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Air Quality Updating and Screening Assessment for Three Rivers District Council

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

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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 and their objectives have been enacted through the Air Quality Regulations in 1997, 2000 and 2002. The Environment Act 1995 requires Local Authorities to undertake air quality reviews. In areas where an air quality objective is not anticipated to be met, Local Authorities are required to establish Air Quality Management Areas and implement action plans to improve air quality.

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

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

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

The first round of Review and Assessment proceeded to Stage Three for two pollutants: nitrogen dioxide and PM₁₀ particulate matter. Air Quality Management Areas (AQMAs) were declared for these pollutants at three locations along the M25 motorway. These AQMAs were reviewed at Stage 4 in the light of updated information. The AQMAs for PM₁₀ were revoked, and those for NO₂ were reduced in size.

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

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

What are the conclusions of this report for Three Rivers District Council?

This Updating and Screening Assessment for Three Rivers District Council has concluded that a Detailed Assessment is not required for any pollutants.

Which objectives are being taken to a Detailed Assessment?

No pollutants have been recommended for review by a Detailed Assessment.

Acronyms and definitions used in this report

AADTF	Annual Average Daily Traffic Flow
ADMS	an atmospheric dispersion model
AQDD	an EU directive (part of EU law) - Common Position on Air Quality Daughter Directives, commonly referred to as the Air Quality Daughter Directive
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AP	Action Plan
AURN	Automatic Urban and Rural Network (Defra funded network)
base case	In the context of this report, the emissions or concentrations predicted at the date of the relevant air quality objective (2005 for nitrogen dioxide)
CO	Carbon monoxide
d.f.	degrees of freedom (in statistical analysis of data)
DETR	Department of the Environment Transport and the Regions (now Defra)
Defra	Department of the Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
HA	Highways Agency
HDV	Heavy Duty Vehicles
kerbside	0 to 1 m from the kerb
LADS	Urban background model specifically developed for Stage 3 Review and Assessment work by netcen . This model allowed contributions of the urban background and road traffic emissions to be calculated
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
NAEI	National Atmospheric Emissions Inventory
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NRTF	National Road Traffic Forecast
ppb	parts per billion
r	the correlation coefficient (between two variables)
receptor	In the context of this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
roadside	1 to 5 m from the kerb
SD	standard deviation (of a range of data)
SO ₂	Sulphur dioxide
TEMPRO	A piece of software produced by Defra used to forecast traffic flow increases
UWE AQMRC	University of the West of England Air Quality Management Resource Centre

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

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

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

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

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1 Introduction to the Updating and Screening Assessment

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

1.1 PURPOSE OF THE UPDATING AND SCREENING ASSESSMENT

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

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

1.2 OVERVIEW OF APPROACH TAKEN

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

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

1.3 RELEVANT DEFRA DOCUMENTATION USED

This report takes into account the guidance in LAQM.TG(03)¹, published February 2003.

1.4 POLLUTANTS CONSIDERED IN THIS REPORT

All pollutants included in the Air Quality Regulations² for the purposes of Review and Assessment have been considered in this report.

1.5 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Section 1** summarises the conclusions of air quality review and assessment work to date, the aims of the Updating and Screening Assessment, and the approach adopted for the assessment;
- **Section 2** summarises the UK Air Quality Strategy and the function of an Updating and Screening Assessment;
- **Section 3** identifies data used in support of this assessment and highlights significant changes in emissions to air within the district since the first 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.

2 The UK Air Quality Strategy

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)³ and amended in 2002⁴.

2.1 NATIONAL AIR QUALITY STANDARDS

At the centre of the Air Quality Strategy are national air quality standards, which 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 2.1. Units are microgrammes per cubic metre ($\mu\text{g m}^{-3}$), or milligrammes per cubic metre (mg m^{-3}) in the case of carbon monoxide.

Table 2.1 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
Authorities in Scotland and Northern Ireland only	$3.25 \mu\text{g m}^{-3}$	running annual mean	31.12.2010
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	10.0 mg m^{-3}	maximum daily running 8-hour mean	31.12.2003
Authorities in Scotland only	10.0 mg m^{-3}	running 8-hour mean	31.12.2003
Lead	$0.5 \mu\text{g m}^{-3}$ $0.25 \mu\text{g m}^{-3}$	annual mean annual mean	31.12.2004 31.12.2008
Nitrogen dioxide^a	$200 \mu\text{g m}^{-3}$ 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 (PM_{10}) (gravimetric)^b	$50 \mu\text{g m}^{-3}$ 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
Authorities in Scotland only ^c	$50 \mu\text{g m}^{-3}$ not to be exceeded more than 7 times a year $18 \mu\text{g m}^{-3}$	24 hour mean annual mean	31.12.2010 31.12.2010
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

- 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.

In most Local Authorities in the UK, objectives will be met for most of the pollutants within the timescale of the objectives shown in Table 2.1. It is important to note that the objectives for NO₂ 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.

2.2 AIR QUALITY REVIEWS – OBJECTIVES AND APPROACHES

Technical Guidance has been issued in Part IV of the Environment Act 1995, Local Air Quality Management - Technical Guidance LAQM.TG (03)¹ (January 2003) 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 2.2.

Table 2.2 Brief details of steps in the second 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 exceedance 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 for the Progress Report has not yet been determined, but will essentially follow the checklist approach that is set out in subsequent chapters of this document. Further details on the Progress Reports will be provided via the Helpdesks by the middle of 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 May 2003, and for Detailed Assessments April 2004.

The current deadline for completion of Updating and Screening Assessments is May 2003, and for Detailed Assessments April 2004.

2.3 LOCATIONS OF CONCERN

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 2.3 summarises the locations where the objectives should and should not apply.

Table 2.3 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) 	<ul style="list-style-type: none"> • All background locations where members of the public might be regularly exposed. 	<ul style="list-style-type: none"> • Building facades of offices or other places of work where members of the public do not have regular access.
		<ul style="list-style-type: none"> • Building facades of residential properties, schools, hospitals, libraries etc. 	<ul style="list-style-type: none"> • Gardens of residential properties.
			<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • All locations where the annual mean objective would apply. 	<ul style="list-style-type: none"> • Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
		<ul style="list-style-type: none"> • Gardens of residential properties. 	

Table 2.3 (contd.) Typical locations where the objectives should and should not apply

Averaging Period	Pollutants	Objectives should apply at ...	Objectives should generally not apply at ...
1 hour mean	<ul style="list-style-type: none"> Nitrogen dioxide Sulphur dioxide 	<ul style="list-style-type: none"> All locations where the annual mean and 24 and 8-hour mean objectives apply. 	<ul style="list-style-type: none"> Kerbside sites where the public would not be expected to have regular access.
		<ul style="list-style-type: none"> Kerbside sites (e.g. pavements of busy shopping streets). 	
		<ul style="list-style-type: none"> Those parts of car parks and railway stations etc. which are not fully enclosed. 	
		<ul style="list-style-type: none"> Any outdoor locations to which the public might reasonably be expected to have access. 	
15 minute mean	<ul style="list-style-type: none"> Sulphur dioxide 	<ul style="list-style-type: none"> 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 only.

3 Information used to Support this Assessment

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

3.1 CONCLUSIONS FROM THE FIRST ROUND OF REVIEW AND ASSESSMENT

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

- Stage 1 for all pollutants
- Stage 2 for CO, NO₂, SO₂ and PM₁₀
- Stage 3 for NO₂ and PM₁₀
- Stage 4 for NO₂ and PM₁₀

The first three Stages concluded that Three Rivers needed to declare three Air Quality Management Areas for NO₂ and PM₁₀ at locations near the M25. At Stage 4 these AQMAs were reviewed in the light of updated information. The extent of the AQMAs for NO₂ were reduced, and the AQMAs for PM₁₀ were revoked.

3.2 PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY

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

- Industry
- Housing and redevelopment
- Road Network changes

Three Rivers District Council have confirmed that there are none of the following planned within the District:

- significant industrial developments
- housing and redevelopment schemes
- road transport development schemes.

3.3 MAPS AND DISTANCES OF RECEPTORS FROM ROADS

Three Rivers District Council provided electronic OS LandLine™ which was used in a Geographical Information System (GIS) for the assessment. Individual buildings or groups of buildings (receptors) were identified from the electronic OS Landline maps of the areas. The distances of these receptors from the road, and the widths of the roads, could be accurately determined from the maps where necessary.

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3.4 ROAD TRAFFIC DATA

This section summarises the information used in this report; more 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.

Traffic data were collated from two sources:

- The National Atmospheric Emissions Inventory (NAEI, 2000), for the M25 and major roads.
- Hertfordshire County Council, for other non-motorway A roads and some smaller roads in the District.

Where no average speed data were available, estimated speeds (based on the type of road and national speed limits) were used. Speeds slower than the national speed limits were assigned to sections of roads in areas close to junctions where necessary.

3.4.1 Fraction of HGVs

Percentages of cars, LGVs, HGV and buses were available for some road sections in the data provided by Hertfordshire County Council. For other road links, the percentage of HGVs was estimated from the data held in the 2000 National Atmospheric Emissions Inventory.

3.4.2 Base year for traffic

The base year for the traffic flows was 2000 in the NAEI data, 2002 for the data supplied by Hertfordshire County Council.

3.4.3 Traffic growth

Traffic growth figures were calculated using TEMPRO. These were based on the high side of national growth figures to provide conservative estimates of pollutant concentrations.

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

The distances of receptors from the road, where required, were taken from the electronic OS Landline™ of the Council area.

3.5 PART A AND B PROCESSES

There are no Part A processes in Three Rivers, but there are seven Part B processes. A full list is given in Appendix 3.

3.6 AMBIENT MONITORING

Three Rivers District Council have undertaken monitoring of the following pollutants in their area:

- Nitrogen dioxide
- Particles (PM₁₀)

Full details of the type, locations, and concentrations recorded by the monitors (diffusion tubes and continuous monitors) are given in Appendix 1.

3.6.1 Diffusion tubes

Three Rivers carry out monitoring of NO₂ by diffusion tubes at 14 locations. The tubes are supplied and analysed by Harwell Scientifics Ltd.

3.6.2 Continuous monitoring

Concentrations of nitrogen dioxide and PM₁₀ are monitored at one urban background location in Rickmansworth. This site is part of the Herts and Beds Pollution Monitoring Network, operated by King's College Environmental Resource Group (ERG). Details of the network, and monitoring data, are available from http://www.seiph.umds.ac.uk/envhealth/HBNet/hb_archive.html.

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

4.2 STANDARD AND OBJECTIVE FOR CARBON MONOXIDE

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

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

The following conclusions were given for carbon monoxide in the earlier stages of Review and Assessment for Three Rivers District Council

- At Stage 1, three road sections were identified with traffic flows greater than 50,000 vehicles per day. A Stage 2 Review and Assessment was therefore required.
- The Stage 2 Review and Assessment concluded that the risk of the AQS Objective for CO being exceeded at sites where the public may be exposed, is negligible.

4.4 SCREENING ASSESSMENT OF CARBON MONOXIDE

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

- Monitoring Data
- Very Busy Roads

These are described in the following sections.

4.5 BACKGROUND CONCENTRATIONS FOR CARBON MONOXIDE

The average background carbon monoxide concentration in Three Rivers District, estimated from the UK background maps was 0.37 mgm^{-3} in 2001, with maximum concentration of 0.42 mgm^{-3} in the grid square centred on 510500 194500, in the south-eastern part of the District.

