

HERTSMERE BOROUGH COUNCIL

LOCAL AIR QUALITY MANAGEMENT UPDATING AND SCREENING
ASSESSMENT 2009

AGGX1394684/BV/AQ

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| Submitted to | Sarah Hoggett | | Sarah Hoggett | |
| Prepared by | Sharon Atkins | | Sharon Atkins | |
| Signature | | | | |
| Approved by | Lakhu Luhana | | Lakhu Luhana | |
| Signature | | | | |
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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_x:NO₂ 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 (PM₁₀) 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 (NO₂) continue to occur in the Hertsmere six Air Quality Management Areas (AQMAs) and in the emerging AQMA at The Broadway, Potters Bar. Outside the AQMAs, exceedences of the annual mean NO₂ 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 NO₂ 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 NO₂.

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 NO₂ objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m³. 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 NO₂ 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/Aldenharn 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 NO₂ 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), 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 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 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 NO₂ 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 DMRB¹ 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 Defra²

¹ 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

² 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)³ 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/EC⁴ introduces new obligatory standards for PM_{2.5} for Government but places no statutory duty on local Government to work towards achievement.

The Air Quality Standards (England) Regulations 2007⁵ came into force on 15th 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 - PM₁₀ and PM_{2.5}, ozone and PAHs - Polycyclic Aromatic Hydrocarbons) have been prescribed within the Air Quality Strategy³ 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 2000⁶ and Air Quality (England) (Amendment) Regulations 2002⁷ for seven pollutants benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide, particulates - PM₁₀.

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_{2.5}. 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.

³ 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

⁴ 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

⁵ The Air Quality Standards Regulations 2007, Statutory Instrument No 64, The Stationary Office Limited

⁶ The Air Quality (England) Regulations 2000 (Statutory Instrument 928)

⁷ 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 |
|---|--|-----------------------------------|--|
| 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 | 3.25 µg/m ³ | running annual mean | 31.12.2010 |
| 1,3 Butadiene All authorities | 2.25 µg/m ³ | running annual mean | 31.12.2003 |
| Carbon monoxide Authorities in England, Wales and Northern Ireland only | 10.0 µg/m ³ | maximum daily running mean 8-hour | 31.12.2003 |
| Authorities in Scotland only | 10.0 µg/m ³ | running mean 8-hour | 31.12.2003 |
| Lead All authorities | 0.5 µg/m ³ | annual mean | 31.12.2004 |
| | 0.25 µg/m ³ | annual mean | 31.12.2008 |
| Nitrogen dioxide ^a All authorities | 200 µg/m ³ , not to be exceeded more than 18 times a year | hourly mean | 31.12.2005 |
| | 40 µg/m ³ | annual mean | 31.12.2005 |
| Particles (PM₁₀) (gravimetric) ^b 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 ^c | 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 All authorities | 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 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.

^b Measured using the European gravimetric transfer sampler or equivalent.

^c 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)⁸ 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))⁹ and Technical Guidance (LAQM.TG (09))¹⁰. 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:

⁸ DoE, 1997, 'The United Kingdom National Air Quality Strategy', The Stationery Office

⁹ 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

¹⁰ 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.

