ENV/254/23
26.03.04

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

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Environmental Protection

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 second round of review and assessments are to take. Review and assessment will now be in two stages. The first stage, the Updating and Screening Assessment, was completed and the results published in June 2003, it included the findings of Detailed Assessment undertaken for two road junctions (one in Melton and one in Woodbridge). The report identified specific sources for the pollutants lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}) which required further investigation to determine whether there was a risk that the Air Quality Objectives would be exceeeded at relevant receptor locations.

This report is the second stage – the Detailed Assessment of air quality within the Suffolk Coastal district. The report includes the outcome of continued Updating and Screening Assessment and Detailed Assessment where relevant. The aim of the Updating and Screening and Detailed 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.

The investigations undertaken for this report have determined, for the Suffolk Coastal district, that the risk of exceedance of the air quality objectives for lead is unlikely, and no further assessment will be necessary.

The investigations undertaken for this report have determined, for the Suffolk Coastal district, that for 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 in the areas detailed overleaf will be undertaken, and the findings will be presented in the next LAQM report, the Progress Report, to be produced in April 2005:

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

- Emissions of **nitrogen dioxide, sulphur dioxide and particulate matter** from activities on and associated with the Port of Felixstowe, incorporating assessment of emissions generated by the Bathside Bay and Felixstowe South Reconfiguration planning applications if they are granted permission.

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 9).

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Table of Contents

Appendices

1. Introduction

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

The Suffolk Coastal Updating and Screening Assessment report (June 2003), identified specific sources for the pollutants lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}) which required further investigation to determine whether there was a risk that the Air Quality Objectives would be exceeeded at relevant receptor locations. Within the Updating and Screening Assessment report Detailed Assessment was undertaken for two road junctions (one in Melton and one in Woodbridge) and the findings reported. The findings of the Updating and Screening Assessment report are detailed below.

In accordance with the Council's statutory obligations, the Updating and Screening Assessment report was submitted to the Department for Environment, Food and Rural Affairs (defra). Defra accepted the conclusions reached for all pollutants and had no adverse comments to make in its response to the Updating and Screening Assessment.

Defra also accepted the conclusions reached in the Detailed Assessment for nitrogen dioxide and particulate matter at the road junctions investigated in Melton and Woodbridge. Defra commented that our intention to continue monitoring levels of nitrogen dioxide at the junction of Lime Kiln Quay Road, The Throughfare and St. John's Street in Woodbridge was sensible. They also suggested that it would be appropriate to consider using a continuous analyser to undertake further monitoring at this junction.

This Detailed Assessment report should be read in conjunction with the Suffolk Coastal Updating and Screening Assessment report (June 2003). Due to a lack of information available at the time of the Updating and Screening Assessment, for a number of specific emission sources, this report contains the investigations and findings of continued Updating and Screening Assessment. For emission sources and areas where is has been necessary to undertake a Detailed Assessment this report contains the details of investigations and findings.

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 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.

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.

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 second round of review and assessment 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
	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. 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 second round no assessments have been made in respect of these 2010 limits for nitrogen dioxide and particles (PM_{10}) as they are not yet statutory requirements, instead we have concentrated on those elements which we are required statutorily to assess.

1.2 Second round of air quality review and assessments

The Environment Act 1995 provides powers for Defra and the Devolved Administrations to make guidance which local authorities must have regard to when carrying out their LAQM duties. The current guidance for the second round of review and assessments is provided within LAQM.TG(03) and this has been used in the preparation of this report.

LAQM.TG(03) uses a phased approach in two stages, the first stage of the process is an **Updating and Screening Assessment**, which was undertaken by Suffolk Coastal District Council and published in June 2003. The aim of the Updating and Screening Assessment was 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.

The aim of the **Detailed Assessment** is to provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation of any necessary AQMAs. A Detailed Assessment must use quality-assured monitoring and validated modelling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective. This is to ensure that local authorities are confident in the decisions they reach. Where a likely exceedance is identified, the assessment must be sufficiently detailed to determine both its magnitude and geographical extent. Local authorities should not declare an AQMA unless a Detailed Assessment has been completed.

1.3 Findings of the Suffolk Coastal Updating and Screening Assessment (June 2003)

The Updating and Screening Assessment for the Suffolk Coastal district (June 2003) determined that the risk of exceedance of the air quality objectives for carbon monoxide, benzene and 1,3-butadiene was unlikely, and that no further assessment was necessary.

The Updating and Screening Assessment for the Suffolk Coastal district (June 2003) determined that for lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM_{10}) there was a potential risk of the air quality objectives being exceeded at receptor locations. Further investigation, in the form of continued Updating and Screening Assessment or Detailed Assessment, was necessary and areas of investigation required for each pollutant are detailed overleaf:

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.

The aim of this Detailed Assessment report is to provide further information on the investigations undertaken and the findings for each of the specified emission sources as above.

2. Methodology

The aim of the second round of review and assessments 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. This Detailed Assessment report contains the findings of continued investigation of specific sources of pollutants identified in the Updating and Screening Assessment report for Suffolk Coastal, produced in June 2003. The methodology used in the compilation of this report is in accordance with Defra's latest technical guidance in LAQM.TG(03).

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 report:

- 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 continued Updating and Screening Assessment and Detailed Assessment

The following information was compiled for completion of this report, building upon that collated for the Updating and Screening Assessment Report (June 2003):

- Details of relevant air quality monitoring undertaken within the Suffolk Coastal district, including all relevant information, eg - quality assurance and quality control (QA/QC) procedures, and information on diffusion tube analysis.
- Available traffic data and future traffic-growth predictions for roads or junctions of concern, from Suffolk County Council, Environment and Transport.
- Annual mean background levels for specific pollutants, 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.
- Detail of equipment and emissions for Sizewell A and B Power Stations, as supplied by the premises and the Environment Agency.
- Detail regarding boiler plant burning fuel oil at Her Majestys Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk, as supplied by the premises.
- Detail regarding boiler plant burning fuel oil at site buildings on the Port of Felixstowe, as supplied by the Port of Felixstowe.
- Details regarding activities at the Port of Felixstowe, as supplied by the Port of Felixstowe.
- Details regarding planned developments at the Port of Felixstowe and Martlesham Park and Ride.
- Information regarding use of solid fuel heating within domestic premises in the Suffolk Coastal District.

The above information was collated using the following sources:

- Suffolk Coastal District Council, Environmental Protection Team.
- Suffolk Coastal District Council, Development & Policy Team.
- Suffolk Coastal District Council, Private Sector Housing Team.
- 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.
- Suffolk Coastal District Council Geographic Information System.
- Magnox Electric plc - Environmental Co-ordinator for Sizewell A Power Station.
- British Energy Generation Limited - Environmental Support Section for Sizewell B Power Station.
- Information regarding number and thermal capacity of boilers and fuel type used at Her Majestys Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley, Suffolk. Provided by the Works Department for Hollesley Bay and Warren Hill.
- The Environment Agency.
- Port of Felixstowe for information on shipping, traffic data and predictions and related activities, current and future.
- Local coal and solid fuel merchants servicing households within the Suffolk Coastal district.

- TRANSCO for details on parishes within Suffolk Coastal which receiving gas for use in domestic heating systems.
- Pollutant specific information from the Expert Panel on Air Quality Standards, Department of the Environment.
- Defra helpdesks.
- 2001 Census ward statistics and 2003 mid-year housing stock information, provided by the Suffolk Coastal Development & Policy Team.

2.3 Monitoring equipment for nitrogen oxides

Monitoring for concentrations of nitrogen oxides by continuous ozone chemiluminescence was undertaken at a relevant receptor location on the A1214, near to its junction with Bell Lane, to assess concentrations arising from road traffic emissions on this stretch of road.

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.

3. Consultation Responses

3.1 Introduction

Local authorities are required by the Environment Act 1995 to carry out periodic reviews of air quality within their areas to assess present and likely future quality against air quality objectives prescribed in Regulations. All Local Authorities must consult on the findings of the reviews, as laid out in Schedule 11 of the Environment Act 1995. This enables local views to be taken into consideration within the review and assessment process which is of great importance for the Local Air Quality Management (LAQM) process, as it is all about local air quality issues.

3.2 Consultation findings regarding the Suffolk Coastal Updating and Screening Assessment Report (June 2003)

Suffolk Coastal undertook a full Consultation in November 2003, in order to obtain comments on the contents and findings of the Updating and Screening Assessment Report (June 2003) produced for the district. A list of all consultees can be seen in Appendix A. A total of 17 consultation responses were received, they were then collated and divided into three categories. A summary, table 3.1, can be seen below which details each of the three categories and the number of responses received for each. Each consultation response received has been personally replied to.

Table 3.1 Summary table of Consultation responses received regarding the contents and findings of the Updating and Screening Assessment Report (June 2003)

Category of response	No. of responses received
Number of responses received from consultees who were satisfied with the process/report and/or had no specific comments to make	**2**
Number of responses received from consultees with specific comments relevant to LAQM (expanded upon below)	**12**
Number of responses received from consultees on topics that were not within the scope of LAQM	**3**
Total number of responses received	**17**

The topics covered by responses that fell in the second category (comments relevant to the scope of the LAQM process), have been detailed in table 3.2 overleaf. Further information regarding each topic then follows. This report does not comprise a direct transcript of each reply, due to the fact that comments were sought without the intention to publish views attributable to individuals.

3.3 Response to consultation comments

All aspects raised in the consultation process which came within the scope of LAQM have been, and continue to be, 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 included in this Detailed Assessment Report.

The consultation responses show road transport to be the main area of concern, followed by emissions from current and future planned activities on the Port of Felixstowe, trains, and two responses relating to specific premises – Sizewell A and B Power Stations in Leiston and Cranes Limited in Ipswich.

As a result of the consultation process, consideration has been given to the following areas;

Table 3.2 Summary table of the number and type of Consultation response received regarding the Updating and Screening Assessment Report (June 2003) (some replies covered more than one subject)

Subject of response	No. of responses received
Further information requested regarding possible action that may be taken if areas of concern regarding traffic emissions are proven to be a problem	**1**
Emissions from traffic at junctions / roundabouts on the A12 trunk road	**1**
Emissions from traffic using the new Park and Ride site at Martlesham.	**3**
Emissions from traffic using the A12 trunk road at Farnham	**1**
Emissions from traffic using the A14 trunk road, including Dock Spur roundabout.	**3**
Emissions from current and future planned activities at the Port of Felixstowe	**4**
Query regarding shipping figures used in the report detailing SO_2 monitoring at the Port of Felixstowe.	**1**
Emissions from trains at Trimley Station	**1**
Emissions of lead from Crane Limited, Nacton Road, Ipswich	**1**
Emissions from Sizewell A and B Power Stations	**1**

3.3.1 Emissions from general road traffic within the Suffolk Coastal district

Concern was expressed regarding emissions from road traffic, both generally and at specific locations, within our district. Road traffic is one of the main emission sources included within the review and assessment process. The guidance provided by the Government allowed us to revisit the entire road network within Suffolk Coastal and locate any specific areas of concern, these areas were reviewed and assessed within the Updating and Screening Assessment report. Traffic flow information was obtained from Suffolk County Council and locations that were highlighted under the guidance at this stage were investigated.

Further information requested regarding possible action that may be taken if areas of concern regarding traffic emissions are proven to be a problem

Local authorities are required by section 82(1) of the Environment Act 1995 to carry out periodic reviews of air quality in their areas, and to assess present and likely future quality against the standards prescribed in Regulations. Where the objectives are not likely to be achieved by the set target date an authority is required to designate an Air Quality Management Area (AQMA), and make an action plan for improvements in air quality.

Should Detailed Assessment of any areas conclude that the objectives for specified pollutants are not likely to be achieved by the set target date (for example 31 December 2005 in the case of NO_2), the Council would be required to declare an AQMA, stating precisely the area that this encompasses. The Council would then be required to carry out further assessment of existing and likely future air quality within the AQMA, to supplement information obtained in the Detailed Assessment and define the contribution of pollutant from different sources so as to allow a focused action plan to be prepared. An action plan would then need to be drawn up considering all options available for reduction of pollutant levels. These options must be investigated fully and include information on cost, effectiveness and feasibility. Should an action plan be required for any areas within the district due to traffic emissions, other relevant bodies, for example Suffolk County Council and the relevant Town or Parish Council, would be consulted in order to decide on a way forward.

3.3.2 Emissions from traffic at junctions / roundabouts on the A12 trunk road

The Updating and Screening Assessment required the reassessment of emissions of nitrogen dioxide and particulate matter from traffic on busy roads within the district, and also included assessment of busy junctions this time. Emissions from traffic using the A12 trunk road were assessed for all sections within the Suffolk Coastal district, this included assessments at the junctions / roundabouts with the largest volumes of traffic and /or those with receptor locations close to the road. A specialised computer model, provided by the Government for use in the review and assessments, was used to assess the levels of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) that would arise at the nearest receptor locations at each junction due to emissions from the traffic.

The consultation response received related specifically to the BT roundabout, the Martlesham Park and Ride roundabout (junction of the A12 with the A1214) and the Tesco roundabout. Assessments were made for the BT and Martlesham Park and Ride roundabouts, but the Tesco roundabout was not specifically assessed as the other two roundabouts provided the worse case scenario in that the receptor locations were closer to the road.

The results of the computer modelling showed that for NO_2 the predicted annual mean concentration at the closest receptor to the BT roundabout is 27.3 $\mu g/m^3$ in 2005, and for the closest receptor to the Martlesham Park and Ride roundabout is 31.7 $\mu g/m^3$ in 2005. Both of these levels are below the air quality objective of 40 $\mu g/m^3$ to be achieved by 2005. The air quality objectives for PM_{10} are an annual mean of 40 $\mu g/m^3$ and a fixed 24-hour mean of 50 $\mu g/m^3$ not to be exceeded on more than 35 days each year, both to be achieved by the end of 2004. The results from the computer modelling showed that the predicted annual mean concentration at the closest receptor to the BT roundabout is 23.3 $\mu g/m^3$ in 2004 with 8.7 days when the level is predicted to be above 50 $\mu g/m^3$. The results showed that the predicted annual mean concentration at the closest receptor to the Martlesham Park and Ride roundabout is 26.5 $\mu g/m^3$ in 2004 with 16.3 days when the level is predicted to be above 50 $\mu g/m^3$. The results for both of these roundabouts are both below the air quality objectives set for PM_{10}. The conclusions of the Updating and Screening Assessment were that the relevant air quality standards and objectives for NO_2 and PM_{10} will not be exceeded at receptor locations along the A12, including those at junctions and roundabouts.

The consultation response also requested that monitoring for pollutants be carried out at these three roundabouts, but this is only required where the DMRB screening method undertaken in the Updating and Screening Assessment indicates that the objectives may be exceeded at receptor locations. As the findings of the computer modelling undertaken for these roundabouts on the A12 did not indicate that any likely exceedances of the objectives for NO_2 or PM_{10} we will not be undertaking any monitoring at this time. The review and assessment process, however, is ongoing and will be undertaken again in the future. Should investigations indicate that traffic emissions at these junctions could cause an exceedance of the air quality objectives further action, including monitoring to confirm pollutant levels, would be taken.

3.3.3 Emissions from traffic using the new Park and Ride site at Martlesham

Traffic emissions associated with the new Park and Ride scheme at Martlesham were considered in the Updating and Screening Assessment report for the pollutants nitrogen dioxide (NO_2) and particulate matter (PM_{10}), and supporting information regarding the Park and Ride was provided in Appendix H of the report. The findings of the report, for both pollutants, were that the objectives are not likely to be exceeded at the closest receptor locations to the junction of the A12 and A1214 (the Park and Ride site) and further review and assessment will not, therefore, be necessary at this time.

A number of consultation responses were received regarding the Park and Ride site at Martlesham, and we have decided to undertake further assessment now that the scheme is up and running. We will

obtain up-to-date traffic counts from Suffolk County Council and undertake further computer modelling of traffic emissions from vehicles using this junction, to assess whether the air quality objectives are likely to be exceeded. Suffolk County Council has been asked to confirm whether traffic levels seen since the scheme opened are similar to those predicted in the original Planning Application for the site. The Planning Application contained traffic predictions for this junction once the scheme was open, and the results of complex computer modelling for receptor locations at the junction. The conclusions reached were that the air quality objectives at receptor locations would not be exceeded. Further investigations of this junction will be undertaken this year and will be published in the next air quality report 'The Progress Report' which must be completed by April 2005. Should these investigations indicate the possible exceedance of any air quality objectives, further work will be undertaken to include monitoring of pollutant levels.

3.3.4 Emissions from traffic using the A12 trunk road at Farnham

The Updating and Screening Assessment required reassessment of nitrogen dioxide and particulate matter emissions from traffic on busy roads within the district. Emissions from traffic using the A12 trunk road were assessed for all sections within the Suffolk Coastal district this included specifically an assessment of the A12 at Farnham, where the speeds are reduced due to the sharp bend in the road. The Design Manual for Roads and Bridges (DMRB) screening method, provided by the Government for use in the review and assessments, was used to assess the levels of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) that would arise at the nearest receptor location due to emissions from the traffic.

The results of DMRB showed that for NO_2 the predicted annual mean concentration at the closest receptor is 25 $\mu g/m^3$ in 2005, which is below the air quality objective of 40 $\mu g/m^3$ to be achieved by 2005. The air quality objectives for PM_{10} are an annual mean of 40 $\mu g/m^3$ and a fixed 24-hour mean of 50 $\mu g/m^3$ not to be exceeded on more than 35 days each year, both to be achieved by the end of 2004. The results of DMRB showed that the predicted annual mean concentration at the closest receptor is 24.2 $\mu g/m^3$ in 2004 with 10.6 days when the level is predicted to be above 50 $\mu g/m^3$. These are both below the air quality objectives set for PM_{10}. The conclusions of the Updating and Screening Assessment were that the relevant air quality standards and objectives for nitrogen dioxide and particulate matter will not be exceeded at receptor locations along the A12 at Farnham.

Additionally, monitoring for levels of NO_2 from road traffic emissions was undertaken from January to December 2000 at one site in Farnham and one in Benhall. The Farnham site was located on the roadside at The Street (the A12 trunk road) as the road bends sharply, in order to assess NO_2 levels from road traffic travelling at reduced speeds in this location. The Benhall site was located in Park Road, several hundred metres from the A12, in order to provide a background level in this area for comparison with the roadside site at Farnham. The results of ratified monitoring data show an annual mean NO_2 concentration of 24.8 $\mu g/m^3$ at The Street, Farnham (the A12 trunk road) and 9.4 $\mu g/m^3$ at Park Road, Benhall. The results of monitoring at both locations are within the air quality objectives prescribed for NO_2.

The consultation response included information that there are increased levels of traffic and queuing in the summer months on the A12 at Farnham. The traffic data provided for this stretch of the A12 was, therefore, investigated in more detail. The DMRB screening method, referred to above, requires traffic data to be input in the format of daily traffic flows that are averaged over a year. Investigations were, therefore, undertaken to find out if the traffic data used in DMRB included traffic counts and speed data collected over the summer months, or if it was collected in the winter when the traffic levels may be lower and flow more freely. Suffolk County Council, who provide traffic data for the A12, were contacted and they advised that a permanent traffic counter was installed on the A12 at Farnham in May 2002 and is due to remain in place for the foreseeable future. This counter records traffic flow and speed data constantly, and would therefore have included increased traffic flows in

the summer months in the 2002 data used to undertake DMRB. A comparison was also made between the traffic average daily flows for 2002 and the data now available for 2003, and they are very similar. This confirms that the outcome of the DMRB screening method undertaken in the Updating and Screening Assessment for the A12 at Farnham was as accurate as possible.

The review and assessment process is ongoing and will be undertaken again in the future. As the traffic counter at Farnham is now a permanent site it will provide accurate data for future assessments. The traffic data will also provide an indication of any future increases in traffic volumes or reductions in average speed levels in this area of the A12. Should future investigations indicate that traffic emissions at Farnham could cause an exceedance of the air quality objectives further assessment would be undertaken.

3.3.5 Emissions from traffic using the A14, including the Dock Spur roundabout

The Updating and Screening Assessment required that reassessment of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) emissions from traffic on busy roads within the district. Emissions from traffic using the A14 trunk road were assessed for all sections within the Suffolk Coastal district this included specifically an assessment of the junction with Candlet Road (Dock Spur roundabout). A specialised computer model, provided by the Government for use in the review and assessments, was used to assess the levels of NO_2 and PM_{10} that would arise at the nearest receptor location due to emissions from the traffic.

