MILTON KEYNES COUNCIL

Milton Keynes Council
Local Air Quality Management

Updating and Screening Assessment

May 2003

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1 EXECUTIVE SUMMARY

- Milton Keynes Council (MKC) will not need to undertake a Detailed Assessment for any of the pollutants investigated in this Updating and Screening Assessment (USA). All pollutant objectives are expected to be met by the relevant date.

- A Progress Report will be provided by the end of April 2004 and will include all data collected during the year 2003. Guidance on the format of the Progress Report is expected from the Department for Environment, Food and Rural Affairs (DEFRA) in September 2003 following a consultation period in July.

- A second Progress Report will be submitted to DEFRA by the end of April 2005.

- At any time during the Progress Reporting years, if the Council identifies a risk of an Air Quality Objective exceedence, a Detailed Assessment will be undertaken to formally identify the need to declare any Air Quality Management Areas (AQMAs).

- As local authorities are required to undertake reviews and assessments of air quality every three years, the next USA is to be completed by the end of April 2006.

2 INTRODUCTION

This is the second round of reviews and assessments of local air quality undertaken by Milton Keynes Council, the first having been completed and published in December 2000. The original 3-stage approach to review and assessment has been reduced to 2 steps known as an Updating and Screening Assessment (USA) and a Detailed Assessment. All local authorities must carry out an Updating and Screening Assessment. If a risk is identified in the USA that an Air Quality Objective (AQO) will be exceeded, the local authority is required to undertake a Detailed Assessment similar to stages 2 and 3 in the first round of Review and Assessment.

This is an Updating and Screening Assessment report and follows the methodology described in the revised technical guidance document LAQM.TG(03). This single document supersedes and incorporates all aspects of four technical guidance notes published in 2000. The USA is based on a checklist approach and its purpose is to identify and assess matters that have changed since the last review and assessment. The USA covers new monitoring data; new objectives; new sources or significant changes to existing sources; other local changes that might affect air quality.

The screening assessment for road traffic sources uses the screening model prepared for the Design Manual for Roads and Bridges (DMRB) as provided by the Highways Agency (ref 7). Traffic data, provided by Milton Keynes Council's Land Use and Transport Strategy Division, are derived from an extensive network of monitoring sites around the Borough operated by MKC, the Department for Transport (DfT) and English Partnerships. For the purposes of the USA, Milton Keynes is not considered to be a major conurbation (population in excess of 2 million). The Council's Geographical Information System, MapInfo, which now includes an aerial photography data set, taken in September 1999, has been used for this study.

Reviews and assessments are focussed on locations where members of the public are likely to be regularly exposed over the averaging period of the pollutant objective, which may be short-term (e.g. 15 minutes) or long-term (e.g. 24 hours). A location with relevant exposure must also be outside of buildings or other man-made structures. The façade of a building is considered to represent relevant exposure. The objectives do not apply to building façades of workplaces where members of the public do not have regular access. The USA focuses on locations where pollutant concentrations are expected to be highest and takes account of evidence gathered from the first round of review and assessments. This has indicated that pollutant levels may be higher at relevant locations in busy towns even though traffic flows are relatively small compared to that on motorways and dual carriageways.

Where the USA has identified a risk that an AQO will be exceeded at a location with relevant public exposure, the Council is required to undertake a Detailed Assessment similar to stages 2 and 3 of the last review and assessment. This has to be completed by April 2004 in sufficient detail to allow for the designation of any Air Quality Management Areas (AQMAs). Milton Keynes Council does not currently have any AQMAs.

3 MONITORING NETWORK IN MILTON KEYNES

The Environmental Health Division now operates four continuous automatic air quality monitoring stations, supplied by Horiba Instruments of Northampton, containing the analysers listed in table 1 below.

Since the first Review and Assessment Milton Keynes Council's air quality network has been enhanced. A new air quality station was installed in June 2002 on Wolverton Road, Newport Pagnell near the M1 bridge (see photographs of automatic monitoring stations in Appendix 1). This is known as a "roadbox" and is a small, semi-permanent installation consisting of a waterproof air-conditioned enclosure housing a chemiluminescent analyser (oxides of nitrogen) and a beta-attenuation monitor (particulate matter PM_{10}). The mobile air quality station previously at this location has been relocated to High Street, Olney, to further investigate any street canyon effect leading to increased pollutant levels.

There is a fixed monitoring station located within the walled garden at the rear of the Civic Offices, parallel with the pavement of North Eighth Street. The site is classified as an urban centre (U3) location representative of typical population exposure in the city centre. The Council also has two mobile air quality stations, which can be moved to various locations throughout the borough. The mobile stations are mainly used to assess possible air pollution hotspots and collect data over a monitoring period of a few months.

The stations contain National Environmental Technology Centre (NETCEN) type-tested and approved analysers, as used in national networks, housed in secure air-conditioned containers to maintain the correct operating temperature range. Most functions of the air quality stations are automatic or can be operated by remote communication via modem, usually from the air quality monitoring computer at the Civic Offices. Data are downloaded at least twice daily, and gas analysers are check calibrated automatically every 3 days using a gas mixture of known concentration to ensure accuracy of data.

A full service by the manufacturer is undertaken every 6 months and the service includes a verification of the calibration gas concentration using a traceable standard. After correction has been made to the data set for any calibration errors, and other relevant factors, the data are usable for comparison with the objectives of the Strategy. The UK Automatic Network Site Operator's Manual, produced by NETCEN, is used as an operational guide for the automatic monitoring stations.

