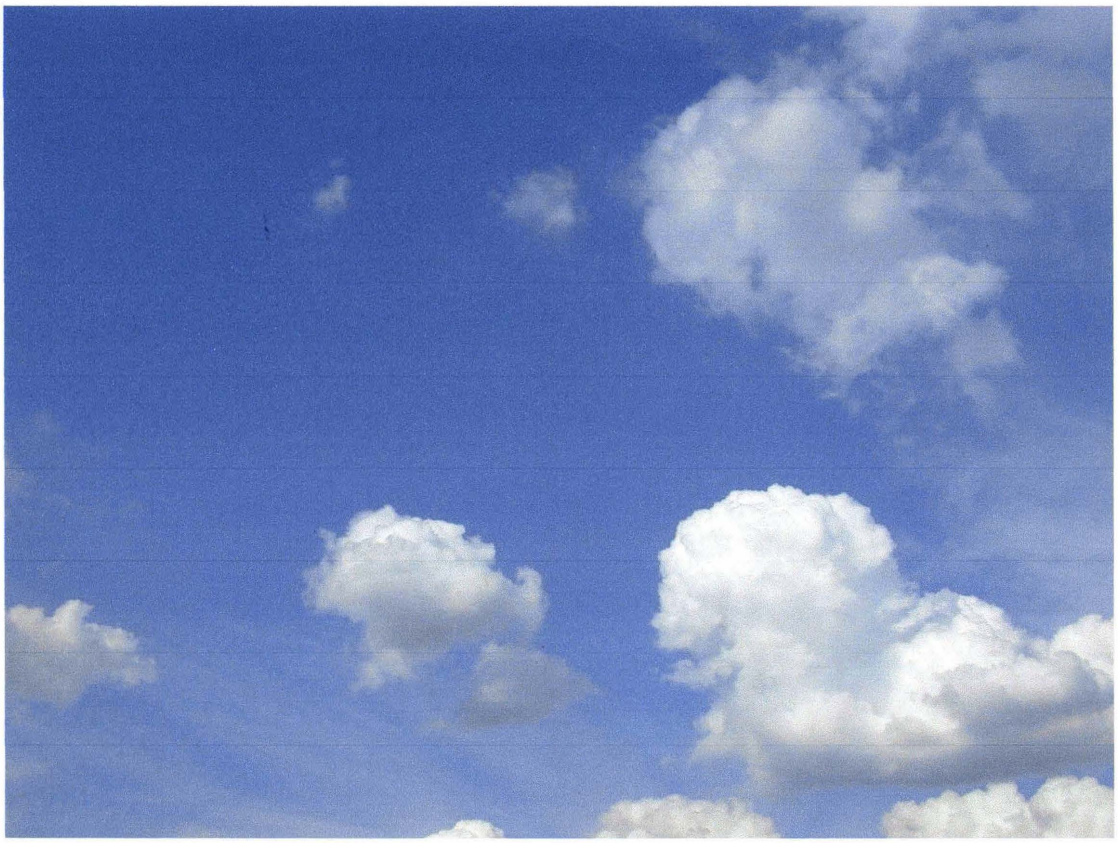
NORTH DEVON
DISTRICT COUNCIL
Close to the Community

Local Air Quality Management
Environment Act 1995

UPDATING AND SCREENING ASSESSMENT REPORT 2003



North Devon District Council
Environmental Health Unit
August 2003

Updating and Screening Assessment

North Devon District Council

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Contents

1. Introduction

1.1 Background

The Environment Act 1995 required the UK Government to produce a national air quality strategy containing standards and objectives for improving ambient air quality. The Act introduced the system of local air quality management (LAQM). As a result, local authorities are required to periodically review and assess the current and future air quality in their areas against those in the Strategy, which have been prescribed in regulations.

1.2 Air Quality Strategy

The most recent Air Quality Strategy was published in January 2000. The Strategy sets air quality standards and objectives for eight key air pollutants to be achieved between 2003 and 2008. For seven of these pollutants local authorities are charged with the task of working towards the objectives in a cost-effective way.

The Strategy objectives for particles (PM_{10}), benzene and carbon monoxide were reviewed in 2000/2001 and as a result tighter air quality *objectives* for these pollutants were adopted in an Addendum to the Strategy. The Addendum also introduced, for the first time, an objective for polycyclic aromatic hydrocarbons (PAH), however local authorities have no statutory responsibilities for the new PAH objective for the time being.

The Air Quality *standards* set out in the Strategy are based purely on medical evidence of the effects of the particular pollutants on health and represent the minimum or no significant effect levels. They based on the advice of the Expert Panel on Air Quality Standards (EPAQS) or upon EU limit values derived from World Health Organisation (WHO) guideline values.

The Air Quality *objectives* in the Strategy however do take into account the costs and benefits, and the feasibility of achieving the standards. The objectives therefore provide a framework for determining the extent to which air quality policies should aim to improve air quality and also a measure for each particular pollutant of concern against which future progress can be judged.

The role of local authorities in the Strategy is to make a judgement on whether the Air Quality Objectives are likely to be met in their area by the relevant deadline. Where objectives are not likely to be met then the local authority is required to designate an Air Quality Management Area (AQMA) at the relevant locations.

1.3 Regulations and Air Quality Objectives

The Air Quality Objectives are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) Amendment Regulations 2002. The exception is the particles (PM_{10}) objective for 2010 which for the time being is provisional, and not included in regulation. The Government will consider the inclusion of this objective after the EU first Air Quality Daughter Directive is adopted.

Table 1.1 - National air quality standards and objectives as outlined in regulations.

POLLUTANT	OBJECTIVE		DATE TO BE ACHIEVED BY
	Concentration	Measured as	
Benzene	16.25μg/m³ (5ppb)	running annual mean	31 December 2003
1,3-butadiene	2.25μg/m³ (1ppb)	running annual mean	31 December 2003
Carbon monoxide	11.6mg/m³ (10ppm)	running 8 hour mean	31 December 2003
Lead	0.5μg/m³ 0.25μg/m³	annual mean annual mean	31 December 2004 31 December 2008
Nitrogen dioxide	200μg/m³ (105ppb) not to be exceeded more than 18 times a year 40μg/m³ (21ppb)	1hour mean annual mean	31 December 2005 31 December 2005
Particles (PM_{10}) (gravimetric)*	50μg/m³ not to be exceeded more than 35 times a year 40μg/m³	24 hour mean annual mean	31 December 2004 31 December 2004
Sulphur dioxide	350μg/m³ (132ppb) not to be exceeded more than 24 times a year 125μg/m³ (47ppb) not to be exceeded more than 3 times a year 266μg/m³ (100ppb) not to be exceeded more than 35 times a year	1 hour mean 24 hour mean 15 minute mean	31 December 2004 31 December 2004 31 December 2005
*measured using the European gravimetric transfer sampler or equivalent			

The provisional objectives for particles (PM_{10}) for 2010 are different depending on which part of the UK is being assessed. The provisional objectives applicable to the North Devon district are given in Table 1.2.

Although local Authorities are not yet statutorily required to assess levels of particles for 2010, they are strongly recommended to do so, to assist with long term planning and the assessment of development proposals in their areas. Therefore this Authority has undertaken an assessment of particles against the 2010 objective.

Table1.2 – Provisional Objectives for Particles Not Included in the Regulations for the Purpose of Local Air Quality Management

POLLUTANT	AIR QUALITY OBJECTIVE		DATE TO BE ACHIEVED BY
	Concentration	Measured as	
Particles (PM_{10}) (gravimetric)*	50μg/m³ not to be exceeded more than 7 times a year	24 hour mean	31 December 2004
	20μg/m³	annual mean	31 December 2004
*measured using the European gravimetric transfer sampler or equivalent			

1.4 Local Air Quality Management – Review and Assessment of Air Quality

Part IV of the Environment Act 1995 requires local authorities "from time to time" to review and assess the current and likely future air quality in their areas against the objectives in the Nation Air Quality Strategy. As discussed above, where objectives are not likely to be achieved, then the local authority is required to designate an AQMA at the relevant locations. The local authority must then draw up an action plan setting out the measures it intends to take in pursuit of the air quality objectives with the area covered by the AQMA.

A review and assessment is the initial step in Local Air Quality Management (LAQM). The structure of the reviews and assessment are set out in the guidance made under the Act and deadlines for each round of review and assessment are set out in the regulations. North Devon District Council has already completed one round of review and assessment in 2000. The structure of the first round of review and assessments was based on earlier LAQM guidance (see section 1.5 below), and the findings were published in the report: -

- AIR QUALITY IN NORTH DEVON – A First Stage Review and Assessment of Air Quality – Consultation Document; North Devon District Council (1998)

- NORTH DEVON AIR QUALITY – A Review and Assessment of Air Quality in North Devon in Accordance with The National Air Quality Strategy; North Devon District Council (2000)

The first round of review and assessment concluded that the air quality objectives were likely to be achieved, and there was no need to declare an AQMA in North Devon. The report was subsequently reviewed be the University of the West of England on behalf of DEFRA, and accepted the findings of the review and assessment and agreed with the report conclusions.

The 2003 round of local air quality review is different in format from previous rounds in that it is split into two steps: -

- Step One is an **Updating and Screening Assessment (USA)** for identifying those aspects that have changed since the first round of reviews and assessment, which might lead to a risk of an air quality objective being exceeded

- Step Two, a **Detailed Assessment** to provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure.

The USA should cover: new monitoring data; new objectives; new sources or significant changes to existing sources and any other changes that may affect local air quality. Where the USA has identified a risk that an air quality objective will be exceeded at a particular location with relevant public exposure (see section 1.7 below), then Detailed Assessment will have to be carried out. The aim of Detailed Assessment is to identify with reasonable certainty whether or not a likely exceedence will occur, and therefore an existing AQMA needs to continue or if a new AQMA needs to be declared.

1.5 LAQM Guidance

The following guidance for Round 2 of Review and Assessment has been issued by DEFRA under section 88(1) of the Environment Act 1995:

Policy Guidance LAQM. PG(03) (February 2003)

Technical Guidance LAQM TG(03) (February 2003)

The above guidance replaces the previous guidance published in 2000 as LAQM. G1, G2, G3 and G4(00). The new guidance sets out the latest statutory policy and technical framework for the system of LAQM and the completion of both the USA and any required Detailed Assessment that make up Round 2 of Review and Assessment.

The timescale for Round 2 and subsequent rounds of the Review and Assessment process is set out in the Regulations as detailed in Table 1.3 below.

1.6 Purpose and Scope of the Report

The purpose of this report is to complete the Updating and Screening Assessment required for Round 2 of LAQM within the administrative boundaries of North Devon District Council. This is a draft report completed for the purposes of statutory consultation. A list of consultees is given in Appendix 1.

The scope and structure of this USA report is in accordance with that set out in guidance LAQM.PG(03) and LAQM.TG(03). The structure of the report closely follows the pollutant by pollutant and pollutant-specific checklists contained in the technical guidance LAQM.TG(03).

The subsequent individual review and assessment chapters for each pollutant within the report summarise the checklist approach/assessment criteria used along with the findings. More technical information relating to the pollutant specific chapters can be found in the Appendices towards the end of the report.

The report was completed by the Environmental Health Unit of North Devon District Council between April and August 2003.

Table 1.3 – Recommended Timescales for Submissions of Reviews and Assessments and Progress Reports for Local Authorities

LAQM Activity	Completion Date	Which Authorities?
Updating and Screening Assessment (USA)	End of May 2003	All Authorities
Detailed Assessment	End of April 2004	Those Authorities which have identified the need for on in their May 2003 USA
Progress Report	End of April 2004	Those Authorities which identified that there was no need for a Detailed Assessment in their May 2003 USA
Progress Report	End of April 2005	All Authorities
USA	End of April 2006	All Authorities
Detailed Assessment	End of April 2007	Those Authorities which have identified the need for on in their April 2006 USA
Progress Report	End of April 2007	Those Authorities which identified that there was no need for a Detailed Assessment in their April 2006 USA
Progress Report	End of April 2008	All Authorities
USA	End of April 2009	All Authorities
Detailed Assessment	End of April 2010	Those Authorities which have identified the need for on in their April 2009 USA
Progress Report	End of April 2010	Those Authorities which identified that there was no need for a Detailed Assessment in their April 2009 USA
Timescale surrounded in **bold** above represents Round 2 of Review and Assessment		

1.7 Public Exposure

An important consideration in the completion of this report was public exposure to air pollution and an understanding of the general definitions and approach applied to the assessment of this public exposure is also important in order to understand those locations in North Devon that have, or have not, been assessed for the purposes of this report.

The regulations make it quite clear that likely exceedences of the objectives should be assessed in relation to "*the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present*". Reviews and assessments are therefore focused on those locations where the public are likely to be regularly present and exposed over the averaging period of the objective. Locations are not considered if relevant public exposure would not be realistic. Further guidance on the approach taken in this report is given in Table 1.4 below.

The examples below are guidance only and are not prescriptive in this manner; therefore at all locations local circumstances and any other relevant factors have been applied using local judgement and professional knowledge.

In the assessment of some pollutants and pollution source locations a definitive judgement has been applied using specific distances of exposure in relation to the individual source. Guidance contained in LAQM.TG(03) has also been applied where it is prescriptive. All examples of this are detailed in the subsequent review and assessment sections for each individual pollutant.

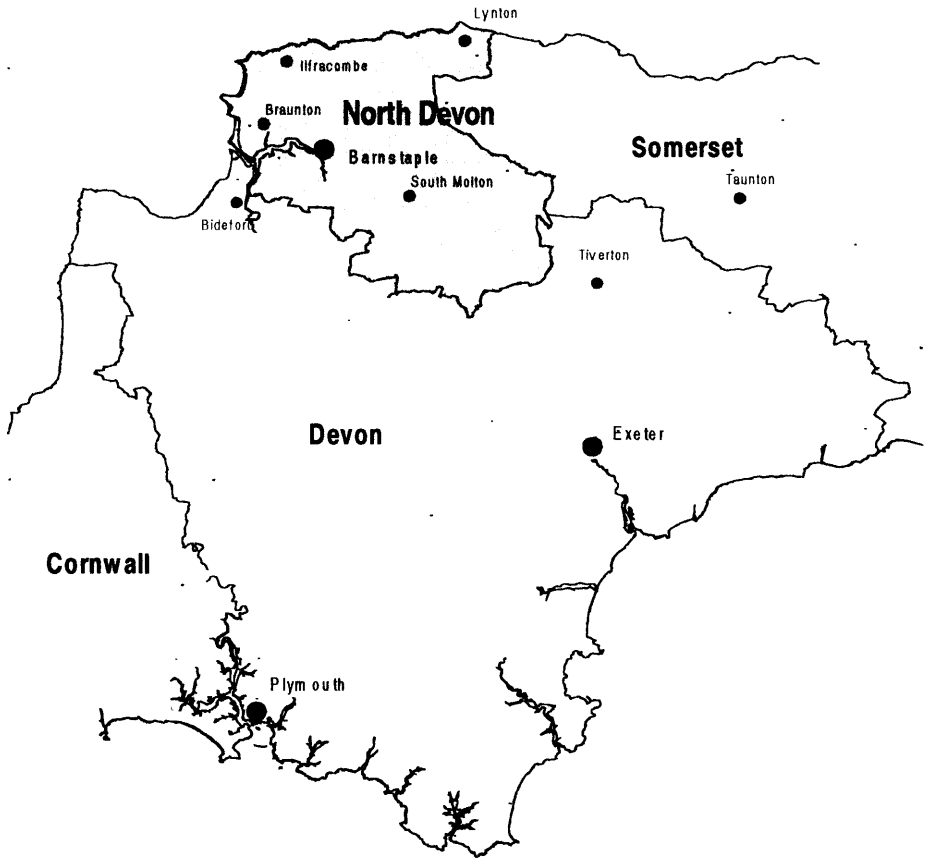
Table 1.4 Examples of Where Air Quality Objectives Should/Should Not Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools hospitals and libraries etc. Exposure must be likely for a cumulative period of at least six months in a year.	Building facades of offices or other places of work where members of the public do not have regular access. Gardens of residential properties Kerbside sites (as opposed to the building façade), or any other location where public exposure is expected to be short term.
24-hour and 8-hour mean	All locations where the annual mean objective would apply. Gardens of residential properties.	Kerbside sites (as opposed to the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean, 24-hour and 8-hour mean objectives apply. Kerbside sites (e.g. pavements of busy shopping areas). Those parts of carparks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more.	Kerbside sites where the public would not be expected to have regular access or spend 1-hour or more.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or more.	

