



LOCAL AIR QUALITY MANAGEMENT UPDATING AND SCREENING ASSESSMENT

Part IV of the Environment Act 1995

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with assistance from the
Sussex Air Quality Steering Group**

May 2003

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SUMMARY

Local Authorities in the United Kingdom have the statutory duty to review and assess air quality on a regular basis. This report represents the first step of this process to carry out an updating and screening assessment of local air pollution levels. This is intended to identify potential areas and pollutants of concern, focusing on the changes in emission levels since the end of the previous round of review and assessment in 2000.

Although national data show a decline in air pollution levels in recent years, there is still concern about local hotspots mainly related to road transport emissions and certain industrial processes. In Sussex, industrial sources represent only a small percentage of total emissions of most air pollutants. Road transport is the main source of local air pollution in our region. Population exposure to traffic-related pollutants is expected to be relatively high near major roads or in congested city centres. In this report, particular attention has been given to these kinds of locations.

The updating and screening assessment has used information about old and new emission sources in Lewes District Council, air quality monitoring data collected during recent years, and screening modelling tools. The resultant data have been compared with the air quality objectives of seven pollutants (carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide, and particles). This assessment has confirmed that for all the above pollutants other than particles that the objectives are likely to be met in locations of relevant exposure. There is however evidence that the 2010 objectives for particles (PM₁₀) may be exceeded at roadside locations.

For this reason, the Council will undertake a Detailed Assessment of air quality at the roadside locations with relevant exposed populations. The Council will also undertake a Detailed Assessment of air quality for roads meeting the definition of street canyons in Lewes town centre. The results of the detailed assessments will be published by April 2004.

GLOSSARY

AADT	Annual Average Daily Traffic (vehicles per day)
APEG	Airborne Particles Expert Group
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AURN	Automatic Urban and Rural (air quality monitoring) Network
CO	Carbon monoxide
COMEAP	Committee on the Medical Effects of Air Pollutants
DA	Detailed Assessment
DEFRA	Department for Environment Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges Screening Model
ESCC	East Sussex County Council
HGV	Heavy Goods Vehicles
LAQM	Local Air Quality Management
mg/m ³	Milligrams of the pollutant per cubic metre of air
µg/m ³	Micrograms of the pollutant per cubic metre of air
ppb	Parts per billion
ppm	Parts per million
NAEI	National Atmospheric Emissions Inventory
NAQIA	National Air Quality Information Archive
NO	Nitric oxide
NO ₂	Nitrogen dioxide
PM ₁₀	Particles with diameter less than 10µm
QA/QC	Quality Assurance / Quality Control
R&A	Review and Assessment
SAQSG	Sussex Air Quality Steering Group
SO ₂	Sulphur dioxide
TEOM	Tapered Element Oscillating Microbalance
USA	Updating and Screening Assessment

1. Introduction

Under the Environment Act 1995, local authorities are required to review and assess air quality on a regular basis. A *review* of air quality means a consideration of the levels of pollutants in the air for which objectives are prescribed in Regulations¹, and estimations of likely future levels. An *assessment* of air quality is the consideration of whether estimated levels for the relevant future period are likely to exceed the levels set in the objectives.

The first round of review and assessment (R&A) was completed in 2000. The main conclusion was that the national air quality objectives were not likely to be exceeded at any locations in the District of the Lewes District Council (“the District”).

This first round of R&A constitutes a benchmark against which the Council can measure future progress in making improvements to the local air quality.

The new guidance issued by the Department for Environment, Food and Rural Affairs (DEFRA) requires local authorities to carry out an Updating and Screening Assessments (USA) of local air quality by the end of May 2003 (LAQM.PG03). This assessment is intended to identify those aspects that have changed since the first round of review and assessment. The USA will also indicate which pollutants and specific locations within the District require a Detailed Assessment (DA) that will have to be carried out by the end of April 2004.

The review and assessment of air quality is the first step in the Local Air Quality Management (LAQM) process. Local authorities have to designate those parts of their areas where the prescribed objectives are not likely to be met by, or at any point beyond the relevant deadline, as Air Quality Management Areas (AQMA). This applies only to those locations where members of the public might reasonably be exposed. Where local authorities have designated AQMAs, they have a duty to produce an action plan. This plan must set out what measures the authority intends to introduce in pursuit of the Air Quality Objectives. So far, there are no AQMAs designated in the district.

The main reasons for tackling poor air quality are the link between air quality and the quality of life and the need to minimise the risk of poor air quality to human health. We now have a better understanding of the short-term and the long-term health effects of air pollution largely due to the work undertaken by the Committee on the Medical Effects of Air Pollutants (COMEAP).

The health effects associated with particles, sulphur dioxide and nitrogen dioxide are increased deaths brought forward and increased respiratory or cardiovascular hospital admissions in the elderly and those who are already ill. These pollutants can also worsen symptoms in those with asthma. COMEAP has also recently reported that long-term exposure to particles is associated with reduced life expectancy mainly as a result of earlier deaths from heart disease. Carbon monoxide increases symptoms in those with heart disease, and lead affects brain development in children. Benzene and 1,3-butadiene can both cause cancer.

¹ Air Quality Regulations for England (2000; Amendment Regulations 2002)

2. Air Quality Objectives

The air quality objectives set out in the Air Quality Regulations provide the statutory basis for the system of Local Air Quality Management (LAQM). For each objective, local authorities have to consider present and likely future air quality, and assess whether the objectives are likely to be achieved in time.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.5 µg/m ³	Running annual mean	31.12.2003
	5 µg/m ³	Annual mean	31.12.2010
1,3 Butadiene	2.25 µg/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 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31.12.2004
	40 µg/m ³	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m ³ not to be exceeded more than 24 times a year	1 hour mean	31.12.2004
	125 µg/m ³ not to be exceeded more than 3 times a year	24 hour mean	31.12.2004
	266 µg/m ³ not to be exceeded more than 35 times a year	15 minute mean	31.12.2005

New particles objectives for England (not included in Regulations)

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Particles (PM ₁₀) (Except London given in brackets)	50 µg/m ³ not to be exceeded more than 7 (10) times a year	24 hour mean	31 Dec 2010
	20 (23) µg/m ³	Annual Mean	31 Dec 2010

3. Information about Lewes District Council

The District is a predominantly rural area with a population of 87,389. The total area is 29,200 hectares. Lewes is the main town and the principal administrative and commercial centre within the District. A map of the District can be found in Appendix I. It is also the County town of East Sussex.

The South Downs and the associated landscape form a large proportion of the area of the district. The Downs are a line of chalk hills running east to west, interrupted by the River Ouse and the Ouse valley, which winds south through Lewes and several villages to the port of Newhaven on the south coast. North of the Downs is an area once densely forested and containing the Sussex Clay Belt, known as the Weald. Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, and Sites of Nature Conservation Importance overlap the area. Agriculture remains a major user of land within the District.

Major roads in the District include the busy A27 between Eastbourne and Brighton, the smaller A26 links to Newhaven and north to Uckfield, Crowborough and Tunbridge Wells. The A259 runs along the coast linking the towns of Peacehaven, Newhaven and Seaford. There is a rail service to London in the north and Brighton and Seaford on the coast.

