

Updating and Screening Assessment of Air Quality in Peterborough

September 2006

Executive Summary

The air quality review and assessment process forms part of local air quality management (LAQM) carried out by Peterborough City Council. LAQM provides a means of achieving improvements in air quality to help secure national air quality objectives. National air quality objectives are set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

The first Air Quality Review and Assessment in Peterborough was carried out by Peterborough City Council in 1998. Results showed the air quality objectives were likely to be achieved by the relevant deadline in all areas of the local authority although the village of Thorney was identified as requiring further monitoring. As a result no Air Quality Management Areas were required in Peterborough.

The second Updating and Screening Assessment of Air Quality in Peterborough was carried out by Peterborough City Council as the second review and assessment. Results showed the air quality objectives were likely to be achieved by the relevant deadline in all areas of the local authority except for the village of Thorney. A bypass was planned to bypass the village which was due to be completed by 2005, therefore, no Air Quality Management Areas were required in Peterborough.

The aim of this Updating and Screening Assessment (USA) of air quality in Peterborough is to identify matters that have changed since the last review and assessment which might lead to a risk of an air quality objective being exceeded.

The USA was carried out according to 'Local Air Quality Management Technical Guidance' LAQM.TG (03) and its update published in January 2006. The conclusion of the assessment is that all the air quality objectives listed in Table 1.0 will be met by the relevant deadlines, with the exception of SO₂ which will be exceeded due to an industrial process located outside Peterborough in Fenland District Council. The non statutory PM₁₀ 2010 indicative values are likely to exceed as well. Peterborough City Council has no statutory obligation to assess air quality against these limit values but has done so in order to assist with longer term planning.

A Detailed Assessment for the pollutants listed in Table 1.0 is only necessary for the SO₂ 15 minute mean value, the evidence to support this decision is provided in chapters 6 to 13 of this report. Peterborough City Council will review its Air Quality Strategy and carry out a further air quality review and assessment in 2009 with progress reports in 2007, 2008 and 2010.

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1.0 National framework

1.1 National Air Quality Strategy

Under the Environment Act 1995 the Government was required to produce an air quality strategy to map out the future of ambient air quality policy in the United Kingdom. Following a period of consultation in 1996 the first strategy *The United Kingdom National Air Quality Strategy* was published in March 1997 (given statutory force by the *Air Quality Regulations 1997*). The main objective of the strategy is to provide the best practicable protection to human health by setting health-based objectives for eight main air pollutants. The pollutants covered by the strategy are listed below (objectives for each pollutant are given in Table 1.0):

- Benzene
- 1,3-butadiene
- Carbon monoxide (CO)
- Lead
- Nitrogen dioxide (NO₂)
- Ozone
- Particles (PM₁₀)
- Sulphur dioxide (SO₂)

A revised version of this strategy was published in January 2000 - *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air* (given statutory force by the *Air Quality (England) Regulations 2000*). The strategy was revised again in 2002 to include changes in objectives, which are set out in the *Air Quality (England) Amendment Regulations 2002*.

1.2 Local Air Quality Management

Local Air Quality Management (LAQM) which came into effect in December 1997 in England, Scotland and Wales requires local authorities to periodically review and assess the current and future quality of air in their areas. The aim of the review is to assess whether air quality standards and objectives are being achieved, or are likely to be achieved, measured against the National Air Quality Strategy.

Any part of a local authority where standards or objectives are not being met, or are unlikely to be met must be designated an 'air quality management area' (AQMA).

Where an AQMA is designated the local authority must draw up an action plan setting out how it aims to meet air quality standards in that area.

Under local air quality management (LAQM), local authorities must work towards achieving the objectives for seven of the pollutants (see Table 1). Ozone levels are affected by pollutants produced outside the UK and are therefore not assessed by local authorities as part of the air quality review and assessment process.

1.3 The Review and Assessment Process

The first round of reviews and assessments were to be completed by all local authorities by June 2000 with AQMAs designated where applicable by October 2000. Four guidance notes were issued to local authorities by the Department of the Environment Transport and the Regions (DETR) to assist them in undertaking the first round of review and assessment. This review was a three-stage process with stage 1 being information gathering to determine if specific sources had potential, either individually or in combination to emit significant quantities of the relevant pollution. Stage 2 required simple monitoring and modelling to further investigate any pollutants identified as requiring further study. Stage 3 undertakes sophisticated monitoring and modelling techniques to determine whether any AQMAs were required and their location.

The first air quality review and assessment in Peterborough was carried out by Peterborough City Council in 1998. Results showed the air quality objectives were likely to be achieved by the relevant deadline in all areas of the local authority. As a result no Air Quality Management Areas were required in Peterborough.

In order to keep air quality in the forefront of local authorities thinking a new timetable for review and assessment of air quality was issued in February 2003 by the Department for Environment Food and Rural Affairs (DEFRA) called 'Local Air Quality Management Technical Guidance' (LAQM. TG(03)). The LAQM. TG(03) required local authorities to carry out an Updating Screening and Assessments (USA) of air quality in their area every three years starting in 2003 with a progress report in the intervening years. If screening shows any potential exceedences, a detailed assessment is to be produced which will highlight the extent of the exceedence and its source. Once the detailed assessment is completed an Air Quality Management Area (AQMA) will be declared for any relevant receptors within the area of exceedence and an action plan drawn up to control the levels of pollution.

Table 1 Objectives included in the *Air Quality Regulations 2000* and *Air Quality (England) Amendment Regulations 2002* for the purpose of Local Air Quality Management.

| POLLUTANT | AIR QUALITY OBJECTIVE | | Measured as | DATE TO BE ACHIEVED BY |
|-------------------------------|-----------------------|---|-----------------------------------|------------------------|
| | Concentration | | | |
| Benzene | 16.25 | $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2003 |
| | 5.00 | $\mu\text{g}/\text{m}^3$ | Annual Mean | 31.12.2010 |
| 1,3-butadiene | 2.25 | $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2003 |
| Carbon monoxide | 10.0 | mg/m^3 | Maximum daily running 8-hour mean | 31.12.2003 |
| Lead | 0.5 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2004 |
| | 0.25 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2008 |
| Nitrogen dioxide | 200 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2005 |
| Particles (PM ₁₀) | 50 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times a year | 24-hour mean | 31.12.2004 |
| | 40 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2004 |
| | 50 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 7 times a year | 24-hour mean | 31.12.2010* |
| | 20 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2010* |
| Sulphur dioxide | 350 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 | $\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |

* The 2010 PM₁₀ objectives are not statutory objectives.

The reviews will follow a similar phased approach to the first round of review and assessments as described below:

Stage 1: This is an Updating and Screening Assessment which will identify matters that have changed since the last review and assessment which might lead to a risk of an air quality objective being exceeded.

Stage 2: This is a Detailed Assessment, which will provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. Sophisticated monitoring and modelling techniques will be required at this stage to determine whether designations of AQMAs are required.

Peterborough City Council will carry out further air quality review and assessments in 2009 with progress reports in 2007, 2008 and 2010. In the event that an Air Quality Management Area is declared an Action Plan will be produced in 2007.

1.4 Air Quality Objectives

The National Air Quality Strategy sets out standards and objectives for the eight main health threatening air pollutants in the UK. These standards are based on recommendations by the Expert Panel on Air Quality Standards (EPAQS), standards used by the European Union (EU), and guidelines used by the World Health Organisation (WHO).

In addition to the objectives set out in the *Air Quality (England) Regulations 2000* and the *Air Quality (England) Amendment Regulations 2002*, the EU has set limit values for nitrogen dioxide and benzene to be achieved by 01 January 2010, and the United Kingdom has set indicative limit values for PM₁₀ to be achieved by 2010. Local Authorities are not required to assess air quality against these 2010 limit values but may find it helpful to do so.

2.0 Summary of results from the previous rounds of air quality Review and Assessments (1998 & 2003)

Peterborough City Council has undertaken two previous review and assessments. The first being completed in 1998 and the second in 2003. Both of these review and assessments concluded that Peterborough would meet all air quality objectives see table 2.

Table 2 Summary of results from rounds 1 and 2 of the Review and Assessments

| Pollutant | Assessment | |
|------------------------------------|----------------------------------|-----------------------------------|
| | Round1: Exceedance identified | Round 2: Exceedance identified |
| Benzene | No | No |
| 1,3-butadiene | No | No |
| Carbon monoxide | No | No |
| Lead | No | No |
| Nitrogen dioxide | No | No |
| Fine particles (PM ₁₀) | No | No |

| | | |
|-----------------|----|----|
| Sulphur dioxide | No | No |
|-----------------|----|----|

3.0 General information

3.1 Description of Area

Peterborough district covers an area of 343.44 km² and is made up of a variety of landscapes. Although dominated by the city of Peterborough, the eastern part of the district is composed of rich arable farmland, with the population dispersed across the flat land in many scattered farmsteads. In contrast, the western area is more undulating, with a more mixed farming economy and a population concentrated within the area's many villages. Figure 1 shows Peterborough and surrounding districts.

Figure 1 Peterborough and surrounding districts



From medieval times to the start of the Industrial Revolution, Peterborough was little more than a small market town on the edge of the Fens, though Henry VIII granted it city status in 1541. For many centuries the river was an important highway and the Customs House still stands today alongside the Town Bridge. Its real growth started

in the mid-19th century, with the arrival of the railways. Peterborough soon became a major railway junction and attracted a number of heavy industrial companies.

By the late 1960s, the New Towns programme had begun. Peterborough was designated a New Town in 1968, and the Peterborough Development Corporation was established to double the city's population in close partnership with the City Council. The Master Plan was to concentrate development in four new residential townships, each with a full range of social and economic facilities with the fourth township, Hampton, now being built to the south of the city. In April 1998 the City Council achieved Unitary Status and is now responsible for all local government services in the district.

The Draft East of England Plan or Regional Spatial Strategy (RSS) sets out the regional strategy for planning and development in the East of England to the year 2021, and reflects the Government's Sustainable Communities agenda (*Sustainable Communities: building for the future [ODPM, 2003]*), which includes Peterborough within the London-Stansted-Cambridge-Peterborough Growth Corridor.

The Examination in Public Panel, which sat through November 2005 – March 2006, has recommended that Peterborough's total housing provision be increased to 25,000 dwellings and jobs provision to 20,000 over the plan period 2001-2021. This represents significant growth and a step change in the rate of provision will be required in order to deliver this.

Peterborough is mid-way between the East Anglian coast and the Midlands and has excellent road and rail connections both north-south and east-west. The city is 78 miles from London, five miles from the A1(M), and less than 20 miles from the A14, which links the East Coast ports of Felixstowe and Harwich with the Midlands.

The city is on the East Coast main rail line, which links London with Leeds, York, Newcastle, Edinburgh and Glasgow while London itself is less than 50 minutes away by train. An east-west rail line links Peterborough with Norwich, Great Yarmouth, Leicester, Birmingham and beyond.

3.2 Climate

Peterborough is located in Cambridgeshire whose easterly location is furthest from the landfall of most Atlantic depressions, as a result its climate is one of the most

'continental' in Britain. The State of the Environment Report (Cambridgeshire and Peterborough) 1998 outlines Cambridgeshire's environment, a summary of which is given below.

Day-to-day weather conditions, and even seasonal averages in the region, are governed largely by which air masses most frequently affect the County. A period of westerly maritime air streams is likely to bring a spell of mild moist weather but as they tend to cool and dry as they cross western and central Britain, they are rarely as warm or wet as further west. A period under the influence of easterly continental air streams is likely to bring the most extreme conditions; hot dry spells in summer but very cold and sometimes snowy weather during the winter.

Cambridgeshire is one of the driest counties in the British Isles, only Essex is sometimes drier. Most places in the county receive, on average, less than 600mm of rain per annum. Precipitation is approximately equally distributed over the year.

Compared with other parts of Britain, East Anglia is hot and sunny in the summer but cold and frosty in the winter. Cambridgeshire's inland location within East Anglia provides some protection from cool onshore breezes that affect coastal parts of the region in summer.

3.3 Recent changes in Peterborough's population total

Table 3 below indicates the rapid growth of Peterborough from 1971 to 2004. The seventies witnessed the greatest degree of change, engineered by the momentum of new town expansion. Much of Peterborough's growth in the seventies centred on the Bretton and Orton townships, and Ravensthorpe, which were developed to attract new residents to Peterborough.

Throughout the eighties the high level of in-migration continued. People from many UK regions moved to Peterborough to benefit from a healthy and growing economy, and a green and clean 'new town' environment. The Orton and Werrington townships were completed during this period.

The nineties saw a change to this trend of continuous growth. From mid-1995 to mid-1998 the population total fell each year. The decline, predominantly a local issue, did not mirror the national or regional picture. Much of the decline has been attributed to the high growth rates experienced in neighbouring districts over the same period. Net

outward migration to neighbouring market towns such as The Deepings, Stamford, Bourne and Spalding, together with a slow down in the number of people migrating into the district, is seen as the primary cause of the decline.

However, the mid 1999 estimate showed an increase in Peterborough's population for the first time since mid 1995. The total has remained stable from mid 1999 to mid 2001. Table 3 highlights the changes in Peterborough's population from 1971 – 2005.

