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Air Quality Updating and Screening Assessment

**A report produced for
Three Rivers District Council**

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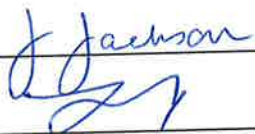
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Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in the Environment Act, 1995. The Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. These and other air quality standards^a and their objectives have been enacted through the Air Quality Regulations in 1997, 2000 and 2002². The Environment Act 1995 requires Local Authorities to undertake air quality reviews. In areas where an air quality objective is not anticipated to be met, Local Authorities are required to establish Air Quality Management Areas and implement action plans to improve air quality.

The second round of air quality review and assessments has been completed by Three Rivers District Council. The Council are now required to proceed to the third round of review and assessment in which sources of emissions to air are reassessed to identify whether the situation has changed since the second round, and if so, what impact this may have on predicted exceedences of the air quality objectives.

The third round of review and assessment is to be undertaken in two steps, essentially following the format of the second round. The first step is an Updating and Screening Assessment, which updates the findings of the previous Review and Assessment cycle, undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment the following year. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead.

This report is an Updating and Screening Assessment for Three Rivers District Council as outlined in the Government's published guidance.

This Updating and Screening Assessment has concluded that Three Rivers District Council is not required to carry out a Detailed Review and Assessment for carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, PM₁₀ or sulphur dioxide.

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

Contents

1	INTRODUCTION TO THE UPDATING AND SCREENING ASSESSMENT.....	1
1.1	PURPOSE OF THE UPDATING AND SCREENING ASSESSMENT.....	1
1.2	STRUCTURE OF THE REPORT	1
1.3	OVERVIEW OF APPROACH TAKEN	2
1.4	RELEVANT GUIDANCE DOCUMENTATION	2
1.5	POLLUTANTS CONSIDERED IN THIS REPORT	2
2	THE UK AIR QUALITY STRATEGY.....	4
2.1	NATIONAL AIR QUALITY STANDARDS	4
2.2	TIMESCALES TO ACHIEVE THE OBJECTIVES FOR THE POLLUTANTS IN AIR QUALITY STRATEGY	4
2.3	AIR QUALITY REVIEWS – THE APPROACHES AND EXPECTED OUTCOMES.....	4
2.4	LOCATIONS THAT THE REVIEW AND ASSESSMENT MUST CONCENTRATE ON	6
3	INFORMATION USED TO SUPPORT THIS ASSESSMENT	8
3.1	THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT OF AIR QUALITY FOR THREE RIVERS DISTRICT COUNCIL	8
3.2	PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY	8
3.3	AIR QUALITY MONITORING	8
3.4	MAPS AND DISTANCES OF RECEPTORS FROM ROADS	9
3.5	ROAD TRAFFIC DATA	9
3.6	PART A AND B INDUSTRIAL PROCESSES	9
3.7	SCREENING TOOLS	9
4	UPDATING AND SCREENING ASSESSMENT FOR CARBON MONOXIDE	10
4.1	THE NATIONAL PERSPECTIVE.....	10
4.2	STANDARD AND OBJECTIVE FOR CARBON MONOXIDE	10
4.3	CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR CARBON MONOXIDE	10
4.4	SCREENING ASSESSMENT OF CARBON MONOXIDE	10
4.5	CONCLUSIONS FOR CARBON MONOXIDE CONCENTRATIONS IN COUNCIL AREA	11
5	UPDATING AND SCREENING ASSESSMENT FOR BENZENE	12
5.1	THE NATIONAL PERSPECTIVE.....	12
5.2	STANDARD AND OBJECTIVE FOR BENZENE.....	12
5.3	CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR BENZENE.....	12
5.4	SCREENING ASSESSMENT OF BENZENE.....	12
5.5	CONCLUSIONS FOR BENZENE IN COUNCIL AREA.....	13
6	UPDATING AND SCREENING ASSESSMENT FOR 1,3-BUTADIENE	15
6.1	THE NATIONAL PERSPECTIVE.....	15
6.2	STANDARD AND OBJECTIVE FOR 1,3-BUTADIENE.....	15
6.3	CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR 1,3-BUTADIENE.....	15
6.4	SCREENING ASSESSMENT OF 1,3-BUTADIENE	15
6.5	CONCLUSIONS FOR 1,3-BUTADIENE CONCENTRATIONS IN COUNCIL AREA.....	16
7	UPDATING AND SCREENING ASSESSMENT FOR LEAD	17
7.1	THE NATIONAL PERSPECTIVE.....	17
7.2	STANDARD AND OBJECTIVE FOR LEAD.....	17
7.3	CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR LEAD.....	17
7.4	SCREENING ASSESSMENT OF LEAD.....	17
7.5	CONCLUSIONS FOR LEAD CONCENTRATIONS IN COUNCIL AREA.....	18

8	UPDATING AND SCREENING ASSESSMENT FOR NITROGEN DIOXIDE	19
8.1	THE NATIONAL PERSPECTIVE.....	19
8.2	STANDARDS AND OBJECTIVES FOR NITROGEN DIOXIDE.....	19
8.3	CONCLUSIONS OF THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT FOR NITROGEN DIOXIDE.....	19
8.4	SCREENING ASSESSMENT OF NITROGEN DIOXIDE	20
8.5	CONCLUSIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN COUNCIL AREA	25
9	UPDATING AND SCREENING ASSESSMENT FOR SULPHUR DIOXIDE	27
9.1	THE NATIONAL PERSPECTIVE.....	27
9.2	STANDARD AND OBJECTIVE FOR SULPHUR DIOXIDE.....	27
9.3	CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE.....	27
9.4	SCREENING ASSESSMENT OF SULPHUR DIOXIDE.....	27
9.5	CONCLUSIONS FOR SULPHUR DIOXIDE CONCENTRATIONS IN COUNCIL AREA	29
10	UPDATING AND SCREENING ASSESSMENT FOR PM ₁₀	30
10.1	THE NATIONAL PERSPECTIVE.....	30
10.2	STANDARD AND OBJECTIVE FOR PM ₁₀	30
10.3	CONCLUSIONS OF THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT FOR PM ₁₀	30
10.4	SCREENING ASSESSMENT OF PM ₁₀	31
10.5	CONCLUSIONS FOR PM ₁₀ CONCENTRATIONS IN COUNCIL AREA	35
11	CONCLUSIONS	37
11.1	CARBON MONOXIDE.....	37
11.2	BENZENE.....	37
11.3	1,3-BUTADIENE	37
11.4	LEAD	37
11.5	NITROGEN DIOXIDE.....	37
11.6	SULPHUR DIOXIDE	37
11.7	PM ₁₀	37
11.8	SUMMARY AND RECOMMENDATIONS	38
12	REFERENCES	39

APPENDICES

Appendix 1	Monitoring data
Appendix 2	Traffic data
Appendix 3	Descriptions of selected models and tools
Appendix 4	Part A and Part B Regulated Processes

Acronyms and definitions used in this report

AADTF	Annual Average Daily Traffic Flow
AQDD	an EU directive (part of EU law) - Common Position on Air Quality Daughter Directives, commonly referred to as the Air Quality Daughter Directive
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network (Defra funded air quality monitoring network)
CO	Carbon monoxide
DETR	Department of the Environment Transport and the Regions (now Defra)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
kerbside	0 to 1 m from the kerb
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
NAEI	National Atmospheric Emission Inventory
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NRTF	National Road Traffic Forecast
ppb	parts per billion
receptor	In the context of this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
roadside	1 to 5 m from the kerb
SO ₂	Sulphur dioxide
TEA	Triethanolamine
TEOM	Tapered Element Oscillating Microbalance

1 Introduction to the Updating and Screening Assessment

1.1 PURPOSE OF THE UPDATING AND SCREENING ASSESSMENT

The second round of air quality review and assessments is now complete and all local authorities should have completed all necessary stages. Where the likelihood of exceedences of air quality objectives have been identified in areas of significant public exposure, an air quality management area should have been declared, followed by a Further (formerly 'Stage 4') Assessment, and the formulation of an action plan detailing measures intended to reduce or to eliminate exceedences.

Local authorities are now required to proceed to the third round of review and assessment. The updating and screening assessment reassesses sources of emissions to air to identify whether the situation has changed since the second round of review and assessment. Changes are reviewed to assess the potential impact on predicted exceedences of the air quality objectives. Such changes might include significant traffic growth on a major road, which had not been foreseen, construction of a new industrial plant with emissions to air, or significant changes in the emissions of an existing plant.

The third round of review and assessment is to be undertaken in two steps. The first step is an Updating and Screening Assessment. This Assessment updates the findings of the previous Review and Assessment cycle, undertaken for all pollutants identified in the Air Quality Regulations. Where a significant risk of exceedence is identified for a pollutant it will be necessary for the local authority to proceed to a Detailed Assessment. Where a local authority does not need to undertake a Detailed Assessment, a progress report is required instead by the following year.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Section 1** summarises the aims of the updating and screening assessment, the approach adopted for the assessment, the pollutants and air quality objectives;
- **Section 2** summarises the UK Air Quality Strategy and the function of an updating and screening assessment;
- **Section 3** summarises the conclusions of air quality review and assessment work to date, identifies data used in support of this assessment as well as relevant background information on the Council area, and relevant emissions-to-air sources and highlights significant changes in emissions to air within the city since the last round of review and assessment;
- **Sections 4-10** present the review and assessment for each of the seven pollutants included in the Air Quality Regulations;
- **Section 11** presents conclusions and recommendations for further work, where required, for each of the seven pollutants;

1.3 OVERVIEW OF APPROACH TAKEN

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

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

1.4 RELEVANT GUIDANCE DOCUMENTATION

This report takes into account the guidance in LAQM.TG(03)¹, published January 2003, and the update to this guidance², published January 2006.

1.5 POLLUTANTS CONSIDERED IN THIS REPORT

All pollutants included in the Air Quality Regulations³ for the purposes of Review and Assessment have been considered in this report (Table 1.1).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene			
All authorities	16.25 $\mu\text{g m}^{-3}$	running annual mean	31.12.2003
Authorities in England and Wales only	5.00 $\mu\text{g m}^{-3}$	annual mean	31.12.2010
<i>Authorities in Scotland and Northern Ireland only^a</i>	<i>3.25 $\mu\text{g m}^{-3}$</i>	<i>running annual mean</i>	<i>31.12.2010</i>
1,3-Butadiene	2.25 $\mu\text{g m}^{-3}$	running annual mean	31.12.2003
Carbon monoxide			
Authorities in England, Wales and Northern Ireland only ^a	10.0 mg m^{-3}	maximum daily running 8-hour mean	31.12.2003
<i>Authorities in Scotland only</i>	<i>10.0 mg m^{-3}</i>	<i>running 8-hour mean</i>	<i>31.12.2003</i>
Lead	0.5 $\mu\text{g m}^{-3}$ 0.25 $\mu\text{g m}^{-3}$	annual mean annual mean	31.12.2004 31.12.2008
Nitrogen dioxide^b	200 $\mu\text{g m}^{-3}$ not to be exceeded more than 18 times a year 40 $\mu\text{g m}^{-3}$	1 hour mean annual mean	31.12.2005 31.12.2005
Particles (PM₁₀)^c	50 $\mu\text{g m}^{-3}$ not to be exceeded more than 35 times a year 40 $\mu\text{g m}^{-3}$	24 hour mean annual mean	31.12.2004 31.12.2004
<i>Authorities in Scotland only^d</i>	<i>50 $\mu\text{g m}^{-3}$ not to be exceeded more than 7 times a year</i> <i>18 $\mu\text{g m}^{-3}$</i>	<i>24 hour mean</i> <i>annual mean</i>	<i>31.12.2010</i> <i>31.12.2010</i>
Sulphur dioxide	350 $\mu\text{g m}^{-3}$ not to be exceeded more than 24 times a year 125 $\mu\text{g m}^{-3}$ not to be exceeded more than 3 times a year 266 $\mu\text{g m}^{-3}$ not to be exceeded more than 35 times a year	1 hour mean 24 hour mean 15 minute mean	31.12.2004 31.12.2004 31.12.2005

^a Air Quality (Northern Ireland) Regulations 2003

^b The objectives for nitrogen dioxide are provisional.

