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

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CONTENTS

SUMMARY

Local Authorities in the UK have the statutory duty to review and assess air quality on a regular basis. The first step in this process is 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.

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 only represent 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 kind of locations.

The updating and screening assessment has relied on information about old and new emission sources in Arun District, air quality monitoring data collected during recent years, and screening modelling tools. The data obtained has been compared with national air quality objectives based on the health effects of seven pollutants (carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide, and particulate matter). There is no evidence to suggest that any of the objectives for the seven pollutants will be exceeded at any location within the District.

GLOSSARY

AADT	Annual Average Daily Traffic (vehicles per day)
AEOLIUSQ	Screening model for street canyons (Met Office)
APEG	Airborne Particles Expert Group
AQMA	Air Quality Management Area
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
HDV	Heavy Duty Vehicles
LAQM	Local Air Quality Management
mg/m^3	Milligrams of the pollutant per cubic meter of air
$\mu g/m^3$	Micrograms of the pollutant per cubic meter of air
ppb	Parts per billion
ppm	Parts per million
NAEI	National Atmospheric Emissions Inventory
NAQS	National Air Quality Strategy
NO	Nitrogen monoxide
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
vpd	Vehicles per day
WSCC	West Sussex County Council

1.0 Introduction

Under the Environment Act 1995, local authorities are required to Review and Assess (R&A) 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 Regulations[1], 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 review and assessment round was completed in May 2000. The main conclusion was that the national air quality objectives were not likely to be exceeded at any locations in the Arun District.

This first round of R&A constitutes a benchmark against which Arun District 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 Assessment (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 Arun 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 Arun 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).

Short-term increases in particles, sulphur dioxide and nitrogen dioxide are associated with increased deaths, 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 both cause cancer.

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

2.0 National 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

3.0 Information about Arun District Council

Arun District is a mixed urban / rural area covering 85 square miles, and has a population of over 140,000. Littlehampton and Bognor Regis are the main urban centres and the principal administrative and commercial centres within the district. A map of the District can be found in Appendix I.

Arun District is well served by transport links to London, Gatwick Airport, the M25, the coast and Europe. A network of subsidiary routes connects the villages and small centres of population.

A large proportion of the district is composed of countryside with a varied landscape of woodland, downland, river valleys and meadows being represented. 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.

3.1 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 concern. The review and assessment technical guidance (LAQM.TG (03)) 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). There are currently no Part A processes operating in the District.

3.2 Road Traffic

Details of road traffic movements in Arun District Council are collected by West Sussex County Council and the Highways Agency. Recent traffic data are shown in Appendix II.

Each District in the County has its own growth factor which can be 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. All councils within West Sussex have been advised to use the "high growth" factor, which represents the worst case figure.

3.3 Background concentrations

Predicted future annual mean background concentrations for PM_{10}, NO_x and NO_2 were downloaded from http://www.airquality.co.uk/archive/laqm/tools/5_2001.csv and are listed in Appendix IV.

4.0 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 (LAQM.TG (03)).

4.1 Monitoring data

Arun District Council does not carry out any monitoring for carbon monoxide. The nearest national network sites where automatic monitoring (using infrared analysers) for carbon monoxide is undertaken are: Brighton (roadside), Hove (roadside), Portsmouth (urban background) and Southampton (urban centre). There have been no recorded exceedences of the maximum daily running 8-hour mean for carbon monoxide at any of the above sites for the period 1999 to 2002.

4.2 Very busy roads or junctions in built up areas

Very busy roads and junctions in areas where the 2003 background is expected to be above 1 mg/m^3 were assessed against traffic flow criteria as defined in technical guidance document LAQM.TG (03). All roads (including major junctions) within the Arun district were found to have flows of less than 80,000 vehicles per day, therefore no further assessment was undertaken.

It is thus concluded that the carbon monoxide objective is unlikely to be exceeded at any location in the District.

5.0 Updating and Screening Assessment for Benzene

Benzene is a known human carcinogen (cancer causing substance), and also contributes to the formation of ground-level ozone (summer smog). The main sources of benzene emissions in the UK are petrol vehicles, petrol refining, and the fuel distribution from petrol station 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 (LAQM.TG (03)).

5.1 Monitoring data

Arun District Council does not carry out any monitoring for benzene. The nearest national network sites where automatic monitoring (using diffusion or pumped tubes) for benzene is undertaken are: Hove (roadside), Portsmouth (urban background) and Southampton (urban centre). There were no recorded exceedences of the maximum running annual mean for benzene at any of the above sites in 2002.

