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Chiltern's Local AIR & Environment

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Air Quality Updating and Screening assessment for the Chiltern District

A report produced for Chiltern 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[a] and their objectives have been enacted through the Air Quality Regulations in 1997, 2000 and 2002[2]. The Environment Act 1995 requires Local Authorities to undertake air quality reviews. In areas where an air quality objective is not anticipated to be met, Local Authorities are required to establish Air Quality Management Areas and implement action plans to improve air quality.

The first round of air quality review and assessments has been completed by Chiltern District Council. The Council 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 an Updating and Screening Assessment for Chiltern District Council as outlined in the Government's published guidance.

This Updating and Screening Assessment has concluded that Chiltern District Council is not required to carry out a Detailed Review and Assessment for carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide or PM_{10} .

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

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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
AURN	Automatic Urban and Rural Network (Defra funded air quality monitoring 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 for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
kerbside	0 to 1 m from the kerb
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
n	number of pairs of data
NAEI	National Atmospheric Emission 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)
SEPA	Scottish Environment Protection Agency
SO_2	Sulphur dioxide
TEA	Triethanolamine
TEMPRO	A piece of software produced by the Defra used to forecast traffic flow increases
TEOM	Tapered Element Oscillating Microbalance
TEOM (Grav.)	TEOM Measurements expressed as the equivalent value from a gravimetric monitor
V/V	Volume ratio

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

The second round of review and assessment is to be undertaken in two steps. The first step is an Updating and Screening Assessment. This assessment updates the 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 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Section 1** summarises the aims of the updating and screening assessment, the approach adopted for the assessment, the pollutants and air quality objectives;
- **Section 2** summarises the UK Air Quality Strategy and the function of an updating and screening assessment;
- **Section 3** summarises the conclusions of air quality review and assessment work to date, identifies data used in support of this assessment as well as relevant background information on the Council area, and relevant emissions-to-air sources and highlights significant changes in emissions to air within the borough 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;

1.3 OVERVIEW OF APPROACH TAKEN

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

- Identify the conclusions of the last round of review and assessment for each of the seven pollutants included in the air quality regulations;
- Identify significant sources of emissions to air for the seven pollutants included in the air quality regulations, including major roads and industrial plant;
- Identify new sources not previously considered in the first 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.

1.4 RELEVANT GUIDANCE DOCUMENTATION

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

1.5 POLLUTANTS CONSIDERED IN THIS REPORT

All pollutants included in the Air Quality Regulations[2] for the purposes of Review and Assessment have been considered in this report (Table 1.1).

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

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

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

2 The UK Air Quality Strategy

2.1 NATIONAL AIR QUALITY STANDARDS

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

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

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

2.3 AIR QUALITY REVIEWS – THE APPROACHES AND EXPECTED OUTCOMES

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

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

Table 2.1 Brief details of steps in the 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, than apply simple screening tools to decide whether there is sufficient risk of an exceedence of an objective to justify a Detailed Assessment
Detailed Assessment	To provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation or amendment of any necessary AQMAs	Use quality-assured monitoring and validated modelling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective.
Annual Progress reports	Local authorities should prepare annual air quality Progress Reports between subsequent rounds of reviews and assessments. The concept is that this will ensure continuity in the LAQM process.	The precise format 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.

2.4 LOCATIONS THAT THE REVIEW AND ASSESSMENT MUST CONCENTRATE ON

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

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

Averaging Period	Pollutants	Objectives *should* apply at …	Objectives should *not* generally apply at …
Annual mean	• 1,3 Butadiene • Benzene • Lead • Nitrogen dioxide • Particulate Matter (PM_{10})	All background locations where members of the public might be regularly exposed.	Building facades of offices or other places of work where members of the public do not have regular access.
		Building facades of residential properties, schools, hospitals, libraries etc.	Gardens of residential properties.
			Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term
24 hour mean and 8-hour mean	• Carbon monoxide • Particulate Matter (PM_{10}) • Sulphur dioxide	All locations where the annual mean objective would apply.	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
		Gardens of residential properties.	
1 hour mean	• Nitrogen dioxide • Sulphur dioxide	All locations where the annual mean and 24 and 8-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.
		Kerbside sites (e.g. pavements of busy shopping streets).	
		Those parts of car parks and railway stations etc. which are not fully enclosed.	
		Any outdoor locations to which the public might reasonably be expected to have access.	
15 minute mean	• Sulphur dioxide	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

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

3 Information used to support this assessment

3.1 THE FIRST ROUND OF REVIEW AND ASSESSMENT OF AIR QUALITY FOR CHILTERN DISTRICT COUNCIL

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

- Stage 1 and Stage 2 (March 1999)[4]

The Stage 1 and Stage 2 report concluded that air quality objectives within Chiltern district were likely to be met for 2005 and no further assessment was required in the first round of review and assessment.

3.2 PROPOSED DEVELOPMENTS WHICH MAY AFFECT AIR QUALITY

3.2.1 Industry

There are no significant industrial developments currently planned in the district.

3.2.2 Housing

A need for some 1,800 additional dwellings was identified in the 1997 Local plan with about 1,500 predicted before 2001. The bulk of the development is in Chesham and Amersham.

3.2.3 Transport

Policies are in place for development of walking, cycling, and rail transport.

3.3 AIR QUALITY MONITORING

The district has several air quality monitoring locations for nitrogen dioxide which use diffusion tubes and this network was expanded in 2002. Benzene monitoring was undertaken in 1998 and 1999 but there are currently no benzene monitoring sites in the District. Continuous air quality monitoring equipment is not used in the District. Full details of the locations and concentrations recorded by the diffusion tubes for 2001 are given in Appendix 1. There are no National network air quality monitoring sites within the district.

3.4 MAPS AND DISTANCES OF RECEPTORS FROM ROADS

An initial review of roads and receptors was undertaken using Ordnance Survey maps. Chiltern District Council also provided electronic OS LandLine™ data which was used in the Geographical Information System (GIS) used in assessment. Individual buildings or groups of buildings (receptors) were identified from the OS maps of the areas. The distances of these receptors from the road, and the widths of the roads, were determined from the maps.

3.5 ROAD TRAFFIC DATA

3.5.1 Summary of traffic data provided

This section summarises the information used in this report; detailed information is given in Appendix 2. Appendix 2 lists the locations of the traffic flow and speed measurement points, flow and speed data and other relevant traffic statistics. Data were collated from a range of sources, including:

- data provided by Chiltern District Council (Buckinghamshire county council)
- data held in the National Atmospheric Emissions Inventory (NAEI, 2000) where no other data were available.

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

3.5.2 Proportion of HGVs

Percentages of Cars and LGVs were available from the data provided by Chiltern Council. For other road links, the percentage of HGVs was estimated from the data held in the 2000 National Atmospheric Emissions Inventory.

3.5.3 Base year for traffic

The base year for the traffic flows was 2001.

3.5.4 Traffic growth

Traffic growth figures were based on the department for Transport 'TEMPRO' growth figures for car journeys in Chiltern to provide estimates of pollutant concentrations.

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

Road widths and the distances of receptors from the road were estimated based on the road classification and, where available, from the OS Landline data.

3.6 PART A AND B INDUSTRIAL PROCESSES

There are several Part B Industrial processes in the district but no Part A processes. A full list is given in Appendix 3. Emission data have been supplied by the council for selected processes.

3.7 SCREENING TOOLS

Appendix 4 includes outline details of the DMRB and other screening tools used in the assessment.

4 Updating and Screening Assessment for Carbon Monoxide

4.1 THE NATIONAL PERSPECTIVE

The main source of carbon monoxide in the United Kingdom is road transport, which accounted for 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 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 first round review and assessment concluded that the National Strategy objective for carbon monoxide was likely to be achieved and that a Stage three assessment was unnecessary for the pollutant.

4.4 SCREENING ASSESSMENT OF CARBON MONOXIDE

4.4.1 Screening check list

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

- Monitoring Data
- Very Busy Roads

These are described in the following sections.

4.4.2 Screening assessment of monitoring data

No monitoring for carbon monoxide has been undertaken in the district since the first round of review and assessment. However, no AURN site in the UK exceeded the running 8 hour mean objective in 2001. The average 2001 background carbon monoxide concentration in the District, estimated from the UK background maps[5], was 0.31 mgm^{-3} with a maximum concentration of 0.38 mgm^{-3}.

4.4.3 Screening assessment for very busy roads

The guidance document LAQM TG(03)[1] requires assessment of CO only at 'very busy roads'. A 'very busy' road is defined in LAQM TG(03) as a single carriageway road with a daily average traffic flow greater than 80,000 vehicles. Very busy dual carriageways and motorways have daily average traffic flows greater than 120,000 and 140,000 respectively. Traffic flow data were supplied by Chiltern District Council and from the NAEI. Based on these data, there are no roads or junctions with relevant exposure in the council area which can be classified as 'very busy' according to the criteria in the guidance. The

M25 meets the very busy criteria and it intersects the south-east corner of the district but there is no relevant exposure within the district.

4.5 CONCLUSIONS FOR CARBON MONOXIDE CONCENTRATIONS IN COUNCIL AREA

Although there is no monitoring data for carbon monoxide within the district, it is unlikely that ambient concentrations are above the objective. There are no roads in the district which can be classified as 'very busy' according to the criteria in the guidance. Consequently, Chiltern District Council is not required to carry out a Detailed Review and Assessment for carbon monoxide.

5 Updating and Screening Assessment for Benzene

5.1 THE NATIONAL PERSPECTIVE

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

5.2 STANDARD AND OBJECTIVE FOR BENZENE

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

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

The following conclusions were given for benzene in the First and Second Stage Review and Assessment for Chiltern.

- There are no major industrial processes which have the potential, individually or cumulatively, to result in elevated levels of benzene in relevant locations in the Chiltern District Council Area;

The national policies were expected to deliver the air quality objective for benzene and hence there was no need to undertake a Stage three review and assessment for benzene.

5.4 SCREENING ASSESSMENT OF BENZENE

5.4.1 Screening check list

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

- Monitoring Data
- 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.

5.4.2 Background concentrations for benzene

The average background benzene concentration in Chiltern District, estimated from the UK 2001 background maps[5] was 0.45 μgm^{-3}, with a maximum concentration of 0.61 μgm^{-3} (occurring at the south-east of the district near the M25).

5.4.3 Screening assessment of monitoring data

No monitoring of benzene has been undertaken recently in the district. A short survey was undertaken in 1998 using diffusion tubes and this was considered in the previous round of review and assessment.

5.4.4 Screening assessment of very busy roads

The guidance document LAQM TG(03)[1] requires assessment of benzene only at 'very busy roads' (Appendix 2 Table A2.1). Traffic flow data were supplied by the district Council and from the NAEI. Based on these data, there are no roads in the District with relevant exposure which can be classified as 'very busy' according to the criteria in the guidance. The M25 intersects the south east of the district but has no relevant exposure.

5.4.5 Screening assessment of industrial sources

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

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

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

None of the industrial plant in the district (Appendix 3) operate these processes or have the potential to emit benzene.

5.4.6 Screening assessment of Petrol Stations

There are 11 petrol stations identified in Chiltern district (Appendix 3). Most of the stations are fitted with vapour recovery systems for tanker offloading (Stage 1 vapour recovery). One station (BP at White Lion Road, Amersham) is reported to have Stage 2 vapour recovery fitted and consequently can be excluded from the screening procedure. None of the stations has an estimated throughput of more than 2 million litres petrol per year.

The guidance requires petrol stations to be considered only if they are near a busy road, that is with more than 30,000 vehicles per day and have a throughput greater than 2 million litres. None of the stations have petrol throughputs greater 2 million litres and consequently, a detailed assessment for benzene is not required based on petrol station emissions.

5.4.7 Screening assessment of Fuel Storage Depots

There are no major fuel storage depots in the district.

