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Report on the Updating and Screening Assessment of Air Quality in the Suffolk Coastal District.

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Executive Summary

As part of the requirements of Part IV of the Environment Act 1995, the Government adopted the United Kingdom Air Quality Strategy as a statement of its policies with respect to the assessment and management of air quality. In January 2000, the Government adopted the revised Air Quality Strategy for England, Scotland, Wales and Northern Ireland. The Strategy continues to represent a comprehensive approach to maintaining and improving the quality of ambient air in the United Kingdom. It sets health-based air quality objectives to be achieved by prescribed target dates, and the process by which the Strategy is to be implemented.

National policies on air pollution are expected to deliver a significant improvement in air quality throughout the country. It is recognised, however, that there is an important local dimension to air quality, and the Environment Act 1995 and the Air Quality Strategy produced for it provide the statutory basis for the system of local air quality management (LAQM) across England and Wales. LAQM is the regime for all local authorities to undertake their requirement to review air quality within their districts periodically, and assess the current and future air quality against those objectives that have been prescribed in regulations. The air quality objectives have been prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) Regulations 2002. These Regulations set standards and objectives for seven pollutants: Benzene, 1,3-Butadiene, Lead, Carbon Monoxide, Nitrogen Dioxide, Sulphur Dioxide and Particulate Matter (PM_{10}).

Following completion of the first round of review and assessments, the Government and the Devolved Administrations issued a new set of guidance which prescribes the format that the second round of review and assessments are to take. Review and assessment will now be in two stages.

This report completes the first phase, which is the Updating and Screening Assessment. The aim of this Updating and Screening Assessment is to identify those matters that have changed since the first round of review and assessment was finished, and which may now require further assessment. The guidance also includes new information on potential sources of some pollutants following further studies undertaken since the last set of guidance was issued. Where the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority is then required to undertake a Detailed Assessment, to identify with reasonable certainty whether or not a likely exceedance will occur. Where a Detailed Assessment indicates that any of the air quality objectives are likely to be exceeded, an air quality management area (AQMA) must be designated.

This Updating and Screening Assessment for the Suffolk Coastal district has determined that the risk of exceedance of the air quality objectives for carbon monoxide, benzene and 1,3-butadiene is unlikely, and no further assessment will be necessary.

This Updating and Screening Assessment for the Suffolk Coastal district has determined that for lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}) there is a potential risk of the air quality objectives being exceeded at receptor locations, and further investigation will be necessary.

For these pollutants, further investigation will be undertaken for the following areas, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004:

Lead

- Emissions from Crane Limited at Ipswich, a site regulated under Part I of the Environmental Protection Act 1990 by Ipswich Borough Council, which is 0.3 km from the Suffolk Coastal boundary.

Nitrogen dioxide

- Emissions from traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St John's Street in Woodbridge.
- Emissions from traffic using a section of the A1214 near the Bell Lane junction in Kesgrave.
- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.

Sulphur dioxide

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.
- Areas of domestic coal burning within the Suffolk Coastal district.
- Emissions from boiler plant burning fuel oil at Her Majesty's Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk.
- Emissions from boiler plant burning fuel oil at site buildings on the Port of Felixstowe, Felixstowe, Suffolk.

Particulate matter (PM_{10})

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.
- Areas of domestic coal burning within the Suffolk Coastal district.
- Combined emissions from activities on, and associated with, the Port of Felixstowe.

Details of the form that the further investigations will take for each of the above sites are outlined in the Summary and Recommendations section of this report (chapter 10).

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J Report produced by Entec UK Limited for Suffolk Coastal District Council, on sulphur dioxide (SO_2) monitoring at the Port of Felixstowe.

1. Introduction

This is the Updating and Screening Assessment report for Suffolk Coastal District Council, which is required, for the second round of local air quality management review and assessments, under Part IV of the Environment Act 1995.

1.1 Statutory background

The Environment Act 1995 required the United Kingdom (UK) Government and the Devolved Administrations for Scotland and Wales to produce a national air quality strategy containing standards and objectives for improving ambient air quality. In England this function is administered by the Department of the Environment, Food and Rural Affairs (DEFRA). The original Air Quality Strategy, published in March 1997, has now been superseded by the Air Quality strategy for England, Scotland, Wales and Northern Ireland, published in January 2000 and its addendum, published in February 2003 (further to be referred to as the 'Air Quality Strategy'). The Air Quality Strategy uses information on health effects to set air quality standards and objectives for each pollutant of concern, and the date by which they should be achieved.

In addition to the Air Quality Strategy, the UK, as a member state, must also meet specified air pollutant limit values prescribed in the European Union's Air Quality Framework. This framework has produced, to date, three Daughter Directives which set the limit values for specified pollutants, and the date by which they must be achieved. The first two daughter directives, and their limit values, have now been transposed into UK law.

Air quality standards and objectives have been taken from both the Air Quality Strategy and the European Union's Air Quality Framework and transcribed into UK Regulations.

The Environment Act 1995 and the Air Quality Strategy produced for it provide the statutory basis for the system of Local Air Quality Management (LAQM) across England and Wales. LAQM is the regime for all local authorities to undertake their requirement to review air quality within their districts periodically, and assess the current and future air quality within them against those objectives that have been prescribed in regulations. Where the review and assessments indicate that any of the air quality objectives in the regulations are likely to be exceeded, then an Air Quality Management Area (AQMA) must be designated.

As the new European Union's Daughter Directives have been produced, with specific limit values, they have led to revisions in the Air Quality Strategy and the regulations under which the LAQM process must function. There have been three revisions of the air quality regulations to date producing: the Air Quality Regulations 1997, the Air Quality Regulations 2000, and the Air Quality (Amendment) Regulations 2002. The requirements in each of the regulations produced have become more stringent in respect of air quality objectives and/or the date by which the objectives are to be achieved.

In Suffolk Coastal's first round of review and assessment reports, the pollutants of concern were reviewed against the regulations current at that time. In this Updating and Screening Assessment report air quality has been assessed against the current regulations – the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002, (further to be referred to as 'the Regulations'). The pollutants specified in the Regulations, together with their objectives and target dates, can be seen in table 1.1 below. For nitrogen dioxide, particles and sulphur dioxide, there is specified an allowed number of exceedances per year for certain of the objectives; this is in order to account for unusual meteorological conditions and specific events, such as 5 November.

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3	Running annual mean	31 December 2003
	5.0μg/m^3	Annual mean	31 December 2010
1,3-butadiene	2.25 μg/m^3	Running annual mean	31 December 2003
Carbon monoxide	10.0 mg/m^3	Maximum daily running 8-hour mean	31 December 2003
Lead	0.5 μg/m^3	Annual mean	31 December 2004
	0.25 μg/m^3	Annual mean	31 December 2008
Nitrogen dioxide*	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31 December 2005
	40 μg/m^3	Annual mean	31 December 2005
Particles (PM_{10}) (gravimetric)#	50 μg/m^3 not to be exceeded more than 35 times a year	24-hour mean	31 December 2004
	40 μg/m^3	Annual mean	31 December 2004
Sulphur dioxide	350 μg/m^3 not to be exceeded more than 24 times a year	1-hour mean	31 December 2004
	125 μg/m^3 not to be exceeded more than 3 times a year	24-hour mean	31 December 2004
	266 μg/m^3 not to be exceeded more than 35 times a year	15-minute mean	31 December 2005

* The objectives for nitrogen dioxide are provisional

\# Measured using the European gravimetric transfer sampler or equivalent

In addition to the objectives set out in the Regulations (table 1.1), the European Union has set limit values in respect of nitrogen dioxide to be achieved by 2010, as well as indicative limit values for particles (PM_{10}) also to be achieved by 2010. Both of these objectives can be seen in table 1.2 below.

Local authorities currently have no statutory obligation to assess air quality against these limit values, as they have not yet been transcribed into the Regulations under which LAQM operates. In this report no assessments have been made in respect of these 2010 limits for nitrogen dioxide and particles (PM_{10}) due to time constraints in completion of the statutory requirements of this report.

Table 1.2 New nitrogen dioxide and particles objectives, from European Union legislation, for England, Wales, Northern Ireland and Greater London (not included currently in the Regulations).

Pollutant	Region	Air Quality Objective		Date to be achieved by
		Concentration	Measured as	
Nitrogen dioxide	All authorities	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31 December 2010
		40 μg/m^3	Annual mean	31 December 2010
Particles (PM_{10})	Greater London	50 μg/m^3 not to be exceeded more than 10 times a year	24-hour mean	31 December 2010
	Greater London	23 μg/m^3	Annual mean	31 December 2010
	Greater London	20 μg/m^3	Annual mean	31 December 2015*
	Rest of England, Wales and Northern Ireland	50 μg/m^3 not to be exceeded more than 7 times a year	24-hour mean	31 December 2010
	Rest of England, Wales and Northern Ireland	20 μg/m^3	Annual mean	31 December 2010

* This objective is provisional, to be achieved only where cost effective and proportional local action can be identified.

1.2 Second round of air quality review and assessments

The Air Quality Strategy establishes the framework for air quality improvements, and measures agreed at national and international levels provide its foundations. It is recognised, however, that despite these measures areas of poor air quality will remain at the local level, and these are best dealt with under the LAQM regime.

The Environment Act 1995, therefore, provides powers for DEFRA and the Devolved Administrations to make guidance which local authorities must have regard to when carrying out their LAQM duties. Guidance provided for the first round of review and assessments required that the process be undertaken in three stages, each becoming more detailed should a pollutant progress to it for assessment. Further information on the first round review and assessments is detailed later in this chapter.

The technical guidance used for the first round of review and assessments was updated midway through the process and both documents, LAQM.TG(98) and LAQM.TG(00), have now been superseded by new guidance provided as LAQM.TG(03). LAQM.TG(03) provides the current guidance for the second round of review and assessments. It sets out the general approach to be used, together with detailed technical guidance, provided on a pollutant by pollutant basis. It updates the previous guidance following further studies carried out on behalf of DEFRA and the Devolved Administrations, to enable local authorities to more accurately assess the pollutants of concern.

LAQM.TG(03) continues to use a phased approach; however, this is now in two stages instead of three. The first stage of the process is an **Updating and Screening Assessment** (this report) to be completed by all local authorities. This is based on a checklist to identify those matters that have changed since the first round was finished and which may now require further assessment. The

guidance also includes new information on potential sources of some pollutants following further studies undertaken since the last set of guidance was issued.

Where the Updating and Screening Assessment identifies a risk that an air quality objective may be exceeded at a location with relevant public exposure, the authority is then required to undertake a **Detailed Assessment**. The aim of the Detailed Assessment is to identify with reasonable certainty whether or not a likely exceedance will occur. Assumptions used in a Detailed Assessment will need to be considered in depth and data collected or used should be quality assured to a high standard. This is to ensure that local authorities are confident in the decisions they reach.

The guidance states that the Updating and Screening Assessment should be completed by the end of May 2003, and the Detailed Assessment by the end of April 2004. It is expected that local authorities will then undertake review and assessments every three years, requiring Updating and Screening Assessments in 2006 and 2009 and Detailed Assessments, if required, in 2007 and 2010.

In addition, the guidance recommends that local authorities prepare annual air quality **Progress Reports** in years when either an Updating and Screening or Detailed Assessment is not produced. Detail regarding the format that these reports would take has not yet been published, but will follow.

1.3 Summary of the first round of review and assessment findings for the Suffolk Coastal district.

For the first round of review and assessment, all three stages of the process were undertaken by Suffolk Coastal District Council, and the reports produced for each are titled as below. **All reports have been accepted by DEFRA.**

- Report on the First Stage Review and Assessment of Air Quality in Suffolk Coastal. Report written by Suffolk Coastal District Council and published February 1999.
- Report on the Second Stage Review and Assessment of Air Quality in Suffolk Coastal. Report written by Suffolk Coastal District Council and published August 2000.
- Report on the Third Stage Review and Assessment of Air Quality in Suffolk Coastal. Report written by Suffolk Coastal District Council and published November 2001.
- Suffolk Coastal District Council – Monitoring of PM_{10} at Sinks Pit, Kesgrave. This was a supplementary Third Stage report undertaken by Entec UK Limited, and published October 2001.
- Air Quality Review and Assessment – Stage 3 – A report produced for Suffolk Coastal District Council. This was a supplementary Third Stage report undertaken by the National Environmental Technology Centre (netcen), and published December 2001.

The reports can be viewed on the Suffolk Coastal website at www.suffolkcoastal.gov.uk or copies are available at our Melton Hill offices in Woodbridge, our Undercliff Road West offices in Felixstowe, and at all libraries and Town Council offices in the district.

A summary of the findings of each report is detailed below:

The **First Stage** review and assessment demonstrated that it was likely that the air quality objectives for benzene and 1,3-butadiene would be met in the Suffolk Coastal District by the relevant target dates, and further review and assessment of these pollutants would not be necessary.

The **Second Stage** review and assessment demonstrated that it was likely that the air quality objectives for lead and carbon monoxide would be met in the Suffolk Coastal District by the relevant target dates, and further review and assessment of these pollutants would not be necessary.

The **Third Stage** review and assessment concentrated on specific areas within the district. It demonstrated that it was likely that the air quality objectives for the following emission sources of nitrogen dioxide, and particulate matter (PM_{10}) would be met at relevant locations in the Suffolk Coastal District by the relevant target dates, and further review and assessment would not be necessary:

Nitrogen dioxide

- Traffic using the A14 trunk road;
- Traffic using High Road West, Felixstowe

Particulate Matter (PM_{10})

- Traffic using the A1152, including specifically the crossroads of the A1152 and B1438 at Melton;
- Traffic using High Road West, Felixstowe;
- Traffic using Lime Kiln Quay Road / The Thoroughfare / St. John's Street junction, Woodbridge;
- PM_{10} levels from the combined emission "footprint" of White Mountain Roadstone Limited, A12 traffic, Foxhall Four Quarry, and Foxhall Landfill Site.

The **Third Stage** review and assessment concluded that insufficient information was available, for the following sources, to assess whether there was a significant risk that the air quality objectives for sulphur dioxide, particulate matter (PM_{10}) and nitrogen dioxide would be exceeded at relevant locations in the Suffolk Coastal District. **It was determined that further review and assessment for each was necessary.** The sources in question are listed below together with details of the further investigations undertaken for each:

Sulphur dioxide

- **Emissions from shipping activities at the Port of Felixstowe**. A Third Stage review and assessment was undertaken to assess sulphur dioxide emissions from shipping activities at the Port of Felixstowe. A continuous analyser was used to record sulphur dioxide concentrations for a six-month period during 2002. **The findings of this investigation are presented in this Updating and Screening Assessment report in the relevant chapter.**

Particulate Matter (PM_{10})

- **Emissions from shipping activities at the Port of Felixstowe.** A Third Stage review and assessment was undertaken to assess PM_{10} emissions from shipping activities at the Port of Felixstowe. The DEFRA monitoring helpdesk advised that it would be possible to assess PM_{10} levels using the results from monitored levels of SO_2 in the 6-month programme to be undertaken at the Port of Felixstowe, and proportional calculations taken from previous studies, in particular the Southampton Dibden Terminal Study. This method of assessment was carried out for PM_{10}. **The findings of this investigation are presented in this Updating and Screening Assessment report in the relevant chapter.**

- **PM_{10} concentrations arising from the combined emission "footprint" of Roadworks (1952) Limited and Sinks Pit in Kesgrave.** A Third Stage review and assessment was undertaken to assess PM_{10} concentrations arising from combined emissions of Roadworks (1952) Limited, who operate a roadstone coating process, and general activities at Sinks Gravel Pit, which is a quarry. A continuous analyser was used to record PM_{10} concentrations for a three-month period during 2001 at a suitable relevant receptor location. **The findings showed that the risk of the PM_{10} objectives being exceeded at relevant receptor locations by 2004 was unlikely, and that an air quality management area would not need to be declared.** The findings of this investigation are presented in the supplementary Third Stage review and assessment report for the Sinks Pit site.

Nitrogen dioxide
The Third Stage review and assessment concluded that consideration should be given to the designation of an air quality management area (AQMA) for nitrogen dioxide from road traffic emissions at the following locations:

- The crossroads of the A1152 and B1438 at Melton;
- The junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street at Woodbridge.

A supplementary third Stage review and assessment was commissioned to assess nitrogen dioxide concentrations arising from road traffic emissions at these junctions. The investigation was undertaken using a complex computer model with more accurate diffusion tube monitoring data than had been available previously. **The findings showed that it was unlikely (with a probability of between 5% and 20%) that an exceedance of the annual mean objective for nitrogen dioxide would occur at either of the junctions in 2005. It was suggested, therefore, that Suffolk Coastal District Council should not consider declaring an air quality management area for nitrogen dioxide.** The findings were accepted by Suffolk Coastal District Council and are presented in a supplementary Third Stage review and assessment report, listed above.

1.4 Summary of Consultation findings from the first round of review and assessment

During the first round of review and assessment there were three official consultations, at different stages in the process, to obtain comments on the findings of the reports. The reports consulted upon were those listed in the above section in this chapter.

Details of the consultations undertaken and the responses received can be seen in the 'Report on the Consultation Findings for the Local Air Quality Management Review and Assessment undertaken by Suffolk Coastal District Council' which was published in June 2002. The report can be viewed on the Suffolk Coastal website at www.suffolkcoastal.gov.uk or copies are available at our Melton Hill offices in Woodbridge, our Undercliff Road West offices in Felixstowe, and at all libraries and Town Council offices in the district.

A total of 85 consultation responses were received, of which 33 were relevant to LAQM. All aspects raised in the consultation process, which came within the scope of LAQM, were addressed within the review and assessment process. For some specific areas mentioned, work is continuing to confirm compliance with the air quality objectives, and is detailed in this Updating and Screening Assessment Report.

2. Updating and Screening Assessment methodology

The aim of this Updating and Screening Assessment Report is to identify those matters that have changed since the first round was finished and which may now require further assessment. The guidance also includes new information on potential sources for some pollutants, following further studies undertaken since the last set of guidance (LAQM.TG4(00)) was issued.

The methodology used in the compilation of this report is in accordance with DEFRA's latest technical guidance in LAQM.TG(03). For a number of sources a Detailed Assessment has been undertaken, where further study was required from the first round of review and assessments, and is also presented in this report.

2.1 Relevant receptor locations

For the purpose of review and assessment, authorities are required to focus their work upon locations where members of the public are regularly present and likely to be exposed over the averaging period of the objective. This should include locations where likely future developments may affect exposure to existing sources of air pollution or may result in new sources. The following approach is suggested in LAQM.TG(03) to define relevant locations for review and assessment and has been used in this Updating and Screening Assessment:

- For annual mean objectives (benzene, 1,3-butadiene, lead, nitrogen dioxide and PM_{10}) the review and assessment should focus upon all background locations where members of the public might regularly be exposed, and building facades of residential properties, schools, hospitals, libraries, etc.

  Areas where the annual mean objectives would not apply are, for example, building facades of offices or other places of work where members of the public do not have regular access, and gardens of residential properties.

- For 24-hour mean and 8-hour mean objectives (carbon monoxide, sulphur dioxide and PM_{10}) the review and assessment should focus upon all locations where the annual mean objective applies and also gardens of residential properties, where people would be expected to spend a significant proportion of time. For assessment of the 24-hour PM_{10} objective only areas of the garden where people would be expected to spend a number of hours have been included for assessment.

  Areas where these objectives would not apply are, for example, kerbside sites or any other location where public exposure is expected to be short term.

- For 1-hour mean objectives (nitrogen dioxide and sulphur dioxide) the review and assessment should focus upon all locations where the annual mean, 24-hour and 8-hour objectives apply. Also included should be kerbside sites (e.g. pavements of busy shopping streets), parts of car parks and railway stations, etc, which are not fully enclosed, and any outdoor locations to which the public might reasonably be expected to have access and spend 1 hour or more.

  Areas where these objectives would not apply are, for example, kerbside sites where the public would not be expected to have regular access or be exposed for more than 1 hour.

- For 15-minute mean objective (sulphur dioxide) the review and assessment should focus upon all locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.

Authorities should not consider exceedances of the objectives at any location where public exposure over the relevant averaging period would not be realistic, and the locations should represent non-occupational exposure. There are specific regulations that cover occupational exposure, therefore, this is not covered under the LAQM review and assessment process.

2.2 Information used to undertake the Updating and Screening Assessment

The following information was complied for completion of this report, building upon that collated for the first round of review and assessments:

- Details of any relevant air quality monitoring undertaken within the Suffolk Coastal district, by the Council or other bodies, including all relevant information, eg - quality assurance and quality control(QA/QC) procedures, and information on diffusion tube analysis.
- Details of significant transport-related sources within the local authority's area, including all current available traffic data and future traffic growth predictions for any existing or proposed roads for the future objective years as required.
- Annual mean background levels for pollutants in the UK, estimated and mapped on a 1km x 1km grid basis by netcen, part of AEA Technology Environment, on behalf of DEFRA and the Devolved Administrations.
- Details of, and distances to, relevant receptor locations for pollutant sources.
- Details for industrial processes regulated under Part I of the Environmental Protection Act 1990 within the Suffolk Coastal district and neighbouring local authority areas.
- Details of aircraft movements from Woodbridge Airfield.
- Details of any small boilers >5MW(thermal) burning coal or oil.
- Details regarding shipping movements and related activities at the Port of Felixstowe.
- Details of railway locomotive use within the Suffolk Coastal district and areas where they may idle for any period of time.
- Details of any other existing or proposed sources of pollutants, as detailed in LAQM.TG(03), ie - quarries, landfill sites, etc.
- Details of any large scale planned developments in the Suffolk Coastal district. Where any future developments are proposed which could impact on the air quality in the Suffolk Coastal District, an assessment will be made at the time of the planning application as to whether any breaches of air quality objectives will occur.

The above information was collated using the following sources:

- Guidance documents provided by DEFRA, namely LAQM.TG(03).
- Information collated from the first round of review and assessments.
- Suffolk Coastal District Council, Environmental Services Department.
- Suffolk Coastal District Council, Planning & Leisure Department.
- Details from analytical laboratories with regard to diffusion tubes, eg - QA/QC procedures, tube and adsorbent types.
- The National Air Quality Archive, Department of Environment, Transport and the Regions.
- Traffic flow data held by Suffolk County Council Environment & Transport Department, the Highways Agency and independent traffic counts commissioned by Suffolk Coastal District Council.
- Suffolk Coastal District Council Geographic Information System.
- Register of processes regulated under Part I of the Environmental Protection Act 1990, held by Suffolk Coastal District Council.
- Individual operators of processes regulated under Part I of the Environmental Protection Act 1990, where necessary.

- Neighbouring local authorities.
- The Environment Agency.
- The Ministry of Defence, Wattisham Air Traffic Services, with regard to the number and type of aircraft movements from Woodbridge Airfield.
- A list of large employers, and schools, hospitals and colleges large enough to potentially have boilers >5MW(thermal) burning coal or oil within Suffolk Coastal District. Information obtained from Suffolk Coastal District Council, Suffolk County Council and premises directly.
- Port of Felixstowe for information on shipping and related activities, current and future.
- Network Rail and the Port of Felixstowe, for passenger and freight train information.
- Pollutant specific information from the Expert Panel on Air Quality Standards, Department of the Environment.
- DEFRA helpdesks.

2.3 Design Manual for Roads and Bridges Screening Methodology

LAQM.TG(03) advises that The Design Manual for Roads and Bridges Screening Method (DMRB), hereafter referred to as DMRB, should be used to assess traffic emissions for roads and junctions against the objectives where necessary. DMRB includes a simple methodology for estimating the concentrations of air pollutants in the vicinity of roads. This methodology has been used for many years as a screening tool, primarily in support of assessments of new road building projects. The methodology is attractive as it implicitly includes the change in vehicle technologies year by year.

Since the first round of review and assessments the DMRB has been updated and now includes, amongst other changes, new vehicle emission data. The revised DMRB has now incorporated technological advances and has been converted to a spreadsheet program. The performance of the revised version of DMRB has been assessed by comparing its results with measurements conducted at a wide range of roadside locations, and empirical corrections have been incorporated that significantly improve its accuracy.

LAQM.TG(03) states that the revised DMRB model is expected to provide a slightly conservative assessment of the impact of traffic in most cases. The model will, therefore, tend to over-estimate the predicted pollutant concentrations; this is appropriate for a screening model as the authority can be reasonably confident that it has identified all areas at risk of exceeding the objectives. DMRB should prevent local authorities from unnecessarily proceeding to a Detailed Assessment.

Validation work carried out by the Highways Agency, however, has indicated that the model may significantly under-predict concentrations of nitrogen dioxide alongside roads classified as ‘street canyons’. In this context a ‘street canyon’ is classified as a relatively narrow street (less than 10 metres wide) with buildings on both sides, where the height of the buildings is more than twice that of the road width. The advice issued in LAQM.TG(03) has been followed in this Updating and Screening Assessment and, for any roads which are classified as street canyons, the predicted annual mean nitrogen dioxide output from the DMRB spreadsheet has been multiplied by a factor of 2.

The DMRB requires the following input data:

- **Year of assessment** – this is the year for which the specific pollutant requires assessment.
- **Number of road links** being assessed – where the DMRB spreadsheet is used for the assessment of a junction, the number of links for the junction, as defined in the DMRB instruction manual, need to be calculated. The following information will then need to be input for each road link identified.

- **Receptor location** and **distance to the centre of the road** from the receptor. The nearest relevant receptor locations (as defined earlier in this chapter) were identified for each section of road or each junction considered as part of this review and assessment. The distance from each receptor location to the centre of the road was measured and input into the DMRB spreadsheet.
- **Annual Average Daily Traffic flows** (AADT) - AADT's were obtained from a number of sources, Suffolk County Council Environment and Transport Department, the Highways Agency, and independent traffic surveys employed by Suffolk Coastal District Council for the most recent traffic count year (base year). Where there was more than one source of data for a road or junction the most representative information was used. The base year data was then factored forward to the year of concern, using a Trip End Modelling Programme (TEMPRO) provided by Suffolk County Council Environment and Transport Department, if no growth information was provided. TEMPRO produces traffic growth factors for this area of the country, for both low and high percentage traffic growth. Following DMRB input instructions, high percentage traffic growth figures were used. Any traffic from future developments, where known, was then also added to predict an AADT for the year in question. The final AADT for the year in question was then input into the DMRB spreadsheet.
- **Annual average speeds** – vehicle emission rates are calculated as a function of average speed and, therefore, annual average speed data needs to be input into the DMRB spreadsheet. Where no information is available on average speeds then the speed limit may be used as a default value. Care should be taken to provide reduced speed data when assessing road junctions; where there is no junction speed information available default values detailed in LAQM.TG(03) for different types of junctions have been used.
- **Road type** – DMRB requires that a road type definition be given for each road in the assessment. The DMRB Screening Method has three road type categories built into it which include default values for traffic compositions for that type of road (A, B and C). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. There is also a fourth road type, category D, which allows the user to input their own traffic composition data where they have it. For the report the three categories for which data is provided in the DMRB spreadsheet (A, B and C) were used.
- **Traffic composition data** – the DMRB spreadsheet requires the fraction of both Light Duty Vehicles (LDVs) and Heavy Duty Vehicles (HDVs). The definition between these two categories is that any vehicle above 3.5 tonnes gross vehicle weight is classified as a HDV and anything under this weight as a LDV. Information was obtained from a number of sources, Suffolk County Council Environment and Transport Department, the Highways Agency, and independent traffic surveys employed by Suffolk Coastal District Council. Where there was more than one source of data for a road or junction the most representative information was used. Most traffic information provided by Suffolk County Council Environment and Transport Department is not classified in terms of gross vehicle weights, but as vehicle length and number of axles. Advice was given by Suffolk County Council Environment and Transport Department to determine HDV and LDV percentages.
- **Local background concentrations** – for local impact assessments of road traffic, it is necessary to specify background concentrations upon which the traffic derived pollution is superimposed. For this report background concentrations have been obtained from a series of default concentration maps produced by netcen on behalf of DEFRA. The maps provide data with a resolution of 1km x 1km for every local authority district for the pollutant assessment year of concern, and can be obtained from the website at www.airquality.co.uk. The maps have been plotted using information from DEFRA-run background and urban monitoring networks and National Atmospheric Emissions Inventory estimates. Due to concerns raised that background pollutant concentrations for major roads in rural areas may include emissions from the road in question, LAQM.TG(03) advises that the average background concentration four grid squares away from either side of the road, where there are no other significant sources of pollution, is used. This advice was used in deriving background pollutant concentrations from the netcen maps for this report.

A summary of road traffic data can be seen in Appendix A. Traffic detail for input to the DMRB spreadsheet for roads and junctions is also summarised in Appendix A.

For each pollutant applicable, the annual mean background estimates have been combined with the annual mean roadside predictions from the DMRB to derive the final estimated concentration. This is then compared with the relevant air quality objective.

2.4 Atmospheric dispersion modelling undertaken for Detailed Assessment

A Detailed Assessment has been undertaken, and included, in this report for two road junctions (Melton and Woodbridge). The Detailed Assessment was undertaken by netcen, on behalf of Suffolk Coastal District Council, and used more complex, air dispersion modelling to predict air quality impacts of nitrogen dioxide and PM_{10} from moving and idling traffic at the road junctions.

Netcen used their own proprietary LADSUrban model to predict the nitrogen dioxide and PM_{10} levels at the junctions. This model was developed for use in the review and assessment process by netcen. The model made use of the atmospheric dispersion model ADMS-3.1 to provide dispersion kernels over a grid.