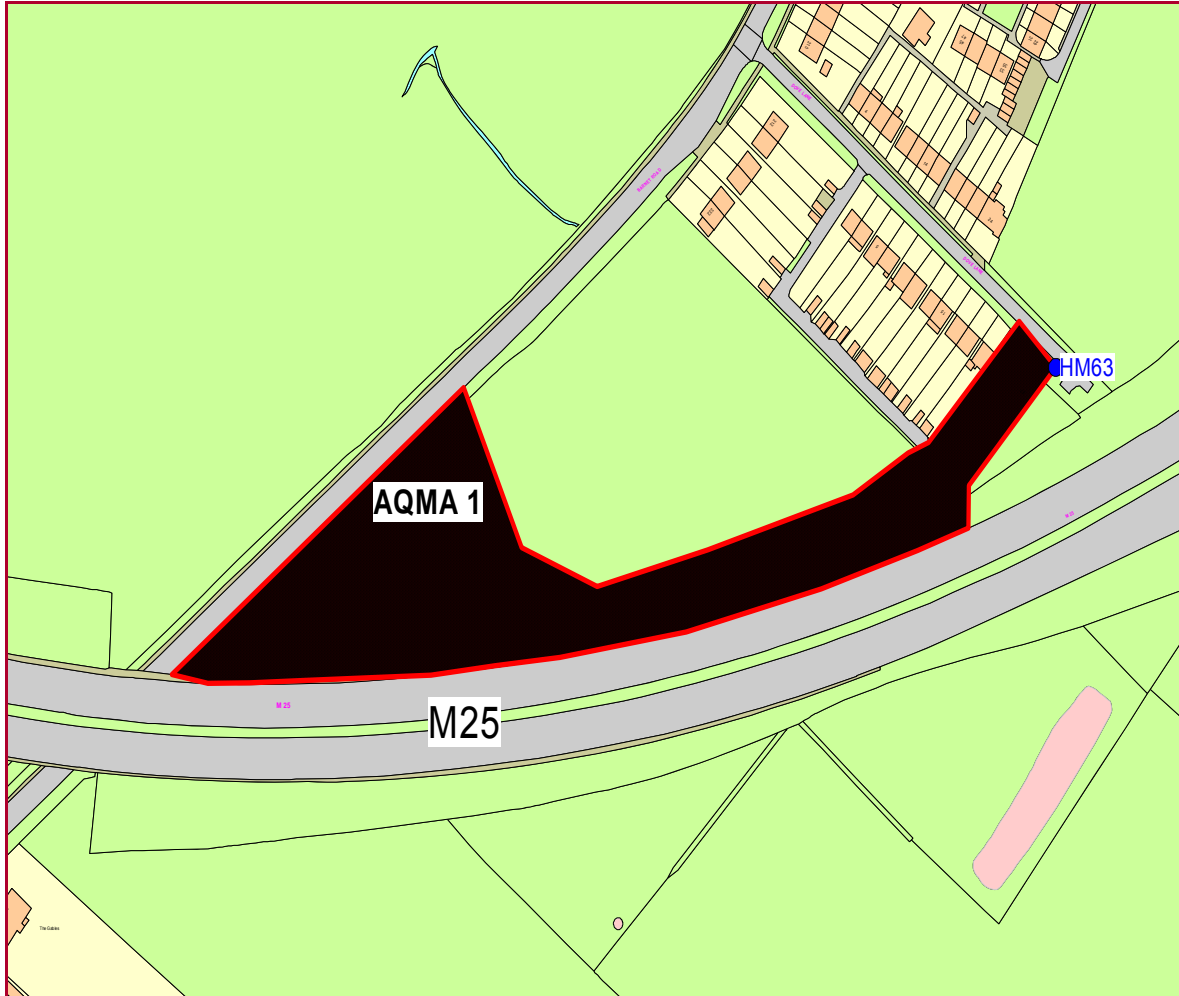


Figure 2 – Hertsmere AQMA No. 2

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

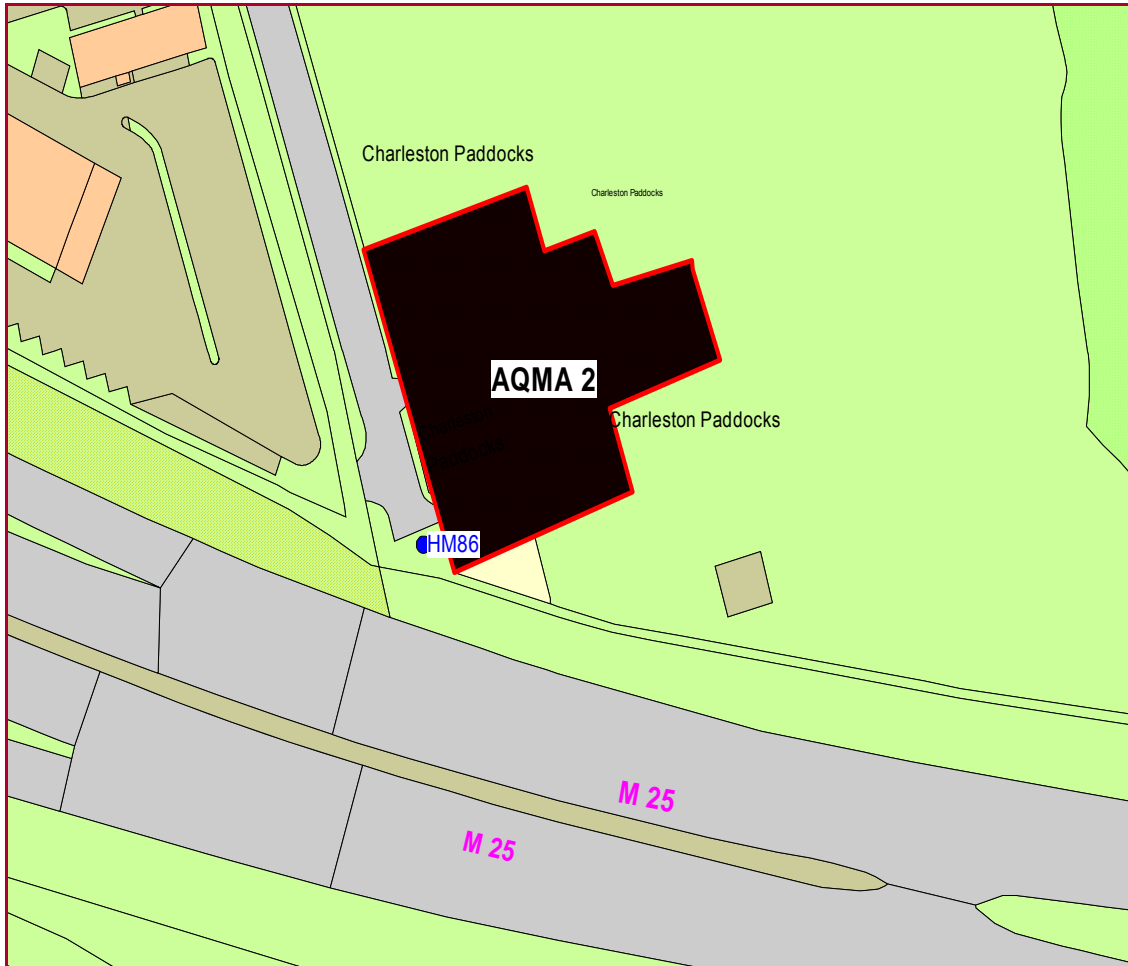


Figure 4 – Hertsmere AQMA No. 4

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.