Industrial Sources

Industrial sources are currently controlled under the Environmental Protection Act 1990, and are classified into either Part A (large industries such as power stations and chemical works) or Part B/A2 processes (such as crematoria, petrol stations, quarries, etc.) for guidance and control. Part A processes fall under the jurisdiction of the Environment Agency, whilst control of Part B/A2 processes is a duty carried out by local authorities. Those small industrial processes that fall outside of Part B/A2 process control are also of interest. The review and assessment technical guidance (LAQM.TG03) requires details of boilers with a thermal rating of greater than 5 MW that burn coal or fuel oil (e.g. in universities, hospitals, etc).

It is also possible for industrial sources located outside the boundaries of the district to influence air quality. Neighbouring authorities (Brighton and Hove City Council, Wealden District Council, and Mid Sussex District Council) have been contacted to help identify any such potential sources.

Lists of Part A, Part B/A2 and other processes of potential concern in the District together with their emissions are given in Appendix II.

Road Traffic

The East Sussex County Council collects details of road traffic movements in Lewes District Council. Recent traffic data for 2002 are shown in Appendix II.

A growth factor of 1% per annum represents likely traffic growth for the area (based on discussions with the E.S.C.C) and this has been used to convert 2002 traffic flows into

predicted future flows, assuming that there is no local development nearby likely to increase traffic flows before this date.

The technical guidance requires details of roads with more than 80,000 vehicles per day (a possible significant source of carbon monoxide and benzene) and busy streets or junctions with more than 10,000 vehicles per day or high flow of buses/ HGVs (a possible significant source of NO₂ and PM₁₀). However no roads with flows more than 80,000 are found in the District. Those roads with traffic flows greater than 10,000 are listed in Appendix II and highlighted on the District map in Appendix I.

Future Developments

The Lewes District Local Plan defines the planning policies that cover Lewes District. This Local Plan, giving detailed guidance on where, and what, different forms of development are likely to be permitted in the District, was adopted on 31st March 2003.

It is divided into two sections:

- District Wide policies - which relate to the whole district
- Area Specific policies - which relate to specific town and villages.

The Local Plan contains a number of policies designed to ensure that the air quality effects of development proposals are fully assessed and to encourage the adoption of traffic reducing measures.

4. Updating and Screening Assessment for Carbon Monoxide

Carbon monoxide is an asphyxiating pollutant that reduces the ability of blood to carry oxygen to the different organs. The main source of carbon monoxide in the UK is road transport, which accounted for 67% of total releases in 2000 (the most recent year for which estimates are available). Annual emissions of carbon monoxide have been falling steadily since the 1970s, and are expected to continue to do so. This is mainly due to improvements in vehicle technology and the fitting of catalytic converters. Current projections indicate that road transport emissions will decline by a further 42% between 2000 and 2005 (TG03).

Available monitoring data (obtained using automatic infrared analysers) suggest that the carbon monoxide objective is unlikely to be exceeded at any location in Sussex. If exceedences are possible then they will be close to very busy roads or junctions. Lewes District Council does not carry out any carbon monoxide monitoring, however monitoring is carried out at two sites nearby, in Brighton and Hove as part of the AURN. The results for these sites is given in the following table:

Table 1 Maximum daily running 8 hour mean CO concentrations (mg/m³)

Site	Site Classification	1999	2000	2001
Brighton	Roadside	4.1	-	3.5
Hove	Roadside	3.6	3.5	2.9

These results indicate that roadsides in large urban areas nearby do not exceed the objective.

Very busy roads and junctions in areas across the U.K, where the 2003 background is expected to be above 1 mg/m³, have been identified and the following prescribed criteria have been determined. These require the identification of relevant population exposure within 10m of the kerb where traffic flows on single carriageways exceed 80,000 vehicles per day (vpd). For dual carriageways the equivalent flow is 120,000 and for junctions the flows should be added.

Appendix II lists the traffic flows as supplied by the East Sussex County Council. From this list it can be seen that there are no roads where the traffic flows exceed the criteria given. The A27 dual carriageway was investigated in the previous R&A as the busiest road in the District but its flow is of the order of 50,000vpd.

Following the guidance given in TG03, this assessment of the District indicates that there is no potential for an exceedence of the 8-hour carbon monoxide objective beyond the end of 2003.

5. Updating and Screening Assessment for Benzene

Benzene is a known human carcinogen (cancer causing substance). The main sources of benzene emissions in the UK are petrol vehicles, petrol refining, and the fuel distribution from those petrol stations without vapour recovery systems. National benzene concentrations have declined in recent years, mainly due to the increasing use of three-way catalytic converters and the introduction of vapour recovery systems in petrol stations (Stage 1 and 2 control).

Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol (TG03).

Lewes District Council does not carry out any benzene monitoring. The nearest continuous monitoring in the AURN to the District is at London Eltham (a suburban site), although the site stopped monitoring in 2000. The annual mean results for 1999 and 2000 were 2.81 and 2.52 $\mu\text{g}/\text{m}^3$ respectively, i.e. below both 2003 and the more stringent 2010 objectives.

The assessment carried out by DEFRA for the 2010 objective however suggests there may be a few locations close to busy roads, in areas with high background concentrations, that may be at risk of exceeding the objective.

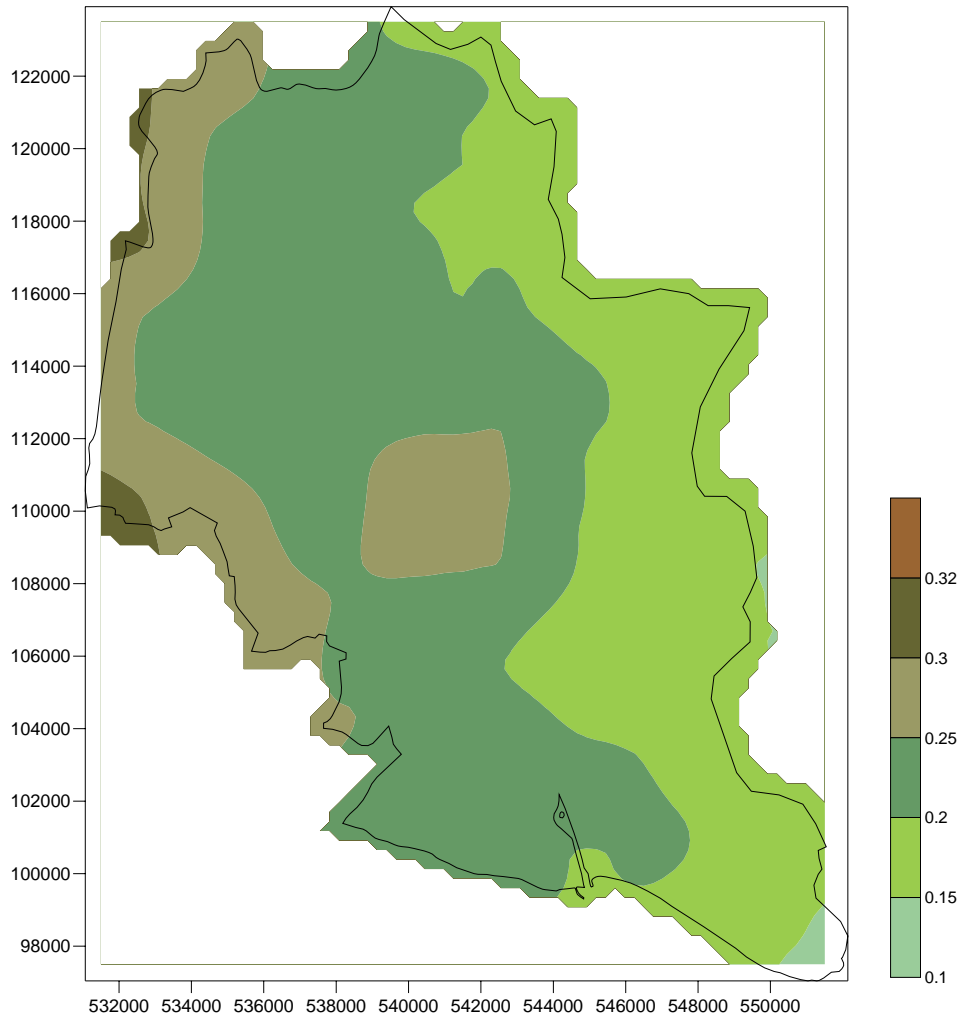
TG03 requires local authorities to examine both roads and industrial sites for potential sources and relevant exposure. The prescribed criteria require the identification of very busy roads and junctions in areas where the 2010 background annual mean concentration is expected to be above 2 $\mu\text{g}/\text{m}^3$.

