ASHFIELD DISTRICT COUNCIL

Review & Assessment
Local Air Quality Management

Updating & Screening Assessment
Consultation Copy
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1.0 CHAPTER ONE

1.1 Executive summary

Part IV of the Environment Act 1995[1] requires local authorities to review and assess the current and future air quality in their areas against objectives set out for eight key air pollutants, under the provisions of the National Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002[2] (see Table 2.0).

A review and assessment of air quality is the first step in the Local Air Quality Management (LAQM) process. Part IV of the Act requires each local authority to review air quality 'from time to time'. The National Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002 prescribe air quality objectives and the dates for meeting them. For each objective, local authorities have to consider present and future air quality and assess whether the objectives are likely to be achieved by the prescribed date.

Review and assessment is now undertaken using a phased approach, initially conducting an 'Updating and Screening Assessment'; this is based on a checklist approach to identify those matters that have changed since the first round of review and assessment was completed and which now require further assessment. Then a 'Detailed Assessment' where the updating and screening assessment indicates that an Air Quality Objective may be compromised.

Where objectives set for air quality are unlikely to be met, local authorities must issue orders designating these areas as Air Quality Management Areas (AQMAs). In these areas local authorities are required to draw up plans to ensure air quality objectives are met. Plans may include action to be taken both within and outside an AQMA and could extend beyond a single District Council's area involving several Councils working together.

In addition to the objectives set out in the Air Quality Regulations 2000, and the Air Quality (Amendment) Regulations 2002, the EU has set limit values in respect of nitrogen dioxide and benzene, to be achieved by 1st January 2010, as well as indicative limit values for PM_{10} also to be achieved by 2010. In addition there are separate limit values for carbon monoxide, sulphur dioxide and lead, to be achieved by 2005[3].

The new particles objectives for England, Wales, Northern Ireland and Greater London are not currently included in Regulations for the purpose of Local Air Quality Management (LAQM). Local authorities have no statutory obligation to assess air quality against these limits, however informal guidance has been provided to enable them to do so. Review and assessment within Ashfield has taken consideration of these limits.

1.2 Summary of the Updating and Screening Process

Carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide

The updating and screening assessment for the above pollutants has been completed against the checklist criteria contained in LAQM Technical Guidance 2003[4]. It is expected that the Air Quality Objectives prescribed for these pollutants will be achieved across Ashfield and there is therefore no requirement to undertake a detailed assessment for these pollutants within Ashfield.

Particles PM_{10}

The updating and screening assessment for PM_{10} has been completed against the criteria listed in the LAQM Technical Guidance 2003. It is expected that the Air Quality Objectives will be met across Ashfield, except in the location of Pinxton Green where the updating and screening assessment has indicated that the 24-hour mean objective may be compromised. It is therefore recommended that a detailed assessment for PM_{10} be undertaken in this location (see section 9.5).

1.3 Conclusion

The results of this updating and screening report will be submitted to DEFRA, in accordance with the Government's prescribed deadlines, and will form the statutory submission for Ashfield District Council upon which the Government will determine compliance with the current National Air Quality Objectives.

2.0 CHAPTER TWO

Introduction

This report presents the findings of the second statutory review and assessment for air quality undertaken within the district of Ashfield. Local authorities have already carried out their first round of review and assessments to determine whether there is a need to designate any AQMAs in their area. It is therefore envisaged that the first round should act as a benchmark against which local authorities can measure their future progress in making improvements to their local air quality[5,6].

All previous guidance for carrying out review and assessments has now been revised and consolidated into a single document designed to support local authorities in carrying out their duties under the Environment Act 1995[4]. These review and assessments form the cornerstone of the system of local air quality management (LAQM) and hence play a key part in the Government and Devolved Administration's strategies to achieve the Air Quality Objectives[7].

The guidance sets out the general approach to be used, together with detailed technical guidance, which is provided on a pollutant-by-pollutant basis. The guidance is issued by the Department for the Environment, Food and Rural Affairs (DEFRA), the Scottish Executive and the Welsh Assembly Government under section 88(1) of the Environment Act 1995('the Act'). Local authorities are required to take account of this guidance when carrying out their duties under or by virtue of Part IV of the Act[3,4].

2.1 A Phased Approach to Review and Assessment

A phased approach to the second round of review and assessment has been established by the Government and Devolved Administrations with the intention that local authorities undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. The review and assessment has been divided into two steps (i.e. two levels of assessment) these being an 'Updating and Screening Assessment' (USA) and a 'Detailed Assessment' (DA).

The Updating and Screening Assessment uses a checklist approach to identify those matters that have changed since the first round of review and assessment, and which now require further assessment. The Updating and Screening Assessment will address new monitoring data, new objectives, new sources of emissions or significant changes to existing sources, either locally or within neighbouring authorities, which might affect air quality. Where such changes are identified, simple screening tools have been made available to determine whether the exceedance of an air quality objective may occur.

Where the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority is then required to undertake a Detailed Assessment. The aim of the Detailed Assessment is to identify with reasonable certainty whether or not a likely exceedance would occur. The assumptions within a Detailed Assessment are therefore considered in greater detail than the screening process and use data quality assured to a high

standard. This is to ensure that the authority is confident in the decisions it reaches. Where a likely exceedance of a pollutant is identified, the assessment is required to be sufficiently detailed to determine both its magnitude and geographical extent. Local Authorities are restricted from declaring an Air Quality Management Area (AQMA) unless a Detailed Assessment has been completed.

2.2 Air Quality and Health

The main reason for tackling poor air quality is to minimise detrimental effects on human health. We now have a better understanding of the short-term and long-term health effects of air pollution, largely due to the work undertaken by the Committee on the Medical Effects of Air pollutants (COMEAP)[3].

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

2.3 Public Exposure

The Regulations make clear that likely exceedances 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*'. Review and assessments should thus be focussed on those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Authorities are advised not to consider exceedances of the objectives at any location where public exposure would not be realistic[4].

2.4 Consultation

DEFRA, advise that local authorities will not need to consult widely on the updating and screen assessment, however they have advised that results from this process should be made available to the public[5].

This report and associated appendices will be made available to the public via libraries on the district, at the Council Offices in Kirkby-in-Ashfield and on the Council's Web Site. The Nottingham Air Quality Steering Group, established during the first round of review and assessment to co-ordinate consultation across Nottinghamshire authorities, will continue to be involved in the Local Air Quality Management. A copy of this report will be put before this group for consultation.

Table 2.0 *Objectives included in the Air Quality Regulations (England) (Wales) 2000 and in Air Quality (England) (Wales) (Amendment) Regulations 2002 for the purpose of Local Air Quality Management.*

Pollutant	**Air Quality Objective**		**Date to be achieved by**
	Concentration	**Measured As**	
Benzene [1.]	16.25 µg/m^3	Running annual mean	31.12.2003
	5 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide[1.]	10.0 mg/m^3	Maximum daily running 8-hour mean	31.12.2003
Lead	0.5µg/m^3	Annual mean	31.12.2004
	0.25µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide[2.]	200 µg/m^3 not to be exceeded more than 18 times a year.	1-hour mean	31.12.2005
	40 µg/m^3	annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)[3.]	50 µg/m^3 not to be exceeded more than 35 times a year.	24-hour mean	31.12.2004
	40 µg/m^3	annual mean	31.12.2004
Sulphur dioxide	350µg/m^3 not to be exceeded more than 24 times a year.	1-hour mean	31.12.2004
	125µg/m^3 not to be exceeded more than 3 times a year.	24-hour mean	31.12.2004
	266µg/m^3 not to be exceeded more than 35 times a year.	15-minute mean	31.12.2005

[1.] The Air Quality Objective of 5 µg/m^3 for benzene and the objective of 10µg/m^3 for carbon monoxide came into force in separate Air Quality (Amendment) Regulations for England and Wales on 11 December 2002 and 31 December 2002 respectively.
[2.] The objectives for nitrogen dioxide are provisional.
[3.] Measured using the European gravimetric transfer sampler or equivalent

3.0 CHAPTER THREE - REVIEW AND ASSESSMENT OF CARBON MONOXIDE

The Government and Devolved Administrations have set a new objective of 10mg/m^3 as a daily running mean concentration, to be achieved by the end of 2003, bringing it into line with the Second Air Quality Daughter Directive limit value[2].

National Objective:

10mg/m^3 Max daily running eight-hour mean. 31st. December 2003

3.1 (A) Monitoring Data

No local monitoring has been conducted in Ashfield to determine the concentrations of carbon monoxide against the objective concentration.

Air Quality Emission Inventory

A carbon monoxide emission inventory for Ashfield has been revised since the first round of review and assessment, undertaken by consultants acting on behalf of Nottinghamshire authorities[8]. Considerable data relating to emissions of carbon monoxide has been compiled and entered into the new inventory. The inventory clearly demonstrates a reduction in carbon monoxide levels across Ashfield and Nottinghamshire since the first round. Table 3.0 tabulates the reduction in carbon monoxide emissions from road transport along with a number of other pollutants.

Table 3.0 *Emission reductions from Road Transport within Nottinghamshire 1997 –2001 (tonnes/year)*[8]

Pollutant	**Emissions from Road Transport**		
	1997 (tonnes/year)	**2001 (tonnes/year)**	**% Reduction**
Carbon Monoxide (CO)	45283	29863	34
Nitrogen Oxides (NOx)	16812	12993	23
Non Methane Volatile Organic Compounds (NMVOCs)	9095	3280	64
Particulates PM_{10}	769	462	40
Benzene	312	45	85
1,3 Butadiene	75	51	32

There has been no significant increase in carbon monoxide sources identified within Ashfield. Low resolution modelling conducted during the first round of review and assessment indicated that carbon monoxide levels were predicted to be between 0.3 mg/m^3 – 0.6 mg/m^3 (1997), considerably below the new objective[10].

A summary of maximum 8-hour mean concentrations measured at nearby Automatic Urban Network Stations (Table 3.1) supports this modelling since there have been no exceedances of the objective and results are well below the standard.

Table 3.1 *Summary of Maximum Carbon Monoxide 8-Hour mean concentrations measured at a number of National Network Monitoring Sites (1999 – 2001)*

Site	**Site Classification**	**Maximum daily 8-hour mean concentration (Objective 10mg/m^3)**		
		1999 mg/m^3	**2000 mg/m^3**	**2001 mg/m^3**
Nottingham Centre	Urban Centre	3.4	4.3	5.7
Birmingham East	Urban Background	4.4	4.4	3.7
Sheffield Centre	Urban Centre	2.7	3.6	4.9
Leicester Centre	Urban Centre	2.8	4.5	3.1

UK Background Concentrations

Estimated annual background concentrations for 2001 have been mapped for the UK and made available for access on the Internet at www.airquality.co.uk (see figure 3.0). The highest estimated background concentration in Ashfield for carbon monoxide in 2001 was determined as 0.458mg/m^3. This figure has been corrected to the objective year of 2003 using the adjustment factor provided in LAQM Technical Guidance (03), Box 2.3.

Estimated background concentration in 2001 = 0.448mg/m^3

Correction factor to be applied = 0.826 (2003)

Estimated concentration in 2003 is 0.458 x 0.826 = 0.378mg/m^3

The highest estimated carbon monoxide concentration determined against the 2003 objective is 0.378mg/m^3

3.2 (B) Very Busy Roads or junctions in Built-up areas

Local authorities are only required to undertake a review and assessment for road traffic sources of carbon monoxide in respect of the 2003 objective, where there are 'very busy' roads with daily average traffic (AADT) flows that exceed the following criteria:

i. single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day.
ii. dual carriageway (2 or 3 lanes) roads with daily average traffic flows which exceed 120,000 vehicles per day.

iii. Motorways with daily average traffic flows which exceed 140,000 vehicles per day.

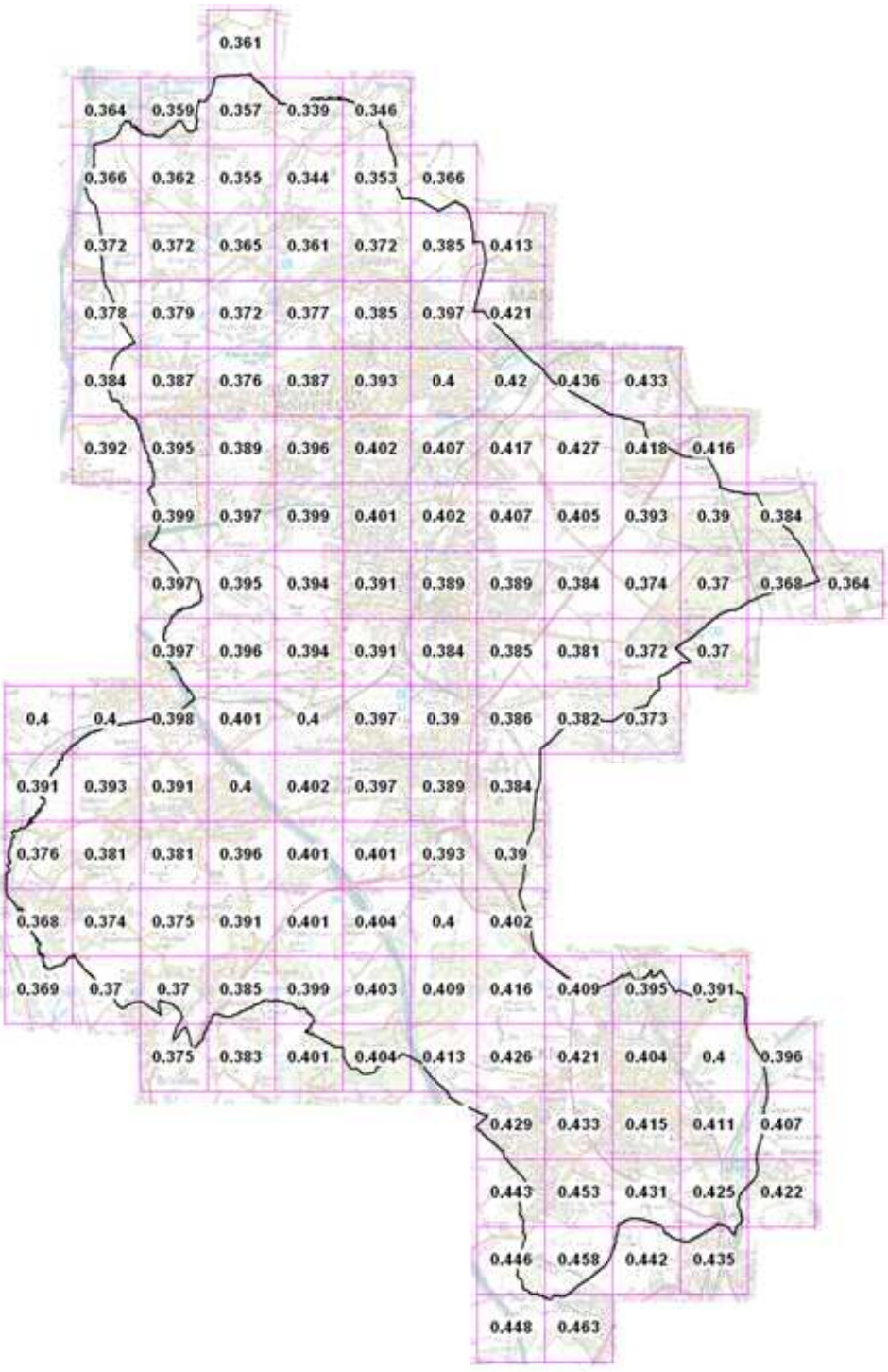
There are no roads in Ashfield that have been identified as 'very busy' and therefore no further review and assessment has been undertaken for this section.