Table 3 Population totals for Peterborough 1971-2005

| Mid-Year | 1971 | 1981 | 1991 | 2001 | 2002 | 2003 | 2004 | 2005 |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Population | 106,500 | 134,300 | 155,000 | 157,400 | 15,600 | 158,800 | 159,100 | 159,700 |

Source: Office for National Statistics mid year estimates

Notably, the development of Peterborough's fourth township, Hampton, continues to gather momentum and attract people from outside the district. Hampton is planned to provide a total of 7200 dwellings between 1997 and 2020 and will provide an important impetus for further growth throughout the next two decades. This along with the house building at Riverside Place, a former sugar beet factory, signals the trend and location of key future growth.

3.4 Population Forecasts

Despite the recent decline in population, the forecast to 2021 is for 'sustained growth'. Mid-2000 was identified as the important turning point away from recent population decline and into growth – this process seems to have begun. The development of the Hampton township has been as a key driver in the process. The forecast change largely reflects the change in house building indicated in the Draft East of England Plan Panel Report (June 2006). See Table 4.

Table 4 Population Forecasts for Peterborough mid 2001 - 2016

| | Mid-2001 Estimate¹ | 2006² | 2011² | 2016² | 2021² |
|-----------------------|--------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Peterborough District | 157,400 | 166,000 | 182,000 | 194,300 | 206,400 |

Source: ¹ – ONS ² - Cambridgeshire County Council Research Group Mid 2005 based Draft Interim Population Forecasts

The forecasts indicate much greater rates of growth from 2001 to 2021 than was experienced between 1991 and 2001. Of this change 38% is derived from natural change and 62% from net inward migration.

3.5 Transport

Traffic levels in Peterborough are monitored using two imaginary screenlines. The first runs north-south along the railway line and the second-east west along the River Nene. All sites are counted in May each year.

The traffic growth figures are calculated using the traffic levels in 1991 as a baseline of 100%. The figures in subsequent years denote the percentage of vehicular traffic relative to the 1995 base; for example, in 2000, there was an 8% increase in the volume of motor cycle traffic, and a 13% increase in the volume of car traffic. The screenlines are designed to measure movements of traffic in and out of, and around Peterborough. The figures are calculated using traffic counts on the strategic routes in the area. See table 5.

Table 5 Traffic growth on Peterborough screenlines

| Vehicle Type | 1995 | 1998 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Motor Cycles | 100 | 104.1 | 108.7 | 91.5 | 107.5 | 111.5 | 94 | 93 |
| Cars | 100 | 107.9 | 113.8 | 114.8 | 115.8 | 117.5 | 124 | 121 |
| Light Goods | 100 | 109.4 | 118.5 | 125.6 | 123.8 | 128.4 | 138 | 140 |
| Heavy Goods | 100 | 108.7 | 100.6 | 98.4 | 96.3 | 96.2 | 98 | 94 |
| Total motor vehicles | 100 | 108.1 | 113.2 | 114.4 | 115.1 | 116.8 | 123 | 120 |

Source: Peterborough City Council Transportation Group.

4.0 THE PLANNING BACKGROUND

4.1 The Regional Plan

The Draft Regional Plan for the East of England (RSS14) outlines the spatial planning policies for the East of England and provides the context within which local development frameworks (LDF's) are being developed. RSS 14 when adopted, will replace the existing Regional Planning Guidance for East Anglia (RPG6) which

formed the regional framework for the Cambridgeshire and Peterborough Structure Plan (2003). Peterborough City Council is a Unitary Authority and, therefore, also has input into the Cambridgeshire Structure plan (see below).

4.2 The Cambridgeshire and Peterborough Structure Plan

The Cambridgeshire and Peterborough Structure Plan was adopted in October 2003 and provides a strategic framework for development and the use of land in Cambridgeshire and Peterborough. It covers the period to 2016.

Policy P7/8 seeks to ensure that new development will be located and designed to minimise and where possible avoid air, land and water pollution. Individual and cumulative impacts of development will be taken into account in the consideration of development proposals and developers will be expected to take appropriate avoidance and mitigation measures. Local Planning Authorities should resist proposals that will adversely affect air quality.

4.3 Peterborough Local Plan

The Peterborough Local Plan covers the period mid 1991 to mid-2006, and was adopted on 20 July 2005.. It sets out planning policies to provide a basis for decisions on planning applications; and, makes proposals for development and the use of land and allocates land to meet housing, employment and social needs.

The aims of the Plan do not specifically include the minimisation of air pollution. However, the Plan includes policies that seek to minimise any adverse impact of development on the amenity of existing and future neighbours, and these policies could be used to control emissions that could cause air pollution.

The Plan also includes other policies that will help minimise air pollution. They seek to:

- Reduce travel by car and encourage the use of cycle-ways, footpaths and buses;
- Concentrate development in urban areas to reduce commuting;
- Promote energy conservation and the production of energy from renewable resources.

4.4 The second Peterborough Local Transport Plan

The Transport Act 2000 places a statutory responsibility on local transport authorities in England (outside London) to produce and implement a Local Transport Plan that reflects the guidance issued by the Government. The second Peterborough Local Transport Plan (LTP2) was submitted in March 2006 and covers the period 2006 to 2011.

The development of the LTP2 reflects a growing Peterborough; it tackles congestion by balancing the need to maintain good accessibility to private motorised vehicles against the requirement to meet growing demand for travel by the promotion of attractive and safe sustainable alternatives through travel mode choice. The LTP2 is split in to four shared priorities: tackling congestion; delivering accessibility; safer roads; better air quality; and also discusses the maintenance of the highway network.

The Department for Transport awarded Peterborough a Sustainable Travel Demonstration Town status (known locally as Travelchoice). The Travelchoice project forms the umbrella under which the Council's sustainable transport ambitions are co-ordinated. The project was initiated in 2004 and is set to run until 2009, and consists of 18 individual schemes which all have a key central theme of delivering 'soft' measures to improve the use of sustainable transport modes.

4.5 Local Agenda 21

Improving air quality is very strongly linked to the principles of Sustainable Development. This is about ensuring a better quality of life for everyone, now and for generations to come, and has had a high profile since the "Earth Summit" in Rio in 1992. From this, emerged agreement on a plan for the 21st Century, known as Agenda 21, which had the key aims of ensuring environmental protection, quality of life and equality.

Local authorities have a key role to play in promoting Sustainable Development by producing Local Agenda 21 Strategies for their districts. Peterborough City Council supports the principles of Local Agenda 21 and produced a strategy by the end of the year 2000.

Local Agenda 21 is based on sustainability objectives, which cover broad environmental and social fields. These include objectives relevant to improved air quality, such as:

A Fairer Society: everyone having the right to a good environment, including high air quality standards, no matter what their social status.

Our Living Space: planning of new development and transport systems so that they are more sustainable, this could include air quality considerations.

Our Health: improving health overall, particularly in relation to environmental factors such as air quality.

Air quality management initiatives already fall in line with Local Agenda 21 objectives; however, it is necessary to view such initiatives as part of the broader picture and not as independent schemes. An aspect of air quality could be used as an indicator of sustainability in a Local Agenda 21 Strategy for Peterborough.

Traffic impacts, including deterioration in air quality, are seen as one of the main environmental problems facing Peterborough. Therefore, an Air Quality Management Plan will have strong links with other plans that aim to reduce road traffic and make the city more sustainable.

5.0 Air Pollution Monitoring

5.1 History of Pollution Monitoring in Peterborough

Pollution monitoring has been undertaken in Peterborough with varying levels of complexity since the 1960s. Early monitoring involved measuring levels of sulphur dioxide and black smoke between 1963 and 1991 to assess the impact of the Clean Air Act 1956. Levels of nitrogen dioxide were first measured in Peterborough using passive diffusion tubes in 1994.

Following the 1956 and 1968 Clean Air Acts, Smoke Control Areas were introduced in Peterborough, in these areas it is illegal to emit smoke from chimneys and use unauthorised fuel in domestic premises. As a result, the annual mean concentration of sulphur dioxide and smoke have decreased between 1962 and 1989. As pollution levels declined, sulphur dioxide and smoke monitoring were discontinued in Peterborough.

In 2001, estimates of background concentrations of sulphur dioxide in the Peterborough area were between 2 and 10 $\mu\text{g}/\text{m}^3$ (UK National Air Quality Information

Archive). Today, the majority of air pollution in Peterborough is considered to be from road traffic.

5.2 Pollution Monitoring in Peterborough

In Peterborough, at present, only nitrogen dioxide of the seven pollutants assessed under local air quality management is currently monitored. Nitrogen dioxide is monitored using diffusion tubes at sixteen sites around Peterborough, which are listed in table 6. Four of the monitoring sites are part of the National Nitrogen Dioxide Diffusion Tube Survey, which collects data from 325 Local and Unitary Authorities, and has the objective of assessing the spatial and temporal distribution of nitrogen dioxide concentrations in urban areas of the UK.

All the monitoring sites in Peterborough have been chosen in line with DEFRA diffusion tube siting requirements (*DEFRA 2003*) and are classified according to the type of environment in which they are located.

Monitoring of nitrogen dioxide using diffusion tubes is common throughout the UK. Whilst this method can produce data that are comparable to reference methods (chemiluminescence samplers), care must be taken with the storage, handling and analysis of the tubes.

When using diffusion tubes, they must be validated against a reference method so that a 'bias correction' can be applied. Details of the use of nitrogen dioxide diffusion tubes in Peterborough including 'bias correction' are given in Appendix 1.

Table 6 NO₂ diffusion tube monitoring sites in Peterborough

| Site Location | Site type | Description |
|----------------------|------------------|--|
| Copeland | Urban | An urban location distanced from sources and therefore broadly representative of city-wide background concentrations |
| | Background | |
| Lythmere | Urban | |
| | Background | |
| Stanground | Urban | Site sampling within 5m of the kerbside of a busy road and the back of the pavement |
| | Background | |
| Walton | Roadside | |
| Bourges | Roadside | |
| Boulevard | | |
| Fletton | Roadside | |
| Parkway | | |
| Fletton | Roadside | |
| Parkway | | |
| Thorney S1(b) | Kerbside | Site sampling within 1m of the kerb of a |

| | | |
|-------------|----------|-----------|
| Thorney 2TA | Kerbside | busy road |
| Thorney 2TA | Kerbside | |
| Thorney S7 | Kerbside | |
| Thorney S3 | Kerbside | |
| Thorney S4 | Kerbside | |
| Thorney S5 | Kerbside | |
| Thorney S6 | Kerbside | |
| Thorney S2 | Kerbside | |

5.3 Weather and air pollution

Weather and local climate affect air quality (see section 3.2.1 for details of Peterborough's climate). Sunshine, rain, air temperature and wind can affect the amount of air pollution present:

- *Sunshine*: Makes some pollutants undergo chemical reactions producing smog.
- *Rain*: Washes out water soluble pollutants and particulate matter.
- *Air temperature*: Higher air temperatures speed up chemical reactions in the air.
- *Wind*: Wind speed, atmospheric turbulence/stability and mixing depth affect the dispersal and dilution of pollutants.

A comprehensive knowledge of meteorology is required to link emissions of pollution with that of measured ambient concentrations. Without such information, it is not possible to determine the relative importance of different sources in contributing to population exposure. Air pollution episodes, such as those that produce exceedences of short term Air Quality Standards, may not be due to large increases in emissions but to unfavourable meteorological conditions.

6.0 The Updating and Screening Assessment (USA) process

The updating screening and assessment for the eight pollutants specified in the *Air Quality Regulations 2000* and *Air Quality (England) Amendment Regulations 2002* is outlined in chapters 7 to 13. This assessment is based on a checklist and identifies those matters that have changed since the first round was completed, and which may now require further assessment. It considers new monitoring data and new sources of pollution or significant changes to existing sources.

If there is a risk that changes may be significant, a simple screening assessment has been carried out. The screening assessment determines whether an air quality

objective will be exceeded at a location with relevant public exposure. The regulations make clear that likely exceedences of the objectives should be assessed in relation to “the quality of the air at locations, which are situated outside of buildings or other natural or man made structures, above or below ground, and where members of the public are regularly present.”

If there is sufficient risk of an exceedence of an objective, Peterborough City Council is required to undertake a detailed assessment to identify with reasonable certainty whether or not a likely exceedence will occur.

For each pollutant assessed, the following information is provided: A summary of conclusions from the previous rounds of review and assessment, the air quality objective specified in the *Air Quality Regulations 2000 and Air Quality (England) Amendment Regulations 2002*. The aims of chapters 6 to 13 are to identify any locations and pollutants for which it is considered necessary to carry out a Detailed Assessment.

6.1 Sources of Information

A number of local and national bodies and organisations have provided information used in this report:

Monitoring Data: Monitoring data held by Peterborough City Council has been considered, together with any relevant data from other organisations, in an attempt to provide a holistic picture.

Background Pollutant Concentrations: Where information is not already available within the City Council, background pollutant concentrations have been used from data available from the National Air Quality Information Archive prepared by Netcen (<http://www.airquality.co.uk/archive/laqm/tools.php>).