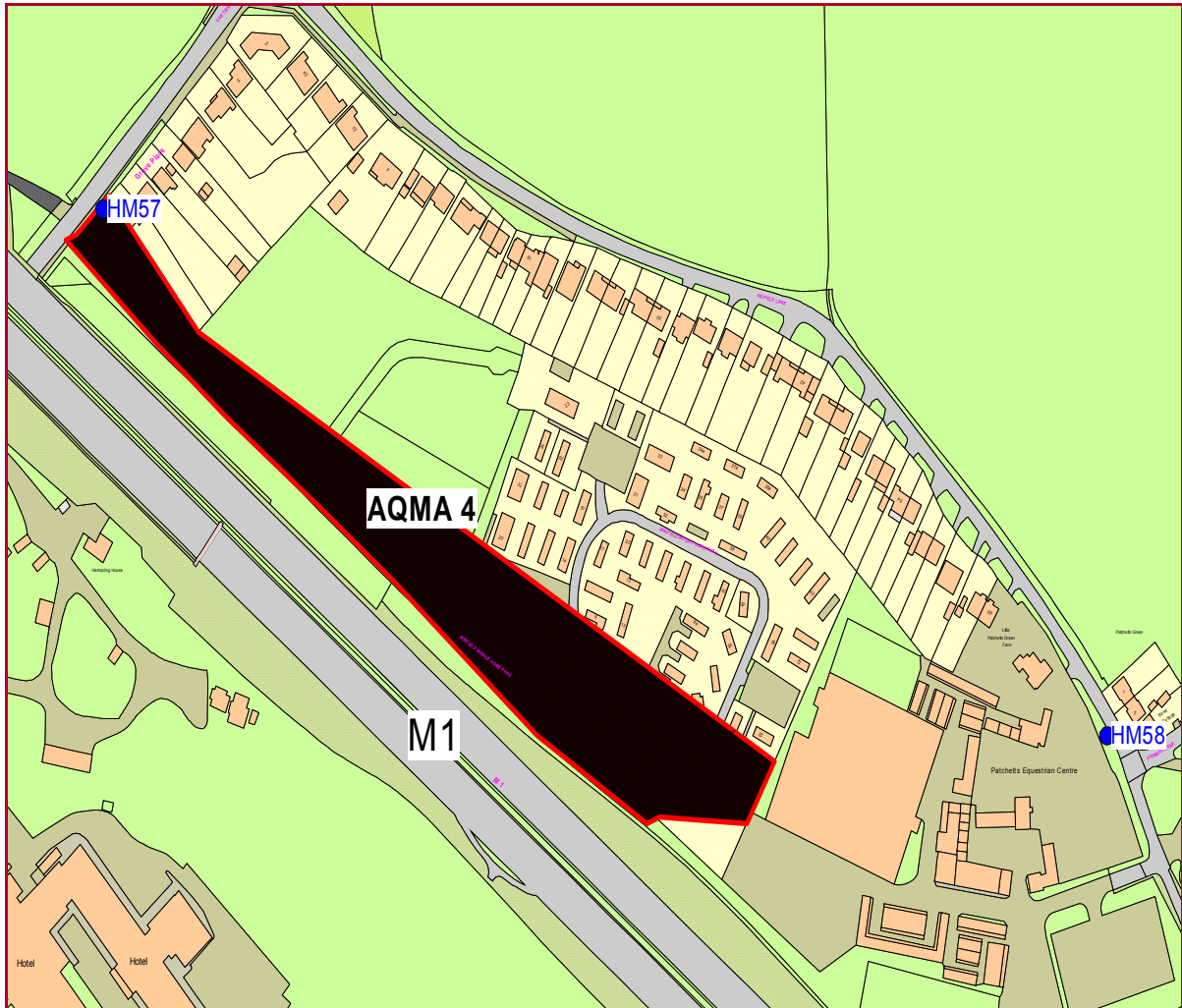


Figure 5 – Hertsmere AQMA No. 5

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.