1.8 Characteristics of the North Devon District

The North Devon district occupies the northern most part of the county of Devon, and borders the western borders of Somerset, and the Bristol Channel, covering an area approximately 1085 square kilometres (419sq miles). The area is characterised by a rugged northern Bristol Channel coast, the sandy beaches of the West Coast, the estuarine and valley landscapes of

the River Taw, and the open moorland and farmland of the Exmoor fringes. The district includes approximately one third of the area of Exmoor National Park. The character of the North Devon district is inextricably linked to its natural landscape, which is its most prized asset. The landscape is highly valued by residents and tourists alike, and incorporates numerous Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty, and Heritage Coastline.



The population of the area in 2000 was approximately 91,800, with approximately half the residents living in the four main settlements of Ilfracombe, Braunton, South Molton, and Barnstaple, which is also the regional centre for northern Devon. The remainder of the population lives in the open countryside or in one of the numerous villages and hamlets of the area.

The area has an extensive rural road network and is connected to the rest of the region by the A39, A361 and A377 roads. There is also a regional rail connection between Barnstaple and Exeter, which runs along the valley of the River Taw.

Employment in the district is concentrated in the main settlements. There is a strong dependence on the service industry, especially tourism related in the summer, and also in the public administration, health, and finance sectors, reflecting Barnstaple's role as a regional centre. There is also a healthy industrial base in the area, and this is reflected in the 49 prescribed processes regulated under Part 1 of the Environmental Protection Act 1990, which are currently in operation within the administrative area of North Devon District Council. Details of individual prescribed processes within North Devon are given in Appendix 2.

2. Carbon Monoxide

2.1 Introduction

Carbon monoxide is a colourless and odourless gas produced by the incomplete combustion of carbon containing fuels. In general, the more efficient the combustion process, the lower the carbon monoxide emission. The main outdoor source of carbon monoxide in the UK is currently road transport, which accounts for about 69% of UK emissions mainly from petrol engined vehicles. Road transport sources will constitute a larger proportion of the total in urban areas, especially near busy, congested, roads.

Carbon monoxide is one of the most dangerous pollutant gases because it can, and does, cause death. The main threats to human health from exposure to carbon monoxide are the formation of carboxyhaemoglobin, which substantially reduces the capacity of the blood to carry oxygen and deliver it to the tissues and blockage of important biochemical reactions in cells. People who have an existing disease which affects the delivery of oxygen to the heart or brain (e.g. coronary artery disease – angina) are likely to be at particular risk if these delivery systems are further impaired by carbon monoxide.

The focus of a review and assessment for carbon monoxide are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals

2.1.1 Standard and Objective for Carbon monoxide

The UK Government has adopted an 8-hour running mean concentration of 11.6mg/m^3 as the air quality standard for carbon monoxide. The new objective for local air quality management has been set at a slightly tighter level of: -

Pollutant	Concentration Limit	Measured as	Date to be achieved by
Carbon Monoxide	10 mg/m^3 (8.6ppm)	Maximum daily running 8 hour mean	31 December 2003

This brings the objective in line with the second EU Air Quality Daughter Directive limit value for Carbon monoxide.

2.1.2 The National Perspective

Studies at National level, based on both measured and modelled data, suggest there is little likelihood of the new objective for carbon monoxide being exceeded by 2003. While the national scale studies suggest the objective will be achieved, it is important that all local

circumstances are fully considered. Local Authorities are therefore required to undertake a review and assessment for carbon monoxide.

2.2 Updating and Screening Assessment of Carbon Monoxide in North Devon

Estimated annual mean background carbon monoxide concentrations for 2001 have been mapped for the UK. The maximum concentration mapped in the North Devon District is 0.208mg/m^3, centred on the Newport area of Barnstaple. For the purposes of this assessment, the above figure has been corrected to an estimated annual average carbon monoxide concentration in 2003 of 0.172mg/m^3.

At the time of the last review and assessment of air quality in North Devon, Devon County Council operated continuous carbon monoxide monitoring equipment at 3 locations in Barnstaple. The maximum-recorded Carbon monoxide concentration recorded at any of the Barnstaple monitoring sites was 9.4mg/m^3, at a roadside site adjacent to the Seven Brethren roundabout. The average Carbon monoxide concentration at this site from 1 January - 30 June 1999 was 3.6mg/m^3.

Since that time, the continuous monitoring equipment operated by Devon County Council has proven to be very unreliable, and has not produced any data at all for at least 12 months. The monitoring results described above remains the most up to date, reliable monitoring data available to this Authority.

Within the North Devon district, there are no "very busy" roads and junctions, as described in the Guidance. The busiest road in the district is the B3233, over the Longbridge in Barnstaple, with an annual average daily traffic flow of 28,300 vehicles. In any case, there are no areas in the district where the 2003 background concentration of carbon monoxide is expected to exceed 1mg/m^3.

2.3 Conclusion

Within the North Devon District, the maximum estimated annual mean background carbon monoxide concentration for 2003 is significantly below the figure that would require progression to a detailed assessment, and there are no "very busy" roads or junctions in the district.

Carbon monoxide monitoring data pre-dates the last review and assessment of air quality in North Devon, however the maximum-recorded concentration is below the objective standard. Trending in carbon monoxide concentrations at similar roadside sites in the national network shows a reduction in maximum daily running 8-hour mean concentrations at the majority of sites between 1999 and 2001. It is therefore reasonable to assume that this trend is repeated at roadside locations in North Devon.

Based on the above findings, it is unlikely that the objective for carbon monoxide will be achieved at all locations in North Devon by 31st December 2003, and there is no need to progress to a detailed assessment for this pollutant.

3 Benzene

3.1 Introduction

Benzene is a clear, colourless aromatic hydrocarbon, which has a characteristic sickly sweet odour. At normal ambient temperatures it is a liquid, but it readily evaporates and small amounts are detectable in the atmosphere.

In the U.K. the main atmospheric source of benzene is the combustion and distribution of petrol. Diesel is only a minor source. The amount of benzene in petrol was, until the beginning of 2000, regulated to an upper limit of 5% by volume by EU legislation. In recent years it comprised on average 2% by volume in the UK. Since 1 January 2000, EU legislation has required that the amount of benzene in petrol be below 1% and is presently about 0.7% by volume on average for fuel sold in the UK. The main outdoor sources of benzene remaining beyond 2005 are expected to be petrol engined vehicle exhausts and petrol refining and distribution.

Benzene is a recognised genotoxic (i.e. it can alter the genetic make-up of cells) human carcinogen. Studies of industrial workers exposed in the past to high levels of benzene have demonstrated an excess risk of leukaemia, which increased in relation to their working lifetime exposure. Because it is a genotoxic carcinogen, no absolutely safe level can be specified for ambient air concentrations of benzene. However the rarity of the disease associated with benzene, means that it has been feasible to create an air quality standard for atmospheric benzene, which presents an exceedingly small risk to the UK population.

The focus of a review and assessment for benzene are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals

3.1.1 Standard and Objective for Benzene

The UK Government has adopted a running annual mean concentration of 16.25μg/m^3 as the air quality standard for benzene to be achieved by the end of 2003. The new objective for local air quality management has been set at a tighter level of: -

Pollutant	Concentration Limit	Measured as	Date to be achieved by
Benzene	5μg/m^3	running annual mean	31 December 2010

3.1.2 The National Perspective

The main sources of benzene emissions in the UK are petrol-engined vehicles, petrol refining, and the distribution and uncontrolled emissions from petrol stations without vapour recovery

systems. A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene.

Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective at all urban background and roadside/kerbside locations. Whilst the 2010 objectives are expected to be met at all urban background, and most roadside locations, there is a possibility for some remaining exceedences which will require additional measures at a local level.

3.2 Updating and Screening Assessment of Benzene in North Devon

There is no local monitoring of benzene in the North Devon district. Therefore an assessment of background concentrations must rely on the estimated annual mean background concentration mapped data. The maximum estimated concentration mapped in North Devon for 2001 is 0.273 $\mu g/m^3$. When correction factors are applied, this results in maximum running annual mean concentrations of 0.239 $\mu g/m^3$ and 0.180 $\mu g/m^3$ for 2003 and 2010 respectively. These figures are comfortably below the relevant objective standards.

On the basis of the above prediction of background concentrations, an assessment of the impact of road traffic is not required, as there are no locations within the North Devon district where the 2010 background is expected to be above 2 $\mu g/m^3$.

There are none of the identified industrial sources with the potential to cause an exceedence of the 2010 objective located in the North Devon district.

Authorisations to operate do not provide sufficient information on annual petrol throughput for the purposes of this assessment, therefore all petrol stations with an annual throughput greater than 1,000,000 litres per annum have been subject to assessment. There are 13 petrol stations in this category in the North Devon district, and only 2 of these stations have relevant exposure within 10 metres of the pumps: - Barbrook Services and Rogers Garage.

The nearest permanent ATC site to Barbrook Services on the A39 recorded an annual average daily traffic flow of 2720 in 2001, with an August average 16hr weekday of 4480 as the maximum flows for this site. These traffic flows are considerably less than those considered representing a "busy road" for the purposes of this assessment, and therefore this site need not be considered any further.

Information was requested from Rogers Garage on the exact petrol throughput of the premises in 2002. Information provided by the fuel supplier revealed that the total petrol throughput of the site in that year was just over 1,500,000 litres. Therefore detailed assessment of this source is not required.

3.3 Conclusions

Given the extremely low estimated background concentrations, and the absence of industrial sources that could have a significant impact on Benzene concentrations at relevant locations, a detailed assessment for benzene in North Devon is not required.

4 1,3-Butadiene

4.1 Introduction

1,3-Butadiene is a chemical compound, the molecule of which comprises of four carbon and six hydrogen atoms. At normal ambient temperatures it is a gas, and trace amounts can be found in the atmosphere that we breathe.

1,3-Butadiene in the atmosphere is usually derived from the combustion of petrol and other materials. Although neither petrol nor diesel contains 1,3-Butadiene, it is formed in the combustion process from olefins, which are a constituent of the fuel. 1,3-Butadiene is also an important industrial chemical, and is handled in bulk in a number of industrial locations in the UK. The main sources in the UK however are emissions from motor vehicle exhausts.

1,3-Butadiene is a genotoxic (i.e. it alters the genetic structure of cells) carcinogen, and as such it is not possible to determine an absolutely safe level for human exposure. In practice however, it is clear from studies of groups of workers who have had substantial exposures to 1,3-Butadiene, that risks to the general population from the levels currently found in the atmosphere must be exceedingly small.

The focus of a review and assessment for 1,3-Butadiene are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals

4.1.1 Standard and objective for 1,3-Butadiene

Pollutant	Concentration Limit	Measured as	Date to be achieved by
1,3-Butadiene	2.25μg/m^3 (1ppb)	running annual mean	31 December 2003

4.1.2 The National Perspective

The increasing numbers of vehicles equipped with three way catalysts 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 emissions of 1,3-butadiene from vehicle exhausts. These measures are expected to deliver the air quality objective by the end of 2003, and no further measures are thought to be necessary.

The studies at a national level, based on both measures and modelling data, suggest that there is little likelihood of the objective for 1,3-butadiene being exceeded by 2003. It is however important that local circumstances are fully taken into consideration within the review and assessment process. All local authorities are therefore required to complete the review and assessment for 1,3-butadiene.

4.2 Updating and Screening Assessment of 1,3-Butadiene in North Devon

There is no local monitoring of 1,3-butadiene in the North Devon district. Therefore the estimated annual mean background concentration mapped data has been used as the basis of the assessment. The maximum estimated concentration mapped in North Devon for 2001 is 0.0966 $\mu g/m^3$. When correction factors are applied, this results in maximum running annual mean concentration of 0.074 $\mu g/m^3$ for 2003. This figure is comfortably below the relevant objective standard.

At present there are no Part A or Part B authorised processes, in this, or neighbouring areas, with the potential to lead to exceedences of the air quality standard for 1,3-Butdiene, nor are there any planned in the locality.

4.3 Conclusions

Given the extremely low estimated background concentrations, and the absence of industrial sources that could have a significant impact on 1,3-Butadiene concentrations in the atmosphere, detailed assessment of 1,3-Butadiene in North Devon is not required.

5 Lead

5.1 Introduction

Lead is the most widely used non-ferrous metal, and has a large number of industrial applications, both in its elemental form and in alloys and compounds. The single largest use globally is in the manufacture of batteries, but other uses are as a pigment in paints and glazes, in alloys, in radiation shielding, tank lining and piping. As the compound tetraethyl lead, it has been used as a petrol additive to improve its octane rating, however the sale of leaded petrol has been banned since 1 January 2000.

Lead is a cumulative poison, and in sufficient amounts can cause severe and sometimes permanent damage to the central nervous system. The first signs of lead poisoning are headaches, tiredness, constipation, and weight loss. Acute lead poisoning is now rare in the UK, while research into low level atmospheric exposure is inconclusive.

The focus of a review and assessment for lead are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals

5.1.1 Standard and Objective for Lead

Pollutant	Concentration Limit	Measured as	Date to be achieved by
Lead	0.5μg/m^3	annual mean	31 December 2004
	0.25μg/m^3	annual mean	31 December 2008

5.1.2 The National Perspective

Detailed assessments of the potential impact of lead emissions from industrial processes have been undertaken by the Government based upon both monitoring and sector analysis studies. The monitoring data has generally indicated no exceedences of the 2004 or 2008 objectives, although locations in proximity to non-ferrous metal production and foundry processes were deemed to be at risk.

There have been no AQMAs declared in respect of the 2004 and 2008 objectives as a result of the first round of review and assessment. Only local authorities with relevant locations in the vicinity of major industrial processes that emit significant quantities of lead would need to progress to a detailed assessment.

5.2 Updating and Screening Assessment of Lead in North Devon

While there are no Part A or A2 processes in this area, or neighbouring areas, with the potential to result in elevated levels of Lead, there are three Part B processes in the North Devon District that have been highlighted as potentially significant sources of lead (see Appendix 2).

Two of the processes identified are aluminium foundries producing components for the aerospace industry. Information obtained from these processes as part of their Part B authorisation obligations has demonstrated that the processes utilise only pure aluminium as their feedstock, and at no point is lead, in metallic or alloy form, added to the process.