Traffic – Flows, Speeds and Growth Forecasts: The Transportation Group of The Environmental and Community Services department of Peterborough City Council have supplied the traffic figures used. For each of the major road links and segments, data is provided on: annual average daily traffic flow (AADT), peak hour mean traffic speed (kph) and percentage of heavy goods vehicles.

Prescribed Processes (A1), (A2) and (B) – Pollution Prevention and Control (England and Wales) Regulations 2000: Significant emissions of pollutants are

likely from a number of different processes. The DEFRA Technical Guidance LAQM. TG (03) document identifies Part A1, A2 and B processes most likely to release significant quantities of specified pollutants into the atmosphere. The information on emissions from Part A(1) processes has been obtained from the Environment Agency

(<http://maps.environment-agency.gov.uk/wiyby/dataSearchController?topic=pollution&lang=e>).

Appendix 2 details prescribed processes in Peterborough, which may have an impact on air quality.

7 Updating and Screening Assessment for carbon monoxide

Table 7 Summary of conclusions from rounds 1 and 2 for carbon monoxide

| Round | Assessment | |
|-------|------------------------------|-------------------------------------|
| | Stage1: Potential exceedence | Final report: Exceedance identified |
| 1 | Yes | No |
| 2 | No | No |

Table 8 Air quality objective for 3rd round of Review & Assessment carbon monoxide

| Pollutant | Air quality objective | | |
|-----------------|------------------------|--------------------------------------|------------------------|
| | Concentration | Measured as | Date to be achieved by |
| Carbon monoxide | 10.0 mg/m ³ | Maximum daily running 8-hour mean | 31.12.2003 |

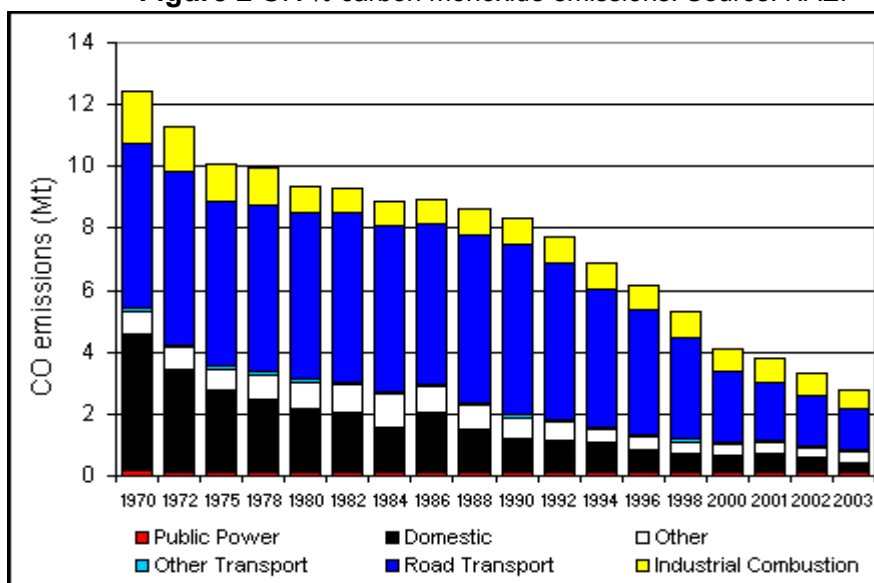
Table 9 Summary of findings of 2006 Updating Screening Assessment for carbon monoxide

| Data assessed | Detailed Assessment required | Refer to paragraph number |
|-----------------|------------------------------|---------------------------|
| Monitoring data | No | 7.3 |
| Very busy roads | No | 7.4 |

7.1 Sources

Carbon monoxide is formed from incomplete fuel combustion. The main source of emissions of carbon monoxide in the UK is from road transport. In the period 1970 to 2003 emissions of carbon monoxide have decreased by 78%. Diesel vehicle emissions of carbon monoxide are relatively small and in 1997 contributed only 3% of the national total. Figure 2 shows the breakdown of carbon monoxide emissions by sectors since 1970 (NAEI)

Figure 2 UK % carbon monoxide emissions. Source: NAEI



7.2 Health effects

Of all the pollutant gases, carbon monoxide is one of the most dangerous since it is associated with acute morbidity and mortality. However, fatal consequences are confined to people exposed to very high levels produced, for example, by fires in buildings, blockage of flues, faulty appliances and deliberate self-poisoning by car exhaust gases.

Life threatening concentrations of carbon monoxide may be inhaled without giving any warning to the victim. The first sign of severe poisoning is loss of consciousness, and further inhalation of high concentrations readily leads to death. These effects are due to the interference of carbon monoxide with the processes whereby oxygen is taken up by the blood and utilised in the cells of the body. It does this both by interfering with transport of oxygen by red cells in the blood (by the formation of carboxyhaemoglobin, which substantially reduces the ability of red cells to carry oxygen) and also by blocking essential biochemical reactions in cells.

In those people who recover from accidental or deliberate poisoning by carbon monoxide, brain damage to a greater or lesser degree due to lack of oxygen, is a common sequel.

The formation of carboxyhaemoglobin in the blood of people exposed to carbon monoxide, and the amount present, depends on both the level and duration of exposure, as well as on the rate and depth of breathing. Thus someone exercising and breathing more rapidly and deeply, will have higher levels than someone resting but exposed to the same concentration.

Smokers may have levels of carboxyhaemoglobin (COHb) of 4%. Uptake of carbon monoxide from multiple sources, such as smoking and traffic, is not additive, and does not cause long-term health effects.

Acute health effects are only likely when the levels of COHb in the blood exceed 30%. Non-smokers exposed to levels of 25 to 50 ppm show blood levels of 2 to 5% COHb. It is likely that people who already have a disease affecting delivery of oxygen to the heart and brain are likely to be at particular risk if these delivery systems are further impaired by carbon monoxide. These will include angina sufferers, others with severe heart and lung disease or anaemia, as well as young infants and the elderly.

7.3 Monitoring data

Are any maximum daily running 8-hour concentrations greater than 10 mg/m³?

Peterborough City Council does not monitor carbon monoxide concentrations. However, carbon monoxide concentrations are measured at 61 national automatic sites within the National Automatic Urban Network. Of the UK national network sites, Oxford Centre is the nearest roadside site on the national monitoring network and maximum 8-hour mean CO concentrations at this location are shown in table 10. Only monitoring data collected at roadside sites needs to be considered for review and assessment of carbon monoxide (DEFRA, 2003).

Table 10 Summary of maximum 8-hour mean CO concentrations measured at Oxford Centre roadside site (Oxford City Council).

| Year | Maximum daily running 8-hour mean mg m ⁻³ | Exceedences | Days |
|------|--|-------------|------|
| 2003 | 2.7 | 0 | 0 |
| 2004 | 1.6 | 0 | 0 |
| 2005 | 2.6 | 0 | 0 |

Table 10 shows the maximum daily running 8-hour concentration of carbon monoxide in Oxford for 2003, 2004 & 2005 as being below 10mg/m³ and there is no reason to suggest that Peterborough does not have similar levels.

7.4 Very busy roads or junctions in built up areas

Are any predicted annual mean concentrations in 2006 greater than 1 mg/m³?

The carbon monoxide objective is most likely to be exceeded close to very busy roads or junctions. Roads and junctions in Peterborough with the highest traffic flows were identified; none of these roads can be classified as 'very busy' (in excess of: 80,000 vehicles per day on a single carriageway, 120,000 vehicles per day on a dual carriageway, and 140,000 per day on a motorway) as daily average traffic flows for 2005 are below this figure in Peterborough.

In addition, estimated carbon monoxide background concentrations in Peterborough for 2005 are below 0.15 and 0.24 mg/m³. This indicates that there will be no exceedance of the 8-hour objective (in LAQM. TG (03). DEFRA reports that monitoring data show no exceedance of the 8-hour objective when the annual mean is less than 2 mg/m³).

7.5 Conclusion of 2003 USA for carbon monoxide

Emissions of carbon monoxide declined nationally by 33% between 1990 and 1999 (*DETR 2000*), and are forecast to decline further as a result of a range of transport measures which will reduce carbon monoxide emissions from transport (DEFRA, 2003). Carbon monoxide concentrations are likely to be highest at roadside and kerbside sites. DEFRA predicts that existing policy measures should be sufficient to reduce roadside concentrations of carbon monoxide in all areas to below 10 mg/m³ in 2003 (DEFRA, 2003).

The 2006 USA for carbon monoxide in Peterborough indicates that the 2005 air quality objective for carbon monoxide will be met; therefore, no further assessment is required.

8 Updating and Screening Assessment for benzene

Table 11 Summary of conclusions from rounds 1 and 2 of the Review & Assessment benzene

| Round | Assessment | | |
|-------|------------------------------|---------------|-----------------------|
| | Stage1: Potential exceedence | Final report: | Exceedance identified |
| 1 | No | | No |
| 2 | No | | No |

Table 12 Air quality objective for 3rd Round of Review & Assessment benzene

| Pollutant | Air quality objective | | | Date to be achieved by |
|-----------|-----------------------|--------------------------|---------------------|------------------------|
| | Concentration | Measured as | | |
| Benzene | 16.25 | $\mu\text{g}/\text{m}^3$ | Running annual mean | 31.12.2003 |
| | 5.00 | $\mu\text{g}/\text{m}^3$ | Annual mean | 31.12.2010 |

Table 13 Summary of findings of 2006 Updating Screening Assessment for benzene

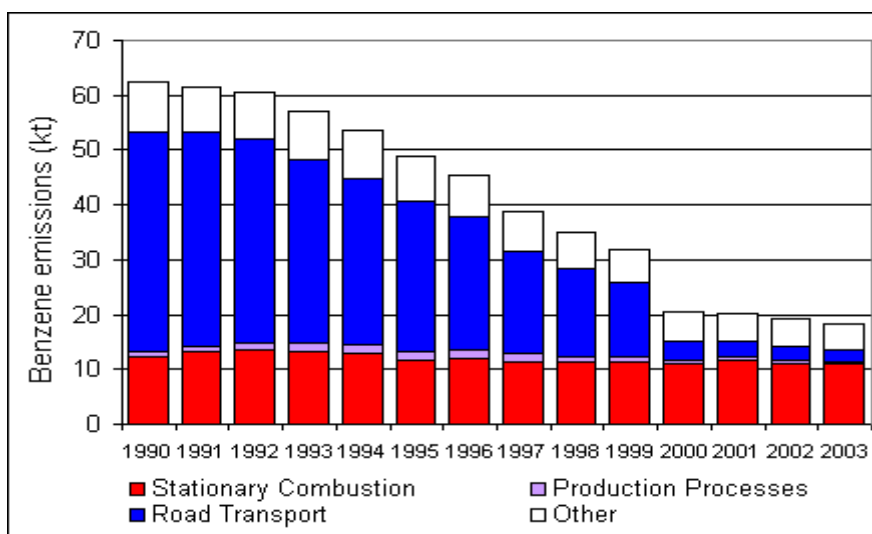
| Data assessed | Detailed Assessment required | Refer to paragraph number |
|--------------------|------------------------------|---------------------------|
| Monitoring data | No | 8.3 |
| Very busy roads | No | 8.4 |
| Industrial sources | No | 8.5 |
| Other sources | No | 8.6 |

8.1 Sources

There are no well-defined natural sources of benzene. Emissions arise predominately from the evaporation and combustion of petroleum products, where it is used as an anti-knock agent (NAEI). In the UK, the road transport sector accounted for 11% of the 2003 emission estimate total, although the amount of benzene in petrol is regulated to an upper limit and currently comprises on average about 2% by volume (DETR 2000). Figure 3 shows the breakdown of emissions of benzene from 1990 to 2003 (NAEI 2006).

Petrol filling installations were brought into regulation under the Pollution Prevention Control Act 1999 in respect of vapour recovery. The first stage of the two-stage implementation of this regulation programme has already been implemented. In 2006 DEFRA initiated the consultation of the second stage which should reduce the contributions of atmospheric benzene from this source to negligible levels.

Figure 3 UK % benzene emissions. Source: NAEI 2006



8.2 Health effects

The effect of most concern from long-term exposure to benzene is leukaemia and, in particular, several types of this disease, known collectively as the non-lymphocytic leukaemias. It acts on the genetic material of cells causing malignant effects.

At concentrations occurring in the ambient atmosphere, benzene does not have short-term or acute effects. The risk of leukaemia in industrial works, where workers are exposed to much higher concentrations of benzene, has been related to their calculated lifetime exposure - the more benzene a person has been exposed to, the greater the risk. Levels of benzene currently found in outdoor air do not exceed levels at which a health effect would be expected.

8.3 Monitoring data

Are any running annual means greater than 16.25 $\mu\text{g}/\text{m}^3$ and are any annual means greater than 5 $\mu\text{g}/\text{m}^3$?