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

^d These 2010 Air Quality Objectives for PM₁₀ apply in Scotland only, as set out in the Air Quality (Scotland) Amendment Regulations 2002.

2 The UK Air Quality Strategy

2.1 NATIONAL AIR QUALITY STANDARDS

The Government prepared the Air Quality Strategy for England, Scotland, Wales and Northern Ireland for consultation in August 1999. It was published in January 2000 (DETR, 2000)⁴ with an addendum issued in February 2003. The Air Quality Strategy uses national air quality standards to enable air quality to be measured and assessed. These also provide the means by which objectives and timescales for the achievement of objectives can be set. These standards and associated specific objectives to be achieved between 2003 and 2010 are shown in Table 1.1. The table shows the standards in mass concentrations ($\mu\text{g m}^{-3}$ or mg m^{-3}) with the number of exceedences that are permitted (where applicable) and the equivalent percentile.

2.2 TIMESCALES TO ACHIEVE THE OBJECTIVES FOR THE POLLUTANTS IN AIR QUALITY STRATEGY

In most local authorities in the UK, objectives were (or will be) met for most of the pollutants within the timescale of the objectives shown in Table 1.1. It is important to note that the objectives for NO_2 remain provisional. The Government has recognised the problems associated with achieving the standard for ozone and this will not therefore be a statutory requirement. Ozone is a secondary pollutant and transboundary in nature and it is recognised that local authorities themselves can exert little influence on concentrations when they are the result of regional primary emission patterns.

2.3 AIR QUALITY REVIEWS – THE APPROACHES AND EXPECTED OUTCOMES

Technical Guidance has been issued in 'Review and Assessment: Technical Guidance' LAQM.TG (03)¹ to enable air quality to be monitored, modelled, reviewed and assessed in an appropriate and consistent fashion. This updating and screening assessment has considered the procedures set out in this technical guidance.

The primary objective of undertaking a review of air quality is to identify any areas that are unlikely to meet national air quality objectives and ensure that air quality is considered in local authority decision-making processes. The complexity and detail required in a review depends on the risk of failing to achieve air quality objectives and it has been proposed therefore that reviews should be carried out in two steps. Both steps of review and assessment may be necessary and every authority is expected to undertake at least a first stage review and assessment of air quality in their authority area. The steps are briefly described in Table 2.1.

Table 2.1 Brief details of steps in the third Round of the Air Quality Review and Assessment process

Level of Assessment	Objective	Approach
Updating and Screening	To identify those matters that have changed since the last review and assessment, which might lead to a risk of an air quality objective being exceeded	Use a checklist to identify significant changes that require further consideration. Where such changes are identified, then apply simple screening tools to decide whether there is sufficient risk of an exceedence of an objective to justify a Detailed Assessment
Detailed Assessment	To provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation or amendment of any necessary AQMAs	Use quality-assured monitoring and validated modelling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective.
Annual Progress reports	Local authorities should prepare annual air quality Progress Reports between subsequent rounds of reviews and assessments. The concept is that this will ensure continuity in the LAQM process.	The precise format of the progress report is left up to the local authority to decide, but guidance on what it should cover is available in LAQM.PRG(03) ⁵ , published in 2003. It is envisaged that these Progress Reports could be useful for the compilation of annual 'state of the environment' reports that many authorities already prepare.

The current deadline for completion of updating and screening assessments is April 2006, and for detailed assessments April 2007.

2.4 LOCATIONS THAT THE REVIEW AND ASSESSMENT MUST CONCENTRATE ON

For the purpose of review and assessment, the authority should focus their work on locations where members of the public are likely to be exposed over the averaging period of the objective. Table 2.2 summarises the locations where the objectives should and should not apply.

Table 2.2 Typical locations where the objectives should and should not apply

Averaging Period	Pollutants	Objectives <i>should</i> apply at ...	Objectives <i>should not</i> generally apply at ...
Annual mean	<ul style="list-style-type: none"> 1,3 Butadiene Benzene Lead Nitrogen dioxide Particulate Matter (PM₁₀) 	All background locations where members of the public might be regularly exposed.	Building facades of offices or other places of work where members of the public do not have regular access.
		Building facades of residential properties, schools, hospitals, libraries etc.	Gardens of residential properties.
			Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term
24 hour mean and 8-hour mean	<ul style="list-style-type: none"> Carbon monoxide Particulate Matter (PM₁₀) Sulphur dioxide 	All locations where the annual mean objective would apply.	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
		Gardens of residential properties.	
1 hour mean	<ul style="list-style-type: none"> Nitrogen dioxide Sulphur dioxide 	All locations where the annual mean and 24 and 8-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.
		Kerbside sites (e.g. pavements of busy shopping streets).	
		Those parts of car parks and railway stations etc. which are not fully enclosed.	

Averaging Period	Pollutants	Objectives <i>should</i> apply at ...	Objectives <i>should not</i> generally apply at ...
		Any outdoor locations to which the public might reasonably be expected to have access.	
15 minute mean	• Sulphur dioxide	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

It is unnecessary to consider exceedences of the objectives at any location where public exposure over the relevant averaging period would be unrealistic. Locations should also represent non-occupational exposure.

3 Information used to support this assessment

3.1 THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT OF AIR QUALITY FOR THREE RIVERS DISTRICT COUNCIL

Three Rivers District Council has completed the following review and assessments of air quality to date:

- Stage 1 (all pollutants, 2000), Stage 2 (for CO, NO₂, SO₂ and PM₁₀, 2000), Stage 3 (for NO₂ and PM₁₀, 2000) and Stage 4 (for NO₂ and PM₁₀, 2003).
- Updating and Screening Assessment (January 2004) and a progress report in 2005

The first three stages concluded that Three Rivers District needed to declare three Air Quality Management Areas for NO₂ and two for PM₁₀ at locations close to the M25. Maps of these locations are included in section 8.3 of this report.

The Updating and Screening Assessment in 2004 concluded that Three Rivers District Council was not required to proceed to a detailed assessment for any of the pollutants considered.

3.2 PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY

Any new developments in the local authority or in surrounding areas that may impact on local air quality need to be considered.

3.2.1 Industry

There are no significant industrial developments currently planned in the area. No new industrial processes have started since the previous round of review and assessment.

3.2.2 Housing and redevelopment

Three Rivers District Council have not identified any significant new developments that are likely to impact on the air quality of the area.

3.2.3 Transport

No major changes to the road network have been made since the last round of review and assessment.

3.3 AIR QUALITY MONITORING

During 2005, monitoring of NO₂ and PM₁₀ has been undertaken at a background location in Rickmansworth. This monitor forms part of the Herts and Beds air quality network, and is run by ERG King's College. Details of the site location and the measurements made can be found in Appendix 1.

Monitoring of NO₂ has also been carried out at 14 other sites in the district using diffusion tubes. Unfortunately, this dataset finished in 2004 – concentrations for 2005 have been estimated from the 2004 data, and the year adjustment factors for NO₂ (available from www.airquality.co.uk/archive/laqm/tools.php).

3.4 MAPS AND DISTANCES OF RECEPTORS FROM ROADS

Three Rivers District Council provided electronic OS LandLine™ data, which was used to accurately measure the distances of buildings from the road centre lines.

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3.5 ROAD TRAFFIC DATA

3.5.1 Summary of traffic data provided

This section summarises the information used in this report; detailed information is given in Appendix 2. Appendix 2 lists the locations of the traffic flow and speed measurement points, flow and speed data and other relevant traffic statistics

The main sources of traffic count data was the National Atmospheric Emissions Inventory (NAEI, 2004), and data provided by Hertfordshire County Council.

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

3.5.2 Proportion of HGVs

Percentages of Cars and LGVs were available from the data provided by the NAEI. The traffic data provided by Herts County Council did not have this information for all road links, and so a conservative estimate of 10% HDVs has been assumed for these roads.

3.5.3 Base year for traffic

The base year for both the NAEI traffic data, and the data from Hertfordshire County Council is 2004.

3.5.4 Traffic growth

NRTF factors (central growth) have been used to project the traffic flows forward from the base year.

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

Road widths and receptor distances have been estimated from the OS LandLine™ data provided by Three Rivers District Council.

3.6 PART A AND B INDUSTRIAL PROCESSES

There are no Part A processes in the district. A list of the Part B Authorised processes is in Appendix 4 – no new processes have been identified since the last updating and screening assessment.

3.7 SCREENING TOOLS

Appendix 3 includes outline details of the DMRB and other screening tools used in the assessment.

4 Updating and Screening Assessment for Carbon Monoxide

4.1 THE NATIONAL PERSPECTIVE

The main source of carbon monoxide in the United Kingdom is road transport, which accounted for 49% of total releases in 2003. Annual emissions of carbon monoxide have been falling steadily since the 1970s, and are expected to continue to do so. The automatic monitoring network recorded no exceedences of the objective in 2005 at any location across the UK.

4.2 STANDARD AND OBJECTIVE FOR CARBON MONOXIDE

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

4.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR CARBON MONOXIDE

The Updating and Screening Assessment for 2004 concluded that, based on monitoring data in neighbouring districts, background data for Three Rivers District and the available traffic data, exceedences of the objectives for CO were unlikely. A detailed assessment was not required, and no AQMAs have been declared for CO.

4.4 SCREENING ASSESSMENT OF CARBON MONOXIDE

4.4.1 Screening check list

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

- Monitoring Data
- Very Busy Roads or junctions in built up areas

These are described in the following sections.

4.4.2 Background Concentrations of carbon monoxide

The average background annual mean concentration for carbon monoxide estimated from the UK background maps (<http://www.airqualityarchive.co.uk/archive/laqm/tools.php>) and the year adjustment factors published in LAQM.TG(03) was 0.23 mg m^{-3} , with a maximum concentration of 0.27 mg m^{-3} in 2005.

4.4.3 Screening assessment of monitoring data

No monitoring of CO has been carried out in Three Rivers District. Monitoring has been carried out, however, at background locations in the neighbouring districts of Luton and St Albans, by ERG King's College as part of the Hertfordshire and Bedfordshire Air Pollution Monitoring Network. Neither of these sites recorded any exceedences of the running 8-hour mean objective in 2005. The annual means at these sites were 0.2 mg m^{-3} at Luton and 0.3 mg m^{-3} at St Albans.