Traffic flows in the District are given in Appendix II and this indicates that the 'very busy roads' and junctions as outlined are not found. The 2010 background obtained from the NAQIA also confirms that 2010 background is less than 2 $\mu\text{g}/\text{m}^3$ (see Figure 1). The estimated background predictions vary between 0.1 and 0.3 $\mu\text{g}/\text{m}^3$ across the District.

For industrial sources it is necessary to examine Part A and B processes. There are however no Part A processes in the District and hence no IPC/ IPPC petroleum, petrochemical, or carbonisation processes. Similarly there is no Part B process for the storage and unloading of petrol at terminals in the District and none of the major fuel storage depots listed in TG03 are located within the District. Information provided by neighbouring authorities indicates that there are no industrial sources beyond the boundaries of the district that need to be taken into account in this assessment.

The list of authorised petrol stations is attached in Appendix II; details on the exact throughput in terms of quantity of petrol are not available. However based on a worst case assumption that all are greater than 2000 m^3 , it is necessary to identify whether the petrol stations are close to a busy road with more than 30,000vpd. From Appendix II the only applicable road is A27 and there are two petrol stations along this section of the road (i.e. Brighton Road). There is however no relevant exposure within 10m of the petrol pumps at either site.

Figure 1 Interpolated benzene (annual mean concentration $\mu\text{g}/\text{m}^3$) plot for Lewes D.C (2010)



Following the guidance given in TG03, this assessment of the District shows that there is no potential for an exceedence of the annual mean benzene objectives in either 2003 or 2010.

6. Updating and Screening Assessment for 1, 3- Butadiene

1,3-Butadiene is a suspected human carcinogen (cancer causing substance). The major source of 1,3-butadiene nationally is motor vehicle emissions, with other major sources being industrial processes (such as petrochemical and rubber processes). As with benzene, the fitting of catalytic converters to petrol vehicles reduces emissions of 1,3-butadiene. Recently agreed reductions in vehicle emissions and improvements to fuel quality (in the framework of the Auto-Oil programme), are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts (TG03).

Concentrations of 1,3-butadiene are measured at a limited number of UK national network sites. No local monitoring of 1,3-butadiene is currently being carried out by any of the local authorities in Sussex or elsewhere in the Southeast. All monitoring undertaken across the U.K at the AURN sites in the past 2 years indicates that the objective has been met (TG03).

No industrial sources handling, storing or emitting 1,3-butadiene were identified during the first round of review and assessment as likely to give rise to exceedences of the running annual mean objective. No new sources have been introduced into the District, nor have any existing sources been identified with substantially increased emissions. Information provided by neighbouring authorities indicates that there are no industrial sources beyond the boundaries of the district that need to be taken into account in this assessment.

Following the guidance given in TG03, this assessment of the District indicates that there is no potential for an exceedence of the annual mean 1,3-butadiene objective beyond the end of 2003.

7. Updating and Screening Assessment for Lead

Lead has been identified as causing acute and chronic damage to the nervous system, effects on the kidneys, joints and reproductive system. Historically, the major source of lead has been motor vehicle emissions, with other major sources being metal industries and power generation. The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels led to the ban on sales of leaded petrol in the United Kingdom since 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping (TG03).

There is currently no monitoring of lead by any of the local authorities in Sussex. Current monitoring elsewhere at national sites indicates that lead in air at all background and kerbside UK national network sites was significantly below the 2004 and 2008 objectives during the period between 1999 and 2001 (from TG03).

Further assessments however have been undertaken nationally at specific sites near industrial processes. For one industrial site in 2000 the monitoring result exceeded the $0.5 \mu\text{g}/\text{m}^3$ objective, followed in 2001 by an exceedence of the $0.25 \mu\text{g}/\text{m}^3$ objective. For the other site the result was exceeded at 2 locations in 1999, one for the $0.5 \mu\text{g}/\text{m}^3$ objective and the other of $0.25 \mu\text{g}/\text{m}^3$. Concentrations at this particular site however have since dropped markedly. Thus the monitoring results indicated no exceedences of the 2004/ 2008 objectives although it was considered that locations in proximity to non-ferrous metal production and foundry processes were deemed to be at risk.

One industrial source in the District was identified during the first round of R&A of possible concern and therefore needing investigation in respect of the annual mean objective for lead. The source was the aluminium foundry at Barnwell Castings in Newhaven. It was investigated at Stage 2 and shown not to be likely to cause an exceedence of the objective. The process has since been revoked as the business has closed.

No new sources have been identified in the District and nor are there any existing sources with substantially increased emissions. Information provided by neighbouring authorities indicates that there are no industrial sources beyond the boundaries of the district that need to be taken into account in this assessment. The lead objective is therefore unlikely to be exceeded at any location in the District.

Following the guidance given in TG03, this assessment of the District indicates that there is no potential for an exceedence of the annual mean lead objectives in 2004 and 2008.

8. Updating and Screening Assessment for Nitrogen Dioxide

Nitrogen dioxide is a respiratory irritant associated with both acute (short-term) and chronic (long-term) effects on human health, particularly in people with asthma. Nitrogen dioxide (NO₂) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of a reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health.

The principal source of nitrogen oxides emissions is road transport, which accounted for about 49% of total UK emissions in 2000 (TG03). Major roads carrying large volumes of high-speed traffic are a predominant source, as are conurbations and city centres with congested traffic. The contribution of road transport to emissions of nitrogen oxides has declined significantly in recent years as a result of various policy measures. At a national level, emissions of nitrogen oxides from urban traffic are estimated to fall by about 20% between 2000 and 2005, and by 46% between 2000 and 2010 (Stedman et al, 2001).