3.3 CONCLUSION

The updating and screening assessment for carbon monoxide has been completed against the checklist criteria contained in the LAQM Technical Guidance (03). It is expected that the annual objective concentration of 10mg/m^3 in 2003 will be met across Ashfield.

There is no requirement to undertake a detailed assessment for carbon monoxide in any location within Ashfield.

2001 Carbon Monoxide background concentrations Map



4.0 CHAPTER FOUR - REVIEW AND ASSESSMENT OF BENZENE

The Government and Devolved Administrations have adopted a running annual mean of 16.25µg/m^3 as the air quality standard for benzene, with an objective for the standard to be achieved by the end of 2003. However, in light of the health advice from Expert Panel on Air Quality Standards (EPAQS) and the Department of Health's Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC), additional tighter objectives have been set. The Second Air Quality Daughter Directive for benzene, which has been transposed into UK legislation, sets a limit value, annual mean of 5µg/m^3 to be achieved by 1st January 2010[2].

National Objectives:

16.25 µg/m^3 running annual mean 31st. December 2003

5µg/m^3 annual mean 31st. December 2010

4.1 (A) Monitored Data

No local monitoring has been undertaken within Ashfield to determine the concentrations of benzene against the objective concentrations.

Air Quality Emission Inventory and Modelling

A benzene emission inventory for Ashfield has been revised since the first round of review and assessment[8]. Considerable data relating to emissions of benzene has been compiled and entered into the new inventory. The inventory clearly demonstrates a reduction in benzene levels across Ashfield and Nottinghamshire since the first round of review and assessment and no significant new sources of benzene have been identified.

During the first round of review and assessment all sources of benzene were modelled to produce 1km^2 maps of annual mean benzene concentrations[10]. Low resolution modelling predicted that benzene concentrations were below 0.375µg/m^3 (1997) across most of Ashfield and therefore well below the standard objective of 16.25µg/m^3. The low resolution modelling undertaken during the first round would not have evaluated against the 2010 objective. However, the modelling results indicated that the concentrations predicted were significantly below the 5µg/m^3 objective and it is therefore very unlikely that this limit will be compromised.

The nearest benzene Automatic Urban Network monitoring site is Nottingham (Urban) Centre. However, this site has only been in operation since 5th March 2002. The nearest benzene national monitoring site with historic data is Birmingham East. From 1999 to 2000 the annual average mean concentrations were 3.06µg/m^3, 2.41µg/m^3, respectively, considerably less than the objective level (see Table 4.1).

Table 4.1 *Summary of maximum running annual mean concentrations of benzene µg/m^3 measured at Birmingham national network monitoring site (1999-2000)*

Site	Site Classification	Maximum running annual mean concentration (Objectives: 16.25µg/m^3 2005 and 5µg/m^3 2010)	
		1999 µg/m^3	2000 µg/m^3
Birmingham East	Urban Background	3.06	2.41

Estimated annual benzene concentrations were calculated for 2003 and 2010 in accordance with criteria listed in Box 3.4 LAQM Technical Guidance (03) and are tabulated below.

Table 4.2 *Estimated future year benzene concentrations for 2003 & 2010*

Site	Monitored Year	Measured Conc. µg/m^3	Correction Factors to be applied	Estimated Annual Ave 2003 µg/m^3	Estimated Annual Ave 2010 µg/m^3
Birmingham East	1999	3.06	2.767	0.96	0.72
Birmingham East	2000	2.41	1.069	1.96	1.46

UK Background Concentrations

Estimated annual background concentrations of benzene for 2001 have been mapped for the UK and made available for access on the Internet at www.airquality.co.uk (see figure 4.0). The highest estimated background concentration in Ashfield for benzene in 2001 was determined as 0.839µg/m^3. This figure has been corrected to the objective years of 2003 and 2010 using the adjustment factors provided in LAQM Technical Guidance (03), Box 3.3.

i. Estimated concentration for 2003

Estimated background concentration in 2001 = 0.839µg/m^3

Correction factor to be applied for 2003 = 0.875

Estimated concentration in 2003 is 0.839 x 0.875 = **0.73µg/m^3**

ii. Estimated concentration for 2010

Estimated background concentration in 2001 = 0.839µg/m^3

Correction factor to be applied 2010 = 0.659

Estimated concentration in 2010 is 0.839 x 0.659 = **0.55µg/m^3**

The highest estimated benzene concentrations determined against the future objectives of 2003 and 2010 are 0.73µg/m^3 and 0.55µg/m^3 respectively.

4.2 (B) Very Busy Roads or junctions in built-up areas

Local authorities are only required to undertake a review and assessment for road traffic sources of benzene in respect of the 2003 objective, where there are 'very busy' roads with daily average traffic (AADT) flows that exceed the following criteria:

iv. single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day.
v. dual carriageway (2 or 3 lanes) roads with daily average traffic flows which exceed 120,000 vehicles per day.
vi. Motorways with daily average traffic flows which exceed 140,000 vehicles per day.

There are no roads in Ashfield that have been identified as 'very busy' and therefore no further review and assessment has been undertaken for this section.

4.3 (C) Industrial sources

A benzene emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Considerable data relating to the sources of benzene has been compiled and entered into the revised inventory. There have been no new industrial sources of benzene identified within Ashfield as determined against the checklist in Annex 2 of the LAQM Technical Guidance (03) and therefore no further review and assessment has been undertaken for this section.

4.4 (D) Petrol Stations

Local authorities are only required to undertake a review and assessment of petrol stations in respect of the benzene objectives where the following criteria have been met:

Petrol stations that:

i. have petrol throughputs greater than 2 million litres (2000m^3) / year.
ii. are located adjacent to roads which have an AADT traffic flow greater than 30,000
iii. have relevant receptors within 10m of any petrol pump.

There are 14 petrol service stations within the district of Ashfield, of which eight have an annual throughput greater than 2000m^3. However, these petrol stations are not located adjacent to roads which have a daily average traffic flow greater than 30 000 vehicles (see table 4.3).

The location of each petrol station has been evaluated to determine whether there is a relevant receptor within 10m of the petrol pumps. Only two petrol stations have been determined to have a receptor within 10m of the nearest pump, however the AADT traffic flow estimated for the adjacent roads are considerably below 30,000.

None of the Petrol stations listed in table 4.3 meet the required criteria for assessment stipulated in the LAQM Technical Guidance (03) and therefore no further assessment has been undertaken.

Table 4.3 *Petrol Station criteria assessed against the LAQM Technical Guidance (03) requirements.*

Petrol Station Location	**Petrol Throughput**	**AADT traffic Flow**	**Distance to nearest receptor (Guidance 10m)**
	million l/annum	> 30,000 Yes/No	m
1. Hucknall By-pass	6.5	Yes	27
2. Eastfield Side	2.2	No	15
3. ASDA SS	6.7	No	71
4. Selston Motor S	2.1	No	11
5. Skegby SS	< 2.0	No	9
6. Manor Garage S/A	2.6	No	20
7. Derby Road	< 2.0	No	26
8. Green SS	< 2.0	No	14
9. Huthwaite	3.3	No	14
10. Portland	3.7	No	22
11. Fisher Motor	< 2.0	No	10
12. Sutton Road	< 2.0	No	30
13. Fulwood	2.8	Yes	>100
14. Kirkby Service S	3.1	No	20

4.5 (E) Major fuel storage depots (Petrol only)

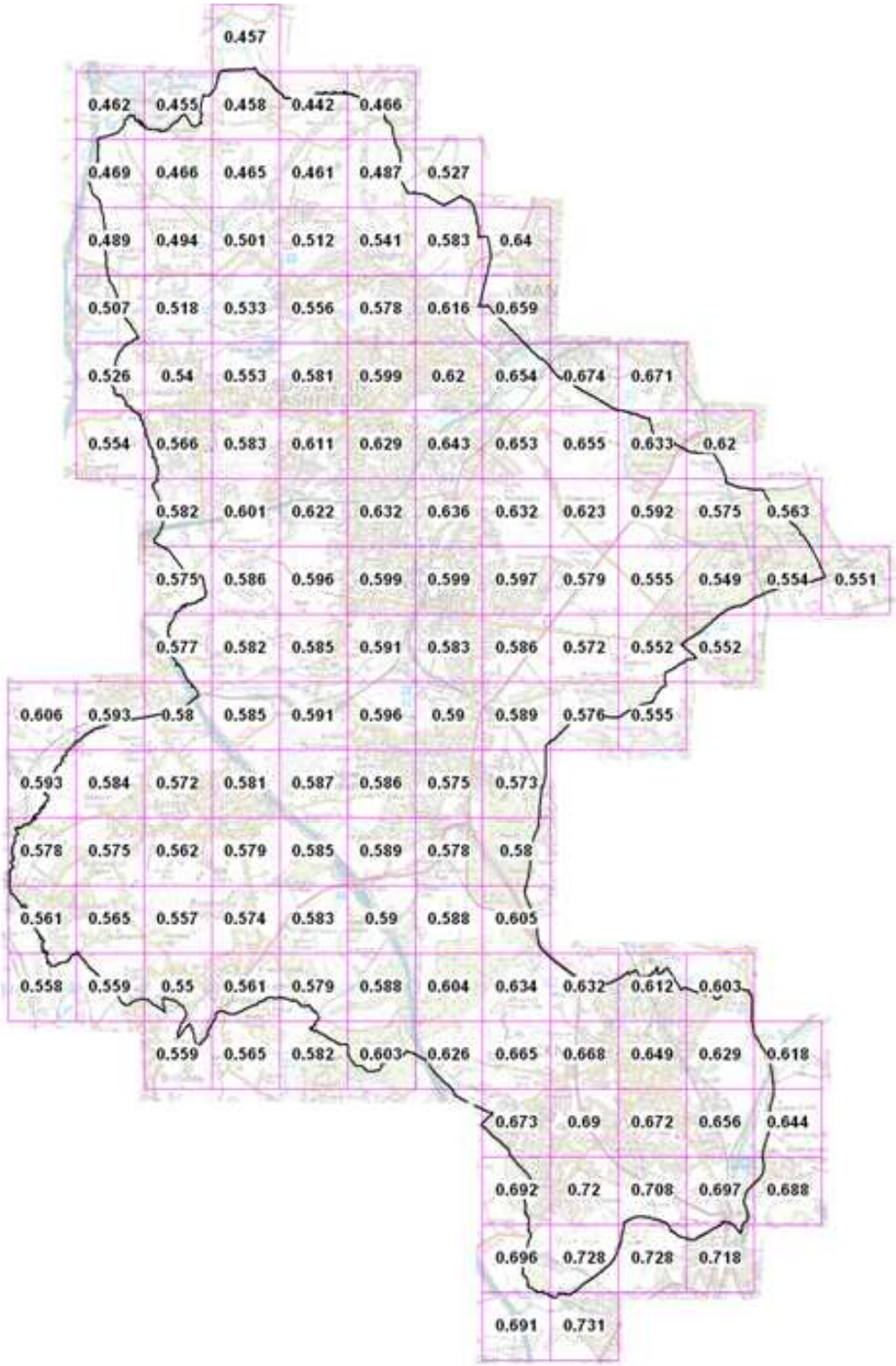
A benzene emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Considerable data relating to the sources of benzene has been compiled and entered into the revised inventory. There are no major fuel storage depots located within Ashfield and therefore no further review and assessment has been undertaken for this section.

4.6 CONCLUSION

The updating and screening assessment for benzene has been completed against the criteria checklist contained in the LAQM Technical Guidance (03). It is expected that the annual objective concentrations of 16.25 $\mu g/m^3$ (2003) and 5$\mu g/m^3$ (2010) will be met across Ashfield.

There is no requirement to undertake a detailed assessment for benzene within Ashfield.

Figure 4.0
2001 Background Concentrations Benzene for Ashfield



5.0 CHAPTER FIVE - REVIEW AND ASSESSMENT OF 1,3 BUTADIENE

The Government and Devolved Administrations have adopted a maximum running annual mean concentration of 2.25 µg/m^3 as an air quality standard for 1,3 butadiene. The objective is for the standard to be achieved by the end of 2003.

National Objectives:

2.25µg/m^3 running annual mean 31st. December 2003

5.1 (A) Monitoring Data

No local monitoring has been undertaken within Ashfield to determine the concentrations of 1,3 butadiene against the objective concentrations.

Air Quality Emission Inventory and Modelling

A 1,3-butadiene emission inventory for Ashfield has been revised since the first round of review and assessment[8]. Considerable data relating to emissions of 1,3-butadiene has been compiled and entered into the new inventory. The inventory clearly demonstrates a reduction in levels of 1,3-butadiene across Ashfield and Nottinghamshire since the first round of review and assessment. There has been no significant increase of 1,3-butadiene emission sources identified within Ashfield.

During the first round of review and assessment all sources of 1,3-butadiene were modelled to produce 1km^2 maps of annual mean 1,3-butadiene concentrations across Ashfield[10]. Low resolution modelling predicted that 1,3-butadiene concentrations ranged between 0.002µg/m^3 and 0.225µg/m^3 across most of Ashfield. It is clear that these were substantially below the objective of 2.25µg/m^3.

The nearest 1,3-butadiene Automatic Urban Network monitoring centre is Nottingham (Urban) Centre. However, the nearest 1,3-butadiene national monitoring centre with historic data is Birmingham East. From 1999 to 2002 the annual mean concentrations were 0.17µg/m^3 and 0.15µg/m^3 respectively, considerably less than the objective level (see Table 5.1).

Table 5.1 *Summary of maximum running annual mean concentrations of 1,3-butadiene µg/m^3 measured at Birmingham national network monitoring site (1999-2000)*

Site	**Site Classification**	**Maximum running annual mean concentration (Objective 2.25 µg/m^3)**	
		1999 µg/m^3	**2000 µg/m^3**
Birmingham East	Urban Background	0.17	0.15

UK background Concentrations

Estimated annual background concentrations of 1,3-butadiene for 2001 have been mapped for the UK and made available for access on the Internet at www.airquality.co.uk (see figure 5.0). The highest estimated background concentration in Ashfield for 1,3-butadiene in 2001 was determined as 0.321µg/m^3. This figure has been corrected to the objective year of 2003 using the adjustment factors provided in LAQM Technical Guidance (03), Box 4.3

Estimated UK background concentration of 1,3-butadiene in 2001 = 0.321µg/m^3

Correction factor to be applied = 0.766 (2003)

Estimated 1,3-butadiene concentration in 2003 is 0.321x 0.766 = **0.245µg/m^3**

The highest estimated 1,3-butadiene concentration that was determined in Ashfield against the 2003 objective was 0.245µg/m^3.

5.2 (B) New Industrial Sources

A 1,3-butadiene emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Significant data relating to emissions of 1,3-butadiene has been compiled and entered into the revised inventory. There have been no new industrial sources identified since the first round of review and assessment likely to give rise to exceedances of the running average mean objective for 1,3-butadiene.

5.3 (C) Industrial sources with substantially increased emissions.