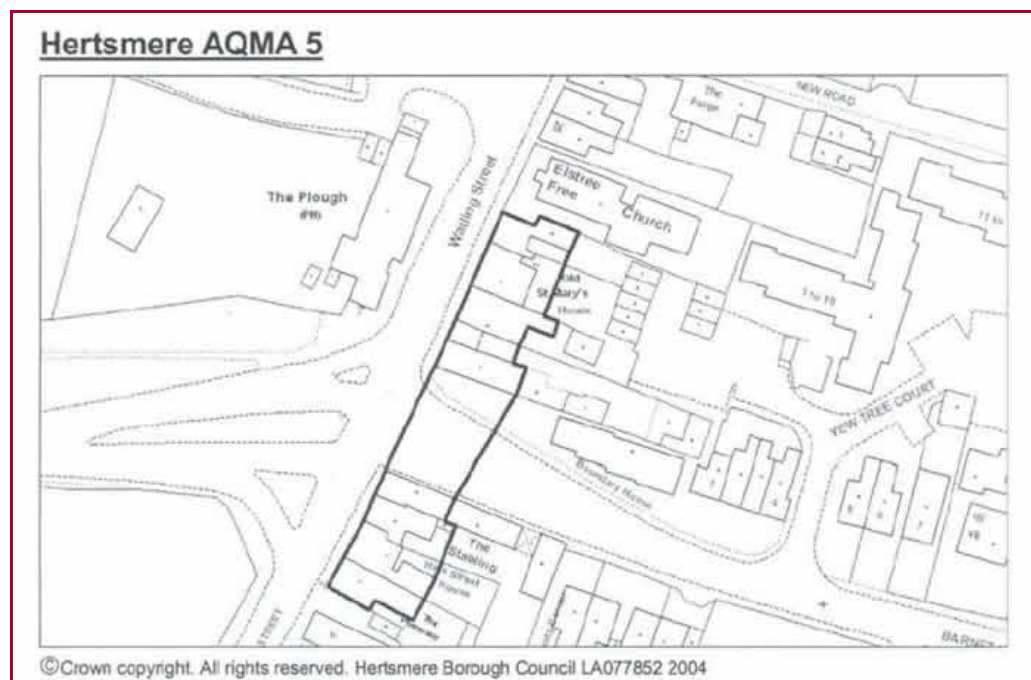
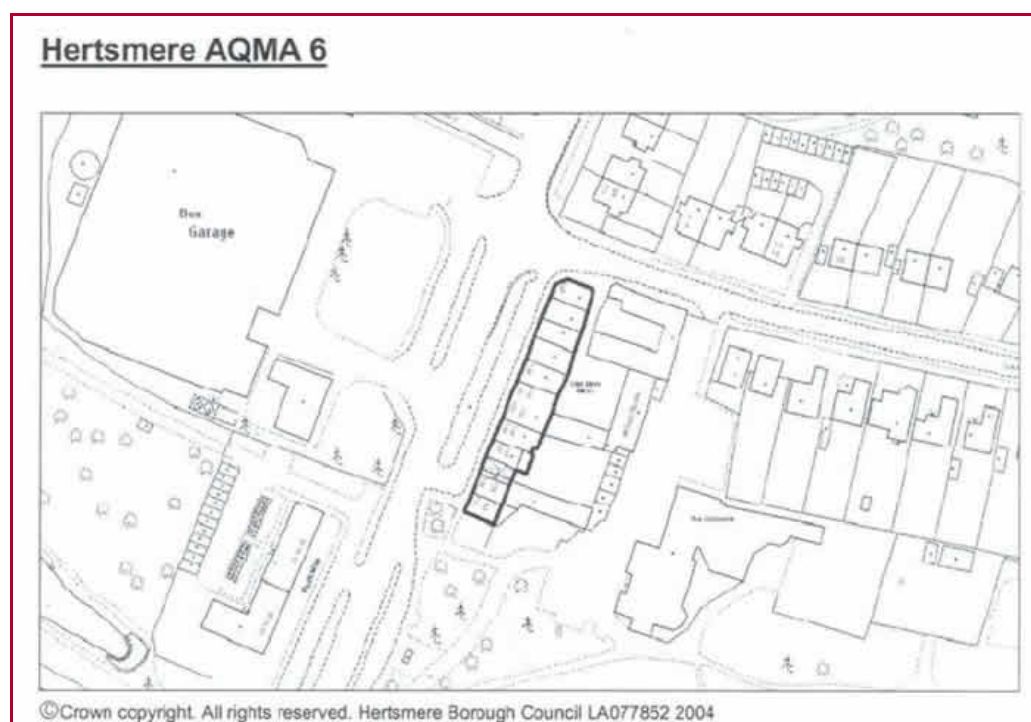