The findings of our assessments regarding the A14 and Dock Spur roundabout, for both pollutants, concluded that the objectives were unlikely to be exceeded at receptor locations and further review and assessment would not be necessary at this time. Specific reference was, however, made to the Port of Felixstowe and potential traffic generation from current and future planning applications for the site. The report, published in June 2003, concluded that Suffolk Coastal did not possess enough specific detail regarding predicted traffic increases from the developments, or the proportion of proposed freight to be moved by rail at that time. It confirmed that we would contact the Port of Felixstowe to obtain the required information so that a full and accurate assessment could be made. Information has now been received regarding road and rail traffic in the Planning Application for Felixstowe South Reconfiguration, details can be seen in chapter 8 of this report.

One of the consultation responses received included questions about monitoring of NO_2 levels from vehicles using the A14. Monitoring was undertaken using a continuous analyser, which measured concentrations of both oxides of nitrogen (NO_x) and NO_2 for a three-month period from 30 January to 1 May 2001. The analyser was located in a garage of a residential property in Heathgate Piece, Trimley St. Mary. The road and property selected were representative of other residential properties close to the A14 in this location. The monitoring was undertaken to provide accurate measurements of NO_2 levels at this location, and more importantly the results were used to validate a computer air dispersion model run for the A14. The model predicted levels of NO_2 at 519 specific receptors, representing the facades of buildings within 100 metres of the A14 between Felixstowe and Ipswich, and compared them with the Air Quality Objectives set for the year 2005.

The monitoring results showed the annual mean concentration of NO_2 to be 30.5$\mu g/m^3$ at the monitoring location, which is below the annual mean objective of 40 $\mu g/m^3$ to be achieved by the year 2005. The predictions from the computer modelling showed that the objectives were not likely to be exceeded at receptor locations on the A14 by the end of 2005 and that further review and assessment was not necessary at that time. The consultant's report produced, detailing monitoring and modelling undertaken for the A14 can be viewed at http://www.suffolkcoastal.gov.uk/envhealth/airquality.html – on the Council's website.

The LAQM process requires that review and assessment is undertaken on a three-year cycle, with an update report being produced each year. During each three-year cycle all air quality issues must be

reviewed and updated, issues regarding the Port of Felixstowe and any effect on traffic emissions from the A14 will continue to be assessed under this process and included in the annual reports produced for LAQM.

3.3.6 Emissions from current and future planned activities at the Port of Felixstowe

A number of consultation responses were received regarding the Port of Felixstowe, including concerns about both current and future planned activities for the site. Concerns regarding emissions from traffic using the A14 trunk road and Dock Spur roundabout, discussed above, also contained references to current and potential future traffic generated by the Port of Felixstowe site.

Operations at the Port of Felixstowe were considered within the Updating and Screening Assessment process. This included emissions from road and rail traffic, from fuel oil fired heating equipment used within some site buildings, and from shipping. At the time this report was published (June 2003) it only included information that was available at the time. Since the report was published the Felixstowe South Regeneration planning application has been received. We are currently carrying out investigations into the proposals for all activities (road vehicles, ships, trains, Port equipment etc) with respect to air quality, and have employed consultants to comment on the complex information provided in the planning application. If permission is given to the planning application the effects of the development will be considered in future LAQM reports. Further details regarding the Port of Felixstowe are detailed in chapter 8 of this report. The LAQM process requires that review and assessment is undertaken on a three-year cycle, with an update report being produced each year. During each three-year cycle all air quality issues must be reviewed and updated, issues regarding the Port of Felixstowe and any future development will continue to be assessed under this process.

3.3.7 Query regarding shipping figures in the report detailing SO_2 monitoring at the Port of Felixstowe

A consultation response was received which questioned the shipping vessel figures used in the report produced by Entec UK Limited detailing SO_2 monitoring at the Port of Felixstowe. The report included results of SO_2 monitoring undertaken, together with an assessment of PM_{10} emissions from shipping activities. In order to get an indicative estimate of PM_{10} emissions from shipping at the Port of Felixstowe, a comparison was made with the Dibden Terminal at Southampton. The Dibden Terminal Planning Application has an Environmental Statement produced for it which included detailed information on SO_2 and PM_{10} emissions from shipping and the relationship between the two. The Port of Felixstowe was compared with the Dibden Terminal using the daily number of shipping vessels at each. The consultation response received was from someone in a position of knowledge that enabled them to question the daily number of shipping vessel movements for Felixstowe used in the report, it was believed to be too low.

The questions raised in this consultation response were forwarded to Entec UK Limited for their comments, and they were requested to liaise directly with the consultee in order to investigate the questions raised. The results and conclusions of further assessment undertaken by Entec UK Limited on this matter have recently been received and are still being confirmed. Further information regarding the outcome of this reassessment will be published once it has been finalised.

3.3.8 Emissions from trains within the Suffolk Coastal district

The Updating and Screening Assessment required that an assessment of the potential for emissions of sulphur dioxide from idling trains to cause an exceedance of the Air Quality Objectives. The technical guidance provided by the Government stated the parameters under which emissions from idling trains could potentially cause an exceedance of the objectives for sulphur dioxide. Any areas where on two or more occasions a day trains were idling with their engines running for 15 minutes or more, and where there were receptor locations within 15 metres of the idling engines should be identified as a first step. All train routes within the Suffolk Coastal district were assessed, including both passenger and freight train movements. There were no areas, with the exception of station platforms themselves, where receptor locations were closer than 15 metres to areas where trains would idle with their engines running. Train timetables for all stations within the district were studied, including Trimley station, which indicated that there were no times at which trains should stand at the platform with engines running for 15 minutes or more twice a day. The findings of the report were, therefore, that emissions from trains in the Suffolk Coastal district were unlikely to cause any exceedances of the sulphur dioxide objectives and that no further investigation was required. The consultee has been asked to come back to us with more information regarding trains at Trimley station if they fall into the criteria for assessment as outlined above. Should new information regarding trains at Trimley station be received, further investigations will be undertaken and any findings included in the next LAQM report.

3.3.9 Emissions of lead from Crane Limited, Nacton Road, Ipswich

Crane Limited is situated in Nacton Road, Ipswich and is 0.3 km from the Suffolk Coastal boundary and receptor locations within the district. At the time of the Updating and Screening Assessment, in June 2003, Ipswich Borough Council was investigating emissions of lead from this process, but had insufficient information available to complete an Updating and Screening Assessment. All relevant information for this site has now been obtained from Ipswich Borough Council, and is detailed in Chapter 4 of this report. The findings of this report are that emissions of lead from this process are unlikely to be significant and that no further assessment of this site will be necessary at this time.

3.3.10 Emissions from Sizewell A and B Power Stations

All industrial processes within the Suffolk Coastal district that are authorised under Part I of the Environmental Protection Act 1990 were considered within the Updating and Screening Assessment, as required by the technical guidance produced by the Government. There are 39 processes authorised under Part I of the Environmental Protection Act 1990 for industrial emissions within the Suffolk Coastal district, of which four fall within the category of 'potentially significant emitters' of certain pollutants, as specified within the technical guidance provided for LAQM.

Two of the four authorised processes are at Sizewell B Power Station and are for emergency standby equipment, which is not run continuously. This is an unusual scenario in that the number of operating hours of each piece of equipment becomes an issue in order to determine whether any emissions could give rise to an exceedance of the objectives. In addition, Sizewell A Power Station is in close proximity to Sizewell B and also emits some of the specified pollutants from its standby equipment, although it is not large enough to require an authorisation under Part I of the Environmental Protection Act 1990. The Updating and Screening Assessment reported that there was, therefore, a possibility that, for the pollutants NO_2, SO_2 and PM_{10}, emissions from the two sites may combine, but without detailed information for each Power Station a conclusion could not be drawn at that time.

Since the Updating and Screening Assessment report was published (June 2003) close consultation has taken place with Sizewell A and B Power Stations and the Environment Agency, to obtain the required information so that an assessment can be made. The details of our investigations are reported

in chapters 5, 6 and 7 of this report for the specific pollutants. The conclusion, for all three pollutants, is that there would be no likely exceedances of any of the objectives and no further assessment will be necessary at this time.

3.4 Conclusion

The consultation process on the contents and findings of the Updating and Screening Assessment for the Suffolk Coastal district has been undertaken in accordance with Schedule 11 under Part IV of the Environment act 1995.

The responses received were collated and all aspects raised, which came within the scope of Local Air Quality Management, have been, or continue to be, addressed within the review and assessment process.

Work is continuing to be undertaken by Suffolk Coastal District Council to confirm compliance with the Air Quality Objectives in specific areas, and further details on these are included in this report.

The review and assessment process must be repeated on a three-year basis, and all issues raised by this consultation process relevant to LAQM will be reassessed in the future, in accordance with the Government guidance published for this purpose.

4. Review and assessment of lead

4.1 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.

4.2 Sources, health effects, national and local perspectives

Lead is a naturally occurring non-ferrous metal, which is also released into the atmosphere by human activities. Following the ban on sales of leaded petrol in the UK in 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.

Lead can be absorbed into the body through the lungs, stomach and intestines. Studies have shown that exposure to high levels may result in problems in the synthesis of haemoglobin for the blood, effects on the kidneys, gastrointestinal tract, joints, reproductive system and acute damage to the nervous system. Of greater concern, however, are the more subtle effects from long-term exposure to lower levels of lead on the developing brains of children and, hence, intellectual development.

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 μg/m^3 and 0.25 μg/m^3 respectively (LAQM.TG(03)). There were also 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 for lead.

4.3 Continued Updating and Screening Assessment for lead

The Suffolk Coastal Updating and Screening Assessment Report (June 2003) identified the following source of lead as requiring further investigation, in the form of continued Updating and Screening Assessment, due to insufficient information available at the time;

- Emissions from Crane Limited situated at Nacton Road in 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.

4.3.1 Continued Updating and Screening Assessment for Crane Limited, Nacton Road, Ipswich

Crane Limited is situated in Nacton Road, Ipswich and is regulated under Part I of the Environmental Protection Act 1990 by Ipswich Borough Council. The site is 0.3 km from the Suffolk Coastal boundary and receptor locations within the district.

At the time of the Updating and Screening Assessment, in June 2003, Ipswich Borough Council was investigating emissions of lead from this process, but had insufficient information available to complete an Updating and Screening Assessment.

All relevant information for this site has now been obtained from Ipswich Borough Council, and advice sought from defra's Emissions Helpdesk. The Helpdesk confirmed that emissions of lead from

this process were unlikely to be significant and that **no further assessment of this site will be necessary at this time.**

4.4 Conclusion

It is concluded 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, and no further assessment will be necessary at this time.

5. Review and assessment of nitrogen dioxide (NO_2)

5.1 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.

5.2 Sources, health effects, national and local perspectives

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, but the largest source is from the combustion of fossil fuels by man, of which the principal source is from road transport. Other important sources include the electricity supply industry and other industrial and commercial sectors.

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 known to have serious effects if inhaled at very high concentrations - causing inflammation of the airways, severe lung damage and often fatality. Evidence also shows that long-term exposure to lower levels, such as those in the ambient atmosphere, may intensify symptoms associated with respiratory illness and enhance response to allergens in sensitised individuals, especially those with asthma.

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. 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.

Concentrations of NO_2 were measured at UK national network monitoring sites between 1999-2001, showing that the annual mean objective is widely exceeded at roadside sites throughout the UK, with exceedances also seen at urban background locations in major conurbations. Exceedances of the 1-hour objective are seen in major conurbations, at roadside or kerbside sites, in close proximity to roads with large volumes of traffic on them. Modelling studies suggest that in general it will be most demanding to achieve the annual mean objective of 40 $\mu g/m^3$, but that if this is achieved the hourly objective will also be met.

From the first round of review and assessments there were over 100 AQMA's declared for NO_2, the majority of which were related specifically to road traffic emissions from major conurbations, smaller town centres with congested traffic, and alongside dual carriageways and motorways in more rural areas. No exceedances of the objectives were identified as a direct result of these emissions from industrial sources alone.

5.3 Continued Updating and Screening Assessment for nitrogen dioxide

The Suffolk Coastal Updating and Screening Assessment Report (June 2003) identified the following source of NO_2 as requiring further investigation, in the form of continued Updating and Screening Assessment, due to insufficient information available at the time;

- 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.

5.3.1 Continued Updating and Screening Assessment for combined emissions from ancillary equipment at Sizewell A and B Power Stations

In the Updating and Screening Assessment Report, NO_x emissions from ancillary equipment used at Sizewell A and B Power Stations were considered, together with the potential for emissions from the two sites to combine and cause an exceedance of the NO_2 objectives. The findings of the report considered that it was unlikely that NO_x emissions from ancillary equipment at these two sites would cause an exceedance of the NO_2 objectives, however, confirmation of that conclusion was required.

Emissions of NO_x from Sizewell A and B Power Stations were considered in the first round of review and assessments. They were not progressed beyond the first stage of investigation following advice from the Environment Agency that the equipment on the sites was for standby use only, and would not cause significant emissions of NO_x to exceed the NO_2 objectives. In this second round of review and assessments we wanted to confirm these findings by detailing equipment on each site, and its usage. In addition, due to the close proximity of the two sites, there is the potential for emissions of NO_x from the two sites to combine. Further investigation was, therefore, necessary to establish whether Detailed Assessment of NO_x emissions is required.

At the time of the Updating and Screening Assessment there was insufficient information available regarding exact details of all the equipment used on both sites to complete the review and assessment. Since that time we have worked closely with the Environmental Co-ordinators at Sizewell A and B Power Stations and the Environment Agency, to obtain the relevant information needed to undertake an Updating and Screening Assessment for these sites, which is detailed below.

Sizewell A Power Station is owned and run by Magnox Electric plc, it incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. It 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 require authorisation. The site has four essential diesel generators and two auxiliary boilers that are all present as standby equipment, and are not operated continuously. The essential diesel generators are present to 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 present to provide steam whilst the reactor is shut down for maintenance or refuelling, and for start-up of the reactor following a shut down.

There also several pieces of small combustion plant on the site, for example Tertiary Feed Pumps, Mulsifyre Diesels and a Trailer Fire Pump. These are all present as standby equipment for use in an emergency should the site experience a loss of power supply. Together with station vehicles, the aggregated thermal capacity of combustion equipment on site is above 20 MW, but is below the aggregated total of 50 MW and the single plant threshold of 20 MW requiring authorisation under the Environmental Protection Act 1990.

There is one waste incinerator on the site for which the throughput capacity is less than 50 kg per hour, which also means that it does not require authorisation under Part 1 of the Environmental Protection Act 1990. The maximum operating time for the waste incinerator is 480 hours per year, however, the actual running time for the year 2002 was much lower.

Domestic heating is provided to the older site buildings by the site steam system, and the newer buildings have zoned electrical heating. One building has a kerosene heater with a thermal capacity of 0.02 MW, this is too small to require authorisation or create any significant NO_x emissions.

Sizewell B Power Station is owned and run by British Energy Generation Limited, and is a pressurised water reactor nuclear power station. It is regulated by the Environment Agency under the Environmental Protection Act 1990, and also has separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency to regulate the discharge of radioactive waste. 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 processes are for the essential supplies diesel generators and the auxiliary boilers. The thermal capacity of the essential supplies diesel generators is greater than 50 MW requiring Part A authorisation, and the thermal capacity of the auxiliary boilers is between 20 and 50 MW requiring Part B authorisation. Both are, therefore, listed as potentially significant emitters of NO_x in the technical guidance LAQM.TG(03). The essential diesel generators and auxiliary boilers are present only as standby equipment, and are not operated continuously. There are four essential supplies diesel generators present to 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. Only one of the four essential supplies diesel generators is needed in an emergency, however, there are four on site to cover all eventualities, in case one is under-going routine maintenance, one being repaired etc. There are two auxiliary boilers that are present to provide process steam, whilst the reactor is shut down for maintenance or refuelling, to systems that would normally be supplied by steam produced for the turbine-generator plant. They are also required for start-up of the reactor following a shut down. Only one of the two auxiliary boilers is needed in an emergency, however, there are two on site in case one is under-going routine maintenance or being repaired.

The authorisation for the incineration process is for a solid waste incinerator on the site. There are three incinerators in total on the site, two are solid waste incinerators of which only one has ever been used and the third is a contaminated oil incinerator. The throughput capacity of the solid waste incinerator, which is in use, is greater than 50 kg per hour, therefore requiring Part B authorisation under Part I of the Environmental Protection Act 1990. The throughput of the contaminated oil incinerator is less than 50 kg per hour, and so it does not require authorisation. Part B authorisation for an incineration process is not listed as a potentially significant emitter of NO_x in LAQM.TG(03). The running time for the solid waste incinerator is 250 hours per year maximum, the contaminated oil incinerator was not run at all in 2002 and was run for a total of 30 hours in 2003.

There are several pieces of other small combustion plant on the site, for example Fire Fighting Diesels, Hydrant Pump Diesels and Battery Charging Diesels, the thermal capacity of which is less than 20 MW and, therefore, it does not require authorisation under Part 1 of the Environmental Protection Act 1990. All small combustion plant is again present only as standby equipment for use in an emergency should the site experience loss of power supply.

The site's domestic heating is provided by four Domestic Heating Boilers, which run on gas-oil, the thermal capacity of each is 0.9 MW and only two are run at any one time. The thermal capacity of the boilers is too small to require authorisation.

Following collation of the above information, advice was obtained from defra's Review and Assessment Helpdesk regarding the potential for emissions from the equipment at Sizewell A and B to cause exceedances of the objectives at receptor locations. The Helpdesk confirmed that experience has shown the sources of emissions on the sites, and their usage, would give no likely exceedances of the objectives, and that there is no need to proceed to a Detailed Assessment. **Therefore, no further assessment of nitrogen dioxide with regard to Sizewell A and B Power Stations will be necessary at this time.**

5.4 Detailed Assessment for nitrogen dioxide

The Suffolk Coastal Updating and Screening Assessment Report (June 2003) identified the following sources of NO_2 as requiring further investigation, in the form of a Detailed Assessment;

- 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. 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.

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

5.4.1 Continued Detailed Assessment of traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge

The Updating and Screening Assessment (published June 2003) presented results of NO_2 diffusion tube monitoring undertaken throughout the Suffolk Coastal district. A summary of the annual mean concentrations at sites in Woodbridge for 2002 can be seen in table 5.1 overleaf. These sites were located to assess NO_2 concentrations at the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge due to emissions from road traffic. The results were predicted forward to the end of 2005, for comparison with the air quality objectives, using factors provided in the technical guidance LAQM.TG(03), the predicted levels at all sites in 2005 can also be seen in table 5.1 overleaf. Full details of the analytical technique and laboratory used, monitoring locations, a breakdown of results on a monthly basis for 2002 and diffusion tube bias adjustment information can be seen in Appendix B.

The results of monitoring at this junction in Woodbridge, see table 5.1 below, showed that the kerbside site Woodbridge 1 had levels of NO_2 in 2002 that were elevated above the annual mean objective of 40$\mu g/m^3$. The results for the other two sites were within the annual mean objective level. When the results were predicted forward to the end of 2005, for comparison with the air quality objectives, these calculations confirmed that the predicted concentration of NO_2 at Woodbridge 1 would be above the annual mean objective of 40 $\mu g/m^3$ in 2005. The results for this junction were considered unusual as Woodbridge 1 and Woodbridge 5 are opposite one another but the diffusion tube results showed a difference in the annual mean of more than 15 $\mu g/m^3$.

Table 5.1 Summary of NO_2 diffusion tube monitoring results in 2002 (adjusted for diffusion tube bias) for sites in Woodbridge, and predicted annual mean concentrations for 2005.

