Newtownabbey Borough Council

Environmental Services Department

Local Air Quality
Updating and Screening Assessment

August 2006

Newtownabbey
BOROUGH COUNCIL

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C O N T E N T S

ACKNOWLEDGEMENTS

The authors of this report would like to acknowledge the support and assistance of the following in the completion of this report:

Environmental Policy Group

Air Quality Review and Assessment Helpdesk

Denise Welch
Air Quality Consultants Ltd

Phelim Sands
Industrial Pollution Inspectorate

Mr J Targa
AEAT/Netcen

Mr P Donaldson
Northern Group Systems

DRD Roads Service (Eastern Division)

EXECUTIVE SUMMARY

Part III of The Environment (Northern Ireland) Order 2002 specifies air quality management duties for local authorities in Northern Ireland. Local authorities are required to regularly review air quality within their area. Newtownabbey Borough Council has already completed its first round of review and assessments and this report fulfils Newtownabbey Borough Council's requirements to complete an Updating and Screening Assessment.

This report concludes that in Newtownabbey Borough Council the air quality objectives for:

- Carbon monoxide
- Benzene
- 1,3 Butadiene
- Lead
- Nitrogen dioxide
- Sulphur dioxide, and
- Particulate matter (PM_{10})

are unlikely to be exceeded at any location in Newtownabbey and therefore detailed assessments will not be required.

INTRODUCTION

The Air Quality Issue

Although air quality has been improving in recent years in Northern Ireland, the issue continues to be important due to concern about the environment and improved scientific knowledge about pollutants and their effect on health. Councils in Northern Ireland are under a statutory obligation to review and assess air quality from time to time. This is known as local air quality management (LAQM).

Local authorities in Northern Ireland have air quality management duties which are specified in Part III of the Environment (Northern Ireland) Order 2002.

As part of these duties local authorities are required to review the level of pollutants as specified in Regulations for their geographical area, to estimate likely future levels and assess whether these estimated levels are likely to exceed the levels set in the Air Quality Objectives.

Newtownabbey Borough Council has already completed its first round of reviews and assessments:

First Stage Review and Assessment of Local Air Quality	March 2001
Second and Third Stage Review and Assessment of Local Air Quality	August 2004
Local Air Quality Progress Report	April 2005

Newtownabbey Borough Council has now commenced its second round of review and assessment and is required to prepare an Updating and Screening Assessment Report. The aim of this report is to identify any matters that have changed since the first round of reviews and assessments and which may lead to a risk of an air quality objective being exceeded. This Assessment should also include a conclusion as to whether or not the Council needs to proceed to a detailed assessment for any pollutants.

Phased Approach to LAQM

Councils in Northern Ireland have already completed the first round of review and assessment of local air quality, and are now undertaking the second round. A phased approach is used to review and assess air quality. The first stage of the review and assessment process is an updating and screening assessment. This identifies any changes that have occurred since the first round which may have an effect on air quality and which require a more detailed assessment. Where an updating and screening assessment has identified a risk that an air quality objective will be exceeded at a location with relevant public exposure then the council is required to undertake a detailed assessment.

LEGISLATIVE BACKGROUND

The Environment (Northern Ireland) Order 2002

The Environment (Northern Ireland) Order 2002 introduced a statutory obligation on councils to carry out a review and assessment of their local air quality known as local air quality management (LAQM). The process requires the current and likely future quality of air to be assessed and compared against nationally prescribed air quality objectives. The process is set out in the Department of the Environment's Local Air Quality Management Technical Guidance LAQM. TG(03).

National Air Quality Strategy

The Environment Act 1995 – Part IV Section 80 required the Secretary of State to publish a strategy containing policies with respect to the assessment and management of the quality of air, i.e. a National Air Quality Strategy (NAQS). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in January 2000. The primary objective of the strategy is to ensure that everyone is able to enjoy a level of ambient air quality in public places which poses no significant risk to health and quality of life. It sets out air quality objectives for 8 pollutants, the date by which they should be achieved and the policy framework which is to be adopted to achieve the objectives. Pollutants covered by the strategy are: benzene, 1,3 butadiene, carbon monoxide, lead, oxides of nitrogen, particulate matter (as PM_{10}) and sulphur dioxide.