Figure 6 – Hertsmere AQMA No. 6

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 NO₂ and PM₁₀ 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 DMRB¹ model. NO₂ concentrations have been calculated based on the updated NO_x:NO₂ 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 |
|--|---|---|
| A. Road Transport Sources | | |
| 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 ₁₀ |
| A.4 | Junctions (including busy roads and junctions in Scotland and Northern Ireland) | Nitrogen dioxide, PM ₁₀ |
| A.5 | New roads constructed since the last round of review and assessment | Nitrogen dioxide, PM ₁₀ |
| A.6 | Roads/junctions identified as being close to the objective during the previous round of review and assessment | Nitrogen dioxide, PM ₁₀ |
| A.7 | Roads with significantly changed traffic flows | Nitrogen dioxide, PM ₁₀ |
| A.8 | Bus and coach stations | Nitrogen dioxide |
| B: Other transport sources | | |
| B.1 | Airports | Nitrogen dioxide |
| B.2 | Railway (diesel and steam trains) | Sulphur dioxide, nitrogen dioxide |
| B.3 | Ports (shipping) | Sulphur dioxide |
| C: Industrial sources | | |
| C.1 | Industrial processes (new processes and those with significantly increased emissions) | Benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide, PM ₁₀ |
| C.2 | Major petrol storage depots | Benzene |
| C.3 | Petrol Stations | Benzene |
| C.4 | Poultry farms | PM ₁₀ |
| D: Commercial and domestic sources | | |
| D.1 | Biomass combustion | Nitrogen dioxide, PM ₁₀ |
| D.2 | Domestic solid-fuel burning | Sulphur dioxide |
| E: Fugitive or uncontrolled sources | | |
| E.1 | Quarries, landfill sites, opencast coal mining, waste transfer sites, materials handling (i.e. ports, major construction sites) | PM ₁₀ |

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.

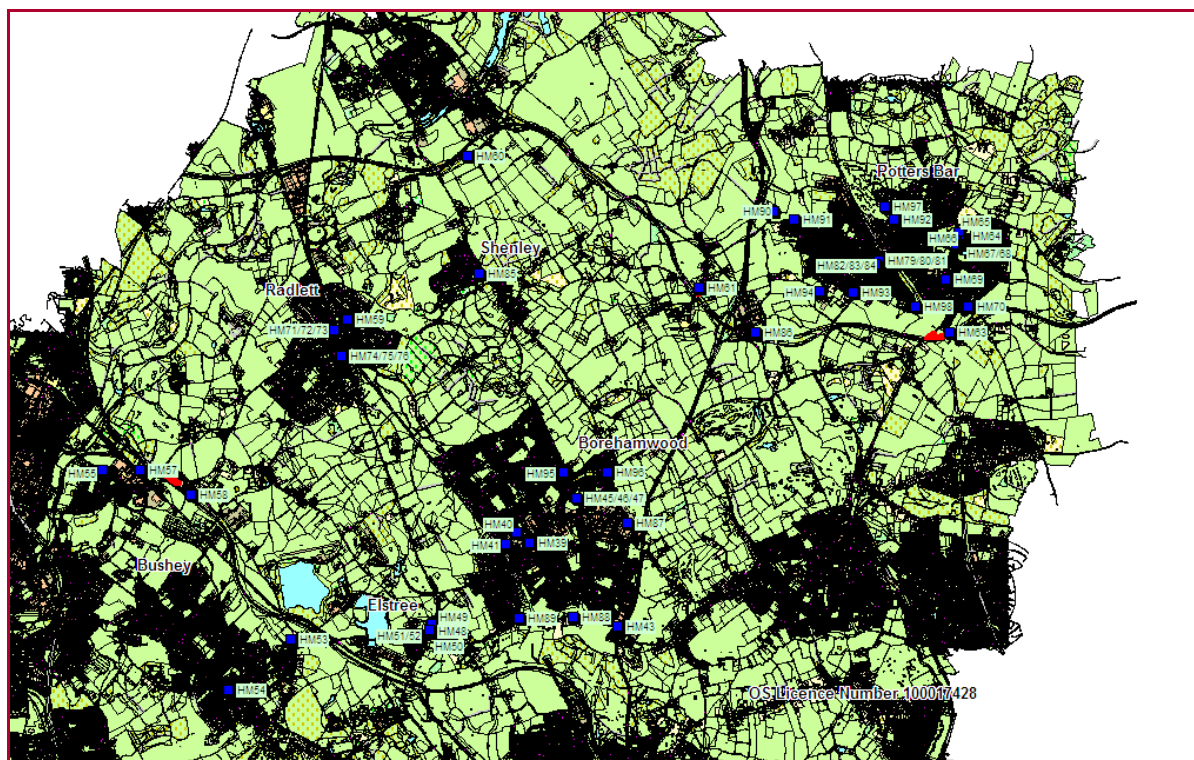
The background concentrations can be obtained either from appropriate monitoring stations or from Defra maps of modelled background pollutant concentrations. These maps are available at a resolution of 1x1 km for the entire UK. Maps are provided for future years' background pollutant concentrations. The maps can be obtained from the UK Air Quality Information Archive⁹. 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 Hertsmer



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 ₂ , ozone, PM ₁₀ | No | Y=0m | N/A | No |

There is currently continuous monitoring of nitrogen dioxide, ozone and particles (PM₁₀) undertaken by Hertsmer Borough Council at one location in the area, Borehamwood background site at Hertswood School Upper Site, Thrift Farm Lane, Borehamwood, Hertfordshire. PM₁₀ concentrations

are monitored using a Tapered Element Oscillating Microbalance (TEOM) analyser (PM₁₀ 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, Hertsmere Borough Council undertook monitoring at 44 NO₂ 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 NO₂ diffusion tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ 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. Hertsmere 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 studies¹¹. For 2006 and 2007 data, the bias adjustment factors were 0.89 for 2007 and 0.98 for 2006.

