Road), Southgate Road/Barnet Road Junction, Potters Bar and Watling Street/Aldenham Road Junction, Radlett. The Elstree Crossroads junction has already been declared as an AQMA. However, monitoring in 2008 on the High Street and Barnet Lane (outside the AQMA) indicates that the extent of the AQMA may need to be extended to incorporate a larger area of relevant exposure. It will be necessary to proceed to a Detailed Assessment at this location. Monitoring undertaken in 2008 at the Southgate Road/Barnet Road Junction, Potters Bar indicate there is a risk of exceedence of the annual mean NO<sub>2</sub> objective at relevant receptor locations. It will be necessary to proceed to a detailed assessment at this location.



Roadside monitoring undertaken in 2008 near the Watling Street/Aldenham Road Junction, on Watling Street indicate concentrations below the objective ( $38\mu\text{g}/\text{m}^3$ ), although this is not the worst case location with respect to relevant exposure at the junction. Additionally, north of this junction on Watling Street (at the junction with Park Road),  $\text{NO}_2$  concentrations are predicted to exceed the annual mean objective at relevant receptor locations. It will therefore be necessary to proceed to a Detailed Assessment at this location. There is insufficient traffic data to assess the Watling Street/Aldenham Road junction through DMRB. It is therefore recommended that additional monitoring be installed at the nearest relevant exposure to this junction and prior to a detailed assessment being undertaken, a traffic count be undertaken.

Proposed actions arising from the Updating and Screening Assessment are as follows:

- Undertake additional monitoring of  $\text{NO}_2$  at relevant receptor locations at High Street, Bushey and Watling Street/Aldenham Road junction, Radlett;
- Proceed to a detailed assessment of annual mean  $\text{NO}_2$  at the following locations:
  - Elstree Crossroads, Elstree (Barnet Lane and High Street)
  - Potters Bar, including the junction of Barnet Road/Southgate Road/High Street and the High Street, near the bus station and junction of the High Street with The Causeway.
  - Radlett, including the junctions of Watling Street/Aldenham Road and Watling Street/Park Road.
  - M1 Bushey, at Hartspring Lane.
- Progress to a 2010 Annual Progress Report by April 2010.

## 1 Introduction

### 1.1 Description of Local Authority Area

The Borough of Hertsmere is situated north of London in the southwest of Hertfordshire and includes the distinctly individual communities of Bushey, Potters Bar, Radlett, Elstree and Borehamwood, the latter being the political centre and largest town. The Borough also contains several smaller settlements including Shenley, South Mimms, Ridge, Aldenham and Letchmore Heath. 80% of Hertsmere is Green Belt land, much of which is in agricultural use.

The main source of air pollution in the borough is road traffic emissions from major roads, notably the M25, M1, A1, A41, A411 and A1000. Hertsmere Borough Council have declared six road traffic emission related Air Quality Management Areas (AQMAs) for exceedences of the annual mean NO<sub>2</sub> objective.

Hertsmere suffers from significant congestion, especially on the major roads and high streets. Other pollution sources, including commercial, industrial and domestic sources, also make a contribution to background pollution concentrations.

### 1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The Local Air Quality Management (LAQM) process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Bureau Veritas has been commissioned by Hertsmere Borough Council to undertake the Updating and Screening Assessment (USA) 2009, as part of the fourth round of LAQM Review and Assessment.

The following information has been considered within this assessment:

- Relevant legislative background
- Hertsmere Borough Council's Review and Assessment of air quality under the Local Air Quality Management (LAQM) regime
- Traffic data provided by Hertfordshire County Council; For the purposes of the updating and screening assessment, the Highways Agency's DMRB<sup>1</sup> model has been used to assess traffic data
- Industrial, domestic and other non-traffic related source data provided by Hertsmere Borough Council
- Monitoring data for 2008 provided by Hertsmere Borough Council
- Background pollutant concentrations from modelled maps
- Technical guidance and tools provided by Defra<sup>2</sup>

---

<sup>1</sup> Highways Agency's Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 1 Air Quality, May 2007, and accompanying spreadsheet DMRB Screening Method V1.03.xls. July 2007

<sup>2</sup> Local Air Quality Management Technical Guidance LAQM.TG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland

This report sets out the relevant air quality legislation for air quality, provides a review of local air quality management within the administrative area, assesses the air quality for all relevant sources and then summarises the findings of the assessment and potential need for further detailed assessment work.

### 1.3 Air Quality Objectives

The significance of existing and future pollutant levels are assessed in relation to the national air quality standards and objectives, established by Government. The revised Air Quality Strategy (AQS)<sup>3</sup> for the UK (released in July 2007) provides the over-arching strategic framework for air quality in the UK and contains national air quality standards and objectives established by the UK Government and devolved administrations to protect human health. The air quality objectives incorporated in the AQS and the UK Legislation are derived from the Limit Values prescribed in the EU Directives transposed into national legislation by member states.

The CAFE (Clean Air for Europe) programme was initiated in the late 1990s to draw together previous directives into a single EU Directive on air quality. The Directive 2008/50/EC<sup>4</sup> introduces new obligatory standards for PM<sub>2.5</sub> for Government but places no statutory duty on local Government to work towards achievement.

The Air Quality Standards (England) Regulations 2007<sup>5</sup> came into force on 15<sup>th</sup> February 2007 in order to align and bring together in one statutory instrument the Governments obligations to fulfil the requirements of the CAFE Directive.

The objectives for ten pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide particulates - PM<sub>10</sub> and PM<sub>2.5</sub>, ozone and PAHs - Polycyclic Aromatic Hydrocarbons) have been prescribed within the Air Quality Strategy<sup>3</sup> based on The Air Quality Standards (England) Regulations 2007.

Part IV of the Environment Act 1995 places a statutory duty on local authorities to periodically review and assess the current and the future air quality within their area – a process known as a Local Air Quality Management (LAQM). The air quality objectives that apply to LAQM are defined in Air Quality Regulations 2000<sup>6</sup> and Air Quality (England) (Amendment) Regulations 2002<sup>7</sup> for seven pollutants benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide, particulates - PM<sub>10</sub>.

This assessment focuses on those pollutants included in Air Quality Regulations for the purpose of Local Air Quality Management, in respect of pollutant sources affecting air quality within the Council's administrative area. The objectives set out in the AQS for these pollutants are presented in the table below.

The UK Government and the Devolved Administrations have also set new national air quality objectives for PM<sub>2.5</sub>. These objectives have not been incorporated into LAQM Regulations, and authorities have no statutory obligation to review and assess air quality against them.

The locations where the AQS objectives apply are defined in the AQS as locations outside buildings or other natural or man-made structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed [to pollutant concentrations] over the relevant averaging period of the AQS objective. Typically these include residential properties and schools/care homes for longer period (i.e. annual mean) pollutant objectives and high streets for short-term (i.e. 1-hour) pollutant objectives.

---

<sup>3</sup> The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007), Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland

<sup>4</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

<sup>5</sup> The Air Quality Standards Regulations 2007, Statutory Instrument No 64, The Stationary Office Limited

<sup>6</sup> The Air Quality (England) Regulations 2000 (Statutory Instrument 928)

<sup>7</sup> The Air Quality (England) (Amendments) Regulations 2000 (Statutory Instrument 3043)

**Table 1– Air Quality Objectives included in the Air Quality Regulations for the purpose of Local Air Quality Management**

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

<sup>a</sup> EU Limit values in respect of nitrogen dioxide to be achieved by 1st January 2010. There are, in addition, separate EU limit values for carbon monoxide, sulphur dioxide, lead and PM10, to be achieved by 2005, and benzene by 2010.

<sup>b</sup> Measured using the European gravimetric transfer sampler or equivalent.

<sup>c</sup> These 2010 air quality objectives for PM10 apply in Scotland only, as set out in the Air Quality (Scotland) Amendment Regulations 2002.

## 1.4 Local Air Quality Management (LAQM)

As established by the Environment Act 1995 Part IV, all local authorities in the UK are under a statutory duty to undertake an air quality assessment within their area and determine whether they are likely to meet the air quality objectives set down by Government for a number of pollutants. The process of review and assessment of air quality undertaken by local authorities is set out under the Local Air Quality Management (LAQM) regime and involves a phased three yearly assessment of local air quality. Where the results of the review and assessment process highlight that problems in the attainment of health-based objectives for air quality will arise, the authority is required to declare an Air Quality Management Area (AQMA) – a geographic area defined by high levels of pollution and exceedences of health-based standards.

The LAQM regime was first set down in the 1997 National Air Quality Strategy (NAQS)<sup>8</sup> and introduced the idea of local authority 'Review and Assessment'. The Government subsequently published policy and technical guidance related to the review and assessment processes in 1998. This guidance has since been reviewed and the latest documents include Policy Guidance (LAQM.PG (09))<sup>9</sup> and Technical Guidance (LAQM.TG (09))<sup>10</sup>. The guidance lays down a progressive, but continuous, framework for the local authorities to carry out their statutory duties to monitor, assess and review air quality in their area and produce action plans to meet the air quality objectives.

Defra and the Devolved Administrations released the latest Policy and Technical Guidance in February 2009, in anticipation of the fourth round of review and assessment. The fourth round begins with this Updating and Screening Assessment, required to be completed by local authorities by the end of April 2009, and builds upon the Council's previous work in the first three rounds.

## 1.5 Summary of Review and Assessment undertaken by Hertsmere Borough Council

Hertsmere Borough Council has declared six Air Quality Management Areas (AQMAs) for nitrogen dioxide following the results of the first and second rounds of Review and Assessment. Descriptions and figures of the AQMAs are shown below:

---

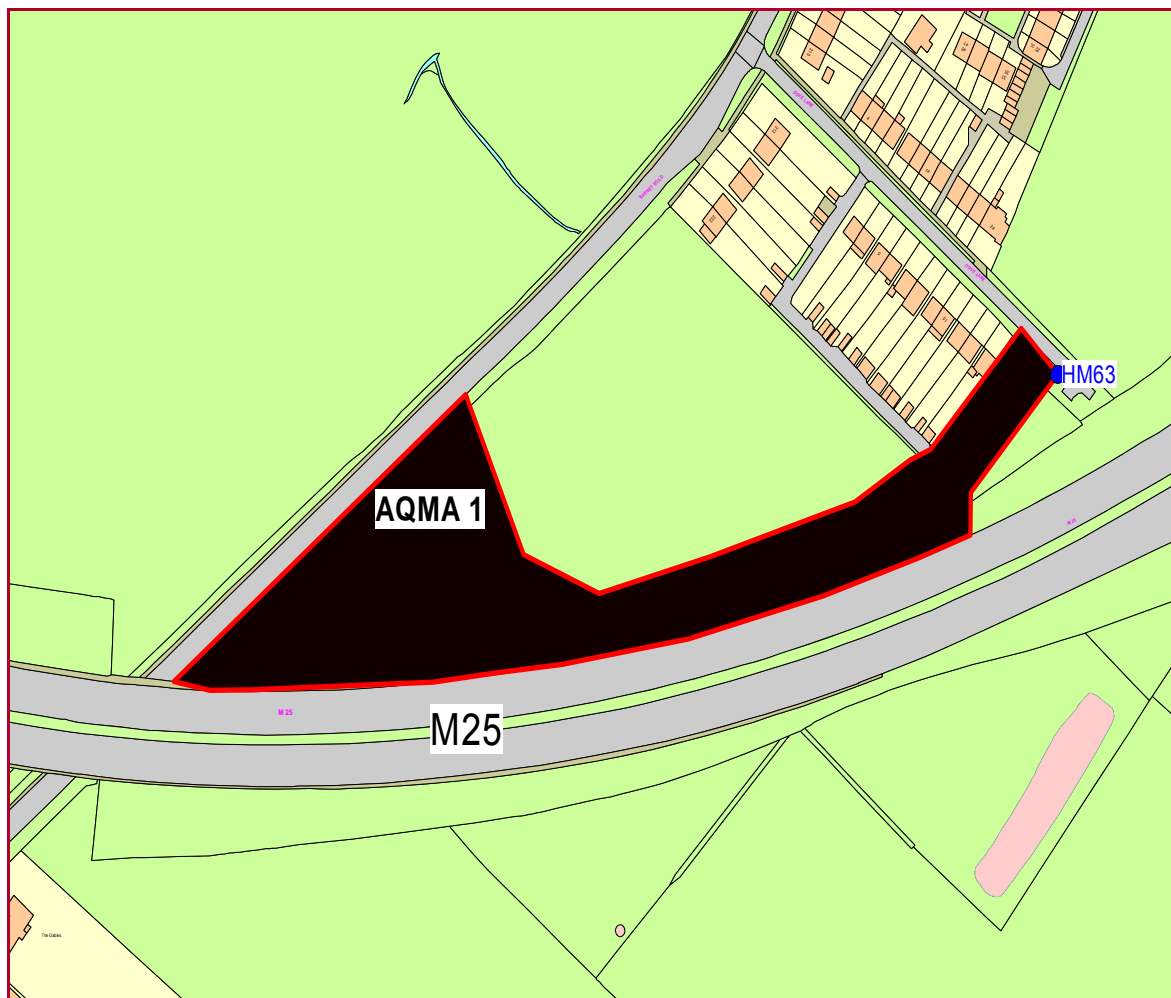
<sup>8</sup> DoE, 1997, 'The United Kingdom National Air Quality Strategy', The Stationery Office