5.2 Very busy roads or junctions in built up areas

Very busy roads and junctions in areas where the 2010 background is expected to be above $2\mu g/m^3$ were assessed against traffic flow criteria as defined in technical guidance document LAQM.TG (03). All roads (including major junctions) within the Arun district were found to have flows of less than 80,000 vehicles per day, therefore no further assessment was undertaken.

5.3 Industrial sources

No Part A or Part B/A2 processes (as listed in Annex II of LAQM.TG (03)) likely to release significant quantities of benzene into air have been identified within the Arun district.

5.4 Petrol stations

No petrol stations with an annual throughput of more than $2000m^3$ of petrol (2 million litres per annum) on a busy road of more than 30,000 vpd have been identified within the Arun district.

5.5 Major fuel storage depots (petrol only)

No major fuel storage depots handling petrol have been identified within the Arun district.

It is thus concluded that the benzene objective is unlikely to be exceeded at any location in the District.

6.0 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 their 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 (LAQM.TG03).

6.1 Monitoring data

Arun District Council does not carry out any monitoring for 1,3-butadiene. Concentrations of 1,3-butadiene are measured at a limited number of UK national network sites. The nearest national network site where automatic monitoring for 1,3-butadiene is undertaken is Southampton (urban centre). There were no recorded exceedences of the maximum running annual mean concentration (2.25µg/m^3) for 1,3-butadiene for the period between 1999 and 2000 at the above site.

6.2 New industrial sources

No new industrial sources have been identified through the planning or authorisation process as being likely to give rise to exceedences of the 2003 running annual mean objective concentration for 1,3-butadiene within the District.

6.3 Industrial sources with substantially increased emissions

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.

It is thus concluded that the 1,3-butadiene objective is unlikely to be exceeded at any location in the District.

7.0 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 has led to the ban on sales of leaded petrol in the United Kingdom with effect from 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 (LAQM.TG (03)).

7.1 Monitoring data outside an AQMA

Arun District Council does not carry out any monitoring for lead. Lead-in-air concentrations are measured at a limited number of UK national network sites. All concentrations at background and kerbside network sites for the period 1999-2001 are well below the annual mean objective for 2004 and 2008.

7.2 New industrial sources

No new industrial sources have been identified through the planning or authorisation process as being likely to give rise to exceedences of the 2004 and 2008 annual mean objective concentration for lead within the District.

7.3 Industrial sources with substantially increased emissions

No industrial sources likely to give rise to exceedences of the annual mean objective for lead were identified during the first round of Review and Assessment.

It is thus concluded that the lead objective is unlikely to be exceeded at any location in the District.

8.0 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 (NO_2) 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 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 (LAQM.TG (03)). 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 nitrogen oxides emissions has declined significantly in recent years as a result of various policy measures. At a national level, urban traffic nitrogen oxides emissions are estimated to fall by about 20% between 2000 and 2005, and by 46% between 2000 and 2010 (Stedman et al, 2001).

Other significant sources of nitrogen oxides emissions include the electricity supply industry and other industrial and commercial sectors. Emissions from both sources have also 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.

8.1 Monitoring data outside an AQMA

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. Arun District Council operates a number of diffusive sampling sites for nitrogen dioxide.

Technical guidance document LAQM.TG (03) states that "it is imperative that any local monitoring data are ratified before being used" as part of the Update and Screening Assessment. This requires that all diffusion tube data be appropriately 'bias-corrected' before use and the bias adjustment factor be based on collocation of diffusion tubes with a chemiluminesence monitor. Arun District Council uses nitrogen dioxide diffusion tubes supplied and analysed by Rotherham Metropolitan Borough Council's Environmental Health Laboratory Services. There is no **local** collocation study available for tubes supplied and analysed by this laboratory, therefore a bias adjustment factor is not available based on Arun District Council data. In view of this, no decisions regarding future nitrogen dioxide concentrations have been taken on the basis of nitrogen dioxide monitoring data.

8.2 Monitoring data within an AQMA

No AQMA was previously declared for nitrogen dioxide in the District.

8.3 Narrow congested streets with residential properties close to the kerb

Narrow congested streets with residential properties within 5m of the kerb were assessed against traffic flow criteria as defined in technical guidance document LAQM.TG (03). No roads less than 10m wide with a traffic flow greater than 10,000 vehicles per day were identified, therefore no further assessment was undertaken.