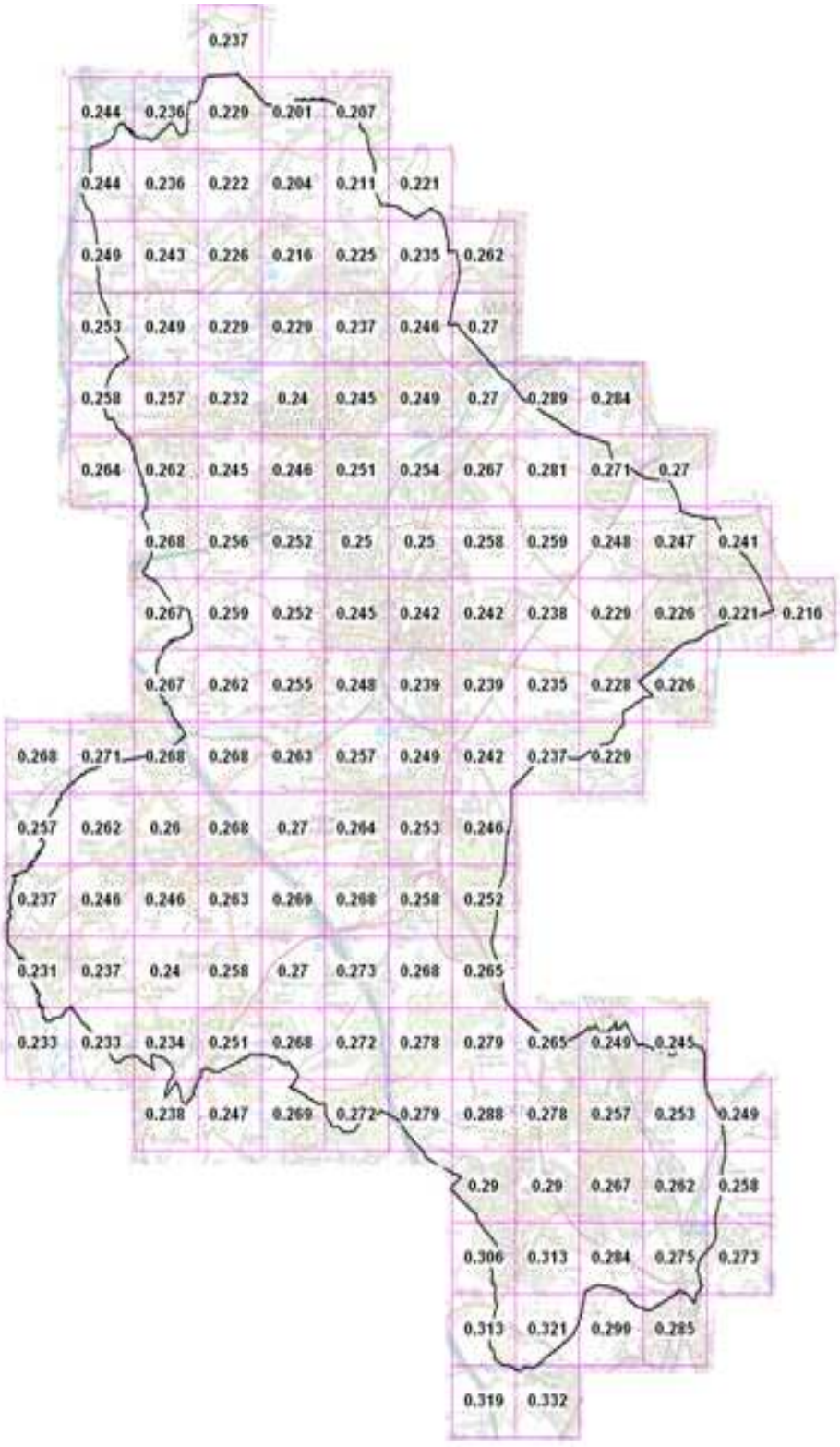
There has been no substantial increase of 1,3-butadiene emissions from any source within Ashfield as identified in the revised emission inventory for Nottinghamshire[8].

5.4 CONCLUSION

The updating and screening assessment for 1,3-butadiene has been completed against the checklist criteria contained in the LAQM Technical Guidance (03). It is expected that the annual objective concentration of 2.25µg/m^3 (2003) will be met across Ashfield.

There is no requirement to undertake a detailed assessment for 1,3-butadiene within Ashfield.

Figure 5.0
2001 Background Concentrations 1,3 Butadiene for Ashfield



6.0 CHAPTER SIX - REVIEW AND ASSESSMENT OF LEAD

The Government and Devolved Administrations have adopted an annual mean concentration of 0.5µg/m^3 as the air quality standard for lead, with an objective for the standard to be achieved by the end of 2004. In addition, a lower air quality objective of 0.25µg/m^3 to be achieved by the end of 2008 has also been set[4].

National Objectives:

0.5 µg/m^3 annual mean 31st. December 2004

0.25 µg/m^3 annual mean 31st. December 2008

6.1 (A) Monitoring Data

No local monitoring has been undertaken within Ashfield to determine the concentrations of lead against the objective concentrations. There was no emission inventory compiled during the first round of review and assessment as evidence suggested that there was no risk of the objective being exceeded. There has been no significant increase in sources of lead since the first round of review and assessment.

The nearest lead Automatic Urban Network monitoring centre is Leeds. From 1999 to 2001 the highest annual average mean concentration was 0.039µg/m^3 considerably less than the objective level (see table 6.0).

Table 6.0 *Summary of annual mean lead-in-air concentrations measured at Leeds national network monitoring site (1999-2001)*

Site	Site Classification	Annual mean lead-in-air concentration		
		1999 µg/m^3	2000 µg/m^3	2001 µg/m^3
Leeds	Urban Background	0.039	0.027	0.031

6.2 (B) New industrial sources

There have been no new industrial sources of lead identified since the first round of review and assessment as likely to give rise to exceedances of the annual mean objectives for lead in 2004 or 2008.

6.3 (C) Industrial source with substantially increased emissions

There has been no substantial increase in lead emissions from any source within Ashfield therefore no further assessment has been made.

6.4 CONCLUSION

The updating and screening assessment for lead has been completed against the criteria contained in the LAQM Technical Guidance (03). It is expected that the annual objective concentration of 0.5 µg/m^3 (2004) and 0.25 µg/m^3 (2008) will be met across Ashfield.

There is no requirement to undertake a detailed assessment for lead within Ashfield.

7.0 CHAPTER SEVEN - REVIEW AND ASSESSMENT OF NITROGEN DIOXIDE

The Government and Devolved Administrations have adopted two Air Quality Objectives for nitrogen dioxide, as an annual mean concentration of 40µg/m^3 and a 1-hour mean concentration of 200µg/m^3, not to be exceeded more than 18 times per year. The objectives are to be achieved by the end of 2005[4].

The first Air Quality Daughter Directive also sets limit values for nitrogen dioxide, which has been transposed into UK legislation. The directive includes a 1-hour limit value of 200µg/m^3 not to be exceeded more than 18 times per year and an annual mean limit value of 40µg/m^3 both to be achieved by 1st January 2010[4].

UK National Objectives:

200 µg/m^3 1 hour mean (18 exceedances) 31st. December 2005

40 µg/m^3 annual mean 31st. December 2005

7.1 (A) Monitoring Data

First round review and assessment information

A third stage review was conducted at Rolls-Royce Hucknall during the first round of review and assessment[6].

Monitoring for nitrogen dioxide has been undertaken at a number of locations across Ashfield since the first round of review and assessment (see Table 7.0).

Table 7.0 *Monitoring undertaken for nitrogen dioxide between 2001 and 2003.*

Location	Year	Period
Field Place (A38 & B6018)	2001	Feb – May
Portland Road	2001	May – Aug
Hucknall Town Centre	2001/02	Oct – Jan
Pinxton (M1)	2002	Feb – June
Oakfield Ave (A38 & B6018)	2002/3*	Aug – Jan*

* *Monitoring remains in progress at this location.*

Monitoring Equipment

Monitoring for nitrogen dioxide has been undertaken using a chemiluminescence NO-NO_2-NO_x analyser. This instrument continuously draws a sample of air into the unit and analyses it to determine the NO and NO_x concentrations in the air. This information is used to calculate the NO_2 concentrations in the air.

The analyser is a Thermo Environmental Instruments unit, model 42c supplied by Onix Process Analysis Limited and is USA–EPA approved for the measurement of ambient concentrations of NO_2. It has a precision of ± 0.4ppb and is set up with a flow rate of 0.5 litres per minute. Instrument diagnostics as well as the NO and NO_x concentrations of the air sample are continuously updated.

The analyser is set up to log the mean NO and NO_x concentrations and instrument diagnostics every 15 minutes. Whilst there are no daily span and zero checks on the performance of the instrument the unit is calibrated once every 7 days using certified standard gases for the NO and NO_2 span calibration and zero scrubber for the zero calibration. Data is downloaded from the analyser once every 7 days, examined and reformulated as hourly and other averages for direct comparison with the objectives.

The unit is located inside a purpose built small mobile trailer and the sample inlet is on top of the trailer approximately 2.5 metres above ground level.

7.2 Monitoring for nitrogen dioxide within close proximity to the Junction of A38 and B6018 Kirkby-in-Ashfield

Monitoring was undertaken at Field Place and Oakfield Avenue, Kirkby-in-Ashfield, within close proximity to the road junction during 2001 and 2002/3

Location Description

Monitoring was undertaken at this location, as residential receptors are situated adjacent to both sides of the junction (see fig 7.0, Appendix). Short term monitoring was initially conducted at Field Place during 2001 but has been repeated in a comparable location to capture a full annual data set. The equipment has been re-located at Oakfield Avenue; on the opposite side of the junction due to the inconvenience it caused local residents at Field Place. Both locations are considered suitable to make assessment against the nitrogen dioxide annual mean objectives, as there are residential buildings and gardens within close proximity to the junction.

Field Place Kirkby-in-Ashfield. (Junction of A38 and B6018)

Measurement period: 1st February to 31st March 2001
Total data capture 61 days out of a total of 61 days.

Oakfield Avenue, Kirkby-in-Ashfield (Junction of A38 and B6018)

Measurement period: July 8th 2002 to February 28th 2003
Total data capture 236 days out of a total of 236 days.

Monitoring

Monitoring for nitrogen dioxide was conducted at Field Place between February and March of 2001. Further monitoring has subsequently taken place at Oakfield Avenue since July 2002 and is currently ongoing. A summary of the results for both locations

is tabulated below (see Table 7.1). A more detailed summary, chart and estimated annual average calculations can be found in the Appendix, Figures 7.4 –7.18.

Table 7.1 *Summary of nitrogen dioxide monitoring data Junction A38 and B6018 Field Place and Oakfield Avenue, Kirkby-in-Ashfield*

	24 hour means (monitoring period)			**EU 2010**
Location	**Measured Period Mean (µg/m^3)**	**Min 1 hour (µg/m^3)**	**Max 1hour mean (µg/m^3)**	**No of 1-hour limit value exceedances >200 (µg/m^3)**
Field Place (A38 & B6018) 2001	35.1	0.7	85.2	0
Oakfield Avenue (A38 & B6018) 2002/3	40.5	11.7	106.6	0

Only short-term data was available for the updating and screening assessment at these locations as recorded above. Estimated annual averages were calculated in accordance with the LAQM Technical Guidance (03) (Box 6.5 and 6.6) and then extrapolated to determine whether the 2005 and 2010 objectives would be compromised. Table 7.2 tabulates the results for these locations.

The base year for estimating the nitrogen dioxide annual mean for Field Place was 2001. The estimated annual mean calculated for Field Place was based upon the annual mean comparisons with four nearby long-term Automatic Urban Network sites Nottingham (Urban centre), Birmingham East (Urban background), Leicester (Urban centre) and Sheffield (Urban centre). The same base year was used to estimate the annual mean for Oakfield Avenue even though the measurements were recorded during 2002/3.

Table 7.2 *Estimated nitrogen dioxide Annual mean concentration for 2005 and 2010 Junction A38 and B6018 Field Place and Oakfield Avenue, Kirkby-in-Ashfield*

Location	**Estimated Annual Mean in 2001 (µg/m^3)**	**Estimated Annual mean in 2005 (µg/m^3)**	**Estimated Annual mean in EU 2010 (µg/m^3)**	**2005 & 2010 Annual mean Objective (µg/m^3)**
Field Place (A38 & B6018)	29.8	26.6	21.9	40
Oakfield Ave (A38 & B6018)	40.9	36.5	30.0	40

The estimated annual mean at Field Place for 2001 was calculated as 29.8µg/m^3 based upon a short-term monitoring period commencing 1st February to 31st March 2001. The estimated annual mean in 2005 was calculated as 26.6µg/m^3 well below the 2005

objective of 40µg/m^3. The estimated annual mean at Field Place for 2010 was 21.9µg/m^3 below the 2010 objective of 40µg/m^3.

The estimated annual mean at Oakfield Avenue for 2001 was calculated as 40.9µg/m^3 based upon a short-term monitoring period from July 8th 2002 to February 28th 2003. The estimated annual mean in 2005 was calculated as 36.5µg/m^3 below the 2005 objective of 40µg/m^3. The estimated annual mean at Oakfield Avenue for 2010 was 30.0µg/m^3 below the 2010 objective of 40µg/m^3.

There is no requirement for Ashfield to proceed to a detailed assessment for nitrogen dioxide in respect of the 2005 or 2010 objectives at this location.

7.3 Portland Road, Kirkby-in-Ashfield.

Location Description.

The location of the monitor was within a mobile trailer positioned at the kerbside, approximately 2metres in from the edge of the road (see fig 7.1, Appendix). Residential gardens are located approximately 3metres from the road although the façade of the nearest building is approximately 17metres further back. The site is considered to be a roadside location where public exposure would be expected to be short-term. It is therefore not considered the most suitable location for relevant exposure to the annual mean objective. However, the results have been reported for completeness.

Measurement period: 4th May to 7th October 2001
Total data capture 126 days out of a total of 156 days

Monitoring results

Monitoring was conducted at Portland Street between May and October of 2001. A summary of the results is tabulated below (see Table 7.3). A problem associated with the calibration gases has resulted in data captured during the month of July 2001 being omitted from the results. The mean concentration recorded over the monitoring period was 24.3µg/m^3. The highest 1-hour mean concentration was 83.3µg/m^3. There were therefore no exceedances of any of the air quality standards throughout this monitoring period. A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 7.10 –7.12.

Table 7.3 *Summary of nitrogen dioxide monitoring data at Portland Street, Kirkby-in-Ashfield*

	24 hour means (monitoring period)			EU 2010
Location	**Measured Period Mean (µg/m^3)**	**Min 1 hour (µg/m^3)**	**Max 1hour mean (µg/m^3)**	**No of 1-hour limit value exceedances >200 (µg/m^3)**
Portland Street Kirkby-in-Ashfield 2001	24.3	0	83.3	0

Only short-term data was available for the updating and screening assessment at this location as recorded above (May to October 2001). The estimated annual mean was calculated in accordance with the LAQM Technical Guidance (03) and then extrapolated to determine whether the 2005 and 2010 (Ref. Box 6.5 and 6.6 of guidance) objectives would be compromised. Table 7.4 tabulates the results for this location.

The base year for estimating the nitrogen dioxide annual mean for Portland Street was 2001. The estimated annual mean was calculated based upon the annual mean comparisons with four nearby long-term Automatic Urban Network sites, Nottingham (Urban centre), Birmingham East (Urban background), Leicester (Urban centre) and Sheffield (Urban centre).