4.4.4 Screening assessment for very busy roads

The guidance document LAQM TG(03)¹ requires assessment of CO only at 'very busy roads', or junctions in built up areas. A 'very busy' road is defined in LAQM TG(03) as a single carriageway road with a daily average traffic flow greater than 80,000 vehicles. Very busy dual carriageways and motorways have daily average traffic flows greater than 120,000 and 140,000 respectively. In addition to this, the guidance also states that these will only need to be assessed in areas where the estimated background concentration is expected to be above 1mg m^{-3} .

The maximum background concentration for Three Rivers District is estimated at 0.27 mg m^{-3} . A number of the traffic count points on the M25 have traffic flows greater than 140,000 vehicles, but since the background concentration is well below the 1 mg m^{-3} threshold, there is no need to assess this road.

4.5 CONCLUSIONS FOR CARBON MONOXIDE CONCENTRATIONS IN COUNCIL AREA

The background concentrations of CO in Three Rivers District, and the measured concentrations elsewhere in Hertfordshire suggest that an exceedence of the objectives for CO is very unlikely. The results of this assessment are summarized in table 4.1.

Table 4.1 Updating and Screening Checklist for carbon monoxide

Item	Response
A) Monitoring data	No monitoring of CO is carried out in Three Rivers District
B) Very busy roads or junctions in built-up areas	Background concentration is below the threshold

Three Rivers District Council is not required to carry out a Detailed Assessment for carbon monoxide.

5 Updating and Screening Assessment for Benzene

5.1 THE NATIONAL PERSPECTIVE

The main sources of benzene emissions in the UK are petrol-engined vehicles, petrol refining, storage and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems. A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene. Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol are controlled by vapour recovery systems. The UK automatic monitoring network recorded no exceedences of the 2003 objective in 2003, or later years. Whilst the 2010 objectives are expected to be met at all urban background, and most roadside locations, there is the possibility for some remaining exceedences, which will require additional measures at a local level.

5.2 STANDARD AND OBJECTIVE FOR BENZENE

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

5.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR BENZENE

The following conclusions were given for benzene in the Second Stage Review and Assessment for Three Rivers District.

- There are no major industrial processes which have the potential, individually or cumulatively, to result in elevated levels of benzene in Three Rivers District.

The national policies were expected to deliver the air quality objective for benzene and hence there was no need to undertake a detailed assessment for benzene. No AQMAs have been declared for benzene.

5.4 SCREENING ASSESSMENT OF BENZENE

5.4.1 Screening check list

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

- Monitoring Data outside an AQMA
- Monitoring Data within an AQMA
- Very Busy Roads or Junctions in Built-up Areas
- New Industrial Sources
- Industrial sources with substantially increased emissions or new relevant exposure
- Petrol Stations
- Major Fuel Storage Depots (Petroleum only)

These are described in the following sections.

5.4.2 Background concentrations for benzene

The average background benzene concentration in Three Rivers District, estimated from the UK 2003 background maps⁵ and the year projection factors published in TG.03 was $0.46 \mu\text{gm}^{-3}$, with a maximum concentration of $0.59 \mu\text{gm}^{-3}$ in 2005. This was well below the objective, and the projected concentrations for 2010 are even lower, with an average concentration of $0.39 \mu\text{gm}^{-3}$, and a maximum $0.5 \mu\text{gm}^{-3}$.

5.4.3 Screening assessment of monitoring data

No monitoring of benzene has been carried out in Three Rivers District.

5.4.4 Screening assessment of very busy roads

The guidance document LAQM TG(03)¹ requires assessment of benzene only at 'very busy roads', or at junctions in built up areas, with a predicted background concentration of more than $2 \mu\text{gm}^{-3}$ (Appendix 2 Table A2.1).

Although there are some roads in the area that can be classified as 'very busy,' the estimated background concentrations at all locations across the district are below the $2 \mu\text{gm}^{-3}$ threshold. Therefore, no assessment of traffic sources is required.

5.4.5 Screening assessment of industrial sources

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

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

Petroleum processes (73)

Petrochemical processes (2)

Carbonisation processes (12)

Cement/lime manufacture (7)

Gasification processes (5)

Part B

Processes for the storage and unloading of petrol at terminals

There are no Part A processes in the area, and no Part B processes (other than the petrol stations assessed below) which involve the storage or unloading of petrol.

5.4.6 Screening assessment of Petrol Stations

There are 12 petrol stations in the district, a number of which have a throughput of greater than 2 million litres (the threshold stated in the Technical Guidance). However, Three Rivers District Council have advised that none of these are near busy roads with more than 30,000 vehicles per day, or relevant public exposure within 10m of the pumps.

5.4.7 Screening assessment of Fuel Storage Depots

There are no major fuel storage depots in the Three Rivers District. Until 2005 there was a major storage depot in the neighbouring district of Dacorum, but this is no longer in use.

5.5 CONCLUSIONS FOR BENZENE IN COUNCIL AREA

The background data indicates that exceedences of the 2003 and 2010 objectives for benzene are unlikely. There are no industrial sources or fuel depots, and no roads meeting the criteria for assessment. The findings of this assessment are summarized in table 5.1.

Table 5.1 Updating and Screening Checklist for benzene

Item	Response
A) Monitoring data outside an AQMA	No monitoring of benzene is carried out in Three Rivers District
B) Monitoring data within an AQMA	No AQMAs for benzene in area
C) Very busy roads or junctions in built up areas	Background concentration is below the threshold
D) New industrial sources.	None present
E) Industrial sources with substantially increased emissions, or new relevant exposure	None present
F) Petrol stations	None meeting the criteria with relevant exposure
G) Major fuel storage depots (petrol only)	None present

Three Rivers District Council is not required to carry out a Detailed Assessment for benzene.

6 Updating and Screening Assessment for 1,3-Butadiene

6.1 THE NATIONAL PERSPECTIVE

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

6.2 STANDARD AND OBJECTIVE FOR 1,3-BUTADIENE

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

6.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR 1,3-BUTADIENE

Previous rounds of review and assessment for Three Rivers District concluded that:

- There are no major industrial sources of 1,3 butadiene

Emissions from vehicles were also expected to decrease. A detailed assessment for 1,3-butadiene was not required. No AQMAs have been declared for 1,3-butadiene.

6.4 SCREENING ASSESSMENT OF 1,3-BUTADIENE

6.4.1 Screening check list

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

- Monitoring Data
- New Industrial Sources
- Existing Industrial Sources with Significantly Increased Emissions, or new relevant exposure

These are described in the following sections.

6.4.2 Background concentrations for 1,3-Butadiene

The average background 1,3-butadiene concentration for 2005 estimated from the UK background maps⁵ and the year adjustment factors was $0.17 \mu\text{g m}^{-3}$ with a maximum concentration of $0.21 \mu\text{g m}^{-3}$.

6.4.3 Screening assessment of monitoring data

No monitoring of 1,3-butadiene has been undertaken in Three Rivers District, or in any neighbouring authorities.

6.4.4 Screening assessment of industrial sources

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

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

Petroleum processes (2)

Petrochemical processes (95)

Organic chemical manufacture (3)

Part B

Rubber processes

None of the above processes was identified in the district or in adjacent authorities, or is believed to have the potential to emit 1,3-butadiene.

6.5 CONCLUSIONS FOR 1,3-BUTADIENE CONCENTRATIONS IN COUNCIL AREA

Estimated background concentrations indicate that the objective for 1,3-butadiene was achieved by the end of 2003, and the 2005 values show that the standard is continuing to be met. There are no significant industrial sources that have the potential to emit 1,3-butadiene. The findings of this assessment are summarised in Table 6.1.

Table 6.1 Updating and Screening Checklist for 1,3-butadiene

Item	Response
A) Monitoring data	None – background maps indicate below the objective
B) New industrial sources.	None present
C) Industrial sources with substantially increased emissions, or new relevant exposure	None present

Three Rivers District Council is not required to carry out a Detailed Assessment for 1,3-butadiene.

7 Updating and Screening Assessment for Lead

7.1 THE NATIONAL PERSPECTIVE

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

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

7.2 STANDARD AND OBJECTIVE FOR LEAD

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

7.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR LEAD

The following conclusions were given for lead in the First and Second Stage Review and Assessment for Three Rivers District.

- There are no significant sources of lead in the District, and sources in neighbouring areas are not large enough to affect the air quality in Three Rivers District.

No AQMAs have been declared for lead.

7.4 SCREENING ASSESSMENT OF LEAD

7.4.1 Source checklist

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

- Monitoring Data
- New Industrial Sources
- Existing Industrial Sources with Significantly Increased Emissions or new relevant exposure

These are described in the following sections.

7.4.2 Screening assessment of monitoring data

No monitoring of lead has been undertaken in Three Rivers District. A national monitoring site at Cottered in Hertfordshire closed in 2002, although the concentrations measured at this site were

well below both the 2004 and 2008 objectives for lead throughout the time series (since 1985). This site is thought to be representative of background across Three Rivers District.

More recently, monitoring sites in Central London and London Brent measured concentrations in 2004 of 0.015 and 0.020 $\mu\text{g m}^{-3}$ respectively. It is considered unlikely that the lead concentrations in Three Rivers District will be greater than this.

7.4.3 Screening assessment of industrial sources

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

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

Iron and steel (37)

Non-ferrous metals (23)

Manufacture of organic chemicals (35)

Part B

Non-ferrous metal furnaces

Electrical furnaces

Blast cupolas

Aluminium processes

Zinc Processes

Copper processes

Lead glass manufacture

None of the above Part A or Part B processes are present in Three Rivers District. Two processes in neighbouring areas were identified in the last Updating and Screening Assessment as potential sources of lead, but it was concluded that the emissions were unlikely to impact the air quality in Three Rivers District. These processes have not reported significant increases in emissions.

7.5 CONCLUSIONS FOR LEAD CONCENTRATIONS IN COUNCIL AREA

Emissions of lead from industrial processes in and around Three Rivers District are not likely to cause an exceedance of the objectives for lead to be achieved in 2004 and 2008. The relevant section of the checklist summarising these findings is presented in Table 6.1.

Table 7.1 Updating and Screening Checklist for Lead

Item	Response
A) Monitoring data	No monitoring of lead is carried out in Three Rivers District
B) New industrial sources.	None present
C) Industrial sources with substantially increased emissions, or new relevant exposure	None present

The Council is not required to carry out a Detailed Review and Assessment for lead.

8 Updating and Screening Assessment for Nitrogen Dioxide

8.1 THE NATIONAL PERSPECTIVE

The principal source of NO_x emissions is road transport, which accounted for about 40% of total UK emissions in 2003. Major roads carrying large volumes of high-speed traffic (such as motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic. Within most urban areas, the contribution of road transport to local emissions will be much greater than for the national picture.