Table 1: Types of Analyser contained within MKC Air Quality Monitoring Stations

Analyser	*Installation Date*			
	Static	**Mobile 1**	**Mobile 2**	**Roadbox**
NO_x Monitor	21-May-98	09-Oct-98	23-Aug-00	19-Jun-02
Particulate (PM_{10}) Monitor	21-May-98	09-Oct-98	23-Aug-00	19-Jun-02
SO_2 Monitor	04-Feb-99	10-Nov-98	Not monitored	Not monitored
CO Monitor	06-Jul-00	07-Jul-00	23-Aug-00	Not monitored

Table 2: Monitoring Station Information

Location	**Grid Reference**	**Site Classification**	**Comments**
Civic Offices Central Milton Keynes	485070 239131	Urban Centre	Fixed site operational since 21-May-98
Wolverton Road Newport Pagnell	486290 243344	Roadside	Fixed site 150 metres from edge of M1
Burgess Gardens Newport Pagnell	486942 242677	Suburban	Mobile site 85 metres from edge of M1
Western Road Bletchley	487360 234012	Urban Background	Mobile site in Central Bletchley
High Street* Olney	488919 251452	Kerbside	Mobile site in busy market town
Selbourne Avenue* Bletchley	485722 232957	Urban Background	Mobile site close to landfill site
****Current location of mobile air quality stations (May 2003)*			

All automatic monitoring station data have been ratified before being used and have been reported up to the end of 2002.

In addition to continuous monitoring, the Council monitors for nitrogen dioxide using diffusion tubes at over thirty locations throughout the Borough. Diffusion tubes are prepared 'in-house' using 20% Triethanol amine (TEA) in water. The Council participates in the WASP scheme for quality assurance of diffusion tube analysis and the monthly NO_2 Network Field Intercomparison Exercise.

4 REVIEW AND ASSESSMENT OF CARBON MONOXIDE

The new air quality objective for carbon monoxide is a maximum daily running 8-hour mean concentration of **10 mg/m^3** to be achieved by the end of **2003** in line with the second Air Quality Daughter Directive limit value.

There were no measured exceedences of this objective at any of the UK national network sites for the period 1999-2001. The main source of carbon monoxide is road transport and projections are that emissions will fall by 42% between 2000 and 2005.

4.1 Monitoring data

A significant amount of monitoring data has been collected since the last review and assessment published in December 2000. As there is a poor relationship between the annual mean concentration and the maximum running 8-hour mean, the measured concentration in the year of monitoring is applicable to 2003 for the purposes of this assessment (Chapter 2.16 LAQM TG(03)).

Table 3: Air Quality Monitoring Station – Data Summary for Carbon Monoxide

Location	***Monitoring period***	***Maximum daily running eight hour mean (mg/m^3)***		
		2000	**2001**	**2002**
Western Road Bletchley	07-July-00 14-Nov-00	1.8	-	-
Burgess Gardens, Newport Pagnell	14-Nov-00 14-Aug-02	2.6	3.2	2.0
Selbourne Avenue, Bletchley	09-Oct-02 31-Dec-02	-	-	1.4
Wolverton Road, Newport Pagnell	23-Aug-00 19-Jun-02	4.2	4.2	4.4
High Street, Olney	14-Aug-02 31-Dec-02	-	-	2.2
Civic Offices, Central Milton Keynes	07-Jun-00 31-Dec-02	1.1	3.6	2.1

No recorded daily running 8-hour mean exceeded the objective. The highest recorded maximum daily running 8-hour mean was 4.4 mg/m^3 measured in 2002 at Wolverton Road, Newport Pagnell. This site is within 150 metres of the M1 motorway and is only 3 metres from the kerb of Wolverton Road.

4.2 “Very busy” roads

The Annual Average Daily Traffic (AADT) flows do not exceed the stated threshold criteria; therefore a screening assessment for road traffic sources in respect of the 2003 objective is not required.

4.3 Conclusion

There is no significant risk of exceeding the 2003 objective and it is not necessary to undertake a Detailed Assessment for carbon monoxide.

5 REVIEW AND ASSESSMENT OF BENZENE

There are two air quality objectives for benzene; a running annual mean concentration of **16.25 µg/m^3**, to be achieved by the end of **2003** and an annual mean of **5 µg/m^3** to be achieved by the end of **2010**. The latter, tighter objective is new and has been set on the grounds of health advice from Government advisory committees to reduce concentrations of benzene in air to as low a level as possible. The new objective is similar to the limit value for benzene set in the second Air Quality Daughter Directive.

The main sources of benzene emissions are petrol-engined vehicles, petrol refining and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems. The maximum benzene content of fuel was reduced to 1% since January 2000 and most petrol stations now have vapour recovery systems. Further reductions in benzene emissions are forecast for the future.

5.1 Monitoring data

Milton Keynes Council does not monitor benzene concentrations and so data from the national network sites have been analysed.

Measured concentrations in 2001 at all urban background and roadside sites were significantly below the 2003 objective and also complied with the tighter 2010 objective. The only site exceeding the 2010 objective was the London Marylebone Road (kerbside) site where an annual mean of 6.29 µg/m^3 was recorded for 2001. Using the correction factors in Box 3.4 of the guidance to estimate the 2010 annual mean concentration at this location gives a value of 4.07 µg/m^3, indicating future compliance with the objectives.

If compliance is achieved at the kerbside of Marylebone Road then it is reasonable to assume there will be no significant problem in Milton Keynes.

5.2 Very busy roads or junctions in built-up areas

The Annual Average Daily Traffic (AADT) flows do not exceed the stated threshold criteria, therefore a screening assessment for road traffic sources in respect of the 2010 objective is not required. The maximum estimated background benzene concentration for 2010 in Milton Keynes is 0.427 µg/m^3, well below the threshold value of 2 µg/m^3.

5.3 Industrial sources

There are no significant industrial sources of benzene in Milton-Keynes, as listed in Annex 2, Appendix E of LAQM.TG(03).

5.4 Petrol Stations

There are 31 petrol stations in Milton Keynes with an annual throughput of more than 2000 m^3 (2 million litres per annum) of petrol as listed below in Table 4.
All are authorised under the Environmental Protection Act 1990 and have Stage 1 vapour recovery systems in place. The petrol distribution pumps are all more than 10 metres away from the façades of residential properties.