Air Quality Regulations (Northern Ireland) 2003

In Northern Ireland the air quality objectives contained in the strategy are incorporated into the Air Quality Regulations (Northern Ireland) 2003. This provides the statutory basis for the system of LAQM.

The Air Quality Regulations specify the following objectives:

Pollutant	***Air Quality objective levels****	***Date to be achieved by***
(1)	*(2)*	*(3)*
Benzene	16.25µg/m^3 (5ppb) when expressed as a running annual mean	31 December 2003
	3.25µg/m^3 when expressed as a running annual mean	31 December 2010
1,3-butadiene	2.25µg/m^3 (1ppb) when expressed as a running annual mean	31 December 2003
Carbon monoxide	10mg/m^3 (8.6ppm) when expressed as a maximum daily running 8 hour mean	31 December 2003

Lead	0.5µg/m^3 when expressed as an annual mean	31 December 2004
	0.25mg/m3 when expressed as an annual mean	31 December 2008
Nitrogen dioxide	200µg/m^3 (105ppb) when expressed as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
	40µg/m^3 (21ppb) when expressed as an annual mean	31 December 2005
Sulphur dioxide	35µg/m^3 (132ppb) when expressed as a 1 hour mean, not to be exceeded more than 24 times a year	31 December 2004
	125µg/m^3 (47ppb) when expressed as a 24 hour mean, not to be exceeded more than 3 times a year	31 December 2004
	266µg/m^3 (100ppb) when expressed as a 15 minute mean, not to be exceeded more than 35 times a year	31 December 2005
Particles (PM_{10})	50µg/m^3 when expressed as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
	40µg/m^3 when expressed as an annual mean	31 December 2004

*µg/m^3: micrograms per cubic metre

ADMINISTRATIVE AREA OF NEWTOWNABBEY BOROUGH COUNCIL

Newtownabbey is situated on the shore of Belfast Lough reaching north from the City of Belfast and stretching up towards the Glens of Antrim. The Council area is 54 square miles and is bound to the west by Antrim Borough Council, to the north by Larne Borough Council, to the east by Carrickfergus Borough Council and to the south by Belfast City Council.

Newtownabbey Borough Council has a population of approximately 80,000 and is the fifth highest Borough population within Northern Ireland.

The majority of the population of the Borough is in the developed urban area stretching out from Glengormley to include Whiteabbey, Mossley, Monkstown and Mallusk and Ballyclare. There are a number of rural villages including Ballynure, Ballyrobert, Ballyeaston, Doagh and Straid, all of which lie within the commuter belt of Belfast.

The Borough is a prime business location with large industrial centres at Mallusk, Hydepark and Monkstown. Newtownabbey's proximity to Northern Ireland's ports and airports makes these industrial parks an ideal place to locate. The port of Larne, Belfast International Airport and Belfast City Airport are within 30 minutes drive and the area is also well served by major roads linking it to the rest of the province. The Borough is well provided for in terms of major retail outlets and shopping centres at Abbeycentre and Northcott.

REVIEW AND ASSESSMENT FOR CARBON MONOXIDE

Carbon monoxide (CO) is a pollutant gas generated by combustion sources. The dominant source is road transport, although domestic and other combustion processes contribute. At very high concentrations (such as may occur inside a building with a faulty heating appliance), it can be a dangerous asphyxiant. Whilst outdoor concentrations do not generally reach dangerous levels, they may still have adverse health effects for vulnerable people. As CO is a component of vehicle emissions, the highest outdoor concentrations occur near busy roads.

Pollutant	Objective	To be achieved by
Carbon Monoxide	10mg/m^3 (8.6ppm) when expressed as a maximum daily running 8 hour mean	31 December 2003

Conclusion from the First Round of Review and Assessment

In the First Stage Review and Assessment it was recommended to proceed to a Second Stage Review and Assessment for Carbon Monoxide due to a Part A process in Belfast City Council area. At second stage it was concluded that it was unlikely that the 10.0 mgm^{-3} maximum daily running 8 hour mean objective would be exceeded and it was therefore not necessary to proceed to a Third Stage Review and Assessment.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance
LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of carbon monoxide.