<sup>9</sup> Policy Guidance LAQM.PG(09) (2009), Part IV of the Environment Act 1995, Local Air Quality Management, Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland, The Stationery Office

<sup>10</sup> Technical Guidance LAQM.TG (09) (2009), Part IV of the Environment Act 1995, Local Air Quality Management, Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland, The Stationery Office

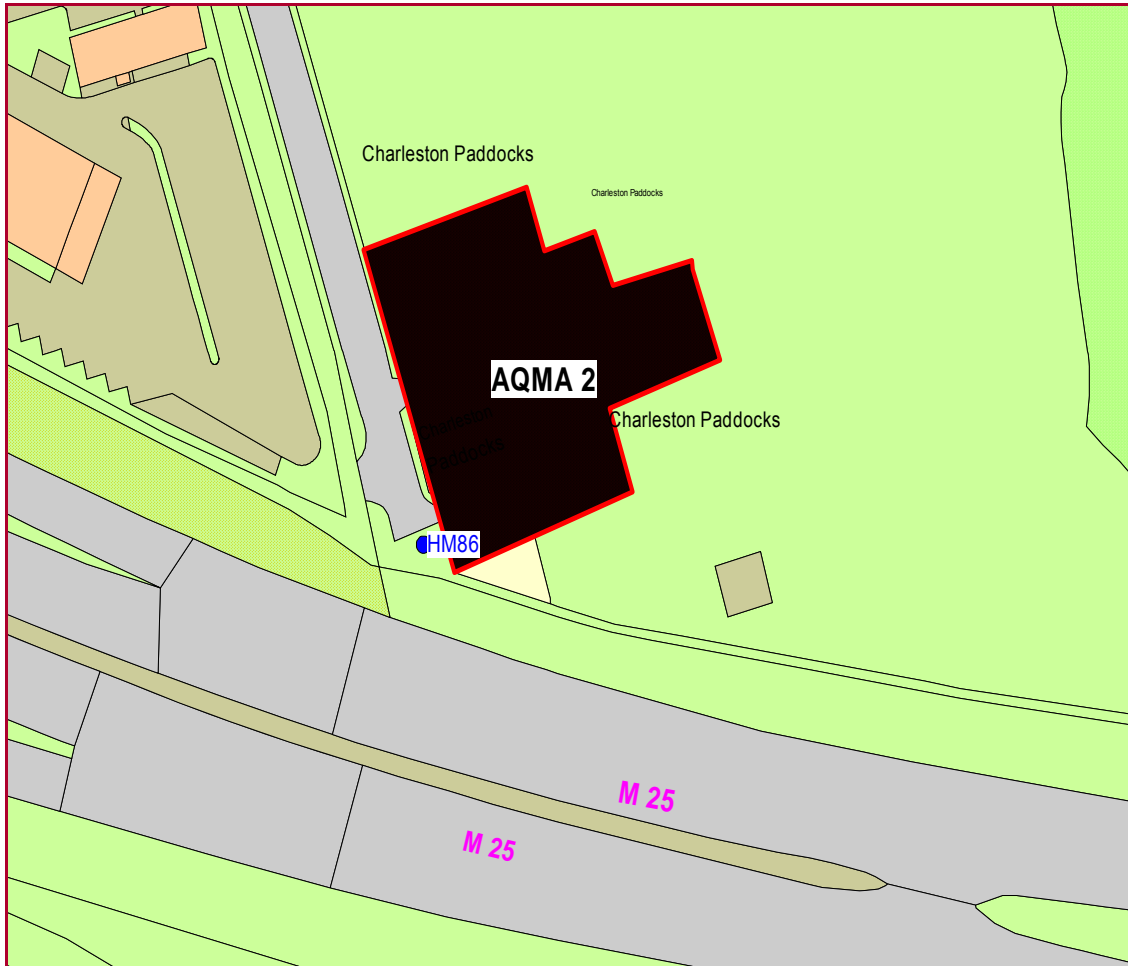
**Figure 1 – Hertsmere AQMA No. 1**

Hertsmere No. 1: An area comprising the domestic properties 23-27 Dove Lane and caravan site off A1000 Barnet Road, near the M25.



**Figure 2 – Hertsmere AQMA No. 2**

Hertsmere No. 2: An area comprising the domestic property known as Charleston Paddocks, St Albans Road, South Mimms, Potters Bar, near the M25.



**Figure 3 – Hertsmere AQMA No. 3**

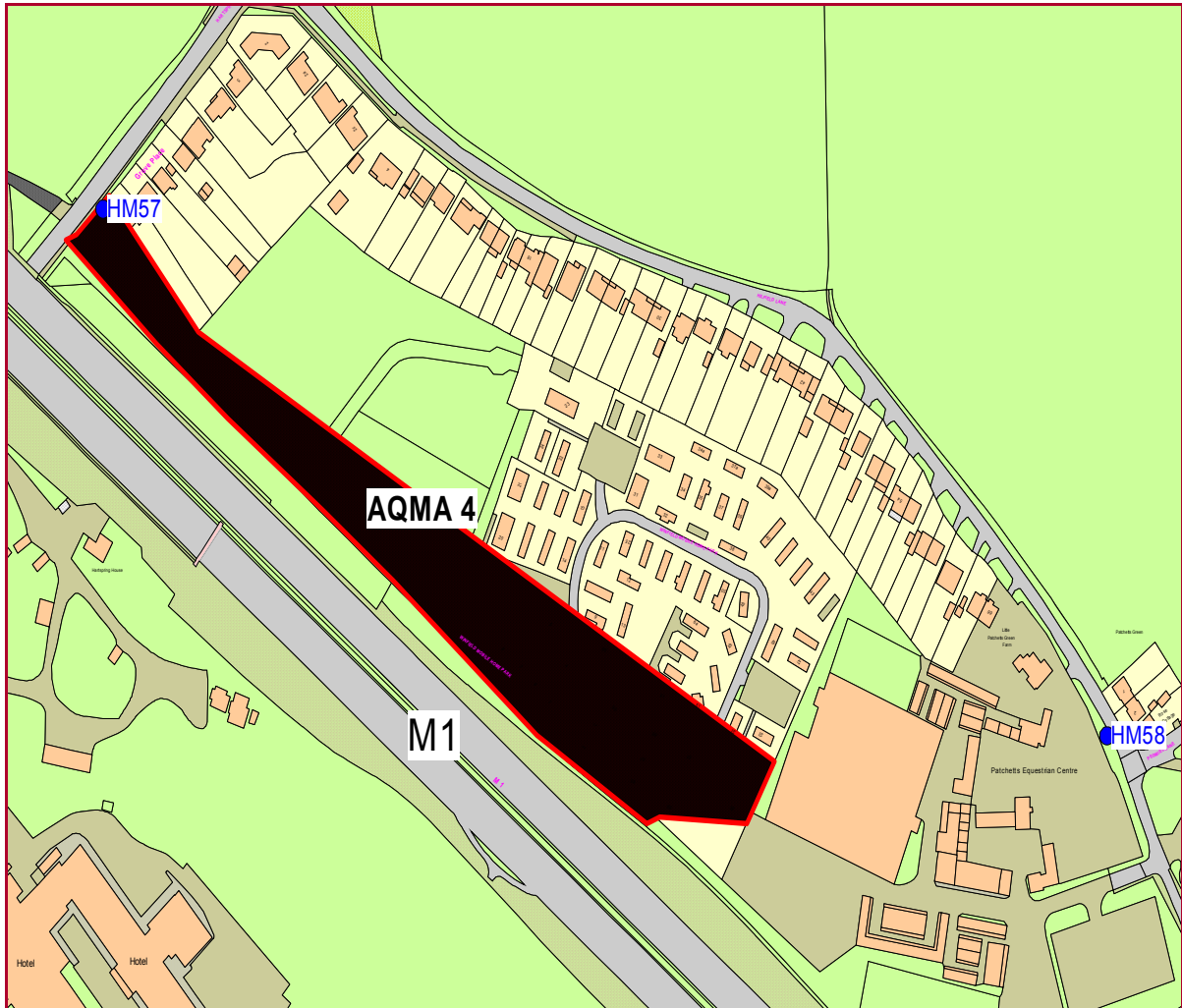
Hertsmere No. 3: An Area comprising the domestic properties 31-39 Blanche Lane, South Mimms, near the M25.





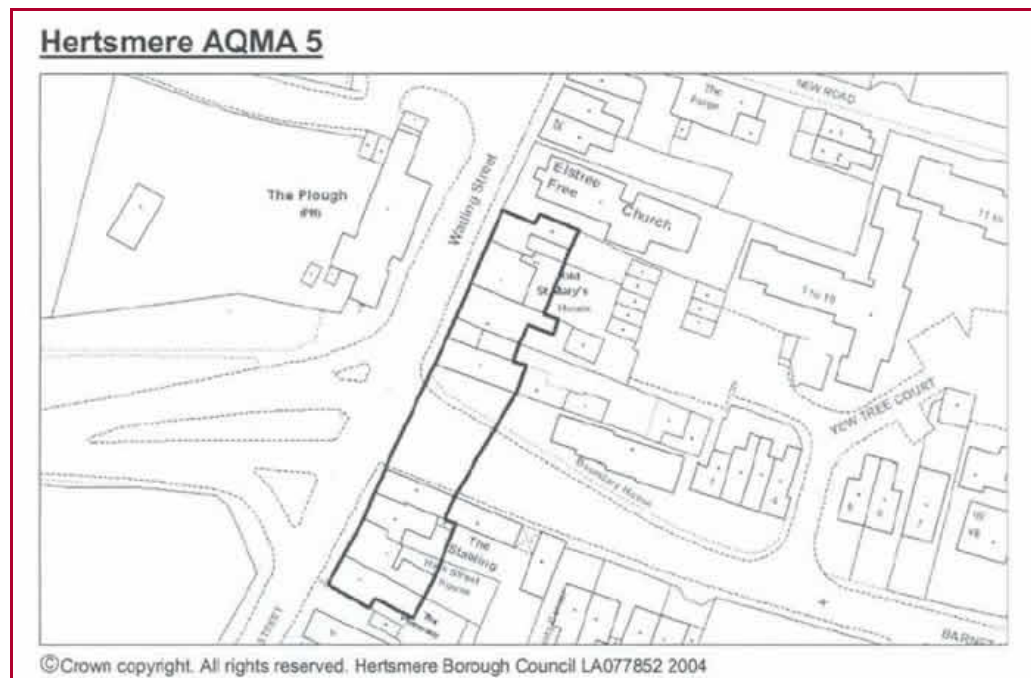
**Figure 4 – Hertsmere AQMA No. 4**

Hertsmere No. 4: An area comprising the domestic properties 12 Grove Place, Hartspring Lane, Aldenham and caravans numbered 1, 2, 3, 4, 7, 8, 55, 56, 57, 58, 59, 60 within Winfield Caravan site, Hartspring Lane, near the M1 at Bushey.