Site and category	Location	2002 annual mean corrected for bias ($\mu g/m^3$)	2002 measured annual mean predicted forward to 2005 ($\mu g/m^3$) (Kerbside & Roadside sites = x 0.92 Other sites = x 0.93)
Woodbridge 1 (triplicate site) Kerbside site	Thoroughfare (number 93)	51.9	**47.8**
Woodbridge 3 Urban Background site	Kingston Farm Road	20.8	**19.3**
Woodbridge 5 (triplicate site) Roadside site	Thoroughfare (Suffolk Place)	35.3	**32.5**

Due to these differing diffusion tube results, a Detailed Assessment was undertaken for this junction by Netcen and presented in the Updating and Screening Assessment report (published June 2003). Automatic and manual traffic counts were undertaken for each arm of the junction and future traffic increases at this junction from four developments in this area were estimated. The Detailed Assessment entailed complex computer modelling using the atmospheric dispersion model ADMS version 3.1 to predict air quality impacts of NO_2 emissions from moving and idling traffic at receptor locations on the road junction. The model was validated using the results of continuous monitoring undertaken at a nearby junction in Melton. 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. All details regarding the Detailed Assessment undertaken for this junction are presented in the Updating and Screening Assessment report (June 2003), within which the Netcen report is also attached as Appendix I.

The findings of the modelling showed that it was unlikely (with a probability between 5% and 20%) that an exceedance of the annual mean objective would occur at the Woodbridge junction in 2005. The report produced stated, however, that diffusion tubes exposed on the Melton Hill arm of the junction showed an exceedance of the annual mean NO_2 objective, and that this might be the result of a street canyon effect. It was recommended that Suffolk Coastal District Council should not consider declaring an air quality management area for nitrogen dioxide from road transport at this junction. It was 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. Consideration should be given to the declaration of an air quality management area after 12 months if the results showed that the annual mean NO_2 objective would not be met. The recommendations were accepted and a 12-month diffusion tube monitoring campaign began at this junction in July 2003.

Defra commented on the findings of the Detailed Assessment for this junction. They stated that the intention to continue monitoring levels of nitrogen dioxide at the junction was sensible. They also suggested that it would be appropriate to consider using a continuous analyser to undertake further monitoring at this junction.

A 12-month diffusion tube survey at receptor locations around the junction was started in July 2003, with 7 extra sites added each consisting of a single diffusion tube. This junction has four arms to it that are controlled by traffic lights, it experiences stationary queuing traffic at peak hours. There are a number of receptor locations within 10 metres of the kerb on all arms of the junction, the nearest of which is less than 1 metre from the kerb. A diffusion tube site was placed at the closest receptor location on each arm of the junction, with additional sites being placed near to Woodbridge 1 due to the elevated levels seen here. Monitoring location descriptions are provided in Appendix B of this report together with a map of the junction and the diffusion tube sites located on it (Map B-2).

A summary of the annual mean NO_2 concentrations recorded by the diffusion tubes for 2003 can be seen in table 5.2 below. Full details of the analytical technique and laboratory used, monitoring locations, a breakdown of results on a monthly basis for 2002 and diffusion tube bias adjustment information can be seen in Appendix B. It should be noted that the annual mean has been calculated on 6 months of monitoring data available to date for the new sites, Woodbridge 6 to Woodbridge 12. The results for all sites were predicted forward to the end of 2005, for comparison with the air quality objectives, using factors provided in the technical guidance LAQM.TG(03). The predicted levels at all sites in 2005 can also be seen in table 5.2 below.

Table 5.2 Summary of NO_2 diffusion tube monitoring results in 2003 (adjusted for diffusion tube bias) for sites in Woodbridge, and predicted annual mean concentrations for 2005.

Site and category	Location	2003 annual mean corrected for bias (μg/m^3)	2003 measured annual mean predicted forward to 2005 (μg/m^3) (Kerbside and Roadside sites = x 0.95 other sites = x 0.96)
Woodbridge 1 (triplicate site) Kerbside site	Thoroughfare (number 93)	50.8	**48.3**
Woodbridge 3 Urban Background site	Kingston Farm Road	19.7	**18.9**
Woodbridge 5 (triplicate site) Roadside site	Thoroughfare (Suffolk Place)	36.1	**34.3**
Woodbridge 6 Roadside site	Thoroughfare (number 87)	49.1	**46.6**
Woodbridge 7 Roadside site	Sun Lane	28.4	**27.0**
Woodbridge 8 Roadside site	Thoroughfare (number 95)	43.2	**41.0**
Woodbridge 9 Roadside site	Thoroughfare (at Deben Road)	29.1	**27.6**
Woodbridge 10 Roadside site	St. John's Street	36.7	**34.9**
Woodbridge 11 Roadside site	Thoroughfare (number 83)	28.0	**26.6**
Woodbridge 12 Roadside site	Lime Kiln Quay Road	31.8	**30.2**

The results of monitoring at the Woodbridge junction in table 5.2 above showed that the sites at Woodbridge 1, 6 and 8 had levels of NO_2 in 2003 that were elevated above the annual mean objective of 40μg/m^3. The results for all other sites located at the junction were within the annual mean objective level. When the results were predicted forward to the end of 2005, for comparison with the air quality objectives, it confirmed that the concentrations of NO_2 at Woodbridge 1, 6 and 8 would be above the annual mean objective of 40 μg/m^3 in 2005.

The diffusion tubes located at Woodbridge 1, 6 and 8 are all on the same side of the Thoroughfare arm of the junction, see Map B-2 in Appendix B of this report. Woodbridge 6 is nearest to the centre of the junction and is approximately 9 metres away from Woodbridge 1 as you travel along the Thoroughfare arm of the junction towards Melton Hill. Woodbridge 8 is then sited approximately 22 metres from Woodbridge 1, again farther along the Thoroughfare arm of the junction towards Melton Hill. All diffusion tubes are located on the façade of receptor locations between 1 and 3 metres from the kerbside.

The results obtained for the first 6 months of the 12-month diffusion tube survey continue to indicate that conditions at this junction are unusual. Results for three arms of the junction show concentrations

within the annual mean objective, with only the northern side of the Thoroughfare (Melton Hill) arm of the junction indicating levels above the annual mean objective. Advice has been obtained from Netcen regarding the diffusion tube survey concentrations seen at the junction and a site visit has been made. It has been decided, as suggested by defra, that a continuous NOx analyser will be sited at this junction in the locality of the diffusion tubes sites Woodbridge 1, 6 and 8 to obtain more accurate data and information. The junction is fairly narrow at this location and a site for the analyser has proved difficult to find, permission however has now been obtained from one of the property owners and preparations are underway to site the analyser and begin the monitoring. The diffusion tube survey will continue with a triplicate set of diffusion tubes co-located with the analyser in order to obtain a diffusion tube bias correction factor. The co-located site will be at Woodbridge 6, or a location very close to it. Two additional diffusion tube sites were also added to the survey in November 2003, on the advice of Netcen, in the locality of 85 Thoroughfare to record concentrations at the centre of the junction. Map B-1 in Appendix B of this report shows the location of these two new sites.

The results of the diffusion tube survey and continuous monitoring undertaken at this junction will be assessed once the monitoring has been completed. Nine months of continuous monitoring data should have been obtained in time for the next LAQM report, the Progress Report, due in 2005 and the findings will be reported at that time.

5.4.2 Detailed Assessment of traffic using a section of the A1214 near the Bell Lane junction in Kesgrave, where monitoring by diffusion tubes has shown elevated levels

The Updating and Screening Assessment (published June 2003) presented results of NO_2 diffusion tube monitoring undertaken throughout the Suffolk Coastal district. The results of monitoring undertaken in 2002 along the A1214 in Kesgrave showed that the kerbside site, Kesgrave 2, had levels of NO_2 that were elevated above the annual mean objective of 40μg/m^3. The results were predicted forward to the end of 2005 for comparison with the air quality objectives using factors provided in LAQM.TG(03). These calculations confirmed that the predicted concentration of NO_2 at Kesgrave 2 would be above the annual mean objective of 40 μg/m^3 in 2005. A summary of the annual mean concentrations for 2002, and the predicted levels in 2005 can be seen in table 5.3 below. Full details of the analytical technique and laboratory used, monitoring locations and a breakdown of results on a monthly basis for 2002 can be seen in Appendix B.

Table 5.3 Summary of NO_2 diffusion tube monitoring results in 2002 (adjusted for diffusion tube bias) for sites in Kesgrave, and predicted annual mean concentrations for 2005.

Site and category	Location	2002 annual mean corrected for bias (μg/m^3)	2002 measured annual mean predicted forward to 2005 (μg/m^3) (Kerbside sites = x 0.92 Urban Background sites = x 0.93)
Kesgrave 2 Kerbside site	Main Road, Kesgrave	51.0	**46.9**
Kesgrave 4 Urban Background site	Kesgrave High School	22.0	**20.5**

Kesgrave 2 was less than 1 metre from the kerb on the A1214 at Kesgrave and had three diffusion tubes (triplicate site) for increased accuracy of monitoring results. The site was approximately 120 metres from the junction with Bell Lane, which is controlled by traffic lights. A map of this section of the A1214 and the diffusion tube site can be seen in appendix B, Map B-2, in this report. This section of the A1214 experiences stationary queuing traffic at peak hours. It does not have members of the public who would be on the pavement over the averaging time for the 1-hour NO_2 objective and, therefore, the nearest relevant receptor locations are residential properties 2.6 metres from the kerb.

The Updating and Screening Assessment report concluded that, due to the elevated diffusion tube readings at this site, further Detailed Assessment was necessary.

A Detailed Assessment must determine with reasonable certainty whether or not there is a likelihood of the objectives not being achieved. The assumptions should be considered in-depth, and the data that are used or collected must be quality assured to a high standard. In undertaking a Detailed Assessment the technical guidance LAQM.TG(03) states that it is important to consider the points of maximum relevant public exposure.

A continuous NO_x analyser was located at this site in March 2003 which was co-located with a triplicate diffusion tube site (Kesgrave 6) in order to provide a bias adjustment factor for diffusion tube results. Details and calculations regarding diffusion tube bias adjustment are provided in Appendix B. The site located was on the same side of the road as the traffic queues (the traffic only queues in this location in the westbound lane), 2.6 metres from the kerb - the same distance as the nearest relevant receptor location. Kesgrave 2 was a kerbside site less than 1 metre from the kerb, it was not representative of relevant public exposure and was, therefore, discontinued and replaced by the triplicate co-located site Kesgrave 6. In addition, three other diffusion tube sites were located in this area of the A1214 at receptor locations, to provide NO_2 measurements on both sides of the road and at varying distances from the kerb. Monitoring location descriptions are provided in Appendix B of this report together with full details of the analytical technique and laboratory used, and a map of this section of the A1214 and the diffusion tube sites located on it (Map B-2).

The continuous NO_x analyser measured levels of NO_x, NO and NO_2 by ozone chemiluminescence from 14 March to 31 December 2003 at a site representative of the nearest relevant receptor location to this area of the A1214. 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. Data collection, site auditing, checking of calibration data, quality control and scaling of real-time results were undertaken by an external laboratory to ensure that the data collected was quality assured to a high standard.

Table 5.4 below shows the average measured concentrations and maximum hourly mean concentrations of NO_x and NO_2 for the monitoring period. A summary table and graph showing more detailed results of the monitoring can be seen in Appendix C. Table 5.4 shows the average NO_2 concentration (28.7 $\mu g/m^3$) to be below the annual mean objective of 40$\mu g/m^3$ and the maximum hourly mean (116.5 $\mu g/m^3$) to be below the 1-hour objective of 200$\mu g/m^3$ not to be exceeded more than 18 times a year. The average NO_2 concentration measured by the analyser was predicted forward to the end of 2005, using factors provided in LAQM.TG(03), for comparison with the annual mean air quality objective of 40μg/m and the result can be seen in table 5.4. These calculations confirmed the predicted concentration of NO_2 at 27.3 $\mu g/m^3$ is below the annual mean objective, 40 $\mu g/m^3$ in 2005.

Table 5.4 Summary of continuous NO_x and NO_2 ratified data collected at Kesgrave, 14 March to 31 December 2003, and prediction of 2003 annual mean NO_2 concentration forward to 2005

	Concentration of NO_x recorded by analyser in 2003	**Concentration of NO_2 recorded by analyser in 2003**	**2003 measured annual mean NO_2 concentration predicted forward to 2005 (Roadside sites = x 0.95)**
Average concentration	57.3 $\mu g/m^3$	**28.7 $\mu g/m^3$**	**27.3 $\mu g/m^3$**
Maximum hourly mean	607.4 $\mu g/m^3$	**116.5 $\mu g/m^3$**	n/a
Data capture	93.6%	93.6%	n/a

The summary results of the NO_2 diffusion tube survey at this location can be seen in table 5.5 below, details of monitoring locations and a breakdown of results on a monthly basis for 2003 are provided in Appendix B. The results were predicted forward to the end of 2005 for comparison with the air quality objectives using factors provided in LAQM.TG(03). These calculations confirm that the predicted concentrations of NO_2 at all locations measured by diffusion tubes are below the annual mean objective of 40 $\mu g/m^3$ in 2005.

Table 5.5 Summary of NO_2 diffusion tube monitoring results in 2003 (adjusted for diffusion tube bias) for sites in Kesgrave, and predicted annual mean concentrations for 2005.

Site and category	Location	2003 annual mean corrected for bias ($\mu g/m^3$)	2003 measured annual mean predicted forward to 2005 ($\mu g/m^3$) (Kerbside and Roadside sites = x 0.95 Urban Background sites = x 0.96)
Kesgrave 4 Urban Background site	Kesgrave High School	20.4	**19.6**
Kesgrave 6 (triplicate site) Roadside site	Main Road, Kesgrave	28.8	**27.4**
Kesgrave 7 Roadside site	Main Road, Kesgrave	26.5	**25.2**
Kesgrave 8 Roadside site	Main Road, Kesgrave	24.7	**23.5**
Kesgrave 9 Roadside site	Main Road, Kesgrave	34.9	**33.2**

The continuous monitoring and diffusion tube survey targeted areas representative of relevant maximum public exposure along both sides of the A1214 in Kesgrave. The monitoring results confirm both current and future predicted levels of NO_2 to be well below the annual average objective of 40 $\mu g/m^3$ in 2005. The continuous monitoring data set shows no exceedence of the NO_2 hourly objective value (as may be expected with such a low annual mean).

The Design Manual for Roads and Bridges (DMRB) screening method was applied to all sections of the A1214 within the Updating and Screening Assessment report, details are available in Chapter 7 of that report. The results from DMRB show that annual mean NO_2 concentrations are unlikely to exceed the 2005 objective at receptor locations on any of the sections of the A1214, including specifically the section near the Bell Lane junction discussed here. On this basis it was deemed unnecessary to undertake further detailed modelling of this area of the A1214.

Monitoring of NO_2 concentrations on this section of the A1214 is to be continued, using a single diffusion tube at the Kesgrave 6 and Kesgrave 9 site which represent the closest receptor locations on opposite sides of the road. The urban background Kesgrave 4 site will also be retained to provide a continuing record of background NO_2 concentrations in the area.

The findings of this Detailed Assessment show it is unlikely that exceedence of the NO_2 objectives will occur at any relevant receptor locations on this section of the A1214 and, therefore, it is not necessary to declare an Air Quality Management Area for this location.

5.5 Conclusion

It is concluded that there is a potential risk that the air quality objectives for nitrogen dioxide may be exceeded at receptor locations on the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge by the end of 2005. A Detailed Assessment was undertaken for this junction that concluded an air quality management area does not need to be declared at this time. The Detailed Assessment recommended 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. The results of the diffusion tube survey and of continuous monitoring also to be undertaken at this junction will be assessed once the monitoring has been completed. Nine months of continuous monitoring data should have been obtained in time for the next LAQM report, the Progress Report, due in 2005 and the findings will be reported at that time.

6. Review and assessment of sulphur dioxide (SO_2)

6.1 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.

6.2 Sources, health effects, national and local perspective

SO_2 is a gas at normal temperature and pressure, which is soluble in water. There are a number of natural sources of SO_2, for example volcanic activity and releases caused by marine organisms. In the UK the main source of SO_2 is from the combustion of sulphur-containing fossil fuels, principally coal and oil. Emissions of SO_2 have decreased in the past thirty years due to legislation to move away from the use of coal as a domestic urban fuel source. Emissions have become more localised due to the use of large, rural power stations burning fossil fuels to create our energy generation, which are now the main source of SO_2 in the UK. There are also significant emissions from other industrial combustion sources.

SO_2 is an irritant gas when inhaled, due to its acidic nature, which can cause constriction of the airways and breathing difficulties. This is particularly likely to occur in those suffering from asthma and chronic lung disease, and the effects of SO_2 on sensitive subjects are seen to appear almost immediately after the start of exposure. Some studies undertaken also suggest that SO_2, in conjunction with NO_2, can increase the sensitivity to allergens of some asthma sufferers.

Concentrations of SO_2 were measured at UK national network monitoring sites during the period 1999-2001 and show that concentrations have fallen at all sites in recent years, the only exceedance being associated with domestic coal burning at a site in Belfast. Local exceedances of the objectives may occur in the vicinity of small combustion plant burning coal or oil, in areas where solid fuels are the predominant source of domestic heating, and in the vicinity of major ports. Due to these sources, a small number of AQMA's were declared for SO_2 in the first round of review and assessments.

6.3 Continued Updating and Screening Assessment for sulphur dioxide

The Suffolk Coastal Updating and Screening Assessment Report (June 2003) identified the following sources of SO_2 as requiring further investigation, in the form of continued Updating and Screening Assessment, due to insufficient information available at the time;

- 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.

6.3.1 Continued Updating and Screening Assessment for combined emissions from ancillary equipment at Sizewell A and B Power Stations

In the Updating and Screening Assessment Report, SO_2 emissions from ancillary equipment used at Sizewell A and B Power Stations were considered, together with the potential for emissions from the two sites to combine. The findings of the report considered that it was unlikely that SO_2 emissions from ancillary equipment at these two sites would cause an exceedance of the objectives, however, confirmation of that conclusion was required.

Emissions of SO_2 from Sizewell A and B Power Stations were considered in the first round of review and assessments. They were not progressed beyond the first stage of investigation following advice from the Environment Agency that the equipment on the sites was for standby use only, and would not cause significant emissions of SO_2. In this second round of review and assessments we wanted to confirm these findings by detailing equipment on each site, and its usage. In addition, due to the close proximity of the two sites, there is the potential for emissions of SO_2 from the two sites to combine. Further investigation was, therefore, necessary to establish whether Detailed Assessment of SO_2 emissions is required.

At the time of the Updating and Screening Assessment there was insufficient information available regarding exact details of all the equipment used on both sites to complete the review and assessment. Since that time we have worked closely with the Environmental Co-ordinators at Sizewell A and B Power Stations and the Environment Agency, to obtain the relevant information needed to undertake an Updating and Screening Assessment for these sites, which is detailed below.

Sizewell A Power Station is owned and run by Magnox Electric plc, it incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. It 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 require authorisation. The site has four essential diesel generators and two auxiliary boilers that are all present as standby equipment, and are not operated continuously. The essential diesel generators are present to 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 present to provide steam whilst the reactor is shut down for maintenance or refuelling, and for start-up of the reactor following a shut down.

There also several pieces of small combustion plant on the site, for example Tertiary Feed Pumps, Mulsifyre Diesels and a Trailer Fire Pump. These are all present as standby equipment for use in an emergency should the site experience a loss of power supply. Together with station vehicles, the aggregated thermal capacity of combustion equipment on site is above 20 MW, but is below the aggregated total of 50 MW and the single plant threshold of 20 MW requiring authorisation under the Environmental Protection Act 1990.

There is one waste incinerator on the site for which the throughput capacity is less than 50 kg per hour, which also means that it does not require authorisation under Part 1 of the Environmental

Protection Act 1990. The maximum operating time for the waste incinerator is 480 hours per year, however, the actual running time for the year 2002 was much lower.

Domestic heating is provided to the older site buildings by the site steam system, and the newer buildings have zoned electrical heating. One building has a kerosene heater with a thermal capacity of 0.02 MW, this is too small to require authorisation or create any significant SO_2 emissions.

Sizewell B Power Station is owned and run by British Energy Generation Limited, and is a pressurised water reactor nuclear power station. It is regulated by the Environment Agency under the Environmental Protection Act 1990, and also has separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency to regulate the discharge of radioactive waste. 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 processes are for the essential supplies diesel generators and the auxiliary boilers. The thermal capacity of the essential supplies diesel generators is greater than 50 MW requiring Part A authorisation, and the thermal capacity of the auxiliary boilers is between 20 and 50 MW requiring Part B authorisation. Both are, therefore, listed as potentially significant emitters of SO_2 in the technical guidance LAQM.TG(03). The essential diesel generators and auxiliary boilers are present only as standby equipment, and are not operated continuously. There are four essential supplies diesel generators present to 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. Only one of the four essential supplies diesel generators is needed in an emergency, however, there are four on site to cover all eventualities, in case one is under-going routine maintenance, one being repaired etc. There are two auxiliary boilers that are present to provide process steam, whilst the reactor is shut down for maintenance or refuelling, to systems that would normally be supplied by steam produced for the turbine-generator plant. They are also required for start-up of the reactor following a shut down. Only one of the two auxiliary boilers is needed in an emergency, however, there are two on site in case one is under-going routine maintenance or being repaired.

