

Progress Report

Air Quality in the Suffolk Coastal District

May 2005

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Many thanks to Chris Cornish, Julia Webb and Tim Davidson for help with compilation of this report.

Executive Summary

Part IV of the Environment Act 1995 established a new legal framework for national air quality and includes strategies and policies to be adopted at both the national and local level. It places a duty on all local authorities to periodically review air quality within their districts under the Local Air Quality Management (LAQM) process. This will ensure that local authorities continually assess air quality in their districts, to update their records and determine any areas of concern.

Local authorities must review air quality against health-based standards and objectives set in the Air Quality 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 (PM₁₀). If a review indicates locations where any of the Air Quality Objectives are likely to be exceeded, the local authority must designate an Air Quality management Area (AQMA). A written action plan must then be drawn up in pursuit of achievement of the objectives.

The first round of review and assessment for Suffolk Coastal was completed in 2001 and concluded that the Air Quality Objectives for all seven pollutants would be met within the Suffolk Coastal district and no AQMAs were declared. The second round of review and assessment began in 2002 to identify those matters that have changed since the first round of review and assessment, and which may now require further assessment. The Updating and Screening Assessment Report was published in June 2003 and the Detailed Assessment Report in March 2004.

The Updating and Screening Assessment and Detailed Assessment concluded that the risk of exceedance of the air quality objectives for benzene, 1,3-butadiene, lead and carbon monoxide is unlikely, and no further assessment is necessary. For nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and particles (PM₁₀) the review and assessment concluded that there was a potential risk of the air quality objectives being exceeded. Further investigation was required to assess emissions of NO₂ from traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge, and emissions of NO₂, SO₂ and PM₁₀ from activities on and associated with the Port of Felixstowe.

Progress Reports are designed to ensure continuity in the LAQM process and are required in years when an Updating and Screening Assessment or Detailed Assessment is not being undertaken. This Progress Report determines whether there have been any changes in the concentrations of the seven prescribed pollutants by examining new monitoring results and new local developments that may affect local air quality.

This Progress Report has determined a number of new developments and proposed future developments that may affect air quality and that will be investigated further in the Updating and Screening Assessment for 2006.

It has been determined for the Suffolk Coastal district that the risk of exceedance of the air quality objectives for benzene, 1,3-butadiene, lead and carbon monoxide is unlikely, and no further assessment is necessary. Continued investigations of particulate matter (PM₁₀) emissions from activities on and associated with the Port of Felixstowe have also determined that that the risk of exceedance of the air quality objectives is unlikely, and no further assessment is necessary.

Continued investigations of nitrogen dioxide and sulphur dioxide emissions have determined that there is a potential risk of the air quality objectives being exceeded at receptor locations and further investigation will be necessary:

- 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 and sulphur dioxide** from activities on and associated with the Port of Felixstowe.

Details of the form that the further investigations will take for each of the above sites are outlined in the Summary and Recommendations, section 13 in this report.

Decisions on the Public Inquiries for the Felixstowe South Reconfiguration and Bathside Bay Container Terminal planning applications are expected later in 2005. If planning approval is given, any air quality impacts arising from these developments will be assessed at that time.

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Appendices

- A List of Consultees for the Local Air Quality Management Review and Assessment Process – Detailed Assessment Report**
- B Summary and graphical representation of data output from an automatic NO_x analyser, sited on the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street. Data includes summary of ratified 6-month data set (5 April to 30 September 2004) and provisional 9-month data set (5 April 2004 to 4 January 2005).**
- C Monthly and annual mean nitrogen dioxide (NO₂) concentrations in air recorded by diffusion tubes at sites in Felixstowe, Kesgrave, Woodbridge and Melton.**
- D Maps detailing the location of nitrogen dioxide diffusion tube monitoring sites within the Suffolk Coastal district, and the automatic NO_x analyser in Woodbridge.**
- E Information required for assessment of the Park & Ride site in Martlesham.**
- F Felixstowe South Reconfiguration Planning Application - Written Statement of John Anthony Abbott of the National Environmental Technology Centre (netcen) for the Public Inquiry.**

1. Introduction

This is the air quality Progress Report for Suffolk Coastal District Council. It is required by the Government guidance issued in 2003 (LAQM.TG(03) and LAQM.PRG(03)) under Part IV of the Environment Act 1995, and has been prepared using this guidance. This report should be read in conjunction with the Suffolk Coastal Updating and Screening Assessment Report (June 2003) and Detailed Assessment Report (March 2004).

1.1 Legislative Background

Part IV of the Environment Act 1995 established a new legal framework for national air quality and includes strategies and policies to be adopted at both the national and local level. It places a duty on all local authorities to periodically review air quality within their districts under the Local Air Quality Management (LAQM) process. This will ensure that local authorities continually assess air quality in their districts, to update their records and determine any areas of concern.

Local authorities must review air quality against health-based standards and objectives set in the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002 for seven key pollutants. The pollutants specified in the Regulations, together with their objectives and target dates for achievement can be seen in table 1.1 below.

Table 1.1 Objectives included in the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002, 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 (objectives are provisional)	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 (PM₁₀) (gravimetric) (Measured using the European gravimetric transfer sampler or equivalent)	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

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 (PM₁₀) 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 the second round of review and assessments no investigations have been undertaken by Suffolk Coastal in respect of these 2010 limits.

If a review indicates locations where any of the Air Quality Objectives are likely to be exceeded, the local authority must designate an Air Quality management Area (AQMA). A written action plan must then be drawn up in pursuit of achievement of the objectives.

The first round of review and assessment for Suffolk Coastal was completed in 2001 and consisted of three stages, each reported upon separately. The findings of the first round were that the Air Quality Objectives for all seven pollutants would be met within the Suffolk Coastal district and no AQMAs were declared.

The second round of review and assessment began in 2002 and the guidance issued for completion of this (LAQM.TG(03)) advised that the process was to be completed over a three year period in two stages, with an air quality report due for publication annually. The first stage was an Updating and Screening Assessment, published in June 2003 for Suffolk Coastal. The second stage was a Detailed Assessment, where required, this was necessary for the Suffolk Coastal district and was published in March 2004. The findings from these reviews are detailed in the next Chapter of this report.

1.2 Purpose of the Progress Report

Progress Reports are designed to ensure continuity in the LAQM process and are required in years when an Updating and Screening Assessment or Detailed Assessment is not being undertaken. Progress Reports have been introduced into the LAQM process, following a Government evaluation of the first round of review and assessments. The evaluation found that the LAQM process had been too disjointed, as some local authorities were not required to produce reports for several years. It was felt that this situation did not encourage the integration of LAQM into the routine work of local authorities to bring about improvements in air quality. The requirement for Progress Reports now ensures that local authorities must retain air quality resourcing to maintain the capacity and skills needed to manage LAQM.

The Progress Report is intended to determine whether there have been any changes in the concentrations of the seven prescribed pollutants by examining any new monitoring results and new local developments that may affect local air quality. It also includes any information that may have an effect on future air quality, for example impending planning applications, local transport plans and planning policies.

2 Findings of the Updating and Screening and Detailed Assessment undertaken for the Suffolk Coastal district (2003/2004)

2.1 Updating and Screening Assessment findings (June 2003)

The Updating and Screening Assessment for the Suffolk Coastal district 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 determined that for lead, nitrogen dioxide, sulphur dioxide and particulate matter (PM₁₀) 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.

2.2 Detailed Assessment findings (March 2004)

Continued Updating and Screening Assessment for the Suffolk Coastal district determined that the risk of exceedance of the air quality objectives for lead was unlikely, and that no further assessment was necessary.

Continued investigations undertaken determined for the Suffolk Coastal district, that for nitrogen dioxide, sulphur dioxide and particulate matter (PM₁₀) there is a potential risk of the air quality objectives being exceeded at receptor locations, and further investigation will be necessary. Further investigation is required for the following areas:

- Emissions of **nitrogen dioxide** from traffic using the junction of Lime Kiln Quay Road, 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.

It was concluded that further investigation would be undertaken for the above two areas, and the findings presented in the Progress Report, to be produced in April 2005.

This Progress Report provides an update on the review and assessment being undertaken for both areas, which can be seen in sections 10 and 11 of this report.

2.3 Consultation findings regarding the Detailed Assessment Report (March 2004)

All Local Authorities must consult on the findings of their periodic reviews of air quality, 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 as Local Air Quality Management (LAQM) is about air quality issues relevant to the Suffolk Coastal district.

Suffolk Coastal undertook a full Consultation exercise in June 2004 to obtain comments on the contents and findings of the Detailed Assessment Report produced for the district. A total of 21 consultation responses were received, these were collated and all aspects raised which came within the scope of LAQM have been commented on in Appendix A. A list of all consultees is also provided in Appendix A. All aspects raised have been, or continue to be, addressed within the review and assessment process.

3 New Monitoring Data

Since the Updating and Screening Assessment report was produced in June 2003, monitoring of nitrogen dioxide (NO₂) has continued at a number of locations within the district. No other pollutants have been monitored in the district since June 2003.

The Detailed Assessment report (April 2004) presented new monitoring data available for 2003 for the automatic analyser (measuring oxides of nitrogen - NO_x), and NO₂ diffusion tube locations in the district where assessment was continuing. The Detailed Assessment report did not provide an update of 2003 monitoring data for all diffusion tube locations in the district and so this Progress Report details monitoring data for 2003 and 2004 for all diffusion tube locations.

3.1 Automatic NO_x analyser results

Since the Detailed Assessment Report (April 2004) the automatic NO_x analyser was relocated from Main Road, Kesgrave to the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street, Woodbridge on 5 April 2004 to undertake a Detailed Assessment, for a site location map see Appendix D. Further information regarding this site and the monitoring undertaken is presented later in this report in section 10. The automatic analyser has recently completed 12 months of monitoring at this location and the final Quality Assurance / Quality Control procedures are being undertaken in order to produce the ratified 12-month data-set for this site. The final ratified data is not available for inclusion in this report and will be reported on later this year when a Detailed Assessment report is produced for this junction in Woodbridge. A 6-month ratified data set (5 April to 30 September 2004) is available for this site, together with a 9-month provisional data set (5 April 2004 to 4 January 2005) which was produced in order to provide a bias correction factor for collocated diffusion tubes in 2004. The 9-month provisional data set was screened and scaled for use in these calculations.

A summary of the average measured concentrations and the maximum hourly mean concentrations of NO₂ for both the 6-month and 9-month monitoring periods can be seen in table 3.1 below. Detailed summary tables and graphs for both sets of monitoring results can be seen in Appendix B.

Table 3.1 Summary of 6-month ratified and 9-month provisional NO₂ data collected by the automatic analyser located at the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street in Woodbridge in 2004.

	Concentration of NO ₂ recorded by analyser	
	6-month ratified data	9-month provisional data
Average concentration	37 µg/m ³	36 µg/m ³
Maximum hourly mean	151 µg/m ³	151 µg/m ³
Data capture	98.5%	93.0%

The results in table 3.1 show that the 6-month and 9-month data for the average concentration and the maximum hourly mean are similar. The average NO₂ concentration for the site of 36 / 37 µg/m³ is just below the annual mean objective of 40 µg/m³. The maximum hourly mean of 151 µg/m³ does not exceed the 1-hour objective of 200 µg/m³ not to be exceeded more than 18 times per year.

More detailed information regarding the monitoring undertaken at this junction and continuing assessment is provided in section 10 later in this report.

3.2 Diffusion tube results

The Updating and Screening Assessment report (June 2003) presented diffusion tube data up to the end of 2002, since this time a number of sites have been relocated, removed and added to our survey. Site descriptions for sites present in 2003 and 2004 are provided in Appendix C, the location of each site is shown in the maps provided in Appendix D. The changes that have occurred in monitoring locations are summarised for each area overleaf:

Felixstowe and the Trimleys

- Felixstowe 7 (Carr Road) and Felixstowe 11 (Hamilton Road) were relocated in 2003 as they were not sited at relevant receptor locations, the new sites Felixstowe 14 (Adastral Close) and Felixstowe 12 (Hamilton Road) respectively were sited at relevant receptor locations.
- Felixstowe 13, 15 and 16 (all in Ferry Lane near Dock Gate 2 roundabout) were new sites to the survey in 2003, located to assess concentrations of NO₂ at one of the closest receptor locations to the Port of Felixstowe and one of its main entrance gates. Felixstowe 13 was located at the relevant receptor and 15 and 16 provided NO₂ concentrations between this site and Dock gate 2 roundabout. Felixstowe 15 and 16 were sited for a 12-month survey and were removed in 2004 and used to triplicate Felixstowe 13.
- Felixstowe 5 (High Road West), Felixstowe 6 (Nayland Road) and Felixstowe 9 (Brinkley Way) were removed in 2004 as the concentrations of NO₂ were shown to be below the objective levels.
- Felixstowe 17 (Spriteshall Lane, Trimley St. Mary), Felixstowe 18 (Kirton Road, Trimley St. Martin) and Felixstowe 19 (Welbeck Close, Trimley St. Mary) were added to the survey in 2004. Felixstowe 18 and 19 are triplicate sites located at the closest receptor locations to the A14 trunk road and Felixstowe 19 is an urban background site located to provide information for the Trimleys.

Kesgrave

- Kesgrave 1 (Main Road opposite the High School) was an original long term monitoring location that was removed in 2002 as the concentration of NO₂ was shown to be below the objective levels. This site was reinstated in 2003 on behalf of Suffolk County Council to monitor future trends on the A1214 now Martlesham Park and Ride is open.
- Kesgrave 2 (Main Road near the Bell Lane junction traffic lights) was a triplicate site relocated in 2003, to Kesgrave 6 which is sited at a relevant receptor location and was collocated with an automatic NO_x analyser in 2003. In 2004 Kesgrave 6 was reduced to a single tube once the automatic analyser was moved to a new location.
- Kesgrave 7, 8 and 9 were all new sites on Main Road near the Bell Lane junction traffic lights in 2003, located as part of the Detailed Assessment of this stretch of the A1214. In 2004 Kesgrave 7 and 8 were removed following the results of the Detailed Assessment that showed concentrations of NO₂ to be below the objective levels. Kesgrave 9 was left to provide information on future NO₂ concentrations.

Woodbridge

- The Updating and Screening Assessment concluded that the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street in Woodbridge required further assessment. Woodbridge 6 (Thoroughfare), Woodbridge 7 (Sun Lane), Woodbridge 8 (Thoroughfare), Woodbridge 9 (Melton Hill), Woodbridge 10 (St. John's Street), Woodbridge 11 (Thoroughfare) and Woodbridge 12 (Lime Kiln Quay Road) were added to the survey as part of this investigation in 2003.
- Woodbridge 7, 9, 11 and 12 were removed once they had recorded 12 months of data in 2004 as the results showed concentrations of NO₂ to be below the objective levels.
- Woodbridge 13 (Thoroughfare), Woodbridge 14 (St. John's Street) and Woodbridge 15 (Thoroughfare) were added to the survey in 2004 to provide additional information. Woodbridge 15 is collocated with an automatic NO_x analyser at this junction.

Melton

- Melton 3 (Wilford Bridge Road at Melton crossroads) and Melton 4 (Woods Lane at Melton crossroads) were removed in 2003 following the results of a Detailed Assessment undertaken for this junction which confirmed that NO₂ concentrations would not exceed the objectives. Woodbridge 5 (Wilford Bridge Road at Melton crossroads) was left in place to provide future data at the closest receptor to the junction.

Monitoring was conducted using passive diffusion tubes, exposed on a monthly basis, information regarding the analyst laboratory used and its accreditation details is provided in Appendix C. The annual average concentration of NO₂ was calculated for all sites with 6 months or more of monitoring data. Diffusion tubes can over or under read and the annual average should be corrected for laboratory bias. Bias correction factors for 2003 and 2004 were calculated using results from the collocation studies undertaken in each year and are detailed in Appendix C of this report. These factors were used to correct the annual average concentration recorded for each site, and have been compared with the bias adjustment factor for the analyst laboratory, Harwell Scientifics, obtained from the Review and Assessment Helpdesk website inventory. The monthly results of sampling for 2004 together with the bias correction calculations are detailed in Appendix C. The monthly results of sampling for diffusion tube sites in Felixstowe, Kesgrave and Woodbridge in 2003, together with all bias correction calculations, were provided in the Detailed Assessment Report for Suffolk Coastal (April 2004) which can be viewed on the Council's website at <http://www.suffolkcoastal.gov.uk> The full data sets and calculations have not been duplicated in this report. The monthly results of sampling for diffusion tube sites in Melton in 2003 were not provided in the Detailed Assessment report and so are included in Appendix C of this report for completeness.

Table 3.2 overleaf shows the bias corrected annual average results for all sites in 2003 and 2004 and the predicted annual mean concentration in 2005, for comparison with the objectives, in accordance with the technical guidance LAQM.TG(03). Sites located to provide Urban Background concentrations of NO₂ are marked in the table. The remaining sites are all located at or close to relevant receptor locations on roads and junctions of concern and near to industrial sources of NO₂.

The results in table 3.2 show 6 sites in 2003 and 4 sites in 2004 with a predicted annual mean concentration in 2005 that is above the objective level of 40 µg/m³.

Sites Felixstowe 15 and 16, both located in Ferry Lane, were removed at the end of 2003 once they had completed a 12-month study. These sites were not located at relevant receptor locations, they were sited to determine whether there is a NO₂ gradient from the kerbside at Dock Gate 2 roundabout (one of the main entrances to the Port of Felixstowe) and the nearest receptor location in Ferry Lane (the site at Felixstowe 13).

The Felixstowe 13 site in Ferry Lane is located at the closest receptor location to the Port of Felixstowe and one of its main entrance gates and has a predicted NO₂ concentration of 46.5 µg/m³ in 2005 from the 2004 measurements. Felixstowe 14 located in Adastral Close, another receptor close to the Port of Felixstowe boundary, has a predicted NO₂ concentration of 39.1 µg/m³ in 2005 which is very close to the objective level of 40 µg/m³. The concentrations recorded at both sites have increased between 2003 and 2004. Further investigations are being undertaken at the Felixstowe 13 receptor location and for other receptors close to the Port of Felixstowe boundary and along the A14 trunk road. These investigations are detailed in section 11 of this report.

Woodbridge 1, 6 and 8 are all located on the Thoroughfare arm of the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street in Woodbridge, and are part of a Detailed Assessment being undertaken for this junction. These investigations are detailed in section 10 of this report.

The predicted NO₂ concentration in 2005 at all other locations monitored is within the objective level of 40 µg/m³.

Table 3.2 Bias corrected annual mean nitrogen dioxide concentrations recorded at sites within the Suffolk Coastal district in 2003 and 2004, figures in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$). Annual mean concentration at each site predicted forward to 2005.

Site and location # UB = Urban Background site	2003		2004	
	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.95 Others = x 0.96)	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.97 Others = x 0.98)
Felixstowe 4 (Lynwood Avenue) (UB)	25.7	24.7	25.9	25.4
Felixstowe 5 (High Road West)	34.0	32.3	~	~
Felixstowe 6 (Nayland Road)	36.4	34.6	~	~
Felixstowe 9 (Brinkley Way) (UB)	25.2	24.2	~	~
Felixstowe 12 (Hamilton Road)	35.6	33.8	35.1	34.0
Felixstowe 13 (Ferry Lane)	42.6	40.9	47.4	46.5
Felixstowe 14 (Adastral Close)	36.4	34.9	39.9	39.1
Felixstowe 15 (Ferry Lane)	55.2	53.0	~	~
Felixstowe 16 (Ferry lane)	69.2	65.7	~	~
Felixstowe 17 (Spriteshall lane)	~	~	29.1	28.2
Felixstowe 18 (Kirton Road)	~	~	33.6	32.6
Felixstowe 19 (Welbeck Close) (UB)	~	~	26.4	25.9
Kesgrave 1 (Main Road)	33.7	32.0	26.2	25.4
Kesgrave 4 (High School) (UB)	20.4	19.6	20.0	19.6
Kesgrave 6 (Main Road)	28.8	27.4	27.1	26.3
Kesgrave 7 (Main Road)	26.5	25.2	~	~
Kesgrave 8 (Main Road)	24.7	23.5	~	~
Kesgrave 9 (Main Road)	34.9	33.2	34.7	33.7
Woodbridge 1 (Thoroughfare)	50.8	48.3	49.4	47.9
Woodbridge 3 (Kingston Farm Rd) (UB)	19.7	18.9	18.0	17.6
Woodbridge 5 (Thoroughfare)	36.1	34.3	31.5	30.6
Woodbridge 6 (Thoroughfare)	49.1	46.6	45.7	44.3
Woodbridge 8 (Thoroughfare)	43.2	41.0	41.9	40.6
Woodbridge 10 (St. John's Street)	36.7	34.9	34.5	33.5
Woodbridge 13 (Thoroughfare)	~	~	34.7	33.7
Woodbridge 14 (St. John's Street)	~	~	34.1	33.1
Woodbridge 15 (Thoroughfare)	~	~	38.7	37.5
Melton 2 (Hall Farm Road) (UB)	18.6	17.9	14.9	14.6
Melton 5 (Melton crossroads)	30.6	29.1	28.4	27.5

Results for sites Woodbridge 7, 9, 11 and 12 are not presented here as they recorded data for 6 months in 2003 and 6 months in 2004. The data is presented as a full 12-month survey, with the annual average NO_2 concentration calculated for each site, in section 10 of this report.

4 Trends in Local Air Quality

Nitrogen dioxide levels have been monitored in Suffolk Coastal since 1993 using diffusion tubes, however most of the original sites have now been relocated or removed. In 1999 the laboratory supplying and analysing the diffusion tubes was changed which caused a marked increase in the NO₂ monitoring results for all sites. Since 1999 the same analyst laboratory has been employed and so monitoring data has only been presented from 1999 onwards for the purpose of obtaining information on air quality trends.

Many of the current diffusion tube sites are in place for short-term assessment of locations of concern and are not relevant for the purpose of obtaining trend information. The graphs in figures 4.1 to 4.4 on the following pages show the annual average concentration of NO₂ recorded at those sites planned, at the current time, to remain in place for the foreseeable future.

The graphs show that there are only six sites with five or more years of data that could provide useful information on trends, Felixstowe 4, Kesgrave 1 & 4, Woodbridge 1 & 3 and Melton 2. These are the only sites that will be included in the discussions on air quality trends.

All data presented has been corrected for laboratory bias, for the years 1999, 2000 and 2001 this was undertaken using a bias correction factor provided by the laboratory itself. From 2002 onwards the bias correction factor has been calculated from collocation studies undertaken within the Suffolk coastal district. The graphs should, therefore, be viewed with some care as although the same laboratory was used to supply and analyse the tubes the bias correction method has altered from 2002 onwards.

For all five sites in place in 1999, it can be seen that the NO₂ concentration fell between 1999 and 2000, it then stabilised or increased slightly from 2000 to 2001 and then increased at all sites between 2001 and 2002. Between 2002 and 2004 the concentration has either stabilised or is showing a downward trend at all six sites.

Figure 4.1 Annual mean nitrogen dioxide concentrations measured at permanent diffusion tube sites in Felixstowe between 1999 and 2004

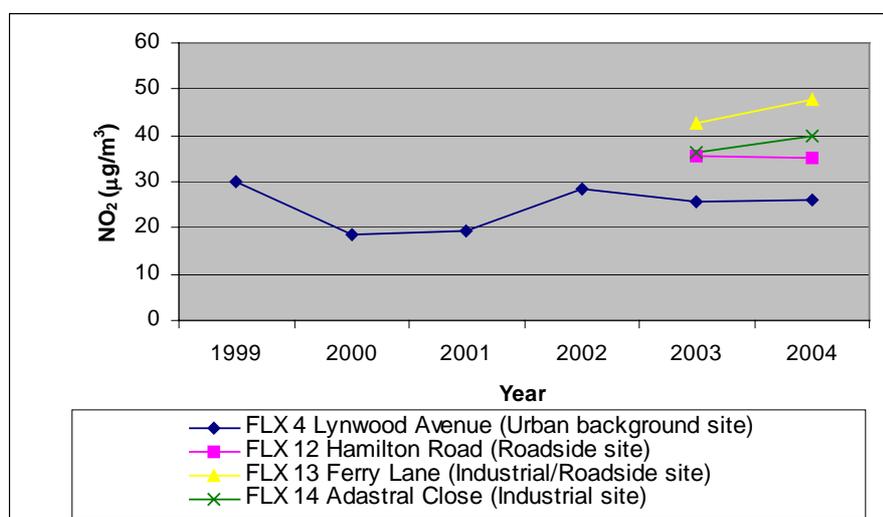


Figure 4.2 Annual mean nitrogen dioxide concentrations measured at permanent diffusion tube sites in Kesgrave between 1999 and 2004

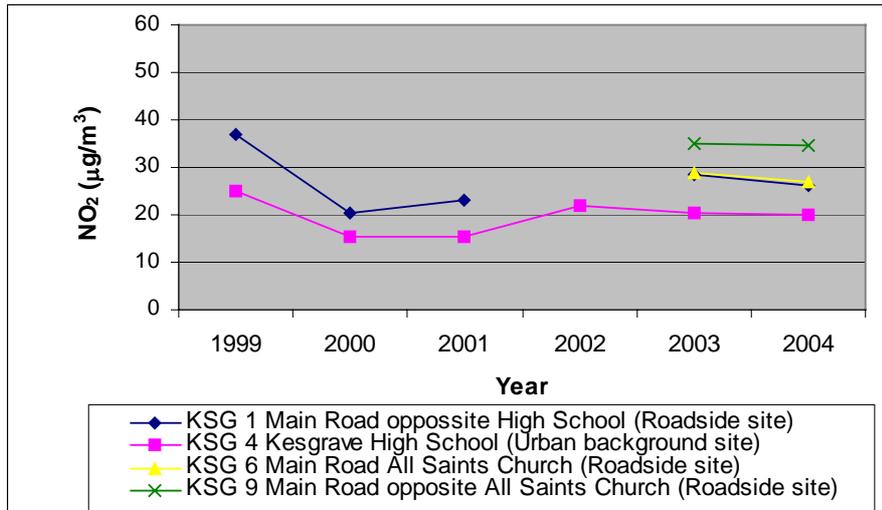


Figure 4.3 Annual mean nitrogen dioxide concentrations measured at permanent diffusion tube sites in Woodbridge between 1999 and 2004

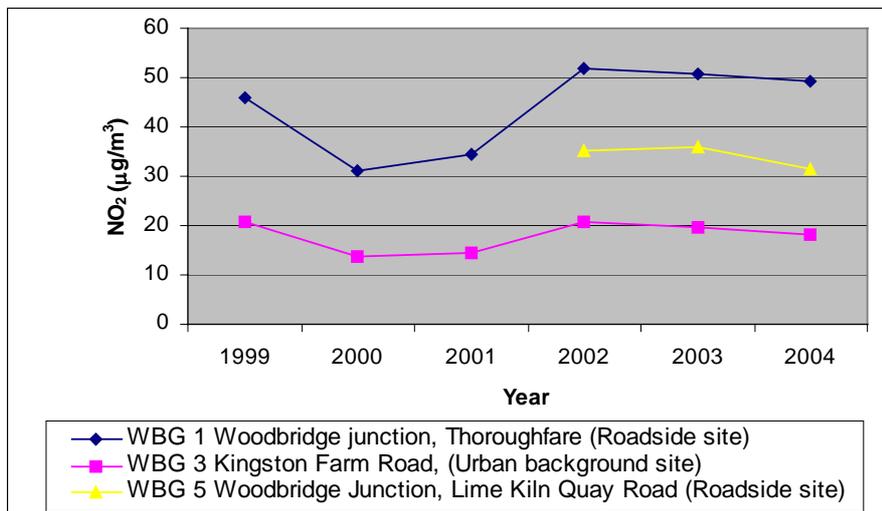
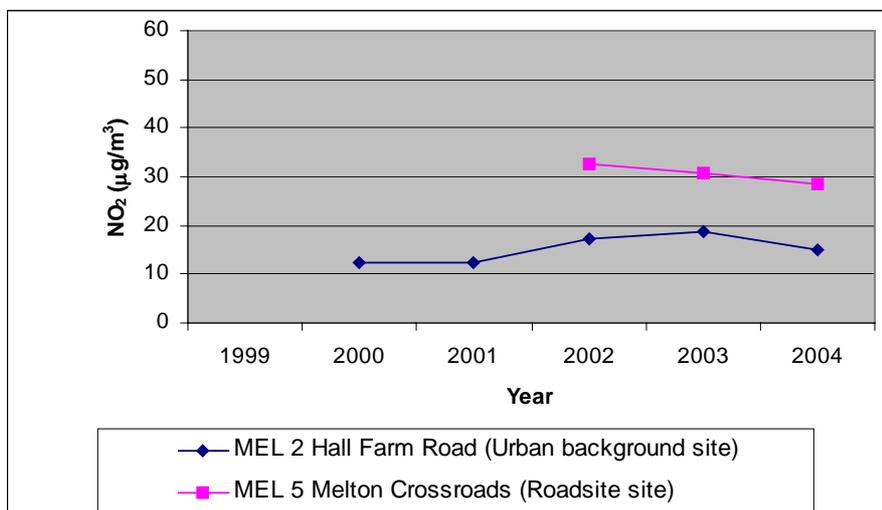


Figure 4.4 Annual mean nitrogen dioxide concentrations measured at permanent diffusion tube sites in Melton between 1999 and 2004



5 New Local Developments

Any new local developments, since the Updating and Screening Assessment Report, that may affect air quality within the Suffolk Coastal district are listed in this Progress Report so that they can be considered in more detail during the next full round of review and assessment, to begin later this year. This includes developments that are now in operation or have been granted planning permission to be brought into operation in the near future.

5.1 New industrial processes

Industrial processes authorised under the Pollution Prevention and Control (England and Wales) Regulations 2000 that are likely to require air quality review and assessment are listed in Appendix 2 of the technical guidance LAQM.TG(03). The progress report guidance LAQM.PRG(03) states that any new or substantially changed installations that are included in the above mentioned appendix should be listed for future investigation. There is one new A2 installation that has been authorised since the Updating and Screening Assessment in 2003 and information has been received regarding an existing A1 installation that will be undergoing significant alterations in the future:

- Aldeburgh Brickworks, Saxmundham Road, Aldeburgh.
This is a newly authorised A2 installation involving the manufacture of bricks using Scotch Kilns. It has a permit to operate a Ceramic Production Process under section 3.6 of the Pollution Prevention and Control (England and Wales) Regulations 2000. Review and assessment of this industrial process will be undertaken and detailed in the Updating and Screening Assessment report to be produced in April 2006.
- Sizewell A Nuclear Power Station, Sizewell - decommissioning.
This is an existing A1 installation for electricity generation and is authorised under the Radioactive Substances Act 1993 by the Environment Agency to regulate the discharge of radioactive waste. Emissions were considered in the Detailed Assessment report (April 2004) due to the proximity of Sizewell B Nuclear Power Station, and the possibility of emissions from both installations combining to cause objective exceedances. The report concluded that the objectives were not likely to be exceeded and no further assessment was necessary. Sizewell A Nuclear Power station is now to be decommissioned with reactor shutdown expected at the end of 2006. An application must be submitted to the Health and Safety Executive (HSE) to obtain consent, as part of which an Environmental Statement must be provided. The application has not yet been submitted, once it is received the contents will be assessed under the local air quality management regime and the findings detailed in the next review and assessment report due at that time.