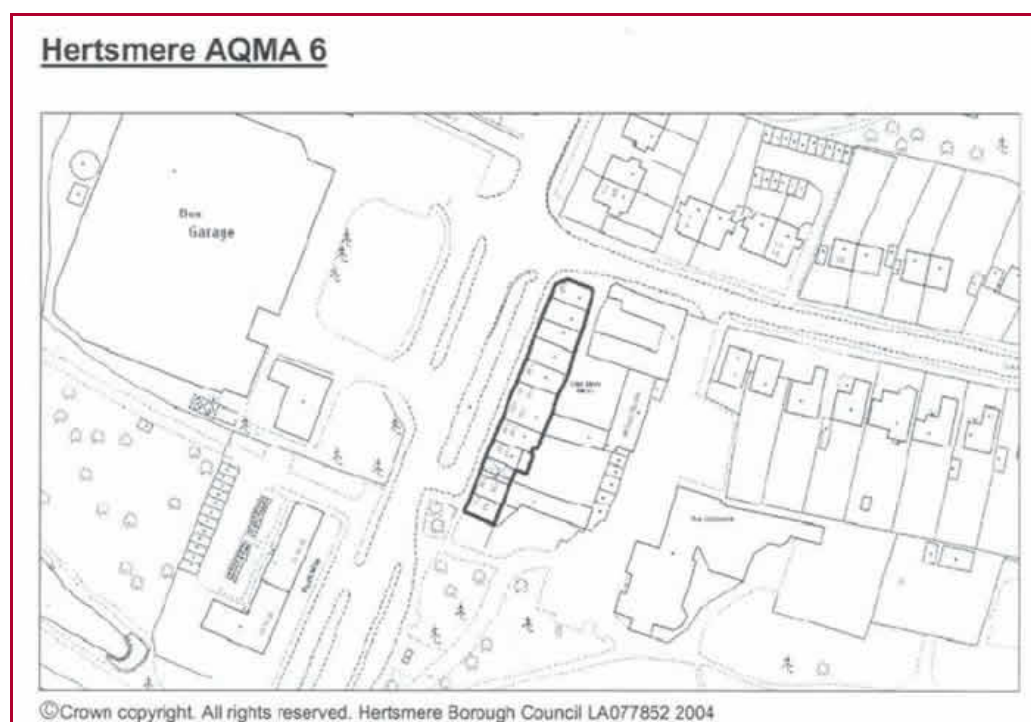
**Figure 5 – Hertsmere AQMA No. 5**

Hertsmere No. 5: Comprising domestic dwellings within eight properties on the east side of the A5183 High Street Elstree either side of the junction with the A411.



**Figure 6 – Hertsmere AQMA No. 6**

Hertsmere No. 6: Comprising domestic dwellings within properties between numbers 133 to 167 High Street on the east side of the High Street opposite the bus station Potters Bar.





At present there are six designated AQMAs in Hertsmere, however, a new area is to be declared at The Broadway, Potters Bar in the near future following completion of a Detailed Assessment in November 2007.

The Annual Progress Report 2008 concluded that further investigation needs to be carried out at Southgate Road, Potters Bar and Park Road, Radlett following analysis of monitoring data and that these should be further assessed in the next review and assessment carried out by Hertsmere Borough Council.

A regional dispersion modelling assessment of NO<sub>2</sub> and PM<sub>10</sub> is currently being undertaken as part of project being undertaken jointly with other authorities in the North London Air Quality Cluster Group.

## 2 Updating and Screening Assessment Methodology

The Updating and Screening Assessment is intended to identify any significant changes that may have occurred since the previous rounds of Review and Assessment were completed. This includes new monitoring data, new or changed emissions sources (either locally or in neighbouring authorities), or any other local changes that might affect air quality e.g. new relevant exposure. The assessment builds on the previous Review and Assessment work undertaken by local authorities.

The Updating and Screening Assessment involves a checklist approach that considers all significant emissions sources relevant to the Air Quality Objectives. The checklists are broadly the same as in the previous rounds, but have been re-ordered so that they follow a source-by-source rather than pollutant-by-pollutant approach. This is to reduce repetition within the screening process for those local authorities that do not have all the listed sources within their area. These can more easily be discounted at an early stage.

A summary of the emission source categories for the Updating and Screening checklists is provided below. The detailed checklists for each source type are then set out in the following sections, as per the methodology provided in Chapter 5 of the Technical Guidance LAQM.TG (09).

The air quality assessment for road traffic emissions sources has been undertaken using the Highways Agency's DMRB<sup>1</sup> model. NO<sub>2</sub> concentrations have been calculated based on the updated NO<sub>x</sub>:NO<sub>2</sub> conversion method provided on behalf of Defra as part of the LAQM.TG(09) tools.

For other sources, the checklist approach to screening and relevant LAQM.TG(09) nomograms have been utilised.

**Table 2– Summary of emission sources and relevant pollutants to be considered as part of the Updating and Screening Assessment**

Reference No.	Emission sources to be assessed	Relevant Pollutants
<b>A. Road Transport Sources</b>		
A.1	Narrow congested streets with residential properties close to the kerb	Nitrogen dioxide
A.2	Busy streets where people may spend 1-hour or more close to traffic	Nitrogen dioxide
A.3	Roads with a high flow of buses and/or HGVs.	Nitrogen dioxide, PM <sub>10</sub>
A.4	Junctions (including busy roads and junctions in Scotland and Northern Ireland)	Nitrogen dioxide, PM <sub>10</sub>
A.5	New roads constructed since the last round of review and assessment	Nitrogen dioxide, PM <sub>10</sub>
A.6	Roads/junctions identified as being close to the objective during the previous round of review and assessment	Nitrogen dioxide, PM <sub>10</sub>
A.7	Roads with significantly changed traffic flows	Nitrogen dioxide, PM <sub>10</sub>
A.8	Bus and coach stations	Nitrogen dioxide
<b>B: Other transport sources</b>		
B.1	Airports	Nitrogen dioxide
B.2	Railway (diesel and steam trains)	Sulphur dioxide, nitrogen dioxide
B.3	Ports (shipping)	Sulphur dioxide
<b>C: Industrial sources</b>		
C.1	Industrial processes (new processes and those with significantly increased emissions)	Benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide, PM <sub>10</sub>
C.2	Major petrol storage depots	Benzene
C.3	Petrol Stations	Benzene
C.4	Poultry farms	PM <sub>10</sub>
<b>D: Commercial and domestic sources</b>		
D.1	Biomass combustion	Nitrogen dioxide, PM <sub>10</sub>
D.2	Domestic solid-fuel burning	Sulphur dioxide
<b>E: Fugitive or uncontrolled sources</b>		
E.1	Quarries, landfill sites, opencast coal mining, waste transfer sites, materials handling (i.e. ports, major construction sites)	PM <sub>10</sub>

## 2.1 Input Data

### 2.1.1 Traffic data

Hertfordshire County Council provided the baseline (2008) annual average daily traffic flow (AADT) and vehicle breakdown used in this assessment.

Where speed data has not been available, speeds have been based on speed limits, modified according to local conditions to take account of congestion and stop/start vehicle movements at junctions. Speeds were reduced at busy junctions to 20kph to reflect the higher emissions of queuing traffic.

Appendix 1 contains the tabular summary of traffic data provided for the Updating and Screening Assessment for use in the DMRB model.

### 2.1.2 Background concentrations

The DMRB model calculates the pollutant concentrations due to road traffic emissions only. The user must then add the background concentrations (arising from sources other than traffic) to derive the total pollutant concentrations at the relevant receptors modelled.

The background concentrations can be obtained either from appropriate monitoring stations or from Defra maps of modelled background pollutant concentrations. These maps are available at a resolution of 1x1 km for the entire UK. Maps are provided for future years' background pollutant concentrations. The maps can be obtained from the UK Air Quality Information Archive<sup>9</sup>. The maps have been updated from the previous round of review and assessment as part of the LAQM.TG (09) tools released in February 2009. Background concentrations used in the DMRB model runs are shown in Appendix 3.



### 3 New Monitoring Data

Section 3 reviews and assesses all new monitoring data in order to determine whether the air quality objectives are at risk of exceedance.

#### 3.1 Summary of Monitoring Undertaken

Figure 7 – Map of monitoring sites in Hertsmere



##### 3.1.1 Automatic Monitoring Sites

This section provides details of automatic monitoring carried out in 2008, the year covered by this report.

Table 3– Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref (x,y)	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Hertsmere Borehamwood	Urban background	x=520250, y=197250	NO <sub>2</sub> , ozone, PM <sub>10</sub>	No	Y=0m	N/A	No

There is currently continuous monitoring of nitrogen dioxide, ozone and particles (PM<sub>10</sub>) undertaken by Hertsmere Borough Council at one location in the area, Borehamwood background site at Hertswood School Upper Site, Thrift Farm Lane, Borehamwood, Hertfordshire. PM<sub>10</sub> concentrations

are monitored using a Tapered Element Oscillating Microbalance (TEOM) analyser (PM<sub>10</sub> data is reported as gravimetric equivalent; corrected using the Volatile Correction Model). Hertfordshire and Bedfordshire Air Quality Monitoring Network managers Kings College ERG have ratified data for 2008. The Quality Assurance/Quality Control (QA/QC) procedures for the network are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures.

### 3.1.2 Non-Automatic Monitoring Data

Details of the non-automatic monitoring undertaken in the borough are shown below.

#### 3.1.2.1 Nitrogen dioxide diffusion tube data

Outside the continuous monitoring network, Hertsmeire Borough Council undertook monitoring at 44 NO<sub>2</sub> diffusion tubes sites in 2008. The diffusion tubes are supplied and analysed by Gradko utilising the 20% Triethanolamine (TEA) in water preparation method. Gradko participate in the Workplace Analysis Scheme for Proficiency (WASP) for NO<sub>2</sub> diffusion tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO<sub>2</sub> concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance.

With regard to the application of a bias adjustment factor for the diffusion tubes, the technical guidance LAQM.TG (09) and Review and Assessment Helpdesk recommends use of a local bias adjustment factor where available and relevant to diffusion tube sites. Hertsmeire Borough Council has a (triplicate) diffusion tube co-location study at the Borehamwood background site. However, the data capture for 2008 was below the recommended 90% capture rate. The bias adjustment factor for 2008 has therefore been taken from the Review and Assessment Helpdesk spreadsheet of national co-location sites for this laboratory methodology. This is calculated as 0.9 (update 05/09) based on 18 studies<sup>11</sup>. For 2006 and 2007 data, the bias adjustment factors were 0.89 for 2007 and 0.98 for 2006.