¹¹ <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 ₂ | N | Y-9.7m | <1m | Y |
| HM40 | Essex Road Borehamwood | K | 519200 | 196800 | NO ₂ | N | N | <1m | Y |
| HM41 | Boulevard Borehamwood | K | 519021 | 196619 | NO ₂ | N | Y-6m | <1m | Y |
| HM43 | Stirling Corner Borehamwood | K | 520800 | 195300 | NO ₂ | N | N | <1m | Y |
| HM45/46/47 | AQMS (triplicate) | B | 520147 | 197357 | NO ₂ | N | Y-17.7m | N/A | N |
| HM48 | Elstree Crossroads 1 | K | 517798 | 195272 | NO ₂ | Y | N | <1m | Y |
| HM49 | Elstree Crossroads 2 | K | 517843 | 195338 | NO ₂ | N | Y-4m | <1m | Y |
| HM50 | Elstree Crossroads 3 | K | 517862 | 195226 | NO ₂ | N | Y-6.5m | <1m | Y |
| HM51/52 | Elstree Crossroads 4/5 (duplicate) | K | 517803 | 195249 | NO ₂ | Y | Y-0m | <1m | Y |
| HM53 | Caldecote Lane Bushey Heath | B | 515600 | 195100 | NO ₂ | N | Y-2.9m | N/A | Y |
| HM54 | High Road Bushey | K | 514600 | 194300 | NO ₂ | N | Y-15.9m | <1m | Y |
| HM55 | Highwood Avenue Bushey garages | B | 512600 | 197800 | NO ₂ | N | Y-36.7m | N/A | N |
| HM57 | 12 Hartspring Lane Aldenham Bushey | K | 513516 | 197818 | NO ₂ | Y | Y-10m | <1m | Y |
| HM58 | Pegmire Lane Aldenham | K | 514000 | 197400 | NO ₂ | N | - | <1m | Y |
| HM59 | Aldenham Grove Radlett | K | 516500 | 200200 | NO ₂ | N | Y-8m | <1m | Y |
| HM60 | Bell Lane London Colney | K | 518400 | 202800 | NO ₂ | N | Y-6m | <1m | Y |
| HM61 | Blanche Lane South Mimms | K | 522100 | 200700 | NO ₂ | Y | Y-32m | <1m | Y |
| HM62 | The Broad way Potters Bar 1 | K | 524945 | 201163 | NO ₂ | Y | Y-7m | <1m | Y |
| HM63 | Dove Lane Potters Bar | K | 526100 | 200000 | NO ₂ | Y | Y-12.9m | <1m | |
| HM64 | Bus Garage 1 Potters Bar | K | 526207 | 201452 | NO ₂ | Y | N | <1m | Y |
| HM65 | Hatfield Road Potters Bar | K | 526252 | 201597 | NO ₂ | N | Y-5m | <1m | Y |
| HM66 | Bus Garage 2 Potters Bar | K | 526245 | 201458 | NO ₂ | Y | Y-8.4m | <1m | Y |
| HM67/68 | Bus Garage 3/4 Potters Bar (duplicate) | K | 526211 | 201400 | NO ₂ | 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 ₂ | N | Y-14m | <1m | Y |
| HM70 | Park Avenue Potters Bar | K | 526400 | 200400 | NO ₂ | N | Y-7.8m | <1m | Y |
| HM71/72/73 | Park Road junction Radlett (triplicate) | R | 516295 | 200035 | NO ₂ | N | Y-4m | 1m | Y |
| HM74/75/76 | 301 Watling Street Radlett (triplicate) | R | 516406 | 199621 | NO ₂ | N | Y-10.8m | 3m | N |
| HM77/78 | The Broadway Potters Bar 2/3 (duplicate) | K | 524945 | 201163 | NO ₂ | Y | Y-7m | <1m | Y |
| HM79/80/81 | 11 The Broadway Potters Bar (Triplicate) | R | 524973 | 201140 | NO ₂ | Y | Y6m | 4m | N |
| HM82/83/84 | 10 Baker Street Potters Bar (Triplicate) | R | 524922 | 201079 | NO ₂ | Y | Y-9.8m | 2.8m | N |
| HM85 | Andrew Close Shenley | B | 518595 | 200936 | NO ₂ | N | Y-4.1m | N/A | N |
| HM86 | Charleston Paddocks South Mimms | M/way | 522997 | 199991 | NO ₂ | Y | N | 48.2m | N |
| HM87 | Elstree Way BP Garage Borehamwood | R | 520955 | 196962 | NO ₂ | N | N | 2.4m | N |
| HM88 | Barnet Lane Elstree | R | 520103 | 195452 | NO ₂ | N | Y-17.8m | 7.2m | N |
| HM89 | Hartfield Ave Elstree | B | 519222 | 195429 | NO ₂ | N | Y-0m | N/A | N |
| HM90 | Warrengate Road Potters Bar | R | 523283 | 201933 | NO ₂ | N | - | - | - |
| HM91 | Mutton Lane Potters Bar | R | 523628 | 201791 | NO ₂ | N | Y-7.1m | 2.3m | N |
| HM92 | The Avenue Potters Bar | K | 525212 | 201800 | NO ₂ | N | Y-9.6m | <1m | Y |
| HM93 | 103 Baker Street Potters Bar | R | 524557 | 200638 | NO ₂ | N | Y-12.9m | 4m | N |
| HM94 | Sawyers Lane Potters Bar | B | 524042 | 200643 | NO ₂ | N | Y-0m | N/A | N |
| HM95 | Cowley Hill Borehamwood | K | 519946 | 197760 | NO ₂ | N | Y-8.6m | <1m | Y |
| HM96 | Rowley Lane Borehamwood | K | 520645 | 197768 | NO ₂ | N | Y-21.5m | <1m | Y |
| HM97 | Heath Drive Potters Bar | B | 525056 | 202000 | NO ₂ | N | Y-0m | N/A | N |
| HM98 | Sunny Bank Road Potters Bar | B | 525553 | 200407 | NO ₂ | 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 |
| | | | 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 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) 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 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 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 NO_2 objective, there could be a potential risk of exceedence of this short-term objective, where the annual mean 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 (PM_{10})