4.6 SCREENING ASSESSMENT OF MONITORING DATA

Monitoring for carbon monoxide has not been undertaken in Three Rivers District itself. However, King's College London Environmental Research Group (ERG) monitored CO during 2002, at urban background sites in neighbouring Districts Hertsmere, Luton and St Albans. These sites are part of the Hertfordshire and Bedfordshire Air Pollution Monitoring Network⁵. The maximum 8-hour average concentrations at these three sites were within the AQS Objective of 10 mgm^{-3} during

2002. In addition, data from the UK Automatic Urban and Rural Network, which has sites throughout the UK, show no exceedences of this Objective during the period 1999-2001. It is therefore unlikely that any exceedences of the AQS Objective for CO will occur at urban background sites away from busy roads or other specific sources.

4.7 SCREENING ASSESSMENT OF VERY BUSY ROADS

The guidance document LAQM TG(03) requires assessment of CO only at 'very busy' roads and junctions, *in areas where the 2003 background concentration is expected to be above 1 mg m⁻³*. (Box 2.2 of LAQM. TG(03), item B). The modeled maximum annual mean background concentration for 2001 in Three Rivers District was 0.42 mg m⁻³; applying the correction factors from Box 2.3 gives an estimated maximum concentration of 0.35 mg m⁻³ for 2003. This is well below 1 mg m⁻³ therefore there is no requirement to proceed to a Detailed Assessment for CO.

4.8 CONCLUSIONS FOR CARBON MONOXIDE

Carbon dioxide is not monitored in Three Rivers District. However, 2002 monitoring data from HBAPMN sites in neighbouring Hertsmere, Luton and St Albans, and from AURN sites throughout the UK over the period 1999 – 2001, identified no occasions when the maximum running 8-hour concentration exceeded the objective value of 10 mgm⁻³. According to the Guidance, it is only necessary to assess busy roads and junctions where the predicted 2003 annual mean background CO concentration is above 1 mg m⁻³. As there are no parts of the District for which this is the case, it is not necessary to assess any roads. A Detailed Assessment is not required for carbon monoxide in Three Rivers District.

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, and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems. A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene. Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol are controlled by vapour recovery systems. Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective at all urban background and roadside/kerbside locations. Whilst the 2010 objectives are expected to be met at all urban background, and most roadside locations, there is the possibility of 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 be achieved by the end of 2003. However, in light of the health advice from EPAQS and the Department of Health's Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) to reduce concentrations of benzene in air to as low a level as possible, additional tighter objectives have also been set. The additional objective is for an annual mean of $5 \mu\text{g m}^{-3}$ to be achieved by the end of 2010 in England and Wales. In Scotland and Northern Ireland, a running annual mean of $3.25 \mu\text{g m}^{-3}$ has been adopted as an additional objective, to be achieved by the end of 2010.

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

The following conclusions were given for benzene in the earlier stages of Review and Assessment for Three Rivers District Council.

- There are no present or proposed industrial processes in Three Rivers District Council or neighbouring areas, which have the potential, individually or cumulatively, to emit significant quantities of benzene;
- Emissions from vehicles are expected to decrease over the relevant period and national policies are expected to ensure that there will be no exceedences due to petrol stations by 2003;
- Current levels of benzene are estimated to be already below the objective of $16.25 \mu\text{g m}^{-3}$ in Three Rivers District
- National policy measures are expected to deliver the national air quality objective for benzene by the end of 2003.

The objective for benzene will not be exceeded in Three Rivers District.

5.4 SCREENING ASSESSMENT OF BENZENE

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

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

These are described in the following sections.

5.5 BACKGROUND CONCENTRATIONS FOR BENZENE

The average 2003 background benzene concentration in Three Rivers, estimated from the UK background maps was $0.52 \mu\text{g m}^{-3}$, with a maximum concentration of $0.65 \mu\text{g m}^{-3}$ in the grid square centred on 510500 194500, in the south-eastern part of the District. These values are well within the 2003 AQS objective of $16.25 \mu\text{g m}^{-3}$ for the running annual mean.

It is predicted that in 2010 the average background concentration will have fallen to $0.39 \mu\text{g m}^{-3}$, and the maximum background concentration to $0.49 \mu\text{g m}^{-3}$. These values are well within the 2010 AQS objective of $5 \mu\text{g m}^{-3}$ for the running annual mean. It is therefore unlikely (except in the vicinity of industrial or other emission sources) that either the 2003 or 2010 Objectives for benzene will be exceeded in the District

5.6 SCREENING ASSESSMENT OF MONITORING DATA

No benzene monitoring is currently undertaken in Three Rivers District. However, benzene was monitored using benzene diffusion tubes until 2001 at sites in nearby districts. The sites, in Mid Beds, North Herts, St Albans and Stevenage were part of ERG's Hertfordshire and Bedfordshire Air Pollution Monitoring Network. The highest annual mean concentration recorded at any of these sites in 2001 was $7.3 \mu\text{g m}^{-3}$. Maximum running annual mean benzene concentrations measured during the years 1999 – 2001 at national monitoring sites in cities throughout the UK were within the objective of $16.25 \mu\text{g m}^{-3}$ for 2003.

With the exception of one site, (the kerbside site at Marylebone Road, central London which is close to a very busy city centre road) all UK sites already meet the 2010 objective of $5 \mu\text{g m}^{-3}$. Therefore, exceedence of the 2003 benzene objective in Three Rivers is unlikely.

35 new benzene monitoring sites, utilising pumped tube samplers, began operation during 2002, as part of the re-structuring of the Hydrocarbon Network. While most of these sites do not yet have a full year's data for 2002, their results indicate that most parts of the UK already meet the 2010 objective of $5 \mu\text{g m}^{-3}$. Annual mean benzene concentrations from the two sites in central London were as follows: Haringey Roadside $2.70 \mu\text{g m}^{-3}$ (data capture 77%), London Bloomsbury $1.50 \mu\text{g m}^{-3}$ (data capture 58%).

5.7 SCREENING ASSESSMENT OF VERY BUSY ROADS

The guidance document LAQM TG(03) requires assessment of benzene only at 'very busy' roads and junctions, defined in terms of average daily traffic flows, and where the 2010 average background concentration is expected to be above $2 \mu\text{g m}^{-3}$. Traffic flow data obtained from the NAEI show that the M25 falls into the "busy" category, with annual average daily traffic count (AADTF) on the section running through the District ranging between 125,000 and 156,000. However, the predicted annual mean background concentration of benzene for 2010 is well below $2 \mu\text{g m}^{-3}$. Therefore a Detailed Assessment is not required for benzene in relation to the M25.

5.8 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 industrial processes in Three Rivers District. There are no Part B processes involving the storage and unloading of petrol at terminals within the District, apart from petrol stations.

5.9 SCREENING ASSESSMENT OF PETROL STATIONS

There are 12 petrol stations in Three Rivers District, of which some have a throughput of more 2 million litres of petrol per year. However, the guidance requires petrol stations to be considered only if they are also near a busy road, i.e. with more than 30,000 vehicles per day. Three Rivers have confirmed that there are no petrol stations that meet both these criteria. A Detailed Assessment for benzene is not required based on petrol station emissions.

5.10 SCREENING ASSESSMENT OF FUEL STORAGE DEPOTS

There are no major fuel storage depots in Three Rivers District itself. There are three major fuel storage depots at Buncefield near Hemel Hempstead, in neighbouring Dacorum District (Table in Appendix A2.182 of LAQM.TG(03)). Together they are listed by the NAEI as a point source emitting 1.96 tonnes per year of benzene. However, these are just over 2km away from the border with Three Rivers and therefore far enough away not to require further consideration.

5.11 CONCLUSIONS FOR BENZENE

There are some roads in Three Rivers District, including the M25 motorway, which can be classified as 'very busy' according to the criteria in the guidance. However, no parts of the District are predicted to have annual mean background concentrations of benzene greater than $2 \mu\text{g m}^{-3}$ in 2010. There are no petrol stations with a throughput greater than 2 million litres which are also located near a busy road with AADTF > 30,000 vehicles.

A Detailed Assessment is, therefore, not required for benzene in Three Rivers District.

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 already 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. These measures are expected to deliver the air quality objective by the end of 2003.

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 be achieved by the end of 2003.

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

The following conclusions were given for 1,3-butadiene in the earlier stages of Review and Assessment for Three Rivers District Council

- There are no existing or proposed Part A or B processes in Three Rivers District or neighbouring areas, which have the potential to emit significant amounts of 1,3-butadiene;
- National policy measures are expected to deliver the national air quality objective for 1,3-butadiene by the end of 2003.

The objective for 1,3-butadiene will not be exceeded in Three Rivers District

6.4 SCREENING ASSESSMENT OF 1,3-BUTADIENE

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

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

These are described in the following sections.

6.5 BACKGROUND CONCENTRATIONS FOR 1,3-BUTADIENE

The modelled average 2003 background 1,3-butadiene concentration in Three Rivers, estimated from the UK background maps was $0.21 \mu\text{g m}^{-3}$, with a maximum concentration of $0.26 \mu\text{g m}^{-3}$ in the grid square centred on 512500 192500, in the south-eastern part of the District near South Oxhey. These values are well within the 2003 AQS objective of $2.25 \mu\text{g m}^{-3}$ for the running annual mean.

6.6 SCREENING ASSESSMENT OF MONITORING DATA

No monitoring of 1,3-butadiene has been undertaken in Three Rivers District, or elsewhere in Hertfordshire or Bedfordshire (e.g. as part of ERG's HBAPMN Network). However, maximum running annual mean concentrations of this pollutant at all urban background, urban centre, and roadside sites in national network monitoring sites are already well below the 2003 objective of $2.25 \mu\text{g m}^{-3}$.

6.7 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

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

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

Part B
 Rubber processes

There are no Part A, and none of the above Part B industrial processes in Three Rivers District, (Appendix 3) nor any with the potential to emit significant amounts of 1,3-butadiene.

There are no industrial processes, current or proposed, in neighbouring areas, which have the potential to emit 1,3-butadiene. The NAEI lists no significant point sources of this pollutant in Three Rivers or neighbouring districts.

6.8 CONCLUSIONS FOR 1,3-BUTADIENE

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

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) has led to the ban on sales of leaded petrol in the United Kingdom with effect from 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

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

7.2 STANDARD AND OBJECTIVE FOR LEAD

The Government and the Devolved Administrations have 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 be achieved by the end of 2004. In addition, a lower air quality objective of $0.25 \mu\text{g m}^{-3}$ to be achieved by the end of 2008 has also been set.

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

The following conclusions were given for lead in the earlier Stages of Review and Assessment for Three Rivers District.

- There are no existing or proposed Part A or B processes in Three Rivers District or neighbouring areas, which have the potential to emit significant amounts of lead;
- National policy measures are expected to deliver the national air quality objective for lead by 2004 and 2008.

The objectives for lead are very unlikely to be exceeded in Three Rivers District.

7.4 SCREENING ASSESSMENT OF LEAD

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

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

These are described in the following sections.