Of the 3 petrol stations where residential properties are about 15 metres away from the distribution pumps, traffic flows are less than 10,000 vehicles/day. These stations are identified in bold lettering in table 4.

Table 4: Petrol Stations with Annual Throughput of More Than 2000 m^3 Petrol

REF.No	ADDRESS
RPFS/002	**Pikesley's (Esso) Garage, 19a High Street, Woburn Sands, Milton Keynes MK17 8RF**
RPFS/003	Shell, Northampton Road, Newport Pagnell, Milton Keynes, MK16 8J
RPFS/015	Shell Blakelands, H3 Monks Way,Blakelands, Milton Keynes, MK14 5JA
RPFS/016	Texaco Filling Station, H3 Monks Way,Tongwell, Milton Keynes, MK15 8HR
RPFS/029	Total Service Station, Whaddon Way,Bletchley, Milton Keynes, MK3 7SY
RPFS/031	**BP Viking Filling Station, 26 Aylesbury Street, Fenny Stratford, Milton Keynes MK2 2BA**
RPFS/032	Shell Bleak Hall, Grafton Street,Bleak Hall, Milton Keynes, MK6 1LT
RPFS/045	Shell Leadenhall, Grafton Street,Leadenhall, Milton Keynes, MK6 5LY
RPFS/048	Shell Stacey Bushes, H3 Monks Way, Stacey Bushes, Milton Keynes, MK12 6HU
RPFS/053	Tesco Filling Station, 1 Winchester Circle, Kingston, Milton Keynes, MK10 0AH
RPFS/054	Tesco Filling Station, Watling Street, Bletchley, Milton Keynes, MK1 1DD
RPFS/055	Tesco Filling Station, McConnell Drive,Wolverton, Milton Keynes, MK12 5RJ
RPFS/056	BP Wavendon Gate Filling Station, Newport Road, Wavendon Gate,Milton Keynes MK7 7AG
RPFS/057	BP Conniburrow, H5 Portway,Conniburrow, Milton Keynes, MK9 3DZ
RPFS/062	Total Filling Station, H5 Portway,Bradwell Common, Milton Keynes, MK13 8HR
RPFS/063	Total Filling Station, Watling Street,Little Brickhill, Milton Keynes, MK17 9AA
RPFS/065	BP Linford Wood, Saxon Street,Linford Wood, Milton Keynes, MK9 1ES
RPFS/068	Welcome Break M1 Service Area Northbound, Newport Pagnell, Milton Keynes, MK16 8DS
P069	Welcome Break, M1 Service Area,Southbound, Newport Pagnell, Milton Keynes MK16 8DS
RPFS/070	BP Emerson Valley, H8 Standing Way,Emerson Valley, Milton Keynes MK4 2DZ
RPFS/071	BP Bradwell Abbey, H3 Monks Way,Bradwell Abbey, Milton Keynes, MK12 6HU
RPFS/077	BP Childs Way,Central Milton Keynes MK9 3DA
RPFS/081	**Jet Filling Station, London Road,Stony Stratford, Milton Keynes, MK11 1JA**
RPFS/084	BP Three Counties Filling Station,Warrington Rondabout, Warrington, Olney, MK46 4JA
RPFS/085	Whitefield Service Station, Stratford Road,Wolverton, Milton Keynes MK12 5NG
RPFS/089	Margram Filling Station, H5 Portway,Central Milton Keynes, MK9
RPFS/092	Safeway Filling Station, Barnsdale Drive, Westcroft, Milton Keynes, MK4 43DP
RPFS/094	BP Norman Filling Station, Saxon Street,Bletchley, Milton Keynes, MK2 2JP
RPFS/095	BP Saxon Filling Station, Saxon Street,Bletchley, Milton Keynes, MK2 2 JP
RPFS/098	BP Chicheley Park, Tickford Street,Newport Pagnell, Milton Keynes, MK16 9BD
RPFS/100	Total Filling Station, H6 Childs Way,Broughton, Milton Keynes, MK10 9AB

5.5 Major fuel storage depots (petroleum only)

There are no major fuel storage depots handling petrol.

5.6 Conclusions

It is not necessary to proceed to a Detailed Assessment for benzene.

6 REVIEW AND ASSESSMENT OF 1,3-BUTADIENE

The adopted air quality objective for 1,3-butadiene is a maximum running annual mean concentration of **2.25 µg/m^3** to be achieved by the end of **2003**.

Exhaust emissions from motor vehicles are the main source of 1,3-butadiene in the United Kingdom, but it is an important industrial chemical handled in bulk at some industrial premises. No industrial sources were identified during the first round of review and assessment as likely to give rise to exceedences of the objective. There are no existing or proposed significant industrial sources within the Borough or in neighbouring areas.

The increasing use of three-way catalysts in vehicle exhaust systems has brought about further reductions in vehicle emissions. Improvements to fuel quality (Auto-Oil programme) are expected to reduce emissions of 1,3-butadiene in future years.

6.1 Monitoring data

Concentrations of 1,3-butadiene are measured at a small number of national network sites. It is not measured in Milton Keynes. Maximum running annual mean concentrations of 1,3-butadiene measured at all national network sites are well below the 2003 objective, e.g. the London Marylebone Road site measured a maximum running annual mean concentration of 1.63 µg/m^3 in 2001.

6.2 Industrial sources

There are currently no industrial sources of 1,3-butadiene and no new or proposed sources.

6.3 Conclusions

It is not necessary to proceed to a Detailed Assessment for 1,3-butadiene.

7 REVIEW AND ASSESSMENT OF LEAD

There are two air quality objectives for lead. The first is a concentration of **0.5 µg/m^3** as an annual mean to be achieved by the end of **2004**, equivalent to the limit value set in the European Union (EU) Air Quality Daughter Directive. However, Government policy is to reduce the concentration of lead in air to a level as low as reasonably practicable. A second objective of **0.25 µg/m^3** to be achieved by the end of **2008** has therefore been set.