Table 7.4 *Estimated nitrogen dioxide Annual mean concentration for 2005 and 2010 Portland Street, Kirkby-in-Ashfield*

Location	**Estimated Annual Mean in 2001 (µg/m^3)**	**Estimated Annual mean in 2005 (µg/m^3)**	**Estimated Annual mean in EU 2010 (µg/m^3)**	**2005 & 2010 Annual mean Objective (µg/m^3)**
Portland Street 2001 data	26.8	23.9	19.7	40

The estimated annual average at Portland Street for 2001 was calculated as 26.8µg/m^3 based upon a short-term monitoring period commencing 4th May to 7th October 2001. The estimated annual average in 2005 was calculated as 23.9µg/m^3 well below the 2005 objective of 40µg/m^3. The estimated annual average at Portland Street for 2010 was 19.7µg/m^3 below the 2010 objective of 40µg/m^3.

Based upon the results of the monitoring carried out at Portland Street there is no requirement for Ashfield to proceed to a detailed assessment for nitrogen dioxide in respect of the 2005 or 2010 objectives at this location.

7.4 Hucknall High Street

Location Description

The location of the monitor was within a mobile trailer positioned at the kerbside approximately 1m in from the edge of the road and adjacent to nearby town centre retail outlets. (See figure 7.2, Appendix).

Measurement period: 8th October to 31st December 2001
Total data capture 85 days out of a total of 85 days

Monitoring results

Monitoring was conducted at Hucknall High Street between October and December 2001. A summary of the results is tabulated below (see Table 7.5). The mean concentration recorded over the monitoring period was 45.1µg/m^3. The highest 1-hour mean concentration was 135µg/m^3. A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 7.13 –7.15.

Table 7.5 *Summary of nitrogen dioxide monitoring data High Street, Hucknall*

	24 hour means (monitoring period)			**EU 2010**
Location	**Measured Period Mean (µg/m^3)**	**Min 1 hour (µg/m^3)**	**Max 1hour mean (µg/m^3)**	**No of 1-hour limit value exceedances >200 (µg/m^3)**
High Street Hucknall 2001	45.1	2.8	135	0

Only short-term data was available for the updating and screening assessment at this location as recorded above (October to December 2001). The estimated annual mean was calculated in accordance with the LAQM Technical Guidance (03) and then extrapolated to determine whether the 2005 and 2010 (Ref. Box 6.5 and 6.6 of guidance) objectives would be compromised. Table 7.6 tabulates the results for this location.

The base year for estimating the nitrogen dioxide annual mean for Hucknall Town Centre was 2001. The estimated annual mean calculated was based upon the annual mean comparisons with four nearby long-term Automatic Urban Network sites Nottingham (Urban centre), Birmingham East (Urban background), Leicester (Urban centre) and Sheffield (Urban centre).

Table 7.6 *Estimated nitrogen dioxide Annual mean concentration for 2005 and 2010 High Street Hucknall*

Location	Estimated Annual Mean in 2001 (µg/m^3)	Estimated Annual mean in 2005 (µg/m^3)	Estimated Annual mean in EU 2010 (µg/m^3)	2005 & 2010 Annual mean Objective (µg/m^3)
High Street Hucknall 2001 data	39.6	35.3	29.0	40

The estimated annual mean at High Street, Hucknall for 2001 was calculated as 39.6µg/m^3 based upon a short-term monitoring period between 8th October and 31st December 2001. The estimated annual mean in 2005 was calculated as 35.3µg/m^3 below the 2005 objective of 40µg/m^3. The estimated annual mean at High Street for 2010 was 29.0µg/m^3 below the 2010 objective of 40µg/m^3.

Based upon the results of the monitoring carried out at High Street, Hucknall there is no requirement for Ashfield to proceed to a detailed assessment for nitrogen dioxide in respect of the 2005 or 2010 objectives at this location.

7.5 Pinxton Green, Pinxton (B6019) Within close proximity to M1 Motorway.

Measurement period: 6th February to 16th June 2002
Total data capture 126 days out of a total of 131 days.

The Location - Description

The monitoring trailer was located at Pinxton Green, Pinxton adjacent to houses to the east of the M1 (see fig.7.3, Appendix). The monitoring site was adjacent to a house on the B6019 and approximately 10 metres from the hardshoulder of the M1 Bridge over this road. The sample inlet was approximately 4 metres below the height of the M1. This site is situated Northeast of an industrial estate with both light and heavy industry present.

Monitoring Results

Monitoring was conducted at Pinxton Green between February and June of 2002. A summary of the results is tabulated below (see Table 7.7). The mean concentration recorded over the monitoring period was 32.4µg/m^3. The highest 1-hour mean concentration was 90.4µg/m^3. There were therefore no exceedances of any of the air quality standards throughout this monitoring period. A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 7.16 – 7.18.

Table 7.7 *Summary of nitrogen dioxide monitoring data Pinxton Green, Pinxton*

	24 hour means (monitoring period)			EU 2010
Location	**Measured Period Mean (µg/m^3)**	**Min 1 hour (µg/m^3)**	**Max 1hour mean (µg/m^3)**	**No of 1-hour limit value exceedances >200 (µg/m^3)**
Pinxton Green Pinxton 2001	32.4	0	90.4	0

Only short-term data was available for the updating and screening assessment at this location as recorded above (February to June 2002). The estimated annual mean was calculated in accordance with the LAQM Technical Guidance (03) and then extrapolated to determine whether the 2005 and 2010 (Ref. Box 6.5 and 6.6 of guidance) objectives would be compromised. Table 7.8 tabulates the results for this location.

The base year for estimating the nitrogen dioxide annual mean for Pinxton Green was 2001. The estimated annual mean calculated was based upon the annual mean comparisons with four nearby long-term Automatic Urban Network sites, Nottingham (Urban centre), Birmingham East (Urban background), Leicester (Urban centre) and Sheffield (Urban centre).

Table 7.8 *Estimated nitrogen dioxide Annual mean concentration for 2005 and 2010 Pinxton Green, Pinxton*

Location	**Estimated Annual Mean in 2001 (µg/m^3)**	**Estimated Annual mean in 2005 (µg/m^3)**	**Estimated Annual mean in EU 2010 (µg/m^3)**	**2005 & 2010 Annual mean Objective (µg/m^3)**
Pinxton Green Pinxton 2001 data	32.8	29.3	24.1	40

The estimated annual mean at Pinxton Green, Pinxton for 2001 was calculated as 32.8µg/m^3 based upon a short-term monitoring period commencing 6th February to 16th June 2002. The estimated annual mean in 2005 was calculated as 29.3µg/m^3 below the 2005 objective of 40µg/m^3. The estimated annual mean at Pinxton Green for 2010 was 24.1µg/m^3 below the 2010 objective of 40µg/m^3.

Based upon the results of the monitoring carried out at Pinxton Green, Pinxton there is no requirement for Ashfield to proceed to a detailed assessment for nitrogen dioxide in respect of the 2005 or 2010 objectives at this location.

7.6 Summary

Table 7.9 *Summary of results of estimated nitrogen dioxide annual mean Concentrations for 2005 and 2010 (Chemiluminescence) Monitored Locations in Ashfield District from 2001 -2003*

Location	Measured Period Mean ($\mu g/m^3$)	Estimated Annual Mean in 2001 ($\mu g/m^3$)	Estimated Annual Mean in 2005 ($\mu g/m^3$)	Estimated Annual Mean in 2010 ($\mu g/m^3$)
Field Place (A38 & B6018)	29.8	29.8	26.6	21.9
Oakfield Ave. (A38 & B6018)	40.9	40.9	36.5	30.0
Portland Street Kirkby	24.3	26.8	23.9	19.7
High Street Hucknall	45.1	39.6	35.3	29.0
Pinxton Green Pinxton	32.4	32.8	29.3	24.1

7.7 Nitrogen Dioxide Diffusion Tubes Network

Monitoring of nitrogen dioxide concentrations using diffusion tubes has been undertaken across Ashfield since May 1996. All tubes are located on light columns except at Sutton Baths where the tube is fixed to the façade of the building approximately 2 metres from the roadside. All sites are approximately 2 metres above ground except at the M1 motorway site which is located on a light column, on a bridge approximately 10metres above the motorway, although 2 metres above the ground level of neighbouring properties in Selston. A summary of monthly results is shown in Tables 7.13 and 7.14.

The supply and analysis of nitrogen dioxide diffusion tubes is currently undertaken by Harwell Scientifics who have held this contract since October 1999. A UKAS 1:1 actetone:triethanolamine method is utilised based upon a four week tube exposure period. Annual means were calculated for the years 2000, 2001 and 2002 and bias adjusted using a correction factor supplied by Harwell (see below). The bias corrected annual means were then extrapolated to estimate and compare the annual mean with the 2005 objective (see Tables 7.10 –712 and figure 7.19 Appendix).

Bias Correction for Diffusion Tubes

An approach to bias correction for nitrogen dioxide diffusion tubes is provided within the LAQM Technical Guidance (03). The method can only be calculated based upon the collocation of diffusion tubes with a continuous chemiluminescene monitor, typically over a full year's study. Ashfield have undertaken a collocation study from December 2002, however there is insufficient results to have confidence in any bias adjustment factor based upon the available data. Conversely Ashfield have used a bias

adjustment factor supplied by Harwell Scientific. The bias for the tube preparation method used as compared to a chemiluminescene continuous monitor was provided as **0.78** as determined by the equation:

Adjustment Factor (A)= Direct measurement (Cm)/Diffusion tube (Dm)

This bias adjustment factor has only been used with diffusion tube results supplied by Harwell Scientifics (i.e. between 2000 and 2002) and not with results prior to 2000.

The correction factors to estimate 2005 annual means were calculated in accordance with the LAQM Technical Guidance (03) Box 6.6

Table 7.10 *Estimated annual mean nitrogen dioxide concentrations 2005 objective based upon year 2000-diffusion tubes analysis.*

Diffusion Tube Site Locations	Year 2000 Annual Mean (ug/m3)	Harwell Scientifics Bias Factor 0.78	Year 2005 Estimated Annual Mean (ug/m3)
Sutton. Outram Street	48.7	38.0	32.8
Sutton Baths	37.4	29.2	25.2
A 38 Fire Station	51.5	40.2	34.7
Selston Kwik Save	36.7	28.6	24.7
Hucknall High Street	57.7	45.0	38.9
Hucknall Croft/Beardall St	36.4	28.4	24.5
Kirkby Naggs Head	61.7	48.1	41.6
M1 Salmon Lane	41.4	32.3	27.9
M1 Pinxton	44.2	34.5	29.8
Castle Hill	47.7	37.2	32.1

Table 7.11 *Estimated annual mean nitrogen dioxide concentrations 2005 objective based upon year 2001 diffusion tubes analysis.*

Location	Year 2001 Annual Mean (ug/m3)	Harwell Scientifics Bias Factor 0.78	Year 2005 Estimated Annual Mean (ug/m3)
Sutton. Outram Street	48.8	38.1	34.0
Sutton Baths	38.6	30.1	26.9
A 38 Fire Station	56.8	44.3	39.5
Selston Kwik Save	39.5	30.8	27.5
Hucknall High Street	53.9	42.0	37.5
Hucknall Croft/Beardall St	37.4	29.2	26.0
Kirkby Naggs Head	62.1	48.4	43.2
M1 Salmon Lane	49.4	38.5	34.4
M1 Pinxton	42.9	33.5	29.8
Castle Hill	52.2	40.7	36.3

Table 7.12 *Estimated annual mean nitrogen dioxide concentrations 2005 objective based upon year 2002 diffusion tubes analysis.*

Location	Year 2002 Annual Mean (ug/m3)	Harwell Scientifics Bias Factor 0.78	Year 2005 Estimated Annual Mean (ug/m3)
Sutton. Outram Street	50.2	39.2	36.0
Sutton Baths	37.7	29.4	27.1
A 38 Fire Station	57.0	44.5	40.9
Selston Kwik Save	41.7	32.5	29.9
Hucknall High street	57.2	44.6	41.1
Hucknall Croft/Beardall St	36.4	28.4	26.1
Kirkby Naggs Head	62.0	48.4	44.5
M1 Salmon Lane	49.6	38.7	35.6
M1 Pinxton	44.3	34.6	31.8
Castle Hill	53.7	41.9	38.6

Monitoring Results

Nitrogen dioxide diffusion tube monitoring results indicate that the highest annual mean concentrations are typically situated along roads within the urban centres of Hucknall and Kirkby and within the vicinity of the A38, a busy trunk road. Current bias adjusted results range between 40 – 48µg/m^3 above the 2005 objective of 40µg/m^3. The estimated annual mean concentrations for 2005 in these areas were estimated between 41 – 44µg/m^3 slightly above the 2005 objective. However, it is not expected that any person is likely to be exposed to these levels of nitrogen dioxide in these locations over a whole year. A few metres back from the road it would be expected the nitrogen dioxide concentrations would be less than at the roadside. The nearest property to the A38 is 4 metres back from the side of the road. Furthermore, continuous monitoring using a chemiluminescene monitor has been undertaken in the majority of these locations as reported within this updating and screening report. The current results indicate that nitrogen dioxide concentrations across all the monitored locations, even those within close proximity to the A38 and M1 motorway will be below the 2005 objective of 40µg/m^3.

Conclusions

The nitrogen dioxide diffusion tube results indicate that three locations will slightly exceed the 2005 objective. However, it should be noted that these three sites are all roadside locations where public exposure would be expected to be short term. They are therefore not considered suitable to represent relevant exposure to the annual mean objective (LAQM TG(03) Box 1.4), although they are an invaluable indicative source of spatial distribution of nitrogen dioxide across the district.

The nitrogen dioxide diffusion tube results do not required Ashfield to proceed to a detailed assessment in these areas.

Cont.
Ashfield have commenced a collocation study with the chemiluminescene monitor in December 2002. It has also been decided that all diffusion tubes will be duplicated across the district. Nitrogen dioxide monitoring sites are to be evaluated in the light of this updating and screening assessment to ensure that they are located in areas of relevant exposure.

7.8 (B) Monitoring data within an AQMA.

The updating and screening assessment for this section is only applicable to authorities that have declared Air Quality Management Areas. Ashfield have not declared any Air Quality Management Areas within the district. No further updating and screening assessment has been undertaken for this section.

7.9 (C) Narrow congested streets with residential properties close to the kerb.

Local authorities are only required to undertake assessments of roads where there are narrow congested streets with residential properties within 5m of the kerb and which have traffic flows greater than 10,000 per day.

GIS software and local knowledge were used to evaluate roads within Ashfield against this criteria. AADT road flows were overlaid on GIS street maps to identify such locations. Where residential properties were identified as being within 5 metres of roads, they were located in areas where AADT traffic flows were below 10,000 vehicles per day and where stop start vehicle movements or congestion are not expected.

No locations were identified to warrant the use of the DMRB screening model for narrow congested streets in any location within Ashfield and therefore no further assessment has been undertaken for this section.

7.10 (D) Junctions.

Local authorities are required to undertake assessment of busy junctions within their districts. The LAQM Technical Guidance (03) interprets a 'busy' junction as '*one with more than 10,000 vehicles per day*'[4]. The identification of all busy junctions in Ashfield was undertaken utilising GIS software and local knowledge (see table 7.15). Where junctions were determined to have receptors within 10m the DMRB model was used to determined any exceedance of the nitrogen dioxide objective (see table 7.16).