8.4 Junctions

No specific assessment of road junctions against the 2005 nitrogen dioxide objective was undertaken during the first round of Review and Assessment. Using local knowledge, all major road junctions within the District have now been identified. Technical guidance document LAQM.TG (03) requires that the DMRB screening model be used to predict future concentrations for any road junction with traffic flows of greater than 10,000 vpd where there is relevant exposure within 10m of the kerb. Although traffic data was not readily available for many of the roads associated with identified junctions, all junctions involved either a section of the A259 or A27. Traffic flows from the previous round of Review and Assessment showed all sections of the A259 and A27 to be greater than 10,000 vpd and subsequently all junctions identified were assessed for relevant public exposure within 10m of the kerb. A list of the junctions identified are shown in Appendix II, Table 1. Maps marking 10m (concentric ring) distance from the kerb at all junctions identified are shown in Appendix II.

One junction (A259 Hotham Way/ A29 Shripney Road/ A259 Chichester Road) was identified as having three receptors within 10m of the kerb, and further assessment of the junction was carried out using the DMRB screening model. The predictions of the DMRB assessment for 2005 and 2010 (Table 1.) suggest that there will be no exceedence of the predicted annual means at any of the receptor locations.

Table 1.

Receptor	NO2 prediction for 2005	NO2 prediction for 2010	Any predicted exceedence of annual mean objective?
6 Gordon Road West	22.6	18.5	NO
12 Gordon Avenue	22.6	18.3	NO
19 Chichester Road	23.6	19.2	NO

Maps of the junction indicating receptors and road links are shown in Appendix II and DMRB model inputs/outputs (showing all traffic data used) found in Appendix III.

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

No specific assessment of busy streets where people may spend 1-hour or more close to the traffic was undertaken during the first round of Review and Assessment. Therefore, all streets with over 10,000 vehicles per day where members of the public may be exposed within 5m of the kerb for 1-hour or more were identified (details listed in Appendix III, Table 2.). Three street locations with outside seating areas: The Regis Centre (Bognor Regis, The Oystercatcher PH (Climping) and Out & Out Restaurant (Arundel), were identified as being within 5m of the kerb (with vehicle flow of >10,000 vpd) and further assessment was carried out using the DMRB screening model. Maps marking 5m (concentric ring) distance from the kerb for the three locations identified are shown in Appendix II. The predictions of the DMRB assessment for 2005 and 2010 (Table 2.) suggest that there will be no exceedence of the predicted annual mean objective for nitrogen dioxide at any of the street locations.

Table 2.

Receptor	NO2 prediction for 2005	NO2 prediction for 2010	Any predicted exceedence of annual mean objective?
The Regis Centre	20.1	16.6	NO
Out & Out Restaurant	27.5	22.15	NO
The Oystercatcher PH	23.8	18.9	NO

DMRB model inputs/ outputs for each location (showing all traffic data used) can be found in Appendix III.

8.6 Roads with high flow of buses and/or HGVs

No specific assessment of roads with high flows of buses and/or HGVs was undertaken during the first round of Review and Assessment. In accordance with technical guidance document LAQM.TG (03), no roads were identified as having an unusually high proportion of heavy duty vehicles (>25%), therefore no further assessment was undertaken.

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

One new road, the Angmering Bypass (NGR: 507856, 103234 - 507999, 105011) has been constructed in the District since the first round of review and assessment. An initial environmental assessment was carried out in December 1999, which included assessment of future air quality. The assessment stated that nitrogen dioxide levels would increase slightly but were not expected to exceed the National Air Quality Strategy objectives for either pollutant.

Technical guidance document LAQM.TG (03) requires that the DMRB screening model be used to predict future concentrations for any newly constructed road with traffic flows of greater than 10,000 vpd where there is relevant exposure within 10m of the kerb. Traffic flow data is not currently available for the Angmering Bypass road. However, the road has been assessed for relevant public exposure within 10m of the kerb, and the nearest receptor found to be 50m from the kerb. Therefore no further assessment was indertaken. A map showing the location of the nearest receptor is shown in Appendix II.

Technical guidance document LAQM.TG (03) also requires that the DMRB screening model be used to predict future concentrations for any existing roads with increased traffic flow as a result of the new road, which were previously identified as having 2005 annual mean concentrations greater than 36µg/m^3 or more than 15 1-hour exceedences of 200µg/m^3. No existing roads linked to the new road were previously predicted as likely to exceed 36µg/m^3 annual mean in 2005. Therefore no further assessment was undertaken.