Other significant emission sources of nitrogen oxides include the electricity supply industry and other industrial and commercial sectors. Emissions from both sources have declined dramatically, due to the fitting of low nitrogen oxides burners, and the increased use of natural gas. Industrial sources make only a very small contribution to annual mean nitrogen dioxide levels.

Nitrogen dioxide is the pollutant for which there is the most local monitoring. This is because cheap and relatively simple monitoring equipment is available to monitor nitrogen dioxide. The Council operates 24 diffusion tube sampling sites across its District. The annual mean results for all these monitoring locations are below the national NO₂ objective (see Appendix III). The diffusion tube results confirm that the annual mean nitrogen dioxide objective for all sites was met.

There is no continuous monitoring of nitrogen dioxide in the District, however monitoring is undertaken at three sites nearby in Brighton, Hove and Lullington Heath, as part of the AURN. The results for these is given below:

Table 2 Results of NO₂ objectives for AURN sites in Sussex (2000-2001)

Site	Annual mean 2000 (µg/m ³)	Annual mean 2001 (µg/m ³)	No of hourly exceedences 2000	No of hourly exceedences 2001
Brighton Roadside	-	36	-	0
Hove Roadside	36	39	0	0
Lullington Rural	12	13	0	0

These results confirm that the nitrogen dioxide objectives for all three sites were met.

Other locations of concern for which monitoring data are not available have been identified using the guidance. These include narrow congested streets with residential

properties within 5m of the kerb, busy junctions with population exposure within 10m of the kerb, busy streets where members of the public may be exposed within 5m of the kerb for 1 hour or more (all where the traffic flows are greater than 10,000vpd), and roads with high flows of buses and/or HGVs. In addition new roads or roads with significantly changed traffic, as well as roads close to the objective during the first round of review and assessment, have also been examined. Appendix II provides the details of the traffic information for the Council's area. Finally, the bus station in Lewes has been assessed.

A re-assessment of those roads which are less than 10m wide, with residential properties within 5m of the kerb, daily flows of more than 10,000vpd and with average speed of 50kph or less has been undertaken using DMRB. This includes the revised emission factors and also the TG03 methodology for street canyons. (A street canyon is defined as being a relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road). The average speed of traffic in the centre of Lewes is 35kph (based on data provided by the E.S.C.C).

The road identified in the District with the highest flow meeting these criteria is A2029 East Street in Lewes and the findings of this assessment confirm that the objective will be met (see Appendix IV).

Using traffic data supplied by E.S.C.C an exercise has been undertaken to identify busy junctions i.e. roads with combined flows greater than 10000vpd and where there is relevant exposure within 10m. The junctions identified as meeting these criteria are the junctions of the A2029 Eastgate Street and A277 High Street in the centre of Lewes, and Fisher Street and West Street. A DMRB assessment was undertaken for a receptor location on the northeast side of the former junction and southeast corner of the latter. The results for the roads identified confirm that the objective will be met (see Appendix IV).

An assessment has been made of busy streets in the District i.e. where people may regularly spend more than one hour, and the busiest road based on the traffic information obtained and likely exposure is A2029 East Street in Lewes. This road was modelled assessed above for narrow congested streets and found not to exceed the annual mean objective. TG03 advises that if the annual mean objective is not exceeded then the one-hour mean objective should also not be exceeded.

A comparison with previous traffic data used in the first round of review and assessment has confirmed that no traffic flow has increased by more than 25% on the roads examined and therefore no road needs to be re-assessed on this basis.

A number of roads were assessed in the previous review and assessment and these roads have been re-assessed using DMRB and the traffic information in Appendix II. The traffic speeds used for the previous R&A have been also used for this assessment. The results of the DMRB assessment incorporating new emission factors confirm that the roads are not predicted to exceed the annual mean NO₂ objective (see results in Appendix IV).

From the traffic information obtained the only road identified as having less than 20000vpd and a proportion of greater than 25% HGVs is Fisher Street in the centre of

Lewes. This is a small narrow street with traffic flowing in single file one way only and the nearest receptor position is measured at 2m from the road centre line. A DMRB assessment was undertaken for this road and it was treated as a street canyon as it is less than 10m wide with buildings on either side of the road. The result of the DMRB assessment was that the road is not predicted to exceed the annual mean NO₂ objective (see results in Appendix IV). The higher concentration predicted for this road however is also reflected in the most recent diffusion tube monitoring undertaken (see Figure 3 in Appendix III).

In addition no roads with traffic flows greater than 10,000vpd have been built in the District since the first round of review and assessment where there is relevant exposure arising.

An assessment of the numbers of buses using Lewes bus station has been made and the total is less than 1000 per day. On this basis no further assessment is required.

It is considered that industrial sources will not make a significant local contribution to annual mean concentrations, however they could be significant in terms of the 1-hour objective. The previous review and assessment did not identify any such sources requiring investigation and no new significant sources have been built or are proposed which will lead to predicted exceedences at relevant locations. Information provided by neighbouring authorities indicates that there are no industrial sources beyond the boundaries of the district that need to be taken into account in this assessment.

Aircraft emissions of NO_x are not an issue in District, since there is no airport in the Council's area.

Following the guidance given in TG03, this assessment of the District indicates that there is no potential for an exceedence of the annual and daily mean nitrogen dioxide objectives in 2005. However because of the limited traffic data and the presence of street canyons it is proposed to undertake a Detailed Assessment for nitrogen dioxide in Lewes town centre.

9. Updating and Screening Assessment for Sulphur Dioxide

Sulphur dioxide is an acute respiratory irritant, hence the short averaging time for its objective. The main source of sulphur dioxide in the UK is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions (TG03).

Automatic sulphur dioxide monitoring is undertaken at two permanent stations in Sussex as part of the AURN. These are located in Hove (a roadside site) and Lullington Heath (a rural site). The results from these sites indicate there were no occasions when the objectives were exceeded for the period 1999 to 2001 (from TG03).

There are no Part A processes in the area and no new industrial sources have been introduced into the District since the last review and assessment.

Of the two sources investigated during the last review and assessment, one process (Barnwell Castings) has since been revoked. The other source was the gas-fired brickworks at Ibstock Building Products Ltd. and it was investigated at Stage 2. Detailed modelling was undertaken and the source was found not to be significant. No other sources with substantially increased emissions have been found in the District. All Part B processes in the District are listed in Appendix II.

Local knowledge and professional judgement indicates that there are no significant areas of domestic coal burning (areas of about 500 x 500 m with more than 100 houses burning solid fuel as their primary source of heating) in the District.

Boiler plant (>5 MW_{thermal}) can give rise to high short-term concentrations, with the risk that the 15-minute objective may be exceeded. These boilers were identified previously and no other boilers have been identified since the previous review and assessment.

The port of Newhaven is located in the south of the District. Ships up to 160m long with a maximum draft of 8m can use the facility. Currently two ferry companies operate from the port to France, Hoverspeed (operating high-speed ferries between April to September twice a day) and Transmanche (which operates ferries twice a day). Cruise liners or container ships do not use the port but smaller passenger ships visit occasionally. Based on the above activity the ship movements to and from the port are far less than the 5,000 per year, which is the requirement for the Council to undertake a detailed assessment.