The third foundry utilises a range of ferrous and non-ferrous metals, including gunmetal. The technical specification for this product states that lead is one of the components of the metal. Further discussions with the operator have revealed that this product has not been processed for over two years, and future use in significant quantities is unlikely. Furthermore there are no relevant locations within approximately 500 metres of the foundry emission point.

5.3 Conclusions

Given the negligible impact of the process described above, the absence of any Part A authorised processes, and the absence of any planned developments of these potential emission sources, a detailed assessment for Lead is not required.

6 Nitrogen Dioxide

6.1 Introduction

Nitrogen oxides are formed during high temperature combustion processes from the oxidation of nitrogen in the fuel or air. Nitrogen Dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen and together they are referred to as NOx. All combustion processes produce some NOx, but only NO_2 is associated with adverse effects on human health.

The main sources of NOx in the UK are road transport, which, in 2000, accounted for about 49% of the total UK emission. Power generation and general industrial activity are the other significant sources of NOx. In urban areas, the proportion of local emissions due to road transport sources is larger.

Nitrogen dioxide is a respiratory irritant, which can exacerbate asthma, and can cause throat and eye irritation in healthy individuals. In the presence of sunlight, it reacts with hydrocarbons to produce photochemical pollutants such as ozone

The focus of a review and assessment for the *annual mean objective* (see 6.1.1) for nitrogen dioxide are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals

For the *1-hour mean objective* (see 6.1.1), the focus of the review and assessment for nitrogen dioxide shall include any non-occupational, near ground level outdoor locations (including kerbside sites), as short term exposures are likely at these sites.

6.1.1 Standard and Objective for Nitrogen Dioxide

Pollutant	Concentration Limit	Measured as	Date to be achieved by
Nitrogen Dioxide	200μg/m³ (105ppb) not to be exceeded more than 18 times a year	1 hour mean	31 December 2005
	40μg/m³ (21ppb)	annual mean	31 December 2005

6.1.2 The National Perspective

The annual mean objective is currently widely exceeded at roadside sites throughout the UK, and at some urban background sites in major conurbations. The number of exceedences of the 1-hour objective show considerable variation, and are driven by meteorological conditions which give rise to winter episodes of poor dispersion and summer oxidant episodes.

In practice, meeting the annual mean objective in 2005, and the limit value in 2010, is expected to be considerably more demanding than achieving the 1-hour objective. National studies have indicated that the annual mean is likely to be achieved at all urban background sites outside of London by 2005, but the objective may be exceeded more widely at roadside sites in close proximity to busy road links.

Of the AQMAs declared for Nitrogen dioxide, 95% have traffic emissions as the main, if not only, component. Exceedences of the objective have been identified within major conurbations, within smaller town centres with congested traffic, and alongside dual carriageways and motorways in more rural areas. Local Authorities are expected to focus upon locations such as these where they expect pollutant concentrations to be highest (often referred to as "hot spots"). If there are no exceedences of the objectives at the most polluted locations, then it can be reasonably concluded that there should be no exceedences elsewhere.

6.2 Updating and Screening Assessment of Nitrogen Dioxide in North Devon

6.2.1 Monitoring Data

Nitrogen dioxide is monitored at 14 locations in the North Devon District using passive diffusion tubes. There are 12 roadside tube locations, 1 urban intermediate and 1 urban background location. The monitoring programme has been in place since 2000. There are no continuous analysers operational in the district.

Data from the diffusion tubes has been bias corrected by comparison of the NO_2 diffusion tube and continuous analyser located at Queen Street, Exeter on a year-by-year basis (DEFRA, 2003, Box 6.4). These adjustment factors, by which the tube data are multiplied, are contained in Table 6.2.1

Table 6.2.1 – Exeter Bias adjustment factors

Year	2000	2001	2002
Continuous Analyser Annual Mean (µg m^{-3}) (C_m)	38.1	41.1	37.9
Queen Street Diffusion Tube Annual Mean (µg m^{-3}) (D_m)	28.97	28.09	30.75
Bias Adjustment Factor (C_m / D_m)	*1.32*	*1.46*	*1.22*

Plymouth City Council has also derived bias adjustment factors from a co-location study between the national automatic urban monitoring station in Plymouth city centre and an NO_2 tube. The tube is of similar type, and processed by the same laboratory as, those used in North Devon and Exeter. The bias adjustment factor should be similar to that calculated from Exeter's data, however, this is not the case, figures of 0.82 or 0.86 being obtained (the first being based on only six months of ratified, the second on a whole year's data (only part of which had been ratified). The 0.86 bias adjustment figure has been used in this assessment, as although it is currently unratified, it does represent the worst case situation using the Plymouth figures.

Table 6.2.2 lists the crude uncorrected annual means for the monitoring locations from 2000-2002, as well as data for 2003 as far as May. Data capture rates are also listed.

Table 6.2.2 - Uncorrected Annual Mean NO_2 concentrations in North Devon, 2000 – 2002. Provisional 2003 figures in Italics.

Site *(all locations in Barnstaple unless stated)*	**Annual Mean NO_2 Concentrations ($\mu g/m^3$)**				**Data Capture (%)**		
	2000	**2001**	**2002**	***2003***	**2000**	**2001**	**2002**
Broad Street, South Molton	17.26	23	26.91	*27.26*	91	100	83
Hollowtree Road	27.47	28.9	33.84	*36.12*	100	100	100
Cedars Roundabout	21.25	23	26.91	*29.82*	100	92	100
Sticklepath School	8.65	9.67	9.93	*12.6*	100	100	100
Alexandra Road	32.98	33.38	35.71	*43.20*	100	100	92
Medical Centre, Vicarage St.	15.43	16.62	17.11	*22.60*	100	100	100
Pilton Causeway	22.86	22.62	25.49	*30.08*	100	92	92
High Street, Ilfracombe (1)	22.90	20.02	23.83	*25.84*	100	92	100
High Street, Ilfracombe (2)	21.37	22.13	27.75	-	100	92	83
Church Street, Ilfracombe	-	-	-	*28.21*	-	-	-
The Square, Braunton	28.40	29.24	34.12	*41.21*	100	100	100
Prixford, nr Barnstaple	-	8.85	10.59	*12.32*	-	100	92
West Yelland, nr Barnstaple	-	10.21	12.20	*13.93*	-	100	100
Lower Sticklepath	-	-	-	*34.82*	-	-	-
Rolle Street	-	-	-	*43.77*	-	-	-

As can be seen from Table 6.2.3 below, there is considerable variance in the corrected figures depending on the bias adjustment factor used. Even when using the worst case Exeter bias adjustment factor however, there is only one potential predicted exceedence in 2005, and none in 2005. The tube location at Alexandra Road however is kerbside, whereas the nearest relevant location i.e. the façade of a residential property is approximately 5 metres further from the carriageway, so a slight reduction can be expected at the relevant location for the purpose of this assessment.

Table 6.2.3 – Annual Mean NO2 concentrations from 2000-2002, with potential predicted exceedences of the air quality objectives identified

Site *(all locations in Barnstaple unless stated)*	**Bias Corrected Measured Concentration (µg/m³)**					**Maximum Predicted Concentration (µg/m³)**		**Predicted Exceedence**	
	Exeter			**Plymouth**					
	2000	**2001**	**2002**	**2001**	**2002**	**2005**	**2010**	**2005**	**2010**
Broad Street, South Molton	22.78	33.58	32.83	19.78	23.14	30.63	26.25		
Hollowtree Road	36.26	42.19	41.28	24.85	29.10	38.52	33.01		
Cedars Roundabout	28.05	33.58	32.83	19.78	23.14	30.64	26.25		
Sticklepath School	11.42	14.12	12.11	8.32	8.54	12.82	10.99		
Alexandra Road	43.53	49.61	43.57	28.71	30.71	45.05	38.64	✔	
Medical Centre, Vicarage St.	20.37	24.27	20.87	14.29	14.71	22.04	18.88		
Pilton Causeway	30.18	33.03	31.10	19.45	21.92	29.99	25.70		
High Street, Ilfracombe (1)	30.23	29.23	29.07	17.22	20.49	27.13	23.24		
High Street, Ilfracombe (2)	28.21	32.31	33.86	19.03	23.87	31.60	27.07		
The Square, Braunton	37.49	42.69	41.63	25.15	29.34	38.85	33.29		
Prixford, nr Barnstaple	-	12.92	12.92	7.31	9.11	12.06	10.33		
West Yelland, nr Barnstaple	-	14.91	14.88	8.78	10.49	13.89	11.90		

6.2.2 Road Sources

The technical guidance (DEFRA, 2003) states that the following locations should be assessed for road traffic impacts on concentrations of NO_2: -

(a) narrow congested streets with residential properties close to the kerb;
(b) junctions;
(c) busy streets where people may spend an hour or more close to traffic;
(d) roads with a high flow of buses and / or HGVs;
(e) new roads constructed or proposed since the first round of review and assessment;
(f) roads close to the objective during the first round of review and assessment;
(g) *roads with significantly changed traffic flows.*
(h) *bus stations*

The streets and areas that fall into these categories are identified in Table 1 in Appendix 3. The majority of the areas for assessment were considered at the last review and assessment, and this informed the design of the Nitrogen dioxide diffusion tube survey in the district.

(a) *narrow congested streets with residential properties close to the kerb*

The principle narrow congested streets in North Devon district are Rolle Street, and The Strand both in Barnstaple town centre. Rolle Street is a canyon, with residential property within 4 metres of the kerb; whereas The Strand has large open space down one side of the street, but residential property within 2 metres of the kerb at first floor level.

Rolle Street was assessed at the time of the last review & assessment, but only against the 1-hour objective. North Devon District Council has recently established a monitoring location in Rolle Street, and the provisional result can be seen in Table 6.2.2. When the bias correction factors are applied, the annual mean concentration for 2005 is in the range 36.05-61.20μg/m^3.

The Strand is not subject to diffusion tube monitoring by this Authority. Therefore, assessment of NO_2 at this location was undertaken using the DMRB methodology and the results are given in Table 6.2.4 below.

Full details of the DMRB modelling input and output data are included in Appendix 4.

Table 6.2.4 Nitrogen dioxide DMRB results for Narrow Congested Streets

Location	DMRB Predicted 2005 Annual Mean (μg/m^3)	DMRB Predicted 2010 Annual Mean (μg/m^3)
The Strand, Barnstaple	21.6	16.7
Note – Due to the street canyon nature of these locations (either all or part) then the "road traffic component" of the DMRB output has been multiplied by a factor of 2 to avoid underestimating concentrations and this figure included in the reported predicted results for 2005 and 2010		

(b) *junctions*

Based on supplied traffic data, there are few junctions in North Devon which exceed 10,000 vehicles per day *and* have relevant exposure within 10metres of the kerb. For example, the Mermaid Cross complex of roundabouts has traffic flows in excess of 40,000 vehicles per day, but has no relevant exposure. Robust traffic data exists for The Square in Barnstaple town

centre, and the junction of South Street/Hollowtree Road and Newport Road in the Newport area of Barnstaple.

Nitrogen dioxide concentrations at the junction of South Street/Hollowtree Road and Newport Road are subject to diffusion tube monitoring and this has been considered in section 6.2.1 above. Nitrogen dioxide concentrations at The Square have been subject assessment using the latest DMRB methodology and the results are given in Table 6.2.5 below.

Full details of the DMRB modelling input and output data are included in Appendix 4.

Table 6.2.5 Nitrogen dioxide DMRB results for busy junctions

Location	DMRB Predicted 2005 Annual Mean ($\mu g/m^3$)	DMRB Predicted 2010 Annual Mean ($\mu g/m^3$)
The Square, Barnstaple	33.0	25.1
Note – Due to the street canyon nature of these locations (either all or part) then the "road traffic component" of the DMRB output has been multiplied by a factor of 2 to avoid underestimating concentrations and this figure included in the reported predicted results for 2005 and 2010		

(c) *busy streets where people may spend an hour or more close to traffic*

The main shopping area in Barnstaple is pedestrianised, and in the shopping areas of the other main centres of population in North Devon district, it was considered unlikely that members of the public would regularly spend 1 hour or more exposed in these locations.

There is however an outdoor café on The Strand, as well as a bar with potential for relevant exposure. This location has already been subject to DMRB assessment, and the results are contained in Table 6.2.4 above.

(d) *roads with a high flow of buses and / or HGVs*

Information supplied by Devon County Council indicates that there are no roads in the North Devon District with a HGV flow in excess of 25%.

(e) *new roads constructed or proposed since the first round of review and assessment*

A major new road scheme is proposed for Barnstaple. Planning permission has been granted for a western bypass of the town centre, together with a new bridge over the River Taw downstream of the town centre. The path of the downstream bridge can be seen in outline in Appendix 5.

An air quality assessment using the DMRB methodology was undertaken as part of the scheme's environmental impact assessment. This concluded that although a small number of properties would suffer deterioration in air quality as a result of the new traffic flows, the National Air Quality Standards would not be exceeded at any relevant locations. Furthermore, Devon County Council has predicted the impact of the scheme on existing road links in Barnstaple. These are summarised in Table 6.2.6 below. It is currently projected that the road scheme will be completed and open to traffic by late 2005/early 2006.

Table 6.2.6 Effect of Downstream Bridge Scheme on Traffic Flows in Barnstaple

Location/Road Link	Current AADT	Expected Reduction in Traffic Flow
A361 Rolle Street	20,000	54%
A3125 Longbridge	30,200	23%
The Strand	19,600	48%
Taw Vale	11,000	8%
A3125 Sticklepath	22,300	20%
A361 Inner Relief Road 1 (Alexandra Rd)	24,700	22%
A39 Pilton Causeway	23,400	21%
A361 Eastern Avenue	21,700	22%
South Street	11,900	32%
Data supplied by Devon County Council		

DMRB calculations for the above road links have been undertaken using a 0% traffic growth factor, rather than the expected traffic reduction factors, as this represents a "business as usual" approach with regards the this road scheme, in the event that it is not completed by the 2005 objective.

(f) *roads close to the objective during the first round of review and assessment*

No roads in the North Devon district were considered close to the objective during the first round of review and assessment.

(g) *roads with significantly changed traffic flows*

No roads in North Devon district have experienced traffic flow increases of 25% or more since the last round of review and assessment

(h) *bus stations*

The principal bus station in the North Devon district is Barnstaple Bus Station. There is relevant exposure within 2 metres of the bus station boundary, however information from Devon County Council advises that vehicle slow is significantly less than 1000 buses per day.

6.2.3 Industrial Sources

(a) *new industrial sources*

A Combined Cycle Gas Turbine Power Station is proposed for West Yelland, Barnstaple. This project has been in development for approximately 5 years, and was considered at the last round of review and assessment. Basic emissions modelling determined that potential existed for exceedences of the 1-hour standard.

At the time of the last review and assessment, it was envisaged that the power station would be operational by 2004, however an unfavourable economic climate and significant delay in the planning process means that if constructed the power station would not be operational until

after the 2005 objective. As this project does not have planning permission, detailed assessment of this source against the 2010 objective shall not be undertaken, however should the project progress, then it will be fully considered at the next round of review and assessment.

(b) *industrial sources with substantially increased emissions*

The only industrial source identified in the first round of review and assessment was the potential power station project outlined above, therefore there are no industrial sources with substantially increased emissions in the North Devon district.

6.2.4 Other Sources

(a) *aircraft*

There are no major passenger or freight airports in the North Devon district, and the military airfield does not have substantial numbers of aircraft movements.

