



Air Quality

Updating and Screening Assessment 2003

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Abstract Summary

This is the updating and screening assessment of Air Quality in the New Forest.

This is a desk top exercise designed to enable local authorities to identify, using data gathered and predictive models the likelihood of exceedances of the standards and objectives set for seven pollutants Carbon monoxide, Benzene, 1,3 butadiene, Lead, Nitrogen Dioxide, Sulphur Dioxide and PM10.

The second stage of the review and assessment will be required if exceedances are predicted and this will involve a more detailed assessment using specified monitoring techniques and Dispersion Models.

It will be necessary for New Forest District Council to proceed with to the second stage with regard to the following pollutants;

Benzene	2010 annual mean objective (Hardley, Hythe)
Nitrogen dioxide	2005 annual mean objective (Lyndhurst and Totton)
Sulphur dioxide	2005 15 min mean objective (Fawley village, Hythe and Marchwood)

The second stage detailed assessment must be completed by the end of April 2004

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Second Round Review and Assessment of Air Quality in the New Forest

1.0 Introduction to the Air Quality Review and Assessment Process

Updating and Screening Assessment

New Forest DC is continuing to fulfill its legal obligations under the Environment Act 1995 Part IV in conducting the second review and assessment of air quality in the District, this follows on from the previous review and assessment (R & A) published in 2002

The Environment Act 1995 Part IV imposed a duty on the Secretary of State to prepare and publish a National Air Quality Strategy, containing policies with respect to the assessment or management of the quality of air.

Section 80 of the Act places a statutory responsibility on local authorities to review and assess air quality.

The Air Quality (England) Regulations 2000

The Air Quality (England) Regulations 2000 prescribes air quality objectives for seven pollutants detailed below.

The objective for each of the pollutants are listed in **TABLE ONE**.

The Phased approach to review and assessment

A 2 step approach to R & A has been established to ensure that Local Authorities (LA's) only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded – it is not envisaged that every LA will need to proceed beyond the first step.

Step 1 – Updating and Screening Assessment (USA)

To identify those matters that may have changed since the last review and assessment, which might lead to a risk of an air quality objective being exceeded

Technical guidance has been published that provides checklists for LA s to use to identify significant changes that may require further investigation. Where such changes are identified then by using simple screening tools, a LA can decide whether or not there is sufficient risk of an exceedances of an objective to justify a Detailed Assessment.

Step 2 – Detailed Assessment

To provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation or amendment of any necessary Air Quality Management Areas (AQMA's).

Technical guidance ensures that LA s use quality – assured monitoring and validated modeling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective.

1.1 UK National AQ Standards and Objectives

Carbon Monoxide (CO) is a gas produced by the incomplete combustion of organic substances.

The common sources are motor vehicles and combustion related industries.

Benzene is not a chemical that is naturally produced. It commonly reaches the atmosphere through the combustion of petroleum fuels, the processing and transportation of these fuels.

1,3 Butadiene is used in industry mainly in the manufacture of synthetic rubber and in the petroleum industry.

Lead (Pb) the main source of airborne lead is from the combustion of petrol in motor vehicles, however the increase in the use of unleaded petrol and the phasing out of leaded petrol has ensured that motor vehicles emission of lead will meet the

objective in 2005. The other main sources are from Industry and waste disposal. This is a pollutant that can be controlled.

Nitrogen Dioxide (NO_2) is a gas produced by the reaction of Nitrogen and Oxygen in a two-stage reaction that initially results in the formation of Nitric Oxide, which is then oxidised to Nitrogen Dioxide in the atmosphere.

The main source of oxides of nitrogen is from motor vehicles, other sources include non nuclear power stations and industrial activity.

PM10 (Particles of less than $10\mu m$ in diameter) particles arise from both natural and man-made sources. Man-made sources result from combustion processes, quarrying, other industrial processes and from road surfaces.

Sulphur Dioxide (SO_2) is a gas produced from the combustion of fossil fuels, including power stations and other combustion industries.

The air quality *standards* in the Strategy are set purely with regard to scientific and medical evidence of the effects of the particular pollutant on health. (DETR 97)

The air quality *objectives* in the Strategy, represent the Government's present judgement of achievable air quality by the end of the stated years on the evidence of costs and benefits and technical feasibility. (DETR 2000)

TABLE ONE

<u>Substance</u>	<u>Air Quality Objective levels</u>
Benzene	16.25 µg/m ³ or less, when expressed as a running annual mean to be achieved by December 31 st 2003
	5.0 µg/m ³ or less, when expressed as a running annual mean to be achieved by December 31 st 2010
1,3 Butadiene	2.25 µg/m ³ or less, when expressed as a running annual mean to be achieved by December 31 st 2003
Carbon monoxide	10.0 mgm ³ or less, when expressed as a running 8 hour mean to be achieved by December 31 st 2003
Lead	0.5 µg/m ³ annual mean to be achieved by December 31 st 2004
	0.25 µg/m ³ annual mean to be achieved by December 31 st 2008
Nitrogen dioxide	200 µg/m ³ when expressed as an hourly mean not to be exceeded more than 18 times a year to be achieved by 31st December 2005.
	40 µg/m ³ or less when expressed as an annual mean to be achieved by 31st December 2005
PM ₁₀	50 µg/m ³ or less when expressed as a 24hr mean not to be exceeded more than 35 times a year to be achieved by 31st December 2004.
	40 µg/m ³ or less when expressed as an annual mean to be achieved by the 31 st December 2004.
Sulphur dioxide	125 µg/m ³ or less, when expressed as a 24 hour mean, not to be exceeded more than 3 times per year, to be achieved by 31 st December 2004
	350 µg/m ³ or less when expressed as an hourly mean, not to be exceeded more than 24 times a year, to be achieved by 31 st December 2004.
	266 µg/m ³ or less when expressed as a 15 minute mean not to be exceeded more than 35 times a year, to be achieved by 31 st December 2005

1.2 Design Manual for Roads and Bridges (DMRB).

The Screening Model that can be used for assessing the impact of traffic on air quality is detailed in the publication Design Manual for Roads and Bridges (DMRB).

This is a useful tool in assessing the likelihood of exceedances of the air quality standards for future years but it can only be used in predicting levels of five of the seven specified pollutants (and only where road traffic is considered a major source of these pollutants).

The following information is required for input into the DMRB Model; Volume of traffic expressed as annual average daily traffic flow (AADT), speed of traffic, vehicle mix (%age light goods vehicles and heavy goods vehicles) and distance from the receptor from both the kerb of the highway and the centre of the highway.

Traffic data inputted into this model was provided by Hampshire County Council and in the case of major trunk roads by the Highways Agency.

1.3 New Forest DC AQ Monitoring data

Following the first Review and Assessment the council purchased continuous air quality monitoring equipment for PM10, NO2 and SO2.

The diffusion tube survey was extended to investigate areas that had not been considered previously and/or where local factors indicated that further investigation may be required.

The data from diffusion tubes and air quality stations has been collated and ratified for use in this assessment.

2.0 Carbon monoxide

National Perspective

The main source of carbon monoxide in the UK is road transport, which accounted for 67% of total emissions in 2000.

Annual emissions of carbon monoxide have been falling steadily since the 1970s and are expected to continue to do so. Current projections indicate that road transport emissions will decline by a further 42% between 2000 & 2005.

There were no Air Quality Management Areas (AQMA's) declared after the first round of reviews and assessments in respect of the previous 2003 air quality objective of 11.6 mg/m³.