7.5 SCREENING ASSESSMENT OF MONITORING DATA

No monitoring of lead has been undertaken in Three Rivers District. There is a national lead monitoring site in East Hertfordshire, at Cottered (grid reference 532200 228300), close to the northern border of the district. The annual mean lead concentration at this rural background site was $0.017 \mu\text{g m}^{-3}$ in 2001. Annual mean lead concentrations have been well below $0.5 \mu\text{g m}^{-3}$ since the mid 1980s. This site is likely to be representative of parts of the District outside larger towns.

Outside the District, there are two national monitoring sites in London; at Brent on the North Circular road, and at Cromwell Road in central London. Annual mean lead concentrations for 2001 at these two London sites were $0.030 \mu\text{g m}^{-3}$ at Brent and $0.031 \mu\text{g m}^{-3}$ at Cromwell Road: well within the objective for 2004. Ambient lead concentrations in urban areas within East Hertfordshire are unlikely to be higher than at these London sites.

National policy measures are predicted to deliver the national air quality objective for lead by 2004 and 2008 throughout the UK.

7.6 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

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

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

Iron and steel (37)

Non-ferrous metals (23)

Manufacture of organic chemicals (35)

Part B

Non-ferrous metal furnaces

Electrical furnaces

Blast cupolas

Aluminium processes

Zinc Processes

Copper processes

Lead glass manufacture

There are none of the above Part A or Part B industrial processes actually in Three Rivers District (Appendix 3). The following potential sources of lead exist in neighbouring areas, as identified from the NAEI:

- Clinical waste incineration at Northwick Park and St Mark's Hospital, Harrow (grid reference 516300 187600); emission 10kg per year (as of 2001)
- A non-ferrous metal process at Multicore Solders Ltd in Hemel Hempstead, (grid reference 507600 207000); emission 25kg per year (as of 2001)

According to the nomogram in Fig 5.2 of LAQM.TG(03), the emissions from these sources are not large enough to be significant within the perimeter of Three Rivers.

7.7 CONCLUSIONS FOR LEAD

Emissions of lead from industrial processes in, or bordering, Three Rivers District, are not likely to exceed the objectives for lead to be achieved in 2004 and 2008. A Detailed Assessment is not required for lead in Three Rivers District.

8 Updating and Screening Assessment for Nitrogen Dioxide

8.1 INTRODUCTION

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

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

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 µg m⁻³, and a 1-hour mean concentration of 200 µg m⁻³ not to be exceeded more than 18 times per year. The objectives are to be achieved by the end of 2005.

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

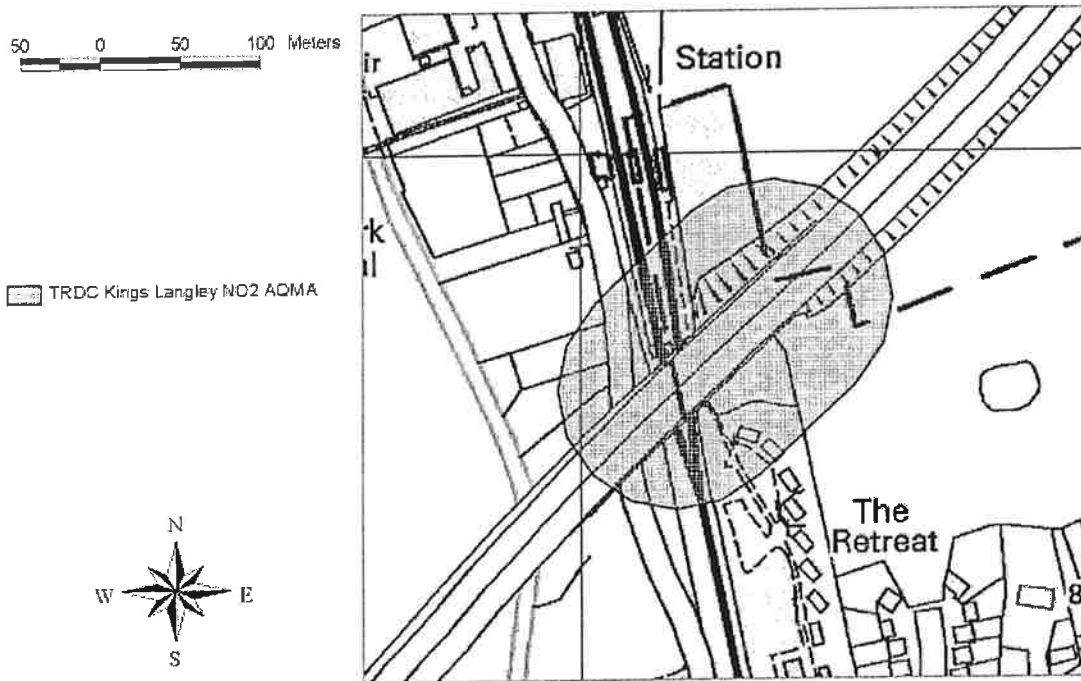
The following conclusions were given for nitrogen oxides in the earlier stages of Review and Assessment report for Three Rivers District Council:

- Emissions from industrial processes in Three Rivers District and neighbouring areas are unlikely to cause exceedence of the objectives;
- Emissions from traffic or other transport sources in Three Rivers District **are** likely to cause exceedence of the annual mean objective for NO₂, within 70-80m of the M25 motorway.
- Three AQMAS have been declared for NO₂, alongside the M25 at locations where there is likely to be relevant public exposure.

Maps of the three AQMAS are provided on the LAQM website, <http://laburnum.aeat.co.uk/archive/laqm/laqm.php> and are as follows:

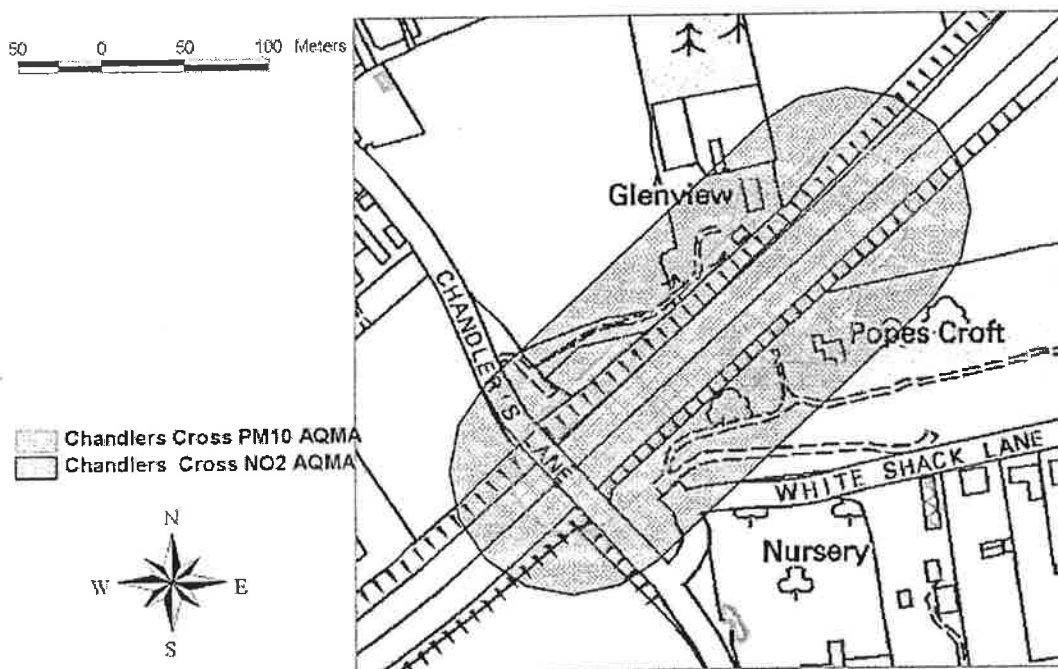
- Along a short (approximately 200m) stretch of the M25 at Kings Langley, where the motorway crosses the railway line near the station, extending 74 m from the centre of the motorway.
- Along the M25 at Chandlers Cross, from just west of where Chandler's Lane crosses the M25 to the beginning of Junction 19, extending 74m either side of the centreline, taking in residential properties.
- Along the M25 at Chorleywood, from just south of Junction 18 to just north of where the motorway crosses the River Chess extending 74m either side of the centreline.

These AQMA's are shown in Figures 8.1, 8.2, and 8.3.



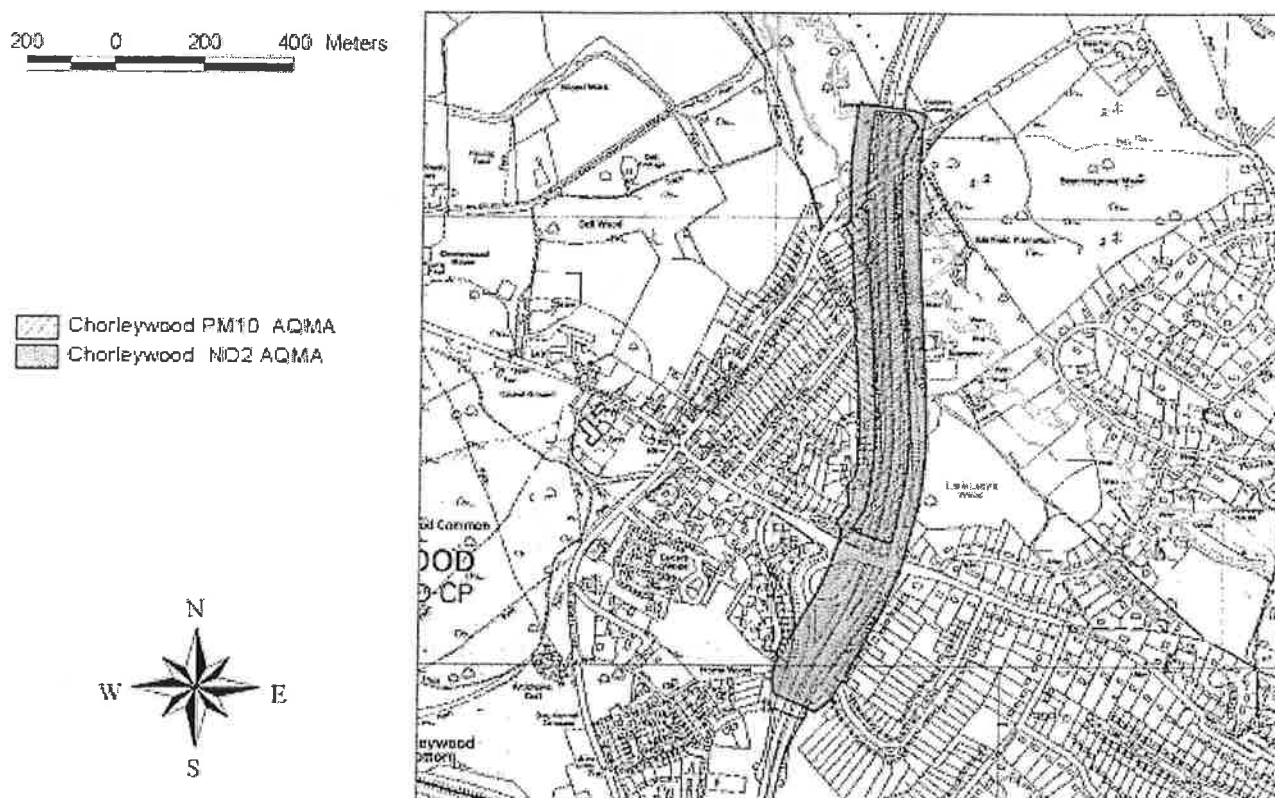
AQMAs - Raster Map

Figure 8.1 Extent of Kings Langley AQMA for NO₂
(From <http://laburnum.aeat.co.uk/archive/laqm/laqm.php>).
Three Rivers District Council Licence LA 079758.