An assessment has been made of railway activity at sites where locomotives are known to operate in the District. From this it has been established that there is no relevant exposure within 15m of the sites where diesel locomotives are stationary with engines running for two periods of more than 15 minutes per day.

Following the guidance given in TG03, this assessment shows that there is no potential for an exceedence of the 15 minute, hourly or 24 hour mean sulphur dioxide objectives beyond the end of 2004 and 2005.

10. Updating and Screening Assessment for Particles (PM₁₀)

Particulate matter is of major health concern, as it has been linked with both increased rates of disease and premature death. There is a wide range of emission sources that contribute to PM₁₀ concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories (APEG, 1999):

(I) *Primary particle* emissions are derived directly from combustion sources, including road traffic, power generation, industrial processes etc.

(II) *Secondary particles* are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates.

(III) *Coarse particles* comprise of emissions from a wide range of sources, including re-suspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles.

The expected reduction in national particle emissions in future years is different for each source type. For example, emissions from road transport will be governed by new legislation on vehicle emission standards. Emissions of secondary particles will be largely governed by controls on power generation, industrial and transport emissions of SO₂ and NO_x, both in the UK and in Europe. Emissions of coarse particles are largely uncontrolled, and in general are not expected to decline in future years (TG03).

Relatively high PM₁₀ background concentrations have been reported for the South East of England, mainly due to the influence of sources from continental Europe (Abbott and John Stedman, 1999).

An automatic (TEOM) monitor is permanently located at the roadside of the A259 at Telscombe Cliffs in Peacehaven, giving hourly readings of PM₁₀ concentration. This site was established in late 2000, with the first full year of results being for 2001. The results including data capture are given in the table below.

Lewes Roadside	2001	2002
Annual mean (µg/m ³)	30	31
Days > 50 µg/m ³	19	15
Data capture	100%	69%

Data are also given for the nearby urban background site in Eastbourne in the table below:

Eastbourne Background	2000	2001	2002
Annual mean (µg/m ³)	24	25	25
Days > 50 µg/m ³	2	5	4
Data capture	58%	99%	69%

The data obtained for both sites indicates that the 2004 objectives were met.

The 2001 data have been used to estimate gravimetric concentrations, which were then ratified, averaged over 24-hour periods and a full calendar year, and projected to the year 2004, as indicated in the technical guidance. These are given in the following table:

2004 predicted	No. of days > 50 $\mu\text{g}/\text{m}^3$
Lewes roadside	22.8
Eastbourne background	10.1

The same data have also been used to provide 2010 estimates and these are given in the following table:

2010 predicted	Annual mean	No. of days > 50 $\mu\text{g}/\text{m}^3$
Lewes roadside	26.2	15.5
Eastbourne background	22.2	6.6

These estimates suggest that the 2004 objective will be met, as will the background 24-hour mean objective for 2010. Both annual mean and the roadside predictions for 2010 however indicate that the 2010 objective will be exceeded.

Figure 2 Interpolated 2010 PM₁₀ (annual mean concentration $\mu\text{g}/\text{m}^3$) plot for Lewes

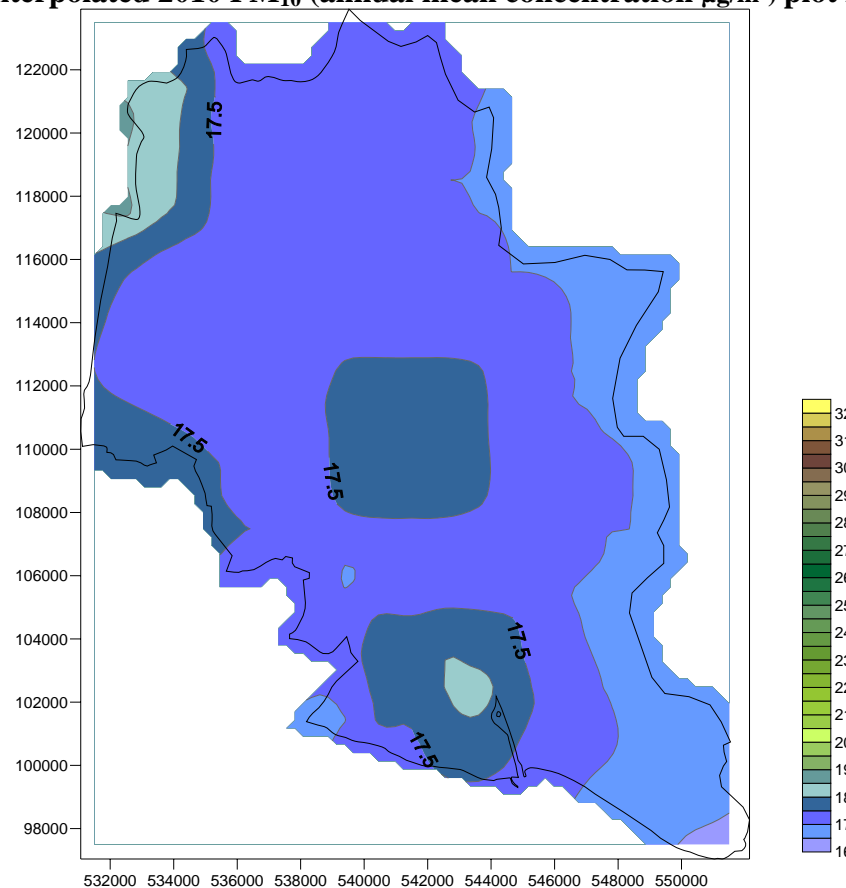


Figure 2 is a plot of the District, based on an interpolation of the national projections (from the NAQIA) for the predicted annual mean concentrations in 2010. The estimated background predictions are below the objective, varying between 16 and 18 $\mu\text{g}/\text{m}^3$ across the Council's area. Care however is needed with this interpretation as the map of background concentrations has been calculated for the whole of the UK at a 1 km x 1 km square resolution. It therefore does not represent locations (and emissions) other than on a general scale.

Details of the traffic flows for the area are listed in Appendix II. An examination of these details has been made to try to identify busy junctions with population exposure within 10m of the kerb and roads with high flow of buses and/or HGVs. This also includes new roads or roads with significantly changed traffic, as well as roads close to the objectives during the first round of review and assessment.

DMRB screening model was used to predict the annual mean concentrations in 2004 at all relevant locations. The DMRB assessment was for applicable junctions (as identified earlier for nitrogen dioxide) and for those roads assessed in the previous round of R&A. An assessment was also made of Fisher Street near the town centre of Lewes. Applicable roads with changed flows and new roads were not identified and therefore no assessment of these was needed. The model results suggest that the 2004 annual mean and 24-hour mean objectives will not be exceeded in the District (see Appendix IV).

Industrial sources will not make a significant contribution to annual mean concentrations, but could be significant in terms of the 24-hour mean objective. For this reason, an assessment was made of new industrial sources or sources with substantially increased emissions. The outcome from this is that no new such sources have been identified in the District. Information provided by neighbouring authorities indicates that there are no industrial sources beyond the boundaries of the district that need to be taken into account in this assessment.

Local knowledge and professional judgement indicates that there are no significant areas of domestic coal burning (areas of about 500 x 500 m with more than 50 houses burning solid fuel as their primary source of heating) in the District.