6.3 Conclusions

With the exception of the monitoring data for Alexandra Road and Rolle Street, Barnstaple, all sources and locations assessed in the Updating and Screening Assessment for Nitrogen Dioxide do not require detailed assessment.

At both of these two locations however, significant reductions in traffic flow are likely to occur by 2005, and certainly by 2010, as a result of the construction of the Western bypass and Downstream Bridge. The uncorrected annual means in 2005 would fall from 41.92 to approximately 25.82$\mu g/m^3$ at Rolle Street, and 41.37 to approximately 34.74$\mu g/m^3$ at Alexandra Road, based on the year to date monitoring results for 2003.

On this basis it is this Authority's decision not to progress to detailed assessment of these locations at this time. These locations will however be a key element of this Authority's progress reports in 2004 and 2005. Should this North Devon District Council be of the opinion that the Western bypass and Downstream Bridge scheme will not be effective in alleviating traffic flows in these locations, or that its completion will be significantly delayed, then a detailed assessment of Nitrogen dioxide at these locations will be required.

7 Sulphur Dioxide

7.1 Introduction

Sulphur dioxide is a colourless gas with a choking taste, which is a harmful air contaminant and a constituent of winter smog. As it is acidic it corrodes stonework and other materials. Sulphur dioxide is primarily produced by the combustion of fossil fuels containing sulphur e.g. coal and oil.

Sulphur dioxide is an irritant when it is inhaled, because of its acidic nature, and high concentrations may cause breathing difficulties in people exposed to it. Recent studies have shown that people suffering from asthma may be especially susceptible to the adverse effects of sulphur dioxide and that, asthma attacks may be brought on by pollution episodes.

The focus of a review and assessment for the *24-hour mean objective* for sulphur dioxide are the following non-occupational, near ground level outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups may be exposed, such as near schools or hospitals

For the *1-hour mean objective* (see 7.1.1), the focus of the review and assessment for sulphur dioxide shall include any non-occupational, near ground level outdoor locations (including kerbside sites), as short term exposures are likely at these sites. The *15-minute mean objective* is relevant to all outdoor locations where members of the public may be exposed for that period of time.

7.1.1 Standard and Objective for Sulphur dioxide

Pollutant	Concentration Limit	Measured as	Date to be achieved by
Sulphur Dioxide	266μg/m^3 (100ppb) not to be exceeded more than 35 times a year	15 minute mean	31 December 2005
	350μg/m^3 (132ppb) not to be exceeded more than 24 times per year	1-hour mean	31 December 2004
	125μg/m^3 (47ppb) not to be exceeded more than 3 times per year	24-hour mean	31 December 2004

7.1.2 The National Perspective

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

primary source of heating, or what type of solid fuel is used. For the purposes of this assessment it is assumed that all properties identified use coal as their primary source of domestic heating.

Table 7.2.1 – Households Using Solid Fuel

Location	Number of Households burning solid fuel for domestic heating	Area of Town/Village (km^2)	Density per km^2
Barnstaple	426	5	85
Braunton	176	3	59
Ilfracombe	172	3	57
South Molton	101	1.5	67
Note - The parish of Barnstaple is 9km^2 in size, however the majority of the houses located in a central 5km^2 block			

Given the densities predicted for 1km^2 in the towns and villages, it is considered to be highly unlikely that there would be greater than 100 houses burning coal in an area of 500m x 500m in any of these locations, and detailed assessment is not therefore considered necessary.

7.2.4 Boilers

At the last review and assessment, enquiries made of local industry and institutions revealed few combustion systems with a thermal power rating of greater than 5MW, and all those systems identified utilised natural gas as fuel.

7.2.5 Shipping

There are ports at Ilfracombe in North Devon District, and also at Appledore and Bideford in the neighbouring Torridge District. The ports in Torridge District are within 1km of the district boundary, and therefore could present areas of relevant exposure. At all of these ports however there are no movements of large ships, therefore there is no need for detailed assessment of this source.

7.2.6 Railway Locomotives

There is one railway line through the North Devon district from Exeter, with stops at Kings Nympton, Portsmouth Arms, Umberleigh and Chapelton, before terminating at Barnstaple. There are no goods stops or depots along this line.

The majority of the route is through open countryside, following the route of the River Taw through the district, with no public exposure to stationary locomotive engines, including at signals. Timetable assessment has indicated that there is not likely to be relevant exposure at any of the stations with the exception of the Barnstaple terminus. At Barnstaple, the timetable has indicated that up to 4 times a day there is an interval of 15 minutes or greater between train arrival and departure, where locomotives may idle adjacent to the platform before making the return journey to Exeter.

Observations made at the station have revealed that trains are stopped at the platform with their engines idling on a minimum of 3 occasions every weekday for periods of greater than 15 minutes. The train engines are only switched off when the train is timetabled to stay at the

station for 44 minutes, and even then it is likely that the 15-minute period is frequently exceeded when the engine idling time after arrival and before departure are aggregated.

7.3 Conclusions

For the majority of potentially significant sources of sulphur dioxide in the North Devon district, there is no need to progress to a detailed assessment. The idling of trains at Barnstaple Railway Station however has been identified as having the potential to result in an exceedence of the 15minute mean objective for sulphur dioxide. A detailed assessment of this source is therefore required.

8 Particles (PM_{10})

8.1 Introduction

PM_{10} is the name given to particulate matter below 10 μm in diameter. Particles below 10 μm have a larger probability of penetrating further into the delicate region of the lung where respiration occurs, where they may cause damage. Here the pollutant is described by its physical character rather than by its chemical composition, therefore this particulate matter can be derived from a wide variety of sources, and be either solid or liquid particles

The focus for a review and assessment for PM_{10} are the following non-occupational outdoor locations:

- background locations
- roadside locations (sites close to the façade of a building)
- other locations where potentially significant groups might be exposed, such as schools or hospitals
- gardens of residential properties (24 hour mean only)

8.1.1 Standard and Objective for PM_{10}

Pollutant	Concentration Limit	Measured as	Date to be achieved by
PM_{10}	50μg/m³ not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40μg/m³	annual mean	31 December 2004

8.1.2 The National Perspective

There is a wide range of emission sources that contribute to PM_{10} concentrations in the UK. These can usually be divided into 3 main source categories:

- *Primary Combustion Particles* – particles emitted directly from combustion sources such as road traffic, power generation, industrial combustion processes etc. These particles are generally less than 2.5 μm and often well below 1 μm in diameter.
- *Secondary Particles* – particles formed in the atmosphere following their release in the gaseous phase. These include sulphates and nitrates, formed from emissions of SO_2 and NO_x; these particles are again generally less than 2.5 μm in diameter;
- *"Coarse" or "Other" Particles* – the so-called "coarse" or "other" particles component comprises of emissions from a wide range of non-combustion sources. These include resuspended dust from road traffic, construction and mineral extraction processes, wind-

(b) junctions

There are 3 busy junctions in the district with road traffic flows greater than 10,000 vehicles per day, and relevant exposure within 10 metres of the kerb. PM_{10} concentrations at these locations have been subject to assessment using the latest DMRB methodology and the results are given in Table 8.2.5 below.

Full details of the DMRB modelling input and output data are included in Appendix 4.

Table 8.2.1 PM_{10} DMRB results for busy junctions

Location	DMRB Predicted 2004 Annual Mean (µg/m³)	Number of 24-hour Exceedences
The Square, Barnstaple	23.0	8
Newport Road/South Street, Barnstaple	19.4	3
The Square, Braunton	19.72	3

(c) *roads with a high flow of buses and / or HGVs*

Information supplied by Devon County Council indicates that there are no roads in the North Devon District with a HGV flow in excess of 20%.

(d) *new roads constructed or proposed since the first round of review and assessment*

A major new road scheme is proposed for Barnstaple. Planning permission has been granted for a western bypass of the town centre, together with a new bridge over the River Taw downstream of the town centre. The path of the downstream bridge can be seen in outline in Appendix 5.

An air quality assessment using the DMRB methodology was undertaken as part of the scheme's environmental impact assessment. This concluded that although a small number of properties would suffer deterioration in air quality as a result of the new traffic flows, the National Air Quality Standards would not be exceeded at any relevant locations. Furthermore, Devon County Council has predicted the impact of the scheme on existing road links in Barnstaple. These are summarised in Table 6.2.6. It is currently projected that the road scheme will be completed and open to traffic by late 2005/early 2006.

(e) roads close to the objective during the first round of review and assessment

No roads were considered to be close to exceeding the objective for PM_{10} during the last round or review and assessment.

(f) roads with significantly changed traffic flows

No roads in North Devon district have experienced traffic flow increases of 25% or more since the last round of review and assessment

blown dusts and soils, and sea salt. These particles are generally greater than 2.5 μm in diameter.

There are a number of reasons why it is important to bear in mind the different source categories and their respective contributions to PM_{10} concentrations, within the review and assessment process, principally: -

(a) The expected reduction in particle emissions in future years is different for each type of source e.g. emissions from road transport will be governed by new legislation on vehicle emission standards; 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 Europe.

(b) The principal focus of Local Air Quality Management is the control of emissions at a local level. It is therefore important that the review and assessment process identifies the contribution of local emission sources, so that the effectiveness of control policies or action plans can be evaluated.

A significant proportion of current annual mean PM_{10} is derived from regional (including long distance transport from Europe) background sources. The exact regional background contribution at any site is variable, and is dependent upon the precise geographic location. Local authorities are therefore encouraged to focus their efforts on the identification of the contribution of local sources to overall PM_{10} concentrations.

8.2 Updating and Screening Assessment of Pm_{10} in North Devon

8.2.1 Monitoring

No monitoring of PM_{10} concentrations has been undertaken in the North Devon district since the last round of review and assessment, and the data obtained before that time is not considered to be sufficiently robust for use in a review and assessment of PM_{10}.

8.2.2 Road Traffic

The technical guidance (DEFRA, 2003) states that the following sources locations and data should be assessed for road traffic impacts on concentrations of PM_{10}: -

(a) busy roads and junctions in Scotland;
(b) junctions;
(c) roads with high flow of buses and/or HGVs;
(d) new roads constructed or proposed since the last round of review and assessment;
(e) roads close to the objective during the last round of review and assessment;
(f) roads with significantly changed traffic flows.

The roads and junctions assessed are outlined in Appendix 3.

(a) busy roads and junctions in Scotland

This does not apply to the review and assessment of PM_{10} in North Devon

8.2.3 Industrial Sources

(a) *new industrial sources*

No new industrial sources with the potential to impact upon PM_{10} concentrations have been constructed or proposed since the last round of review and assessment.

(b) *industrial sources with substantially increased emissions*

There are no industrial sources with substantially increased emissions in the North Devon district.

8.2.4 Domestic Sources

(a) Areas of domestic solid fuel burning

Solid fuel burning for domestic heating can potentially cause exceedences of the objective in areas where it is still a major heating source. Areas of significant coal burning are those where there are more than 50 houses burning solid fuels as their primary source of heating in an area of 500m x 500m.

Information provided to this Authority by domestic occupiers identified 11 towns and villages in North Devon where more than 50 houses utilise solid fuel for heating. This information is limited in that it does not state if the solid fuel is the primary source of heating, or what type of solid fuel is used. For the purposes of this assessment it is assumed that all properties identified use coal as their primary source of domestic heating.

Technical Guidance LAQM.TG(03) contains a nomogram to determine the risk of exceeding the objective. This nomogram requires the density of effective coal burning houses for an area of 500m x 500m to be plotted against the 2004 annual mean PM_{10} background concentration. The maximum 2004 annual mean PM_{10} background concentration in North Devon is estimated at 16.6$\mu g/m^3$. For a small village, this equates to density of approximately 440 effective coal-burning houses in a 500m x 500m area, and in a small town, a density of 300.

In calculating the density of effective coal burning houses in the areas identified for assessment, it was assumed that all solid fuel houses were located within 1km^2 or the appropriate smaller area, and that open space was calculated from the most densely packed 500m x 500m area in the town or village. The calculated density of effective coal burning houses for each town and village assessed is contained in Table 8.2.2 below, along with its representative area type description.

Table 8.2.2 shows that the maximum calculated density for a small town is 142 in Barnstaple, and for a small village, 152 in Witheridge. Both of these figures are significantly lower than the threshold densities above, therefore there is no need to progress to a detailed assessment for PM_{10} form this source.

Table 8.2.2 – Calculated Effective Coal Burning Densities

Location	Density of Effective Coal Burning Households	Representative Area Type
Barnstaple	142	Small Town
Braunton	59	Small Town
Chulmleigh	36	Small Village
Combe Martin	20	Small Village
Ilfracombe	54	Small Town
Lynton	67	Small Village
South Molton	36	Small Town
Bratton Fleming	136	Small Village
Landkey	56	Small Village
North Molton	60	Small Village
Witheridge	152	Small Village

8.2.5 Other Sources

(a) Quarries, landfill sites, opencast coal mining & handling of dusty cargoes at ports

There are 3 operational quarries in the North Devon District. These are: -

- Aggregate Industries, Venn Quarry, Landkey, Barnstaple
- Hanson Aggregates, Brayford Quarry, Brayford, Barnstaple
- Hanson Aggregates, Barton Wood Quarry, Charles, South Molton

The estimated 2004 annual mean background at all of these sites is less than 26μg/m^3. Consequently, relevant exposure has been assessed within 200m of sources of dust emission, and it was determined there is no relevant exposure at Brayford Quarry.

Barton Wood Quarry is due to cease production before the 2004 objective is reached; however it will then become the overburden tip for the nearby Brayford Quarry. The route of the planned haul road between the two sites may result in relevant exposure, however based on previous experience with these sites, it is unlikely that this will give rise to dust emission concerns.

At Venn Quarry, the primary crusher and some haul roads are within 200m of the boundary of the nearest relevant location. There have been no recent complaints to this Authority or the Quarry itself concerning dust emissions from the quarry. There fore it is not considered necessary to proceed to a detailed assessment for this source.

(b) Aircraft

There are no major passenger or freight airports in the North Devon district, and the military airfield does not have substantial numbers of aircraft movements.

8.3 Conclusions

As there are no significant road traffic, industrial, or domestic sources of PM_{10} in the North Devon district, a detailed assessment for PM_{10} is not required.

9. Summary of Assessment Conclusions

Carbon Monoxide

There is no need to progress to a detailed assessment for carbon monoxide

Benzene

There is no need to progress to a detailed assessment for benzene

1,3-butadiene

There is no need to progress to a detailed assessment for 1,3-butadiene

Lead

There is no need to progress to a detailed assessment for lead

Nitrogen Dioxide

A detailed assessment for nitrogen dioxide will not be undertaken, as a major road scheme will produce significantly reduced traffic flows in the vicinity of relevant locations by the objective date.

Sulphur Dioxide

A detailed assessment of sulphur dioxide emissions from stationary trains is required. No other sources of sulphur dioxide require a detailed assessment.

PM_{10}

There is no need for a detailed assessment of PM_{10}.

Appendix 1

List of Consultees for the Purposes of Local Air Quality Management

- DEFRA;
- Environment Agency Devon Area Office;
- Devon County Council;
- All neighbouring Local Authorities: -
  - Mid Devon District Council;
  - Torridge District Council;
  - West Somerset District Council;
- North Devon Primary Care Trust;
- Exmoor National Park Authority

Appendix 2

Prescribed Processes Authorised to Operate in the Administrative Area of North Devon District Council

The following table details the Part B processes operating within this Council's administrative area on 1st April 2003. Those processes with the potential to emit significant quantities of the specified substances to air (based on DETR Pollutant Specific Guidance LAQM.TG(03), are marked by an "✔" under that pollutant.