---

<sup>11</sup> <http://www.uwe.ac.uk/aqm/review/mR&Asupport09.html#Bias Adjustment>



**Table 4– Details of Non- Automatic Monitoring Sites**

Site No.	Location	Site Type	X	Y	Pollutant monitored	In AQMA?	Relevant Exposure ? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
HM39	Shenley Road	K	519406	196645	NO <sub>2</sub>	N	Y-9.7m	<1m	Y
HM40	Essex Road Borehamwood	K	519200	196800	NO <sub>2</sub>	N	N	<1m	Y
HM41	Boulevard Borehamwood	K	519021	196619	NO <sub>2</sub>	N	Y-6m	<1m	Y
HM43	Stirling Corner Borehamwood	K	520800	195300	NO <sub>2</sub>	N	N	<1m	Y
HM45/46/47	AQMS (triplicate)	B	520147	197357	NO <sub>2</sub>	N	Y-17.7m	N/A	N
HM48	Elstree Crossroads 1	K	517798	195272	NO <sub>2</sub>	Y	N	<1m	Y
HM49	Elstree Crossroads 2	K	517843	195338	NO <sub>2</sub>	N	Y-4m	<1m	Y
HM50	Elstree Crossroads 3	K	517862	195226	NO <sub>2</sub>	N	Y-6.5m	<1m	Y
HM51/52	Elstree Crossroads 4/5 (duplicate)	K	517803	195249	NO <sub>2</sub>	Y	Y-0m	<1m	Y
HM53	Caldecote Lane Bushey Heath	B	515600	195100	NO <sub>2</sub>	N	Y-2.9m	N/A	Y
HM54	High Road Bushey	K	514600	194300	NO <sub>2</sub>	N	Y-15.9m	<1m	Y
HM55	Highwood Avenue Bushey garages	B	512600	197800	NO <sub>2</sub>	N	Y-36.7m	N/A	N
HM57	12 Hartspring Lane Aldenham Bushey	K	513516	197818	NO <sub>2</sub>	Y	Y-10m	<1m	Y
HM58	Pegmire Lane Aldenham	K	514000	197400	NO <sub>2</sub>	N	-	<1m	Y
HM59	Aldenham Grove Radlett	K	516500	200200	NO <sub>2</sub>	N	Y-8m	<1m	Y
HM60	Bell Lane London Colney	K	518400	202800	NO <sub>2</sub>	N	Y-6m	<1m	Y
HM61	Blanche Lane South Mimms	K	522100	200700	NO <sub>2</sub>	Y	Y-32m	<1m	Y
HM62	The Broad way Potters Bar 1	K	524945	201163	NO <sub>2</sub>	Y	Y-7m	<1m	Y
HM63	Dove Lane Potters Bar	K	526100	200000	NO <sub>2</sub>	Y	Y-12.9m	<1m	
HM64	Bus Garage 1 Potters Bar	K	526207	201452	NO <sub>2</sub>	Y	N	<1m	Y
HM65	Hatfield Road Potters Bar	K	526252	201597	NO <sub>2</sub>	N	Y-5m	<1m	Y
HM66	Bus Garage 2 Potters Bar	K	526245	201458	NO <sub>2</sub>	Y	Y-8.4m	<1m	Y
HM67/68	Bus Garage 3/4 Potters Bar (duplicate)	K	526211	201400	NO <sub>2</sub>	Y	Y-0.5m	<1m	Y

**Table 4– Details of Non- Automatic Monitoring Sites (Continued)**

Site No.	Location	Site Type	X	Y	Pollutant monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
HM69	Southgate Road Potters Bar	K	526033	200838	NO <sub>2</sub>	N	Y-14m	<1m	Y
HM70	Park Avenue Potters Bar	K	526400	200400	NO <sub>2</sub>	N	Y-7.8m	<1m	Y
HM71/72/73	Park Road junction Radlett (triplicate)	R	516295	200035	NO <sub>2</sub>	N	Y-4m	1m	Y
HM74/75/76	301 Watling Street Radlett (triplicate)	R	516406	199621	NO <sub>2</sub>	N	Y-10.8m	3m	N
HM77/78	The Broadway Potters Bar 2/3 (duplicate)	K	524945	201163	NO <sub>2</sub>	Y	Y-7m	<1m	Y
HM79/80/81	11 The Broadway Potters Bar (Triplicate)	R	524973	201140	NO <sub>2</sub>	Y	Y6m	4m	N
HM82/83/84	10 Baker Street Potters Bar (Triplicate)	R	524922	201079	NO <sub>2</sub>	Y	Y-9.8m	2.8m	N
HM85	Andrew Close Shenley	B	518595	200936	NO <sub>2</sub>	N	Y-4.1m	N/A	N
HM86	Charleston Paddocks South Mimms	M/way	522997	199991	NO <sub>2</sub>	Y	N	48.2m	N
HM87	Elstree Way BP Garage Borehamwood	R	520955	196962	NO <sub>2</sub>	N	N	2.4m	N
HM88	Barnet Lane Elstree	R	520103	195452	NO <sub>2</sub>	N	Y-17.8m	7.2m	N
HM89	Hartfield Ave Elstree	B	519222	195429	NO <sub>2</sub>	N	Y-0m	N/A	N
HM90	Warrengate Road Potters Bar	R	523283	201933	NO <sub>2</sub>	N	-	-	-
HM91	Mutton Lane Potters Bar	R	523628	201791	NO <sub>2</sub>	N	Y-7.1m	2.3m	N
HM92	The Avenue Potters Bar	K	525212	201800	NO <sub>2</sub>	N	Y-9.6m	<1m	Y
HM93	103 Baker Street Potters Bar	R	524557	200638	NO <sub>2</sub>	N	Y-12.9m	4m	N
HM94	Sawyers Lane Potters Bar	B	524042	200643	NO <sub>2</sub>	N	Y-0m	N/A	N
HM95	Cowley Hill Borehamwood	K	519946	197760	NO <sub>2</sub>	N	Y-8.6m	<1m	Y
HM96	Rowley Lane Borehamwood	K	520645	197768	NO <sub>2</sub>	N	Y-21.5m	<1m	Y
HM97	Heath Drive Potters Bar	B	525056	202000	NO <sub>2</sub>	N	Y-0m	N/A	N
HM98	Sunny Bank Road Potters Bar	B	525553	200407	NO <sub>2</sub>	N	Y-0m	N/A	N

## 3.2 Comparison of Monitoring Results with AQ Objectives

### 3.2.1 Nitrogen dioxide

#### 3.2.1.1 Automatic Monitoring Data

The 2008 data shows the prescribed objectives for LAQM are being met at the Borehamwood urban background site. AQS objectives for ozone were exceeded.

**Table 5– Results of Automatic Monitoring for Nitrogen dioxide: Comparison with Annual Mean Objective**

Site ID	Location	Within AQMA?	Description	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ )		
				2006	2007	2008
HM4	Hertsmere Borehamwood background	No	Annual Mean $\text{NO}_2 > 40 \mu\text{g}/\text{m}^3$	24	22	25
			$\text{NO}_2$ Hourly Mean $> 200 \mu\text{g}/\text{m}^3$ for more than 18 times per year	0	0	0
			% Data Capture	(44)	96	(84)

\*Data for all years has been fully ratified.

Exceedences of the air quality objectives are shown in bold. Data capture less than the recommended 90% is shown in brackets.

#### 3.2.1.2 Diffusion Tube Monitoring Data

The nitrogen dioxide diffusion tube data are summarised in the table below. The full dataset (monthly mean values) are included in Appendix 2.

The 2008 diffusion tube results show nineteen sites exceeding the annual mean  $\text{NO}_2$  objective. Of these, six are within the existing AQMAs and a further two are within an area (The Broadway, Potters Bar) that underwent a Detailed Assessment in 2007 i.e. an emerging AQMA. The remaining eleven sites are roadside sites which have been considered with respect to relevant exposure and projection from roadside to façade using the LAQM.TG(09)  $\text{NO}_2$  with distance from roads calculator to assess the risk of exceedence of the annual mean objective. Five of the eleven sites are in locations, which are not representative of relevant exposure for the annual mean objective. Six sites have relevant exposure nearby and therefore have been assessed using the  $\text{NO}_2$  with distance from roads calculator.

Sites exceeding outside AQMAs, with no relevant exposure:

- HM 39 Shenley Road
- HM43 Stirling Corner Borehamwood
- HM48 Elstree Crossroads 1
- HM64 Bus Garage 1 Potters Bar
- HM87 Elstree Way BP Garage Borehamwood

It is recommended that the Council consider these locations with respect to re-locating to sites more representative of relevant exposure.

Sites exceeding outside AQMAs, with nearby relevant exposure:

- HM49 Elstree Crossroads 2 (Projected to façade -  $42\mu\text{g}/\text{m}^3$ )
- HM50 Elstree Crossroads 3 (Projected to façade -  $43\mu\text{g}/\text{m}^3$ )

- HM65 Hatfield Road Potters Bar (Projected to façade -  $42\mu\text{g}/\text{m}^3$ )
- HM66 Bus Garage 2 Potters Bar (Projected to façade -  $40\mu\text{g}/\text{m}^3$ )
- HM69 Southgate Road Potters Bar (Projected to façade -  $49\mu\text{g}/\text{m}^3$ )
- HM71/72/73 Park Road junction Radlett (triplicate) (Projected to façade -  $41\mu\text{g}/\text{m}^3$ )

The assessment of  $\text{NO}_2$  with distance from roads has indicated a risk of exceedence of the annual mean objective at these six locations. It is therefore recommended that the Council proceed to a detailed assessment at these locations.

With respect to the hourly  $\text{NO}_2$  objective, there could be a potential risk of exceedence of this short-term objective, where the annual mean  $\text{NO}_2$  concentration is  $>60\mu\text{g}/\text{m}^3$ . There are two monitoring sites in the borough with concentrations of  $60\mu\text{g}/\text{m}^3$  and above. These are at the worst-case kerbside locations and not at locations where members of the public are likely to be present at the roadside for the averaging period of the objective.

**Table 6– Results of nitrogen dioxide diffusion tubes ( $\mu\text{g}/\text{m}^3$ )**

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) adjusted for bias		
				2006 (Bias factor: 0.98)	2007 (Bias factor: 0.89)	2008 (Bias factor: 0.92)
HM39	Shenley Road	No	75	-	-	52
HM40	Essex Road Borehamwood	No	100	29	26	29
HM41	Boulevard Borehamwood	No	100	38	36	38
HM43	Stirling Corner Borehamwood	No	100	52	51	56
HM45/46/47	AQMS (triplicate)	No	100	29	27	28
HM48	Elstree Crossroads 1	Yes	83	39	42	41
HM49	Elstree Crossroads 2	N	75	38	43	45
HM50	Elstree Crossroads 3	N	100	52	54	56
HM51/52	Elstree Crossroads 4/5 (duplicate)	Yes	100	60	59	58
HM53	Caldecote Lane Bushey Heath	No	100	25	23	24
HM54	High Road Bushey	No	92	32	32	33
HM55	Highwood Avenue Bushey garages	No	100	27	26	24
HM57	12 Hartspring Lane Aldenham Bushey	Yes	100	48	43	46
HM58	Pegmire Lane Aldenham	No	100	32	34	32
HM59	Aldenham Grove Radlett	No	100	25	22	25
HM60	Bell Lane London Colney	No	100	37	37	35
HM61	Blanche Lane South Mimms	Yes	100	53	53	54
HM63	Dove Lane Potters Bar	Yes	100	45	42	45
HM64	Bus Garage 1 Potters Bar	Yes	100	56	62	62
HM65	Hatfield Road Potters Bar	No	92	50	52	48
HM66	Bus Garage 2 Potters Bar	Yes	100	43	45	45
HM67/68	Bus Garage 3/4 Potters Bar (duplicate)	Yes	83	43	43	42
HM69	Southgate Rd Potters Bar	No	100	60	59	57
HM70	Park Avenue Potters Bar	No	58*	39	36	30
HM71/72/73	Park Road junction Radlett (triplicate)	No	100	-	47	50
HM74/75/76	301 Watling Street Radlett (triplicate)	No	100	-	37	38
HM62/77/78	The Broadway Potters Bar (triplicate)	Yes	100	-	48	48
HM79/80/81	11 The Broadway Potters Bar (Triplicate)	Yes	67*	-	-	45
HM82/83/84	10 Baker Street Potters Bar (Triplicate)	Yes	83	-	40	38
HM85	Andrew Close Shenley	No	50*	-	-	25
HM86	Charleston Paddocks South Mimms	Yes	42*	-	-	55
HM87	Elstree Way BP Garage Borehamwood	No	92	-	-	44
HM88	Barnet Lane Elstree	No	100	-	-	34
HM89	Hartfield Ave Elstree	No	83	-	-	24
HM90	Warren Gate Road Potters Bar	No	100	-	-	35
HM91	Mutton Lane Potters Bar	No	100	-	-	32
HM92	The Avenue Potters Bar	No	100	-	-	24