The new objective has been set at a slightly tighter level of 10 mg/m³ as a maximum daily 8 hour running mean concentration to be achieved by the end of 2003 (this brings it in line with the second Air Quality Daughter Directive Limit Value)

Local Perspective

It is considered unlikely that any authority will need to proceed beyond the USA for carbon monoxide.

The First round of review and assessment concluded that there was little risk of the air quality objective being exceeded at any location within the New Forest.

Background concentrations

Data collected from national networks or local monitoring is expected to give a more accurate indication of carbon monoxide than modelling studies. Local Authorities are recommended to prioritise the use of measured carbon monoxide concentrations wherever suitable data are available. For the review and assessment of carbon monoxide, only monitoring data collected at roadside sites need be considered.

2.1 Updating and Screening Checklist

Monitoring data

New Forest DC has not undertaken any monitoring for carbon monoxide either prior to the first round of review and assessment nor since it.

The nearest continuous monitoring is undertaken at Southampton Centre (urban centre location)

Table 2.1 LAQM.TG(03)		Maximum daily running 8hr mean concentration		
Site	Site classification	1999	2000	2001
Southampton Centre	Urban centre	3.4 mg/m ³	5.3 mg/m ³	4.6 mg/m ³

In view of the relatively low figures previously recorded in the centre of Southampton, and the advice that it is unlikely that any LA will need to proceed beyond the initial screening assessment. It is not anticipated that levels within the New Forest are likely to exceed the tighter objective of 10mg/m³ as a maximum running 8 hr mean concentration for carbon monoxide

2.2 Road Traffic Sources

Authorities need only undertake a screening assessment for road traffic sources where flows exceed the stated threshold criteria. (BOX 2 LAQM.TG(03))

Within the District of New Forest there are NO

- Single carriageway roads where AADT flows exceed 80 000 vehicles.
- Dual carriageways with AADT of 120,00 vehicles per day
- Motorways with AADT exceeds 140 000 vehicles.

Consequently there is no need for New Forest DC to proceed to a detailed review and assessment with regard to carbon monoxide.

3.0 Benzene

National Perspective

The main sources of benzene emissions in the UK are petrol-engine vehicles, petrol refining and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems.

Since January 2000 EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%.

Vapour recovery systems will also reduce emissions from petrol storage and distribution centres.

The Government has adopted a running annual mean concentration of $16.25 \mu\text{g}/\text{m}^3$ as the objective for the standard to be reached by the end of 2003.

A tighter objective for benzene has been set this additional objective is for an annual mean of $5 \mu\text{g}/\text{m}^3$ to be achieved by the end of 2010 in England and Wales.

Local Perspective

Data collected during the first round of review and assessments have indicated that there are current exceedances of the 2010 objective at locations in close proximity to industrial sites (petrochemical processes) and in close proximity to busy roads.

Studies carried out in the vicinity of a major refinery have also measured exceedances of the current objective, although these have not been in areas of relevant public exposure.

Clearly with the large refinery and associated chemical industries at Fawley within the New Forest district there is a particular concern and careful consideration will be given to the updating and screening assessment checklist for benzene and industrial sources within the district.

Monitoring data

New Forest District Council has not conducted any monitoring of benzene in recent years.

A study around the vicinity of the refinery was carried out in 1996 using diffusion tubes.

Although the sites were not specifically placed at what could now be called relevant locations they were placed at distances from the boundary that are the same distance as residential premises.

Over the study period the highest average benzene concentration at one site (Hardley School (250m from refinery boundary) was 1.85 ppb.

Maximum running annual mean at Southampton centre for 1999 was $5.10 \mu\text{g}/\text{m}^3$ and for 2000 was $4.25 \mu\text{g}/\text{m}^3$. Benzene is no longer monitored at Southampton due to a restructuring of the UK Network

3.2 Road Traffic Sources

Authorities need only undertake a screening assessment for road traffic sources where flows exceed the stated threshold criteria. (BOX 3.2 LAQM.TG(03))

Within the District of New Forest there are NO

- Single carriageway roads where AADT flows exceed 80 000 vehicles.
- Dual carriageways with AADT of 120,00 vehicles per day
- Motorways with AADT exceeds 140 000 vehicles.

No need to proceed to detailed assessment with regard to road traffic.

3.3 Industrial Sources

Some petrochemical works may emit sufficient benzene to put the 2010 objective at risk of being exceeded.

Using the checklist supplied in LAQM.TG(03) there are several industrial sources that are likely to emit significant levels of benzene, within the New Forest that needed to be considered further;

Exxon Mobil Chemicals, Petroleum processes and Esso Petroleum, Tar and Bitumen process.

In identifying these processes it was necessary to obtain information on the annual benzene emissions and the height of these emissions, and using nomograms detailed in the guidance determine whether or not there was a likelihood of the objective being exceeded and if so to proceed to the detailed assessment for benzene.

Exxon Mobil Chemicals – Part A authorisation references;

AL 0524 (Higher Olefins distillation)

AJ3000 (Steam Cracking)

AL0559 (Manufacture of Methyl Ethyl Ketone)

AL0567 (Manufacture of Halogenated Butyl Polymers)

Esso Petroleum - Part A authorisation references ;

AF8009/AZ3291

The total annual emissions of each of these are detailed in the table below along with the height of emission and where applicable calculation of effective stack height and the result of applying these factors to the relevant nomogram.

Polimeri Europa UK Ltd butadiene polymers - Part A authorisation reference ;

AK 5539

Sources in New Forest District	total annual emission benzene	Stack height of emission	nomograms + Para 3.31 - further assessment ?
Exxon Mobil Chemicals Ltd			
AL0524	3.02 tonnes (estimated)		n/a
AJ3000	8.35 tonnes (estimated)	62m effective = actual in this instance	emission rate from nomograms well below actual for both 2003 & 2010 objective - no detailed assessment required
AL0559	below reporting threshold		
AL0567	NA		
Esso Petroleum			
AF8009/ AZ 3291	81 tonnes (measure/calc)	88m effective = actual in this instance (diam 2.0m)	emission rate from nomograms well below actual for 2003 objective and below 2010 objective - no detailed assessment required
Polimeri Europa UK Ltd			
AK 5547	300kg calculated 12 kg measured	Storage tank vent 60m hot well stack	

There is no evidence to suggest that either the 2003 benzene objective, nor the tighter 2010 objective is likely to be exceeded with regard to the petrochemical industries on the waterside.

No need to proceed to detailed assessment with regard to industrial sources.

3.4 Other sources

Petrol stations

There is some evidence that petrol stations emit sufficient benzene to put the 2010 objective at risk of being exceeded particularly if combined with higher levels from nearby roads.

It was necessary to identify petrol stations within the New Forest that had an annual throughput of more than 2 million litres and were near to a busy road (one with more than 30 000 vehicles per day)

Three petrol filling stations were identified, the two Shell service stations on the A31 at Picket Post and the Q8 service station also on the A31 at Stoney Cross.

However, these are only likely to provide a risk of exceeding the objective if there is relevant exposure (i.e. residential accommodation) within 10m of the pumps.

None of these service stations are close to residential premises.

No need to proceed to detailed assessment with regard to Petrol Stations.

Major Fuel storage depots (petrol only)

Hythe Terminal is a major fuel storage depot within the New Forest that stores and unloads petrol into road tankers, this is a Part B Process that is authorised by New Forest District Council.