PROCESS (PG Note)	COMPANY	REF. NO.	BENZENE	1,3-BUTADIENE	LEAD	CARBON MONOXIDE	SULPHUR DIOXIDE	NITROGEN DIOXIDE	PM_{10}
Waste Oil Combustion (1/1)	Bob Tucker Motors, Barnstaple	EPA/91/50							
	Central Park Garage South Molton	EPA/91/13							
	Colin John Cars Ilfracombe	EPA/91/16							
	Granville Garage Lynton	EPA/91/17							
	Jubilee "77" Garage Ilfracombe	EPA/91/10							
	Michael Tucker Garage, South Molton	EPA/91/11							
	Midway Motors Yelland	EPA/91/25							
	Smallridge Bros. Tawstock	EPA/91/34							
	Vicarage Lawn Garage, Barnstaple	EPA/91/18							
	Glen Lyn Garage, Combe Martin	EPA/91/55							
	Woodside Garage Bishops Nympton	EPA/91/39							

PROCESS (PG Note)	COMPANY	REF. NO.	BENZENE	1,3-BUTADIENE	LEAD	CARBON MONOXIDE	SULPHUR DIOXIDE	NITROGEN DIOXIDE	PM_{10}
Unloading of Petrol (1/14)	Barbrook Services, Lynton	PVR/98/1							
	Chivenor Cross Garage, Chivenor	PVR/98/3							
	Cox of Devon, Barnstaple	PVR/98/4							
	Ilfracombe Service Station, Ilfracombe	PVR/98/7							
	Coastline Auto Repairs, Mortehoe	PVR/98/8							
	Oasis Service Station, Braunton	PVR/98/20							
	Orchard Self Serve, Braunton	PVR/98/9							
	Pilton Bridge Garage, Barnstaple	PVR/98/10							
	Rogers Garage, South Molton	PVR/98/12							
	Roundswell Services, Barnstaple	PVR/98/13							
	J Sainsbury PLC Barnstaple	PVR/98/19							
	Tesco Petrol Filling Station, Barnstaple	PVR/98/14							
	Taw Garage Service Station, Barnstaple	PVR/98/16							
	Sticklepath Service Station, Barnstaple	PVR/98/17							
	West End Service Station, Barnstaple	PVR/98/18							

PROCESS (PG Note)	COMPANY	REF. NO.	BENZENE	1,3-BUTADIENE	LEAD	CARBON MONOXIDE	SULPHUR DIOXIDE	NITROGEN DIOXIDE	PM_{10}
Unloading of Petrol (1/14)	Murco Petroleum, Umberleigh	PVR/98/22							
	South Lea Service Station, South Molton	PVR/98/23							
	Woodside Garage, South Molton	PVR/98/24							
	Evoco Petroleum, Combe Martin	PVR/98/26							
	Braunton Service Station, Braunton	PVR/98/27							
Aluminium and Aluminium Alloys (2/6)	Cronite Alkast, Barnstaple	EPA/91/24			✔				
	Investacast Machinery, Ilfracombe	EPA/91/31			✔				
Bulk Cement (3/1)	Hanson Aggregates Premix, Barnstaple	EPA/91/23							
	Hanson Aggregate Blocks, South Molton	EPA/91/32							
	RMC (South West), Landkey	EPA/91/29							
Quarry Processes (3/8)	Hanson Aggregates, Brayford	EPA/91/27							✔
	Hanson Aggregates, Charles	EPA/91/33							✔
	Aggregate Industries, Landkey	EPA/91/31							✔

PROCESS (PG Note)	COMPANY	REF. NO.	BENZENE	1,3-BUTADIENE	LEAD	CARBON MONOXIDE	SULPHUR DIOXIDE	NITROGEN DIOXIDE	PM_{10}
Mobile Crushing (3/16)	Warwick Contractors, Barnstaple	EPA/91/56							
Crematoria (5/2)	North Devon Crematorium, Barnstaple	EPA/91/4							
Wood Products Manufacture (6/2)	Rawle Gammon & Baker, Chapelton	EPA/91/58							
	Leaderflush + Shapland, Barnstaple	EPA/91/4							
	Barnstaple Industrial Services, Barnstaple	EPA/91/22							
Manufacture of Particleboard (6/4)	Nexfor Ltd., South Molton	EPA/91/6							
Animal Feed Compounding (6/26)	EJ Snell & Sons, Week, Harracott	EPA/91/43							
	JGW Thomas & Son, Atherington	EPA/91/36							
Di-isocyanate process (6/29)	Clarks International, Barnstaple	EPA/91/38							
Adhesive Coating (6/32)	Clarks International, Barnstaple	EPA/91/46							
Wood Coating (6/33)	Leaderflush + Shapland, Barnstaple	EPA/91/47							
Respraying of Road Vehicles (6/34)	South West Collision Repair, Barnstaple	EPA/91/41							

Part A Authorised Processes

There are currently no Part A Authorised Processes operational within the administrative area of North Devon District Council. There are however two Part A processes located within the administrative area of the neighbouring Torridge District Council. Only one of these processes emits specified pollutants (Sulphur dioxide and Nitrogen dioxide), and enquiries made of Torridge District Council have revealed that this process is unlikely to have an impact on the concentrations of those pollutants in North Devon.

The current regime under the Environmental Protection Act 1990 is being phased out and replaced by powers under the Pollution Prevention and Control Regulations 2000. Between 2003 and 2006, all existing Authorisations to operate must be reissued as Permits under the Pollution Prevention and Control legislation. Furthermore, some current Part B processes are being upgraded to what is known as A(2) status. These are larger industrial installations that will be subject to pollution controls on water, land, waste, and energy, as well as air. In the North Devon District, the particleboard plant operated by Nexfor Ltd. at Hill Village, South Molton will be subject to A(2) regulation, however this change in regulation does not influence this site's impact on local air quality.

Appendix 3

Streets and Areas in the North Devon District Assessed for Road Traffic Impacts on Concentrations of Nitrogen Dioxide

Street/Area	Narrow congested street	Busy junction	Busy streets, with people exposed for >1 hour	High Bus/HGV flow	New Roads	Roads close to objective at last R&A	Significant change in traffic flow
Rolle Street	✔	✔			✔		
Longbridge		✔			✔		
The Strand	✔	✔			✔		
Taw Vale		✔					
Sticklepath Hill					✔		
Alexandra Road					✔		
Pilton Causeway	✔	✔			✔		
South Street	✔	✔			✔		
A361 Ashford							

The above locations are those where traffic data was available, and the annual average daily traffic flow was in excess of 10,000 vehicles per day

Appendix 4

DMRB Input and Output Data

The following pages contain copies of the Input and Output screens from version 1.01 of the DMRB model spreadsheet. The Input and Output screens for each location assessed using the DMRB model have been included.

Background concentrations used are estimated annual mean concentrations based on 1km x1km grid squares. This data can be accessed from the internet at the following address www.airquality.co.uk/archive/laqm/tools.php All background measurements used have been taken from the relevant 1km grid square corresponding to the relevant location.

Traffic flow data and statistics have been obtained from the document, Devon Local Transport Plan 2001-2006 – Travel and Transportation Statistics for Devon; Devon County Council (September 2002). Where the necessary data was not in this document, further location specific traffic data was obtained from Devon County Council. All traffic flows are expressed as Annual Average Daily Flows (AADT).

For the purposes of this Updating and Screening Assessment, road traffic growth factors have not been used to forward estimate traffic flows for the relevant objective years. This decision has been taken in light of the significant impact that the Western Bypass Scheme is likely to have on traffic flows in Barnstaple and the surrounding area. Therefore a "business as usual" approach has been taken in this assessment, rather than calculate emissions based on the estimated traffic growth or reduction figures.

Appendix 5

Maps

Map 1 – Road Traffic Levels in Barnstaple, including Downstream Bridge Plan

Legend

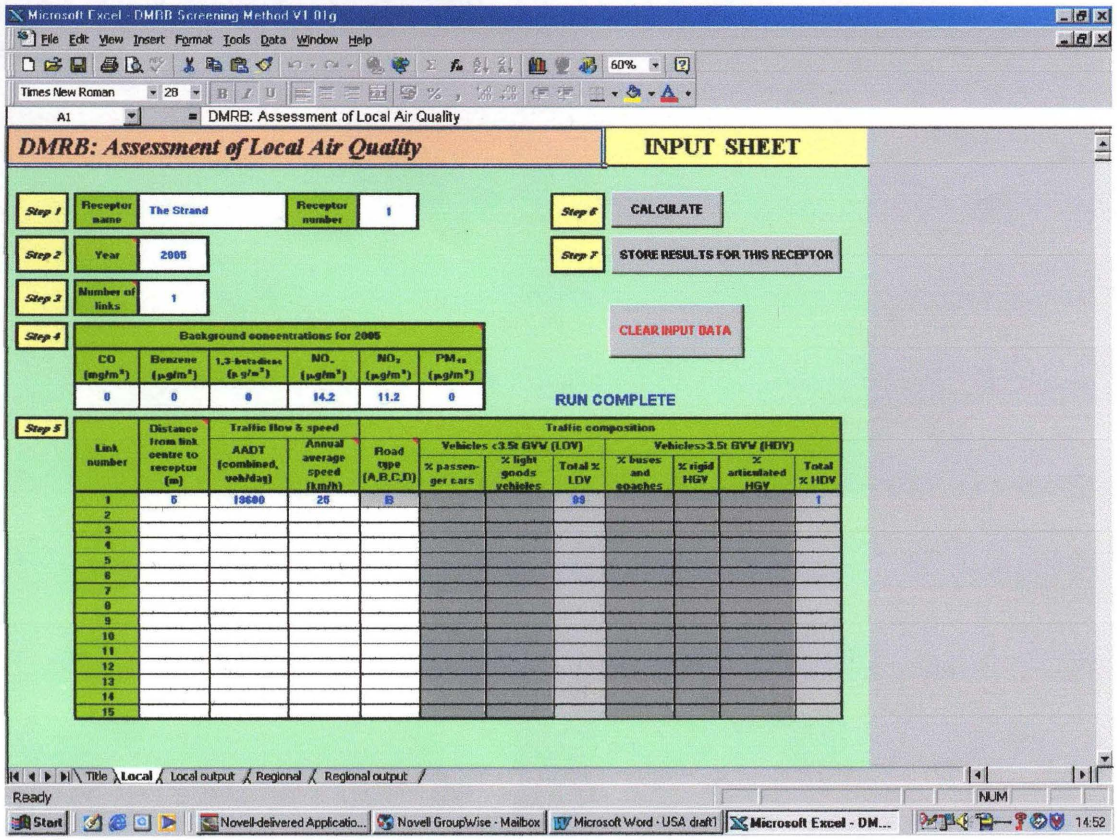
Blue line	=	10,000-19,999 AADT
Yellow line	=	20,000-29,999 AADT
Green line	=	30,000-39,999 AADT
Red line	=	40,000+ AADT

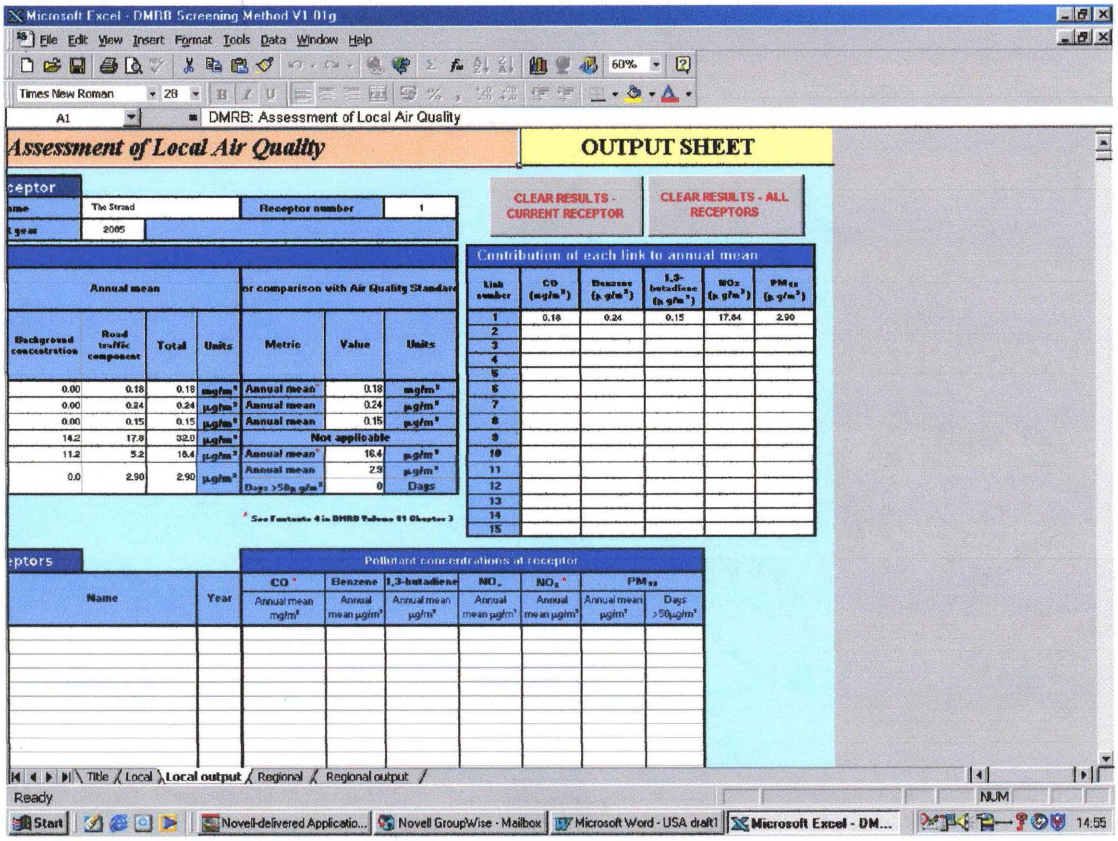
Map 2 – Nitrogen Dioxide Monitoring Locations in Barnstaple