There is currently continuous monitoring of particles (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 PM₁₀ 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 PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

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

Table 9– Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

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

*Data capture < 90%; the 90th %ile of hourly means is 32µg/m³.

4 Road Traffic Sources

The air quality assessment for road traffic emissions sources has been undertaken using the Highways Agency's DMRB¹ 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 NO₂ 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 NO₂ 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 NO₂ objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m³. 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 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 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), 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 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 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, NO₂, PM₁₀ 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 m³ 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 PM₁₀.

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 PM₁₀ 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 (PM₁₀ 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. PM₁₀ 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 PM₁₀ 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/m³ threshold for relevant exposure within 400m (20µg/m³ 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 NO₂ 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 NO₂ 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 NO₂.

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 NO₂ objective is being met at locations of relevant exposure with a predicted annual mean concentration of 37µg/m³. 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 NO₂ 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 NO₂ 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), 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 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 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 | 53 |
| 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 | 58 |
| 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 | 42 |
| HM49 | Elstree Crossroads 2 | 517843 | 195338 | K | 49 | 60 | 39 | 53 | 60 | - | - | - | 32 | 48 | 54 | 55 | 50 | 46 |
| HM50 | Elstree Crossroads 3 | 517862 | 195226 | K | 68 | 74 | 63 | 71 | 60 | 55 | 65 | 56 | 61 | 36 | 68 | 66 | 62 | 57 |
| HM51/52 | Elstree Crossroads 4/5 (duplicate) | 517803 | 195249 | K | 77 | 76 | 57 | 64 | 65 | 69 | 58 | 66 | 59 | 52 | 67 | 70 | 65 | 60 |
| 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 | 47 |
| 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 | 55 |
| HM62 | The Broad way Potters Bar 1 | 524945 | 201163 | K | 67 | 56 | 49 | 59 | 61 | 51 | 52 | 44 | 37 | 45 | 57 | 48 | 52 | 48 |
| HM63 | Dove Lane Potters Bar | 526100 | 200000 | K | 59 | 64 | 40 | 60 | 57 | 40 | 49 | 48 | 38 | 49 | 47 | 48 | 50 | 46 |
| HM64 | Bus Garage 1 Potters Bar | 526207 | 201452 | K | 87 | 76 | 69 | 79 | 84 | 60 | 59 | 60 | 67 | 55 | 60 | 65 | 68 | 63 |
| HM65 | Hatfield Road Potters Bar | 526252 | 201597 | K | 74 | 63 | 41 | 64 | 41 | 48 | 56 | 51 | 37 | | 59 | 52 | 53 | 49 |
| HM66 | Bus Garage 2 Potters Bar | 526245 | 201458 | K | 68 | 61 | 57 | 54 | 32 | 48 | 54 | 46 | 23 | 57 | 55 | 49 | 50 | 46 |
| HM67/68 | Bus Garage 3/4 Potters Bar (duplicate) | 526211 | 201400 | K | 59 | 60 | 48 | 49 | 45 | 40 | 39 | 47 | 29 | 55 | - | - | 47 | 43 |
| HM69 | Southgate Rd Potters Bar | 526033 | 200838 | K | 76 | 73 | 56 | 64 | 62 | 62 | 73 | 60 | 48 | 58 | 62 | 64 | 63 | 58 |
| 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 | 51 |
| 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 | 50 |
| HM79/80/81 | 11 The Broadway Potters Bar (Triplicate) | 524973 | 201140 | R | - | - | 45 | - | - | 43 | 44 | 38 | 38 | 50 | 57 | 56 | 46 | 46 |