2.5 Monitoring equipment for nitrogen oxides

Monitoring for concentrations of nitrogen oxides by continuous ozone chemiluminescence was undertaken at a relevant receptor location for the junction of the A1152 and B1438 at the Melton crossroads to assess concentrations arising from road traffic emissions. This monitoring provided validation data for detailed computer modelling undertaken for the Suffolk Coastal district where necessary.

The equipment used was an API Model 200A analyser for nitrogen oxides (chemiluminescent techniques). This is the same instrumentation as that used in the DEFRA Urban Rural Network, which monitors concentrations of nitrogen oxides at sites throughout the UK.

The meter is a continuous analyser that records 15-minute and hourly average concentrations of nitrogen oxides, for use in comparison with the objectives.

2.6 Monitoring equipment for sulphur dioxide

Monitoring for concentrations of sulphur dioxide from shipping emissions was undertaken at a location within the Port of Felixstowe, at the same distance from the emissions as the nearest receptor location.

The equipment used was an API Model 100A sulphur dioxide UV fluorescence analyser. This is the same instrumentation as that used in the DEFRA Urban Rural Network, which monitors concentrations of sulphur dioxide at sites throughout the UK.

The meter is a continuous analyser that records 15-minute and hourly average concentrations of sulphur dioxide, for use in comparison with the objectives.

3. Review and assessment of carbon monoxide

3.1 Air quality objectives

The Air Quality (Amendment) Regulations 2002 have set a new objective for carbon monoxide of 10mg/m^3 measured as a maximum daily running 8-hour mean to be achieved by the 31 December 2003. This new objective has been set at a slightly tighter level than the previous objective, of 11.6mg/m^3 measured as an 8-hour running mean, to bring it into line with the European Union limit value set in the second Air Quality Daughter Directive 2000.

3.2 Sources

Carbon monoxide is a colourless, odourless gas formed by the incomplete combustion of carbon containing fuels. In the outside environment, the main source of carbon monoxide in the UK is currently road transport, which accounted for 67% of total emissions in 2000, and is mainly from petrol-engined vehicles (LAQM.TG(03)). This percentage will be higher in most cities and near busy and congested roads. In the indoor environment, exposure can occur at high levels from gas cookers and fuel burning heaters, especially if they are poorly maintained. Another major source of personal exposure for some people is the smoking of cigarettes.

3.3 Health effects

There are two main threats to human health from exposure to carbon monoxide; carbon monoxide readily combines with the haemoglobin in the blood in place of oxygen therefore reducing the blood's capacity to transport oxygen to the tissues including the brain, and the blockage of important biochemical reactions in cells. The reaction is reversible and exposure to unpolluted air will remove most of the carbon monoxide from the body, albeit slowly.

Studies have shown that exposure to high levels of carbon monoxide in the air can lead to tiredness, unconsciousness and even death. In some patients who recover from carbon monoxide poisoning, brain damage can be demonstrated. At lower levels, as seen in the ambient atmosphere, people who have an existing disease which affects the delivery of oxygen to the heart or brain (for example coronary heart disease – angina) are likely to be at particular risk if these oxygen delivery systems are further impaired by carbon monoxide. In a healthy person, carbon monoxide exposure can decrease performance in athletes.

The current objective set for carbon monoxide is based on the World Health Organisation air quality guideline, as the concentration at which health effects arising from exposure are unlikely to be observed.

3.4 The national perspective

Annual emissions of carbon monoxide have been falling steadily since the 1970's, 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. UK national network monitoring sites for carbon monoxide showed no measured exceedences of the objective at any site during the period 1999-2001. In addition, carbon monoxide concentrations adjacent to major roads have also been modelled at a national level, and the results suggest that existing national policies will be sufficient to achieve the objectives (LAQM.TG(03)).

3.5 The local perspective

There were no AQMA's declared in the UK from the first round of review and assessments, in respect of the previous air quality objective of 11.6 mg/m^3 measured as an 8-hour running mean. Studies carried out at a national level, based on both measured and modelling data, suggest that there is also little likelihood of the new objective for carbon monoxide being exceeded by 2003.

DEFRA's technical guidance, LAQM.TG(03), states that it is still important that local circumstances are fully taken into consideration, and all local authorities are, therefore, required to carry out a review and assessment for carbon monoxide at this time. They do envisage, however, that it is highly unlikely that any local authority will be required to proceed beyond the Updating and Screening Assessment.

3.6 Updating and Screening Assessment for carbon monoxide

3.6.1 Monitoring data

There is no monitoring data available for carbon monoxide for the Suffolk Coastal area. There are no national network monitoring sites within the district and no local monitoring has been undertaken for this pollutant.

3.6.2 Very busy roads or junctions in built-up areas

The technical guidance in LAQM.TG(03) states that very busy roads and junctions in areas where the 2003 annual mean background is expected to be above 1 mg/m^3 should be identified.

Annual mean background levels of carbon monoxide for 2001 in the UK have been estimated and mapped on a 1km x 1km grid basis by netcen, on behalf of DEFRA and the Devolved Administrations. The information can be accessed from the internet at the following address: www.airquality.co.uk/archive/laqm/tools.php. From these mapped estimates, the highest annual mean background level of carbon monoxide within the Suffolk Coastal area for 2001 is 0.331 mg/m^3.

Using the correction factors provided in LAQM.TG(03) to calculate 2001 levels of carbon monoxide forward to 2003, the highest estimated annual mean background level of carbon monoxide within the Suffolk Coastal area in 2003 is 0.273 mg/m^3.

The annual mean background level of carbon monoxide within the Suffolk Coastal area in 2003 is, therefore, considerably below 1 mg/m^3. **Further investigation of any 'very busy' roads or junctions will not, therefore, be necessary.**

3.7 Conclusion

Suffolk Coastal District Council concludes that there is no risk of the air quality objective for carbon monoxide being exceeded by the end of 2003 in the Suffolk Coastal area.

4. Review and assessment of benzene

4.1 Air quality objectives

DEFRA and the Devolved Administrations have adopted an air quality objective for benzene of 16.25 $\mu g/m^3$ measured as a running annual mean to be achieved by 31 December 2003.

The Air Quality (Amendment) Regulations 2002 have, additionally, set a second objective for benzene of 5 $\mu g/m^3$ measured as a running annual mean to be achieved by 31 December 2010 in England and Wales.

This additional, tighter, objective for 2010 follows new health advice, which suggests that levels of benzene in the air should be reduced as much as possible, and brings into UK legislation the European Union limit value for benzene set in the second Air Quality Daughter Directive 2000.

4.2 Sources

The benzene molecule is made up of six atoms of carbon arranged in a ring structure, to each of which is attached an atom of hydrogen. At normal ambient temperatures it is a liquid but it readily evaporates and small amounts are detectable in the atmosphere, hence it is known as a volatile organic compound. In the UK the main atmospheric sources of benzene are petrol-engined vehicles, petrol refining, and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems (LAQM.TG(03)). Diesel fuel also contains benzene but is a relatively small source in comparison to petrol. Other sources of benzene include cigarette smoking and low concentrations can be found in some foods and water.

4.3 Health effects

Benzene is a recognised genotoxic human carcinogen, it damages the genetic structure of cells. Studies of industrial workers accidentally exposed in the past to high levels of benzene have shown an excess risk of leukaemia, which increased in relation to their working lifetime exposure. Because benzene is a genotoxic carcinogen no absolutely safe level can be specified for ambient air.

The current objective set for benzene of 16.25 $\mu g/m^3$ measured as a running annual mean to be achieved by 31 December 2003, is based on advice from the Expert Panel on Air Quality Standards (EPAQS) that exposure to this level of benzene represents an exceedingly small risk to health. EPAQS did, however, take into account additional advice from the Committee on Carcinogenicity, that exposure to benzene should be kept as low as practicable, and also recommended a target of 3.25 $\mu g/m^3$ as a running annual mean. This has been adopted in the Air Quality Strategy as a long-term policy aim for benzene. The EU limit value of 5 $\mu g/m^3$ measured as a running annual mean to be achieved by 31 December 2010, that has been adopted in UK legislation, is working towards this aim.

4.4 The national perspective

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum 2003 states that estimated annual emissions of benzene decreased by 45% between 1990 and 1999, and projections show that emissions from road transport are expected to decrease by 79% between 1995 and 2010. This is due to a number of policy measures already in place and future planned ones. Since 1 January 2000 EU legislation has reduced the amount of benzene in petrol from 5% to below 1%, and it is presently about 0.7% by volume on average for fuel sold in the UK. In addition, 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 (LAQM.TG(03)).

Concentrations of benzene measured at UK national network monitoring sites during the period 1999-2001 at all urban background and roadside sites were significantly below the 2003 running annual mean objective of 16.25 $\mu g/m^3$. In 2001 the concentrations measured at urban background locations were also below the tighter 2010 running annual mean objective of 5 $\mu g/m^3$; however, levels elevated above this objective have been seen at some kerbside sites in the UK confirming the important contribution of traffic emissions (LAQM.TG(03)).

Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective at all urban background and roadside locations. The 2010 objective is expected to be met at all urban background sites and most roadside locations, but there is the possibility for some remaining exceedances that will need additional measures at a local level (LAQM.TG(03)).

LAQM.TG(03) advises that the potential impact of emissions from petrol stations has recently been investigated by DEFRA and the Devolved Administrations. They have found that there are two potential sources of benzene emissions: Stage 1 emissions when the underground storage tanks are filled and petrol vapour can be displaced, and Stage 2, when vehicles refuel at the petrol stations. All petrol stations with a throughput of above 1,000 cubic metres per annum were required to fit Stage 1 recovery systems before 1 January 1999. Any petrol stations with a lower throughput have been found to be very unlikely to have any significant effect on local benzene concentrations. Therefore LAQM.TG(03) advises that Stage 1 emissions are unlikely to have any effect on concentrations of benzene in the vicinity of petrol stations. There are Stage 2 recovery systems in place in some petrol stations but this is not a current legal requirement.

4.5 The local perspective

There were no AQMA's declared in the UK from the first round of review and assessments, in respect of the 2003 air quality objective of 16.25 $\mu g/m^3$ measured as a running annual mean for benzene. This supports the studies carried out at a national level. LAQM.TG(03) states that there is, therefore, no requirement for local authorities to consider road traffic emissions in their review and assessment of the 2003 objective. Only those local authorities with relevant receptor locations in the vicinity of major industrial processes that store, handle, or emit benzene will need to progress beyond this Updating and Screening Assessment for the 2003 objective.

In respect of the 2010 objective of 5 $\mu g/m^3$ measured as a running annual mean, data collected during the first round of review and assessments have indicated that there were exceedances of this objective in close vicinity to industrial sites (petrochemical processes), and to busy roads. Potential emissions from petrol stations have also been highlighted with respect to benzene concentrations.

DEFRA's technical guidance, LAQM.TG(03), states that whilst concentrations of benzene are expected to decline in future (as background concentrations fall), authorities will need to consider the above sources in their review and assessment of the 2010 objective. All local authorities should, therefore, undertake the Updating and Screening Assessment for benzene.

4.6 Updating and Screening Assessment for benzene

4.6.1 Monitoring data

There is no national network monitoring data available for benzene for the Suffolk Coastal area as there are no national network monitoring sites within the district.

Diffusion tubes

Local monitoring of monthly concentrations of benzene was undertaken at several roadside locations within the Suffolk Coastal district from April 1995 to April 2002. LAQM.TG(03) requests that all data collected since the first round of review and assessments (undertaken in 1999) be presented in this Updating and Screening report. In order to provide a reasonable and representative estimate of the annual mean concentration at a monitoring site, concentrations for at least 6 months of the year are needed, therefore, the annual means have not been presented where there are less than 6 months of data. A summary of the annual mean concentrations for each site since 1999 can be seen in tables 4.1 to 4.3. LAQM.TG(03) states that the annual mean concentrations obtained can be assumed to be equivalent to the running annual mean concentration for comparison with the objectives. Appendix B provides full details of monitoring locations, data for other years where available, and a breakdown of results on a monthly basis.

Monitoring was conducted using passive diffusion tubes that were exposed for the first two weeks in every month. The diffusion tubes measured, in addition to benzene, concentrations of toluene, ethylbenzene, m.p-xylene and o-xylene and for this reason are referred to as BTEX tubes. The results for benzene only are presented in this report. Two analytical laboratories were used over the course of the monitoring:

- Stanger Science and Environment (now Casella Stanger) provided and analysed diffusion tubes from April 1995 to July 1999. The laboratory was formally accredited for analysis of benzene diffusion tubes under the United Kingdom Accreditation Scheme (UKAS), but did not partake in any inter-laboratory comparison studies at that time.

- Harwell Scientifics provided and analysed diffusion tubes from July 1999 to April 2002. The laboratory was also formally accredited for analysis of benzene diffusion tubes under UKAS. Harwell Scientifics took part in the Workplace Analysis Scheme for Proficiency (WASP), an inter laboratory comparison study, during 2002 and was classed as a performance category ‘Good’ for analysis of benzene samples.

Diffusion tubes can under or over read and, if possible, should be compared to the results of continuous monitoring to ascertain a correction factor for any inaccuracies. This ratification of the diffusion tube data produced will then increase the accuracy of the results. During the monitoring period there were no co-location studies undertaken, either by ourselves or by the analytical laboratories used, which could be used to produce a factor to correct the diffusion tube results. Based on results of co-location studies which showed that BTEX diffusion tubes tended to underestimate benzene concentrations by 0.65–1.3 $\mu g/m^3$ (0.2-0.4 ppb), the DEFRA monitoring help-desk recommended that 1.3 $\mu g/m^3$ be added to the annual mean to correct for inaccuracies. The results of this can be seen in tables 4.1 to 4.3.

LAQM.TG(03) provides factors to predict the annual mean benzene concentration produced from diffusion tubes at roadside locations forward to 2003 and 2010, for comparison with the air quality objectives. The calculations used, and the results obtained can be seen in tables 4.1 to 4.3.

Table 4.1 Annual mean benzene concentrations obtained at monitoring locations in 1999, corrected for bias and factored forward to 2003 and 2010 for comparison with the objectives.

Site	1999			
	Annual mean concentration ($\mu g/m^3$)	**Annual mean concentration with bias correction factor (+ 1.3 $\mu g/m^3$)**	**Predicted annual mean concentration in 2003 ($\mu g/m^3$) (1999 annual mean x (0.871 ÷2.767)) #**	**Predicted annual mean concentration in 2010 ($\mu g/m^3$) (1999 annual mean x (0.647 ÷2.767)) #**
Woodbridge	2.9	4.2	**1.3**	**1.0**
Felixstowe	1.6	2.9	**0.9**	**0.7**
Kesgrave	1.6	2.9	**0.9**	**0.7**
Leiston	3.9	5.2	**1.6**	**1.2**
Farnham	N/A	N/A	N/A	N/A
Melton	N/A	N/A	N/A	N/A

LAQM.TG(03) provides factors to predict the annual mean benzene concentration produced from diffusion tubes at roadside locations forward to 2003 and 2010, for comparison with the air quality objectives.

Table 4.2 Annual mean benzene concentrations obtained at monitoring locations in 2000, corrected for bias and factored forward to 2003 and 2010 for comparison with the objectives.

Site	2000			
	Annual mean concentration ($\mu g/m^3$)	**Annual mean concentration with bias correction factor (+ 1.3 $\mu g/m^3$)**	**Predicted annual mean concentration in 2003 ($\mu g/m^3$) (2000 annual mean x (0.871 ÷1.069)) #**	**Predicted annual mean concentration in 2010 ($\mu g/m^3$) (2000 annual mean x (0.647 ÷1.069)) #**
Woodbridge	2.6	3.9	**3.2**	**2.4**
Felixstowe	1.0	2.3	**1.9**	**1.4**
Kesgrave	1.0	2.3	**1.9**	**1.4**
Leiston	N/A	N/A	N/A	N/A
Farnham	1.6	2.9	**2.4**	**1.8**
Melton	N/A	N/A	N/A	N/A

LAQM.TG(03) provides factors to predict the annual mean benzene concentration produced from diffusion tubes at roadside locations forward to 2003 and 2010, for comparison with the air quality objectives.

Table 4.3 Annual mean benzene concentrations obtained at monitoring locations in 2001, corrected for bias and factored forward to 2003 and 2010 for comparison with the objectives.

Site	2001			
	Annual mean concentration ($\mu g/m^3$)	**Annual mean concentration with bias correction factor (+ 1.3 $\mu g/m^3$)**	**Predicted annual mean concentration in 2003 ($\mu g/m^3$) (2001 annual mean x (0.871 ÷1.000)) #**	**Predicted annual mean concentration in 2010 ($\mu g/m^3$) (2001 annual mean x (0.647 ÷1.000)) #**
Woodbridge	2.6	3.9	**3.4**	**2.5**
Felixstowe	1.0	2.3	**2.0**	**1.3**
Kesgrave	1.0	2.3	**2.0**	**1.3**
Leiston	N/A	N/A	N/A	N/A
Farnham	N/A	N/A	N/A	N/A
Melton	2.0	3.3	**2.9**	**2.1**

LAQM.TG(03) provides factors to predict the annual mean benzene concentration produced from diffusion tubes at roadside locations forward to 2003 and 2010, for comparison with the air quality objectives.

From the results in tables 4.1 to 4.3 it can be seen that for all monitoring locations the 2003 objective of 16.25 μg/m^3 and the 2010 objective of 5 μg/m^3 will be met. **No further assessment of any of the monitoring locations will, therefore, be necessary.**

4.6.2 Very busy roads or junctions in built-up areas

The technical guidance in LAQM.TG(03) states that very busy roads and junctions in areas where the 2010 annual mean background is expected to be above 2 μg/ m^3 should be identified.

Annual mean background levels of benzene for 2010 in the UK have been estimated and mapped on a 1 km x 1km grid basis by netcen, on behalf of DEFRA and the Devolved Administrations. The information can be accessed from the internet at the following address; www.airquality.co.uk/archive/laqm/tools.php. From these mapped estimates the highest annual mean background level of benzene within the Suffolk Coastal area for 2010 is 0.395 μg/m^3.

The annual mean background level of benzene within the Suffolk Coastal area in 2010 is, therefore, considerably below 2 μg/ m^3. **Further investigation of any 'very busy' roads or junctions will not, therefore, be necessary.**

4.6.3 Industrial sources

The technical guidance in LAQM.TG(03) states that there may be a few petrochemical works that emit sufficient quantities of benzene to put the 2010 objective at risk of being exceeded. Even if such sources were considered in the first round of review and assessment they will need to be considered again with regard to the new objective. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

Industrial sources within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there is one authorised process within the Suffolk Coastal district with the potential to emit significant quantities of benzene:

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of benzene. Sizewell B is a pressurised water reactor nuclear power station and is regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

  There are three separate Environmental Protection Act 1990 authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The authorisation covering the fuel oil fired combustion process for the Essential Supplies Diesel Generators

(ESDG's) on the site (see Appendix C) is listed as a potentially significant emitter of benzene in LAQM.TG(03) requiring investigation. The ESDG's at Sizewell B are not operated continuously, they provide a back-up electrical supply to the power station if it is needed during shut down for maintenance, refuelling, etc. They are potentially significant emitters of benzene as they operate by burning fuel oil that can contain benzene as an additive or contaminant. Following discussions with the Environment Agency, it was considered that as the ESDG's are only operated as a back-up system they would not combust a quantity of fuel oil which would give rise to significant emissions of benzene. **Therefore**, **further assessment will not be necessary at this time.**

Industrial sources from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres, impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of benzene which would impact within the Suffolk Coastal district. **No further assessment will, therefore, be necessary.**

4.6.4 Petrol stations

LAQM.TG(03) advises that a twelve month study has been undertaken on benzene concentrations in the vicinity of petrol stations. This study concluded that a petrol station is unlikely to have any significant influence on concentrations of benzene close to residential properties where:

- the petrol throughput is less than 2000 cubic metres per annum
- the petrol pumps are more than 10 metres from residential properties, either horizontally or vertically.
- the petrol station is fitted with a canopy.

However, residential properties that are immediately above a petrol station may result in elevated concentrations of benzene.

LAQM.TG(03) states that there is some evidence that petrol stations will emit sufficient benzene to put the 2010 objectives at risk of being exceeded, especially if combined with higher levels from nearby roads. It states that all petrol stations with a throughput of more than 2,000 cubic metres per annum and with a 'busy road' nearby should be identified. A 'busy road' is classified as having a traffic flow greater than 30,000 vehicles per day. All petrol stations within the Suffolk Coastal district which have Stage 1 recovery systems (those which have a petrol throughput greater than 1000 cubic metres per annum are required to fit these) are listed in table 4.4 below. The presence, or absence, of a nearby 'busy road' to each of these is also shown in table 4.4. LAQM.TG(03) states, for any petrol stations which fall into this category, it shall be determined whether there is relevant exposure within 10 metres of the actual petrol pumps, this is also detailed in table 4.4 where relevant.

Table 4.4 Petrol stations within the Suffolk Coastal district with a throughput of greater than 1,000 cubic metres per annum (Stage 1 recovery systems fitted), presence of a busy road to the station, and distance of the closest receptor location to the pumps.

Petrol stations fitted with Stage 1 recovery systems, name and address	Is there a 'busy road' nearby ?	Distance of closest receptor location to pumps (if relevant)	Progression to Detailed Assessment ?
Shell Garage, A12 Northbound, Grove Road, Woodbridge	Yes	38 metres	**No**
Shell Garage, A12 Southbound, Grove Road, Woodbridge	Yes	24 metres	**No**
Haynings Service Station, Saxmundham Road, Framlingham	No	N/A	**No**
Safeway Petrol Station, Grange Farm Avenue, Cavendish Park Estate, Felixstowe	No	N/A	**No**
Sterling Motor Group, Woodbridge Road, Rushmere St. Andrew	No	N/A	**No**
Solar Garage, High Road West, Felixstowe	No	N/A	**No**
Sainsbury's Supermarkets Ltd., Felixstowe Road, Ipswich	No	N/A	**No**
Martlesham Heath Services, Anson Road, Martlesham Heath	Yes	112 metres	**No**
Felixstowe Dock Service Area, Anzani Avenue, Felixstowe	No	N/A	**No**
Tesco Stores Ltd., Anson Road, Martlesham Heath	Yes	227 metres	**No**
Stratford Service Station, A12 Main Road, Stratford St. Andrew	No	N/A	**No**
L.B. Shotter & sons, Waterloo Avenue, Leiston	No	N/A	**No**
R.C. Edmundson (Woodbridge Ltd.), Melton Road, Woodbridge	No	N/A	**No**
A.G. Potter Ltd., Station Road, Framlingham	No	N/A	**No**

From table 4.4 it can be seen that there are no petrol stations within the Suffolk Coastal district which require further investigation. **No further assessment will, therefore, be necessary**

4.6.5 Major fuel storage depots (petrol only)

There are no major fuel storage depots, current or planned, within the Suffolk Coastal district or any neighbouring authorities. **No further assessment will, therefore, be necessary.**

4.7 Conclusion

Suffolk Coastal District Council concludes that there is no risk of the air quality objectives for benzene being exceeded by the end of 2003 or 2010 in the Suffolk Coastal area.

5. Review and assessment of 1,3-butadiene

5.1 Air quality objectives

DEFRA and the Devolved Administrations have adopted an air quality objective for 1,3-butadiene of 2.25 μg/m^3 measured as a maximum running annual mean to be achieved by 31 December 2003.

5.2 Sources

1,3-Butadiene at normal temperature and pressure is a gas. Trace amounts can be found in the atmosphere, all are solely derived from human activity. It is derived mainly from the combustion of petrol and other materials. It is also used in industry, mainly in the production of synthetic rubber for tyres and is handled in bulk at a small number of industrial premises, and is present in cigarette smoke. The main source, however, is emissions from motor vehicle exhausts.

5.3 Health effects

The data on health effects is limited mainly to studies on animals and accidental exposure of workers to relatively high levels of 1,3-Butadiene. From studies it has been seen to cause a variety of cancers and damages the genetic structure of the cell as, like benzene, it is a recognised genotoxic human carcinogen. Studies on workers exposed to high levels have shown, in the long term, an excess risk of cancers of the lymphoid system and blood forming tissues. Lymphomas and leukaemia have also been seen. Because 1,3-butadiene is a genotoxic carcinogen no absolutely safe level can be specified for ambient air.

The current objective set for 1,3-butadiene, 2.25 μg/m^3 measured as a maximum running annual mean to be achieved by 31 December 2003, is based on advice from the Expert Panel on Air Quality Standards (EPAQS). EPAQS believes that exposure to this level of 1,3-butadiene represents an exceedingly small risk to the health of the population. EPAQS has, however, agreed that the standard should be reviewed in several years time to take into account any additional data on human health that may come to light.

5.4 The national perspective

Concentrations of 1,3-butadiene are measured at a limited number of UK national network monitoring sites. Maximum running annual mean concentrations measured at all urban background, urban centre and roadside sites are already well below the 2003 running annual mean objective of 2.25 μg/m^3 (LAQM.TG(03)).

The increasing numbers of vehicles fitted with three way catalysts will significantly reduce emissions of 1,3-butadiene in future years. New emission limits agreed for cars, light vans and heavy-duty vehicles sold from 2001 and 2006, together with improvements to fuel quality as part of the Auto-Oil programme, are expected to further reduce emissions from vehicle exhausts (LAQM.TG(03)).

These measures are expected to deliver the air quality objective by the end of 2003, and no further measures are thought to be necessary. Only those authorities with relevant locations within the vicinity of major industrial processes that handle, store or emit 1,3-butadiene are expected to proceed beyond the updating and screening assessment.

5.5 The local perspective

There were no AQMA's declared in the UK from the first round of review and assessments, in respect of the 2003 air quality objective of 2.25 $\mu g/m^3$ measured as a maximum running annual mean for 1,3-butadiene. This supports studies carried out at a national level, based on both measured and modelling data, which suggest that there is little likelihood of the objective for 1,3-butadiene being exceeded by 2003.

DEFRA's technical guidance, LAQM.TG(03), states that it is still important that local circumstances are fully taken into consideration, and all local authorities are, therefore, required to carry out a review and assessment for 1,3-butadiene at this time. They do envisage, however, that it is highly unlikely that any local authority will be required to proceed beyond the Updating and Screening Assessment.

5.6 Updating and Screening Assessment for 1,3-butadiene

5.6.1 Monitoring data

There is no monitoring data available for 1,3-butadiene for the Suffolk Coastal area. There are no national network monitoring sites within the district and no local monitoring has been undertaken for this pollutant.

5.6.2 New industrial sources

The technical guidance in LAQM.TG(03) states that no industrial sources were identified during the first round of review and assessment as likely to give rise to exceedences of the running annual mean objective. Any new sources, introduced since the first round of review and assessments, must be reviewed in this report. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

New industrial sources within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

Within this list there are no new processes, since the first round of review and assessments, that have the potential to emit significant quantities of 1,3-butadiene. There are also no planned developments within the Suffolk Coastal district that have the potential to emit significant quantities of 1,3-butadiene. **No further assessment will, therefore, be necessary.**

New industrial sources from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres, impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no new authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of 1,3-butadiene which would impact within the Suffolk Coastal district. **No further assessment will, therefore, be necessary.**

5.6.3 Industrial sources with substantially increased emissions

The technical guidance in LAQM.TG(03) states that no industrial sources were identified during the first round of review and assessment as likely to give rise to exceedances of the running annual mean objective. Any sources with substantially increased emissions since the first round of review and assessments must be reviewed in this report. LAQM.TG(03) advises that any emissions from a process which have increased by more than 30% are classed as substantially increased. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. Authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

Industrial sources with substantially increased emissions within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there is one authorised process within the Suffolk Coastal district with the potential to emit significant quantities of 1,3-butadiene:

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of 1,3-butadiene. Sizewell B is a pressurised water reactor nuclear power station and is regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

  There are three separate authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The authorisation covering the fuel oil fired combustion process for the Essential Supplies Diesel Generators (ESDG's) on the site (see Appendix C) is listed as a potentially significant emitter of 1,3-butadiene in LAQM.TG(03) requiring investigation. The ESDG's at Sizewell B are not operated continuously, they provide a back-up electrical supply to the power station if it is needed during shut down for maintenance, refuelling etc. They are potentially significant emitters of 1,3-butadiene as they operate by burning fuel oil that can contain 1,3-butadiene as an additive or contaminant. Following discussions with the Environment Agency, it was considered that as the ESDG's are only operated as a back-up system they would not combust a quantity of fuel oil which would give rise to significant emissions of benzene. **Therefore**, **no further assessment will be necessary at this time.**

Industrial sources with substantially increased emissions from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered it was determined that there are no authorised processes in neighbouring authorities which have the potential to emit significant quantities of 1,3-butadiene which would impact within the Suffolk Coastal district. **No further assessment will, therefore, be necessary.**

5.7 Conclusion

Suffolk Coastal District Council concludes that there is no risk of the air quality objective for 1,3-butadiene being exceeded by the end of 2003 in the Suffolk Coastal area.

6. Review and assessment of lead

6.1 Air quality objectives

DEFRA and the Devolved Administrations have adopted an air quality objective for lead of 0.5 μg/m^3 measured as an annual mean to be achieved by 31 December 2004.

In addition a second, lower, air quality objective has also been adopted for lead of 0.25 μg/m^3 measured as an annual mean to be achieved by 31 December 2008.

The 2004 objective is the same as the European Union limit value for lead set in the first Air Quality Daughter Directive which was agreed in June 1998. The additional, tighter, objective for 2008 has been added by DEFRA and the Devolved Administrations as they strongly believe that, in view of the health advice below, UK national policy should be to reduce concentrations of lead in the air to as low a level as reasonably practicable.