5.2 New developments with an impact on air quality

Any new developments that have been granted planning permission and will have an impact on air quality, especially those that will significantly change traffic flows, should be listed for future investigation. There are six new developments that have been granted planning permission since the Updating and Screening Assessment in 2003 and which may have an impact on air quality, they will be investigated further and detailed in the Updating and Screening Assessment report to be produced in April 2006.

- Land at Notcutts Garden Centre, Ipswich Road, Woodbridge - Outline Planning Application C04/1823
This is an outline planning application granted permission for the refurbishment and extension of Notcutts garden centre, erection of medical centre and housing (including sheltered and affordable housing) together with new access, parking, public open space and landscaping. The application has been approved subject to finalising legal issues. The garden centre will have an additional floor space of some 1900m². There are 164 car parking spaces proposed and 33 over-spill car parking spaces for the garden centre, along with 58 car parking spaces for the offices and associated service yard. The new medical centre will have 36 car parking spaces provided. The

sheltered housing will comprise of a maximum of 70 sheltered housing units. There will also be an addition 28 flats abutting Fen House and Fen Meadow Walk. A new vehicular access to serve the whole site will be provided in the form of a new roundabout.

- Extension at Tesco, Anson Road, Martlesham Heath - Planning Application C02/0780
This planning application has recently been granted permission. It is for an extension to the existing retail store together with an enlarged service yard and cage marshalling area, an extension to the car park, amendments to the existing car parking layout and associated works. The changes will involve an increase in the number of car parking spaces from 495 to 622. Works to extend the store and site have recently commenced.
- Land off Anson Road, Martlesham Heath – Outline Planning Application C96/0048
A subsidiary of Tesco Stores Ltd owns the land adjoining the C02/0780 application site to the south-east, as detailed above. Outline planning permission for the ‘erection of non-food retail units (40,000 gross square feet (3,716 m²)), access road and servicing’ was originally approved in April 1993. The permission was subsequently renewed in March 1996 (C96/0048) and again in July 2000. In 2003 planning application C03/1571 was received with detailed plans for the site, a terrace of three retail units with customer parking for 197 cars. This most recent application is awaiting submission of amended plans before any final approval can be granted.
- Development of land at Clickett Hill and Blofield Hall, north of Blofield Road / Nicholas Road, Trimley St Mary - Outline Planning Application C98/0290
This outline planning permission is for earthworks and provision of infrastructure in connection with the use of land for business (B1), industrial (B2) and storage and distribution (B8) purposes. It includes the formation of plateaux, provision of roads, alterations to Blofield Road and its junction with Trinity Avenue, provision of flood ponds, building, structural landscaping and disposal of soil. There are six plateaux A-E included in the outline planning permission; plateaux A,B,E and F have outline permission for any of the planning use classes listed above and plateaux C and D only have permission for planning use class B1 (business) purposes. A detailed planning application has now been received, and planning permission is currently being drawn up, for the use of plateaux E and F for container storage and haulage business, this may be operational by the end of 2005.
- RAF Woodbridge Airfield Barracks – redevelopment to form new barracks for the 23 Engineer Regiment (Air Assault) Brigade, Sutton - Planning Application C03/2371
This is a redevelopment of part of RAF Woodbridge to provide a new barracks for the 23 Engineer Regiment (Air Assault) Brigade. It involves the demolition of existing buildings and other structures with redevelopment to provide new offices, garages, workshops, stores, single living accommodation, recreational facilities and other associated works. There will be 636 Army personnel located on the site once the work is complete. Work to the site has already commenced and the facilities are due to become operational during 2006.
- New school facility for Woodbridge School in Pytches Road, Melton – Planning Application C04/0178
This is a Suffolk County Council Planning Application to develop a new school facility for Woodbridge School, to accommodate 210 pupils with an additional nursery unit for pre-school children. Vehicular access to the school will be solely via Wilkinson Way. Children using the school may include those currently attending Woodbridge Primary School, which is due to be shut down and redeveloped - further information is provided below.

In addition to the above developments, there are a further three planning applications in Woodbridge that have been granted planning permission and are in close proximity to one another. Individually these developments would not significantly effect traffic flows, but together they may have a significant effect on traffic flows in the area. These developments also have associations with the new school proposed in Pytches Road, as outlined above. Traffic flows will be altered due to these developments but the extent of this, and the areas that will be affected, are unknown at this time.

These developments will be investigated further and detailed in the Updating and Screening Assessment report to be produced in April 2006.

- **Redevelopment of Woodbridge Primary School, New Street, Woodbridge – Planning Applications C04/0167 and C04/0168**
Planning Application C04/0167 is for the demolition of temporary classrooms, caretakers cottage, part dining hall building and parts of the main building to facilitate redevelopment of the site to provide a new library and 23 houses/flats. The second application, C04/0168 is for the erection of extensions, alterations and conversion of the existing school building to provide a library, four houses and five flats and the erection of 14 houses. At the present time these applications are approved subject to legal agreements being drawn up. There is no further information on a time-scale for commencement of work to the site and the application would appear to be associated with the applications for a new school in Pyches Road (outlined above) and the redevelopment of the existing library (outlined below).
- **Redevelopment of Woodbridge Library Site, New Street, Woodbridge – Planning Applications C04/0169 and C04/0170**
These applications are for the demolition of the existing library building and for the erection of a 3-storey building with medical facilities on the ground floor and 5 x 2-bedroom and 2 x 1-bedroom maisonettes above. Both applications are approved subject to legal agreements being drawn up.
- **Development on north-east side of 11 The Thoroughfare, Oak Lane Car Park, Woodbridge – Planning Application C04/1560**
This application is for the erection of a 3-storey building with basement level car parking to incorporate 3 retail units, storage and servicing on ground floor with 14 x 1-bedroom residential units above. This application is currently in the early stages of being constructed.

5.3 New Road schemes

Any new roads or road schemes that have been constructed or approved should be listed for future investigation. There have been no new roads constructed or road schemes approved for the Suffolk Coastal district that would significantly change traffic flows and impact on air quality objectives since the Updating and Screening Assessment of 2003.

Many consultation responses were received following the Updating and Screening Assessment regarding road alterations for the Park and Ride scheme at Martlesham Heath, further assessment of this site has been undertaken and the findings are presented in section 11 of this report.

5.4 New landfill sites, mineral developments etc.

Any new landfill sites, quarries etc. which are in operation, or have been granted planning permission, and which have nearby relevant exposure should be listed for future investigation. There are no new developments of this nature within the Suffolk Coastal district or neighbouring authorities since the Updating and Screening Assessment of 2003.

6 Local Planning Policies relating to air quality

The land use planning system is recognised to play an integral part in improving air quality in the Local Air Quality Management regime. Government policy on planning is set out in Planning Policy Guidance notes/ Planning Policy Statements, Regional Planning Guidance, circulars and statements, and by precedent through decisions issued on individual plans and proposals.

Planning Policy Guidance notes (PPGs) are issued to help local authorities in land use planning by providing information from the Government on various themes. PPGs are currently being updated

and will be replaced by Planning Policy Statements (PPSs). The advice in the PPG and PPS documents is taken into account when the Local Development Plan/Document is produced for the Suffolk Coastal area and is also material in individual planning applications. There are several PPG/PPS documents relevant to air quality as follows:

- PPS 1 : Delivering Sustainable Development
- PPG 3 : Housing
- PPG 6 : Town Centres and Retail Developments
- PPG 13 : Transport
- PPS 23 : Planning and Pollution Control

PPS 1 sets out the Governments overarching planning policies on the delivery of sustainable development through the planning system. It states the following of relevance to air quality:

‘Planning authorities should seek to enhance the environment as part of development proposals. Significant adverse impacts on the environment should be avoided and alternative options which might reduce or eliminate those impacts pursued.’

‘Development plan policies should take account of environmental issues such as ... air quality and pollution...’

PPS 23 sets out the Governments policies on Planning and Pollution Control and advises that:

‘any consideration of the quality of land, air or water and potential impacts arising from development, possibly leading to impacts on health, is capable of being a material planning consideration, in so far as it arises or may arise from or may affect any land use.’

Appendix A of the document advises on matters for consideration when preparing Local Development Documents and taking decisions on individual planning applications and lists:

‘the possible impact of potentially polluting developments (both direct and indirect) on land use, including effects on health, the natural environment or general amenity.’

‘the existing, and likely future, air quality in an area, including any AQMAs or other areas where air quality is likely to be poor (including the consideration of cumulative impacts of a number of smaller developments on air quality, and the impact of development proposals in rural areas with low existing levels of background air pollution). The findings of air quality reviews and assessments will be important in the consideration of local air pollution problems and the siting of certain types of development.’

‘the need for compliance with any statutory environmental quality standards (including the Air Quality Objectives prescribed by the Air Quality Regulations 2000 and amendment Regulations 2002)’

The Development Plan for Suffolk Coastal District Council is currently made up of the Suffolk Structure Plan and the Suffolk Coastal Local Plan. The Regional Plan for the Eastern Area (RP6) was produced in 1991 and is due to be replaced, any advice needed is obtained directly from the Government Office. Over the next few years this system is to be replaced by the Local Development Framework in which there are no structure plans. In working toward this system, a draft document ‘The Regional Spatial Strategy for the East of England’ has been produced and is being consulted upon. Once this document is agreed any existing documents (such as the Suffolk Structure Plan) can be kept in place for up to 3 years whilst the adjustment is being made. Suffolk Coastal District Council will be consulting upon the options available later this year.

The **Suffolk Structure Plan** (June 2001) has the following policies relevant to air quality:

- Environment (ENV) 5 – ‘New development, including transport development, should be located and designed to minimise or avoid air, noise, water, land and light pollution. The polluting effects of a development, the presence of other existing or proposed sources of pollution which may affect it, and any cumulative pollution impacts arising, should all be taken into account. Development which would result in a significant pollution impact ... will not be acceptable.’

- County Strategy (CS) 1 – ‘Housing and employment growth will be accommodated at a level that will safeguard the environment and sustain the economic well being of Suffolk and does not give rise to problems of transport or service provision.’
- County Strategy (CS) 10 – ‘The County Council will pursue an integrated development and transport strategy, promoting the most effective use of the transport network ...’
- Transport (T) 1 – ‘In allocating transport investment, high priority will be given to the improvement of environmental conditions, ... effective use of existing infrastructure, reduced overall levels of car and lorry traffic, the integration of different modes of travel, ...’
- Transport (T) 5 – ‘The County Council will implement traffic management schemes which: (a) will reduce the adverse environmental, social, health and safety impact of vehicular travel ...’

The **Suffolk Coastal Local Plan** (February 2001) has the following objectives and policies of relevance to air quality:

- Environmental Objective xii – ‘to control or prevent, where within the Council’s powers, pollution of the environment.’
- Policy AP159: Rendlesham/Wantsiden (Former Base): General Principles – ‘Development proposals must be ... accompanied by an Environmental Management Plan, Environmental Statement, Traffic Impact Assessment ...’

The Local Plan is being revised and work is progressing towards the preparation of a Local Development Framework. A number of issues relating to roads and transport have been identified, four of which are linked with air quality:

- The impacts of heavy goods vehicles on rural roads and the conflict that can occur as rural businesses grow.
- The management of cars at tourist areas. Visitors are vital to the economy of the area, but the sheer numbers of vehicles at peak periods can create problems for local people.
- The role of the A12 in the economy of the district, notably the rural north, and the opportunities for its improvement.
- Access to Adastral Park and proposed high tech business cluster at Martlesham Heath (further information is provided on this proposal in section 7 of this report).

A system exists whereby all planning applications to Suffolk Coastal District Council are recorded on a Public Register. This comprehensive list is then circulated to the Principal Environmental Health Officer in the Environmental Protection team who assesses which applications will require investigation by the team. Details of these applications are then provided to members of the team for relevant comment on any issues relating to air quality, noise, contaminated land, drainage etc.

7 Proposed Future Developments

There are a number of future proposed developments within the Suffolk Coastal district that are either included in the Local Plan or have not yet had planning permission granted, and which may impact on air quality. It is important that these developments are logged in this Progress Report so that their progress through the planning system can be monitored and any potential impacts on air quality assessed. Updates on these developments will be detailed during the next full round of review and assessment, to begin later this year. There are four developments that we are aware of at this time:

- Port of Felixstowe - Felixstowe South Reconfiguration, Felixstowe
Information regarding this development is provided in section 11 of this report.

- Suffolk Innovation Park, Adastral Park, Martlesham Heath
Policy ECON 7 in the Suffolk Structure Plan (2001) allows for the presence of an innovation park at Martlesham Heath as follows:

“The establishment and growth of business clusters is supported, and provision for them will be considered in local plans. ... Adastral Park at Martlesham Heath is suitable as one significant focus for a business cluster in Suffolk.”

Following this inclusion in the Structure Plan, Suffolk Coastal District Council has prepared a Supplementary Planning Guidance for this location. SPG 12.8 – Hi-Tech Cluster: Martlesham Heath Area Specific Guidance June 2001. The District Council proposes a Hi-Tech Cluster comprising of:

- Redevelopment and new development within Adastral Park itself including development of an Enterprise Village.
- Allocation of an area of land, approximately 12 hectares to south of Adastral Park complex and adjacent to the A12, as an Innovation Park.
- Development of a strategic gateway for the Hi-Tech Cluster.

The proposed floor space for the development is 30,351m² with 870 car parking spaces to be provided. There has been no outline planning application made as yet for the site but the Council is expecting that an application may be made for this site later this year.

- Felixstowe South Seafront land (land bounded by Orford Road, Langer Road, Manor Road, Manor Terrace and the seawall)

Policy AP202 in the Suffolk Coastal Local Plan (February 2001) identifies the South Seafront land in Felixstowe as suitable for comprehensive development. The policy includes detail of the principal components that any development shall contain. This includes recreation/leisure orientated uses, sufficient car parking for the site, retention of the Martello Tower, cycle route and public footpath, the use of the Herman de Stern building for complementary activities, appropriate modifications and improvements to the highway infrastructure at the site and routes leading to it. It also states that residential development will only be acceptable if it constitutes a minor part of the land uses. Supplementary Planning Guidance (SPG 12.2) has been produced by Suffolk Coastal District Council for Felixstowe South Seafront to explain in more detail how it expects the policies of the Suffolk Coastal Local Plan to be implemented for development of this area.

Planning Application C04/0300 was submitted for the redevelopment of the South Seafront land, to include the construction of a public park including amphitheatre, play equipment, toilets, refreshment centre and associated public car park together with 209 dwellings (comprising of 2, 3, 4 and 5-storey buildings). This application was refused, but the decision has been appealed and this is due to be heard in September 2005.

- Woodbridge Riverside area

A Supplementary Planning Statement has been produced by Suffolk Coastal District Council for the Woodbridge Riverside area to explain in more detail how it expects the policies of the adopted Suffolk Coastal Local Plan to be implemented for development of this area. The area covered in this document is to the east of the East Suffolk Railway line and north of Ferry Quay including the site of the former Whisstocks Boatyard. It extends north of Tide Mill Yacht Harbour, west of the railway line it encompasses areas to the north and south of Tide Mill Way and includes the former Gas Works site off Quayside. Opposite the gasworks site it also includes the site of the former Quayside Mill between Crown Place and Doric Place. It also includes the Riverside Theatre, Woodbridge Station and its car park and the former railway goods shed.

Both the Whisstocks site and Quayside Mill have been the subject of planning applications that challenged policies in the adopted Local Plan, these applications were refused and were then subsequently the subject of planning appeals where the Local Plan policies were upheld. There has been an application for the former goods shed – WR Refrigeration Ltd building, Station Road, Woodbridge (C04/1519). This application was for a change of use, alteration and extension to form offices, restaurant, 5 flats and warehouse with vehicular link between adjoining car parks. This application is in the process of being granted permission in the near future. There is also an application, currently undergoing consultation, for the former gas works site - for the erection of

13 dwellings, two office suites, formation of vehicular access and parking area and ancillary works.

8 Local Air Quality Strategy

Suffolk Coastal District Council has not drawn up a local Air Quality Strategy at the present time. The need for a strategy will be considered as part of our ongoing review of air quality.

9 Local Transport Plan and Strategies

The Local Transport Plan system is a 5-year transport strategy at a local level whereby Local Transport Authorities are required to submit a 5-year Local Transport Plan (LTP) for their area that sets objectives and targets for transport, and strategies for achieving them. The plans must cover all forms of transport and establish strategies to tackle congestion and poor air quality. The LTP provides the basis for allocating resources to the Local Transport Authority in order for them to implement their plans. The Local Transport Authority for Suffolk is Suffolk County Council.

In July 2000 the first LTP for Suffolk was submitted covering the period 2001/2 to 2005/6. This has an objective under the Environment and Health theme relevant to air quality: 'To promote transport patterns that maintain and where possible improve air quality.' Policy 37 in the LTP is related to this objective: 'To not exceed the threshold limits and objectives contained in the National Air Quality Strategy.'

This summer (2005) the second LTP for Suffolk must be submitted to cover the period 2006/7 to 2010/11, and work is currently being undertaken to produce this document.

The Suffolk LTP is the over-arching document which sets the scene for the county. Local Transport Action Plans (LTAPs) have then been produced to cover specific towns or groups of towns in Suffolk to look at local issues and measures required. Annual LTP Progress reports are produced to provide updates on the implementation of the LTP and any LTAPs developed.

The LTP Progress report for 2004 reports that no Air Quality Management areas have been declared in Suffolk, however there are some sites that may be close to the threshold limits set in the National Air Quality Strategy and they will continue to be closely monitored. With regard to the Suffolk Coastal district the following is included:

- The Suffolk LTP does not propose any major transport schemes (those costing more than £5 million) within the Suffolk Coastal district.
- LTAPs have been produced for the towns of Aldeburgh, Framlingham, Felixstowe & the Trimleys, Leiston and Saxmundham. In Leiston and Saxmundham transport activities have been integrated with those for environmental enhancement and economic regeneration (utilising Single Regeneration resources) with the result being considerable improvements in both centres in 2003/4. In Felixstowe the LTAP has been integrated with strategies for Town Centre Management and Resort Regeneration. The final draft of a LTAP for Woodbridge and Melton is also currently under consultation.
- The Park & Ride scheme has been completed at Martlesham Heath, this aims to ease traffic flows on the A1214 and congestion in the town centre of Ipswich. Further information on the Park and Ride scheme is provided in section 12 of this report.

There is one major road scheme for the A12 within the Suffolk Coastal district that has been put forward for further assessment work and will appear in the second LTP due for completion in July 2005. It is known as 'The Four Villages Bypass' and is a proposed Bypass Option for the A12 which

would start at the northern end of the Ufford Bypass, run to the eastern side of the existing A12 and terminate just to the north of Farnham at the A1094 junction. The scheme would thus bypass the villages of Marlesford, Little Glemham, Stratford St. Andrew and Farnham.

Works are also due to be undertaken on the junction of the A1152 and B1438 in Melton (Melton crossroads) which will widen two arms of the junction and thus increase its capacity. Increased junction capacity is needed to assist with future traffic increases predicted at this junction due to a number of planned developments in the area.

10 Continued Assessment of the Junction of Lime Kiln Quay Road, Thoroughfare and St. John's Street in Woodbridge

10.1 Review and assessment history for the junction

The Updating and Screening Assessment Report (June 2003) and the Detailed Assessment Report (March 2004) of air quality within the Suffolk Coastal district, reported results of monitoring and modelling undertaken at the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street in Woodbridge (hereafter referred to as the Woodbridge junction). This junction has four arms that are controlled by traffic lights and 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 closest of which is less than 1 metre from the kerb. The junction layout can be seen in detail on the map provided in figure 10.1.

A detailed assessment was undertaken for this junction following the results of nitrogen dioxide (NO₂) diffusion tube monitoring in 2002. The results showed that the kerbside site Woodbridge 1 had an annual mean NO₂ concentration in 2002 of 51.9 µg/m³, which was above the objective of 40µg/m³. The result for the other monitoring site at the junction, Woodbridge 5, was considerably lower at 35.3µg/m³. (The location of both diffusion tube monitoring locations are marked on the map in figure 10.1). When the results were predicted to the end of 2005, for comparison with the air quality objectives, these calculations resulted in a predicted NO₂ concentration of 47.8µg/m³ at Woodbridge 1 and 32.5 µg/m³ at Woodbridge 5. The results for this junction were considered unusual as Woodbridge 1 and Woodbridge 5 are opposite one another and only 19.5 metres apart, but the diffusion tube results showed a difference in the annual mean of more than 15 µg/m³ putting Woodbridge 1 above the objective level and Woodbridge 5 below it. It was concluded that detailed computer modelling of NO₂ concentrations at receptor locations on this junction was needed. Particulate Matter (PM₁₀) is also emitted from vehicle exhausts and the technical guidance LAQM.TG(03) advises that busy roads and junctions may emit significant quantities of PM₁₀ to cause potential exceedances of the air quality objectives. For this reason it was decided that detailed computer modelling of PM₁₀ concentrations at receptor locations on this junction would also be undertaken.

The computer model used was the atmospheric dispersion model ADMS version 3.1, which predicts air quality impacts of emissions from moving and idling traffic at receptor locations. The National Environmental Technology Centre (netcen) undertook the modelling, on behalf of Suffolk Coastal District Council. The model was validated using the results of NO₂ monitoring from an automatic analyser located at a nearby busy road 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. The detailed assessment of NO₂ and PM₁₀ for this junction is presented in the Updating and Screening Assessment report (June 2003), within which the netcen report is attached as Appendix I, the reports are available for viewing on the Council's website at <http://www.suffolkcoastal.gov.uk>

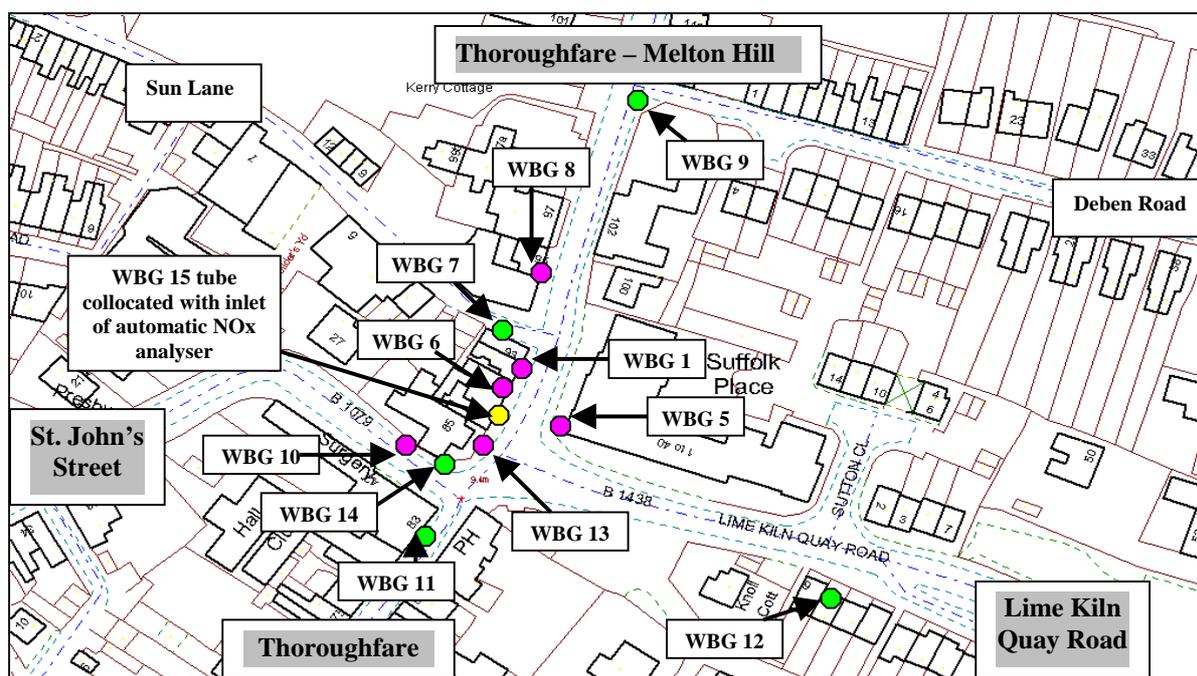
The findings of the detailed assessment modelling for PM₁₀ showed that it was very unlikely (with a probability less than 5%) that an exceedance of the 24-hour objective would occur at the Woodbridge junction in 2004. It was recommended that Suffolk Coastal District Council should not consider declaring an Air Quality Management Area for PM₁₀ from road transport at this junction. The findings of the detailed assessment undertaken by netcen were accepted and it was concluded that no further assessment of PM₁₀ was necessary for the Woodbridge junction.

The findings of the detailed assessment modelling for NO₂ 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 NO₂ objective, which 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 NO₂ from road transport at this junction. The Council was advised to undertake further monitoring at building facades at a number of locations on both sides of the street and at the junction for a period of 12 months and report the findings.

The findings of the detailed assessment undertaken by netcen were accepted and it was concluded that the results of the diffusion tube survey to be undertaken at this junction would be assessed once the monitoring was complete. Defra commented on the findings of the detailed assessment for this junction and 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.

Location of nitrogen dioxide diffusion tubes and automatic NO_x analyser sited at the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street (Kerbside and Roadside sites) in Woodbridge



● Current sites ● Sites now removed ● Site of automatic NO_x analyser inlet

<p>This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Licence No. 100019684. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.</p>	<p>Not to scale</p>	<p>↑ N</p>
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A 12-month diffusion tube survey at receptor locations around the junction was undertaken from July 2003 to June 2004, with seven extra sites added each consisting of a single diffusion tube. A diffusion tube monitoring site was placed at the same distance as the closest receptor location on each arm of the junction with additional sites being placed near Woodbridge 1 due to the elevated NO₂ concentrations seen here. The new monitoring sites were Woodbridge 6, 7, 8, 9, 10, 11 and 12 and the location of each is marked on the map in figure 10.1.

In March 2004 the Detailed Assessment and Continued Updating and Screening Assessment Report for the Suffolk Coastal district was produced, as required by defra. This reported on the progress of monitoring being undertaken at the Woodbridge junction, and included results of the first six months of diffusion tube data. The results indicated that conditions at the junction were unusual. The results

for three arms of the junction (Lime Kiln Quay Road, St. John's Street and Thoroughfare) were predicted to be within the annual mean objective in 2005. The results for the northern side of Thoroughfare (Melton Hill) arm of the junction (Woodbridge 1, 6 and 8) were predicted to be above the annual mean objective in 2005.

Following the results of the first six months of diffusion tube data, advice was obtained from netcen regarding the junction and a site visit made. It was concluded, as suggested by defra, that an automatic analyser measuring oxides of nitrogen (NO_x) would be sited at the 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 was difficult to find. Permission however was obtained from the occupant at one of the receptor locations, and at the time of our last air quality report preparations were underway to site the analyser and begin the monitoring.

10.2 Update on monitoring undertaken at the junction

On the advice of netcen, two additional diffusion tube sites were added at the junction in January 2004. These sites (Woodbridge 13 and 14) were located near the centre of the junction to provide further information on NO_2 concentrations. The locations of these sites are shown on the map in figure 10.1.

The automatic NO_x analyser began collecting data from the Woodbridge junction on 5 April 2004. Due to space restrictions at the junction, the analyser inlet was unable to be located at the diffusion tube site showing the highest concentration of NO_2 (Woodbridge 1). The analyser was located in the front garden of 87 Thoroughfare with the maximum length of tubing taking the inlet point midway along 89/91 Thoroughfare, approximately 13.5 metres from Woodbridge 1. The location of the analyser and its inlet can be seen on the map in figure 10.1. A triplicate diffusion tube site (Woodbridge 15) was collocated at the analyser inlet in order to enable the diffusion tube results to be corrected for bias.

The 12-month diffusion tube survey was run from July 2003 to June 2004. At the end of the survey period the annual mean NO_2 concentration for each site was calculated (results for each site are shown in table 10.2 later). A number of the new sites had an annual mean NO_2 concentration close to or above the air quality objective of $40 \mu\text{g}/\text{m}^3$ (Woodbridge 6, 8 and 10) and it was decided that monitoring at these sites would continue. The historic diffusion tube sites, Woodbridge 1 and 5 were also left in place. The diffusion tube sites Woodbridge 7, 9, 11 and 12 had an annual mean NO_2 concentration below the air quality objective and were removed. Detailed information regarding the results of diffusion tube monitoring follow later in this section of the report.

Automatic NO_x analyser results

The automatic analyser operates continuously, recording and logging concentrations every 15 minutes and the data downloaded daily. The analyser measures concentrations of oxides of nitrogen (NO_x), nitrogen oxide (NO) and nitrogen dioxide (NO_2) by ozone chemiluminescence. This is the reference method specified by the EC Nitrogen Dioxide Directives. Calibration methods employed included daily automatic calibration by permeation tube, gravimetric cylinder and static dilution. A fortnightly manual two point calibration by cylinder audit was undertaken to quantify the analyser 'zero' and 'span' response. The 'zero' response is the response of the analyser when the pollutant being measured is not present in the sample airstream, and the 'span' response is the response of the analyser to a gas mixture of an accurately known concentration. Data collection, 6-monthly 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. The expected accuracy of the method for NO_2 is $\pm 10-11\%$ with a precision of $\pm 3.5\text{ppb}$. The continuous analyser records levels in parts per billion (ppb); these values are then converted to $\mu\text{g}/\text{m}^3$.

The automatic analyser has recently completed 12 months of monitoring at this location and the final Quality Assurance / Quality Control procedures are being undertaken in order to produce the ratified 12-month data set for this site. The final ratified data are not available for inclusion in this report and

will be reported on this summer in an additional full detailed assessment report for this junction. A 6-month ratified data set (5 April to 30 September 2004) has been obtained, together with a 9-month provisional data set (5 April 2004 to 4 January 2005). The provisional 9-month data set was produced in order to calculate a bias correction factor for collocated diffusion tubes in 2004, and was screened and scaled for this use. Both monitoring periods have data capture greater than 90% as recommended in the technical guidance LAQM.TG(03) for quality assurance of the data produced.

A summary of the average measured concentrations and the maximum hourly mean concentrations of NO₂ for both the 6-month and 9-month monitoring periods is shown in table 10.1 below. Detailed summary tables and graphs for both sets of monitoring results are provided in Appendix B.

Table 10.1 Summary of 6-month ratified and 9-month provisional NO₂ data collected by the automatic analyser located at the Woodbridge junction in 2004.

	Concentration of NO ₂ recorded by analyser	
	6-month ratified data	9-month provisional data
Average concentration	37 µg/m ³	36 µg/m ³
Maximum hourly mean	151 µg/m ³	151 µg/m ³
Data capture	98.5%	93.0%

The results in table 10.1 show that the 6-month and 9-month data for the average concentration and the maximum hourly mean are similar. The 6-month and 9-month recorded concentrations indicate an average NO₂ concentration for the site in the range of 36 - 37 µg/m³, which is below the annual mean objective of 40 µg/m³. The maximum hourly mean is 151 µg/m³, which is also below the 1-hour objective of 200 µg/m³ not to be exceeded more than 18 times per year.