5.5 CONCLUSIONS FOR BENZENE IN COUNCIL AREA

There are no roads in Chiltern which can be classified as 'very busy' with relevant exposure according to the criteria in the guidance. There are no petrol stations with a throughput greater than 2 million litres.

Chiltern District Council is not required to carry out a Detailed Review and Assessment for benzene.

6 Updating and Screening Assessment for 1,3-Butadiene

6.1 THE NATIONAL PERSPECTIVE

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

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 μgm^{-3} as an air quality standard for 1,3-butadiene. The objective is for the standard to be achieved by the end of 2003.

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

The First and Second Stage Review and Assessment for Chiltern District Council considered 1,3 butadiene sources and determined :

- There are no major industrial sources of 1,3 Butadiene in the area;
- Existing National policy measures are expected to deliver the national air quality objective for 1,3-butadiene by the end of 2005.

6.4 SCREENING ASSESSMENT OF 1,3-BUTADIENE

6.4.1 Screening check list

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

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

These are described in the following sections.

6.4.2 Background concentrations for 1,3-Butadiene

The average background 1,3-butadiene concentration for 2001 estimated from the UK background maps[5] was 0.19 μgm^{-3} with a maximum concentration of 0.30 μgm^{-3} in an area close the M25. The average estimated background concentration for 2003 in Chiltern District is 0.15 μgm^{-3}.

6.4.3 Screening assessment of monitoring data

No monitoring of 1,3-butadiene has been undertaken in Chiltern.

6.4.4 Screening assessment of industrial sources

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

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

Part B
Rubber processes

None of the processes identified in the District and in adjacent authorities is believed to have the potential to emit 1,3-butadiene.

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

Estimated background concentrations indicate that the objective for 1,3-butadiene is likely to be achieved by the end of 2003. There are no significant industrial sources which have the potential to emit 1,3-butadiene.

Consequently, Chiltern District Council is not required to carry out a Detailed Review and Assessment for 1,3-butadiene.

7 Updating and Screening Assessment for Lead

7.1 THE NATIONAL PERSPECTIVE

The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels (part of the Auto-Oil Programme) 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 exceedances 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 μgm^{-3} as the air quality standard for lead, with an objective for the standard to be achieved by the end of 2004. In addition, a lower air quality objective of 0.25 μgm^{-3} has also been set to be achieved by the end of 2008.

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

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

- No significant industrial sources of lead was identified and there were no planned developments of processes emitting significant amounts of lead.
- National policy measures were expected to deliver the national air quality objective for lead.

7.4 SCREENING ASSESSMENT OF LEAD

7.4.1 Source checklist

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

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

These are described in the following sections.

7.4.2 Screening assessment of monitoring data

No monitoring of lead has been undertaken in Chiltern.

Annual average data for lead in 2001 at National monitoring sites are generally below the 2004 and 2008 objectives with the exception of one monitoring station located in an industrial area (0.419 μgm^{-3} which is within the 2004 objective but higher than the 0.25 μgm^{-3} objective for the end of 2008).

7.4.3 Screening assessment of industrial sources

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

Part A (percentage of total emissions from all UK plant in this sector to the UK total in brackets)
Iron and steel (37)
Non-ferrous metals (23)
Manufacture of organic chemicals (35)

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

There is a non-ferrous foundry in the district and emissions have been reported by the operator[6]. Although emission report provides limited data, the data suggest an annual lead emission of less than 1 kg per year (excluding the roof vents for which no flow data are provided) which is not likely to give rise to significant ground level lead concentrations. **netcen** considers that it is unlikely that the plant is a significant source of lead in the district. No processes in the district or adjoining authorities are considered to be significant sources of lead.

7.5 CONCLUSIONS FOR LEAD CONCENTRATIONS IN COUNCIL AREA

Emissions of lead from industrial processes in and around Chiltern district are not likely to exceed the objectives for lead to be achieved in 2004 and 2008.

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

8 Updating and Screening Assessment for Nitrogen Dioxide

8.1 THE NATIONAL PERSPECTIVE

The principal source of NO_x emissions is road transport, which accounted for about 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 μgm^{-3}, and a 1-hour mean concentration of 200 $\mu g\ m^{-3}$ 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 dioxide in the first round review reports for Chiltern:

- Monitoring data indicated that the nitrogen dioxide concentrations were within the national air quality strategy objective concentration for nitrogen dioxide.

- Modelling of background and kerbside nitrogen dioxide concentrations indicated that the nitrogen dioxide concentrations in 2005 would remain within the objective.

A Stage three assessment for nitrogen dioxide was not considered necessary.

8.4 SCREENING ASSESSMENT OF NITROGEN DIOXIDE

8.4.1 Screening checklist

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

- Monitoring data outside an AQMA
- Monitoring data within an AQMA
- Narrow congested streets with residential properties close to the kerb
- Junctions
- Busy streets where people may spend 1-hour or more close to traffic
- Roads with high flow of buses and/or HGVs
- New roads constructed or proposed since 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.

8.4.2 Background concentrations for nitrogen dioxide

The estimated average background nitrogen dioxide concentration for 2001 was 25.2 μgm^{-3} with a maximum concentration of 35.2 μgm^{-3} near the M25 in the south-east of the district.

8.4.3 Screening assessment of monitoring data

No automatic monitoring stations are located in the district. Diffusion tube monitoring of nitrogen dioxide was undertaken at several sites in 2001. Additional monitoring sites have been introduced and monitoring suspended at some sites in recent years. None of the UK national survey sites are located within the district. Table 8.1 details the location of monitoring sites in Chiltern.

Table 8.1 Location of diffusion tube sites in Chiltern district

ID	Address	Location	x	y
1	Moor Road Chesham	Roadside	9608	0105
2	St Mary's Way Chesham	Roadside	9585	0151
3	Broad Street Chesham, bottom of White Hill	Roadside	9609	0197
4	Nashleigh Hill Chesham	Roadside	9632	0295
5	Tesco Petrol Station Old Amersham	Roadside	9605	9725
6	London Road West Amersham, bottom of Station Road	Roadside	9631	9710
7	Hill Avenue Amersham	Roadside	9635	9825
8	Sycamore Road Amersham	Roadside	9638	9856
9	Rickmansworth Road Amersham	Roadside	9655	9872
10	High Street Chalfont St Peter	Roadside	0005	9081
11	White Lion Road Amersham	Roadside	9742	9806
12	Chalfont Station Road, Nightingales Corner	Roadside	9928	9745
13	The Pheasant Chalfont St Giles	Roadside	9925	9375
14	Gore Hill Old Amersham	Roadside	9596	9694
15	Stanley Hill Amersham	Roadside	9676	9710
16	Chesham Police Station, Broad Street	Roadside	961	020
17	Chesham flats by opticians, Broad Street	Roadside	960	020
18	Chesham Jolly Sportsman Pub, end of Berkhampstead Road	Roadside	962	023
19	Chesham opposite 170 Berkhampstead Road	Roadside	961	023
20	Chesham at 305 Berkhampstead Road	Roadside	963	025
21	Chesham by 336 Berkhampstead Road	Roadside	962	025
22	Chesham opposite 5 Nashleigh Hill Chesham nr Petrol	Roadside	963	029
23	Chesham opposite St Columba Church, Berkhampstead Rd	Roadside	962	028
24	Ashley green , by speed camera, Chesham Rd	Roadside	976	051
25	Ashley green , by Bus stop/Church, Chesham Rd	Roadside	976	052
26-35	*Introduced April 2003*		-	-

The monitoring sites are all designated as 'roadside' monitoring locations. Data are available for 2002 and the first quarter of 2003 for several sites. The datasets for sites 13,14 and 15 are incomplete for 2001 as they started in December 2001. Sites 16-25 were introduced after 2001 and some of the earlier sites were discontinued.. There are no intercomparison data between diffusion tubes and continuous air quality monitors available within the district although the sites introduced in April 2003 will address this issue as they include sites colocated with an automatic air quality monitoring station in a neighbouring authority albeit at a background location. Dual tube monitoring has also been introduced at several monitoring sites in April 2003.

Bias-adjustment has been undertaken on the data using intercomparison data sourced from the National Survey. The National Survey data comprises six months data from 2002 for diffusion tubes from the same analyst and using the same preparation as used for Chiltern District Council. Intercomparison data

prior to 2002 are available from the National Survey but were undertaken on a reduced frequency. A bias adjustment factor of 0.89 has been applied to all the data based on the 2002 intercomparison information.

Guidance LAQM TG(03) provides the adjustment factor to estimate annual average concentrations in 2005 from 2001 data (0.89 for roadside locations). The equivalent factors for estimating the 2005 concentration from 2002 and 2003 data are 0.92 and 0.95 respectively.

Some of the data from 2002 and all the data from 2003 are from the first quarter only and have been adjusted to annual concentrations using factors derived from the 2001 and 2002 data (where available). Sites introduced in 2002 do not have any data for the first quarter of 2002 to provide annual adjustment factors; these sites had nine months data for 2002 and annual mean concentrations are averages for nine months only. For 2003, an annual adjustment factor was determined based on the average adjustment factor determined at the other, long-term, sites.

The annual mean concentrations determined for 2001, 2002 and 2003 and the estimated NO_2 annual mean concentrations for 2005 are shown in Tables 8.2, 8.3 and 8.5.

Table 8.2 Annual Mean Nitrogen Dioxide Concentrations µgm^{-3} (2001)

Site	NO_2 2001 measured	NO_2 2001 bias adjusted	NO_2 2005
1	24.7	21.9	19.6
2	26.1	23.2	20.7
3	29.0	25.8	23.0
4	19.4	17.3	15.4
5	26.3	23.4	20.9
6	26.0	23.1	20.6
7	23.5	20.9	18.7
8	28.1	25.0	22.3
9	22.7	20.2	18.1
10	20.3	18.1	16.1
11	24.0	21.4	19.1
12	26.0	23.1	20.6

Table 8.3 Annual Mean Nitrogen Dioxide Concentrations µgm^{-3} (2002)

Site	NO_2 2002 measured	NO_2 2002 bias adjusted	NO_2 2005
1	20.4	18.1	15.7
2	31.6	28.1	22.7
3	27.1	24.1	27.4
4	27.6	24.6	16.6
5	26.2	23.3	19.0
6	28.4	25.3	21.8
7	20.7	18.5	16.9
8	30.4	27.1	28.3
9	22.8	20.3	16.1
10	27.6	24.6	23.3
11	24.1	21.4	18.3
12	24.3	21.7	18.4
13	28.0	25.0	23.0
14	29.8	26.5	24.4
15	28.3	25.2	23.2
16	26.3	23.4	21.6
17	32.3	28.8	26.5
18	38.0	33.8	31.1
19	29.6	26.4	24.3
20	28.0	24.9	22.9
21	33.5	29.8	27.4
22	26.0	23.2	21.3
23	22.6	20.1	18.5
24	16.9	15.0	13.8
25	21.8	19.4	17.8

Table 8.4 Annual Mean Nitrogen Dioxide Concentrations µgm^{-3} (2003)

Site	NO_2 2003 measured	NO_2 2003 bias adjusted	NO_2 2005
1	-	-	-
2	38.2	34.0	31.3
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	33.4	29.7	24.8
10	31.0	27.6	26.9
11	-	-	-
12	-	-	-
13	41.8	37.2	39.0
14	39.1	34.8	34.1
15	-	-	-
16	39.0	34.7	33.0
17	36.1	32.1	30.6
18	46.5	41.4	39.4
19	35.3	31.4	30.0
20	33.7	30.0	28.6
21	33.6	29.9	28.5
22	36.1	32.1	30.6
23	27.1	24.1	22.9
24	27.0	24.0	22.9
25	33.4	29.7	28.3

None of the measuring sites indicated nitrogen dioxide concentrations in excess of 40 µgm^{-3}.