TG03 identifies that a number of fugitive dust sources including quarries, landfill sites, opencast coal, and handling of dusty cargoes at ports may be significant for PM_{10} . Where dust is emitted, a proportion, (typically around 20%), will be present as PM_{10} .

Potential sources within the District include the licensed landfill sites and the port handling facilities at Newhaven. The landfill sites are listed in Appendix II. These areas were assessed in terms of the predicted annual mean background concentration in 2004, specifically to determine whether it was greater than or less than 26 $\mu\text{g}/\text{m}^3$. This assessment confirmed that the maximum annual mean background concentration in 2004 in the District in these is approximately 20 $\mu\text{g}/\text{m}^3$. Evidence of relevant exposure within 200m of the potential sources of emissions was then sought for both the port and landfill sites. No relevant exposure was found at any of the sites. There are also no recent dust complaints in relation to the sites.

Aircraft emissions are not an issue in the District, since there is no airport in the Council's area.

Following the guidance given in TG03, this assessment of the District indicates that there is no potential for an exceedence of the annual and 24-hour mean particle objectives in 2004.

There is however potential for an exceedence of the 2010 annual mean objective and therefore, in accordance with the Technical Guidance (TG03), a Detailed Assessment will be undertaken for the road sections identified in Appendix II where there is relevant exposure.

11. Conclusions

The atmospheric emission sources in Lewes District Council have been examined and those aspects that have changed since the first round of review and assessment have been identified. Recent monitoring data and screening modelling tools have been used to assess compliance with the air quality objectives for seven pollutants. The following conclusions have been reached for each of the pollutants:

Carbon monoxide:	No further assessment needed.
Benzene:	No further assessment needed.
1,3-Butadiene:	No further assessment needed.
Lead:	No further assessment needed.
Nitrogen dioxide:	No further assessment required. However a detailed assessment will be undertaken to ensure this conclusion is correct for street canyons in Lewes town centre.
Sulphur dioxide:	No further assessment needed.
Particles (PM₁₀):	A further detailed assessment is needed of the 2010 objective at roadside locations where there might be relevant exposure.

Consequently, Lewes District Council will undertake a Detailed Assessment for particles (PM₁₀) and for nitrogen dioxide. A separate report of the Detailed Assessments will be produced by end of April 2004.

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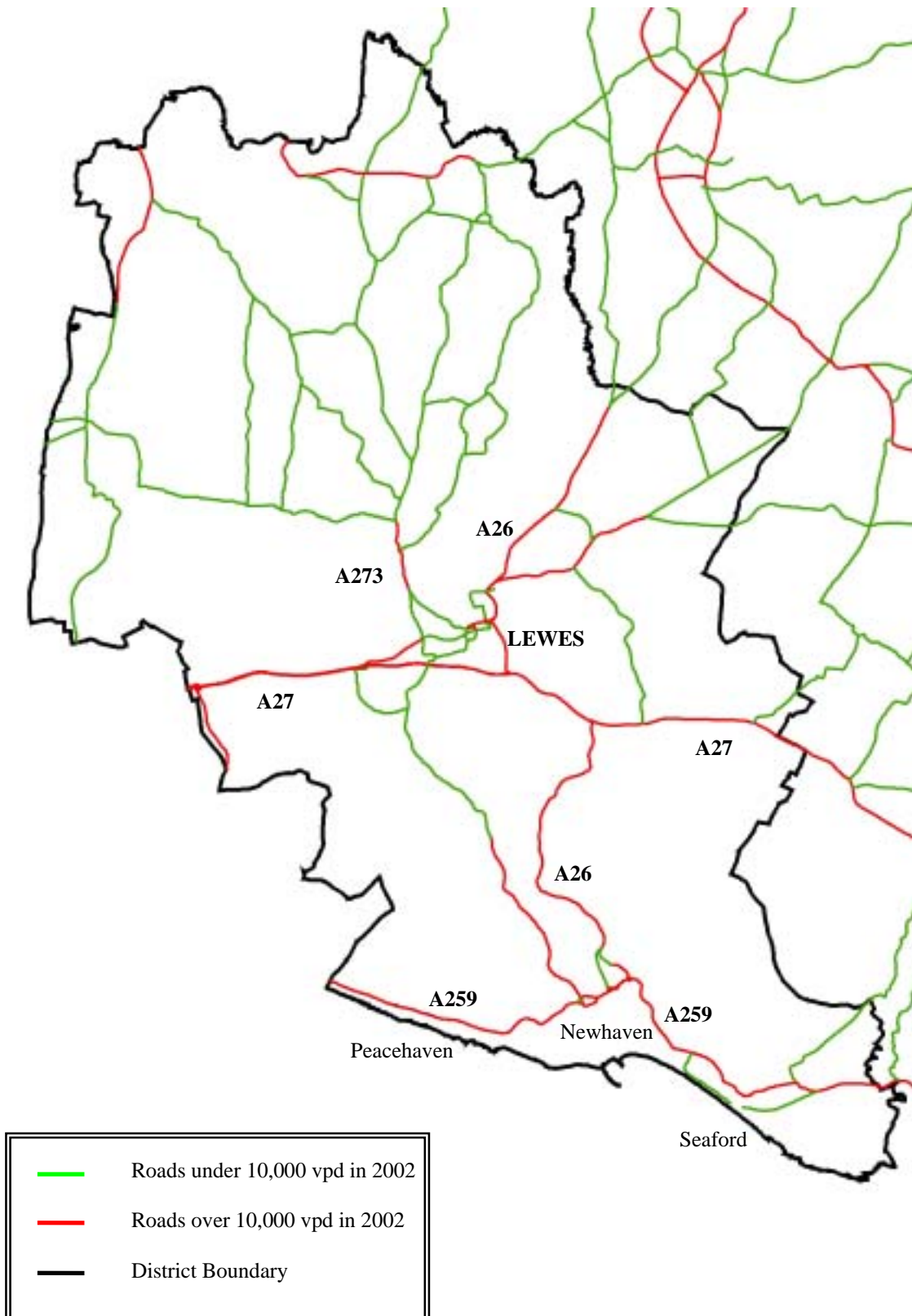
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The Environment Act (1995)

The Environmental Protection Act (1990)

Appendix I: Map of District



Appendix II: Emissions

Industrial Sources

Part A Processes

There are currently no authorised Part A processes in the Lewes D.C area.