6.2 Sources

Lead is a naturally occurring non-ferrous metal found in the Earth's crust, and is released naturally by such processes as weathering, volcanic activity and uptake and release by plants. It is, however, also released into the atmosphere by human activities, and it is the most widely used non-ferrous metal with a large number of industrial applications.

Historically, most of the national airborne emissions of lead have been from petrol-engined vehicles; however, there is now a ban on sales of leaded petrol in the UK which has been in force since 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 in piping.

Direct human intake of lead occurs through ingestion of contaminated food, water and dust and from occupational sources. The main source of intake for most people is via food, which can be decreased by thorough washing of food before eating.

6.3 Health effects

Lead can be absorbed into the body through the lungs, stomach and intestines. Studies have shown that exposure to high levels may result in toxic biochemical effects in humans which in turn cause problems in the synthesis of haemoglobin for the blood, have effects on the kidneys, gastrointestinal tract, joints, reproductive system and can cause acute damage to the nervous system.

Of greater concern, however, are the more subtle effects seen through long-term exposure to lower levels of lead. Once absorbed, lead accumulates, particularly in the bone, teeth, skin and muscle where it is very stable, and it is released over months or years into the blood from where it exerts its effects. Studies have shown that lead has adverse effects on the developing brains of children and hence intellectual development.

The more stringent current objective set for lead, 0.25 μg/m^3 measured as an annual mean to be achieved by 31 December 2008, is based on advice from the Expert Panel on Air Quality Standards (EPAQS). EPAQS believe that exposure to this level of lead would make the effects on the health of children, the most vulnerable group, so small as to be undetectable. It took into account that, usually, only a small amount of total lead intake is from inhalation, the main sources being food and water

intake. It also accounted for the fact that lead in the air is deposited through rain and dust onto crops and the soil and can, therefore, be ingested through this route.

6.4 The national perspective

Concentrations of lead were measured at a number of UK national network monitoring sites between 1999 and 2001. Annual mean concentrations measured at all background and kerbside sites were well below the objectives for 2004 and 2008, 0.5 $\mu g/m^3$ and 0.25 $\mu g/m^3$ respectively (LAQM.TG(03)).

Detailed assessments, on potential impacts of lead emissions from industrial processes, have been undertaken on behalf of DEFRA and the Devolved Administrations. Monitoring has included a 12-month survey in the vicinity of 30 key industrial sites in the UK and has been used to supplement other information already provided. This data has generally indicated no exceedances of the 2004 or 2008 objectives, although locations in close proximity to non-ferrous metal production and foundry processes were deemed to be at risk and further investigations are being undertaken (LAQM.TG(03)).

6.5 The local perspective

There were no AQMA's declared in the UK from the first round of review and assessments, in respect of the 2004 and 2008 air quality objectives of 0.5 $\mu g/m^3$ and 0.25 $\mu g/m^3$ respectively measured as an annual mean for lead.

DEFRA's technical guidance, LAQM.TG(03), states that only those local authorities with relevant locations in the vicinity of major industrial processes that emit significant quantities of lead, will be required to proceed beyond the Updating and Screening Assessment.

6.6 Updating and Screening Assessment for lead

6.6.1 Monitoring data outside an Air Quality Management Area

There is no monitoring data available for lead for the Suffolk Coastal area. There are no national network monitoring sites within the district and no local monitoring has been undertaken for this pollutant.

6.6.2 New Industrial sources

The technical guidance in $LAQM.TG_{(03)}$ states that no industrial sources were identified during the first round of review and assessment as likely to give rise to exceedences of the annual mean objectives. Any new sources, introduced since the first round of review and assessments, must be reviewed in this report. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

New industrial sources within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

Within this list there are no new processes, since the first round of review and assessments, that have the potential to emit significant quantities of lead. There are also no planned developments within the Suffolk Coastal district that have the potential to emit significant quantities of lead. **No further assessment will, therefore, be necessary.**

New industrial sources from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no new authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of lead which would impact within the Suffolk Coastal district. **No further assessment will, therefore, be necessary.**

6.6.3 Industrial sources with substantially increased emissions

The technical guidance in LAQM.TG(03) states that no industrial sources were identified during the first round of review and assessment as likely to give rise to exceedences of the annual mean objective. Any sources with substantially increased emissions since the first round of review and assessments must be reviewed in this report. LAQM.TG(03) advises that any emissions from a process which have increased by more than 30% are classed as substantially increased. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. Authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

Industrial sources with substantially increased emissions within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there is one authorised process within the Suffolk Coastal district with the potential to emit significant quantities of lead:

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of lead. Sizewell B is a pressurised water reactor nuclear power station and is

regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

There are three separate authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The authorisation covering the fuel oil fired combustion process for the Essential Supplies Diesel Generators (ESDG's) on the site (see Appendix C) is listed as a potentially significant emitter of lead in LAQM.TG(03) requiring investigation. Following discussions with the Environment Agency, it was considered that as the ESDG's do not use leaded fuel oil there would not be any emissions of lead from this process. **Therefore**, **no further assessment will be necessary at this time.**

Industrial sources with substantially increased emissions from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are three authorised processes in neighbouring authorities with the potential to emit significant quantities of lead that may impact within the Suffolk Coastal district:

- White Rose Environmental Limited, Ipswich Hospital, Heath Road, Ipswich. This is a clinical waste incinerator, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 1km from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on emissions of lead from this process, which have fallen from 8.5 kg in 1999 to 0.89 kg in 2002. As emissions of lead have actually reduced from this process since the first round of review and assessments undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared in the first round, **no further assessment will be necessary at this time.**

- Agilent Technology (formerly B. T. & D Hewlett Packard Ltd.), Whitehouse Road Industrial Estate, Ipswich. This is an inorganic chemical process, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 3 km from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on this process, and has confirmed that it has no emissions of lead. **No further assessment will, therefore, be necessary at this time.**

- Crane Ltd, Nacton Road, Ipswich. This is a foundry for the manufacture of valves, an authorised process regulated by Ipswich Borough Council. This process is within the Ipswich Borough and is approximately 0.3 km from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council is currently investigating emissions of lead from this process, and will undertake an Updating and Screening Assessment as soon as all of the required information is available. **The findings of Ipswich Borough Council with regard to this process will be presented in the Detailed Assessment report for Suffolk Coastal District Council, to be produced in April 2004.**

6.7 Conclusion

On the basis of completed work, Suffolk Coastal District Council concludes that there is no risk of the air quality objective for lead being exceeded by the end of 2004 or 2008 in the Suffolk Coastal area.

The outcome of investigations by Ipswich Borough Council into Crane Limited, a site 0.3 km from the Suffolk Coastal boundary, will be considered before the final conclusions for lead are made.

7. Review and assessment of nitrogen dioxide (NO_2)

7.1 Air quality objectives

DEFRA and the Devolved Administrations have adopted two air quality objectives for nitrogen dioxide (NO_2). Both objectives are only provisional at this time and are as follows:

- 40 $\mu g/m^3$ measured as an annual mean to be achieved by 31 December 2005.
- 200 $\mu g/m^3$ measured as a 1-hour mean not to be exceeded more than 18 times per year, to be achieved by 31 December 2005.

The National Air Quality Regulations 1997 originally set a provisional maximum 1-hour objective for NO_2 of 286 $\mu g/m^3$ to be achieved by 31 December 2005, based on advice from the Expert Panel on Air Quality Standards (EPAQS). The current objective, of 200 $\mu g/m^3$ measured as a 1-hour limit not to be exceeded more than 18 times per year, is from the Revised Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000. These changes were based on European Union limit values set in the first Air Quality Daughter Directive, agreed at Environment Council in June 1998, which used the World Health Organisation air quality guideline.

7.2 Sources

Nitrogen oxides are gases formed during high temperature combustion processes from the oxidation of nitrogen in the air or fuel. They are released into the atmosphere mainly in the form of nitric oxide (NO), which is then readily oxidised to nitrogen dioxide (NO_2) by reaction with ozone. NO and NO_2 are, therefore, both oxides of nitrogen and are collectively known as nitrogen oxides (NO_x).

There are many natural sources of NO_x in the atmosphere, including lightning, forest fires, soil bacterial activity and plant metabolism. The largest source, however, is from human activity – the combustion of fossil fuels such as those found in petrol, oil, coal and gas. The principal man-made source is from road transport, which accounted for 49% of total emissions in the UK in 2000. Major roads carrying large volumes of high-speed traffic (motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic. NO and NO_2 contributions from road traffic are, therefore, greatest in urban areas where traffic is heaviest. Elevated levels can occur in these areas when meteorological conditions are stable and the air mass is unable to disperse. Other important man-made sources include the electricity supply industry that accounted for about 24% of emissions in 1999, and other industrial and commercial sectors that accounted for about 23% of emissions in 1999.

Sources of indoor exposure for individuals to NO_x are gas cooking, paraffin heaters and cigarette smoke.

Once formed, NO_x reacts chemically in the atmosphere, contributing to the formation of ozone, photochemical smog, nitric acid and nitrates. Nitric acid and nitrates can be removed from the atmosphere by direct deposition to the ground or via the transfer to aqueous droplets, thereby contributing to acid deposition. Nitrates can also remain in the air as very small particles that disperse widely and contribute to the airborne concentrations of small particles known as PM_{10}.

7.3 Health effects

NO is produced naturally by cells in the lungs and respiratory tract and is not harmful to man when inhaled at the concentration likely to occur in the ambient atmosphere. NO_2, however, is an irritant gas that is known to have serious and sometimes fatal effects if inhaled at very high concentrations.

At relatively high levels NO_2 causes inflammation of the airways. Studies undertaken on accidental industrial exposure to NO_2 show that it can cause very severe lung damage and is often fatal. There is also evidence to show that long-term exposure to lower levels, which can occur in the ambient atmosphere both indoors and outdoors, may affect lung function. People with healthy lungs show little response to NO_2 at levels well above those in the ambient air; however, people with asthma show airway problems at much lower levels. Thus, ambient air concentrations of NO_2 have been seen to intensify symptoms associated with respiratory illness and enhance the response to allergens in sensitised individuals.

For the above health reasons EPAQS advised that a short-term, 1-hour limit for NO_2 of 286 $\mu g/m^3$ be adopted. They also considered that a longer-term standard was desirable, but concluded that there was insufficient evidence at the time (1996) to set an appropriate figure. The two current objectives adopted by DEFRA and the Devolved Administrations are based on European Union limit values set in the first Air Quality Daughter Directive, agreed in June 1998, which used the World Health Organisation air quality guideline, for which the 1-hour limit is more stringent.

7.4 The national perspective

The contribution of road transport to NO_x emissions has declined significantly in recent years as a result of various policy measures, and further reductions are expected up until 2010 and beyond. NO_x emissions from urban traffic are estimated to fall by about 20% between 2000 and 2005 and by 46% between 2000 and 2010 (LAQM.TG(03)).

Emissions from the electricity supply industry and other industrial and commercial sectors have also declined dramatically due to the fitting of low NO_x burners, and the increased use of natural gas plant. Industrial sources make only a very small contribution to annual mean NO_2 levels, although breaches of the hourly objective may occur under certain circumstances due to emissions from these sources.

Concentrations of NO_2 were measured at UK national network monitoring sites during the period 1999-2001 and are summarised in LAQM.TG(03). Results from monitoring showed that the annual mean NO_2 objective is widely exceeded at roadside sites throughout the UK, with exceedances also seen at urban background locations in major conurbations. The number of exceedances of the 1-hour objective show considerable variation from year-to-year and are driven by meteorological conditions which give rise to winter episodes of poor dispersion and summer oxidant episodes. In recent years, exceedances of the 1-hour objective have generally only been seen at roadside or kerbside sites in close proximity to roads in major conurbations that have large volumes of traffic on them.

Modelling studies suggest that in general achieving the annual mean objective of 40 $\mu g/m^3$ is more demanding than achieving either the former or current hourly objectives. If the annual mean is achieved, then the modelling suggests that the hourly objectives will also be achieved. 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 roads.

7.5 The local perspective

From the first round of review and assessments there were over 100 AQMA's declared for NO_2, the vast majority of which were related specifically to road traffic emissions where attainment of the annual mean objective was considered unlikely. Exceedances of the objective were identified within major conurbations, within smaller town centres with congested traffic, and alongside dual carriageways and motorways in more rural areas.

Exceedances have also been predicted in the vicinity of major airports, where both road traffic and aircraft NO_x emissions combine. For industrial sources, although they may make a contribution to local pollutant levels, no exceedances of the objectives have been identified as a direct result of these emissions alone.

An analysis of monitoring data in the vicinity of roads throughout the UK has been undertaken and reported on in LAQM.TG(03), and this provides useful guidance to local authorities on where exceedances might occur. The conclusion is that, outside of major conurbations, exceedances of the annual mean objective are only likely to occur within about 10 metres of the kerbside of single carriageway roads. This includes roads with relatively low traffic flows of 10,000 to 20,000 vehicles per day if they are in congested town centres. This conclusion is significant as many market towns have narrow streets with residential properties within 5 metres of the kerb. The other finding of the study is that, despite higher traffic flows, exceedances of the annual mean objective are only likely within about 5 metres of the kerbside or hard shoulder of dual carriageways outside of major conurbations.

DEFRA and the Devolved Administrations have also recently released new road traffic emissions factors. These new factors reflect the findings of studies undertaken, which have shown that new vehicles produced in future years will have expected higher NO_x emissions than first identified. NO_x emissions from road transport will, therefore, be slightly higher than originally predicted. At a national level these changes are expected to be relatively minor, but more significant changes may be seen at a local level depending upon the traffic mix. The effect of these factors will also be to change the predicted background concentrations in future years, as these are derived from the estimates of future fleet mix and vehicle emissions.

All local authorities are, therefore, expected to complete the Updating and Screening Assessment for NO_2. It is critical that local authorities focus upon those locations where they expect pollutant concentrations to be the highest. Focussing on these areas should ensure that potential exceedances are not missed. If there are no exceedances of the objectives at the most polluted locations, then it can be reasonably concluded that there should be no exceedances elsewhere.

7.6 Updating and Screening Assessment for nitrogen dioxide

7.6.1 Monitoring data outside an Air Quality Management Area

There is no national network monitoring data available for NO_2 for the Suffolk Coastal area as there are no national network monitoring sites within the district.

Continuous monitoring

Monitoring of NO_2 by ozone chemiluminescence was undertaken at two sites within the Suffolk Coastal district:

- Monitoring was undertaken for a Stage 3 assessment of traffic using the A14 trunk road in the first round of review and assessments. The monitoring location was to the south of the A14, west

of the town of Felixstowe at a relevant receptor location to the A14 trunk road. Monitoring provided continuous recordings of ambient concentrations of NO_x and NO_2 for a three-month period from the end of January to the beginning of May 2001. The purpose of the monitoring was to provide local data against which the results of dispersion modelling for emissions from traffic using the A14 could be validated and corrected if needed. The details of this monitoring and the findings of the investigation have already been published and can be found in Appendix G, Part II in the 'Report on the Third Stage Review and Assessment of Air Quality in the Suffolk Coastal District', November 2001. The predictions from modelling showed that exceedance of the objectives was not likely at receptor locations on the A14 by the end of 2005 and, therefore, an Air Quality Management Area was not designated. The summary table from the report to show the results of monitoring can be seen in table 7.1 below.

Table 7.1 Summary table of continuous monitoring results for nitrogen oxides and nitrogen dioxide, undertaken at a relevant receptor location to the A14 near Felixstowe.

Statistic	Nitrogen oxides concentration	Nitrogen dioxide concentration
Minimum 1-hour ($\mu g/m^3$)	2.5	1.7
Maximum 1-hour ($\mu g/m^3$)	361.1	79.2
Range of the above ($\mu g/m^3$)	358.6	77.5
19^{th} highest hourly value – 3 month period ($\mu g/m^3$)	267.3	69.3
Mean ($\mu g/m^3$)	**42.0**	**30.5**
Data capture (%)	99.9	99.9

- NO_2 was also measured by ozone chemiluminescence from 22 February 2002 to 10 February 2003 at the nearest relevant receptor location to the junction of the B1438 and A1152 at Melton.

  Monitoring of NO_2 by ozone chemiluminescence is the reference method specified by the EC Nitrogen Dioxide Directives. Calibration methods employed included primary calibration by permeation tube, and gravimetric cylinder and static dilution. In addition, transfer calibration by cylinder audit was undertaken during a fortnightly site visit. The expected accuracy of the method for NO_2 is ±10-11% with a precision of ±3.5ppb. The continuous analyser records levels in parts per billion (ppb), these values are then converted to $\mu g/m^3$ using a factor of 1.91. Site auditing, checking of calibration data, quality control and scaling of real-time results were undertaken by an external laboratory.

  Table 7.2 below shows the daily average measured concentrations throughout the monitoring period. A summary table and graph showing more detailed results of the monitoring can be seen in Appendix D. From table 7.2 it can be seen that the average concentration is below the annual mean objective for NO_2.

Table 7.2 Summary of continuous nitrogen oxides and nitrogen dioxide ratified data collected at a site in Melton from 22 February 2002 to 10 February 2003.

	Concentration of nitrogen dioxide	Concentration of nitrogen oxides
Average concentration	32.5 $\mu g/m^3$	74.5 $\mu g/m^3$
Maximum daily concentration	59.0 $\mu g/m^3$	229.0 $\mu g/m^3$
Data capture	94.9%	94.9%

The results from this monitoring have been used in model validation to assess concentrations of NO_2 from traffic emissions at two road junctions within the Suffolk Coastal district. The modelling was undertaken as a detailed assessment by netcen, on behalf of Suffolk Coastal District Council, and is discussed in more detail later in this chapter of the report, within the 'road junctions' section. The report on the modelling of these junctions is attached as Appendix I.

Diffusion tubes

Local monitoring of monthly concentrations of NO_2 has been undertaken at a number of locations within the Suffolk Coastal district since March 1993. LAQM.TG(03) requests that all data collected since the first round of review and assessments (undertaken in 1999) be presented in this Updating and Screening Assessment report. A summary of the annual mean concentrations for each site from 1999 can be seen in table 7.3. In order to provide a reasonable estimate of the annual mean concentration at a monitoring site, concentrations for at least 6 months of the year are needed; therefore, the annual means have not been presented where there are less than 6 months of data. Appendix E contains full details of monitoring locations, data for other years where available, and a breakdown of results on a monthly basis.

Monitoring was conducted using passive diffusion tubes, exposed on a monthly basis. The analytical laboratory used for supply and analysis of diffusion tubes from 1999 onwards was Harwell Scientifics. The laboratory was formally accredited for analysis of NO_2 diffusion tubes under the United Kingdom Accreditation Scheme (UKAS). Harwell Scientifics participate in the Workplace Analysis Scheme for Proficiency (WASP) for analysis of diffusion tubes. This is an inter-laboratory comparison study for analysing diffusion tubes and the results show that Harwell Scientifics are categorised as a 'Good' laboratory for the years 1999 to 2003.

Diffusion tubes can under or over read and, if possible, should be compared to the results of continuous monitoring to ascertain a correction factor for any inaccuracies. This process in known as ratification (or bias correction) of the diffusion tube data and will increase the accuracy of the results. A factor for bias correction can be obtained in two ways, either by using results from tubes co-located with a continuous analyser, or by using the results of the United Kingdom National Diffusion Tube Survey Field Comparison Exercise. The more accurate method is a local co-location study as tube bias may alter in different situations, for example, tube bias in a city may vary from that in a rural location.

Three diffusion tubes were co-located by Suffolk Coastal District Council with a continuous analyser, sited in Melton, from March to December 2002. Further details with regard to the continuous analyser can be seen in the previous section of this report. The diffusion tubes exposed at this site are classed as 'Melton 5' in table 7.3, and they recorded an average NO_2 concentration of 36.1 $\mu g/m^3$ in 2002. Over the same time period the continuous analyser recorded an average NO_2 concentration of 32.5 $\mu g/m^3$, details of these results can be seen in Appendix D. From these two figures we were able to obtain a bias correction factor of 0.90 ($32.5 \div 36 = 0.90$) for 2002. The diffusion tube results for 2002 at all sites were, therefore, multiplied by this adjustment factor to correct for the over reading shown by the tubes, the results of this can be seen in table 7.3.

For 1999, 2000 and 2001 Suffolk Coastal did not undertake any co-location of diffusion tubes with a continuous analyser. Harwell Scientifics, therefore, provided bias correction factors for their laboratory for each of these years from the results of the United Kingdom National Diffusion Tube Survey Field Comparison Exercise. These results are listed below and the diffusion tube results for each year, at all sites, were multiplied by this adjustment factor to correct for the over reading shown for the tubes - the results of this can be seen in table 7.3.

Year 1999 – bias correction factor of 0.96
Year 2000 – bias correction factor of 0.60
Year 2001 – bias correction factor of 0.66

LAQM.TG(03) provides factors to predict the annual mean NO_2 concentration produced from diffusion tubes at roadside and background locations forward to 2005, for comparison with the air quality objectives. The calculations used, and the results obtained can be seen in table 7.3.

From the results in table 7.3 it can be seen that there are three sites in 2002 which, when predicted forward to 2005, are above the annual mean objective of 40 $\mu g/m^3$, these are in the cells shaded grey.

- The first site is Kesgrave 2 a, b & c, this is a triplicate site less than 1 metre from the kerb on the A1214 at Kesgrave. The site is approximately 120 metres from the junction with Bell Lane, which is controlled by traffic lights. This section of road experiences stationary queuing traffic at peak hours. The nearest relevant receptor location to the diffusion tube site is 2.6 metres from the kerb. **Due to the elevated diffusion tube readings at this site further assessment will be necessary in the form of a Detailed Assessment.** A continuous analyser was located at this site in March 2003 and is co-located with a triplicate diffusion tube site. The site is 2.6 metres from the kerb (the same distance as the nearest relevant receptor location). The findings from this monitoring will be reported in the Detailed Assessment report to be completed in April 2004.

- The second site is Woodbridge 1 a, b & c, this is a triplicate site 2.6 metres from the kerb on the B1438 at the junction of Lime Kiln Quay Road, The Thoroughfare and St. John's Street, Woodbridge. This junction is controlled by traffic lights and experiences stationary queuing traffic at peak hours, in addition the junction consists of a sharp bend which slows all traffic passing through it.

  The nearest relevant receptor location is 2.6 metres from the kerb, and this triplicate diffusion tube site is located on it. During the first round of LAQM reports, this junction progressed to a Stage 3 review and assessment, for which complex modelling was undertaken. The findings of the Stage 3 review and assessment were that there was no significant risk of exceedances of the annual mean or hourly NO_2 objectives at relevant receptor locations, and Air Quality Management Area did not need to be declared. We have continued to monitor the junction since this time and obtained traffic count data for 2002. **A Detailed Assessment has been undertaken using computer modelling for this junction, the findings of which are discussed later in this chapter of the report within the 'road junctions' section.**

- The third site is Melton 3 a, b & c, this is a triplicate site less than 1 metre from the kerb located on the Wilford Bridge Road arm of the B1438 and A1152 crossroads at Melton. This junction is controlled by traffic lights and experiences stationary queuing traffic at peak hours. The nearest relevant receptor location is 3.9 metres from the kerb and has the triplicate diffusion tube site 'Melton 5 a, b & c' on its nearest boundary. The triplicate site at Melton 3 is, therefore, not a relevant receptor location and the results for Melton 5 at the nearest receptor are within the objective levels. During the first round of LAQM reports, this junction progressed to a Stage 3 review and assessment, for which complex modelling was undertaken. The findings of the Stage 3 review and assessment were that there was no significant risk of exceedances of the annual mean or hourly NO_2 objectives at relevant receptor locations, and an Air Quality Management Area did not need to be declared. The junction has been monitored since this time, both with diffusion tubes and a continuous analyser, as detailed above, and traffic count data for 2002 has been obtained. **A Detailed Assessment has been undertaken using computer modelling for this junction, the findings of which are discussed later in this chapter of the report within the 'road junctions' section.**

Table 7.3 Annual mean nitrogen dioxide concentrations recorded at sites within the Suffolk Coastal district from 1999 to 2002, figures in micrograms per cubic metre (µg/m^3). Annual mean concentration at each site then corrected for bias and predicted forward to 2005.

Site and category: K = Kerbside R = Roadside I = Intermediate UB = Urban background Ind = Industrial Ru = Rural	Location	1999			2000			2001			2002		
		Annual mean	Annual mean corrected for bias (x 0.96)	Predicted annual mean in 2005 (K+R sites = x0.83 others=x0.85)	Annual mean	Annual mean corrected for bias (x 0.60)	Predicted annual mean in 2005 (K+R sites=x0.86 others=x0.89)	Annual mean	Annual mean corrected for bias (x 0.66)	Predicted annual mean in 2005 (K+R sites=x0.89 others=x0.91)	Annual mean	Annual mean corrected for bias (x 0.90)	Predicted annual mean in 2005 (K+R sites=x0.92 others=x0.93)
Felixstowe 1 (K)	High Road West	47.0	45.1	**37.4**	44.3	26.6	**22.9**	43.8	28.9	**25.7**	~	~	~
Felixstowe 2 (I)	High Road West	37.8	36.3	**30.9**	37.1	22.3	**19.9**	41.6	27.5	**25.0**	~	~	~
Felixstowe 3 (UB)	Princes Gardens	35.0	33.6	**28.6**	34.6	20.8	**18.5**	32.4	21.4	**19.5**	~	~	~
Felixstowe 4 (UB)	Lynwood Avenue	31.3	30.0	**25.5**	31.1	18.7	**16.6**	29.2	19.3	**17.6**	31.5	28.4	**26.4**
Felixstowe 5 (R)	High Road West	~	~	~	~	~	~	41.8	27.6	**24.6**	40.9	36.8	**33.9**
Felixstowe 6 (R)	Nayland Road	~	~	~	~	~	~	45.1	29.8	**26.5**	46.3	41.7	**38.4**
Felixstowe 7 (Ind)	Carr Road	~	~	~	~	~	~	43.6	28.8	**26.2**	43.8	39.4	**36.6**
Felixstowe 8 (UB)	Victoria Street	~	~	~	~	~	~	34.1	22.5	**20.5**	~	~	~
Felixstowe 9 (UB)	Brinkley Way	~	~	~	~	~	~	26.5	17.5	**15.9**	28.5	25.7	**23.9**
Felixstowe 10 (UB)	Rosebery Road	~	~	~	~	~	~	30.4	20.1	**18.3**	~	~	~
Felixstowe 11 (K)	Hamilton Road	~	~	~	~	~	~	~	~	~	44.8	40.3	**37.1**
Kesgrave 1 (R)	Main Road	38.4	36.9	**30.6**	34.2	20.5	**17.6**	35.2	23.2	**20.7**	~	~	~
Kesgrave 2 (I)	Main Road	26.7	25.6	**21.8**	23.7	14.2	**12.6**	~	~	~	~	~	~
Kesgrave 2 & 2 a,b,c (K)	Main Road	~	~	~	~	~	~	48.2	31.8	**28.3**	56.7	51.0	**46.9**
Kesgrave 3 (UB)	Grange farm	26.7	25.6	**21.8**	25.2	15.1	**13.4**	25.2	16.6	**15.1**	~	~	~
Kesgrave 4 (UB)	Main Road	26.1	25.1	**21.3**	25.8	15.5	**13.8**	23.3	15.4	**14.0**	24.4	22.0	**20.5**
Kesgrave 5 (R)	Main Road	~	~	~	~	~	~	36.9	24.4	**21.7**	~	~	~
Woodbridge 1 (K)	Thoroughfare	47.9	46.0	**38.2**	52.1	31.1	**26.9**	52.1	34.4	**30.6**	~	~	~
Woodbridge 1a,b,c (K)	Thoroughfare	~	~	~	~	~	~	~	~	~	57.7	51.9	**47.8**
Woodbridge 2 (I)	Thoroughfare	31.5	30.2	**25.7**	30.6	18.4	**16.4**	~	~	~	~	~	~
Woodbridge 3 (UB)	Kingston Farm Rd	21.6	20.7	**17.6**	22.7	13.6	**12.1**	22.1	14.6	**13.3**	23.1	20.8	**19.3**
Woodbridge 4 (UB)	Ransom Road	25.0	24.0	**20.4**	24.6	14.8	**13.2**	26.1	17.2	**15.7**	~	~	~
Woodbridge 5 a,b,c (R)	Thoroughfare	~	~	~	~	~	**~**	~	~	~	39.2	35.3	**32.5**
Leiston 1 (K)	High Street	36.7	35.2	**29.2**	~	~	~	~	~	~	~	~	~
Leiston 2 (I)	High Street	22.0	21.1	**17.9**	~	~	~	~	~	~	~	~	~
Leiston 3 (UB)	Farrow Close	17.8	17.1	**14.5**	~	~	~	~	~	~	~	~	~
Leiston 4 (UB)	Seaward Avenue	17.8	17.1	**14.5**	~	~	~	~	~	~	~	~	~
Farnham 1 (K)	The Street	~	~	~	41.3	24.8	**21.3**	~	~	~	~	~	~
Farnham 2 (Ru)	Park Rd, Benhall	~	~	~	15.7	9.4	**8.4**	~	~	~	~	~	~
Melton 1 (K)	Melton crossroads	~	~	~	49.5	29.7	**25.5**	51.6	34.1	**30.4**	~	~	~
Melton 2 (UB)	Hall Farm Road	~	~	~	20.6	12.4	**11.0**	18.5	12.2	**11.1**	19.0	17.1	**15.9**
Melton 3 (K)	Melton crossroads	~	~	~	~	~	~	47.5	31.4	**28.0**	~	~	~
Melton 3 a,b,c (K)	Melton crossroads	~	~	~	~	~	~	~	~	~	52.5	47.3	**43.5**
Melton 4 a,b,c (R)	Melton crossroads	~	~	~	~	~	~	~	~	~	41.3	37.2	**34.2**
Melton 5 a,b,c (R)	Melton crossroads	~	~	~	~	~	~	~	~	~	36.1	32.5	**29.9**

7.6.2 Monitoring data within an Air Quality Management Area

There are currently no Air Quality Management Areas designated within the Suffolk Coastal district and, therefore, this section is not applicable.