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 | 56 |
| HM87 | Elstree Way BP Garage Borehamwood | 520955 | 196962 | R | 37 | 61 | 45 | 66 | 35 | 50 | 41 | 50 | 38 | 55 | - | 64 | 49 | 45 |
| 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 _x Annual Mean (µg/m ³) | 2008 NO ₂ Annual Mean (µg/m ³) | 2008 PM ₁₀ Annual Mean (µg/m ³) |
| 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 |

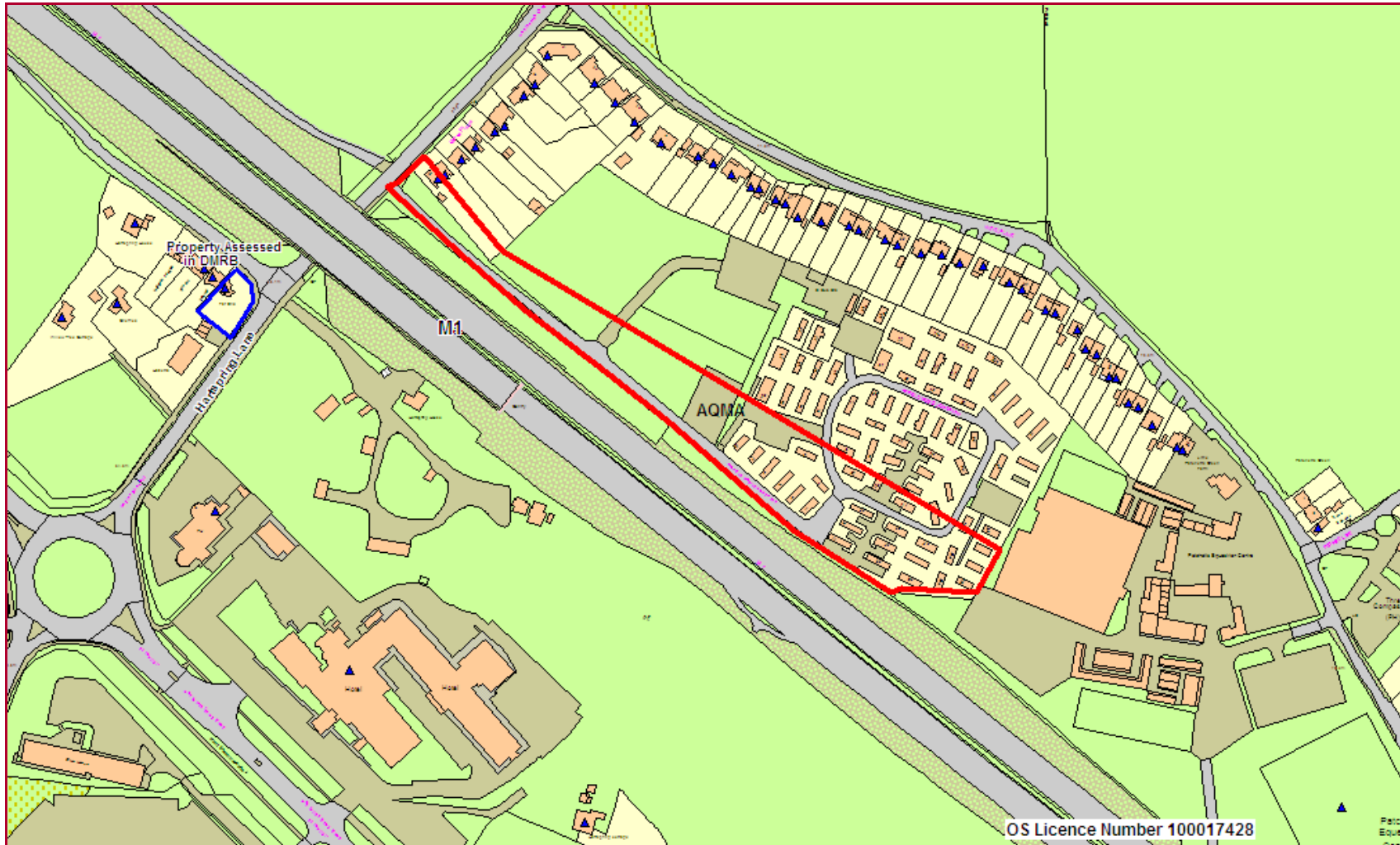
Appendix 4 - DMRB Assessment Results

| Site Ref | Road Name | Receptor | DMRB Assessment Results | | | | Detailed assessment required? |
|----------|--------------------------|-------------------------------|---|---|--|--|---|
| | | | 2008 NO _x Annual Mean (µg/m ³) | 2008 NO ₂ * Annual Mean (µg/m ³) | 2008 PM ₁₀ Annual Mean (µg/m ³) | 2008 Number of exceedences of 24 hour PM ₁₀ | |
| 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 ₂ |

* NO₂ concentrations calculated from NO_x using the LAQM.TG (09) NO_x:NO₂ conversion calculator.

** Narrow street, therefore the predicted road contribution of NO₂ 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 |