The table below details the distance to the nearest relevant receptor, annual emission of benzene per annum, (this data was obtained from the Emissions Helpdesk) and the result of applying these factors to the relevant nomogram.

Storage unloading etc petrol at terminals	total annual emission benzene tonnes/annum (estimated 2001)	distance to nearest exposure	nomograms Fig 3.3/3.4 - further assessment ?
Esso Petroleum Hythe terminal	0.41566 tonnes data obtained from AEA Technology	250m properties at Hardley	no further assessment required using nomograms and estimate emission value, only likely to be an exceedance of 2003 objective if properties within 78m of emissions. 2010 objective at risk of exceedances

The 2003 threshold is not exceeded in the nomograms as there no residential properties within 78m of the terminal, they determined that with the emissions estimated there was unlikely to be an exceedances of the 2003 objective at 250m, however there was a risk of the exceeding the threshold of the nomogram for the 2010 benzene objective.

Detailed assessment of Hythe Terminal required with regard to the 2010 benzene objective.

4.0 1,3 Butadiene

National Perspective

The main source of 1,3 butadiene in the UK is emissions from motor vehicle exhausts. 1,3 butadiene is also an important industrial chemical and is handled in bulk at a small number of industrial premises.

The increasing numbers of vehicles equipped with three way catalyst will significantly reduce emissions of 1,3 butadiene in future years. Further reductions in vehicle emissions and improvements in fuel quality are expected to further reduce 1,3 butadiene emissions.

These measures are expected to ensure that the 1,3, butadiene air quality objective for 2003 is achieved.

The objective for 1,3 butadiene is a maximum running annual mean concentration of $2.25 \mu\text{g}/\text{m}^3$ to be achieved by the end of 2003.

Local Perspective

Only Local Authorities with relevant locations in the vicinity of major industrial processes which handle, store or emit 1,3 butadiene are expected to proceed beyond the updating and screening assessment.

As previously highlighted in the Benzene screening and assessment, New Forest is home to a large refinery and associated chemical industries and again careful consideration will be given to the screening checklist with regard to the 1,3 butadiene objective.

4.1 Updating and Screening checklist

Monitoring data

New Forest District Council has never undertaken any monitoring of 1,3 butadiene.

It was not considered any further after the first round of review and assessment as no risk of exceeding the objective was identified.

Background concentrations taken from the UK estimated annual mean concentration air quality archive at relevant locations are detailed in the table below. (2 locations are residential areas adjacent to the 2 busiest roads in the district, the other are nearest residential properties to both refinery and petrochemical process likely to emit 1,3 butadiene)

	2003 estimated annual mean background concs from UK air quality Archive. (ugm3)
Ringwood School	0.149
Bartram Road Totton	0.169
Harrier Way. Hardley	0.132

These estimated values are well below the 2.25 $\mu\text{g}/\text{m}^3$ annual mean objective for 2003, however data collected from the national monitoring networks or from local monitoring campaigns are expected to give a more accurate indication of 1,3 butadiene concentrations than modelling studies.

The maximum running annual mean concentrations of 1,3 butadiene at Southampton Centre for 1999 was 0.60 $\mu\text{g}/\text{m}^3$ and for 2000 was 0.55 $\mu\text{g}/\text{m}^3$.

Again it can be seen from these monitored levels although in the centre of Southampton that they are well below the objective.

4.2 Industrial Sources

Although no new industrial sources with the potential to emit significant quantities of 1,3 butadiene have started operating within the New Forest, it was thought prudent to revisit those processes operating during the first review and assessment that are continuing to operate within the New Forest.

Using checklist in guidance LAQM. TG(03) there are two industrial processes that are considered likely to emit significant levels of 1,3 butadiene within the New Forest that needed to be considered further.

Exxon Mobil, Petrochemical process - Part A authorisation references

AL 0524 (Higher Olefins distillation)

AJ3000 (Steam Cracking)

AL0559 (Manufacture of Methyl Ethyl Ketone)

AL0567 (Manufacture of Halogenated Butyl Polymers)

Polimeri Europa UK Ltd butadiene polymers - Part A authorisation reference ;

AK 5547

The total annual emissions of each of these are detailed in the table below along with the height of emission and where applicable calculation of effective stack height and the result of applying these factors to the relevant nomogram.

Sources in New Forest District	total annual emission 1,3 butadiene	height of emission	nearest receptor	nomograms + Para 3.31 - further assessment ?
Exxon Mobil Chemicals Ltd				
AL0524	below reporting threshold (brt)			n/a
AJ3000	5.09 t (estimated)	62m	not applicable stack height >10m	emission rate from nomograms well below actual - no detailed assessment required
AL0559	brt			
AL0567	brt			
Polimeri Europa UK butadiene polymers				
AK 5547	420 kg (measured)	20m –30m stacks	1km	receptor considerably further away from emission than nomogram predicts that there may be possible exceedance of objective

With regard to the Exxon Chemicals emission data the only significant process source is from AJ300 (Steam Cracking) emitting an estimated 5.09 tonnes per annum of 1,3 butadiene from a stack height of 62m, however in applying this data to the relevant nomogram Fig 4.1 LAQM.TG.(03) the actual emission is well below that which is likely to give rise to a running annual mean ground level concentration of $0.225 \mu\text{g}/\text{m}^3$ (10 % of the 2003 Air Quality Objective)

Polimeri Europa UK Ltd emit 1,3 butadiene from 3 sources within the process the 60m Hot well vent stack, the ethyl benzene storage tank and most significantly from the Styrene shift product vent.

The majority of the emissions are from low level by applying the total annual emissions data to nomogram Fig 4.2 LAQM.TG.(03) there is no likelihood of the running annual mean ground level concentration of $0.225 \mu\text{g}/\text{m}^3$ (10 % of the 2003 Air Quality Objective) being exceeded at the nearest receptor within the new Forest District which is approximately 1000m away.

In so far as considering the impact from emissions from stacks within neighboring authorities there are no sources that are likely to impact on relevant receptors within the New Forest District.

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to 1,3 butadiene.

5.0 Lead

National Perspective

The ban on sales of leaded petrol in the United Kingdom from 1st January 2001 has considerably reduced lead levels in the air.

Emissions of lead are now restricted to a variety of industrial activities such as battery manufacture, pigments in paints, alloys, radiation shielding, tank lining and piping.

The objective for lead is an annual mean concentration of 0.5 µg/m³ to be achieved by the end of 2004.

In addition a lower air quality objective of 0.25 µg/m³ to be achieved by the end of 2008 has also been set.

Local perspective

There have been no Air Quality Management Areas declared in respect to the 2004 or 2008 Air Quality Objectives, as a result of the first round of review and assessment.

Only those authorities with relevant locations in the vicinity of major industrial processes that emit significant quantities of lead, will need to progress beyond the Updating and Screening Assessment.

5.1 Updating and Screening checklist

Monitoring data

New Forest District Council has monitored lead using high volume samplers at two locations for the past 8 years, one at the façade of a school next to a very busy road and the other in a residential area adjacent to the oil refinery and associated petrochemical industries.

The filters are exposed for one week of each month throughout the year, resulting in 12 weekly averages for each site, these are then averaged to provide an annual average value for each location.

The table below details the annual mean of the monthly monitoring periods at each of the two sites ;

Annual Mean Lead $\mu\text{g}/\text{m}^3$	2000	2001	2002
Lyndhurst School	0.01	0.01	0.01
Fawley	0.01	0.01	0.1

These monitored values are well below both the 2004 objective of $0.5 \mu\text{g}/\text{m}^3$ and the tighter 2008 objective of $0.25 \mu\text{g}/\text{m}^3$.