7.6.3 Narrow congested streets with residential properties close to the kerb

DEFRA has examined the results from the first round of review and assessments, which have shown that concentrations of NO_2 are often higher where traffic is slow moving with stop/start driving, and where buildings either side of the road reduce the dispersion of traffic emissions. Such locations were not always considered fully during the first round of review and assessments and, in such cases, should be now considered in this Updating and Screening Assessment report. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) states that all areas where there may be narrow congested streets with residential properties close to the kerb must be considered. Only areas where the average traffic speed is 50 kilometres per hour (kph) or less, the traffic flow is greater than 10,000 vehicles per day, the carriageway is less than 10 metres wide, and where there are residential properties within 5 metres of the kerb are relevant for consideration here.

Using local knowledge of the district, traffic flow data, and measurements taken from the Suffolk Coastal District Council Geographic Information System, there are no streets within the Suffolk Coastal district which fall into this classification. **No further assessment will, therefore, be necessary**.

7.6.4 Road junctions

DEFRA has examined the results from the first round of review and assessments, and has concluded that road junctions were not considered by many local authorities. In such cases, they should now be considered in this Updating and Screening Assessment. Two road junctions within the Suffolk Coastal district were assessed in the first round of review and assessment, as results of diffusion tube monitoring for NO_2 at the junctions showed elevated levels. No Air Quality Management Areas were declared for either of these junctions following the detailed Third Stage assessment but continued monitoring has been undertaken and a further assessment undertaken at each, as detailed below.

LAQM.TG(03) states that all ‘busy junctions’ where members of the public may be exposed within 10 metres of the kerb must be considered. A ‘busy junction’ is classed as one with more than 10,000 vehicles per day. Flows from each road link to the junction should be added together, as detailed in LAQM.TG(03) to give a combined total.

Local knowledge of the district has been used, together with available traffic flow data and measurements taken from the Suffolk Coastal District Council Geographic Information System, to ascertain which road junctions will fall into this category. There is not a complete traffic data set available for every junction within the Suffolk Coastal district, and so a number of junctions have been assessed which will be representative for the district. Most of the junctions that have been assessed have high combined traffic flows and receptor locations close to the kerbside, these will represent a worse case scenario for most junctions, to determine whether further Detailed Assessment is necessary for the district.

The junctions that have been investigated for this Updating and Screening Assessment are listed as follows:

- The junction of the A1152 and the B1438 in Melton (the Melton crossroads).
- The junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge.
- The junction of the B1438 and Pytches Road in Woodbridge.
- The roundabout connecting the A1214 and the A12 in Martlesham.
- The junctions of Dobbs Lane and Bell Lane with the A1214 in Kesgrave.
- The roundabout connecting the A12 and the B1079 in Woodbridge.
- The junction of the A12 and the A1120 in Yoxford.
- The junction of High Road West and Garrison Lane in Felixstowe.
- The roundabout connecting High Road East and West, Beatrice Avenue and Hamilton Road in Felixstowe.

LAQM.TG(03) advises that traffic information should be obtained and the Design Manual for Road and Bridges (DMRB) screening method undertaken for each area of concern to determine whether any exceedance of the objectives is likely. DMRB is explained in detail in chapter 2 in this report.

For the first two junctions in the above list, an assessment was made at Stage 3 in the first round of review and assessments. In this report, for both junctions, the DMRB screening model has not been used, instead external consultants have been employed to undertake a Detailed Assessment for each. Further details are discussed below and the report is attached as Appendix I.

For the remaining junctions, traffic information on flows, speeds and percentage of heavy and light duty vehicles was obtained for these junctions and can be seen in Appendix A. The guidance in LAQM.TG(03) provides advice on how to split different types of junctions into a number of road links, depending on the number of arms to the junction and traffic flows on each arm. This was undertaken as detailed in LAQM.TG(03) for each junction and the data for each link can be seen from the DMRB input data in Appendix A. Local background concentrations were obtained from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at www.airquality.co.uk. The nearest relevant receptor locations were identified for each link of the junction and the distance to the centre of the road for each link was measured.

The DMRB screening method was run for each of the junctions, the calculated annual mean NO_2 concentration from the roads was added to the background concentration to obtain the predicted concentration in 2005, and a summary of the results can be seen in tables 7.4 to 7.7. Details of the DMRB input information can be seen in Appendix A. The DMRB model predicts the annual mean NO_2 concentration for direct comparison with the annual mean objective, but not the 1-hour concentration. LAQM.TG(03) states that if the annual mean objective is not exceeded the authority may confidently assume that the 1-hour objective will also be met. For this reason care has been taken when measuring distances to the nearest receptor location to ensure that locations where the 1-hour objective would apply have been included.

7.6.4.1 The junction of the A1152 and the B1438 in Melton (referred to as the Melton crossroads)

This junction has four arms to it which are controlled by traffic lights and the combined predicted future traffic flow is in excess of 20,000 vehicles per day; further details on traffic flow can be seen below. The junction experiences stationary queuing traffic at peak hours. There are a number of receptor locations within 10 metres of the kerb, the nearest of which is 3.9 metres from the kerb.

This junction had a detailed Stage 3 assessment undertaken in the first round of review and assessments, the details of which can be seen in the reports entitled; 'Third Stage Review and assessment of Air Quality in the Suffolk Coastal District' (November 2001); and 'Air Quality Review and Assessment – Stage 3. A report produced for Suffolk Coastal District Council' (December

2001). The assessment entailed detailed modelling using the atmospheric dispersion model ADMS version 3.1. The findings of the report were that it was unlikely (with a probability of between 5% and 20%) that an exceedance of the annual mean objective for NO_2 would occur at this junction. It was, therefore, recommended that the declaration of an air quality management area for this junction was not necessary.

The modelling undertaken for this junction at Stage 3 was validated by diffusion tube results available for the junction, as there was no continuous monitoring available at the time. This junction will be subject to future traffic increases, above the general traffic increase forecasts for this area of Suffolk, from a number of developments that were, and still are, at various stages of completion. Traffic predictions for each development were made from the knowledge at that time for the Stage 3 assessment. It was decided, as recommended by DEFRA, that continued monitoring would be undertaken for the junction through diffusion tubes and the siting of a continuous monitor. This would provide more accurate validation for any modelling undertaken. Details of all diffusion tube and continuous monitoring undertaken at this junction and a summary of results can be seen earlier in this chapter of the report, additionally data can be seen in Appendix D and E.

In this report the DMRB screening model has not been used, instead external consultants have been employed to undertake a Detailed Assessment for the junction to be presented in this report.

In order to obtain updated traffic data for this junction, a complex set of traffic counts were commissioned for the junction, and sections of the A1152 and B1438 in 2002. Automatic counts (7-day) were undertaken on each of the four junction arms and a 1-day, 12-hour manual turning count was undertaken at the junction itself during this period to provide directional flow details. A summary of the traffic count data can be seen in Appendix F.

In addition to general traffic growth, this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that were, and still are, at various stages of completion. In the first round of review and assessments traffic predictions were made for three developments that were known of at that time. In the Third Stage Review and Assessment of Air Quality in the Suffolk Coastal District, published in November 2001, future traffic predictions were included from the Sutton Hoo development at Sutton. This development has not been included in predictions for this report as at the time of our traffic counts, June 2002, the site was open and traffic was therefore included in the counts undertaken. Traffic predictions for the St Audry's development at Melton and the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham have been made for this assessment and are detailed below. In addition, the Director of Planning and Leisure for Suffolk Coastal District Council advised that there are now two more developments that may impact on this junction. These are the Annington homes development at Sutton and the Deben Mill development at Woodbridge.

Traffic predictions have been obtained for the majority of the St Audry's, the Rendlesham Enterprise Park and New Rendlesham, the Annington homes and the Deben Mill developments and can be seen in Appendix F.

The percentage of traffic from these developments that will travel on each arm of the Melton crossroads and on each section of the A1152 was estimated and used to calculate the annual average daily traffic flow for each. Details of calculations and assumptions can be seen in Appendix F.

A Detailed Assessment was undertaken for this junction. This used complex, air dispersion modelling to predict air quality impacts of NO_2 from moving and idling traffic at receptor locations on the road junction. The model was validated using the results of the continuous monitoring undertaken at the Melton junction. Statistical techniques were then used to assess the likelihood of any exceedances of the air quality objectives at this junction based on the modelled concentrations. The report of this Detailed Assessment is attached as Appendix I.

The findings of the modelling, see Appendix I, showed that it is unlikely (with a probability between 5% and 20%) that an exceedance of the annual mean objective would occur at the Melton junction in 2005. **Netcen recommended that Suffolk Coastal District Council does not consider declaring an air quality management area for nitrogen dioxide from road transport at this junction.**

Suffolk Coastal District Council accepts the findings with regard to nitrogen dioxide at this junction. **No further assessment will, therefore, be necessary.**

7.6.4.2 The junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge (referred to as the Woodbridge junction).

This junction has four arms to it which are controlled by traffic lights and the combined predicted future traffic flow is in excess of 10,000 vehicles per day, further details on traffic flow can be seen below. The junction experiences stationary queuing traffic at peak hours. There are a number of receptor locations within 10 metres of the kerb, the nearest of which is less than 1 metre from the kerb.

This junction had a detailed Stage 3 assessment undertaken in the first round of review and assessments, the details of which can be seen in the reports entitled; 'Third Stage Review and assessment of Air Quality in the Suffolk Coastal District' (November 2001); and 'Air Quality Review and Assessment – Stage 3. A report produced for Suffolk Coastal District Council' (December 2001). The assessment entailed detailed modelling using the atmospheric dispersion model ADMS version 3.1. The findings of the report were that it was unlikely (with a probability of between 5% and 20%) that an exceedance of the annual mean objective for NO_2 would occur at this junction. It was, therefore, recommended that declaration of an air quality management area for this junction was not necessary.

The modelling undertaken for this junction at Stage 3 was validated by diffusion tube results available for the junction, as there was no continuous monitoring data available at the time. It was decided, as recommended by DEFRA, that continued monitoring would be undertaken for the junction using diffusion tubes. In addition, a continuous monitor would be sited at the Melton junction and co-located with diffusion tubes. This would provide more accurate diffusion tube results and validation for any modelling undertaken. Details of all diffusion tube monitoring undertaken at this junction and a summary of results can be seen earlier in this chapter of the report, additionally data can be seen in Appendix E. A summary of the results of continuous monitoring undertaken at Melton can be seen in Appendix D.

In this report the DMRB screening model has not been used, instead external consultants have been employed to undertake a Detailed Assessment for the junction, which is presented in this report.

In order to obtain updated traffic data for this junction, a complex set of traffic counts were employed for the junction and the B1438 in 2002. Automatic counts (7-day) were undertaken on each of the B1438 junction arms and a 1-day, 12-hour manual turning count was undertaken at the junction itself during this period to provide directional flow details. A summary of the traffic count data can be seen in Appendix G.

In addition to general traffic growth, this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that are at various stages of completion. The Director of Planning and Leisure for Suffolk Coastal District Council advised that there are four developments that may impact on this junction. These are the St Audry's development at Melton, the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham, the Annington homes development at Sutton and the Deben Mill development at Woodbridge.

Traffic predictions have been obtained for the majority of the St Audry's, the Rendlesham Enterprise Park and New Rendlesham, the Annington homes and the Deben Mill developments and can be seen in Appendix G.

The percentage of traffic from these developments that will travel through the Woodbridge junction was estimated and used to calculate the annual average daily traffic flow. Details of calculations and assumptions can be seen in Appendix G.

A Detailed Assessment was undertaken for this junction. This used complex, air dispersion modelling to predict air quality impacts of NO_2 from moving and idling traffic at receptor locations on the road junction. The model was validated using the results of the continuous monitoring undertaken at the Melton junction. Statistical techniques were then used to assess the likelihood of any exceedances of the air quality objectives at this junction based on the modelled concentrations. The report of this Detailed Assessment is attached as Appendix I.

The findings of the modelling (see Appendix I) showed that it is unlikely (with a probability between 5% and 20%) that an exceedance of the annual mean objective would occur at the Woodbridge junction in 2005. They state, however, that diffusion tubes exposed on the Melton Hill arm of the junction show an exceedance of the annual mean NO_2 objective, and that this might be the result of a street canyon effect.

Netcen have recommended that Suffolk Coastal District Council does not consider declaring an air quality management area for nitrogen dioxide from road transport at this junction. **They have also recommended that further monitoring be carried out at building facades at a number of locations on both sides of the street for a period of 12 months. They recommend that Suffolk Coastal District Council should consider declaring an air quality management area in 12 months time if the results of the monitoring campaign at this junction show that the annual mean NO_2 objective will not be met.**

Suffolk Coastal District Council accepts the findings with regard to nitrogen dioxide at this junction. A 12-month monitoring campaign will be undertaken at this junction, to determine whether the annual mean NO_2 objective will be met, and the results will be presented in a further Detailed Assessment report.

7.6.4.3 The junction of the B1438 and Pytches Road in Woodbridge

In addition to the above-mentioned Woodbridge junction, a second Woodbridge junction has been modelled to predict NO_2 concentrations in 2005. This junction is not within a street canyon and has a large traffic flow when compared to other junctions in Woodbridge, and receptor locations within 10 metres of the kerb. It was, therefore, modelled to be representative of other junctions in Woodbridge.

Input details required by DMRB were obtained, as outlined in section 7.6.4 above, for this junction and can be seen in Appendix A.

In addition to general traffic growth, the B1438 arm of this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that are at various stages of completion. The Director of Planning and Leisure for Suffolk Coastal District Council advised that there are four developments that may impact on this junction. These are the St Audry's development at Melton, the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham, the Annington homes development at Sutton and the Deben Mill development at Woodbridge. Traffic predictions have been obtained for these developments and can be seen in Appendix G. The percentage of traffic from these developments that will travel through the Woodbridge junction was estimated and used to calculate the annual average daily traffic flow, and is assumed to be the same for the junction of the B1438 and Pytches Road. Details of calculations and assumptions can be seen in Appendix G.

The DMRB screening method was run for this junction, to determine whether an exceedance of the NO_2 objectives is likely. The calculated annual mean NO_2 concentration from the road was added to the background concentration, to obtain the predicted concentration in 2005, and a summary of the results can be seen in table 7.4. Details of the DMRB input information can be seen in Appendix A.

Table 7.4 Predicted annual mean NO_2 concentrations for 2005, derived from DMRB, for the junction of the B1438 and Pytches Road in Woodbridge

Receptor location	**Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)**	**DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)**
Closest receptor location, Woodbridge. Junction of the B1438 and Pytches Road, Woodbridge.	18.3	6.9	**25.2**

The results in table 7.4 show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at the closest receptor location to this junction. **Further review and assessment of this junction will not, therefore, be necessary at this time.**

7.6.4.4 Junctions on the A1214 in Martlesham and Kesgrave

The following junctions on the A1214 were assessed, because these junctions have the largest traffic flows when compared to other junctions on the A1214, and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions on this road.

- The roundabout connecting the A1214 and the A12 at Martlesham.
- The junction of Dobbs Lane with the A1214 at Kesgrave.
- The junction of Bell Lane with the A1214 at Kesgrave.

Input details required by DMRB were obtained, as outlined in section 7.6.4 above, for this junction and can be seen in Appendix A.

In addition to general traffic growth, the A1214 will have traffic increases from developments in this area of the Suffolk Coastal district that are at various stages of completion. The Planning and Leisure, Development and Policy, section for Suffolk Coastal District Council advised that there are three developments that may impact on the A1214. These are the Grange Farm development at Kesgrave, the Bixley Farm development at Purdis Farm and the Martlesham Park and Ride development at Martlesham.

Details and traffic predictions have been obtained for these developments and can be seen in Appendix H. The volume of traffic from each of these developments that will travel on the A1214 in 2005 was estimated and used to calculate the annual average daily traffic flow. Details of calculations and assumptions can be seen in Appendix H.

The DMRB screening method was run for each of these junctions, to determine whether an exceedance of the NO_2 objectives is likely. The calculated annual mean NO_2 concentration from the road was added to the background concentration, to obtain the predicted concentration in 2005, and a summary of the results can be seen in table 7.5. Details of the DMRB input information can be seen in Appendix A.

Table 7.5 Predicted annual mean NO_2 concentrations for 2005, derived from DMRB, for junctions on the A1214

Receptor location	Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)	DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)	DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)
Closest receptor location, Martlesham. Junction of the A1214 and A12, Martlesham.	18.4	13.3	**31.7**
Closest receptor location, Kesgrave. Junction of the A1214 and Dobbs Lane, Kesgrave.	18.6	15.5	**34.1**
Closest receptor location, Kesgrave. Junction of the A1214 and Bell Lane, Kesgrave.	18.6	15.9	**34.5**

The results in table 7.5 show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at the closest receptor locations for any of these junctions. **Further review and assessment for junctions on the A1214 will not, therefore, be necessary at this time.**

7.6.4.5 Junctions on the A12 in Woodbridge and Yoxford

The following junctions on the A12 were assessed, because these junctions have the largest traffic flows when compared to other junctions on the A12 and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions on this road.

- The roundabout connecting the A12 and the B1079 at Woodbridge.
- The junction of the A12 and the A1120 at Yoxford.

Input details required by DMRB were obtained, as outlined in section 7.6.4 above, for these junctions and can be seen in Appendix A. The DMRB screening method was run for each of these junctions, to determine whether an exceedance of the NO_2 objectives is likely. The calculated annual mean NO_2 concentration from the road was added to the background concentration, to obtain the predicted concentration in 2005, a summary of the results can be seen in table 7.6. Details of the DMRB input information can be seen in Appendix A.

Table 7.6 Predicted annual mean NO_2 concentrations for 2005, derived from DMRB, for junctions on the A12

Receptor location	Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)	DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)	DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)
Closest receptor location, Woodbridge. Junction of the A12 and B1079, Woodbridge.	16.2	14.5	**30.7**
Closest receptor location, Yoxford. Junction of the A12 and A1120, Yoxford.	12.0	17.9	**29.9**

The results in table 7.6 show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at the closest receptor locations for any of these junctions. **Further review and assessment for junctions on the A12 will not, therefore, be necessary at this time.**

7.6.4.6 Junctions within the town of Felixstowe

The following junctions within the town of Felixstowe were assessed because they have the largest traffic flows, when compared to other junctions within Felixstowe and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions within Felixstowe.

- The junction of High Road West and Garrison Lane in Felixstowe.
- The roundabout connecting High Road East and West, Beatrice Avenue and Hamilton Road in Felixstowe.

Input details required by DMRB were obtained, as outlined in section 7.6.4 above, for these junctions and can be seen in Appendix A. The DMRB screening method was run for each of these junctions, to determine whether an exceedance of the NO_2 objectives is likely. The calculated annual mean NO_2 concentration from the road was added to the background concentration, to obtain the predicted concentration in 2005, and a summary of the results can be seen in table 7.7. Details of the DMRB input information can be seen in Appendix A.

Table 7.7 Predicted annual mean NO_2 concentrations for 2005, derived from DMRB, for junctions within the town of Felixstowe

Receptor location	**Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)**	**DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)**
Closest receptor location, Felixstowe. Junction of High Road West and Garrison Lane.	17.9	9.5	**27.4**
Closest receptor location, Felixstowe. Junction of High Road East and West, Beatrice Avenue and Hamilton Road.	17.9	10.1	**28.0**

The results in table 7.7 show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at the closest receptor locations for any of these junctions. **Further review and assessment for junctions within the town of Felixstowe will not, therefore, be necessary at this time.**

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

DEFRA have examined the results from the first round of review and assessments, which have shown that there will be some locations where members of the public may regularly spend one hour or more, e.g. streets with many shops or outside cafes/bars. Such locations will, therefore, need to be assessed with respect to emissions from road traffic and the 1-hour NO_2 objective. LAQM.TG(03) specifically states that people occupationally exposed in such areas should not be included as they are not classified as relevant receptors within the scope of LAQM, as explained in section 2.1 in chapter 2 of this report. Such locations were not always considered fully during the first round of review and

assessments and, in such cases, should now be considered in this Updating and Screening Assessment report. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) states that all 'busy streets' where members of the public may be exposed within 5 metres of the kerb for 1-hour or more must be considered. A 'busy street' is classed as one with more than 10,000 vehicles per day.

Using local knowledge of the district, traffic flow data, and measurements taken from the Suffolk Coastal District Council Geographic Information System, all areas that fall into this category were identified. Investigations showed that there are three areas that require assessment within this section of the report:

- An area with public seating, opposite the cinema and near the public toilets at Hamilton Road, Felixstowe.
- Outside seating at a Public House situated on the junction of Ipswich Road and Old Barrack Road, Woodbridge.
- Outside seating at a Public House situated on the A1214, Main Road, Kesgrave.

LAQM.TG(03) advises that traffic information should be obtained and the Design Manual for Road and Bridges (DMRB) screening method undertaken for each area of concern to determine whether any exceedance of the objectives is likely. DMRB is explained in detail in chapter 2 of this report. Traffic information on flows, speeds and percentage of heavy and light duty vehicles was obtained for these areas and can be seen in Appendix A. Local background concentrations were obtained from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at www.airquality.co.uk. The nearest relevant receptor locations were identified for each area and the distance to the centre of the road measured, as outlined above.

For the area of outside seating on the B1438 and Old Barrack Road junction in Woodbridge, in addition to general traffic growth, the B1438 arm of this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district. The Director of Planning and Leisure for Suffolk Coastal District Council advised that there are four developments that may impact on the junction of Lime Kiln Quay Road, Thoroughfare and St. John's Street in Woodbridge. This junction is further north into Woodbridge, but development impacts on the B1438 traffic will still be seen at its junction with Old Barrack Road and so must be considered. These are the St Audry's development at Melton, the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham, the Annington homes development at Sutton and the Deben Mill development at Woodbridge. Traffic predictions have been obtained for these developments and can be seen in Appendix G. The percentage of traffic from these developments that will travel on the B1438, through the Lime Kiln Quay Road junction and onto the Old Barrack Road junction was estimated. This was then used to calculate the annual average daily traffic flow. Details of calculations and assumptions can be seen in Appendix G.

The DMRB screening method was then run for each of the three locations, the calculated annual mean NO_2 concentration from the road was added to the background concentration to obtain the predicted concentration in 2005, and a summary of the results can be seen in table 7.8. Details of the DMRB input information can be seen in Appendix A. The DMRB model predicts the annual mean NO_2 concentration for direct comparison with the annual mean objective but not the 1-hour concentration. LAQM.TG(03) states that if the annual mean objective is not exceeded the authority may confidently assume that the 1-hour objective will also be met. For this reason care has been taken when measuring distances to the nearest receptor location to ensure that locations where the 1-hour objective would apply have been included.

Table 7.8 Predicted annual mean NO_2 concentrations for 2005, derived from DMRB, for busy streets where people may spend 1-hour or more close to traffic in the Suffolk Coastal district

Receptor location	Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)	DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)	DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)
Closest receptor location at the public seating area, opposite the cinema and near the public toilets at Hamilton Road in Felixstowe.	17.9	7.5	**25.4**
Closest area of outside seating at a Public House on the Ipswich Road and Old Barrack Road junction in Woodbridge.	19.5	8.6	**28.1**
Closest area of outside seating at a Public House on the A1214, Main Road, Kesgrave	18.6	13.6	**32.2**

The results in table 7.8, above, show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at any of the sites investigated. **Further review and assessment will not, therefore, be necessary at this time.**

7.6.6 Roads with a high flow of buses and/or heavy goods vehicles

DEFRA have examined the results from the first round of review and assessments, which have shown that there will be some street locations where traffic flows will not necessarily be high but there is an unusually high proportion of buses and/or heavy goods vehicles (HGVs). These can be a major source of NO_x and such roads will, therefore, need to be assessed with respect to emissions from road traffic. Such locations were not considered by many local authorities during the first round of review and assessments and, in such cases, should now be considered in this Updating and Screening Assessment report. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) states that all roads with an unusually high proportion of heavy duty vehicles (greater than 25%) which totals more than 2,500 vehicles per day and with relevant exposure within 10 metres must be considered.

Using local knowledge of the district, traffic flow data, and measurements taken from the Suffolk Coastal District Council Geographic Information System, all roads that fall into this category were identified.

Investigations showed that there is only one road with a proportion of heavy duty vehicles (HDVs) greater than 25% within the Suffolk Coastal district, which is the A14 trunk road from the Haven Exchange roundabout at the Port of Felixstowe to the Ipswich Borough boundary. This road is the only route to and from the Port of Felixstowe, the largest container port in Britain and the fourth largest in Europe. Due to the large number of HDVs generated by the Port of Felixstowe, the A14 has a HDV proportion of greater than 30%, totalling greater than 2,500 vehicles per day, on all sections of it within the Suffolk Coastal district.

Emissions from traffic using the A14 trunk road do not come within the scope of this section of the report, however, as there are no relevant receptor locations within 10 metres of the road. **No further**

review and assessment will, therefore, be necessary. Assessment of all sections of the A14 trunk road for NO_2 concentrations from road traffic emissions have been made later in section 7.6.8.1 of this chapter of the report and details can be viewed there.

7.6.7 New roads constructed or proposed since the first round of review and assessment

There have been no new roads constructed or proposed within the Suffolk Coastal district since the first round of review and assessment and, therefore, this section is not applicable.

7.6.8 Roads close to the objective during the first round of review and assessment

Investigations undertaken on behalf of DEFRA have found that the emission factors used in the DMRB screening method for the first round of review and assessment were under-estimated. A revised version of DMRB is, therefore, now available which incorporates new emission factors for NO_2. LAQM.TG(03) advises that any roads which had receptor locations for which the predicted annual mean objective for 2005 was above 36 $\mu g/m^3$ should be re-visited. A number of roads assessed during the first round of review and assessment had receptor locations for which the annual mean objective was above 36 $\mu g/m^3$, these include the A14 trunk road, the A12 trunk road, the A1214 and the A1152.

From the first round of review and assessments, the A14 trunk road was the only road which was taken to a third stage review and assessment for detailed monitoring and modelling to be undertaken, as discussed earlier in this chapter of the report. Details of the third stage investigation have already been published and can be found in Appendix G, Part II in the 'Report on the Third Stage Review and Assessment of Air Quality in the Suffolk Coastal District', November 2001. The predictions from the modelling showed that exceedance of the objectives was not likely at receptor locations on the A14 by the end of 2005 and, therefore, an Air Quality Management Area was not designated.

In this Updating and Screening Assessment the DMRB screening model has been re-run for each of the roads listed above. This will enable the predicted annual mean NO_2 concentrations to be determined at the nearest relevant receptor locations using the new emission factors and with more recent traffic flow information. In addition, new information presented in LAQM.TG(03) with regard to the procedure for obtaining annual mean background NO_2 concentrations from the default concentration maps produced by netcen on behalf of DEFRA (which can be obtained from the website at www.airquality.co.uk.) suggests that the background contribution for each location may have been over-estimated. The maps have been plotted using information from DEFRA background and urban monitoring networks and National Atmospheric Emissions Inventory estimates. Concerns have been raised, when using the maps to assess a major road in a rural area, that the background pollutant concentrations may include emissions from the road in question. Detail is provided in LAQM.TG(03) to account for this; it is recommended that concentrations are derived from the average background concentration four grid squares away from either side of the road where there are no other significant sources of pollution. This advice has been used in deriving background pollutant concentrations from the netcen maps for this report and has decreased the background concentrations used in the DMRB screening model in each case.

Traffic information on flows, speeds and percentage of heavy and light duty vehicles was obtained for the A14 trunk road, the A12 trunk road, the A1214 and the A1152. Each road was then split into sections, dependent on alterations in traffic flow, vehicle speed, HDV percentage and major intersections. The sections determined and the traffic data used for each can be seen in Appendix A.

Local background concentrations were obtained, as explained above, from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at www.airquality.co.uk.

The nearest relevant receptor locations were identified for each road section and the distance to the centre of the road measured. LAQM.TG(03) states that annual mean predictions should be carried out at locations where the 1-hour objective would apply so that an assessment of the short term objective can be made as well; the closest receptor locations were, therefore, taken as the gardens of residential properties where people could be expected to be exposed for 1-hour or more.

The Design Manual for Road and Bridges (DMRB) screening method was then run for each section of each road to determine whether any exceedance of the objectives is likely. DMRB is explained in detail in chapter 2 of this report. The calculated annual mean NO_2 concentration from the road was added to the background concentration to obtain the predicted concentration in 2005, and a summary of the results can be seen in tables 7.9 to 7.12. Details of the DMRB input information can be seen in Appendix A. The DMRB model predicts the annual mean NO_2 concentration for direct comparison with the annual mean objective but not the 1-hour concentration. LAQM.TG(03) states that if the annual mean objective is not exceeded the authority may confidently assume that the 1-hour objective will also be met. For this reason care has been taken when measuring distances to the nearest receptor location to ensure that locations where the 1-hour objective would apply have been included.