	Relevant Section of Technical Guidance LAQM. TG(03)
A) Monitoring data	Carbon monoxide is not monitored within Newtownabbey Borough Council.
B) Very Busy Roads/Junctions	There are no very busy roads in Newtownabbey (ie no single carriageway roads where the daily average traffic flows exceed 80,000 vehicles per day, no dual carriageway roads where the daily average traffic flows exceed 120,000 vehicles per day or no motorways where the flow exceeds 140,000 vehicles per day).

CONCLUSION	**There have been no significant changes with regard to carbon monoxide emissions in Newtownabbey Borough Council.** **The assessment has indicated that the carbon monoxide objectives are unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

REVIEW AND ASSESSMENT FOR BENZENE

Benzene is a known human carcinogen (cancer causing substance), and also contributes to the formation of ground-level ozone (summer smog). The main sources of benzene emissions in the UK are petrol vehicles, petrol refining, and the fuel distribution from petrol stations without vapour recovery systems. National benzene concentrations have declined in recent years, mainly due to the increasing use of three-way catalytic converters and the introduction of vapour recovery systems in petrol stations (Stage 1 and 2 control).

Since January 2000, EU legislation has reduced the maximum benzene content of petrol to1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol (LAQM.TG (03)).

Pollutant	Objective	To be achieved by
Benzene	16.25µg/m^3 (5ppb) when expressed as a running annual mean	31 December 2003
Benzene	3.25µg/m^3 when expressed as a running annual mean	31 December 2010

Conclusion from the First Round of Review and Assessment

In the First Stage Review and Assessment it was concluded the objective for benzene was likely to be achieved at all locations within the Newtownabbey area and it was therefore not necessary to proceed to a Second Stage Review and Assessment.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of Benzene.

	Relevant Section of Technical Guidance LAQM. TG(03)
A) Monitoring data	Benzene is not monitored within Newtownabbey Borough Council.

B) Very Busy Roads/Junctions	There are no very busy roads in Newtownabbey (ie no single carriageway roads where the daily average traffic flows exceed 80,000 vehicles per day, no dual carriageway roads where the daily average traffic flows exceed 120,000 vehicles per day or no motorways where the flow exceeds 140,000 vehicles per day).
C) Industrial Sources	There are no industrial processes with the potential to emit significant quantities of benzene in Newtownabbey or neighbouring areas.
D) Petrol Stations	There is only one petrol station within Newtownabbey with an annual throughput of more than 2000 m^3 of petrol and with a busy road nearby at Tesco Filling Station, Abbey Retail Park, Church Road, Newtownabbey. However, as there is no relevant exposure within 10 m of the pumps there will be no requirement to assess this source further.
E) Major fuel storage depots (petrol only)	There are no major fuel depots within Newtownabbey.
CONCLUSION	**The assessment has indicated that the benzene objectives are unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

REVIEW AND ASSESSMENT FOR 1, 3 BUTADIENE

1,3-Butadiene is a suspected human carcinogen (cancer causing substance). The major source of 1,3-butadiene nationally is motor vehicle emissions, with other major sources being industrial processes (such as petrochemical and rubber processes). As with benzene, the fitting of catalytic converters to petrol vehicles reduces their emissions of 1,3-butadiene. Recently agreed reductions in vehicle emissions and improvements to fuel quality (in the framework of the Auto-Oil programme), are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts (LAQM.TG03).

Pollutant	Objective	To be achieved by
1, 3 Butadiene	2.25µg/m^3 (1ppb) when expressed as a running annual mean	31 December 2003

Conclusion from the First Round of Review and Assessment

In the First Stage Review and Assessment it was concluded the objective for 1,3 butadiene was likely to be achieved at all locations within the Newtownabbey area and it was therefore not necessary to proceed to a Second Stage Review and Assessment.

Update Screening and Assessment Checklist

	Relevant Section of Technical Guidance LAQM. TG(03)
A) Monitoring data	1,3 butadiene is not monitored within Newtownabbey Borough Council.
B) New Industrial Sources	There are no new industrial sources with the potential to emit significant quantities of 1,3 butadiene in Newtownabbey or neighbouring areas.
C) Industrial Sources with Substantially Increased Emissions	There are no industrial sources with substantially increased emissions in Newtownabbey.
CONCLUSION	**The assessment has indicated that the 1,3 butadiene objective is unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

REVIEW AND ASSESSMENT FOR LEAD

Lead has been identified as causing acute and chronic damage to the nervous system, effects on the kidneys, joints and reproductive system. Historically, the major source of lead has been motor vehicle emissions, with other major sources being metal industries and power generation. The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels has led to the ban on sales of leaded petrol in the United Kingdom with effect from 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping (LAQM.TG (03)).