The authorisation for the incineration process is for a solid waste incinerator on the site. There are three incinerators in total on the site, two are solid waste incinerators of which only one has ever been used and the third is a contaminated oil incinerator. The throughput capacity of the solid waste incinerator, which is in use, is greater than 50 kg per hour, therefore requiring Part B authorisation under Part I of the Environmental Protection Act 1990. The throughput of the contaminated oil incinerator is less than 50 kg per hour, and so it does not require authorisation. Part B authorisation for an incineration process is not listed as a potentially significant emitter of SO_2 in LAQM.TG(03). The running time for the solid waste incinerator is 250 hours per year maximum, the contaminated oil incinerator was not run at all in 2002 and was run for a total of 30 hours in 2003.

There are several pieces of other small combustion plant on the site, for example Fire Fighting Diesels, Hydrant Pump Diesels and Battery Charging Diesels, the thermal capacity of which is less than 20 MW and, therefore, it does not require authorisation under Part 1 of the Environmental Protection Act 1990. All small combustion plant is again present only as standby equipment for use in an emergency should the site experience loss of power supply.

The site's domestic heating is provided by four Domestic Heating Boilers, which run on fuel oil, the thermal capacity of each is 0.9 MW and only two are run at any one time. The thermal capacity of the boilers is too small to require authorisation. LAQM.TG(03) states that we should consider any boilers which, in combination, have a thermal capacity of 5 MW or greater as potentially significant emitters of SO_2. The total thermal capacity of boilers running at any one time would be 1.8 MW and they would, therefore, not fall into this criterion. In addition the boilers are run on gas-oil, which has a low sulphur content and is not considered to be a significant source of SO_2.

Following collation of the above information, advice was obtained from defra's Review and Assessment Helpdesk regarding the potential for emissions from the equipment at Sizewell A and B to cause exceedances of the objectives at receptor locations. The Helpdesk confirmed that experience has shown the sources of emissions on the sites, and their usage, would give no likely exceedances of the objectives, and that there is no need to proceed to a Detailed Assessment. **Therefore, no further assessment of sulphur dioxide emissions from Sizewell A and B Power Stations will be necessary at this time.**

6.3.2 Continued Updating and Screening Assessment of emissions from areas of domestic coal burning within the Suffolk Coastal district

The technical guidance LAQM.TG(03) advises that 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.

At the time of the Updating and Screening Assessment (June 2003) there was insufficient information available regarding solid fuel use within the Suffolk Coastal district to complete the review and assessment. Some information had been obtained from local solid fuel suppliers in the first round of review and assessments that indicated 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 was not possible to confirm these findings at the time of the Updating and Screening Assessment. Information was obtained from Transco regarding gas supplies to the district, this indicated that due to the rural nature of a large proportion of the district many parishes did not have access to a mains gas supply and would be using alternatives fuels. Information provided by Transco detailing which parishes have mains gas supply is presented in Appendix D. It was concluded that further information would need to be obtained and the findings reported in this Detailed Assessment report.

Information was obtained detailing the maximum housing density per 500 x 500 metre area for each parish using the Suffolk Coastal Geographical Information System (GIS) and is presented in Appendix D.

Information from the 2001 Census undertaken within the UK contains data on the number of houses without central heating, some of these properties would have solid fuel as their main source of heating. It was assumed as a worse case scenario that all properties without central heating used solid fuel as their main source of heating. The Census data showed that of 49,025 households in the district, 3,318 do not have central heating, this equates to only 6.8% of households but does provide information on where these properties are geographically located. At the time of the investigation only data at ward level was available, the parish data being due to be released later this year. The 2001 Census Ward data was obtained from the Suffolk Coastal Development & Policy Team, together with known housing stock estimates for each parish in mid 2003. This information was used to calculate the percentage of houses attributable to each parish making up that Ward. These percentages were then applied to the Census Ward data to estimate the number of houses in each parish without central heating. Appendix D details those parishes that have been estimated to have more than 50 properties without central heating. 50 houses were used as this is the criteria used for the assessment of PM_{10} emissions from solid fuel use, see chapter 7 of this report, and would be a worse case scenario for SO_2.

Complaints received within the last three years regarding fumes/smoke from domestic chimneys were collated for each parish and are detailed in Appendix D. There were a total of 7 complaints received

in the last three years across the district. Officer experience together with the complaint statistics revealed that there are no areas within the district affected by distinctive solid fuel burning odours.

The above information was used to identify parishes that required a visual inspection, to collate the number of chimneys with smoke coming from them. Nine parishes fell within the criteria for visual inspection; Aldeburgh, Felixstowe, Framlingham, Leiston, Melton, Saxmundham, Trimley St Martin, Trimley St Mary and Woodbridge, these are detailed in Appendix D and all have mains gas supply to them. A visual inspection was made of the main built-up areas within each parish during February 2004, assessments were undertaken on Sundays and after 18:30 hours on weekdays, times when people would be likely to be at home and using their heating and hot water. The number of houses seen with smoke coming from a chimney is detailed in Appendix D. Each parish inspected had an area larger than 500 x 500 metres, and the results show less than 100 houses in each with smoke arising from a chimney at the time of inspection.

Advice was also sought from the Suffolk Coastal Private Sector Housing Team and two of the larger solid fuel merchants that serve the district. Their comments were that the use of solid fuel is generally decreasing, with the majority of the rural parishes using oil or electricity for their main source of heating. There are a number of properties using solid fuel in one or two rooms in the house, but these have an alternative source of fuel for their main heating. The number of customers served by the solid fuel merchants over the summer months is very limited, and these would be households most likely to be dependent on solid fuel as their main source of heating and hot water.

It is concluded that there are unlikely to be any areas in Suffolk Coastal where the burning of solid fuel as a primary source of heating for domestic purposes is greater than 100 houses in a 500 x 500 metre area. **It is, therefore, unlikely that the objectives for SO_2 would be exceeded in any areas within the district due to solid fuel use and further review and assessment will not be necessary.**

6.3.3 Continued Updating and Screening Assessment of 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 technical guidance within LAQM.TG(03) states that the first round of review and assessment confirmed that large boiler plant with a thermal capacity greater than 5 MW can give rise to high short term concentrations of SO_2, with the risk that the 15-minute objective may be exceeded. LAQM.TG(03) advises that particular attention should be paid to the combined impact of several sources, including those outside the local authority.

The findings of the Updating and Screening Assessment report indicated that Her Majesty's Prison and Young Offenders Institution at Hollesley Bay and Warren Hill, Hollesley may have several small boilers using fuel oil which, in combination, may have a thermal capacity greater than 5 MW.

At the time of the Updating and Screening Assessment (June 2003) there was insufficient information available regarding the type of fuel oil used and the combined thermal capacity of the boiler plant at both sites to complete the review and assessment.

We have worked closely with the Works Department for Hollesley Bay and Warren Hill, to obtain the relevant information needed to undertake an Updating and Screening Assessment, detailed below;

- The distance between the boundaries of the Hollesley Bay and Warren Hill sites is approximately 800 metres
- The total combined thermal capacity of the boilers at the Warren Hill site are 3.6 MW
- The total combined thermal capacity of the boilers at the Hollesley Bay site are 7.8 MW
- Boilers at both sites use gas oil, with the exception of a new Waste Oil Burner at the Hollesley Bay site that uses heavy fuel oil and has a thermal capacity of 0.041 MW

Advice obtained from defra's Review and Assessment Helpdesk confirmed that the sites are sufficiently far apart not to require consideration together. They also confirmed that as the boilers, with the exception of the Waste Oil Burner, use gas oil (a light fuel oil) they would not cause significant emissions of sulphur dioxide from these sites. **Therefore, no further assessment of sulphur dioxide emissions from these sites will be necessary at this time.**

6.3.4 Continued Updating and Screening Assessment of emissions from boiler plant burning fuel oil at site buildings on the Port of Felixstowe, Felixstowe, Suffolk

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. LAQM.TG(03) advises that particular attention should be paid to the combined impact of several sources, including those outside the local authority.

The findings of the Updating and Screening Assessment report indicated that site buildings on the Port of Felixstowe might have several small boilers using fuel oil that, in combination, could have a thermal capacity greater than 5 MW.

At the time of the Updating and Screening Assessment there was insufficient information available regarding the combined thermal capacity of boiler plant on the Port of Felixstowe to complete the review and assessment.

We have obtained information from the Port of Felixstowe who have advised that there is a total of 35 small boilers and warm air heaters on the site which run on fuel oil, the combined thermal capacity of which is 4.16 MW.

As the combined thermal capacity of all oil-fired plant on the Port of Felixstowe does not exceed 5MW, **no further assessment of this site will be necessary at this time.**

This review and assessment has concluded that emissions from oil-fired boiler plant on the Port of Felixstowe are not a significant source of SO_2 in isolation. The potential for combined emissions of pollutants, including SO_2, from current and future planned activities at the Port of Felixstowe is, however, considered later in chapter 8 of this report.

6.4 Conclusion

It is concluded that there is no risk of the air quality objectives for SO_2 being exceeded in the Suffolk Coastal area, and no further assessment will be necessary at this time.

Investigations into any SO_2 emissions associated with the Bathside Bay, Harwich and Port of Felixstowe Planning Applications are currently being considered and further details are available in chapter 8 of this report.

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

7.1 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}. There are a number of measurement methods 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.

7.2 Sources, health effects, national and local perspectives

Particulate matter in the atmosphere is composed of many different constituents depending on its source (both natural and from human activity). It is characterised and defined by the mass of that fraction which is most likely to penetrate beyond the larynx and be deposited in the lung, particles less than 10 μm in diameter which are known as PM_{10}.

There are three main source types of particles, primary, secondary and coarse. Primary particles are emitted directly from the source, and arise from combustion sources such as road traffic, power generation and industrial processes. Secondary particles are formed within the atmosphere by chemical processes, and comprise principally of sulphate and nitrate. Coarse particles 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. PM_{10} is a mix of each of the three source types, including both natural sources and those derived from human activity, this mix can vary daily.

The expected reduction in future particle emissions is different for each source type. Emissions from road traffic (primary particles) will be governed by new legislation on emission standards, emissions of secondary particles will be largely governed by controls on power generation, industry, and transport, and emissions of coarse particles are largely uncontrolled and in general are not expected to decline in the future. A significant proportion of current annual mean PM_{10} is derived from regional background sources, including long distance transport from Europe, and in years with a high proportion of easterly winds, Europe does account for high concentrations, particularly in the south and east of England. It is, therefore, essential to treat each source separately and the principal focus of LAQM should be towards the control of emissions at a local level.

Particulate air pollution is associated with a range of effects on health, including effects on the respiratory and cardiovascular systems, asthma and mortality and those most at risk are the elderly, children and those who already suffer from a heart/lung complaint. In general, larger particles over 15 microns in diameter do not cause as much damage to health as they can be filtered out by the body, smaller particles especially below 4 microns in diameter can, however, penetrate deep into the lungs. There is emerging evidence that the health effects of particles are principally due to particles with a diameter of 2.5 microns, and investigations are continuing.

Concentrations of PM_{10} were measured at UK national network monitoring sites during the period 1999-2001 and show that concentrations were generally well below the annual mean objective. The 24-hour objective was exceeded at a small number of sites, principally those in the vicinity of busy roads or close to industrial activities. Analysis undertaken has identified that exceedances of the 2004

objectives might be found adjacent to busy roads, in areas with significant emissions from the domestic burning of solid fuels, in the vicinity of industrial plant, or areas which have significant uncontrolled or fugitive sources (quarrying, materials handling facilities etc.). Most AQMA declarations from the first round of review and assessments were in combination with NO_2 and associated with road traffic sources. There were, however, also AQMA's based on industrial sources, unregulated coal-fired boilers and heating plant, and fugitive emissions from quarrying and port handling activities.

There has been progress in recent years in reducing emissions of particles from both the transport and industrial sectors. Further reductions are expected in future years as a result of agreed policies, or those that are currently under discussion.

7.3 Continued Updating and Screening Assessment for PM_{10}

The Suffolk Coastal Updating and Screening Assessment Report (June 2003) identified the following sources of PM_{10} as requiring further investigation, in the form of continued Updating and Screening Assessment, due to insufficient information available at the time;

- 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.

7.3.1 Continued Updating and Screening Assessment for combined emissions from ancillary equipment at Sizewell A and B Power Stations

In the Updating and Screening Assessment Report, PM_{10} emissions from ancillary equipment used at Sizewell A and B Power Stations were considered, together with the potential for emissions from the two sites to combine. The findings of the report considered that it was unlikely that PM_{10} emissions from ancillary equipment at these two sites would cause an exceedance of the objectives, however, confirmation of that conclusion was required.

Emissions of PM_{10} from Sizewell A and B Power Stations were considered in the first round of review and assessments. They were not progressed beyond the first stage of investigation following advice from the Environment Agency that the equipment on the sites was for standby use only, and would not cause significant emissions of PM_{10}. In this second round of review and assessments we wanted to confirm these findings by detailing equipment on each site, and its usage. In addition, due to the close proximity of the two sites, there is the potential for emissions of PM_{10} from the two sites to combine. Further investigation was, therefore, necessary to establish whether Detailed Assessment of PM_{10} emissions is required.

At the time of the Updating and Screening Assessment there was insufficient information available regarding exact details of all the equipment used on both sites to complete the review and assessment. Since this time we have worked closely with the Environmental Co-ordinators at Sizewell A and B Power Stations and the Environment Agency, to obtain the relevant information needed to undertake an Updating and Screening Assessment for these sites, which is detailed below.

Sizewell A Power Station is owned and run by Magnox Electric plc, it incorporates two Magnox nuclear reactors and supporting plant and equipment for electricity generation. It 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 require authorisation. The site has four essential diesel generators and two auxiliary boilers that are all present as standby equipment, and are not operated continuously. The essential diesel generators are present to 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 present to provide steam whilst the reactor is shut down for maintenance or refuelling, and for start-up of the reactor following a shut down.

There also several pieces of small combustion plant on the site, for example Tertiary Feed Pumps, Mulsifyre Diesels and a Trailer Fire Pump. These are all present as standby equipment for use in an emergency should the site experience a loss of power supply. Together with station vehicles, the aggregated thermal capacity of combustion equipment on site is above 20 MW, but is below the aggregated total of 50 MW and the single plant threshold of 20 MW requiring authorisation under the Environmental Protection Act 1990.

There is one waste incinerator on the site for which the throughput capacity is less than 50 kg per hour, which also means that it does not require authorisation under Part 1 of the Environmental Protection Act 1990. The maximum operating time for the waste incinerator is 480 hours per year, however, the actual running time for the year 2002 was much lower.

Domestic heating is provided to the older site buildings by the site steam system, and the newer buildings have zoned electrical heating. One building has a kerosene heater with a thermal capacity of 0.02 MW, this is too small to require authorisation or create any significant PM_{10} emissions.

Sizewell B Power Station is owned and run by British Energy Generation Limited, and is a pressurised water reactor nuclear power station. It is regulated by the Environment Agency under the Environmental Protection Act 1990, and also has separate authorisations issued under the Radioactive Substances Act 1993 by the Environment Agency to regulate the discharge of radioactive waste. 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 processes are for the essential supplies diesel generators and the auxiliary boilers. The thermal capacity of the essential supplies diesel generators is greater than 50 MW requiring Part A authorisation, and the thermal capacity of the auxiliary boilers is between 20 and 50 MW requiring Part B authorisation. Both are, therefore, listed as potentially significant emitters of PM_{10} in the technical guidance LAQM.TG(03). The essential diesel generators and auxiliary boilers are present only as standby equipment, and are not operated continuously. There are four essential supplies diesel generators present to 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. Only one of the four essential supplies diesel generators is needed in an emergency, however, there are four on site to cover all eventualities, in case one is under-going routine maintenance, one being repaired etc. There are two auxiliary boilers that are present to provide process steam, whilst the reactor is shut down for maintenance or refuelling, to systems that would normally be supplied by steam produced for the turbine-generator plant. They are also required for start-up of the reactor following a shut down. Only one of the two auxiliary boilers is needed in an emergency, however, there are two on site in case one is under-going routine maintenance or being repaired.

The authorisation for the incineration process is for a solid waste incinerator on the site. There are three incinerators in total on the site, two are solid waste incinerators of which only one has ever been

used and the third is a contaminated oil incinerator. The throughput capacity of the solid waste incinerator, which is in use, is greater than 50 kg per hour, therefore requiring Part B authorisation under Part I of the Environmental Protection Act 1990. The throughput of the contaminated oil incinerator is less than 50 kg per hour, and so it does not require authorisation. Part B authorisation for an incineration process is not listed as a potentially significant emitter of PM_{10} in LAQM.TG(03). The running time for the solid waste incinerator is 250 hours per year maximum, the contaminated oil incinerator was not run at all in 2002 and was run for a total of 30 hours in 2003.

There are several pieces of other small combustion plant on the site, for example Fire Fighting Diesels, Hydrant Pump Diesels and Battery Charging Diesels, the thermal capacity of which is less than 20 MW and, therefore, it does not require authorisation under Part 1 of the Environmental Protection Act 1990. All small combustion plant is again present only as standby equipment for use in an emergency should the site experience loss of power supply.

The site's domestic heating is provided by four Domestic Heating Boilers, which run on gas-oil, the thermal capacity of each is 0.9 MW and only two are run at any one time. The thermal capacity of the boilers is too small to require authorisation.

Following collation of the above information, advice was obtained from defra's Review and Assessment Helpdesk regarding the potential for emissions from the equipment at Sizewell A and B to cause exceedances of the objectives at receptor locations. The Helpdesk confirmed that experience has shown the sources of emissions on the sites, and their usage, would give no likely exceedances of the objectives, and that there is no need to proceed to a Detailed Assessment. **Therefore, no further assessment of particulate matter emissions from Sizewell A and B Power Stations will be necessary at this time.**

7.3.2 Continued Updating and Screening Assessment into domestic coal burning within the Suffolk Coastal district.

The technical guidance LAQM.TG(03) advises that 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 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.

At the time of the Updating and Screening Assessment (June 2003) there was insufficient information available regarding solid fuel use within the Suffolk Coastal district to complete the review and assessment. Some information had been obtained from local solid fuel suppliers in the first round of review and assessments that indicated 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 was not possible to confirm these findings at the time of the Updating and Screening Assessment. Information was obtained from Transco regarding gas supplies to the district, this indicated that due to the rural nature of a large proportion of the district many parishes did not have access to a mains gas supply and would be using alternatives fuels. Information provided by Transco detailing which parishes have mains gas supply is presented in Appendix D. It was concluded that further information would need to be obtained and the findings reported in this Detailed Assessment report.

Information was obtained detailing the maximum housing density per 500 x 500 metre area for each parish using the Suffolk Coastal Geographical Information System (GIS) and is presented in Appendix D.

Information from the 2001 Census undertaken within the UK contains data on the number of houses without central heating, some of these properties would have solid fuel as their main source of heating. It was assumed as a worse case scenario that all properties without central heating used solid fuel as their main source of heating. The Census data showed that of 49,025 households in the district, 3,318 do not have central heating, this equates to only 6.8% of households but does provide information on where these properties are geographically located. At the time of the investigation only data at ward level was available, the parish data being due to be released later this year. The 2001 Census Ward data was obtained from the Suffolk Coastal Development & Policy Team, together with known housing stock estimates for each parish in mid 2003. This information was used to calculate the percentage of houses attributable to each parish making up that Ward. These percentages were then applied to the Census Ward data to estimate the number of houses in each parish without central heating. Appendix D details those parishes that have been estimated to have more than 50 properties without central heating.

Complaints received within the last three years regarding fumes/smoke from domestic chimneys were collated for each parish and are detailed in Appendix D. There were a total of 7 complaints received in the last three years across the district. Officer experience together with the complaint statistics revealed that there are no areas within the district affected by distinctive solid fuel burning odours.