**Table 6– Results of nitrogen dioxide diffusion tubes ( $\mu\text{g}/\text{m}^3$ )**

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) adjusted for bias		
				2006 (Bias factor: 0.98)	2007 (Bias factor: 0.89)	2008 (Bias factor: 0.92)
HM93	103 Baker Street Potters Bar	No	100	-	-	34
HM94	Sawyers Lane Potters Bar	No	17*	-	-	26
HM95	Cowley Hill Borehamwood	No	75	-	-	25
HM96	Rowley Lane Borehamwood	No	83	-	-	22
HM97	Heath Drive Potters Bar	No	83	-	-	23
HM98	Sunny Bank Road Potters Bar	No	67*	-	-	28

### 3.2.2 Particles ( $\text{PM}_{10}$ )

There is currently continuous monitoring of particles ( $\text{PM}_{10}$ ) undertaken by Hertsmere Borough Council at one location in the area, Borehamwood background site, using a Tapered Element Oscillating Microbalance (TEOM). The Quality Assurance/Quality Control (QA/QC) procedures for the site are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures.

LAQM.TG (09) sets out the calculation required for TEOM results using the Volatile Correction Model (VCM) to estimate gravimetric equivalent. This replaces use of the previous 1.3 factor. Data for 2008 has been corrected using the VCM model. Data for previous years has been taken from previous LAQM reports and uses the 1.3 calculation.

**Table 7– Summary Sheet from Volatile Correction Model**

Summary	Text /Value
Site Name	Hertsmere Borehamwood 2 (Background)
Organisation	Herts & Beds
Start Date	01/01/2008
End Date	01/01/2009
TEOM data already corrected with 1.3 factor	No
EPA Constant A	3
EPA Constant B	1.030
Instrument Temperature	25
Instrument Pressure	1013
Instrument reports to local ambient readings	No
Timescale	Daily
Pressure Site	Broxbourne (Roadside) (BB1)
Pressure Site Warning	
Temperature Site	Broxbourne (Roadside) (BB1)
Temperature Site Warning	
FDMS Site 1	Tower Hamlets 4 - Blackwall (TH4)
FDMS Site 1 Warning	Correction includes unratified data.
FDMS Site 2	Bexley 7 (F) - Thames Rd North (BX6)
FDMS Site 2 Warning	Correction includes unratified data.
FDMS Site 3	Chichester Roadside FDMS (CI3)
FDMS Site 3 Warning	Correction includes unratified data.

The 2008 results in Tables 8 and 9 below show that the PM<sub>10</sub> objectives are continuing to be met at this site. Data for all years has been fully ratified. For 2008, data is VCM corrected; data in brackets shows the annual mean corrected by 1.3, as per previous methodology. Data for previous years is shown for comparison purposes and has the 1.3 correction factor applied.

**Table 8– Results of PM<sub>10</sub> Automatic Monitoring: Comparison with Annual Mean Objective**

Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m <sup>3</sup> )		
			2006	2007	2008
Hertsmere Borehamwood Background	No	85	22	20	18 (19)

**Table 9– Results of PM<sub>10</sub> Automatic Monitoring: Comparison with 24-hour Mean Objective**

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of 24-hour mean (50 µg/m <sup>3</sup> )		
			2006	2007	2008
Hertsmere Borehamwood Background	No	85	5	6	3 (2)

\*Data capture < 90%; the 90<sup>th</sup> %ile of hourly means is 32µg/m<sup>3</sup>.

## 4 Road Traffic Sources

The air quality assessment for road traffic emissions sources has been undertaken using the Highways Agency's DMRB<sup>1</sup> model. The DMRB inputs and results are shown in Appendices 3 - 5.

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

The criteria for narrow congested streets are listed below:

- Daily traffic flow (AADT) should be around 5,000 vehicles/day or more.
- A congested street will be one with slow moving traffic that is frequently stopping and starting due to pedestrian crossings, parked vehicles etc throughout much of the day (not just during rush hours). The average speed is likely to be less than about 25 kph (15 mph).
- A narrow street will be one with residential properties within 2 m of the kerb, and buildings on both sides of the road (the buildings on the other side of the road can be further from the road than 2 m).

The assessment need only consider nitrogen dioxide.

The Council has identified four areas as narrow congested streets, which may meet these criteria:

- High Street at Elstree Crossroads, Elstree
- Darkes Lane, Potters Bar
- High Street/Barnet Road near junction with Southgate Road, Potters Bar
- Bushey High Street, Bushey

Elstree Crossroads has been previously assessed and an AQMA has been declared at the junction. Monitoring in 2008 on High Street and Barnet Lane indicates that the area of exceedence of the annual mean NO<sub>2</sub> objective may be larger than currently declared. It is therefore recommended that the Council proceed to a Detailed Assessment at this location.

Darkes Lane at its junction with Mutton Lane (The Broadway) has been previously assessed through a detailed assessment and monitoring confirms the risk of exceedence of the annual mean objective at this location. This is an emerging AQMA, soon to be declared.

The junction of High Street/Barnet Road/Southgate Road, Potters Bar has already been highlighted as an area of potential exceedence of the NO<sub>2</sub> annual mean through monitoring data (Section 3.2.1.2). It is therefore recommended that the Council proceed to a Detailed Assessment at this location.

High Street Bushey has been assessed through the DMRB model. The predicted results indicate that the annual mean NO<sub>2</sub> objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m<sup>3</sup>. However, it is recommended that monitoring be undertaken to confirm compliance with the objective.

Hertsmere Borough Council have assessed narrow congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, and have concluded that **it will be necessary to proceed to a detailed assessment.**

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

Shenley Road, Borehamwood has been identified as a busy street with shops and cafes where people may spend 1-hour or more close to traffic. Monitoring is undertaken at the kerbside, which in



2008 showed levels of  $52\mu\text{g}/\text{m}^3$  i.e. below the  $60\mu\text{g}/\text{m}^3$  threshold that would indicate a risk of exceedence of the hourly objective.

Hertsmere Borough Council has assessed busy streets where people may spend 1 hour or more close to traffic and concluded that it will not be necessary to proceed to a detailed assessment.

### 4.3 Roads with a high flow of buses and/or Heavy Goods Vehicles

Traffic data assessed for the Updating and Screening Assessment show two roads with high flows of buses and heavy goods vehicles >20%:

- M1 Junction 4-5, Bushey
- A1 Barnet Bypass, Dyrham Park

The nearest relevant exposure to these roads have been assessed through DMRB. The model predictions indicate a risk of exceedence of the annual mean  $\text{NO}_2$  objective outside an AQMA near the M1 at Bushey. It will therefore be necessary to proceed to a Detailed Assessment at this location. Prescribed objectives are predicted to be met at the nearest receptors to the A1 Barnet Bypass, Dyrham Park.

Hertsmere Borough Council has assessed roads with high flows of buses and/or heavy goods vehicles and concluded that **it will be necessary to proceed to a detailed assessment.**

### 4.4 Junctions

Hertsmere Borough Council has identified three busy junctions where there is relevant exposure:

- Elstree Crossroads (High Street/Barnet Road)
- Southgate Road/Barnet Road Junction, Potters Bar
- Watling Street/Aldenham Road Junction, Radlett

The Elstree Crossroads junction is already declared as an AQMA. However, monitoring in 2008 on the High Street and Barnet Lane (outside the AQMA) indicates that the extent of the AQMA may need to be extended to incorporate a larger area of relevant exposure. It will be necessary to proceed to a Detailed Assessment at this location.

Monitoring undertaken in 2008 at the Southgate Road/Barnet Road Junction, Potters Bar indicate there is a risk of exceedence of the annual mean  $\text{NO}_2$  objective at relevant receptor locations. It will be necessary to proceed to a Detailed Assessment at this location.

Roadside monitoring undertaken in 2008 on Watling Street, near the Watling Street/Aldenham Road Junction, indicate concentrations below the objective ( $38\mu\text{g}/\text{m}^3$ ), although this is not the worst case location with respect to relevant exposure at the junction. Additionally, north of this junction on Watling Street (at the junction with Park Road),  $\text{NO}_2$  concentrations are predicted to exceed the annual mean objective at relevant receptor locations. It will therefore be necessary to proceed to a Detailed Assessment at this location. There is insufficient traffic data to assess the Watling Street/Aldenham Road junction through DMRB. It is therefore recommended that additional monitoring be installed at

the nearest relevant exposure to this junction and prior to a Detailed Assessment being undertaken, a traffic count be undertaken.

Hertsmere Borough Council has assessed busy junctions and concluded that **it will be necessary to proceed to a detailed assessment.**

#### 4.5 New roads constructed or proposed since the last round of Review and Assessment

Hertsmere Borough Council confirms that there are no new/proposed roads.

#### 4.6 Roads with significantly changed traffic

Traffic data assessed for the USA, and compared with the previous round's USA data, show no roads with significantly changed traffic flows of more than 25%. The highest % increase was 15% on A1081 St Albans Road, Potters Bar. Future changes in traffic flows are expected from proposed development in the area, including the M25 Widening (opening year 2012). The air quality impact assessment for the M25 Widening predicts no significant impact on air quality ( $<1\mu\text{g}/\text{m}^3$  on the annual mean  $\text{NO}_2$ ) in the borough.

Hertsmere Borough Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

#### 4.7 Bus and coach stations

The assessment considers both nitrogen dioxide and  $\text{PM}_{10}$  emissions at bus stations that are not enclosed with  $>2500$  movements per day. There are no new bus stations or significant changes since the last round of review and assessment.

Hertsmere Borough Council confirms that there are no relevant bus stations in the Local Authority area.

## 5 Other Transport Sources

### 5.1 Airports

The assessment for airports considers nitrogen dioxide. If there are no airports in the Local Authority area, there is no need to proceed further with this part.

Hertsmere Borough Council confirms that there are no airports in the Local Authority area.

### 5.2 Railways (diesel and steam trains)

The assessment for stationary trains considers sulphur dioxide emissions, while the assessment for moving diesel trains considers nitrogen dioxide emissions. If there are no railways carrying diesel or steam trains in the Local Authority area, there is no need to proceed further with this part.

#### 5.2.1 Stationary Trains

Hertsmere Borough Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

#### 5.2.2 Moving Trains

Hertsmere Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

### 5.3 Ports (shipping)

The assessment for shipping considers sulphur dioxide emissions at busy ports with 5,000 and 15,000 movements per year and relevant exposure within 250 metres. If there are no ports or shipping, there is no need to proceed further with this part. In the Hertsmere borough, there is a small port at Whitstable, but there are considerably less than 5000 movements per year.

Hertsmere Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

## 6 Industrial Sources

### 6.1 Industrial Installations

The assessment of industrial installations considers all of the regulated pollutants, although those most at risk of requiring further work are sulphur dioxide, NO<sub>2</sub>, PM<sub>10</sub> and benzene. A list of industrial processes in the borough is provided in Appendix 6.