AQMAs - Raster Map

Figure 8.2 - Extent of Chandlers Cross AQMA for NO₂
(From <http://laburnum.aeat.co.uk/archive/laqm/laqm.php> . The PM₁₀AQMA also shown here has now been revoked). **Three Rivers District Council Licence LA 079758.**



AQMAs - Raster Map

Figure 8.3 – Extent of AQMA at Chorleywood

(From <http://laburnum.aeat.co.uk/archive/laqm/laqm.php> . The PM₁₀AQMA also shown here has now been revoked). **Three Rivers District Council Licence LA 079758.**

8.4 SCREENING ASSESSMENT OF NITROGEN DIOXIDE

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

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

These are evaluated in the following sections.

8.5 BACKGROUND CONCENTRATIONS FOR NITROGEN DIOXIDE

The modelled average background nitrogen dioxide concentration for Three Rivers in 2001 was $32.3 \mu\text{g m}^{-3}$, with a maximum background concentration of $39.8 \mu\text{g m}^{-3}$ in the grid square centred on 509500 204500, located in the northern part of the District. The average background concentration in Three Rivers is predicted to fall to $28 \mu\text{g m}^{-3}$ in 2005, and to $23 \mu\text{g m}^{-3}$ in 2020. Background concentrations are predicted to be well below the AQS annual mean objective of $40 \mu\text{g m}^{-3}$ throughout this District by 2005.

8.6 SCREENING ASSESSMENT OF MONITORING DATA

8.6.1 Diffusion tube monitoring

Nitrogen dioxide is measured at 14 sites in Three Rivers, of which three sites are operated as part of the UK Nitrogen Dioxide Network. Details of the diffusion tube sites are given in Table 8.1. Three of these sites are within the declared AQMAs.

Table 8.1 NO₂ Diffusion Tube Sites in Three Rivers

Site Code	Site Type	Easting *	Northing*	Location
TR01	kerb/roadside	506000	194400	High Street, Rickmansworth
TR03	background	506100	194600	The Cloisters, Rickmansworth
TR04	background	505000	194300	Parkway, Moneyhill, Rickmansworth
TR05	background	503100	192500	Hornhill Road, Maple Cross, Rickmansworth
TR06	kerb/roadside	502500	196100	Lower Road, Chorleywood
TR07	kerb/roadside	504100	199700	The Green, Sarratt
TR08	kerb/roadside	509500	202000	High Street, Abbots Langley
TR09	intermediate	511900	193500	St Andrews Precinct, South Oxhey
TR10	kerb/roadside	507000	195300	All Saints Lane, Croxley Green
TR11	background	503800	195100	The Queens Drive, Mill End
TR12	intermediate	505500	194400	Rectory Road, Rickmansworth (= Aut. Site TR1)
TR13	kerb/roadside	504300	196300	Junction 18, M25
TR15	background	506500	198600	Chandlers Cross
TR16	background	508100	201800	The Retreat, Abbots Langley

* To nearest 100m only

Sites in *italics* are within the declared AQMAs.

The diffusion tubes are prepared and analysed by Harwell Scientifics Ltd. The tubes are prepared by coating the grids in a 50% v/v solution of the absorbent, triethanolamine (TEA) in acetone. Analysis is carried out using a colorimetric technique.

Diffusion tubes frequently exhibit bias (over- or under-read) relative to the chemiluminescence analyser (the reference technique for NO₂), and the Guidance states that it is necessary to correct for any such bias, when using diffusion tube results for review and assessment purposes. One of the diffusion tube sites is co-located with one of Three Rivers' automatic NO₂ monitoring sites at the Fire Station, Rectory Road, Rickmansworth. By comparing diffusion tube and automatic measurements of NO₂ from this site, it is possible to establish a bias correction factor as set out in Box 6.4 of the Guidance. The annual mean NO₂ concentration at Rectory Road, Rickmansworth as measured by the diffusion tubes was $41.8 \mu\text{g m}^{-3}$, based on 10 months' valid data (no valid result was obtained for June or November 2002 at this site). The 2002 annual mean concentration measured by the reference technique (chemiluminescent analyser) was $29.5 \mu\text{g m}^{-3}$, and data capture was 94%. Ignoring the June and November exposure periods for which there were no diffusion tube data, the annual mean was $30.1 \mu\text{g m}^{-3}$. Using the approach specified in Box 6.4 of the Guidance LAQM TG(03), the bias correction factor is calculated as $30.1/41.8 = 0.72$. This factor should be applied to annual mean NO₂ concentrations measured at the other sites, to correct for the bias of the diffusion tubes, as specified in the Guidance LAQM TG(03). (It should be noted that diffusion tube bias can vary from site to site and month to month, so any bias correction is only approximate).

**Table 8.2 Annual Mean Nitrogen Dioxide Concentrations μgm^{-3} ,
Measured Using Diffusion Tubes**

Site Code	Site Type	No. of Months data	Mean 2002, Uncorrected, $\mu\text{g m}^{-3}$	Mean 2002, Bias Corrected 2002 $\mu\text{g m}^{-3}$	Predicted 2005 $\mu\text{g m}^{-3}$
TR01	High Street, Rickmansworth	12	37.1	26.7	24.6
TR03	The Cloisters, Rickmansworth	12	28.1	20.2	18.9
TR04	Parkway, Rickmansworth	12	32.1	23.1	21.6
TR05	Hornhill Road, Maple Cross,	12	41.8	30.1	28.1
TR06	Lower Road, Chorleywood	11	34.1	24.6	22.6
TR07	The Green, Sarratt	12	28.1	20.3	18.7
TR08	High Street, Abbots Langley	12	42.0	30.3	27.9
TR09	St Andrews Precinct, South Oxhey	9	40.4	29.1	26.8
TR10	All Saints Lane, Croxley Green	12	46.2	33.3	30.6
TR11	The Queens Drive, Mill End	12	47.9	34.5	32.2
TR12	Rectory Road, Rickmansworth	10	41.8	30.1	28.1
TR13	Junction 18, M25	12	62.9	45.3	41.7
TR15	Chandlers Cross	12	44.2	31.8	29.7
TR16	The Retreat, Abbots Langley	12	41.8	30.1	28.1

From the Guidance LAQM TG (03), the adjustment factor to estimate annual average concentrations in 2005 from 2002 data is 0.921 (0.892/0.969) at kerbside and roadside sites, and 0.933 (0.908/0.973) at urban background sites. Estimated concentrations for 2005 are shown in Table 8.2.

After appropriate bias correction, all but one NO_2 diffusion tube site currently meets the AQS objective of $40 \mu\text{gm}^{-3}$ for the annual mean, and is predicted to do so in 2005. (Table 8.2). The one site predicted to exceed the annual mean objective in 2005 is site is TR13, a roadside site beside junction 18 of the M25. This site is already within a declared AQMA for NO_2 .

The two other diffusion tube sites within AQMAs (TR15 and TR16) appear to indicate that the annual mean objective will be met in 2005. However, is not recommended that the AQMA be revoked at this stage, as diffusion tubes are only an indicative monitoring technique, and subject to considerable uncertainty. Three Rivers District Council intend to retain this AQMA pending further information.

8.6.2 Automatic Monitoring

Monitoring for nitrogen dioxide has been undertaken using the chemiluminescent method at one location in Three Rivers: the Fire Station, Rectory Road, Rickmansworth. Site details are shown in Table 8.3. This site is part of the Herts and Beds Pollution Monitoring Network, operated by King's College Environmental Resource Group (ERG). Details of the network, and monitoring data, are available from http://www.seiph.umds.ac.uk/envhealth/HBNet/hb_archive.html.

The site is classified as urban background, but is located close to the Rickmansworth ring road. It is intended to be representative of urban background sites close to busy road, and ERG note that it does frequently record higher pollution levels than typical urban background locations. There is no automatic monitoring at present within any of the District's three AQMAs.

Table 8.3 Automatic NO_x Monitoring Site

Site Type	OS Grid Ref	Location	Pollutants
Urban background	505500 194400	Site TR1, Rectory Road, Rickmansworth	NO _x , PM ₁₀ , met. Data

Table 8.4 2002 Data from Automatic NO_x Monitoring Sites

Site	Data Capture %	2002 Annual Mean NO ₂ , $\mu\text{g m}^{-3}$	Predicted 2005 Annual Mean NO ₂ , $\mu\text{g m}^{-3}$	Predicted 2010 Annual Mean NO ₂ , $\mu\text{g m}^{-3}$	2002 19 th Highest 1-hour mean NO _x , $\mu\text{g m}^{-3}$
TR1	94%	29.5	27.5	23.6	86

The annual mean NO₂ concentration at this automatic monitoring site during 2002 was below the annual mean objective of 40 $\mu\text{g m}^{-3}$. Annual mean NO₂ concentrations in 2005 and 2010 were predicted, using the correction factors in Boxes 6.6 and 6.7 of the Guidance. The Rickmansworth site is predicted to meet the annual mean objective in 2005 and 2010. The site had no 1-hour means above the 1-hour objective of 200 $\mu\text{g m}^{-3}$ during 2002: therefore this objective appears to be met at present. This supports the findings of the Stage 4 Review and Assessment carried out earlier in 2003, that AQMAs are only required for NO₂ at specific locations very close to the M25.

8.7 SCREENING ASSESSMENT OF ROAD TRAFFIC SOURCES

Three Rivers District confirmed that there are none of the following within the District:

- Busy streets where people may spend one hour or more close to traffic
- Roads with high flow (greater than 20%) of buses and/or HGVs
- Roads with significantly changed traffic flows.
- Bus stations.

8.7.1 Narrow Congested Streets with Residential Properties Close to the Kerb

A Detailed Assessment is required any streets which meet all the following criteria:

- i. There are residential properties within 5m of the kerb
- ii. The average vehicle speed is less than 50 kph
- iii. The carriageway is less than 10m wide
- iv. The average daily traffic flow > 10,000 vehicles per day

While there are numerous streets in Three Rivers meeting the first three of the above criteria, none of them also meet the fourth, i.e. all have an average daily traffic flow less than 10,000 vehicles per day. Therefore, none require further consideration.

8.7.2 Busy Roads

Traffic flow data were taken from the NAEI 2000 roads database, and from traffic count data for 2002 supplied by Hertfordshire County Council (Appendix 2). The DMRB model was used to predict annual mean NO₂ concentrations in 2005, near the roads for which data were available. For initial screening purposes, the following receptor distances (from the road centre line to the nearest assumed public exposure) 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 possibly not meeting the 2005 objective were then examined in more detail, using actual receptor distances, estimated from the OS map, or measured from OS Landline data supplied by Three Rivers. Table 8.5 shows nitrogen dioxide concentrations in 2005 calculated using DMRB for A roads and motorways in Three Rivers District.