8.4.4 Screening assessment of road traffic sources

Traffic flow data were taken from the NAEI 2000 roads database and from traffic count data for roads in Chiltern for 2001 supplied by the Council (Appendix 2). For screening purposes, appropriate receptor distances based on the closest property where public exposure was likely and annual average speeds for the road were used. A traffic growth factor of 1.045 from 2001 to 2005 was used (sourced from the Department for Transport TemPro model for car driver journey growth).

Table 8.5 shows nitrogen dioxide concentrations in 2005 calculated using DMRB for major roads and motorways in the district. The DMRB screening model indicates that the 2005 annual mean objective for NO_2 is unlikely to be exceeded alongside any road in the district.

No congested 'street canyons' or roads with high flows of buses and other large vehicles were identified in the screening procedure.

Table 8.5 Estimated nitrogen dioxide concentrations near roads in Chiltern in 2005

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Total concentrations, µg m^{-3}
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	NO_2
1	1	A404	10	18876	75	A	2.93	26.7
2	2	A355	10	12849	75	A	3.16	25.7
3	3	A416	10	29408	52	A	3.30	27.7
4	4	A413	20	17157	51	A	3.79	25.6
5	5	A4128	8	10343	52	A	2.42	24.6
6	6	A416	10	12926	75	A	4.20	26.2
7	7	A413	10	18053	75	A	3.58	27.0
8	8	A413	10	21195	75	A	3.06	27.0
9	9	A413	10	28491	75	A	2.18	27.1
10	10	A404	10	16675	41	A	3.08	26.6
11	11	A413	10	21351	75	A	2.82	26.9
12	12	A416	10	20463	51	A	3.50	27.0
13	13	A404	10	13212	51	A	4.12	26.2
14	14	A404	10	17983	51	A	3.49	26.8
15	15	A416	10	17952	75	A	3.04	26.7
16	16	A355	10	18996	51	A	3.43	26.9
17	B485	B485	10	9189	75	D	4.10	24.4
18	A4154	A4154	10	13950	50	D	4.20	25.7
30	A40	A40	10	26150	75	A	4.00	28.1
49	49	M25	40	148094	110	A	13.2	34.1

8.4.5 Busy Junctions

Annual average NO_2 concentrations near busy road junctions in the district have been estimated for 2005 using DMRB (Table 8.6). Several busy junctions were identified however few have relevant exposure (that is having receptors within 10m of kerbs).

The DMRB screening model indicates that the 2005 annual mean objective for NO_2 is unlikely to be exceeded at receptors near busy road junctions (see Table 8.6).

Table 8.6 Estimated nitrogen dioxide concentrations near road junctions in Chiltern

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Annual mean concentrations, µg m^{-3}
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	NO_2
22	A413	A413	35	23380	75	D	3.60	
	A4128	A4128	50	9030	32	D	3.50	25.7
23	A413	A413	30	20622	75	D	3.60	
	B485	B485	50	9189	32	D	4.10	25.9
24	A404	A404	50	15207	50	D	4.50	
	A413	A413	75	21420	50	D	4.40	24.2
25	A355	A355	45	12334	40	D	3.80	
	A413	A413	30	18710	40	D	3.60	26.0
26	A355	A355	30	13075	32	D	3.80	
	unc	unc	20	7845	32	D	3.50	25.8
27	A355	A355	20	15923	40	D	4.00	
	A404	A404	20	17952	40	D	4.50	28.8
28	A413	A413	30	19136	32	D	4.40	
	A404	A404	30	14541	32	D	4.50	27.7
29	A404	A404	20	19929	40	D	4.50	
	A4154	A4154	40	15756	40	D	4.20	27.6
31	A416	A416	20	20679	40	D	4.20	
	A4154	A4154	30	12144	40	D	4.20	27.9
32	A416	A416	10	20980	50	D	4.40	
	unc	unc	30	4270	40	D	0.80	27.9
33	A416	A416	10	33105	40	D	4.40	
	B485	B485	25	3857	40	D	4.00	29.5
34	A416	A416	30	22506	50	D	4.40	
	B4505	B4505	10	7645	40	D	4.00	27.8
35	A416	A416	10	12283	50	D	5.40	
	unc	unc	10	1790	32	D	6.30	26.3
36	A404	A404	20	14106	50	D	4.60	
	B4442	B4442	15	4929	32	D	2.70	26.1
37	A413	A413	15	17120	50	D	3.89	
	B4442	B4442	10	8142	32	D	3.17	28.2

8.4.6 Screening assessment of industrial sources

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

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

Part B
Glass manufacture

No new industrial sources have started operating in the district since the first round round of review and assessment. There are no Part A processes in Chiltern district or in adjoining authorities reporting significant emissions of nitrogen oxides to the Environment Agency.

Several Part B processes are present in the district however these processes are not associated with glass manufacture.

8.4.7 Screening assessment of other transport sources

Bus Stations : There are no bus stations in Chiltern district.

Airports : The nearest major airport is Heathrow which is about 10 km southeast of the district and consequently not considered further.

8.5 CONCLUSIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial sources of nitrogen dioxide in Chiltern district. The DMRB screening tool indicates that nitrogen dioxide levels at sites of relevant exposure alongside the district's roads are unlikely to exceed the 2005 annual mean limit value. Furthermore, diffusion tube data also indicate that the 2005 annual mean nitrogen dioxide concentrations will be below the limit value at the measurement sites. Consequently the Council is not required to carry out a Detailed Review and Assessment for nitrogen dioxide.

9 Updating and Screening Assessment for Sulphur Dioxide

9.1 THE NATIONAL PERSPECTIVE

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for 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 μgm^{-3} as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005.

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

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

The First and Second Stage Review and Assessment report for Chiltern district concluded that :

- Emissions from low level background sources were unlikely to contribute significantly to exceedences of the target concentrations.

9.4 SCREENING ASSESSMENT OF SULPHUR DIOXIDE

9.4.1 Source checklist

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

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

These are evaluated in the following sections.

9.4.2 Background concentrations for sulphur dioxide

The estimated average background sulphur dioxide concentration for 2001 was 3.3 μgm^{-3} with a maximum concentration of 7.4 μgm^{-3}.

9.4.3 Screening assessment of monitoring data

No monitoring for SO_2 has been undertaken in the Chiltern district. National survey monitoring sites for smoke and SO_2 are located in other parts of the South East and the nearest site (Slough) gave an annual mean SO_2 concentration of 7.2 μgm^{-3} in 2001, with a maximum daily average of 18 μgm^{-3}.

9.4.4 Screening assessment of industrial sources

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

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

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

One of the Part B processes identified in the district is a brick kiln however it is not considered to be a major SO_2 emission source. It has not had a major increase in production since the first round assessment.

9.4.5 Small Boilers

A survey of small boilers was undertaken prior to the first round assessment. The size of many of the boilers is not known however, most appear to be for public, commercial or institutional heating and no boilers larger than $5MW_{th}$ were identified. The maximum SO_2 emission is unlikely to exceed the threshold emission rate of 10 tonnes/yr of the emissions toolkit nomogram. Consequently exceedence of the SO_2 objective due to small boilers is considered to be unlikely.

9.4.6 Domestic coal burning

There are no data for domestic coal burning available but NAEI activity statistics indicate that coal accounts for less than 1% of the energy used in domestic combustion in the district. Solid fuel use continues to decline throughout the area. It is considered unlikely that there are any areas with 50 houses using these fuels in a 500 m square.

9.4.7 Screening asssessment of other transport Sources

Shipping : There are no shipping movements in the district.

Railways : No locations were identified within the district where locomotives are stationary for prolonged periods.

9.5 CONCLUSIONS FOR SULPHUR DIOXIDE CONCENTRATIONS IN COUNCIL AREA

There are no significant industrial or domestic sources of sulphur dioxide in Chiltern district.

Chiltern District Council is not required to carry out a Detailed Review and Assessment for sulphur dioxide.

10 Updating and Screening Assessment for PM_{10}

10.1 THE NATIONAL PERSPECTIVE

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

10.2 STANDARD AND OBJECTIVE FOR PM_{10}

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles (PM_{10}), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 μgm^{-3} as the annual mean, and 50 μgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. In addition there is an objectives of 50 μgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 7 days per year. and 20 μgm^{-3} as the annual mean to be achieved by the end of 2010. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent.

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

The following conclusions were given for PM_{10} in the First and Second Stage Review and Assessment report for Chiltern :

- Modelled annual mean background concentrations of PM_{10} indicated ground level concentrations for Chiltern in 1996 ranging from 21-22 μgm^{-3};
- The annual mean background concentrations of PM_{10} concentrations for Chiltern in 2005 was predicted to be 17 μgm^{-3};

A third stage review and assessment was not required.

10.4 SCREENING ASSESSMENT OF PM_{10}

10.4.1 Checklist for PM_{10}

The Technical Guidance LAQM TG(03)[1] requires assessment of PM_{10} to consider the following sources, data or locations:

- Monitoring data outside an AQMA

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

These are evaluated in the following sections.

10.4.2 Background concentrations for PM_{10}

The estimated average background PM_{10} concentration for 2001 was 20.1 μgm^{-3} in Chiltern district with a maximum concentration of 21.8 μgm^{-3}. The predicted 2004 background concentration is 19.4 μgm^{-3}.

10.4.3 Screening assessment of monitoring data

No monitoring for PM_{10} has been undertaken in Chiltern.

10.4.4 Screening assessment of road traffic sources

Traffic flow data were taken from the NAEI roads database and from 2001 traffic count data provided by the Council (Appendix 2). For screening purposes, appropriate receptor distances based on the closest property where public exposure was likely and annual average speeds for the roads were used. Traffic growth factors of 1.03 to 2004 and 1.11 to 2010 were used (from Tempro for Chiltern district using 2001 as the base year).

Table 10.1 shows predicted PM_{10} annual mean concentrations and predicted annual exceedences of the 24-hour mean in 2004 and 2010 calculated using DMRB for roads and motorways in Chiltern.

The DMRB model predicts that annual mean concentration 24-hour exceedence targets will be met in 2004. In addition, the predicted number of exceedences of the daily mean concentration would be lower than the objectives in 2004 and 2010. The predicted 2010 annual mean concentration is higher than the 2010 objective concentration of 20 µg m^{-3} at locations near the M25 however, there is no relevant exposure in the district at locations near to the M25.

Table 10.1 Predicted annual mean PM_{10} concentrations alongside roads in Chiltern

Road name	Receptor distance (m)	Traffic flow & speed (2004)		Traffic composition		Annual PM_{10} concentrations, µg m^{-3}		PM_{10} 24-hour mean exceedences	
		AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	2004	2010	2004	2010
A404	10	18659	75	A	2.93	21.8	19.3	6	3
A355	10	12701	75	A	3.16	21.3	19.0	5	2
A416	10	29070	52	A	3.30	22.6	19.7	7	3
A413	20	16960	51	A	3.79	21.4	19.0	5	2
A4128	8	10224	52	A	2.42	21.0	18.8	5	2
A416	10	12777	75	A	4.20	21.5	19.1	5	2
A413	10	17846	75	A	3.58	21.9	19.3	6	3
A413	10	20952	75	A	3.06	21.9	19.4	6	3
A413	10	28164	75	A	2.18	22.0	19.5	6	3
A404	10	16484	41	A	3.08	22.2	19.5	7	3
A413	10	21106	75	A	2.82	21.9	19.3	6	3
A416	10	20228	51	A	3.50	22.2	19.5	7	3
A404	10	13060	51	A	4.12	21.7	19.2	6	3
A404	10	17776	51	A	3.49	22.1	19.4	6	3
A416	10	17746	75	A	3.04	21.8	19.3	6	3
A355	10	18778	51	A	3.43	22.1	19.4	7	3
B485	10	9084	75	D	4.10	20.6	18.6	4	2
A4154	10	13790	50	D	4.20	21.4	19.1	5	2
A40	10	25850	75	A	4.00	22.4	19.6	7	3
M25	40	146395	110	A	13.2	26.1	**21.8**	15	6

10.4.5 Busy Junctions

Annual average PM_{10} concentrations at receptors near busy road junctions in the district have been estimated for 2004 and 2010 using DMRB (Table 10.2). The DMRB-predicted exceedence statistics for receptors near junctions are summarised in Table 10.3.