Peterborough City Council does not monitor benzene concentrations. However, benzene concentrations measured at UK national network sites for the period 1999 to 2001 and all urban background and roadside sites were significantly below the 2003 running annual mean objective of 16.25 $\mu\text{g}/\text{m}^3$ (DEFRA, 2003). In 2001, the concentrations measured at urban background locations were also below the tighter 2010 objectives. Forecasts based on national mapping suggest that the policy measures currently in place will achieve the

2003 objective at all urban background and roadside/kerbside locations. DEFRA (2003) also expects the 2010 objective to be met at all urban background and most roadside locations.

8.4 Very busy roads or junctions in built up areas

Are any predicted annual means in 2010 greater than 5 µg/m³?

The benzene objective is most likely to be exceeded close to very busy roads or junctions, in areas with high background concentrations of benzene. Roads and junctions in Peterborough with the highest traffic flows were identified, none of these roads can be classified as 'very busy' (in excess of 80,000 vehicles per day on a single carriageway, 120,000 vehicles per day on a dual carriageway, and 140,000 per day on a motorway) as daily average traffic flows for 2005 are below these figures.

In addition, estimated benzene background concentrations in Peterborough for 2010 are between 0.15 and 0.41 mg/m³ (NAEI) indicating that there will be no exceedence of the 2010 annual mean objective.

8.5 Industrial sources

The USA 2003 indicated that there were no industrial processes in Peterborough, which release significant quantities of benzene into the air. Since the last report there have been no new industrial processes open within or near to Peterborough City Council's borders which would release significant quantities of benzene into the air.

8.6 Other sources

Petrol Stations

Petrol stations, which have an annual throughput of more than 2000m³ of petrol per year, may emit sufficient benzene to exceed the 2010 objective, especially if they are located near a busy road (located with relevant exposure within 10m of the pumps and the road has more than 30,000 vehicles per day). The 2003 USA concluded that there were no petrol stations which would fall within this category.

Since 2003 there have not been any petrol stations that have opened which have an annual throughput of more than 2000m³ of petrol per year and are located near a busy road. Therefore a detailed assessment for benzene from petrol stations in Peterborough is not required.

Major Fuel Storage Depots (Petrol Only)

There are no major fuel storage depots handling petrol in Peterborough

8.7 Conclusion of 2006 USA for benzene

Emissions of benzene have declined nationally by 45% between 1990 and 1999 and are forecast to decline further as a result of the introduction of lower maximum benzene content levels in petrol in January 2000 (DEFRA, 2003). Therefore, DEFRA has predicted that existing policy measures should be sufficient to achieve the strategy's present objective of 16.25 $\mu\text{g}/\text{m}^3$ at all background and roadside locations by the end of 2003. In addition, the objective of 5 $\mu\text{g}/\text{m}^3$ should be met at all urban background locations and possibly all roadside locations by 2010.

The 2003 USA for benzene in Peterborough indicates that the 2003 is and the 2010 air quality objectives for benzene will be met; therefore, no further assessment is required.

9 Updating and Screening Assessment for 1,3-butadiene

Table 14 Summary of conclusions from rounds 1 and 2 of the Review & Assessment for 1,3-butadiene

| Round | Assessment | |
|-------|------------------------------|-------------------------------------|
| | Stage1: Potential exceedance | Final report: Exceedance identified |
| 1 | No | No |
| 2 | No | No |

Table 15 Air quality objective for 3rd round of Review & Assessment for 1,3-butadiene

| Pollutant | Air quality objective | | Date to be achieved by |
|---------------|-----------------------|---------------------|------------------------|
| | Concentration | Measured as | |
| 1,3-butadiene | 2.25µg/m ³ | Running annual mean | 31.12.2003 |

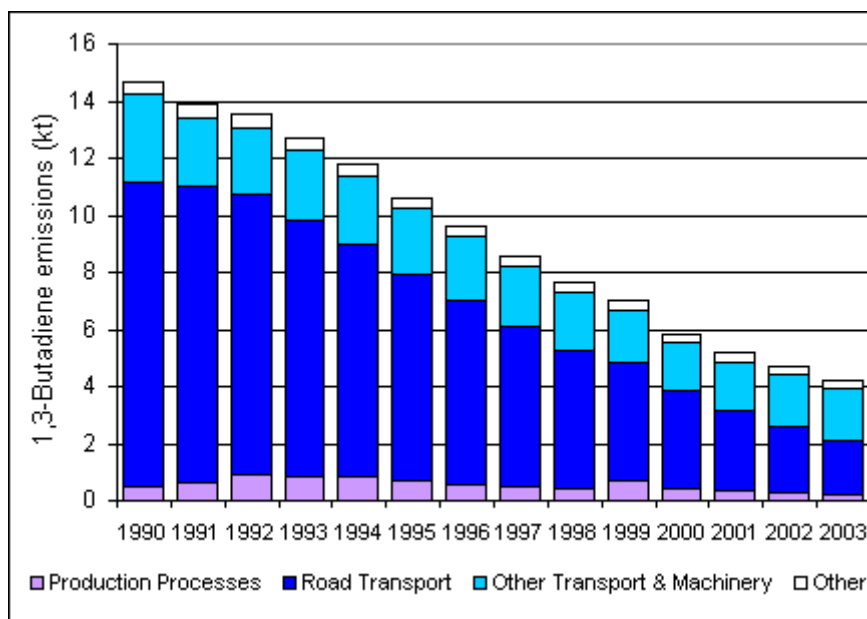
Table 16 Summary of findings of 2006 Updating Screening Assessment for 1,3-butadiene

| Data assessed | Detailed Assessment required | Refer to paragraph number |
|--------------------|------------------------------|---------------------------|
| Monitoring data | No | 9.3 |
| Industrial sources | No | 9.4 |

9.1 Sources

The main source of emissions of 1,3-butadiene in the UK is from the combustion of petroleum products, its manufacture and use in the chemical industry. In 2003 the road transport sector contributed 83% of the total 1,3-butadiene emissions. The introduction of catalytic converters in 1991 reduced the impact of 1,3-butadiene emissions by 72% by 2003, however, emissions from other significant sources have not significantly reduced (NAEI). Figure 4 shows the emissions of 1,3-butadiene by its sector since 1990 (NAEI)

Figure 4 UK % 1,3-butadiene emissions since 1990. Source: NAEI 2006



9.2 Health Effects

There is evidence that workers exposed to 1,3-butadiene have a slightly higher than expected risk of cancers of the bone marrow, lymphomas and leukaemia. Laboratory studies have shown that 1,3-butadiene causes a variety of cancers in rodents and damages the genetic structures of the cell (DOE, 1994). It is thus a carcinogen and, in theory, it is not possible to determine an absolutely safe level for human exposure.

9.3 Monitoring Data

Are any current running annual means greater than 2.25 µg/m³?:

Peterborough City Council does not monitor 1,3-butadiene concentrations. The last estimated monitoring emissions for 1,3 butadiene was undertaken by the National Atmospheric Emissions Inventory (NAEI) in 2003. The NAEI data is shown in a 1 km by 1 km square grid and by emission source. The data was for the year 2003 and shows that no area in the Peterborough City Council district exceeds the objective.

9.4 Industrial Sources

There are no industrial processes in Peterborough or the surrounding area with emissions of 1,3-butadiene which are likely to give rise to exceedences of the running annual mean objective for 1,3-butadiene. In addition, there have been no new industrial processes

authorised in Peterborough or the surrounding area with the potential to emit 1,3-butadiene since the last review and assessment. Therefore a detailed assessment for 1,3-butadiene from industrial sources in Peterborough is not required.

9.5 Conclusion of 2006 USA for 1,3-butadiene

The 2003 objective of 2.25 µg/m³ is already being met at all urban background/centre and roadside locations nationally (DEFRA, 2003). The 2006 USA for 1,3-butadiene in Peterborough indicates that the 2003 air quality objective for 1,3-butadiene is still being met, therefore no further assessment is required.

10 Updating and Screening Assessment for lead

Table 17 Summary of conclusions from rounds 1 and 2 of Review & Assessment for lead

| Round | Assessment | |
|-------|------------------------------|-------------------------------------|
| | Stage1: Potential exceedence | Final report: Exceedance identified |
| 1 | No | No |
| 2 | No | No |

Table 18 Air quality objective for 3rd round of Review & Assessment for lead

| Pollutant | Air quality objective | | Date to be achieved by |
|-----------|-----------------------|-------------|------------------------|
| | Concentration | Measured as | |
| Lead | 0.5µg/m ³ | Annual mean | 31.12.2004 |
| | 0.25µg/m ³ | Annual mean | 31.12.2008 |

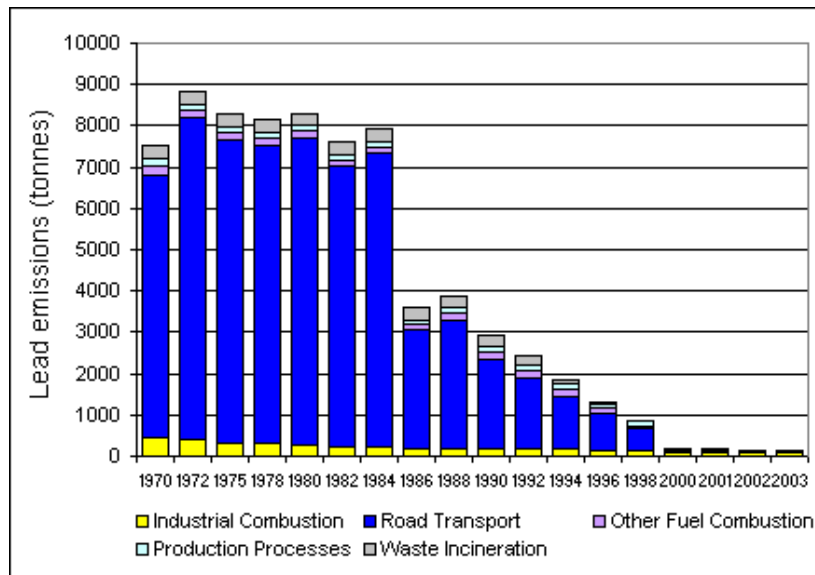
Table 19 Summary of findings of 2006 Updating Screening Assessment for lead

| Data assessed | Detailed Assessment required | Refer to paragraph number |
|--------------------|------------------------------|---------------------------|
| Monitoring data | No | 10.3 |
| Industrial sources | No | 10.4 |

10.1 Sources

One of the main source of emissions of lead in the UK is from industrial processes and iron and steel combustion. Emissions of lead fell significantly since the mid 1980's. This decrease is due to the reduction of the lead content of leaded petrol from around 0.34g/l to 0.143g/l in 1986 which has led to an increase in sales of unleaded petrol. In 1999 leaded petrol was phased out from general sales, which has reduced emissions from transport to almost zero. Figure 5 shows the lead emissions from each sector since 1970 (NAEI).

Figure 5 UK % lead emissions: NAEI 2006



10.2 Health effects

Direct human exposure to lead occurs through food, water, dust, soil and air. Most people receive the largest portion of their daily lead intake via food, although other sources may be important to specific members of the population. For example; from water areas with lead pipes and a plumb solvent water supply, in air where populations live near to point sources; from paint flakes where young children live in houses with leaded paint; or from contaminated soil.

Effects of lead on human health are quantified by using the concentration of lead in blood as an indicator of exposure. Anaemia occurs in cases of severe lead poisoning and affects on red blood cell survival and haemoglobin production are found at low levels. Acute neurological effects of delirium, confusion and convulsions are rare and occur at blood levels above 100 µg/dl. Subtle effects on children, however, have been shown at blood levels below 10µg/dl. Lead levels in children have halved to an average of 4-5µg/dl since the introduction of unleaded petrol (DETR, 1998).

10.3 Monitoring data

Are any current annual means greater than 0.5 µg/m³? and are any current annual means greater than 0.25 µg/m³?

Lead concentrations are not monitored by Peterborough City Council; however, the 2003 USA concluded that lead in air concentrations at all background and kerbside UK national network monitoring sites are well below the objectives for 2004 and 2008.

10.4 Industrial sources

There are no industrial processes in Peterborough with emissions of lead which are likely to give rise to exceedences of the running annual mean objective. In addition, there have been no new industrial processes authorised in Peterborough with the potential to emit lead since 2003. Therefore a detailed assessment for lead from industrial sources in Peterborough is not required.

10.5 Conclusion of 2006 USA for lead

DEFRA reported that the 2004 and 2008 objectives of $0.5 \mu\text{g}/\text{m}^3$ and $0.25 \mu\text{g}/\text{m}^3$ are already being met at all background and kerbside sites nationally (DEFRA, 2003). There has been no further evidence that lead emissions have increased significantly to cause any air quality exceedences in Peterborough. The 2006 USA for lead in Peterborough indicates that the 2004 objective is already being met and the 2008 air quality objective for lead will be met; therefore, no further assessment is required.