The sale of leaded petrol in the United Kingdom has been phased out since January 2000, with the exception of 0.5% of the total UK fuel demand. Emissions of lead are now restricted to certain industrial activities such as battery manufacture, alloy production and radiation shielding. There are no existing or proposed significant industrial sources within the Borough or in neighbouring areas.

7.1 Monitoring data

Concentrations of lead at all national network background and kerbside sites are well below the objectives for 2004 and 2008.

7.2 Industrial sources

There are no existing or proposed industrial sources likely to give rise to exceedences of the annual mean objectives.

7.3 Conclusions

There are no major industrial processes that emit significant quantities of lead; therefore it is not necessary to proceed to a Detailed Assessment.

8 REVIEW AND ASSESSMENT OF NITROGEN DIOXIDE

The two Air Quality Objectives for nitrogen dioxide are unchanged from the last review and assessment; an annual mean concentration of **40 µg/m^3** and a 1-hour mean concentration of **200 µg/m^3** not to be exceeded more than 18 times a year. Both nitrogen dioxide objectives are to be achieved by the end of **2005**. The first Air Quality Daughter Directive sets similar limit values for nitrogen dioxide, which have been transposed into UK legislation. There is an annual mean limit value of **40 µg/m^3** and a 1-hour limit value of **200 µg/m^3** not to be exceeded more than 18 times a year both to be achieved by 1st January **2010**.

The principal source of nitrogen oxides emissions in Milton Keynes is road transport. In the first round of review and assessment, the Council proceeded to a detailed Third Stage review and assessment of nitrogen dioxide using the AAqUIRE advanced dispersion model. Predicted concentrations in 2005 were highest within about 20-30 metres of the edge of the M1 motorway. This area does not include any residential properties or other relevant locations and an AQMA was not required. However, a further study of the M1 corridor was undertaken and completed in January 2003 (ref. 5)

The detailed study used the revised 2002 road traffic emission factors, new traffic data on all road links and closer receptor grid spacing on the advanced model. The results confirmed that an AQMA was not required. Exceedences of the annual objective were predicted up to approximately 15 metres from the motorway edge.

The USA concentrates on areas that may be at risk of exceeding the objectives as identified below. Air quality monitoring station "2" was relocated to High Street, Olney in August 2002 to provide monitoring data from a market town were there are residential properties close to the kerb.

Emissions of nitrogen oxides from road transport are estimated to fall by about 20% between 2000 and 2005 and by 46% between 2000 and 2010.

The annual mean is the key assessment objective for NO_2, i.e. if the annual mean is not exceeded the hourly objective will also be met.

8.1 Monitoring data

Tables 5 and 7 below summarise the results from the automatic air quality stations and from diffusion tube locations in 2001 and 2002.

Continuous monitoring

Ratified data have been reported from the years 2001 and 2002.

Table 5: Nitrogen Dioxide Continuous Monitoring Results Summary (µg/m^3)

Location	Site classification	Annual mean		99.8th percentile of hourly means		Estimated roadside annual mean in 2005
		2001	2002	2001	2002	
Civic Offices	Urban centre	24.2	24.6	76.8	104.2	N/A
Burgess Gardens, Newport Pagnell	Suburban	27.4	27.3*	103.1	88.9*	N/A
Selbourne Ave, Bletchley	Urban background	-	22.0**	-	65.5**	N/A
Wolverton Road, Newport Pagnell	Roadside	36.9	36.8	97.3	98.2	32.9 (2001) 33.9 (2002)
High Street, Olney	Kerbside	-	34.2***	-	89.1***	31.5***

** Monitoring ended 14-Aug-02*
*** Monitoring began 9-Oct-02*
****Monitoring began 14-Aug-02*
Note: there were no exceedences of the 1-hour 200 µg/m^3 objective at any location

The highest recorded continuous monitoring annual mean was 36.9 µg/m^3 in 2001 on Wolverton Road, Newport Pagnell, corresponding to a predicted annual mean of 32.9 µg/m^3 in 2005. There have been no exceedences of the hourly objective at any monitoring site and the 99.8th percentiles of hourly means were well below the 200 µg/m^3 objective. Predicted annual means for roadside sites in 2005 using the correction factors in Box 6.6 of LAQM.TG(03) are less than the objective concentration of 40 µg/m^3. High Street, Olney is a kerbside monitoring location and concentrations of nitrogen dioxide will be lower at the façade of adjacent residential buildings where the annual objective is applicable.

Nitrogen Dioxide Diffusion Tube Monitoring

Diffusion tube results have been bias-corrected following the procedure described in Box 6.4 of LAQM.TG(03). Triplicate sets of diffusion tubes were co-located at two automatic air quality monitoring stations during 2002, in order to calculate a bias adjustment factor relative to the chemiluminescent NOx analysers. The bias adjustment factor was 0.8 at both locations demonstrating that the diffusion tubes over-read by 25% compared to continuous analysers.

Table 6: 2002 Co-located Diffusion Tube Results (µg/m^3) and Bias Factor

Location	Chemi-luminescent	Diffusion Tube Result	Over-read %	Bias Adjustment Factor
Civic Offices	24.6	30.7	24.8	0.8
Wolverton Road	36.8	46.0	25.0	0.8

Table 7 shows the bias adjusted results and the projected concentrations for 2005, calculated using the formulae set out in Box 6.6 of LAQM.TG(03).