Pollutant	Objective	To be achieved by
Lead	0.5µg/m^3 when expressed as an annual mean	31 December 2004
Lead	0.25mg/m3 when expressed as an annual mean	31 December 2008

Conclusion from First Round of Review and Assessment

In the First Stage Review and Assessment it was recommended to proceed to a Second Stage Review and Assessment for lead due to a Part A process in Newtownabbey Borough Council area. At Second Stage it was concluded that it was unlikely that the 0.5 µg/m^3 annual mean (2004) objective would be exceeded and it was therefore not necessary to proceed to a Third Stage Review and Assessment.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of lead.

	Relevant Section of Technical Guidance LAQM. TG(03)
A)Monitoring data outside an AQMA	Lead is not monitored within Newtownabbey Borough Council
B) New Industrial Sources	There are no new industrial processes within Newtownabbey or in neighbouring authorities to consider for the purpose of this assessment

C) Industrial Sources with Substantially Increased Emissions	There are no industrial sources with substantially increased emissions to consider for the purpose of this assessment. Since the first round of review and assessment Brett Martin Ltd has changed from using large bags of loose lead to sealed bags which are added directly to the mix without being opened and the possibility of lead emissions is vastly reduced. As a result the process is now exempt from the Industrial Pollution Control (NI) Order 1997 and the authorisation for Brett Martin Ltd in respect of the use of a compound containing lead in a process was revoked from 1 April, 2006. NK Coating Ltd, 4 Michelin Road, Mallusk is a Part A permitted process. The process involves the galvanising of metal to provide a protective layer of zinc. Emission tests for NK Coating Ltd (March 2006) show a lead concentration of 0.01 mg/m^3 with a sample volume of 0.250 m^3 per hour, giving a concentration of 0.04 mg/m^3.
CONCLUSION	**The assessment has indicated that the lead objectives are unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

REVIEW AND ASSESSMENT FOR NITROGEN DIOXIDE

Nitrogen dioxide is a respiratory irritant associated with both acute (short-term) and chronic (long-term) effects on human health, particularly in people with asthma. Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NOx). All combustion processes produce NOx emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health.

The principal source of nitrogen oxides emissions is road transport, which accounted for about 49% of total UK emissions in 2000 (LAQM.TG (03)). Major roads carrying large volumes of high-speed traffic are a predominant source, as are conurbations and city centres with congested traffic. The contribution of road transport to nitrogen oxides emissions has declined significantly in recent years as a result of various policy measures. At a national level, urban traffic nitrogen oxides emissions were estimated to fall by about 20% between 2000 and 2005, and by 46% between 2000 and 2010 (Stedman et al, 2001). Other significant sources of nitrogen oxides emissions include the electricity supply industry and other industrial and commercial sectors. Emissions from both sources have also declined dramatically, due to the fitting of low nitrogen oxides burners, and the increased use of natural gas. Industrial sources make only a very small contribution to annual mean nitrogen dioxide levels.

Pollutant	Objective	To be achieved by
Nitrogen Dioxide	200µg/m^3 (105ppb) when expressed as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
Nitrogen Dioxide	40µg/m^3 (21ppb) when expressed as an annual mean	31 December 2005

Conclusion from First Round of Review and Assessment

The First Stage Review and Assessment recommended to proceed to a Second Stage Review and Assessment for nitrogen dioxide due to road traffic and significant industrial sources in neighbouring authorities. At Second/Third Stage it was recommended that automatic monitoring of nitrogen dioxide continues at two sites in Newtownabbey and a number of diffusion tube sites be kept under review. At Progress Report Stage it was recommended that monitoring continues at a number of sensitive locations in the Borough.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of Nitrogen Dioxide .