Table 7.13 *Summary of monitoring results from Ashfield's nitrogen dioxide diffusion tubes network*

Monitoring Location	May '96 – April '97			May '97 – April '98			May '98 – Sept '99			Oct '99 – Jan '03			Over all mean
	GMSS Labs			Gradko Labs			AEA Labs			Harwell Scientific			
	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	
URBAN CENTRES Sutton – Outram St.	54.8 (11mths)	64.9 Nov	45.8 July	37.2 (10mths)	52.5 Nov	16.4 May	47.6 (14mths)	68.6 Nov	29.8 Jul	50.0 (40mths)	66.9 Nov	31.1 Jun	**47.0**
Kirkby – Naggs Head	62.1 (12mths)	84.0 Aug	22.9 Nov/Oct	46.6 (12mths)	66.7 Feb	15.5 Oct	60.0 (14mths)	81.0 Nov	36.1 May	62.1 (39mths)	77.7 Jan	45.3 Jun	**57.7**
Hucknall - High St.	60.5 (12mths)	80.0 Nov	22.9 Oct	44.9 (10mths)	66.3 Feb	21.0 May	55.4 (16mths)	76 Nov	34.2 May	56.3 (40mths)	76.4 Nov	41.4 May	**54.2**
Hucknall Mobile High Street										60.9 (3mths)	68 Nov	55.4 Jan	**60.9**
Notts Check										48.1 (7mths)	59.8 Nov	40.5 Aug	**48.1**
URBAN BACKGROUNDS Sutton – Baths	43.2 (11mths)	72.6 Oct	26.7 July	31.3 (12mths)	47.1 Nov	15.0 May	36.7 (14mths)	68.6 Nov	29.8 Jul	38 (40mths)	57.7 Jan	23.3 Jul	**37.2**
Hucknall – Beardall St.	60.5 (11mths)	80.2 Nov	22.9 Oct	30.6 (11mths)	46.2 Jan	16 May	33.4 (16mths)	56.5 Jan	14.9 Jul	37.4 (40mths)	56.1 Nov	21.8 Jun	**40.5**
Castle Hill										51.6 (34mths)	69.9 Jan	31.1 Jun	**51.6**
RURAL CENTRES Selston – Sommerfield	44.9 (11mths)	61.1 Nov	24.8 June	29.8 (11mths)	48.5 Jan	13.8 May	37 (16mths)	52.9 Jan	20 May	40.1 (40mths)	60.3 Nov	25.2 May	**38.0**
Portland Street, Kirkby										31.3 (4mths)	35.9 Aug	27.7 Jun	**31.3**

Table 7.14 *Cont. Summary of monitoring results from Ashfield's nitrogen dioxide diffusion tubes network*

Monitoring Location	May '96 – April '97			May '97 – April '98			May '98 – Sept '99			Oct '99 – Jan '03			Over all mean
	GMSS Labs			Gradko Labs			AEA Labs			Harwell Scientific			
	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	mean/ no. mths	max/ month	min/ month	
M1 – Salmon Lane	53.5 (5mths	74.5 Jan	36.3 Dec	32.9 (11mths)	50.0 Nov	15 May	43.5 (16mths)	61.1 Nov	26.5 July	47.3 (40mths)	71.8 Dec	26.0 Jun	**44.3**
A38 – Firestation	62.2 (12mths)	80.2 Aug	43.9 Feb	43.9 (11mths)	59 Jan	23.1 May	56.3 (15mths)	69.1 Nov	39.3 July	56 (39mths)	82.5 Sept	35.1 Feb	**56.4**
M1 Pinxton										44.5 (40mths)	44.5 Nov	29.8 Aug	**44.5**
Mobile M1 Pinxton										41 (4mths)	50.6 Mar	34.9 May	**41.1**
M1 Erewash										49.1 (5mths)	65.7 Jan	28.4 May	**49.1**
Mobile A38 (1) (oakfield Ave)										48.9 (7mths)	71 Nov	30.6 Aug	**48.9**
Mobile A38 (2) (oakfield Ave)										54.6 (4mths)	71.2 Nov	45.8 Jan	**54.6**
Mobile A38 (3) (oakfield Ave)										41.4 (2mths)	58.8 Dec	24.1 Jan	**41.4**
Mean	55		Mean	37.2		Mean	44.1		Mean	47.8			

Table 7.15 *Junctions evaluated for nitrogen dioxide against criteria stipulated within the LAQM TG (03) Box 6.2*

Junctions with more than 10, 000 Vehicles per day	**Receptor within 10 metres Yes/No**	**DRMB Receptor Ref.**
1. A6075 – B6014	No	N/A
2. A38-A6075-B6023	No	N/A
3. A38 – B6139	No	N/A
4. A38 – B6022	Yes	1
5. A38 – B6021	No	N/A
6. A38 – B6018	No	N/A
7. B6023 – B6018	No	N/A
8. A38 – B6023	No	N/A
9. A38 – B6027	No	N/A
10. B6018 – B6020	Yes	2
11. B6020 - Lowmoor	No	N/A
12. Kingsway –A611	No	N/A
13. A611 – A6009	No	N/A
14. Lowmoor – Southwell	No	N/A
15. A611 – Forest Road	Yes	3
16. A608 – A611	No	N/A
17. A611 –B6011	No	N/A
18. B6023 – B6026	Yes	4
19. B6023 – Forest Street	Yes	5
20. B6023 – B6028	Yes	6
21. B6014 – B6028	Yes	7

Table 7.16 *DMRB Model results from junction receptors evaluated (See nitrogen dioxide assessed Receptors 1-7 Appendix)*

Receptor Ref:	**Junction**	**Est. Annual Mean 2001 NO_2 ($\mu g/m^3$)**	**Est. Annual Mean 2005 NO_2 ($\mu g/m^3$)**
1	A38 – B6022	45.4	39.2
2	B6018 – B6020	42.1	36.0
3	A611 – Forest Road	42.9	36.8
4	B6023 – B6026	37.8	32.9
5	B6023 – Forest Street	35.8	31.2
6	B6023 – B6028	38.2	33.0
7	B6014 – B6028	36.0	31.4

Conclusions

There were no exceedances of the 2005 nitrogen dioxide objective measured at any of the seven junctions evaluated (see table 7.16 & Appendix Receptors 1-7). There is no requirement for Ashfield to proceed to a detailed assessment for any busy junctions within the district.

7.11 (E) Busy streets where people may spend 1-hour or more, close to traffic.

Local authorities are only required to undertake review and assessment for this section where there are busy street locations identified where members of the public might regularly spend 1-hour or more, e.g. streets with many shops, streets with outdoor cafes/bars. The guidance interprets 'busy' as those streets with more than 10,000 vehicles per day. There are no streets within Ashfield, which meet all the criteria of this section and therefore no further assessment has been undertaken for this section.

7.12 (F) Roads with high flows of buses and/or HGVs

Authorities are only required to undertake an updating and screening assessment for this section where roads are identified as having an unusually high proportion of buses or HGVs. An 'unusual high proportion of Buses or HGVs' is taken to be greater than 20% of the AADT, LAQM Technical Guidance (03) Box 6.2.

There have been no roads identified within Ashfield which show an 'unusually high proportion of buses and/or HGVs' and therefore no further screening assessment has been undertaken for this section.

7.13 (G) New roads constructed or proposed since first round of review and assessment.

Mansfield and Ashfield Regeneration Route (MARR)

This is a new road, which intersects the district of Mansfield and Ashfield and is currently under construction. Consultants, on behalf of Nottingham County Council have carried out an air quality assessment using the old DMRB emission factors for the road. However, only three receptors were identified as requiring assessment within the district of Ashfield (see table 7.17)[11,12].

Table 7.17 *MARR Route DMRB Nitrogen Dioxide (NO_2) Results*

Location (Appendix – Receptors 8,9&10)	**1998 (µg/m^3) Old DMRB**	**2004 Without Route (µg/m^3) Old DMRB**	**2004 With Route (µg/m^3) Old DMRB**	**2005 With Route (µg/m^3) New DMRB**
113 Beck Lane A6075 (S)	49.7	38.2	40.1	35.3
Rushley Cottage (A611)	49.7	40.1	38.2	32.9
Rushley Farm (A60)	32.5	24.8	28.7	28.9

The receptors were located at 113 Beck Lane, Rushley Cottage and Rushley Farm and nitrogen dioxide concentrations were estimated for 2004 as 40.1µgm^3, 38.2µgm^3 and 28.7µgm^3 respectively. These concentrations were derived from using the old DMRB

model and emission factors, and only estimated to 2004 and not the objective year of 2005. The DMRB has recently been revised and a new version has been released. The receptors have therefore been remodelled as part of the updating and screening process to predict concentrations at the objective year (see Appendix, MARR receptors 8,9&10).

Table 7.17 tabulates the new results against the results from the original air quality assessment. The measurements indicate a reduction in nitrogen dioxide at the receptors of Beck Lane and Rushley Cottages and a negligent increase at Rushley Farm. However, all the remodelled results are below the 2005 annual mean objective of $40\mu gm^3$.

Conclusions
It is unlikely that the 2005 objective for nitrogen dioxide will be compromised at the locations of Beck Lane, Rushley Cottage and Rushley Farm receptors as part of the Mansfield and Ashfield Regeneration Route.

7.14 (H) Roads close to the objective during the first round of review and assessment.

High resolution modelling for nitrogen dioxide were conducted by CERC during the first round of review and assessment and concluded that there would be no roads within Ashfield other than the M1 Motorway which would exceed the nitrogen dioxide objective in 2005[10]. Real time monitoring has since been undertaken at a relevant receptor adjacent to the M1 Motorway and indicates that the 2005 objective is unlikely to be exceeded (see section 7.5).

No further review and assessment has been undertaken for this section.

7.15 (I) Roads with significantly changed traffic flows

Authorities are only required to undertake the updating and screening assessment of roads with traffic flows greater than 10,000 vehicles per day, that have experienced a large increase in traffic. The LAQM Technical Guidance (03) has interpreted 'large increase' as '*more than a 25% increase in traffic*'. All roads within Ashfield above 10,000 have been evaluated against this criteria.

There are no roads within Ashfield that have seen a 25% increase in daily traffic flow based upon 1997 and 2001 AADT traffic flow data and therefore no further updating and screening has been undertaken for this section.

7.16 (J) Bus Stations

There is only one bus station within Ashfield located at Sutton-in-Ashfield. The guidance only requires the updating and screening process to be undertaken if bus movements exceed 1000 movements a day, and if there is a relevant receptor within 10m, assessed against the 1-hour objective. An evaluation of the bus station has determined that there are well below 1000 bus movements per day. It is also very unlikely that any members of the public would remain in this location for over an hour. No further review and assessment has been undertaken for this section.

7.17 (K) New Industrial sources

A nitrogen dioxide emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Considerable data relating to emissions of nitrogen dioxide has been compiled and entered into the new inventory. There have been no new industrial sources of nitrogen dioxide identified within Ashfield. No further updating and screening assessment has been undertaken for this section.

7.18 (L) Industrial sources with substantially increased emissions

A nitrogen dioxide emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Considerable data relating to emissions of nitrogen dioxide has been compiled and entered into the new inventory. There have been no new industrial sources with substantially increased emissions identified within Ashfield. No further updating and screening assessment has been undertaken for this section.

7.19 (M) Aircraft

There are no relevant air quality issues relating to aircraft within Ashfield and therefore no further updating and screening has been undertaken for this section.

7.20 CONCLUSION

The updating and screening assessment for nitrogen dioxide has been completed against the checklist criteria listed in the LAQM Technical Guidance (03). It is expected that the Air Quality Objectives of 200µg/m^3 1-hour mean (18 exceedances) 2005 and 40µg/m^3 annual mean 2005, will be met across Ashfield.

There is no requirement for Ashfield to proceed to a detailed assessment for nitrogen dioxide at any location within the district.

8.0 CHAPTER EIGHT - REVIEW AND ASSESSMENT OF SULPHUR DIOXIDE

The Government and Devolved Administrations have adopted a 15-minute mean of 266µg/m^3 as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times per year by the end of 2005. Additional objectives have also been set which are equivalent to the EU limit values specified in the First Daughter directive. These are for a 1-hour mean objective of 350µg/m^3 to be exceeded no more than 24 times per year and a 24-hour objective of 125 µg/m^3 to be exceed no more than 3 times per year, to be achieved by the end of 2004[4].

UK National Objectives:

266 µg/m^3 15 minute mean (35 exceedances) 31st. December 2005

350 µg/m^3 1-hour mean (24 exceedances) 31st. December 2004

125 µg/m^3 24-hour mean (3 exceedances) 31st. December 2004

First round Review and Assessment Information

A third stage review for sulphur dioxide was undertaken at Kings Mill hospital during the first round of review and assessment[6]. Monitoring for sulphur dioxide has since continued in a location close to the hospital, undertaken by Mansfield District Council. Ashfield has reviewed their results as part of this updating and screening assessment (see section 8.6).

8.1 (A) Monitoring Data

Air Quality Emission Inventory

A Sulphur dioxide emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment, undertaken by consultants acting on behalf of Nottinghamshire authorities[8]. Considerable data relating to emissions of sulphur dioxide has been compiled and entered into the revised inventory. The inventory clearly demonstrates a reduction in the levels of sulphur dioxide across Ashfield and Nottinghamshire since the first round of review and assessment.

Monitoring for sulphur dioxide has been undertaken at a number of locations across Ashfield since the first round of review and assessment (see Table 8.0).

Note:

Monitoring for sulphur dioxide has been undertaken in conjunction with the evaluation of other pollutants since all Ashfield's analytical equipment is contained within a single air-mobile trailer. The monitoring sites evaluated since the first round of review and assessments have been exclusively roadside locations. The LAQM Technical Guidance (03) suggests there is little risk from road traffic sources of sulphur dioxide exceeding the objectives. The monitoring results are therefore included within the updating and screening process for completeness[4].

Table 8.0 *Monitoring undertaken for sulphur dioxide between 2001 and 2003, locations and dates.*

Location	Year	Measurement Period
Field Place (A38 & B6018)	2001	Jan – May
Portland Road	2001	May – Oct
Hucknall Town Centre	2001/02	Oct – Jan
Pinxton (M1)	2002	Feb – June
Oakfield Ave (A38 & B6018)	2002/03 ongoing	Aug - Jan ongoing
Kings Mill (Mansfield D.C)	2001 & 2002	Jan - Dec

Monitoring Equipment

Monitoring for sulphur dioxide has been undertaken using a pulsed fluorescence SO_2 analyser. This continuously draws a sample of air into the unit and analyses it to determine the sulphur dioxide concentration in the air.

The analyser is a Thermo Environmental Instruments Unit, model 43C supplied by Onix Process Analysis Limited and is USA–EPA approved for the measurement of ambient concentrations of sulphur dioxide. It has a precision of 1% of the reading or 1ppb (whichever is greater) and is set up with a flow rate of 0.5 litres per minute. The analyser also has an internal permeation span source and external zero scrubber to enable daily span and zero checks on the performance of the instrument. Instrument diagnostics as well as the sulphur dioxide concentration of the air sample are continuously updated.