Diffusion tube results

Monitoring was conducted using passive diffusion tubes, exposed on a monthly basis. Information regarding the analyst laboratory used and its accreditation details is provided in Appendix C. The 12-month diffusion tube survey undertaken at the Woodbridge junction was run between two calendar years (2003 and 2004) and at the end of the sampling period, June 2004, some sites were removed and others continued on the basis of interpretation of results obtained in the survey.

The diffusion tube data is therefore presented in two forms in this report. A summary of the annual mean NO₂ concentration recorded by the 12-month survey at each monitoring site is presented in table 10.2. In addition, a summary of the annual mean NO₂ concentration in 2003 and 2004, for sites present for 9 months or more, are presented in table 10.3.

Diffusion tubes can over or under read and the annual average should be corrected for laboratory bias. Bias correction factors for 2003 and 2004 were calculated using results from the collocation studies undertaken in each year. These factors were used to correct the annual average concentration recorded for each site, and have been compared with the bias adjustment factor for the analyst laboratory, Harwell Scientifics, obtained from the Review and Assessment Helpdesk website inventory. Full details of the analytical technique and laboratory used, monitoring locations, diffusion tube bias adjustment information and breakdown of results on a monthly basis for the monitoring periods can be seen in Appendix C.

Bias correction of the diffusion tube data from the 12-month study that extended over both 2003 and 2004 was undertaken using the factor produced for 2004. The defra monitoring help desk advised that the 2004 factor represented the worse case scenario and so should be the one used.

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 tables 10.2 and 10.3, sites where the predicted annual mean NO₂ concentration in 2005 is above the objective level of 40 µg/m³ are highlighted in grey.

Table 10.2 Bias corrected annual mean NO₂ diffusion tube concentrations for a 12-month survey undertaken at the Woodbridge junction from July 2003 to June 2004. Figures in micrograms per cubic metre (µg/m³). Annual mean concentration at each site predicted forward to 2005.

Site and location	Annual mean from 12-month survey (July 2003 to June 2004)	Annual mean predicted forward to 2005 (using calculations for 2004) (Kerbside & Roadside sites = x0.97)
Woodbridge 1 (Thoroughfare)	53.1	51.5
Woodbridge 5 (Thoroughfare)	35.2	34.1
Woodbridge 6 (Thoroughfare)	49.6	48.1
Woodbridge 7 (Sun Lane)	28.4	27.5
Woodbridge 8 (Thoroughfare)	44.2	42.9
Woodbridge 9 (Deben Road)	30.2	29.3
Woodbridge 10 (St. John's Street)	37.9	36.8
Woodbridge 11 (Thoroughfare)	28.6	27.7
Woodbridge 12 (Lime Kiln Quay Road)	32.6	31.6

The results of the 12-month diffusion tube survey showed three sites, Woodbridge 1, 6 and 8, with a predicted annual mean NO₂ concentration in 2005 above the objective level of 40 µg/m³. In addition, Woodbridge 10 had a predicted annual mean NO₂ concentration in 2005 close to the objective. All other monitoring sites, Woodbridge 5, 7, 9, 11 and 12 had a predicted annual mean NO₂ concentration for 2005 within the objective.

At the end of the 12-month diffusion tube survey, monitoring was continued at those sites predicted to be close to or above the objective level in 2005 – Woodbridge 1, 6, 8 and 10. Monitoring was also continued at Woodbridge 5 as this is a historic monitoring site for this junction. The diffusion tube sites Woodbridge 7, 9, 11 and 12 were within the objective level and so were removed.

Additional monitoring data to the end of 2004 is available for sites that were continued. Table 10.3 below shows the annual mean NO₂ concentration recorded at sites present for 9 months or more in 2003 and 2004, together with the predicted concentration for each site in 2005.

Table 10.3 Bias corrected annual mean NO₂ diffusion tube concentrations recorded in 2003 and 2004 for sites at the Woodbridge junction that continued monitoring after June 2004. Figures in micrograms per cubic metre (µg/m³). Annual mean concentration at each site predicted forward to 2005.

Site and location	2003		2004	
	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.95 Others = x 0.96)	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.97 Others = x 0.98)
Woodbridge 1 (Thoroughfare)	50.8	48.3	49.4	47.9
Woodbridge 5 (Thoroughfare)	36.1	34.3	31.5	30.6
Woodbridge 6 (Thoroughfare)	49.1	46.6	45.7	44.3
Woodbridge 8 (Thoroughfare)	43.2	41.0	41.9	40.6
Woodbridge 10 (St. John's Street)	36.7	34.9	34.5	33.5
Woodbridge 13 (Thoroughfare)	~	~	34.7	33.7
Woodbridge 14 (St. John's Street)	~	~	34.1	33.1
Woodbridge 15 (Thoroughfare)	~	~	38.7	37.5

The monitoring data collected in 2003 and 2004 is consistent with the results of the 12-month survey. Annual mean NO₂ concentrations recorded at Woodbridge 1, 6 and 8 are predicted to be above the objective level in 2005, and concentrations at Woodbridge 5 and 10 are confirmed to be below the objective level in 2005.

Results of monitoring at the new diffusion tube sites, Woodbridge 13, 14 and 15, in 2004 show the NO₂ annual mean concentration at all three to be below the objective level in 2005. Woodbridge 15 is the triplicate diffusion tube site collocated with the automatic analyser, situated 4.5 metres from Woodbridge 6 and 13.5 metres from Woodbridge 1. The predicted annual mean NO₂ concentration in 2005 is close to but below the objective level.

The results for diffusion tubes located on the northern side of Thoroughfare (Melton Hill) arm of the junction show a gradient in NO₂ concentration travelling away from the centre of the junction. Concentrations increase from 33.7 µg/m³ at the Woodbridge 10 site, to 37.5 µg/m³ at the Woodbridge 15 site and 44.3 µg/m³ at the Woodbridge 6 site. The concentration of NO₂ peaks at 47.9 µg/m³ at the Woodbridge 1 site, and then decreases again to 40.6 µg/m³ at the Woodbridge 8 site.

10.3 Conclusion

The 6-month ratified and 9-month provisional data sets obtained from the automatic analyser to date show the annual mean to be below the objective level of 40 µg/m³ at the site of the analyser. The diffusion tubes collocated with the analyser have allowed us to correct all diffusion tube results obtained at the junction for laboratory bias, therefore increasing the reliability of the data recorded. The results of the diffusion tube monitoring confirm that conditions at the junction are unusual, with concentrations of NO₂ being spatially variable. The results for the closest receptor locations monitored on the Lime Kiln Quay Road, St. John's Street, and Thoroughfare arms of the junction are predicted to be within the annual mean objective for NO₂ in 2005. The results for the northern side of Thoroughfare (Melton Hill) arm of the junction show a distinct rise in NO₂ concentration rise as you travel away from the centre of the junction, peaking above the objective level at 47.9 µg/m³ at the Woodbridge 1 site and then decreasing again. An increase in annual mean NO₂ concentration of more than 10 µg/m³, taking results from below to above the objective level, was observed the short

distance of 13.5 metres between the automatic analyser/Woodbridge 15 site and the Woodbridge 1 site.

The additional monitoring data obtained for this junction from the automatic analyser and the diffusion tubes will be used to update the detailed computer modelling originally undertaken for the junction in order to predict NO₂ concentrations at all receptor locations on the junction. As detailed earlier, the final ratified 12-month data set for the automatic analyser is awaited before the modelling can be undertaken. The relevant traffic count information was obtained in October 2004 for the junction and the modelling can therefore be undertaken as soon as the ratified data is received.

The automatic analyser will continue to monitor NO₂ concentrations at its current location, as it is not possible due to space restrictions to monitor any closer to the Woodbridge 1 diffusion tube site. The diffusion tube sites Woodbridge 1, 5, 6, 8, 10, 13 and 15 will also continue until at least the end of 2005. The diffusion tube site at Woodbridge 14 was removed in January of 2005 as the results were similar to those obtained for Woodbridge 13 which is the more relevant location for the area of interest on the junction.

A full report with the results and conclusions of the detailed computer modelling to be undertaken for the Woodbridge junction will be published later in 2005. The report will determine whether it will be necessary to consider the declaration of an Air Quality Management Area at the Woodbridge junction.

11 Continued Assessment of Emissions Generated by the Port of Felixstowe

11.1 Introduction

The Port of Felixstowe is located within the Suffolk Coastal district, it 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. 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.

Trinity III and Trinity III (Phase 2) Terminal extensions

The original Trinity III Terminal extension was completed in 1996 and provided an extra 630 metres of deep-water quay to the Port. In February 2000 planning permission was granted by Suffolk Coastal District Council for the Trinity III (Phase 2) Terminal – a proposed extension of 14 hectares of land reclamation and a change of land use to planning use class B8 (storage and distribution). The land was to be used 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.

Following a Public Enquiry in 2002, the Port of Felixstowe was also granted the Harbour Revision Order to proceed with an extension to extend the deep-water quay at the Trinity Terminal by 270 metres. This included enclosure and reclamation of part of the sea and river bed adjacent to the dock, comprising of 7.27 hectares, for a new storage and handling park.

The first phase of the Trinity III (Phase 2) Terminal extension consisted of 6 hectares of back-up land behind the existing Trinity III Terminal and was opened in mid-2003. In November 2004 the 270 metre quay extension was opened, increasing the length of deep-water berths on the Trinity Terminal to 900 metres. The infrastructure for the Trinity III (Phase 2) Terminal extension is now in place and it is working to full capacity.

Planning Application for Felixstowe South Reconfiguration

In 2003 Hutchison Ports (UK) Ltd 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.

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 increase by 1.56 million Twenty-foot Equivalent Units (TEU), to total 5.56 million TEU. TEU is the industry measure of container capacity and on average the ratio is 1.5 TEUs per container. The Port of Felixstowe website advises that, if approved, it is expected that the first phase of the new terminal would commence operation at the end of 2007.

Posford Haskoning (Environment) was commissioned by Hutchison Ports (UK) Ltd and submitted an Environmental Statement to accompany the Planning Application. This included 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. It also included a report detailing the 'In-combination' effects on air quality should both the Felixstowe South Reconfiguration and Bathside Bay Container Terminal (detailed below) Planning Applications gain approval.

In October 2004 the Felixstowe South Reconfiguration Planning Application was taken to Public Inquiry, the Inquiry closed in December 2004. A decision has not yet been made and is expected later

in 2005. Further information on the Public Inquiry is available at <http://www.planning-inspectorate.gov.uk/felixstowe/index.htm>, including all documents submitted as part of the Inquiry.

Planning Application for Bathside Bay Container Terminal, 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 craning 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.

In April 2004 the Bathside Bay Container Terminal Planning Application was taken to Public Inquiry, the Inquiry closed in October 2004. A decision has not yet been made and is expected later in 2005. Further information, including all documents submitted, on the Public Inquiry is available at <http://www.planning-inspectorate.gov.uk/bathsidebay/>

11.2 Review and assessment history for the Port of Felixstowe

Nitrogen dioxide (NO₂)

In the Updating and Screening Assessment concentrations of NO₂ at receptor locations along the A14 were estimated using the Design Manual for Roads and Bridges screening method (DMRB) to determine whether any exceedance of the objectives was likely. This included receptor locations at the Haven Exchange roundabout, Dock Spur roundabout and the intersection with the A12 at Nacton. The results from DMRB confirmed that NO₂ concentrations at all receptor locations modelled were within the objective levels for 2005, and the Updating and Screening Assessment Report (June 2003) concluded that no further action was necessary.

The report did, however, acknowledge that there was the potential for emissions of NO₂ from activities on and associated with the Port of Felixstowe to combine at nearby receptor locations. It was concluded that NO₂ concentrations would be monitored, using diffusion tubes, at the closest receptor location to the Port boundary, Adastral Close, and at a public receptor located approximately 70 metres from Dock Gate 2 roundabout in Ferry Lane.

Diffusion tube monitoring began at both locations in April 2003, with two additional sites located to determine whether a gradient existed between the kerbside at Dock Gate 2 roundabout and the receptor location in Ferry Lane. These sites were Felixstowe 13, 14, 15, and 16 and the location of each is shown in the maps in Appendix D. The results of monitoring for 2003 were presented in the Detailed Assessment and Continued Updating and Screening Assessment Report produced in March 2004. The results showed that the predicted NO₂ concentration in 2005 at the Adastral Close receptor (Felixstowe 14) was within the annual mean objective of 40 µg/m³. The results for the receptor located in Ferry Lane (Felixstowe 13) confirmed that a gradient did occur between the kerbside of Dock Gate 2 roundabout and the receptor (Felixstowe 15 and 16). The NO₂ concentration at the Ferry Lane receptor (Felixstowe 13) was marginally above the objective level when predicted to 2005, at 40.9 µg/m³. The NO₂ concentrations at Felixstowe 15 and 16 respectively were 53.0 µg/m³ and 65.7 µg/m³ respectively, well above the objective level.

It was concluded that the single diffusion tube site at the receptor would be triplicated to increase the accuracy of the monitoring results obtained, and the results of a further 12 months of sampling in 2004 would be presented in the next air quality report produced. The diffusion tube site at Adastral Close (Felixstowe 14) was already a triplicate site and this was left in place. The diffusion tube sites Felixstowe 15 and 16 had determined that a NO₂ gradient existed between Dock Gate 2 roundabout and the Ferry Lane receptor, and as these sites were not representative of public exposure they were removed.

Sulphur dioxide (SO₂)

An Updating and Screening Assessment was undertaken to investigate SO₂ emissions arising from boiler plant burning fuel oil at site buildings on the Port of Felixstowe. In combination the boiler plant could have a thermal capacity greater than 5 MW and therefore be classified as a significant emitter of SO₂. Information was obtained from the Port of Felixstowe advising that the combined thermal capacity of boilers and warm air heaters was 4.16 MW. As the combined thermal capacity did not exceed 5 MW no further assessment was necessary.

The Updating and Screening Assessment also reported on SO₂ 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. Only one area was identified, a signalled junction at Grange Road, Walton 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. Investigations were undertaken and advice sought from defra's Review and Assessment Helpdesk who confirmed that exceedance of the SO₂ objectives at receptor locations is unlikely, and further assessment was not necessary.

The Updating and Screening Assessment report included a Detailed Assessment for SO₂ concentrations arising from shipping activities at the Port of Felixstowe. External contractors, Entec UK Limited, were employed to undertake the assessment. Monitoring for concentrations of SO₂ from shipping emissions was undertaken for a six-month period at a site relevant to the nearest receptor location. The findings were that ambient concentrations of SO₂ were well within the relevant air quality criteria. The report concluded that the Port and surrounding residential areas would not require declaration of an Air Quality Management Area due to emissions of SO₂ associated with shipping activities and no further assessment was necessary.

Particles (PM₁₀)

In the Updating and Screening Assessment concentrations of PM₁₀ at receptor locations along the A14 were estimated using the Design Manual for Roads and Bridges screening method (DMRB) to determine whether any exceedance of the objectives was likely. This included receptor locations at the Haven Exchange roundabout, Dock Spur roundabout and the intersection with the A12 at Nacton. The results from DMRB confirmed that PM₁₀ concentrations at all receptor locations modelled were within the objective levels for 2005, and the Updating and Screening Assessment Report (June 2003) concluded that no further action was necessary.

LAQM.TG(03) states that there are emissions of PM₁₀ 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 PM₁₀ emissions from shipping activities at the Port of Felixstowe. The defra monitoring helpdesk advised that it would be possible to assess PM₁₀ levels using the results from monitored levels of SO₂ 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 PM₁₀ was carried out by Entec UK Limited. The findings were that the potential for the air quality objectives for PM₁₀ to be exceeded was negligible, and further assessment for this pollutant at the relevant receptors was not necessary.

During the consultation on the Updating and Screening Assessment and Detailed Assessment Reports, a response was received from someone in a position of knowledge questioning the shipping vessel figures used in the Entec UK Limited report to predict PM₁₀ concentrations arising from shipping. The consultation response stated that the vessel figures used in the modelling appeared to be too low. The consultation response was forwarded to Entec UK Limited who were asked to liaise directly with the consultee and report back on their conclusions, these would then be included in the next air quality report by Suffolk Coastal District Council.

Although investigations of emissions from traffic and shipping in isolation confirmed that further assessment was not necessary, the potential exists for emissions of PM₁₀ from combined activities at the Port of Felixstowe to cause elevated concentrations at nearby receptor locations. The Detailed Assessment and Continued Updating and Screening Assessment Report (March 2004) advised that an Environmental Statement had been submitted as part of the Felixstowe South Reconfiguration planning application. This included detailed information regarding current emissions of PM₁₀ from the different activities associated with the Port of Felixstowe, and future emissions should the planning approval be given. The report advised that Suffolk Coastal District Council commissioned a consultant to comment on the complex air quality information provided in the planning application. When his findings were received an assessment of the potential for emissions of PM₁₀ from combined activities at the Port of Felixstowe to cause an exceedance of the objectives at nearby receptor locations would be reported.

Expansion at the Port of Felixstowe

The Detailed Assessment and Continued Updating and Screening Assessment Report (March 2004) advised that future traffic increases, associated with the Port of Felixstowe, were predicted for the A14. These increases were associated with the Trinity III Terminal extension at the Port, opened in mid-2003, and on-going works to the Trinity III (Phase 2) Terminal extension, both of which would increase the capacity of the Port.

In addition, planning applications for the Felixstowe South Reconfiguration at the Port of Felixstowe, and the Bathside Bay Container Terminal Development at Harwich had been submitted to the relevant local authorities.

The report concluded that if the Felixstowe South Reconfiguration and/or Bathside Bay Container Terminal planning applications were granted permission they would potentially increase pollutant concentrations of NO₂, SO₂ and PM₁₀ at receptor locations close to the Port of Felixstowe and along the A14. The report advised that a consultant had been commissioned by Suffolk Coastal District Council to comment on the complex air quality information provided in the planning application for Felixstowe South Reconfiguration, and that the impacts with respect to air quality would be reported if the planning applications were granted permission.

11.3 Update on review and assessment

Environmental Statement for Felixstowe South Reconfiguration (FSR) Planning Application

The Environmental Statement that accompanied the planning application for FSR included an Air Quality Assessment report to determine the potential impacts of the development within the area of the Port, in the nearby town centre of Felixstowe and along the A14 towards Ipswich. It also included a report on the In-Combination effects of FSR and Bathside Bay Container Terminal developments if the applications are both approved, in which air quality was addressed.

A firm of consultants, the National Environmental Technology Centre (netcen), were employed on behalf of Suffolk Coastal District Council to comment on the complex information provided in the air quality reports, to determine the accuracy of the findings. Netcen provided a review report and were also required to submit a Proof of Evidence to the FSR Public Inquiry in October 2004 detailing their findings. A copy of the Proof of Evidence is attached as Appendix F.

The FSR Environmental Statement identifies the significant sources of emissions of NO₂, SO₂ and PM₁₀ on and associated with the Port of Felixstowe and specifically the FSR, to include construction activities, shipping, the Container Terminal and car parking, road and rail transport. The Environmental Statement reports the findings of detailed computer modelling undertaken to assess air quality from activities on and associated with the Port of Felixstowe. The computer model used was ADMS-Roads 2.0, a new generation atmospheric dispersion modelling system produced by Cambridge Environmental Research Consultants Ltd. This model has been widely used in other similar assessments and is appropriate for this use. The model allows emissions to be defined as point, line and area sources. The point sources defined include the shipping berths for the existing South Port and the FSR. Area sources defined include the existing Landguard Container Terminal, the proposed FSR, the existing maintenance dredge area, areas of construction activity, capital and additional maintenance dredging activity, the Trinity III extension and the Bathside Bay Terminal. Line sources have been defined to represent emissions from incoming and outgoing shipping vessels, railway lines and the A14.

The detailed modelling was run for a number of scenarios including predictions for the year 2008 with a Business As Usual (BAU) scenario and also with FSR in place. The BAU scenario included all committed development at the Port of Felixstowe, such as the Trinity III and Trinity III (Phase 2) Terminal, and included traffic figures using the A14. The traffic figures provided were much higher than anticipated but did include traffic from the P&O Ro-Ro operation, this ceased operation in 2002 but it was assumed that it would be reinstated if FSR does not go ahead. The BAU scenario therefore represents the worse case in terms of the current concentrations of pollutant and whether levels will exceed the objectives. In addition, during the Public Inquiry for FSR the traffic figures were revised and vehicle estimates lowered so the modelled figures are worse case. The modelling included predicted concentrations of pollutants at 16 specific receptor locations near to the Port of Felixstowe boundary and along the A14, of which 13 are located within the Suffolk Coastal district.

Netcen had a number of minor criticisms with the methodology used to carry out the dispersion modelling study but concluded that they were not likely to affect the following findings:

- NO₂ concentrations at relevant receptor locations close to the Port of Felixstowe Road and its junction with Candlet Road (Dock Spur roundabout) may exceed the annual average objective for 2005. The predicted exceedances occur in both the BAU and with FSR scenarios.
- PM₁₀ concentrations at all receptor locations considered will not exceed the objectives for 2004.
- The additional contribution to NO₂ and PM₁₀ concentrations from the proposed FSR development is small.

Netcen do not agree with the findings of the modelling for SO₂ due to discrepancies with model outputs when compared with continuous monitoring undertaken by Suffolk Coastal District Council. They are concerned that there is a risk that the discharge plumes from ships at berth in the Port, with FSR in place, might combine when the wind is from the north-west or south-east.

The Public Inquiry for FSR has not reached a decision as yet, but it is expected later in 2005. Predictions of pollutant concentrations at receptor locations with FSR in place will therefore not be undertaken at this time, but will be considered once the Public Inquiry decision has been made if FSR obtains planning approval. The BAU detailed modelling findings will be used in this report to undertake a current assessment of pollutant concentrations due to committed development at the Port of Felixstowe.

Nitrogen dioxide (NO₂)

The air quality assessment provided as part of the Environmental Statement for the FSR planning application included detailed modelling of NO₂ emissions from activities on the Port of Felixstowe and traffic on the A14 associated with the Port of Felixstowe. The modelling undertaken for the BAU scenario in 2008 represents the worse case, due to inclusion of emissions from committed development at the Port not yet in place, and predicts concentrations of NO₂ at 13 specific receptor

locations within the Suffolk Coastal district. The worse case scenario model predictions for 2008 have been used to assess current PM₁₀ concentrations at receptor locations close to the Port of Felixstowe and the A14.

The model for 2008 shows two receptor locations with an annual mean NO₂ concentration greater than the 2005 objective of 40 µg/m³. The receptor locations are at The Downs (close to the Port of Felixstowe Road) and Spriteshall Lane (close to Dock Spur roundabout) and the predicted annual mean NO₂ concentrations are 43.5 µg/m³ and 41.5 µg/m³ respectively. The model predictions for 2008 of hourly mean NO₂ concentrations at all receptor locations are shown to be within the 2005 objective of 200 µg/m³.

As detailed earlier in this section of the report, concentrations of NO₂ were monitored at a number of locations within Felixstowe during 2003. In 2004 three of these sites were removed, Felixstowe 5 (High Road West), Felixstowe 6 (Nayland Way) and Felixstowe 9 (Brinkley Way). They were removed as the annual mean concentration of NO₂ recorded at each site was shown to be within the objective level of 40 µg/m³ when predicted forward to 2005.

Three additional NO₂ sites were added in April 2004 to monitor concentrations at receptors close to the A14. Felixstowe 17 was located at the closest receptor location to the Dock Spur roundabout in Spriteshall Lane, Trimley St. Mary. Felixstowe 18 was located at the closest receptor location to the A14 between the Dock Spur roundabout and the Trimley junction in Kirton Road, Trimley St. Martin. Felixstowe 19 was located in Welbeck close to provide an urban background concentration in this area for comparison purposes.

The locations of all sites removed and all new sites are shown in the maps in Appendix D and the results of diffusion tube sampling undertaken in 2003 and 2004 is summarised in table 11.1. Full details of the analytical technique and laboratory used, monitoring locations, diffusion tube bias adjustment information and breakdown of results on a monthly basis for the monitoring periods can be seen in Appendix C. 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 11.1, sites where the predicted annual mean NO₂ concentration in 2005 is above the objective level of 40 µg/m³ are highlighted in grey.

Table 11.1 shows three monitoring locations (Felixstowe 13, 15 and 16) in 2003 with a predicted annual mean NO₂ concentration above the objective level in 2005. Felixstowe 15 and 16 were removed from the survey in 2004, they were sited to determine the existence of a NO₂ concentration gradient from the kerbside of Dock gate 2 roundabout (Felixstowe 16) to the receptor in Ferry Lane (Felixstowe 13), and were not representative of receptor locations. In 2004 Felixstowe 13 is the only site with a predicted NO₂ concentration above the objective level in 2005. The measured NO₂ concentrations in 2003 and 2004 have increased at Felixstowe 13 and 14. Both sites are located near to the Port of Felixstowe boundary, the Ferry Lane sites (Felixstowe 13) is to the north of the Port of Felixstowe and the Adastral Close site (Felixstowe 14) is to the south-east. The measured concentration at Adastral Close (Felixstowe 14) in 2004 is now close to the objective level.

Felixstowe 4 and 12 are located in the centre of Felixstowe and confirm that predicted levels are within the 2005 objective. Concentrations of NO₂ at the three new sites (Felixstowe 17, 18 and 19) located to measure concentrations close to the A14 are also within the objective level.

Felixstowe 4 and 19 are both urban background locations and show very similar levels, indicating that the predicted background NO₂ concentration in Felixstowe and the Trimleys for 2005 is 25.4 – 25.9 µg/m³.

Table 11.1 Bias corrected annual mean NO₂ diffusion tube concentrations recorded in 2003 and 2004 for sites in Felixstowe and the Trimleys. Figures in micrograms per cubic metre (µg/m³). Annual mean concentration at each site predicted forward to 2005.

Site and location	2003		2004	
	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.95 Others = x 0.96)	Annual mean	Predicted annual mean in 2005 (Kerbside and Roadside sites = x 0.97 Others = x 0.98)
Felixstowe 4 (Lynwood Avenue) (UB)	25.7	24.7	25.9	25.4
Felixstowe 5 (High Road West)	34.0	32.3	~	~
Felixstowe 6 (Nayland Road)	36.4	34.6	~	~
Felixstowe 9 (Brinkley Way)	25.2	24.2	~	~
Felixstowe 12 (Hamilton Road)	35.6	33.8	35.1	34.0
Felixstowe 13 (Ferry Lane)	42.6	40.9	47.4	46.5
Felixstowe 14 (Adastral Close)	36.4	34.9	39.9	39.1
Felixstowe 15 (Ferry Lane)	55.2	53.0	~	~
Felixstowe 16 (Ferry lane)	69.2	65.7	~	~
Felixstowe 17 (Spriteshall lane)	~	~	29.1	28.2
Felixstowe 18 (Kirton Road)	~	~	33.6	32.6
Felixstowe 19 (Welbeck Close)	~	~	26.4	25.9

The diffusion tube sites Felixstowe 13, 14 and 17 compare in their locations with receptors modelled in the FSR Environmental Statement. The annual mean predicted NO₂ concentrations for these sites are as follows:

- Ferry Lane receptor location (Felixstowe 13) has a predicted annual mean NO₂ concentration as measured by diffusion tube of 46.5 µg/m³ in 2005 and a modelled concentration of 27.0 µg/m³ under the 2008 BAU scenario.
- Adastral Close receptor location (Felixstowe 14) has a predicted annual mean NO₂ concentration as measured by diffusion tube of 39.1 µg/m³ in 2005 and a modelled concentration of 27.1 µg/m³ under the 2008 BAU scenario.
- Spriteshall Lane receptor location (Felixstowe 17) has a predicted annual mean NO₂ concentration as measured by diffusion tube of 28.2 µg/m³ in 2005 and a modelled concentration of 41.5 µg/m³ under the 2008 BAU scenario.

The receptors close to the Port of Felixstowe boundary have a higher predicted concentration of NO₂ from the diffusion tube monitoring. The receptor close to the A14 but away from the Port of Felixstowe boundary has a higher predicted concentration of NO₂ from the detailed computer modelling. It would be expected that the modelled concentrations should be consistently higher than measured concentrations, as the modelling included additional emissions from committed development not currently present at the Port of Felixstowe. The number of comparable sites is too few at the current time to confirm any trends. Seven new diffusion tube sites have been located at receptors near the Port of Felixstowe boundary and along the A14 in order to provide more detailed information. These sites are shown on the maps in Appendix D of this report and are as follows:

- Felixstowe 20 – located in Glemsford Close, near to the Port of Felixstowe Road at the Haven Exchange roundabout and closest to the north / north-east boundary of the Port of Felixstowe.

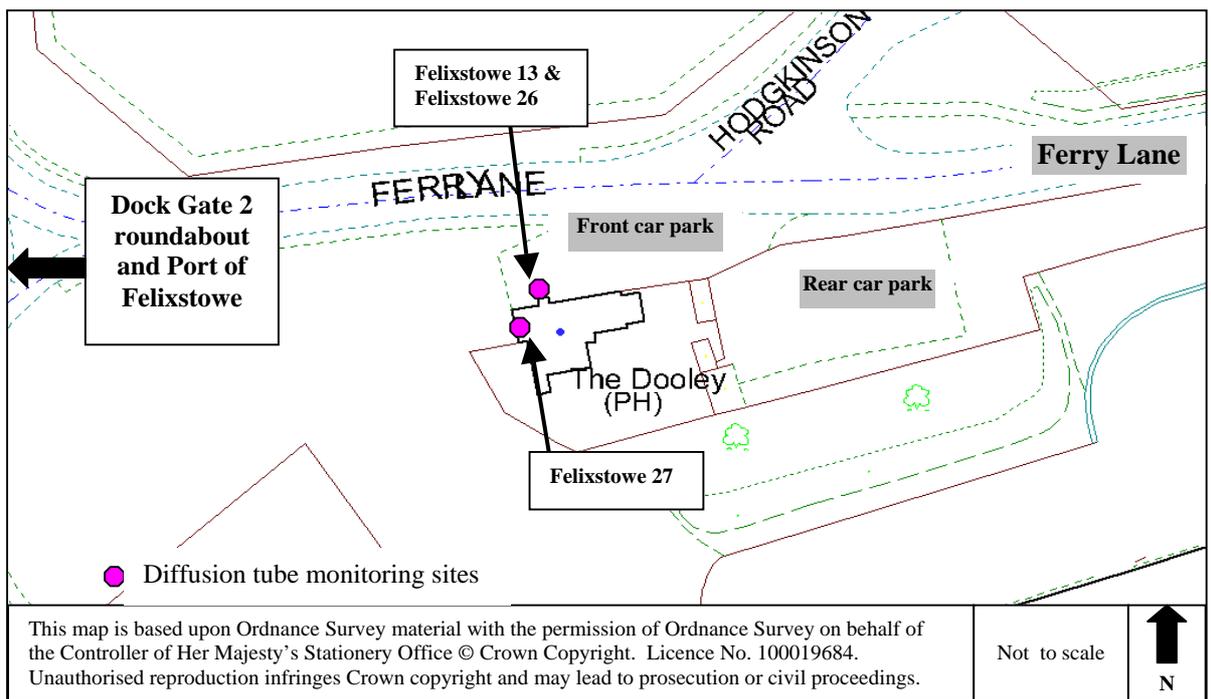
- Felixstowe 21 – located in Kings Fleet Road to provide an urban background concentration to the north / north-east of the Port of Felixstowe.
- Felixstowe 22 - located in Levington Road, closest to the East / north-east boundary of the Port of Felixstowe.
- Felixstowe 23 – located in Heathgate Piece, Trimley St. Mary, near to the A14 at the Dock Spur roundabout.
- Felixstowe 24 – located in Brandon Road, close to the Port of Felixstowe Road and its slip road off to Dock Gate 2 roundabout.
- Felixstowe 25 – located in Rendlesham Road, at the closest receptor to the Port of Felixstowe Road.
- Felixstowe 28 – located in Blyford Way, close to the Port of Felixstowe Road and its slip road off to Dock Gate 2 roundabout.