11 Updating and Screening Assessment for nitrogen dioxide

Table 20 Summary of conclusions from rounds 1 and 2 of Review & Assessment for nitrogen dioxide

| Round | Assessment | |
|-------|------------------------------|-------------------------------------|
| | Stage1: Potential exceedence | Final report: Exceedence identified |
| 1 | Yes | No |
| 2 | Yes | No |

Table 21 Air quality objective for 3rd round of Review & Assessment for nitrogen dioxide

| Pollutant | Air quality objective | | |
|------------------|-----------------------|--|------------------------|
| | Concentration | Measured as | Date to be achieved by |
| Nitrogen dioxide | 200µg/m ³ | 1-hour mean not to be exceeded more than 18 times a year | 31.12.2005 |
| | 40µg/m ³ | Annual mean | 31.12.2005 |

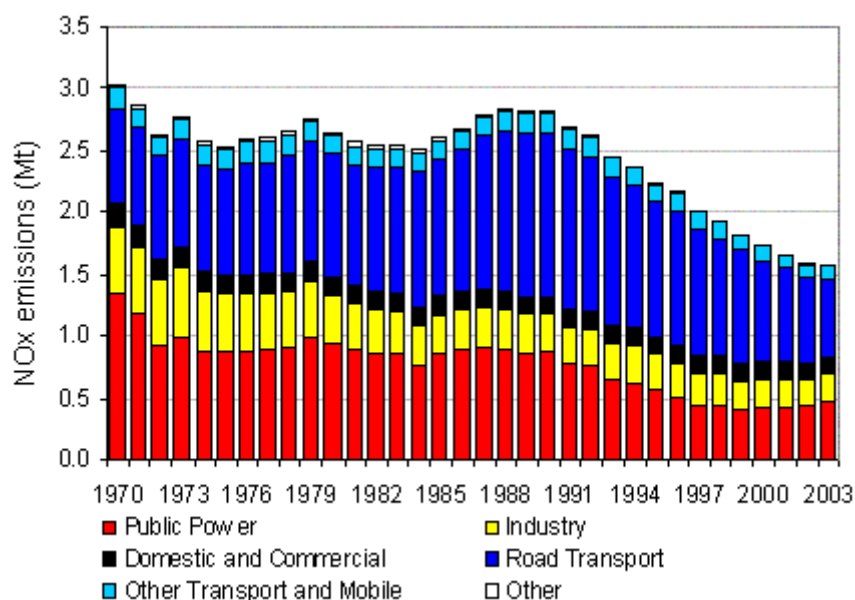
Table 22 Summary of findings of 2003 Updating Screening Assessment for nitrogen dioxide

| Data assessed | Detailed Assessment required | Refer to paragraph number |
|--|------------------------------|---------------------------|
| Monitoring data | No | 11.3 |
| Narrow congested streets with residential properties close to the kerb | No | 11.4 |
| Junctions | No | 11.5 |
| Busy streets where people may spend 1-hour or more close to traffic | No | 11.6 |
| Roads with high flow of busses and/or HGV's | No | 11.7 |
| New roads constructed or proposed since 1 st round of review and assessment | No | 11.8 |
| Roads close to the objective during the first round of review and assessment | No | 11.9 |
| Roads with significantly changed traffic flows | No | 11.10 |
| Bus Stations | No | 11.11 |
| New industrial sources | No | 11.12 |
| Existing industrial sources | No | 11.13 |
| Aircraft | No | 11.14 |

11.1 Sources

Nitric oxide (NO) and nitrogen dioxide (NO₂) are often referred to as nitrogen oxides (NO_x). The National Atmospheric Emissions Inventory estimates that about 40% of the total emissions of NO_x is from the road transport sector. NO_x emissions only decreased by 3% between 1970 and 1990, however, since 1990 there has been a decrease of 45% in emissions. This decrease has been a result of a 52% decrease from the road transport sector due to the introduction of catalytic converters and stricter regulations of emissions and a 47% reduction of power station emissions (National Atmospheric Emissions Inventory). Figure 6 shows the reduction and breakdown of NO_x emissions.

Figure 6 Total UK NO_x emissions and sector breakdown. *NAEI*



11.2 Health effects

Nitrogen dioxide is an irritant gas, which has been known for many years to have serious and sometimes fatal effects on health when inhaled in the very high concentrations associated with accidental exposures. Its properties as an oxidising agent can damage cell membranes and proteins. At relatively high concentrations, it causes acute inflammation of the airways.

There is some evidence that nitrogen dioxide may have subtle effects on health at the much lower concentrations that may occur in the ambient atmosphere. It is

thought that nitrogen dioxide may be a contributory factor in the development of asthma (DOE, 1996).

During a pollution episode in London in December 1991, in which the maximum recorded hourly average concentration of nitrogen dioxide was 423 ppb, the mortality rate from all causes was raised by 10%, and there was an increase in admission rates amongst older people with chronic lung disease. No effects on younger people with asthma were detected (DOE, 1996). It is not clear whether these effects were primarily associated with exposures to nitrogen dioxide or particles.

11.3 Monitoring data

Are any predicted annual means in 2005 greater than $40\mu\text{g}/\text{m}^3$? and are there currently 18 or fewer 1-hour exceedences of, or 99.8th percentiles less than, $200\mu\text{g}/\text{m}^3$?

Peterborough City Council currently monitors NO_2 at 16 locations throughout its borders. The NO_2 monitoring results provide a general indication of average NO_2 concentrations in Peterborough. The data collected in 2005 can be seen in figures 7 and 8. See appendix 1 for more detail on how these averages are obtained.

Figure 7 2005 diffusion tube monitoring data in Peterborough.

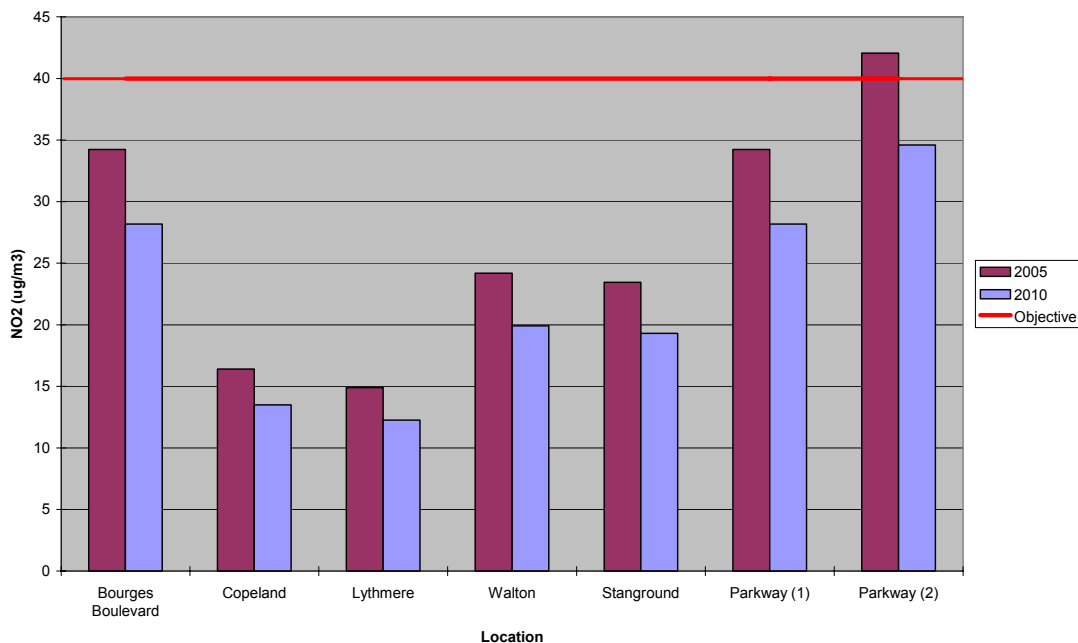
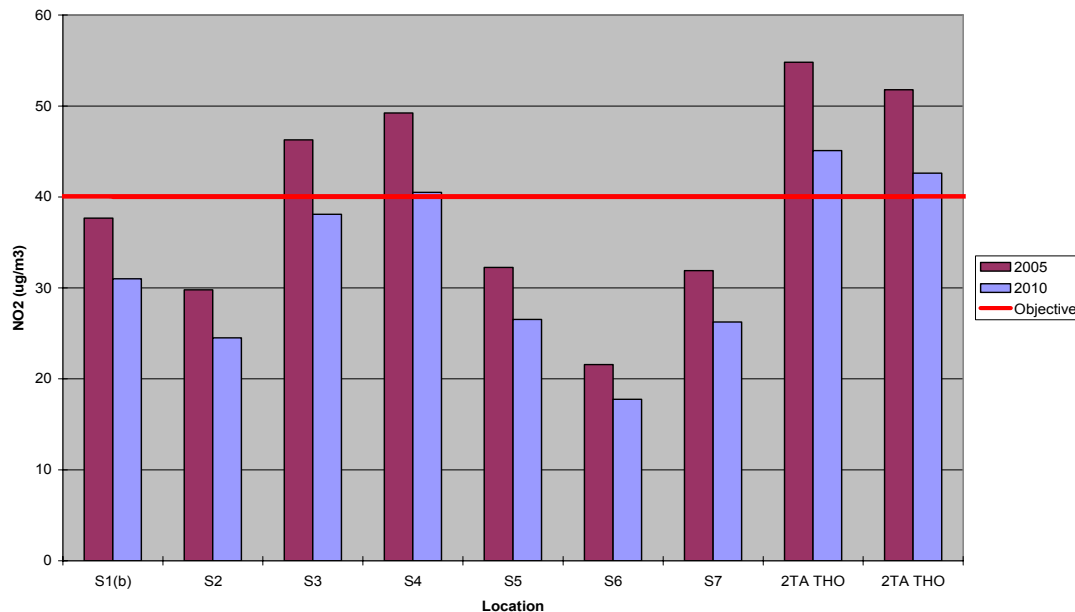


Figure 8 2005 diffusion tube monitoring data in Thorney.



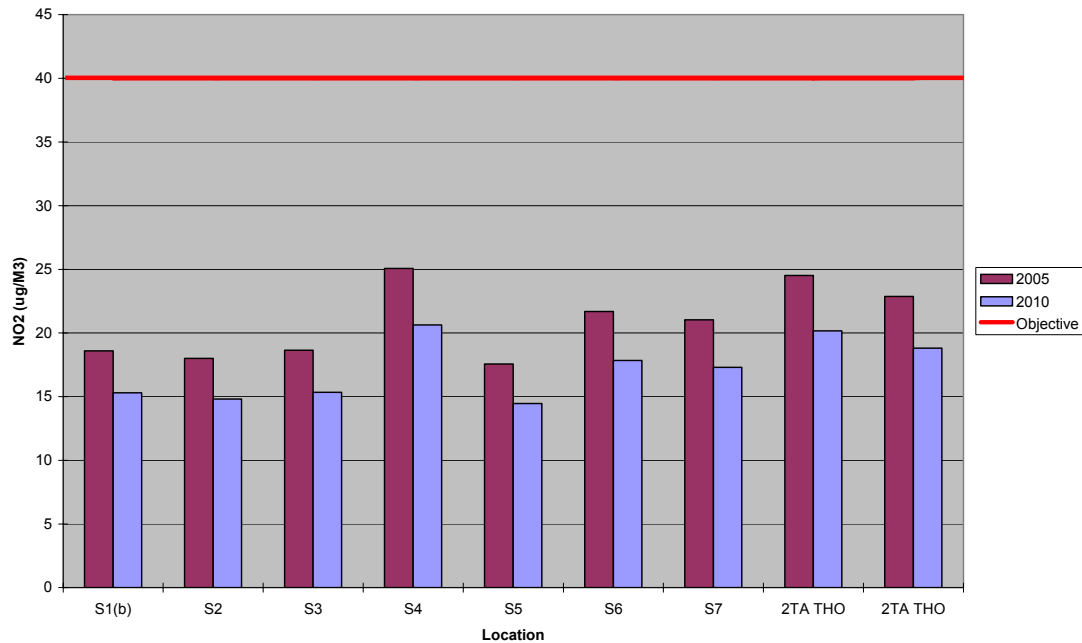
Exceedence of UK air quality objectives are assessed in relation to ‘the quality of the air at locations which are situated outside of buildings or other natural or man-made structures above or below ground, and where members of the public are regularly present’.

Figure 7 shows the annual mean in 2005 of greater than 40 $\mu\text{g}/\text{m}^3$ at one location in Peterborough (Parkway 2). This location, however, is one of Peterborough’s parkways therefore relevant public exposure at this location is not realistic and therefore the air quality objective does not apply. The tube Parkway 2 is situated directly next to tube parkway 1. The results of these two tubes highlights the potential difference in results that can be obtained from using diffusion tubes and, therefore, care should be taken when analysing results from a diffusion tube. NO₂ concentrations at the remaining sites shown in figure 7 indicate that the annual mean air quality objective for 2005 was met in these areas.

Figure 8 shows the annual mean in 2005 of greater than 40 $\mu\text{g}/\text{m}^3$ NO₂ at several monitoring sites which are located in the centre of Thorney within 100m of the signalised junction of the A47 and the B1040. These sites are at locations where members of the public are likely to be regularly present and are likely to be exposed.

In 2003 the Highways Agency added a bypass of Thorney to the Highways Agency Targeted Programme of Improvements. The building of the bypass commenced in 2004 and was completed in December 2005. Figure 9 shows the results of the diffusion tubes taken between January 2006 and July 2006.

Figure 9 January 2006 to July 2006 diffusion tube monitoring data in Thorney.