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

Technical guidance document LAQM.TG (03) requires the identification of *"any roads where annual mean concentrations in 2005 were predicted to be above 36µg/m^3 but below 40µg/m^3 at relevant locations, during the first round of Review and Assessment"*.

During the previous round of Review and Assessment two road sections were predicted (using the DMRB screening model) as potentially exceeding 36μg/m^3 in 2005:

- A27 Lyminster Rd/Station Rd/The Causeway (40μg/m^3); and
- A27 Fontwell – Chichester (37μg/m^3)

Technical guidance (LAQM.TG4 (00)) used during the first round of Review and Assessment, advised that "*where there is an indication of a significant risk of the air quality objective for nitrogen dioxide not being achieved by the end of 2005, a stage three assessment should be carried out"*.

As the DMRB prediction for A27 Lyminster Rd/Station Rd/The Causeway was equal to the air quality objective of 40μg/m^3, this was considered a significant risk and the decision was taken to proceed to a stage three assessment using the more advanced BREEZE ROADS Model (Version 3.0.4) and pre-2002 emission factors. The BREEZE ROADS model predicted much lower levels of nitrogen dioxide in 2005 than the DMRB model at the nearest receptor for the A27 Lyminster Rd/Station Rd/The Causeway section. In view of this it was considered (during the first round of Review and Assessment) that the annual mean nitrogen dioxide objective concentration would not be breached in 2005 at this location. It was assumed that as the DMRB model had significantly over predicted nitrogen dioxide concentrations for the A27 Lyminster Rd/ Station Rd/The Causeway section, the A27 Fontwell - Chichester section DMRB prediction of 37μg/m^3 would also be over predicted. Therefore no BREEZE ROADS model assessment was undertaken for the A27 Fontwell - Chichester section.

As a precaution, it was decided to run the latest version (1.01) of the DMRB screening model, using updated traffic data supplied by the Highways Agency for both sections of road. Traffic flows for 2005 were estimated by using traffic growth factors supplied by WSCC. The predictions of the DMRB assessment for 2005 (Table 3.) suggest that there will be no exceedence of the predicted annual means at any of the receptor locations for either section of road.

Table 3.

Receptor	Road section	Updated DMRB NO_2 prediction for 2005 (μg/m$^{3)}$	Any predicted exceedence of annual mean objective?
1-4 Causeway Villas	A27 Lyminster Rd/ Station Rd/ The Causeway	24.7	NO
The Lodge	A27 Fontwell - Chichester	22.9	NO

DMRB model inputs/ outputs for each location (showing all traffic data used) can be found in Appendix III.

It is thus concluded that there were no road sections with a predicted annual mean concentration in 2005 above 36μg/m^3 but below 40μg/m^3 at relevant locations, during the

first round of Review and Assessment, and therefore a detailed assessment for nitrogen dioxide was not undertaken at the above locations.

8.9 Roads with significantly changed traffic flows

No roads of more than 10,000 vehicles per day have been identified as experiencing a large (25%) increase in traffic flow. Therefore no further assessment was undertaken.

8.10 Bus stations

There are no bus stations located within the District.

8.11 New industrial sources

No new industrial sources have been identified in the District, since the last round of Review and Assessment.

8.12 Industrial sources with substantially increased emissions

No industrial sources were identified during the first round of Review and Assessment as likely to give rise to exceedences of the 2005 annual mean objective for nitrogen dioxide.

8.13 Aircraft

There is no airport located in Arun District and therefore aircraft emissions of NO_x are not relevant.

It is thus concluded that the nitrogen dioxide objective is unlikely to be exceeded at any location in the District.

9.0 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 (LAQM.TG03).

9.1 Monitoring data outside an AQMA

Automatic sulphur dioxide monitoring is undertaken at two permanent stations in Sussex located in: Hove (roadside) and Lullington Heath (rural). The obtained data do not indicate any exceedences of the national objectives for sulphur dioxide.

9.2 Monitoring data within an AQMA

No AQMA was previously declared for sulphur dioxide in the District.

9.3 New industrial sources

No new industrial sources have been identified within the District, since the last round of Review and Assessment.