Legend

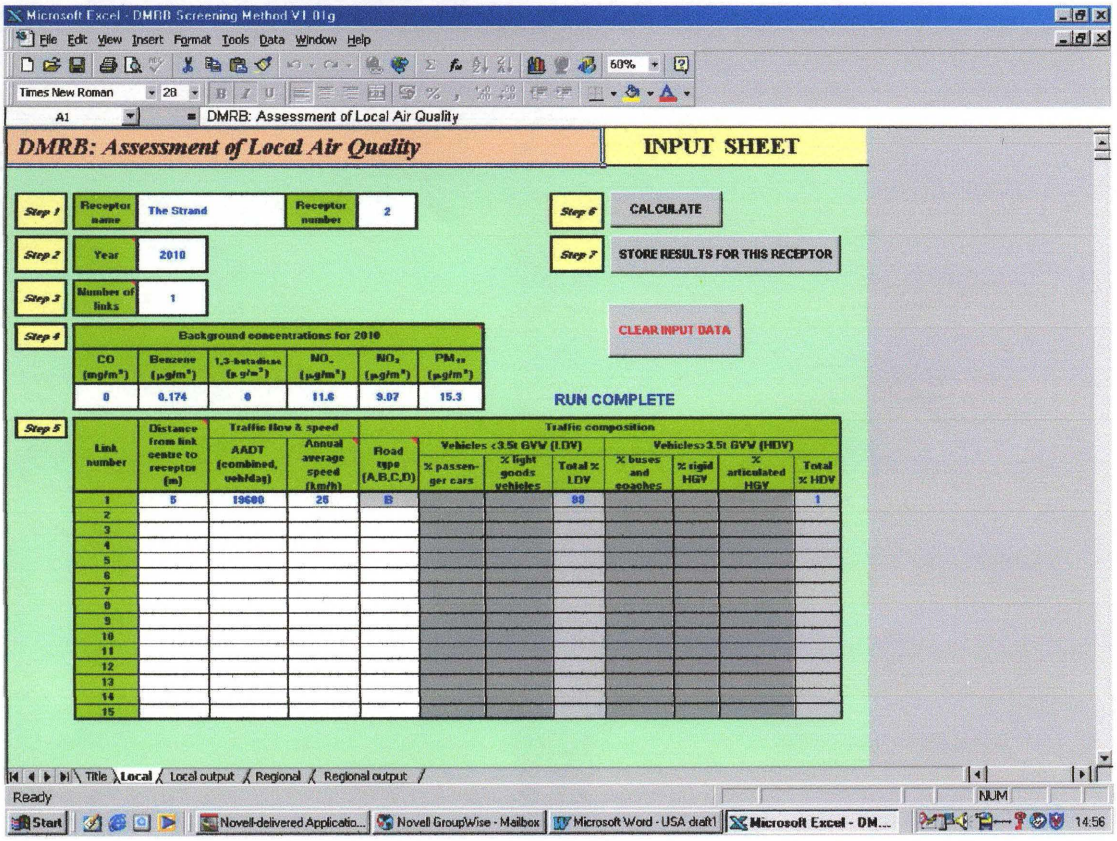
Red dot	=	Roadside monitoring location
Yellow dot	=	Intermediate monitoring location
Green dot	=	Background monitoring location

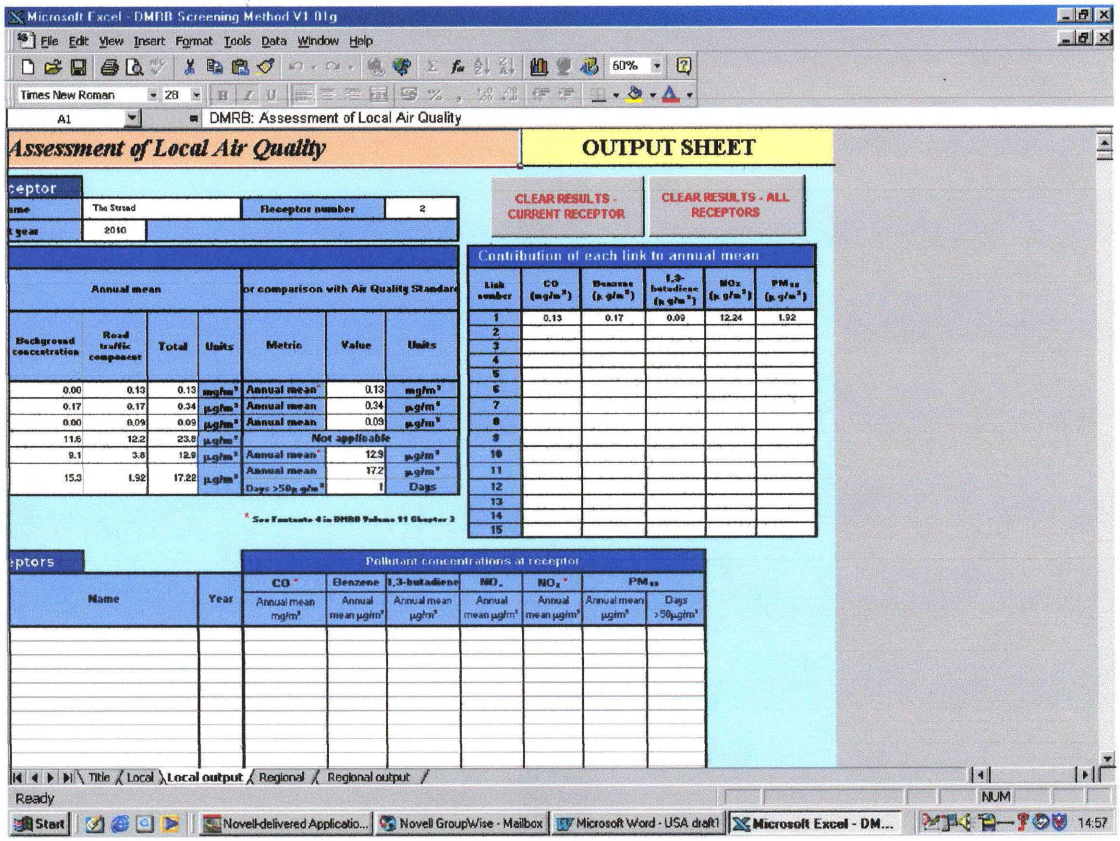
Nitrogen Dioxide – The Strand (2005)



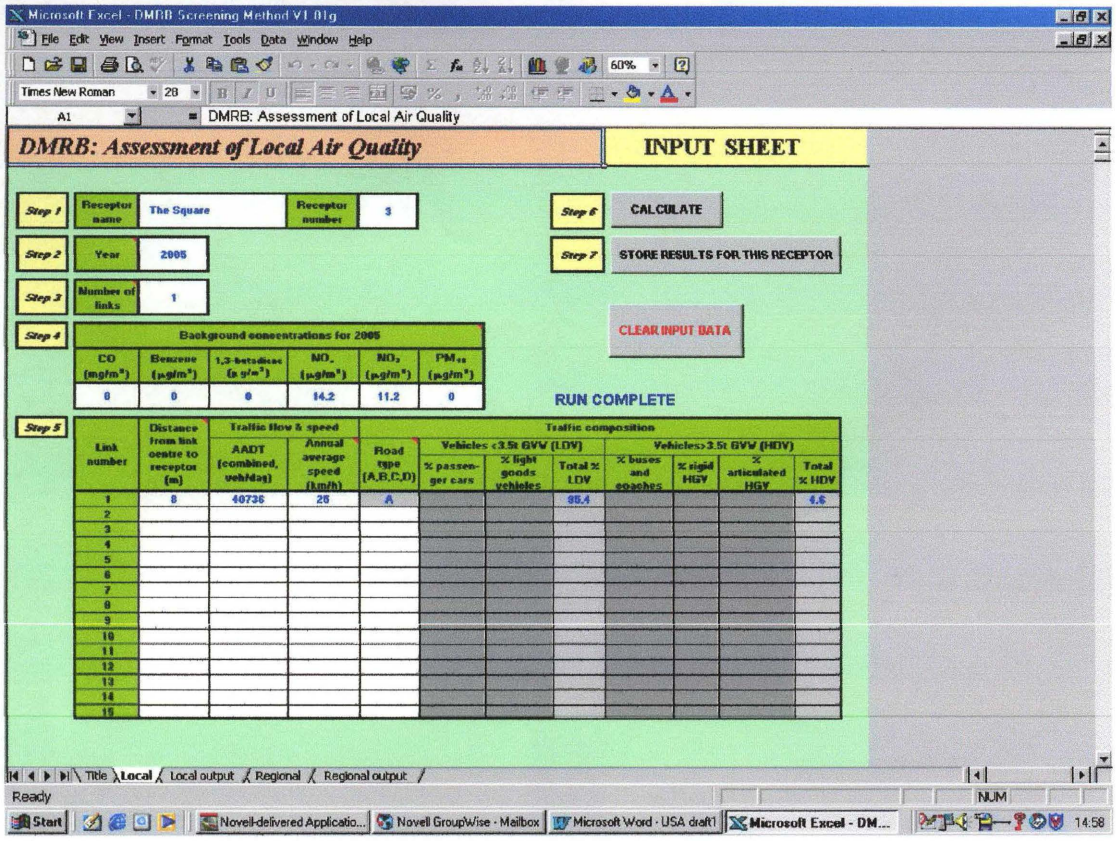


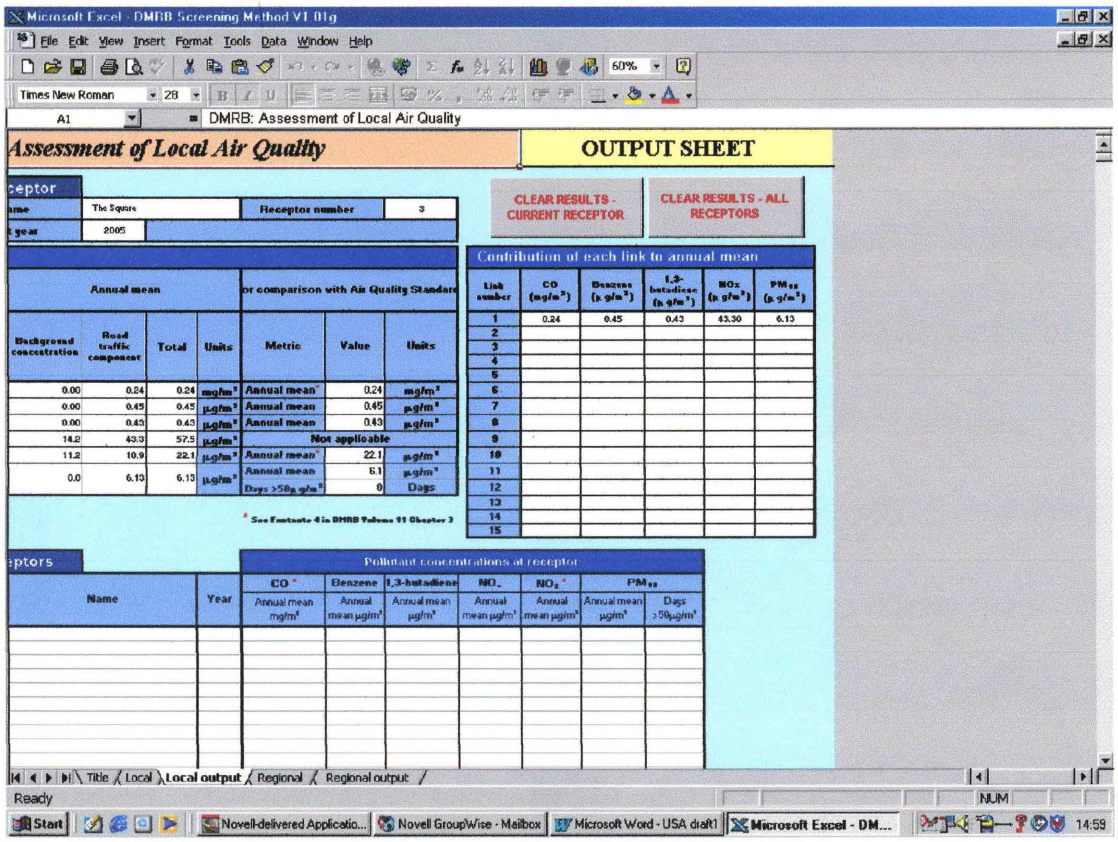
Nitrogen Dioxide – The Strand (2010)



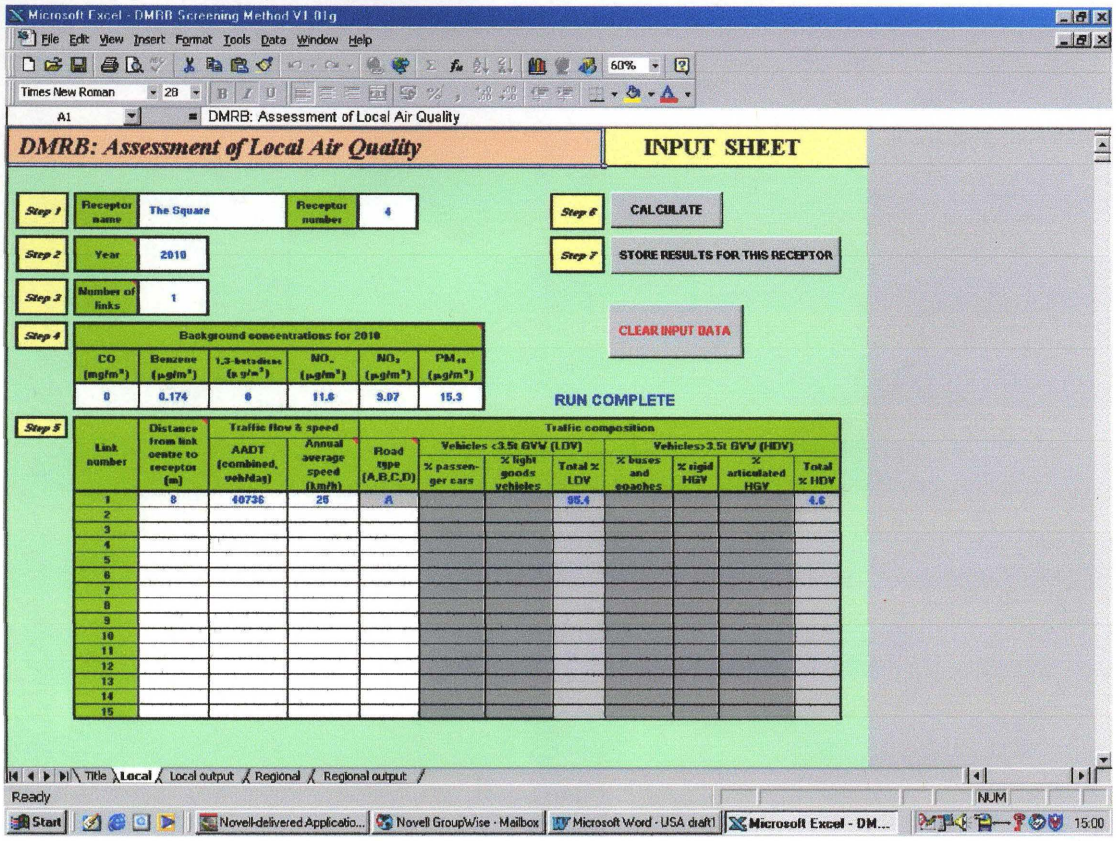


Nitrogen Dioxide – The Square (2005)





Nitrogen Dioxide – The Square (2010)



Microsoft Excel - DMRB Screening Method V1 01g

File Edit View Insert Format Tools Data Window Help

Times New Roman 28 60%

A1 = DMRB: Assessment of Local Air Quality

DMRB: Assessment of Local Air Quality — **INPUT SHEET**

Step 1 — Receptor name: The Square — Receptor number: 4

Step 2 — Year: 2010

Step 3 — Number of links: 1

Step 4 — Background concentrations for 2010

CO (mg/m³)	Benzene (µg/m³)	1,3-butadiene (µg/m³)	NO_x (µg/m³)	NO_2 (µg/m³)	PM_{10} (µg/m³)
0	0.174	0	11.6	9.07	15.3

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed: AADT (combined, veh/day)	Traffic flow & speed: Annual average speed (km/h)	Traffic composition: Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV): % passenger cars	% light goods vehicles	Total % LDV	Vehicles>3.5t GVW (HDV): % buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	8	40736	25	A			95.4				4.6
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