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

8.2 STANDARDS AND OBJECTIVES FOR NITROGEN DIOXIDE

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

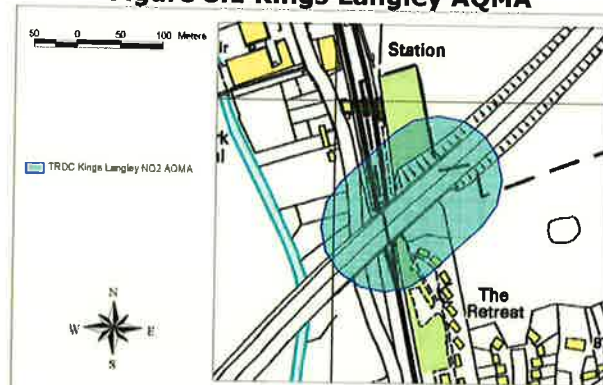
8.3 CONCLUSIONS OF THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT FOR NITROGEN DIOXIDE

The following conclusions were given for nitrogen dioxide in the first and second round of review and assessment reports for Three Rivers District:

- The first three stages of the review and assessment process identified three areas where the objectives for NO_2 were unlikely to be met at relevant receptors, for which AQMAs were declared. The Stage 4 assessment confirmed that exceedences were likely, but recommended that the area covered by the AQMAs should be reduced. The Committee of Members decided to keep the original AQMAs, and the extent was not changed.
- The Updating and Screening Assessment concluded that exceedences in these locations were still likely, but did not identify any new exceedences.

Since there were no significant changes identified in the last Updating and Screening Assessment, no detailed assessment for NO_2 was required in round 2. The three AQMAs cover residential properties close to the M25 at Kings Langley, Chandlers Cross and Chorleywood. The extent of the AQMAs are illustrated by figures 8.1 to 8.3.

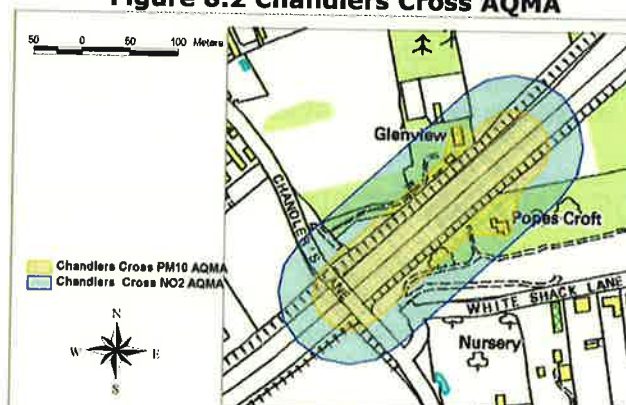
Figure 8.1 Kings Langley AQMA



AQMAs - Raster Map

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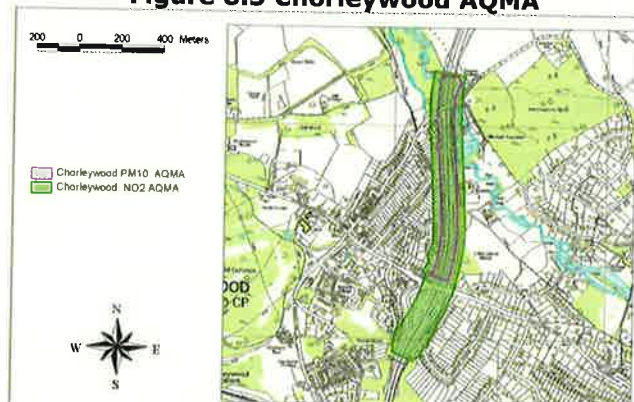
Figure 8.2 Chandlers Cross AQMA



AQMAs - Raster Map

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Figure 8.3 Chorleywood AQMA



AQMAs - Raster Map

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8.4 SCREENING ASSESSMENT OF NITROGEN DIOXIDE

8.4.1 Screening checklist

The Technical Guidance LAQM TG(03)¹ requires assessment of nitrogen dioxide to consider the following sources, data or locations:

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- Narrow congested streets with residential properties close to the kerb
- Junctions

- Busy streets where people may spend 1-hour or more close to traffic
- Roads with high flow of buses and/or HGVs
- New roads constructed or proposed since last round of review and assessment
- Roads with significantly changed traffic flows or new, relevant exposure
- Bus Stations
- New industrial sources
- Industrial sources with substantially increased emissions or new relevant exposure
- Aircraft

These are evaluated in the following sections.

8.4.2 Background concentrations for nitrogen dioxide

The estimated average background nitrogen dioxide concentration for 2005 was $19.8\mu\text{gm}^{-3}$ with a maximum concentration of $28.9\mu\text{gm}^{-3}$.

8.4.3 Screening assessment of monitoring data

8.4.3.1 Automatic monitoring data

Automatic monitoring of NO_2 in 2005 was carried out at the Rickmansworth site on Rectory Road. This is classified as an 'urban background' location, although it is situated quite close to a busy dual carriageway, and is therefore representative of urban sites near busy roads in the area. It is part of the Hertfordshire and Bedfordshire Air Pollution Monitoring Network. The site is run by ERG Kings College. Details of the site location and measured data can be found in appendix 1. The data is summarised in table 8.1. The data has been ratified until 31st October 2005, and data capture for 2005 was high (90%). Measurements from after this date remain provisional.

Table 8.1 Measured NO_2 concentrations from Rickmansworth monitoring station

Site Name	Class	Annual Mean ($\mu\text{g m}^{-3}$)	Number of exceedences of 1- hour mean objective
Rickmansworth	Background	29	14

The measurements indicate that the objectives for nitrogen dioxide were met at this location in 2005. Three Rivers District Council are currently considering re-locating this monitor to inside the Chorleywood AQMA to monitor NO_2 levels at this location.

8.4.3.2 Diffusion tube monitoring data

Until 2004, diffusion tube monitoring was undertaken at 14 sites in the Three Rivers District area. No monitoring took place in 2005. Table 8.2 summarises the site locations, classifications and annual means measured in 2004. The tubes were prepared and analysed by Harwell Scientifics using 50% TEA in acetone. A bias adjustment factor for this laboratory has been taken from the UWE Review and Assessment website and applied to the results.

Projected values for 2005 have been calculated using the updated year adjustment factors, published in January 2006. For kerbside sites, the roadside adjustment factor has been applied, and for intermediate sites, the background factor was used.

Table 8.2 Measured NO_2 concentrations from diffusion tube sites in 2004

Address	X Grid Ref	Y Grid Ref	Class	Raw mean (μgm^{-3})	Bias adjustment factor	Adjusted Mean	2005 Projection
High Street Rickmansworth	506000	194400	Kerbside	33.0	0.89	29.4	28.5
The Cloisters, Rickmansworth	506100	194600	Background	26.8	0.89	23.8	23.4
Parkway Moneyhill Rickmansworth	505000	194300	Background	27.3	0.89	24.3	23.8
Hornhill Road Maple Cross Rickmansworth	503100	192500	Background	34.0	0.89	30.3	29.7
Lower Road Chorleywood	502500	196100	Kerbside	31.4	0.89	28.0	27.2
The Green Sarratt	504100	199700	Kerbside	22.1	0.89	19.7	19.1
High Street Abbots Langley	509500	202000	Kerbside	34.8	0.89	31.0	30.1
St Andrews Precinct South Oxhey	511900	193500	Intermediate	35.4	0.89	31.5	30.9
All Saints Lane Croxley Green	507000	195300	Kerbside	42.9	0.89	38.2	37.1

Address	X Grid Ref	Y Grid Ref	Class	Raw mean (μgm^{-3})	Bias adjustment factor	Adjusted Mean	2005 Projection
The Queens Drive Mill End	503800	195100	Background	41.9	0.89	37.3	36.6
Rectory Road Rickmansworth TR1	505500	194400	Intermediate	35.7	0.89	31.8	31.2
<i>Junction 18 M25</i>	<i>504300</i>	<i>196300</i>	<i>Kerbside</i>	<i>58.3</i>	<i>0.89</i>	<i>51.9</i>	50.4
<i>Chandlers Cross</i>	<i>506500</i>	<i>198600</i>	<i>Background</i>	<i>33.3</i>	<i>0.89</i>	<i>29.7</i>	<i>29.1</i>
<i>The Retreat Abbots Langley</i>	<i>508100</i>	<i>201800</i>	<i>Background</i>	<i>35.9</i>	<i>0.89</i>	<i>32.0</i>	<i>31.4</i>

The three sites in italics are within the existing AQMAs. Red text indicates that data capture at the site is less than 9 months.

In 2004, the diffusion tubes measured only one exceedence of the NO₂ annual mean objective. This was within one of the existing AQMAs. The projected values for 2005 indicate that the concentration of NO₂ will remain below the objective at all sites, except for Junction 18 of the M25, which is within an existing AQMA.

8.4.4 Screening assessment of road traffic sources

Traffic flow data has been supplied by Hertfordshire County Council (2004), and the 2004 NAEI road traffic database. Projections to 2005 have been made using NRTF factors, based on the central growth scenario. The DMRB model was used to predict annual mean concentrations of NO₂ near to the A roads in the district. For screening purposes, the following receptor distances from the road centre line were assumed as a "worst case":

- For motorways, 15m
- For dual carriageways, 10m
- For single carriageway roads, 5m

Any locations highlighted at this stage as not meeting the 2005 annual mean objective were then examined in more detail using receptor distances measured from the landline data. Where no data on the proportion of HDVs was available, a value of 10% was assumed to give a conservative estimate of the air quality. The results of this assessment are summarised in table 8.3.

The DMRB has indicated no exceedences of the annual mean objective for NO₂ in 2005.

Table 8.3 Estimated nitrogen dioxide concentrations near roads in Three Rivers District in 2005

Data Source	Road Name	Receptor Distance	AADT	Average Speed	HDV %	NO2 annual mean ($\mu\text{g m}^{-3}$)
NAEI	A405	10	44866	101	6.4	30.6
NAEI	M25	40	141581	95	11.5	33.5
NAEI	A412	5	20789	51	3.9	26.6
NAEI	M25	50	144530	95	10.9	27.9
NAEI	A404	5	21361	51	2.8	25.0
NAEI	A404	5	22739	51	4.2	28.0
NAEI	M25	50	152672	103	10.4	29.0
NAEI	A412	10	28639	51	3.8	25.9
NAEI	A41	5	29476	51	5.1	30.9
NAEI	A4125	5	16280	51	2.0	26.2
NAEI	A412	5	25645	51	3.4	25.9
NAEI	M25	50	118624	95	11.8	30.0
NAEI	A412	10	18035	51	6.1	28.6
NAEI	A404	5	22508	51	3.3	25.8
NAEI	M25	15	28210	95	4.5	28.4
NAEI	M1	15	65631	103	8.3	32.1
NAEI	A412	5	12484	51	5.2	27.7
NAEI	M25	100	118511	95	11.1	24.3
NAEI	A404	5	20492	51	4.3	26.8
NAEI	A4145	5	11133	51	3.1	24.1