7.6.8.1 A14 trunk road

As explained above, the A14 trunk road was the only road taken to a Stage 3 assessment in the first round of review and assessments. The Stage 3 assessment showed that exceedance of the objectives was not likely at receptor locations on the A14 by the end of 2005 and, therefore, an Air Quality Management Area was not designated. Results from the DMRB screening method run for each section of the A14 can be seen in table 7.9 below

Table 7.9 Predicted annual mean nitrogen dioxide concentrations for 2005, derived from DMRB, for the **A14 trunk road**

Receptor location	**Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)**	**DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)**
Closest receptor location, Felixstowe A14 Section 1 – Haven Exchange roundabout to Dock Spur roundabout, Felixstowe (Port of Felixstowe Road)	16.4	16.5	**32.9**
Closest receptor location, Felixstowe A14 Section 1 – reduced speeds at Haven Exchange roundabout	16.4	20.6	**37.0**
Closest receptor location, Trimley A14 Section 2 – Dock Spur roundabout, Felixstowe to A12 junction, Nacton	16.4	20.7	**37.1**
Closest receptor location, Felixstowe A14 Section 2 – reduced speeds and junction assessment at Dock Spur roundabout	16.4	22.3	**38.7**
Closest receptor location, Nacton A14 Section 3 –A12 junction, Nacton to Ipswich Borough boundary	18.7	11.1	**29.8**
Closest receptor location, Nacton Where A14 Section 3 and A1156 run parallel, so contribution from both	18.7	9.6	**28.3**

The results are considerably lower than those obtained from DMRB in the first round of review and assessments, and show that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at receptor locations on any of the sections of the A14. These results are comparable to those obtained from the Stage 3 assessment undertaken for the A14. **Further review and assessment of the A14 trunk road will not, therefore, be necessary at this time.**

7.6.8.2 The Port of Felixstowe

The A14 was divided into the relevant sections, as seen in table 7.9, above, and the assessment was started at the Haven Exchange roundabout. Road traffic emissions within the Port of Felixstowe were not assessed as there are no public receptor locations. LAQM.TG(03) specifically states that people occupationally exposed should not be included as they are not classified as relevant receptors within the scope of LAQM.

The closest public receptor locations to the Port of Felixstowe, and traffic generated by it, are located at Adastral Close, and there is also a public receptor location approximately 70 metres from Dock Gate 2 roundabout. Concentrations of NO_2 will be measured at these two locations, using diffusion tubes, to confirm that there are no exceedances of the objectives due to their proximity to the Port of Felixstowe and possible emissions from activities undertaken on it. Results from this monitoring will assessed in 12 months time and be presented in future Updating and Screening Assessments reports.

There are new port developments being carried out at Felixstowe for the Trinity III, Phase 2 project. In October 2002, following a Public Enquiry, the Port of Felixstowe was granted the Harbour Revision Order to proceed with an extension to create a larger deep-water quay at the Trinity Terminal. This will enable the Port to handle more of the latest generation large container ships simultaneously. It will also provide 15 hectares of additional container storage space, thus increasing the Port's capacity. The work is expected to commence in 2003 and the quay to be fully operational by March 2004. There are also proposals for additional works, the Felixstowe South project, for a phased reconstruction of the existing Dock Basin Numbers 1 and 2, ro-ro berths, and the Landguard terminal. The proposals would develop additional further deep-water container berth capacity and would convert current redundant areas to container use. These proposals are substantially within the existing port limits and will see maximum use being made of the present facilities. Consent is currently being sought for these works, although the time scale at present is unclear. The Trinity III, Phase 2 development will be underway shortly and the increased capacity that it provides will create an additional throughput of containers and the traffic related to this. Should the Felixstowe South project also be approved this will further increase future port traffic.

At this time, Suffolk Coastal District Council does not possess any detail with regard to predicted traffic increases from these developments nor the proportion of freight to be moved by rail. The Port of Felixstowe and its appointed consultants will be consulted, in order to obtain future traffic predictions and undertake assessments of impacts on air quality in the vicinity of the Port of Felixstowe and along the A14 trunk road.

7.6.8.3 A12 trunk road

As explained above, the DMRB screening method was undertaken for the A12 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A12 by the end of 2005 and, therefore, an Air Quality Management Area was not designated. Results from the DMRB screening method run for each section of the A12 in this Updating and Screening Assessment report can be seen in table 7.10 below. The results are considerably lower than those obtained from DMRB in the first round of review and assessments and confirm, as in the first round, that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at receptor locations on any of the sections of the A12. **Further review and assessment of the A12 trunk road will not, therefore, be necessary at this time.**

Table 7.10 Predicted annual mean nitrogen dioxide concentrations for 2005, derived from DMRB, for the **A12 trunk road**

Receptor location	Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)	DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)	DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)
Closest receptor location, Martlesham A12 Section 1 – A14 junction, Nacton to A1214 roundabout, Martlesham	18.4	9.2	**27.6**
Closest receptor location, Martlesham A12 Section 1 – reduced speeds at roundabouts	18.4	8.9	**27.3**
Closest receptor location, Bealings A12 Section 2 – A1214 roundabout, Martlesham to B1438 roundabout, Woodbridge	18.4	7.4	**25.8**
Closest receptor location, Martlesham A12 Section 2 – reduced speeds and junction assessment at A1214 roundabout, Martlesham	18.4	13.3	**31.7**
Closest receptor location, Woodbridge A12 Section 3 – B1438 roundabout, Woodbridge to A1152 roundabout, Woodbridge	16.2	13.0	**29.2**
Closest receptor location, Woodbridge A12 Section 3 – reduced speeds and junction assessment at B1079 roundabout, Woodbridge	16.2	14.5	**30.7**
Closest receptor location, Ufford A12 Section 4 – A1152 roundabout, Woodbridge to B1116 junction, Wickham Market	15.3	12.2	**27.5**
Closest receptor location, Woodbridge A12 Section 4 – reduced speeds and junction assessment at A1152 roundabout, Woodbridge	16.2	9.3	**25.5**
Closest receptor location, Farnham A12 Section 5 – B1116 junction, Wickham Market to end of A12 at Waveney District boundary	13.2	12.1	**25.3**
Closest receptor location, Yoxford A12 Section 5 – reduced speeds and junction assessment at A1120 junction, Yoxford	12.0	17.9	**29.9**

7.6.8.4 A1214

As explained above, the DMRB screening method was undertaken for the A1214 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A1214 by the end of 2005 and, therefore, an Air Quality Management Area was not designated.

As detailed earlier in this chapter of this report, there are three developments in this area of the Suffolk Coastal district that will increase future traffic flows on this road. These are detailed in

Appendix H, together with the estimated future traffic contribution that each will make to traffic on the A1214. These increases have been added to the general traffic growth for this road to provide the traffic flow inputs for the DMRB model. It has, therefore, been possible to more accurately predict future PM_{10} levels at receptor locations along this road.

Results from the DMRB screening method run for each section of the A1214 in this Updating and Screening Assessment report can be seen in table 7.11 below. The concentrations are considerably lower than those obtained from DMRB in the first round of review and assessments and confirm, as in the first round, that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at receptor locations on any of the sections of the A1214.

Results of kerbside diffusion tube monitoring undertaken at a site on the A1214 have been discussed earlier in section 7.6.1 in this chapter of the report. Results of monitoring undertaken at Kesgrave 2 a, b & c in 2002, seen in table 7.3, show a predicted annual mean NO_2 concentration of 46.9 $\mu g/m^3$ in 2005 which is above the objective levels of 40 $\mu g/m^3$. The site is approximately 120 metres from the junction with Bell Lane, which is controlled by traffic lights and experiences stationary queuing traffic at peak hours. **Due to the elevated diffusion tube readings at this site further assessment will be necessary in the form of a Detailed Assessment.** The current diffusion tube site is a kerbside location, and is much closer to the A1214 than the nearest relevant receptor location. A continuous analyser was located at this site in March 2003 and is co-located with a triplicate diffusion tube site. The site is 2.6 metres from the kerb (the same distance as the nearest relevant receptor location). **The results from the monitoring will be used to run a detailed computer model for this section of the A1214, and the findings will be reported in the Detailed Assessment report to be completed in April 2004.**

Table 7.11 Predicted annual mean nitrogen dioxide concentrations for 2005, derived from DMRB, for the **A1214**

Receptor location	**Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)**	**DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)**
Closest receptor location, Kesgrave A1214 – A12 junction at Martlesham to Ipswich Borough boundary.	18.6	10.6	**29.3**
Closest receptor location, Kesgrave A1214 – A12 junction at Martlesham to Ipswich Borough boundary – reduced speeds	18.6	13.6	**32.2**

7.6.8.5 A1152

As explained above, the DMRB screening method was undertaken for the A1152 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A1152 by the end of 2005 and, therefore, an Air Quality Management Area was not designated.

As detailed earlier in this chapter of this report, there are a number of developments in this area of the Suffolk Coastal district that will increase future traffic flows on this road. These are detailed in Appendix F, together with the estimated future traffic contribution that each will make upon the

different sections of the A1152. These increases have been added to the general traffic growth for this road to provide the traffic flow inputs for the DMRB model. The knowledge of potential traffic increases from each development has increased since the first round of review and assessments, and traffic counts were commissioned on the A1152 in 2002, so that future NO_2 concentrations can be predicted more accurately at receptor locations along this road.

Results from the DMRB screening method run for each section of the A1152 in this Updating and Screening Assessment report can be seen in table 7.12 below. Section 2 of the A1152 is missing from table 7.12 as this is the actual Melton crossroad junction and has been reviewed above. The concentrations are considerably lower than those obtained from DMRB in the first round of review and assessments and confirm, as in the first round, that annual mean NO_2 concentrations are not likely to exceed the 2005 objective at receptor locations on any of the sections of the A1152. **Further review and assessment of the A1152 trunk road will not, therefore, be necessary at this time.**

Table 7.12 Predicted annual mean nitrogen dioxide concentrations for 2005, derived from DMRB, for the **A1152**

Receptor location	**Estimated annual mean NO_2 background concentration for 2005 ($\mu g/m^3$)**	**DMRB calculated annual mean NO_2 contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean NO_2 concentration (background + traffic) in 2005 ($\mu g/m^3$)**
Closest receptor location, Melton A1152 Section 1 – A12 roundabout, Woodbridge to B1438 crossroads at Melton	16.0	8.0	**24.0**
Closest receptor location, Melton A1152 Section 3 – B1438 crossroads at Melton to B1083 roundabout at Wilford Bridge, Bromeswell	16.0	8.7	**24.7**
Closest receptor location, Bromeswell A1152 Section 4 – B1083 roundabout at Wilford Bridge, Bromeswell to B1084 junction, Bromeswell	16.2	5.3	**21.5**
Closest receptor location, Eyke A1152 Section 5 – B1084 junction, Bromeswell to ex-RAF Bentwaters roundabout, Rendlesham	14.1	4.3	**18.4**

7.6.9 Roads with significantly changed traffic flows

LAQM.TG(03) states that any roads with traffic flows greater than 10,000 vehicles per day which have experienced a 'large' increase in traffic flow, taken to be 25% or more, since the first round of review and assessments should be considered in this Updating and Screening Assessment.

The most recent available traffic flow data was obtained from a number of sources, Suffolk County Council Environment and Transport Department, the Highways Agency, and independent traffic surveys employed by Suffolk Coastal District Council. For roads with a flow greater than 10,000 vehicles per day the percentage traffic increase from 1996 to 2002 was calculated. The year 1996 was used because, as in the first round of review and assessments, this was the farthest year back traffic data was available.

From the traffic data provided it was found that there was one section of the A12 with a 33% traffic increase since 1996. This was section 5, as seen in table 7.10 above, at Farnham. The DMRB screening method has already been run for this section of the A12 using the new traffic count data (see table 7.10) and the result showed a predicted annual mean NO_2 concentration of 25.3 $\mu g/m^3$ in 2005. The 2005 objectives are, therefore, not likely to be exceeded at receptor locations on this sections of the A12, and **further review and assessment will not be necessary at this time.**

7.6.10 Bus stations

DEFRA have examined the results from the first round of review and assessments, which have shown that concentrations of NO_2 may be elevated in the vicinity of bus stations where there are large numbers of bus movements per day. This only applies to bus stations that are not enclosed and the assessment is against the 1-hour objective. Such locations were not always considered fully during the first round of review and assessments and, in such cases, should be now considered in this Updating and Screening Assessment report. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) states that any bus stations with a flow of buses greater than 1,000 movements per day, and where there is relevant exposure within 10 metres of the bus station must be considered.

Using local knowledge of the district, there are no bus stations within the Suffolk Coastal district with a flow of buses greater than 1,000 movements per day. **No further assessment will, therefore, be necessary**.

7.6.11 New industrial sources

The technical guidance in LAQM.TG(03) states that industrial sources will not make a significant local contribution to annual mean NO_2 concentrations, but could be significant in terms of the 1-hour objective. The evidence from work carried out during the first round of review and assessments is that very few sources will require consideration. Any new sources, introduced since the first round of review and assessments, must be reviewed in this report. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant. Emissions from industrial processes will be in the form of NO_x, for the purpose of review and assessment all emissions of NO_x should be taken to be as NO_2.

<u>New industrial sources within the Suffolk Coastal district</u>

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

Within this list there are no new processes, since the first round of review and assessments, that have the potential to emit significant quantities of NO_x. There are also no planned developments within the Suffolk Coastal district that have the potential to emit significant quantities of NO_x. **No further assessment will, therefore, be necessary.**

New industrial sources from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no new authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of NO_x which would impact within the Suffolk Coastal district. **No further assessment will, therefore, be necessary.**

7.6.12 Industrial sources with substantially increased emissions

The technical guidance in LAQM.TG(03) states that industrial sources will not make a significant local contribution to annual mean NO_2 concentrations, but could be significant in terms of the 1-hour objective. The evidence from work carried out during the first round of review and assessments is that very few sources will require consideration. Any sources with substantially increased emissions since the first round of review and assessments must be reviewed in this report. LAQM.TG(03) advises that any emissions from a process which have increased by more than 30% are classed as substantially increased. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. Authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

Industrial sources with substantially increased emissions within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there is one authorised process within the Suffolk Coastal district with the potential to emit significant quantities of NO_x:

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of NO_x. Sizewell B is a pressurised water reactor nuclear power station and is regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

  There are three separate authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The authorisation covering the fuel oil fired combustion process for the essential supplies diesel generators (ESDG's) on the site (see Appendix C) is the only one listed as a potentially significant emitter of NO_x in LAQM.TG(03) requiring investigation.

The ESDG's at Sizewell B are not operated continuously, they provide a back-up electrical supply to the power station if it is needed during shut down for maintenance, refuelling etc. in the event of loss of grid electricity supplies. Following discussions with the Environment Agency, it was considered that as the ESDG's are only operated as a back-up system they should not emit significant quantities of NO_x that would exceed the objectives for NO_2.

Although the other two authorisations, for the oil fired combustion process operated by the auxiliary boilers and the incineration process, are not classed as potentially significant emitters of NO_x, they are in close proximity to the ESDG's. Advice in LAQM.TG(03) recommends that, where there is one or more source in close proximity, total emissions from the site should be included in the assessment. For completeness it is considered that total emissions from the site as a whole should be included in an assessment.

In addition, Sizewell B is in close proximity to Sizewell A Power Station. Sizewell A is authorised under the Radioactive Substances Act 1993 by the Environment Agency, to regulate the discharge of radioactive waste. The site is not, however, regulated under Part 1 of the Environmental Protection Act (1990), as processes on site are not of a capacity to emit significant quantities of NO_x to require authorisation.

Sizewell A incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. The supporting plant and equipment includes four essential supplies diesel generators (ESDG's) to provide power only in the event of loss of grid electricity supplies, two boilers for provision of steam, and an incinerator. There is, therefore, the potential for emissions of NO_x from Sizewell A and Sizewell B Power Station to combine. There is insufficient information available at this time to assess the possibility of combined emissions and whether they would exceed the objectives for NO_2. Close working relationships have been developed with the Environment Agency and the Environmental Co-ordinators at Sizewell A and B to obtain all necessary information regarding releases of NO_x from the site so that an assessment can be made.

At this time it is considered unlikely that NO_x emissions from ancillary equipment at these two sites would cause an exceedance of the NO_2 objectives, but confirmation of this is required. An Updating and Screening Assessment for Sizewell A and B Power Station will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

Industrial sources with substantially increased emissions from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered it was determined that there are two authorised processes in neighbouring authorities with the potential to emit significant quantities of NO_x that may impact within the Suffolk Coastal district;

- White Rose Environmental Limited, Ipswich Hospital, Heath Road, Ipswich. This is a clinical waste incinerator, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 1kilometre from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information

on emissions of NO_x from this process, which have decreased from 11,848 kg in 1999 to 5,145 kg in 2002. As emissions of NO_x have actually reduced from this process since the first round of review and assessments, undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared for NO_2 in the first round, **no further assessment will be necessary at this time.**

- Agilent Technology (formerly B. T. & D Hewlett Packard Ltd.), Whitehouse Road Industrial Estate, Ipswich. This is an inorganic chemical process, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 3 kilometres from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on this process, and has confirmed that it produces no emissions of NO_x. **No further assessment will be necessary at this time.**

7.6.13 Other sources – Aircraft

LAQM.TG(03) states that aircraft are significant sources of NO_x emissions, especially during takeoff. Aircraft emissions at airports were not always considered fully during the first round of review and assessments and, in such cases, should now be considered in this Updating and Screening Assessment report. Emissions from aircraft once they are above 200 metres will make a negligible contribution to ground-level concentrations and so do not need to be considered. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) provides information to assess emissions from aircraft at airports by the annual throughput of passengers and/or freight, and states that assessment is only necessary where there is relevant exposure within 1,000 metres of the airport boundary.

There are no commercial airports that carry passengers or freight within the Suffolk Coastal district. There is, however, a military airbase owned by the Ministry of Defence that is still operational at Woodbridge Airfield. There are relevant receptor locations within 1,000 metres of the airfield boundary, the nearest being approximately 300 metres from the boundary.

Information was obtained from the Ministry of Defence, Wattisham Air Traffic Services, with regard to the number and type of aircraft movements from the airfield in 2002. From January to December 2002 there was a total of 77 rotary aircraft movements undertaken by the military and 180 rotary aircraft movements undertaken by Wattisham Search and Rescue. There were no fixed wing aircraft movements in this period.

Advice was sought from DEFRA's Review and Assessment Helpdesk, and they confirmed that the number of aircraft movements from Woodbridge Airfield in 2002 was insufficient to produce significant emissions of NO_2 to cause an exceedance of the objectives at receptor locations near the site. **No further assessment will, therefore, be required.**

7.6.14 Other sources – Diesel and coal-fired locomotives

LAQM.TG(03) states that both types of locomotive emit NO_x, but there is no evidence to suggest that there is any risk of the 1-hour or annual mean objectives for NO_2 in 2005 being exceeded. **No further assessment will, therefore, be required.**

7.6.15 Other sources – Shipping

LAQM.TG(03) states that there are emissions of NO_x from the burning of oil in ship's engines, but there is no evidence to suggest that there is any risk of the 1-hour or annual mean objectives for NO_2 in 2005 being exceeded. **No further assessment will, therefore, be required.**

7.7 Conclusion

Suffolk Coastal District Council concludes that, for the following sites identified in this report, there is a potential risk that the air quality objectives for nitrogen dioxide may be exceeded at receptor locations by the end of 2004 and further investigation will be necessary:

- Traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge. A Detailed Assessment was undertaken for this junction that has concluded that an air quality management area does not need to be declared at this time. The Detailed Assessment recommends that continued monitoring should be undertaken for a 12-month period to confirm these findings, due to elevated levels recorded by diffusion tubes at this junction.

- Traffic using a section of the A1214 near the Bell Lane junction in Kesgrave where monitoring by diffusion tubes has shown elevated levels.

Suffolk Coastal District Council concludes that, for the following site identified in this report, there is insufficient information available to determine whether the air quality objectives for nitrogen dioxide may be exceeded at receptor locations by the end of 2004 and further investigation will be necessary:

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations. The findings have shown that it is considered unlikely that NO_x emissions from these two sites would cause an exceedance of the NO_2 objectives, but confirmation of this is required.

Further investigations will be undertaken for these three sites, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

8. Review and assessment of sulphur dioxide (SO_2)

8.1 Air quality objectives

Defra and the Devolved Administrations have adopted three air quality objectives for SO_2. These are:

- 15-minute mean of 266 $\mu g/m^3$ not to be exceeded more than 35 times in a year, to be achieved by 31 December 2005;
- 1-hour mean of 350 $\mu g/m^3$ not to be exceeded more than 24 times in a year, to be achieved by 31 December 2004;
- 24-hour mean of 125 $\mu g/m^3$ not to be exceeded more than 3 times in a year, to be achieved by 31 December 2004.

The National Air Quality Regulations 1997 set the 15-minute mean objective of 266 $\mu g/m^3$, which has been retained. The 1-hour and 24-hour objectives arise from the Revised Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000. These additional objectives were based on European Union limit values set in the First Air Quality Daughter Directive, agreed at Environment Council in June 1998. These additional objectives were written into UK legislation in the Air Quality Regulations 2000.

8.2 Sources

SO_2 is a gas at normal temperature and pressure. It is soluble in water, forming an acidic solution that is readily oxidised to sulphuric acid, as found in acid rain. There are a number of natural sources of SO_2 which include emissions from volcanic activity and the oxidation of dimethyl sulphide, which is released from marine organisms. In the UK, however, the main source of SO_2 is from the combustion of sulphur-containing fossil fuels, principally coal and oil.

The prevalence of SO_2 as an air pollutant has decreased markedly in the past thirty years. This decline is a result of legislation introduced in response to large numbers of excess deaths attributed to inner city smog, particularly in London. The most significant change brought about by the legislation was the move away from the use of coal as a domestic urban fuel source. Energy for domestic and commercial use is now provided mainly by gas and electricity. Generation of this electricity has become localised to large, rural power stations burning fossil fuels. This, in addition to the use of taller chimneys that deposit waste products higher into the atmosphere, has reduced low level urban pollution problems associated with sulphur dioxide.

The main source of SO_2 in the UK currently is from power stations, which accounted for more than 71% of total emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of total emissions, but locally may be more significant. Road transport currently accounts for less than 1% of emissions (LAQM.TG(03)).

8.3 Health effects

SO_2 is an irritant gas when inhaled due to its acidic nature and can cause health problems, particularly with regard to the respiratory tract. It causes constriction of the airways by stimulating nerves in the lining of the nose, throat and airways of the lung, thus causing breathing difficulties. The latter effect is particularly likely to occur in those suffering from asthma and chronic lung disease. Asthma affects some 4% of the population with a higher percentage amongst children. Some data from studies undertaken also suggests that SO_2, in conjunction with NO_2, can increase the sensitivity to allergens of some asthma sufferers.

The effects of SO_2 on sensitive subjects are seen to appear almost immediately after the start of exposure. For these reasons EPAQS advised that the 15-minute, short-term, limit for SO_2 of 266μg/m^3 be adopted. This is intended to reduce the exposure of the population, including individuals who may be particularly susceptible, to levels of SO_2 at which harmful effects are unlikely to occur.

8.4 The national perspective

Concentrations of SO_2 were measured at UK national network monitoring sites during the period 1999-2001 and are summarised in LAQM.TG(03). Results from monitoring showed that concentrations have fallen at all sites in recent years, and the objectives were only exceeded at one site in Belfast during this period. This exceedance was associated with domestic coal burning, which is still widespread in this area.

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

8.5 The local perspective

From the first round of review and assessments there were a small number of AQMA's declared for SO_2. These relate to emissions from coal-fired boilers at a cellophane process and a food processing plant, a coal-fired boiler at a hospital, domestic coal burning, and shipping at a major port.

DEFRA's technical guidance, LAQM.TG(03), states that it is still important that local circumstances are fully taken into consideration, and all local authorities are, therefore, required to carry out a review and assessment for SO_2 at this time.

8.6 Updating and Screening Assessment for sulphur dioxide

8.6.1 Monitoring data outside an Air Quality Management Area

There is no national network monitoring data available for SO_2 for the Suffolk Coastal area as there are no national network monitoring sites within the district.

Continuous monitoring

Monitoring for concentrations of SO_2 from shipping emissions was undertaken by UV fluorescence for a six-month period, from 21 March to 20 September 2002, at a location within the Port of Felixstowe. This location was sited the same distance from the emissions as the nearest receptor location. The monitoring was undertaken by Entec UK Limited, on behalf of Suffolk Coastal District Council.

The equipment used was an API Model 100A, sulphur dioxide UV fluorescence analyser. This is the same instrumentation as that used in the DEFRA Urban Rural Network, which monitors concentrations of sulphur dioxide at sites throughout the United Kingdom. The meter was a continuous analyser, recording 15-minute and hourly average concentrations of sulphur dioxide, for use in comparison with the objectives.

Calibration methods employed included primary internal span calibration by permeation tube, and an internal zero check once every 24 hours. In addition, calibration to ascertain the zero and span errors was undertaken during a four weekly site visit, using the internal zero and a calibration gas of known concentration for the span. Checking of the calibration data, and quality control and scaling of the real-time results was undertaken by Entec. Independent site audits were undertaken to confirm the accuracy of the analyser and calibration gases.

Table 8.1 is a summary of the 15-minute, 1-hour and 24-hour measured concentrations throughout the monitoring period. More detailed results from the monitoring can be seen in the report, which is attached as Appendix J.

From table 8.1 it can be seen that the maximum 15-minute mean SO_2 concentration recorded was 177 $\mu g/m^3$. The air quality standard specifies a maximum 15-minute mean objective of 266 $\mu g/m^3$ with 35 exceedances permitted in a calendar year, equivalent to the 99.9th percentile. The 99.9th percentile of 15-minute means was 142 $\mu g/m^3$, representing only 53% of the objective.

The maximum 1-hour mean SO_2 concentration recorded was 154 $\mu g/m^3$. The air quality standard specifies a maximum hourly objective of 350 $\mu g/m^3$ with 24 exceedances permitted in a calendar year, equivalent to the 99.7th percentile. The 99.7th percentile of 1-hour means was 108 $\mu g/m^3$, representing only 31% of the objective.

The maximum 24-hour mean SO_2 concentration recorded was 52 $\mu g/m^3$. The air quality standard specifies a maximum 24-hour objective of 125 $\mu g/m^3$ with 3 exceedances permitted in a calendar year, equivalent to the 99.1st percentile. The 99.1st percentile of 24-hour means was 51 $\mu g/m^3$, representing only 41% of the objective.

Table 8.1 Summary of continuous SO_2 ratified data collected at a site on the Port of Felixstowe from 21 March to 20 September 2002.

Criteria	**15-minute mean concentrations ($\mu g/m^3$)**	**1-hour mean concentrations ($\mu g/m^3$)**	**24-hour mean concentrations ($\mu g/m^3$)**
Maximum recorded SO_2 concentration	177	154	52
AQS Percentile –99.9th (266) 15-minute mean	**142**	n/a	n/a
AQS Percentile –99.7th (350) 1-hour mean	n/a	**108**	n/a
AQS Percentile –99.1st (125) 24-hour mean	n/a	n/a	**51**
% of Air Quality Standard objective	53	31	41
% data capture	90	95	92

The results from this monitoring have been used to assess concentrations of SO_2 from shipping activities at the Port of Felixstowe. The investigation was undertaken as a Third Stage detailed assessment, and is discussed in more detail later in this chapter of the report within the 'shipping' section. The final report is attached as Appendix J.

8.6.2 Monitoring data within an Air Quality Management Area

There are currently no Air Quality Management Areas designated within the Suffolk Coastal district and, therefore, this section is not applicable.

8.6.3 New Industrial sources

The technical guidance in LAQM.TG(03) states that the 15-minute SO_2 objective was the most stringent in the first round of review and assessments, and that there were a few industrial sources which caused exceedances. It is thought likely that large coal burning boilers may be significant in terms of causing an exceedance of the objectives. New objectives that came into force on 1 January 2003 limiting the sulphur content of fuel to less than 1% should mean that sources burning fuel oil are unlikely to be significant. It is advised, however, that particular attention should be paid to the combined impact of several sources, including those outside the local authority area.

Any new sources, introduced since the first round of review and assessments, must be reviewed in this report. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

The guidance in LAQM.TG(03) specifically states that for processes authorised by the local authority (Part B or A2 processes), only those that burn coal or heavy fuel oil will be potentially significant emitters of SO_2.

<u>New industrial sources within the Suffolk Coastal district</u>

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

Within this list there are no new processes, since the first round of review and assessments, that have the potential to emit significant quantities of SO_2. There are also no planned developments within the Suffolk Coastal district that have the potential to emit significant quantities of SO_2. **No further assessment will, therefore, be necessary.**

<u>New industrial sources from neighbouring authorities</u>

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no new authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of SO_2 which would impact within the Suffolk Coastal district. **No further assessment is, therefore, necessary.**

8.6.4 Industrial sources with substantially increased emissions

The technical guidance in LAQM.TG(03) states that the 15-minute SO_2 objective was the most stringent in the first round of review and assessments, and that there were a few industrial sources which caused exceedances. It is thought likely that large coal burning boilers may be significant in terms of causing an exceedance of the objectives. New objectives that came into force on 1 January 2003 limiting the sulphur content of fuel to less than 1% should mean that sources burning fuel oil are unlikely to be significant. It is advised, however, that particular attention should be paid to the combined impact of several sources, including those outside the local authority area.