The site of greatest concern is the receptor location in Ferry Lane, the Dooley Inn Public House. This single receptor is situated approximately 70 metres from Dock Gate 2 roundabout and the Port of Felixstowe boundary, to the north-west. The map in figure 11.1 shows the site detail. The diffusion tube monitoring site at this location (Felixstowe 13) is triplicated and has been corrected for bias thereby increasing the accuracy of its measurements. Monitoring undertaken in 2004 at this site shows a predicted NO₂ concentration in 2005 of 46.5 µg/m³, which is above the objective level.

During the monthly site visits made in 2004 to change the diffusion tubes it was noted that the car park at the front of the building was used more often and by more vehicles than was at first suggested. Vehicles have also been seen on a number of occasions, when the pub is busy, parked in close proximity (1-2 metres) to the diffusion tubes. Information provided confirms that both the rear and sometimes front car parks are often used to park Heavy Goods Vehicle cabs overnight. The pub Landlord has also confirmed that only the top floor of the building is used for residential purposes.

This information suggests that NO₂ concentrations recorded at Felixstowe 13 may be influenced by emissions from vehicle exhausts in close proximity. This may be leading to an increase in the concentrations being recorded by the diffusion tubes which is not necessarily representative of ambient levels at this site. The confirmation that only the top floor of the building is used for residential purposes, and is therefore the relevant receptor location for annual mean NO₂ concentrations also suggests that the diffusion tubes may not be situated at the best location.

Site map and location of nitrogen dioxide diffusion tubes at The Dooley Inn Public House, Ferry Lane, Felixstowe



Two new single diffusion tube monitoring locations were added on this site in January 2005 to determine whether the above situations have any influence on the NO₂ concentrations being recorded. Felixstowe 26 is located on the same drainpipe as Felixstowe 13 but at the height of the first floor windows of the building. Felixstowe 27 is located on the south-west side of the building facing towards the Port of Felixstowe and Dock Gate 2 roundabout, and at the height of the first floor windows of the building.

At the end of 2005 12-months of monitoring information will be obtained for all of the new diffusion tube sites in Felixstowe and the Trimleys. This will enable Suffolk Coastal District Council to consider whether declaration of an Air Quality Management Area for NO₂ is necessary at receptor locations near to the Port of Felixstowe and/or along the A14.

Sulphur dioxide (SO₂)

The Updating and Screening Assessment and Detailed Assessment concluded, for all sources of SO₂ investigated, that it was unlikely the objectives would be exceeded and no further assessment was necessary. A Detailed Assessment of SO₂ emissions arising from shipping and other activities on and associated with the Port of Felixstowe was undertaken by Entec UK Limited, on behalf of Suffolk Coastal District Council. Detailed monitoring was undertaken at a site relevant to the nearest receptor location to the Port, which determined that ambient concentrations of SO₂ were within the relevant air quality criteria.

The detailed monitoring was undertaken in 2002, at which time the Trinity III (Phase 2) Terminal extension was not completed. The Trinity III (Phase 2) Terminal extension was opened in November 2004, this added 270 metres of quay for deep-water berths and land for new storage and handling facilities at the Port of Felixstowe. The extension of deep-water quay at the Port increases the number of larger ships that can be berthed simultaneously. The infrastructure is now all in place and the terminal is working to full capacity. The current situation at the Port of Felixstowe is therefore much different to that in 2002 when the detailed monitoring was undertaken.

Information was obtained regarding the number of ship calls and the volume of cargo handled in 2002 and 2004 at the Port of Felixstowe, in order to provide an indication of any changes that have occurred. The number of ship calls has reduced significantly from 6,132 in 2002 to 4,415 in 2004, but the volume of cargo handled shows no significant difference. This may be as a result of the capacity for larger ships to berth at the Port due to the extension of deep-water quay.

It could be concluded that a reduction in the number of ship calls to the Port between 2002 and 2004 would reduce SO₂ emissions from shipping, and therefore reduce the concentration of SO₂ at nearby receptor locations. Emissions from ships engines are, however, complex and determined by a number of parameters including stack height, stack diameter and fuel type. It cannot therefore be concluded that concentrations of SO₂ at receptor locations have decreased or are even similar to those measured in 2002, and the results of the detailed monitoring undertaken will not be used to determine the current situation.

The air quality assessment provided as part of the Environmental Statement for the FSR planning application included detailed modelling of SO₂ emissions from activities on and associated with the Port of Felixstowe. The modelling undertaken for the BAU scenario in 2008 predicts concentrations of SO₂ at 13 specific receptor locations within the Suffolk Coastal district. The Environmental Statement includes model predictions of the 99.7th percentile hourly mean concentration and the 99.1th percentile 24-hour mean concentration of SO₂. Predicted concentrations at all 13 receptor locations are well within the levels set for these two objectives. The Environmental Statement does not include any predictions of the 99.9th percentile 15-minute mean concentration which is usually the most stringent of the three objectives.

Netcen had a number of comments with regard to the air quality assessment of SO₂ within the Environmental Statement. One of the receptor locations modelled was Avocet House, the location of detailed monitoring undertaken in 2002 by Suffolk Coastal District Council. The model predicted

concentrations for a base year in 2001, which were all markedly less (by a factor of approximately two) than the measured concentrations recorded in 2002. Netcen concluded that it was unlikely that the short-term 15-minute mean objective would be breached at Avocet House with the FSR in place. They were concerned, however, that a risk exists for the discharge plumes from ships at berth to combine when the wind is from the north-west or south-east and cause objective exceedances at receptor locations.

Data required for a screening modelling study to predict the concentration of SO₂ at receptor locations near to the Port of Felixstowe is being investigated with the assistance of netcen. Once the data is obtained it will be determined whether detailed monitoring and modelling of SO₂ emissions is necessary. The findings will be reported in the Updating and Screening Assessment report, which is due to be published in April 2006.

Particles (PM₁₀)

The Updating and Screening Assessment and Detailed Assessment concluded that emissions from traffic and shipping in isolation were unlikely to cause exceedances of the objectives and further assessment was not necessary. The conclusions drawn for emissions from shipping from the report provided by Entec UK Limited were questioned in a consultation response and it was determined that Entec UK Limited would liaise directly with the consultee and report back on their findings.

The Updating and Screening Assessment and Detailed Assessment also concluded that the potential exists for emissions of PM₁₀ from combined activities at the Port of Felixstowe to cause elevated concentrations at nearby receptor locations, and that further assessment was needed. An assessment of PM₁₀ from combined activities on and associated with the Port of Felixstowe was included in the Environmental Statement that had been submitted as part of the Felixstowe South Reconfiguration planning application. This included detailed information regarding current emissions of PM₁₀ from the different activities associated with the Port of Felixstowe, and future emissions should the planning approval be given. It was determined that an assessment would be made by Suffolk Coastal District Council of the current potential for the PM₁₀ objectives to be exceeded following receipt of comments from netcen, employed by Suffolk Coastal District Council to comment on the air quality assessment included in the Environmental Statement.

Following liaison directly with the consultee, Entec UK Limited submitted a new report to Suffolk Coastal District Council in 2004. The new report quoted an increased number of shipping vessels leaving and entering the Port, and predicted a higher concentration of PM₁₀ at the receptor location than originally estimated. This report was based on the detailed monitoring undertaken for SO₂ in 2002, at which time the Trinity III (Phase 2) Terminal extension was not completed. The Trinity III (Phase 2) Terminal extension was opened in November 2004, this added 270 metres of quay for deep-water berths and land for new storage and handling facilities at the Port of Felixstowe. The infrastructure is now all in place and it is working to full capacity. The report is therefore not representative of the current situation at the Port of Felixstowe, and the revised version will not be submitted or used in the review and assessment process.

The air quality assessment provided as part of the Environmental Statement for the Felixstowe South Reconfiguration (FSR) planning application included detailed modelling of PM₁₀ emissions from activities on the Port of Felixstowe and traffic on the A14 associated with the Port of Felixstowe. The modelling undertaken for the Business As Usual (BAU) scenario in 2008 represents the worse case, due to inclusion of emissions from committed development at the Port not yet in place, and predicts concentrations of PM₁₀ at 13 specific receptor locations within the Suffolk Coastal district. The worse case scenario model predictions for 2008 have been used to assess current PM₁₀ concentrations at receptor locations close to the Port of Felixstowe and the A14.

The model for 2008 shows predicted annual mean and 24-hour mean PM₁₀ concentrations at all receptor locations to be within the 2004 objective levels of 40 µg/m³ and 50 µg/m³ respectively. The highest predicted annual mean concentration in 2008 is 25.2 µg/m³ at receptor locations in both The Downs (close to the Port of Felixstowe Road) and Sriteshall Lane (close to Dock Spur roundabout).

The highest predicted 24-hour means are also seen at these locations with a concentration of $25.6\mu\text{g}/\text{m}^3$ predicted at The Downs and $25.7\mu\text{g}/\text{m}^3$ predicted at Spriteshall Lane. The Proof of Evidence submitted by netcen at the Public Inquiry agrees that PM_{10} concentrations at all receptor locations considered will not exceed the objectives for 2004.

As the modelling represents a worse case scenario, with all committed development included in the predictions for BAU in 2008, it is concluded that both the annual mean and 24-hour mean PM_{10} objectives will be met at receptor locations near to the Port of Felixstowe and along the A14. No further review and assessment of PM_{10} is therefore necessary.

11.4 Conclusion

Detailed computer modelling of NO_2 emissions from activities on and associated with the Port of Felixstowe has been undertaken as part of the FSR planning application. The modelling presents a worse case scenario, with all committed development included in the predictions for BAU in 2008. It concludes that the annual mean NO_2 objective in 2005 will be exceeded at receptor locations situated in The Downs (close to the Port of Felixstowe Road) and Spriteshall Lane (close to Dock Spur roundabout). Results of diffusion tube monitoring undertaken in 2004 do not correspond with the modelling results and 7 new diffusion tube monitoring sites have been established at the start of 2005 to obtain further information for receptor locations close to the Port of Felixstowe and along the A14. The monitoring site in Ferry Lane at The Dooley Inn Public House shows concentrations of NO_2 above the objective levels when predicted forward to the end of 2005. Doubts have been cast on the reliability of results from the monitoring location due to vehicles parking in close proximity to the diffusion tubes and the relevant receptor location being confirmed as the top floor of the building only. Two new diffusion tube sites have been established on the building at the height of the receptor and away from the direct emissions of vehicles using the car park at the front of the building. At the end of 2005 12-months of monitoring information will be obtained for all of the new diffusion tube sites in Felixstowe and the Trimleys. This will enable Suffolk Coastal District Council to consider whether declaration of an Air Quality Management Area for NO_2 is necessary at receptor locations near to the Port of Felixstowe and/or along the A14.

The results of detailed SO_2 monitoring undertaken in 2002 cannot be used to determine the current situation at receptors close to the Port of Felixstowe due to changes that have occurred at the Port following the Trinity III (Phase 2) terminal extension. Detailed computer modelling of SO_2 emissions from activities on and associated with the Port of Felixstowe has been undertaken as part of the FSR planning application. The report produced was assessed by independent consultants, netcen, who expressed concern that a risk exists for the discharge plumes from ships at berth to combine when the wind is from the north-west or south-east and cause objective exceedances at receptor locations. Data required for a screening modelling study to predict the concentration of SO_2 at receptor locations near to the Port of Felixstowe is being investigated with the assistance of netcen. Once the data is obtained it will be determined whether detailed monitoring and modelling of SO_2 emissions is necessary. The findings will be reported in the Updating and Screening Assessment report, which is due to be published in April 2006.

Detailed computer modelling of PM_{10} emissions from activities on and associated with the Port of Felixstowe has been undertaken as part of the FSR planning application. The modelling presents a worse case scenario, with all committed development included in the predictions for BAU in 2008 and concludes that both the annual mean and 24-hour mean PM_{10} objectives will be met at receptor locations near to the Port of Felixstowe and along the A14. No further review and assessment of PM_{10} is therefore necessary.

The Public Inquiries for the FSR and Bathside Bay Container Terminal planning applications have not reached decisions on either development as yet, but decisions on both are expected later in 2005. Predictions of pollutant concentrations at receptor locations with the FSR and/ or Bathside Bay Container Terminal developments in place will be considered once the Public Inquiry decisions have been made, if planning approval is given.

12 Assessment of Traffic Emissions on the A12/A1214 Roundabout - Martlesham Park and Ride

Traffic emissions associated with the planned Park and Ride scheme at Martlesham were considered in the Updating and Screening Assessment report (June 2003) for the pollutants nitrogen dioxide (NO₂) and particulate matter (PM₁₀). The report assessed concentrations of NO₂ and PM₁₀ at receptor locations that would arise from road traffic emissions on the junction of the A12 / A1214 / C376 - the location of the Park and Ride site. The findings of the report, for both pollutants, were that the objectives were not likely to be exceeded at the closest receptor locations to the junction, and further review and assessment was not necessary.

At the time of the Updating and Screening Assessment report the Park and Ride scheme had not opened and the assessment was based upon future traffic flow predictions for this junction and the site itself. The Environmental Statement produced for the A1214 Martlesham Park and Ride Planning Application by Suffolk County Council contained traffic predictions for this junction with the scheme open, and the results of complex computer modeling undertaken for receptor locations at the junction. The Environmental Statement concluded from the modeling that the air quality objectives at nearby receptor locations would not be exceeded.

The Park and Ride scheme opened in November 2003, and a number of consultation responses were received regarding the site expressing concerns over increased traffic emissions at the junction once the site was opened. Most responses commented that the new junction layout, to be controlled by traffic lights, would slow the traffic, cause queuing on the arms of the junction and, therefore, increase traffic emissions. It was concluded that a further assessment would be undertaken once the Park and Ride was open, using updated traffic flow information and knowledge of traffic speeds at the junction, to ascertain whether the air quality objectives are likely to be exceeded.

In order to predict pollutant concentrations resulting from road traffic emissions, the Technical Guidance LAQM.TG(03) provided by the Government for air quality assessments advises the use of The Design Manual for Roads and Bridges Screening Method (DMRB). DMRB includes a simple methodology for estimating the concentrations of air pollutants in the vicinity of roads and junctions, and has been used for many years as a screening tool, primarily in support of assessments of new road building projects. The DMRB model is expected to provide a slightly conservative assessment of the impact of traffic in most cases and will tend to over-estimate the predicted pollutant concentrations, so that areas with any risk of exceeding the objectives will be highlighted.

The DMRB screening method was run for the closest receptors to the junction of the A12 / A1214 / C376 / Park & Ride, in order to predict concentrations of NO₂ and PM₁₀ and determine whether an exceedance of any of the objectives is likely.

Further information about DMRB, a summary of all road traffic data and input data used to run the DMRB screening method for receptor locations at this junction is detailed in Appendix E. In addition to general traffic growth, the A1214 arm of the junction will have traffic increases from two developments in this area of the Suffolk Coastal district, the Grange Farm development at Kesgrave and the Bixley Farm development at Rushmere St. Andrew. Details and traffic predictions were obtained for these developments and the volume of traffic from each development that will travel on the A1214 in 2004 and 2005 was estimated. The traffic flows were then added to produce an annual average daily traffic flow for the A1214. Details of all calculations and assumptions can be seen in Appendix E.

The calculated annual mean NO₂ and PM₁₀ concentrations from the road were added to the background concentration, to obtain the predicted concentrations in the relevant year for each objective, 2005 and 2004 respectively. A summary of the results can be seen in tables 12.1 and 12.2.

Table 12.1 Predicted annual mean NO₂ concentrations for 2005, derived from DMRB, for receptor locations at the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham

Receptor location	Estimated annual mean background concentration in 2005 (µg/m ³)	DMRB calculated annual mean contribution from road traffic (µg/m ³)	DMRB predicted total annual mean concentration (background + traffic) in 2005 (µg/m ³)
Closest property to the junction on the C376	18.4	5.2	23.6
Closest property to the junction on the Portal Avenue side of the A1214	18.4	9.9	28.3
Closest property to the junction on the A12 (located in Portal Avenue)	18.4	7.4	25.8
Closest property to the junction on the Park and Ride side of the A1214 (includes the bus access road to the Park & Ride)	18.4	17.1	35.5

Table 12.2 Predicted annual mean PM₁₀ concentration and number of days when the concentration will be >50 µg/m³ for 2004, derived from DMRB, for receptor locations on the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham

Receptor location	Estimated annual mean background concentration in 2004 (µg/m ³)	DMRB calculated annual mean contribution from road traffic (µg/m ³)	DMRB predicted total annual mean concentration (background + traffic) in 2004 (µg/m ³)	DMRB predicted no. of days when concentration will be >50µg/m ³ in 2004
Closest property to the junction on the C376	19.1	2.8	21.9	6.1
Closest property to the junction on the Portal Avenue side of the A1214	19.1	5.9	25.0	12.4
Closest property to the junction on the A12 (located in Portal Avenue)	19.1	4.2	23.3	8.6
Closest property to the junction on the Park and Ride side of the A1214 (includes the bus access road to the Park & Ride)	19.1	11.2	30.3	28.7

The results in table 12.1 show that annual mean NO₂ concentrations at the closest receptor locations to the junction are within 2005 objective of 40 µg/m³.

The results in table 12.2 show that annual mean PM₁₀ concentrations at the closest receptor locations to the junction are within the 2004 objective of 40 µg/m³, and the number of days when the PM₁₀ concentration will be greater than 50 µg/m³ is within the 24-hour objective of 35 days.

The DMRB screening method has predicted that the concentrations of both NO₂ and PM₁₀ at the closest receptor locations to the junction with the Park and Ride site open are unlikely to exceed the objectives, and **further review and assessment will not be necessary for either pollutant at this time.**

The Park and Ride scheme opened in November 2003 and Suffolk County Council were asked to confirm whether traffic levels seen since the scheme opened are similar to those predicted in the original Planning Application for the site. Suffolk County Council informed us that, unfortunately, the traffic information needed to confirm the situation is not available at this time. The information is due to be collected in summer 2005 and their comments on the traffic flows will then be made. Should the traffic information obtained by Suffolk County Council indicate that the junction is not operating as predicted then the traffic information obtained will be used to reassess the junction.

13 Summary and Recommendations

The Updating and Screening Assessment and Detailed Assessment concluded that the risk of exceedance of the air quality objectives for benzene, 1,3-butadiene, lead and carbon monoxide is unlikely, and no further assessment is necessary. For nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and particles (PM₁₀) the review and assessment concluded that there was a potential risk of the air quality objectives being exceeded. Further investigation was required to assess emissions of NO₂ from traffic using the junction of Lime Kiln Quay Road, The Thoroughfare, and St. John's Street in Woodbridge, and emissions of NO₂, SO₂ and PM₁₀ from activities on and associated with the Port of Felixstowe.

Progress Reports are designed to ensure continuity in the LAQM process and are required in years when an Updating and Screening Assessment or Detailed Assessment is not being undertaken. This Progress Report determines whether there have been any changes in the concentrations of the seven prescribed pollutants by examining new monitoring results and new local developments that may affect local air quality.

It has been determined that there are a number of new developments and proposed future developments within the Suffolk Coastal district that may affect air quality, these will be investigated further in the Updating and Screening Assessment for 2006.

It has been determined for the Suffolk Coastal district that the risk of exceedance of the air quality objectives for benzene, 1,3-butadiene, lead and carbon monoxide is unlikely, and no further assessment is necessary.

Continued investigations of PM₁₀ emissions from activities on and associated with the Port of Felixstowe undertaken for this report have determined that the risk of exceedance of the air quality objectives is unlikely, and no further assessment is necessary.

Continued investigations of NO₂ and SO₂ emissions have determined that 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:

- Emissions of NO₂ from traffic using the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge.

The 6-month ratified and 9-month provisional data sets obtained from the automatic analyser to date show the annual mean NO₂ concentration to be below the objective level of 40 µg/m³ at the site of the analyser. The results of the diffusion tube monitoring confirm that conditions at the junction are unusual, with concentrations of NO₂ within the air quality objectives at all locations except for the northern side of Thoroughfare (Melton Hill) arm of the junction. The additional monitoring data obtained for this junction from the automatic analyser and the diffusion tubes will be used to update the detailed computer modelling originally undertaken for the junction in order to predict NO₂ concentrations at all receptor locations on the junction. This will be undertaken once the final ratified 12-month data set for the automatic analyser is received.

A full report with the results and conclusions of the detailed computer modelling to be undertaken for the Woodbridge junction will be published later in 2005. The report will determine whether it will be necessary to consider the declaration of an Air Quality Management Area at the Woodbridge junction.

- Emissions of NO₂ from activities on and associated with the Port of Felixstowe.

Detailed computer modelling of NO₂ emissions from activities on and associated with the Port of Felixstowe has been undertaken as part of the FSR planning application. The modelling presents a worse case scenario, with all committed development included in the predictions for BAU in

2008. It concludes that the annual mean NO₂ objective in 2005 will be exceeded at receptor locations situated in The Downs (close to the Port of Felixstowe Road) and Spriteshall Lane (close to Dock Spur roundabout). Results of diffusion tube monitoring undertaken in 2004 do not correspond with the modelling results and 7 new diffusion tube monitoring sites have been established at the start of 2005 to obtain further information for receptor locations close to the Port of Felixstowe and along the A14.

The monitoring site in Ferry Lane at The Dooley Inn Public House shows concentrations of NO₂ above the objective levels when predicted forward to the end of 2005. Doubts have been cast on the reliability of results from the monitoring location due to the to vehicles parking in close proximity to the diffusion tubes and the relevant receptor location being confirmed as the top floor of the building only. Two new diffusion tube sites have been established on the building at the height of the receptor and away from the direct emissions of vehicles using the car park at the front of the building.

At the end of 2005 12-months of monitoring information will be obtained for all of the new diffusion tube sites in Felixstowe and the Trimleys. This will enable Suffolk Coastal District Council to consider whether declaration of an Air Quality Management Area for NO₂ is necessary at receptor locations near to the Port of Felixstowe and/or along the A14. The findings will be reported in the Updating and Screening Assessment report, which is due to be published in April 2006.

- Emissions of SO₂ from activities on and associated with the Port of Felixstowe.

The results of detailed SO₂ monitoring undertaken in 2002 cannot be used to determine the current situation at receptors close to the Port of Felixstowe due to changes that have occurred at the Port following the Trinity III (Phase 2) terminal extension. Detailed computer modelling of SO₂ emissions from activities on and associated with the Port of Felixstowe has been undertaken as part of the FSR planning application. The report produced was assessed by independent consultants, netcen, who expressed concern that a risk exists for the discharge plumes from ships at berth to combine when the wind is from the north-west or south-east and cause objective exceedances at receptor locations.

Data required for a screening modelling study to predict the concentration of SO₂ at receptor locations near to the Port of Felixstowe is being investigated with the assistance of netcen. Once the data is obtained it will be determined whether detailed monitoring and modelling of SO₂ emissions is necessary. The findings will be reported in the Updating and Screening Assessment report, which is due to be published in April 2006.

The Public Inquiries for the Felixstowe South Reconfiguration and Bathside Bay Container Terminal planning applications have not reached decisions on either development as yet, but decisions on both are expected later in 2005. Predictions of pollutant concentrations at receptor locations with the FSR and/ or Bathside Bay Container Terminal developments in place will be considered once the Public Inquiry decisions have been made, if planning approval is given.

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28. *The Suffolk Local Transport Plan Annual Progress Report 2002*. Produced by Suffolk County Council, 2002.
29. *The Suffolk Local Transport Plan Annual Progress Report 2004*. Produced by Suffolk County Council, 2004.
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31. *The Planning Inspectorate website*. Information relating to the Public Inquiry for Felixstowe South Reconfiguration planning application, including all documents submitted as part of the Inquiry can be viewed at <http://www.planning-inspectorate.gov.uk/felixstowe/index.htm>
32. *The Planning Inspectorate website*. Information relating to the Public Inquiry for The Bathside Bay Container Terminal planning application, including all documents submitted as part of the Inquiry can be viewed at <http://www.planning-inspectorate.gov.uk/bathsidebay>
33. *Felixstowe South Reconfiguration Environmental Statement Supporting Document 3: Air Quality Assessment*. Produced by Hutchison Ports (UK) Ltd, October 2003. This document was submitted for the Public Inquiry and can be viewed on the Planning Inspectorate website at <http://www.planning-inspectorate.gov.uk/felixstowe/index.htm>
34. *Felixstowe South Reconfiguration Environmental Statement Volume II Development in the Haven: In-combination Effects*. Produced by Hutchison Ports (UK) Ltd, November 2003. This document was submitted for the Public Inquiry and can be viewed on the Planning Inspectorate website at <http://www.planning-inspectorate.gov.uk/felixstowe/index.htm>

35. *Felixstowe South Reconfiguration – Written Statement of John Anthony Abbott*. Produced by the National Environmental Technology Centre (netcen), October 2004. This document was submitted for the Public Inquiry and can be viewed on the Planning Inspectorate website at <http://www.planning-inspectorate.gov.uk/felixstowe/index.htm>
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Appendix A

List of Consultees for the Local Air Quality Management Review and Assessment Process – Detailed Assessment Report.

Responses received from the Detailed Assessment report Consultation.

List of Consultees for the Local Air Quality Management Review and Assessment Process – Detailed 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
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
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>

Responses received from the Detailed Assessment report Consultation.

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 as Local Air Quality Management (LAQM) is about air quality issues relevant to the Suffolk Coastal district.

Consultation findings regarding the Suffolk Coastal Detailed Assessment Report (published March 2004)

Suffolk Coastal District Council undertook a full Consultation exercise in June 2004 to obtain comments on the contents and findings of the Detailed Assessment Report produced for the district. A list of all consultees can be seen at the end of this Appendix. A total of 21 consultation responses were received, which were collated and divided into three categories. A summary table can be seen below detailing each of the three categories and the number of responses received for each. All consultation responses received, which fell into the second or third category detailed in the table below, were personally replied to.

Summary table of consultation responses received regarding the Detailed Assessment Report

Category of response	Number of responses received
Number of responses received from consultees who were satisfied with the process/report and/or had no specific comments to make	11
Number of responses received from consultees with specific comments relevant to LAQM (expanded upon below)	9
Number of responses received from consultees on topics that were not within the scope of LAQM	1
Total number of responses received	21

The topics covered by responses that fell in the second category (comments relevant to the scope of the LAQM process), are detailed in the second table 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.

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 information is updated in this Progress 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, and emissions from trains at Trimley St. Mary.

Summary table showing further detail of the consultation responses received regarding the Detailed Assessment Report

Subject of response	Number of responses received
Emissions from traffic using the junction of Lime Kiln Quay Road, Thoroughfare and St. John's Street, Woodbridge.	2
Emissions from traffic on the A12/A1214 Park and Ride roundabout, Martlesham.	1
Emissions from current and future planned activities at the Port of Felixstowe, including shipping, lorries using the A14, and requests for further monitoring.	2
Emissions from stationary idling trains on the rail network in Trimley St. Mary.	1
Traffic light sequencing at the junction of the A1152 and B1438 (Melton crossroads) and the effect on traffic flow and air pollution.	1
Emissions from traffic in Framlingham, with specific reference to heavy goods vehicles using the road network.	1
Emissions from road traffic in Orford.	1

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

Concern was expressed regarding emissions from road traffic using this junction, together with acknowledgement of the continuing detailed investigations of nitrogen dioxide concentrations at this junction. Further investigation of nitrogen dioxide concentrations at receptor locations on this junction is continuing and detailed information is provided in section 10 of this report. Continuous monitoring for nitrogen dioxide has been in place at the junction since April 2004 in order to obtain 12 months of data on which to base the findings.

Suggestions were included in both consultation responses regarding possible reasons for the congestion experienced at this junction and solutions to mitigate the problems. Specific reference was made to the draft Woodbridge and Melton Local Transport Action Plan and measures that may be included in this to help reduce the congestion and improve air quality at this junction. Suffolk County Council were contacted regarding the draft plan and confirmed that it includes suggestions to improve the signing on the A12 to minimise traffic travelling accidentally through Woodbridge. The draft plan also sets weight restrictions for certain roads in Woodbridge, for example St. John's Street, and discusses better road markings at the above junction to assist with traffic direction. The plan is, however, only in draft form at the present time and may be altered before being published.

The LAQM process requires that if any exceedances of the objectives are predicted an Air Quality Management Area must be declared and an Action Plan then drawn up. This Action Plan must investigate all potential solutions for improving the air quality and their viability. It would involve input from relevant agencies and wide consultation. Should the results of the findings with regard to this junction lead to the declaration of an Air Quality Management Area all options would be assessed and consulted upon widely.

Emissions from traffic on the A12/A1214 Park and Ride roundabout, Martlesham.

Emissions associated with queuing traffic at the A12/A1214 roundabout due to traffic lights installed as part of the new 'Park and Ride Scheme' at Martlesham were considered in the Updating and Screening Assessment report (June 2003) for the pollutants nitrogen dioxide and particulate matter. The findings of the report, for both pollutants, were that the air quality objectives are not likely to be

exceeded at the closest receptor locations to the junction, and further review and assessment will not be necessary at this time.

A number of consultation responses have been received regarding traffic queuing at the traffic lights and the Park and Ride site at Martlesham. A further assessment of air quality at receptor locations on this junction has been undertaken now that the scheme is up and running which is detailed in section 12 of this report. The Design Manual for Roads and Bridges (DMRB) screening method was used to predict the concentrations of both NO₂ and PM₁₀ at the closest receptor locations to the junction with the Park and Ride site open. The DMRB findings are that concentrations of both NO₂ and PM₁₀ at the closest receptor locations are unlikely to exceed the air quality objectives, and further review and assessment will not be necessary for either pollutant at this time.

Emissions from current and future planned activities at the Port of Felixstowe including shipping, lorries using the A14, and requests for further monitoring.

Concerns were raised regarding emissions from ships using the Port of Felixstowe and Parkeston Quay at Harwich, and lorries in and on the approach to the Port of Felixstowe. Shipping and heavy duty/goods vehicles are both sources of pollutants included within the Local Air Quality Management (LAQM) process that have been and are continuing to be investigated in detail. Guidance provided by the Government for LAQM advises that the pollutants of concern relating to shipping are sulphur dioxide and particulate matter, and relating to road traffic are nitrogen dioxide and particulate matter. A number of monitoring and computer modelling studies for each of these sources have been undertaken, and are explained in more detail below.