Data Source	Road Name	Receptor Distance	AADT	Average Speed	HDV %	NO2 annual mean ($\mu\text{g m}^{-3}$)
NAEI	A412	5	18917	51	3.9	28.3
NAEI	A404	5	18647	51	4.3	24.0
NAEI	A412	5	18643	51	6.7	30.2
NAEI	A4125	5	16690	51	3.5	25.0
Hertfordshire CC	A404, Rickmansworth Road, Chorleywood	5	22212	30	10.0	31.4
Hertfordshire CC	A404, London Road, Batchworth Heath	5	21947	30	10.0	31.3
Hertfordshire CC	A412, Scots Hill, Rickmansworth	5	25733	30	3.6	26.8
Hertfordshire CC	A412, North Orbital Rd, W Hyde	5	13251	30	6.5	26.7
Hertfordshire CC	A4008, Oxhey Lane, Watford	5	17333	30	10.0	30.4
Hertfordshire CC	A4125, Sandy Lane, Eastbury	5	15038	30	10.0	29.9
Hertfordshire CC	A4145, Moor Lane, Batchworth	5	11491	30	10.0	27.7
Hertfordshire CC	B4542, Little Oxhey Lane, Carpenders Park	5	10272	30	10.0	26.9
Hertfordshire CC	B4542, Prestwick Road, S. Oxhey	5	13641	30	4.2	25.3
Hertfordshire CC	B4542, Prestwick Road, Oxhey Woods	5	7510	30	10.0	25.0
Hertfordshire CC	B5378, Shenleybury, Shenley	5	11482	30	3.8	24.2
Hertfordshire CC	C76, Station Road, Kings Langley	5	6973	30	10.0	24.6
Hertfordshire CC	C101, Harefield Rd, Rickmansworth	5	4640	30	2.8	20.9
Hertfordshire CC	A404, Chorleywood Road, Rickmansworth	5	23279	30	10.0	31.6
Hertfordshire CC	C63, Batchworth Lane, Eastbury	5	12004	30	10.0	28.1
Hertfordshire CC	A412, Uxbridge Road, Rickmansworth	5	17378	30	10.0	30.4
Hertfordshire CC	A412, Dehnam Way, West Hyde	5	12563	30	10.0	28.4
Hertfordshire CC	A404, Chenies Road, Chorleywood	5	16039	30	10.0	30.2
Hertfordshire CC	C74, Sarratt Road, Redhall	5	8613	30	1.34	21.8

As part of this assessment, the following items from the checklist have been considered:

- Narrow congested properties with residential properties close to the kerb – none have been identified
- Busy streets where people may spend 1-hour or more close to traffic – none have been identified
- Roads with high flow of buses and/or HGVs – none have been identified
- New roads constructed or proposed since the last round of review and assessment – no new roads are planned or have been constructed.
- Roads with significantly changed traffic flows or new, relevant exposure – a new 'crawler lane' for HGVs on the M25 running from junction 18 clockwise. This has been considered in the above assessment.

8.4.5 Busy Junctions

The technical guidance requires the assessment of NO₂ concentrations at all junctions with a combined traffic flow of more than 10,000 vehicles per day. The motorway junctions have all been assessed in previous reports, and three more junctions meeting the criteria were identified in the last updating and screening assessment. One of these could be discounted, as there was no relevant public exposure. The other two were roundabouts on the A412. These were assessed and were not close to the objective for 2005, and there has been no significant changes to the road network or traffic flows, so it has not been necessary to reassess these junctions.

From the traffic data provided, three more busy junctions have been identified:

- London Road/Batchworth Lane
- Sandy Lane/Batchworth Lane
- Prestwick Road/Little Oxhey Lane

The first two junctions identified do not have relevant public exposure within 20m of the kerb. The remaining junction has been assessed using the DMRB model. The results are summarised in Table 8.4. The 2005 traffic count has been estimated from the 2004 data supplied and the NRTF factors. Where no HDV % has been provided, a value of 10% has been assumed. The receptor distances were measured from the GIS map provided by Three Rivers District Council. The DMRB has not indicated an exceedance of the objective at this junction.

Table 8.4 Estimated nitrogen dioxide concentrations near busy junctions in Three Rivers District in 2005

Receptor Number	Link	Receptor Distance (m)	AADT	%HDV	Speed (km/h)	NO ₂ concentration (ugm-3)
1	Prestwick Road, Oxhey Wood	15	7510	10	20	30
	Prestwick Road, S. Oxhey/Little Oxhey Lane	22	11957	7.1	20	

8.4.6 Screening assessment of industrial sources

The Guidance LAQM TG(03)¹ lists the following processes as significant potential sources of nitrogen dioxide:

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
 Iron and steel (19)
 Petroleum processes (16)
 Combustion processes (34)
 Cement/lime manufacture (9)
 Carbonisation (6)
 Gasification (4)
 Inorganic chemicals (4)

Part B

Glass manufacture

There are no Part A processes in the Three Rivers District area, and no Part B authorised processes involving glass manufacture. There are no processes in neighbouring boroughs which are likely to impact the nitrogen dioxide concentrations in Three Rivers District.

8.4.7 Screening assessment of other transport sources

Bus Stations : There are no bus stations in the Three Rivers District.

Airports: There are no working airports in Three Rivers District. The nearest airport is Denham Aerodrome, which is located in South Bucks District, over 1km away from the border with Three Rivers District. This does not require further consideration as it is too far away and is very small.

8.5 CONCLUSIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial sources of nitrogen dioxide in Three Rivers District. The DMRB screening tool indicates that nitrogen dioxide levels at sites of relevant exposure alongside the district's roads are unlikely to exceed the 2005 annual mean objective. Automatic monitoring data at Rickmansworth indicates that the objectives are being met at that location, and the diffusion tube measurements for 2004 only indicated an exceedence within an existing AQMA.

Three Rivers District Council may wish to consider reinstating NO₂ diffusion tube monitoring at receptors close to the M25, within the existing AQMAs. Should the recorded concentrations fall below the annual mean objective for NO₂ in the future, the Council may then be able to revoke one or more of the AQMAs for NO₂. Three Rivers District Council are also considering re-locating the automatic NO₂ monitor to within the Chorleywood AQMA.

A summary of this assessment is presented in table 8.5. A detailed assessment is not required for NO₂.

Table 8.5 Updating and Screening Checklist for NO₂

Item	Response
A) Monitoring data outside an AQMA	Automatic monitoring recorded concentrations below the objective. 2004 diffusion tubes were below the objective.
B) Monitoring data within an AQMA	One exceedence within one of the AQMAs
C) Narrow congested streets with residential properties close to the kerb	None identified
D) Junctions.	DMRB indicates no exceedences
E) Busy streets where people may spend 1-hour or more close to traffic	None identified
F) Roads with high flow of buses and/or HGVs.	None identified
G) New roads constructed or proposed since the previous round of R&A	None identified
H) Roads with significantly changed traffic flows, or new relevant exposure	DMRB indicates no exceedences
I) Bus Stations	None identified

Item	Response
J) New industrial sources.	None present
K) Industrial sources with substantially increased emissions, or new relevant exposure	None present
L) Aircraft	No airports in the area

9 Updating and Screening Assessment for Sulphur Dioxide

9.1 THE NATIONAL PERSPECTIVE

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for 69% of emissions in 2004. There are also significant emissions from other industrial combustion sources. Emissions from domestic sources fell by 34% in 2002-2003, but these can still have a significant effect locally. Road transport currently accounts for less than 1% of emissions.

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

9.2 STANDARD AND OBJECTIVE FOR SULPHUR DIOXIDE

The Government and the Devolved Administrations have adopted a 15-minute mean of $266 \mu\text{g m}^{-3}$ as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005.

Additional objectives have also been set which are equivalent to the EU limit values specified in the First Air Quality Daughter Directive. These are for a 1-hour mean objective of $350 \mu\text{g m}^{-3}$, to be exceeded no more than 24 times per year, and a 24-hour objective of $125 \mu\text{g m}^{-3}$, to be exceeded no more than 3 times per year, to be achieved by the end of 2004.

9.3 CONCLUSIONS OF THE SECOND ROUND OF REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE

The First and Second Stage Review and Assessment report for Three Rivers District concluded that:

- There are no significant sources of sulphur dioxide in the Three Rivers District area, or in adjacent local authority areas.

No AQMAs have been declared for SO_2 in Three Rivers District.

9.4 SCREENING ASSESSMENT OF SULPHUR DIOXIDE

9.4.1 Source checklist

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

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

These are evaluated in the following sections.

9.4.2 Background concentrations for sulphur dioxide

The estimated average background sulphur dioxide concentration for 2001 was $3.60\mu\text{gm}^{-3}$ with a maximum concentration of $4.73\mu\text{gm}^{-3}$.

9.4.3 Screening assessment of monitoring data

No monitoring of SO_2 has been carried out in Three Rivers District. However, monitoring has been carried out at three locations in neighbouring areas – St Albans Fleetville (background), Luton (background) and Bedford Stewartby (rural). These sites measured annual mean concentrations of 5.9, 11 and $11.5\mu\text{g m}^{-3}$ respectively.

All of the objectives for SO_2 were met at Luton and St Albans, but the 15 minute mean objective was exceeded 44 times (35 are permitted) at the Bedford Stewartby site. This site is impacted by local industrial sources, and is not likely to be representative of the SO_2 concentration of the wider area.

The background monitoring data indicates that concentrations of sulphur dioxide are unlikely to exceed the objectives away from localised sources.

9.4.4 Screening assessment of industrial sources

The Guidance LAQM TG(03)¹ lists the following processes as significant potential sources of sulphur dioxide:

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

- Iron and steel (9)
- Petroleum processes (15)
- Combustion processes (45)
- Cement/lime manufacture (3)
- Carbonisation (10)
- Non-ferrous metals (7)
- Ceramic Production (9)

Part B

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

None of the above Part A or Part B processes are present in Three Rivers District. There are no significant sources in neighbouring authorities that are close enough to the border with Three Rivers District to affect the sulphur dioxide concentrations in this area.

9.4.5 Small Boilers

Three Rivers District Council have confirmed that there are no small boiler processes greater than 5MWth present in the area.

9.4.6 Domestic coal burning

There are no data for domestic coal burning available but NAEI activity statistics indicate that coal solid fuel use continues to decline throughout the area. Three Rivers District Council advise that it is unlikely that there are any areas with 100 houses using these fuels in a 500 m square.

9.4.7 Screening assessment of other transport Sources

Shipping: There are no shipping movements in the district.

Railways: Three Rivers District Council have advised that some diesel Chiltern Turbo trains do pass through the area, and stop at Rickmansworth and Chorleywood stations. However, it is understood that there are no areas where railway engines are run for more than 15 minutes where members of the public are likely to be exposed.

9.5 CONCLUSIONS FOR SULPHUR DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial or domestic sources of sulphur dioxide in Three Rivers District. A summary of this assessment is included in table 8.2

Table 9.1 Updating and Screening Checklist for SO₂

Item	Response
A) Monitoring data outside an AQMA	No monitoring of SO ₂ has been carried out in Three Rivers District
B) Monitoring data within an AQMA	No AQMAs declared for SO ₂
C) New industrial sources.	None present
D) Industrial sources with substantially increased emissions, or new relevant exposure	None present
E) Areas of domestic coal burning	Not relevant
F) Small Boilers > 5 MW (thermal).	None identified
G) Shipping	Not relevant
H) Railway Locomotives	No diesel trains stopping for significant periods of time

A Detailed Assessment is not required for sulphur dioxide.