Table 7: 2001 and 2002 Roadside Annual Diffusion Tube Results (µg/m^3)

Tube Location/Year	NO_2	NO_2 (bias adjusted)	Projected NO_2
2001			**2005**
High Street South, Olney	52.5	42.0	37.5
M1 Junction 14	51.4	41.1	36.7
High Street, Newport Pagnell	47.0	37.6	33.5
5-7 Greenlands, Newport Pagnell	42.6	34.1	30.4
16-17 Greenlands, Newport Pagnell	35.9	28.7	25.6
Aylesbury Street, Fenny Stratford	38.0	30.4	27.1
Silbury Boulevard Kerbside, CMK	34.0	27.2	24.3
Newport Road, New Bradwell	32.9	26.3	23.4
42-44 Walnut, Newport Pagnell	32.5	26.0	23.2
Wolverton Road, Blakelands	34.0	27.2	24.3
Co-located tubes, Civic Offices, CMK	30.1	24.1	21.5
Co-located tubes, Wolverton Rd, N/Pagnell	42.3	33.8	30.2
2002			
High Street South, Olney	49.3	39.4	36.3
M1 Junction 14	52.1	41.7	38.4
High Street, Newport Pagnell	47.6	38.0	35.0
5-7 Greenlands, Newport Pagnell	39.5	31.6	29.1
16-17 Greenlands, Newport Pagnell	40.9	32.7	30.1
Aylesbury Street, Fenny Stratford	34.6	27.7	25.5
Silbury Boulevard Kerbside, CMK	34.0	27.2	25.0
Newport Road, New Bradwell	28.7	22.9	21.1
42-44 Walnut, Newport Pagnell	36.5	29.2	26.9
Wolverton Road, Blakelands	30.8	24.6	22.6
Co-located tubes, Civic Offices, CMK	30.7	24.6	20.6
Co-located tubes, Wolverton Rd, N/Pagnell	46.0	36.8	32.8

Results from diffusion tubes (bias corrected) in 2001 indicate two exceedences of the annual mean objective; M1 junction 14 and High Street South, Olney. The projected 2005 annual means are 36.7 and 37.5 µg/m^3 respectively suggesting future compliance with the 2005 objective. Diffusion tube data from 2002 shows an improvement in Olney with an annual mean of 39.4µg/m^3 and a projected 2005 annual mean of 36.3 µg/m^3.

The M1 site on the south carriageway exit slip road is not a relevant location for the purposes of this assessment as people are not regularly exposed here. In the case of High Street South Olney, the annual objective applies to building facades of residential properties and this site is therefore a relevant location. The hourly objective is also applicable on the pavement of High Street South. An air quality assessment for road traffic sources using the DMRB screening model is reported below.

8.2 Screening assessment for road traffic sources

Levels of traffic and locations that might lead to exceedences of the objectives have been identified and assessed.

The screening assessment for road traffic sources in 2005 has been carried out by using the DMRB Screening Model (v1.01) provided by the Highways Agency in Microsoft Excel spreadsheet format. Model input data on traffic information has been obtained from Milton Keynes Council's Land Use and Transport Strategy Division. Background nitrogen oxides and nitrogen dioxide concentrations predicted for 2005 and 2010 were downloaded from the following internet site;
www.airquality.co.uk/archive/laqm/tools.php
It is known that the model underpredicts nitrogen dioxide concentrations where a "street canyon" exists. This is defined as a relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road. To compensate for this effect in such locations the "road traffic component" calculated by the model has been doubled before being added to the background concentration to give the total concentration.

The percentage split of two vehicle categories has been used in the DMRB model; percentage of Light Duty Vehicles (LDVs) and Heavy Duty Vehicles (HDVs). An LDV is any vehicle weighing under 3.5 tonnes and an HDV is any vehicle weighing over 3.5 tonnes.

The DMRB model does not calculate hourly mean concentrations. However, as mentioned above, if the annual mean objectives are not exceeded it can be assumed that the hourly objectives will also be met.

The future year high traffic growth factors in Table 8 below have been used to give worst-case predictions from the model.

Table 8: Traffic Growth Forecast – Milton Keynes Factors for Future Years (derived from the Trip End Modelling Program TEMPRO)

Count Year	Future Year	Traffic Growth Factor		
		Low	Medium	High
1999	2003	1.098	1.123	1.148
	2004	1.124	1.152	1.181
	2005	1.147	1.181	1.214
	2010	1.268	1.323	1.378
2000	2003	1.077	1.091	1.105
	2004	1.100	1.119	1.137
	2005	1.124	1.146	1.168
	2010	1.242	1.284	1.325
2001	2003	1.054	1.059	1.064
	2004	1.078	1.087	1.095
	2005	1.101	1.113	1.125
	2010	1.218	1.248	1.277
2002	2003	1.029	1.031	1.032
	2004	1.051	1.057	1.062
	2005	1.074	1.083	1.091
	2010	1.187	1.213	1.238

Narrow congested streets with residential properties close to the kerb

There is a narrow section of High Street South, Olney, which has residential properties within 5 metres of the kerb, the traffic flow is greater than 10,000 vehicles per day and the average speed is less than 50 kph. The road widens from the Market Square and north along the High Street. Kerbside chemiluminescent monitoring on the High Street is currently showing compliance with the objectives. Diffusion tube monitoring on High Street South indicates that the annual objective will be met in 2005.

Table 9: DMRB Screen Model Results – High Street South, Olney

Distance to receptor (metres)	Year	Traffic Flow (vehicles /day)	Percentage LDV/HDV	Average speed (kph)	Pollutant concentration at receptor (µg/m^3)	
					Annual mean NO_2	Annual mean NO_2 (street canyon)
4	2005	17060	93.5/6.5	35	30.2	38.7
4	2010	19365	93.5/6.5	35	24.8	31.3
Note: Full input data parameters are available on Excel spreadsheets						

This receptor represents a worst-case screening assessment for road traffic in Milton Keynes; receptor distance of 4 metres from the road centre is very small, the predicted traffic flows are high and average speed is low. It is also a relevant location for the hourly objective.