5.2 Industrial Sources

There are no Industrial processes regulated under Part A or Part B of the Environmental Protection Act 1990 within the New Forest that are likely to emit significant amounts of lead into the atmosphere

There have been no industrial sources introduced to the New Forest since the last round of review and assessment

Similarly no existing industrial sources have substantially increased their emissions of Lead.

In so far as considering the impact from emissions from stacks within neighboring authorities there are no sources that are likely to impact on relevant receptors within the New Forest District.

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to lead.

6.0 Nitrogen Dioxide

National Perspective

Nitrogen dioxide (NO₂) and nitric oxide 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 oxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects on human health.

The principal source of nitrogen oxides emissions is road transport, which accounted for about 49% of total UK emissions in 2000. Major roads carrying large volumes of high speed traffic area 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 and further reductions are expected up until 2010 and beyond.

Other significant sources of nitrogen oxides emissions include the electricity supply industry and other industrial and commercial sectors. Emissions from these sources had declined dramatically due to the fitting of low nitrogen oxides burners and the increased use of natural gas plant.

In recent years exceedances of the short term objective (1 hour mean concentration) have generally only been recorded at roadside or kerb side sites in close proximity to heavily-trafficked roads in major conurbations.

There are two UK air quality objectives for nitrogen dioxide; an annual mean concentration of 40 µg/m³ and a 1 hour mean concentration of 200 µg/m³ not to be exceeded more than 18 times per year. Both are to be achieved by the end of 2005.

The EC first Air Quality Daughter Directive also sets limit values for nitrogen dioxide, which have been transposed into UK legislation. The Directive includes a 1 hour limit value of 200 µg/m³, not to be exceeded more than 18 times per year, and an annual mean limit value of 40 µg/m³, both to be achieved by 1 January 2010.

Local Perspective

Across the UK the majority of the exceedances of the objective (95% related to traffic emissions) were identified in the first round of review and assessment within major conurbations, within smaller town centres with congested traffic and alongside dual carriageways and motorways in more rural areas.

In the first round of review and assessment within the New Forest the highest predicted levels (modelled) were along the major trunk roads – A31, M27 and A35. These roads had the highest daily traffic flows and were assessed at locations close to the roadside where there may have been relevant exposure, however no exceedances were predicted.

Roads with smaller traffic flows although congested were not assessed in the first round.

Recent studies undertaken on behalf of DEFRA concluded that even roads with relatively low traffic flows (10 000 –20 000 vehicles per day) may give rise to exceedances of the annual mean objective if they are within congested town centres and there are residential properties close to the kerb side.

With this in mind New Forest District Council extended its diffusion tube monitoring to include Lyndhurst town centre and Junction Road in Totton, both areas have locations that could be deemed relevant to exposure – residential properties within 10m of the kerb, the roads are both congested and narrow.

Lyndhurst High Street is a single lane one way through route and Junction Road is subject to standing traffic due to frequent closure of the level crossing gates.

6.1 Updating and Screening checklist

Monitoring data

New Forest District Council has used diffusion tubes to monitor Nitrogen Dioxide across the district for several years.

The number of locations where diffusion tubes were placed was extended during the first review and assessment and was further extended during the investigations into the planning application for the Dibden Bay container port.

Although some of the original locations are no longer used, New Forest District Council has continued to collect data from over thirty tubes at locations across the district where it is thought levels of nitrogen dioxide may be close to exceeding the UK objective.

In addition to the tube data, following the first round of review and assessment two continuous monitors were purchased and installed, one in Ringwood in a school close to the A31 and the other in Holbury in a residential area close to the Refinery.

Diffusion tube data

New Forest District Council uses (50% TEA (triethanolamine)/Water) diffusion tubes prepared by Gradko International Ltd.

Results from both 2001 and 2002 have been used in the screening assessment, since the 1st January 2002 triplicate sites have been put up alongside the two continuous monitoring stations using chemiluminescent analysers, and this has enabled New Forest DC to determine the local bias correction for the Gradko tubes.

In 2001 Gradko tubes were estimated to under read by 18 % this factor was applied to the results obtained from the diffusion tubes.

In 2002 the bias correction factor determined through the two triplicate sites alongside chemiluminescent analysers detailed an under read of 19%

Three tube locations within the District after applying the bias correction factor showed exceedances of the 2005 Annual mean objective of $40 \mu\text{g}/\text{m}^3$, these sites are detailed in the table below. Other sites in the vicinity of these three locations particularly in Totton showed levels close to the objective.

Diffusion tube sites (all results $\mu\text{g}/\text{m}^3$)	Lyndhurst Bakery	Junction Rd 1 Totton	Junction Rd 2 Totton	Junction Rd 2 Totton
Annual Mean data (2001)	36.74	30.79	37.10	n/a - double site from 2002
Annual Mean data (2002)	46.02	36.08	40.96	51.29
Bias corrected figures (2001) BIAS CORRECTION - UNDER READ BY 18% from GRADKO figures	43.35	36.33	43.78	n/a
Bias corrected figures (2002) bias adj factor =1.24 - UNDER READ BY 19% average from NFDC figures - chemiluminescent	57.06	44.73	50.78	63.60

Roadside Adjusted figure (2001) to 2005 - (x 0.892/1.0)	38.67	32.41	39.05	n/a
Roadside Adjusted figure (2002) to 2005 - (x0.892/0.969)	52.53	41.18	46.75	58.55

Annual means > 40 Ugm3 ?	Detailed assessment required	Detailed assessment required	Detailed assessment required	Detailed assessment required

All three sites can be classed as roadside (determined as within 1-5 metres of the kerbside) consequently a correction factor in order to estimate NO₂ concentrations in future years can be applied.

Applying the correction factor still predicts exceedances of the $40 \mu\text{g}/\text{m}^3$ 2005 annual mean objective at all four of the sites.

It is not possible using diffusion tube data to predict the 1 hour means for nitrogen dioxide.

It will be necessary to proceed to a detailed review and assessment with regard to Nitrogen dioxide at these locations.

Continuous monitoring data

The two continuous monitoring sites at Holbury Manor Infants School and Ringwood School have been in situ for three years and have gathered two full calendar years of data; 2001 & 2002 with regards to nitrogen dioxide.

The summarised results are detailed in the table below.

2001	Holbury	Ringwood
Annual mean (2005 Objective is 21ppb (40 µg/m ³))	10 ppb (19.1 µg/m ³)	14.2 ppb 27.1 µg/m ³)
Number of 1hr exceedances	None	none
Data capture	86.7 %	87.3 %
99.8 th %ile hourly means (as data capture less than 90 %)	37 ppb (70.7 µg/m ³)	46 ppb (87.8 µg/m ³)

2002	Holbury	Ringwood
Annual mean (2005 Objective is 21ppb (40 µg/m ³))	9 ppb (17.2 µg/m ³)	12.1 ppb (23.1 µg/m ³)
Number of 1hr exceedances	none	none

Data capture	97.5 %	92.5 %
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It can be seen from the table that there have been no exceedances of the annual mean objective for nitrogen dioxide in 2001 or 2002 at either of the two sites, similarly the 2004 hourly mean objective has not been exceeded.