9.4 Industrial sources with substantially increased emissions

One Part B/A2 industrial process, Tarmac Southern Ltd (Roadstone Coating Process), was identified during the first round of review and assessment as having potentially significant emissions of sulphur dioxide to air. However, advanced modelling of the process suggested that emissions from the process would not breach any of the 2004 objectives for sulphur dioxide. For the purposes of this USA substantially increased emissions are considered to be 30% or more. There has been no such increase in emissions for this source. Therefore no further assessment was undertaken.

9.5 Areas of domestic coal burning

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.

9.6 Small boilers >5 MW $_{\text{(thermal)}}$

Large boiler plant (>5 $MW_{thermal}$) can give rise to high short-term concentrations, with the risk that the 15-minute objective may be exceeded. Following investigation during the first round of Review and Assessment, no boiler plant >5 $MW_{thermal}$ that burn coal or fuel oil were identified.

9.7 Shipping

Littlehampton Port does not experience the movement of large ships such as cross-Channel ferries, Ro-Ro, container ships or cruise liners, and is therefore not expected to present a risk of exceeding the 15-minute objective for sulphur dioxide in 2004.

9.8 Railway locomotives

There are no railway locomotive emissions in the District.

It is thus concluded that the sulphur dioxide objective is unlikely to be exceeded at any location in the District.

10.0 Updating and Screening Assessment for Particulate Matter (PM_{10})

Particulate matter is of major health concern, as it has been linked with both increased morbidity and premature mortality. There is a wide range of emission sources that contribute to PM_{10} 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 resuspended 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 SO_2 and NO_x emissions, 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 (LAQM.TG (03)).

Relatively high PM_{10} 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).

10.1 Monitoring data outside an AQMA

Arun District Council does not carry out any monitoring for PM_{10}.

The nearest national network sites where automatic monitoring for PM_{10} is undertaken are: Portsmouth (urban background) and Southampton (urban centre). Between 1999-2001 (2001 data only for Portsmouth) the number of exceedences of the 24-hour PM_{10} objective was well below the allowed number (35) of exceedences.

10.2 Monitoring data within an AQMA

No AQMA was previously declared for PM_{10} in the District.

10.3 Busy roads and junctions in Scotland

Not applicable to Arun District Council.

10.4 Junctions

No specific assessment of road junctions against the 2004 objective was undertaken during the first round of Review and Assessment. Using local knowledge, all major road junctions within the District have now been identified. Technical guidance document LAQM.TG (03) requires that the DMRB screening model be used to predict future concentrations for any road junction with traffic flows of greater than 10,000 vpd where there is relevant exposure within 10m of the kerb. Although traffic data was not readily available for many of the roads associated with identified junctions, all junctions involved either a section of the A259 or A27. Traffic flows from the previous round of Review and Assessment showed all

sections of the A259 and A27 to be greater than 10,000 vpd and subsequently all junctions identified were assessed for relevant public exposure within 10m of the kerb. A list of the junctions identified are shown in Appendix II, Table 1. Maps marking 10m (concentric ring) distance from the kerb at all junctions identified are shown in Appendix II.

One junction (A259 Hotham Way/A29 Shripney Road/A259 Chichester Road) was identified as having three receptors within 10m of the kerb, and further assessment of the junction was carried out using the DMRB screening model. The predictions of the DMRB assessment for 2004 (Table 3.) suggest that there will not be more than 35, 24 hour exceedences of 50μg/m^3 at any of the receptor locations.

Table 3.

Receptor	Number of predicted PM_{10} exceedences of 50μg/m^3 for 2004	More than 35, 24 hour exceedences of 50μg/m^3 predicted for 2004?	Predicted annual mean PM_{10} in 2004	Any likely exceedence of the 40μg/m^3 annual mean in 2004?
6 Gordon Road West	7	NO	22.6	NO
12 Gordon Avenue	8	NO	23.1	NO
19 Chichester Road	7	NO	22.1	NO

Maps of the junction indicating receptors and road links are shown in Appendix II and DMRB model inputs/outputs found in Appendix III.

10.5 Roads with high flow of buses and/or HGVs

No specific assessment of roads with high flows of buses and/or HGVs was undertaken during the first round of Review and Assessment. In accordance with technical guidance document LAQM.TG (03), no roads were identified as having an unusually high proportion of heavy duty vehicles (>20%), therefore no further assessment was undertaken.