The above information was used to identify those parishes that required a visual inspection, to collate the number of chimneys with smoke coming from them. Nine parishes fell within the criteria for visual inspection; Aldeburgh, Felixstowe, Framlingham, Leiston, Melton, Saxmundham, Trimley St Martin, Trimley St Mary and Woodbridge, these are detailed in Appendix D and all have mains gas supply to them. A visual inspection was made of the main built-up areas within each parish during February 2004, assessments were undertaken on Sundays and after 18:30 hours on weekdays, times when people would be likely to be at home and using their heating and hot water. The number of houses seen with smoke coming from a chimney is detailed in Appendix D. Each parish inspected had an area larger than 500 x 500 metres, and the results show less than 50 houses in each with smoke arising from a chimney at the time of inspection.

Advice was also sought from the Suffolk Coastal Private Sector Housing Team and two of the larger solid fuel merchants that serve the district. Their comments were that the use of solid fuel is generally decreasing, with the majority of the rural parishes using oil or electricity for their main source of heating. There are a number of properties using solid fuel in one or two rooms in the house, but these have an alternative source of fuel for their main heating. The number of customers served by the solid fuel merchants over the summer months is very limited, and these would be households most likely to be dependent on solid fuel as their main source of heating and hot water.

It is concluded that there are unlikely to be any areas in Suffolk Coastal where the burning of solid fuel as a primary source of heating for domestic purposes is greater than 50 houses in a 500 x 500 metre area. **It is, therefore, unlikely that the objectives for SO_2 would be exceeded in any areas within the district due to solid fuel use and further review and assessment will not be necessary.**

7.3.3 Continued Updating and Screening Assessment into combined emissions of PM_{10} from activities at, and associated with, the Port of Felixstowe.

The Updating and Screening Assessment advised that further investigation would be undertaken, and progress reported, regarding the potential for emissions of PM_{10} from combined activities at the Port of Felixstowe to cause elevated concentrations at receptor locations.

Since the Updating and Screening Assessment report was published a planning application has been received on the Felixstowe South Regeneration. Further detail is provided in this report in chapter 8 - The Port of Felixstowe. The planning application contains an Environmental Impact Assessment which provides detailed information regarding current emissions of PM_{10} from activities associated

with the Port of Felixstowe, and future detail on proposed increases in activity and emissions with respect to road vehicles, ships, trains, Port equipment etc.

We are currently investigating the proposals for all activities (road vehicles, ships, trains, Port equipment etc) with respect to air quality, including emissions of PM_{10}, and have employed consultants to comment on the complex information provided in the planning application. Once we know if planning permission has been granted or refused we will be able to provide accurate information on the potential for emissions of PM_{10} from combined activities at the Port of Felixstowe to cause an exceedance of the objectives at nearby receptor locations. The findings of our investigations will be published in future LAQM reports.

7.4 Conclusion

We are currently investigating the proposals within the Felixstowe South Reconfiguration planning application with respect to air quality, including emissions of PM_{10}, and have employed consultants to comment on the complex information provided. Once we know if planning permission has been granted or refused we will be able to provide accurate information on the potential for emissions of PM_{10} from combined activities at the Port of Felixstowe to cause an exceedance of the objectives at nearby receptor locations. The findings of any further investigations will be published in future LAQM reports.

8. The Port of Felixstowe

8.1 Introduction

The Port of Felixstowe is located 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 incorporates the Trinity and Landguard Container Terminals, an existing Dock Basin, Dooley Ro-Ro Terminal, the Ferry Terminal and the two rail terminals – North and South. The Trinity Container Terminal is the largest container handing facility in the UK currently with a 2,084 metre continuous quay and a container handling capacity of 200,000 Twenty-foot Equivalent Units (TEU). TEU is the industry measure of container capacity and on average the ratio is 1.5 TEUs per container. 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.

8.1.1 Trinity III Terminal

In February 2000 planning permission was sought by the Felixstowe Dock and Railway Company for the Port of Felixstowe Trinity III Terminal – a proposed extension of land reclamation and a change of land use to planning use class B8 (storage and distribution). The planning application was for reclamation of 14 hectares of land on the North West side of the Port of Felixstowe, from the sea-wall out to the existing Environmental Bund. The reclaimed land would be developed, in accordance with section 15.1(b) of the Felixstowe Dock and Railway Act 1988, as a container yard serving existing Port operations and as the northern end of a new rail terminal to be constructed to service the Port. The Felixstowe Dock and Railway Act 1988 allows for this work to be undertaken, however, the time period permitted in this Act for the work to be undertaken had elapsed and, therefore, planning permission had to be sought. Planning permission for this development was granted by Suffolk Coastal District Council in February 2000 and allowed 5 years within which time the works must be commenced.

At the same time the Felixstowe Dock and Railway Company applied to the Secretary of State for Transport in order to pass the Felixstowe Dock and Railway Harbour Revision Order 2000. 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. The Order authorises works to extend the quay and deep-water berths at the North West end of the Felixstowe Trinity III Terminal by 270 metres. Part of the bed of the sea and river adjacent to the dock will be enclosed and reclaimed. This will extend the limits of the dock within which the Felixstowe Dock and Railway Company exercise jurisdiction. The Order area comprises 7.27 hectares and will enclose a new storage and handling park. The scheme is known as the Trinity III Terminal (Phase 2) Extension and is in addition to the above planning application. It will increase the Ports container handling facilities to enable two of the World's largest container vessels to be berthed simultaneously and, therefore, increase its ability to compete with European markets.

The Environmental Statement submitted to the Secretary of State in 2000 included an assessment of air quality and states that the maximum growth in road based freight, once the scheme is in operation, will be 12.5%. It also states that neither the traffic flow nor percentage of Heavy Goods Vehicles on the road will increase by more than 30%. At that time the Institute of Environmental Assessment's 1993 guidance suggested that only an increase above 30% would be likely to have any effects on air quality. The Public Enquiry held in 2001, considered all arguments relating to the order. The findings of the inspector with regard to traffic impacts on the highway was that, apart from at Dock Spur roundabout, the scheme would have no significant impact on road, cycle or pedestrian traffic or on traffic-driven air quality based upon the traffic details submitted. The inspector also specifically concluded that the scheme would have no significant effect on air. The Secretary of State accepted

the findings of the Public Enquiry and passed the Felixstowe Dock and Railway Harbour Revision Order 2000, as amended by the inspector.

Works on the Trinity III Terminal began in 2003 and are ongoing.

8.2 Findings of the Updating and Screening Assessment with regard to the Port of Felixstowe

Operations at the Port of Felixstowe were considered within the Updating and Screening Assessment process for the pollutants NO_2, SO_2 and PM_{10}. This included emissions from road and rail traffic, from fuel oil fired heating equipment used within some site buildings, and from shipping, details of all investigations can be seen in our Updating and Screening Assessment report (June 2003). A summary of the report findings are detailed for each pollutant below:

8.2.1 Nitrogen dioxide (NO_2)

Emissions of NO_2 from **road traffic using the A14** within the Suffolk Coastal district were assessed using the Design Manual for Roads and Bridges (DMRB) screening method. The A14 was divided into sections, dependant on traffic data available, from the Haven Exchange roundabout to the Ipswich Borough boundary. Junctions on the A14 where traffic speeds would also be reduced were assessed separately. Road traffic emissions within the Port of Felixstowe were not investigated as there are no public receptor locations. The technical guidance 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 results obtained from the DMRB screening method run for each section of the A14 showed that annual mean NO_2 concentrations were not likely to exceed the 2005 objective at receptor locations on any of the sections or junctions of the A14.

The report concluded that further review and assessment of the A14 trunk road was, therefore, not considered necessary at that time. The report stated, however, that the closest public receptor locations to the Port of Felixstowe were located at Adastral Close, and at Dock Gate 2 roundabout, Ferry Lane. Concentrations of NO_2 would be measured at these two locations, using diffusion tubes, to assess whether that there are exceedances of the objectives due to their proximity to the Port of Felixstowe and possible emissions from activities associated with it.

8.2.2 Sulphur dioxide (SO_2)

The Updating and Screening Assessment reported on **SO_2** emissions arising from **boiler plant burning fuel oil at site buildings on the Port of Felixstowe**, which in combination could have a thermal capacity greater than 5 MW and therefore be classified as significant emitters of SO_2. The findings were that there was insufficient information regarding boiler plant at that time but the required information would be collected and reported upon in the Detailed Assessment report.

The Updating and Screening Assessment report included a Detailed Assessment for SO_2 concentrations arising from **shipping activities** at the Port of Felixstowe. External contractors, Entec UK Limited, were employed to undertake the review and assessment. Monitoring for concentrations of SO_2 from shipping emissions was undertaken by UV fluorescence for a six-month period at a site relevant to the nearest receptor location. The findings of the review and assessment from the monitoring programme were that 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. The recommendations were accepted and further assessment was, therefore, not considered necessary.

The Updating and Screening Assessment reported on SO_2 concentrations arising **from diesel and coal-fired locomotives**. The presence of any locations where diesel locomotives were 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 was investigated. Information was obtained from Network Rail and the Port of Felixstowe regarding passenger and freight train movements within the Suffolk Coastal district. Only one area was identified as possibly fitting the criteria, a signalled junction at Grange Road, Walton in Felixstowe that stops freight trains travelling from the Landguard Terminal (South Terminal) at the Port of Felixstowe onto the main line if the main line is in use. The closest receptor was approximately 10 metres away from the stopping area. Network Rail had no information available to indicate whether freight trains stopped at the signal on a regular basis, and advised that on some days they may not stop 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 did 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 who confirmed that exceedance of the SO_2 objectives at receptor locations is unlikely, and further assessment was not be necessary.

8.2.3 Particles (PM_{10})

Emissions of PM_{10} from **road traffic using the A14** within the Suffolk Coastal district were assessed using the Design Manual for Roads and Bridges (DMRB) screening method. The A14 was divided into sections, dependant on traffic data available, from the Haven Exchange roundabout to the Ipswich Borough boundary. Junctions on the A14 where traffic speeds would also be reduced were assessed separately. Road traffic emissions within the Port of Felixstowe were not investigated as there are no public receptor locations, the technical guidance 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 results obtained from the DMRB screening method run for each section of the A14 showed that annual mean PM_{10} concentrations were not likely to exceed the 2005 objective at receptor locations on any of the sections or junctions of the A14. The report concluded that further review and assessment of the A14 trunk road was, therefore, not considered necessary at that time.

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 was, therefore, required under LAQM.TG(03). 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 for PM_{10} was carried out by Entec UK Limited. The recommendations were that the potential for the air quality objectives for PM_{10} to be exceeded was negligible, and further assessment for this pollutant at the relevant receptors was not necessary. The findings were accepted and further assessment was, therefore, not considered necessary.

The Updating and Screening Assessment report (June 2003) investigated the **potential for emissions of PM_{10} from combined activities at the Port of Felixstowe** to cause elevated concentrations at receptor locations. Sources of PM_{10}, in addition to shipping, include road traffic and emissions from equipment used at the Port. The closest public receptor locations to the Port of Felixstowe are located at Adastral Close, and at Dock Gate 2 roundabout, Ferry Lane. The findings of the report were that further investigations regarding emissions of PM_{10} from activities on, and associated with, the Port of Felixstowe would be undertaken to confirm whether there are any predicted exceedances of the objectives at receptor locations. The progress from this further investigation would be presented in the Detailed Assessment report.

The Updating and Screening Assessment (June 2003) commented that there were new port developments being carried out for the approved Trinity III projects at the Port of Felixstowe. At that time there was a possibility that planning applications would be submitted for further works to the Port of Felixstowe and to develop new facilities at Bathside Bay in Harwich, part of Harwich International Port. These future developments could impact upon concentrations of NO_2, SO_2 and PM_{10} at receptor locations within the Suffolk Coastal district, due to increased Port activity including road vehicles, ships, trains, and Port equipment. At the time of the report no detail regarding either of these developments was available. It was concluded that the Port of Felixstowe, Harwich International Port and their appointed consultants would be contacted, in order to obtain relevant information for all three pollutants.

8.3 Further information and assessment with regard to the Port of Felixstowe following the Updating and Screening Assessment

Since the Updating and Screening Assessment report was published Suffolk Coastal District Council has been consulted on the Bathside Bay, Harwich planning application, and has received the Felixstowe South Regeneration planning application. Details for each planning application are provided below. These planning applications contain Environmental Impact Assessments and Environmental Statements which provide information on the current situation, and detail on proposed increases with respect to road vehicles, ships, trains, Port equipment etc. The proposals for all activities (road vehicles, ships, trains, Port equipment etc) are currently being investigated with respect to air quality, and consultants have been employed to comment on the complex information provided in the planning applications. If the planning applications are permitted, the effects of any developments will be considered in future LAQM reports.

8.3.1 Planning Application for Felixstowe South Reconfiguration

Hutchison Ports (UK) Ltd has submitted an application for planning permission and other consents to reconfigure the existing quay-side and land at the Southern end of the Port of Felixstowe, with reclamation and dredging to enable the engineering of a new container quay of some 1350 metres in length.

The proposal involves the conversion of the area previously used by P&O North Sea Ferries and the now largely redundant Dock Basin to container use. At the same time the existing container facilities in the Southern part of the Port which were developed in the 1960s and 1970s would be upgraded. The scheme would provide 910 metres of additional quay face bringing the total length of quay at the Port to 3,828 metres. The container handling capacity of the Port would be increased by 1.56 million TEU to a total of 5.56 million TEU.

Posford Haskoning (Environment) was commissioned by Hutchison Ports (UK) Ltd and has submitted an Environmental Statement to accompany the Planning Application. This includes a specific report relating to air quality and the potential impacts within the area of the Port, in the nearby Felixstowe town centre, and along the A14 trunk road towards Ipswich.

8.3.2 Planning Application for Bathside Bay, Harwich

Harwich International Port is currently a multipurpose facility that handles passengers and freight. There has been a recent increase in Ro-Ro freight following the move of P&O from Felixstowe to Harwich and the port also offers ferry, container and bulk operations. The current container managing service is at two berths and has a stacking capacity of 1,536 TEUs.

Hutchison Ports (UK) Ltd has submitted an application for planning consent to develop a new container port facility at Bathside Bay in Harwich. The planning scheme proposes reclamation of

approximately 60 hectares of Bathside Bay to create container storage and cranage facilities, and additional areas for potential mixed-use development (commercial, employment and retail uses). A new quay wall would be constructed to form approximately 1,400 metres of quayside. The container yard storage capacity would be 40,000 TEUs with a predicted throughput of 1.68 million TEUs per year. A new 775 metre long rail terminal is also proposed, to link to existing rail facilities. Posford Haskoning (Environment) was commissioned by Hutchison Ports (UK) Ltd and has submitted an Environmental Statement to accompany the Planning Application.

8.3.3 NO_2 monitoring in Felixstowe

The Updating and Screening Assessment (published June 2003) presented results of NO_2 diffusion tube monitoring undertaken throughout the Suffolk Coastal district. A summary of the annual mean concentrations at sites within the town of Felixstowe for 2002 can be seen in table 8.1 below. The results were predicted forward to the end of 2005, for comparison with the air quality objectives, using factors provided in the technical guidance LAQM.TG(03), the predicted levels at all sites in 2005 can also be seen in table 8.1 below. Full details of the analytical technique and laboratory used, monitoring locations, a breakdown of results on a monthly basis for 2002 and diffusion tube bias adjustment information can be seen in Appendix B.

Table 8.1 Summary of NO_2 diffusion tube monitoring results in 2002 (adjusted for diffusion tube bias) for sites in Felixstowe, and predicted annual mean concentrations for 2005.

Site and category	Location	**2002 annual mean corrected for bias ($\mu g/m^3$)**	**2002 measured annual mean predicted forward to 2005 ($\mu g/m^3$) (Kerbside & Roadside sites = x 0.92 Other sites = x 0.93)**
Felixstowe 4 Urban Background site	**Lynwood Avenue**	**28.4**	26.4
Felixstowe 5 Roadside site	**High Road West**	**36.8**	33.9
Felixstowe 6 Roadside site	**Nayland Road**	**41.7**	38.4
Felixstowe 7 Industrial site	**Carr Road**	**39.4**	36.6
Felixstowe 9 Urban Background site	**Brinkley Way**	**25.7**	23.9
Felixstowe 11 Kerbside site	**Hamilton Road**	**40.3**	37.1

The results of monitoring at sites within the town of Felixstowe, see table 8.1 above, showed that the roadside site Felixstowe 6 and the kerbside site Felixstowe 11 had levels of NO_2 in 2002 that were elevated above the annual mean objective of 40$\mu g/m^3$. The results for all other sites within the town of Felixstowe were within the annual mean objective level. When the results were predicted forward to the end of 2005, for comparison with the air quality objectives, it showed that concentrations of NO_2 at all sites within the town of Felixstowe, including Felixstowe 6 and 11, were within the annual mean objective of 40 $\mu g/m^3$ in 2005. No further action was, therefore, necessary.

Monitoring of NO_2 levels within the town of Felixstowe continued in 2003 with several new sites being added, as required by the findings of the Updating and Screening Assessment. The Updating and Screening Assessment report stated that the closest public receptor locations to the Port of Felixstowe were located at Adastral Close, and at Dock Gate 2 roundabout, Ferry Lane. The report concluded that concentrations of NO_2 would be measured at these two locations, using diffusion tubes, to assess whether there are exceedances of the objectives due to their proximity to the Port of Felixstowe and possible emissions from activities undertaken on it. The sites located to monitor levels in this area were Felixstowe 13, 14, 15 and 16, see Appendix B for exact monitoring location of

each. Diffusion tube sites Felixstowe 13 and 14 were located on relevant receptor locations. Diffusion tube sites 15 and 16 were not at receptor locations, they were located to assess whether a gradient of NO_2 concentrations occurred between the kerbside at Dock Gate 2 roundabout and the nearest receptor location, the Felixstowe 13 site. If a gradient is shown to exist then NO_2 concentrations may be able to be correlated with emissions from vehicles using Dock Gate 2 roundabout.

A summary of the annual mean concentrations for all Felixstowe sites in 2003 can be seen in table 8.2 below, details of monitoring locations and a breakdown of results on a monthly basis for 2003 are provided in Appendix B. The results were predicted forward to the end of 2005, for comparison with the air quality objectives, using factors provided in the technical guidance LAQM.TG(03), the predicted levels at all sites in 2005 can also be seen in table 8.2 below. Full details of the analytical technique and laboratory used, monitoring locations, a breakdown of results on a monthly basis for 2002 and diffusion tube bias adjustment information can be seen in Appendix B.

Table 8.2 Summary of NO_2 diffusion tube monitoring results in 2003 (adjusted for diffusion tube bias) for sites in Felixstowe, and predicted annual mean concentrations for 2005.

Site and category	Location	**2003 annual mean corrected for bias ($\mu g/m^3$)**	**2003 measured annual mean predicted forward to 2005 ($\mu g/m^3$) (Kerbside and Roadside sites = x 0.95 other sites = x 0.96)**
Felixstowe 4 Urban Background site	**Lynwood Avenue**	25.7	**24.7**
Felixstowe 5 Roadside site	**High Road West**	34.0	**32.3**
Felixstowe 6 Roadside site	**Nayland Road**	36.4	**34.6**
Felixstowe 9 Urban Background site	**Brinkley Way**	25.2	**24.2**
Felixstowe 12 Roadside site	**Hamilton Road**	35.6	**33.8**
Felixstowe 13 Industrial / Road traffic site	**Ferry Lane**	42.6	**40.9**
Felixstowe 14 (triplicate site) Industrial site	**Adastral Close**	36.4	**34.9**
Felixstowe 15 Intermediate site	**Ferry Lane**	55.2	**53.0**
Felixstowe 16 Roadside site	**Dock gate 2 roundabout**	69.2	**65.7**

The results of monitoring at sites within the town of Felixstowe in table 8.2 above showed that the sites at Felixstowe 13, 15 and 16 had levels of NO_2 in 2003 that were elevated above the annual mean objective of 40$\mu g/m^3$. The results for all other sites within the town of Felixstowe were within the annual mean objective level. When the results were predicted forward to the end of 2005, for comparison with the air quality objectives, it confirmed that the concentrations of NO_2 at Felixstowe 13, 15 and 16 would be above the annual mean objective of 40 $\mu g/m^3$ in 2005.