Data capture in 2001 at both sites was below 90% in accordance with the guidance in LAQM.TG (03) it was necessary to calculate the 99.8 %ile of the hourly means.

At both sites it can be seen that the 99.8%ile was well below the UK Objective value of 105ppb for nitrogen dioxide.

It will not be necessary to proceed with a detailed assessment for Nitrogen Dioxide at either Ringwood or Holbury.

QA/QC of sites

Both monitoring stations calibrate automatically overnight using a zero gas source and a certified span gas source.

The calibration factor is then automatically applied by the software to the raw data every 24 hours

In addition to this the sites are manually calibrated fortnightly using the same span gases.

The monitors are serviced on a six monthly contract.

6.2 Road traffic sources

Narrow congested streets with residential properties close to the kerb.

Concentrations of nitrogen dioxide are often higher where traffic is slow moving with stop start driving and where buildings either side reduce dispersion, such locations in the New Forest were not fully considered in the first round of review and assessment. With this in mind three locations were considered that met this criteria;

Lyndhurst High Street - slow moving traffic due to traffic lights and one way system and two/three storey residential properties adjacent to the kerb.

Junction Road, Totton – Railway level crossing on main route through town, gates frequently closed (3 or more times per hour), often for periods of 10 mins, cars left with engines running, residential properties adjacent to queuing traffic.

Brockenhurst – slow moving traffic on busy through route, queuing frequently due to railway level crossing, properties close to kerbside and pub gardens where customers sit in close proximity to road.

Narrow congested streets with residential properties close to kerb	residential properties within 5m kerb ?	traffic flows	DMRB – NO2 predicted levels 2005 Annual mean
Lyndhurst High Street	Yes - 2m	13 000	44.25 $\mu\text{g}/\text{m}^3$
Junction Road, Totton	Yes - 4m		not necessary – tube results indicate exceedance of annual mean
Brockenhurst	No - 7m	15 356	22.99 $\mu\text{g}/\text{m}^3$

By inputting road traffic data obtained from Hampshire County Council ; Annual Average Daily Traffic flow (AADT), speed, the percentage of heavy goods vehicles and distance from kerb to the receptor, into the DMRB and using estimated annual mean background concentrations obtained from the UK air quality archive, levels of nitrogen dioxide at the receptor can be estimated.

Predicted levels at Lyndhurst and those projected from diffusion tube results at Totton indicate that there are likely exceedances of the 2005 annual mean objective at these two sites.

It will be necessary to proceed to a detailed review and assessment with regard to Nitrogen dioxide at these locations.

6.3 Junctions

Busy junctions can be taken as ones with more than 10 000 vehicles per day, these were not considered adequately in the first round of the review and assessment.

The following table details junctions within the New Forest where traffic flows are greater than 10 000 vehicles per day.

Unless there is relevant exposure within 10m of the kerb, these junctions can be disregarded.

Junctions 10,000 veh/day	exposure within 10m of kerb	traffic flows	DMRB	DMRB – NO2 predicted levels 2005 – annual mean
A31/A338 Ringwood	46m	52157+15000	Not necessary	
A326/A35 Hounslow	31m	28597+32942	Not necessary	
A336/A326 Netley Marsh	26m	22158+8370	Not necessary	
A35/A337 Lyndhurst	2m	6500 + 6500	required	44.25 µg/m ³
M27/A336 Cadnam	75m	72256+8370	Not necessary	
B3055/B3058 New Milton	3m	Est 10 000	required	21.08 µg/m ³
A337/B3054 Lymington	5m	13 073 + 9251	required	25.03 µg/m ³

With the exception of Lyndhurst High Street Junction, which was identified earlier as needing a detailed assessment, the other junctions within the New Forest did not result in predicted levels using the DMRB that were above the UK annual mean objective for 2005.

It will be necessary to proceed to a detailed review and assessment with regard to Nitrogen dioxide at Lyndhurst High Street.

6.4 Busy street where people may spend more than 1 hour close to traffic (more than 10 000 vehicles per day)

There are some street locations where the public may spend more than 1 hour for example cafes and bars, consequently they may be exposed to levels of nitrogen dioxide above the 2005 UK 1 hour objective.

In the New Forest several locations were identified where there are pub gardens or other places people will sit and eat or drink close to a busy road, these are identified in the table below.

Locations within 5m of the kerb need only be assessed and the road must have an AADT of greater than 10 000 vehicles.

Busy street where people may spend 1 hour or more close to traffic (more than 10 000 veh/day)	exposure within 5m of kerb	traffic flows AADT >10 000 veh	DMRB	DMRB – NO2 predicted levels 2005 -Annual mean
Lyndhurst High St	yes 2m	13 000	Yes	44.25 $\mu\text{g}/\text{m}^3$
Lymington High St	yes 3m	Est 10 000	yes	19.48 $\mu\text{g}/\text{m}^3$
Brockenhurst	no 7m	15 356	n/a	
Beaulieu	Yes	Below	n/a	
Burley	Yes	Below	n/a	

With the exception of Lyndhurst High Street, which was identified earlier as needing a detailed assessment, the other locations within the New Forest where people may be exposed for an hour or more, did not result in predicted levels using the DMRB that were above the UK annual mean objective for 2005.

If the annual mean does not exceed $40 \mu\text{g}/\text{m}^3$ then it is not expected that there will be more than 18 exceedances of the 1 hour objective for nitrogen dioxide

It will be necessary to proceed to a detailed review and assessment with regard to Nitrogen dioxide at Lyndhurst High Street.

6.5 Roads with high flow of buses and/or HGVs

There are no roads with an excess of 25 % of the flow being heavy duty vehicles within the New Forest.

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

There have been no new roads constructed and roads with proposals for alteration or extensions have not yet been granted planning permission (e.g. works to A326 for Dibden Bay Port)

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

Three roads were assessed during the first round, these roads although they were not close to the objective, it was thought prudent to reassess them using the new DMRB and more recent traffic data obtained from Hampshire County Council.

Roads close to objective in first R & A	Traffic flows	DMRB	relevant location	DMRB – NO2 predicted levels 2005 -Annual mean
A31 Ringwood	52 157	Yes	14m	30.95 µg/m ³
A35 (Bartram Road, Totton)	32 942	Yes	6m	34.00 µg/m ³
A326 Marchwood Junior School	28 597	Yes	25m	26.27 µg/m ³

The DMRB confirmed that there are no exceedances of the 2005 UK annual mean objective for nitrogen dioxide at any of the three locations close to the busiest roads in the district.

6.8 Roads with significantly changed traffic flows

No roads within the new Forest have experienced large increases in traffic.

6.9 Bus Stations

Bus stations need only be assessed where the flow of buses is greater than 1000 vehicles per day and there is relevant exposure within 10m.

The following bus stations are within the New Forest;

Bus Stations	flow of buses greater than 1000 per day
Lymington	no
Hythe	no
Ringwood	no
Gang Warily	no
Fordingbridge	no

None of the stations have flows great enough to warrant using the DMRB to screen further, consequently there is no need to proceed with a detailed assessment for nitrogen dioxide with regard to bus stations.

6.10 New Industrial sources

There have been no new industrial sources set up within the New Forest that are likely to make a significant contribution to either the annual mean or the 1 hour objective for nitrogen dioxide.

6.11 Industrial sources with substantially increased emissions

No existing industrial sources have substantially increased their emissions of nitrogen dioxide.

6.12 Aircraft

Although there are no airports within the New Forest there are two in neighboring authorities;

Bournemouth International Airport at Christchurch and
Southampton Airport at Eastleigh.