The LAQM guidance states that shipping is a potentially significant source of sulphur dioxide and advises that there could be exceedances of the air quality objectives for any receptors located within 1 kilometre of berths with a large number of ship movements (more than 5,000 per year). Beyond the 1 kilometre radius any emissions from the ships would not be of a concentration to cause exceedances of the air quality objectives. The Port of Felixstowe is the United Kingdom's largest container port, it has more than 5,000 ship movements per year and there are residential properties within 500 metres of the berths. In addition, vessels using the Harwich shipping lanes will come within 1 kilometre of certain areas of the district. The closest residential properties are located at Adastral Close, with some properties in Manor Road and Manor Terrace also falling within the 1 kilometre radius from the berths. Regarding particulate matter emissions from shipping, the LAQM guidance states that there will be emissions from the burning of oil in ship's engines but that there is no evidence to suggest that there is any risk of the 2004 air quality objectives being exceeded.

In 2001 a detailed study was undertaken on behalf of Suffolk Coastal District Council by Entec UK Limited, to monitor concentrations of sulphur dioxide at receptor locations near to the ship berths at the Port of Felixstowe. The monitor was sited the same distance from the shipping berths as the closest residential properties but in a South-Westerly direction, in order to account for the predominant wind direction and provide a worse-case monitoring location. The monitoring results confirmed that levels of sulphur dioxide were well within each of the air quality standards. The findings from the monitoring were used to assess emissions of particulate matter from the ships, based on findings of a number of other UK shipping studies. The assessment concluded that emissions of particulate matter from shipping at the Port of Felixstowe would not cause exceedance of the air quality standards at receptor locations. The report was accepted by the Government and has been published for public viewing - it can be accessed on the Suffolk Coastal website at <http://www.suffolkcoastal.gov.uk> or from the Council's Melton Hill offices in Woodbridge and Undercliff Road West offices in Felixstowe.

Levels of nitrogen dioxide have been monitored at numerous locations in Felixstowe since 1993 using passive diffusion tubes. The results obtained from nitrogen dioxide tubes are directly comparable to

the annual mean air quality objective set for nitrogen dioxide, and provide useful information on air quality. The monitoring locations in Felixstowe have been moved around over the years to cover a number of sites and assess whether there are any areas requiring further assessment. Nitrogen dioxide concentrations within Felixstowe and on the A14 trunk road will be associated with local traffic emissions and receptor locations that could be affected are those close to the road. The LAQM guidance advises that road traffic emissions will disperse within 50 metres of the kerbside, and beyond that distance pollutant concentrations will be reduced to background levels. To date, monitoring for nitrogen dioxide has been undertaken at High Road West, Hamilton Road, Carr Road, Adastral Close, Lynwood Avenue, Brinkley Way, Rosebery Road, Nayland Road, Victoria Street, and Princes Road. The levels of nitrogen dioxide recorded at each location have been within the air quality standards and many sites have now been discontinued. Monitoring sites continue in Hamilton Road, Lynwood Avenue and Adastral Close. Many new sites have also been set up in Felixstowe and the Trimleys to monitor levels close to the A14 trunk road and the Port of Felixstowe itself. Further information on the location of these sites is detailed in section 11 of this report. The results of historic sampling are provided in the Updating and Screening Assessment report, which can be accessed as outlined above. The results of sampling undertaken in 2003 and 2004 are summarised in sections 3 and 11 of this report. Results of future monitoring will be published in the annual air quality report.

A detailed monitoring and modelling study of nitrogen dioxide concentrations arising from road traffic emissions on the A14 trunk road was also undertaken in 2001. The monitoring was undertaken at a residential property in Heathgate Piece, Trimley St Mary, and the results were used to validate a complex computer model run for all receptor locations along the A14 trunk road. The monitoring showed that the nitrogen dioxide levels at the receptor location in Heathgate Piece were below the air quality objectives. The computer modelling confirmed that there would be no exceedances of the air quality objectives at any receptor locations on the A14. This report is also available for viewing as outlined above, and is filed as Appendix G to the Stage 3 Review and Assessment published in 2001.

The Public Inquiries for the Felixstowe South Reconfiguration (FSR) and Bathside Bay Container Terminal planning applications closed in 2004. A decision on either development has not been reached yet and is expected later in 2005. Predictions of pollutant concentrations at receptor locations with the FSR and/ or Bathside Bay Container Terminal developments in place will be considered once the Public Inquiry decisions have been made, if planning approval is given.

The Environmental Statement that accompanied the planning application for FSR included an Air Quality Assessment report to determine the potential impacts of the development within the area of the Port, in the nearby town centre of Felixstowe and along the A14 towards Ipswich. It also included a report on the In-Combination effects of FSR and Bathside Bay Container Terminal developments if the applications are both approved, in which air quality was addressed. A firm of consultants, the National Environmental Technology Centre (netcen), were employed on behalf of Suffolk Coastal District Council to comment on the complex information provided in the air quality reports, to determine the accuracy of the findings. Netcen provided a review report and were also required to submit a Proof of Evidence to the FSR Public Inquiry in October 2004 detailing their findings. A copy of the Proof of Evidence is attached as Appendix F.

Detail regarding the assessment of the reports and continued review and assessment of emissions of nitrogen dioxide, sulphur dioxide and particulate matter (PM₁₀) from activities on and associated with the Port of Felixstowe is provided in section 11 of this report.

Emissions from stationary idling trains on the rail network in Trimley St. Mary.

An assessment of the potential for emissions of sulphur dioxide from idling trains to cause an exceedance of the air quality objectives within Suffolk Coastal was undertaken in the Updating and Screening Assessment (June 2003).

The technical guidance provided by the Government states the parameters under which emissions from idling trains could potentially cause an exceedance of the air quality objectives for sulphur dioxide. Exceedances may occur in areas where on two or more occasions a day trains idle with their engines running for 15 minutes or more, and where there are receptor locations within 15 metres of the idling engines. All train routes within the Suffolk Coastal district were assessed, including passenger and freight train movements. There were no locations, with the exception of station platforms themselves, where receptors 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 specific area of concern in Trimley St. Mary is a location where freight trains leaving the Port of Felixstowe are held to wait for passenger trains on the main line. This area has been specifically assessed under the Local Air Quality Management criteria for this reason. The closest receptor location to the idling train engines is in Chatsworth Crescent approximately 30 metres from the trains. The receptor does not, therefore, fall into the criteria outlined above where an exceedance of the objectives may be possible.

In addition, information was obtained from a detailed study undertaken by the City of York that looked at concentrations of sulphur dioxide produced by emissions from idling trains over distance. The study used a worse case scenario in that it looked at concentrations produced from the emissions of two trains idling at the same location. The results from the study showed the highest sulphur dioxide concentration to be found approximately 12 metres from the train engines, beyond this distance concentrations were reduced. At 12 metres, the study showed that the highest sulphur dioxide concentrations produced were well within the air quality objectives for sulphur dioxide.

At the current time, there are no areas within the Suffolk Coastal district where sulphur dioxide emissions from stationary idling train engines would cause an exceedance of the air quality objectives at receptor locations.

Traffic light sequencing at the junction of the A1152 and B1438 (Melton crossroads) and the effect on traffic flow and air pollution.

A comment was received regarding the traffic light sequencing at the Melton crossroads advising that in terms of reducing vehicle exhaust emissions the shortest waiting time for vehicles at the traffic lights is needed at this junction. Detailed air quality monitoring and computer modelling of traffic emissions from the Melton crossroads has been undertaken during the last few years, the findings of which have all been published in previous air quality reports. Assessment of all receptor locations on the junction, and on each arm of the junction, concluded that exceedances of the objectives were unlikely and no further action was necessary. Following this assessment, monitoring of nitrogen dioxide levels at the closest receptor has continued and the results to date confirm that the objectives are not being exceeded. Monitoring results for 2003 and 2004 are summarised in section 3 of this report and full data is provided in Appendix C.

The road traffic network in Suffolk is managed by the Environment & Transport Directorate of Suffolk County Council. This consultation response was forwarded to them direct for a response. Suffolk County Council explained that the waiting time when the traffic lights are on red may be longer than anticipated in order to allow vehicles turning right to clear the junction or to allow pedestrians to cross safely. They stated that it is possible that traffic volumes at this junction have changed in recent times and the traffic signal timings may need adjustment, they will be investigating the situation.

Emissions from traffic in Framlingham, with specific reference to heavy goods vehicles using the road network.

Concerns were raised regarding emissions of pollutants from road traffic in Framlingham, with specific reference made to heavy goods vehicles using the road network in the town.

Investigation of nitrogen dioxide and particulate matter emissions from road vehicles is required in detail by the air quality management process. Studies undertaken on behalf of central Government have enabled guidance to be produced for all local authorities to assess emissions from road traffic in their districts. This guidance enables local authorities to determine whether road traffic levels would lead to an exceedance of the air quality standards and objectives and, therefore, have implications for the health of those residing close to these areas. The studies and guidance confirm that the areas of concern will be roads carrying large volumes of high-speed traffic, such as the A12 and A14, smaller town centres with congested traffic and busy road junctions with queuing traffic.

As it is not possible to assess every road and junction within the district extensive investigations have been undertaken, including detailed continuous air quality monitoring and computer modelling, for the most heavily trafficked roads and busy road junctions. The areas investigated include the A1214 at Kesgrave, where houses are situated less than 1 metre from the kerb, and the crossroads of the A1152 and B1438 at Melton. Investigations have determined that the air quality standards and objectives will not be exceeded at any receptor locations for the areas investigated. As these areas represent the worse case scenarios regarding traffic emissions within Suffolk Coastal, it has been confidently concluded that traffic emissions from other roads and junctions within the district would not lead to exceedance of the objectives. Traffic flows on the main routes through, and the most heavily trafficked junctions, in Framlingham were investigated in the initial screening exercise. Traffic flow data provided by Suffolk County Council confirmed that the volume of traffic on the main routes and junctions in Framlingham was much lower than that of the roads and junctions chosen for assessment as detailed above.

Concerns were also raised regarding emissions from heavy duty/goods vehicles (lorries, buses and agricultural vehicles) travelling through Framlingham. The guidance issued for local authorities to assess emissions from traffic within their districts does include specific assessment for any roads with a high percentage of heavy-duty vehicles. The guidance advises that any roads with a heavy-duty vehicle percentage of greater than 20%, or a flow of heavy-duty vehicles greater than 2,000 per day, may cause exceedances of the objectives for the pollutants nitrogen dioxide and particulate matter. The traffic flow data provided by Suffolk County Council for the main routes through Framlingham showed an average percentage of heavy goods vehicles at 12.2%, with the total number of heavy goods vehicles per day being in the order of 500. The volume of heavy duty/goods vehicles on the main routes through Framlingham is, therefore, not great enough to cause emissions that would be likely to cause any exceedances of the objectives and no further action is necessary at this time.

The Local Air Quality Management process is ongoing and must be repeated every three years, with a progress report produced annually. Traffic volumes and numbers of heavy duty/goods vehicles on roads within the Suffolk Coastal district will continue to be re-assessed in the future and any significant changes investigated.

Emissions from road traffic in Orford.

Concern was raised regarding the increase in road traffic in Orford over the last few decades, with particular reference to increases in traffic in the summer months due to tourism.

As detailed for Framlingham above, investigations undertaken in areas representing worse case scenarios regarding traffic emissions within Suffolk Coastal, for example the A1214 at Kesgrave and

the Melton crossroads, have determined that the air quality standards and objectives will not be exceeded at any receptor locations. It has, therefore, been confidently concluded that traffic emissions from other roads and junctions within the district would not lead to exceedance of the objectives.

Areas similar to Orford, where summer tourism causes an increase in traffic levels, have been specifically assessed to determine whether there are any areas of concern. It was concluded that although the traffic levels do increase considerably in some areas of the district, especially in the coastal towns and villages, the increases would not give rise to any exceedances of the air quality standards. In general, traffic levels in all areas have been increasing over the years. The LAQM process is ongoing and must be repeated every three years, this will enable continued assessment of future traffic increases and any health implications.

Conclusion

The consultation process on the contents and findings of the Detailed Assessment for the Suffolk Coastal district was 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 LAQM, 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 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.

Appendix B

Summary and graphical representation of data output from an automatic NO_x analyser, sited on the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street in Woodbridge.

Data includes summary of ratified 6-month data set (5 April to 30 September 2004) and provisional 9-month data set (5 April 2004 to 4 January 2005).

Air Pollution Report

Produced by netcen on behalf of Suffolk Coastal District Council

SUFFOLK COASTAL WOODBRIDGE 05 April to 30 September 2004

These data have been fully ratified by netcen

POLLUTANT	NO _x	NO ₂
Number Very High	-	0
Number High	-	0
Number Moderate	-	0
Number Low	-	4232
Maximum 15-minute mean	581 µg m ⁻³	275 µg m ⁻³
Maximum hourly mean	474 µg m ⁻³	151 µg m ⁻³
Maximum running 8-hour mean	349 µg m ⁻³	127 µg m ⁻³
Maximum running 24-hour mean	185 µg m ⁻³	82 µg m ⁻³
Maximum daily mean	185 µg m ⁻³	74 µg m ⁻³
Average	79 µg m ⁻³	37 µg m ⁻³
Data capture	98.5 %	98.5 %

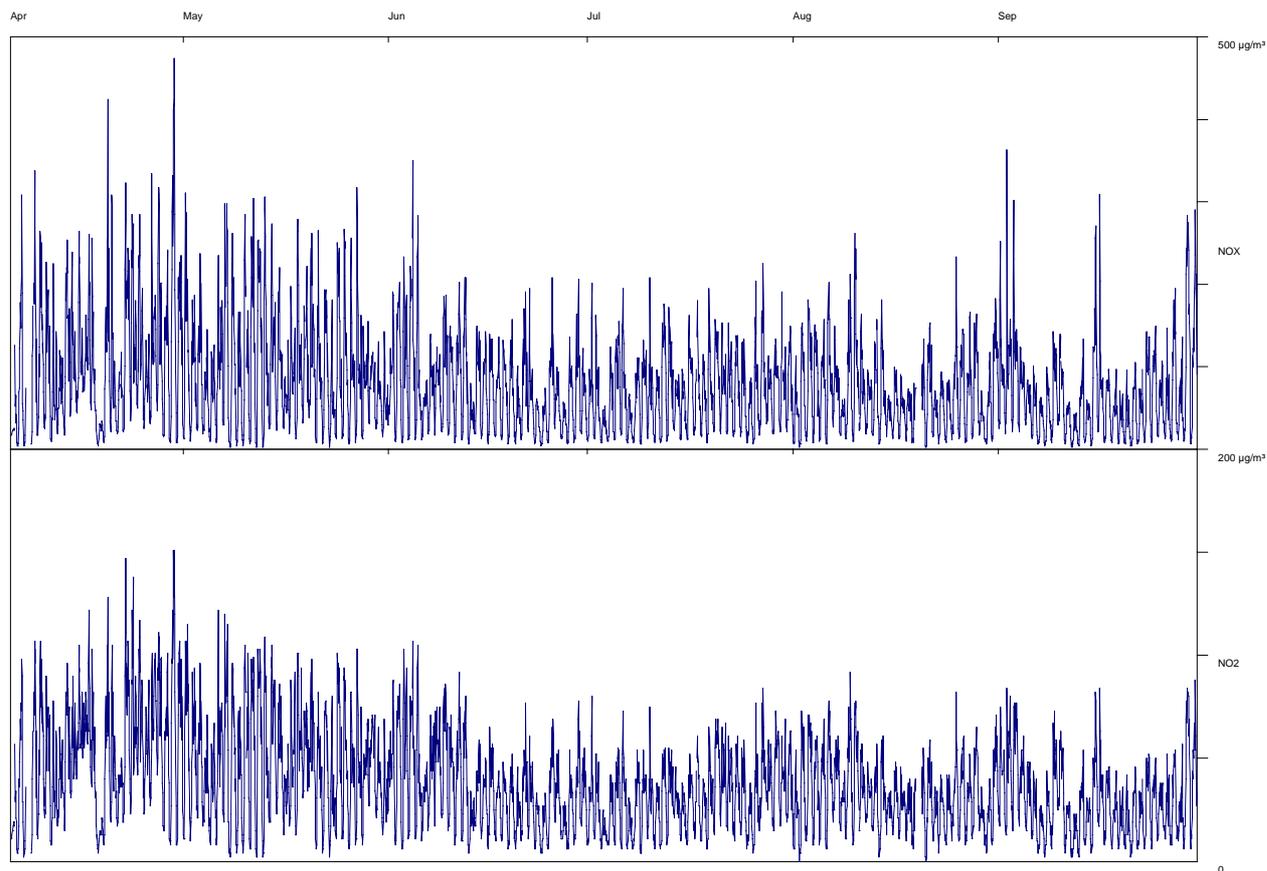
All mass units are at 20°C and 1013mb
NO_x mass units are NO_x as NO₂

Pollutant	Air Quality (England) Regulations 2000 and (Amendment) Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Air Pollution Report

Produced by netcen on behalf of Suffolk Coastal District Council

Suffolk Coastal Woodbridge Air Monitoring Hourly Mean Data for 05 April to 30 September 2004



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

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Environmental Quality
AEA Technology
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OX11 0QJ

Direct line 0870 190 6523
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netcen

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Air Pollution Report

Produced by netcen on behalf of Suffolk Coastal District Council

SUFFOLK COASTAL WOODBRIDGE 05 April 2004 to 04 January 2005

These data are provisional from 01/10/2004 and may be subject to further quality control

POLLUTANT	NO _x	NO ₂
Number Very High	-	0
Number High	-	0
Number Moderate	-	0
Number Low	-	6136
Maximum 15-minute mean	869 µg m ⁻³	275 µg m ⁻³
Maximum hourly mean	724 µg m ⁻³	151 µg m ⁻³
Maximum running 8-hour mean	349 µg m ⁻³	127 µg m ⁻³
Maximum running 24-hour mean	221 µg m ⁻³	82 µg m ⁻³
Maximum daily mean	206 µg m ⁻³	74 µg m ⁻³
Average	81 µg m ⁻³	36 µg m ⁻³
Data capture	93.0 %	93.0 %

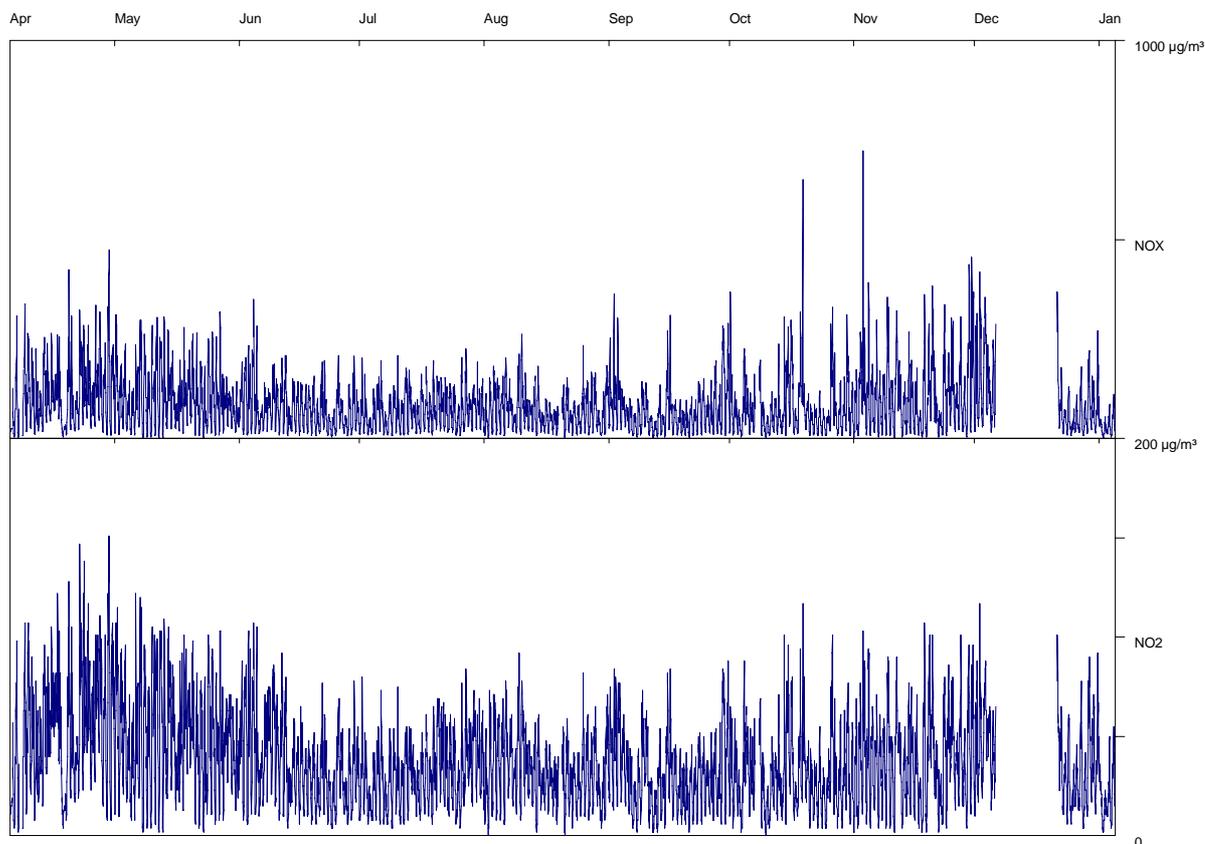
All mass units are at 20°C and 1013mb
NO_x mass units are NO_x as NO₂

Pollutant	Air Quality (England) Regulations 2000 and (Amendment) Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Air Pollution Report

Produced by netcen on behalf of Suffolk Coastal District Council

Suffolk Coastal Woodbridge Air Monitoring Hourly Mean Data for 05 April 2004 to 04 January 2005



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Appendix C

Monthly and annual mean nitrogen dioxide (NO₂) concentrations in air recorded by diffusion tubes at sites in Felixstowe, Kesgrave, Woodbridge, and Melton.

Figure C-1 Information regarding NO₂ diffusion tubes, including analyst laboratory details and site descriptions for diffusion tube locations.

Figure C-2 Bias adjustment calculations for diffusion tube data recorded in 2004.

Figure C-3 Bias adjustment calculations for diffusion tube data recorded in 2003.

Table C-1 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Felixstowe during 2004, figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Table C-2 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Kesgrave during 2004, figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Table C-3 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Woodbridge during 2004, figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Table C-4 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Woodbridge during a 12-month survey from July 2003 to June 2004. Figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Table C-5 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Melton during 2004, figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Table C-6 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Melton during 2003, figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Figure C-1

Information regarding NO₂ diffusion tubes, including analyst laboratory details and site descriptions for diffusion tube locations.

Analyst laboratory details and general NO₂ diffusion tube information

Local monitoring of monthly concentrations of NO₂ has been undertaken at a large number of locations within the Suffolk Coastal district since March 1993. All data collected up to the end of 2003 was presented in the Updating and Screening Assessment report (published in June 2003) and the Detailed Assessment report (published in March 2004). This Progress Report provides an update and includes data collected for 2003 and 2004. Monitoring for NO₂ was conducted using Palmes passive diffusion tubes, with an absorbent of 50% triethanolamine (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 NO₂ 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 NO₂ from road traffic and industrial emissions and background concentrations for these areas. Monthly and annual mean NO₂ 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 2004. 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.

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 is detailed below and maps showing diffusion tube locations are in appendix D of this report.

Felixstowe and the Trimleys (FLX)

FLX 4 – Urban background site located to provide background concentrations of NO₂ for comparison with other sites in Felixstowe. Sited on a lamp-post in Lynwood Avenue, a quiet residential street located approximately 140 metres from the nearest busy road.

FLX 5 - Roadside site to record NO₂ concentrations derived from road traffic emissions on High Road West in Felixstowe. 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 to record NO₂ concentrations derived from road traffic emissions on the A14 trunk road (Port of Felixstowe Road). Sited on a lamp-post 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 9 - Urban background site in north-east Felixstowe, to provide background levels of NO₂ in Felixstowe for comparison with sites measuring emissions from road traffic and industry. Sited on a lamp-post in Brinkley Way, a quiet residential street located away from the centre of Felixstowe and further than 900 metres from any busy road.

FLX 12 – Roadside site to record NO₂ concentrations derived from road traffic emissions on Hamilton Road in Felixstowe. This is a busy high street in Felixstowe often with very slow moving traffic due to congestion. 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. Site is near the junction with York Road on a shop front approximately 5 metres from the kerb, located at relevant receptor.

FLX 13 a, b & c – Industrial / Roadside site to record NO₂ 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 and is close to one of the major site entrances for Port traffic. The Port of Felixstowe has a number of potential sources of NO₂ emissions, the main one being heavy goods vehicles, with other potential emissions from shipping, and on site equipment and activities. Triplicate site located on at The Dooley Inn Public House, the upstairs of which is residential. 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 to record NO₂ concentrations derived from emissions at the Port of Felixstowe at another of the nearest relevant receptor locations. The Port of Felixstowe has a number of potential sources of NO₂ emissions, the main one being heavy goods vehicles using the Port with other potential emissions from shipping, and on site equipment and activities. Triplicate site located on a residential property in Adastral Close, approximately 40 metres from the Port of Felixstowe boundary.

FLX 15 –Intermediate site to assess whether a gradient of NO₂ 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 NO₂ concentrations may 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 to assess whether a gradient of NO₂ 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 NO₂ concentrations may 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.

FLX 17 a, b & c – Roadside site, a new site in 2004 set up to record NO₂ concentrations derived from road traffic emissions on the A14 trunk road at the Dock Spur roundabout. The traffic using this road is predicted to increase in the future due to development of the Port of Felixstowe, this site will provide current information on concentrations of NO₂ before the traffic increases begin. Triplicate site located on the closest residential property to the roundabout in Spriteshall Lane, Trimley St. Mary, approximately 31 metres from the kerb.

FLX 18 a, b & c - Roadside site, a new site in 2004 set up to record NO₂ concentrations derived from road traffic emissions on the A14 trunk road. The traffic using this road is predicted to increase in the future due to development of the Port of Felixstowe, this site will provide current information on concentrations of NO₂ before the traffic increases begin. Triplicate site located on a lamp-post adjacent to, and at the same distance as, the closest residential property to the kerb in Kirton Road, Trimley St. Martin, approximately 23 metres from the kerb.

FLX 19 - Urban background site, a new site in 2004 set up to provide background concentrations of NO₂ for comparison with concentrations recorded at above the roadside sites monitoring A14 road traffic emissions. Sited on a lamp-post in Welbeck Close, Trimley St Mary, a quiet residential street located approximately 140 metres from the nearest busy road.

Kesgrave (KSG)

KSG 1 – Roadside site to record NO₂ concentrations derived from road traffic emissions on the A1214 at Kesgrave. Sited opposite Kesgrave High School on a lamp-post 3 metres from the kerb. At this point the A1214 is fairly open, with domestic houses set back 15-20 metres from the kerb along one side of the road and the High School set back approximately 40 metres from the kerb on the other side.

KSG 4 – Urban background site located to provide background concentrations of NO₂ for comparison with other sites in Kesgrave. Sited on a drainpipe within Kesgrave High School and located approximately 65 metres from the A1214.

KSG 6 – Roadside site to record NO₂ 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, it experiences stationary traffic queuing at peak times and is fairly narrow with a mix of domestic houses and retail outlets along either side. Site located on a drainpipe of The Bell Inn Public House, the closest receptor on this side of the A1214, 2.6 m from kerb.

KSG 7 – Roadside site to record NO₂ 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.

KSG 8 – Roadside site to record NO₂ 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.

KSG 9 – Roadside site, to record NO₂ 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, it experiences stationary traffic queuing at peak times and is fairly narrow with a mix of domestic houses and retail outlets along either side. Site located on the opposite side of the road to KSG 6, on a lamp-post 1-2 metres from the kerb. The closest residential property on this side of the road is approximately 2 metres from the kerb.

Woodbridge (WBG)

WBG 1 a, b & c - Kerbside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is controlled by traffic lights and is characterised by standing traffic on all arms at peak times. The junction has a mix of residential properties and retail shops. Triplicate site on the drainpipe of a shop which has a residential flat above it, in Thoroughfare near Sun Lane, approximately 1 metre from the kerb and 14 metres from the traffic lights at the junction. This area of the junction is very narrow and enclosed by tall buildings, creating a canyon effect.

WBG 3 - Urban background site located to provide background concentrations of NO₂ for comparison with the roadside sites at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. Sited on a lamp-post in Kingston Farm Road, a quiet residential street approximately 100 metres from any busy roads.

WBG 5 a, b & c - Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Triplicate site on the drainpipe of a residential home in Lime Kiln Quay Road, approximately 2-3 metres of the kerb. Site parallel with the traffic lights in Thoroughfare, on the corner building of the junction, area is more open in character.

WBG 6 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on the drainpipe of a residential receptor location, in Thoroughfare near Sun Lane, approximately 2 metres from the kerb and 9 metres from WBG 1, towards the traffic lights. This area of the junction is very narrow and enclosed by tall buildings, creating a canyon effect.

WBG 7 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on the drainpipe of a residential receptor location in Sun Lane, approximately 11 metres from Thoroughfare kerbside.

WBG 8 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on the drainpipe of a residential receptor location, approximately 3 metres from the kerb on Thoroughfare going away from the junction itself past Sun Lane, approximately 38 metres from the traffic lights and 21 metres from WBG 1. This area of the junction is still narrow and enclosed by tall buildings, creating a canyon effect. Traffic regularly queues up to and past this location.

WBG 9 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on a lamp-post at the same distance as receptor locations in this area, approximately 3 metres from the kerb, on Thoroughfare at the entrance to Deben Road. Site is approximately 83 metres from the traffic lights at the junction and at peak times traffic does queue up to and past this location.

WBG 10 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on a signpost in St John's Street 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. This area of the junction is also narrow with queuing traffic up to and beyond this point at most times.

WBG 11 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on a drainpipe of a receptor location in the other Thoroughfare arm of the junction, where Thoroughfare becomes the main shopping street and is one way only. Site is approximately 10 metres from the junction and traffic is free flowing on this arm of the junction.

WBG 12 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on a drainpipe of a receptor location on Lime Kiln Quay Road, approximately 7 metres from the kerb. Site is approximately 72 metres from the traffic lights at the junction. This area of the junction is more open and traffic queues up to and beyond this point at most times.

WBG 13 – Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on traffic lights at the junction itself, at the boundary of a residential property garden in Thoroughfare, approximately 2-3 metres from the kerb. This area of the junction is more open and the traffic usually free flowing as it is on the junction itself.

WBG 14 – Kerbside site to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. Sited on traffic lights at the junction itself, at the boundary of a residential property garden where vehicles queue at the traffic lights in St. John's Street. Site is less than 1 metre from the kerb and approximately 22 metres from WBG 1. This area of the junction is narrow with buildings either side of the road.