The DMRB screening model indicates that the annual mean objective of 50 µgm^{-3} for PM_{10} will be met in 2004. The annual mean objective of 20 µgm^{-3} may be exceeded at relevant locations close to junctions in 2010 however, the NAEI predicted background PM_{10} concentration for Chiltern in 2010 (17.8 µgm^{-3}) is close to the objective.

The number of 24-hour mean exceedences is not predicted to exceed the 2004 and 2010 objectives at any location.

Table 10.2 Predicted annual mean PM_{10} concentrations at road junctions in Chiltern

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed (2004)		Traffic composition		Annual PM_{10} concentrations, $\mu g\ m^{-3}$	
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	2004	2010
22	A413	A413	35	23112	75	D	3.60		
22	A4128	A4128	50	8927	32	D	3.50	21.3	19.0
23	A413	A413	30	20386	75	D	3.60		
23	B485	B485	50	9084	32	D	4.10	21.4	19.1
24	A404	A404	50	15032	50	D	4.50		
24	A413	A413	75	21174	50	D	4.40	20.6	18.6
25	A355	A355	45	12193	40	D	3.80		
25	A413	A413	30	18495	40	D	3.60	21.8	19.3
26	A355	A355	30	12925	32	D	3.80		
26	unc	unc	20	7755	32	D	3.50	21.9	19.4
27	A355	A355	20	15740	40	D	4.00		
27	A404	A404	20	17747	40	D	4.50	23.4	**20.2**
28	A413	A413	30	18917	32	D	4.40		
28	A404	A404	30	14375	32	D	4.50	23.0	**20.0**
29	A404	A404	20	19701	40	D	4.50		
29	A4154	A4154	40	15575	40	D	4.20	22.7	19.8
31	A416	A416	20	20442	40	D	4.20		
31	A4154	A4154	30	12005	40	D	4.20	22.9	19.9
32	A416	A416	10	20739	50	D	4.40		
32	unc	unc	30	4221	40	D	0.80	22.6	19.8
33	A416	A416	10	32725	40	D	4.40		
33	B485	B485	25	3813	40	D	4.00	23.9	**20.5**
34	A416	A416	30	22248	50	D	4.40		
34	B4505	B4505	10	7558	40	D	4.00	22.6	19.8
35	A416	A416	10	12142	50	D	5.40		
35	unc	unc	10	1770	32	D	6.30	21.7	19.3
36	A404	A404	20	13945	50	D	4.60		
36	B4442	B4442	15	4872	32	D	2.70	21.7	19.3
37	A413	A413	15	16924	50	D	3.89		
37	B4442	B4442	10	8048	32	D	3.17	23.0	**20.1**

Table 10.3 Predicted exceedences of 24-hour mean PM_{10} concentrations at road junctions in Chiltern

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed (2004)		Traffic composition		Predicted exceedences	
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	2004	2010
22	A413	A413	35	23112	75	D	3.60		
22	A4128	A4128	50	8927	32	D	3.50	5	2
23	A413	A413	30	20386	75	D	3.60		
23	B485	B485	50	9084	32	D	4.10	5	2
24	A404	A404	50	15032	50	D	4.50		
24	A413	A413	75	21174	50	D	4.40	4	2
25	A355	A355	45	12193	40	D	3.80		
25	A413	A413	30	18495	40	D	3.60	6	3
26	A355	A355	30	12925	32	D	3.80		
26	unc	unc	20	7755	32	D	3.50	6	3
27	A355	A355	20	15740	40	D	4.00		
27	A404	A404	20	17747	40	D	4.50	9	4
28	A413	A413	30	18917	32	D	4.40		
28	A404	A404	30	14375	32	D	4.50	8	3
29	A404	A404	20	19701	40	D	4.50		
29	A4154	A4154	40	15575	40	D	4.20	8	3
31	A416	A416	20	20442	40	D	4.20		
31	A4154	A4154	30	12005	40	D	4.20	8	3
32	A416	A416	10	20739	50	D	4.40		
32	unc	unc	30	4221	40	D	0.80	7	3
33	A416	A416	10	32725	40	D	4.40		
33	B485	B485	25	3813	40	D	4.00	10	4
34	A416	A416	30	22248	50	D	4.40		
34	B4505	B4505	10	7558	40	D	4.00	7	3
35	A416	A416	10	12142	50	D	5.40		
35	unc	unc	10	1770	32	D	6.30	6	3
36	A404	A404	20	13945	50	D	4.60		
36	B4442	B4442	15	4872	32	D	2.70	6	3
37	A413	A413	15	16924	50	D	3.89		
37	B4442	B4442	10	8048	32	D	3.17	8	4

10.4.6 screening assessment of industrial sources

The Guidance LAQM TG(03)[1] lists the following processes as significant potential sources of PM_{10}:

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

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

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

There are no Part A processes in the district and no new industrial sources have been identified.

Of the Part B processes listed in Appendix 3, several are potential sources of PM_{10} according to the process classifications. However, **netcen** considers that the processes in Chiltern are unlikely to be significant (<0.5 tonnes PM_{10} per year) and have not had a major increase in production or throughput.

10.4.7 Quarries and landfill sites

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

10.4.8 Domestic solid fuel burning

The NAEI mapped fuel use activity statistics suggests that domestic solid fuel combustion is a small (<1%) part of the domestic energy use in the district. There are no data for domestic coal burning available for the district 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.

10.4.9 Screening assessment of other transport sources

There are no airports in Chiltern district.

10.5 CONCLUSIONS FOR PM_{10} CONCENTRATIONS IN COUNCIL AREA

The DMRB screening model indicates that the annual mean objective of 40 μgm^{-3} for PM_{10} will be met in 2004 and the number of 24-hour mean exceedences is likely to be lower than 35 at receptors near road junctions. Chiltern District Council does not require to undertake a detailed assessment for PM_{10}.

The 2010 annual mean may exceed 20 μgm^{-3} at relevant locations in 2010 due, in part, to the background contribution predicted by the NAEI for PM_{10} being very near the objective.

11 Conclusions

11.1 CARBON MONOXIDE

Although there is no monitoring data for carbon monoxide within Chiltern district, it is unlikely that ambient concentrations are above the objective. There are no roads in the district with relevant exposure which can be classified as 'very busy' according to the criteria in the guidance. Consequently, Chiltern District Council is not required to carry out a Detailed Review and Assessment for carbon monoxide.

11.2 BENZENE

There are no roads in Chiltern which can be classified as 'very busy' according to the criteria in the guidance. There are no petrol stations with a throughput greater than 2 million litres. and with relevant exposure within 10m of the pumps. Chiltern District Council is not required to carry out a Detailed Review and Assessment for benzene.

11.3 1,3-BUTADIENE

Estimated background concentrations indicate that the objective for 1,3-butadiene is likely to be achieved by the end of 2003. There are no significant industrial sources which have the potential to emit 1,3-butadiene. Consequently, Chiltern District Council is not required to carry out a Detailed Review and Assessment for 1,3-butadiene.

11.4 LEAD

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

11.5 NITROGEN DIOXIDE

There are no significant industrial sources of nitrogen dioxide in Chiltern district. The DMRB screening tool indicates that nitrogen dioxide levels at sites of relevant exposure alongside the district's roads are unlikely to exceed the 2005 annual mean limit value. Furthermore, diffusion tube data also indicate that the 2005 annual mean nitrogen dioxide concentrations will be below the limit value at the measurement sites. Consequently Chiltern District Council is not required to carry out a Detailed Review and Assessment for nitrogen dioxide.

11.6 SULPHUR DIOXIDE

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

11.7 PM_{10}

The DMRB screening model indicates that the annual mean objective of 40 μgm^{-3} for PM_{10} will be met in 2004 and the number of 24-hour mean exceedences is likely to be lower than 35 at receptors near road junctions. Chiltern District Council does not require to undertake a detailed assessment for PM_{10}.

The 2010 annual mean may exceed 20 μgm^{-3} at relevant locations in 2010 due, in part, to the background contribution predicted by the NAEI for PM_{10} being very near the objective.

11.8 SUMMARY AND RECOMMENDATIONS

Chiltern District Council is not required to undertake a detailed review and assessment for any Air Quality Strategy pollutants.

12 References

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

2. The Air Quality regulations (2000) and The Air Quality (England) Amendment Regulations 2002.

3. DETR (2000) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Department of the Environment, Transport and the Regions. Cm 4548, SE 2000/3, NIA 7.

4. Air Quality Review and Assessment, Stage one and stage two. 1999, AEA Technology plc, Report AEAT-5334/20615014 Issue 2

5. Maps of Estimated Ambient Air Pollution in 2001 and Projections for Other Years. http://www.airquality.co.uk/archive/laqm/tools.php

6. Report on atmospheric monitoring for Draycast foundries Ltd, Chesham. 2002. Evans Environmental Chemistry Report 1608a.

7. Design Manual For Roads and Bridges, Highways Agency, 2003

8. EA (1998b) Guidance for estimating the air quality impact of stationary sources. Guidance Note 24. Environment Agency

Appendices

CONTENTS

Appendix 1
Detailed Monitoring data

CONTENTS

Table A1.2 Annual average NO_2 concentrations (2001)

Site	January	February	March	April	May	June	July	August	September	October	November	December
1	26.89	24.9	33.64	20.86	16.96	11.77	28.99	19.91	24.33	26.11	34.99	26.5
2	30.24	30.68	35.94	23.31	22.22	17.16	14.2	29.83	23.14	28.48	29.57	28.27
3	23.33	23.73	29.49	21.47	30.4	29.91	20.71	32.19	32.64	27.3	39.87	36.87
4	24.64	27.78	33.64	9.82	5.26	12.76	14.79	20.36	17.21	20.77	25.54	20.16
5	34.81	31.74	29.92	27.65	15.81	16.65	19.47	18.98	22.55	39.16	36.78	21.89
6	30.33	na	29.92	25.19	11.71	25.47	30.08	28	24.92	13.65	34.09	32.26
7	na	30.11	21.25	na	na	15.2	15.95	19.88	31.45	33.23	21.98	22.47
8	20.18	31.76	28.64	27.61	29.86	18.63	19.49	35.98	27.89	44.5	33.64	19.01
9	29.71	24.25	31.87	22.09	14.05	20.59	14.18	17.04	24.33	na	31.88	20.16
10	14.03	24.96	25.35	14.72	17.49	16.22	16.52	19.91	23.73	23.11	28.71	19.01
11	27.47	27.83	29.07	21.44	15.18	16.71	na	15.64	25.52	33.82	30.5	21.31
12	33.63	26.69	31.34	13.5	22.77	20.15	21.79	22.75	23.73	35.6	35.05	24.77
13	na	na	na	na	na	na	na	na	na	na	na	na
14	na	na	na	na	na	na	na	na	na	na	na	28.8
15	na	na	na	na	na	na	na	na	na	na	na	16.13

Notes :
1. All concentrations are µg m^{-3} expressed as NO_2 .
2. 'na' denotes no data.