Any sources with substantially increased emissions since the first round of review and assessments must be reviewed in this report. LAQM.TG(03) advises that any emissions from a process which have increased by more than 30% are classed as substantially increased. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. Authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

The guidance in LAQM.TG(03) specifically states that for processes authorised by the local authority (Part B or A2 processes), only those that burn coal or heavy fuel oil will be potentially significant emitters of SO_2.

Industrial sources with substantially increased emissions within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there are three authorised process within the Suffolk Coastal district with the potential to emit significant quantities of SO_2;

- White Mountain Roadstone Limited, Foxhall Quarry No. 4, Foxhall Road, Brightwell, Suffolk. This site operates a roadstone coating process and is regulated by Suffolk Coastal District Council. Investigations confirm that this process does not use coal or heavy fuel oil and is not, therefore, classed as a potentially significant emitter of SO_2. **No further assessment is necessary at this time.**

- Ipswich Coated Stone, Sinks Gravel Pit, Main Road, Kesgrave, Suffolk. This site operates a roadstone coating process and is regulated by Suffolk Coastal District Council. Investigations confirm that this process does not use coal or heavy fuel oil and is not, therefore, classed as a potentially significant emitter of SO_2. **No further assessment is necessary at this time.**

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of SO_2. Sizewell B is a pressurised water reactor nuclear power station and is regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

There are three separate authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The two authorisations covering the fuel oil fired combustion process for the essential supplies diesel generators (ESDG's) and the auxiliary boilers (see Appendix C) are listed as potentially significant emitters of SO_2 in LAQM.TG(03), requiring investigation. The authorisation for the incineration process is not listed as a potentially significant emitter of SO_2 in LAQM.TG(03).

The ESDG's at Sizewell B are not operated continuously, they provide a back-up electrical supply to the power station if it is needed during shut down for maintenance, refuelling etc. in the event of loss of grid electricity supplies. The auxiliary boilers are also not operated continuously, they provide steam to heat the buildings on site when the reactor is shut-down for maintenance or refuelling, and steam for the reactor when it is started up following a shut down. Following discussions with the Environment Agency, it was considered that as the ESDG's and auxiliary boilers are only operated as a back-up system they should not emit significant quantities of SO_2 that would exceed the objectives.

Although the incineration process is not classed as a potentially significant emitter of SO_2, it is in close proximity to the ESDG's and the auxiliary boilers. Advice in LAQM.TG(03) recommends that, where there is one or more source in close proximity, total emissions from the site should be included in the assessment. For completeness it is considered that total emissions from the site as a whole should be included in an assessment.

In addition, Sizewell B is in close proximity to Sizewell A Power Station. Sizewell A is authorised under the Radioactive Substances Act 1993 by the Environment Agency, to regulate the discharge of radioactive waste. The site is not, however, regulated under Part 1 of the Environmental Protection Act 1990, as processes on site are not of a capacity to emit significant quantities of SO_2 to require authorisation.

Sizewell A incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. The supporting plant and equipment includes four essential supplies diesel generators (ESDG's) to provide power only in the event of loss of grid electricity supplies, two boilers for provision of steam, and an incinerator. There is, therefore, the potential for emissions of SO_2 from Sizewell A and Sizewell B Power Station to combine. There is insufficient information available at this time to assess the possibility of combined emissions and whether they would exceed the objectives for SO_2. Close working relationships have been developed with the Environment Agency and the Environmental Co-ordinators at Sizewell A and B to obtain all necessary information regarding releases of SO_2 from the site so that an assessment can be made.

At this time it is considered unlikely that SO_2 emissions from ancillary equipment at these two sites would cause an exceedance of the objectives, but confirmation of this is required. An Updating and Screening Assessment for Sizewell A and B Power Station will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

Industrial sources with substantially increased emissions from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of

specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered it was determined that there are three authorised processes in neighbouring authorities with the potential to emit significant quantities of SO_2 that may impact within the Suffolk Coastal district:

- White Rose Environmental Limited, Ipswich Hospital, Heath Road, Ipswich. This is a clinical waste incinerator, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 1 kilometre from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on emissions of SO_2 from this process, which have decreased from 6,934 kg in 1999 to 1,503 kg in 2002. As emissions of SO_2 have reduced from this process since the first round of review and assessments, undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared for SO_2 in the first round, **no further assessment will be necessary at this time.**

- Agilent Technology (formerly B. T. & D Hewlett Packard Ltd.), Whitehouse Road Industrial Estate, Ipswich. This is an inorganic chemical process, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 3 kilometres from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on this process, and has confirmed that it produces no emissions of SO_2. **No further assessment will be necessary at this time.**

- Crane Ltd, Nacton Road, Ipswich. This is a foundry for the manufacture of valves, an authorised process regulated by Ipswich Borough Council. This process is within the Ipswich Borough and is approximately 0.3 kilometres from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has confirmed that this process does not use coal or heavy fuel oil and is not, therefore, classed as a potentially significant emitter of SO_2. **No further assessment will be necessary at this time.**

8.6.5 Areas of domestic coal burning

Although coal and smokeless fuel burning to provide domestic heating has largely been replaced by other fuels, where coal burning is concentrated in small areas there exists the potential for exceedances of the SO_2 objectives. LAQM.TG(03) advises that the results from the first round of review and assessments have indicated that there is a need to focus where the density of houses burning solid fuel as their primary source of heating exceeds 100 per 500 x 500 metre area. There have been changes to the screening calculation since the first round, and so a further screening exercise should be carried out for this report.

In the first round of review and assessment local fuel suppliers were contacted to obtain approximate numbers of customers in the more densely populated areas within the Suffolk Coastal district. The conclusion was that it was unlikely there were any areas within the Suffolk Coastal district where the burning of solid fuel for domestic purposes would give rise to an exceedance of the objectives.

It has not been possible to confirm this information for the Updating and Screening Assessment. Information regarding mains gas supplies to the district was obtained from Transco. This confirmed that, due to the rural nature of a large proportion of the district, many parishes do not have access to a mains gas supply, and may use solid fuel as the main source of heating. A number of these parishes have a housing density exceeding 100 per 500 x 500 metre area.

Information from the 2001 Census undertaken within the UK contains data on the number of houses without central heating. Information from the Census at the parish level is due to be released later this year and will be used to determine any areas within the Suffolk Coastal district which require assessment. **An Updating and Screening Assessment will be undertaken for areas of domestic**

coal burning as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

8.6.6 Small boilers with a capacity greater than 5 $MW_{(thermal)}$ burning coal or fuel oil

The technical guidance within LAQM.TG(03) states that the first round of review and assessment confirmed that large boiler plant with a capacity greater than 5 $MW_{(thermal)}$ can give rise to high short term concentrations of SO_2, with the risk that the 15-minute objective may be exceeded. New regulations which came into force on 1 January 2003 limiting the sulphur content of fuel oil to less than 1% mean that boilers using fuel oil are unlikely to be significant on their own. Particular attention should be paid to the combined impact of several sources, including those outside the local authority.

In the first round of review and assessment it was concluded that there was no large boiler plant with a capacity greater than 5 $MW_{(thermal)}$ using coal or fuel oil which would produce emissions of SO_2 that would impact within the Suffolk Coastal district. Information gathered during the first round of review and assessment has been used and built upon for this Updating and Screening Assessment. The replies from fuel usage questionnaires sent to all industrial premises with more than 50 employees, together with information obtained from public and private schools and colleges, leisure centres, sports clubs, prisons, hospitals and large nursing homes/hospices have been used. In addition, information was obtained from other large premises not contacted in the first round of review and assessments.

The findings indicate that there are two premises, each with several small boilers burning fuel oil, which in combination may have a capacity greater than 5 $MW_{(thermal)}$. These are:

- Her Majesty's Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk;
- site buildings at the Port of Felixstowe, Felixstowe, Suffolk.

We are working closely with the relevant department for each site to obtain information regarding the combined thermal capacity of the boiler plant, but have been unable to obtain sufficient information to assess either site at this time. **An Updating and Screening Assessment for the above sites will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.**

8.6.7 Shipping

The technical guidance in LAQM.TG(03) advises that large ships generally burn oils with a high sulphur content in their main engines (bunker oils). If there are sufficient movements in a port they can give rise to short-term concentrations above the 15-minute objectives for SO_2. Auxiliary engines used while berthed usually use a lower sulphur fuel, and are unlikely to be significant as regards exceedance of the objectives.

LAQM.TG(03) states that where there are receptor locations within 1 kilometre of the berths and main areas of manoeuvring, and the total number of shipping movements per year from large ships (i.e container ships, Ro-Ro ships etc) is over 5,000, a Detailed Assessment should be undertaken.

The Port of Felixstowe is within the Suffolk Coastal district and is the largest container port in the UK, and the fourth largest in Europe. It is owned by Hutchinson Ports (UK) Limited, and in 2002 there was a total of 6,132 vessel movements and a throughput of approximately 2.8 million shipping containers, as advised by the Port of Felixstowe. A potential for public exposure exists at Felixstowe

due to the location of a number of domestic properties and the viewing area at Landguard Point within 500 metres of the docking area.

Following the above guidance from LAQM.TG(03), a Detailed Assessment is required for SO_2 concentrations arising from shipping activities at the Port of Felixstowe.

Investigation of SO_2 concentrations arising from shipping activities at the Port of Felixstowe was undertaken in a Third Stage review and assessment in the first round and is reported on in this Updating and Screening Assessment. External consultants, Entec UK Limited, were employed to undertake the Third Stage review and assessment, and their report is attached as Appendix J.

Monitoring for concentrations of SO_2 from shipping emissions was undertaken by UV fluorescence for a six-month period, from 21 March to 20 September 2002, at a location within the Port of Felixstowe. This location was sited the same distance from the emissions as the nearest receptor location. The equipment used was an API Model 100A, sulphur dioxide UV fluorescence analyser, a continuous analyser which recorded 15-minute and hourly average concentrations of sulphur dioxide.

The results from this monitoring have been used to assess concentrations of SO_2 from shipping activities at the Port of Felixstowe. Full details of the monitoring results can be seen in the report attached as Appendix J. A summary of the results can also be seen in section 8.6.1, in this chapter of the report. The results of the monitoring can be summarised as follows;

- For the 15-minute mean objective of 266 $\mu g/m^3$ with 35 exceedances permitted in a calendar year, (equivalent to the 99.9th percentile) - the 99.9th percentile of 15-minute means was 142 $\mu g/m^3$, representing 53% of the objective.
- For the hourly objective of 350 $\mu g/m^3$ with 24 exceedances permitted in a calendar year, (equivalent to the 99.7th percentile) - the 99.7th percentile of 1-hour means was 108 $\mu g/m^3$, representing 31% of the objective.
- For the 24-hour objective of 125 $\mu g/m^3$ with 3 exceedances permitted in a calendar year, (equivalent to the 99.1st percentile) - the 99.1st percentile of 24-hour means was 51 $\mu g/m^3$, representing 41% of the objective.

The findings of the Third Stage review and assessment concluded that, from the monitoring programme, ambient concentrations of SO_2 were well within the relevant air quality criteria. The recommendations were that the port and surrounding residential areas would not require declaration of an AQMA due to emissions of SO_2 associated with the operation of the port.

Suffolk Coastal District Council accepts the findings of Entec UK limited with regard to emissions of SO_2 from shipping activities at the Port of Felixstowe. **No further assessment is, therefore, necessary.**

The conclusions of the Third Stage review and assessment report for SO_2 have been accepted by DEFRA. DEFRA's specific comments with regard to the report are attached also in Appendix J, together with a response to each point raised.

There are new developments being carried out at Felixstowe POrt for the Trinity III, Phase 2 project. In October 2002, following a Public Enquiry, the Port of Felixstowe was granted the Harbour Revision Order to proceed with an extension to create a larger deep-water quay at the Trinity Terminal. This will enable the Port to handle more of the latest generation large container ships simultaneously. It will also provide 15 hectares of additional container storage space, thus increasing the Port's capacity. The work is expected to commence in 2003 and the quay to be fully operational by March 2004. There are also proposals for additional works, the Felixstowe South project, for a phased reconstruction of the existing Dock Basin Numbers 1 and 2, ro-ro berths, and the Landguard terminal. The proposals would develop additional further deep-water container berth capacity and

would convert current redundant areas to container use. These proposals are substantially within the existing port limits and will see maximum use being made of the present facilities. Consent is currently being sought for these works, although the time scale at present is unclear. Should the Felixstowe South project also be approved this will further increase future port activity.

In addition to the development at the Port of Felixstowe, there are also plans to develop new facilities at Bathside Bay in Harwich, part of Harwich International Port.

At this time, Suffolk Coastal District Council does not possess any detail with regard to predicted shipping increases from these developments. The Port of Felixstowe, Harwich International Port and their appointed consultants will be contacted, in order to obtain future predictions with regard to shipping movements, and to undertake assessments of any impacts on air quality.

8.6.8 Railway locomotives

LAQM.TG(03) advises that diesel and coal-fired locomotives emit SO_2, and may represent a risk of exceeding the 15-minute objective. Moving locomotives do not make a significant contribution to short-term concentrations and do not need to be considered further. Exposure to stationary locomotives may be more significant in terms of the 15-minute objective.

All locations where diesel locomotives are stationary for two or more periods per day, of at least 15-minutes, with their engines running and where there are receptor locations within 15 metres of the stationary locomotives must be identified. Locations outside of the station or depot as well as on the station should be considered.

Information was obtained from Network Rail and the Port of Felixstowe regarding passenger and freight train movements within the Suffolk Coastal district. Any areas where trains may stop with their engines running for two or more 15-minute periods per day were identified.

Passenger train timetable information for stations within the Suffolk Coastal district confirmed that no trains idle for 15-minutes on two occasions per day at any station.

Information provided by Network Rail showed that there are three areas within the Suffolk Coastal district where, due to junction signalling, trains may idle:

- A signalled junction in Westerfield - information was provided by Network Rail indicating the precise location where trains would stop at the signal. The receptor closest to this location is approximately 240 metres away. As the closest receptor is further than 15 metres from the stationary locomotives, **further assessment will not be necessary.**

- A signalled junction near Clickett Hill in Felixstowe – this junction allows freight trains travelling from the Trinity Terminal (North Terminal) at the Port of Felixstowe onto the main line. The main line takes passenger trains from Felixstowe station and freight trains from the Landguard Terminal (South Terminal) at the Port of Felixstowe. Information was provided by Network Rail indicating the precise location where trains would stop at the signal and which trains take priority. Network Rail has advised that passenger and other trains on the main line will take priority, and freight trains from the Trinity Terminal at the Port of Felixstowe will be stopped at the signal. The precise location where the freight trains would stop at the signal was provided by Network Rail. The receptor closest to this location is approximately 40 metres away. As the closest receptor is further than 15 metres from the stationary locomotives, **further assessment will not be necessary.**

- A signalled junction at Grange Road, Walton in Felixstowe - this junction allows freight trains travelling from the Landguard Terminal (South Terminal) at the Port of Felixstowe onto the main line. The main line takes passenger trains from Felixstowe station. Network rail has advised that passenger trains on the main line will take priority, and freight trains from the Landguard Terminal at the Port of Felixstowe will be stopped at the signal. The precise location where the freight trains would stop at the signal was provided by Network Rail. The receptor closest to this location is approximately 10 metres away. Advice was sought from Network Rail as to the number of freight trains that would stop at the signal each day and the length of time that they would be stationary for. Network Rail advised that, due to the nature of activities on the Port of Felixstowe, freight trains cannot always operate to a schedule and may often be delayed. Any delay may, or may not, then coincide with passenger trains travelling on the main line. There is no information available to indicate whether freight trains stop at the signal on a regular basis, on some days they may not be stopped at all. As the passenger train service from Felixstowe only operates one train per hour, and the distance from the station to the signalled junction is only 1 kilometre, Network Rail do not believe that freight trains would be stopped at the junction for any length of time.

  Advice was sought from DEFRA's Review and Assessment Helpdesk with regard to this site. The Helpdesk confirmed the opinion of Suffolk Coastal District Council, that exceedance of the SO_2 objectives at receptor locations is unlikely, and **further assessment will not be necessary.**

8.7 Conclusion

Suffolk Coastal District Council concludes that, for the following sites identified in this report, there is insufficient information available to determine whether the air quality objectives for sulphur dioxide will be exceeded at receptor locations by the end of 2004 and 2005, and further investigation will be necessary:

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations. The findings to date indicate that it is unlikely that SO_2 emissions from these two sites would cause an exceedance of the objectives, but confirmation of this is required.

- Areas of domestic coal burning within the Suffolk Coastal district. There was insufficient evidence available to confirm whether there are any areas of domestic coal burning in the district that would cause an exceedance of the SO_2 objectives.

- Emissions from boiler plant burning fuel oil at Her Majesty's Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk. There was insufficient information available to confirm whether emissions from a number of small boilers at this site would cause an exceedance of the SO_2 objectives.

- Emissions from boiler plant burning fuel oil at site buildings on the Port of Felixstowe, Felixstowe, Suffolk. There was insufficient information available to confirm whether emissions from a number of small boilers at this site would cause an exceedance of the SO_2 objectives.

Further investigations will be undertaken for these four sites, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

9. Review and assessment of particles (PM_{10})

9.1 Air quality objectives

The air quality standards for fine particles have been set for PM_{10}, which is particulate matter with an aerodynamic diameter of less than 10 microns. DEFRA and the Devolved Administrations have adopted two air quality objectives for PM_{10}. Both objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent, and are as follows:

- 40 $\mu g/m^3$ measured as an annual mean to be achieved by 31 December 2004.
- 50 $\mu g/m^3$ measured as a fixed 24-hour mean, not to be exceeded on more than 35 days per year, to be achieved by 31 December 2004.

These objectives replace the 24-hour objective originally set for PM_{10} in the Air Quality Regulations 1997, which only allowed 4 days of exceedance per year, and additionally adopt an annual mean objective. Revised objectives were proposed because work carried out by the Airborne Particles Expert Group indicated that the original objective was unrealistic. Both objectives were then based on European Union limit values set in the First Air Quality Daughter Directive, agreed at Environment Council in June 1998. These objectives were written into UK legislation in the Air Quality Regulations 2000.

9.2 Sources

Unlike any of the previous pollutants considered, particulate matter in the atmosphere cannot be classed as a simple, well-defined, chemical substance. Indeed, it is composed of many different constituents depending on its source (both natural and from human activity). It is, therefore, characterised and defined by the mass of that fraction which is most likely to penetrate beyond the larynx and be deposited in the lung. The particles of concern are those less than 10 μm in diameter, these are called PM_{10}.

A report produced by the Airborne Particles Expert Group (APEG) in 1999 confirmed that, in the UK, particles can be regarded as having three main source types:

- **Primary particles**, these are emitted directly from the source and arise from combustion sources, including road traffic, power generation, industrial processes, etc.
- **Secondary particles**, these are formed within the atmosphere by chemical processes and comprise principally of sulphate and nitrate.
- **Coarse**, these consist of emissions from a wide range of sources, including re-suspended dusts from road traffic, construction works, mineral extraction processes, windblown dusts and soils, sea salt and biological particles.

Analysis of concentrations of PM_{10} show that it is a mix of each of the three source types and, therefore, includes both natural sources and those derived from human activity. In general terms each of the source types make up one third of the total at urban background locations, but this can vary from day to day dependant upon meteorological conditions and quantities of emissions from mobile and static sources.

LAQM.TG(03) advises that it is important to bear in mind the different emission sources and their respective contributions to PM_{10} concentrations within the review and assessment process for several reasons:

- The expected reduction in particle emissions in the future is different for each source type. For example, emissions from road traffic will be governed by new legislation on emission standards; emissions of secondary particles will be largely governed by controls on power generation; industrial, and transport emissions of NO_x and SO_2, and emissions of coarse particles are largely uncontrolled and in general are not expected to decline in the future. It is, therefore, essential to treat each source separately.
- The principal focus of LAQM should be towards the control of emissions at a local level. It is, therefore, important that the review and assessment process identifies the contribution of local emission sources so that the effectiveness of any control policies or action plans can be assessed.
- A significant proportion of current annual mean PM_{10} is derived from regional background sources, including long distance transport from Europe. In years with a high proportion of easterly winds, Europe does account for high concentrations, particularly in the south and east of England.

Of the natural sources, the most important are forest fires, sea spray, erosion of soil and rocks, and biological particles, i.e. – pollen and fungal spores. Depending on locality, these could account for a large proportion, for example, much of the Suffolk Coastal District is on the coast and, therefore, a high proportion of PM_{10} particles are likely to be from sea salt.

Particles from human activity arise from a range of sources. The APEG report produced in 1999 shows that across the country road traffic contributes to approximately 25% of national PM_{10} emissions. In city centres, however, road traffic contributes typically 30-40% to the annual average concentrations.

Sources of secondary particles are harder to determine, as they are mainly formed from the oxidation of sulphur and nitrogen oxides to acids. These are then neutralised by ammonia in the air from agricultural sources. Their formation is slow and persistence in the atmosphere is prolonged; they are, therefore, distributed more evenly between urban and rural areas and may drift large distances.

LAQM.TG(03) advises, for the above reasons, that where exceedances of the proposed objectives are predicted that local authorities focus their efforts on the identification of the contribution of local sources to overall PM_{10} concentrations.

9.3 Health effects

Particulate air pollution is associated with a range of effects on health including effects on the respiratory and cardiovascular systems, asthma and mortality. EPAQS has concluded that particulate air pollution episodes are responsible for causing excess deaths among those with pre-existing lung and heart disease. It also concluded that there was a relationship between the concentration of PM_{10} and the effect on health, the higher the concentration the greater the health effects seen. Those most at risk are the elderly, children and those who already suffer from a heart/lung complaint.

In general, the larger sizes of airborne particles (over 15 microns in diameter) do not cause as much damage to health as they can be filtered out by the body, not entering the thoracic airways. It is the smaller particles (especially below 4 microns in diameter) which can penetrate deep into the lungs. There is emerging evidence that the health effects of particles are principally due to $PM_{2.5}$ (particles with a diameter of 2.5 microns), and investigations are continuing by EPAQS.

9.4 The national perspective

Concentrations of PM_{10} were measured at UK national network monitoring sites during the period 1999-2001 and are summarised in LAQM.TG(03). Results from monitoring showed that concentrations were generally well below the annual mean objective, with the exception of the London Marylebone kerbside site. The 24-hour objective has been exceeded at a small number of sites, principally those in the vicinity of busy roads or close to industrial activities.

There are a number of measurement methods for PM_{10}, the EU limit values and the UK objectives are based upon measurements carried out using the European transfer reference sampler which is a gravimetric sampler. The monitoring of PM_{10} in the UK national networks was undertaken, however, using a tapered element oscillating microbalance (TEOM) analyser. Studies have shown that the accuracy of the gravimetric samplers is greater than the TEOM or any other samplers and LAQM.TG(03) provides advice on how to calculate these inaccuracies and account for them in any results produced.

There has been progress in recent years in reducing emissions of particles from both the transport and industrial sectors. Total UK annual national emissions have declined by 40% between 1990 and 1999. Further reductions are expected in future years as a result of agreed additional policies, or those that are currently under discussion. Within the industrial sector emissions will be further controlled through the EU Directive on Integrated Pollution Prevention and Control (IPPC) and the EU Waste Incineration Directive. A reduction in emissions that lead to formation of secondary particles is also expected from the EU legislation on the Acidification Strategy. Emissions from road transport will be reduced as a result of tightening emission controls and by the reduction in the sulphur content of diesel fuels, which affects particulate emissions.

An analysis has been undertaken on PM_{10} concentrations recorded in 1996 (as this was a worse case meteorological year with a higher frequency of easterly winds transporting more pollution from Europe) and predictions made for 2004 from this data in LAQM.TG(03). The analysis has indicated that with existing national policy levels and the above meteorology, exceedances of the 2004 objectives might be found in the following areas:

- Urban background sites in central London;
- Areas adjacent to busy roads, particularly within major urban areas;
- Areas which have significant emissions from the domestic burning of solid fuels;
- Areas in the vicinity of industrial plant, or which have significant uncontrolled or fugitive sources (for example, quarrying, materials handling facilities).

9.5 The local perspective

More than 50% of the AQMA's declared in the first round of review and assessments included exceedances of the 24-hour objective. Most of these declarations were in combination with NO_2 and associated with road traffic sources. There were, however, industrial based AQMA's (including unregulated coal-fired boilers and heating plant) and AQMA's based upon fugitive emissions of PM_{10} from a quarry and port handling activities.

DEFRA's technical guidance, LAQM.TG(03), states that it is still important that local circumstances are fully taken into consideration, and all local authorities are, therefore, required to carry out a review and assessment for PM_{10} at this time. Local authorities should focus on those locations where they expect concentrations to be the highest, which should ensure that potential exceedances are not missed.

9.6 Updating and Screening Assessment for PM_{10}

9.6.1 Monitoring data outside an Air Quality Management Area

There is no national network monitoring data available for PM_{10} for the Suffolk Coastal area as there are no national network monitoring sites within the district.

Continuous monitoring

Monitoring for concentrations of PM_{10} from the combined emissions of a roadstone coating process and quarrying activities was undertaken at a relevant receptor location to Sinks Pit in Kesgrave. The monitoring was undertaken using a Beta Attenuation Monitor – BAM-1020 for a three-month period, from 20 June to 19 September 2001. The BAM is accredited for use in the UK Automatic Urban Network. The monitoring was undertaken by Entec UK Limited, on behalf of Suffolk Coastal District Council.

The details of this monitoring and the findings of the investigation have already been published as a Third Stage supplementary report – 'Suffolk Coastal District Council – Monitoring of PM_{10} at Sinks Pit, Kesgrave' October 2001. The findings of the monitoring showed that exceedance of the objectives was unlikely at receptor locations close to the Sinks Pit by the end of 2004 and, therefore, an Air Quality Management Area was not designated. The summary table from the report to show the results of monitoring can be seen in table 9.1 below.

Table 9.1 Statistical summary of PM_{10} monitoring data, undertaken at a relevant receptor location to the Sinks Pit, Kesgrave.

Statistic		
Maximum PM_{10} concentration $\mu g/m^3$	Hourly	124.0
	Daily	59.7
Minimum PM_{10} concentration $\mu g/m^3$	Hourly	1.0
	Daily	11.8
Daily average PM_{10} $\mu g/m^3$		**26.8**
Number of days >50 $\mu g/m^3$ during monitoring period		**3.0**
Average PM_{10} levels for duration of monitoring period $\mu g/m^3$		**26.8**

9.6.2 Monitoring data within an Air Quality Management Area

There are currently no Air Quality Management Areas designated within the Suffolk Coastal district and, therefore, this section is not applicable.

9.6.3 Road junctions

DEFRA has examined the results from the first round of review and assessments, and has concluded that road junctions were not considered by many local authorities. In such cases, they should now be considered in this Updating and Screening Assessment. Two road junctions within the Suffolk Coastal district were investigated in the first round of review and assessment. These junctions had a Second Stage assessment undertaken which determined that a Third Stage review and assessment was not necessary.

LAQM.TG(03) states that all 'busy junctions' where members of the public may be exposed within 10 metres of the kerb must be considered. A 'busy junction' is classed as one with more than 10,000 vehicles per day. Flows from each road link to the junction should be added together, as detailed in LAQM.TG(03) to give a combined total.

Local knowledge of the district has been used, together with available traffic flow data and measurements taken from the Suffolk Coastal District Council Geographic Information System, to ascertain which road junctions will fall into this category. There is not a complete traffic data set available for every junction within the Suffolk Coastal district, and so a number of junctions have been assessed which will be representative for the district. Most of the junctions that have been assessed have high combined traffic flows and receptor locations close to the kerbside, these will represent a worse case scenario for most junctions, to determine whether further Detailed Assessment is necessary for the district.

The junctions that have been investigated for this Updating and Screening Assessment are listed as follows:

- The junction of the A1152 and the B1438 in Melton (the Melton crossroads).
- The junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge.
- The junction of the B1438 and Pytches Road in Woodbridge.
- The roundabout connecting the A1214 and the A12 in Martlesham.
- The junctions of Dobbs Lane and Bell Lane with the A1214 in Kesgrave.
- The roundabout connecting the A12 and the B1079 in Woodbridge.
- The junction of the A12 and the A1120 in Yoxford.
- The junction of High Road West and Garrison Lane in Felixstowe.
- The roundabout connecting High Road East and West, Beatrice Avenue and Hamilton Road in Felixstowe.

LAQM.TG(03) advises that traffic information should be obtained and the Design Manual for Road and Bridges (DMRB) screening method undertaken for each area of concern to determine whether any exceedance of the objectives is likely. DMRB is explained in detail in chapter 2 in this report.

For the first two junctions in the above list, an assessment was made in the first round of review and assessments at the Second Stage, which determined that a Third Stage review and assessment was not necessary. Third Stage assessment of both junctions was, however, undertaken for NO_2. The findings of the assessment were that no air quality management areas were necessary for NO_2 at these junctions. Continued monitoring was recommended by DEFRA for NO_2 at both of these junctions, which was undertaken. The results of the continuous monitoring were then used to undertake a Detailed Assessment for NO_2 at each junction, the findings of which can be seen in Chapter 7 of this report. As PM_{10} and NO_2 share road traffic as a common emission source, it was determined that a Detailed Assessment should also be undertaken for PM_{10} at both junctions.

In this report, for both junctions, the DMRB screening model has not been used, instead external consultants were employed to undertake a Detailed Assessment for each. Further details are discussed below and the report is attached as Appendix I.