Due to the change in location of the bypass tube S6 was moved to the closest relevant location near the new bypass to assess the impact of the bypass. This tube was chosen as it was the lowest value within the area. The results show that there are no areas which are greater than 40 $\mu\text{g}/\text{m}^3$ objective value within Thorney.

Diffusion tube monitoring data for Peterborough indicates that UK air quality objectives for annual mean NO_2 in 2005 will not be exceeded in any relevant locations.

Peterborough City Council does not have any continuous monitoring data for NO_2 with which to calculate the number of 1-hour exceedences of $200\mu\text{g}/\text{m}^3$ in a full year, or the 99.8th percentile of hourly means. However, if the annual mean objectives are not exceeded, it can be assumed that the short-term (1-hour) objectives will also be met (DEFRA 2003).

11.4 Narrow congested streets with residential properties close to the kerb

Are any predicted annual means in 2005 greater than $40\mu\text{g}/\text{m}^3$?

Concentrations of NO_2 are often higher where traffic is slow moving with stop/start driving, and where buildings either side reduce dispersion i.e. narrow congested

streets with residential properties close to the kerb. The USA in 2003 identified one road which met this criteria. The 2003 USA predicted the annual mean would be 36.8 $\mu\text{g}/\text{m}^3$ in 2005 which was below the objective value of 40 $\mu\text{g}/\text{m}^3$. Due to the proximity of the predicted value to the objective level this road was reassessed with actual road figures for 2005 see table 23.

Table 23 Narrow congested street with residential properties close to the kerb

| | |
|---|-------------------------------|
| Road | A605 |
| Link Description | Oundle Road |
| Carriageway under 10m wide | Yes |
| Properties within 5m of the kerb | Yes |
| AADT 2005 | 11,804 |
| HGV | 496 |
| Mean traffic speed (kph) | 39 |
| Annual mean NO₂ 2005 (adjusted) | 29.7 $\mu\text{g}/\text{m}^3$ |

The predictions for mean NO₂ concentration for 2005 was made using the DMRB screening model. The predicted annual means was below the annual mean limit value of 40 $\mu\text{g}/\text{m}^3$; therefore, a detailed assessment for NO₂ from narrow congested streets in Peterborough is not required.

11.5 Junctions

Are any predicted annual means in 2005 greater than 40 $\mu\text{g}/\text{m}^3$?:

The 2003 USA identified nine junctions in Peterborough which had a traffic flow of more than 10,000 vehicles per day with relevant exposure within 10m of the kerb see appendix 3. Predictions for mean NO₂ concentrations for 2005 and 2010 at these junctions concluded that none of the junctions exceeded the objective values. These nine junctions have been reassessed using recent traffic and background pollution figures to populate the DMRB screening model. The results can be seen in table 24.

Results in table 24 show no exceedences of both the 2005 and 2010 objective values. Therefore no further assessment of NO₂ from busy junctions is required.

Table 24 Junctions assessed in Peterborough for nitrogen dioxide

| JUNCTION | NO₂ 2005 µg/m³ | NO₂ 2010 µg/m³ |
|-----------------|---|---|
| A | 28 | 26.1 |
| B | 35.3 | 32.4 |
| C | 26.4 | 24.3 |
| D | 26.4 | 24.4 |
| E | 28.2 | 25.9 |
| F | 22.7 | 21.2 |
| G | 27.6 | 25.6 |
| H | 27.5 | 25 |
| I | 27.6 | 25.3 |

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

The 2003 USA concluded that there were no streets in Peterborough with more than 10,000 vehicles per day where members of the public may be exposed within 5 m of the kerb for 1-hour or more. There has not been any changes which have resulted in these criteria not being met since the last screening and assessment so no further assessment is required.

11.7 Roads with high flow of buses and or HGVs

The 2003 USA concluded that there were no roads where traffic flows are less than 20,000 vehicles per day but which have an unusually high proportion of buses and/or HGVs (25%). The only roads in Peterborough meeting this criteria are still the Werrington and Orton bus only lanes. However, traffic flow on these routes is very low (respectively 562 and 1156 journeys weekly), therefore, a detailed assessment for nitrogen dioxide at these locations is not necessary.

11.8 New roads constructed or proposed since 2003

Are there any exceedences of the objectives at relevant locations?

The 2003 USA identified that three new roads were proposed which may have had an effect on air quality. These were the A1073 improvement scheme, the A47 Thorney Bypass and the A605 Stanground Bypass. The A47 Thorney Bypass was opened in December 2005 and has improved the air quality of the local area, see

section 11.3. The A1073 is due to start construction in the summer of 2007 and the A605 Stanground Bypass does not yet have a construction start date yet.

There have not been any new roads proposed which are likely to cause an exceedence of any air quality objective since the last review and assessment. Therefore, detailed assessment for nitrogen dioxide at these locations is not necessary.

11.9 Roads close to the objective in 2003

Are any predicted annual means in 2005 above 36 $\mu\text{g}/\text{m}^3$ but below 40 $\mu\text{g}/\text{m}^3$?

During the second round of review and assessment the only road assessed which estimated an annual mean in 2005 above 36 $\mu\text{g}/\text{m}^3$ but below 40 $\mu\text{g}/\text{m}^3$ was designated junction B, see appendix 3 for a description of junction B. This junction has been reassessed using the DMRB screening model and the results can be seen at table 24. The result of the screening model concludes that there will be no exceedence of the objective at this location, therefore, no further assessment is required.

11.10 Roads with significantly changed traffic flows

There are no roads in Peterborough which have been identified as having a significantly increased traffic flow since the last review and assessment. It is considered, therefore, that further assessment for nitrogen dioxide is not necessary.

11.11 Bus stations

The bus station in Peterborough located in Queensgate is enclosed, therefore a detailed assessment for nitrogen dioxide at this location is not necessary.

11.12 New industrial processes

Since the last round of review and assessment, only one new part A industrial processes has been permitted in Peterborough with the potential to emit significant quantities of nitrogen oxides. The process is a gasification plant which uses waste as one of the fuels. The installation has not yet been built and the application form included a section on air quality which concluded that no air quality objectives will be

breached due to the process. Therefore no further assessment of nitrogen dioxide from new industrial processes is required.

11.13 Existing industrial processes

Processes identified in the first round of review and assessment as having the potential to emit quantities of nitrogen oxides are shown in Table 25; a description of these processes can be found in Appendix 2. The Environment Agency's Pollution Inventory was used to determine whether each process had substantially increased nitrogen dioxide emissions (increase greater than 30%) since 2003.

Table 25 Processes with the potential to emit nitrogen oxides

| Process name | Process type | Substantially increased emissions since 2003? |
|------------------------------|----------------------|--|
| Centrica PB Ltd | Power Generation | No |
| National Grid Plc | Compressor Station | No |
| Castle Cement Ltd | Cement Manufacturing | No |
| Hanson Building Products Ltd | Brick Manufacture | No |

Centrica PB Ltd: Emissions of nitrogen oxides from this power station have decreased since 2003. In 2006 Centrica PB Ltd submitted a Pollution Prevention and Control permit application to the Environment Agency. The application included a section on emissions to atmosphere and concluded that it would not cause a breach of any air quality objective. The permit conditions will be based on current best available techniques and will include maintenance and monitoring of the systems which have the potential to release emissions into the atmosphere. No further assessment is required for nitrogen dioxide from this process.

National Grid Plc: Emissions of nitrogen oxides from this compressor station have increased since 2003, however, the increase has not been substantial. In 2006 National Grid Plc submitted a Pollution Prevention and Control permit application to the Environment Agency. The application included a section on emissions to atmosphere and concluded that it would not cause a breach of any air quality objective. The permit conditions will be based on current best available techniques and will include maintenance and monitoring of the systems which have the potential to release emissions into the atmosphere. No further assessment is required for nitrogen dioxide from this process.

Castle Cement Ltd: Emissions of nitrogen oxides from this cement/lime manufacturing process have not increased substantially since 2003, however, they have been increasing in recent years. In 2002 the installation applied for a new Pollution Prevention and Control Permit. The application included modelling on emissions. According to the Environment Agency the emissions would not cause any air quality exceedences and the installation was issued a new permit which included monitoring of emissions and installing a form of abatement for nitrogen dioxide. No further assessment is required for nitrogen dioxide from this process.

Hanson Building Products Ltd: Emissions of nitrogen oxides from this brick manufacturing process have been decreasing since 2003. In 2004 the Environment Agency received a Pollution Prevention and Control permit application which included a section on air quality. The application concluded that the nitrogen dioxide objective will not be exceeded from this process. Therefore no further assessment is required for nitrogen dioxide from this process.

11.14 Aircraft

Aircraft are significant sources of nitrogen oxide emissions, especially during takeoff (DEFRA, 2003). A detailed assessment of nitrogen dioxide from aircraft is only necessary where the predicted total equivalent passenger throughput in 2005 is more than 5 million passengers per annum. There are currently no airports in Peterborough although there is an RAF base in Wittering. The base, however, does not have sufficient aircraft manoeuvres to exceed the passenger throughput equivalent. Therefore a detailed assessment of emissions of nitrogen dioxide from aircraft at RAF Wittering is not considered necessary.

11.15 Conclusion of 2006 USA for Nitrogen Dioxide

The 2006 USA of nitrogen dioxide indicates that the 2005 annual mean objective of 40 µg/m³ is being achieved in all areas of Peterborough. The A47 Thorney Bypass, was completed in December 2005, which has ensured that the annual mean nitrogen dioxide concentration is now being met. As the 2006 USA for nitrogen dioxide in Peterborough indicates that the 2005 air quality objective for nitrogen dioxide is being met no further assessment is required.

12 Updating and Screening Assessment for sulphur dioxide

Table 26 Summary of conclusions from rounds 1 & 2 of the Review & Assessment for sulphur dioxide

| Round | Stage1: Potential exceedence | Assessment Final report: Exceedance identified |
|--------------|-------------------------------------|---|
| 1 | Yes | No |
| 2 | Yes | No |

Table 27 Air quality objective for 3rd round of Review & Assessment for sulphur dioxide

| Pollutant | Concentration | Air quality objective Measured as | Date to be achieved by |
|------------------|----------------------|--|-------------------------------|
| Sulphur dioxide | 350µg/m ³ | not to be exceeded more than 24 times a year | 1-hour mean 31.12.2004 |
| | 125µg/m ³ | not to be exceeded more than 3 times a year | 24-hour mean 31.12.2004 |
| | 266µg/m ³ | not to be exceeded more than 35 times a year | 15-minute mean 31.12.2005 |

Table 28 Summary of findings of 2006 Updating Screening Assessment for sulphur dioxide

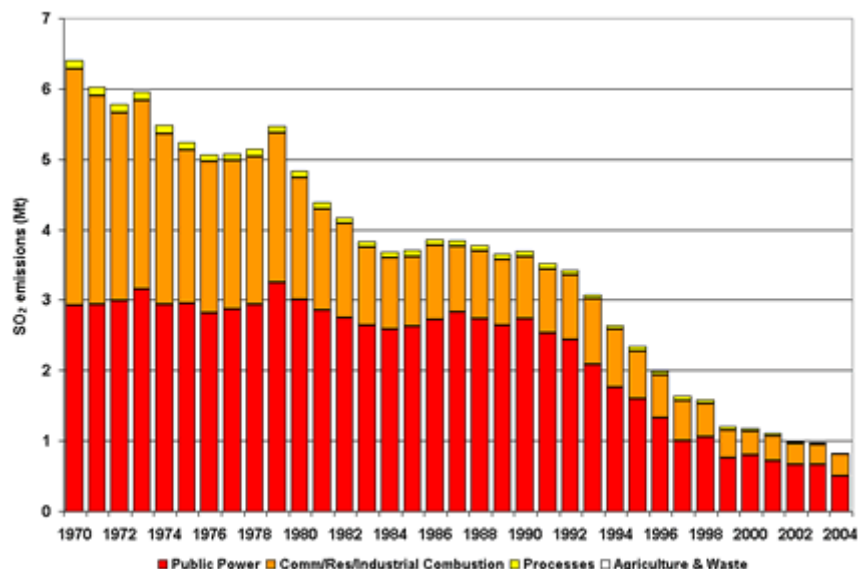
| Data assessed | Detailed assessment required | Refer to paragraph number |
|--|-------------------------------------|----------------------------------|
| Monitoring data | No | 12.3 |
| New industrial sources | No | 12.4 |
| Existing industrial sources | Yes | 12.5 |
| Areas of domestic coal burning | No | 12.6 |
| Small boilers (>5MW _(thermal)) burning coal or oil | No | 12.7 |
| Shipping | N/A | 12.8 |
| Railway locomotives | No | 12.9 |

12.1 Sources

Following the introduction of the Clean Air Act in 1956 emissions of sulphur dioxide in the UK have decreased significantly. The National Atmospheric Emissions Inventory (NAEI) estimates that there has been more than an 85% reduction in SO₂ emissions since 1970. The main source of emissions of sulphur dioxide in the UK is from solid fuel and petroleum

products. The DETR in 1997 estimated that fossil-fuelled power stations accounted for 62% of total releases, with emissions from transport being relatively unimportant, although the contribution of diesel fuel can make a significant contribution to background levels in urban areas (DETR, 2000). Other significant sources of sulphur dioxide came from the industrial sector including refineries. Figure 10 shows the breakdown of sulphur dioxide emissions by sector since 1970.