Table A1.2 Annual average NO_2 concentrations (2002)

Site	January	February	March	April	May	June	July	August	September	October	November	December
1	28.57	17.43	15.14	na	na	na	na	na	na	na	na	na
2	36.07	18.06	29.36	27.95	na	11.4	67.12	na	28.38	25.44	33.1	38.92
3	28.57	28.02	24.74	na	na	na	na	na	na	na	na	na
4	37.15	18.06	na	na	na	na	na	na	na	na	na	na
5	39.36	18.05	21.09	na	na	na	na	na	na	na	na	na
6	29.65	28.04	27.5	na	na	na	na	na	na	na	na	na
7	28.53	18.07	15.62	na	na	na	na	na	na	na	na	na
8	37.74	26.79	26.66	na	na	na	na	na	na	na	na	na
9	29.65	21.18	19.78	11.69	12.16	14.11	13.29	15.15	27.35	36.58	36.99	35.8
10	35.04	17.43	22.06	17.27	19.11	14.75	52.12	16.06	36.44	28.87	34.55	37.37
11	31.81	19.3	21.12	na	na	na	na	na	na	na	na	na
12	31.81	20.55	20.68	na	na	na	na	na	na	na	na	na
13	35.04	na	15.62	18.39	11.29	na	33.54	11.47	45.33	34.78	36.01	38.93
14	35.58	19.28	31.63	13.93	18.67	16.58	32.3	16.98	44.48	42.47	41.86	44.11
15	36.12	23.68	25.21	na	na	na	na	na	na	na	na	na
16	na	na	na	22.95	0.87	22.67	18.46	26.63	44.39	18.91	36.52	45.66
17	na	na	na	28.57	19.98	na	36.7	20.2	49.65	18.92	46.26	38.4
18	na	na	na	31.91	24.32	36.74	21.23	22.95	66.86	na	50.63	49.3
19	na	na	na	15.11	24.75	21.43	17.21	21.58	68.18	41.41	34.57	22.31
20	na	na	na	21.28	11.72	25.7	30.44	17.44	43.83	28.4	37.01	35.8
21	na	na	na	15.13	28.23	36.71	24.69	24.79	51.66	43.21	41.4	35.29
22	na	na	na	18.49	18.67	14.08	14.92	12.86	62.21	21.91	37.5	33.73
23	na	na	na	17.94	22.15	19.58	na	18.83	25.14	19.54	na	34.76
24	na	na	na	10.11	9.12	8.56	18.4	17.74	25.19	14.2	23.85	24.91
25	na	na	na	11.78	13.03	7.95	na	20.66	46.38	18.92	25.81	29.58

Notes :
1. All concentrations are µg m^{-3} expressed as NO_2 .
2. 'na' denotes no data.

Table A1.3 Annual average NO_2 concentrations (2003)

Site	January	February	March
1	na	na	na
2	36.52	40.15	38.01
3	na	na	na
4	na	na	na
5	na	na	na
6	na	na	na
7	na	na	na
8	na	na	na
9	29.01	45.63	25.49
10	24.5	38.98	29.63
11	na	na	na
12	na	na	na
13	na	44.44	39.11
14	33.01	48.68	35.56
15	na	na	na
16	32.01	50.49	34.38
17	33.01	na	39.13
18	30.51	62.04	46.84
19	35.51	45.01	25.49
20	29.5	39.54	32.01
21	30.01	31.63	39.12
22	26.51	49.84	32.01
23	24.5	37.72	18.96
24	22.51	35.89	22.52
25	20	48.24	32

Notes :
1. All concentrations are µg m^{-3} expressed as NO_2 .
2. 'na' denotes no data.

Appendix 2
Detailed Traffic Flow Data

CONTENTS

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

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

A 2.2a Traffic Flow Data from the NAEI Data Warehouse

Explanation of the data fields:

Rd_no	Number of the road
x	Grid reference Easting
y	Grid reference Northing
All_vehicles	AADF Total
CAR	AADF Cars
BUS	AADF Buses
LGV	AADF Light Goods Vehicles
HGV	AADF HGVs
Moto	AADF Motorcycles
MB	Built-up motorway
MN	Non built-up motorway
PB	Built-up primary road

A 2.2b Traffic Flow Data from the NAEI Data Warehouse

Rd_no	x	y	All_vehicles	CAR	BUS	LGV	HGVr	Moto
A404	490010	196066	17876	15657	94	1560	321	135
A355	496569	197057	12168	10916	175	815	168	53
A416	496007	201930	27850	23770	250	3012	607	150
A413	500450	190000	16248	14037	179	1247	402	348
A4128	487300	200000	9795	8594	85	907	147	57
A416	497524	205000	12241	10232	76	1384	333	111
A413	496740	196960	17097	14499	31	1821	459	165
A413	490000	200892	20072	17645	89	1576	421	236
A413	495600	196850	26982	23432	123	2637	382	324
A404	500000	197700	15792	13785	85	1422	320	99
A413	500000	191700	20220	17851	159	1581	384	218
A416	495940	200000	19379	16705	229	1818	382	177
A404	497000	198380	12512	10792	170	1127	290	77
A404	497000	197150	17030	14813	188	1493	336	130
A416	496330	198000	17001	14912	215	1390	227	182
A355	496050	197100	17990	15703	176	1554	405	116

Table A2.3 Traffic Flow Data supplied for roads in district by Chiltern District Council

Road No	Description	AADT, 2001
A404	Chenies	14128
A416	Ashley Green	13066
A355	Gore Hill, Amersham	18166
A413	Pipers wood, Amersham	21136
A413	Chalfont St Giles	19215
A416	St Mary's way, Chesham	35431
A404	Whieldon lane, Amersham	16795
B474	Knotty Green	10127
A404	White lion rd, Little Chalfont	21187
		AADT, 2002 (12 hour)
	Junction A413 and B485, Great Missenden	
B485	Frith Hill	8165
A413	London side	15873
A413	Aylesbury side	20774
	Junction A413, B4442 and MC36, Chalfont St Giles	
A413	Amersham side	14409
B4442	Vache lane	6813
A413	London side	16016
MC36	Chalfont St Giles side	7656
	Junction Chesham road, Hog lane and Two dells road, Ashley Green	
A416	Chesham side	10006
UNC	Hog Lane side	943
A416	Berkhamstead side	11821
MC6	Two Dells Ln side	2238
	Junction St Mary's way and Church st, Chesham	
A416	Berkhampstead side	29547
UNC	Market Square side	452
A416	Amersham side	29283
B485	Church Street side	6402
	Junction Amersham road with Amy lane and Moor road, Chesham	
UNC	Amy Lane side	2869
A416	Chesham side	19997
UNC	Moor Road side	4720
A416	Amersham side	17286
	Junction Chesham road with Rickmansworth road, Amersham	
A416	Chesham side	21067
A4154	Rickmansworth side	10791
A416	Amersham side	15680
	Junction of Wheedon Hill, Fullers hill and Copperkins lane, Hyde Heath	
MC43	Chesham side	1794
MC44	Copperkins Lane side	3474
MC43	Hyde Heath side	4152
	Junction of Martinsend lane with Broombarn and Green lanes, Prestwood	
UNC	Broombarn Lane side	293
A4128	Gt.Missenden side	8024
UNC	Green Lane side	1992
A4128	Prestwood side	6483
	Junction of Lye Green with Lycrome road, Chesham	
UNC	Lycrome Road side	2718
B4505	Bovingdon side	5955
B4505	Chesham side	6793
	Junction of Amersham road with Stony lane and Church Grove,	

Table A2.3 Traffic Flow Data supplied for roads in district by Chiltern District Council

Road No	Description	AADT, 2001
	Little Chalfont	
A404	Amersham side	12728
MC34	Stony Lane side	1946
A404	Watford side	12342
MC34	Church Grove side	1354
	Junction of Stanley hill with White lion road and Woodside road	
A404	Lt Chalfont side	19432
A404	Amersham side	15984
A4154	Woodside Rd	14000
	Junction of London road with Station road, Amersham	
A416	Station Road side	17612
A355	London side	11592
A355	Aylesbury side	20328
	Junction Amersham bypass and Whieldon lane, Amersham	
A413	London side	23925
A404	High Wycombe side	13513
A413	Aylesbury side	14144
	Junction Amersham bypass with London road and Stanley Hill, Amersham	
A355	Amersham side	10961
A404	Stanley Hill	14883
A413	London side	17384
A413	Amersham side	16626
	Junction Amersham road and South Park, Amersham	
A413	Denham side	16884
UNC	South Park side	1252
A413	Amersham side	17856
	Junction Hazlemere road, Elm road, New road and Penn Bottom, Tylers Green	
B474	Hazlemere side	1204
UNC	Penn Bottom side	78
B474	Penn side	317
C111	New Road side	179

Note:

1. Data for junctions are from short-term surveys and represent 12 hour averages. Data were converted to 16-hour averages and then 24-hour AADT figures using factors provided by Chiltern District Council. The 2002 AADT figures were converted to 2001 data using factors for traffic growth in Chiltern from the Dept. for Transport Tempro model.

Table A2.4 Summary of DMRB screening tool links

Receptor	Link No	Road Number	Description
1	1	A404	Generalised receptor location along road based on NAEI census point
2	2	A355	Generalised receptor location along road based on NAEI census point
3	3	A416	Generalised receptor location along road based on NAEI census point
4	4	A413	Generalised receptor location along road based on NAEI census point
5	5	A4128	Generalised receptor location along road based on NAEI census point
6	6	A416	Generalised receptor location along road based on NAEI census point
7	7	A413	Generalised receptor location along road based on NAEI census point
8	8	A413	Generalised receptor location along road based on NAEI census point
9	9	A413	Generalised receptor location along road based on NAEI census point
10	10	A404	Generalised receptor location along road based on NAEI census point
11	11	A413	Generalised receptor location along road based on NAEI census point
12	12	A416	Generalised receptor location along road based on NAEI census point
13	13	A404	Generalised receptor location along road based on NAEI census point
14	14	A404	Generalised receptor location along road based on NAEI census point
15	15	A416	Generalised receptor location along road based on NAEI census point
16	16	A355	Generalised receptor location along road based on NAEI census point
17	17	B485	Generalised receptor location along road based on NAEI census point
18	18	A4154	Generalised receptor location along road based on NAEI census point
19	19	B474	Generalised receptor location along road
20	20	B4442	Generalised receptor location along road
21	21	B416	Generalised receptor location along road
30	30	A40	Generalised receptor location along road
49	49	M25	Generalised receptor location along road based on NAEI census point
22	A413	A413	
22	A4128	A4128	Junction of A413 and A4128 at Great Missenden
23	A413	A413	
23	B485	B485	Junction of A413 and B485 at Great Missenden
24	A404	A404	
24	A413	A413	Junction of A413 and A404 at Amersham
25	A355	A355	
25	A413	A413	Junction of A413/A404 and A355 at Amersham
26	A355	A355	
26	unc	unc	Junction of A355 and Broadway/London Rd, Amersham
27	A355	A355	
27	A404	A404	Junction of A355 and A416 (Station road), Amersham
28	A413	A413	
28	A404	A404	Junction of A413 and A404 (Stanley Hill), Amersham
29	A404	A404	
29	A4154	A4154	Junction of A404 (Stanley Hill) and A4154 (Woodside road). Amersham
31	A416	A416	
31	A4154	A4154	Junction of A416 and A4154 (Rickmansworth rd), Amersham
32	A416	A416	
32	unc	unc	Junction of A416 and Amy lane, Chesham
33	A416	A416	
33	B485	B485	Junction of A416 and B485 (Church st), Chesham
34	A416	A416	
34	B4505	B4505	Junction of A416 and B4505, Chesham
35	A416	A416	
35	unc	unc	Junction A416 and Hog lane, Ashley Green

Table A2.4 Summary of DMRB screening tool links

Receptor	Link No	Road Number	Description
36	A404	A404	
36	B4442	B4442	Junction A404 and B4442, Little Chalfont
37	A413	A413	
37	B4442	B4442	Junction A413 and B4442 (Vache lane), Chalfont St Giles