10 Updating and Screening Assessment for PM₁₀

10.1 THE NATIONAL PERSPECTIVE

National UK emissions of primary PM₁₀ have been estimated as totalling 141,000 tonnes in 2003. Of this total, around 27% was derived from road transport sources. It should be noted that, in general, the emissions estimates for PM₁₀ are less accurate than those for the other pollutants with prescribed objectives, especially for sources other than road transport.

The Government established the Airborne Particles Expert Group (APEG) to advise on sources of PM₁₀ in the UK and current and future ambient concentrations. Their conclusions were published in January 1999 (APEG, 1999). APEG concluded that a significant proportion of the current annual average PM₁₀ is due to the secondary formation of particulate sulphates and nitrates, resulting from the oxidation of sulphur and nitrogen oxides. These are regional scale pollutants and the annual concentrations do not vary greatly over a scale of tens of kilometres. There are also natural or semi-natural sources such as wind-blown dust and sea salt particles. The impact of local urban sources is superimposed on this regional background. Such local sources are generally responsible for winter episodes of hourly mean concentrations of PM₁₀ above 100 µg m⁻³ associated with poor dispersion. However, it is clear that many of the sources of PM₁₀ are outside the control of individual local authorities and the estimation of future concentrations of PM₁₀ are in part dependent on predictions of the secondary particle component.

10.2 STANDARD AND OBJECTIVE FOR PM₁₀

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles (PM₁₀), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 µgm⁻³ as the annual mean, and 50 µgm⁻³ as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to have been achieved by the end of 2004. In addition there is an objective of 50 µgm⁻³ as the fixed 24-hour mean to be exceeded on no more than 7 days per year and 20 µgm⁻³ as the annual mean to be achieved by the end of 2010. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent.

It should be noted that the objectives for 2010, based on the Stage 2 EU Limit Values have not been included in the Air Quality Regulations for England, and local authorities are not currently required to assess against them. In addition, they were the subject of the European Commission's recent review of the First Daughter Directive.

The Commission is currently consulting on a new consolidated Directive on Ambient Air Quality, which is likely to see changes to the above Limit Values, though the nature of these changes cannot be confirmed at this time.

10.3 CONCLUSIONS OF THE FIRST AND SECOND ROUNDS OF REVIEW AND ASSESSMENT FOR PM₁₀

The following conclusions were given for PM₁₀ in the First and Second Stage Review and Assessment report for Three Rivers District:

- In the first round of Review and Assessment, two locations were identified where potential exceedences of the objectives for PM₁₀ were likely, and two AQMAs were declared.
- The Stage 4 Assessment which followed, modelled PM₁₀ concentrations in the area using updated emission factors, and concluded that exceedences of the PM₁₀ objectives at locations with relevant public exposure were unlikely. The Committee of Members reviewed this report, but concluded that the two AQMAs should remain.

- The 2004 Updating and Screening Assessment concluded that the relevant objectives were likely to be met, and that a Detailed Assessment for PM₁₀ was not required.

There are currently two AQMAs for PM₁₀ in Three Rivers District. Maps of these are included in section 8.3 of this report.

10.4 SCREENING ASSESSMENT OF PM₁₀

10.4.1 Checklist for PM₁₀

The Technical Guidance LAQM TG(03)¹ requires assessment of PM₁₀ to consider the following sources, data or locations:

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

These are evaluated in the following sections.

10.4.2 Background concentrations for PM₁₀

The estimated average background PM₁₀ concentration for 2005 was 22.5 µg m⁻³ in Three Rivers District with a maximum concentration of 25.4 µg m⁻³.

10.4.3 Screening assessment of monitoring data

Monitoring of PM₁₀ has taken place at the Rickmansworth background monitoring site. This site is part of the Hertfordshire and Bedfordshire Air Pollution Monitoring Network. The results of the monitoring for 2005 are summarised in table 10.1. Measurements are made using a TEOM analyser – the results have been scaled by a factor of 1.3 to convert them to the gravimetric equivalent. Data capture for 2005 was 81%.

Table 10.1 Summary of PM₁₀ Monitoring data

Site	Annual Mean (µg m ⁻³)	Maximum Daily Mean (µg m ⁻³)	Number of exceedences of daily mean objective
Rickmansworth	18.7	51.9	1

The monitor recorded an annual mean well below the 2004 annual mean objective, and the objective for daily mean exceedences was also met by a significant margin. The projected annual mean for 2010, calculated according to the method detailed in LAQM.TG(03), is 17.2 µg m⁻³. This is within the provisional objective set for 2010. The projected number of daily mean exceedences (1 day) is also within the 2010 objective. Three Rivers District Council are currently considering relocating this monitor to within the Chorleywood AQMA.

10.4.4 Screening assessment of road traffic sources

Traffic flow data has been taken from the 2004 NAEI road traffic database, and from data provided by Hertfordshire County Council. Projections to 2005 have been made using NRTF factors, based on the central growth scenario. The DMRB model was used to predict annual mean concentrations of PM₁₀, and the number of exceedences of the daily mean objectives, near to the A roads in the district in 2005 and 2010. For screening purposes, the following receptor distances were assumed as a "worst case":

- For motorways, 15m
- For dual carriageways, 10m
- For single carriageway roads, 5m

Any locations highlighted at this stage as not meeting the objectives were then examined in more detail using receptor distances measured from the landline data. The results of this assessment are summarised in table 10.2.

The DMRB has indicated no exceedences of the annual mean objective or daily mean objective for PM₁₀ at relevant receptors in 2005. The objectives for 2010, however, are unlikely to be met at any of the roadside locations assessed.

Table 10.2 Modelled annual mean PM₁₀ concentrations and 24-hour exceedences alongside roads in Three Rivers District for 2005 and 2010

Road number	Receptor Distance (m)	AADT combined veh/day (2005)	Annual average speed (km/h)	% HDV	2005		2010	
					Annual Mean (µg m ⁻³)	Days > 50µgm ⁻³	Annual Mean (µg m ⁻³)	Days > 50µgm ⁻³
A405	10	44866	101	6.4	28.6	23	24.6	11
M25	40	141581	95	11.5	28.3	22	24.4	11
A412	5	20789	51	3.9	25.9	15	22.7	8
M25	50	144530	95	10.9	26.5	16	23.1	8
A404	5	21361	51	2.8	25.4	13	22.4	7
A404	5	22739	51	4.2	26.1	15	22.9	8
M25	50	152672	103	10.4	26.2	15	22.7	8
A412	10	28639	51	3.8	25.6	14	22.5	7
A41	5	29476	51	5.1	28.0	21	24.3	11
A4125	5	16280	51	2.0	25.9	15	23.1	8
A412	5	25645	51	3.4	25.7	14	22.5	7
M25	50	118624	95	11.8	27.0	18	23.6	9
A412	10	18035	51	6.1	26.2	15	22.8	8
A404	5	22508	51	3.3	25.7	14	22.6	7
M25	15	28210	95	4.5	26.8	17	23.6	9
M1	15	65631	103	8.3	29.2	25	24.9	12
A412	5	12484	51	5.2	25.8	14	22.8	8
M25	100	118511	95	11.1	24.0	10	21.5	6
A404	5	20492	51	4.3	25.6	14	22.4	7
A4145	5	11133	51	3.1	25.0	12	22.5	7
A412	5	18917	51	3.9	26.4	16	23.2	8
A404	5	18647	51	4.3	24.5	11	21.4	5
A412	5	18643	51	6.7	27.0	18	23.5	9
A4125	5	16690	51	3.5	25.5	14	22.5	7
A404, Rickmansworth Road, Chorleywood	5	22212	30	10	29.5	26	24.7	12
A404, London Road, Batchworth Heath	5	21947	30	10	29.5	26	24.7	12
A412, Scots Hill, Rickmansworth	5	25733	30	3.6	27.1	18	23.5	9
A412, North Orbital Rd, W Hyde	5	13251	30	6.5	26.8	17	23.3	9
A4008, Oxhey Lane, Watford	5	17333	30	10	28.9	24	24.3	11
A4125, Sandy Lane, Eastbury	5	15038	30	10	28.5	22	24.1	10
A4145, Moor Lane, Batchworth	5	11491	30	10	27.2	18	23.5	9
B4542, Little Oxhey Lane, Carpenders Park	5	10272	30	10	26.7	17	23.2	8
B4542, Prestwick Road, S. Oxhey	5	13641	30	4.2	26.2	15	23.0	8

Road number	Receptor Distance (m)	AADT combined veh/day (2005)	Annual average speed (km/h)	% HDV	2005		2010	
					Annual Mean ($\mu\text{g m}^{-3}$)	Days > $50\mu\text{g m}^{-3}$	Annual Mean ($\mu\text{g m}^{-3}$)	Days > $50\mu\text{g m}^{-3}$
B4542, Prestwick Road, Oxhey Woods	5	7510	30	10	25.6	14	22.5	7
B5378, Shenleybury, Shenley	5	11482	30	3.8	25.5	14	22.6	7
C76, Station Road, Kings Langley	5	6973	30	10	25.4	13	22.4	7
C101, Harefield Rd, Rickmansworth	5	4640	30	2.8	23.7	10	21.5	5
A404, Chorleywood Road, Rickmansworth	5	23279	30	10	29.6	26	24.8	12
C63, Batchworth Lane, Eastbury	5	12004	30	10	27.4	19	23.6	9
A412, Uxbridge Road, Rickmansworth	5	17378	30	10	28.9	24	24.3	11
A412, Dehnam Way, West Hyde	5	12563	30	10	27.6	19	23.7	10
A404, Chenies Road, Chorleywood	5	16039	30	10	28.7	23	24.2	11
C74, Sarratt Road, Redhall	5	8613	30	1.34	24.3	11	21.9	6

The following items from the checklist for PM_{10} have also been considered:

- Roads with a high flow of buses and/or HGVs – No roads with high flows of HDVs have been identified.
- New roads constructed or proposed since the last round of review and assessment – no new roads have been constructed since the last Updating and Screening Assessment.
- Roads close to the objective during the last round of review and assessment – there were no roads that were close to the objective during the last round of review and assessment.
- Roads with significantly changed traffic flows or new, relevant exposure – a 'crawler lane' is now in place along the M25 from Junction 18 clockwise. This has been considered in the above assessment

10.4.5 Busy Junctions

The technical guidance requires the assessment of PM_{10} concentrations at all junctions with a combined traffic flow of more than 10,000 vehicles per day. The motorway junctions have all been assessed in previous reports, and three more junctions meeting the criteria were identified in the last updating and screening assessment. One of these could be discounted, as there was no relevant public exposure. The other two were roundabouts on the A412. These were assessed and were not close to the objectives for 2004, so it has not been necessary to reassess these junctions.

From the traffic data provided, three more busy junctions have been identified:

- London Road/Batchworth Lane
- Sandy Lane/Batchworth Lane
- Prestwick Road/Little Oxhey Lane

The first two junctions identified do not have relevant public exposure within 20m of the kerb. The remaining junction has been assessed using the DMRB model. The results are summarised in Table 10.3. The 2005 traffic count has been estimated from the 2004 data supplied and the NRTF factors. Where no HDV % has been provided, a value of 10% has been assumed. The receptor distances were measured from the GIS map provided by Three Rivers District Council. The DMRB

has not indicated an exceedence of the objective at this junction in 2005. However, the projection for 2010 indicates that both the provisional annual mean objective, and the daily mean objective are likely to be exceeded at this location.