Table 8.5 Estimated nitrogen dioxide concentrations near A roads in Three Rivers District

Road	East	North	Distance receptor to road centre m	AADTF 2005	Average Speed Kph	%HDV	NO ₂ Annual mean 2005 µgm ⁻³
M25	503800	195000	40	160681	118	11.1	37.2
A412	505000	194100	5	21489	90	3.3	32.0
M25	510000	202901	50	135758	118	13.2	35.1
A404	507001	192842	5	19589	80	2.6	31.0
A41	509005	199553	25	38760	118	4.1	31.9
A404	505000	195870	5	21321	80	2.9	31.3
M25	505020	198090	50	167415	118	10.8	35.0
A412	505600	194600	10	30520	90	3.2	32.2
A41	508330	200000	5	29477	118	4.1	34.8
A4125	510000	193950	5	17483	50	1.8	29.8
M25	502000	190700	50	150487	118	13.2	35.6
A412	503118	192000	5	19662	90	6.7	33.9
A4125	511220	195000	5	17603	80	3.5	31.2
A412	506000	194710	5	23969	118	3.0	33.4
M25	507453	200045	50	134900	118	13.0	35.2
A412	503389	193966	10	19078	80	4.3	31.3
A404	506000	194073	5	27205	90	2.9	32.3
M25	508000	199380	15	22766	118	4.4	32.4
A405	511759	201005	10	32529	80	5.3	33.3
A4008	512050	194850	5	14893	90	2.8	30.9
A412	503040	191730	5	13770	50	6.2	31.7
M25	502350	192900	100	150487	118	13.2	28.6
A404	503300	196720	5	16945	90	3.1	31.3
A404	502900	197050	5	22880	59.2	3.1	31.2
A404	507210	192760	5	21298	86.4	2.6	31.3
A412	506400	195000	5	26937	59.2	3.0 *	31.5
A412	503050	191580	5	14478	59.2	3.0 *	30.1
A4008	512630	193880	5	18834	86.4	2.8	31.2
A4125	510250	192720	5	14156	72	3.0 *	30.1
A4145	506650	194030	5	12147	59.2	3.5	29.6
A404	504550	196150	5	22804	59.2	3.1	31.2
A412	504250	193780	5	18234	72	3.0 *	30.8
B4542	511530	194080	5	13202	59.2	3.0 *	29.2
C63	509780	192720	5	12941	72	3.0 *	29.2
M25 nr. Jn 18	504200	196900	25	163333	118.4	10.8	41.4
B4542	512510	192550	5	10007	59.2	3.0 *	28.2
B4542	510670	192400	5	7674	59.2	3.0 *	27.5
C76	508020	201920	5	7271	59.2	3.0 *	27.4
C101	505840	193500	5	5084	59.2	3.0 *	26.7

HDV = HGV + buses. * Estimated as 3% where no data available.

The Hertfordshire CC data was adjusted from 2002 to 2000 (the base year) for inclusion. Not all Hertfordshire sites had %HDV data, so this has been estimated from NAEI sites on the same stretches of road, or alternatively an estimated value of 3% has been used. Vehicle speeds, where not supplied, were estimated based on the type of road. Traffic growth factors were modelled using TEMPRO. The Herts CC monitoring point data are shown in italics.

The DMRB screening model predicted that the 2005 annual mean objective for NO₂ is likely to be exceeded within 15m of the carriageway of the M25 at several of the traffic count points. However, in most cases the nearest relevant public exposure is at a distance of 50m or greater, and at these distances no exceedence is predicted for 2005. There is one exception: a building very close to the M25 at grid reference 504300 197000 (Beechengrove Wood, just north of junction 18). However, this building falls within the existing Chorleywood AQMA. Therefore the DMRB model predicts no exceedences of the 2005 annual mean objective outside existing AQMAs in Three Rivers District.

8.7.3 Busy Junctions

Annual average NO₂ concentrations near busy road junctions in Three Rivers District have been estimated for 2005 using DMRB (Table 8.6). All junctions with AADTF greater than 10,000 vehicles, and with relevant public exposure within 20m, require consideration. The M25 junctions have

already been assessed in detail in Stages 3 and 4 of the previous round, so have not been re-considered here.

Two non-motorway busy junctions were identified with potentially relevant exposure within 20m: these were the two roundabouts on the A412 in Rickmansworth, where it is joined by the A404. The two roundabouts are located at grid reference 505500 194500 and 505700 194800. They are linked by a short section of dual carriageway. The Rickmansworth automatic monitoring site is located close to the first of these. The closest relevant public exposure at these two roundabouts is 7m and 8m respectively from the road centre line (as measured from Landline GIS data supplied by Three Rivers).

The roundabout linking the M25 Watford spur to the A41 and A411 was also investigated: however, there appear to be no buildings within 20m.

Table 8.6 Estimated nitrogen dioxide concentrations near busy junctions in Three Rivers

Junction	East	North	Average Speed, kph	% HDV	NO ₂ Annual mean 2005 μgm^{-3}
A412 & A404 Rickmansworth (i)	505500	194500	48	3.3	33.9
A412 & A404 Rickmansworth (ii)	505700	194800	48	3.1	33.4
M25 Watford spur, A41 & 411 *	508500	199600	72	4.2	28.8

Receptor distance assumed to be 5m from the road centre line for Rickmansworth (i) and (ii), 50m for Watford spur junction.

* Can be ignored, as no relevant public exposure.

Even using a worst-case receptor distance of 5m, the DMRB screening model indicates that the 2005 annual mean objective for NO₂ is not likely to be exceeded near the two busy A412-A404 junctions in Rickmansworth.

8.7.4 Busy Streets with Relevant Public Exposure

Three Rivers have confirmed that there are no busy street locations (> 10,000 vehicles per day) where the public are likely to regularly spend one hour or more within 5m of the kerb.

8.8 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM TG(03) 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

None of the above Part A or Part B industrial processes were identified in Three Rivers District (Appendix 3). There is a crematorium at Garston Manor (grid reference 511613 201444), and a sewage gas combustion plant at Maple Lodge (505000 192200). According to Appendix 2 of the Technical Guidance, crematoria do not require further consideration for NO₂. The Maple Lodge plant was further investigated, as NAEI data indicated it was a significant source of NO_x. However, it was concluded that the NAEI emission figure in this case was out of date, having been based on

emissions from an experimental sewage screenings gasification plant, which has now been dismantled.

There are no industrial processes, current or proposed, in neighbouring areas that have the potential to emit significant quantities of NO₂. There is a combustion process in neighbouring Harrow, (Kodak, at grid reference 515000 189700), which required consideration at Stage 2 of the previous round of Review and Assessment, according to the NAEI emits a significant quantity of sulphur dioxide: 10 tonnes per year. However, it is over 2km from the border with Three Rivers and therefore far enough away to have negligible impact.

8.9 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

8.9.1 Bus Stations

There are no bus stations in Three Rivers District.

8.9.2 Airports

There are no working airports in Three Rivers. (The old airport at Leavesden near Abbots Langley is no longer in use). The nearest airport is Denham Aerodrome, in neighbouring South Bucks District. However, as this airport is just over 1km from the border with Three Rivers it does not need further consideration.

8.10 CONCLUSIONS FOR NITROGEN DIOXIDE

Predicted concentrations of nitrogen dioxide indicate that the annual average objective is likely to be met in 2005, except at a few locations close to the M25 within existing AQMAs. This is confirmed by diffusion tube measurements and continuous monitoring. There are no significant industrial sources of nitrogen dioxide in Three Rivers District.

A Detailed Assessment is not required for nitrogen dioxide.

9 Updating and Screening Assessment for Sulphur Dioxide

9.1 INTRODUCTION

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

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

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 FIRST ROUND OF REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE

A Stage 2 Review and Assessment was required for SO_2 in Three Rivers District, as the plant operated by Kodak Ltd, in the neighbouring London Borough of Harrow, was considered a large enough source of this pollutant to have a potentially significant impact. However, the conclusion of Stage 2 was that the risk of exceeding air quality objectives for sulphur dioxide was considered negligible.

9.4 SCREENING ASSESSMENT OF SULPHUR DIOXIDE

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

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

These are evaluated in the following sections.

9.5 BACKGROUND CONCENTRATIONS FOR SULPHUR DIOXIDE

The estimated average background sulphur dioxide concentration for 2001 in Three Rivers was $3.59 \mu\text{g m}^{-3}$ in with maximum concentration of $4.73 \mu\text{g m}^{-3}$ in grid square 509500 194500, located in the south-eastern part of the District, close to the border with Watford.

9.6 SCREENING ASSESSMENT OF MONITORING DATA

No monitoring for sulphur dioxide has been undertaken in Three Rivers. However, there are Automatic Urban Network monitoring sites throughout London, also at Thurrock and Southend in the neighbouring county of Essex. The AQS objectives for SO₂ are currently met at all these sites, as is the case in most of the UK.

The Hertfordshire and Bedfordshire Air Pollution Monitoring (HBAPMN) Network also contains three sites at which SO₂ is monitored;

- Luton Background, an urban background site, but within 500m of Junction 11 of the M1. The annual mean SO₂ concentration at this site in 2002 was 10 µg m⁻³.
- St Albans (urban background, located in a community centre and considered representative of urban background areas within St Albans and neighbouring towns). The annual mean SO₂ concentration at this site in 2002 was 5 µg m⁻³.
- Bedfordshire Rural: in the village of Stewartby, a rural site, but in an area affected by emissions of SO₂ from nearby industrial sources. The annual mean SO₂ concentration at this site in 2002 was 10 µg m⁻³.

Only Bedfordshire Rural recorded any significant levels of SO₂ in 2002. This site reported 26 exceedences of the 15-minute mean objective of 266 µg m⁻³ (35 exceedences are permitted), and 2 exceedences of the 1-hour mean objective of 350 µg m⁻³ (24 exceedences are permitted). All three sites in the HBAPMN therefore meet the AQS Objectives for SO₂.

The available monitoring data from other nearby Districts therefore indicates that the objectives for this pollutant are unlikely to be exceeded in East Hertfordshire, except possibly in the vicinity of specific emission sources.

9.7 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

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

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

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

Part B

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

There are none of the above Part A or Part B industrial processes in Three Rivers District (Appendix 3). There is a crematorium at Garston Manor (grid reference 511613 201444) but according to Appendix 2 of the Technical Guidance, crematoria do not require further consideration for SO₂.

The combustion process in neighbouring Harrow, (Kodak, at grid reference 515000 189700), which required consideration at Stage 2 of the previous round of Review and Assessment, according to the NAEI emits a significant quantity of sulphur dioxide: 10 tonnes per year. However, it is over 2km from the border with Three Rivers and therefore far enough away to have negligible impact.

There are no industrial processes, current or proposed, in neighbouring areas that have the potential to emit significant quantities of sulphur dioxide.

9.7.1 Small Boilers

Three Rivers District confirmed that there are no small boiler processes greater than 5MWth.

9.8 SCREENING ASSESSMENT OF DOMESTIC SOURCES

9.8.1 Domestic coal burning

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

9.9 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

9.9.1 Shipping

Three Rivers District is inland, and there are no substantial shipping movements. Shipping is therefore not considered a significant source of sulphur dioxide.

9.9.2 Railways

According to information supplied by Three Rivers, all trains stopping in the District are electric. Some diesel Chiltern Turbo trains pass through, but stop only briefly without long periods of engine idling. Therefore, there are no areas where railway engines are run for more than 15 minutes continuously and where members of the public might be exposed.