Table A2.5 DMRB Screening tool output for 2001

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10} exceedences
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
1	1	A404	10	18046	75	A	2.93	0.31	0.453	0.184	38.8	24	20	0.46	0.62	0.33	71.8	31.8	23.1	8
2	2	A355	10	12284	75	A	3.16	0.31	0.453	0.184	38.8	24	20	0.42	0.57	0.29	64.5	30.3	22.4	7
3	3	A416	10	28115	52	A	3.30	0.31	0.453	0.184	38.8	24	20	0.53	0.82	0.51	76.2	32.7	24.2	11
4	4	A413	20	16402	51	A	3.79	0.31	0.453	0.184	38.8	24	20	0.45	0.61	0.33	62.9	29.9	22.7	8
5	5	A4128	8	9888	52	A	2.42	0.31	0.453	0.184	38.8	24	20	0.43	0.59	0.30	57.1	28.6	22.1	6
6	6	A416	10	12357	75	A	4.20	0.31	0.453	0.184	38.8	24	20	0.42	0.57	0.30	67.1	30.9	22.6	7
7	7	A413	10	17259	75	A	3.58	0.31	0.453	0.184	38.8	24	20	0.45	0.61	0.33	73.3	32.1	23.2	8
8	8	A413	10	20263	75	A	3.06	0.31	0.453	0.184	38.8	24	20	0.46	0.64	0.35	73.8	32.3	23.3	9
9	9	A413	10	27238	75	A	2.18	0.31	0.453	0.184	38.8	24	20	0.48	0.71	0.40	74.9	32.5	23.4	9
10	10	A404	10	15942	41	A	3.08	0.31	0.453	0.184	38.8	24	20	0.53	0.70	0.40	68.3	31.1	23.7	10
11	11	A413	10	20412	75	A	2.82	0.31	0.453	0.184	38.8	24	20	0.46	0.65	0.35	73.1	32.1	23.2	8
12	12	A416	10	19563	51	A	3.50	0.31	0.453	0.184	38.8	24	20	0.50	0.71	0.41	71.9	31.9	23.7	10
13	13	A404	10	12631	51	A	4.12	0.31	0.453	0.184	38.8	24	20	0.46	0.62	0.34	65.5	30.5	23.0	8
14	14	A404	10	17192	51	A	3.49	0.31	0.453	0.184	38.8	24	20	0.49	0.68	0.39	70.2	31.5	23.5	9
15	15	A416	10	17163	75	A	3.04	0.31	0.453	0.184	38.8	24	20	0.45	0.61	0.33	71.5	31.8	23.0	8
16	16	A355	10	18161	51	A	3.43	0.31	0.453	0.184	38.8	24	20	0.50	0.69	0.40	70.7	31.6	23.6	9
17	B485	B485	10	8785	75	D	4.10	0.31	0.453	0.184	38.8	24	20	0.39	0.53	0.26	56.4	28.5	21.6	6
18	A4154	A4154	10	13337	50	D	4.20	0.31	0.453	0.184	38.8	24	20	0.46	0.63	0.33	63.3	30.0	22.7	8
19	B474	#N/A	8	1295	50	D	4.50	0.31	0.453	0.184	38.8	24	20	0.33	0.47	0.20	41.4	24.7	20.3	4
20	B4442	#N/A	8	7330	50	D	3.20	0.31	0.453	0.184	38.8	24	20	0.40	0.55	0.27	51.9	27.4	21.5	5
21	B416	#N/A	8	5000	50	D	3.50	0.31	0.453	0.184	38.8	24	20	0.37	0.52	0.24	48.0	26.4	21.0	5
22	A413	#N/A	35	22352	75	D	3.60	0.31	0.453	0.184	38.8	24	20							
22	A4128	#N/A	50	8633	32	D	3.50	0.31	0.453	0.184	38.8	24	20	0.46	0.62	0.32	64.8	30.4	22.6	7
23	A413	#N/A	30	19716	75	D	3.60	0.31	0.453	0.184	38.8	24	20							
23	B485	#N/A	50	8785	32	D	4.10	0.31	0.453	0.184	38.8	24	20	0.46	0.62	0.33	66.3	30.7	22.8	8
24	A404	#N/A	50	14538	50	D	4.50	0.31	0.453	0.184	38.8	24	20							
24	A413	#N/A	75	20478	50	D	4.40	0.31	0.453	0.184	38.8	24	20	0.41	0.57	0.29	54.8	28.1	21.8	6
25	A355	#N/A	45	11792	40	D	3.80	0.31	0.453	0.184	38.8	24	20							
25	A413	#N/A	30	17887	40	D	3.60	0.31	0.453	0.184	38.8	24	20	0.52	0.69	0.38	65.1	30.4	23.3	9
26	A355	#N/A	30	12500	32	D	3.80	0.31	0.453	0.184	38.8	24	20							
26	unc	#N/A	20	7500	32	D	3.50	0.31	0.453	0.184	38.8	24	20	0.54	0.70	0.39	62.7	29.9	23.4	9
27	A355	#N/A	20	15223	40	D	4.00	0.31	0.453	0.184	38.8	24	20							
27	A404	#N/A	20	17163	40	D	4.50	0.31	0.453	0.184	38.8	24	20	0.64	0.83	0.51	82.5	34.0	25.4	13
28	A413	#N/A	30	18295	32	D	4.40	0.31	0.453	0.184	38.8	24	20							
28	A404	#N/A	30	13902	32	D	4.50	0.31	0.453	0.184	38.8	24	20	0.62	0.81	0.49	74.3	32.3	24.9	12
29	A404	#N/A	20	19053	40	D	4.50	0.31	0.453	0.184	38.8	24	20							

Table A2.5 DMRB Screening tool output for 2001

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10}
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	exceedences
29	A4154	#N/A	40	15063	40	D	4.20	0.31	0.453	0.184	38.8	24	20	0.58	0.78	0.47	75.0	32.5	24.5	11
30	A40	#N/A	10	25000	75	A	4.00	0.31	0.453	0.184	38.8	24	20	0.48	0.69	0.41	80.2	33.5	23.8	10
31	A416	#N/A	20	19770	40	D	4.20	0.31	0.453	0.184	38.8	24	20							
31	A4154	#N/A	30	11610	40	D	4.20	0.31	0.453	0.184	38.8	24	20	0.59	0.79	0.47	76.8	32.9	24.7	12
32	A416	#N/A	10	20058	50	D	4.40	0.31	0.453	0.184	38.8	24	20							
32	unc	#N/A	30	4083	40	D	0.80	0.31	0.453	0.184	38.8	24	20	0.56	0.75	0.44	77.8	33.0	24.3	11
33	A416	#N/A	10	31649	40	D	4.40	0.31	0.453	0.184	38.8	24	20							
33	B485	#N/A	25	3688	40	D	4.00	0.31	0.453	0.184	38.8	24	20	0.67	0.98	0.64	87.5	34.9	26.0	15
34	A416	#N/A	30	21516	50	D	4.40	0.31	0.453	0.184	38.8	24	20							
34	B4505	#N/A	10	7309	40	D	4.00	0.31	0.453	0.184	38.8	24	20	0.56	0.73	0.42	75.5	32.6	24.2	11
35	A416	#N/A	10	11743	50	D	5.40	0.31	0.453	0.184	38.8	24	20							
35	unc	#N/A	10	1712	32	D	6.30	0.31	0.453	0.184	38.8	24	20	0.47	0.64	0.35	66.3	30.7	23.1	8
36	A404	#N/A	20	13486	50	D	4.60	0.31	0.453	0.184	38.8	24	20							
36	B4442	#N/A	15	4712	32	D	2.70	0.31	0.453	0.184	38.8	24	20	0.50	0.66	0.36	65.0	30.4	23.1	8
37	A413	#N/A	15	16368	50	D	3.89	0.31	0.453	0.184	38.8	24	20							
37	B4442	#N/A	10	7784	32	D	3.17	0.31	0.453	0.184	38.8	24	20	0.61	0.79	0.46	78.1	33.1	24.8	12
49	49	M25	40	141581	110	A	13.2	0.31	0.453	0.184	38.8	24	20	0.53	0.99	1.06	119.6	40.4	28.0	21

Table A2.6 DMRB Screening tool output for 2004

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10}
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	exceedences
1	1	A404	10	18659	75	A	2.93	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.48	0.23	58.1	28.1	21.8	6
2	2	A355	10	12701	75	A	3.16	0.26	0.38	0.146	34.8	22.2	19.3	0.32	0.45	0.21	53.4	27.0	21.3	5
3	3	A416	10	29070	52	A	3.30	0.26	0.38	0.146	34.8	22.2	19.3	0.39	0.59	0.33	62.5	29.1	22.6	7
4	4	A413	20	16960	51	A	3.79	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.47	0.23	52.7	26.9	21.4	5
5	5	A4128	8	10224	52	A	2.42	0.26	0.38	0.146	34.8	22.2	19.3	0.33	0.46	0.21	48.4	25.9	21.0	5
6	6	A416	10	12777	75	A	4.20	0.26	0.38	0.146	34.8	22.2	19.3	0.33	0.45	0.21	55.6	27.6	21.5	5
7	7	A413	10	17846	75	A	3.58	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.47	0.24	59.4	28.4	21.9	6
8	8	A413	10	20952	75	A	3.06	0.26	0.38	0.146	34.8	22.2	19.3	0.35	0.49	0.25	59.6	28.5	21.9	6
9	9	A413	10	28164	75	A	2.18	0.26	0.38	0.146	34.8	22.2	19.3	0.36	0.53	0.27	60.0	28.5	22.0	6
10	10	A404	10	16484	41	A	3.08	0.26	0.38	0.146	34.8	22.2	19.3	0.38	0.52	0.27	57.0	27.9	22.2	7
11	11	A413	10	21106	75	A	2.82	0.26	0.38	0.146	34.8	22.2	19.3	0.35	0.49	0.24	59.0	28.3	21.9	6
12	12	A416	10	20228	51	A	3.50	0.26	0.38	0.146	34.8	22.2	19.3	0.37	0.53	0.28	59.4	28.4	22.2	7
13	13	A404	10	13060	51	A	4.12	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.47	0.24	55.2	27.5	21.7	6
14	14	A404	10	17776	51	A	3.49	0.26	0.38	0.146	34.8	22.2	19.3	0.36	0.51	0.26	58.1	28.1	22.1	6
15	15	A416	10	17746	75	A	3.04	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.47	0.23	58.0	28.1	21.8	6
16	16	A355	10	18778	51	A	3.43	0.26	0.38	0.146	34.8	22.2	19.3	0.37	0.51	0.27	58.4	28.2	22.1	7
17	B485	B485	10	9084	75	D	4.10	0.26	0.38	0.146	34.8	22.2	19.3	0.30	0.43	0.19	47.5	25.6	20.6	4
18	A4154	A4154	10	13790	50	D	4.20	0.26	0.38	0.146	34.8	22.2	19.3	0.35	0.48	0.23	53.2	27.0	21.4	5
19	B474	#N/A	8	1339	50	D	4.50	0.26	0.38	0.146	34.8	22.2	19.3	0.27	0.39	0.15	36.7	22.8	19.5	3
20	B4442	#N/A	8	7579	50	D	3.20	0.26	0.38	0.146	34.8	22.2	19.3	0.31	0.44	0.19	44.5	24.9	20.4	4
21	B416	#N/A	8	5170	50	D	3.50	0.26	0.38	0.146	34.8	22.2	19.3	0.29	0.42	0.18	41.6	24.1	20.1	4
22	A413	#N/A	35	23112	75	D	3.60	0.26	0.38	0.146	34.8	22.2	19.3							
22	A4128	#N/A	50	8927	32	D	3.50	0.26	0.38	0.146	34.8	22.2	19.3	0.34	0.47	0.22	53.4	27.0	21.3	5
23	A413	#N/A	30	20386	75	D	3.60	0.26	0.38	0.146	34.8	22.2	19.3							
23	B485	#N/A	50	9084	32	D	4.10	0.26	0.38	0.146	34.8	22.2	19.3	0.35	0.48	0.23	54.5	27.3	21.4	5
24	A404	#N/A	50	15032	50	D	4.50	0.26	0.38	0.146	34.8	22.2	19.3							
24	A413	#N/A	75	21174	50	D	4.40	0.26	0.38	0.146	34.8	22.2	19.3	0.31	0.45	0.20	46.6	25.4	20.6	4
25	A355	#N/A	45	12193	40	D	3.80	0.26	0.38	0.146	34.8	22.2	19.3							
25	A413	#N/A	30	18495	40	D	3.60	0.26	0.38	0.146	34.8	22.2	19.3	0.38	0.51	0.25	54.5	27.3	21.8	6
26	A355	#N/A	30	12925	32	D	3.80	0.26	0.38	0.146	34.8	22.2	19.3							
26	unc	#N/A	20	7755	32	D	3.50	0.26	0.38	0.146	34.8	22.2	19.3	0.39	0.52	0.26	53.4	27.1	21.9	6
27	A355	#N/A	20	15740	40	D	4.00	0.26	0.38	0.146	34.8	22.2	19.3							
27	A404	#N/A	20	17747	40	D	4.50	0.26	0.38	0.146	34.8	22.2	19.3	0.44	0.60	0.33	67.7	30.2	23.4	9
28	A413	#N/A	30	18917	32	D	4.40	0.26	0.38	0.146	34.8	22.2	19.3							