For the remaining junctions, traffic information on flows, speeds and percentage of heavy and light duty vehicles was obtained for these junctions and can be seen in Appendix A. The guidance in LAQM.TG(03) provides advice on how to split different types of junctions into a number of road links, depending on the number of arms to the junction and traffic flows on each arm. This was undertaken as detailed in LAQM.TG(03) for each junction and the data for each link can be seen from the DMRB input data in Appendix A. Local background concentrations were obtained from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at

www.airquality.co.uk. The nearest relevant receptor locations were identified for each link of the junction and the distance to the centre of the road for each link was measured.

The DMRB screening method was run for each of the junctions, and the calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicts the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in tables 9.2 to 9.5. Details of the DMRB input information can be seen in Appendix A. Care has been taken when measuring distances to the nearest receptor location to ensure that locations where the 24-hour objective would apply have been included.

9.6.3.1 The junction of the A1152 and the B1438 in Melton (the Melton crossroads)

This junction has four arms to it which are controlled by traffic lights and the combined predicted future traffic flow is in excess of 20,000 vehicles per day; further details on traffic flow can be seen below. The junction experiences stationary queuing traffic at peak hours. There are a number of receptor locations within 10 metres of the kerb, the nearest of which is 3.9 metres from the kerb.

This junction had a Second Stage assessment undertaken in the first round of review and assessments, the details of which were published in the report entitled; 'Third Stage Review and assessment of Air Quality in the Suffolk Coastal District' (November 2001). The findings of the report were that no further review and assessment was necessary.

Third Stage assessment of this junction was, however, undertaken for NO_2. The findings of the assessment were that an air quality management area was not necessary for NO_2 at this junction. Continued monitoring was recommended by DEFRA for NO_2 at this junction, which was undertaken. The results of the continuous monitoring and diffusion tubes were then used to undertake a Detailed Assessment for NO_2 at this junction, the findings of which can be seen in Chapter 7 of this report. As PM_{10} and NO_2 share road traffic as a common emission source, it was determined that a Detailed Assessment should also be undertaken for PM_{10} at this junction.

This junction will be subject to future traffic increases, above the general traffic increase forecasts for this area of Suffolk, from a number of developments that were, and still are, at various stages of completion. Traffic predictions for each development were made from the knowledge available at that time for the Stage 2 assessment.

In this report the DMRB screening model has not been used, instead external consultants have been employed to undertake a Detailed Assessment for the junction to be presented in this report.

In order to obtain updated traffic data for this junction, a complex set of traffic counts were commissioned for the junction and sections of the A1152 and B1438 in 2002. Automatic counts (7-day) were undertaken on each of the four junction arms and a 1-day, 12-hour manual turning count was undertaken at the junction itself during this period to provide directional flow details. A summary of the traffic count data can be seen in Appendix F.

In addition to general traffic growth, this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that were, and still are, at various stages of completion. In the first round of review and assessments traffic predictions were made for three developments that were known of at that time. In the Third Stage Review and assessment of Air Quality in the Suffolk Coastal District published in November 2001, future traffic predictions were included from the Sutton Hoo development at Sutton. This development has not been included in predictions for this report as at the time of our traffic counts, June 2002, the site was open and traffic was therefore included in the counts undertaken. Traffic predictions for the St Audry's development

at Melton and the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham have been made for this assessment and are detailed below. In addition, the Director of Planning and Leisure for Suffolk Coastal District Council advised that there are now two more developments that may impact on this junction. These are the Annington homes development at Sutton and the Deben Mill development at Woodbridge.

Traffic predictions have been obtained for the majority of the St Audry's, the Rendlesham Enterprise Park and New Rendlesham, the Annington homes and the Deben Mill developments and these can be seen in Appendix F.

The percentage of traffic from these development that will travel on each arm of the Melton crossroads and on each section of the A1152 was estimated and used to calculate the annual average daily traffic flow for each. Details of calculations and assumptions can be seen in Appendix F.

A Detailed Assessment was undertaken for this junction. This used complex, air dispersion modelling to predict air quality impacts of PM_{10} from moving and idling traffic at receptor locations on the road junction. Statistical techniques were then used to assess the likelihood of any exceedances of the air quality objectives at this junction based on the modelled concentrations. The report of this Detailed Assessment is attached as Appendix I.

The findings of the modelling, see Appendix I, showed that it is very unlikely (with a probability less than 5%) that an exceedance of the 24-hour PM_{10} objective would occur at the Melton junction in 2004. **Netcen recommended that Suffolk Coastal District Council do not consider declaring an air quality management area for PM_{10} from road transport at this junction.**

Suffolk Coastal District Council accepts the findings with regard to PM_{10} at this junction. **No further assessment is, therefore, necessary.**

9.6.3.2 The junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge.

This junction has four arms to it which are controlled by traffic lights and the combined predicted future traffic flow is in excess of 10,000 vehicles per day, further details on traffic flow can be seen below. The junction experiences stationary queuing traffic at peak hours. There are a number of receptor locations within 10 metres of the kerb, the nearest of which is less than 1 metre from the kerb.

This junction had a Second Stage assessment undertaken in the first round of review and assessments, the details of which were published in the report entitled; 'Third Stage Review and assessment of Air Quality in the Suffolk Coastal District' (November 2001). The findings of the report were that no further review and assessment was necessary.

Third Stage assessment of this junction was, however, undertaken for NO_2. The findings of the assessment were that an air quality management area was not necessary for NO_2 at this junction. Continued monitoring was recommended by DEFRA for NO_2 at this junction, which was undertaken. The results of the continuous monitoring and diffusion tubes were then used to undertake a Detailed Assessment for NO_2 at this junction, the findings of which can be seen in Chapter 7 of this report. As PM_{10} and NO_2 share road traffic as a common emission source, it was determined that a Detailed Assessment should also be undertaken for PM_{10} at this junction.

In this report the DMRB screening model has not been used, instead external consultants have been employed to undertake a Detailed Assessment for the junction, which is presented in this report.

In order to obtain updated traffic data for this junction, a complex set of traffic counts were commissioned for the junction and the B1438 in 2002. Automatic counts (7-day) were undertaken on

each of the B1438 junction arms and a 1-day, 12-hour manual turning count was undertaken at the junction itself during this period to provide directional flow details. A summary of the traffic count data can be seen in Appendix G.

In addition to general traffic growth, this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that are at various stages of completion. The Director of Planning and Leisure for Suffolk Coastal District Council advised that there are four developments that may impact on this junction. These are the St Audry's development at Melton, the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham, the Annington homes development at Sutton and the Deben Mill development at Woodbridge.

Traffic predictions have been obtained for the majority of the St Audry's, the Rendlesham Enterprise Park and New Rendlesham, the Annington homes and the Deben Mill developments and these can be seen in Appendix G.

The percentage of traffic from these developments that will travel through the Woodbridge junction was estimated and used to calculate the annual average daily traffic flow. Details of calculations and assumptions can be seen in Appendix G.

A Detailed Assessment was undertaken for this junction. This used complex, air dispersion modelling to predict air quality impacts of PM_{10} from moving and idling traffic at receptor locations on the road junction. Statistical techniques were then used to assess the likelihood of any exceedances of the air quality objectives at this junction based on the modelled concentrations. The report of this Detailed Assessment is attached as Appendix I.

The findings of the modelling, see Appendix I, showed that it is very unlikely (with a probability less than 5%) that an exceedance of the 24-hour PM_{10} objective would occur at the Woodbridge junction in 2004. **Netcen have recommended that Suffolk Coastal District Council do not consider declaring an air quality management area for PM_{10} from road transport at this junction.**

Suffolk Coastal District Council accepts the findings with regard to PM_{10} at this junction. **No further assessment is, therefore, necessary.**

9.6.3.3 The junction of the B1438 and Pytches Road in Woodbridge

In addition to the above-mentioned Woodbridge junction, a second Woodbridge junction has been modelled to predict PM_{10} concentrations in 2004. This junction is not within a street canyon and has a large traffic flow when compared to other junctions in Woodbridge, and receptor locations within 10 metres of the kerb. It was, therefore, modelled to be representative of other junctions in Woodbridge.

Input details required by DMRB were obtained, as outlined in section 9.6.3 above, for this junction and can be seen in Appendix A.

In addition to general traffic growth, the B1438 arm of this junction will have traffic increases from a number of developments in this area of the Suffolk Coastal district that are at various stages of completion. The Director of Planning and Leisure for Suffolk Coastal District Council advised that there are four developments that may impact on this junction. These are the St Audry's development at Melton, the Rendlesham Enterprise Park and New Rendlesham development at Rendlesham, the Annington homes development at Sutton and the Deben Mill development at Woodbridge. Traffic predictions have been obtained for these developments and can be seen in Appendix G. The percentage of traffic from these developments that will travel through the Woodbridge junction was estimated and used to calculate the annual average daily traffic flow, and is assumed to be the same for the B1438 at its junction with Pytches Road. Details of calculations and assumptions can be seen in Appendix G.

The DMRB screening method was run for this junction, to determine whether an exceedance of the PM_{10} objectives is likely. The calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicted the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in table 9.2. Details of the DMRB input information can be seen in Appendix A.

The results in table 9.2 show that, at the closest receptor location to this junction, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment of this junction will not, therefore, be necessary at this time.**

Table 9.2 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 $\mu g/m^3$ for 2004, derived from DMRB, for the junction of the B1438 and Pytches Road in Woodbridge

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 ($\mu g/m^3$)**	**DMRB calculated annual mean PM_{10} contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 ($\mu g/m^3$)**	**DMRB predicted number of days when PM_{10} concentration is >50$\mu g/m^3$ in 2004**
Closest receptor location, Woodbridge. Junction of the B1438 and Pytches Road, Woodbridge.	18.9	3.0	**21.9**	**6.2**

9.6.3.4 Junctions on the A1214 in Martlesham and Kesgrave

The following junctions on the A1214 were assessed as these junctions have the largest traffic flows when compared to other junctions on the A1214, and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions on this road.

- The roundabout connecting the A1214 and the A12 at Martlesham.
- The junction of Dobbs Lane with the A1214 at Kesgrave.
- The junction of Bell Lane with the A1214 at Kesgrave.

Input details required by DMRB were obtained, as outlined in section 9.6.3 above, for this junction and can be seen in Appendix A.

In addition to general traffic growth, the A1214 will have traffic increases from developments in this area of the Suffolk Coastal district that are at various stages of completion. The Planning and Leisure, Development and Policy, section for Suffolk Coastal District Council advised that there are three developments that may impact on the A1214. These are the Grange Farm development at Kesgrave, the Bixley Farm development at Purdis Farm and the Park and Ride development at Martlesham.

Details and traffic predictions have been obtained for these developments and can be seen in Appendix H. The volume of traffic from each of these developments that will travel the A1214 in 2004 was estimated and used to calculate the annual average daily traffic flow. Details of calculations and assumptions can be seen in Appendix H.

The DMRB screening method was run for this junction to determine whether an exceedance of the PM_{10} objectives is likely. The calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicted the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in table 9.3. Details of the DMRB input information can be seen in Appendix A.

Table 9.3 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 $\mu g/m^3$ for 2004, derived from DMRB, for junctions on the A1214.

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 ($\mu g/m^3$)**	**DMRB calculated annual mean PM_{10} contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 ($\mu g/m^3$)**	**DMRB predicted number of days when PM_{10} concentration is >50$\mu g/m^3$ in 2004**
Closest receptor location, Martlesham. Junction of the A1214 and A12, Martlesham.	19.1	7.4	**26.5**	**16.3**
Closest receptor location, Kesgrave. Junction of the A1214 and Dobbs Lane, Kesgrave.	19.1	5.8	**24.9**	**12.2**
Closest receptor location, Kesgrave. Junction of the A1214 and Bell Lane, Kesgrave.	19.1	9.4	**28.5**	**22.2**

The results in table 9.3 show that, at the closest receptor locations to these junctions, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment for junctions on the A1214 will not, therefore, be necessary at this time.**

9.6.3.5 Junctions on the A12 in Woodbridge and Yoxford

The following junctions on the A12 were assessed, as these junctions have the largest traffic flows when compared to other junctions on the A12 and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions on this road.

- The roundabout connecting the A12 and the B1079 at Woodbridge.
- The junction of the A12 and the A1120 at Yoxford.

Input details required by DMRB were obtained, as outlined in section 9.6.3 above, for these junctions and can be seen in Appendix A. The DMRB screening method was run for this junction, to determine whether an exceedance of the PM_{10} objectives is likely. The calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicted the number of days when the PM_{10} concentration will be

greater than 50 μg/m^3 and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in table 9.4. Details of the DMRB input information can be seen in Appendix A.

Table 9.4 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 μg/m^3 for 2004, derived from DMRB, for junctions on the A12.

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 (μg/m^3)**	**DMRB calculated annual mean PM_{10} contribution from road traffic (μg/m^3)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 (μg/m^3)**	**DMRB predicted number of days when PM_{10} concentration is >50μg/m^3 in 2004**
Closest receptor location, Woodbridge. Junction of the A12 and B1079, Woodbridge.	18.4	6.7	**25.1**	**12.6**
Closest receptor location, Yoxford. Junction of the A12 and A1120, Yoxford.	17.8	9.4	**27.2**	**18.1**

The results in table 9.4 show that, at the closest receptor locations to these junctions, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 μg/m^3 is below 35. **Further review and assessment for junctions on the A12 will not, therefore, be necessary at this time.**

9.6.3.6 Junctions within the town of Felixstowe

The following junctions within the town of Felixstowe were assessed as these junctions have the largest traffic flows, when compared to other junctions within Felixstowe and receptor locations within 10 metres of the kerb. They were, therefore, modelled to be representative of other junctions within Felixstowe.

- The junction of High Road West and Garrison Lane in Felixstowe.
- The roundabout connecting High Road East and West, Beatrice Avenue and Hamilton Road in Felixstowe.

Input details required by DMRB were obtained, as outlined in section 9.6.3 above, for these junctions and can be seen in Appendix A. The DMRB screening method was run for this junction, to determine whether an exceedance of the PM_{10} objectives is likely. The calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicted the number of days when the PM_{10} concentration will be greater than 50 μg/m^3 and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in table 9.5. Details of the DMRB input information can be seen in Appendix A.

Table 9.5 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 μg/m^3 for 2004, derived from DMRB, for junctions within the town of Felixstowe.

Receptor location	Estimated annual mean PM_{10} background concentration for 2004 (μg/m^3)	DMRB calculated annual mean PM_{10} contribution from road traffic (μg/m^3)	DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 (μg/m^3)	DMRB predicted number of days when PM_{10} concentration is >50μg/m^3 in 2004
Closest receptor location, Felixstowe. Junction of High Road West and Garrison Lane.	19.1	5.5	**24.6**	**11.5**
Closest receptor location, Felixstowe. Junction of High Road East and West, Beatrice Avenue and Hamilton Road.	19.1	6.0	**25.1**	**12.7**

The results in table 9.5 show that, at the closest receptor locations to these junctions, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 μg/m^3 is below 35. **Further review and assessment for junctions within the town of Felixstowe will not, therefore, be necessary at this time.**

9.6.4 Roads with a high flow of buses and/or heavy goods vehicles

DEFRA have examined the results from the first round of review and assessments, and have concluded that there will be some street locations where traffic flows will not necessarily be high but there is an unusually high proportion of buses and/or heavy goods vehicles (HGVs). These can be an important source of PM_{10} and such roads will, therefore, need to be assessed with respect to emissions from road traffic. Such locations were not considered by many local authorities during the first round of review and assessments and, in such cases, should be now considered in this Updating and Screening Assessment report. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) states that all roads with an unusually high proportion of heavy duty vehicles (greater than 20%) which totals more than 2,000 vehicles per day and with relevant exposure within 10 metres must be considered.

Using local knowledge of the district, traffic flow data, and measurements taken from the Suffolk Coastal District Council Geographic Information System, all roads that fall into this category were identified.

Investigations showed that there is only one road with a proportion of heavy duty vehicles (HDVs) greater than 20% within the Suffolk Coastal district, which is the A14 trunk road from the Haven Exchange roundabout at the Port of Felixstowe to the Ipswich Borough boundary. This road is the only route to and from the Port of Felixstowe, the largest container port in Britain and the fourth largest in Europe. Due to the large number of HDVs generated by the Port of Felixstowe, the A14 has a HDV proportion of greater than 30%, totalling greater than 2,000 vehicles per day, on all sections of it within the Suffolk Coastal district.

Emissions from traffic using the A14 trunk road do not come within the scope of this section of the report, however, as there are no relevant receptor locations within 10 metres of the road. **No further assessment is, therefore, necessary.** Assessment of all sections of the A14 trunk road for PM_{10} concentrations from road traffic emissions have been made later, in section 9.6.6.1, in this chapter of the report and details can be viewed there.

9.6.5 New roads constructed or proposed since the first round of review and assessment

There have been no new roads constructed or proposed within the Suffolk Coastal district since the first round of review and assessment and, therefore, this section is not applicable. **No further assessment is, therefore, necessary.**

9.6.6 Roads close to the objective during the first round of review and assessment

Investigations undertaken on behalf of DEFRA have found that the emission factors used in the DMRB screening method for the first round of review and assessment were under-estimated. A revised version of DMRB is, therefore, now available which incorporates new emission factors for PM_{10}. LAQM.TG(03) advises that any roads which had receptor locations for which the predicted 90^{th} percentile of 24-hour means was above 45 $\mu g/m^3$ should be re-visited. A number of roads assessed during the first round of review and assessment had receptor locations for which the predicted 90^{th} percentile of 24-hour means was above 45 $\mu g/m^3$, these include the A14 trunk road, the A12 trunk road, the A1214 and the A1152.

From the first round of review and assessments, no road assessed for PM_{10} within the Suffolk Coastal district progressed beyond the Second Stage.

In this Updating and Screening Assessment the DMRB screening model has been re-run for each of the roads listed above. This will enable the predicted annual mean PM_{10} concentrations and the number of days when the PM_{10} concentration will be greater than 50$\mu g/m^3$ to be determined at the nearest relevant receptor locations, using the new emission factors and with more recent traffic flow information. In addition, new information presented in LAQM.TG(03) with regard to the procedure for obtaining annual mean background PM_{10} concentrations from the default concentration maps produced by netcen on behalf of DEFRA (which can be obtained from the website at www.airquality.co.uk.) suggests that the background contribution for each location may have been over-estimated. The maps have been plotted using information from DEFRA background and urban monitoring networks and National Atmospheric Emissions Inventory estimates. Concerns have been raised, when using the maps to assess a major road in a rural area, that the background pollutant concentrations may include emissions from the road in question. Detail is provided in LAQM.TG(03) to account for this, it is recommended that concentrations are derived from the average background concentration four grid squares away from either side of the road where there are no other significant sources of pollution. This advice has been used in deriving background pollutant concentrations from the Netcen maps for this report and has decreased the background concentrations used in the DMRB screening model in each case.

Traffic information on flows, speeds and percentage of heavy and light duty vehicles was obtained for the A14 trunk road, the A12 trunk road, the A1214 and the A1152. Each road was then split into sections, dependent on alterations in traffic flow, vehicle speed, HDV percentage and major intersections. The sections determined and the traffic data used for each can be seen in Appendix A.

Local background concentrations were obtained, as explained above, from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at www.airquality.co.uk.

The nearest relevant receptor locations were identified for each road section and the distance to the centre of the road measured. LAQM.TG(03) states that predictions should be carried out at locations where the 24-hour objective would apply. The closest receptor locations were, therefore, taken as any residential gardens or buildings where people may be exposed for a proportion of the 24-hour objective.

The DMRB screening method was then run for each section of each road to determine whether any exceedance of the objectives is likely. DMRB is explained in detail in chapter 2 of this report. The calculated annual mean PM_{10} concentration from the roads was added to the background concentration to obtain the predicted annual mean concentration in 2004. The annual mean can then be compared directly with the air quality standards. DMRB also predicts the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ and whether the 24-hour objective will be exceeded (the 24-hour objective includes 35 allowed exceedances). A summary of the results can be seen in tables 9.6 to 9.9. Details of the DMRB input information can be seen in Appendix A.

9.6.6.1 A14 trunk road

As explained above, the DMRB screening method was undertaken for the A14 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A14 by the end of 2004 and, therefore, an Air Quality Management Area was not designated.

Table 9.6 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 $\mu g/m^3$ for 2004, derived from DMRB, for the A14 trunk Road.

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 ($\mu g/m^3$)**	**DMRB calculated annual mean PM_{10} contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 ($\mu g/m^3$)**	**DMRB predicted number of days when PM_{10} concentration is >50$\mu g/m^3$ in 2004**
Closest receptor location, Felixstowe. A14 Section 1 – Haven Exchange roundabout to Dock Spur roundabout, Felixstowe (Port of Felixstowe Road)	18.7	7.0	**25.7**	**14.2**
Closest receptor location, Felixstowe. A14 Section 1 – reduced speeds at Haven Exchange roundabout	18.7	4.0	**22.7**	**7.6**
Closest receptor location, Trimley. A14 Section 2 – Dock Spur roundabout, Felixstowe to A12 junction, Nacton	18.7	9.7	**28.4**	**21.9**
Closest receptor location, Felixstowe. A14 Section 2 – reduced speeds and junction assessment at Dock Spur roundabout	18.7	11.2	**29.9**	**27.1**
Closest receptor location, Nacton. A14 Section 3 –A12 junction, Nacton to Ipswich Borough boundary	19.1	4.5	**23.6**	**9.3**
Closest receptor location, Nacton. Where A14 Section 3 and A1156 run parallel, so contribution from both	19.1	5.3	**24.4**	**11.0**

Results from the DMRB screening method run for each section of the A14 can be seen in table 9.6. The results are considerably lower than those obtained from DMRB in the first round of review and assessments. They show that, at the closest receptor locations to all sections of the A14, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment of the A14 trunk road will not, therefore, be necessary at this time.**

The Port of Felixstowe

The A14 was divided into the relevant sections, as seen in table 9.6, and the assessment was started at the Haven Exchange roundabout. Road traffic emissions within the Port of Felixstowe were not assessed as there are no public receptor locations. LAQM.TG(03) specifically states that people occupationally exposed should not be included as they are not classified as relevant receptors within the scope of LAQM.

There are new developments being carried out at Felixstowe Port for the Trinity III, Phase 2 project. In October 2002, following a Public Enquiry, the Port of Felixstowe was granted the Harbour Revision Order to proceed with an extension to create a larger deep-water quay at the Trinity Terminal. This will enable the Port to handle more of the latest generation large container ships simultaneously. It will also provide 15 hectares of additional container storage space, thus increasing the Port's capacity. The work is expected to commence in 2003 and the quay to be fully operational by March 2004. There are also proposals for additional works, the Felixstowe South project, for a phased reconstruction of the existing Dock Basin Numbers 1 and 2, ro-ro berths, and the Landguard terminal. The proposals would develop additional further deep-water container berth capacity and would convert current redundant areas to container use. These proposals are substantially within the existing port limits and will see maximum use being made of the present facilities. Consent is currently being sought for these works, although the time scale at present is unclear. The Trinity III, Phase 2 development will be underway shortly and the increased capacity that it provides will create an additional throughput of containers and the traffic related to this. Should the Felixstowe South project also be approved this will further increase future port traffic.

At this time, Suffolk Coastal District Council does not possess any detail with regard to predicted traffic increases from these developments or the proportion of freight to be moved by rail. The Port of Felixstowe and their appointed consultants will be consulted, in order to obtain future traffic predictions and undertake assessments of impacts on air quality in the vicinity of the Port of Felixstowe and along the A14 trunk road.

9.6.6.2 A12 trunk road

As explained above, the DMRB screening method was undertaken for the A12 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A12 by the end of 2004 and, therefore, an Air Quality Management Area was not designated.

Results from the DMRB screening method run for each section of the A12 can be seen in table 9.7. The results are considerably lower than those obtained from DMRB in the first round of review and assessments. They show that, at the closest receptor locations to all sections of the A12, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment of the A12 trunk road will not, therefore, be necessary at this time.**

Table 9.7 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 μg/m^3 for 2004, derived from DMRB, for the A12 trunk Road.

Receptor location	Estimated annual mean PM_{10} background concentration for 2004 (μg/m^3)	DMRB calculated annual mean PM_{10} contribution from road traffic (μg/m^3)	DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 (μg/m^3)	DMRB predicted number of days when PM_{10} concentration is >50μg/m^3 in 2004
Closest receptor location, Martlesham A12 Section 1 – A14 junction, Nacton to A1214 roundabout, Martlesham	19.1	4.0	**23.1**	**8.2**
Closest receptor location, Martlesham A12 Section 1 – reduced speeds at roundabouts	19.1	4.2	**23.3**	**8.7**
Closest receptor location, Bealings A12 Section 2 – A1214 roundabout, Martlesham to B1438 roundabout, Woodbridge	19.1	3.0	**22.1**	**6.4**
Closest receptor location, Martlesham A12 Section 2 – reduced speeds and junction assessment at A1214 roundabout, Martlesham	19.1	7.4	**26.5**	**16.3**
Closest receptor location, Woodbridge A12 Section 3 – B1438 roundabout, Woodbridge to A1152 roundabout, Woodbridge	18.4	4.7	**23.1**	**8.2**
Closest receptor location, Woodbridge A12 Section 3 – reduced speeds and junction assessment at B1079 roundabout, Woodbridge	18.4	6.7	**25.1**	**12.6**
Closest receptor location, Ufford A12 Section 4 – A1152 roundabout, Woodbridge to B1116 junction, Wickham Market	18.3	3.7	**22.0**	**6.3**
Closest receptor location, Woodbridge A12 Section 4 – reduced speeds and junction assessment at A1152 roundabout, Woodbridge	18.4	4.0	**22.4**	**6.9**
Closest receptor location, Farnham A12 Section 5 – B1116 junction, Wickham Market to end of A12 at Waveney District boundary	18.6	5.6	**24.2**	**10.6**
Closest receptor location, Yoxford A12 Section 5 – reduced speeds and junction assessment at A1120 junction, Yoxford	17.8	9.4	**27.2**	**18.1**

9.6.6.3 A1214

As explained above, the DMRB screening method was undertaken for the A1214 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the PM_{10} objectives was not likely at receptor locations on the A1214 by the end of 2004 and, therefore, an Air Quality Management Area was not designated.

As detailed earlier in this chapter of this report, there are three developments in this area of the Suffolk Coastal district that will increase future traffic flows on this road. These are detailed in Appendix H, together with the estimated future traffic contribution that each will make to traffic on the A1214. These increases have been added to the general traffic growth for this road to provide the traffic flow inputs for the DMRB model. It has, therefore, been possible to more accurately predict future PM_{10} levels at receptor locations along this road.

Results from the DMRB screening method run for each section of the A1214 can be seen in table 9.8. The results are considerably lower than those obtained from DMRB in the first round of review and assessments. They show that, at the closest receptor locations to all sections of the A1214, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment of the A1214 trunk road for PM_{10} will not, therefore, be necessary at this time.**

Table 9.8 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 $\mu g/m^3$ for 2004, derived from DMRB, for the A1214.

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 ($\mu g/m^3$)**	**DMRB calculated annual mean PM_{10} contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 ($\mu g/m^3$)**	**DMRB predicted number of days when PM_{10} concentration is >50$\mu g/m^3$ in 2004**
Closest receptor location, Kesgrave A1214 – A12 junction at Martlesham to Ipswich Borough boundary.	19.1	5.2	**24.3**	**10.8**
Closest receptor location, Kesgrave A1214 – A12 junction at Martlesham to Ipswich Borough boundary – reduced speeds	19.1	8.6	**27.7**	**19.8**

9.6.6.4 A1152

As explained above, the DMRB screening method was undertaken for the A1152 trunk road in the first round of review and assessments. The Stage 2 assessment showed that exceedance of the objectives was not likely at receptor locations on the A1152 by the end of 2005 and, therefore, an Air Quality Management Area was not designated.

As detailed earlier in this chapter of this report, there are a number of developments in this area of the Suffolk Coastal district that will increase future traffic flows on this road. These are detailed in Appendix F, together with the estimated future traffic contribution that each will make upon the different sections of the A1152. These increases have been added to the general traffic growth for this road to provide the traffic flow inputs for the DMRB model. The knowledge of potential traffic increases from each development has increased since the first round of review and assessments, and

traffic counts were commissioned on the A1152 in 2002, so that future PM_{10} concentrations can be predicted more accurately at receptor locations along this road.

Results from the DMRB screening method run for each section of the A1214 can be seen in table 9.9 below. Section 2 of the A1152 is missing from table 9.9 as this is the actual Melton crossroad junction and has been reviewed above. The results are considerably lower than those obtained from DMRB in the first round of review and assessments. They show that, at the closest receptor locations to all sections of the A1152, annual mean PM_{10} concentrations are not likely to exceed the 2004 objective, and the number of days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$ is below 35. **Further review and assessment of the A1152 trunk road for PM_{10} will not, therefore, be necessary at this time.**

Table 9.9 Predicted annual mean PM_{10} concentration and number of days when the concentration will be >50 $\mu g/m^3$ for 2004, derived from DMRB, for the A1152.