No relevant exposure within the New Forest, properties in New Forest District further than 1000m away from airport boundary.

7.0 Sulphur Dioxide

National Perspective

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion services.

Local exceedances of the objectives (principally the 15 min mean objective) may occur in the vicinity of small combustion plant (less than 20MW) which burn coal or oil, in areas where solid fuels are the predominant form of domestic heating and in the vicinity of major ports.

The UK has adopted three objectives with regard to sulphur dioxide;

15 -minute mean objective of $266 \mu\text{g}/\text{m}^3$ as an air quality standard for sulphur dioxide with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005.

1-hour mean objective of $350 \mu\text{g}/\text{m}^3$ not to be exceeded more than 24 times a year, to be achieved by 2004.

24 -hour objective of $125 \mu\text{g}/\text{m}^3$ not to be exceeded more than 3 times a year to be achieved by the end of 2004.

Local perspective

There have been a small number of AQMA's declared from the first round of review and assessment.

In the New Forest the first round review and assessment identified likely exceedances of the 15 minute objective around Fawley due to emissions from the Esso Refinery. The Council undertook to work with the Environment Agency to ensure that the objective would be met in 2005.

New Forest DC also undertook to investigate SO₂ levels using continuous monitors in and around Fawley.

The large number of shipping movements in Southampton Water is also a potential source of SO₂ and these will need to be considered more fully than were done so in the first round of review and assessment.

Updating and Screening checklist

Monitoring data

New Forest District Council has monitored sulphur dioxide for several years around Fawley, initially an 8 port bubbler sampler was used to determine 24 hour means and later used to determine weekly averages.

More accurate information has been available to New Forest District Council since the purchase of two ultra violet fluorescence analysers.

For the past three years a continuous monitor has been sited at Holbury Manor Infants School (close to the refinery) and another monitor part funded by Esso Petroleum has been located in Jubilee Hall, Fawley for two years.

Continuous monitoring data

The table below details the results of monitoring at the two sites for two full calendar years 2001 & 2002:

AQ stations 2001	Holbury	Fawley
number of exceedances (2001) of 266 µg/m ³ 15min objective	9	45
number of exceedances (2001) of 350 µg/m ³ 60min objective	0	2
number of exceedances (2001) of 125 µg/m ³ 24hour objective	0	0
exceedance of 15min objective ? not to be exceeded on more than 35 occasions	no	yes
exceedance of 60 min objective ? not to be exceeded on more than 24 occasions	no	no
exceedance of 24hr objective ? not to be exceeded on more than 3 occasions	no	no
2002		
number of exceedances (2002) of 266 µg/m ³ 15min objective	15	37
number of exceedances (2002) of 350 µg/m ³ 60min objective	1	3
number of exceedances (2002) of 125 µg/m ³ 24hour objective	0	0
exceedance of 15min objective ? not to be exceeded on more than 35 occasions	no	yes
exceedance of 60 min objective ? not to be exceeded on more than 24 occasions	no	no
exceedance of 24hr objective ? not to be exceeded on more than 3 occasions	no	no

It can be seen from the table that there have been exceedances of the 15 minute sulphur dioxide objective at both sites over the two years and exceedances of the 1 hour objective at both sites during 2002 and at Fawley in 2001.

Holbury

Holbury had 9 exceedances of the 15 min objective in 2001 and a further 15 exceedances in 2002, however the objective allows 35 such exceedances per year.

It does not appear likely that Holbury will be subject to exceeding any of the three sulphur dioxide objectives by the end of 2004 with regard to the 60 minute and 24 hour objectives nor the 15min objective by the end of 2005.

Fawley

During 2001 the Fawley monitoring station recorded 45 exceedances of the 15 minute objective, this is above the permitted 35 exceedances allowed during a year by the objective.

At the end of 2001 the Esso refinery was undergoing a major refit, the CAT cracker was being replaced and there were on occasions increased emissions to air as plant was temporarily shut down as the refurbishment took place.

In 2002 the objective continued to be exceeded with 37 exceedances over the year. On analysis of each exceedance it was clear that during normal operation if the weather conditions were such that the wind speed was around 3 metres per second and coming from the North West exceedances would occur in Fawley village.

A summary of the monitoring data gathered, including wind information at both sites during 2002 is detailed in the Appendix.

Esso have assured both New Forest DC and the Environment Agency that they will meet the 15 minute objective with regard to sulphur dioxide by 2005, however they have not as yet determined exactly what method will be used to ensure that the objective is met.

New Forest DC has a duty to declare an Air Quality Management Area (AQMA), where it is determined that an exceedances of any objective will occur.

New Forest DC will proceed with a further detailed assessment of sulphur dioxide as required in this second review and assessment of air quality within their district, however any further studies undertaken or the use of recent data or modelling will be with a view to deciding exactly what shape the AQMA will take, i.e. the area to be included in any AQMA and measures to be taken by New Forest DC, Esso and the Environment Agency to achieve the objective and the production of the Air Quality Action Plan.

7.1 New Industrial sources

There have been no new industrial sources set up within the New Forest that are likely to make a significant contribution to any of the objectives for sulphur dioxide.

7.2 Industrial sources with substantially increased emissions

No existing industrial sources have substantially increased their emissions of sulphur dioxide.

7.3 Areas of Domestic Coal Burning

There are no areas within the New Forest where significant coal burning takes place

7.4 Small Boilers > 5MW (Thermal)

In the first round of review and assessment a survey was undertaken of any buildings that may have had this type of plant installed none were identified. Since this investigation no new buildings have been constructed that are likely to have this size of plant installed.

7.5 Other Sources

Fuels used in the transport sector contain varying amounts of sulphur, there are a range of transport sources that may represent a risk of exceeding the 15-minute objective

Shipping

Large ships generally burn oils with a high sulphur content in their main engines (bunker oils). If there are sufficient movements in a port they can give rise to short term concentrations above the objectives.

Auxiliary engines used while berthed (hotelling) usually use a lower sulphur content fuel, and are unlikely to be significant.

The Waterside area of the New Forest from Totton south to Calshot runs adjacent to Southampton Water, one of the busiest shipping waters in the UK.

Residential parts of the district Hythe and Marchwood are directly opposite the cruise liner berths and container berths of the Port of Southampton.

Guidance in LAQM.TG(03) requires the Local Authority to establish whether there is relevant exposure within 1km of the berths and areas of maneuvering, wind direction and total number of shipping movements.

The table below details the 4 areas where there is some exposure to shipping, the type of shipping in the vicinity and the approximate number of movements per year.

	Exposure within 1km of berths and main areas of maneuvering	type of shipping	more than 5000 ?	
Fawley	no	tankers	no	
Marchwood	yes	Containers/Ro Ro/Cargo/Military/ Cruise ships	5000 +	Detailed assessment required for Sulphur Dioxide
Hythe & Hythe Marina	yes	Containers/Ro Ro/Cargo/Military/ Cruise ships	5000 +	Detailed assessment required for Sulphur Dioxide
Totton	No	None		

Studies carried out during the investigations into the impact of the proposed Dibden bay container port highlighted the possibility of exceedances of the 15 minute sulphur dioxide objective from ships traveling along Southampton Water due to the high sulphur content of the fuels used in their main engines.

Southampton City Council have also recorded incidents of exceedances of the 15minute sulphur dioxide objective at their AQ station close to the existing container port on occasions.