Table A2.6 DMRB Screening tool output for 2004

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10} exceedences
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
28	A404	#N/A	30	14375	32	D	4.50	0.26	0.38	0.146	34.8	22.2	19.3	0.44	0.58	0.32	62.2	29.0	23.0	8
29	A404	#N/A	20	19701	40	D	4.50	0.26	0.38	0.146	34.8	22.2	19.3							
29	A4154	#N/A	40	15575	40	D	4.20	0.26	0.38	0.146	34.8	22.2	19.3	0.41	0.57	0.30	62.1	29.0	22.7	8
30	A40	#N/A	10	25850	75	A	4.00	0.26	0.38	0.146	34.8	22.2	19.3	0.36	0.52	0.28	64.6	29.6	22.4	7
31	A416	#N/A	20	20442	40	D	4.20	0.26	0.38	0.146	34.8	22.2	19.3							
31	A4154	#N/A	30	12005	40	D	4.20	0.26	0.38	0.146	34.8	22.2	19.3	0.42	0.57	0.30	63.4	29.3	22.9	8
32	A416	#N/A	10	20739	50	D	4.40	0.26	0.38	0.146	34.8	22.2	19.3							
32	unc	#N/A	30	4221	40	D	0.80	0.26	0.38	0.146	34.8	22.2	19.3	0.40	0.55	0.29	63.5	29.3	22.6	7
33	A416	#N/A	10	32725	40	D	4.40	0.26	0.38	0.146	34.8	22.2	19.3							
33	B485	#N/A	25	3813	40	D	4.00	0.26	0.38	0.146	34.8	22.2	19.3	0.46	0.68	0.40	71.5	31.0	23.9	10
34	A416	#N/A	30	22248	50	D	4.40	0.26	0.38	0.146	34.8	22.2	19.3							
34	B4505	#N/A	10	7558	40	D	4.00	0.26	0.38	0.146	34.8	22.2	19.3	0.40	0.54	0.28	62.6	29.1	22.6	7
35	A416	#N/A	10	12142	50	D	5.40	0.26	0.38	0.146	34.8	22.2	19.3							
35	unc	#N/A	10	1770	32	D	6.30	0.26	0.38	0.146	34.8	22.2	19.3	0.35	0.48	0.24	55.9	27.6	21.7	6
36	A404	#N/A	20	13945	50	D	4.60	0.26	0.38	0.146	34.8	22.2	19.3							
36	B4442	#N/A	15	4872	32	D	2.70	0.26	0.38	0.146	34.8	22.2	19.3	0.37	0.50	0.24	54.7	27.4	21.7	6
37	A413	#N/A	15	16924	50	D	3.89	0.26	0.38	0.146	34.8	22.2	19.3							
37	B4442	#N/A	10	8048	32	D	3.17	0.26	0.38	0.146	34.8	22.2	19.3	0.43	0.57	0.30	64.5	29.5	23.0	8
49	49	M25	40	146395	110	A	13.2	0.26	0.38	0.146	34.8	22.2	19.3	0.38	0.71	0.77	96.9	35.7	26.1	15

Table A2.7 DMRB Screening tool output for 2005

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10}
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	exceedences
1	1	A404	10	18876	75	A	2.93	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.45	0.22	53.9	26.7	21.5	5
2	2	A355	10	12849	75	A	3.16	0.26	0.36	0.146	32.4	21.2	19.1	0.32	0.42	0.20	49.6	25.7	21.0	5
3	3	A416	10	29408	52	A	3.30	0.26	0.36	0.146	32.4	21.2	19.1	0.37	0.54	0.31	58.2	27.7	22.2	7
4	4	A413	20	17157	51	A	3.79	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.44	0.22	49.1	25.6	21.1	5
5	5	A4128	8	10343	52	A	2.42	0.26	0.36	0.146	32.4	21.2	19.1	0.32	0.43	0.20	45.1	24.6	20.7	4
6	6	A416	10	12926	75	A	4.20	0.26	0.36	0.146	32.4	21.2	19.1	0.32	0.42	0.21	51.8	26.2	21.2	5
7	7	A413	10	18053	75	A	3.58	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.44	0.23	55.1	27.0	21.6	6
8	8	A413	10	21195	75	A	3.06	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.46	0.23	55.2	27.0	21.6	6
9	9	A413	10	28491	75	A	2.18	0.26	0.36	0.146	32.4	21.2	19.1	0.35	0.49	0.25	55.4	27.1	21.7	6
10	10	A404	10	16675	41	A	3.08	0.26	0.36	0.146	32.4	21.2	19.1	0.36	0.48	0.25	53.2	26.6	21.9	6
11	11	A413	10	21351	75	A	2.82	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.46	0.23	54.6	26.9	21.6	6
12	12	A416	10	20463	51	A	3.50	0.26	0.36	0.146	32.4	21.2	19.1	0.36	0.49	0.26	55.3	27.0	21.9	6
13	13	A404	10	13212	51	A	4.12	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.44	0.22	51.6	26.2	21.4	5
14	14	A404	10	17983	51	A	3.49	0.26	0.36	0.146	32.4	21.2	19.1	0.35	0.47	0.25	54.1	26.8	21.7	6
15	15	A416	10	17952	75	A	3.04	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.44	0.22	53.7	26.7	21.4	5
16	16	A355	10	18996	51	A	3.43	0.26	0.36	0.146	32.4	21.2	19.1	0.35	0.48	0.25	54.4	26.9	21.8	6
17	B485	B485	10	9189	75	D	4.10	0.26	0.36	0.146	32.4	21.2	19.1	0.30	0.40	0.18	44.1	24.4	20.3	4
18	A4154	A4154	10	13950	50	D	4.20	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.44	0.22	49.6	25.7	21.1	5
19	B474	#N/A	8	1355	50	D	4.50	0.26	0.36	0.146	32.4	21.2	19.1	0.26	0.36	0.15	34.2	21.7	19.3	3
20	B4442	#N/A	8	7667	50	D	3.20	0.26	0.36	0.146	32.4	21.2	19.1	0.30	0.41	0.18	41.4	23.7	20.2	4
21	B416	#N/A	8	5230	50	D	3.50	0.26	0.36	0.146	32.4	21.2	19.1	0.29	0.39	0.17	38.8	23.0	19.9	3
22	A413	#N/A	35	23380	75	D	3.60	0.26	0.36	0.146	32.4	21.2	19.1							
22	A4128	#N/A	50	9030	32	D	3.50	0.26	0.36	0.146	32.4	21.2	19.1	0.33	0.44	0.21	49.5	25.7	21.0	5
23	A413	#N/A	30	20622	75	D	3.60	0.26	0.36	0.146	32.4	21.2	19.1							
23	B485	#N/A	50	9189	32	D	4.10	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.44	0.21	50.5	25.9	21.1	5
24	A404	#N/A	50	15207	50	D	4.50	0.26	0.36	0.146	32.4	21.2	19.1							
24	A413	#N/A	75	21420	50	D	4.40	0.26	0.36	0.146	32.4	21.2	19.1	0.31	0.42	0.20	43.4	24.2	20.4	4
25	A355	#N/A	45	12334	40	D	3.80	0.26	0.36	0.146	32.4	21.2	19.1							
25	A413	#N/A	30	18710	40	D	3.60	0.26	0.36	0.146	32.4	21.2	19.1	0.36	0.48	0.24	50.8	26.0	21.4	5
26	A355	#N/A	30	13075	32	D	3.80	0.26	0.36	0.146	32.4	21.2	19.1							
26	unc	#N/A	20	7845	32	D	3.50	0.26	0.36	0.146	32.4	21.2	19.1	0.37	0.48	0.24	50.0	25.8	21.5	6
27	A355	#N/A	20	15923	40	D	4.00	0.26	0.36	0.146	32.4	21.2	19.1							
27	A404	#N/A	20	17952	40	D	4.50	0.26	0.36	0.146	32.4	21.2	19.1	0.42	0.55	0.30	63.1	28.8	22.9	8
28	A413	#N/A	30	19136	32	D	4.40	0.26	0.36	0.146	32.4	21.2	19.1							
28	A404	#N/A	30	14541	32	D	4.50	0.26	0.36	0.146	32.4	21.2	19.1	0.41	0.54	0.29	58.1	27.7	22.5	7
29	A404	#N/A	20	19929	40	D	4.50	0.26	0.36	0.146	32.4	21.2	19.1							

Table A2.7 DMRB Screening tool output for 2005

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10} exceedences
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
29	A4154	#N/A	40	15756	40	D	4.20	0.26	0.36	0.146	32.4	21.2	19.1	0.39	0.52	0.28	57.9	27.6	22.3	7
30	A40	#N/A	10	26150	75	A	4.00	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.48	0.27	59.9	28.1	22.0	6
31	A416	#N/A	20	20679	40	D	4.20	0.26	0.36	0.146	32.4	21.2	19.1							
31	A4154	#N/A	30	12144	40	D	4.20	0.26	0.36	0.146	32.4	21.2	19.1	0.40	0.53	0.28	59.1	27.9	22.4	7
32	A416	#N/A	10	20980	50	D	4.40	0.26	0.36	0.146	32.4	21.2	19.1							
32	unc	#N/A	30	4270	40	D	0.80	0.26	0.36	0.146	32.4	21.2	19.1	0.38	0.51	0.27	59.1	27.9	22.2	7
33	A416	#N/A	10	33105	40	D	4.40	0.26	0.36	0.146	32.4	21.2	19.1							
33	B485	#N/A	25	3857	40	D	4.00	0.26	0.36	0.146	32.4	21.2	19.1	0.44	0.62	0.36	66.7	29.5	23.3	9
34	A416	#N/A	30	22506	50	D	4.40	0.26	0.36	0.146	32.4	21.2	19.1							
34	B4505	#N/A	10	7645	40	D	4.00	0.26	0.36	0.146	32.4	21.2	19.1	0.38	0.50	0.26	58.4	27.8	22.2	7
35	A416	#N/A	10	12283	50	D	5.40	0.26	0.36	0.146	32.4	21.2	19.1							
35	unc	#N/A	10	1790	32	D	6.30	0.26	0.36	0.146	32.4	21.2	19.1	0.34	0.45	0.23	52.2	26.3	21.3	5
36	A404	#N/A	20	14106	50	D	4.60	0.26	0.36	0.146	32.4	21.2	19.1							
36	B4442	#N/A	15	4929	32	D	2.70	0.26	0.36	0.146	32.4	21.2	19.1	0.35	0.46	0.23	51.1	26.1	21.4	5
37	A413	#N/A	15	17120	50	D	3.89	0.26	0.36	0.146	32.4	21.2	19.1							
37	B4442	#N/A	10	8142	32	D	3.17	0.26	0.36	0.146	32.4	21.2	19.1	0.41	0.53	0.28	60.3	28.2	22.6	7
49	49	M25	40	148094	110	A	13.2	0.26	0.36	0.146	32.4	21.2	19.1	0.36	0.65	0.72	90.6	34.1	25.6	14