The analyser is set up to log the mean sulphur dioxide concentration and instrument diagnostics every 5 minutes and the span and zero checks are carried out daily between 0000 hours and 0030 hours. The unit is calibrated once every 14 days using a certified standard gas for the span calibration and a zero scrubber for the zero calibration. Data is downloaded from the analyser once every 7 days, examined and reformulated as 15 minute, hourly and 24 hourly averages for direct comparison with the objectives. All raw data has been captured as ppb but has subsequently been converted and reported as $\mu g/m^3$ using the conversion factor given within LAQM Technical Guidance (03)[4].

8.2 Monitoring for sulphur dioxide within close proximity to the Junction of A38 and B6018 Kirkby-in-Ashfield

Monitoring conducted during 2001 and 2002 at Field Place and Oakfield Avenue, Kirkby-in-Ashfield, Nottinghamshire.

Location

Monitoring for sulphur dioxide was undertaken at this location, as residential receptors were situated adjacent to both sides of the junction (see fig 7.0 Appendix).

Field Place, Kirkby-in-Ashfield (Junction of A38 and B6018)

Measurement period: 30th January to 2nd May 2001
Data capture 77 days out of a total of 93 days

Only short-term data was available for the updating and screening assessment at this location (see Table 8.1).

The highest 15 minutes concentration was 177.4µg/m^3, well below the objective of 266µg/m^3. The highest 1-hour concentration was 123.1µg/m^3, considerably below the objective of 350µg/m^3. The highest 24-hour concentration was 44µg/m^3, considerably below the objective of 125µg/m^3. The mean concentration was 13.9µg/m^3 (measured period mean only). There were therefore no exceedances of any of the air quality objectives for sulphur dioxide (see table 8.1). A more detailed summary and chart can be found in the Appendix Figures 8.0 – 8.1.

Oakfield Avenue Kirkby-in-Ashfield, (Junction of A38 and B6018).

Measurement period: 8th July – 31st December 2002
Data capture 177 days out of a total of 177 days

Only short-term data was available for the updating and screening assessment at this location (see Table 8.1).

The highest 15 minutes concentration was 23.9µg/m^3, well below the objective of 266µg/m^3. The highest 1-hour concentration was 84.3µg/m^3, considerably below the objective of 350µg/m^3. The highest 24-hour concentration was 87.0µg/m^3, below the objective of 125µg/m^3. The mean concentration was 4.0µg/m^3 (measured period mean only). There were therefore no exceedances of any of the air quality objectives for sulphur dioxide (see Table 8.1). A more detailed summary and chart can be found in the Appendix Figures 8.2 – 8.3.

Table 8.1 *Sulphur Dioxide Pulsed Fluorescent Analyser Summary of monitoring data at Junction A38 and B6018 Field Place and Oakfield Avenue, Kirkby-in-Ashfield*

	Objectives	**266µg/m^3**	**350µg/m^3**	**125µg/m^3**
Monitored Locations	**Measured Period Mean** (µg/m^3)	**Max 15 minute means** (µg/m^3)	**Max 1 hour means** (µg/m^3)	**Max 24 hour means** (µg/m^3)
Field Place	13.9	177.4	123.1	44.0
Oakfield Ave	4.0	23.9	84.3	87.0

8.3 Portland Street Kirkby-in-Ashfield

Measurement period: 4th May to 7th October 2001
Data Capture 156 days out of a total of 156 days

The highest 15 minutes concentration was 185.1µg/m^3, well below the objective of 266µg/m^3. The highest 1-hour concentration was 130.5µg/m^3, considerably below the objective of 350µg/m^3. The highest 24-hour concentration was 35.8µg/m^3, considerably below the objective of 125µg/m^3. The mean concentration was 7.5µg/m^3 (measured period mean only). There were therefore no exceedances of any of the air quality objectives for sulphur dioxide (see Table 8.2). A more detailed summary and chart can be found in the Appendix Figures 8.4 – 8.5.

Table 8.2 *Sulphur Dioxide Pulsed Fluorescent Analyser*
Summary of monitoring data at Portland Street Kirkby-in-Ashfield

	Objectives	**266µg/m^3**	**350µg/m^3**	**125µg/m^3**
Location	**Measured Period Mean** (µg/m^3)	**Max 15 minute mean** (µg/m^3)	**Max 1 hour mean** (µg/m^3)	**Max 24 hour mean** (µg/m^3)
Portland Street	7.5	185.1	130.5	35.8

8.4 High Street Hucknall

Measurement period: 8th October to 31st December 2001
Data Capture 84 days out of a total of 84 days

The highest 15 minutes concentration was 146.7µg/m^3, well below the objective of 266µg/m^3. The highest 1-hour concentration was 110.6µg/m^3, considerably below the objective of 350µg/m^3. The highest 24-hour concentration was 63.5µg/m^3, considerably below the objective of 125µg/m^3. The mean concentration was 11.4µg/m^3 (measured period mean only). There were therefore no exceedances of any of the air quality objectives for sulphur dioxide (see Table 8.3). A more detailed summary and chart can be found in the Appendix Figures 8.6 – 8.7.

Table 8.3 *Sulphur Dioxide Pulsed Fluorescent Analyser*
Summary of monitoring data from High Street Hucknall

	Objectives	**266µg/m^3**	**350µg/m^3**	**125µg/m^3**
Locations	**Measured Period Mean** (µg/m^3)	**Max 15 minute mean** (µg/m^3)	**Max 1 hour mean** (µg/m^3)	**Max 24 hour mean** (µg/m^3)
High Street Hucknall	11.4	146.7	110.6	63.5

8.5 Pinxton Green, Pinxton (M1 Location)

Measurement period: 6th February to 21st June 2002
Data Capture 136 days out of a total of 136 days

The highest 15 minutes concentration was 86.6µg/m^3, well below the objective of 266µg/m^3. The highest 1-hour concentration was 74.0µg/m^3, considerably below the objective of 350µg/m^3. The highest 24-hour concentration was 24.0µg/m^3, considerably below the objective of 125µg/m^3. The mean concentration was 14µg/m^3 (measured period mean only). There were therefore no exceedances of any of the air quality objectives for sulphur dioxide (see Table 8.4). A more detailed summary and chart can be found in the Appendix Figures 8.8 – 8.9.

Table 8.4 *Sulphur Dioxide Pulsed Fluorescent Analyser*
Summary of monitoring data from Pinxton Green, Pinxton.

	Objectives	**266µg/m^3**	**350µg/m^3**	**125µg/m^3**
Locations	**Measured Period Mean** (µg/m^3)	**Max 15 minute mean** (µg/m^3)	**Max 1 hour mean** (µg/m^3)	**Max 24 hour mean** (µg/m^3)
Pinxton Green Pinxton	14.0	86.6	74.0	24.0

8.6 Mansfield sulphur dioxide monitoring (Close to Kings Mill Hospital).

Kings Mill Hospital was the subject of a Stage Three review during the first round of review and assessment against the 15-minute objective. Monitoring undertaken for the assessment determined that the objective would not be compromised subject to the hospital burning low sulphur coal[6].

Mansfield have monitored at a receptor close to this location since the first round of review and assessment and data recorded indicates that none of the sulphur dioxide air quality objectives have been exceeded (see Appendix Fig. 8.15 – 18).

8.7 Discussion – monitoring periods

Review and assessment for sulphur dioxide has been undertaken utilising short term monitoring periods only; ideally monitoring should be conducted over a full year, particularly for the 15-minute mean objectives. The LAQM Technical Guidance (03) denotes that short period data, for example 3 months could be considered sufficient for comparison against the objective if the monitored concentrations are well below the objectives (Annex 1 A1.39). It is clear from the monitoring undertaken throughout Ashfield that sulphur dioxide concentrations are well below the 2005 objective. The data periods were therefore considered satisfactory to use within the updating and screening process.

8.8 (B) Monitoring data within an AQMA

The updating and screening assessment for this section is only applicable to authorities that have declared Air Quality Management Areas. Ashfield have not declared any Air Quality Management Areas within the district. No further updating and screening has been undertaken for this section.

8.9 (C) New Industrial Source

A sulphur dioxide emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment. Considerable data relating to emissions of sulphur dioxide has been compiled and entered into the revised inventory. There have been no new sources of sulphur dioxide identified within Ashfield. No further updating and screening has been undertaken for this section.

8.10 (D) Industrial Sources with substantially increased emissions

A sulphur dioxide emission inventory for Ashfield has been reviewed and updated since the first round of review and assessment. Considerable data relating to emissions of sulphur dioxide has been compiled and entered into the revised inventory. There have been no new industrial sources with substantially increased emissions identified within Ashfield. No further updating and screen has been undertaken for this section.

8.11 (E) Areas of domestic coal burning

Consideration of results from the first round of review and assessment has indicated that areas of densely populated houses burning solid fuel could constitute significant sources of sulphur dioxide, even if smokeless fuel is consumed. The LAQM Technical Guidance (03) has determined 'significant coal burning' as '*any area of 500x500m which contains more than 100 houses burning solid fuel as their primary source of heating*'[4].

Ashfield has undertaken a district wide survey of all potential solid fuel burning areas based upon this criteria. Local knowledge of the district and GIS software were

employed to identify specific areas for evaluation. Five areas were identified for evaluation as listed below (see table 8.5):

Table 8.5 *Locations and coordinates of areas surveyed for coal burning*

Location	**Map Sheet**
Hucknall	SK5349
Sutton-in-Ashfield	SK5059
Kirkby-in-Ashfield	SK4956
Selston	SK4553
Jacksdale	SK4451

Area street plans with an over-layered 500x500m grid were generated to enable officers to survey these areas to determine whether significant solid fuel burning was taking place. The survey involved the visual observation of domestic flue outlets (see figures 8.10 – 8.14, Appendix).

Results

The survey undertaken demonstrates that there is no significant solid fuel burning taking place within these designated areas of Ashfield. Counts of properties burning solid fuel as their primary source of heating have determined there to be substantially below 100 houses within a 500x500m area as stipulated within the LAQM Technical Guidance (03) (see table 8.6).

Table 8.6 *Results of Coal burning survey for designated areas within Ashfield*

Area	**Count of houses within 500x500m area**	**Number of Houses burning coal as primary heating source.**
Hucknall	837	8
Sutton-in-Ashfield	781	6
Kirkby-in-Ashfield	737	14
Selston	458	6
Jacksdale	492	14

Discussion

An emissions inventory for Ashfield for domestic combustion has been updated since the first round of review and assessment. The usage of solid fuel has been estimated to have fallen by approximately 50% within the Nottinghamshire area. This estimation has been based upon a reduction in concessionary coal supply within the region and is further confirmed by the small number of houses identified within the survey as burning solid fuel as their primary source of heating.

There is no requirement for Ashfield to proceed to a detailed assessment for sulphur dioxide in respect of domestic coal burning within any location in the district.

8.12 (F) Small boilers >5 MW (thermal)

An emissions inventory for Ashfield has been reviewed and updated since the first round of review and assessment, which included all boilers above 0.4MW[8]. Details relating to boiler plants were used to derive estimated emission maps for the district.

There were no boilers within the district identified as being greater than $5MW_{(thermal)}$. No further assessment has been undertaken for this section.

8.13 (G) Shipping

There are no relevant air quality issues relating to shipping within Ashfield. No updating and screening assessment has been undertaken for this section.

8.14 (H) Railway Locomotives.

Authorities are only required to undertake updating and screening assessments at locations where there is relevant exposure to diesel or coal fired locomotives, which are regularly stationary for periods of 15-minutes or more. There have been no locations identified within Ashfield, which meet these criteria, and therefore no further updating and screening assessment has been undertaken.

8.15 CONCLUSION

The updating and screening assessment for sulphur dioxide has been completed against the checklist criteria contained in the LAQM Technical Guidance (03). It is expected that the Air Quality Objectives of 266µg/m^3 15 minute mean (35 exceedances) 2005, 350µg/m^3 1-hour mean (24 exceedances) 2004, and 125µg/m^3 24-hour mean (3 exceedances) 2004, will be met across Ashfield.

There is no requirement for Ashfield to proceed to a detailed assessment for sulphur dioxide in any location within the district.

9.0 CHAPTER NINE - REVIEW AND ASSESSMENT OF PM_{10}

The Government and the devolved Administrations have adopted two Air Quality Objectives for fine particles (PM_{10}), which are equivalent to the European Union Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 $\mu g/m^3$ as the annual mean and 50$\mu g/m^3$ as the fixed 24-hour mean not to be exceeded more than 35 days per year, to be achieved by the end of 2004. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent[4].

The EU has also set indicative limit values for PM_{10}, which are to be achieved by 1st January 2010. These stage 2 limit values are considerably more stringent and are 20 $\mu g/m^3$ as the annual mean and 50$\mu g/m^3$ as the 24-hour mean to be exceeded on no more than 7 days per year. The Government, the Welsh Assembly Government and the Department of the Environment in Northern Ireland introduced provisional limit values, although it is not intended that these objectives will be brought into Regulation for the purpose of Local Air Quality Management at this time. The provisional objectives are:

For all parts of England (except London), Wales and Northern Ireland, a 24-hour mean of 50$\mu g/m^3$ not to be exceeded more than 7 times per year and a annual mean of 20$\mu g/m^3$ to be achieved by the end of 2010[4].

UK National Objectives:

50 $\mu g/m^3$ (35 exceedances) 24hr mean 31st. December 2004

40 $\mu g/m^3$ annual mean 31st. December 2004

First round of Review and Assessment Information

A third stage review for PM_{10} was conducted at Pinxton and Selston during the first round of review and assessment evaluating receptors within close proximity to the M1 Motorway[6].

9.1 (A) Monitoring Data

Monitoring for particles (PM_{10}) has been undertaken at a number of locations across Ashfield since the first round of review and assessment (see Table 9.0).

Monitoring Equipment

Particle measurement has been undertaken using an ESM Sequential particulate sampler, type FH95 SEQ Onix Process Analysis Limited. It is designed for the manual gravimetric mass concentration determination of suspended particulate in the ambient air and has 16 filter cassettes stacked in a magazine to allow an automated and accurate filter change.

The sampler is located inside a purpose built mobile trailer. The trailer is equipped with air conditioning required during the summer months to keep the trailer cool. Care is taken to ensure excessively warm temperatures inside the trailer do not compromise

particulates collected on filters. The inlet is on top of the trailer approximately 2.5 metres above ground level. Filters are changed approximately once every 14 days.

Monitoring since the first round of review and assessment has been carried out between 2001-2003 at the following locations:

Table 9.0 *Monitoring undertaken for PM_{10} between 2001 and 2003, locations and dates.*

Location	Year	Period
Field Place (A38 & B6018)	2001	Jan – May
Portland Road	2001	May – Aug
Hucknall Town Centre	2001/02	Oct – Jan
Pinxton (M1)	2002	Feb – June
Oakfield Ave (A38 & B6018)	2002/03 ongoing	Aug - Jan ongoing

9.2 Particulate monitoring at the Junction of A38 and B6018, Kirkby-in-Ashfield

Monitoring conducted during 2001 and 2002/3 at Field Place and Oakfield Avenue, Kirkby-in-Ashfield, Nottinghamshire.

Location Description

Monitoring was undertaken at this location, as residential receptors were situated adjacent to both sides of the junction (see fig 7.0 Appendix). Short term monitoring was initially conducted at Field Place during 2001 but has been repeated to capture a full annual data set. The equipment was re-located at Oakfield Avenue, on the opposite side of the junction due to the inconvenienced it caused to local residents at Field Place. Both locations are considered suitable to make assessment against the 24-hour and annual mean objectives due to the close proximity of the residential buildings and gardens to the junction.