Part B/A2 Processes

The processes authorised in the District are listed in the following table:

CONTACT NAME & ADDRESS	PG Note
Aram Resources Plc, Keepers, By Longfords, Minchinhampton, Stroud, GL6 9AN	3/15
Artex-Rawplug Limited, Artex Avenue, Newhaven, BN9 9DD	3/15
Bevan Funnel Limited, Reprodux House, Norton Road, Newhaven, BN9 0BP	6/2,1/8
Bevan Funnel Limited, Reprodux House, Norton Road, Newhaven, BN9 0BP	6/33
Cash Bases Limited, The Drove, Drove Road, Newhaven, BN9 0WA	6/31
CS Furniture Limited, Brooks Road, Lewes, BN7 2BY	6/2
D Cover & Son Limited, Chatfields Yard, Cooksbridge, Lewes, BN8 4TJ	6/3, 6/2
Ibstock Brick Limited, Chailey Works, South Chailey, Lewes, BN8 4BA	3/2
Main Systems Limited, Beach Road, Newhaven, BN9 0BX	6/23
Market Lane Garage Limited, 32 North Street, Lewes, BN7 2PH	6/34
ID Data Limited, 25-27 Cliffe Industrial Estate, Lewes, BN8 6JL	6/16
S.B.F.I., Units 1A, B and C, Drove Industrial Estate, Newhaven, BN9 0DG	6/33
S.B.F.I., Units 1A, B and C, Drove Industrial Estate, Newhaven, BN9 0DG	6/2
Tarmac Limited, Newhaven Works North Quay, Newhaven, BN9 0AB	3/15
Tarmac Limited, Concrete Plant, North Quay, Newhaven, BN9 0AB	3/1(95)

The authorised petrol stations in the District are:

Name	Address
Texaco	Brighton Road, Lewes, Sussex, BN7 3JP
Tesco	Brookes Road, Lewes, East Sussex, BN7 2BY
Malling Service Station	96-106 Malling Street, Lewes, East Sussex, BN7 2RJ
BP	Newmarket Service Station, Brighton Road, Lewes, East Sussex, BN7 3JJ.
Busy Bee Garage	Lewes Road, Ringmer, BN8 5QF
Murco Service Station	North Chailey Crossroads, Chailey, Lewes, East Sussex, BN8 4DH
Sainsbury's	The Drove, Newhaven, Sussex, BN9 0AG
Total	334/336 South Coast Road, Peacehaven, East Sussex, BN9 7EW
Shell	Shell Peacehaven (166), 180 South Coast Road, Peacehaven, East Sussex, BN10 8JJ
Texaco	376 South Coast Road, Telscombe Cliffs, Peacehaven, Sussex, BN10 7ET
BP	Station Approach, Seaford, East Sussex, BN25 2DH
Sutton Corner Garage	Eastbourne Road, Seaford, East Sussex, BN25 4QS
Baldocks of Wivelsfield	Ditchling Road, Wivelsfield, RH17 7RF

Road Sections

Section	Road	Flow 2002	Flow 2005	% HGVs
A2029_25	A2029	19000	19570	
A2029_27	A2029	13500	13905	
A2029_30	A2029	20100	20703	2.31
A2029_40	A2029	21600	22248	1.24
A259_100	A259	22800	23484	0.95
A259_110	A259	21000	21630	
A259_120	A259	19500	20085	1.38
A259_130	A259	19700	20291	1.53
A259_135	A259	18400	18952	1.46
A259_140	A259	26800	27604	1.13
A259_150	A259	24900	25647	1.36
A259_160	A259	13900	14317	1.65
A259_165	A259	13500	13905	1.56
A26_20	A26	11900	12257	11.42
A26_30	A26	18500	19055	5.63
A26_50	A26	21200	21836	3.94
A26_60	A26	22200	22866	3.75
A26_65	A26	10600	10918	3.61
A26_70	A26	11600	11948	3.71
A27_100	A27	50300	51809	4.87
A27_110	A27	35800	36874	6.47
A27_120	A27	21900	22557	5.2
A27_130	A27	22700	23381	4.83
A272_20	A272	11200	11536	3.63
A272_30	A272	12300	12669	3.8
A272_40	A275	11800	12154	3.79
A272_50	A272	10000	10300	3.8
A275_30	A275	10900	11227	2.69
A275_5	A275	12600	12978	2.5
B2109_10	B2109	13100	13493	1.11
B2112_25	B2112	12400	12772	1.04
B2112_30	B2112	11400	11742	0.88
B2123_10	B2123	15700	16171	1.2
B2192_10	B2192	11900	12257	4.18
B2192_20	B2192	12000	12360	3.71
C7_10	C7	12000	12360	0.62
U5137_10	U5137	13800	14214	2.05

Comparison of more recent traffic data to previous Stage 2 R&A

Receptor (Stage 2)	%HGV (Stage 2)	%HGV (2002)	road	aadt_2005	aadt	% change 2005 figures
<i>South Coast properties</i>	<i>2</i>	0.95	A259	23484	22800	-18.32
			<i>A259</i>	<i>28752</i>	<i>24000</i>	
<i>Claremont properties</i>	<i>3</i>	1.36	A259	25647	24900	-7.24
			<i>A259</i>	<i>27648</i>	<i>23100</i>	
<i>Sutton Rd properties</i>	<i>3</i>	1.65	A259	14317	13900	-30.15
			<i>A259</i>	<i>20496</i>	<i>17100</i>	
<i>South Street properties</i>	<i>11</i>	5.63	A26	19055	18500	-28.34
			<i>A26</i>	<i>26592</i>	<i>22200</i>	
<i>151 Malling St, Lewes</i>	<i>5</i>	3.94	A26	21836	21200	-14.00
			<i>A26</i>	<i>25392</i>	<i>21200</i>	
<i>Malling Down properties</i>	<i>5</i>	3.75	A26	22866	22200	-12.43
			<i>A26</i>	<i>26112</i>	<i>21800</i>	
<i>Housedean Cottages</i>	<i>6</i>	4.87	A27	51809	50300	-5.15
			<i>A27</i>	<i>54624</i>	<i>45600</i>	
<i>Cranedown properties</i>	<i>10</i>	6.47	A27	36874	35800	-3.85
			<i>A27</i>	<i>38352</i>	<i>38340</i>	
<i>Properties adj to railway Xing</i>	<i>8</i>	5.2	A27	22557	21900	-27.59
			<i>A27</i>	<i>31152</i>	<i>26000</i>	
<i>Properties near Comps Farm</i>	<i>7</i>	4.83	A27	23381	22700	0.64
			<i>A27</i>	<i>23232</i>	<i>19400</i>	

(note - italics indicate used in Stage 2 R&A)

The above table confirms that the flows based on recent traffic data are mostly lower than used previously estimated.