The DRMB screening model predicts an annual mean NO_2 concentration of 30.2 µg/m^3 in 2005 and 24.8 µg/m^3 in 2010. However, if a street canyon effect occurs at this location the corresponding values increase to 38.7 and 31.3 µg/m^3 still indicating future compliance with the objectives.

High Street, Newport Pagnell, although having higher background concentrations, is affected to a much lesser extent than High Street South, Olney as the traffic flow and HDV percentage is lower and receptor distances are higher. This is reflected in the DMRB model output results of at 35.7 µg/m^3 (street canyon corrected).

The DMRB model result for the narrow section of High Street South, Olney is unlikely to be exceeded at any other location in the Borough.

Junctions and busy streets

Junctions and roads with a combined flow rate greater than 10,000 vehicles per day and with relevant exposure within 10m of the kerb have been identified in Table 10.

The DMRB screening model has been used to predict the annual mean concentration in 2005 at relevant locations. As recommended in the technical guidance, the road

traffic component NO_2 concentration has been multiplied by a factor of 2 and added to the background concentration to give the final concentration.

Table 10: Traffic Flows above 10,000 Vehicles per Day and Close to Residential Properties

LOCATION	DETAIL	COUNT DATE	AADT	AADT 2005
Bletchley	JUNCTIONS			(High Growth)
Buckingham Rd	junction with Newton Rd	2001	11,760	13,230
Buckingham Rd	junction with Church Green Rd	2002	12,090	13,190
Buckingham Rd	junction with Sherwood Drive	2000	17,240	20,136
Water Eaton Rd	junction with Manor Rd	2001	17,300	19,463
Bletchley	ROADS			
Buckingham Rd	btwn Shenley Rd & Sherwood	2000	12,240	14,296
Manor Road	btwn Pinewood & Water Eaton Rd	2003	12,500	13,638
Watling St, V4	btwn Aylesbury St & Penn Rd	2003	11,250	12,274
Shenley Rd	btwn Tweed St & A421	2002	10,400	11,346
Newport Pagnell				
Marsh End Road	south of Green Park Drive	2002	11,700	12,765
London Road	btwn Cranfield Rd & A422/A509	2002	12,200	13,310
Wolverton Road	btwn Manor Rd & Westbury Lane	2003	10,300	11,237
Wolverton Road	btwn Little Linford Lane & V10	2001	13,300	14,963
High St	btwn Union St & St Johns St	2002	8,800	9,601
St Johns St	btwn Priory St & Silver St	2002	10,050	10,965
A509	btwn A422 & M1 J14	2003	21,450	23,402
New Bradwell				
Newport Road	btwn St Peters & Guest Gardens	2001	11,000	12,375
Newport Road	btwn St James & Clock Tower	2003	11,000	12,001
Olney				
A509	btwn Olney & Emberton	2001	15,165	17060
Stony Stratford				
London Rd	junction with Wolverton Rd	2000	9,800	11,446
Wolverton				
Stratford Road	btwn Old Wolverton Rd & Anson	2002	11,900	12,983
Stratford Road	btwn Creed St & Rail Station	2003	11,100	12,110
Note: Grid roads are not included as there are no relevant receptors nearby				

None of the relevant receptor locations for the junctions and roads in table 10 exceed the 2005 objectives.

Roads with high flow of buses and/or HGVs

Lower Ninth Street in Central Milton Keynes is restricted to buses only and is known as a Bus Activity Hub. Vehicle flow is a maximum of 1200 vehicles per day. The DMRB screening result is well below the objective predicting an annual mean in 2005 of 34.0 μg/m^3, corrected for street canyon effects.

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

A new section of the Snelshall Street (V1) grid road has been constructed to serve new housing developments and a suitable air quality assessment has already been done.

Outline planning permission has been granted for a significant expansion of the shopping centre (the centre:mk) in Central Milton Keynes. The development will include two new multi-storey car parks close to housing. An air quality assessment using the advanced dispersion model ADMS was undertaken by Cambridge Environmental Research Consultants (CERC). There were no predicted exceedences of the air quality objectives.

The Stoke Hammond by-pass south of Bletchley is currently under construction. A new road parallel to Lomond Drive, Bletchley linking the Fenny Stratford southern by-pass to Drayton Road is included in the construction works. A suitable assessment has been carried out.

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

As mentioned above, a further assessment of nitrogen dioxide concentrations along the M1 corridor was undertaken by air quality consultants, FaberMaunsell Ltd. (ref. 5) This detailed study refined the previous modelling work completed for the Stage 3 review and assessment by including; revised vehicle emission factors, new traffic flow data, use of a variable NO_2:NO_x relationship and a 10 metre receptor grid spacing.

There were no predicted exceedences of the objectives at any sensitive receptors in either 2001 or 2005. In 2005, exceedences are predicted up to approximately 15 metres of the edge of the motorway. A sensitivity analysis comparing results of modelling using both old and new emission factors demonstrated an increase in predicted NO_2 concentrations of 4.5% on average using the new factors.

Roads with significantly changed traffic flows

There are no significantly changed flows that would lead to a risk of exceedence of the objectives.

Bus stations

There is an open bus station adjacent to Saxon Street, Bletchley. Bus flows are a maximum of 900 vehicles/day. The DMRB screening result is well below the objective predicting an annual mean in 2005 of 32.3 μg/m^3, corrected for street canyon effects.

8.3 Aircraft

Aircraft are significant emission sources of nitrogen oxides, especially during takeoff. According to the technical guidance LAQM.TG(03), emissions from aircraft once they are above 200 metres make a negligible contribution to ground-level concentrations. Cranfield Airport, just outside the Borough boundary with Bedfordshire, has a passenger and freight throughput well below the screening assessment threshold of 5 million passengers per annum or 500,000 tonnes of freight per annum. The nearest major airport is London Luton Airport, from which emissions will be insignificant in Milton Keynes.

8.4 Industrial sources

There are no new industrial sources or sources with substantially increased emissions.