In view of the number of shipping movements around Marchwood and Hythe marina in particular large ships such as container ships and cruise liners it will be necessary to proceed to a detailed assessment for sulphur dioxide at these locations in particular the 15 minute sulphur dioxide objective.

Railway Locomotives

Diesel and coal locomotives emit sulphur dioxide. Moving locomotives are unlikely to make a contribution to short term objectives, but the emissions from stationary locomotives may be more significant, but only in terms of the 15min sulphur dioxide objective.

The rail route from London to the South West runs through the New Forest, but there is only one area; Rushington, where locomotives are likely to be stationary for 15mins or more.

It is at this point that a branch line runs through to the Esso refinery and locomotives are often held up waiting for the main line to clear. However the nearest locations where people may be exposed for periods of 15 minutes or more are not within 15m of the stationary locomotives.

8.0 PM10

National Perspective

There is a wide range of emission sources that contribute to PM10 concentrations in the UK. These sources can be divided into 3 main categories

Primary particle – directly from combustion sources, including road traffic, power generation, industrial processes etc.

Secondary particles - are formed by chemical reactions in the atmosphere, and comprise principally sulphates and nitrates.

Coarse particles – from a wide range of sources including resuspended dusts from road traffic, construction works, quarries, wind blown dusts and soils, sea salt and biological particles.

The Government has adopted two Air Quality Objectives for PM10, which are equivalent to the EU Stage 1 limit values in the first Air quality Daughter Directive. The objectives are $40 \mu\text{g}/\text{m}^3$ as the annual mean, and $50 \mu\text{g}/\text{m}^3$ as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004.

The EU has also set indicative limit values for PM10 which are to be achieved by 2010. Although these have not yet been set in UK regulations, Local Authorities have been urged to consider these tighter values in the review and assessment process. The provisional objectives are for England, (not London) Wales and Northern Ireland;

24 hour mean of $50 \mu\text{g}/\text{m}^3$ not to be exceeded more than 7 times per year, and an annual mean of $20 \mu\text{g}/\text{m}^3$ to be achieved by the end of 2010.

Local Perspective

More than 50% of the AQMA's declared in the UK have included exceedances of the 2004 24 hour mean objective, although the majority of these have been in combination with nitrogen dioxide and are associated with road traffic sources. Other examples of AQMA's declared in respect to PM10 include – steel plant, unregulated coal fired burners, fugitive sources including quarries and port handling facilities.

Local Authorities have been advised to focus on areas where they expect pollution concentrations to be the highest, by focusing on these areas if there are no exceedances at the most polluted locations then it can be assumed that there should be no exceedances elsewhere.

The highest PM10 concentrations associated with road traffic are close to the road, with relevant locations for exposure at building facades.

All Local Authorities should undertake the screening assessment for the 2004 objective and are encouraged to undertake the screening with regard to the 2010 objectives.

New Forest District Council did not predict any exceedances of the 2004 objective during the first round of review and assessment, several roads within the district have relatively high traffic flows and were assessed using the DMRB model available at that time.

The DMRB has been updated for this round of review and assessment and it was thought prudent to reassess those roads again using updated traffic flow data and the revised DMRB.

8.1 Updating and Screening checklist

Monitoring Data

The two continuous monitoring sites at Holbury Manor Infants School and Ringwood School have been in situ for three years and have gathered two full calendar years of data; 2001 & 2002 with regards to PM10 using a TEOM monitor

The summarised results are detailed in the table below.

AQ stations	Ringwood	Holbury
Annual Mean data (2001)(GRAV) (TEOM adjusted x 1.3)	22.1 µg/m ³	20.61 µg/m ³
Adjusted figure to 2004 (Box 8.6)	21.9 µg/m ³	20.1 µg/m ³
number of 24hr exceedances (2001) (TEOM adjusted x 1.3)	5	4
projected using Fig 8.1	8	6
Annual Mean data (2002)(GRAV) (TEOM adjusted x 1.3)	21.71 µg/m ³	20.75 µg/m ³
Annual mean Adjusted figure to 2004 (box 8.6)	21.02 µg/m ³	20.26 µg/m ³
<i>Annual mean</i> <i>Adjusted figure to 2010 (box 8.6)</i>	17.24 µg/m ³	18.69 µg/m ³
number of 24hr exceedances (2002)	Two	Two
number of 24hr exceedances 2004 projected using Fig 8.1	Four	Four

With regard to the 2004 24hour mean objective there are not more than 35 predicted exceedances of the objective.

The predicted Annual mean values for 2004 are also below the objective of 40 µg/m³.

With regard to the more stringent annual mean objective of $18 \mu\text{g}/\text{m}^3$ for 2010, the predicted values for both sites are very close to the objective ; $17.24 \mu\text{g}/\text{m}^3$ at Ringwood and $18.69 \mu\text{g}/\text{m}^3$ at Holbury.

It will not be necessary to proceed with a detailed review and assessment with regard to the 2004 PM10 objectives at Ringwood or Holbury. However, the two sites are close to the 2010 annual mean objective.

8.2 Junctions

Busy junctions can be taken as ones with more than 10 000 vehicles per day, these were not considered adequately in the first round of the review and assessment. The following table details junctions within the New Forest where traffic flows are greater than 10 000 vehicles per day.

Unless there is relevant exposure within 10m of the kerb, these junctions can be disregarded.

Junctions 10,000 veh/day	Exposure within 10m of kerb	Traffic flows	DMRB	DMRB PM10 predicted levels 2004 annual mean 2010 annual mean	DMRB Predicted number of 24hour exceedances in 2004
A31/A338 Ringwood	46m	52157+15000	No		
A326/A35 Hounslow	31m	28597+32942	No		
A336/A326 Netley Marsh	26m	22158+8370	No		
A35/A337 Lyndhurst	2m	11054+15356	Yes	21.74 µg/m ³ . 18.93 µg/m ³	6
M27/A336 Cadnam	75m	72256+8370	No		
B3055/B3058 New Milton	3m	Est 10 000	Yes	20.30 µg/m ³ . 17.78 µg/m ³ .	4
A337/B3054 Lymington	5m	13 073 + 9 251	Yes	23.50 µg/m ³ . 19.57 µg/m ³ .	9

It can be seen that by using the DMRB the number of exceedances of the 24 hour objective can be predicted at the junctions.

In 2004, 35 exceedances of the 50Ugm/3 24 hour objective are permitted, as it can be seen from the table none of the three sites, Lyndhurst, New Milton or Lymington are likely to have this number of exceedances in 2004.

It will not be necessary to proceed with a detailed review and assessment with regard to the PM10 objectives for 2004 at any busy junction within the New Forest.

The predicted annual mean values for 2010 are close to an exceeding the objective set for 2010 of 18 µg/m³ at all three junction sites.

8.3 Roads with high flow of buses and/or HGVs

There are no roads with an excess of 25 % of the flow being heavy duty vehicles within the New Forest.

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

There have been no new roads constructed and roads with proposals for alteration or extensions have not yet been granted planning permission (e.g. works to A326 for Dibden Bay Port)

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

Three roads were assessed during the first round. Although these roads although were not close to the objective, it was thought prudent to reassess them using the new DMRB and more recent traffic data obtained from Hampshire County Council.