Landfill sites in the District licensed by the Environment Agency

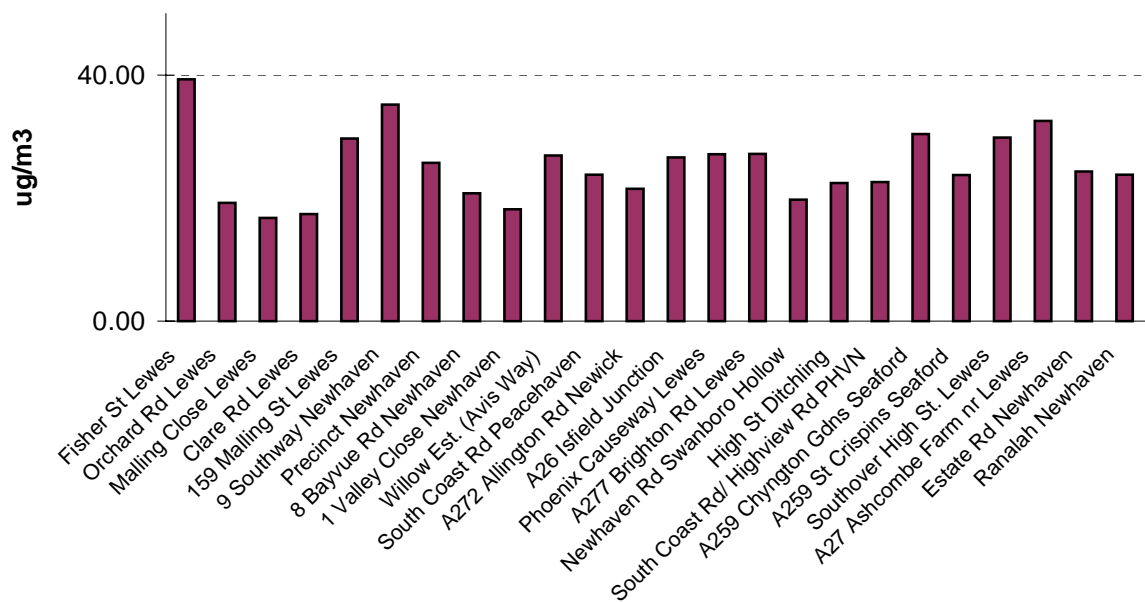
Registration Licence						
Company	Address	Postcode	No	Type	Area	Issued
Blue Circle Industries Plc	Beddingham, Lewes	BN8 6RJ	WD116	19621	Co-disposal landfill sites	Small 21/05/1981
Viridor Waste Disposal Ltd	Beddingham Landfill Site, Beddingham, Lewes	BN8 6JX	WR/5-012/L	19633	Co-disposal landfill sites	Large n/a
James Leppard & Sons Ltd	Streat Sandpit, Streat Lane, Hassocks	BN6 8RS	WD161	19706	Landfills taking non-biodegradeable wastes (not construction)	Large 31/08/1990
Southern Haulage Ltd	Goldbridge Farm, Goldbridge Road, Newick	BN8	WR/5-009/L	19720	Landfills taking non-biodegradeable wastes (not construction)	Small 09/12/1996
Southern Haulage Ltd	Goldbridge Farm, Goldbridge Road, Newick	BN8	WD159	19721	Landfills taking non-biodegradeable wastes (not construction)	Medium 29/06/1990

Appendix III: Diffusion tube monitoring

Air quality monitoring takes place at a number of locations in Lewes District Council using passive diffusion tubes.

Nitrogen dioxide is the pollutant for which the most monitoring has been carried out in the Council's area. There are currently 24 diffusion tube locations. Nitrogen dioxide diffusion tube data for the 2002 are shown in Figure 3. The dotted line indicates the annual mean nitrogen dioxide objective of $40 \mu\text{g}/\text{m}^3$.

Figure 3 Annual mean NO₂ results for Lewes D.C (2002)



The above results are not bias corrected.

A diffusion tube / automatic analyser collocation study is been carried out at a roadside location in Brighton. Triplicate nitrogen dioxide tubes (prepared and analysed by Bristol

Scientific Services) are exposed very close to the inlet of the NO_x analyser during 4-week periods since the beginning of the year 2003. The results obtained so far show a reasonable agreement between the two methods.

Appendix IV: Air Quality Modelling

Once potentially significant roads have been identified, the DMRB screening model (v1.01) can be used to further assess roads. This model allows for the assessment of pollutant levels at relevant receptors that are within 200m of the centre of a road for the relevant year of the objective.

Before using the DMRB Screening Model (v1.01), the following information had been collected:

1. Annual average daily traffic flow based on 24-hour flows (AADT)
2. Average percentage split of vehicle categories as either: Heavy Duty Vehicles (HDV) and Light Duty Vehicles (LDV); or Passenger Cars, Light Good Vehicles (LGV), Rigid Heavy Good Vehicles (HGV), Artic HGV, and Buses/Coaches.
3. Estimates of the average speed of vehicles (km/hr).
4. Traffic growth factors for the relevant year of assessment.

The DMRB screening model (v1.01) contains advice on assessing junctions (Highways Agency, 2002). However, where complex junctions exist, and particularly where there is relevant exposure, the use of monitoring data should be preferred.

Where street canyons (i.e. relatively narrow street with buildings lined up continuously along both sides) or enclosed streets with buildings close to the road on both sides exist, DMRB may not reasonably estimate concentrations due the complex nature of pollution dispersion.

In these cases, the predicted annual mean NO₂ “road traffic component” concentration in the “local output” sheet of DMRB has been multiplied by a factor of 2, to take account of the model under-prediction. No adjustment has been made in the case of PM₁₀ because there is no clear evidence of model under-predictions for these pollutants.

The results of the screening are given in the following table over page:

- Notes: 1) am represents annual mean concentration ($\mu\text{g}/\text{m}^3$) for end of 2005 for NO₂ and 2004 for PM₁₀
2) Days means days PM₁₀ > 50 $\mu\text{g}/\text{m}^3$ for 2004

Screening Results

Location	NO₂_am	PM₁₀_am	PM₁₀_days	USA purpose
A27 Kingston roundabout to boundary in west	24.0	21.3	5.2	Review Stage 2
A259 Peacehaven to boundary in west	21.8	20.7	4.3	Review Stage 2
A259 Seaford from A26 (Newhaven) to Seaford railway station	20.1	20.8	4.5	Review Stage 2
A27 Southerham roundabout to Beddingham	25.7	22.7	7.6	Review Stage 2
A27 Southerham roundabout to Kingston roundabout	22.4	21.1	5.0	Review Stage 2
A26 Southerham roundabout to roundabout N of Cuilfail tunnel	25.5	22.5	7.1	Review Stage 2
A259 Seaford from A26 (Newhaven) to Seaford railway station	19.6	21.0	4.8	Review Stage 2
A26 roundabout N of Cuilfail tunnel Lewes to Mill Rd	26.9	24.3	10.7	Review Stage 2
A26 Mill Rd to B2192	25.3	23.2	8.5	Review Stage 2
A26 roundabout N of Cuilfail tunnel Lewes to Phoenix roundabout	23.2	22.0	6	Review Stage 2
A27 E of Beddingham to Glynde turnoff	24.2	22.0	6.3	Review Stage 2
A2029_25 East Street	30.4	22.9	7.8	Canyon
Junction A277/ A2029	28.8	26.0	14.9	Junction
Junction Fisher Street/ West Street	38.9	31.1	31.9	Junction
Fisher Street	38.8	23.8	9.6	HGVs/ Canyon

Appendix V: Consultation

Statutory Consultees

Under the Environment Act, all local authorities are required to consult on their air quality review and assessment with the Environment Agency and their Highways Authority. Through the Sussex Air Quality Steering Group both of these bodies have been involved since the early stages of the air quality management process, and will be made fully aware of all local air quality reviews and assessments.

The Sussex Air Quality Steering Group is also working to ensure a free exchange of information between neighbouring local authorities, including those, which border Sussex, but are located in Kent, Surrey and Hampshire.

Public Consultation

This report is available on the Council's website and copies are available in local libraries within the district. Further information concerning air quality management is available on the SAQSG website. In addition, the SAQSG produces and disseminates a newsletter (twice per year).

If you have any comments on this report or if you would like to receive further information, please contact Mr Lee Money at the following address:

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