8.5 Conclusions

Evidence from monitoring data, M1 dispersion modelling study and the DMRB screening model for road traffic, indicates that the 2005 nitrogen dioxide objectives will be met at all relevant locations. A Detailed Assessment is not required for nitrogen dioxide.

9 REVIEW AND ASSESSMENT OF SULPHUR DIOXIDE

There are three air quality objectives set for sulphur dioxide;

A 1-hour mean objective of **350 µg/m^3** not to be exceeded more than 24 times per year, to be achieved by the end of **2004**;
A 24-hour mean objective of **125 µg/m^3** not to be exceeded more than 3 times a year to be achieved by the end of **2004**;
A 15-minute mean objective of **266 µg/m^3** not to be exceeded more than 35 times a year, to be achieved by the end of **2005**.

The 15-minute objective is the most stringent for sulphur dioxide.

The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for more than 71% of emissions in 2000. Emissions from industrial combustion processes are also significant. Road transport and domestic sources are minor. Measured sulphur dioxide concentrations have fallen at all national network sites over the period 1999-2001.

9.1 Monitoring data

Since the first round of reviews and assessments measurement of daily average sulphur dioxide concentration at Rickley Park, Bletchley using the chemical method (8-port gas bubbler) has been discontinued. The daily concentration was consistently very low and it was no longer cost effective to use this method in addition to the two UV-fluorescence continuous monitors.

Table 11: Sulphur Dioxide Continuous Monitoring Results Summary (µg/m^3)

		1 hour mean 99.7th percentile		24 hour mean 99th percentile		15 minute mean 99.9th percentile	
Location	**Site classification**	**2001**	**2002**	**2001**	**2002**	**2001**	**2002**
Civic Offices	Urban centre	39.3	46.5	17.3	19.3	60.7	66.4
Burgess Gardens, Newport Pagnell	Suburban	35.6	36.9*	17.0	14.7	59.1	56.9
Selbourne Ave, Bletchley	Urban background	-	58.8**	-	24.5	-	84.1**
*Monitoring ended 14-Aug-02 **Monitoring began 9-Oct-02 No exceedences of any objectives during monitoring period							

Ratified data from the continuous sulphur dioxide monitors (Table 11) have shown the recorded concentrations to be very low with no exceedences of the air quality objectives at any location. However, the concentration has risen at the Civic Offices site in 2002.

9.2 Industrial sources

There are no new industrial sources of sulphur dioxide or sources with substantially increased emissions. Small sulphur dioxide peaks are sometimes detected when the wind direction is easterly or north-easterly. The source is thought to be the brickworks at Stewartby in Bedfordshire, a Part A process operated by Hanson Brick. The characteristic odour of unabated emissions from the firing of high lignite content clay bricks can also be detected.

Fuel oil is used in the boilers at Spillers Speciality Feeds, Wolverton. Reclaimed waste oil is used to dry road stone before coating with bitumen, in the plant operated by RMC Roadstone at Bletchley Satation. Both processes are authorised as Part B processes by Milton Keynes Council. Emissions of sulphur dioxide have been assessed previously and do not give rise to exceedences of the objectives.

Sulphur dioxide emissions from the coal-fired power station at Didcot, Oxfordshire have not been specifically detected by the continuous analysers in Milton Keynes.

9.3 Areas of domestic coal burning

There are no significant areas where the density of houses burning coal as the primary source of heating exceeds 100 properties in any area of about 500 x 500 m.

9.4 Small boilers (>5$MW_{(thermal)}$) burning coal or oil

There are no known boilers greater than 5 $MW_{(thermal)}$ burning coal in the Borough. There are 13 schools in the Borough using fuel oil in boilers all of which are below 5 $MW_{(thermal)}$ capacity. There are no known locations where the impact of several boilers of this size or greater requires assessment.

9.5 Railway locomotives

Diesel locomotives run on the Bletchley to Bedford line and also on the West Coast (electrified) main line. However, there is no relevant exposure in terms of the 15-minute objective.

9.6 Conclusions

It is not necessary to proceed to a Detailed Assessment for sulphur dioxide.

10 REVIEW AND ASSESSMENT OF PARTICULATE MATTER (PM_{10})

There are two Air Quality Objectives for fine particles PM_{10}, which are equivalent to the EU Stage 1 Limit Values in the First Air Quality Daughter Directive. The objectives are **40 µg/m^3** as the annual mean and **50 µg/m^3** as a fixed 24-hour mean not to be exceeded on more than 35 days per year. Both standards are to be achieved by the end of **2004**.

The EU has also set indicative limit values for PM_{10} which are to be achieved by the end of **2010**. These Stage 2 limit values are considerably more stringent, and are **20 µg/m^3** as the annual mean and **50 µg/m^3** as the 24-hour mean not to be exceeded on more than 7 days per year. These objectives have not as yet been brought into Regulation in England for the purpose of Local Air Quality Management but they are regarded as provisional objectives subject to review.

The Updating and Screening Assessment for PM_{10} only considers the 2004 objectives of which the 24-hour objective is the more stringent.

The emission sources contributing to PM_{10} concentrations can be divided into 3 main categories; primary, secondary and coarse. Primary particle emissions are derived are derived directly from combustion sources, including road traffic. Secondary particles are formed by chemical reactions in the atmosphere mainly producing sulphates and nitrates. Coarse particles are made up of resuspended dusts from road traffic, construction works, biological particles and mineral extraction.

Emissions of primary and secondary particles are expected to fall in future years as a result of new legislation on emission standards. Emissions of coarse particles are largely uncontrolled and are not expected to decline significantly in the future. The focus of Local Air Quality Management is on controlling emissions at a local level.