#### 6.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out

Hertsmere Borough Council confirms that there are no new or proposed industrial installations for which an air quality assessment has been carried out.

#### 6.1.2 Existing Installations where emissions have increased substantially or new relevant exposure has been introduced

Hertsmere Borough Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

#### 6.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

There are twenty-two new Part B processes permitted by Hertsmere Borough Council since the last round of review and assessment. These include a mobile crusher, a petrol station, two vehicle resprayers and eighteen dry cleaners. There are no significant emission releases from these processes relevant to the AQS objectives.

Hertsmere Borough Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### 6.2 Major fuel (petrol) storage depots

The assessment considers benzene, with respect to the 2010 objective.

There are no major fuel (petrol) storage depots within the Local Authority area.

### 6.3 Petrol stations

The assessment considers benzene, with respect to the 2010 objective. Large petrol stations, where annual throughput is more than 2000 m<sup>3</sup> of petrol (2 million litres per annum), and with a busy road nearby of >30000 annual average daily traffic flows, require consideration with respect to relevant exposure.

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

### 6.4 Poultry farms

Farms housing in excess of: 400,000 birds if mechanically ventilated, 200,000 birds if naturally ventilated, and 100,000 birds for any turkey unit, require consideration in this assessment, to establish whether there is relevant exposure within 100m of the poultry units. The assessment needs to consider only PM<sub>10</sub>.

Hertsmere Borough Council confirms that there are no poultry farms in the local authority area meeting the specified criteria.

## 7 Commercial and Domestic Sources

### 7.1 Biomass combustion

#### 7.1.1 Biomass combustion - individual installations

The assessment considers both PM<sub>10</sub> and nitrogen dioxide objectives.

Hertsmere Borough Council confirms that there are no biomass combustion plants in the Local Authority area which meet this criteria.

#### 7.1.2 Biomass combustion – combined impacts (PM<sub>10</sub> emissions)

Hertsmere Borough Council confirms that there are no biomass combustion plants in the Local Authority area which meet this criteria.

### 7.2 Domestic solid-fuel burning (sulphur dioxide emissions)

The assessment considers sulphur dioxide emissions (only) from significant areas of residential properties that use solid fuel to heat their houses. ‘Significant’ areas are those of about 500 x 500 m with more than 50 houses burning coal/smokeless fuel as their primary source of heating. PM<sub>10</sub> from domestic solid fuel burning is covered under the Biomass combustion – combined impacts section above.

Hertsmere Borough Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

## 8 Fugitive or Uncontrolled Sources

The assessment of fugitive and uncontrolled sources considers the PM<sub>10</sub> objectives. This included consideration to quarries, landfill sites, opencast coal mining, waste transfer sites, and materials handling (i.e. ports, major construction sites). Only locations not covered by previous rounds of review and assessment, or where there is new relevant exposure, require consideration. In the case of proposed new sources, these are only required to be considered if planning approval has been granted.

One new waste transfer station has been identified on Cranborne Road Industrial Estate Potters Bar (x=523987, y=202368) which has been granted planning approval. This site has no residential exposure within 200m of the site and background concentrations are below the 26µg/m<sup>3</sup> threshold for relevant exposure within 400m (20µg/m<sup>3</sup> in 2008). This source is therefore unlikely to have significant local air quality impacts.

There have been no substantial changes, new exposure or any dust complaints with respect to existing processes.

Hertsmere Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

## 9 Conclusions and Proposed Actions

### 9.1 Conclusions from new monitoring data

The USA review of new monitoring data, has shown that exceedences continue to occur in the Hertsmere six AQMAs and in the emerging AQMA at The Broadway, Potters Bar.

Outside the AQMAs, exceedences of the annual mean NO<sub>2</sub> objective were measured at six monitoring sites, where there is nearby relevant exposure:

- HM49 Elstree Crossroads 2
- HM50 Elstree Crossroads 3
- HM65 Hatfield Road Potters Bar
- HM66 Bus Garage 2 Potters Bar
- HM69 Southgate Road Potters Bar
- HM71/72/73 Park Road junction Radlett (triplicate)

The assessment of NO<sub>2</sub> with distance from roads has indicated a risk of exceedence of the annual mean objective at these six locations. It is therefore recommended that the Council proceed to a detailed assessment for annual mean NO<sub>2</sub>.

### 9.2 Conclusions from assessment of sources

The USA has reviewed new and significantly changed sources in the borough.

#### 9.2.1 Road Sources

High Street Bushey has been identified as a narrow congested street and has been assessed using the DMRB model. The predicted results indicate that the annual mean NO<sub>2</sub> objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m<sup>3</sup>. However, it is recommended that monitoring be undertaken to confirm compliance with the objective.

Traffic data assessed for the USA showed two roads with high flows of buses and heavy goods vehicles >20%: M1 Junction 4-5, Bushey and A1 Barnet Bypass, Dyrham Park. The nearest relevant exposure to these roads have been assessed through DMRB. The model predictions indicate a risk of exceedence of the annual mean NO<sub>2</sub> objective outside an AQMA near the M1 at Bushey. It will therefore be necessary to proceed to a detailed assessment at this location. Prescribed objectives are predicted to be met at the nearest receptors to the A1 Barnet Bypass, Dyrham Park.

Three busy junctions have been identified, which have nearby relevant exposure: Elstree Crossroads (High Street/Barnet Road), Southgate Road/Barnet Road Junction, Potters Bar and Watling Street/Aldenham Road Junction, Radlett.

The Elstree Crossroads junction has already been declared as an AQMA. However, monitoring in 2008 on the High Street and Barnet Lane (outside the AQMA) indicates that the extent of the AQMA may need to be extended to incorporate a larger area of relevant exposure. It will be necessary to proceed to a Detailed Assessment at this location.

Monitoring undertaken in 2008 at the Southgate Road/Barnet Road Junction, Potters Bar indicate there is a risk of exceedence of the annual mean NO<sub>2</sub> objective at relevant receptor locations. It will be necessary to proceed to a Detailed Assessment at this location.



Roadside monitoring undertaken in 2008 near the Watling Street/Aldenham Road Junction, on Watling Street indicate concentrations below the objective ( $38\mu\text{g}/\text{m}^3$ ), although this is not the worst case location with respect to relevant exposure at the junction. Additionally, north of this junction on Watling Street (at the junction with Park Road),  $\text{NO}_2$  concentrations are predicted to exceed the annual mean objective at relevant receptor locations. It will therefore be necessary to proceed to a Detailed Assessment at this location. There is insufficient traffic data to assess the Watling Street/Aldenham Road junction through DMRB. It is therefore recommended that additional monitoring be installed at the nearest relevant exposure to this junction and prior to a detailed assessment being undertaken, a traffic count be undertaken.

### 9.2.2 Other Sources

There are no significant new or substantially changed sources that warrant a detailed assessment.

## 9.3 Proposed Actions

Proposed actions arising from the Updating and Screening Assessment are as follows:

- Undertake additional monitoring of  $\text{NO}_2$  at relevant receptor locations at High Street, Bushey and Watling Street/Aldenham Road junction, Radlett;
- Proceed to a detailed assessment of annual mean  $\text{NO}_2$  at the following locations:
  - Elstree Crossroads, Elstree (Barnet Lane and High Street)
  - Potters Bar, including the junction of Barnet Road/Southgate Road/High Street and the High Street, near the bus station and junction of the High Street with The Causeway.
  - Radlett, including the junctions of Watling Street/Aldenham Road and Watling Street/Park Road.
  - M1 Bushey, at Hartspring Lane.
- Progress to a 2010 Annual Progress Report by April 2010.

## 10 References

- Highways Agency's Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 1 Air Quality, May 2007, and accompanying spreadsheet DMRB Screening Method V1,03.xls. July 2007
- Local Air Quality Management Technical Guidance LAQM.TG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Local Air Quality Management Policy Guidance LAQM.PG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Hertsmere Borough Council 2008 Local Air Quality Management Annual Progress Report
- Hertsmere Borough Council 2007 Local Air Quality Management Annual Progress Report
- Hertsmere Borough Council 2006 Local Air Quality Management Updating and Screening Assessment

## APPENDICES

### Appendix 1 - Traffic data

Site Ref	Data source	Location	X	Y	%HDV *	AADT 2008	AADT 2005	Speed (kph)	Previously Assessed?	Substantial change since USA 2006 (25%)?	Assessed in USA 2009 using DMRB?	Reason for assessment
100	HCC	M1 Junction 4-5, Bushey	-	-	22.5	79094	89906	-	Yes	No	Yes	High HDV
111	HCC	A1 Barnet Bypass, Dyrham Park	-	-	24.1	64060	61918	-	Yes	No	Yes	High HDV
112	HCC	A1 (M) Junction 1-2, South Mimms	-	-	-	69869	67890	-	Yes	No	No	N/A
120	HCC	A5183 Elstree Hill North, Elstree	-	-	-	14390	13431	-	Yes	No	No	N/A
121	HCC	A5183 Watling St, Radlett	-	-	12.2	10277	10063	-	Yes	No	No	N/A
151	HCC	A41 Tylers Way, Aldenham	-	-	-	22497	23006	-	Yes	No	No	N/A
152	HCC	A41 Otterspool Way, Bushey	-	-	-	45393	46258	-	Yes	No	No	N/A
200	HCC	A111 Southgate Road, Potters Bar	-	-	-	22400	19946	-	Yes	No	No	N/A
209	HCC	A411 London Rd, Bushey	-	-	13.7	16706	17610	29.6	Yes	No	No	N/A
210	HCC	A411 Elstree Rd, Bushey	-	-	-	10459	10599	-	Yes	No	No	N/A
211	HCC	A411 Elstree Rd, Bushey	-	-	-	15337	14917	-	Yes	No	No	N/A
212	HCC	A411 Barnet Lane, Borehamwood	-	-	-	22914	21626	-	Yes	No	No	N/A
245	HCC	A1000 Barnet Rd, Potters Bar	-	-	-	9364	10134	-	Yes	No	No	N/A
251	HCC	A1081 St Albans Road, Potters Bar	-	-	-	12754	11063	-	Yes	No	No	N/A
268	HCC	A409 Heathbourne Rd, Bushey	-	-	-	15739	15933	-	Yes	No	No	N/A
314	HCC	B462 Aldenham Rd, Bushey	-	-	-	17292	15903	-	Yes	No	No	N/A
315	HCC	B462 Hartspring Lane, Bushey	-	-	-	16978	15292	-	Yes	No	No	N/A

\*Heavy-duty vehicles (HDV) >20% is considered as an unusually high proportion, which would warrant assessment if not previously considered.