Felixstowe 14 was located at Adastral Close and is one of the nearest relevant receptor locations to the Port of Felixstowe, being approximately 40 metres from the Port boundary. It was located to monitor NO_2 levels from a number of potential sources, the main one being heavy goods vehicles using the Port with other potential emissions from shipping, and equipment and activities at the Port. This site had a three diffusion tubes for increased accuracy and the results of monitoring undertaken in 2003, see table 8.2 above, show that NO_2 concentrations in 2003 and predicted levels in 2005 are within the annual mean objective of 40 $\mu g/m^3$. No further action is, therefore, necessary with regard to this site at this time.

Felixstowe 13, 15 and 16 were located to establish whether a gradient of NO_2 concentrations occurred between the roadside site Felixstowe 16 at Dock Gate 2 roundabout and the nearest receptor location, the Felixstowe 13 site which is approximately 72 metres from the roadside at this roundabout. The results for 2003 do indicate that a gradient of NO_2 concentrations does occur with the highest levels being seen at the roadside site Felixstowe 16 and the lowest at the receptor location Felixstowe 13. **The sites at Felixstowe 15 and 16 were not at representative of public exposure and, therefore, the potential exceedance of the objectives is not relevant at these sites.**

Felixstowe 13 is representative of public exposure and is marginally above the annual mean objective of 40μg/m^3 when predicted forward to 2005. The Design Manual for Roads and Bridges (DMRB) screening method was applied to this receptor location near to the roundabout within the Updating and Screening Assessment report, details are available in Chapter 7 of that report. The DMRB screening model results show that annual mean NO_2 concentrations are unlikely to exceed the 2005 objective at this receptor location.

Felixstowe 13 consists of a single diffusion tube which has been in place for 9 months from April to December 2003, see Appendix B for details. Due to inherent inaccuracies associated with the use of diffusion tubes for monitoring the single NO_2 diffusion tube at Felixstowe 13 will be increased to a triplicate site, with three diffusion tubes, from April 2004. This will increase the accuracy of the results recorded and provide continued data for this location.

Felixstowe 15 and 16 will be discontinued from April 2004 as they are not representative of public exposure and have already provided an indication of the existence of a gradient in NO_2 levels, which was their sole purpose.

Investigations into future emissions from activities at the Port of Felixstowe, including road traffic, will continue. **The results of the continued diffusion tube survey at this location, and any other assessments made, will be published in the Progress Report in 2005.**

8.3.4 Continued Updating and Screening Assessment of SO_2 emissions from boiler plant burning fuel oil at site buildings on the Port of Felixstowe

Further review and assessment has been undertaken into SO_2 emissions arising from boiler plant burning fuel oil at site buildings on the Port of Felixstowe, which in combination could have a thermal capacity greater than 5 MW and therefore be classified as significant emitters of SO_2. The required information regarding boiler plant has now been obtained from the Port of Felixstowe and is detailed in chapter 6 of this report. There are a total of 35 small boilers and warm air heaters on the site which run on fuel oil, the combined thermal capacity of which is 4.16 MW. As the combined thermal capacity does not exceed 5 MW, no further assessment of this site will be necessary at this time. Although the boiler plant in isolation is unlikely to emit significant quantities of SO_2 it will add to SO_2 concentrations in the area and will also be considered in any future air quality assessments.

8.3.5 Continued Updating and Screening Assessment into combined emissions of PM_{10} from activities at, and associated with, the Port of Felixstowe.

The Updating and Screening Assessment advised that further investigation would be undertaken, and progress reported, regarding the potential for emissions of PM_{10} from combined activities at the Port of Felixstowe to cause elevated concentrations at receptor locations. The Environmental Impact Assessment submitted as part of the Felixstowe South Reconfiguration planning application includes detailed information regarding current emissions of PM_{10} from activities associated with the Port of Felixstowe, and future emissions should the planning approval be given. As explained above, we are currently investigating the proposals for all activities (road vehicles, ships, trains, Port equipment etc) with respect to air quality, including emissions of PM_{10}, and have employed consultants to comment on the complex information provided in the planning application. Once we know if planning

permission has been granted or refused, we will be able to provide accurate information on the potential for emissions of PM_{10} from combined activities at the Port of Felixstowe to cause an exceedance of the objectives at nearby receptor locations. The findings of our investigations will be published in future LAQM reports.

8.4 Conclusion

It is concluded that the Bathside Bay, Harwich and the Felixstowe South Regeneration planning applications, which are currently being processed, may have an effect on pollutant concentrations at relevant receptor locations if they are granted planning permission. We are currently investigating the proposals for all activities (road vehicles, ships, trains, Port equipment etc) with respect to air quality, and have employed consultants to comment on the complex information provided in the Planning Applications as part of the process.

The next report due as part of the LAQM process, the Progress Report, must be completed for April 2005, and will include our findings with regard to emissions from the Port of Felixstowe. It will include the outcome of our investigations into NO_2 levels at the Dock Gate 2 receptor location following continued monitoring by diffusion tubes, and PM_{10} emissions from combined activities at the Port of Felixstowe at nearby receptor locations. The report will incorporate our assessment findings if the Bathside Bay and Felixstowe South Reconfiguration planning applications are granted permission.

9. Summary and Recommendations

This Detailed Assessment report of air quality within the Suffolk Coastal district includes the outcome of continued Updating and Screening Assessment and Detailed Assessment where relevant. The report assesses 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 report are 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 the Updating and Screening and Detailed 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.

The investigations undertaken for this report have determined, for the Suffolk Coastal district, that the risk of exceedance of the air quality objectives for lead is unlikely, and no further assessment will be necessary.

The investigations undertaken for this report have determined, for the Suffolk Coastal district, that for 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 in the areas detailed below will be undertaken, and the findings will be presented in the Progress Report, to be produced in April 2005:

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

  It is concluded that there is a potential risk that the air quality objectives for nitrogen dioxide may be exceeded at receptor locations on the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge by the end of 2005. A Detailed Assessment was undertaken for this junction that concluded an air quality management area does not need to be declared at this time. The Detailed Assessment recommended 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. The results of the diffusion tube survey and of continuous monitoring also to be undertaken at this junction will be assessed once the monitoring has been completed. Nine months of continuous monitoring data should have been obtained in time for the next LAQM report, the Progress Report, due in 2005 and the findings will be reported at that time.

- Emissions of **nitrogen dioxide, sulphur dioxide and particulate matter** from activities on and associated with the Port of Felixstowe, incorporating assessment of emissions generated by the Bathside Bay and Felixstowe South Reconfiguration planning applications if they are granted permission.

  It is concluded that the Bathside Bay, Harwich and the Felixstowe South Regeneration planning applications, which are currently being processed, may have an effect on pollutant concentrations at relevant receptor locations if they are granted planning permission. We are currently investigating the proposals for all activities (road vehicles, ships, trains, Port equipment etc) with

respect to air quality, and have employed consultants to comment on the complex information provided in the Planning Applications as part of the process.

The next report due as part of the LAQM process, the Progress Report, must be completed for April 2005, and will include our findings with regard to emissions from the Port of Felixstowe. It will include the outcome of our investigations into NO_2 levels at the Dock Gate 2 receptor location following continued monitoring by diffusion tubes, and PM_{10} emissions from combined activities at the Port of Felixstowe at nearby receptor locations. The report will incorporate our assessment findings if the Bathside Bay and Felixstowe South Reconfiguration planning applications are granted permission.

10. References

1. *Environment Act 1995*, Chapter 25. HMSO, 1997.

2. *Air Quality Regulations 1997* – S.I 1997, No 3043. HMSO, 1997.

3. *Air Quality (England) Regulations 2000* – S.I 2000, No 928. HMSO, 2000.

4. Air Quality (England) Amendment Regulations 2002 – S.I 2002, No. 3043. HMSO, 2002.

5. *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Working together for clean air*. Report by the Department of the Environment, Transport and the Regions (now the Department of Environment, Food and Rural Affairs). HMSO, January 2000.

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7. *Review and assessment: Pollutant Specific Guidance. LAQM.TG4(00).* Report by the Department of the Environment, Transport and the Regions (now the Department of Environment, Food and Rural Affairs), Scottish Executive and National Assembly for Wales. HMSO, May 2000.

8. *Part IV of the Environment Act 1995, Local Air Quality Management, Technical Guidance. LAQM.TG(03).* Report by the Department of Environment, Food and Rural Affairs, Scottish Executive, National Assembly for Wales and the Department of the Environment in Northern Ireland. DEFRA Publications, February 2003

9. *Part IV of the Environment Act 1995, Local Air Quality Management, Policy Guidance. LAQM.PG(03).* Report by the Department of Environment, Food and Rural Affairs, Scottish Executive, National Assembly for Wales and the Department of the Environment in Northern Ireland. DEFRA Publications, February 2003.

10. *National Air Quality Information Archive* – information from which can be viewed at www.airquality.co.uk/archive/laqm/tools.php. Department of Environment, Food and Rural Affairs, 2002.

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

12. 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.
    Reports by EPAQS for the Department of Environment, Food and Rural Affairs. Her Majesty's Stationery Office.

Appendix A

List of Consultees for the Local Air Quality Review and Assessment Process – Updating and Screening Assessment Report

List of Consultees for the Local Air Quality Review and Assessment Process – Updating and Screening Assessment Report

The Secretary of State
The Environment Agency
The Highways Agency
Members of Parliament for the Suffolk Coastal District
Members of the European Parliament for the East of England
All Local Authorities bordering the Suffolk Coastal District
Suffolk County Council
Public Health Authority
All neighbouring County Councils
Members of Suffolk Coastal District Council
Suffolk County Councillors representing Suffolk Coastal District Council
Suffolk Coastal Parish Councils
Members of the Suffolk Coastal Greenprint Forum
Local Business interests
All Processes authorised under Part I of the Environment Act 1990 (Schedule A and B processes) within Suffolk Coastal or 10 km of its boundary
Other businesses mentioned within the review and assessment reports
All business's contacted to complete fuel usage surveys
Members of the Public who have assisted in the review and assessment process
Coach Operators within the Suffolk Coastal District
Utilities Companies
All domestic premises within the Suffolk Coastal District (via 'Coastline' magazine and general press articles)
Consultation also placed on the Suffolk Coastal District Council website for any readers to respond to, website address - http://www.suffolkcoastal.gov.uk/envhealth/airquality.html

Appendix B

Monthly and annual mean nitrogen dioxide (NO_2) concentrations in air recorded by diffusion tubes at sites in Felixstowe, Kesgrave, and Woodbridge, including bias correction calculation details.

Figure B-1

Information regarding NO_2 diffusion tubes, including analyst laboratory details and site descriptions for current and historic diffusion tube locations.

Analyst laboratory details and general NO_2 diffusion tube information

Local monitoring of monthly concentrations of NO_2 has been undertaken at a large number of locations within the Suffolk Coastal district since March 1993. All data collected was presented in the Updating and Screening Assessment report, published in June 2003. This report includes the data collected for 2002, for comparison purposes, together with the results of monitoring data for 2003, collected since the report was published. Monitoring for NO_2 was conducted using Palmes passive diffusion tubes, with an absorbent of 50% triethanloamine (TEA) in acetone, which were exposed on a monthly basis. The analytical laboratory used for supply and analysis of diffusion tubes was Harwell Scientifics. The laboratory is 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 spiked diffusion tubes and the results show Harwell Scientifics as a category 'Good' laboratory.

Site descriptions for diffusion tube locations.

Diffusion tubes were located at numerous sites to assess concentrations of NO_2 from road traffic and industrial emissions and background concentrations for these areas. Monthly and annual mean NO_2 concentrations were recorded at each site. 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.

There are eight 'site types', as defined in LAQM.TG(03), for diffusion tube monitoring. Several of these 'site types' were located within the Suffolk Coastal district during the monitoring period. Definitions for each site type located within the Suffolk Coastal district are as follows;

- **Urban background site** – an urban location distanced from sources and therefore broadly representative of city-wide background conditions, e.g urban residential areas.
- **Roadside site** – a site sampling between 1 metre of the kerbside of a busy road and the back of the pavement. Typically this will be within 5 metres of the road, but could be up to 15 metres.
- **Kerbside site** – a site sampling within 1 metre of the kerb of a busy road.
- **Industrial site** – an area where industrial sources make an important contribution to the total pollution burden.
- **Intermediate site** – a sampling site which is 20–30 metres from the kerbside within sight of the road, this site provides additional information for a kerbside monitoring location in the same area. This is a historical site category, not included in LAQM.TG(03). This site type has been used in this report to describe the location of Felixstowe 15 as it does not fall into any of the above categories.

All diffusion tubes were sited using the following local siting criteria, outlined LAQM.TG(03); tubes were located in an open setting in relation to any surrounding buildings; the tubes were open to the sky immediately above with no overhanging trees or buildings; and the tubes were located at a height of between 1.4 and 4 metres. A more specific site description for each location, current and historic, within the Suffolk Coastal district is detailed below:

Felixstowe (FLX)

FLX 4 – **Urban background site** near to the above tube locations in Felixstowe, sited to provide background levels of NO_2 in the area, for comparison with those seen at the kerbside of High Road West. Sited on a lampost in Lynwood Avenue, a quiet residential street located approximately 140 metres from High Road East.

FLX 5 - Roadside site located to record NO_2 concentrations derived from road traffic emissions on High Road West in Felixstowe, on the same section of road as FLX 1 and 2 above. Sited within the grounds of the Police Station on a signpost 3-4 metres from the kerb. High Road West is fairly wide with domestic houses along either side which are set back 15-20 metres from the kerb.

FLX 6 – **Roadside site** located to record NO_2 concentrations derived from road traffic emissions on the A14 trunk road (Port of Felixstowe Road). Sited on a lampost in Nayland Road, a quiet residential street with domestic receptor locations approximately 24 metres from the kerbside of the A14 trunk road. Site itself was approximately 46 metres from the kerbside of the A14 trunk road.

FLX 7 – Industrial site located to record NO_2 concentrations derived from emissions at the Port of Felixstowe. The Port of Felixstowe has a number of potential sources of NO_2 emissions, the main one being heavy goods vehicles using the Port with other potential emissions from shipping, and equipment and activities at the Port. Site located on a lampost in Carr Road, near to the closest domestic residences to the Port boundary at Adastral Close. Site itself was approximately 150 metres from the Port of Felixstowe boundary.

FLX 9 - Urban background site in North-East Felixstowe, located to provide background levels of NO_2 in Felixstowe for comparison with sites measuring emissions from road traffic and industry. Sited on a lampost in Brinkley Way, a quiet residential street located away from the centre of Felixstowe and further than 900 metres from any busy road.

FLX 11 - Kerbside site located to record NO_2 concentrations derived from road traffic emissions on Hamilton Road in Felixstowe, near the junction with York Road. Sited on a lampost less than 1 metre from the kerb. Hamilton Road is fairly wide, there are shops with residential flats above them along either side of the road which are set back approximately 5 metres from the kerb.

FLX 12 – Roadside site located to replace FLX 11 at a relevant receptor location (FLX 11 was on a kerbside lampost and not representative of a receptor location) to record NO_2 concentrations derived from road traffic emissions on Hamilton Road in Felixstowe, near the junction with York Road. Sited on a shop front drainpipe approximately 5 metres from the kerb. Hamilton Road is fairly wide, there are shops with residential flats above them along either side of the road which are set back approximately 5 metres from the kerb.

FLX 13 – Industrial / Roadside site located to record NO_2 concentrations derived from emissions at the Port of Felixstowe, together with emissions from vehicles entering and exiting the Port of Felixstowe at Dock Gate 2 roundabout. This is one of the closest relevant receptor locations to the Port of Felixstowe that is also close to one of the major site entrances for Port traffic. The Port of Felixstowe has a number of potential sources of NO_2 emissions, the main one being heavy goods vehicles, with other potential emissions from shipping, and Site is on a drainpipe at The Dooley Inn Public House and residential property,. Site is approximately 100 metres from boundary of the Port of Felixstowe at Dock Gate 2, and 72 metres from the kerbside of Dock Gate 2 roundabout.

FLX 14 a, b & c – Industrial site located to replace FLX 7 at one of the nearest relevant receptor locations to the Port of Felixstowe, to record NO_2 concentrations derived from emissions at the Port of Felixstowe. FLX 7 was on a lampost in Carr Road outside industrial premises and not representative of the nearest relevant receptor locations. The Port of Felixstowe has a number of potential sources of NO_2 emissions, the main one being heavy goods vehicles using the Port with other potential emissions

from shipping, and equipment and activities at the Port. Site located on a drainpipe of a residential property in Adastral Close, approximately 40 metres from the Port of Felixstowe boundary.

FLX 15 –Intermediate site located to assess whether a gradient of NO_2 concentrations occurs between the kerbside at Dock Gate 2 roundabout and the nearest receptor location at The Dooley Inn Public House (FLX 13 site). If a gradient is shown to exist then NO_2 concentrations can be correlated with emissions from vehicles using Dock Gate 2 roundabout. Site itself was approximately 40 metres from the kerbside of Dock Gate 2 roundabout.

FLX 16 – Roadside site located to assess whether a gradient of NO_2 concentrations occurs between the kerbside at Dock Gate 2 roundabout and the nearest receptor location at The Dooley Inn Public House (FLX 13 site). If a gradient is shown to exist then NO_2 concentrations can be correlated with emissions from vehicles using Dock Gate 2 roundabout. Site itself was approximately 1-2 metres from the kerbside of Dock Gate 2 roundabout.

Kesgrave (KSG)

KSG 2 a,b,c – Kerbside site with a triplicate set of diffusion tubes, located to record NO_2 concentrations derived from road traffic emissions on the A1214 in Kesgrave near the junction with Bell Lane. This section of the A1214 is approximately 120 metres from the junction with Bell Lane, which is controlled by traffic lights. This section of the A1214 experiences stationary traffic queuing at peak hours. The diffusion tubes were sited on a lampost less than 1 metre from the kerb. This section of the A1214 is narrower, with a mix of domestic houses and retail outlets along either side which are approximately 2.6 metres from the kerb. Site location can be seen in Map B-1 later in this appendix.

KSG 4 – **Urban background site** near to the above tube locations in Kesgrave, sited to provide background levels of NO_2 in the area, for comparison with those seen at the kerbside of the A1214. Sited on a drainpipe within the nearby High School and located approximately 65 metres from the A1214.

KSG 6 – Roadside site with a triplicate set of diffusion tubes, located to replace KSG 2 and for co-location with a continuous chemiluminesent NO_x analyser. Located to record NO_2 concentrations derived from road traffic emissions on the A1214 in Kesgrave near the junction with Bell Lane. This section of the A1214 is approximately 125 metres from the junction with Bell Lane, which is controlled by traffic lights. This section of the A1214 experiences stationary traffic queuing at peak hours and is fairly narrow, with a mix of domestic houses and retail outlets along either side. Sited in All Saints Churchyard at a distance of 2.6 m from road, next door to and the same distance as the nearest receptor location. Site location can be seen in Map B-1 later in this appendix.

KSG 7 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the above mentioned section of the A1214. Sited on the same side of the road as KSG 6, approximately 50 metres from the traffic lights, on a domestic property approximately 6 metres from the kerbside. Site location can be seen in Map B-1 later in this appendix.

KSG 8 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the above mentioned section of the A1214. Sited opposite KSG 6, approximately 130 metres from the traffic lights, on a property approximately 15 metres from the kerbside. Site location can be seen in Map B-1 later in this appendix.

KSG 9 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the above mentioned section of the A1214. Sited directly opposite KSG 6, approximately 125 metres from the traffic lights, on a kerbside lampost that was 1-2 metres from the kerbside. The closest residential property is approximately 2 metres from the kerbside on this side of the A1214. Site location can be seen in Map B-1 later in this appendix.

Woodbridge (WBG)

WBG 1 a,b,c - Kerbside site with a triplicate set of diffusion tubes, located to record NO_2 concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge (the Woodbridge junction). This junction is characterised by standing traffic at all arms at peak hours. Diffusion tube sited on the drainpipe of a receptor location within 1 metre of the kerb. The site was in the Thoroughfare, near Sun Lane, approximately 14 metres from the traffic lights at the junction. The arm of the junction on which the diffusion tube was located is very narrow and enclosed by tall buildings, creating a canyon effect. Site location can be seen in Map B-2 later in this appendix.