9.10 CONCLUSIONS FOR SULPHUR DIOXIDE

There are no significant industrial or domestic sources of sulphur dioxide in Three Rivers District.

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 184,000 tonnes in 1997. Of this total, around 25% 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 µg m⁻³ as the annual mean, and 50 µg m⁻³ as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. In addition, for Local Authorities in England and Wales excluding London, there is an objective of 50 µg m⁻³ as the fixed 24-hour mean to be exceeded on no more than 7 days per year, and an objective of 20 µg m⁻³ for 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.

10.3 CONCLUSIONS OF THE FIRST ROUND OF REVIEW AND ASSESSMENT FOR PM₁₀

The following conclusions were given for PM₁₀ in the earlier stages of Review and Assessment for Three Rivers District Council:

- Local monitoring data for PM₁₀ shows concentrations are currently below the 24 hour objective of 50 µg m⁻³ with no exceedences of the objective recorded to date;
- PM₁₀ emissions from domestic solid fuel burning are unlikely to cause exceedence of the objectives;
- Emissions from industrial processes in Three Rivers District and neighbouring areas, are unlikely to cause exceedence of the objectives;
- Emissions from industrial processes in neighbouring areas are unlikely to cause exceedence of the objectives in Three Rivers District
- The first 3 stages identified that emissions from road traffic may cause exceedence of the 24-hour mean PM₁₀ objective for 2004, at three locations in Three Rivers District.

Therefore, three AQMAs were declared for PM₁₀, along the M25 motorway. These covered housing adjacent to the M25, at Chandlers Cross, Chorleywood and Kings Langley. However, further modelling at Stage 4 using Defra's newly updated emission factors concluded that the PM₁₀

objective for 2004 was unlikely to be exceeded at any location in the District with relevant public exposure. The Stage 4 report therefore recommended that the AQMAs declared for PM₁₀ be revoked. At the time of writing there are no AQMAs in Three Rivers for PM₁₀

10.4 SCREENING ASSESSMENT OF PM₁₀

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

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

These are evaluated in the following sections.

10.5 BACKGROUND CONCENTRATIONS FOR PM₁₀

The modelled average 2001 annual mean background PM₁₀ concentration for Three Rivers was 21.3 $\mu\text{g m}^{-3}$. The model predicts the highest 2001 annual mean concentration to occur in the grid square centred on 509500 204500, towards the northern edge of the District (20.1 $\mu\text{g m}^{-3}$).

10.6 SCREENING ASSESSMENT OF MONITORING DATA

Monitoring for PM₁₀ has been undertaken using a Tapered Element Oscillating Microbalance (TEOM) at one location in Three Rivers: the Fire Station, Rectory Road, Rickmansworth. Site details are shown in Table 10.1. This site is part of the Herts and Beds Pollution Monitoring Network, operated by King's College Environmental Resource Group (ERG). Details of the network, and monitoring data, are available from http://www.seiph.umds.ac.uk/envhealth/HBNet/hb_archive.html. The site is classified as urban background, but is located close to the Rickmansworth ring road. It is intended to be representative of urban background sites close to busy road, and ERG note that it does frequently record higher pollution levels than typical urban background locations.

Although there is only one automatic monitoring site actually in Three Rivers District, this study has also considered data from three other sites in the Herts and Beds Pollution Monitoring Network, in nearby districts or boroughs. These are all sites whose results may be relevant, because similar locations exist in Three Rivers. The sites included are as follows:

- Watford (WF 1): Roadside, 5m from the ring road around Watford town centre, and representative of locations near busy roads in towns bordering London.
- Broxbourne (BB1): Roadside, by Waltham Cross High Street and within 20m of a tunnel on the M25. This site is representative of urban locations close to the M25, and is relevant because previous stages have highlighted similar locations in Three Rivers.
- Hertsmere (HM1): Urban background, in school grounds in Hertsmere District. Representative of urban background locations in towns bordering London.

Table 10.1 Automatic PM₁₀ Monitoring Sites in and around Three Rivers

Site Type	OS Grid Ref	Location	Pollutants
Urban background	505500 194400	TR1, Rectory Road, Rickmansworth	PM ₁₀ , NO _x , met. data
Urban background	519430 196280	HM1, Furzehill School, Borehamwood DC	CO, NO _x , PM ₁₀ , O ₃ , met. data
Roadside	510535 196790	WF1, Town Hall, Watford DC	CO, NO _x , PM ₁₀ , met. data
Roadside	536126 200086	BB1, Waltham Cross nr. M25, Broxbourne	NO _x , PM ₁₀

Sites shown in italics are not in Three Rivers, but are included as they are comparable to some locations in Three Rivers.

Table 10.2 2002 Data from Automatic PM₁₀ Monitoring Sites

Site	Data Capture %	2002 Annual Mean PM ₁₀ , $\mu\text{g m}^{-3}$	No. of 24-h means > 50 $\mu\text{g m}^{-3}$ in 2002	90 th %ile of 24-h means, $\mu\text{g m}^{-3}$.
TR1	92%	23	12	40
HM1	99%	22	7	No data
WF1	98%	25	6	42
BB1	86%	28	14	45

The annual mean PM₁₀ concentrations (expressed as gravimetric equivalent) in 2002 were 22 $\mu\text{g m}^{-3}$ and 23 $\mu\text{g m}^{-3}$ at the background sites TR1 and HM1 respectively. Higher concentrations were measured at the roadside site WF1 and the near-motorway site BB1: 25 $\mu\text{g m}^{-3}$ and 28 $\mu\text{g m}^{-3}$ respectively. However, all four sites meet the annual mean objective of 40 $\mu\text{g m}^{-3}$ set for 2004. At all four sites, the number of days on which the 24-hour mean exceeded the objective of 50 $\mu\text{g m}^{-3}$ was well below the permitted 35 occasions. At BB1, data capture for 2002 was less than 90%: therefore the 90th percentile of 24-hour means, rather than the actual number of exceedances, was assessed. The 90th percentile was below 50 $\mu\text{g m}^{-3}$. All four sites, even the roadside site near the motorway at Broxbourne, appear to meet the 2004 PM₁₀ objectives at the present time. These results indicate that even roadside sites, and urban areas alongside the M25, in Three Rivers District, are likely to meet the 2005 AQS objectives for hourly mean and annual mean PM₁₀.

The approach set out in Box 8.6 of the Guidance was used to predict PM₁₀ concentrations in 2004 and 2010 at site TR1 in Rickmansworth. Using this method, predicted annual mean PM₁₀ concentrations in 2004 and 2010 respectively were 23 $\mu\text{g m}^{-3}$ and 21 $\mu\text{g m}^{-3}$ respectively at this site. These are within the relevant objectives.

10.7 SCREENING ASSESSMENT OF ROAD TRAFFIC SOURCES

Traffic flow data were taken from the NAEI 2000 roads database, and from traffic count data for 2002 supplied by Hertfordshire County Council (Appendix 2). The DMRB model was used to predict annual mean PM₁₀ concentrations in 2004, near the roads for which data were available. For initial screening purposes, the following receptor distances (from the road centre line to the nearest assumed public exposure) 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 possibly not meeting the 2004 objectives were then examined in more detail, using actual receptor distances, estimated from the OS map, or measured from OS Landline data supplied by Three Rivers. Table 10.3 shows nitrogen dioxide concentrations in 2004 calculated using DMRB for A roads and motorways in Three Rivers District.

Table 10.3 Estimated PM₁₀ concentrations 2004 near roads in Three Rivers District

Road	East	North	Distance receptor to road centre m	AADTF 2004	Average Speed kph	%HDV	Annual Mean PM ₁₀ 2004 µgm ⁻³	No. of exceedences of 24h obj. in 2004
M25	503800	195000	40	158434	118	11.1	27.0	18
A412	505000	194100	5	21189	90	3.3	23.4	9
M25	510000	202901	50	133860	118	13.2	25.4	13
A404	507001	192842	5	19315	80	2.6	22.7	8
A41	509005	199553	25	38218	118	4.1	24.5	11
A404	505000	195870	5	21022	80	2.9	22.9	8
M25	505020	198090	50	165074	118	10.8	25.5	14
A412	505600	194600	10	30094	90	3.2	23.5	9
A41	508330	200000	5	29065	118	4.1	26.8	17
A4125	510000	193950	5	17239	50	1.8	22.5	7
M25	502000	190700	50	148383	118	13.2	25.6	14
A412	503118	192000	5	19387	90	6.7	24.1	10
A4125	511220	195000	5	17356	80	3.5	22.8	8
A412	506000	194710	5	23634	118	3.0	26.0	15
M25	507453	200045	50	133014	118	13.0	25.4	13
A412	503389	193966	10	18811	80	4.3	22.8	8
A404	506000	194073	5	26825	90	2.9	23.7	9
M25	508000	199380	15	22448	118	4.4	24.9	12
A405	511759	201005	10	32074	80	5.3	23.7	10
A4008	512050	194850	5	14685	90	2.8	22.8	8
A412	503040	191730	5	13577	50	6.2	23.2	8
M25	502350	192900	100	148383	118	13.2	21.6	6
A404	503300	196720	5	16708	90	3.1	23.1	8
A404	502900	197050	5	22560	59.2	3.1	23.0	8
A404	507210	192760	5	21000	86.4	2.6	23.0	8
A412	506400	195000	5	26560	59.2	3.0 *	23.2	8
A412	503050	191580	5	14275	59.2	3.0 *	22.4	7
A4008	512630	193880	5	18571	86.4	2.8	22.9	8
A4125	510250	192720	5	13958	72	3.0 *	22.2	7
A4145	506650	194030	5	11977	59.2	3.5	22.1	6
A404	504550	196150	5	22485	59.2	3.1	23.0	8
A412	504250	193780	5	17979	72	3.0 *	22.6	7
B4542	511530	194080	5	13017	59.2	3.0 *	21.8	6
C63	509780	192720	5	158434	72	3.0 *	25.4	13
M25 J18	504200	196900	25	161050	118.4	10.8	30.2	28
B4542	512510	192550	5	9867	59.2	3.0 *	21.4	5
B4542	510670	192400	5	7567	59.2	3.0 *	21.0	5
C76	508020	201920	5	7169	59.2	3.0 *	21.0	5
C101	505840	193500	5	5013	59.2	3.0 *	20.6	4

HDV = HGV + buses.

* Estimated as 3% where no data available.

No locations are predicted to exceed the objective of 40 µg m⁻³ for annual mean PM₁₀ in 2004. Nor are any predicted to exceed the 24-hour objective of 50 µg m⁻³ on more than the permitted 35 occasions.

10.7.1 Busy Junctions

The M25 and its junctions were fully assessed in Stages 3 and 4 of the previous round, so have not been re-assessed here. However, three busy junctions on other major roads were identified as requiring investigation. Annual average PM₁₀ concentrations near three busy road junctions in Three Rivers District have been estimated for 2004 using DMRB (Table 10.4).

Table 10.4 Estimated PM₁₀ concentrations 2004 near busy junctions in Three Rivers District

Junction	East	North	Average Speed, kph	% HDV	PM ₁₀ Annual mean μgm^{-3} 2004	No of Exceedences of 50 μgm^{-3}
A412 & A404 Rickmansworth (i)	505500	194500	48	3.3	25.0	12
A412 & A404 Rickmansworth (ii)	505700	194800	48	3.1	24.7	12
M25 Watford spur, A41 & 411 *	508500	199600	72	4.2	21.5	6

* Can be ignored as no relevant public exposure.