WBG 15 – Roadside site, a new site in 2004 to record NO₂ concentrations derived from road traffic emissions at the junction of Lime Kiln Quay Road, Thoroughfare, and St. John's Street in Woodbridge. This junction is described above. This is a triplicate site located on the inlet of an automatic NO_x analyser and provides a collocation study at this junction. Sited on the first floor guttering of a residential receptor location, in Thoroughfare near Sun Lane, approximately 2 metres from the kerb and 14 metres from WBG 1, towards the traffic lights. This area of the junction is very narrow and enclosed by tall buildings, creating a canyon effect.

Melton (MEL)

MEL 2 – Urban background site located to provide background concentrations of NO₂ for comparison with the roadside site at the junction of the A1152 and B1438 in Melton. Sited on the drainpipe of a residential building in Hall Farm Road, a quiet residential street approximately 430 metres from the junction and 350 metres from any other busy roads.

MEL 5 a, b & c - Roadside site to record NO₂ concentrations derived from road traffic emissions at the junction of the A1152 and B1438 in Melton. This junction is controlled by traffic lights, and all arms of the junction experience traffic queues at peak times. The junction has domestic housing and a primary school located on it. Triplicate site located at the closest receptor location to the junction, on the garden boundary of a domestic property 3.9 metres from the kerb.

Figure C-2

Bias adjustment calculations for diffusion tube data recorded in 2004

Diffusion tubes can under or over read and the technical guidance (LAQM.TG(03)) recommends that, where possible, local authorities should verify their nitrogen dioxide diffusion tubes by collocating them with a continuous analyser to ascertain a correction factor for any inaccuracies. This process is known as ratification or bias adjustment of the diffusion tube data and will increase the accuracy of the results. More recent advice has been posted on the Review and Assessment Helpdesk website (www.uwe.ac.uk/aqm/review) which recommends that in many situations local authorities should use the combined results of a number of collocation studies, so as to minimise the uncertainty associated with any single study. To assist with this, an inventory of bias adjustment factors has been compiled by Air Quality Consultants Limited (on behalf of Defra and the Devolved Administrations) and is published on the Review and Assessment Helpdesk website. A combined bias adjustment factor can be obtained for a particular analyst laboratory in a specified year by using this inventory. If a local authority has not included their collocation results in the inventory, there is a methodology provided on the website for adding them to the other factors to provide a combined bias correction factor.

Three diffusion tubes were co-located with an automatic chemiluminescence NO_x analyser, sited in Woodbridge, from April to December 2004. The collocated diffusion tubes were at site Woodbridge 15, see figure C-1, and table C-3 in this appendix for site description and monitoring results, and Map D-5 in Appendix D for site location. Details regarding the automatic analyser and diffusion tubes are provided in section 3 of this report.

In order to calculate a bias correction factor for diffusion tubes collocated with the automatic NO_x analyser a 9-month provisional data set (5 April 2004 to 4 January 2005) was produced in line with the exposure periods of the diffusion tubes each month. The diffusion tube results for December 2004 were not used for the bias adjustment calculations, as the NO_x analyser data capture was too low during this month. Bias adjustment was to be undertaken using 9 months of results, however, due to the data capture problems experienced in December 2004 there were only 8 months of results available for use - from April to November 2004. A summary of the data collected by the automatic analyser and the diffusion tubes is shown in the table below.

Data used for diffusion tube bias adjustment from an automatic analyser and triplicate collocated diffusion tube site in Woodbridge, April to November 2004.

	Mean diffusion tube result for Woodbridge 15 a, b and c ($\mu\text{g}/\text{m}^3$) *	Continuous analyser result ($\mu\text{g}/\text{m}^3$) (provisional data)
Apr	44.0	52.0
May	39.4	47.0
Jun	35.1	35.0
Jul	40.1	31.0
Aug	38.1	32.0
Sep	32.7	28.0
Oct	45.9	31.0
Nov	53.9	38.0
Dec	~	~
Average	41.2	37.0

* Monthly results for each of the diffusion tubes can also be seen in table C-3 later in this appendix.

From the above table it can be seen that the diffusion tubes exposed at this site recorded an average NO₂ concentration of 41.2 µg/m³ over the 8 month period in 2004. Over the same time period the continuous analyser recorded an average NO₂ concentration of 37.0 µg/m³.

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: $37.0 \mu\text{g}/\text{m}^3 \div 41.2 \mu\text{g}/\text{m}^3 = \mathbf{0.902}$

As only 8 months of collocation data was available from our local study (and the technical guidance LAQM.TG(03) recommends using data from at least a 9 month study), the bias adjustment factor for the analyst laboratory, Harwell Scientifics, was obtained from the Review and Assessment Helpdesk website inventory (as outlined above). The inventory bias adjustment factor used the results from four other local authority collocation studies and was 0.90, the same as that obtained from our local collocation study.

The diffusion tube bias adjustment factor used for 2004 was 0.902 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 C-1 to C-6 later in this appendix.

Figure C-3

Bias adjustment calculations for diffusion tube data recorded in 2003.

Three diffusion tubes were co-located with a continuous chemiluminescence NO_x analyser, sited in Kesgrave, from April to December 2003.

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 December 2003.

	<u>Mean diffusion tube result for Kesgrave</u> <u>6a, b and c *</u>	<u>Continuous analyser result</u>
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

From the above table it can be seen that the diffusion tubes exposed at this site recorded an average NO₂ concentration of 33.7 µg/m³ over the 8 month period in 2003. Over the same time period the continuous analyser recorded an average NO₂ concentration of 28.3 µg/m³.

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: $28.3 \mu\text{g}/\text{m}^3 \div 33.7 \mu\text{g}/\text{m}^3 = \mathbf{0.84}$

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.

**Table C-1 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Felixstowe during 2004, figures in micrograms per cubic metre (µg/m³).
Annual mean concentration ratified where relevant to correct for diffusion tube bias.**

Site	Time in months												Annual mean (µg/m ³)	Ratification of annual mean using bias correction factor (µg/m ³) (x 0.902) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
FLX 4	no data	no data	31.2	27.5	16.9	18.0	no data	19.0	25.4	33.6	33.3	53.6	28.7	25.9
FLX 5	48.6	42.0	33.9	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 6	56.2	46.7	49.1	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 9	no data	no data	20.3	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 12	44.0	48.4	39.0	39.9	24.8	33.4	31.3	30.3	40.5	39.0	44.2	52.3	38.9	35.1
FLX 13	64.1	60.5	56.6	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 13a	~	~	~	53.5	33.8	40.6	39.7	46.8	56.6	49.1	47.4	68.3	See FLX 13 mean	n/a
FLX 13b	~	~	~	55.5	37.2	45.2	42.2	44.4	57.6	55.7	54.5	64.5	See FLX 13 mean	n/a
FLX 13c	~	~	~	58.0	36.2	45.5	38.6	48.6	55.9	51.0	57.5	66.8	See FLX 13 mean	n/a
FLX 13a,b,c - mean	64.1	60.5	56.6	55.7	35.7	43.8	40.2	46.6	56.7	51.9	53.1	66.5	52.6	47.4
FLX 14a	51.4	54.6	no data	40.2	33.8	34.8	34.1	34.7	44.2	41.1	48.4	60.7	See FLX 14 mean	n/a
FLX 14b	54.3	52.6	no data	46.2	27.8	29.6	36.0	37.9	51.1	41.9	55.2	61.2	See FLX 14 mean	n/a
FLX 14c	48.5	58.0	no data	38.5	43.9	39.6	33.4	34.5	40.3	36.7	60.5	53.6	See FLX 14 mean	n/a
FLX 14a,b,c - mean	51.4	55.1	no data	41.6	35.2	34.7	34.5	35.7	45.2	39.9	54.7	58.5	44.2	39.9
FLX 15	76.1	49.3	58.5	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 16	99.9	98.3	76.0	End	~	~	~	~	~	~	~	~	n/a *	n/a
FLX 17a	~	~	~	37.4	32.3	20.9	25.3	26.3	23.5	37.7	35.0	45.7	See FLX 17 mean	n/a
FLX 17b	~	~	~	36.6	36.3	23.0	29.1	29.1	25.8	37.6	31.6	46.8	See FLX 17 mean	n/a
FLX 17c	~	~	~	36.7	37.7	19.3	25.8	21.5	27.9	40.2	35.4	47.4	See FLX 17 mean	n/a
FLX 17a,b,c - mean	~	~	~	36.9	35.4	21.1	26.7	25.6	25.7	38.5	34.0	46.6	32.3	29.1
FLX 18a	~	~	~	41.1	29.0	27.6	22.6	33.6	36.6	51.6	44.4	51.0	See FLX 18 mean	n/a
FLX 18b	~	~	~	42.0	24.9	26.3	28.4	32.3	35.4	49.2	44.6	49.1	See FLX 18 mean	n/a
FLX 18c	~	~	~	40.5	28.8	29.8	19.0	31.9	41.7	41.0	44.3	57.2	See FLX 18 mean	n/a
FLX 18a,b,c - mean	~	~	~	41.2	27.6	27.9	23.3	32.6	37.9	47.3	44.4	52.4	37.2	33.6
FLX 19	~	~	~	36.2	28.5	18.7	19.9	17.1	24.9	34.1	34.5	49.8	29.3	26.4

Key to table on next page

Key:	FLX 4	<u>Urban background site</u>	Lamp-post outside 37 Lynwood Avenue, Felixstowe
	FLX 5	<u>Roadside site</u>	Police Station sign (at front), High Road West, Felixstowe. Site discontinued from April 2004.
	FLX 6	<u>Roadside site</u>	Lamp-post at 34 Nayland Road, Felixstowe. Site discontinued from April 2004.
	FLX 9	<u>Urban background site</u>	Lamp-post at 6 Brinkley Way, Felixstowe. Site discontinued from April 2004.
	FLX 12	<u>Roadside site</u>	Drainpipe at 119 Hamilton Road, 'Ford bros. Bike Shop', Felixstowe.
	FLX 13 & 13a,b & c	<u>Industrial / Roadside site</u>	Drainpipe on The Dooley Inn Public House, Ferry Lane, Felixstowe. Site triplicated from April 2004.
	FLX 14a,b & c	<u>Industrial site</u>	Drainpipe on 1 Adastral Close, Felixstowe (triplicate site).
	FLX 15	<u>Intermediate site</u>	Lamp-post at Ferry Lane, Felixstowe. Site discontinued from April 2004.
	FLX 16	<u>Roadside site</u>	Lamp-post at Dock Gate 2 roundabout, Port of Felixstowe. Site discontinued from April 2004.
	FLX 17a,b & c	<u>Roadside site</u>	Drainpipe on 38 Spriteshall Lane, Trimley St. Mary. New site from April 2004 to monitor A14 trunk road (triplicate site)
	FLX 18a,b & c	<u>Roadside site</u>	Lamp-post at 67 Kirton Road, Trimley St. Martin. New site from April 2004 to monitor A14 trunk road (triplicate site)
	FLX 19	<u>Urban background site</u>	Lamp-post at 4 Welbeck Close, Trimley St. Mary. New site from April 2004 to monitor A14 trunk road

Diffusion tube annual mean is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must either be obtained from the analyst laboratory or calculated from a collocation study with a continuous analyser by the authority themselves. In 2004 a collocation study was undertaken by Suffolk Coastal District Council using results from a continuous NO_x analyser located at a site in Woodbridge. The bias correction factor for 2004 was calculated, from this study, as 0.902 and details are available in figure C-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.902.

* 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.

Table C-2 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Kesgrave during 2004, figures in micrograms per cubic metre (µg/m³).
Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Site	Time in months												Annual mean (µg/m ³)	Ratification of annual mean using bias correction factor (µg/m ³) (x 0.902) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
KSG 1	34.5	34.2	25.3	32.0	22.2	18.6	21.9	20.2	24.1	31.9	37.0	46.4	29.0	26.2
KSG 4	32.2	27.6	n/a	22.3	16.1	12.6	16.2	17.3	16.8	27.9	24.9	30.0	22.2	20.0
KSG 6a	38.4	32.9	30.7	End	~	~	~	~	~	~	~	~	See KSG 6 mean	n/a
KSG 6b	37.0	36.1	21.6	End	~	~	~	~	~	~	~	~	See KSG 6 mean	n/a
KSG 6c	37.6	39.6	22.1	End	~	~	~	~	~	~	~	~	See KSG 6 mean	n/a
KSG 6 a,b,c - mean	37.7	36.2	24.8	End	~	~	~	~	~	~	~	~	n/a *	n/a
KSG 6	37.7	36.2	24.8	35.0	29.3	22.1	26.7	24.8	27.9	22.5	32.9	40.3	30.0	27.1
KSG 7	37.0	38.8	38.7	End	~	~	~	~	~	~	~	~	n/a *	n/a
KSG 8	29.0	25.3	n/a	End	~	~	~	~	~	~	~	~	n/a *	n/a
KSG 9	45.4	35.3	32.7	38.7	28.2	28.5	29.9	36.3	34.6	49.0	43.3	59.7	38.5	34.7

Key:

KSG 1	<u>Roadside site</u>	Roadside lamp-post outside 203 Main Road, Kesgrave
KSG 4	<u>Urban background site</u>	Kesgrave High School, Main Road, Kesgrave
KSG 6 & 6a,b,c	<u>Roadside site</u>	All Saints Church, Kesgrave. Triplicate site finished April 2004 and is now just a single tube
KSG 7	<u>Roadside site</u>	Drainpipe on 125 Main Road, Kesgrave. Site discontinued from April 2004
KSG 8	<u>Roadside site</u>	Drainpipe on 118 Main Road, Kesgrave. Site discontinued from April 2004
KSG 9	<u>Roadside site</u>	Roadside lamp-post at 118 Main Road, Kesgrave.

Diffusion tube annual mean is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must either be obtained from the analyst laboratory or calculated from a collocation study with a continuous analyser by the authority themselves. In 2004 a collocation study was undertaken by Suffolk Coastal District Council using results from a continuous NO_x analyser located at a site in Woodbridge. The bias correction factor for 2004 was calculated, from this study, as 0.902 and details are available in figure C-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.902.

* 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.

**Table C-3 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Woodbridge during 2004, figures in micrograms per cubic metre (µg/m³).
Annual mean concentration ratified where relevant to correct for diffusion tube bias.**

Site	Time in months												Annual mean (µg/m ³)	Ratification of annual mean using bias correction factor (µg/m ³) (x 0.902) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
WBG 1a	60.2	59.0	60.3	59.9	51.4	52.2	47.1	50.3	41.9	43.7	47.5	64.1	See WBG 1 mean	n/a
WBG 1b	63.6	64.0	52.7	59.8	57.5	47.5	51.0	41.2	52.7	53.6	52.5	65.9	See WBG 1 mean	n/a
WBG 1c	60.1	66.0	48.3	60.7	55.8	52.7	49.7	47.6	48.8	53.5	66.1	62.3	See WBG 1 mean	n/a
WBG 1a,b,c – mean	61.3	63.0	53.8	60.1	54.9	50.8	49.3	46.4	47.8	50.3	55.4	64.1	54.8	49.4
WBG 3	26.7	24.7	23.1	27.2	12.0	10.3	11.5	11.3	12.5	22.2	23.3	35.6	20.0	18.0
WBG 5a	40.8	41.1	41.1	39.5	36.8	24.4	25.3	20.5	30.6	37.4	31.5	44.0	See WBG 5 mean	n/a
WBG 5b	41.0	38.7	40.2	39.7	35.7	26.5	24.4	24.3	31.2	37.5	32.5	47.7	See WBG 5 mean	n/a
WBG 5c	38.3	36.8	40.5	38.8	37.7	23.5	27.7	25.7	33.7	37.2	37.6	46.1	See WBG 5 mean	n/a
WBG 5a,b,c - mean	40.0	38.9	40.6	39.3	36.7	24.8	25.8	23.5	31.8	37.4	33.9	45.9	34.9	31.5
WBG 6	55.8	49.2	59.5	52.1	58.9	33.8	45.3	43.7	49.0	51.1	no data	59.6	50.7	45.7
WBG 7	37.9	28.5	33.4	30.8	25.7	18.7	End	~	~	~	~	~	29.2	26.3
WBG 8	50.2	51.8	42.8	46.3	45.2	43.8	45.4	34.7	45.4	48.6	47.0	56.3	46.5	41.9
WBG 9	40.3	43.6	39.7	31.2	22.9	17.1	End	~	~	~	~	~	32.5	29.3
WBG 10	42.7	42.1	46.1	41.7	41.9	27.7	29.7	32.1	35.5	40.6	37.0	42.4	38.3	34.5
WBG 11	36.1	37.2	36.8	28.3	24.8	17.5	End	~	~	~	~	~	30.1	27.2
WBG 12	41.7	36.9	34.8	37.0	28.6	28.1	End	~	~	~	~	~	34.5	31.1
WBG 13	45.8	49.3	42.9	41.4	41.0	13.3	31.6	30.6	33.4	40.1	43.0	49.0	38.5	34.7
WBG 14	40.7	44.9	44.7	38.5	38.2	28.5	28.4	30.3	30.8	33.4	48.7	46.4	37.8	34.1
WBG 15a	~	~	~	45.4	no data	34.5	38.4	34.8	34.3	44.8	56.8	58.1	See WBG 15 mean	n/a
WBG 15b	~	~	~	49.9	40.5	35.7	38.5	38.4	28.8	48.1	51.3	58.0	See WBG 15 mean	n/a
WBG 15c	~	~	~	36.7	38.3	no data	43.5	41.0	35.1	44.8	53.5	55.8	See WBG 15 mean	n/a
WBG 15a,b,c - mean	~	~	~	44.0	39.4	35.1	40.1	38.1	32.7	45.9	53.9	57.3	42.9	38.7

Key to table on next page

Key:	WBG 1 a,b,c	<u>Kerbside site</u>	Signpost outside 93 Thoroughfare, Woodbridge (triplicate site)
	WBG 3	<u>Urban background site</u>	Lamp-post outside 8 Kingston Farm Road, Woodbridge
	WBG 5 a,b,c	<u>Roadside site</u>	Drainpipe on Suffolk Place, Lime Kiln Quay Road, Woodbridge (triplicate site)
	WBG 6	<u>Roadside site</u>	Drainpipe on 87 Thoroughfare, Woodbridge
	WBG 7	<u>Roadside site</u>	Drainpipe on 93a Thoroughfare (located in Sun Lane), Woodbridge. Site discontinued from July 2004
	WBG 8	<u>Roadside site</u>	Drainpipe on 95 Thoroughfare, Woodbridge
	WBG 9	<u>Roadside site</u>	Signpost on Thoroughfare at entrance to Deben Road, Woodbridge. Site discontinued from July 2004
	WBG 10	<u>Roadside site</u>	Signpost in St. John's Street (opposite Surgery), Woodbridge
	WBG 11	<u>Roadside site</u>	Drainpipe on 83 Thoroughfare (opposite Red Lion PH), Woodbridge. Site discontinued from July 2004
	WBG 12	<u>Roadside site</u>	Drainpipe on 8 Lime Kiln Quay Road, Woodbridge. Site discontinued from July 2004
	WBG 13	<u>Roadside site</u>	Traffic lights at front of 85 Thoroughfare, Woodbridge. New site from April 2004
	WBG 14	<u>Kerbside site</u>	Traffic lights at 85 Thoroughfare in St. John's Street, Woodbridge. New site from April 2004
	WBG 15 a,b,c	<u>Roadside site</u>	Drainpipe on 87 Thoroughfare, Woodbridge (co-location with continuous monitor). New triplicate site from April 2004

Diffusion tube annual mean is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must either be obtained from the analyst laboratory or calculated from a collocation study with a continuous analyser by the authority themselves. In 2004 a collocation study was undertaken by Suffolk Coastal District Council using results from a continuous NO_x analyser located at a site in Woodbridge. The bias correction factor for 2004 was calculated, from this study, as 0.902 and details are available in figure C-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.902.

Table C-4

Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Woodbridge during a 12-month survey from July 2003 to June 2004.
Figures in micrograms per cubic metre (µg/m³). Annual mean concentration ratified where relevant to correct for diffusion tube bias.

Site	Time in months												Annual mean (µg/m ³)	Ratification of annual mean using bias correction factor (µg/m ³) (x 0.902) #
	Jul 2003	Aug 2003	Sep 2003	Oct 2003	Nov 2003	Dec 2003	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004		
WBG 1a	63.3	63.7	64.4	55.4	62.9	no data	60.2	59.0	60.3	59.9	51.4	52.2	See WBG 1 mean	n/a
WBG 1b	62.5	61.9	63.5	56.8	53.1	no data	63.6	64.0	52.7	59.8	57.5	47.5	See WBG 1 mean	n/a
WBG 1c	65.1	60.3	63.1	55.5	61.8	no data	60.1	66.0	48.3	60.7	55.8	52.7	See WBG 1 mean	n/a
WBG 1a,b,c – mean	63.6	62.0	63.7	55.9	59.3	no data	61.3	63.0	53.8	60.1	54.9	50.8	58.9	53.1
WBG 5a	40.7	38.4	40.3	42.3	47.3	no data	40.8	41.1	41.1	39.5	36.8	24.4	See WBG 5 mean	n/a
WBG 5b	36.8	41.1	42.5	43.1	40.2	no data	41.0	38.7	40.2	39.7	35.7	26.5	See WBG 5 mean	n/a
WBG 5c	39.9	39.0	43.0	<u>45.3</u>	46.1	no data	38.3	36.8	40.5	38.8	37.7	23.5	See WBG 5 mean	n/a
WBG 5a,b,c - mean	39.1	39.5	41.9	<u>43.6</u>	44.5	no data	40.0	38.9	40.6	39.3	36.7	24.8	39.0	35.2
WBG 6	53.9	58.9	65.1	<u>54.4</u>	62.2	55.6	55.8	49.2	59.5	52.1	58.9	33.8	55.0	49.6
WBG 7	25.9	25.4	35.8	<u>35.8</u>	42.7	37.1	37.9	28.5	33.4	30.8	25.7	18.7	31.5	28.4
WBG 8	39.0	51.3	58.1	<u>49.5</u>	57.2	53.2	50.2	51.8	42.8	46.3	45.2	43.8	49.0	44.2
WBG 9	27.2	23.4	29.9	<u>33.7</u>	48.7	44.6	40.3	43.6	39.7	31.2	22.9	17.1	33.5	30.2
WBG 10	33.9	38.7	45.9	<u>44.0</u>	50.1	49.4	42.7	42.1	46.1	41.7	41.9	27.7	42.0	37.9
WBG 11	20.3	25.5	29.6	<u>37.1</u>	44.1	42.9	36.1	37.2	36.8	28.3	24.8	17.5	31.7	28.6
WBG 12	33.2	28.1	41.0	<u>35.0</u>	50.6	38.7	41.7	36.9	34.8	37.0	28.6	28.1	36.1	32.6

Key:	WBG 1 a,b,c	<u>Kerbside site</u>	Signpost outside 93 Thoroughfare, Woodbridge (triplicate Site)
	WBG 5 a,b,c	<u>Roadside site</u>	Drainpipe on Suffolk Place, Lime Kiln Quay Road, Woodbridge (triplicate site)
	WBG 6	<u>Roadside site</u>	Drainpipe on 87 Thoroughfare, Woodbridge
	WBG 7	<u>Roadside site</u>	Drainpipe on 93a Thoroughfare (located in Sun Lane), Woodbridge.
	WBG 8	<u>Roadside site</u>	Drainpipe on 95 Thoroughfare, Woodbridge
	WBG 9	<u>Roadside site</u>	Signpost on Thoroughfare at entrance to Deben Road, Woodbridge.
	WBG 10	<u>Roadside site</u>	Signpost in St. John's Street (opposite Surgery), Woodbridge
	WBG 11	<u>Roadside site</u>	Drainpipe on 83 Thoroughfare (opposite Red Lion PH), Woodbridge.
	WBG 12	<u>Roadside site</u>	Drainpipe on 8 Lime Kiln Quay Road, Woodbridge.

Diffusion tube annual mean is ratified to improve accuracy. As the diffusion tube data extended over two calendar years, 2003 and 2004, the bias correction was undertaken using the factor produced for 2004. The defra monitoring help desk advised that the 2004 factor represented the worse case scenario and so should be the one used. In 2004 a collocation study was undertaken by Suffolk Coastal District Council using results from a continuous NO_x analyser located at a site in Woodbridge. The bias correction factor for 2004 was calculated, from this study, as 0.902 and details are available in figure C-2 in this appendix. Annual mean diffusion tube concentrations were, therefore, multiplied by a factor of 0.902.

**Table C-6 Monthly and annual mean nitrogen dioxide (NO₂) concentrations recorded at sites in Melton during 2003, figures in micrograms per cubic metre (µg/m³).
Annual mean concentration ratified where relevant to correct for diffusion tube bias.**

Site	Time in months												Annual mean (µg/m ³)	Ratification of annual mean using bias correction factor (µg/m ³) #
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
MEL 2	24.3	41.4	22.9	17.3	14.9	17.1	19.2	12.3	24.9	20.1	29.5	no data	22.2	18.6
MEL 3a	53.2	69.4	51.9	End	~	~	~	~	~	~	~	~	See MEL 3 mean	n/a
MEL 3b	53.2	64.0	55.8	End	~	~	~	~	~	~	~	~	See MEL 3 mean	n/a
MEL 3c	49.4	74.3	58.2	End	~	~	~	~	~	~	~	~	See MEL 3 mean	n/a
MEL 3a,b,c – mean	51.9	69.2	55.3	End	~	~	~	~	~	~	~	~	n/a *	n/a
MEL 4a	no data	61.9	End	~	~	~	~	~	~	~	~	~	See MEL4 mean	n/a
MEL 4b	no data	62.0	End	~	~	~	~	~	~	~	~	~	See MEL 4 mean	n/a
MEL 4c	48.1	63.1	End	~	~	~	~	~	~	~	~	~	See MEL 4 mean	n/a
MEL 4a,b,c – mean	48.1	62.3	End	~	~	~	~	~	~	~	~	~	n/a *	n/a
MEL 5a	42.2	52.3	35.7	30.1	29.5	28.8	36.8	31.7	37.3	35.9	42.1	no data	See MEL5 mean	n/a
MEL 5b	42.0	50.1	34.5	31.4	31.4	25.8	39.5	32.4	31.8	36.4	41.6	no data	See MEL5 mean	n/a
MEL 5c	41.5	51.1	37.4	24.4	34.2	32.4	35.3	30.9	35.5	37.2	40.8	no data	See MEL5 mean	n/a
MEL 5a,b,c - mean	41.9	51.2	35.9	28.6	31.7	29.0	37.2	31.7	34.9	36.5	41.5	no data	36.4	30.6

Key: MEL 2 Urban background site Drainpipe on 106 Hall Farm Road, Melton
MEL 3a,b,c Kerbside site Lamp-post opposite Melton CPS, Wilford Bridge Road, Melton (**triplicate site**). **Site discontinued from April 2003**
MEL 4a,b,c Roadside site Lamp-post sited at Woods Lane, Melton (**triplicate site**) **Site discontinued from March 2003**
MEL 5a,b,c Roadside site 6 The Street, Melton (co-located with continuous monitor until March 2003) (**triplicate site**)

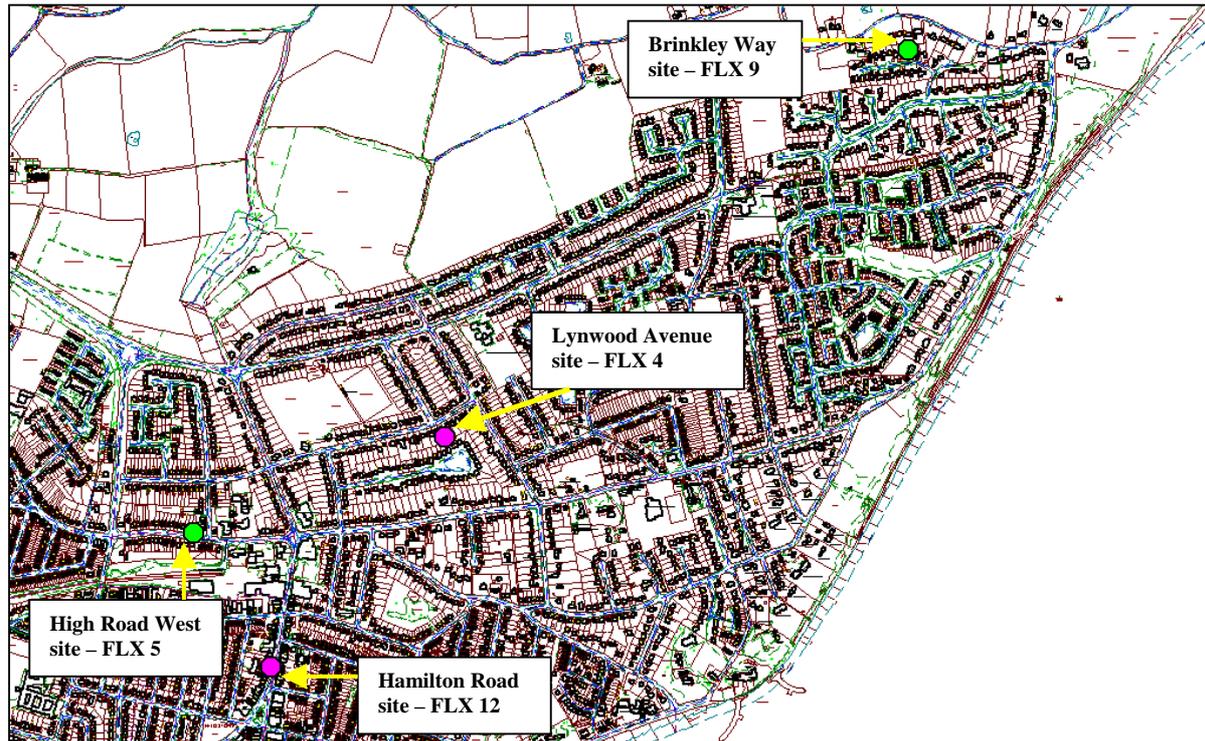
Diffusion tube annual mean is ratified to improve accuracy. The bias adjustment factor for the diffusion tubes must either be obtained from the analyst laboratory or calculated from a co-location study with a continuous analyser by the authority themselves. In 2003 a co-location study was undertaken by Suffolk Coastal District Council using results from a continuous NO_x analyser located at a site in Kesgrave. The bias correction factor for 2003 was calculated, from this study, as 0.84. Details are summarised in figure C-3 in this appendix, full details are also available in the Detailed Assessment report produced for the Suffolk Coastal district in April 2004 which can be viewed on the Council's website at <http://www.suffolkcoastal.gov.uk>. 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.

Appendix D

Maps detailing the location of nitrogen dioxide diffusion tube monitoring sites within the Suffolk Coastal district, and the automatic NOx analyser in Woodbridge.

Map D-1 Location of nitrogen dioxide (NO₂) diffusion tubes at Hamilton Road (Roadside site), Lynwood Avenue (Urban Background site) and Brinkley Way (Urban Background site), Felixstowe.