Field Place Kirkby-in-Ashfield. Junction of A38 and B6018

Measurement period: 30th January to 2nd May 2001
Total data capture 90 days out of a total of 90 days.

The 24-hour objective refers to 35 exceedances per year, which equates to 8.6 exceedances in 90 days (January to May). There have been 15 exceedances of this objective throughout the monitoring period (see fig 9.0 Appendix). Elevated levels of PM_{10} were observed on the 31st January, 14th to 18th February, 2nd to 6th March, 23rd March, 27th March, 12th and 13th April and 2nd May 2001. Comparisons made with PM_{10} results from the automatic monitoring site in Nottingham City Centre indicate that elevated concentrations of particles were predominantly associated with relatively high regional PM_{10} concentrations across the county and not as a result of local PM_{10}

sources. It is believed that regional incidences were responsible for at least 10 of the exceedances recorded during this monitoring period (see fig.9.0, Appendix).

Further monitoring is currently being conducted at this junction; however, the monitoring equipment was sited on the opposite side of the A38 adjacent to a number of residential properties on Oakfield Avenue (see fig.7.0, Appendix, for comparison of the monitoring sites). Particle data recorded at this location has therefore been compared with previous monitoring data recorded at Field Place. Table 9.1 tabulates the measured period means and the number of 24-Hour exceedances recorded during the assessments. A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 9.0 – 9.2.

Oakfield Avenue Kirkby-in-Ashfield, Junction of A38 and B6018

Measurement period: August 6th 2002 to January 19th 2003 (ongoing)
Total data capture to date 151 days out of a total of 167 days.

The 24-hour objective refers to 35 exceedances per year, which equates to 14.5 exceedances in 151days (Aug to Jan). There have been 6 exceedances of the 24-Hour objective from the inception of monitoring in this location (see fig.9.3 Appendix). These were on 12th September, 1st to 2nd and 31st October and 11th and 12th December. This location is down wind of the A38 and adjacent to standing traffic from the junction traffic lights. Table 9.1 tabulates the measured period means and the number of 24-Hour exceedances recorded during the assessments. A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 9.3 – 9.5.

Table 9.1 *Summary of Monitoring data Junction A38 and B6018 Field Place and Oakfield Avenue, Kirkby-in-Ashfield*

	24 hour means (monitoring period)			
Location	**Measured Period Mean (µg/m^3)**	**Min (µg/m^3)**	**Max (µg/m^3)**	**No. of exceedances of the 50µg/m^3 objective**
Field Place (A38 & B6018) 2001	35	10	76.0	15
Oakfield Avenue (A38 & B6018) 2002/3	24	6	73	6

Discussion

It is evident that local sources of PM_{10} appear to be giving rise to some exceedances of the 24-hour objective on a number of occasions at the locations of Field Place and Oakfield Avenue. The measured period mean PM_{10} concentrations recorded over the monitoring periods were 35µg/m^3 and 24µg/m^3 respectively, below the annual mean standard of 40µg/m^3. It would appear that the lower measured period mean and fewer

exceedances of the 24-hour mean recorded at Oakfield Avenue could be attributed to the effects of national policies reducing regional levels of PM_{10} concentrations.

There were 15 and 6 exceedances of the 24-hour mean objective concentration of 50µg/m^3 at Field Place and Oakfield Avenue respectively. The 24-hour mean objective refers to 35 exceedances per year, (i.e. 35 days in 365) which equates to 25 exceedances in 259 days for the combined period of monitoring carried out at this location (90 days at Field Place and 169 days at Oakfield Avenue). There have therefore been 21 overall exceedances of the objective concentration at this junction, against 25 exceedances that would be necessary to exceed the objective.

Only short-term data was available for the updating and screening assessment at this location as referred to above. Estimated annual means and predicted exceedances of the 24-hour objective were calculated in accordance with the guidance to determine whether the 2004 and 2010 objectives would be compromised. Table 9.2 tabulates the results for each location.

Table 9.2 *Estimated PM_{10} Annual mean and 24-hour mean exceedances for 2004 and 2010 Field Place and Oakfield Avenue, Kirkby-in-Ashfield*

Location	**Estimated Annual Mean 2001 (µg/m^3)**	**Estimated Annual mean in 2004 (µg/m^3)**	**Estimated Exceedances in 2004**	**Estimated Annual mean in 2010 (µg/m^3)**	**Estimated Exceedances in 2010**
Field Place (A38) 2001 data	34.2	31.8	37	29	26
Oakfield Avenue (A38) 2002/3 data	25.6	24.9	15	22.9	11

Conclusions

31st December 2004 Objectives

It is apparent from Table 9.2 that the estimated annual mean of 31.8µg/m^3 recorded at Field Place in 2001 would possibly give rise to an exceedance of the 24-hour mean objective set for 2004 (i.e. 37 estimated exceedances). Recent monitoring at Oakfield Avenue however, suggests that PM_{10} concentrations have declined in this location and that the current estimated concentrations are 24.9µg/m^3 annual mean with an estimated 15 exceedances of the 24-hour objective. This is significantly below the 24-hour and annual mean objective for 2004. It is unlikely that the 24-hr objective for 2004 will be compromised at this location.

Based upon the results of the monitoring carried out at this location, there is no requirement for Ashfield to proceed to a detailed assessment for particles in respect of the 2004 objectives.

31st December 2010 Objectives

The results from Oakfield Avenue currently suggest that the 2010 annual mean and 24-hour mean objectives may be compromised. Further review and assessment to determine if this will be the case will need to be conducted at the Oakfield Avenue in future years.

9.3 Portland Street, Kirkby-in-Ashfield

Location Description

The location of the monitor was within a mobile trailer positioned at the kerbside and approximately 2m in from the roadside (see fig 7.1 Appendix). Residential gardens are located approximately 3m from the road, although the façade of the nearest building is approximately 17m from the roadside.

Measurement period: 4th May to 7th October 2001
Total data capture to date 153 days out of a total of 156 days.

Monitoring Results

The 24-hour objective refers to 35 exceedances per year, which equates to 15.5 exceedances in 162 days (May to October). There have been 15 exceedances of this objective throughout the monitoring period (see fig 9.6 Appendix). Elevated levels of PM_{10} were observed on: 4th May, 8th to 11th May, 13th to 14th June, 25th to 26th June, 4th to 7th July, 30th August, 21st to 22nd September 2001.

Comparison with PM_{10} results from the monitoring site in Nottingham City Centre as shown in figure 9.6 indicate that elevated concentrations were associated with relatively high regional PM_{10} concentrations, although this is not always the case. Evidently local sources of PM_{10} appear to be giving rise to exceedances of the objective on a number of occasions.

The mean PM_{10} concentration during this monitoring period was 28.7µg/m^3, well below the annual mean objective of 40µg/m^3 (see table 9.3). A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 9.6 –9.8.

Table 9.3 *Portland Street, Kirkby-in-Ashfield Monitored Period 4th May to 7th October 2001*

	24 hour means			
Location	**Measured Period Mean (µg/m^3)**	**Min (µg/m^3)**	**Max (µg/m^3)**	**No. of exceedances of the 50µg/m^3 objective**
Portland Street (Kirkby-in-Ashfield)	28.7	9	62	15

Only short-term data was available for the updating and screening assessment at this location as referred to above (May to October 2001). Estimated annual means and predicted exceedances of the 24-hour objective were calculated to determine whether

the 2004 and 2010 objectives would be compromised. Table 9.4 tabulates the results for this location.

Table 9.4 *Portland Street, Kirkby-in-Ashfield Estimated PM_{10} Annual mean concentrations and 24-hour mean (35 exceedances) for 2004 and (7 exceedances) 2010.*

Location	Est. Annual mean 2001 (µg/m^3)	Estimated Annual mean in 2004 (µg/m^3)	Estimated Exceedances in 2004	Estimated Annual mean in 2010 (µg/m^3)	Estimated Exceedances in 2010
Portland Street 2001 data	28.7	27.6	22	25.3	16

Conclusions

31st December 2004 Objectives

The estimated annual mean for Portland Street in 2004 was calculated as 27.6µg/m^3 well below the objective of 40µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 22 exceedances, well below the objective of 35 exceedances.

Based upon the results of the monitoring undertaken at this location, there is no requirement for Ashfield to proceed to a detailed assessment for particles in respect of the 2004 objectives.

31st December 2010 Objectives

The estimated annual mean for Portland Street in 2010 was calculated as 25.3µg/m^3 just above the objective of 20µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 16 exceedances, above the objective of 7 exceedances.

The results from Portland Street currently suggest that the 2010 annual mean and 24-Hour mean objectives may be compromised. Further review and assessment to determine whether this will be the case will need to be carried out at this location.

9.4 High Street, Hucknall (Town Centre Location)

Location

The monitor was positioned on a kerbside within the town centre approximately 30 metres from a junction and 1m from the roadside (see fig 7.2, Appendix). It is accepted that this was not the most appropriate position to assess the 2004 24-hour and annual mean objective, however constraints involving the power supply restricted the monitor

being positioned adjacent to the building façade. Monitoring results are therefore considered to be a worse case.

Measurement period: 8th October to 31st December 2001
Total data capture to date 84 days out of a total of 84 days.

The 24-hour objective refers to 35 exceedances per year, which equates to 8.1 exceedances in 85 days (October to December 2001). There have been 13 exceedances of this objective throughout the monitoring period (see fig 9.9 Appendix). Elevated levels of PM_{10} were observed on 13th, 14th October 2nd, 5th, 15th, 20th, 23rd November, and 2nd, 8th, December 2001. Comparisons made with PM_{10} results from the Automatic Urban Network (AUN) site in Nottingham City Centre are shown in figure 9.9 and indicate that elevated concentrations were associated with relatively high regional PM_{10} concentrations, although this is not always the case. Evidently local sources of PM_{10} appear to be giving rise to exceedances of the objective on a number of occasions.

The mean PM_{10} concentration during this monitoring period was 33.5µg/m^3, below the annual mean objective of 40ug/m^3 (see table 9.5). A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix. Figures 9.9 –9.11.

Table 9.5 *Summary of Monitoring undertaken at Hucknall High Street 8th October to 31st December 2001*

	24 hour means			
Location	**Measured Period Mean (µg/m^3)**	**Min (µg/m^3)**	**Max (µg/m^3)**	**No. of exceedances of the 50µg/m^3 objective**
High Street Hucknall	33.5	5	83	13

Only short-term data was available for the updating and screening assessment at this location as referred to above (October to December 2001). Estimated annual means and predicted exceedances of the 24-hour standard were calculated to determine whether the 2004 and 2010 objectives would be compromised. Table 9.6 tabulates the results for this location.

Table 9.6 *Hucknall Town Centre, High Street Estimated PM_{10} Annual mean concentrations and 24-hour mean (35 ex) exceedances for 2004 and (7 ex) 2010*

Location	**Estimated Annual mean 2001 (µg/m^3)**	**Estimated Annual mean in 2004 (µg/m^3)**	**Estimated Exceedances in 2004**	**Estimated Annual mean in 2010 (µg/m^3)**	**Estimated Exceedances in 2010**
High Street 2001 data	29.9	28.6	25	26.2	18

Conclusions

31st December 2004 Objectives

The estimated annual mean for Hucknall High Street in 2004 was calculated as 28.6µg/m^3 well below the objective of 40µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 18 exceedances, well below the objective of 35 exceedances.

31st December 2010 Objectives

The estimated annual mean for Hucknall High Street in 2010 was calculated as 26.2µg/m^3 just above the objective of 20µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 18 exceedances, above the objective of 7 exceedances.

The results from Hucknall High Street currently suggest that the 2010 annual mean and 24-Hour mean objectives may be compromised. Further review and assessment to determine whether this will be the case will need to be carried out at this location.

Based upon the results of the monitoring carried out at this location, there is no requirement to conduct a detailed assessment for particles in respect of the 2004 objectives.

9.5 Pinxton Green, Pinxton (B6019), Close proximity to M1 Motorway

Measurement period: 6th February to 16th June 2002
Total data capture 126 days out of a total of 131 days.

Monitoring was undertaken at Pinxton Green in respect of recommendations from the third stage review and assessment undertaken during the first round. It was recommended that periodic monitoring should be undertaken at this location to ensure that the 24-hour objective continued to be met.

The Location

The monitoring trailer was located at Pinxton Green, Pinxton adjacent to houses to the east of the M1 (see fig 7.3 Appendix). The monitoring site was adjacent to a house on the B6019 and approximately 10 metres from the hardshoulder of the M1 Bridge over this road. The sample inlet was approximately 4 metres below the height of the M1. This site is situated Northeast of an industrial estate with both light and heavy industry present.

Monitoring results

The 24-hour objective refers to 35 exceedances per year, which roughly equates to 12 exceedances in 126 days (February to October 2002). There have been 22 exceedances of this objective throughout the monitoring period (see fig 9.12 Appendix). Elevated levels of PM_{10} were observed on 25th, 27th to 30 March, 3rd to 5th, 10th to 12th and 16th-17th April, 8th to 10th and 23 May, 1st to 2nd, 5th-8th and 16th of June 2002.

The mean PM_{10} concentration during this monitoring period was 35 µg/m^3, below the annual mean objective of 40µg/m^3 (see Table 9.7). A more detailed summary, chart and estimated annual mean calculations can be found in the Appendix, Figures 9.12 – 9.14.

Table 9.7 Summary of monitoring data undertaken at Pinxton Green 6th February to 16th June 2002

	24 hour means			
Location	**Measured Period Mean (µg/m^3)**	**Min (µg/m^3)**	**Max (µg/m^3)**	**No. of exceedances of the 50µg/m^3 objective**
Pinxton Green (B6019)	35	8	97	22

Only short-term data was available for the updating and screening assessment at this location as referred to above. Estimated annual means and predicted exceedances of the 24-hour objective were calculated to determine whether the 2004 and 2010 objectives would be compromised. Table 9.8 tabulates the results for this location.

Table 9.8 *Pinxton Green (B6019) Estimated PM_{10} Annual mean concentrations and 24-hour mean (35) exceedances for 2004 and (7) 2010*

Location	**Estimated Annual Mean 2002 (µg/m^3)**	**Estimated Annual mean in 2004 (µg/m^3)**	**Estimated Exceedances in 2004**	**Estimated Annual mean in 2010 (µg/m^3)**	**Estimated Exceedances in 2010**
Pinxton 2002	37.2	35.9	56	32.6	40

Conclusions

31st December 2004 Objectives

The estimated annual mean for Pinxton in 2004 was calculated as 35.9µg/m^3 below the objective of 40µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 56 exceedances, well above the objective of 35 exceedances.

There were 22 exceedances of the 24-hour objective recorded during the monitoring period, which indicates that the 2004 24-hour objective may be compromised.

It is recommended that Ashfield proceed to a detailed assessment for PM_{10} at this location to determine whether it would be necessary to declare an Air Quality Management Area.

31st December 2010 Objectives

The estimated annual average for Pinxton in 2010 was calculated as 32.6µg/m^3 above the objective of 20µg/m^3. The number of 24-hour exceedances of 50µg/m^3 was estimated using the relationship with the annual mean as described in the LAQM Technical Guidance (03) and calculated as 40 exceedances, above the objective of 7.

The results from Pinxton currently suggest that the 2010 annual mean and 24-Hour mean objectives may be compromised at this location. Further review and assessment to determine whether this will be the case will need to be carried out at this location.