Table 10.3 Concentrations of PM₁₀ near busy junctions in Three Rivers District

Receptor Number	Link	Receptor Distance (m)	AADT	%HDV	Speed (km/h)	2005		2010	
						Annual mean	Days > 50µg m ⁻³	Annual mean	Days > 50µg m ⁻³
1	Prestwick Road, Oxhey Wood	15	7510	10	20	28	21	24	10
	Prestwick Road, S. Oxhey/Little Oxhey Lane	22	11957	7.1	20				

10.4.6 Screening assessment of industrial sources

The Guidance LAQM TG(03)¹ lists the following processes as significant potential sources of PM₁₀:

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

Iron and steel (61)
Petroleum processes (4)
Combustion processes (13)
Cement/lime manufacture (7)
Carbonisation (2)
Gasification (4)
Non-ferrous metals (4)
Fertilizer production

Part B

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

There are no Part A processes in Three Rivers District, and no Part B authorised processes with the potential to emit significant quantities of PM₁₀ (with the exception of the quarry, detailed in section 10.4.7). No processes in neighbouring boroughs with significant emissions of PM₁₀ have been identified.

10.4.7 Quarries and landfill sites

There is a sand and aggregate quarry in Three Rivers District at Chandlers Cross. The site has unpaved haul roads and there is a cement batching process on site. There are a small number of houses within 1km of the quarry, but there have been no complaints of dust nuisance. Experience from site visits also indicates that fugitive dust from this source is not a problem.

There are also a number of landfill sites in the area, but these are now capped and monitored.

10.4.8 Domestic solid fuel burning

There are no data for domestic coal burning available for the district but solid fuel use continues to decline throughout the area. Three Rivers District Council have advised that it is unlikely that there are any areas with 50 houses using these fuels in a 500 m square.

10.4.9 Screening assessment of other transport sources

There are no working airports within the Three Rivers District. The nearest airport is Denham Aerodrome in South Bucks District. This is more than 1km from the district border and therefore does not need to be considered further.

10.5 CONCLUSIONS FOR PM₁₀ CONCENTRATIONS IN COUNCIL AREA

The DMRB has not indicated any exceedences of the objectives for PM₁₀ at any of the roadside locations assessed in 2005. Projections for 2010 indicate exceedences of the provisional objectives, but these are not currently included in the UK air quality legislation, so no action is required at this stage. The automatic monitor at Rickmansworth did not record any exceedences for 2005. The Council are currently considering relocating this monitor to the Chorleywood AQMA to monitor PM₁₀ levels there. The assessment for PM₁₀ is summarised in table 10.4.

Table 10.4 Updating and Screening Checklist for PM₁₀

Item	Response
A) Monitoring data outside an AQMA	Monitoring data indicates no exceedences
B) Monitoring data within an AQMA	No monitoring has been carried out within the AQMA
C) Busy roads and junctions in Scotland	NA
D) Junctions.	Junctions assessed using DMRB – no exceedences
E) Roads with high flow of buses and/or HGVs.	None identified
F) New roads constructed or proposed since last round of R&A	None identified
G) Roads with significantly changed traffic flows, or new relevant exposure.	All roads assessed using DMRB with up to date traffic data.
H) Roads close to the objective during the second round of Review and Assessment	None identified
I) New industrial sources.	None present
J) Industrial sources with substantially increased emissions, or new relevant exposure	None present

Item	Response
K) Areas of domestic solid fuel burning	None present
L) Quarries / landfill sites / opencast coal / handling of dusty cargoes at ports etc.	None present
M) Aircraft	No airports in the area

Three Rivers District Council is not required to proceed to a detailed assessment for PM₁₀.

11 Conclusions

11.1 CARBON MONOXIDE

Predicted background concentrations in the area and monitoring data from neighbouring local authorities indicate that the objectives for CO are unlikely to be exceeded. A Detailed Assessment is not required for carbon monoxide.

11.2 BENZENE

The background concentrations of benzene are below the threshold for the roads to be considered. There are no significant industrial sources, and none of the petrol stations meet the criteria specified in the guidance. A Detailed Assessment is therefore not required for benzene.

11.3 1,3-BUTADIENE

There are no significant industrial sources of 1,3-butadiene in the borough. Estimated background concentrations indicate that the objective for 1,3-butadiene is being met. A Detailed Assessment is not required for 1,3-butadiene.

11.4 LEAD

Emissions of lead from industrial processes in and around Three Rivers District are not likely to exceed the objectives for lead to be achieved in 2004 and 2008. The Council is not required to carry out a Detailed Review and Assessment for lead.

11.5 NITROGEN DIOXIDE

There are no significant industrial sources of nitrogen dioxide in Three Rivers District. The DMRB screening tool indicates that nitrogen dioxide levels at sites of relevant exposure alongside the district's roads are unlikely to have exceeded the 2005 annual mean limit value. Diffusion tube measurements in 2004 showed some exceedences of the objective within the existing AQMAs. Projections for 2005 showed continued exceedences at these sites. Consequently Three Rivers District Council is not required to carry out a Detailed Review and Assessment for nitrogen dioxide.

11.6 SULPHUR DIOXIDE

There are no significant industrial or domestic sources of sulphur dioxide in Three Rivers District. Three Rivers District Council is not required to carry out a Detailed Assessment for sulphur dioxide.

11.7 PM₁₀

The DMRB screening model indicates that the objectives for PM₁₀ were met in 2005 at roadside locations. The 2010 annual mean may exceed 20 µgm⁻³ at relevant locations in 2010 due, in part, to the background contribution predicted by the NAEI for PM₁₀ being higher than the objective. Daily mean objectives in 2010 are also likely to be widely exceeded at roadside locations.

Three Rivers District Council is not required to carry out a Detailed Assessment for PM₁₀.

11.8 SUMMARY AND RECOMMENDATIONS

A Detailed Assessment is not required for benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, PM₁₀ or sulphur dioxide.

It is recommended that Three Rivers District Council should reinstate diffusion tube monitoring of NO₂ at sites within the three AQMAs. The Council is also considering re-locating the automatic NO₂ and PM₁₀ monitors to within the Chorleywood AQMA.

12 References

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Appendices

CONTENTS

Appendix 1	Detailed monitoring data
Appendix 2	Detailed traffic flow data
Appendix 3	Descriptions of selected models and tools
Appendix 4	Part A and Part B regulated processes

Appendix 1

Detailed Monitoring data

CONTENTS

- A1.1 Monthly average NO₂ concentrations from diffusion tube measurements (2004)
- A1.2 Rickmansworth Automatic monitoring data (2005)

A1.1 Monthly average NO₂ concentrations from diffusion tube measurements (2004)¹⁰

Address	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
High Street Rickmansworth	21	22	18	21	20	13	3		12	20	22	21
The Cloisters Rickmansworth	18	19	15	16	14	9	5	6	10	16	20	23
Parkway Moneyhill Rickmansworth	19	19	14	18	14	10	7	8	6	16	20	23
Hornhill Road Maple Cross Rickmansworth		21		22		10	13	13	17	20	24	23
Lower Road Chorleywood	20	21	21	17	20	10	12	10		16	18	19
The Green Sarratt	12	15	16	15	10	7	7	9	10	12	14	14
High Street Abbots Langley	14	23	21	24	17	12	14	13	17	21	25	21
St Andrews Precinct South Oxhey	22	22	24	25	16	10	9	12	16	22	22	26
All Saints Lane Croxley Green	27	26	20	22	21	22	18	17	20	21	30	30
The Queens Drive Mill End	30		27	23	20	16	15					25
Rectory Road Rickmansworth TR1	22	23	23	20	18	8	13			21	17	25
Junction 18 M25	33	30	31	35	28	26	28	29	33	26	37	36
Chandlers Cross	21		26	21	9	10	18	19	14	18	18	21
The Retreat Abbots Langley	22	22	23	20	13	11		11		22	22	25

Note: These measurements are in ppb, and have not been adjusted for bias.

A1.2 Automatic monitoring data from Rickmansworth¹⁰

Figure A1.2.1 Hourly mean NO₂ concentrations (ppb), 2005

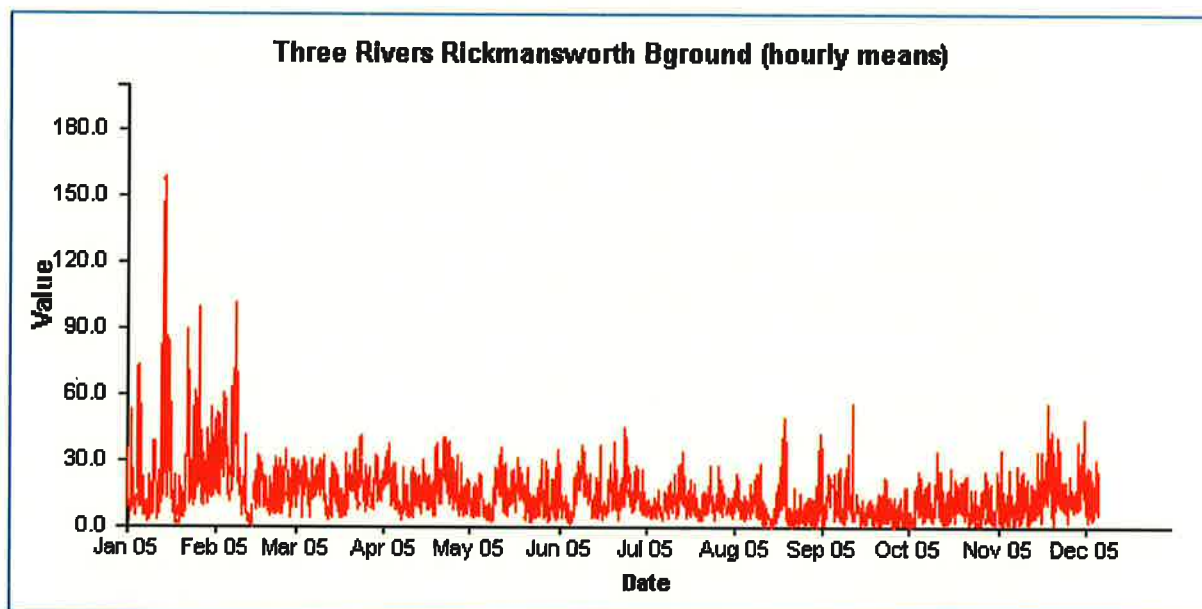
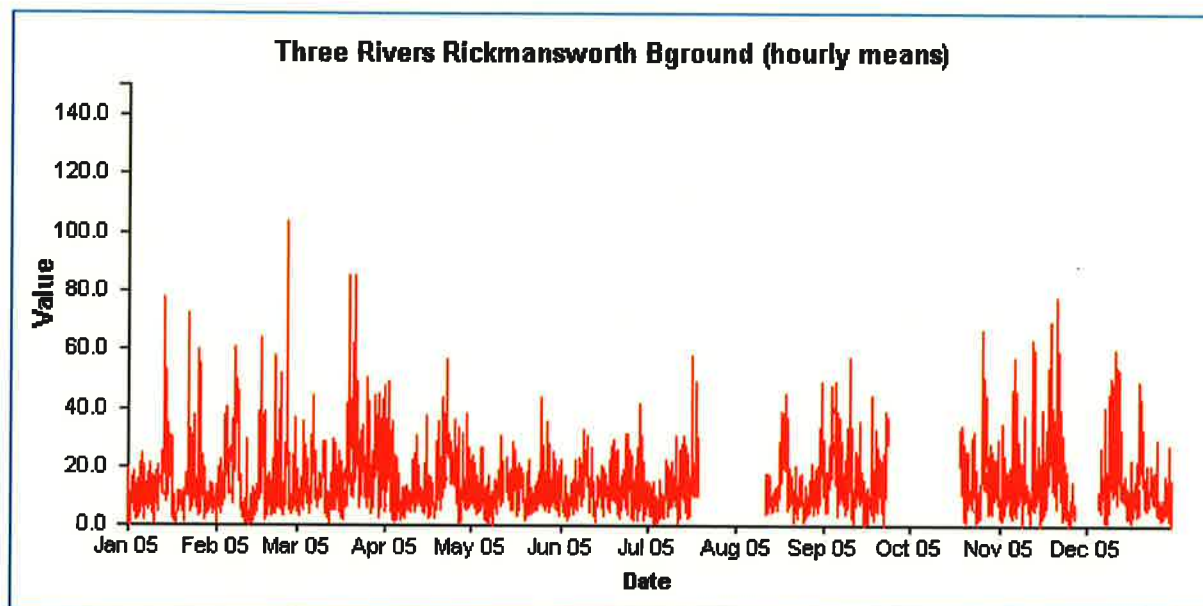