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Not to scale

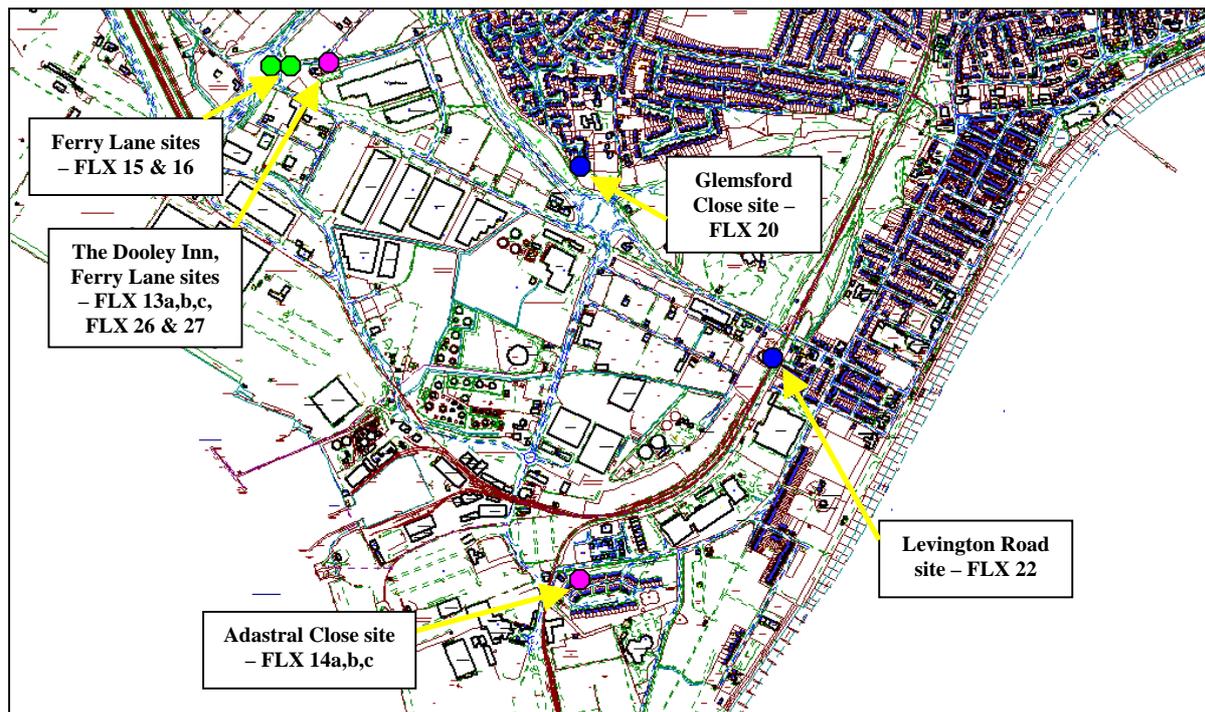


● Current sites

● Sites now removed

● New sites for 2005

Map D-2 Location of NO₂ diffusion tubes at Ferry Lane (Industrial / Roadside sites), Adastral Close, Levington Road and Glemsford Close (Industrial sites), Felixstowe.

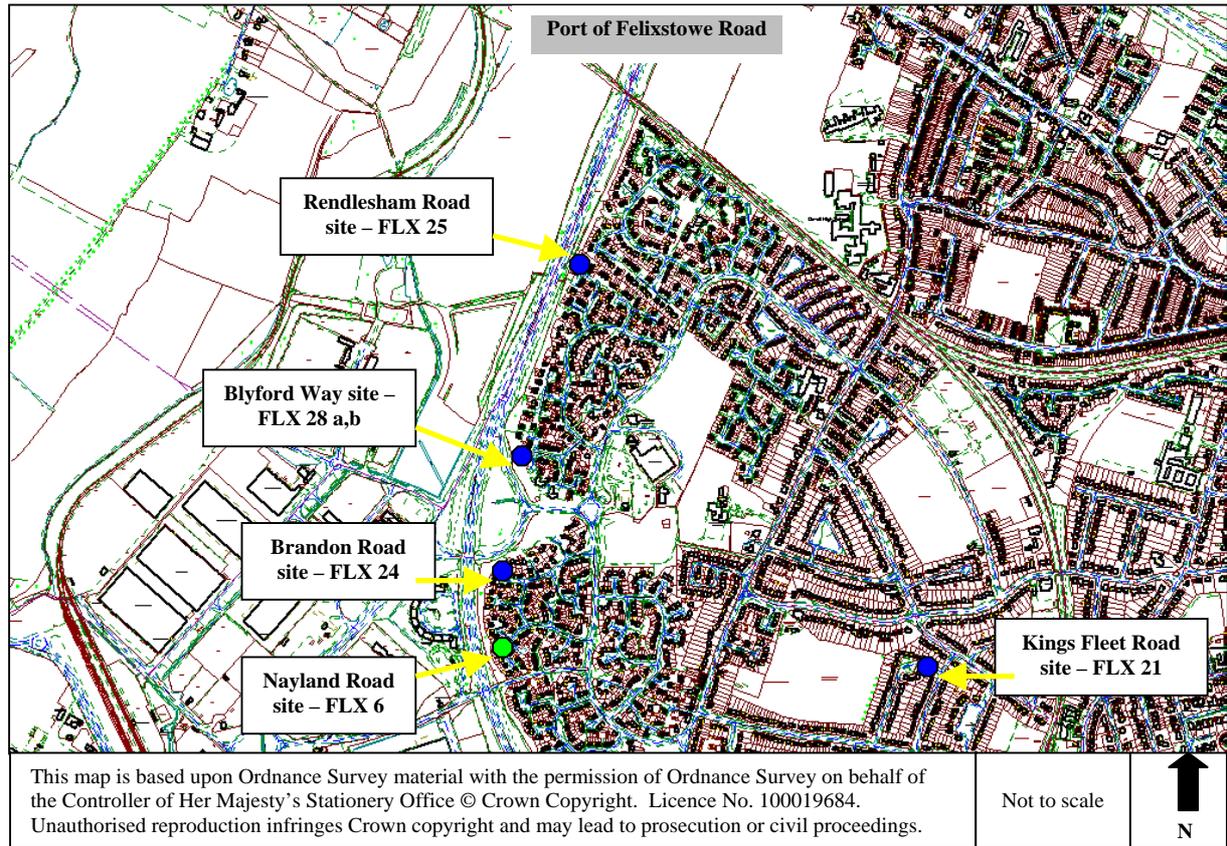


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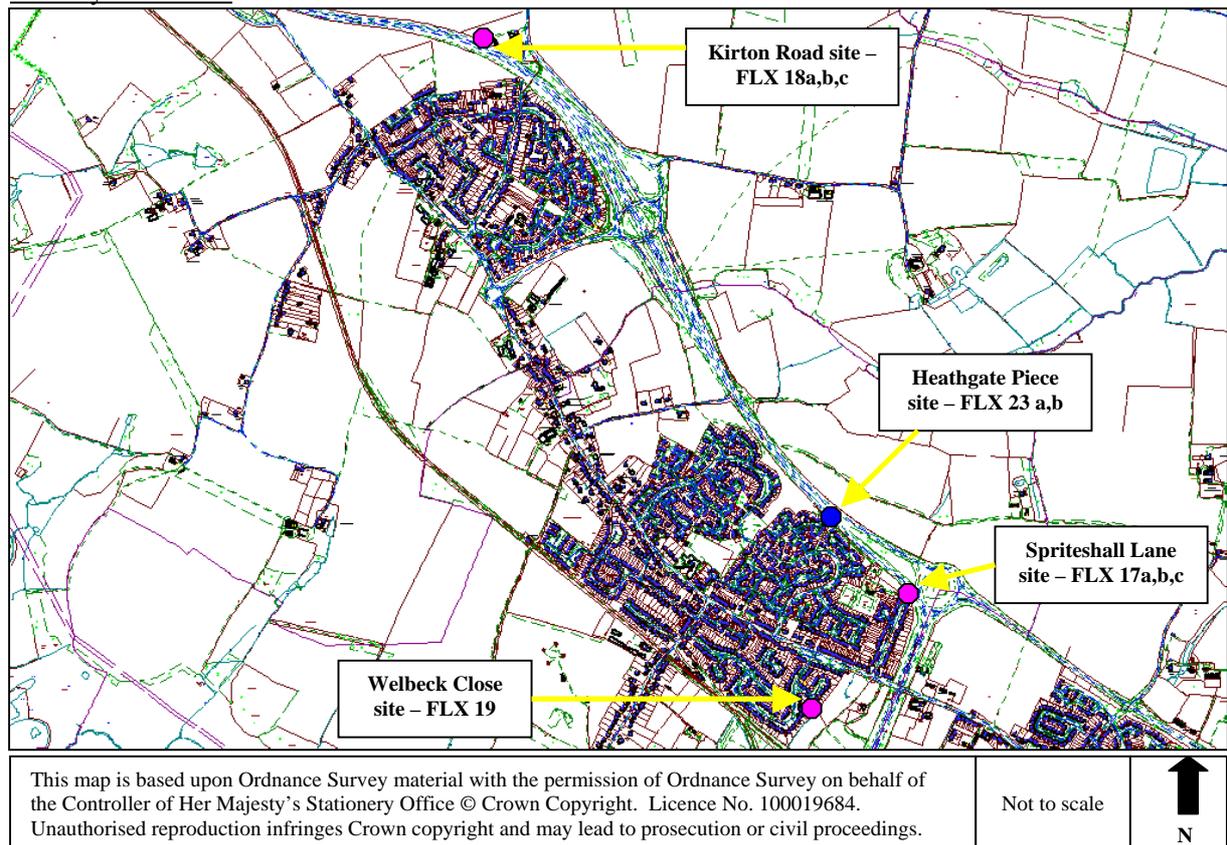


Map D-3 Location of NO₂ diffusion tubes at Nayland Road, Brandon Road, Rendlesham Road, Blyford Way (Roadside sites) and Kings Fleet Road (Urban Background site), Felixstowe.



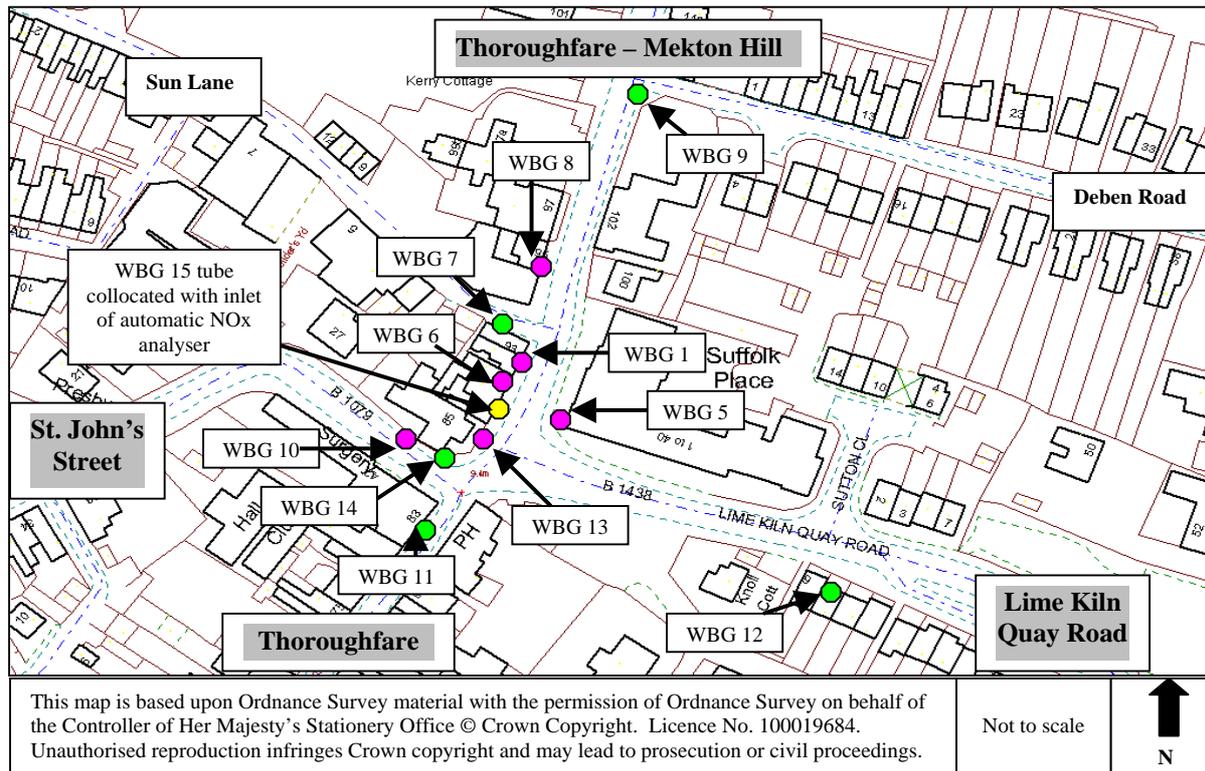
● Current sites
 ● Sites now removed
 ● New sites for 2005

Map D-4 Location of NO₂ diffusion tubes at Spriteshall Lane, Heathgate Piece (Roadside sites) and Welbeck Close (Urban Background site) in Trimley St. Mary, and Kirton Road (Roadside site) in Trimley St. Martin



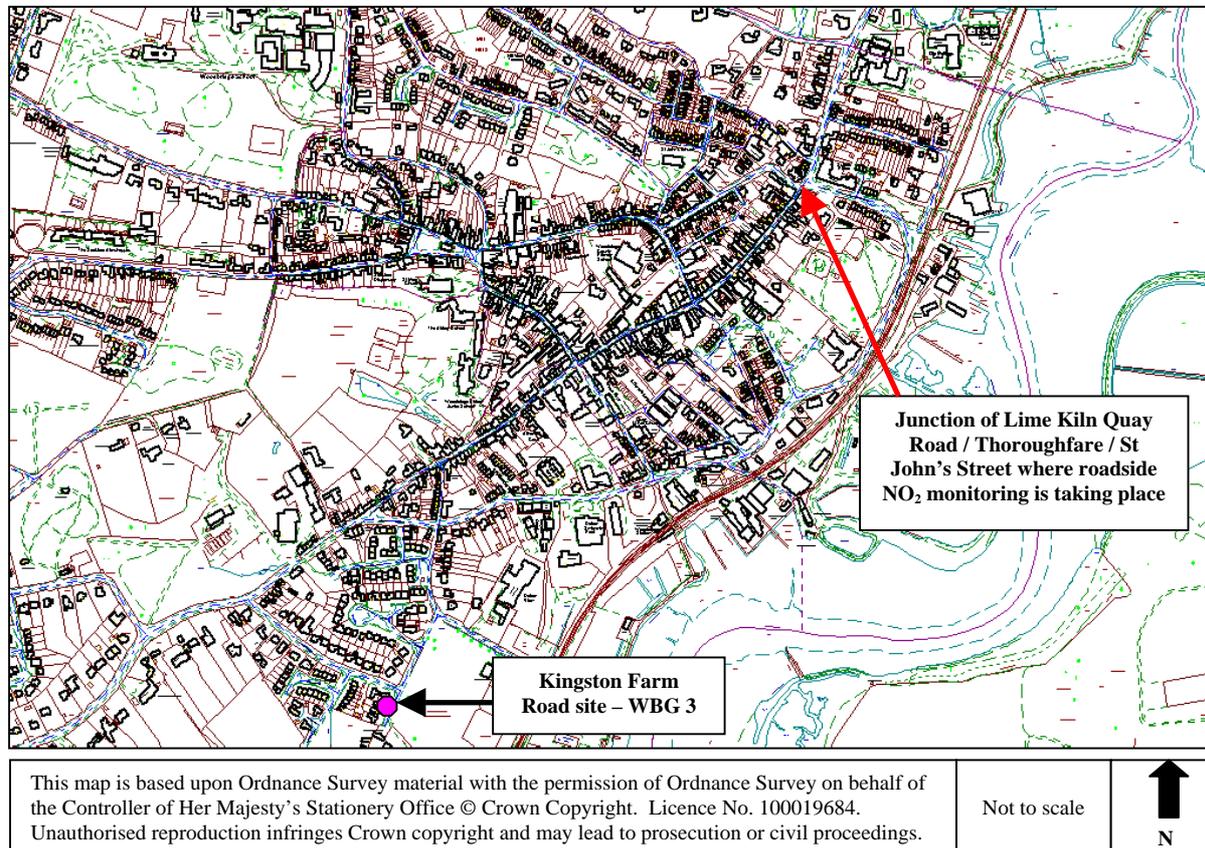
● Current sites
 ● Sites now removed
 ● New sites for 2005

Map D-5 Location of NO₂ diffusion tubes and automatic NO_x analyser sited at the junction of Lime Kiln Quay Road / Thoroughfare / St. John's Street (Kerbside and Roadside sites) in Woodbridge

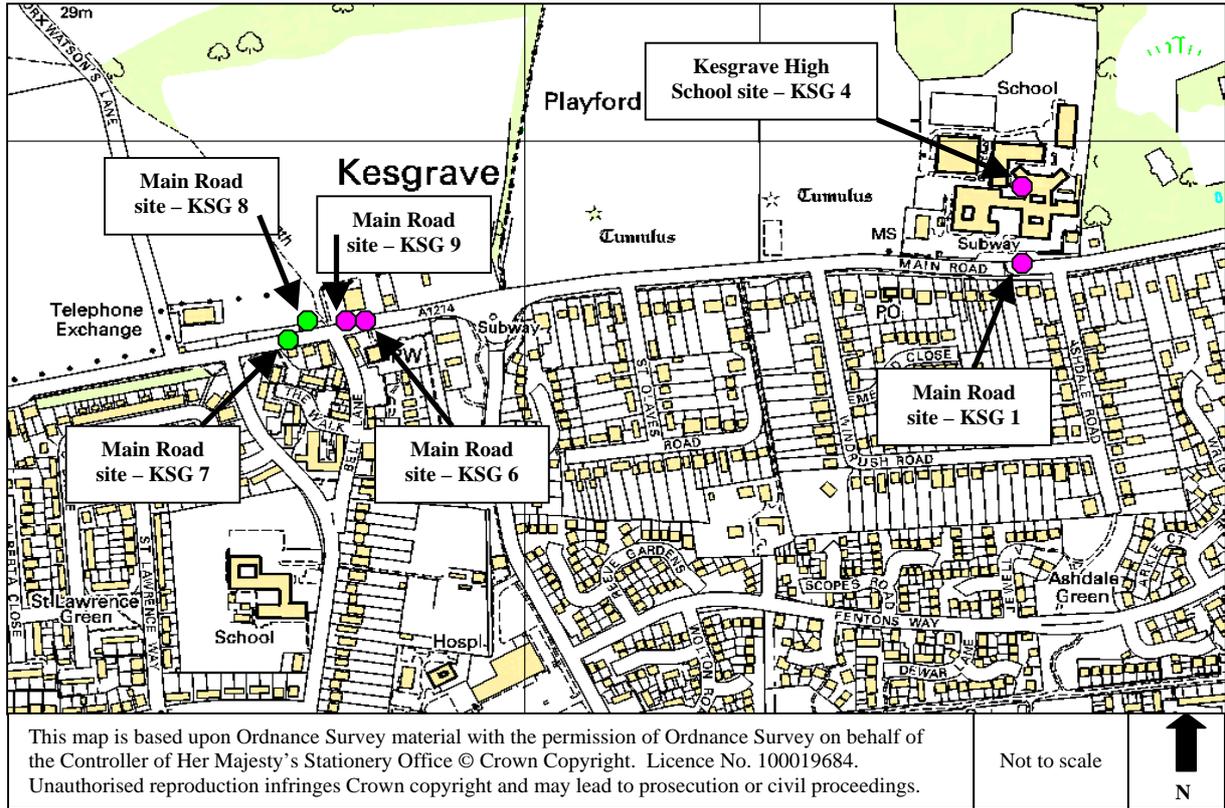


- Current sites
- Sites now removed
- Inlet of automatic NO_x analyser

Map D-6 Location of NO₂ diffusion tube sited at Kingston Farm Road (Urban Background site), Woodbridge.

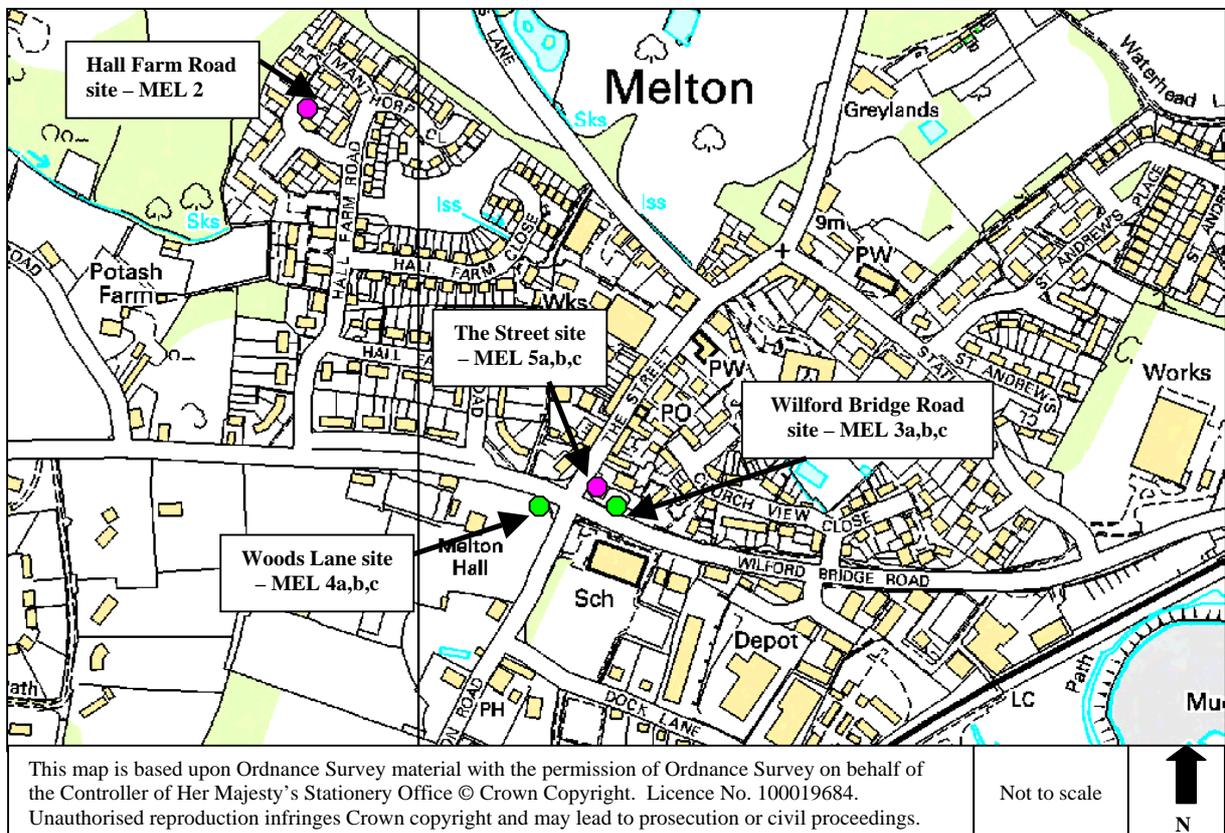


Map D-7 Location of NO₂ diffusion tubes sited at Main Road (Roadside) and Kesgrave High School (Urban Background site), Kesgrave



● Current sites ● Sites now removed

Map D-8 Location of NO₂ diffusion tubes sited at the Melton Crossroads (Roadside & Kerbside sites) and Hall Farm Road (Urban Background site), Melton



Appendix E

Information required for assessment of the Park & Ride site in Martlesham.

- Figure E-1** Input data required for The Design Manual for Roads and Bridges Screening Method (DMRB) to predict pollutant concentrations arising from traffic emissions.
- Table E-1** Traffic count information obtained from Suffolk County Council (SCC) Environment and Transport Department for the assessment of the junction of the A12 and A1214 at Martlesham Heath
- Figure E-2** Details regarding two future developments that will affect traffic flows on the A1214 within the Suffolk Coastal district, and future traffic predictions for this road.
- Table E-2** Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – closest property to the junction on the C376. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than $50\mu\text{g}/\text{m}^3$
- Table E-3** Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the Portal Avenue side of the A1214. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than $50\mu\text{g}/\text{m}^3$
- Table E-4** Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the A12 (located in Portal Avenue). DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than $50\mu\text{g}/\text{m}^3$
- Table E-5** Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the Park & Ride side of the A1214. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than $50\mu\text{g}/\text{m}^3$

Figure E-1

Input data required for The Design Manual for Roads and Bridges Screening Method (DMRB) to predict pollutant concentrations arising from traffic emissions

- **Year of assessment** – this is the year for which the specific pollutant requires assessment.
- **Number of road links** being assessed – where the DMRB spreadsheet is used for the assessment of a junction, the number of links for the junction, as defined in the DMRB instruction manual, need to be calculated. The following information will then need to be input for each road link identified.
- **Receptor location and distance to the centre of the road** from the receptor. The nearest relevant receptor locations (as defined earlier in this chapter) were identified for each section of road or each junction considered as part of this review and assessment. The distance from each receptor location to the centre of the road was measured and input into the DMRB spreadsheet.
- **Annual Average Daily Traffic flows (AADT)** - AADT's were obtained from Suffolk County Council Environment and Transport Department for the most recent traffic count year (base year). The base year data was then factored forward to the year of concern, using a Trip End Modelling Programme (TEMPRO) provided by Suffolk County Council Environment and Transport Department, if no growth information was provided. TEMPRO produces traffic growth factors for this area of the country, for both low and high percentage traffic growth. Following DMRB input instructions, high percentage traffic growth figures were used. Any traffic from future developments, where known, was then also added to predict an AADT for the year in question. The final AADT for the year in question was then input into the DMRB spreadsheet.
- **Annual average speeds** – vehicle emission rates are calculated as a function of average speed and, therefore, annual average speed data needs to be input into the DMRB spreadsheet. Care should be taken to provide reduced speed data when assessing road junctions. There is no speed information available for this junction and so the default value detailed in LAQM.TG(03) for a junction controlled by traffic lights of 20 km per hour has been used.
- **Road type** – DMRB requires that a road type definition be given for each road in the assessment. The DMRB Screening Method has three road type categories built into it which include default values for traffic compositions for that type of road (A, B and C). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. There is also a fourth road type, category D, which allows the user to input their own traffic composition data where they have it. For the assessment the three categories for which data is provided in the DMRB spreadsheet (A, B and C) were used.
- **Traffic composition data** – the DMRB spreadsheet requires the fraction of both Light Duty Vehicles (LDVs) and Heavy Duty Vehicles (HDVs). The definition between these two categories is that any vehicle above 3.5 tonnes gross vehicle weight is classified as a HDV and anything under this weight as a LDV. Information was obtained from Suffolk County Council Environment and Transport Department and advice was given in order to determine HDV and LDV percentages.
- **Local background concentrations** – for local impact assessments of road traffic, it is necessary to specify background concentrations upon which the traffic derived pollution is superimposed. Background concentrations were obtained from a series of default concentration maps produced by netcen on behalf of Defra. The maps provide data with a resolution of 1km x 1km for every local authority district for the pollutant assessment year of concern, and can be obtained from the website at www.airquality.co.uk. The maps have been plotted using information from Defra-run background and urban monitoring networks and National Atmospheric Emissions Inventory estimates. Due to concerns raised that background pollutant concentrations for major roads in rural areas may include emissions from the road in question, the Technical Guidance LAQM.TG(03) advises that the average background concentration four grid squares away from either side of the road, where there are no other significant sources of pollution, is used. This advice was used in deriving background pollutant concentrations from the netcen maps for this assessment.

Table E-1 Traffic count information obtained from Suffolk County Council (SCC) Environment and Transport Department for the assessment of the junction of the A12 and A1214 at Martlesham Heath

Road	Traffic count site description / source of information	Grid reference Eastings (where known)	Grid reference Northings (where known)	7-day Annual Average Daily Traffic Flow (AADT) - all motorised vehicles (year of data)	% of Light Duty Vehicles (LDV) – vehicles <6m in length	% of Heavy Duty Vehicles (HDV) – vehicles >6m in length
A12	Traffic count site, A12 at Brightwell	624800	244300	34,299 (2004)	90.8 %	9.2 %
A1214	Traffic count site, A1214 at Portal Avenue, Martlesham - West of A12	623764	246132	19,743 (2004)	93.5 %	6.5 %
C376	Traffic count information obtained from the Environmental Statement produced for the A1214 Martlesham Park and Ride Planning Application by Suffolk County Council	~	~	2,544 (2001)	~	~
Park & Ride site entrance	Traffic count is a prediction obtained from the Environmental Statement produced for the A1214 Martlesham Park and Ride Planning Application by Suffolk County Council	~	~	815 (2003) *	~	~
Park & Ride bus access on A1214	Traffic count is the number of bus movements per day, obtained from the Environmental Statement produced for the A1214 Martlesham Park and Ride Planning Application by Suffolk County Council	~	~	70 buses per day = 140 bus movements per day	0 %	100 %

* This figure has been calculated from an 18-hour predicted flow for this arm of the junction. The 18-hour predicted flow for 2003 was 802, Suffolk County Council, Environment & Transport Department provided a factor to calculate the predicted 24-hour flow (x1.015) = 815 AADT.

Figure E-2

Details regarding two future developments that will affect traffic flows on the A1214 within the Suffolk Coastal district, and future traffic predictions for this road.

In addition to general traffic growth, the A1214 will have traffic increases from developments in this area of the Suffolk Coastal district that are at various stages of completion. The Community Policy and Planning section for Suffolk Coastal District Council advised that there are still two developments which are not yet complete that may impact on traffic using the A1214. These are the Grange Farm development at Kesgrave and the Bixley Farm development at Rushmere St. Andrew.

The Grange Farm development at Kesgrave

This is a development of 3,150 houses on an area of land in Kesgrave, which lies between the A1214 and Foxhall Road. The A1214 is the only access road for traffic entering and leaving this development and, therefore, all future traffic from the site will use the A1214.

The Community Policy and Planning section for Suffolk Coastal District Council advised that at April 2004 2,666 of the houses were built. Traffic counts for the A1214 were obtained up to the end of 2004 and are shown in table E-1 earlier in this appendix. These counts provide a relevant traffic flow for the assessment of the PM₁₀ objective, which is to be achieved by the end of 2004. Traffic that will be generated from the remaining 484 houses still to be built on the site, as of 2005, will need to be accounted for in the traffic predictions for the assessment of the NO₂ objective, which is to be achieved by the end of 2005.

The Community Policy and Planning section for Suffolk Coastal District Council advised that the build rate for the Grange Farm development is approximated at 150-200 houses per year. It was assumed, as an optimistic forecast, that 200 houses would be built during 2005.

Suffolk County Council, Environment and Transport Department provided information regarding the number of predicted daily traffic 'trips' which would be made from each dwelling using Trip Generation Factors for this type of domestic housing development. Trip Generation Factors were obtained from the Trip Rate Information Computer System (TRICS) model, version 2005(a). The outcome was **7.76 trips per day per dwelling, as a 7-day average.**

Additional traffic predicted for **2005** from the Grange Farm development that will use the A1214 is, therefore:

- 200 houses built per year in 2005
- Trip rate of 7.76 vehicle movements per house.
- 200 houses x 7.76 trips per day = **1,552 vehicle movements per day, as a 7-day average.**

The Bixley Farm development at Rushmere St. Andrew

This is a development that was originally for 1,050 houses on an area of land in Rushmere St. Andrew, which lies between the A1214 and Foxhall Road. Revised figures at April 2004 confirm that the development is now for only 1,019 houses. Advice provided by The Community Policy and Planning section for Suffolk Coastal District Council and the Suffolk County Council, Environment and Transport Department, was to assume that all traffic from this development will use the A1214.