**Appendix 1 (Continued) - Traffic data**

Site Ref	Data source	Location	X	Y	%HDV *	AADT 2008	AADT 2005	Speed (kph)	Previously Assessed?	Substantial change since USA 2006 (25%)?	Assessed in USA 2009 using DMRB?	Reason for assessment
325	HCC	B556 Bell Lane, London Colney	-	-	-	12233	11920	-	Yes	No	No	N/A
327	HCC	B556 Cecil Road, Potters Bar	-	-	16.4	10425	10093	-	Yes	No	No	N/A
359	HCC	A5135 Elstree Way, Borehamwood	-	-	-	16440	15701	27.3	Yes	No	No	N/A
379	HCC	B5378 Allum Lane, Borehamwood	-	-	-	11537	11107	29.6	Yes	No	No	N/A
465	HCC	C85 Theobald Street, Borehamwood	-	-	-	9789	9426	34.4	Yes	No	No	N/A
517	HCC	A4140 High Road, Bushey	-	-	-	15852	15563	-	Yes	No	No	N/A
544	HCC	A411 Barnet Lane, Borehamwood	-	-	-	16107	15364	-	Yes	No	No	N/A
547	HCC	C85 Furzehill Road, Borehamwood	-	-	-	11333	11260	-	Yes	No	No	N/A
710	HCC	B5378 Black Lion Hill, Shenley	-	-	-	10860	10852	-	Yes	No	No	N/A
757	HCC	C84 Radlett Lane, Shenley	-	-	-	6589	6107	35.2	Yes	No	No	N/A
10001	HCC	B5378 Shenley Road, Borehamwood	-	-	17.2	18093	17434	-	Yes	No	No	N/A
6178	DfT	M25	521708	201110	13.9	128719	125407	-	Yes	No	No	N/A
6456	DfT	A41	513140	197800	4.3	49307	47917	-	Yes	No	No	N/A
7065	DfT	A411	515000	194610	3.6	9018	9265	-	Yes	No	No	N/A
7469	DfT	A1000	526023	200992	6.6	19831	20256	-	Yes	No	No	N/A
16001	DfT	M1	512360	200200	7.1	88280	91754	-	Yes	No	No	N/A
17026	DfT	A411	520000	195487	2.3	15266	14833	-	Yes	No	No	N/A
27095	DfT	A411	516008	195042	3.1	23073	22482	-	Yes	No	No	N/A
27539	DfT	A1081	524000	197600	5.1	9478	9290	-	Yes	No	No	N/A

\*Heavy-duty vehicles (HDV) >20% is considered as an unusually high proportion, which would warrant assessment if not previously considered.

**Appendix 1 (Continued) - Traffic data**

Site Ref	Data source	Location	X	Y	%HDV *	AADT 2008	AADT 2005	Speed (kph)	Previously Assessed?	Substantial change since USA 2006 (25%)?	Assessed in USA 2009 using DMRB?	Reason for assessment
36001	DfT	M1	514700	196100	6.1	85908	87795	-	Yes	No	No	N/A
36147	DfT	A5183	516300	200000	3.7	13660	15698	-	Yes	No	No	N/A
37538	DfT	A1000	525800	200000	5.2	12675	12418	-	Yes	No	No	N/A
37759	DfT	A4140	515000	194000	2.2	14519	14855	-	Yes	No	No	N/A
37822	DfT	A5135	520000	197045	3.1	23451	23168	-	Yes	No	No	N/A
38128	DfT	A1000	526125	202000	6.3	11374	11659	-	Yes	No	No	N/A
47100	DfT	A411	517000	195150	3.7	12463	12137	-	Yes	No	No	N/A
47578	DfT	M25	524911	200067	16.9	129527	131032	-	Yes	No	No	N/A
56432	DfT	A41	516400	195000	3.2	19381	18852	-	Yes	No	No	N/A
56466	DfT	A41	515000	195900	2.8	23865	22404	-	Yes	No	No	N/A
56641	DfT	A111	526200	200620	7.4	16257	16669	-	Yes	No	No	N/A
58089	DfT	A411	513000	195300	3.1	14737	15776	-	Yes	No	No	N/A
73483	DfT	M25	526980	200380	14.5	116585	103976	-	Yes	No	No	N/A
73484	DfT	A1005	526800	200150	4.7	13268	12409	-	No	No	Yes	Relevant Exposure
73485	DfT	A111	526720	199890	3.1	19770	19223	-	Yes	No	No	N/A
73619	DfT	A409	515610	194530	3.4	15707	15559	-	Yes	No	No	N/A
74653	DfT	A1	522390	199850	5.9	11800	11562	-	Yes	No	No	N/A
74654	DfT	A1	522440	199970	5.9	47197	46256	-	Yes	No	No	-
78279	DfT	A1000	525980	200700	5.2	14086	13785	-	Yes	No	No	-
78280	DfT	A111	526390	200400	7.4	16395	16834	-	Yes	No	No	-
78355	DfT	A41	512500	198430	3.4	32932	32394	-	Yes	No	No	-
99435	DfT	A4008	511800	197000	2.6	43836	50269	-	Yes	No	No	-

\*Heavy-duty vehicles (HDV) >20% is considered as an unusually high proportion, which would warrant assessment if not previously considered.

## Appendix 2 - Nitrogen dioxide diffusion tube results 2008

Site Ref	Location	X	Y	Site type	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Average	Corrected Annual Mean 2008
HM39	Shenley Road	519406	196645	K	-	-	61	75	66	57	48	-	45	65	64	39	58	<b>53</b>
HM40	Essex Road Borehamwood	519200	196800	K	34	47	30	36	33	22	26	24	22	36	40	42	33	30
HM41	Boulevard Borehamwood	519021	196619	K	48	56	37	44	44	34	32	31	39	44	48	48	42	39
HM43	Stirling Corner Borehamwood	520800	195300	K	65	80	52	72	96	56	54	53	49	56	60	60	63	<b>58</b>
HM45/ 46/47	AQMS (triplicate)	520147	197357	B	48	47	27	28	29	19	21	24	24	33	35	41	31	29
HM48	Elstree Crossroads 1	517798	195272	K	70	40	54	53	57	37	36	35	36	-	-	41	46	<b>42</b>
HM49	Elstree Crossroads 2	517843	195338	K	49	60	39	53	60	-	-	-	32	48	54	55	50	<b>46</b>
HM50	Elstree Crossroads 3	517862	195226	K	68	74	63	71	60	55	65	56	61	36	68	66	62	<b>57</b>
HM51/ 52	Elstree Crossroads 4/5 (duplicate)	517803	195249	K	77	76	57	64	65	69	58	66	59	52	67	70	65	<b>60</b>
HM53	Caldecote Lane Bushey Heath	515600	195100	B	28	38	22	25	32	19	19	18	29	27	31	34	27	25
HM54	High Road Bushey	514600	194300	K	35	51	30	40	48	30	28		31	28	41	43	37	34
HM55	Highwood Avenue Bushey garages	512600	197800	B	25	42	25	26	30	20	18	18	26	30	31	31	27	25
HM57	12 Hartspring Lane Aldenham Bushey	513516	197818	K	68	52	51	48	45	29	55	59	40	56	54	58	51	<b>47</b>
HM58	Pegmire Lane Aldenham	514000	197400	K	43	46	31	35	32	25	31	29	24	43	42	44	35	33
HM59	Aldenham Grove Radlett	516500	200200	K	32	36	22	45	37	18	19	18	22	27	31	25	28	25

R= Roadside, B=Background, K=Kerbside. Exceedences of the annual mean objective are highlighted in bold.

## Appendix 2 (Continued) - Nitrogen dioxide diffusion tube results 2008

Site Ref	Location	X	Y	Site type	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Average	Corrected Annual Mean 2008
HM60	Bell Lane London Colney	518400	202800	K	44	46	50	45	37	44	30	30	25	32	45	45	39	36
HM61	Blanche Lane South Mimms	522100	200700	K	77	61	51	67	41	64	57	71	37	68	61	65	60	<b>55</b>
HM62	The Broad way Potters Bar 1	524945	201163	K	67	56	49	59	61	51	52	44	37	45	57	48	52	<b>48</b>
HM63	Dove Lane Potters Bar	526100	200000	K	59	64	40	60	57	40	49	48	38	49	47	48	50	<b>46</b>
HM64	Bus Garage 1 Potters Bar	526207	201452	K	87	76	69	79	84	60	59	60	67	55	60	65	68	<b>63</b>
HM65	Hatfield Road Potters Bar	526252	201597	K	74	63	41	64	41	48	56	51	37		59	52	53	<b>49</b>
HM66	Bus Garage 2 Potters Bar	526245	201458	K	68	61	57	54	32	48	54	46	23	57	55	49	50	<b>46</b>
HM67/68	Bus Garage 3/4 Potters Bar (duplicate)	526211	201400	K	59	60	48	49	45	40	39	47	29	55	-	-	47	<b>43</b>
HM69	Southgate Rd Potters Bar	526033	200838	K	76	73	56	64	62	62	73	60	48	58	62	64	63	<b>58</b>
HM70	Park Avenue Potters Bar	526400	200400	K	60	47	42	-	-	-	-	-	25	23	43	40	40	31
HM71/72/73	Park Road junction Radlett (triplicate)	516295	200035	R	58	62	55	59	61	59	50	51	47	56	55	56	56	<b>51</b>
HM74/75/76	301 Watling Street Radlett (triplicate)	516406	199621	R	43	50	38	42	60	39	35	32	31	36	50	51	42	39
HM77/78	The Broadway Potters Bar 2/3 (duplicate)	524945	201163	K	65	67	48	56	54	54	46	48	38	60	53	64	54	<b>50</b>
HM79/80/81	11 The Broadway Potters Bar (Triplicate)	524973	201140	R	-	-	45	-	-	43	44	38	38	50	57	56	46	<b>46</b>

R= Roadside, B=Background, K=Kerbside. Exceedences of the annual mean objective are highlighted in **bold**.

## Appendix 2 (Continued) - Nitrogen dioxide diffusion tube results 2008

Site Ref	Location	X	Y	Site type	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Average	Corrected Annual Mean 2008
HM82/8 3/84	10 Baker St Potters Bar (Triplicate)	524922	201079	R	51	52	38	-	-	39	34	30	34	41	43	55	42	38
HM85	Andrew Close Shenley	518595	200936	B	-	-	-	26	28	-	-	-	25	27	33	38	30	25
HM86	Charleston Paddocks South Mimms	522997	199991	M/way	-	-	-	64	45	-	-	61	34	68	-	-	54	<b>56</b>
HM87	Elstree Way BP Garage Borehamwood	520955	196962	R	37	61	45	66	35	50	41	50	38	55	-	64	49	<b>45</b>
HM88	Barnet Lane Elstree	520103	195452	R	37	54	37	42	48	36	27	27	35	30	44	42	38	35
HM89	Hartfield Ave Elstree	519222	195429	B	34	40	26	28	24	20	17	20	21	32	-	-	26	24
HM90	Warrengate Rd Potters Bar	523283	201933	R	53	55	44	33	30	35	31	40	26	41	36	45	39	36
HM91	Mutton Lane Potters Bar	523628	201791	R	45	47	38	37	31	31	27	30	15	43	43	48	36	33
HM92	The Avenue Potters Bar	525212	201800	K	34	37	25	29	26	20	19	23	18	27	30	35	27	25
HM93	103 Baker St Potters Bar	524557	200638	R	54	55	38	38	34	26	26	32	20	41	44	45	38	35
HM94	Sawyers Lane Potters Bar	524042	200643	B	39	43	-	-	-	-	-	-	-	-	-	-	41	27
HM95	Cowley Hill Borehamwood	519946	197760	K	-	-	28	31	33	21	19	24	28	29	35	-	28	25
HM96	Rowley Lane Borehamwood	520645	197768	K	-	-	25	27	23	13	16	18	24	31	34	35	25	23
HM97	Heath Drive Potters Bar	525056	202000	B	-	-	26	29	30	16	17	19	23	30	31	33	25	23
HM98	Sunny Bank Rd Potters Bar	525553	200407	B	-	-	34	-	-	26	21	27	15	39	34	39	29	29

R= Roadside, B=Background, K=Kerbside. Exceedences of the annual mean objective are highlighted in **bold**.