None of the above junctions are expected to have annual mean PM₁₀ concentrations greater than 40 $\mu\text{g m}^{-3}$ in 2004; neither are any expected to have more than 35 exceedences of the 24-hour objective of 50 $\mu\text{g m}^{-3}$ in 2004.

10.8 SCREENING ASSESSMENT OF INDUSTRIAL SOURCES

The Guidance LAQM TG(03) 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 industrial processes in Three Rivers District (Appendix 3). There is a quarry (discussed in section 10.9.1), but no other processes with the potential to emit significant quantities of PM₁₀.

There are no industrial processes, current or proposed, in neighbouring areas that have the potential to emit significant quantities of PM₁₀.

10.9 SCREENING ASSESSMENT OF FUGITIVE AND UNCONTROLLED SOURCES

10.9.1 Quarries and landfill sites

There is a sand and aggregate quarry within Three Rivers: Great Westwood Quarry at Chandlers Cross. This 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. However, there have been no complaints of dust nuisance, and experience from site visits indicates that there is not a problem with fugitive dust emissions.

There are some landfill sites within Three Rivers, but all are now capped and monitored.

10.9.2 Domestic solid fuel burning

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

10.10 SCREENING ASSESSMENT OF OTHER TRANSPORT SOURCES

10.10.1 Airports

There are no working airports in Three Rivers. (The old airport at Leavesden near Abbots Langley is no longer in use). The nearest airport is Denham Aerodrome, in neighbouring South Bucks District. However, as this airport is just over 1km from the border with Three Rivers it does not need further consideration.

10.11 CONCLUSIONS FOR PM₁₀

The DMRB screening model indicates that the annual mean and 24-hour objectives for PM₁₀ will be met in 2004. A Detailed Assessment is not required for PM₁₀ in Three Rivers District.

11 Conclusions

11.1 CARBON MONOXIDE

Carbon monoxide is not monitored in the District. However, there are no roads or junctions which can be classified as 'very busy' according to the criteria in the guidance. A Detailed Assessment is therefore not required for carbon monoxide.

11.2 BENZENE

National monitoring network data indicate that most urban locations in the UK already meet the 2003 and 2010 objectives for benzene. There are no petrol stations in Three Rivers with a throughput greater than 2 million litres which are also located near a busy road with AADTF > 30,000 vehicles. A Detailed Assessment is not required for benzene.

11.3 1,3-BUTADIENE

Estimated background concentrations and data from national monitoring stations indicate that the objective for 1,3-butadiene is likely to be achieved by the end of 2003. There are no industrial processes, current or proposed, in Three Rivers with the potential to emit significant quantities of 1,3-butadiene. A Detailed Assessment is not required for 1,3-butadiene.

11.4 LEAD

Emissions of lead from industrial processes in or near Three Rivers are not likely to exceed the objectives for lead to be achieved in 2004 and 2008. A Detailed Assessment is not required for lead in Three Rivers.

11.5 NITROGEN DIOXIDE

A Detailed Assessment is not required for nitrogen dioxide in Three Rivers. AQMAs already exist in areas alongside the M25 where NO₂ objectives may not be met in 2005. No additional areas were highlighted.

11.6 SULPHUR DIOXIDE

There are no significant industrial or domestic sources of sulphur dioxide in Three Rivers. A Detailed Assessment is not required for sulphur dioxide.

11.7 PM₁₀

Data from the Hertfordshire and Bedfordshire Monitoring Network, and from the DMRB screening model, indicate that the 24-hour and annual mean objectives for 2004 will be met throughout the District. A Detailed Assessment is not required for PM₁₀.

11.8 SUMMARY AND RECOMMENDATIONS

There is no requirement for a Detailed Assessment. Three Rivers should continue to implement its action plan relating to the three existing AQMAs along the M25.

12 References

1. Part IV of Environment Act 1995: Local Air Quality Management. Technical Guidance LAQM.TG(03). Defra, Feb 2003.
2. The Air Quality (England) Regulations 2000 (Statutory Instrument 2000 No. 928), March 2000.
3. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. January 2000. ISBN 0-10-145482-1
4. The Air Quality Amendment Regulations 2002, ISBN 0 11061468 2.
5. Herts and Beds Air Quality Monitoring Network 2002 Annual Report, Kings College ERG, http://www.seiph.umds.ac.uk/envhealth/HBNet/hb_rep.html .

13 Acknowledgements

Netcen would like to thank Three Rivers District Council and Hertfordshire County Council for supplying the information used in this Updating and Screening Assessment.

Appendices

CONTENTS

Appendix 1	Monitoring Data
Appendix 2	Traffic Flow Data
Appendix 3	Emission Source Data
Appendix 4	Assessment Checklist

Appendix 1

Monitoring Data

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Table A1.1	NO ₂ Diffusion Tube Results 2002
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Table A1.1 NO₂ Diffusion Tube Results 2002. Concentrations in $\mu\text{g m}^{-3}$.

Site No.	TR01	TR10	TR03	TR04	TR05	TR06	TR07	TR08	TR09	TR15	TR11	TR12	TR13	TR16
January	49.8	61.5	44	40.6	51.1	*	39.6	49.8	55.2	55.2	62	51.9	67	50.3
February	40.7	49.1	29.1	30	36.2	30	19.2	36	34.2	40	50.2	35.9	68.1	42.2
March	48.8	49.1	30.6	37.4	43.5	40	31.7	48.6	42.7	53	56.1	48.3	73.4	44.6
April	35.9	48.6	17.9	32.4	39.8	30.6	23.4	35.9	31.9	45.3	45.6	45.1	67.5	37.8
May	16.2	39.5	20.5	20	33.3	27.6	21	32.2	26.8	41.5	37.2	38.9	55.4	33.9
June	18.8	27.8	11.6	17.3	30.2	21.7	14	28.1	*	35.8	48.3	Reject	61.5	30.4
July	21.6	39.9	14.4	23.3	32.8	22.2	17.3	31.1	25.1	34.7	37.3	24.2	57.6	30
August	25	32	13.4	24.2	34.6	27.8	20.7	33.7	*	34.5	36.1	28.1	51.7	35.2
September	27.9	38.2	24.9	24.3	42.8	33	27.8	45.7	*	40.8	42.3	46.4	56.5	48.3
October	51.7	53.1	41	40.6	46.5	40.7	34.2	53.6	47.8	45.2	50.5	45.8	62.6	44.9
November	60.2	66	49.9	48.6	57.5	54.2	45.1	58.8	49.6	54.4	61.4	Reject	75.2	54.1
December	48.7	49.3	39.3	46.7	52.7	47.1	43.4	50.3	50.6	49.4	47.9	53.2	58.4	49.5
Annual Mean $\mu\text{g m}^{-3}$	37.1	46.2	28.1	32.1	41.8	34.1	28.1	42.0	40.4	44.2	47.9	41.8	62.9	41.8
No. of valid months	12	12	12	12	12	11	12	12	9	12	12	10	12	12
Bias corrected	26.7	33.3	20.2	23.1	30.1	24.6	20.3	30.3	29.1	31.8	34.5	30.1	45.3	30.1
Predicted 2005 mean	24.6	30.6	18.9	21.6	28.1	22.6	18.7	27.9	26.8	29.7	32.2	28.1	41.7	28.1

*** = missing tube.**

Two months data from site TR12 (Fire Station, Rectory Road) were rejected, as follows: June 2002 (water in tube) and November 2002 (Fire service strike: picket line brazier close to diffusion tube for 3 days).

Appendix 2

Traffic Data

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NAEI Traffic Flow Data 2000
Hertfordshire County Council Traffic Data 2002

Table A2.1 NAEI Traffic Flow Data for Three Rivers District

CensusID00	Rd_no	x	y	Rd_cls	AADFYear	All_vehicles	CAR	BUS	LGV	HGVr	HGVa	Moto	% HDV	LA
7054	M25	503800	195000	MN	2000	149749	116762	560	15808	6906	9209	504	11.14%	Three Rivers
7067	A412	505000	194100	PB	2000	20027	17166	187	2022	423	41	188	3.25%	Three Rivers
7903	M25	510000	202901	MN	2000	126522	95318	804	13888	6339	9550	623	13.19%	Three Rivers
8510	A404	507001	192842	PN	2000	18256	15744	66	1926	348	66	106	2.63%	Three Rivers
16431	A41	509005	199553	TN	2000	36123	30481	188	3767	923	365	399	4.09%	Three Rivers
27080	A404	505000	195870	PB	2000	19870	17146	75	2022	405	106	116	2.95%	Three Rivers
27085	M25	505020	198090	MN	2000	156025	123193	788	15017	6885	9233	909	10.84%	Three Rivers
27096	A412	505600	194600	PB	2000	28444	24602	228	2733	535	145	201	3.19%	Three Rivers
36465	A41	508330	200000	TN	2000	27472	23169	283	2871	680	155	314	4.07%	Three Rivers
37752	A4125	510000	193950	PB	2000	16294	14423	68	1380	214	16	193	1.83%	Three Rivers
38020	M25	502000	190700	MN	2000	140249	107572	720	13377	7853	9943	784	13.20%	Three Rivers
38597	A412	503118	192000	PB	1998	18324	14991	134	1991	772	326	110	6.72%	Three Rivers
38668	A4125	511220	195000	PB	1998	16405	14390	235	1341	325	8	106	3.46%	Three Rivers
38786	A412	506000	194710	PB	2000	22338	19331	202	2222	395	65	123	2.96%	Three Rivers
48041	M25	507453	200045	MN	2000	125722	96665	561	12240	5957	9861	438	13.03%	Three Rivers
48114	A412	503389	193966	PN	2000	17780	14167	43	2772	501	213	84	4.26%	Three Rivers
48481	A404	506000	194073	PB	2000	25354	22005	107	2500	534	88	120	2.88%	Three Rivers
56282	M25	508000	199380	MN	2000	21217	17668	149	2504	533	249	114	4.39%	Three Rivers
57111	A405	511759	201005	TN	2000	30316	25517	314	2952	920	375	238	5.31%	Three Rivers
57673	A4008	512050	194850	PB	2000	13880	11968	96	1375	243	47	151	2.78%	Three Rivers
73173	A412	503040	191730	PN	2000	12833	10569	53	1363	634	110	104	6.21%	Three Rivers
73174	M25	502350	192900	MN	2000	140249	107572	720	13377	7853	9943	784	13.20%	Three Rivers
73175	A404	503300	196720	PN	2000	15792	13785	85	1422	320	81	99	3.08%	Three Rivers

Eastern Region

Count point locations and Annual Average Daily Vehicle Flows (AADF), 2000

Compiled from the UK National Atmospheric Emissions Inventory sponsored by DEFRA.
 File generated on 4-12-02
 For more information see www.naei.org.uk/data_warehouse.php

Explanation of the data fields:

CensusID00	Unique ID for this count point
Rd_no	Number of the road
x	Grid reference Easting
y	Grid reference Northing
Rd_cls	Road classification
AADFYear	Year that the count was made
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
LA	Local Authority
Gov_Office_Region	Government Office Region