Roads close to objective in first R & A	Traffic flows	relevant location	DMRB	DMRB PM10- predicted levels 2005 - Annual mean	DMRB Predicted number of 24hour exceedances in 2004
A31 Ringwood	52 157	14m	Yes	23.87 µg/m ³ .	10
A35 (Bartram Rd, Totton)	32 942	6m	Yes	25.25 µg/m ³ .	13
A326	28 597	25m	Yes	21.70 µg/m ³ .	6

The DMRB confirmed that there is not likely to be an exceedances of the 2004 UK annual mean objective for PM10 nor more than 35 exceedances of the the 24 hr mean objective at any of the three locations close to the busiest roads in the district.

8.6 Roads with significantly changed traffic flows

No roads within the new Forest have experienced large increases in traffic.

8.7 New Industrial sources

There have been no new industrial sources set up within the New Forest that are likely to make a significant contribution to either the annual mean or the 24 hour mean objective for PM10.

8.8 Industrial sources with substantially increased emissions

No existing industrial sources have substantially increased their emissions of PM10.

8.9 Areas of domestic solid fuel burning

There are no areas within the New Forest where the amount of solid fuel burning could be classed as significant as defined in LAQM. TG (03).

8.10 Quarries/Landfill sites/open cast coal/handling of dusty cargoes at ports etc

These are likely to give rise to fugitive emission of dust and need to be evaluated if they were not considered during the first round of review and assessment.

Quarries within the New Forest were considered in the first round of review and assessment and there were no areas where likely exceedances of the objectives were predicted.

Most properties where exposure may occur are at least 1000m away from sources of the dust emission and those closer than that do not experience major problems associated with dust from the sites.

8.11 Aircraft

Although there are no airports within the new Forest there are two in neighbouring authorities;

Bournemouth International Airport at Christchurch and
Southampton Airport at Eastleigh.

No relevant exposure within the New Forest, properties in New Forest District further than 500m away from airport boundary.

9.0 Discussion

Carbon monoxide

Carbon monoxide (CO) was not expected to be a problem within the New Forest and the screening assessment has shown that monitoring in neighbouring areas has determined that there is little risk of the UK standard being exceeded.

Benzene

The screening assessment eliminated road traffic and industrial sources as likely to give rise to an exceedance of the UK objective for benzene. However the fuel storage depot at Hythe, although it is not likely to give rise to an exceedance of the 2003 objective, there may be a risk of the 2010 benzene objective being exceeded due to the proximity of residential properties.

1,3 Butadiene

Having looked at the industrial sources within the New Forest that emit significant quantities of 1,3 butadiene and the height of these emissions, none were assessed as likely to give rise to any exceedances of the 2003 objective.

Lead

Lead levels have dropped considerably across the UK since 2001 and these have been reflected in the levels recorded within the New Forest.

Combined with the lack of industrial processes emitting lead it is not likely that the lead objectives for 2004 or 2008 will be exceeded in the New Forest.

Nitrogen Dioxide

Nitrogen Dioxide is a major pollutant across the UK and it was likely that the New Forest would require some further assessment into this pollutant bearing in mind the major roads going through the New Forest and the congestion of traffic in towns and villages not designed to cope with the traffic flows of the 21st Century.

New Forest DC highlighted the need to investigate further into levels of this pollutant some years ago and the data gathered has been invaluable in this screening and assessment exercise.

Two areas have been identified as likely to exceed the 2005 annual mean objective for nitrogen dioxide, these are; Totton, around the level crossing at Junction Road and Lyndhurst High Street.

Sulphur Dioxide

The first review and assessment conducted in 2001/2002 highlighted Fawley as an area where there was likely to be exceedances of the 15 minute sulphur dioxide objective. Real time monitoring undertaken since then has validated the modelling work of 2001 and there is still a significant risk of the 2005 15min objective for sulphur dioxide being exceeded in Fawley village.

Shipping is also a potential source of sulphur dioxide and this assessment has highlighted the fact that there is a risk of the 15 min sulphur dioxide objective being exceeded at residential properties close to the berths of the Port of Southampton at Marchwood and Hythe.

PM10

Following the first review and assessment of air quality two TEOM monitors were installed within the New Forest in area where it was thought the PM10 level would be at there highest. Some high levels have been recorded but none that are likely to lead to an exceedance of the 2004 objectives for PM10.

Further assessment of other areas in this round using DMRB and local information has shown that there is not a likelihood of exceedances of either of the PM10 objectives for 2004 in the New Forest

With regard to the tighter annual mean objective of $20 \mu\text{g}/\text{m}^3$ set for the rest of England and Wales the assessments carried out during this process in the New Forest have shown that in 2010 the annual mean levels of PM10 using the models presently available will be close to and exceeding this objective.

11.0 Conclusions

Carbon monoxide

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to this pollutant.

Benzene

A detailed assessment of the Hythe petrol storage Terminal is required with regard to the 2010 annual mean objective of 5 $\mu\text{g}/\text{m}^3$.

Monitoring will be undertaken using diffusion tubes exposed for periods of four weeks for a three month period during the Summer starting July 2003 and three months over the Winter period.

This will provide New Forest DC with a guide to the real levels of benzene at the nearest residential properties to the terminal.

1,3 butadiene

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to this pollutant.

Lead

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to this pollutant.

Nitrogen Dioxide

A detailed assessment of nitrogen dioxide levels is required at two areas within the New Forest with regard to the 2005 annual mean objective of 40 $\mu\text{g}/\text{m}^3$.

Junction Road, Totton

New Forest DC anticipated the likelihood of exceedances of the annual mean nitrogen dioxide 2004 objective at Junction Road, Totton and has arranged for a real time analyzer to be installed at this location by the end of the Summer 2003 to validate the diffusion tube results.

Lyndhurst

The diffusion tube monitoring at Lyndhurst will continue for a 12 month period until the end of 2003 so that a full picture of the levels here can be established, it is then anticipated that a real time analyzer will be installed in the High Street Lyndhurst in order to assess the levels further.

Both areas have been highlighted to County Transport Planners as possible areas of exceedances so that this information can be incorporated in any future traffic schemes for these areas.

Sulphur Dioxide

A detailed assessment of sulphur dioxide levels is required at two areas within the New Forest with regard to the 2005, 15 minute mean objective of $266 \mu\text{g}/\text{m}^3$; Fawley Village and the Waterside area (Hythe and Marchwood)

Fawley

New Forest DC will proceed with a further detailed assessment of sulphur dioxide as required in this second review and assessment of air quality within their district, however any further studies undertaken or the use of recent data or modelling will be with a view to deciding exactly what shape the AQMA will take, i.e. the area to be included in any AQMA and measures to be taken by New Forest DC, Esso and the Environment Agency to achieve the objective and the production of the Air Quality Action Plan.

Marchwood and Hythe

Some modeling work was undertaken with regard to shipping during the Dibden Bay container port application. It will be necessary to revisit this modelling and refine the input data in light of both the shipping movements and type of shipping close to the two areas of residential properties and the sulphur content of the bunker fuels used.

PM10

There is no need for New Forest DC to proceed to a detailed review and assessment with regard to this pollutant.

However if the tighter objectives for the rest of England and Wales are introduced to the UK Air quality Regulations then further investigation and works will be necessary in the New Forest to ensure that these objectives are met in 2010.

DMRB OUTPUT SHEET

NFDC TRAFFIC DATA MAP

FAWLEY AIR QUALITY STATION DATA 2002

HOLBURY AIR QUALITY STATION DATA 2002

RINGWOOD AIR QUALITY STATION DATA 2002

SUMMARY SHEET AQ DATA 2002

SUMMARY SHEET AQ DATA 2001