WBG 3 - Urban background site in Woodbridge, sited to provide background levels of NO_2 in the area, for comparison with those seen at the above junction. Sited on a lampost in Kingston Farm Road, a quiet residential street further than 100 metres from any busy roads. This site has a park on one side and domestic houses along the other, which are set back, approximately 15-20 metres from the kerb. Site location can be seen in Map B-2 later in this appendix.

WBG 5 a,b,c - Roadside site with a triplicate set of diffusion tubes, located to record NO_2 concentrations derived from road traffic emissions at the Woodbridge junction. Sited on the drainpipe of a receptor location approximately 2-3 metres of the kerb on the same arm of the junction as WBG 1 but on the opposite side of the road. The site was parallel with the traffic lights controlling the traffic coming from the Melton Hill direction but on the corner building of the junction, and so was more open than WBG 1 and not within the 'street canyon' area. Site location can be seen in Map B-2 later in this appendix.

WBG 6 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on the drainpipe of a receptor location approximately 2 metres from the kerb and 9 metres from WBG 1 on the Thoroughfare, near Sun Lane. Diffusion tube results will indicate whether NO_2 concentrations are similar to WBG 1. Site location can be seen in Map B-2 later in this appendix.

WBG 7 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on the drainpipe of a receptor location in Sun Lane, approximately 11 metres from the Thoroughfare arm of the junction on the Melton Hill side. Diffusion tube results will indicate NO_2 concentrations in Sun Lane. Site location can be seen in Map B-2 later in this appendix.

WBG 8 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on the drainpipe of a receptor location approximately 3 metres from the kerb, on the Thoroughfare past Sun Lane, and approximately 38 metres from the traffic lights and 21 metres from WBG 1. Diffusion tube results will provide NO_2 concentrations on the Thoroughfare arm of the junction with distance from the traffic lights. Site location can be seen in Map B-2 later in this appendix.

WBG 9 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on a lampost at the same distance as receptor locations in this area, approximately 3 metres from the kerb, on the Thoroughfare at Deben Road. Site is approximately 83 metres from the traffic lights at the junction. Diffusion tube results will provide NO_2 concentrations on the Thoroughfare arm of the junction with distance from the traffic lights. At peak times traffic does queue up to and past this location. Site location can be seen in Map B-2 later in this appendix.

WBG 10 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on a signpost on the St John's Street arm of the junction, approximately 2 metres from the kerb, the same distance as the closest receptor location.

Site is approximately 12 metres from the traffic lights at the junction. Diffusion tube results will provide NO_2 concentrations for receptors on this arm of the junction. Site location can be seen in Map B-2 later in this appendix.

WBG 11 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on a drainpipe of a receptor location in the Thoroughfare arm of the junction, where the Thoroughfare becomes the main shopping street and is one way only. Site is approximately 10 metres from the junction and the diffusion tube results will provide NO_2 concentrations for receptors on this arm of the junction. Site location can be seen in Map B-2 later in this appendix.

WBG 12 – Roadside site, located to record NO_2 concentrations derived from road traffic emissions at varying locations on the Woodbridge junction. Sited on a drainpipe of a receptor location on the Lime Kiln Quay Road arm of the junction, approximately 7 metres from the kerb. Site is approximately 72 metres from the traffic lights at the junction. Diffusion tube results will provide NO_2 concentrations at receptors on this arm of the junction. Site location can be seen in Map B-2 later in this appendix.

Figure B-2

Bias adjustment calculations for diffusion tube data recorded in 2003.

Diffusion tubes can under or over read and, where 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 adjustment 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 with a continuous chemiluminesence NO_x analyser, sited in Kesgrave, from April to December 2003. The co-located diffusion tubes were at site Kesgrave 6, see Figure B-1, Table B-4 and Map B-1 in this Appendix for site descriptions and results. Details regarding the continuous analyser and diffusion tubes are provided in chapter 5, section 5.4.2 of this report.

The continuous analyser was in place from 14 March to 31 December 2003. The diffusion tube results for March 2003 were not used for the bias adjustment calculations, as there was not a whole month of continuous analyser data for comparison. In addition, the diffusion tube results for December 2003 over a number of sites, including the co-located site Kesgrave 6, were confirmed with the analyst laboratory as unusual and possibly inaccurate. Bias adjustment was to be undertaken using 9 months of results, however, due to the diffusion tube problems experienced in December 2003 there were only 8 months of results available for use - from 1 April to 3 December 2003. A summary of the data collected by the continuous analyser and the diffusion tubes is shown in the table below.

Data collected for diffusion tube bias adjustment from a continuous analyser and triplicate co-located diffusion tube site in Kesgrave, April to November 2003.

	Mean diffusion tube result for Kesgrave 6a, b and c *	**Continuous analyser result**
Jan	~	~
Feb	~	~
Mar	~	~
Apr	30.9	31.0
May	29.0	26.0
Jun	29.5	25.0
Jul	32.6	23.0
Aug	34.1	27.0
Sep	36.1	34.0
Oct	34.4	28.0
Nov	43.2	32.0
Dec	~	~
Average	**33.7**	**28.3**

***** Monthly results for each of the diffusion tubes can be seen in Table B-4 later in this appendix.

From the above table it can be seen that the diffusion tubes exposed at this site recorded an average NO_2 concentration of 33.7 $\mu g/m^3$ over the 8 month period in 2003. Over the same time period the continuous analyser recorded an average NO_2 concentration of 28.3 $\mu g/m^3$.

The diffusion tube bias adjustment factor was calculated as stated in box 6.4 of the technical guidance LAQM.TG(03):

Annual mean continuous analyser concentration ÷ Annual mean diffusion tube concentration

Therefore: 28.3 $\mu g/m^3$ ÷ 33.7 $\mu g/m^3$ = **0.84**

The diffusion tube bias adjustment factor for 2003 was 0.84 and results from all diffusion tube sites were, therefore, multiplied by this adjustment factor to correct for the over read of the diffusion tubes. Bias adjustment of annual mean results for each diffusion tube site is shown in tables B-2, B-4 and B-6 later in this appendix.

Table B-1

Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Felixstowe during 2002, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias

Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
FLX 4	48.9	32.7	33.4	25.8	24.4	24.5	20.9	20.3	17.6	38.6	45.6	44.8	**31.5**	**28.4**
FLX 5	55.0	40.7	42.6	37.8	35.1	40.6	31.6	28.5	32.1	49.0	52.3	45.8	**40.9**	**36.8**
FLX 6	70.4	55.9	47.1	43.3	34.4	42.3	29.5	33.9	36.8	51.2	64.0	46.7	**46.3**	**41.7**
FLX 7	52.2	59.8	44.1	40.2	29.6	40.1	31.5	34.1	33.7	52.1	55.8	52.2	**43.8**	**39.4**
FLX 9	43.4	31.7	33.8	24.4	19.8	no data	17.6	16.7	14.8	32.2	40.0	39.5	**28.5**	**25.7**
FLX 11	~	~	~	42.4	40.2	42.4	35.0	36.9	no data	51.3	59.2	50.7	**44.8**	**40.3**

Key:

FLX 4	Urban background site	Lampost outside 37 Lynwood Avenue, Felixstowe
FLX 5	Roadside site	Police Station sign (at front), High Road West, Felixstowe
FLX 6	Roadside site	Lampost at 34 Nayland Road, Felixstowe
FLX 7	Industrial site	Lampost at Carr Road industrial units, Felixstowe
FLX 9	Urban background site	Lampost at 6 Brinkley Way, Felixstowe
FLX 11	Kerbside site	Lampost at 131 Hamilton Road Road, Felixstowe**. New site from April 2002**

Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2002 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Melton. The bias correction factor for 2002 was calculated from this study as 0.90, details are available in the Updating and Screening Assessment report. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.90.

Table B-2

Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Felixstowe during 2003, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias

Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
FLX 4	39.0	59.2	36.7	no data	29.4	18.6	23.4	13.6	28.4	27.2	30.1	no data	**30.6**	**25.7**
FLX 5	44.5	61.4	40.4	37.8	36.1	35.3	41.4	26.8	39.7	41.4	no data	no data	**40.5**	**34.0**
FLX 6	56.2	61.8	no data	37.4	37.5	34.9	36.4	32.7	44.5	33.3	58.5	no data	**43.3**	**36.4**
FLX 9	35.8	52.0	32.8	28.4	24.7	20.7	21.8	16.4	26.7	28.9	42.0	no data	**30.0**	**25.2**
FLX 12	~	60.1	43.4	39.0	37.7	36.7	39.5	32.5	40.8	41.8	52.0	no data	**42.4**	**35.6**
FLX 13	~	~	~	50.0	53.7	40.0	55.3	46.2	57.6	45.0	57.9	no data	**50.7**	**42.6**
FLX 14a	~	~	~	42.6	40.5	44.0	44.9	42.1	46.9	40.2	38.5	no data	See FLX 14 mean	n/a
FLX 14b	~	~	~	41.1	41.5	33.8	44.6	40.4	52.9	47.9	47.5	no data	See FLX 14 mean	n/a
FLX 14c	~	~	~	40.1	44.5	38.4	45.9	50.5	45.6	42.7	41.8	no data	See FLX 14 mean	n/a
FLX 14 a,b,c - mean	~	~	~	41.3	42.2	38.7	45.1	44.3	48.5	43.6	42.6	no data	**43.3**	**36.4**
FLX 15	~	~	~	~	66.9	61.8	no data	48.7	67.2	71.1	78.7	no data	**65.7**	**55.2**
FLX 16	~	~	~	~	77.4	69.5	83.8	77.6	85.0	72.8	110.6	no data	**82.4**	**69.2**

Key:			
	FLX 4	Urban background site	Lampost outside 37 Lynwood Avenue, Felixstowe
	FLX 5	Roadside site	Police Station sign (at front), High Road West, Felixstowe
	FLX 6	Roadside site	Lampost at 34 Nayland Road, Felixstowe
	FLX 9	Urban background site	Lampost at 6 Brinkley Way, Felixstowe
	FLX 12	Roadside site	Drainpipe at 119 Hamilton Road, Felixstowe. **New site from February 2003**
	FLX 13	Industrial/Road traffic site	Drainpipe on The Dooley Inn Public House, Ferry Lane, Felixstowe. **New site from April 2003**
	FLX 14 a, b & c	Industrial site	Drainpipe on 1 Adastral Close, Felixstowe. **New triplicate site from April 2003**
	FLX 15	Intermediate site	Lampost at Ferry Lane, Felixstowe. **New site from May 2003**
	FLX 16	Roadside site	Lampost at Dock Gate 2 roundabout, Port of Felixstowe. **New site from May 2003**

Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2003 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Kesgrave. The bias correction factor for 2003 was calculated from this study as 0.84, details are available in Figure B-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.84**.**

Table B-3

Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Kesgrave during 2002, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
KSG 2a	53.5	44.5	56.9	55.8	53.6	49.6	54.0	61.1	59.6	63.0	70.0	67.6	See KSG 2 mean	n/a
KSG 2b	no data	39.4	52.8	56.2	52.7	50.8	55.3	56.8	no data	66.3	69.6	62.4	See KSG 2 mean	n/a
KSG 2c	no data	42.4	57.4	56.5	53.0	49.7	52.6	57.4	55.7	66.8	70.5	63.1	See KSG 2 mean	n/a
KSG 2a,b,c - mean	53.5	42.1	55.7	56.2	53.1	50.0	54.0	58.4	57.7	65.4	70.0	64.4	**56.7**	**51.0**
KSG 4	34.2	23.2	27.5	19.9	19.0	16.9	14.6	18.0	17.5	30.1	37.1	34.3	**24.4**	**22.0**

Key:			
	KSG 2a,b,c	Kerbside site	Signpost at The Bell Inn PH, Main Road, Kesgrave. **Triplicate site from February 2002**
	KSG 4	Urban background site	Kesgrave High School, Main Road, Kesgrave

Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2002 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Melton. The bias correction factor for 2002 was calculated from this study as 0.90, details are available in the Updating and Screening Assessment report. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.90.

Table B-4

Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Kesgrave during 2003, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

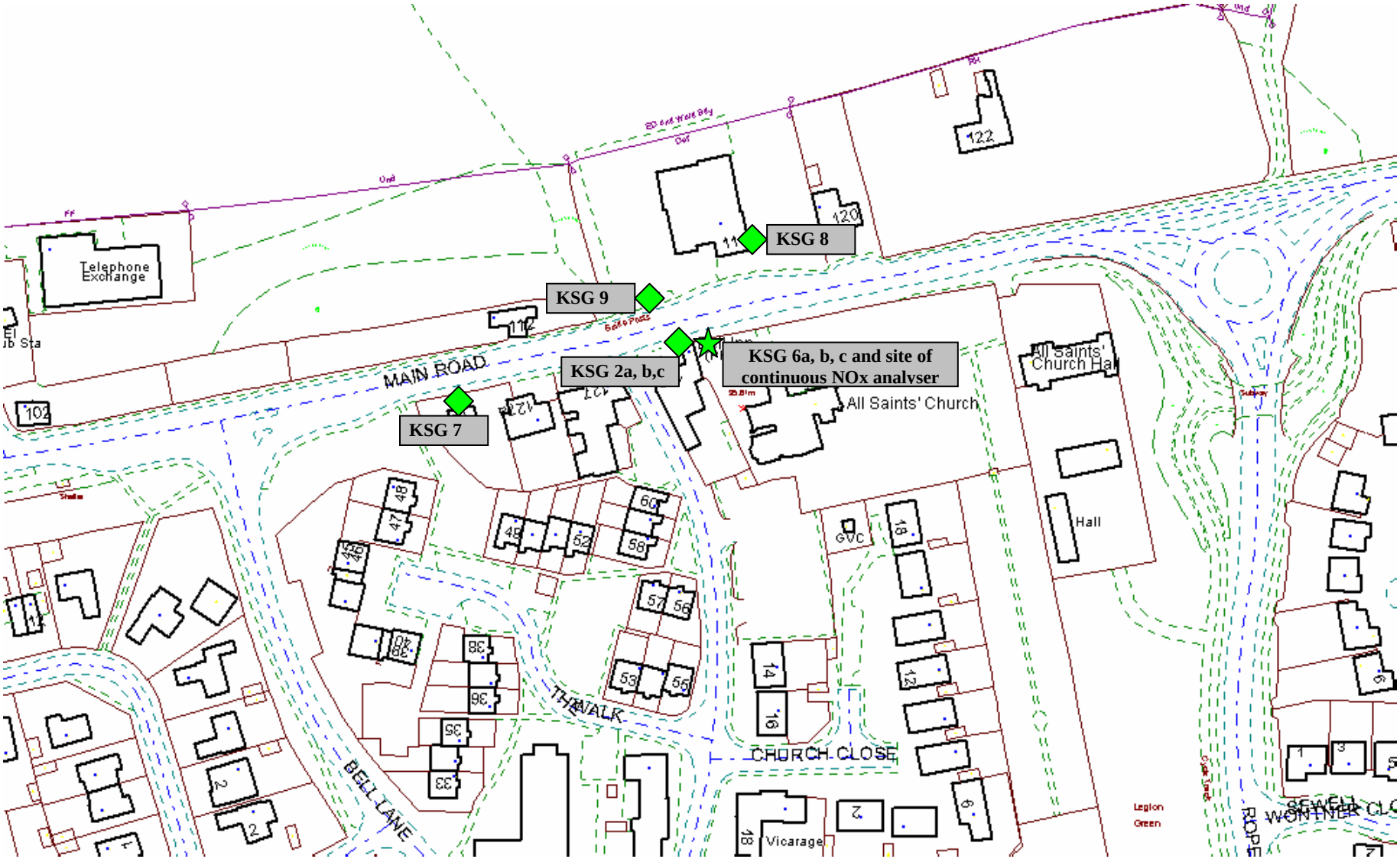
Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
KSG 2a	55.2	75.5	58.0	55.9	~	~	~	~	~	~	~	~	See KSG 2 mean	n/a
KSG 2b	55.7	80.2	58.6	60.4	~	~	~	~	~	~	~	~	See KSG 2 mean	n/a
KSG 2c	49.4	72.7	62.8	55.6	~	~	~	~	~	~	~	~	See KSG 2 mean	n/a
KSG 2a,b,c – mean	53.4	76.1	59.8	57.3	~	~	~	~	~	~	~	~	n/a *	n/a
KSG 4	31.0	43.3	28.0	20.9	19.2	16.2	20.0	15.5	25.3	26.1	21.5	no data	**24.3**	**20.4**
KSG 6a	~	~	38.7	32.7	29.0	27.3	33.3	32.6	36.8	34.6	38.8	no data	See KSG 6 mean	n/a
KSG 6b	~	~	39.7	29.9	28.7	30.0	32.3	34.3	35.7	34.5	47.2	no data	See KSG 6 mean	n/a
KSG 6c	~	~	39.3	30.2	29.3	31.2	32.3	35.3	35.7	34.2	43.6	no data	See KSG 6 mean	n/a
KSG 6 a,b,c - mean	~	~	39.2	30.9	29.0	29.5	32.6	34.1	36.1	34.4	43.2	no data	**34.3**	**28.8**
KSG 7	~	~	~	~	25.2	26.3	30.4	32.3	33.4	34.9	37.8	no data	**31.5**	**26.5**
KSG 8	~	~	~	~	28.9	28.4	30.2	20.2	32.1	27.2	38.9	no data	**29.4**	**24.7**
KSG 9	~	~	~	~	38.9	38.1	45.1	30.4	46.0	39.6	53.1	no data	**41.6**	**34.9**

Key:			
	KSG 2a,b,c	Kerbside site	Signpost at The Bell Inn PH, Main Road, Kesgrave
	KSG 4	Urban background site	Kesgrave High School, Main Road, Kesgrave
	KSG 6a,b,c	Roadside site	All Saints Church, Kesgrave **(co-location with continuous monitor). New triplicate site from March 2003**
	KSG 7	Roadside site	Drainpipe on 125 Main Road, Kesgrave. **New site from May 2003**
	KSG 8	Roadside site	Drainpipe on 118 Main Road, Kesgrave. **New site from May 2003**
	KSG 9	Roadside site	Roadside lampost at 118 Main Road, Kesgrave. **New site from May 2003**

\# Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2003 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Kesgrave. The bias correction factor for 2003 was calculated from this study as 0.84, details are available in Figure B-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.84.

* 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.

Map B-1 **Locations of nitrogen dioxide diffusion tubes on the A1214 near the Bell Lane junction, Kesgrave**



◆ **Location of diffusion tube sites - KSG 2, 6, 7, 8 and 9**

★ **Location of triplicate diffusion tube site KSG 6, co-located with a continuous NOx analyser**

Map produced on 8 March 2004 **Scale 1: 1400**

Table B-5

Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Woodbridge during 2002, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias

Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
WBG 1a	65.1	55.7	60.0	50.0	54.5	56.8	53.4	56.9	65.1	57.5	65.7	60.5	See WBG 1 mean	n/a
WBG 1b	54.0	51.9	60.7	53.5	56.3	53.0	51.0	55.7	65.2	54.2	64.6	58.9	See WBG 1 mean	n/a
WBG 1c	59.9	58.1	59.4	62.5	no data	57.2	52.8	57.7	no data	49.6	66.1	53.6	See WBG 1 mean	n/a
WBG 1a,b,c – mean	59.7	55.2	60.0	55.3	55.4	55.7	52.4	56.8	65.2	53.8	65.5	57.7	**57.7**	**51.9**
WBG 3	32.9	19.3	23.2	18.2	16.0	14.3	10.8	16.3	no data	28.4	34.2	40.5	**23.1**	**20.8**
WBG 5a	45.4	29.7	44.8	41.7	36.3	27.5	31.0	34.2	48.0	35.8	47.1	45.6	See WBG 5 mean	n/a
WBG 5b	42.3	37.9	34.5	45.7	no data	29.4	31.8	37.7	47.3	24.9	42.6	46.2	See WBG 5 mean	n/a
WBG 5c	44.8	35.4	45.3	42.6	36.4	30.4	33.2	36.9	no data	39.6	47.0	47.7	See WBG 5 mean	n/a
WBG 5a,b,c - mean	44.2	34.3	41.5	43.3	36.4	29.1	32.0	36.3	47.7	33.4	45.6	46.5	**39.2**	**35.3**

Key:			
	WBG 1a,b,c	Kerbside site	Signpost outside 93 Thoroughfare, Woodbridge. **Triplicate site from January 2002**
	WBG 3	Urban background site	Lampost outside 8 Kingston Farm Road, Woodbridge
	WBG 5a,b,c	Roadside site	Drainpipe on Suffolk Place, Lime Kiln Quay Road, Woodbridge. **Triplicate site from January 2002**

Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2002 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Melton. The bias correction factor for 2002 was calculated from this study as 0.90, details are available in the Updating and Screening Assessment report. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.90.