Table A2.8 DMRB Screening tool output for 2010

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10} exceedences
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
1	1	A404	10	19995	75	A	2.93	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.20	40.2	22.1	19.3	3
2	2	A355	10	13610	75	A	3.16	0.26	0.31	0.146	25.7	18.1	17.8	0.30	0.36	0.18	37.7	21.5	19.0	2
3	3	A416	10	31151	52	A	3.30	0.26	0.31	0.146	25.7	18.1	17.8	0.34	0.46	0.26	43.3	22.9	19.7	3
4	4	A413	20	18174	51	A	3.79	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.20	37.1	21.3	19.0	2
5	5	A4128	8	10956	52	A	2.42	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.37	0.18	34.7	20.7	18.8	2
6	6	A416	10	13692	75	A	4.20	0.26	0.31	0.146	25.7	18.1	17.8	0.30	0.36	0.19	39.2	21.9	19.1	2
7	7	A413	10	19123	75	A	3.58	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.20	41.0	22.3	19.3	3
8	8	A413	10	22451	75	A	3.06	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.39	0.21	41.1	22.3	19.4	3
9	9	A413	10	30180	75	A	2.18	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.42	0.22	41.2	22.4	19.5	3
10	10	A404	10	17664	41	A	3.08	0.26	0.31	0.146	25.7	18.1	17.8	0.34	0.41	0.22	39.9	22.0	19.5	3
11	11	A413	10	22617	75	A	2.82	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.39	0.21	40.7	22.2	19.3	3
12	12	A416	10	21676	51	A	3.50	0.26	0.31	0.146	25.7	18.1	17.8	0.33	0.41	0.23	41.3	22.4	19.5	3
13	13	A404	10	13995	51	A	4.12	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.38	0.20	39.2	21.9	19.2	3
14	14	A404	10	19048	51	A	3.49	0.26	0.31	0.146	25.7	18.1	17.8	0.33	0.40	0.22	40.5	22.2	19.4	3
15	15	A416	10	19016	75	A	3.04	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.20	40.1	22.1	19.3	3
16	16	A355	10	20122	51	A	3.43	0.26	0.31	0.146	25.7	18.1	17.8	0.33	0.41	0.22	40.7	22.2	19.4	3
17	B485	B485	10	9734	75	D	4.10	0.26	0.31	0.146	25.7	18.1	17.8	0.29	0.34	0.17	34.0	20.5	18.6	2
18	A4154	A4154	10	14777	50	D	4.20	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.38	0.20	38.1	21.6	19.1	2
19	B474	#N/A	8	1435	50	D	4.50	0.26	0.31	0.146	25.7	18.1	17.8	0.26	0.32	0.15	27.0	18.5	17.9	1
20	B4442	#N/A	8	8122	50	D	3.20	0.26	0.31	0.146	25.7	18.1	17.8	0.29	0.35	0.17	32.2	20.0	18.5	2
21	B416	#N/A	8	5540	50	D	3.50	0.26	0.31	0.146	25.7	18.1	17.8	0.28	0.34	0.16	30.3	19.5	18.3	2
22	A413	#N/A	35	24766	75	D	3.60	0.26	0.31	0.146	25.7	18.1	17.8							
22	A4128	#N/A	50	9565	32	D	3.50	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.19	37.5	21.4	19.0	2
23	A413	#N/A	30	21845	75	D	3.60	0.26	0.31	0.146	25.7	18.1	17.8							
23	B485	#N/A	50	9734	32	D	4.10	0.26	0.31	0.146	25.7	18.1	17.8	0.31	0.38	0.19	38.2	21.6	19.1	2
24	A404	#N/A	50	16108	50	D	4.50	0.26	0.31	0.146	25.7	18.1	17.8							
24	A413	#N/A	75	22690	50	D	4.40	0.26	0.31	0.146	25.7	18.1	17.8	0.29	0.36	0.18	33.3	20.3	18.6	2
25	A355	#N/A	45	13066	40	D	3.80	0.26	0.31	0.146	25.7	18.1	17.8							
25	A413	#N/A	30	19819	40	D	3.60	0.26	0.31	0.146	25.7	18.1	17.8	0.33	0.40	0.21	38.5	21.7	19.3	3
26	A355	#N/A	30	13850	32	D	3.80	0.26	0.31	0.146	25.7	18.1	17.8							
26	unc	#N/A	20	8310	32	D	3.50	0.26	0.31	0.146	25.7	18.1	17.8	0.34	0.41	0.21	38.5	21.7	19.4	3
27	A355	#N/A	20	16867	40	D	4.00	0.26	0.31	0.146	25.7	18.1	17.8							
27	A404	#N/A	20	19017	40	D	4.50	0.26	0.31	0.146	25.7	18.1	17.8	0.38	0.46	0.25	47.2	23.8	20.2	4
28	A413	#N/A	30	20270	32	D	4.40	0.26	0.31	0.146	25.7	18.1	17.8							
28	A404	#N/A	30	15403	32	D	4.50	0.26	0.31	0.146	25.7	18.1	17.8	0.37	0.45	0.25	43.7	23.0	20.0	3
29	A404	#N/A	20	21111	40	D	4.50	0.26	0.31	0.146	25.7	18.1	17.8							

Table A2.8 DMRB Screening tool output for 2010

Receptor	Link No	Road name	Receptor distance (m)	Traffic flow & speed		Traffic composition		Background concentrations, µg m^{-3}						Total concentrations, µg m^{-3}						No of PM_{10} exceedences
				AADT combined veh/day	Annual average speed (km/h)	Road type (A,B)	Total %HDV	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	CO (mg)	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
29	A4154	#N/A	40	16690	40	D	4.20	0.26	0.31	0.146	25.7	18.1	17.8	0.36	0.44	0.24	43.5	22.9	19.8	3
30	A40	#N/A	10	27700	75	A	4.00	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.41	0.23	44.3	23.1	19.6	3
31	A416	#N/A	20	21905	40	D	4.20	0.26	0.31	0.146	25.7	18.1	17.8							
31	A4154	#N/A	30	12864	40	D	4.20	0.26	0.31	0.146	25.7	18.1	17.8	0.36	0.44	0.24	44.4	23.2	19.9	3
32	A416	#N/A	10	22224	50	D	4.40	0.26	0.31	0.146	25.7	18.1	17.8							
32	unc	#N/A	30	4523	40	D	0.80	0.26	0.31	0.146	25.7	18.1	17.8	0.35	0.43	0.23	44.2	23.1	19.8	3
33	A416	#N/A	10	35067	40	D	4.40	0.26	0.31	0.146	25.7	18.1	17.8							
33	B485	#N/A	25	4086	40	D	4.00	0.26	0.31	0.146	25.7	18.1	17.8	0.39	0.52	0.30	49.7	24.4	20.5	4
34	A416	#N/A	30	23840	50	D	4.40	0.26	0.31	0.146	25.7	18.1	17.8							
34	B4505	#N/A	10	8098	40	D	4.00	0.26	0.31	0.146	25.7	18.1	17.8	0.35	0.42	0.22	44.5	23.2	19.8	3
35	A416	#N/A	10	13011	50	D	5.40	0.26	0.31	0.146	25.7	18.1	17.8							
35	unc	#N/A	10	1896	32	D	6.30	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.38	0.20	40.0	22.1	19.3	3
36	A404	#N/A	20	14942	50	D	4.60	0.26	0.31	0.146	25.7	18.1	17.8							
36	B4442	#N/A	15	5221	32	D	2.70	0.26	0.31	0.146	25.7	18.1	17.8	0.33	0.39	0.20	39.2	21.9	19.3	3
37	A413	#N/A	15	18135	50	D	3.89	0.26	0.31	0.146	25.7	18.1	17.8							
37	B4442	#N/A	10	8624	32	D	3.17	0.26	0.31	0.146	25.7	18.1	17.8	0.38	0.44	0.24	45.8	23.5	20.1	4
49	49	M25	40	156872	110	A	13.2	0.26	0.31	0.146	25.7	18.1	17.8	0.32	0.53	0.58	65.0	27.7	21.8	6

Appendix 3
Emissions Data

CONTENTS

Table A3.1 Part A and B Processes in Chiltern (excluding petrol stations)

Part A / Part B Ref	Company	Comment
Part A	-	No Part A processes
Part B		
Combustion processes		
3	Chilterns Crematorium	Crematoria
Other processes		
1	Chesham Car repairs	Respraying of road vehicles
2	Draycast Foundry	Iron, steel and non-ferrous foundry
4	Dunton Brothers	Brickworks – Subject to Clean Air Act
5	Matthews Brickworks	Manufacture of clay and refractory goods- Subject to Clean Air Act
6	Arkoss Demolition	Mobile Crusher

Table A3.2 Petrol stations in Chiltern

Reference	Company	Comment
Petrol stations		
70/P233	Total, Amersham Rd, Chesham	
77/P227	Total, Vale Rd, Chesham	
79/P1155	Shell, London Rd, Missenden	
71/P150	Shell, Woodside Rd, Amersham	
87/P80	BP, White Lion rd, Amersham	Stage 2 Vapour recovery
82/P239	BP. Amersham Rd, Chesham	
78/P1364	Tesco, London Rd, Amersham	
78/P72	Knotty Green Garage, Penn Rd, Beaconsfield	
83/P119	Stevens, Pond Approach, Holmer Green	
86/P130	Tesco, Gravel Hill, Chalfont St Peter	
84/P252	Ogglesby's, Ashley Green Rd, Chesham	

Appendix 4

Descriptions of selected models and tools

CONTENTS

Simple screening models[a]

1. Design Manual for Roads and Bridges (DMRB) - This screening method was formulated by the former Department of Transport. The method gives a preliminary indication of air quality near roads, and is more suited to rural motorways and trunk roads than city centre traffic conditions. It is a simple procedure based on tables and nomograms; originally published in August 1994, a revision has been produced in 1999, which is more applicable to urban road situations. The DMRB method requires information on vehicle flow, HGV mix, vehicle speed and receptor-road distances. It contains a useful database of vehicular emission factors for future years.

In the revision of the DMRB method the following pollutants can be estimated:

- the maximum 8-hour mean CO concentration;
- the 98th percentile and the maximum of hourly mean NO_2 concentrations;
- the annual average benzene and annual average 1,3 butadiene concentration;
- the annual mean and the fourth highest daily mean PM_{10} concentrations.

The method adopts the annual mean concentration as the base statistic. Background pollutant levels are included explicitly in the calculations by adding an amount to the annual mean traffic contribution using the Air Quality Archive (paragraph 6.09) or default values. Surrogate statistics are used to convert annual means to National Air Quality Strategy statistics. Details of the road layout cannot be specified.

2. Dl Stack Height Calculations - This screening procedure, based on nomograms, estimates a chimney height which should ensure that ground level concentrations of a pollutant do not exceed a specified standard or guideline for that pollutant for more than about 5 minutes, under weather conditions which are likely to occur 98% of the time. Therefore, the method does not take into account worst-case meteorology. Strictly speaking, this screening method is applicable to only to the smaller processes which come under local authority control i.e. Part B processes and non-combustion sources. The method can be used to check whether a process has a stack of adequate height. The results should be treated with caution in cases of extreme weather condition's, complex topography or complicated configuration of buildings. Heights determined using the method should be regarded as a guide, rather than a accurate definition of the discharge chimney height.

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

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