10.6 New roads constructed or proposed since last round of Review and Assessment

One new road, the Angmering Bypass (NGR: 507856, 103234 – 507999, 105011) has been constructed in the District since the first round of review and assessment. An initial environmental assessment was carried out in December 1999, which included assessment of future air quality. The assessment stated that PM_{10} levels would increase slightly but were not expected to exceed the National Air Quality Strategy objectives for either pollutant.

Technical guidance document LAQM.TG (03) requires that the DMRB screening model be used to predict future concentrations for any newly constructed road with traffic flows of greater than 10,000 vpd where there is relevant exposure within 10m of the kerb. Traffic flow data is not currently available for the Angmering Bypass road. However, the road has been assessed for relevant public exposure within 10m of the kerb, and the nearest receptor found to be 50m from the kerb. Therefore no further assessment was undertaken. A map showing the location of the nearest receptor is shown in Appendix II.

Technical guidance document LAQM.TG (03) also requires that the DMRB screening model be used to predict future concentrations for any existing roads with increased traffic flow as a result of the new road, which were previously identified as having more than 30,

24-hour exceedences of 50µg/m^3 in 2004. No assessment to predict exceedences of the 24-hour mean (50µg/m^3) was undertaken during the first round of Review and Assessment.

Therefore it is not possible (in accordance with technical guidance document LAQM.TG (03)) to identify roads where more than 30, 24-hour exceedences of 50µg/m^3 were predicted at relevant locations in 2004, during the first round of Review and Assessment. However, following advice from the Review and Assessment Helpdesk it can be assumed that as all previous annual mean predictions for PM_{10} in 2004 were below the annual mean objective of 40µg/m^3, it is unlikely there will be any exceedences of the 24-hour mean objective in 2004 for any existing road within the District. Therefore no further assessment was undertaken.

10.7 Roads close to the objective during the first round of Review and Assessment

During the first round of Review and Assessment no road sections were predicted (using the DMRB screening model) as potentially exceeding the annual mean objective for PM_{10} (40µg/m^3) in 2004.

The technical guidance (LAQM.TG4(00)) document used during the first round of Review and Assessment did not require the prediction of exceedences of the 24-hour mean for 2004. However, it stated (8.11 pg 108) that *"the proposed 24-hour objective is **highly unlikely** to be exceeded if the annual mean concentration is below 28µg/m^3 gravimetric"*. Therefore no third stage assessment to predict exceedences of the 24-hour mean (50µg/m^3) was undertaken by Arun District Council during the first round of Review and Assessment.

In view of this, it is not possible (in accordance with technical guidance document LAQM.TG (03)), to identify roads where more than 30, 24-hour exceedences of 50µg/m^3 were predicted at relevant locations in 2004, during the first round of Review and Assessment. However, following advice from the Review and Assessment Helpdesk it can be assumed that as all first round annual mean predictions for PM_{10} in 2004 were below 28µg/m^3, it is unlikely there will be any exceedences of the 24-hour mean objective in 2004 for any road within the District. Therefore no further assessment was undertaken.

10.8 Roads with significantly changed traffic flows

No roads of more than 10,000 vehicles per day have been identified as experiencing a large (25%) increase in traffic flow. Therefore no further assessment was undertaken.

10.9 New industrial sources

No new industrial sources have been identified through the planning or authorisation process as likely to give rise to exceedences of the 2004 objectives for PM_{10} within the District, since the last round of Review and Assessment.

10.10 Industrial sources with substantially increased emissions

One PartB/A2 industrial process, Tarmac Southern Ltd (Roadstone Coating Process), was identified during the first round of review and assessment as having potentially significant emissions of PM_{10} to air. However, during a stage 3 assessment, advanced modelling of the process suggested that emissions from the process would not breach any of the 2004 objectives for PM_{10}. For the purposes of this USA substantially increased emissions are considered to be 30% or more. There has been no such increase in emissions for this source. Therefore no further assessment was undertaken.

10.11 Areas of domestic solid fuel burning

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.

10.12 Quarries/landfill sites/opencast coal/handing of cargoes at ports etc.

A number of fugitive dust sources including quarries, landfill sites, opencast coal, 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} (LAQM.TG03). None of the above sources have been identified within the District.

10.13 Aircraft

There is no airport located in Arun District and therefore aircraft emissions of PM_{10} are not relevant.

It is thus concluded that the PM_{10} objective is unlikely to be exceeded at any location in the District.

11.0 Conclusions

The atmospheric emission sources in the Arun District 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 national 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 needed.

Sulphur dioxide: No further assessment needed.

Particulate matter: No further assessment needed.

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