Figure 10 UK % SO₂ emissions. Source: NAEI



12.2 Health effects

Sulphur dioxide is an irritant when it is inhaled because of its acidic nature. It causes its irritant effects by stimulating nerves in the lining of the nose and throat and in the airways of the lungs. This causes a reflex cough, irritation, and a feeling of chest tightness, and may lead to narrowing of the airways. This is often the case in asthmatics and people suffering from chronic lung disease whose airways are often inflamed and easily irritated.

There is clear evidence that some asthmatics show reductions in breathing capacity after short-term exposure to concentrations of about 400 ppb. Healthy individuals have exhibited measurable narrowing of the airways after exposure to sulphur dioxide at concentrations above 1000 ppb (DOE, 1995).

12.3 Monitoring data

Sulphur dioxide monitoring has been discontinued in Peterborough because of the historical improvements in sulphur dioxide emissions brought the levels to well below the any objective levels.

12.4 New industrial processes

Since the second round of review and assessment, there have been no new Part A or Part B industrial processes authorised in Peterborough or the surrounding area with the potential to emit significant quantities of sulphur dioxide.

12.5 Existing industrial processes

Processes identified as having the potential to emit quantities of sulphur dioxide are shown in Table 29, a description of these processes can be found in Appendix 2. The Environment Agency's Pollution Inventory was used to determine whether each process had substantially increased sulphur dioxide emissions (increase greater than 30%).

Table 29 Processes with the potential to emit sulphur dioxide

| Process name | Process type | Substantially increased emissions since 2003? |
|---------------------|----------------------|--|
| Centrica PB Ltd | Power generation | No |
| National Grid Plc | Compressor station | No |
| Castle Cement Ltd | Cement manufacturing | No |
| Hanson Brick Ltd | Brick manufacture | No |

Centrica: The control of sulphur dioxide emissions from Peterborough's power station is carried out by limiting the sulphur content of the liquid fuel and from adding the odourising agent after pressures have been reduced. In 2006 Centrica applied for an Integrated Pollution Prevention and Control Permit from the Environment Agency for the operation of the power station. The application showed that the installation will not cause an exceedance of any air quality objective. The permit conditions will be based on current best available techniques and will include maintenance and monitoring of the systems which have the potential to release emissions into the atmosphere. No further assessment is required for sulphur dioxide from this process.

National Grid Plc: The control of sulphur dioxide emissions from this compressor station is carried out by using gas as its main fuel source, therefore, monitoring of sulphur dioxide is not required. National Grid has applied for an Integrated Pollution Prevention and Control Permit within the permit application a section was included on its potential impacts on air quality. The result of the study concluded that the compressor station would not be responsible for declaring an air quality management area and the permit, when written, will include conditions on monitoring emissions based on current best available techniques. No further assessment is required for sulphur dioxide from this process.

Castle Cement Ltd: Emissions of sulphur dioxide from this cement/lime manufacturing process have decreased since 1998. In 2002 the installation was issued a new permit which included monitoring of emissions. These concluded that no further assessment is required for sulphur dioxide from this process.

Hanson Brick Ltd: An air quality management area was not declared following the first air quality review and assessment in 1998 because of the programme being implemented by Hanson plc for sulphur dioxide emissions reductions, modelling of which showed compliance with all of the objectives.

Emissions of sulphur dioxide from this brick manufacturing process have decreased since 1998, however, reported emissions of sulphur dioxide have increased since 2003. The Environment Agency received an Integrated Pollution Prevention and Control Permit application in 2004. The permit application included modelling information from the operator. The Environment Agency has also undertaken some modelling of the potential effects from the installation. The modelling data indicated that there may be an exceedence of the 15-minute sulphur dioxide objective. Fenland District Council, whose area the installation is located in, consulted with the operator, DEFRA, the Environment Agency and the other two potentially affected local authorities (Peterborough City Council and Huntingdon District Council) and because the modelling areas were significantly different a period of monitoring was required to validate the models. Fenland District Council has now undertaken its further assessment and declared an Air Quality Management Area. Fenland District Council modelling data has areas of exceedence within Peterborough City Council's borders so further assessment is required.

12.6 Domestic coal burning

Exceedence of the sulphur dioxide objectives may occur in areas where solid fuels are the predominant form of domestic heating; e.g. in an area of 500 x 500m where there may be more than 100 houses burning solid fuel as their primary source of heating (DEFRA, 2003).

The previous Updating and Screening Assessment concluded that there are no areas in Peterborough where burning solid fuel is the primary source of heating. No new housing developments in Peterborough have used solid fuel as the primary source of heating. Therefore a detailed assessment for sulphur dioxide from domestic coal burning in Peterborough is not required.

12.7 Small boilers > 5MW_(thermal)

The previous rounds of the Review and Assessment for sulphur dioxide did not identify any areas where small boilers >5MW_(thermal) would cause an exceedence of any of the sulphur dioxide air quality objectives.

Since the last review and assessment there have not been any new industrial developments using oil or coal to power heating systems or production. Therefore a detailed assessment of sulphur dioxide from small boilers >5MW_(thermal) in Peterborough is not required.

12.8 Shipping

Not applicable.

12.9 Railway locomotives

Diesel and coal-fired locomotives emit sulphur dioxide, which if stationary for periods of 15 minutes or more, may contribute exceedence of the 15-minute objective (DEFRA, 2003). No locations in Peterborough were identified where diesel or coal-fired locomotives are regularly stationary for periods of 15 minutes or more with the potential for regular outdoor exposure of members of the public within 15 m of the stationary locomotives.

12.10 Conclusion of 2006 USA for sulphur dioxide

In recent years sulphur dioxide concentrations have been falling at UK national network sites (DEFRA, 2003). Local exceedences of objectives may occur in areas where industrial processes are located which have the potential to emit large quantities of sulphur dioxide.

The 2006 Updating and Screening Assessment for sulphur dioxide indicates that a detailed assessment is required for emissions from one industrial installation in relation to the 2005 15 minute mean objective of 266 $\mu\text{g}/\text{m}^3$. The 2004 1-hour objective of 350 $\mu\text{g}/\text{m}^3$, the 24-hour objective of 125 $\mu\text{g}/\text{m}^3$, will be achieved in Peterborough; therefore, no further assessment is required for these objective. However information from an industrial process indicates that the 2005 15 minute mean objective of 266 $\mu\text{g}/\text{m}^3$ may be exceeded so further assessment is required.

13 Updating and Screening Assessment of particles (PM₁₀)

Table 30 Summary of conclusions from rounds 1 & 2 of the Review & Assessment for PM₁₀

| Round | Assessment | |
|-------|------------------------------|-------------------------------------|
| | Stage1: Potential exceedence | Final report: Exceedence identified |
| 1 | Yes | No |
| 2 | No | No |

Table 31 Air quality objective for 3rd round of Review & Assessment for PM₁₀

| Pollutant | Air quality objective | | Date to be achieved by |
|-------------------------------|-----------------------|--|--------------------------|
| | Concentration | Measured as | |
| Particles (PM ₁₀) | 50µg/m ³ | not to be exceeded more than 35 times a year | 24-hour mean 31.12.2004 |
| | 40µg/m ³ | | Annual mean 31.12.2004 |
| | 50µg/m ³ | not to be exceeded more than 7 times a year | 24-hour mean 31.12.2010* |
| | 20µg/m ³ | | Annual mean 31.12.2010* |

* The 2010 objectives are not statutory objectives.

Table 32 Summary of findings of 2006 Updating Screening Assessment for PM₁₀

| Data assessed | Detailed Assessment required | Refer to paragraph number |
|---|------------------------------|---------------------------|
| Monitoring data | No | 13.4 |
| Junctions | No | 13.5 |
| Roads with high flow of buses and/or HGVs | No | 13.6 |
| New roads constructed or proposed since first round review & assessment | No | 13.7 |
| Roads close to the objective during first round review & assessment | No | 13.8 |
| Roads with significantly changed traffic flows | No | 13.9 |
| New industrial sources | No | 13.10 |
| Existing industrial sources | No | 13.11 |
| Areas with domestic solid fuel burning | No | 13.12 |
| Quarries, landfill sites, open cast coal, handling of dusty cargoes at ports etc. | No | 13.13 |
| Aircraft | No | 13.14 |

13.1 Sources

Particles arise from a variety of sources both natural and man made, and can be divided into three main categories:

Primary Particles: Emitted directly by combustion processes, and are generally less than 2.5µm and often less than 1µm.

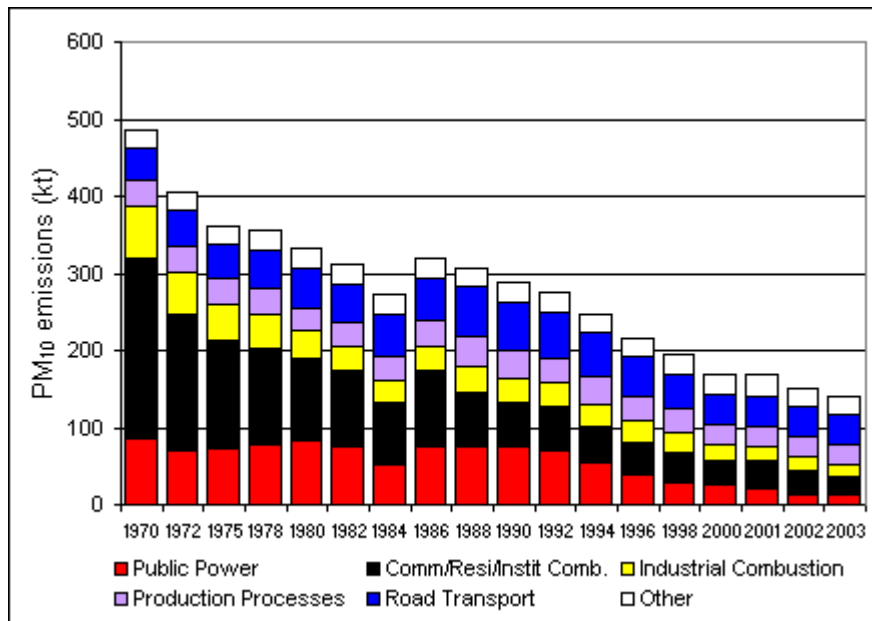
Secondary Particles: Formed in the atmosphere from chemical reaction and include sulphates and nitrates formed from the reactions of emissions of SO₂ and NO_x. These particles are less than 2.5µm, but the size could vary depending on humidity.

Coarse Particles: Formed from a variety of primarily non-combustion sources. These may be from natural sources including wind-blown dusts and soils, forest and other natural fires; or from man made sources including re suspended road dust and tyre debris, construction and mining/quarrying activity. These particles are greater than 2.5µm in size.

Particulate matter less than 10µm in diameter are known as PM₁₀. These particles are defined solely by their physical characteristics and no particular chemical composition is implied (DOE, 1995).

According to the National Atmospheric Emissions Inventory the main sources of PM₁₀ are from road transport, stationary combustion and industrial processes including construction, mining and quarrying. Emissions of PM₁₀ from the UK have declined since 1970. This is mainly due to the reduction in coal use especially from domestic use, which has dropped from 234 kilotonnes (48% of the total emission) in 1970 to 24 kilotonnes (17%) in 2003 see figure 11.

Figure 11 UK PM₁₀ emissions since 1970 (NAEI)



However, reduction rates will differ for each source type; for example emissions from road transport will be controlled by legislation on vehicle emission standards while emissions of coarse particles are largely uncontrolled and are not expected to decline in future years. (DEFRA 2003).

13.2 Objectives

The 2010 objectives are not currently statutory objectives. It is expected that large areas of the United Kingdom will fail these objectives. There are current discussions between DEFRA and air quality experts about using these objectives, relaxing the figures or moving to assess PM_{2.5}, which is currently considered as the component which has the greatest effect on health. Peterborough City Council has assessed the roads and junctions against the provisional 2010 objectives to help with long term planning.

13.3 Health effects

The Air Quality Expert Group (AQEG) carried out a review of particles in 2005 (AQEG Particulate Matter in the UK). A number of studies investigating the effects of particles on health were considered and these provide the main source of information relating to the health effects of particles outlined in this document.

PM₁₀ has been associated with respiratory and cardiovascular illness and mortality for both short term and long term exposure. However, it is currently not possible to

discern whether there is a threshold particle concentration below which there are no adverse effects on the whole populations health.

The effects of particles on health are likely to have worse effects on certain sub groups of the population, such as those with pre-existing lung, heart or other disease and/or the elderly and children.

13.4 Monitoring data

PM₁₀ concentrations are not monitored in Peterborough.

13.5 Junctions

Are there more than 35 exceedences of the 24-hour 50 µg/m³ objective predicted in 2004?