Road class types:

MB	Built-up motorway
MN	Non built-up motorway
PB	Built-up primary road
PN	Non built-up primary road
TB	Built-up trunk road
TN	Non built-up trunk road

Table A2.2. Herts CC Traffic Data for Three Rivers

Site Number	Site Location	2001 AAWD	2001 AADT	2002 AADT	% HDV from NAEI	Average Speed (kph)	Road Type
206	A404 Rickmansworth Rd, Chorleywood	22020	22397	21899	3.1	59	Single Carriageway
207	A404 London Rd, Batchworth Heath	20630	20629	20385		86	Single Carriageway
216	A412 Scots Hill, Rickmansworth	25420	25461	25782		59	Dual Carriageway
217	A412 Denham Way, West Hyde	14920	14147	13857		-	Single Carriageway
252	A4008 Oxhey Lane, Watford	17720	18593	18027		86	Single Carriageway
317	A4125 Sandy Lane, Eastbury	13920	14238	13549		72	Single Carriageway
346	A4145 Moor Lane, Batchworth	11270	10236	11626		59	Single Carriageway
542	A404 Chorleywood Rd, Rickmansworth	21980	21756	21826	3	59	Single Carriageway
562	A412 Uxbridge Rd, Rickmansworth	18040	17733	17452		72	Single Carriageway
351	B4542 Prestwick Road, South Oxhey	12210	12488	12636		59	Single Carriageway
353	B5378 Shenleybury, Shenley	not in Three Rivers				86	Single Carriageway
554	C63 Batchworth Lane, Eastbury	11960	11789	12386		72	Single Carriageway
553	M25 Jn 18/19 Rickmansworth	148940	154200		10.8	118	Motorway
603	M25 Jn 21a-22, Bricket Wood	not in Three Rivers				118	Motorway
161	A405 North Orbital Road, Waterdale	-				118	Dual Carriageway
350	B4542 Little Oxhey Lane, Carpenders Park	9250	9410	9578		59	Single Carriageway
352	B4542 Prestwick Road, Oxhey Woods	7090	6886	7345		59	Single Carriageway
461	C76 Station Road, Kings Langley	7560	7314	6959		59	Single Carriageway
467	C101 Harefield Road, Batchworth	5210	4729	4866		59	Single Carriageway

(2002 data supplied by M. Armstrong, Herts CC, added by Netcen 01/12/2003.)

Appendix 3

Emission Source Data

CONTENTS

Part A and Part B Processes
Petrol Stations

Part A and Part B Processes

Local Authority Three Rivers District Council
Contact Name John Scott
Job Title Commercial Standards Manager
Contact Number 01923 727005
Date Completed 02/12/2003

Collection Sheet - Part A and Part B Processes				
Company	A or B	Process Type eg paint spraying	OS Ref. eg TL 060066	Likely Emissions
West Herts Crematorium	B	Crematorium	TL 116 016	HCl, CO, NO, 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	particulates
Watford Timber Co.	B	Manufacture of Timber and Wood Based Products	TQ 082 944	VOCs particulates
Swift Services	B	Waste Oil Burner	TL 096 018	VOCs, NOx particulates

Petrol Stations

Local Authority	Three Rivers District Council
Contact Name	John Scott
Job Title	
Contact Number	01923 727005
Date Completed	02/12/2003

Petrol Filling Stations			
Service Station Name	OS Ref.	Annual Volume of Petrol Delivered	Vapour Balancing Installed (Y/N)
Q8 Bedmond Road Bedmond	TL 099 037	>1000m ³	01-Dec-98
Primrose Hill Service Station Primrose Hill Kings Langley	TL 078 029	>1000m ³	01-Dec-98
Fina Service Station Ltd Old Mill Road Hunton Bridge	TQ 084 999	>1000m ³	01-Dec-98
Biggerstaffs Garage Dimmocks Lane Sarratt	TQ 045 992	>100 - 500m ³	01-Dec-04
Shell Chorleywood Rickmansworth Road Chorleywood	TQ 038 965	>1000m ³	01-Dec-98
Rickmansworth Service Station Victoria Close Rickmansworth	TQ 057 947	100 - 500m ³	01-Dec-04
Bridge Motors Ltd Church Street Rickmansworth	TQ 062 942	501 - 1000m ³	01-Dec-01
Shell Watford Road Croxley Green	TQ 083 957	>1000m ³	01-Dec-98

Petrol Filling Stations - continued			
Service Station Name	OS Ref.	Annual Volume of Petrol Delivered	Vapour Balancing Installed (Y/N)
B.P. Express Uxbridge Road Mill End	TQ 047 939	>1000m ³	01-Dec-98
Star Service Station Uxbridge Road Rickmansworth	TQ 051 942	>1000m ³	01-Dec-98
Sandy Lodge Service Station Sandy Lane Northwood	TQ 097 037	>1000m ³	01-Dec-98
Esso Prestwick Road South Oxhey	TQ 118 933	>1000m ³	01-Dec-98

Appendix 4

Assessment Checklist

Air Quality Review and Assessment - Updating and Screening Assessment Data Requirements

Please review the checklist below and tick where the emissions sources identified are relevant to your local authority. Then return the checklist to NETCEN along with as much of the data indicated as possible. Please provide all data in electronic format, where possible.

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
A	Previous review and assessment reports (stages 1-4)	Copies of all previous reports. Please indicate last stage reached	1 / 2 / 3 / 4 ✓ Stage 4 completed by NETCEN
B	Any other reports on air quality since the last stage completed	Copies of all previous reports. Please indicate purpose, if not for review and assessment of air quality	Stage 4 accepted by DEFRA
C	New monitoring data since last stage of review and assessment for the district/borough, and any data obtain for adjacent boroughs for NO ₂ .	Data for: <ul style="list-style-type: none"> • carbon monoxide • benzene • 1,3-butadiene • lead 	Available from HABAPMN

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
		<ul style="list-style-type: none"> nitrogen dioxide sulphur dioxide PM₁₀ Delete above as appropriate	
D	Land Line GIS data for the borough or district, ideally in ArcView format, if not as an .ntf file	Land Line GIS data for the borough or district	Already provided under OS License for Stage 4
Section A - Roads			
E	<p>Traffic data for the district or borough. For each stretch or road the following data are required:</p> <ul style="list-style-type: none"> AADT (annual average daily traffic) flows, or if not available as an alternative (18 hour flows, peak hour) along with the relevant statistical conversion factor for each road Speed data or, if not available, speed limits Traffic growth factor for future years Junction queue lengths Junction turning count information Vehicle type split, at least as HDV/LDV 	<p>Identify and provide traffic data indicated. Need to consider roads AND JUNCTIONS with AADT flows over 10,000veh/day. An individual road at a junction may have a flow of less than 10,000 AADT, but the total flow through the junction may exceed 10,000 veh/day. In case of doubt consult NETCEN or the Technical Guidance LAQM.TG(03).</p>	Provided via Herts County Council

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
F	<p>Narrow congested streets meeting <i>all</i> the criteria below:</p> <ul style="list-style-type: none"> • residential properties close to the kerb (within 5m); <i>and</i> • Average traffic speeds are ≤ 50 kph; <i>and</i> • Carriageway is less than 10m wide; <i>and</i> • AADT > 10,000 veh/day based on measured or modelled data, if possible 	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	None
G	<p>Busy streets where people may spend 1 hour or more close to traffic (most likely along streets of shops, pubs, bars and cafes) meeting <i>all</i> the following criteria:</p> <ul style="list-style-type: none"> • Members of the public may be exposed for 1 hour or more within 5m of the kerb; and • AADT > 10,000 veh/day 	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	None
H	<p>Roads with high flows of buses and/or HGVs ($\geq 20\%$) e.g. bus-only streets or roads leading to industrial estates, quarries or freight terminals, and meeting the following criteria:</p> <ul style="list-style-type: none"> • Public exposure within 10m (20m major conurbation of 2 million people); and • HDV flows are >2,000 veh/day AADT 	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	None

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
I	Roads with AADT flows > 10,000 veh/day which have experienced large (>25%) increases in flows, or where traffic data improvements have revealed roads to have much larger flows than previously thought (>25%)	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	None
J	New Roads constructed or proposed since the last Review and Assessment. Has an air quality impact assessment been undertaken for the new road? Does the new road have AADT > 10,000 veh/day or has it increased flows on other roads?	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least)). Provide copies of air quality assessments undertaken	None
Section B - Other Sources			
K	Bus stations.	Provide information on daily movements	None
L	Petrol stations with annual throughput of over 2000 m ³ of <i>petrol</i> (ignore diesel) and with busy roads nearby (>30,000 veh/day). Ignore stations with Stage 2 recovery systems installed.	Identify and provide information on petrol throughput. Are Stage 2 recovery systems likely to be installed?	None All stage 2 in place under LAPC
M	Major fuel storage depots (petrol only)	Identify and provide information on petrol throughput	None

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
N	Industrial emissions sources which are new since the last review and assessment, were omitted in last review and assessment, or have had a significant increase (>=30%) in emissions since last review and assessment, in district or in neighbouring your districts, if known (Part B/A2/ LA-APPC). Also advise of Part A/A1 and mineral processes if known. Do any air quality impact assessment reports exist on the new/alterd emissions sources?	Identify and provide emissions data in tonnes per year for pollutants identified above in C, and information on number and height of stacks, Provide copies of any air quality impact assessment reports available	None
O	Airports with a throughput of 5 million passengers per year and/or 500,000 tonnes of freight (freight-only flights) in 2005 or 2010 and possible public exposure within 1000m of the site boundary.	Identify, providing data on passenger numbers in 2005 and 2010, freight in tonnes per year, and nearest location of possible public exposure	None
P	Significant areas of domestic solid fuel (coal, anthracite, wood or smokeless fuel) use (significant areas are 500m by 500m with at least 50 houses using these fuels). If not known, are any such areas suspected to exist from local authority experience?	Identify and provided details	None

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
Q	<p>Fugitive dust sources such as:</p> <ul style="list-style-type: none"> • Quarries and opencast mines • Landfills • Handling of dusty cargo e.g. at ports • Industrial sites with unpaved haul roads, processing plant and materials handling <p>Only consider above sources where public exposure is possible within 1000m of the source (nor site boundary). For above sites, have dust nuisance complaints been received by the local authority, or does visual inspection suggest significant fugitive dust during site visits?</p>	Identify, provide details of activity, if known, and identify nearest potential location of public exposure	<p>Yes – Great Westwood Quarry, Chanders Cross</p> <p>Public exposure-dwellings within 1km but no fugitive dust emissions observed or reported</p>
R	Boiler plant ($>5 \text{ MW}_{\text{thermal}}$) that burn coal or fuel oil	Identify and provide details	None
S	Ports with more than 5,000 shipping movements per year	Identify and provide details of numbers of shipping movements	None

Item	Local authority to identify	Data Required	Relevant to Local Authority? (✓)
T	<p>Locations where diesel rail locomotives are regularly stationary for 5 minutes or more (e.g. at signals, goods loops, depots or stations) <i>and</i>:</p> <ul style="list-style-type: none"> • Potential for public outdoor exposure within 15m of locomotives; <i>and</i> • there more than 2 occasions per day where locomotives are stationary with engines running for more than 15 minutes? 	Identify and provide details of numbers of movements, if known	None