Table B-6

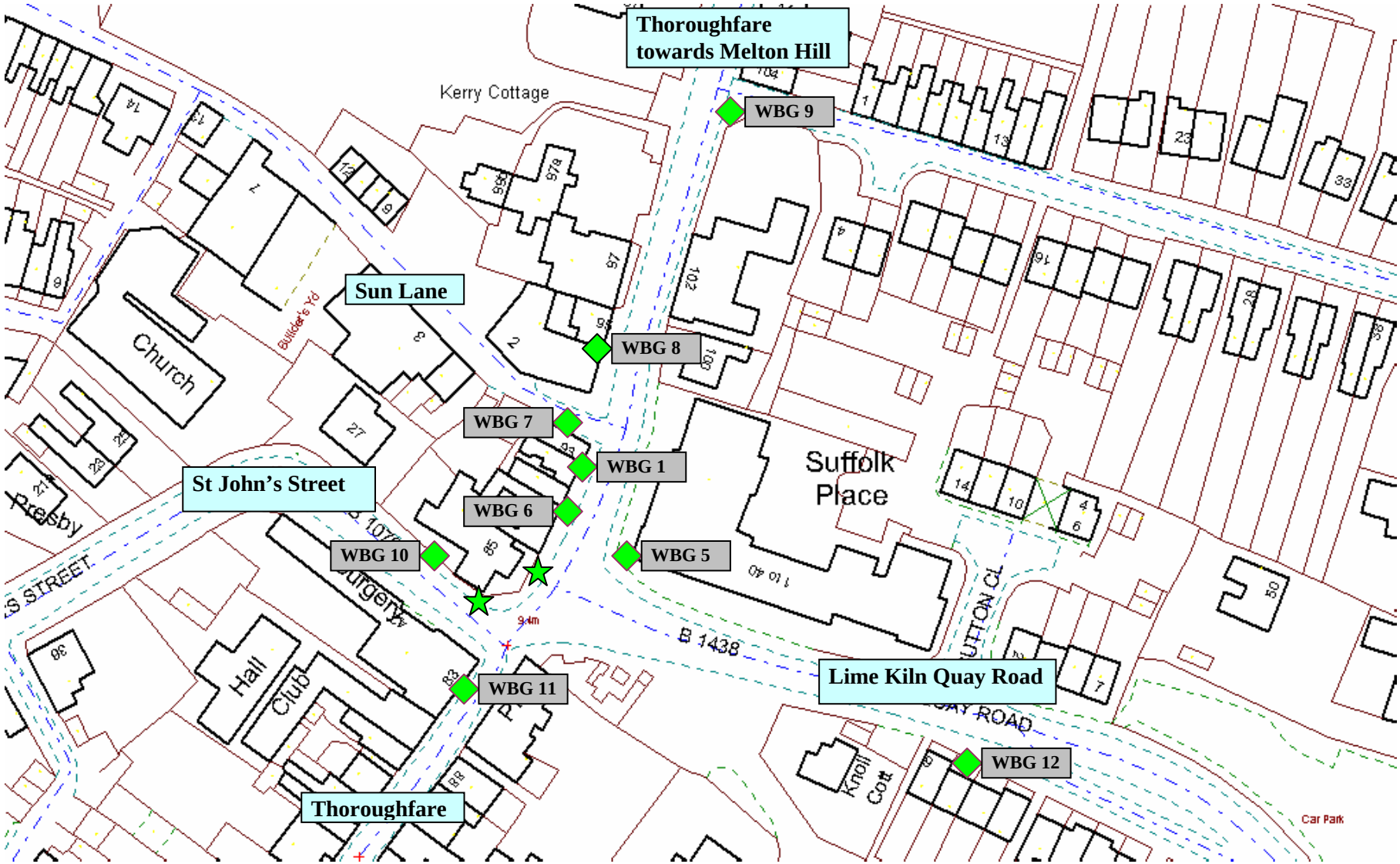
Monthly and annual mean nitrogen dioxide (NO_2) concentrations recorded at sites in Woodbridge during 2003, figures in micrograms per cubic metre ($\mu g/m^3$). Annual mean concentration ratified where relevant to correct for diffusion tube bias

Site	Time in Months												Annual mean ($\mu g/m^3$)	Ratification of annual mean using bias correction factor ($\mu g/m^3$) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
WBG 1a	58.9	71.9	63.3	58.1	61.9	58.2	63.3	63.7	64.4	55.4	62.9	no data	See WBG 1 mean	n/a
WBG 1b	59.8	67.4	60.5	53.0	59.6	52.0	62.5	61.9	63.5	56.8	53.1	no data	See WBG 1 mean	n/a
WBG 1c	59.2	71.5	62.2	54.3	54.3	57.7	65.1	60.3	63.1	55.5	61.8	no data	See WBG 1 mean	n/a
WBG 1a,b,c – mean	59.3	70.3	62.0	55.1	58.6	56.0	63.6	62.0	63.7	55.9	59.3	no data	**60.5**	**50.8**
WBG 3	27.3	46.0	25.0	21.5	16.1	15.1	18.0	12.7	18.6	24.3	33.5	no data	**23.5**	**19.7**
WBG 5a	41.6	55.3	49.8	35.4	35.2	36.0	40.7	38.4	40.3	42.3	47.3	no data	See WBG 5 mean	n/a
WBG 5b	47.1	57.1	47.3	41.8	38.0	38.9	36.8	41.1	42.5	43.1	40.2	no data	See WBG 5 mean	n/a
WBG 5c	41.0	57.2	50.7	47.8	38.6	35.1	39.9	39.0	43.0	45.3	46.1	no data	See WBG 5 mean	n/a
WBG 5a,b,c - mean	43.2	56.5	49.3	41.7	37.3	36.7	39.1	39.5	41.9	43.6	44.5	no data	**43.0**	**36.1**
WBG 6	~	~	~	~	~	~	53.9	58.9	65.1	54.4	62.2	55.6	**58.4**	**49.1**
WBG 7	~	~	~	~	~	~	25.9	25.4	35.8	35.8	42.7	37.1	**33.8**	**28.4**
WBG 8	~	~	~	~	~	~	39.0	51.3	58.1	49.5	57.2	53.2	**51.4**	**43.2**
WBG 9	~	~	~	~	~	~	27.2	23.4	29.9	33.7	48.7	44.6	**34.6**	**29.1**
WBG 10	~	~	~	~	~	~	33.9	38.7	45.9	44.0	50.1	49.4	**43.7**	**36.7**
WBG 11	~	~	~	~	~	~	20.3	25.5	29.6	37.1	44.1	42.9	**33.3**	**28.0**
WBG 12	~	~	~	~	~	~	33.2	28.1	41.0	35.0	50.6	38.7	**37.8**	**31.8**

Key:			
	WBG 1a,b,c	Kerbside site	Signpost outside 93 Thoroughfare, Woodbridge
	WBG 3	Urban background site	Lampost outside 8 Kingston Farm Road, Woodbridge
	WBG 5a,b,c	Roadside site	Drainpipe on Suffolk Place, Lime Kiln Quay Road, Woodbridge.
	WBG 6	Roadside site	Drainpipe on 87 Thoroughfare, Woodbridge. **New site as of July 2003**
	WBG 7	Roadside site	Drainpipe on 93a Thoroughfare (located in Sun Lane), Woodbridge. **New site as of July 2003**
	WBG 8	Roadside site	Drainpipe on 95 Thoroughfare, Woodbridge**. New site as of July 2003**
	WBG 9	Roadside site	Signpost on Thoroughfare at entrance to Deben Road, Woodbridge. **New site as of July 2003**
	WBG 10	Roadside site	Signpost in St. John's Street (opposite Surgery), Woodbridge. **New site as of July 2003**
	WBG 11	Roadside site	Drainpipe on 83 Thoroughfare (opposite Red Lion PH), Woodbridge. **New site as of July 2003**
	WBG 12	Roadside site	Drainpipe on 8 Lime Kiln Quay Road, Woodbridge. **New site as of July 2003**

Diffusion tube annual mean data is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must be either obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2003 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NOx analyser located at a site in Kesgrave. The bias correction factor for 2003 was calculated from this study as 0.84, details are available in Figure B-2 in this Appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.84.

Map B-2 Locations of nitrogen dioxide diffusion tubes at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge



◆ **Locations of current diffusion tube sites – WBG 1, 5, 6, 7, 8, 9, 10, 11 and 12**

★ **Locations of two new sites from November 2003**

Map produced on 5 March 2004 **Scale 1: 950**

Appendix C

Summary and graphical representation of data output from a continuous NO_x analyser, sited on the A1214 between 14 March 2003 and 31 December 2003.

Produced by netcen on behalf of Suffolk Coastal District Council

SUFFOLK COASTAL KESGRAVE
14 March to 31 December 2003

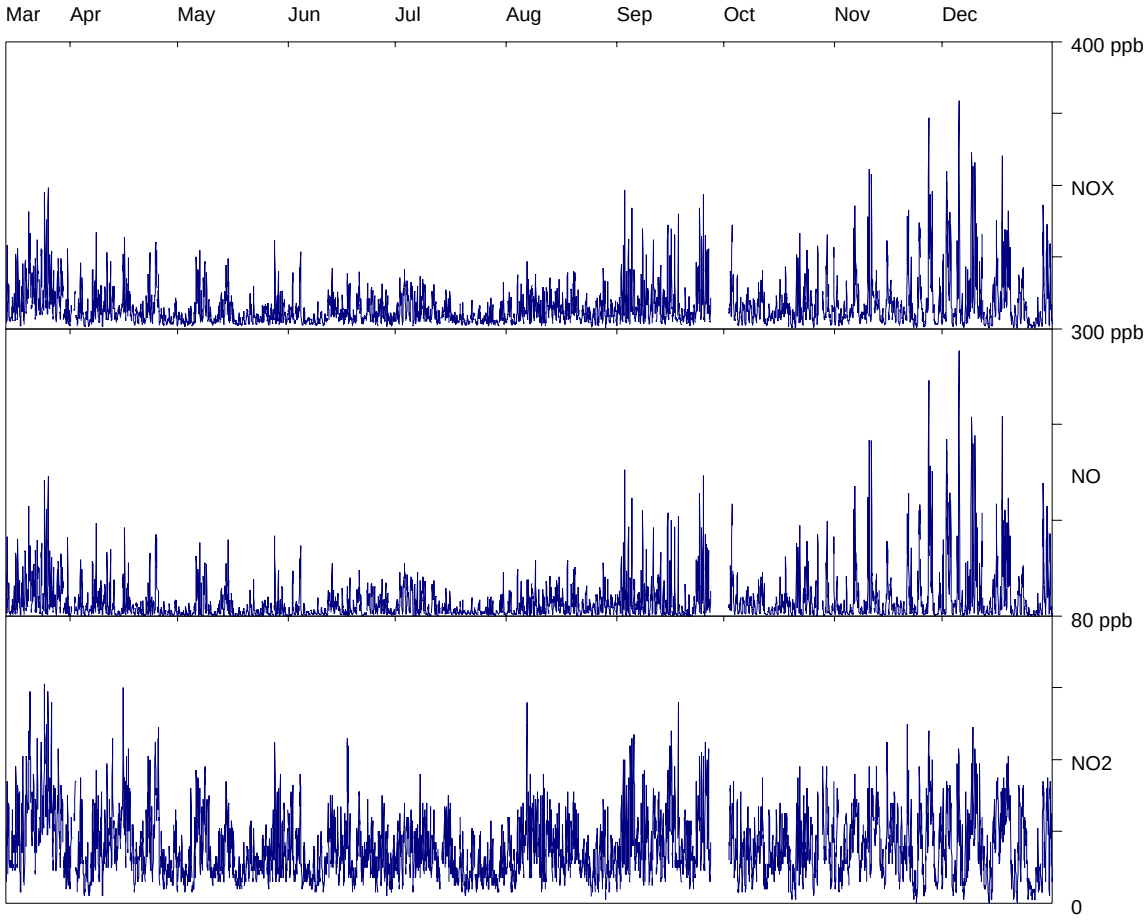
This data has been fully ratified by netcen

POLLUTANT	NO_X	NO	NO_2
Number Very High	-	-	0
Number High	-	-	0
Number Moderate	-	-	0
Number Low	-	-	6585
Maximum 15-minute mean	344 ppb	308 ppb	88 ppb
Maximum hourly mean	318 ppb	277 ppb	61 ppb
Maximum running 8-hour mean	215 ppb	179 ppb	50 ppb
Maximum running 24-hour mean	129 ppb	97 ppb	37 ppb
Maximum daily mean	121 ppb	92 ppb	37 ppb
Average	30 ppb	14 ppb	15 ppb
Data capture	93.6 %	93.7 %	93.6 %

Pollutant	Air Quality Regulations 2000 and 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 21 ppb	0	-
Nitrogen Dioxide	Hourly mean > 105 ppb	0	0

Produced by netcen on behalf of Suffolk Coastal District Council

Suffolk Coastal Kesgrave Air Monitoring
Hourly Mean Data for 14 March to 31 December 2003



For further information on air pollution monitoring please don't hesitate to contact:
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Appendix D

Assessment of solid fuel use within each parish of the Suffolk Coastal district

Assessment of solid fuel use within each parish of the Suffolk Coastal district

Parish	Does parish have gas supply? (Info. from TRANSCO)	Number of houses per 500mx500m (Info. from SCDC GIS*)	Does 2001 census data show >50 houses without central heating?	Parishes with complaints in the last 3 years for smoke from chimneys.	Site visit needed?	Number of houses seen (where site visit undertaken) with smoke coming from chimney?
Aldeburgh	Yes	438	Yes	**Yes (1)**	Yes	**11**
Alderton	**No**	229	No	-	No	-
Aldringham	Yes	99	No	-	No	-
Badingham	**No**	58	No	-	No	-
Bawdsey	**No**	73	No	-	No	-
Great Bealings	**No**	57	No	-	No	-
Little Bealings	**No**	19	No	-	No	-
Benhall	**No**	108	No	-	No	-
Blaxhall	**No**	55	No	-	No	-
Blythburgh	**No**	108	No	-	No	-
Boyton	**No**	44	No	-	No	-
Bramfield	**No**	91	No	-	No	-
Brandeston	**No**	75	No	-	No	-
Bredfield	Yes	52	No	-	No	-
Brightwell	**No**	12	No	-	No	-
Bromeswell	**No**	57	No	-	No	-
Bruisyard	**No**	24	No	-	No	-
Bucklesham	**No**	144	No	-	No	-
Butley	**No**	39	No	-	No	-
Burgh	**No**	37	No	-	No	-
Boulgh	**No**	5	No	-	No	-
Capel St Andrew	Yes	20	No	-	No	-
Campsea Ashe	**No**	58	No	-	No	-
Charsfield	**No**	49	No	-	No	-
Chediston	**No**	35	No	**Yes (1)**	No	-
Chillesford	**No**	48	No	-	No	-
Clopton	**No**	43	No	-	No	-
Cookley	**No**	7	No	-	No	-
Cransford	**No**	34	No	-	No	-
Cratfield	**No**	52	No	-	No	-
Cretingham	**No**	51	No	-	No	-
Culpho	**No**	6	No	-	No	-
Dallinghoo	**No**	27	No	-	No	-
Darsham	**No**	24	No	-	No	-
Debach	**No**	17	No	-	No	-
Dennington	**No**	108	No	-	No	-
Dunwich	**No**	161	No	-	No	-
Earl Soham	**No**	66	No	-	No	-
Easton	**No**	89	No	-	No	-
Eyke	**No**	82	No	-	No	-
Falkenham	**No**	24	No	-	No	-
Farnham	**No**	41	No	-	No	-
Felixstowe	Yes	700	Yes	-	Yes	**20**
Foxhall	Yes	9	No	-	No	-
Framlingham	Yes	410	Yes	-	Yes	**2**
Friston	**No**	126	No	-	No	-
Gedgrave	**No**	10	No	-	No	-
Great Glemham	**No**	50	No	-	No	-
Little Glemham	**No**	57	No	-	No	-
Grundisburgh	Yes	224	No	-	No	-
Hacheston	Yes	43	No	-	No	-
Hasketon	**No**	63	No	-	No	-
Hemley	**No**	13	No	-	No	-
Heveningham	**No**	36	No	-	No	-
Hollesley	**No**	164	No	-	No	-
Hoo	**No**	7	No	-	No	-
Huntingfield	**No**	51	No	-	No	-
Iken	**No**	10	No	-	No	-
Kelsale	**No**	182	No	-	No	-
Kesgrave	Yes	387	No	**Yes (3)**	No	-

Parish	Does parish have gas supply? (Info. from TRANSCO)	Number of houses per 500mx500m (Info. from SCDC GIS*)	Does 2001 census data show >50 houses without central heating?	Parishes with complaints in the last 3 years for smoke from chimneys.	Site visit needed?	Number of houses seen (where site visit undertaken) with smoke coming from chimney?
Kettleburgh	**No**	69	No	-	No	-
Kirton	Yes	251	No	-	No	-
Knodishall	**No**	138	No	-	No	-
Leiston	Yes	500	Yes	-	Yes	**22**
Letheringham	**No**	15	No	**Yes (1)**	No	-
Levington	Yes	86	No	-	No	-
Linstead Magna	**No**	3	No	-	No	-
Linstaed Parva	**No**	9	No	-	No	-
Marlesford	**No**	50	No	-	No	-
Martlesham	Yes	144	No	-	No	-
Martlesham Heath	Yes	473	No	-	No	-
Melton	Yes	389	Yes	-	Yes	**2**
Middleton	**No**	100	No	-	No	-
Monewden	**No**	25	No	-	No	-
Nacton	Yes	118	No	-	No	-
Newbourne	**No**	42	No	-	No	-
Orford	**No**	220	No	-	No	-
Otley	**No**	93	No	-	No	-
Parham	Yes	48	No	-	No	-
Peasenhall	**No**	104	No	**Yes (1)**	No	-
Petistree	**No**	24	No	-	No	-
Playford	**No**	57	No	-	No	-
Purdis Farm	Yes	182	No	-	No	-
Ramsholt	**No**	10	No	-	No	-
Rendham	**No**	75	No	-	No	-
Rendlesham	Yes	266	No	-	No	-
Rushmere	**No**	388	No	-	No	-
Saxmundham	Yes	438	Yes	-	Yes	**3**
Saxtead	**No**	43	No	-	No	-
Shottisham	**No**	71	No	-	No	-
Sibton	**No**	4	No	-	No	-
Sizewell	**No**	14	No	-	No	-
Snape	**No**	188	No	-	No	-
Sternfield	**No**	23	No	-	No	-
Stratford St Mary	**No**	53	No	-	No	-
Stratton Hall	**No**	4	No	-	No	-
Sudbourne	**No**	81	No	-	No	-
Sutton	**No**	57	No	-	No	-
Sweffling	**No**	48	No	-	No	-
Swilland	**No**	22	No	-	No	-
Theberton	**No**	64	No	-	No	-
Thorington	**No**	5	No	-	No	-
Thorpeness	Yes	158	No	-	No	-
Trimley St Martin	Yes	449	Yes	-	Yes	**3**
Trimley St Mary	Yes	966	**Yes**	-	**Yes**	3
Tuddenham	**No**	113	No	-	No	-
Tunstall	**No**	129	No	-	**No**	-
Ubbeston	**No**	16	No	-	No	-
Ufford	Yes	107	No	-	No	-
Walberswick	**No**	127	No	-	No	-
Waldringfield	**No**	121	No	-	No	-
Walpole	**No**	58	No	-	No	-
Wantisden	**No**	15	No	-	No	-
Wenhaston	**No**	142	No	-	No	-
Westerfield	**No**	80	No	-	No	-
Westleton	**No**	160	No	-	No	-
Wickham Market	Yes	423	No	-	No	-
Witnesham	**No**	152	No	-	No	-
Woodbridge	Yes	459	Yes	-	Yes	**10**
Yoxford	Yes	114	No	-	No	-

* GIS = Geographical Information System