There have been no new roads built in Peterborough which have more than 10,000 vehicles per day with relevant exposure within 10m of the kerb. The nine junctions identified in 2003 which were assessed have been reassessed see appendix 3 for a description of the junctions. Predictions for the number of 24-hour exceedences of 50µg/m³ in 2004 and 2010 and the annual mean of 40µg/m³ in 2004 and 20µg/m³ in 2010 at these junctions were made using the DMRB screening model; the results can be seen in Table 33.

Results in table 33 show no exceedences of the annual mean 2004 objective. However, there are exceedences of all the provisional 2010 objectives at all nine junctions.

Table 33 Junctions assessed in Peterborough for PM₁₀

| JUNCTION | Annual mean PM₁₀ 2004µg/m³ | 2004 Days > 50µg/m³ | Annual mean PM₁₀ 2010 µg/m³ | 2010 Days > 50µg/m³ |
|-----------------|---|--|--|--|
| A | 27.7 | 20 | 25.9 | 15 |
| B | 27.1 | 18 | 25.5 | 14 |
| C | 26.5 | 16 | 24.6 | 12 |
| D | 26.8 | 17 | 24.9 | 12 |
| E | 29.4 | 25 | 27.4 | 19 |
| F | 25.5 | 14 | 23.8 | 10 |
| G | 28.9 | 23 | 27.1 | 18 |
| H | 28.4 | 22 | 26.5 | 16 |
| I | 26.6 | 17 | 24.7 | 12 |

13.6 Roads with high flow of buses and/or HGVs

Are there more than 35 exceedences of the 24-hour 50 $\mu\text{g}/\text{m}^3$ objective predicted in 2004?

Roads which have an unusually high proportion of buses and/or HGVs (20%) can be a major source of PM_{10} . The only roads in Peterborough meeting these criteria are the Werrington and Orton bus only lanes. However, traffic flow on these routes is very low (respectively 562 and 1156 journeys weekly); therefore, a detailed assessment for PM_{10} at these locations is not necessary.

13.7 New roads constructed or proposed since 2003

Are there any exceedences of the objectives at relevant locations?

New roads constructed or proposed in Peterborough since the second round of review and assessment were identified and assessed for their impact on air quality. Only roads for which planning approval has been granted were considered, these are the A1139 and the distributor road for a new housing development.

An Air Quality Assessment was undertaken for each of these roads. These assessments are published in the Environmental Statement for each development. The assessments indicate that there will be no exceedence of the PM_{10} objectives for 2004 at relevant locations from any of these roads. Therefore, detailed assessment for PM_{10} at these locations is not necessary.

The second round of review and assessment identified three new roads. The A1073 improvement scheme, the A47 Thorney Bypass, and the A605 Stanground Bypass. At the time of writing only the A47 Thorney Bypass has been built. Peterborough City Council undertook the DMRB screening model to predict if an air quality objective was likely to be exceeded. The result of this model predicted the annual PM_{10} would be 22.5 $\mu\text{g}/\text{m}^3$ with 7 exceedences of the 24-hour 50 $\mu\text{g}/\text{m}^3$ level. Therefore, no further assessment is required.

13.8 Roads close to the objective in 2003

Are there any roads or junctions with more than 25 but fewer than 35, 24-hour exceedences of 50 µg/m³ in 2004 identified in the second round of review and assessment?

Only one junction was identified, known as junction B, from the second round of review and assessment that had more than 25 but fewer than 35 24-hour exceedences of 50 µg/m³.

The DMRB was undertaken for junction B and the results can be seen on table 34 above. The results show that Junction B is not exceeding the 2004 objective, however, it does predict an exceedence of the provisional 2010 objective.

13.9 Roads with significantly changed traffic flows

There are no roads in Peterborough with more than 10,000 vehicles per day (AADT) which have experienced large increases in traffic (greater than 25% AADT) since the second round of review and assessment.

13.10 New industrial processes

Since the first round of review and assessment, there have been no new part A or B industrial processes authorised in Peterborough or the surrounding area with the potential to emit significant quantities of particles.

13.11 Existing industrial processes

Processes identified in the previous rounds of review and assessment as having the potential to emit quantities of particles are shown in Table 34. A description of these processes can be found in Appendix 2. The Environment Agency's Pollution Inventory was used to determine whether each process had substantially increased particulate emissions (increase greater than 30%).

Table 34 Processes with the potential to emit particles (PM₁₀)

| Process name | Process type | Substantially increased emissions since 2003? |
|---------------------|----------------------|--|
| Centrica PB Ltd | Power Generation | No |
| Castle Cement Ltd | Cement Manufacturing | No |
| Hanson Brick Ltd | Brick Manufacture | No |

Centrica PB Ltd: Reported emissions of particulates (PM₁₀) from this power station have increased substantially since 1998, remaining below one tonne per annum between 1998-2001, however, since 2002 reported emissions have remained at below ten tonnes. In 2006 Centrica PB Ltd applied for a Pollution Prevention and Control permit from the Environment Agency. The application form included a section on air quality impacts which assessed that the air quality would not be adversely affected by the power station. Therefore, no further assessment is required for particulates from this process.

Castle Cement Ltd: Emissions of particulates (PM₁₀) from this cement/lime manufacturing process have not increased substantially since 1998 and have steadily decreased from 370 tonnes in 1998 to 201 tonnes in 2005; therefore further assessment is not required for particulates from this process.

Hanson Brick Ltd: Emissions of particulates (PM₁₀) from this brick manufacturing process have increased since 1998 from 263 tonnes in 1998 to 470 tonnes in 2005. The operator has applied for a new Pollution Prevention and Control Permit. Part of the application included sections on its air quality impact and it concluded that emissions of particulates would not cause an exceedence of the objective, therefore, further assessment is not required for particulates from this process.

13.12 Areas of domestic solid fuel burning

Exceedence of the PM₁₀ objectives may occur in areas where solid fuels are the predominant form of domestic heating e.g. in an area of 500x500m where there may be more than 50 houses burning solid fuel as their primary source of heating (DEFRA 2003).

Previous results of consultation with coal and solid fuel merchants in Peterborough on the number of houses in Peterborough burning solid fuel as their primary source of heating suggest that there are no areas where significant solid fuel (as described above) burning still takes place. Therefore a detailed assessment for PM₁₀ from domestic solid fuel burning in Peterborough is not required.

13.13 Quarries

Quarries and landfill sites may be significant sources of PM₁₀. This is because at any location where dust is emitted, a proportion, (typically around 20%) will be present as

PM₁₀. However, the significance and resultant impacts of dust emissions from these sources are dependant upon the amount of dust created, the proximity of dust sensitive locations to the sources of dust, and the prevailing meteorological conditions for that location.

Active mineral workings and waste sites in Peterborough are listed in Table 35.0. Each of these sites were assessed to establish whether there was any relevant exposure nearby ('relevant exposure' and 'near' are defined in Technical Guidance LAQM. TG(03) DEFRA 2003).

Table 35 Active mineral workings and waste sites since Peterborough 2003

| SITE NAME | DESCRIPTION* | RELEVANT EXPOSURE |
|----------------|--|-------------------|
| Maxey | Sand/gravel extraction | No |
| Pode Hole Farm | Sand/gravel extraction | Yes |
| North Bank | Sand/gravel extraction | No |
| Bradley Fen | Sand/gravel/clay extraction | No |
| Cross Leys | Limestone extraction | Yes |
| Southorpe | Limestone extraction, aggregates recycling, inert waste landfill | No |
| Dogsthorpe | Landfill | Yes |
| Dogsthorpe | Composting | No |
| Eyebury | Sand/gravel extraction, construction/demolition waste recycling, industrial/commercial/domestic waste landfilling. | Yes |
| Thornhaugh | Limestone extraction, aggregates recycling landfilling | Yes |

*The extraction of sand and gravel is not a prescribed process for Local Air Pollution Prevention and Control under Section 3.5 Part B of Schedule 1 of the Pollution Prevention and Control (England and Wales) Regulations 2000. It is exempt due to its low potential for dust emissions

Five sites were identified with relevant exposure nearby; however, detailed assessments are not required from these sources for the following reasons:

- Dust mitigation measures are in use, which are effective in controlling dust emissions to maintain amenity at properties where relevant exposure occurs.
- Low potential for significant emission of dust from site.
- No substantiated complaints received regarding dust emissions from site.

13.14 Aircraft

Aircraft are not major sources of PM₁₀ emissions, but may make a contribution close to the source (DEFRA, 2003). Although there are no airports in Peterborough, there

is an RAF base in Wittering. During 2002-2003 there were a total of 17,642 Aircraft movements at RAF Wittering (figures provided by RAF).

A detailed assessment of PM₁₀ from aircraft is only necessary where the predicted total equivalent passenger throughput in 2005 is more than 10 million passengers per annum. Therefore a detailed assessment of emissions of PM₁₀ from aircraft at RAF Wittering is not considered necessary.

13.15 Conclusion of 2003 USA for PM₁₀

Concentrations of PM₁₀ measured at more than 60 national monitoring sites in the UK are generally well below the 2004 annual mean objective of 40 µg/m³. The 24-hour objective for 2004 of 50 µg/m³ with 35 exceedences per year has been exceeded at a small number of sites (DEFRA, 2003).

The 2006 USA for PM₁₀ indicates that the annual mean and 24 hour objectives are being met, therefore no further assessment is required. However, the 2006 USA indicates that exceedences of the provisional 2010 objectives are likely to occur in Peterborough. Peterborough City Council has no statutory obligation to assess air quality against 2010 PM₁₀ limit values but has done so in order to assist with longer term planning. The 2010 annual mean objectives are currently exceeded at the majority of sites within the national monitoring network (DEFRA, 2003).

Conclusion

This USA was carried out according to Local Air Quality Management Technical Guidance LAQM. TG (03) and the LAQM. TG(03) update released in January 2006. It has indicated that all the air quality objectives listed in Table 36 will be met by the relevant deadlines, with the exception of SO₂ 15 minute mean value of 266 µg/m³ not to be exceeded more than 35 times a year. This exceedence is from an industrial source located in the Fenland District Council area. The 2010 PM₁₀ indicative limit values are likely to be exceeded as well, however, Peterborough City Council has no statutory obligation to assess air quality against these limit values but has done so in order to assist with long term planning. Air Quality Management Areas (AQMA) are only required in areas where air quality objectives will not be achieved. Only one AQMA is likely to be required in Peterborough, therefore, a Detailed Assessment will be undertaken for this pollutant.

Table 36 Peterborough City Council conclusion of air quality objectives

| Pollutant | Air quality objective | | Measured as | Date to be achieved by | Achieved |
|-------------------------------|-----------------------|--|-----------------------------------|------------------------|----------|
| | Concentration | | | | |
| Benzene | 16.25 | µg/m ³ | Running annual mean | 31.12.2003 | Yes |
| | 5.00 | µg/m ³ | Annual mean | 31.12.2010 | Yes |
| 1,3-butadiene | 2.25 | µg/m ³ | Running annual mean | 31.12.2003 | Yes |
| Carbon Monoxide | 10.0 | mg/m ³ | Maximum daily running 8-hour mean | 31.12.2003 | Yes |
| Lead | 0.5 | µg/m ³ | Annual mean | 31.12.2004 | Yes |
| | 0.25 | µg/m ³ | Annual mean | 31.12.2008 | Yes |
| Nitrogen Dioxide | 200 | µg/m ³ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 | Yes |
| | 40 | µg/m ³ | Annual mean | 31.12.2005 | Yes |
| Particles (PM ₁₀) | 50 | µg/m ³ not to be exceeded more than 35 times a year | 24-hour mean | 31.12.2004 | Yes |
| | 40 | µg/m ³ | Annual mean | 31.12.2004 | Yes |
| Sulphur dioxide | 350 | µg/m ³ not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 | Yes |
| | 125 | µg/m ³ not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 | Yes |
| | 266 | µg/m ³ not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 | No |

Recommendations

The USA recommends that a Detailed Assessment be undertaken as a result of emissions from an industrial source located in another authority's boundary (Fenland District Council). Fenland District Council has now completed their Detailed Assessment and declared an Air Quality Management Area. Using information in supplied by Fenland District Council Peterborough City Council has undertaken a Detailed Assessment and after an appropriate consultation period will declare an Air Quality Management Area.

Peterborough City Council will carry out further air quality review and assessments in 2009 with progress reports in 2007, 2008 and 2010. To assist with air quality management in Peterborough, consideration should be given to the following:

- Identification of potentially sensitive locations in Peterborough for nitrogen dioxide diffusion tube monitoring.
- Assessment of emissions from all new authorised processes in Peterborough, which may require future air quality review and assessment analysis.
- Assessment of all new and proposed residential and business developments in Peterborough for impact on air quality.
- Assessment of all new and proposed roads in Peterborough for impact on air quality.
- Evaluation of inactive mineral workings and waste sites in Peterborough which become active.

In the event that Peterborough City Council declares an Air Quality Management Area Peterborough City Council will draw up an Action Plan which will plan out how the council intends to deal with the Air Quality Management Area and any course of action which is available for them.

Following completion of the USA, Detailed Assessment and the Local Transport Plan 2, Peterborough City Council will review its Air Quality Strategy to encompass these documents.

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