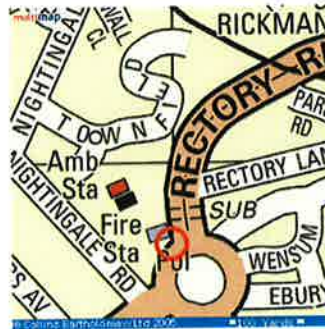
Figure A1.2.2 Hourly mean PM₁₀ concentrations ($\mu\text{g m}^{-3}$), 2005



Note: PM₁₀ measurements have been made by a TEOM – this graph has not been adjusted to gravimetric equivalent.

The site is classified as an urban background location, and measures NO_2 , PM_{10} and weather features. It is located on Rectory Road, Rickmansworth (OS grid reference 505500, 194400). A site map is included below.

Figure A1.2.3 Location map of the Rickmansworth Background monitoring station



Appendix 2

Detailed Traffic Flow Data

CONTENTS

Table 2.1	Road classifications in LAQM TG(03)
Table 2.2	Traffic Flow Data from the NAEI Data Warehouse
Table 2.3	Traffic Flow Data from Hertfordshire County Council

Table A2.1 Road classifications in LAQM TG(03)

Very busy roads	Single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day.
	Dual carriageway (2 or 3-lane) roads with daily average traffic flows which exceed 120,000 vehicles per day.
	Motorways with daily average traffic flows which exceed 140,000 vehicles per day.
Busy Roads	Roads with more than 30,000 vehicles per day.

A 2.2a Traffic Flow Data from the NAEI Data Warehouse

Explanation of the data fields:	
Rd_no	Number of the road
x	Grid reference Easting
y	Grid reference Northing
All_vehicles	AADF Total
CAR	AADF Cars
BUS	AADF Buses
LGV	AADF Light Goods Vehicles
HGVr	AADF rigid HGVs
HGVa	AADF articulated HGVs
Moto	AADF Motorcycles
MB	Built-up motorway
MN	Non built-up motorway
PB	Built-up primary road

A 2.2b Traffic Flow Data from the NAEI Data Warehouse (2004 data)

Road No.	X	Y	All Vehicles	Car	Bus	LDV	HGVr	HGVa	Moto
A405	511990	202220	44099	35872	263	4625	1901	669	769
M25	503800	195000	139161	107800	517	14790	7104	8411	539
A412	505000	194100	20434	17499	165	1953	599	28	190
M25	510000	202901	142059	111209	397	14984	6231	8801	437
A404	507001	192842	20996	17609	62	2554	466	54	251
A404	505000	195870	22350	19040	101	2225	705	131	148
M25	505020	198090	150062	118444	678	15232	6613	8358	737
A412	505600	194600	28149	24383	180	2469	784	114	219
A41	508330	200000	28972	24018	186	3145	1101	195	327
A4125	510000	193950	16002	13987	63	1583	255	8	106
A412	506000	194710	25207	21868	183	2250	615	68	223
M25	507453	200045	116596	90135	426	12121	5626	7722	566
A412	503389	193966	17727	14361	41	2145	871	171	138
A404	506000	194073	22123	19099	58	2171	592	86	117
M25	508000	199380	27728	23135	177	3182	729	348	157
M1	511800	202450	64509	51010	390	7308	3275	1703	823
A412	503040	191730	12271	10016	51	1514	468	122	100
M25	502350	192900	116485	91246	421	11824	4672	7816	506
A404	503300	196720	20142	17179	124	1964	654	91	130
A4145	507720	194000	10943	9106	15	1399	292	35	96
A412	503910	193500	18594	15924	150	1777	545	25	173
A404	502620	197500	18328	15633	113	1787	594	83	118
A412	503118	192000	18324	14991	134	1991	772	326	110
A4125	511220	195000	16405	14390	235	1341	325	8	106

A2.3 Traffic Flow Data from Hertfordshire County Council (2004)

Road Name	Location	AAWD in 2004	% HGV	%LDV	Bus/Coach	Speed Limit	85th Percentile Speed	
							Weekday	Weekend
A404	Rickmansworth Road, Chorleywood	21832						
A404	London Road, Batchworth Heath	21572						
A412	Scots Hill, Rickmansworth	25293	2.55%	9.74%	1.03%			
A412	North Orbital Rd, W Hyde	13024	6.03%	13.08%	0.50%			
A4008	Oxhey Lane, Watford	17037						
A4125	Sandy Lane, Eastbury	14781						
A4145	Moor Lane, Batchworth	11295						
	Little Oxhey Lane,	10096						
B4542	Carpenders Park							
B4542	Prestwick Road, S. Oxhey	13408	2.06%	10.57%	2.11%			
B4542	Prestwick Road, Oxhey Woods	7382						
B5378	Shenleybury, Shenley	11286	2.45%	9.28%	1.30%			
	Station Road, Kings	6854						
C76	Langley							
	Harefield Rd,	4561	2.22%	9.99%	0.58%			
C101	Rickmansworth							
	Chorleywood Road,	22881						
A404	Rickmansworth							
	Batchworth Lane,	11799						
C63	Eastbury							

Road Name	Location	AAWD in 2004	% HGV	%LDV	Bus/Coach	Speed Limit	85th Percentile Speed	
							Weekday	Weekend
A412	Uxbridge Road, Rickmansworth	17081						
A412	Dehnam Way, West Hyde	12348				40	51	52
A404	Chenies Road, Chorleywood	15765				40	43	43
C74	Sarratt Road, Redhall	8466	0.99%	9.52%	0.35%			

Appendix 3

Descriptions of selected models and tools

CONTENTS

- A4.1 Design Manual for Roads and Bridges (DMRB)⁷
- A4.2 Guidance for Estimating the Air Quality Impact of Stationary Sources (GSS)⁸

Simple screening models^a

A4.1. Design Manual for Roads and Bridges (DMRB) - This screening method was formulated by the former Department of Transport. The method gives a preliminary indication of air quality near roads. The DMRB method requires information on vehicle flow, HDV mix, vehicle speed and receptor-road distances. It contains a useful database of vehicular emission factors for future years.

The method adopts the annual mean concentration as the base statistic. Background pollutant levels are included explicitly in the calculations by adding an amount to the annual mean traffic contribution using the Air Quality Archive (paragraph 6.09) or default values. The model also estimates, from the annual mean PM₁₀ prediction, the number of days where the PM₁₀ concentration exceeds the 50µg m⁻³ daily mean objective. The latest version of the DMRB nomogram (1.02, dated February 2003) has been used for this assessment. Details of the road layout cannot be specified.

A4.2. Guidance for Estimating the Air Quality Impact of Stationary Sources (GSS); this guide provides precalculated dispersion results for stack emissions expressed as nomograms, was published by the Environment Agency (EA) in 1998. The nomograms are based on a large number of computations using ADMS. They cover 10 stack heights, 4 categories of surface roughness, 3 averaging times and 3 climate types. The predicted pollutant concentrations are comparable with the prescribed air quality objectives. The model is limited to a range of stack heights and exit velocities, and cannot treat building wake effects or non-buoyant source releases.

Where such point sources needed to be assessed, the **netcen** point source spreadsheet, based on this methodology has been used. This is available from <http://www.airquality.co.uk/archive/laqm/tools.php>.

^a The information on simple screening models has been taken from LAQM.TG(03) Review and Assessment: *Selection and use of dispersion models*.

Appendix 4

Industrial Processes

CONTENTS

A4.1	Part A and B Processes
A4.2	Petrol Stations

A4.1 Part A and Part B Regulated Processes

Company Name	A or B	Process Type	Grid Ref	Likely Emissions
West Herts Crematorium	B	Crematorium	TL 116 016	HCl, CO, CO, Particulates, Organic Compounds
Docwra	B	Respraying of road vehicles	TQ 033 911	VOCs, Particulates
T. V. Kenealy & Sons	B	Respraying of road vehicles	TL 085 038	VOCs, Particulates
Trafalgar Cases	B	Manufacture of timber and wood based products	TL 077 029	VOCs, Particulates
RMC Mortars	B	Cementitious material handling and storage	TQ 072 988	VOCs, Particulates
Watford Timber Co.	B	Manufacture of timber and wood based products	TQ 082 944	VOCs, Particulates, NOx

A4.2 Petrol Stations

Petrol Station Name	Area	Annual Volume of fuel delivered	Grid Ref	Vapour Installed	Balancing
Q8, Bedmond Road	Bedmond	>1000m3	TL 099 037		Y
Primrose Hill Service Station, Primrose Hill	Kings Langley	>1000m3	TL 078 029		Y
Fina Service Station Ltd, Old Mill Road	Hunton Bridge	>1000m3	TQ 084 999		Y
Biggerstaffs Garage, Dimmocks Lane	Sarratt	100-500m3	TQ 045 992		Y
Shell Chorleywood, Rickmansworth Road	Chorleywood	>1000m3	TQ 038 965		Y
Rickmansworth Service Station, Victoria Close	Rickmansworth	100-500m3	TQ 057 947		Y
Bridge Motors Ltd, Church Street	Rickmansworth	501-1000m3	TQ 062 942		Y
Shell, Watford Road	Croxley Green	>1000m3	TQ 083 957		Y
B.P. Express, Uxbridge Road	Mill End	>1000m3	TQ 047 939		Y
Star Service Station, Uxbridge Road	Rickmansworth	>1000m3	TQ 051 942		Y
Sandy Lodge Service Station, Sandy Lane	Northwood	>1000m3	TQ 097 037		Y
Esso, Prestwick Road	South Oxhey	>1000m3	TQ 118 933		Y