9.6 (B) Monitoring Data within an Air Quality Management Area.

The updating and screening assessment for this section is only applicable to those authorities that have declared Air Quality Management Areas. Ashfield have not declared any Air Quality Management Areas within the district. No further updating and screening has been undertaken for this section.

9.7 (C) Busy roads and junctions in Scotland

This section is not applicable to Ashfield.

9.8 (D) Junctions.

Local authorities are required to undertaken assessment of busy junctions within their districts. The LAQM Technical Guidance (03) interprets a 'busy' junction as '*one with more than 10,000 vehicles per day*' Section D (Box 8.4). The identification of all busy junctions in Ashfield was undertaken utilising GIS software and local knowledge. Where junctions were determined to have receptors within 10m, the DMRB model was used to determine any exceedances of the PM_{10} objective (see table 9.9).

Table 9.9 *Junctions evaluated for PM_{10} against criteria stipulated within LAQM Technical Guidance (03) Box 8.4*

Junctions with more than 10,000 Vehicles per day	Receptor within 10 metres Yes/No	DRMB Receptor Ref.
1. A6075 – B6014	No	N/A
2. A38-A6075-B6023	No	N/A
3. A38 – B6139	No	N/A
4. A38 – B6022	Yes	1
5. A38 – B6021	No	N/A
6. A38 – B6018	No	N/A
7. B6023 – B6018	No	N/A
8. A38 – B6023	No	N/A
9. A38 – B6027	No	N/A
10. B6018 – B6020	Yes	2
11. B6020 - Lowmoor	No	N/A
12. Kingsway –A611	No	N/A
13. A611 – A6009	No	N/A
14. Lowmoor – Southwell	No	N/A

15. A611 – Forest Road	Yes	3
16. A608 – A611	No	N/A
17. A611 –B6011	No	N/A
18. B6023 – B6026	Yes	4
19. B6023 – Forest Street	Yes	5
20. B6023 – B6028	Yes	6
21. B6014 – B6028	Yes	7

Table 9.10 *DMRB Model results from junction receptors evaluated (See PM_{10} assessed Receptors 1-7 Appendix)*

Receptor Name	**Junction**	**Estimated Annual mean in 2001 (µg/m^3)**	**Estimated Exceedances in 2001**	**Estimated Annual mean in 2004 (µg/m^3)**	**Estimated Exceedances in 2004**
1	A38 – B6022	30.9	31	28.0	21
2	B6018 – B6020	27.8	20	25.8	14
3	A611 – Forest Road	27.4	19	25.2	13
4	B6023 – B6026	26.6	17	24.7	12
5	B6023 – Forest Street	25.6	14	23.9	10
6	B6023 - B8028	26.8	17	24.7	12
7	B6014 – B6028	25.4	13	23.6	9

Conclusions

There were no exceedances of the PM_{10} objectives measured at any of the seven junctions evaluated (see table 9.10 & Appendix Receptors 1-7).

There is no requirement for Ashfield to proceed to a detailed assessment for any busy junctions within the district.

9.9 (E) Roads with high flow of buses and/or HGVs

Authorities are only required to undertake an updating and screening assessment for this section where roads are identified as having an unusually high proportion of buses or HGVs. An 'unusual high proportion of Buses or HGVs is taken to be 'greater than 20% of the AADT' LAQM Technical Guidance (03) Box 8.4).

There have been no roads identified within Ashfield which show an 'unusually' high proportion of buses and/or HGVs and therefore no further updating and screening assessment has been undertaken for this section.

9.10 (F) New roads constructed or proposed since the last round of review and assessment.

Mansfield and Ashfield Regeneration Route (MARR)

This is a new road, which intersects the district of Mansfield and Ashfield and is currently under construction. Consultants, on behalf of Nottingham County Council have carried out an air quality assessment for the new road using an old version of the DMRB model and emission factors[11,12]. The results indicated that there were possible exceedances of the 24-hour objective at certain receptors within Mansfield and Ashfield. Three receptors were identified as exceeding the objective within Ashfield. The receptors were located at 113 Beck Lane, Rushley Cottage and Rushley Farm and results estimated that the 2004 PM_{10} concentrations were 57µg/m^3, 56µg/m^3 and 54µg/m^3 respectively, based upon the 99th percentile of the 24-hour mean.

The DMRB has recently been revised and a new version has been released. The receptors have therefore been remodelled as part of the updating and screening process using this new version (see Appendix MARR receptors 8,9&10). The new DMRB estimates the number of exceedances of the 24-hour mean objective (50µg/m^3, not to be exceeded more than 35 times a year) rather than the 99th percentile of the 24-hour mean. Table 9.11 tabulates the results recorded for the initial air quality assessment using the old DMRB model along with the results from the new version. It is clear that the number of exceedances estimated against the 24-hour objective for each receptor is considerably below 35 exceedances per year.

Table 9.11 *MARR Route DMRB PM_{10} Calculations*

Location (Appendix – Receptors 8,9&10)	**1998 24-hour values as 99th%ile (µg/m^3) old DMRB**	**2004 Without Route 24-hour values As 99th%ile (µg/m^3) old DMRB**	**2004 With Route 24-hour values as 99th%ile (µg/m^3) old DMRB**	**2004 With Route Days >50 (µg/m^3) new DMRB**
113 Beck Lane A6075 (S)	68	56	57	**12**
Rushley Cottage (A611)	69	57	56	**12**
Rushley Farm (A60)	64	54	55	**8**

Conclusions

It is unlikely that the 2004 24-Hour mean objective for PM_{10} will be compromised at the locations of Beck Lane, Rushley Cottage and Rushley Farm receptors as part of the Mansfield and Ashfield Regeneration Route.

9.11 (G) Roads close to the objective during the first round of review and assessment.

High resolution modelling for PM_{10} which was conducted by CERC during the first round review and assessment concluded that there would be no roads within Ashfield other than the M1 Motorway, which would exceed the PM_{10} objective in 2004[10]. Real time monitoring has since been undertaken at a relevant location adjacent to the M1 Motorway indicating that the 2004 objective may be comprised (see section 9.5 and subsequent conclusions).

No further review and assessment has been undertaken for this section.

9.12 (H) Roads with significantly changed traffic flows.

Authorities are only required to undertake the updating and screening assessment of roads with traffic flows greater than 10,000 vehicles per day, that have experienced a large increase in traffic. The LAQM Technical Guidance (03) has interpreted 'large increase' as 'more than a 25% increase in traffic'. All roads within Ashfield above 10,000 have been evaluated against this criterion.

There are no roads within Ashfield that have seen a 25% increase in daily traffic flow based upon 1997 and 2001 AADT traffic flow data. No further updating and screening has been undertaken for this section.

9.13 (I) New industrial sources

A PM_{10} emissions inventory for Ashfield has been reviewed and updated since the first round review and assessment[8]. Considerable data relating to emissions of PM_{10} has been compiled and entered into the new inventory. There have been no new industrial sources of PM_{10} identified within Ashfield. No further updating and screening assessment has been undertaken for this section.

9.14 (J) Industrial sources with substantially increased emissions.

A PM_{10} emissions inventory for Ashfield has been reviewed and updated since the first round of review and assessment[8]. Considerable data relating to emissions of PM_{10} has been compiled and entered into the new inventory. There have been no new industrial sources with substantially increased emissions of PM_{10} identified within Ashfield. No further updating and screening assessment has been undertaken for this section.

9.15 (K) Areas of domestic solid fuel burning.

Consideration of the results from the first round review and assessment has indicated that areas of densely populated housing burning solid fuel could constitute significant sources of PM_{10}. The LAQM Technical Guidance (03) has determined 'significant coal burning' as '*any area of 500x500m which contains more than 50 houses burning solid fuel as their primary source of heating*' LAQM Technical Guidance (03) Box 7.2.

Ashfield have undertaken a district wide survey of all potential solid fuel burning areas based upon this criteria of the LAQM Technical Guidance (03). Local knowledge and GIS software were used to identify specific areas for evaluation. Five areas were identified for evaluation as listed below (see table 9.12):

Table 9.12 *Locations and co-ordinates of areas surveyed for solid fuel burning*

Location	**Map Sheet**
Hucknall	SK5349
Sutton-in-Ashfield	SK5059
Kirkby-in-Ashfield	SK4956
Selston	SK4553
Jacksdale	SK4451

Area street plans with an over-layered 500x500m grid were generated to enable officers to survey these areas to determine whether significant coal burning was taking place. The survey involved the visual observation of domestic flue outlets (see figures 8.10 – 8.14, Appendix).

Results

The survey undertaken demonstrated that there is no significant solid fuel burning taking place within Ashfield. Counts of properties burning solid fuel as their primary source of heating have determined there to be substantially below 50 houses within a 500x500m area as stipulated within the LAQM Technical Guidance (03) (see table 9.13).

Table 9.13 *Results of Coal burning survey for designated areas within Ashfield*

Area	**Count of houses within 500x500m area**	**Number of Houses burning coal as their primary heating source.**
Hucknall	837	8
Sutton-in-Ashfield	781	6
Kirkby-in-Ashfield	737	14
Selston	458	6
Jacksdale	492	14

Discussion

An emissions inventory for domestic combustion has been updated since the first round of review and assessment. The usage of solid fuel has been estimated to have fallen by approximately 50% within the Nottinghamshire area. This estimation has been based upon a reduction in concessionary coal supply within the region and is further confirmed by the small number of houses identified within the survey as burning solid fuel as their primary source of heating.

There is no requirement for Ashfield to proceed to a detailed assessment for PM_{10} in respect of domestic solid fuel burning.

9.16 (L) Quarries/Landfill sites/opencast coal/handling of dusty cargoes at ports etc.

Authorities are only expected to undertake a detailed assessment for PM_{10} in regard to this section where locations with relevant exposure and substantiated problems associated with dust have been determined.

There is only one location within Ashfield, which meets the criteria of this section. This is Sutton landfill site. It has been determined that the landfill site has areas of relevant exposure, as residential properties are located close to the site boundary. The site is however regulated by the Environment Agency under a waste management

licence, which imposes strict conditions in respect of dust emissions from the site. There have been no recent complaints about dust emanating from the filling operations that take place on the site or any indication of significant dust problems. There is therefore no requirement for Ashfield to proceed to a detailed assessment for PM_{10} in respect of this location.

9.17 (M) Aircraft.

There are no relevant air quality issues relating to aircraft within Ashfield. No updating and screening has been undertaken for this section.

9.18 CONCLUSION

The updating and screening assessment for PM_{10} has been completed against the criteria listed in the LAQM Technical Guidance (03). It is expected that the Air Quality Objectives of 50µg/m^3 (35 exceedances) 24hr mean 31st. December 2004 and 40µg/m^3 annual mean 31st. December 2004 will be met across Ashfield, except in the location of Pinxton Green where the updating and screening assessment has indicated that the 24-hour mean objective may be compromised (see section 9.5). This location was the subject of a stage three review during the first round of review and assessment along with a comparable location in Selston[6].

It is therefore recommended that a detailed assessment for PM_{10} be undertaken at this location. This will include further monitoring to capture a full annual data set and also carry out a full analysis of all historic data.

The updating and screening assessments undertaken against the 2010 annual mean and 24-Hour mean objectives has indicated that these objectives may be compromised at a number of monitored locations. Further review and assessment to determine whether this will be the case will need to be conducted at these locations.

10.0 CHAPTER TEN - REFERENCES

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7. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 'Working Together for Clean Air'. January 2000.

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10. Atmospheric Emission Inventory and Dispersion Modelling Study for Nottinghamshire. Carruthers et al. CERC, May 1999.

11. The Mansfield and Ashfield Regeneration Route (MARR) Stage 3 Environmental Statement, Volume 1 Parts 1 and 2, Babtie for Nottinghamshire County Council 1999.

12. The Mansfield and Ashfield Regeneration Route (MARR), Volume 2 Part 1, Working Paper on Air Quality. 1999.

11.0 CHAPTER ELEVEN – ABBREVIATIONS & GLOSSARY OF TERMS

11.1 Abbreviations

AADT	Annual Average Daily Traffic (vehicles per day)
ADMS	Atmospheric Dispersion Modeling System
AQMA	Air Quality Management Area
ARIC	Atmospheric Research and Information Centre
AURN	Automatic Urban and Rural (air quality monitoring) Network
CO	carbon monoxide
COMEAP	Committee on the Medical Effects of Air Pollutants
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges Screening Model (v1.00)
EA	Environment Agency
GIS	Geographical Information System
HDV	Heavy Duty Vehicles (includes Rigid and articulated Heavy Goods Vehicles,Buses and Coaches)
NO	nitrogen monoxide, also termed nitric oxide
NO_2	nitrogen dioxide
NOx	nitrogen oxides
PM_{10}	particulate matter with an (equivalent aerodynamic) diameter of ten microns (10 µm) or less
SO_2	sulphur dioxide

11.2 Glossary of Terms

Air quality standard The concentrations of pollutants in the atmosphere, which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also Air Quality Objective).

Annual mean The average of the concentrations measured for each pollutant for one year. In the case of the Air Quality Objectives this is for a calendar year.

Air Quality Management Area An area that a local authority has designated for action, based upon predicted exceedences of Air Quality Objectives.

Atmospheric dispersion model A mathematical, often computer-based method for calculating pollutant concentrations from emissions data under a set of known variables. Models vary from screening models to detailed, 'new-generation' types.

Automatic Urban and Rural Network Air pollution measurement sites, managed by contractors on behalf of DEFRA and the Devolved Administrations.

Concentration The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, microgrammes per cubic metre, $\mu g/m^3$) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).

Data capture The percentage of all the possible measurements for a given period that were validly measured.

Exceedence A period of time where the concentration of a pollutant is greater than the appropriate Air Quality Objective.

Fine particles, Particulate matter, (PM_{10}) in air with a (equivalent aerodynamic) diameter of ten micrometres (10 µm, 10 micrometres) or less.

Maximum hourly average The highest hourly reading of air pollution obtained during the time period under study.

Microgramme (µg), one millionth of a gramme.

Micrometre (µm), also referred to as a micron, one millionth of a metre.

mg/m^3 milligrammes per cubic metre of air. A unit for describing the concentration of air pollutants in the atmosphere, as a mass of pollutant per unit volume of clean air. This unit is one thousand times larger than the $\mu g/m^3$ unit listed below.

$\mu g/m^3$ microgrammes per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Percentile A value that is the rank at a particular point in a collection of data. For instance, a 98th percentile of values for a year is the value that 98% of all the data in the year fall below, or equal.

Parts per billion (ppb). The concentration of a pollutant in air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10^9) units of air, there is one unit of pollutant present.

Parts per million (ppm) The concentration of a pollutant in air in terms of volume ratio. A concentration of 1 ppm means that for every million-(10^6) units of air, there is one unit of pollutant present.

Ratification (Monitoring) involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used.

Running mean a mean or series of means calculated for overlapping time periods, and is used in the calculation of several of the National Air Quality Objectives. For instance, an 8-hour running mean is calculated every hour, and averages the values for eight hours. The period of averaging is stepped forward by one hour for each value, so running mean values are given for the periods 00:00 – 07:59, 01:00 – 08:59 etc. By contrast a non-overlapping mean is calculated for consecutive time periods, giving values for the periods 00:00 – 07:59, 08:00 – 15:59 and so on. There are, therefore, 24 possible running 8-hour means in a day (calculated from hourly data) and 3 non-overlapping 8-hour means.