Step 6 — CALCULATE

Step 7 — STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

RUN COMPLETE

Title | Local | Local output | Regional | Regional output

Ready NUM

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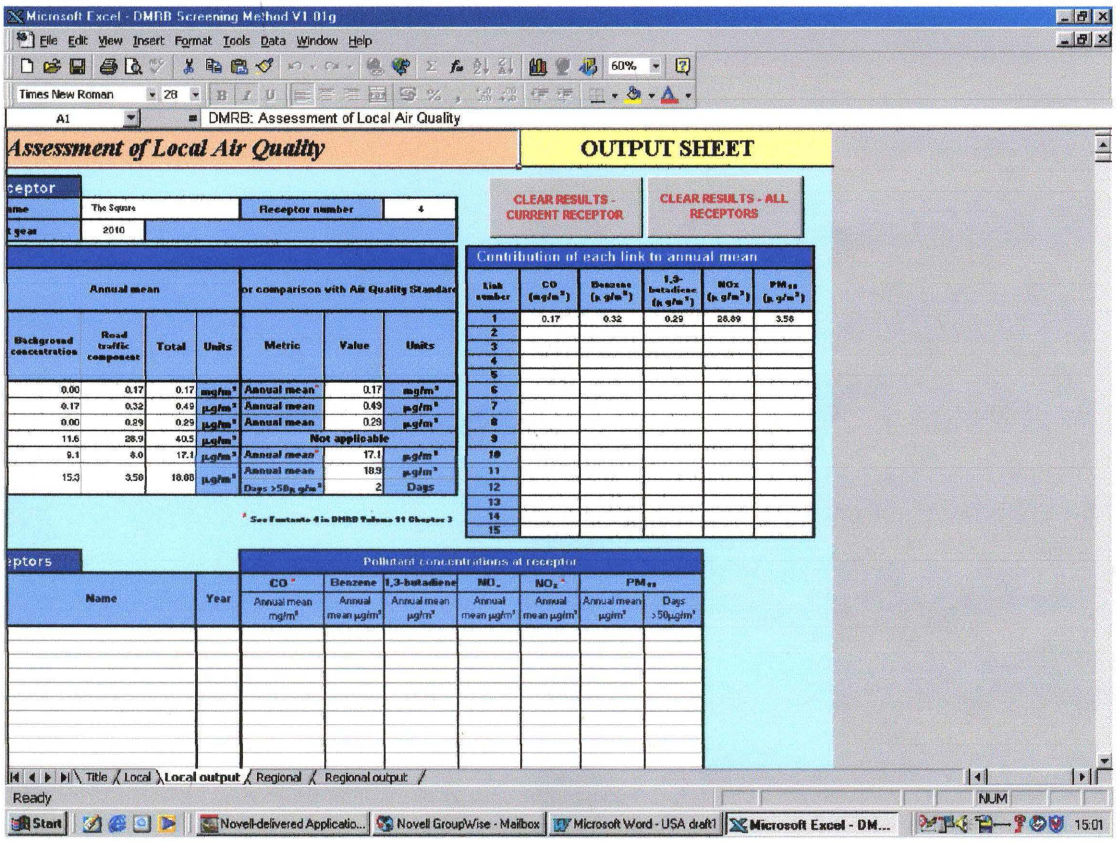


Microsoft Excel - DMRB Screening Method V1 01g

File Edit View Insert Format Tools Data Window Help

Times New Roman 28 60%

A1 = DMRB: Assessment of Local Air Quality

Assessment of Local Air Quality — **OUTPUT SHEET**

ceptor

name: The Square — Receptor number: 4

t year: 2010

CLEAR RESULTS - CURRENT RECEPTOR

CLEAR RESULTS - ALL RECEPTORS

Annual mean

Background concentration	Road traffic component	Total	Units
0.00	0.17	0.17	mg/m³
0.17	0.32	0.49	µg/m³
0.00	0.29	0.29	µg/m³
11.6	28.9	40.5	µg/m³
9.1	8.0	17.1	µg/m³
15.3	3.58	18.88	µg/m³

for comparison with Air Quality Standard

Metric	Value	Units
Annual mean*	0.17	mg/m³
Annual mean	0.49	µg/m³
Annual mean	0.29	µg/m³
Not applicable		
Annual mean*	17.1	µg/m³
Annual mean	18.9	µg/m³
Days >50µg/m³	2	Days

* See footnote 4 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m³)	Benzene (µg/m³)	1,3-butadiene (µg/m³)	NO_x (µg/m³)	PM_{10} (µg/m³)
1	0.17	0.32	0.29	28.89	3.58
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

eptors

Pollutant concentrations at receptor

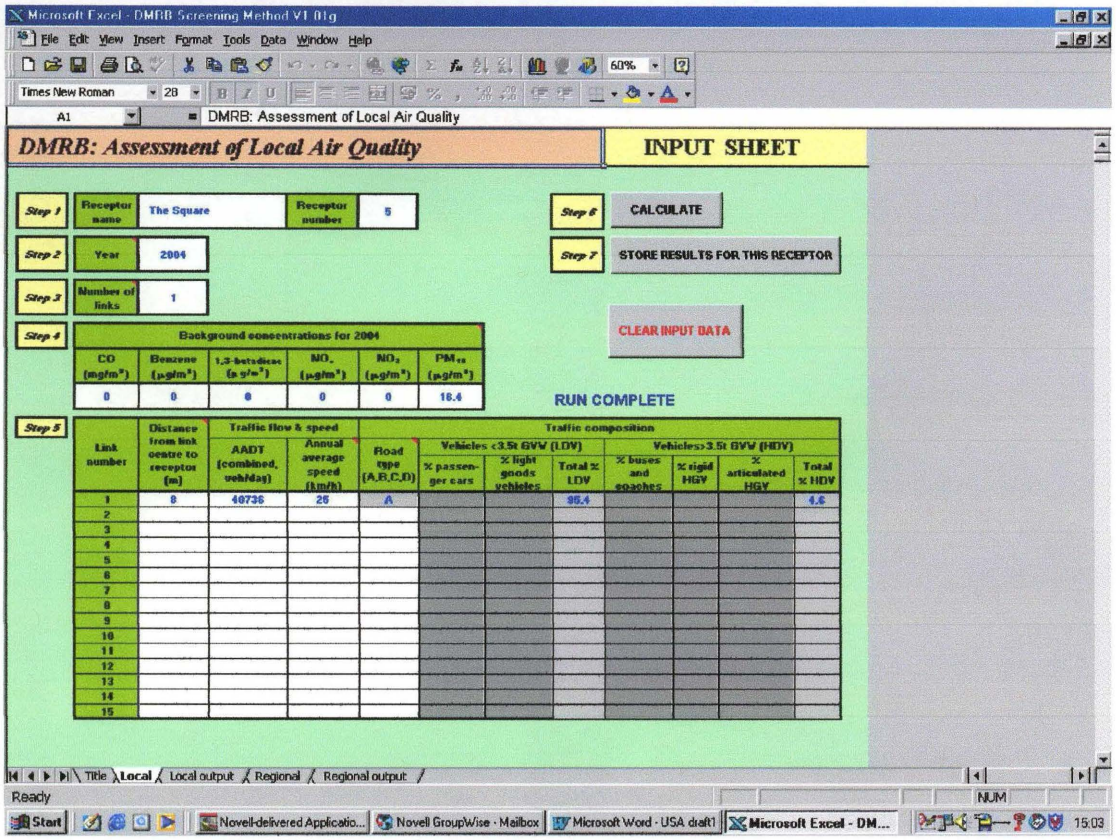
Name	Year	CO* Annual mean mg/m³	Benzene Annual mean µg/m³	1,3-butadiene Annual mean µg/m³	NO_x Annual mean µg/m³	NO_2* Annual mean µg/m³	PM_{10} Annual mean µg/m³	PM_{10} Days >50µg/m³

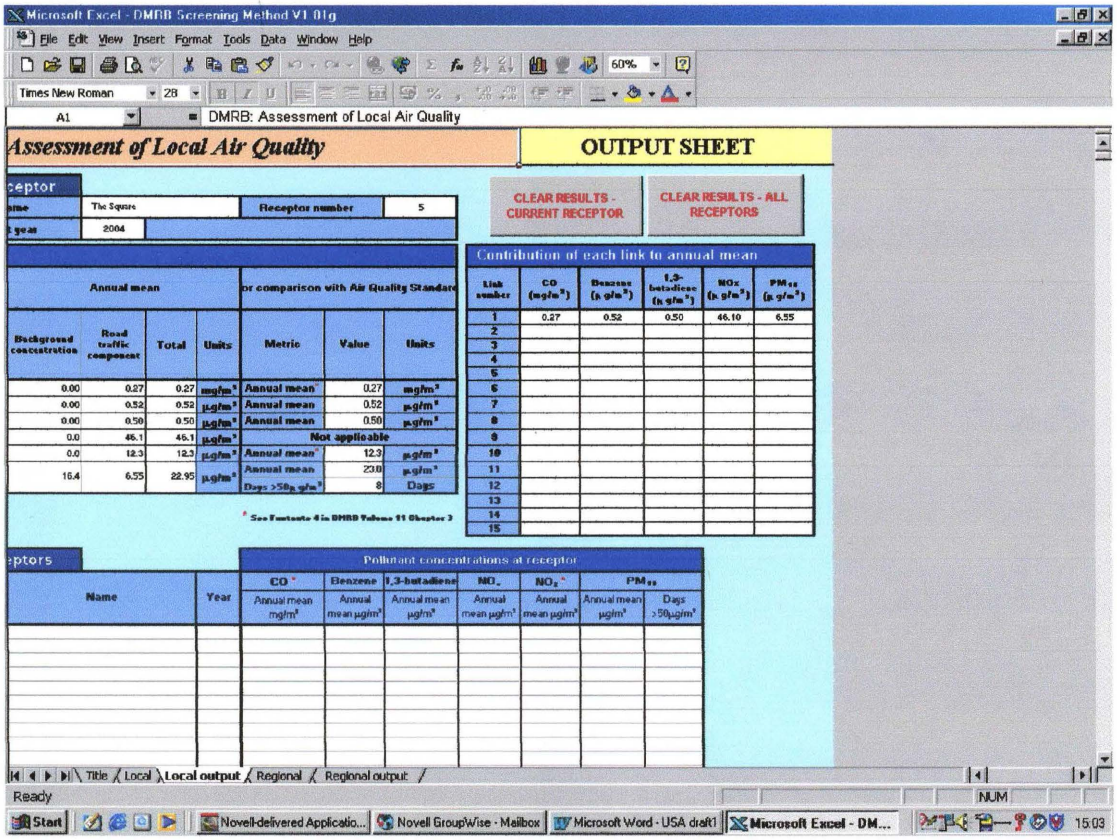
Title | Local | Local output | Regional | Regional output

Ready NUM

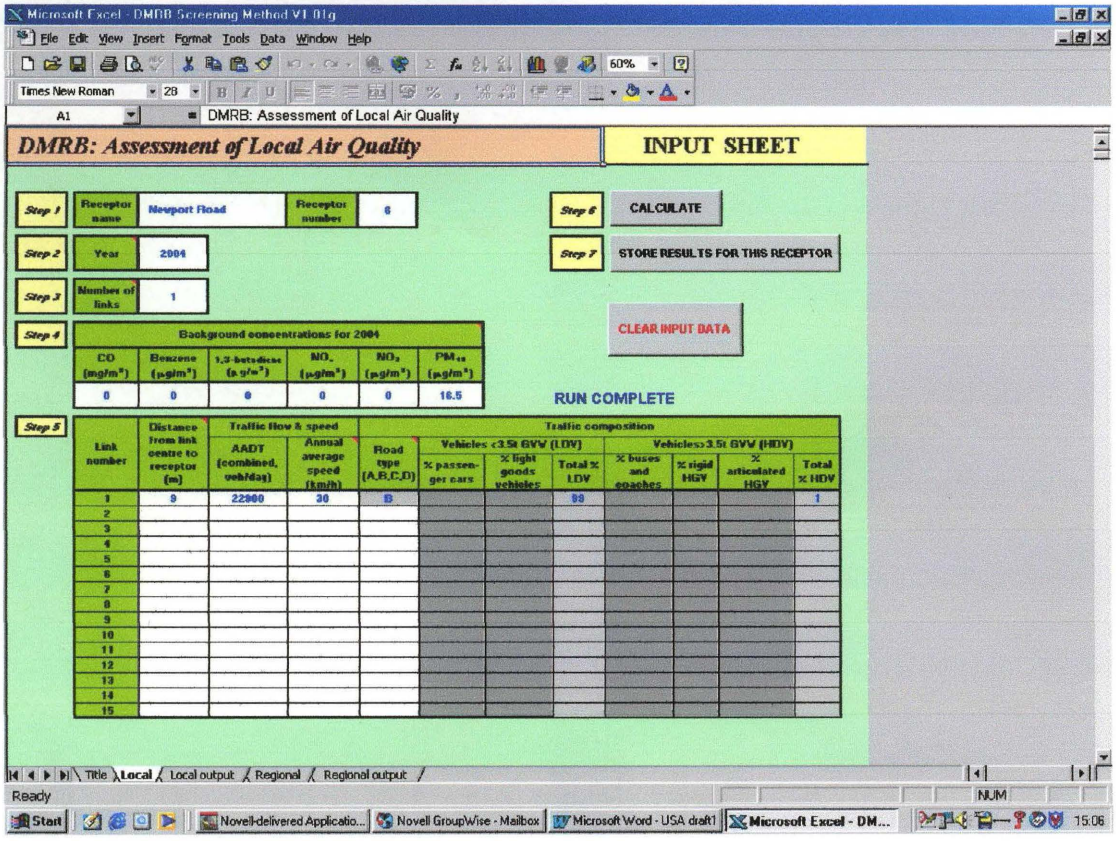
Start | Novell-delivered Applicatio... | Novell GroupWise - Mailbox | Microsoft Word - USA draft1 | Microsoft Excel - DM... | 15:01

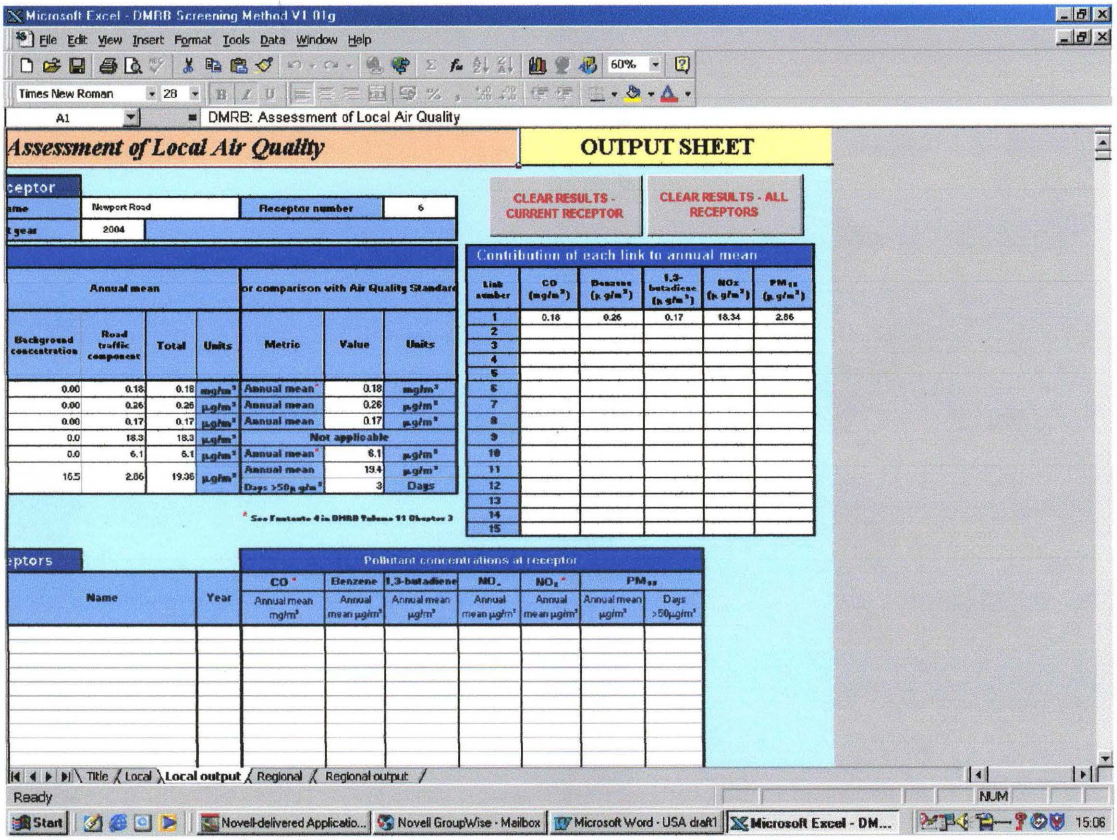
PM_{10} – The Square (2004)