### Appendix 3 - DMRB Assessment Inputs

Site Ref	Road Name	Receptor	Distance to receptor (m)	AADT (2008)	% HDV	Speed (kph)	Street canyon?	Background Concentrations		
								2008 NO <sub>x</sub> Annual Mean (µg/m <sup>3</sup> )	2008 NO <sub>2</sub> Annual Mean (µg/m <sup>3</sup> )	2008 PM <sub>10</sub> Annual Mean (µg/m <sup>3</sup> )
1	M1 Bushey	Far End	52.1	79094	22.5	112	N	30	22	20
1	M1 Bushey	Far End	17.7	16978	5.0	48	N	30	22	20
2	A1 Barnet Bypass	The Cottage, Dryham Park Farm	105	64060	24.1	112	N	31	23	20
3	A1005 The Ridgeway	Mandevyll	40.5	13268	4.7	96	N	36	26	21
4	A411 High Street Bushey	39 High Street	5.5	14737	3.1	38	Y	31	23	20

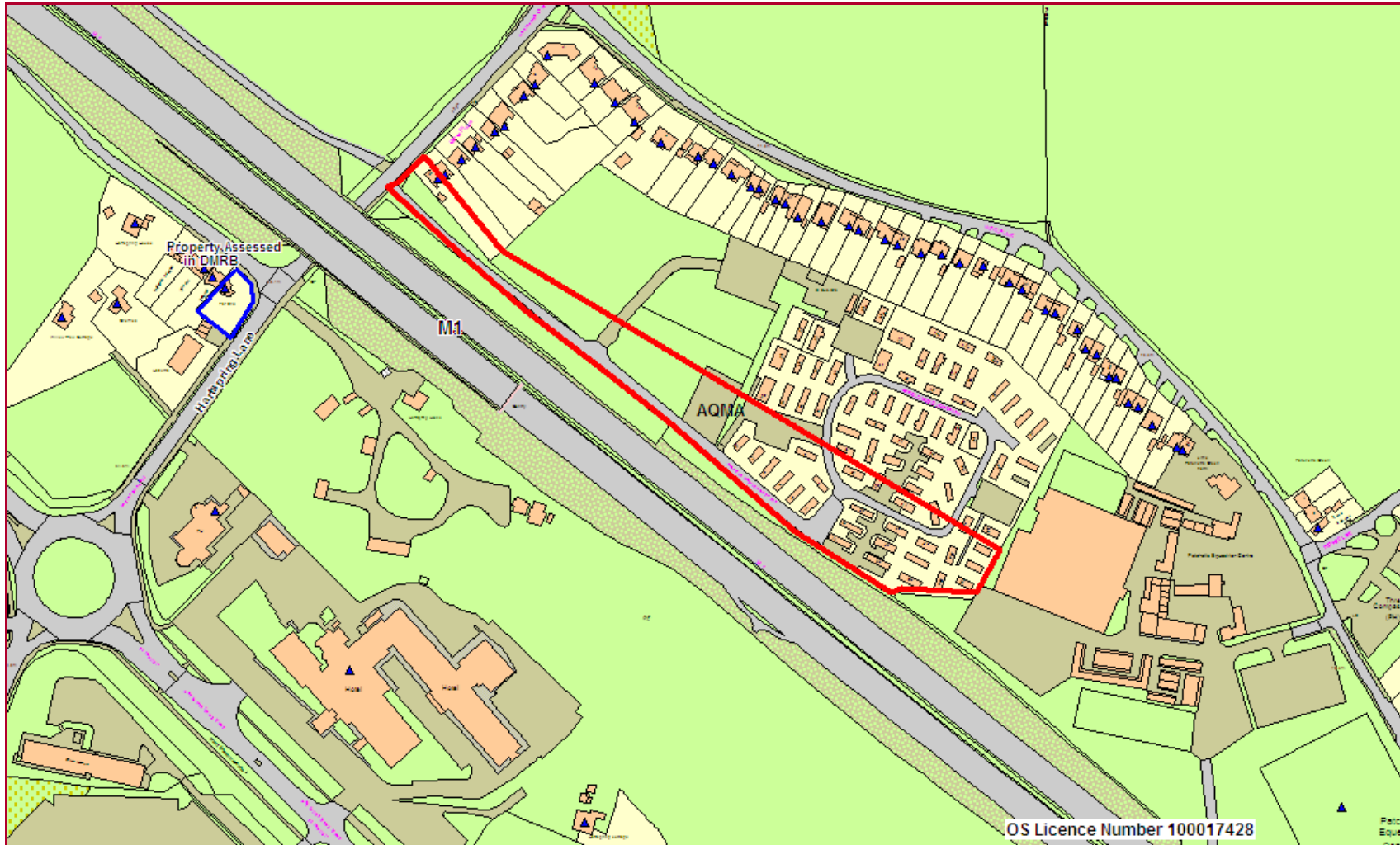
## Appendix 4 - DMRB Assessment Results

Site Ref	Road Name	Receptor	DMRB Assessment Results				Detailed assessment required?
			2008 NO <sub>x</sub> Annual Mean (µg/m <sup>3</sup> )	2008 NO <sub>2</sub> * Annual Mean (µg/m <sup>3</sup> )	2008 PM <sub>10</sub> Annual Mean (µg/m <sup>3</sup> )	2008 Number of exceedences of 24 hour PM <sub>10</sub>	
1	M1 Bushey	Far End	85	42	25	13	Yes
1	M1 Bushey	Far End	42	28	20	4	No
2	A1 Barnet Bypass	The Cottage, Dryham Park Farm	45	29	21	5	No
3	A411 High Street, Bushey	39 High Street	48	37**	22	6	No, but recommendation made for monitoring of NO <sub>2</sub>

\* NO<sub>2</sub> concentrations calculated from NO<sub>x</sub> using the LAQM.TG (09) NO<sub>x</sub>:NO<sub>2</sub> conversion calculator.

\*\* Narrow street, therefore the predicted road contribution of NO<sub>2</sub> has been doubled to assess potential street canyon characteristics.

## Appendix 5 - Maps of Locations DMRB Results indicate risk of exceedence of Air Quality Objectives



## Appendix 6 - List of Industrial Processes

Site Ref	Process Name	Process Type	PG Note	Grid Reference (X, Y)	New source since USA 2006?	Existing process with new exposure?	Substantial change >30%?	Potentially significant release with respect to AQOs?	Nomogram screening assessment required?	Detailed Assessment Required?
PPC/003	Bushey Hall Garage	Respraying road vehicles	6/34b(06)	X=512300 Y=196400	No	No	No	No	No	No
PPC/006	National Institute for Biological Standards and Control	Animal carcass incineration	5/3(04)	X=521700 Y=200300	No	No	No	Yes	No	No
PPC/010	Quinn Construction	Mobile crushing and screening	6/16(04)	X=516600 Y=200000	Yes	N/A	No	No	No	No
PPC/011/SS	ROC UK	Unloading Petrol/ Storage at Stations	1/14(06)	X=517400 Y=194500	No	No	No	No	No	No
PPC/012/SS	Tesco Stores Ltd	Unloading Petrol / Storage at Stations	1/14(06)	X=514900 Y=193900	Yes	N/A	No	No	No	No
PPC/013/SS	BP Oil UK Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=526000 Y=201000	No	No	No	No	No	No
PPC/014/SS	Total UK Ltd WD7 8HH	Unloading Petrol/ Storage at Stations	1/14(06)	X=513600 Y=197100	No	No	No	No	No	No
PPC/016/SS	Tesco Stores Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=519700 Y=196900	No	No	No	No	No	No
PPC/017/SS	Total UK Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=518900 Y=196200	No	No	No	No	No	No
PPC/020/SS	Shell UK Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=520100 Y=197000	No	No	No	No	No	No
PPC/021/SS	Total UK Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=516300 Y=200000	No	No	No	No	No	No
PPC/022/SS	Murco Petroleum Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=526000 Y=200700	No	No	No	No	No	No
PPC/023/SS	Murco Petroleum Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=522200 Y=201200	No	No	No	No	No	No
PPC/024/SS	BP Oil UK Ltd	Unloading Petrol/ Storage at Stations	1/14(06)	X=522800 Y=200200	No	No	No	No	No	No

## Appendix 6 (Continued) - List of Industrial Processes

Site Ref	Process Name	Process Type	PG Note	X, Y	New source since USA 2006?	Existing process with new exposure?	Substantial change >30%?	Potentially significant release with respect to AQOs?	Nomogram screening assessment required?	Detailed Assessment Required?
PPC/028/SS	Tesco Stores Ltd	Unloading Petrol /Storage at Stations	1/14(06)	X=525700 Y=201000	No	No	No	No	No	No
PPC/029	Scotthall Ltd	Respraying road vehicles	6/34b(06)	X=520500 Y=196900	Yes	N/A	No	No	No	No
PPC/030	MDS Accident Repair	Respraying road vehicles	6/34b(06)	X=520700 Y=196800	Yes	N/A	No	No	No	No
PPC/031/DC	JJ Dry Cleaners	Dry Cleaning	6/46(04)	X=511900 Y=196300	Yes	N/A	No	No	No	No
PPC/032/DC	IBSA Dry Cleaners	Dry Cleaning	6/46(04)	X=520400 Y=196800	Yes	N/A	No	No	No	No
PPC/031/DC	JJ Dry Cleaners	Dry Cleaning	6/46(04)	X=511900 Y=196300	Yes	N/A	No	No	No	No
PPC/033/DC	Clean Image	Dry Cleaning	6/46(04)	X=525900 Y=200800	Yes	N/A	No	No	No	No
PPC/034/DC	Bushey Exquisite Drycleaners	Dry Cleaning	6/46(04)	X=513200 Y=195200	Yes	N/A	No	No	No	No
PPC/035/DC	FM Express Drycleaners Limited	Dry Cleaning	6/46(04)	X=519200 Y=196400	Yes	N/A	No	No	No	No
PPC/036/DC	ICC Dry Cleaners	Dry Cleaning	6/46(04)	X=514800 Y=194200	Yes	N/A	No	No	No	No
PPC/037/DC	Spotclean Drycleaners	Dry Cleaning	6/46(04)	X=520300 Y=196200	Yes	N/A	No	No	No	No
PPC/039/DC	Jet Cleaners Limited	Dry Cleaning	6/46(04)	X=521500 Y=201400	Yes	N/A	No	No	No	No
PPC/040/DC	Master Care Valet Services Limited	Dry Cleaning	6/46(04)	X=526000 Y=201200	Yes	N/A	No	No	No	No
PPC/041/DC	Ocean Dry Cleaners	Dry Cleaning	6/46(04)	X=525100 Y=201500	Yes	N/A	No	No	No	No
PPC/042/DC	Sovereign Dry Cleaners	Dry Cleaning	6/46(04)	X=524900 Y=201200	Yes	N/A	No	No	No	No

**Appendix 6 (Continued) - List of Industrial Processes**

Site Ref	Process Name	Process Type	PG Note	X, Y	New source since USA 2006?	Existing process with new exposure?	Substantial change >30%?	Potentially significant release with respect to AQOs?	Nomogram screening assessment required?	Detailed Assessment Required?
PPC/043/DC	Superclean	Dry Cleaning	6/46(04)	X=516300 Y=199800	Yes	N/A	No	No	No	No
PPC/044/DC	Network Dry Cleaners	Dry Cleaning	6/46(04)	X=514800 Y=194100	Yes	N/A	No	No	No	No
PPC/045/DC	Smart Dry Cleaning	Dry Cleaning	6/46(04)	X=519200 Y=196500	Yes	N/A	No	No	No	No
PPC/046/DC	Swift One Hour Drycleaners	Dry Cleaning	6/46(04)	X=551600 Y=144700	Yes	N/A	No	No	No	No
PPC/047/DC	Swift One Hour Drycleaners	Dry Cleaning	6/46(04)	X=551900 Y=146200	Yes	N/A	No	No	No	No
PPC/048/DC	Executive Drycleaners	Dry Cleaning	6/46(04)	X=526200 Y=201500	Yes	N/A	No	No	No	No
PPC/049/DC	Clothes Care	Dry Cleaning	6/46(04)	X=513100 Y=195200	Yes	N/A	No	No	No	No