The Community Policy and Planning section for Suffolk Coastal District Council advised that at 31 December 2004, 977 of the houses were built. Traffic counts for the A1214 were obtained up to the

end of 2004 and are shown in table E-1 earlier in this appendix. These counts provide a relevant traffic flow for the assessment of the PM₁₀ objective, which is to be achieved by the end of 2004. Traffic that will be generated from the remaining 42 houses still to be built on the site, as of 2005, will need to be accounted for in the traffic predictions for the assessment of the NO₂ objective, which is to be achieved by the end of 2005.

The Community Policy and Planning section for Suffolk Coastal District Council advised that the build rate for the Bixley Farm development is approximated at 100 houses per year and, therefore, all remaining 42 houses should be built by the end of 2005.

Suffolk County Council, Environment and Transport Department provided information regarding the number of predicted daily traffic 'trips' which would be made from each dwelling using Trip Generation Factors for this type of domestic housing development. Trip Generation Factors were obtained from the Trip Rate Information Computer System (TRICS) model, version 5.2, December 2002. The outcome was **7.48 trips per day per dwelling, as a 7-day average.**

Additional traffic predicted for **2005** from the Bixley Farm development that will use the A1214 is, therefore:

- All 42 houses built by 2005
- Trip rate of 7.76 vehicle movements per house.
- 42 houses x 7.76 vehicle trips per day = **326 vehicle movements per day, as a 7-day average.**

Predicted AADT for the A1214 in 2005

- 2004 traffic count = 19,743 AADT
- General traffic growth predictions to factor 2004 counts to 2005 were provided by Suffolk County Council, Environment and Transport Department through the Trip End Modelling Programme (TEMPRO) version 4.23, which produces traffic growth factors for this area of the country. The high percentage growth factor of 1.003 from TEMPRO was used, as required by DMRB.
- $19,743 \times 1.003 = 19,803$ AADT
- Add traffic from Grange Farm development = 1,552 AADT
- Add traffic from Bixley Farm development = 326 AADT
- **Predicted traffic flow in 2005 = $19,803 + 1,552 + 326 = 21,681$ AADT**

Table E-2 Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – closest property to the junction on the C376. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than 50µg/m³

Junction link #	Distance from receptor to centre of road (m)	AADT flow (base year)	AADT flow for 2004 * (for the PM ₁₀ assessment)	AADT flow for 2005 * (for the NO ₂ assessment)	Annual average speed (km/h)	Road type (A,B, C, D) ♣	% Light Duty Vehicles (LDV)	% Heavy Duty Vehicles (HDV)	Background PM ₁₀ concentration for 2004 (µg/m ³)	Background NO _x concentration for 2005 (µg/m ³)	Background NO ₂ concentration for 2005 (µg/m ³)	Summary of output results from DMRB spreadsheet
Link 1 (C376 and Park & Ride access)	11.5 m	2,554 (2001)	2,570	2,578	20 km/h	B	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	<p>PM₁₀ annual mean = 21.9µg/m³ number of days PM₁₀ concentration exceeds 50µg/m³ = 6.1 days</p> <p>NO₂ annual mean=23.6µg/m³</p>
Link 2 (A12 North & South)	96 m	34,299 (2004)	34,299	34,402	20 km/h	A	90.8%	9.2%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	
Link 3 (A1214)	158 m	19,743 (2004)	19,743	21,681	20 km/h	A	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	

Details on how predicted AADT was obtained for 2004 and 2005 are explained earlier in this appendix.

Assessment of a junction by DMRB requires that it is split into a number of road links as per the instruction manual, information is put into the model for each link. DMRB calculates the total concentration at a receptor from both links.

* Traffic summary figures calculated by Suffolk Coastal District Council using a Trip End Modelling Programme (TEMPRO), provided by Suffolk County Council Environment and Transport Department, to calculate general future growth where needed. Calculations of AADT for the A1214 link in 2005 also include predicted future traffic growth due to the Grange Farm and Bixley Farm housing developments.

♣ The DMRB Screening Method has four road type categories built into it (A,B,C,D). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. A, B and C include default values for traffic compositions for that type of road. The fourth road type, category D, allows the user to input their own traffic composition data where they have it.

Table E-3 Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the Portal Avenue side of the A1214. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than 50µg/m³

Junction link #	Distance from receptor to centre of road (m)	AADT flow (base year)	AADT flow for 2004 * (for the PM ₁₀ assessment)	AADT flow For 2005 * (for the NO ₂ assessment)	Annual average speed (km/h)	Road type (A,B, C, D) ♣	% Light Duty Vehicles (LDV)	% Heavy Duty Vehicles (HDV)	Background PM ₁₀ concentration for 2004 (µg/m ³)	Background NO _x concentration for 2005 (µg/m ³)	Background NO ₂ concentration for 2005 (µg/m ³)	Summary of output results from DMRB spreadsheet
Link 1 (A1214)	26 m	19,743 (2004)	19,743	21,681	20 km/h	A	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	<p>PM₁₀ annual mean = 25µg/m³</p> <p>number of days PM₁₀ concentration exceeds 50µg/m³ = 12.4 days</p>
Link 2 (A12 North & South)	91 m	34,299 (2004)	34,299	34,402	20 km/h	A	90.8%	9.2%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	
Link 3 (C376 and Park & Ride access)	91 m	Average of C376 and Park & Ride: C376 – 2,554 (2001) Park & Ride – 815 (2003)	Average of C376 and Park & Ride: C376 – 2,570 Park & Ride – 818 Average = 1,694	Average of C376 and Park & Ride: C376 – 2,578 Park & Ride – 821 Average = 1,700	20 km/h	B	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	

Details on how predicted AADT was obtained for 2004 and 2005 are explained earlier in this appendix.

Assessment of a junction by DMRB requires that it is split into a number of road links as per the instruction manual, information is put into the model for each link. DMRB calculates the total concentration at a receptor from both links.

* Traffic summary figures calculated by Suffolk Coastal District Council using a Trip End Modelling Programme (TEMPRO), provided by Suffolk County Council Environment and Transport Department, to calculate general future growth where needed. Calculations of AADT for the A1214 link in 2005 also include predicted future traffic growth due to the Grange Farm and Bixley Farm housing developments.

♣ The DMRB Screening Method has four road type categories built into it (A,B,C,D). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. A, B and C include default values for traffic compositions for that type of road. The fourth road type, category D, allows the user to input their own traffic composition data where they have it.

Table E-4 Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the A12 (located in Portal Avenue). DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than 50µg/m³

Junction link #	Distance from receptor to centre of road (m)	AADT flow (base year)	AADT flow for 2004 * (for the PM ₁₀ assessment)	AADT flow For 2005 * (for the NO ₂ assessment)	Annual average speed (km/h)	Road type (A,B, C, D) ♣	% Light Duty Vehicles (LDV)	% Heavy Duty Vehicles (HDV)	Background PM ₁₀ concentration for 2004 (µg/m ³)	Background NO _x concentration for 2005 (µg/m ³)	Background NO ₂ concentration for 2005 (µg/m ³)	Summary of output results from DMRB spreadsheet
Link 1 (A12 North & South)	68 m	34,299 (2004)	34,299	34,402	20 km/h	A	90.8%	9.2%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	<p>PM₁₀ annual mean = 23.3µg/m³ number of days PM₁₀ concentration exceeds 50µg/m³ = 8.6 days</p>
Link 2 (A1214)	85 m	19,743 (2004)	19,743	21,681	20 km/h	A	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	
Link 3 (C376 and Park & Ride access)	75 m	Average of C376 and Park & Ride: C376 – 2,554 (2001) Park & Ride – 815 (2003)	Average of C376 and Park & Ride: C376 – 2,570 Park & Ride – 818 Average = 1,694	Average of C376 and Park & Ride: C376 – 2,578 Park & Ride – 821 Average = 1,700	20 km/h	B	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	

Details on how predicted AADT was obtained for 2004 and 2005 are explained earlier in this appendix.

Assessment of a junction by DMRB requires that it is split into a number of road links as per the instruction manual, information is put into the model for each link. DMRB calculates the total concentration at a receptor from both links.

* Traffic summary figures calculated by Suffolk Coastal District Council using a Trip End Modelling Programme (TEMPRO), provided by Suffolk County Council Environment and Transport Department, to calculate general future growth where needed. Calculations of AADT for the A1214 link in 2005 also include predicted future traffic growth due to the Grange Farm and Bixley Farm housing developments.

♣ The DMRB Screening Method has four road type categories built into it (A,B,C,D). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. A, B and C include default values for traffic compositions for that type of road. The fourth road type, category D, allows the user to input their own traffic composition data where they have it.

Table E-5 Summary of traffic data and other information used to run the DMRB screening model for the junction of the A12 / A1214 / C376 / Park & Ride in Martlesham – property closest to the junction on the Park & Ride side of the A1214. DMRB predicted annual mean concentrations for nitrogen dioxide and particulate matter together with the number of days particulate matter concentrations are expected to be greater than 50µg/m³

Junction link #	Distance from receptor to centre of road (m)	AADT flow (base year)	AADT flow for 2004 * (for the PM ₁₀ assessment)	AADT flow for 2005 * (for the NO ₂ assessment)	Annual average speed (km/h)	Road type (A,B, C, D) ♣	% Light Duty Vehicles (LDV)	% Heavy Duty Vehicles (HDV)	Background PM ₁₀ concentration for 2004 (µg/m ³)	Background NO _x concentration for 2005 (µg/m ³)	Background NO ₂ concentration for 2005 (µg/m ³)	Summary of output results from DMRB spreadsheet
Link 1 (A1214)	10 m	19,743 (2004)	19,743	21,681	20 km/h	A	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	PM₁₀ annual mean = 30.3 µg/m ³ number of days PM ₁₀ concentration exceeds 50µg/m ³ = 28.7 days
Link 2 (A12 North & South)	70 m	34,299 (2004)	34,299	34,402	20 km/h	A	90.8%	9.2%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	
Link 3 (C376 and Park & Ride access)	70 m	Average of C376 and Park & Ride: C376 – 2,554 (2001) Park & Ride – 815 (2003)	C376 – 2,570 Park & Ride – 818 Average = 1,694	C376 – 2,578 Park & Ride – 821 Average = 1,700	20 km/h	B	93.5%	6.5%	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	NO₂ annual mean= 35.5 µg/m ³
Link 4 (Park & Ride bus access)	6 m	140 (2003)	140	140	20 km/h	C	0 %	100 %	19.1 µg/m ³	26.4 µg/m ³	18.4 µg/m ³	

Details on how predicted AADT was obtained for 2004 and 2005 are explained earlier in this appendix.

Assessment of a junction by DMRB requires that it is split into a number of road links as per the instruction manual, information is put into the model for each link. DMRB calculates the total concentration at a receptor from both links.

* Traffic summary figures calculated by Suffolk Coastal District Council using a Trip End Modelling Programme (TEMPRO), provided by Suffolk County Council Environment and Transport Department, to calculate general future growth where needed. Calculations of AADT for the A1214 link in 2005 also include predicted future traffic growth due to the Grange Farm and Bixley Farm housing developments.

♣ The DMRB Screening Method has four road type categories built into it (A,B,C,D). A is all motorways or A-roads. B is urban roads which are neither motorways nor A-roads. C is any other roads. A, B and C include default values for traffic compositions for that type of road. The fourth road type, category D, allows the user to input their own traffic composition data where they have it.

Appendix F

Written Statement of John Anthony Abbott of netcen for the Felixstowe South Reconfiguration Planning Application Public Inquiry

Report

Felixstowe South Reconfiguration

Written Statement of John Anthony Abbott

Title	Felixstowe South Reconfiguration: Proof of evidence of John Anthony Abbott
Customer	Suffolk Coastal District Council
Customer reference	08628132
Confidentiality, copyright and reproduction	
File reference	netcen/ed 49299/Issue 3
Reference number	netcen/ed49299/Issue 3

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netcen is certificated to ISO9001 & ISO 14001

	Name	Signature	Date
Author	John Abbott		
Reviewed by	Beth Conlan		
Approved by	Beth Conlan		

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Introduction

- 1.1 I am John Abbott employed by AEA Technology at its National Environmental Technology Centre (netcen), Building 551, Harwell, Didcot, Oxfordshire, OX11 0QJ.
- 1.2 AEA Technology is one of Europe's leading Environmental, Safety and Risk Assessment consultancy organisations, with offices throughout the UK, in Europe, the Far East and the USA. Over 900 staff provide consultancy, research and technical services to public and private sector clients world wide. AEA Technology has over twenty five years experience in air quality assessment, contaminated land investigations, waste management consultancy, pollution control, odour control and risk assessment through the work of Warren Spring Laboratory (WSL) and the Harwell Laboratory.
- 1.3 I hold a Bachelor of Science degree from the University of Leeds, where I studied chemical engineering and carried out further research work in electrochemical engineering. From October 1978 until 30th March 1994 I was employed at Warren Spring Laboratory at Gunnels Wood Road, Stevenage, Hertfordshire SG1 2BX. Warren Spring Laboratory was the Environmental Technology Executive Agency of the Department of Trade and Industry. I worked in the Materials Handling Division, later the Marine Pollution and Bulk Materials Division as a member of the continuous weighing, bulk materials handling and shoreline clean-up sections. Since the merger of Warren Spring Laboratory with AEA Technology on 1st April 1994 I have been responsible for air quality impact assessments and dispersion modelling at Culham.
- 1.5 I have conducted many air quality impact assessments over the past ten years. These have ranged from strategic studies for the Department of the Environment into the costs of the proposed National Air Quality Strategy, through studies of the impact of controls of fuel use and energy efficiency measures in Northern Ireland cities and studies of the impact of road widening schemes (e.g. the M1 motorway) or airport development (Heathrow, Gatwick, Luton and Stansted) to studies of the impact of individual plants and processes.

1.6 Local authorities are required to assess the air quality in their areas from time-to-time under the Environment Act 1995. I assisted the Department for Environment, Food and Rural Affairs in the preparation of Technical Guidance designed to support local authorities in carrying out these duties. Netcen has carried out air quality assessments on behalf of a large number of local authorities. For example, we have prepared air quality review and assessment reports for more than 60 local authorities since April 2002. Of these, I have carried out 12 detailed assessments of air quality in which I reviewed air quality monitoring data and used dispersion models to predict future concentrations of pollutants near roads and industrial installations. I have presented training courses on local authority air quality review and assessment to members of the Chartered Institute of Environmental Health under its Emissions Monitoring and Air Quality continuing education programme.

1.7 My proof of evidence is concerned with the following matters relating to the proposed Felixstowe South Reconfiguration:

- the history of my involvement;
- my review of the Air Quality Assessment;
- Local Authority Review and Assessment.

1. The history of my Involvement

2.1. Suffolk Coastal District Council asked netcen to review the Air Quality Assessment submitted as part of the environmental impact assessment for the port of Felixstowe. Work started on the review on 8th January 2004.

2.2 Suffolk Coastal District Council provided netcen with the following information:

Felixstowe South Reconfiguration: Environmental Statement Supporting Document 3: Air Quality Assessment Draft report October 2003 reference 9M5665/R/JDD/Pbor with covers dated November 2003.

Felixstowe South Reconfiguration: Transport Assessment: Volume 1- Main Report. November 2003 Ref 0000868.

Felixstowe South Reconfiguration: Environmental Statement-
Volume II Development in the Haven: In-combination effects.
November 2003 reference ref 9M5665/R/MAS/Exet.

Felixstowe South Reconfiguration: Transport Assessment: Volume
2- Assessment of Highway Impact. November 2003 (contents page
only).

2003 traffic data for A12 and A14 (031230A12NA14SCDC.xls).
Suffolk Coastal District Council: Local Air Quality Management:
Stage 3 Local Air Quality Review and Assessment-Road Traffic
Sources, June 2001.

- 2.3 In addition, Suffolk Coastal District Council referred netcen to their internet website at <http://www.suffolkcoastal.gov.uk/envhealth/airquality.html>). The website provides copies of a series of reports prepared by or on behalf of the Council in fulfilment of their statutory responsibility under the Environment Act, 1995 to assess air quality in their areas from time-to-time. The most recent report at this time was Suffolk Coastal District Council: Local Air Quality Management: Report on the Updating and Screening Assessment of Air Quality in the Suffolk Coastal District, June 2003.
- 2.4 I prepared a draft report "Felixstowe South Reconfiguration: Review of Air Quality Assessment" dated January 2004. After receiving comments from the Council, I revised the draft report in March 2004.
- 2.5 I met with John Drabble and John Clark from Royal Haskoning, who prepared the Air Quality Assessment Report and with Tim Davidson from Suffolk Coastal District Council on 30 June 2004 to discuss the issues raised by my review.
- 2.6 I have had a number of discussions with Tim Davidson subsequently relating to further matters arising.

2. Review of the Air Quality Assessment

- 3.1 My review ("the Review") of the Air Quality Assessment considered two main documents:

Felixstowe South Reconfiguration: Environmental Statement
Supporting Document 3: Air Quality Assessment Draft report

October 2003 reference 9M5665/R/JDD/Pbor with covers dated November 2003. ("the Report")

Felixstowe South Reconfiguration: Environmental Statement- Volume II Development in the Haven: In-combination effects. November 2003 reference ref 9M5665/R/MAS/Exet ("the In-Combination Report")

- 3.2 Section 2 of the Report describes the existing facilities at the Port of Felixstowe and the proposed development in sufficient detail to put the rest of the Report in context.
- 3.3 Section 3 of the Report provides an outline description of the national air quality policy context, air quality standards and objectives and the Local Air Quality Management (LAQM) Review and Assessment process. The description provided is sufficient to put the later sections of the Report in context. The Report summarises the main conclusions of the LAQM Review and Assessment studies carried out by or on behalf of Suffolk Coastal District Council. In particular, it summarises the findings of the 2003 Updating and Screening Assessment.
- 3.4 Section 4 of the Report summarises the likely emission sources associated with construction activities and shipping, container terminal activity, car parking and road and rail transport. The Report identifies the most significant sources of emission.
- 3.5 Section 5 of the Report describes a dispersion modelling study carried out to assess the impact of the proposed development on atmospheric pollutant concentrations in the vicinity of the port and major roads. The dispersion modelling study indicated that predicted annual average nitrogen dioxide concentrations for 2008 at the Downs, close to the Port of Felixstowe Road and at Spriteshall Lane exceeded the objective limit to be achieved by 2005 specified in the Air Quality (England) Regulations 2000. The predicted concentrations exceeded the objective in both the "with Felixstowe South Reconfiguration" and "Business as Usual " cases.
- 3.6 The dispersion modelling study also indicated that predicted particulate matter, PM₁₀ concentrations for 2008 at all receptors considered achieved the objective to be achieved by 2004 specified in the Air Quality (England) Regulations 2000. However, the modelled annual average particulate matter, PM₁₀ concentrations for 2008 and 2023 at all receptors considered exceeded the European Union's indicative limit value for 2010. The predicted concentrations exceeded the objective in both the "with

Felixstowe South Reconfiguration" and "Business as Usual " cases. The Government's Local Air Quality Management Technical Guidance advises that local authorities have no statutory obligation to assess against the European Union's indicative limit values for PM₁₀, but they may find it helpful to do so in order to assist with longer-term planning and the assessment of development proposals in their local areas. In my Review, I note that the provisional objective is likely to be difficult to achieve at many locations throughout the UK and a variety of measures may be needed at national and international level.

3.7 The dispersion modelling study described in the Report compared predicted nitrogen dioxide and PM₁₀ concentrations for the "with Felixstowe South Reconfiguration" and "Business as Usual "(BAU) cases. The BAU case assumed that all committed development such as the Trinity III Phase 2 quay extension would be in place but not the Felixstowe South Reconfiguration. I understand that the BAU case also assumed that the P & O Ro-Ro operation which ceased operation in 2002 would be reinstated if the Felixstowe South Reconfiguration did not go ahead. The dispersion modelling study showed that the incremental increase in nitrogen dioxide and PM₁₀ concentrations resulting from the development compared to the BAU was very small.

3.8 In my Review, I made a number of minor criticisms of the methodology used to carry out the dispersion modelling study and of the omission of some details concerning model inputs. In my opinion, these shortcomings are not likely to affect the assessment that:

- nitrogen dioxide concentrations at relevant receptor locations close to the Port of Felixstowe Road and its junction with Candlet Road may exceed the annual average objective for 2005;
- PM₁₀ concentrations at all receptor locations considered will not exceed objectives for 2004 specified in the Air Quality (England) Regulations 2000;
- annual mean PM₁₀ concentrations at all receptor locations considered will exceed the indicative (non-statutory) limit for 2010;
- the additional contribution to nitrogen dioxide and PM₁₀ concentrations from the proposed development is small.

3.9 In order to provide an independent check on the predicted concentrations, I used the Highways Agency Design Manual for Roads and Bridges (DMRB) method to predict concentrations at receptor locations identified in Suffolk

Coastal District Council's Local Authority Review and Assessment Updating and Screening Assessment report. These receptors broadly corresponded with the Downs, close to the Port of Felixstowe Road and the Spriteshall Lane receptors considered in the dispersion modelling study although the locations do not correspond exactly. The DMRB is intended to be a screening tool to identify where there is a risk of exceeding the air quality objectives and where further detailed assessment, usually by dispersion modelling, may be required. The DMRB calculations confirmed the results of the assessment listed at 3.8 above. It also indicated that the contribution to pollutant from traffic associated with the P & O Ro-Ro ferry operation, if it were reinstated would also be small.

3.10 A similar dispersion modelling study for assessing the impact on air quality of the combined effects of the Bathside Bay development in Harwich and the Felixstowe South Reconfiguration is reported in the "In-Combination Report". My review of that report included a comparison of model predictions in the two reports. This comparison revealed a number of apparently anomalous predictions. For example, the Felixstowe South Reconfiguration is predicted to increase annual average PM₁₀ concentrations in Harwich High Street in 2023 from 19.1 µg m⁻³ to 24.3 µg m⁻³. This seems unlikely.

3.11 My review recommended that Suffolk Coastal District Council should consider a number of key issues:

- Dusts from construction activities can often cause a nuisance and increased particulate matter, PM₁₀ concentrations. These dusts can usually be effectively controlled by means of an agreed Code of Construction Practice. It is recommended that Suffolk Coastal District Council should require the developers to adopt an agreed Code of Construction Practice. This matter is addressed in the Environmental Statement.
- The increase in HGV traffic associated with the development will lead to increased nitrogen dioxide and particulate matter concentrations at residential locations close to the Port of Felixstowe Road or the Port of Felixstowe Road/ Candlet Road roundabout. Limited analysis in this report using the Design Manual for Roads and Bridges screening method suggests that the additional increases in pollutant concentrations resulting from this particular development are not excessive. However, the proposed development is just one contributor to potentially large increases in the traffic on the A14. Suffolk Coastal

District Council may wish to consider the overall impact of all proposed developments at the Port and in Felixstowe at relevant receptors near roads in more detail. This matter is considered further below.

- The increases in shipping from the development will lead to increases in emissions of sulphur dioxide while manoeuvring in Harwich Harbour and while at berth. The most stringent air quality objective for sulphur dioxide is usually the $266 \mu\text{g m}^{-3}$ 15 minute mean not to be exceeded more than 35 times in a year. Doubling the number of ships using the south area of the Port may effectively double the number of times that the objective limit will be exceeded. (Note that the ships are typically 350 m long so that they will be far enough apart during manoeuvring that the discharge plumes will not combine). Monitoring at Avocet House, Port of Felixstowe showed that the $266 \mu\text{g m}^{-3}$ objective was exceeded on no occasion during the monitoring period of March to September 2002, with a maximum measured 15 minute mean concentration of $177 \mu\text{g m}^{-3}$. It is therefore not likely that the short-term objective will be exceeded at this location with the development in place. There is a risk that the discharge plumes from ships at berth might combine when the wind is from the northwest or south east. It would be sensible for facilities to be incorporated into the construction of the FSR quay to enable ship to shore electricity to be provided so that in the future, when ships become equipped to connect to the electricity supply, this facility can be used by them. This will assist to reduce sulphur dioxide emissions from the Port at that time. Suffolk Coastal District Council may also require the Port of Felixstowe to monitor sulphur dioxide concentrations at appropriate locations to establish that concentrations in excess of objectives do not arise.

3. Local Authority Review and Assessment

- 4.1 Local authorities are required to review and assess the air quality in their area from time-to-time under the Environment Act, 1995. They are required to assess whether the objectives specified in the Air Quality (England) Regulations 2000 and the Air Quality (England) Amendment Regulations 2002 are likely to be achieved where there is relevant exposure of members of the public in their area. The local authorities are

required to declare an Air Quality Management Area where the assessment shows that it is likely that the objectives will not be achieved. They are then required to carry out further assessments of current and future air quality in the Air Quality Management Area and to prepare an Action Plan that sets out what measures the authority intends to introduce in pursuit of the Air Quality Objectives. It should also include timescales to indicate by when the measures will be implemented.

- 4.2 Local Air Quality Management: Technical Guidance LAQM TG(03) was prepared by defra and the devolved administrations to guide local authorities through the review and assessment process.
- 4.3 Suffolk Coastal District Council has prepared a series of reports describing the assessments carried out in their area. The most recent "Report on the Detailed Assessment and Continued Updating and Screening Assessment of Air Quality in the Suffolk Coastal District" was prepared in March 2004. This latest report includes details of nitrogen dioxide concentrations measured by means of diffusion tubes near to the Port of Felixstowe Road. These measurements show that the nitrogen dioxide concentrations increase sharply close to the road. The concentration measured at the Dooley Inn on Ferry Road in 2003 exceeded the air quality objective: there is relevant public exposure at this site. Furthermore, the concentration measured is markedly higher than predicted using the DMRB method and higher than that predicted in the Air Quality Assessment for the Felixstowe South Reconfiguration.
- 4.4 There is some uncertainty in the measurement of nitrogen dioxide concentrations by diffusion tube. There is also some uncertainty in the predictions made by dispersion models and the DMRB method. The uncertainty in the model predictions arises both from the inherent uncertainty in the model but also from the uncertainty in the model inputs. For example, the models can substantially underestimate concentrations of nitrogen dioxide and particulate matter where there is frequent queuing of heavy goods vehicles at roundabouts: the modelling assessments carried out so far have assumed that all traffic is free-flowing. Suffolk Coastal District Council do not consider that there is yet sufficient evidence to declare an Air Quality Management Area. However, the council has increased its monitoring effort at this location and resolved to reassess the situation in April 2005.
- 4.5 Local Air Quality Management: Policy Guidance LAQM PG(03) sets out the statutory background and the legislative framework within which local

authorities have to work. It also sets out the general principles behind air quality and land-use planning. It provides guidance on whether air quality is a material planning consideration and how much weight should be attached to it. The impact on ambient air quality is likely to be particularly important where the development, or associated traffic, is likely to result in predicted levels of air pollutants close to a breach (i.e. leaving little headroom for future developments) of the Air Quality Objectives.

- 4.6 The Policy Guidance also advises local authorities on the relevance of the indicative limit values for PM₁₀ for 2010.

“Although local authorities are not yet statutorily required to assess levels of particles for 2010, there is a strong case for starting this work early.

The reasons for this include:

- The fact that authorities are likely to need to carry out this work in the 2006 and subsequent round of reviews and assessments;*
- The fact that local authorities will have a key role to play in helping the UK deliver the EU limit values for particles by 2010. The sooner local authorities can identify any potential local exceedances, the better they are placed to be able to tackle them.*
- It can help local authorities consider the impacts of new developments.”*

- 4.8 In Felixstowe, there is a risk that the annual average air quality objective for nitrogen dioxide and the provisional objective for 2010 for particulate matter, PM₁₀ will not be met at some relevant locations close to the Port of Felixstowe Road and the Candlet Road roundabout both with and without FSR. Suffolk Coastal District Council plan to reassess pollutant concentrations close to these roads in 2005 as part of their Local Authority Review and Assessment process but have not yet declared an Air Quality Management Area. Annual average traffic flows on the Port of Felixstowe Road are expected to increase from 21,373 with 25.7 % heavy goods vehicles in 2003 to 38,430 with 43.5% HGV in 2008 with the Felixstowe South Reconfiguration in operation. This increase in traffic flow contributes to the risk of exceeding the air quality objectives. Much of this increase in traffic flow is associated with cumulative developments at the Port, including the Trinity III and Trinity III phase 2 developments. The increase in the traffic flow from the Felixstowe South Reconfiguration itself is relatively small, particularly if it is accepted that the additional traffic generated is a substitute for that associated with the P & O Ro-Ro

operation. Nevertheless, it seems that the cumulative port developments have eroded substantially the available headroom for other future developments in Felixstowe.

4. Conclusion

- 5.1 My conclusions are as follows.
- 5.2 There is a risk that the annual average air quality objective for nitrogen dioxide for 2004 and the provisional objective for 2010 for particulate matter, PM₁₀ will not be met close to the Port of Felixstowe Road and the Candlet Road roundabout.
- 5.3 Suffolk Coastal District Council continue to reassess the air quality close to these roads and will declare an Air Quality Management Area if it is likely that the air quality objective for nitrogen dioxide will not be met. If the Council declares an Air Quality Management Area, it will carry out further assessments to identify the major sources of pollutant emissions contributing to the pollutant concentrations and it will develop an Action Plan in pursuit of the objectives. The Council will refer to Local Air Quality Management: Policy Guidance LAQM PG(03), which provides advice on the measures that local authorities can take in pursuit of these objectives, including those relating to the planning process. The Guidance describes a number of measures including the use of planning conditions and planning obligations.
- 5.4 The predicted contribution to pollutant concentrations at relevant receptor locations from road traffic associated with the proposed Felixstowe South Reconfiguration is small. However, further developments taking place at the port, including the Trinity III and Trinity III phase 2 developments, taken together, will lead to substantial increases in road traffic and pollutant concentrations. These developments will substantially erode the headroom (up to the objective limits) available for other developments. If it is required to prepare an Action Plan, the Council will consider measures to reduce the impact of port traffic on air quality, drawing on the advice given in Local Air Quality Management: Policy Guidance LAQM PG(03).
- 5.5 In my opinion, it would be appropriate for the Appellant to adopt an agreed Code of Construction Practice in order to minimise pollutant impacts during construction.

- 5.6 It would be sensible for facilities to be incorporated into the construction of the FSR quay to enable ship to shore electricity to be provided so that in the future, when ships become equipped to connect to the electricity supply, this facility can be used by them. This will assist to reduce sulphur dioxide emissions from the Port at that time.
- 5.7 It would be appropriate for the Developer to work with Suffolk Coastal District Council to help achieve its Air Quality Management Objectives in the future, given the affect of the totality of Port operations on future air quality generally.