10.1 Monitoring data

Three air quality monitoring stations contain Tapering Element Oscillating Microbalance (TEOM) continuous PM_{10} analysers and the roadbox has a Beta-attenuation continuous PM_{10} analyser. These instruments all have heated manifolds to prevent condensation of water vapour, but this may lead to a loss of volatile particles. The measured concentrations of these analysers has been multiplied by the recommended factor of 1.3 for comparison with the European transfer reference sampler upon which the UK objectives are based.

Table 12: Particulate Matter (PM_{10}) Continuous Monitoring Results Summary ($\mu g/m^3$, gravimetric)

Location	Site classification	Annual mean		90th percentile of 24-hour means (actual exceedences in brackets)	
		2001	2002	2001	2002
Civic Offices	Urban centre	20.0	19.34	31.5 (4)	28.1 (3)
Burgess Gardens, Newport Pagnell	Suburban	19.6	17.3*	29.5 (0)	24.8* (0)
Selbourne Ave, Bletchley	Urban background	-	21.9**	-	41.2** (5)
Wolverton Road, Newport Pagnell	Roadside	23.8	24.6	35.2 (7)	38.3 (6)
High Street, Olney	Kerbside	-	24.7***	-	42.5***(9)
** Monitoring ended 14-Aug-02 ** Monitoring began 9-Oct-02***Monitoring began 14-Aug-02*					

All locations are well within the objective values. Exceedences of the 24-hour objective at Selbourne Avenue, Bletchley were caused by the relaying of a main sewer adjacent to the monitoring station. PM_{10} concentrations have improved slightly at the Civic Offices location. The percentage contribution of PM_{10} from road transport sources to the overall PM_{10} concentration is relatively small; no exceedences were recorded at Burgess Gardens, Newport Pagnell, even though the M1 motorway is only 85 metres away.

As PM_{10} concentrations are forecast to fall in future years based on monitoring data there is little likelihood of the 2004 objectives being exceeded.

10.2 Screening Assessment for Road Traffic Sources

According to DEFRA junctions may not have been adequately assessed in the first round of review and assessments. Other locations where traffic emissions may lead to exceedences of the objectives for PM_{10} includes roads with high flows of buses and/or HGV's.

A Third Stage review and assessment of PM_{10}, undertaken by CES consultants (now FaberMaunsell) using the AAqUIRE advanced dispersion model, was published in December 2000 (ref 2). All locations were predicted to comply with the 2004 objectives. However, the DMRB screen model has been used for some locations in this study to confirm the Third Stage report findings. As there is no clear evidence that the DMRB model underpredicts PM_{10} in "street canyons" no adjustment of the predicted concentration is required.

Table 13: DMRB Screen Model Results – High Street South, Olney

Distance to receptor (metres)	Year	Traffic Flow (vehicles /day)	Percentage LDV/HDV	Average speed (kph)	Pollutant concentration at receptor (µg/m^3)	
					Annual mean	Number of 24-hour exceedences
4	2004	16606	93.5/6.5	35	23.9	10
4	2010	19365	93.5/6.5	35	21.1	4
Note: Full input data parameters are available on Excel spreadsheets						

Table 13 shows the DMRB screen results for High Street South, Olney. Compliance with the objectives is predicted in 2004 with 10 exceedences of the 24-hour objective (35 exceedences are permitted). Although not a statutory requirement, the DMRB model was used to assess compliance with the tighter 2010 objectives. The model predicted an exceedence of the annual objective and compliance with the 24-hour objective (7 exceedences permitted).

Roads with high flow of buses and/or HGVs

Lower Ninth Street in Central Milton Keynes is restricted to buses only and is known as a Bus Activity Hub. Vehicle flow is a maximum of 1200 vehicles per day, well below the specified flow of 2000 vehicles per day that would require a DMRB model assessment.

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

All new roads have been assessed for air quality impacts as discussed for the nitrogen dioxide assessment in section 8 above.

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

There were no roads close to the objective during the first round of Review and Assessment.

Roads with significantly changed traffic flows

There are no significantly changed flows that would lead to a risk of exceedence of the objectives.

10.3 Industrial sources

There are no new industrial sources that have not been suitably assessed through the planning system. There are no industrial sources with substantially increased emissions.

10.4 Areas with domestic solid fuel burning

There are no significant areas where the density of houses burning coal as the primary source of heating exceeds 50 properties in any area of about 500 x 500 m.

10.5 Quarries and landfill sites

Gravel extraction in Milton Keynes does not give rise to significant dust problems. Extraction and screening is a wet process and dust generated from haul roads is easily controlled by water application in dry weather.

The landfill site operated by Shanks in Bletchley does not give rise to dust complaints. The measured PM_{10} concentration at Selbourne Avenue (approx. 300 metres from landfill site) is only 21.9 $\mu g/m^3$ for the monitoring period Oct-Dec 2002.

10.6 Aircraft

Aircraft are not major sources of PM_{10} emissions but make a contribution close to the source. According to the technical guidance LAQM.TG(03), emissions from aircraft once they are above 200 metres make a negligible contribution to ground-level concentrations.
Cranfield Airport, just outside the Borough boundary with Bedfordshire, has a passenger and freight throughput well below the screening assessment threshold of 10 million passengers per annum or 1,000,000 tonnes of freight per annum. The nearest major airport is London Luton Airport, from which emissions will be insignificant in Milton Keynes.

10.7 Conclusions

It is not necessary to proceed to a Detailed Assessment for PM_{10}

11 UPDATING AND SCREENING ASSESSMENT CONCLUSIONS

- The Updating and Screening Assessment has not identified a requirement to proceed to a Detailed Assessment for any of the 7 pollutants investigated.

- A further detailed assessment of nitrogen dioxide along the M1 corridor, completed in January 2003, has confirmed the findings of the Third Stage review and assessment; there are no predicted exceedences of the 2005 objectives at any sensitive receptor.

- Monitoring data and the DMRB screening model have been used to assess the effect of road traffic in High Street South, Olney. There are no predicted exceedences of the objectives at the closest sensitive receptor.

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