Receptor location	**Estimated annual mean PM_{10} background concentration for 2004 ($\mu g/m^3$)**	**DMRB calculated annual mean PM_{10} contribution from road traffic ($\mu g/m^3$)**	**DMRB predicted total annual mean PM_{10} concentration (background + traffic) in 2004 ($\mu g/m^3$)**	**DMRB predicted number of days when PM_{10} concentration is >50$\mu g/m^3$ in 2004**
Closest receptor location, Melton. A1152 Section 1 – A12 roundabout, Woodbridge to B1438 crossroads at Melton	18.6	3.6	**22.2**	**6.7**
Closest receptor location, Melton. A1152 Section 3 – B1438 crossroads at Melton to B1083 roundabout at Wilford Bridge, Bromeswell	18.6	3.4	**22.0**	**6.3**
Closest receptor location, Bromeswell. A1152 Section 4 – B1083 roundabout at Wilford Bridge, Bromeswell to B1084 junction, Bromeswell	18.7	1.7	**20.4**	**4.0**
Closest receptor location, Eyke. A1152 Section 5 – B1084 junction, Bromeswell to ex-RAF Bentwaters roundabout, Rendlesham	18.0	1.7	**19.7**	**3.0**

9.6.7 Roads with significantly changed traffic flows

LAQM.TG(03) states that any roads with traffic flows greater than 10,000 vehicles per day which have experienced a 'large' increase in traffic flow, taken to be 25% or more, since the first round of review and assessments should be considered in this Updating and Screening Assessment.

The most recent available traffic flow data was obtained from a number of sources, Suffolk County Council Environment and Transport Department, the Highways Agency, and independent traffic surveys employed by Suffolk Coastal District Council. For roads with a flow greater than 10,000 vehicles per day the percentage traffic increase from 1996 to 2002 was calculated. The year 1996 was used, as in the first round of review and assessments this was the farthest year back traffic data was available.

From the traffic data provided it was found that there was one section of the A12 with a 33% traffic increase since 1996. This was section 5, as seen in table 9.7 above, at Farnham. The DMRB screening method has already been run for this section of the A12 using the new traffic count data (see table 9.7). The results show a predicted annual mean PM_{10} concentration of 27.2 $\mu g/m^3$ in 2004, with 18.1 days when the PM_{10} concentration will be greater than 50 $\mu g/m^3$. The 2004 PM_{10} objectives are, therefore, not likely to be exceeded at receptor locations on this section of the A12, and **further review and assessment will not be necessary at this time.**

9.6.8 New Industrial sources

The technical guidance in LAQM.TG(03) states that industrial sources will not make a significant contribution to annual mean PM_{10} concentrations, but could be significant in terms of the 24-hour objective. Evidence from the first round of review and assessment indicates that the focus should be on fugitive sources, although coal-burning boilers and steel works may also be significant.

Any new sources, introduced since the first round of review and assessments, must be reviewed in this report. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. LAQM.TG(03) additionally states that authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

<u>New industrial sources within the Suffolk Coastal district</u>

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

Within this list there are no new processes, since the first round of review and assessments, that have the potential to emit significant quantities of PM_{10}.

There is one site within the Suffolk Coastal district, currently undergoing authorisation under Part 1 of the Environmental Protection Act 1990 by the Environment Agency:

- This site is Green Label Poultry, which is a duck rearing premises, situated on the Rendlesham Enterprise Park. Information provided by the Environment Agency indicates that this process may be a significant emitter of PM_{10}, as a fugitive source, although it is not listed in LAQM.TG(03) as such. The nearest relevant receptor location is a domestic property, which is at a distance of approximately 500 metres from the site. No dust complaints have been received by the Council regarding the site and, upon visual inspection, no obvious signs of dust emissions were noted.

  Advice was requested from DEFRA's Review and Assessment Helpdesk with regard to this site. The Helpdesk confirmed that PM_{10} emissions would occur from this type of process, but in their opinion any emissions would be unlikely to cause an exceedance of the objectives at a distance of 500 metres.

  The advice from DEFRA, in addition to the absence of any dust complaints and no obvious signs of dust from visual inspections of the site, confirms the opinion of Suffolk Coastal District Council that exceedance of the PM_{10} objectives at receptor locations is unlikely. **Further assessment of this site will not, therefore, be necessary.**

New industrial sources from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium-sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered, it was determined that there are no new authorised processes, current or planned, in neighbouring authorities which have the potential to emit significant quantities of PM_{10} which would impact within the Suffolk Coastal district. **No further assessment is, therefore, necessary.**

9.6.9 Industrial sources with substantially increased emissions

The technical guidance in LAQM.TG(03) states that industrial sources will not make a significant contribution to annual mean PM_{10} concentrations, but could be significant in terms of the 24-hour objective. Evidence from the first round of review and assessment indicates that the focus should be on fugitive sources, although coal-burning boilers and steel works may also be significant.

Any sources with substantially increased emissions since the first round of review and assessments must be reviewed in this report. LAQM.TG(03) advises that any emissions from a process which have increased by more than 30% are classed as substantially increased. For the purpose of this review and assessment, LAQM.TG(03) advises that the industrial sources which need to be considered are those processes regulated under Part I of the Environmental Protection Act 1990, which are listed within the guidance as potentially significant emitters. Authorities will need to consider the impact of emissions from stacks within neighbouring areas if there is a potential for these to be significant.

Industrial sources with substantially increased emissions within the Suffolk Coastal district

All processes within the Suffolk Coastal district currently regulated under Part 1 of the Environmental Protection Act 1990 are listed in Appendix C. For each process Appendix C indicates whether it is classified under the guidance in LAQM.TG(03) as a potentially significant emitter of any of the specified pollutants.

From Appendix C it can be seen that there are three authorised process within the Suffolk Coastal district with the potential to emit significant quantities of PM_{10}:

- White Mountain Roadstone Limited, Foxhall Quarry No. 4, Foxhall Road, Brightwell, Suffolk. This site operates a roadstone coating process and is regulated by Suffolk Coastal District Council. Information was obtained from the process operator regarding emissions of PM_{10}, which have decreased from 1,979 kg in 1999 to 1,579 kg in 2002. As emissions of PM_{10} have actually reduced from this process since the first round of review and assessments, undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared for PM_{10} in the first round, **no further assessment is necessary at this time.**

- Ipswich Coated Stone, Sinks Pit, Main Road, Kesgrave, Suffolk. This site operates a roadstone coating process and is regulated by Suffolk Coastal District Council. Information was obtained from the process operator regarding emissions of PM_{10}, which have decreased from 1,622 kg in 1999 to 781 kg in 2002. As emissions of PM_{10} have actually reduced from this process since the first round of review and assessments, undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared for PM_{10} in the first round, **no further assessment is necessary at this time.**

- British Energy Generation Limited, Sizewell B Power Station, near Leiston, Suffolk. This process was investigated in the first round of review and assessment and was not considered to be a significant emitter of PM_{10}. Sizewell B is a pressurised water reactor nuclear power station and is regulated by the Environment Agency. In addition to regulation under the Environmental Protection Act 1990, separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency regulate the discharge of radioactive waste by Sizewell B. For the purposes of review and assessment of air quality in this report, only authorisations issued under the Environmental Protection Act 1990 need to be considered for this site.

  There are three separate authorisations for this site, two for fuel oil fired combustion processes and one for an incineration process. The two authorisations covering the fuel oil fired combustion process for the essential supplies diesel generators (ESDG's) and the auxiliary boilers (see Appendix C) are listed as potentially significant emitters of PM_{10} in LAQM.TG(03) requiring investigation. The authorisation for the incineration process is not listed as a potentially significant emitter of PM_{10} in LAQM.TG(03).

  The ESDG's at Sizewell B are not operated continuously, they provide a back-up electrical supply to the power station if it is needed during shut down for maintenance, refuelling, etc. in the event of loss of grid electricity supplies. The auxiliary boilers are also not operated continuously, they provide steam to heat the buildings on site when the reactor is shut-down for maintenance or refuelling, and steam for the reactor when it is started up following a shut down. Following discussions with the Environment Agency, it was considered that as the ESDG's and auxiliary boilers are only operated as a back-up system they should not emit significant quantities of PM_{10} that would exceed the objectives.

  Although the incineration process is not classed as a potentially significant emitter of PM_{10}, it is in close proximity to the ESDG's and the auxiliary boilers. Advice in LAQM.TG(03) recommends that, where there is one or more source in close proximity, total emissions from the site should be included in the assessment. For completeness it is considered that total emissions from the site as a whole should be included in an assessment.

  In addition, Sizewell B is in close proximity to Sizewell A Power Station. Sizewell A is authorised under the Radioactive Substances Act 1993 by the Environment Agency, to regulate the discharge of radioactive waste. The site is not, however, regulated under Part 1 of the Environmental Protection Act 1990, as processes on site are not of a capacity to emit significant quantities of PM_{10} to require authorisation.

  Sizewell A incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. The supporting plant and equipment includes four essential supplies diesel generators (ESDG's) to provide power only in the event of loss of grid electricity supplies, two boilers for provision of steam, and an incinerator. There is, therefore, the potential for emissions of PM_{10} from Sizewell A and Sizewell B Power Station to combine. There is insufficient information available at this time to assess the possibility of combined emissions and whether they would exceed the objectives for PM_{10}. Close working relationships have been developed with the Environment Agency and the Environmental Co-ordinators at Sizewell A and B to obtain

all necessary information regarding releases of PM_{10} from the site so that an assessment can be made.

At this time it is considered unlikely that PM_{10} emissions from ancillary equipment at these two sites would cause an exceedance of the objectives, but confirmation of this is required. An Updating and Screening Assessment for Sizewell A and B Power Station will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

Industrial sources with substantially increased emissions from neighbouring authorities

LAQM.TG(03) states that consideration must be given to impacts of emissions from stacks within neighbouring areas, if there is a potential for these to be significant. As a guide, for medium sized sources with chimneys between about 40 to 100 metres, impacts should be considered at a distance up to about 5 kilometres. For small sources, with chimneys between about 20 to 40 metres impacts should be considered at a distance up to about 2 kilometres. For fugitive emissions sources, impacts should be considered at a distance up to about 1 kilometre.

Using the above guidance, information was obtained from each neighbouring authority on the processes within their area, whether any were classed under LAQM.TG(03) as significant emitters of specified pollutants, and the distance of each to the Suffolk Coastal boundary. From the information gathered it was determined that there is one authorised process in a neighbouring authority with the potential to emit significant quantities of PM_{10} that may impact within the Suffolk Coastal district:

- White Rose Environmental Limited, Ipswich Hospital, Heath Road, Ipswich. This is a clinical waste incinerator, an authorised process regulated by the Environment Agency. This process is within Ipswich Borough and is approximately 1kilometre from the nearest relevant receptor location within the Suffolk Coastal district. Ipswich Borough Council has provided information on emissions of PM_{10} from this process, which have decreased from 56 kg in 1999 to 8.9 kg in 2002. As emissions of PM_{10} have actually reduced from this process since the first round of review and assessments, undertaken in 1999, and an Air Quality Management Area (AQMA) was not declared for PM_{10} in the first round, **no further assessment is necessary at this time.**

9.6.10 Areas of domestic solid fuel burning

Although coal and other solid fuel burning to provide domestic heating has largely been replaced by other fuels, where solid fuel burning is concentrated in small areas there exists the potential for exceedances of the PM_{10} objectives. LAQM.TG(03) advises that the results from the first round of review and assessments have indicated that there is a need to focus where the density of houses burning solid fuel as their primary source of heating exceeds 50 per 500 x 500 metre area. There have been changes to the screening calculation since the first round, and so a further screening exercise should be carried out for this report.

In the first round of review and assessment local fuel suppliers were contacted to obtain approximate numbers of customers in the more densely populated areas within the Suffolk Coastal district. The conclusion was that it was unlikely there were any areas within the Suffolk Coastal district where the burning of solid fuel for domestic purposes would give rise to an exceedance of the objectives.

It has not been possible to confirm this information for the Updating and Screening Assessment. Information regarding mains gas supplies to the district was obtained from Transco. This confirmed that, due to the rural nature of a large proportion of the district, many parishes do not have access to a mains gas supply, and may use solid fuel as the main source of heating. A number of these parishes have a housing density exceeding 50 per 500 x 500 metre area.

Information from the 2001 Census undertaken within the UK contains data on the number of houses without central heating. Information from the Census at the parish level is due to be released later this year and will be used to determine any areas within the Suffolk Coastal district which require assessment. **An Updating and Screening Assessment will be undertaken for areas of domestic solid fuel burning as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.**

9.6.11 Quarries/landfill sites/opencast coal/handling of dusty cargoes at ports, etc

LAQM.TG(03) states that there are a number of other sources of PM_{10} that may be significant, they include fugitive dust and other transport sources. Where such emissions were not considered in the first round of review and assessment they should be included in this report.

In the first round of review and assessments undertaken for the Suffolk Coastal district all landfill sites and quarries within the district were assessed for fugitive emissions of PM_{10}. There were four quarries and four landfill sites in operation within the district and one planned quarry site. The findings were that exceedance of the PM_{10} objectives at receptor locations was unlikely and no air quality management areas were declared.

In this Updating and Screening report the potential for exceedances of the objectives from emissions at all sites investigated in the first review and assessment was considered, all sites reviewed are listed below. For some sites, the potential for combined emissions to cause an exceedance of the objectives was investigated.

- **Thorington Quarry**, Park Farm, off the A12, Thorington, Suffolk. A First Stage assessment was undertaken for this site in the first round that concluded no further review and assessment was necessary. There have been no changes since the first round and, therefore, **no further assessment is necessary**.

- **Grove Farm Landfill site** (for inert clay filling waste), Clopton, Sufffolk. A First Stage assessment was undertaken for this site in the first round that concluded no further review and assessment was necessary. There have been no changes since the first round and, therefore, **no further assessment is necessary**.

- **Sweffling Lagoons Landfill site** (for sewage and sewage sludge), Sweffling, Suffolk. A First Stage assessment was undertaken for this site in the first round that concluded no further review and assessment was necessary. There have been no changes since the first round and, therefore, **no further assessment is necessary**.

- **Waldringfield Quarry and Landfill site** (landfill site for inert waste to fill quarry excavations), Waldringfield Road, Brightwell, Suffolk. A First Stage assessment was undertaken for this site in the first round that concluded no further review and assessment was necessary.

Investigations into this site have shown that the quarry is still in operation, but that excavations must cease by 1 January 2005. The quarry will, therefore, not be in operation when the PM_{10} objectives must be met (end of 2004). The landfill site fills the quarrying excavations with inert waste, and there have been no alterations to this process since the first round of review and assessments. There is, however, new information with regard to two processes that will be locating to the site in the near future. The first is a cement-batching process which will be authorised under Part I of the Environmental Protection Act 1990 - this is not listed in LAQM.TG(03) as a significant of any pollutants. The second is a mobile concrete crushing plant which will be authorised under Part I of the Environmental Protection Act 1990 - this is not listed in LAQM.TG(03) as a significant of any

pollutants. The mobile concrete crushing plant will only be located on the site when needed, it will not be present permanently.

For the Updating and Screening Assessment of fugitive PM_{10} emissions from these sites, LAQM.TG(03) advises that it must be established whether there is relevant exposure 'near' to the sources of the dust emissions. The definition of 'near' is dependant on the estimated 2004 annual mean PM_{10} background levels for the area. Local background concentrations were obtained from a series of maps produced by netcen on behalf of DEFRA, which can be obtained from the website at www.airquality.co.uk. The annual mean PM_{10} background concentration for this area is 18.8 $\mu g/m^3$. LAQM.TG(03) states that for sites where the annual mean background in 2004 is less than 26 $\mu g/m^3$, 'near' is defined as within 200 metres of the site. There are no relevant receptor locations within 200 metres of the site boundary. In addition, no dust complaints have been received by the Council regarding the site and, upon visual inspection, no obvious signs of dust emissions were noted.

Suffolk Coastal District Council, therefore, concludes that **no further review and assessment of combined emissions at this site is necessary.**

- Combined emission footprint of **Foxhall Four Quarry, Foxhall Landfill site** (landfill site for domestic and commercial wastes), **A12 trunk Road traffic**, and **White Mountain Roadstone Limited** (a roadstone coating plant authorised under Part I of the Environmental Protection Act 1990). A Second Stage assessment was undertaken in the first round, for the combined emissions at this site, that concluded no further review and assessment was necessary.

Investigations into quarrying activities at this site indicate that the volume of quarrying undertaken has reduced since the first round. The landfill site is still in operation, the area being filled currently and areas to be filled in the future are further in distance from the relevant receptor locations assessed in the first review. Prediction of emissions from road traffic on the A12, using DMRB, was undertaken earlier in section 9.6.6.2 in this chapter of the report, the results from the DMRB model are lower than those obtained in the first round. Emissions of PM_{10} from White Mountain Roadstone Limited can be seen in section 9.6.9 in this chapter of the report and have also reduced since the first round. Emissions from each of the individual sources have reduced since the first round and, therefore, **no further assessment is necessary**.

- Combined emission footprint of **Sinks Pit quarry**, and **Ipswich Coated Stone** (previously known as Roadworks 1952 Limited - a roadstone coating plant authorised under Part I of the Environmental Protection Act 1990). A detailed Third Stage assessment was undertaken in the first round, for the combined emissions at this site. This was published as a supplementary report, 'Suffolk Coastal District Council – Monitoring of PM_{10} at Sinks Pit, Kesgrave.' (October 2001). The findings of the investigation were that it was unlikely that the objectives would be exceeded at receptor locations and declaration of an air quality management was not necessary.

Investigations into quarrying activities at this site indicate that quarrying has ceased at the present time, although the site is licensed to quarry until 2005 should they wish. Emissions of PM_{10} from Ipswich Coated Stone can be seen in section 9.6.9 in this chapter of the report, and have reduced since the first round. Emissions from each of the individual sources have reduced since the first round and, therefore, **no further assessment is necessary**.

- **Planned gravel extraction quarry** sited at Red House Farm, alongside the A14 in Bucklesham. A First Stage assessment was undertaken for this site in the first round that concluded no further review and assessment was necessary. Investigations into this site have shown that it is not yet in use and, therefore, **no further assessment is necessary.**

9.6.12 Aircraft

LAQM.TG(03) states that aircraft are not major sources of PM_{10} emissions, but that they may make a contribution close to the source. Aircraft emissions at airports were not always considered fully during the first round of review and assessments and, in such cases, should now be considered in this Updating and Screening Assessment report. Emissions from aircraft once they are above 200 metres will make a negligible contribution to ground-level concentrations and so do not need to be considered. These locations were not considered in detail in the first round of review and assessments for the Suffolk Coastal district, and so are now included in this report.

LAQM.TG(03) provides information to assess emissions from aircraft at airports by the annual throughput of passengers and/or freight, and states that assessment is only necessary where there is relevant exposure within 500 metres of the airport boundary.

There are no commercial airports that carry passengers or freight within the Suffolk Coastal district. There is, however, a military airbase owned by the Ministry of Defence that is still operational at Woodbridge Airfield. There are relevant receptor locations within 500 metres of the airfield boundary, the nearest being approximately 300 metres from the boundary.

Information was obtained from the Ministry of Defence, Wattisham Air Traffic Services, with regard to the number and type of aircraft movements from the airfield in 2002. From January to December 2002 there was a total of 77 rotary aircraft movements undertaken by the military and 180 rotary aircraft movements undertaken by Wattisham Search and Rescue. There were no fixed wing aircraft movements in this period.

Advice was sought from DEFRA's Review and Assessment Helpdesk, and they confirmed that the number of aircraft movements from Woodbridge Airfield in 2002 was insufficient to produce significant emissions of PM_{10} to cause an exceedance of the objectives at receptor locations near the site. **No further assessment is, therefore, required.**

9.6.13 Other sources – Diesel and coal-fired locomotives

LAQM.TG(03) states that both types of locomotive use fuels that cause emissions of PM_{10}, but there is no evidence to suggest that there is any risk of the 24-hour objective for 2004 being exceeded. **No further assessment is, therefore, required.**

9.6.14 Other sources – Shipping

LAQM.TG(03) states that there are emissions of PM_{10} from the burning of oil in ship's engines, but there is no evidence to suggest that there is any risk of the 24-hour objective for 2004 being exceeded. **No further assessment is, therefore, required under LAQM.TG(03).**

The Port of Felixstowe is within the Suffolk Coastal district and is the largest container port in the UK, and the fourth largest in Europe. It is owned by Hutchinson Ports (UK) Limited, and in 2002 there was a total of 6,132 vessel movements and a throughput of approximately 2.8 million shipping containers at the Port of Felixstowe, as advised by the Port of Felixstowe. A potential for public exposure exists at Felixstowe due to the location of a number of domestic properties, and the viewing area at Landguard Point, which are both within 500 metres of the docking area.

Following the technical guidance in LAQM.TG4(00) for the first round of review and assessments a Third Stage investigation was undertaken to assess PM_{10} emissions from shipping activities at the Port of Felixstowe. The DEFRA monitoring helpdesk advised that it would be possible to assess PM_{10} levels using the results from monitored levels of SO_2 in the 6-month programme to be undertaken at

the Port of Felixstowe, and proportional calculations taken from previous studies, in particular the Southampton Dibden Terminal Study. This method of assessment was carried out for PM_{10}. Details and results of SO_2 monitoring at the Port of Felixstowe can be seen in chapter 8 of this report. The Third Stage review and assessment findings are presented in this Updating and Screening Assessment. Entec UK Limited, were employed on behalf of Suffolk Coastal District Council to undertake the Third Stage, and their report is attached as Appendix J.

The findings of the Third Stage report shows that at Felixstowe Docks the potential for the air quality objectives for PM_{10} to be exceeded is negligible, and further assessment for this pollutant at the relevant receptors will not be necessary.

Suffolk Coastal District Council accepts the findings of Entec UK limited with regard to emissions of PM_{10} from shipping activities at the Port of Felixstowe. **No further assessment is, therefore, necessary.**

The conclusions of the Third Stage review and assessment report for shipping emissions have been accepted by DEFRA. DEFRA's specific comments with regard to the report are attached also in Appendix J, together with a response to each point raised.

There are new port developments being carried out at Felixstowe, detailed in section 9.6.6.1 in this chapter of the report, which would increase the capacity of the port and the number and type of ships which could use it. In addition to the development at the Port of Felixstowe, there are also plans to develop new facilities at Bathside Bay in Harwich, part of Harwich International Port. Technical guidance provided in LAQM.TG(03) states that there is no evidence to suggest that there is any risk of the 24-hour PM_{10} objective for 2004 being exceeded by emissions from shipping and, therefore, no further assessment will be required.

9.6.15 Combined emissions from activities at the Port of Felixstowe

Details regarding the Port of Felixstowe can be seen in the above section and in section 9.6.6.1 in this chapter of the report. It has been concluded that shipping emissions alone will not cause an exceedance of the objectives at receptor locations. As this is a container port, there are many additional activities undertaken at the Port of Felixstowe in order to receive, process and depart the containers from the site.

There is, therefore, the potential for emissions of PM_{10} from a number of sources to combine and cause elevated concentrations at receptor locations. Sources of PM_{10}, in addition to shipping, include road traffic travelling to, from and within the port and emissions from equipment such as onshore cranes used at the port for moving containers.

The closest public receptor locations to the Port of Felixstowe, and traffic generated by it, are located at Adastral Close, and there is also a public receptor location approximately 70 metres from Dock Gate 2 roundabout.

Further investigations regarding emissions of PM_{10} from activities on, and associated with, the Port of Felixstowe will be undertaken to confirm whether there are any predicted exceedances of the objectives at receptor locations. The progress from this further investigation will be presented in the Detailed Assessment report for Suffolk Coastal District Council, to be produced in April 2004.

9.7 Conclusion

Suffolk Coastal District Council concludes that, for the following sites identified in this report, there is insufficient information available to determine whether the air quality objectives for PM_{10} will be exceeded at receptor locations by the end of 2004, and further investigation will be necessary:

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations. The findings have shown that it is considered unlikely that PM_{10} emissions from these two sites would cause an exceedance of the objectives, but confirmation of this is required.

- Areas of domestic coal burning within the Suffolk Coastal district. There was insufficient evidence available to confirm whether there are any areas of domestic solid fuel burning in the district that would cause an exceedance of the PM_{10} objectives.

- Combined emissions from activities on, and associated with, the Port of Felixstowe. There was insufficient information available to confirm whether emissions from activities on and generated by this site would cause an exceedance of the PM_{10} objectives.

Further investigations will be undertaken for these three sites, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

10. Summary and Recommendations

This Updating and Screening Assessment of air quality within the Suffolk Coastal district considers the present and likely future quality of air against the standards and objectives in the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002. The pollutants considered in this assessment are carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}). The assessment is required for the second round of local air quality management review and assessments, under Part IV of the Environment Act 1995.

The aim of this Updating and Screening Assessment is to identify those matters that have changed since the first round of review and assessment was finished, and which may now require further assessment. The guidance also includes new information on potential sources of some pollutants following further studies undertaken since the last set of guidance was issued. Where the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority is then required to undertake a Detailed Assessment, to identify with reasonable certainty whether or not a likely exceedance will occur.

This Updating and Screening Assessment for the Suffolk Coastal district has determined that the risk of exceedance of the air quality objectives for carbon monoxide, benzene and 1,3-butadiene is unlikely, and no further assessment will be necessary.

This Updating and Screening Assessment for the Suffolk Coastal district has determined that for lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}) there is a potential risk of the air quality objectives being exceeded at receptor locations, and further investigation will be necessary. For these pollutants, further investigation as detailed below will be undertaken for the following areas, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004:

Lead

- Emissions from Crane Limited at Ipswich, a site regulated under Part I of the Environmental Protection Act 1990 by Ipswich Borough Council, which is 0.3 km from the Suffolk Coastal boundary.

  Ipswich Borough Council is currently investigating emissions of lead from this process, and will undertake an Updating and Screening Assessment as soon as all of the required information is available. The findings of Ipswich Borough Council with regard to this process will be presented in the Detailed Assessment report for Suffolk Coastal District Council.

Nitrogen dioxide

- Emissions from traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge.

  A Detailed Assessment which was undertaken for this junction has concluded that an air quality management area does not need to be declared at this time. The Detailed Assessment recommends, however, that continued monitoring should be undertaken for a 12-month period to confirm these findings, due to elevated levels recorded by diffusion tubes at this junction. A 12-month monitoring campaign will, therefore, be undertaken at this junction, to determine whether the annual mean NO_2 objective will be met, and the results will be presented in a further Detailed Assessment report.

- Emissions from traffic using a section of the A1214 near the Bell Lane junction in Kesgrave.

Monitoring, by diffusion tubes, undertaken at this site has shown elevated levels of NO_2. Further Detailed Assessment of this site will be undertaken. A continuous analyser was located at this site in March 2003 and is co-located with a triplicate diffusion tube site. The results from the monitoring will be used to run a detailed computer model for this section of the A1214, and the findings will be presented in a Detailed Assessment report.

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.

  The findings of this investigation have shown that it is considered unlikely that NO_x emissions from these two sites would cause an exceedance of the NO_2 objectives, but there is insufficient information available at this time to confirm this. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

Sulphur dioxide

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.

  The findings of this investigation have shown that it is considered unlikely that SO_2 emissions from these two sites would cause an exceedance of the objectives, but there is insufficient information available at this time to confirm this. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

- Areas of domestic coal burning within the Suffolk Coastal district.

  The findings of this investigation have shown that there is insufficient evidence available at this time to confirm whether there are any areas of domestic coal burning in the district that would cause an exceedance of the SO_2 objectives. Information from the 2001 Census at the parish level is due to be released later this year, and will be used to determine any areas within the Suffolk Coastal district which require assessment. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

- Emissions from boiler plant burning fuel oil at Her Majesty's Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk.

  The findings of this investigation have shown that there is insufficient information available at this time to confirm whether emissions from a number of small boilers at this site would cause an exceedance of the SO_2 objectives. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

- Emissions from boiler plant burning fuel oil at site buildings on the Port of Felixstowe, Felixstowe, Suffolk.

  The findings of this investigation have shown that there is insufficient information available at this time to confirm whether emissions from a number of small boilers at this site would cause an exceedance of the SO_2 objectives. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

Particulate matter (PM_{10})

- The potential for combined emissions from ancillary equipment at Sizewell A and B Power Stations.

  The findings of this investigation have shown that it is considered unlikely that PM_{10} emissions from these two sites would cause an exceedance of the objectives, but there is insufficient information available at this time to confirm this. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report, to be produced in April 2004.

- Areas of domestic coal burning within the Suffolk Coastal district.

  The findings of this investigation have shown that there is insufficient evidence available at this time to confirm whether there are any areas of domestic coal burning in the district that would cause an exceedance of the PM_{10} objectives. Information from the 2001 Census at the parish level is due to be released later this year, and will be used to determine any areas within the Suffolk Coastal district which require assessment. An Updating and Screening Assessment will be undertaken as soon as all of the required information is available, and the findings will be presented in the Detailed Assessment report.

- Combined emissions from activities on, and associated with, the Port of Felixstowe.

  There was insufficient information available to confirm whether emissions from activities on and generated by this site would cause an exceedance of the PM_{10} objectives. Further investigations will be undertaken to confirm emissions, and whether there are any predicted exceedances of the objectives at receptor locations. The progress from this further investigation will be presented in the Detailed Assessment report.

11. References

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17. *Traffic Flow Survey Reports for Melton Crossroads and Melton Hill - Woodbridge.* Reports produced by Suffolk County Council, Suffolk Highways Engineering Consultancy, November 2002.

18. Expert Panel on Air Quality Standards (EPAQS) Reports:
1,3-Butadiene – published 2002*;*
Benzene – published 1994;
Particulates – published 1995;
Carbon Monoxide – published 1994;
Sulphur Dioxide – published 1995;
Lead – published 1998;
Nitrogen Dioxide – published 1996.
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