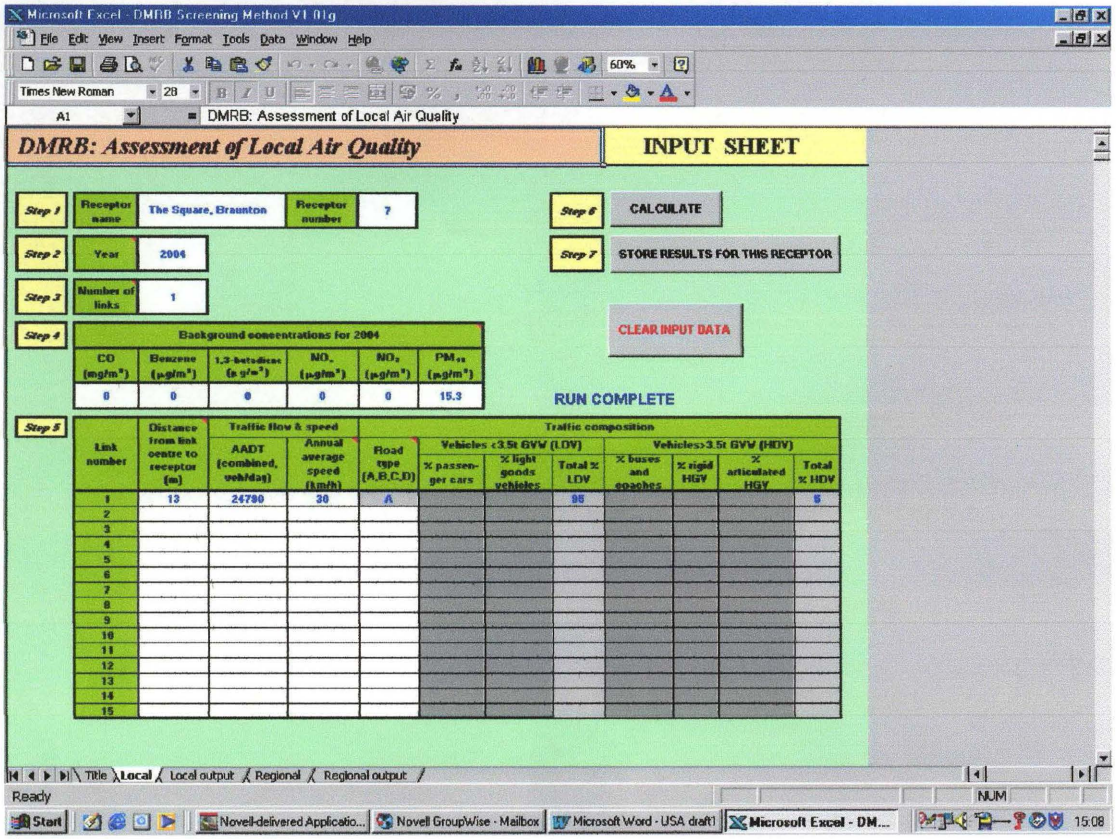


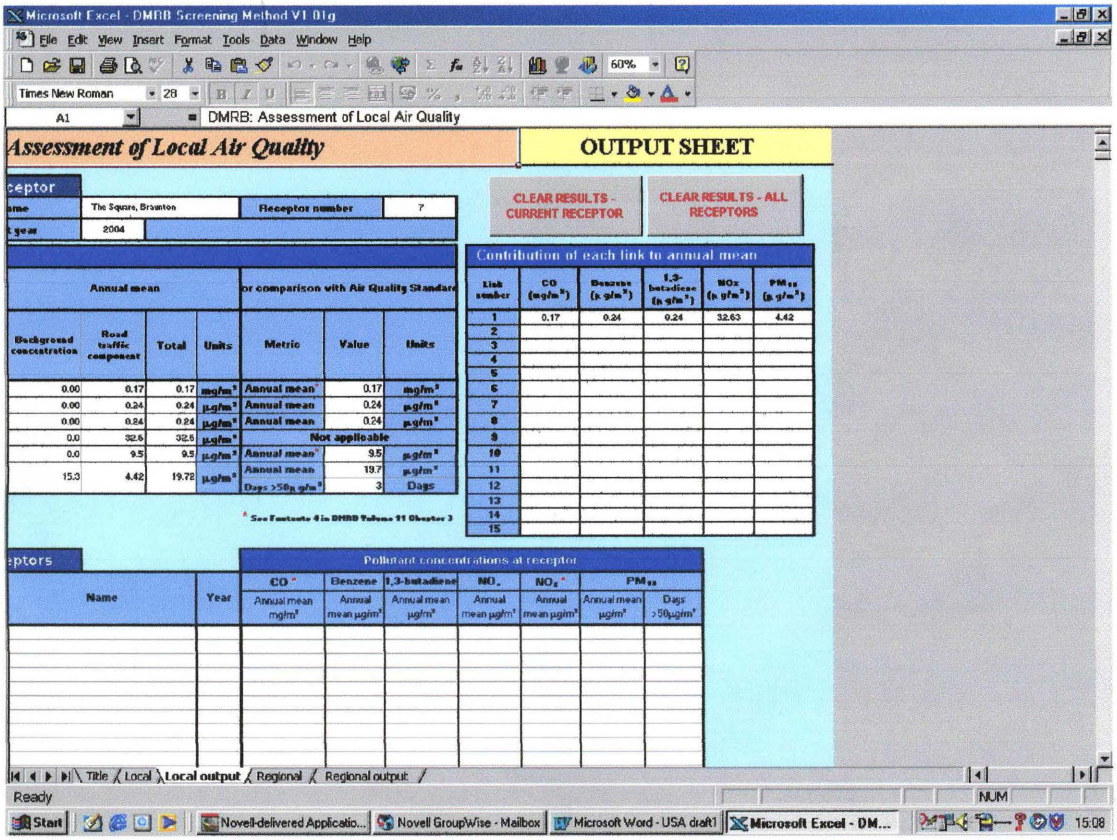
PM_{10} - Newport Road (2004)

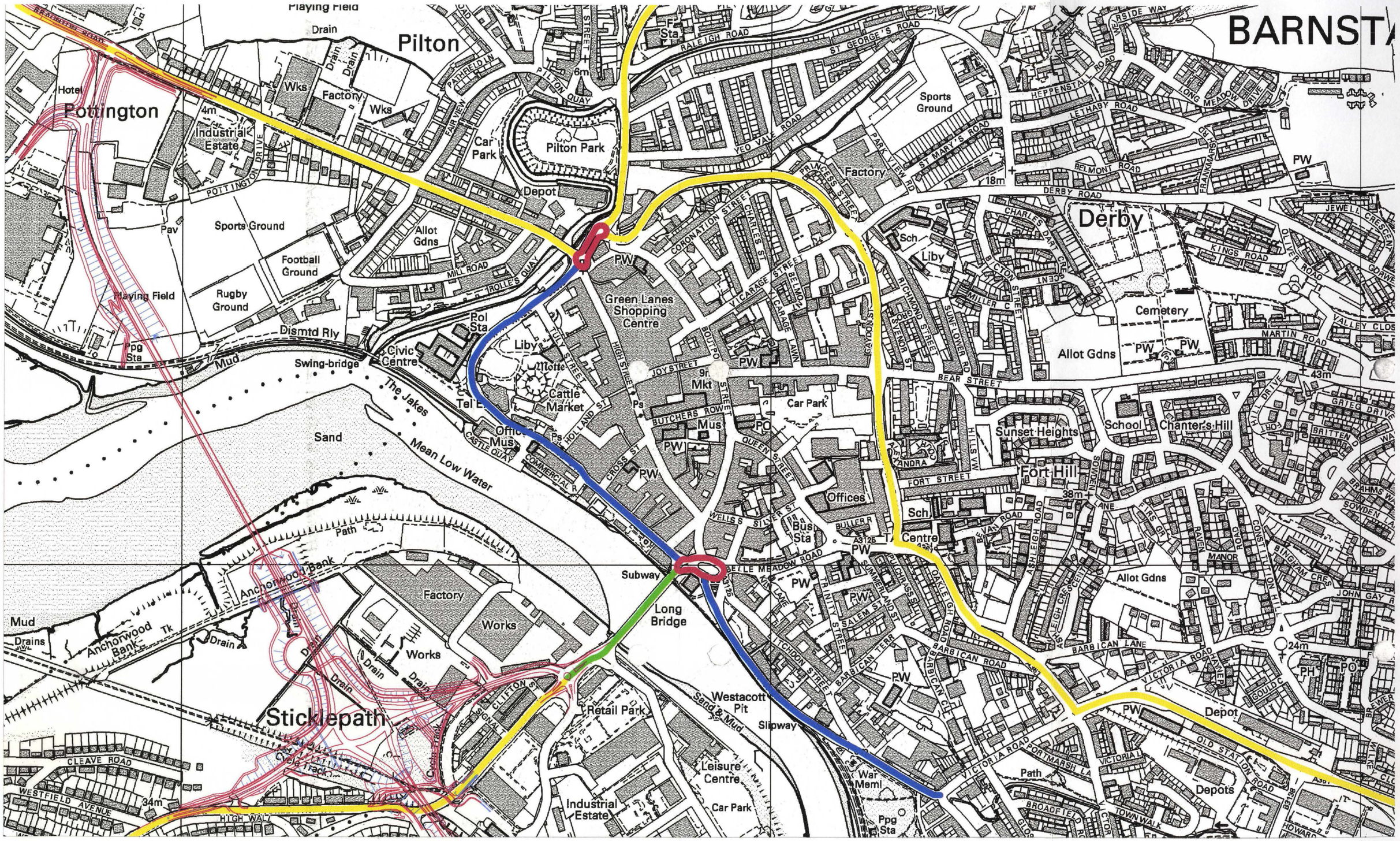




PM_{10} – The Square, Braunton (2004)







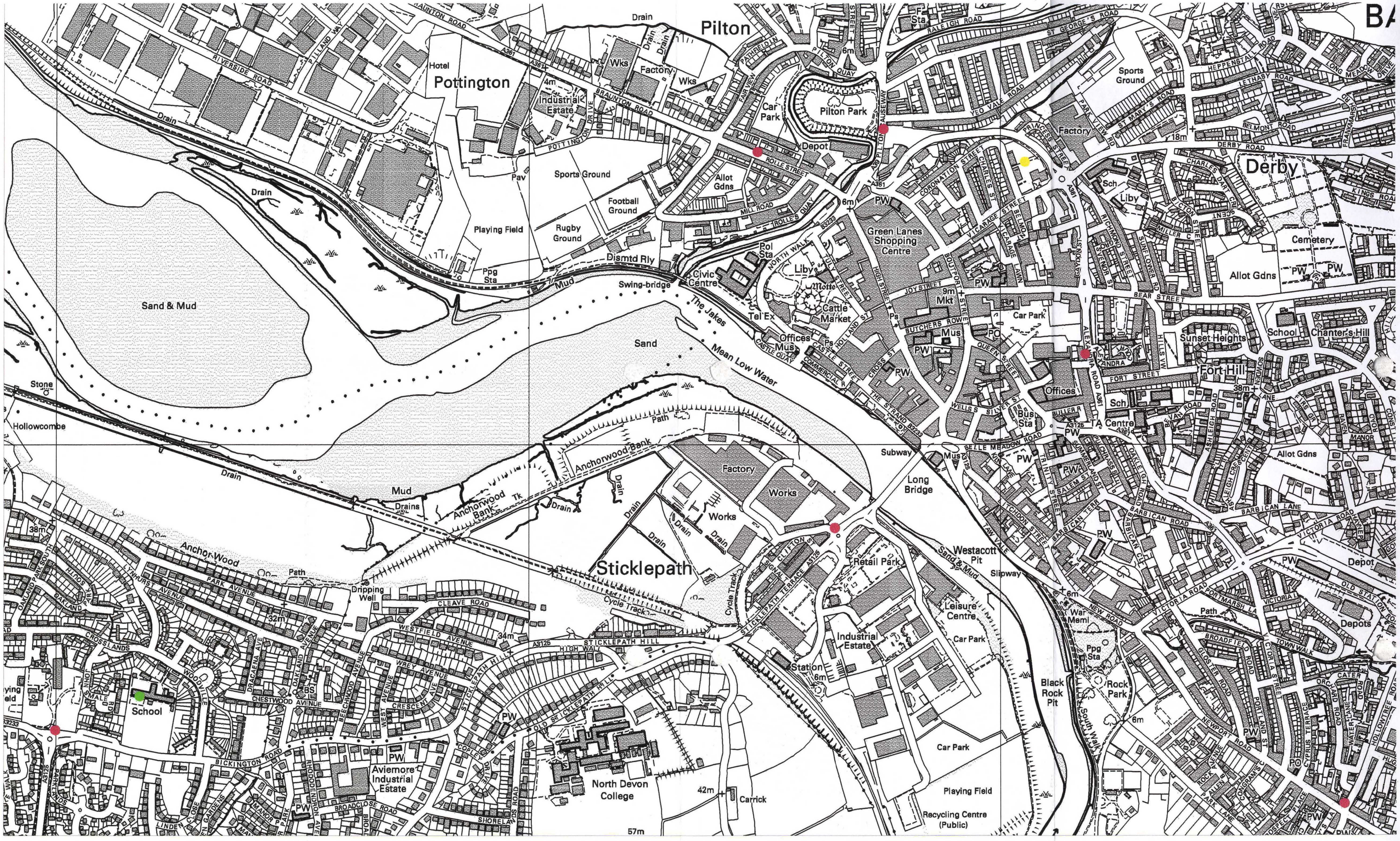
Updating and Screening Assessment

Road Traffic Levels in Barnstaple, including Downstream Bridge plans

NORTH DEVON DISTRICT COUNCIL
Close to the Community

Civic Centre, Barnstaple.
EX31 1EA

SCALE: 1:6000 COPY SUPPLIED TO: Environmental Health Unit DATE 8th July 2003



Updating and Screening Assessment

Nitrogen Dioxide Monitoring Locations in Barnstaple

NORTH DEVON DISTRICT COUNCIL
Close to the Community

Civic Centre, Barnstaple.
EX31 1EA

SCALE: 1:7500

COPY SUPPLIED TO: Environmental Health Unit

DATE 8th August 2003