	Relevant Section of Technical Guidance LAQM. TG(03)			
A) Monitoring data outside an AQMA	Newtownabbey Borough Council has undertaken local monitoring using nitrogen dioxide diffusion tubes and automatic real-time analysers at a number of locations throughout the Borough Automatic Monitoring Results The mean nitrogen dioxide concentrations for 2004 and 2005 are shown below:			
Location	**Mean NO2 Conc. μgm^{-3}**		**Maximum Hourly Average μgm^{-3}**	
Antrim Road, Mallusk (Sandyknowes)	31 (2004)	31 (2005)	189 (2004)	216 (2005)
Shore Road	29 (2004)	29 (2005)	159 (2004)	149 (2005)
	Passive Monitoring Results Passive diffusion tubes are used to measure nitrogen dioxide at a number of roadside locations throughout the Borough. Tubes are also placed in triplicate at the two automatic monitoring sites. Diffusion tube results for 2005 are listed below:			

Site Ref.	Grid Ref.	Location	No. of Tubes Averaged	Average
1	288911	Main Street, Ballyclare	12	25.5
5	318823	Hightown Road	11	23.4
8	339819	Braden Heights	12	15.4
11	306827	44 Sandyknowes Avenue	8	31.1
12	305829	1 Sandyholme Way	12	32.75
16	262895	Doagh Village	11	17.6
18	319936	Main Street, Ballynure	11	16.6
20	305832	A8M	10	27.3
21	314838	Ballyclare Road/Manse Road	12	19.75

27	365806	1A Jordanstown Road	12	23.3
31	276835	Bernice Road	12	16
36	305830	NOx Analyser, Antrim Road	12	25.6
37	305830	NOx Analyser, Antrim Road	12	27.9
38	305830	NOx Analyser, Antrim Road	12	28.3
39	348805	NOx Analyser, Shore Road	12	20.4
40	348805	NOx Analyser, Shore Road	12	20.4
41	348805	NOx Analyser, Shore Road	12	22.75
42	370840	Langley Hall	12	23.7
43	323817	Antrim Road	12	30.8
44	347819	Abbots Cross	9	18.8
45	340806	B & Q	10	21.8
46	322817	12 Collinbridge Road	10	27.8

Bias Adjustment Factor

Triplicate diffusion tubes have been collocated at both the Newtownabbey chemiluminescent NOx analysers since June 2003. Bias adjustment factors for both sites for 2005 were calculated (shown in Tables 1 and 2, Appendix 1). The bias adjustment factor for Antrim Road, Mallusk (Sandyknowes) (2005) was calculated as 1.15 and the factor for Shore Road (2005) was calculated as 1.36, giving an overall factor for Newtownabbey of 1.25 for 2005. A bias adjustment factor of 1.13 based on 5 collocation studies (East Hertfordshire DC, Reigate and Banstead BC x 3 and Elmbridge BC) was obtained from the bias adjustment spreadsheet (published by Air Quality Consultants Ltd on behalf of DEFRA www.uwe.ac.uk/aqm/review). Newtownabbey Borough Council's bias adjustment factors will be added to the bias adjustment spreadsheet in September 2006. This will result in an overall bias adjustment factor of 1.17 (based on 7 studies).

The various bias adjustment factors have been applied to the annual mean nitrogen dioxide concentrations at sites 12, 11 and 43 (three highest results for 2005).

Site No.	NO_2 Annual Mean	Antrim Road, Mallusk (Sandyknowes) Bias 1.15	Shore Road Bias 1.36	Average of NBC Studies 1.25	Air Quality 5 Studies 1.13	Air Quality Studies 7 Studies 1.17
12	32.75	37.7	44.5	40.9	37.0	38.3
11	31.1	35.8	42.3	38.9	35.1	36.4
43	30.8	35.4	41.9	38.5	34.8	36.0

Using the bias adjustment factor of 1.13 from the spreadsheet (as advised by the Review and Assessment Helpdesk) no sites within Newtownabbey are likely to exceed the annual mean objective for nitrogen dioxide.

Site 12 is close to the objective and negotiations including legal consultations are ongoing with the residents adjacent to site 12 in an attempt to relocate the Antrim Road, Sandyknowes analyser adjacent to the relevant location in Sandyholme Way.

B) Monitoring data inside an AQMA	Newtownabbey Borough Council does not have an AQMA for nitrogen dioxide.	
C) Narrow congested streets with residential properties close to the kerb	There are a number of narrow congested streets in Newtownabbey with residential properties close to the kerb. These include:	
Road	**Width**	**Distance from Residential Property to Kerb**
Shore Road at Merville	9.7 m	4.9 m
Shore Road at 654 (Whiteabbey village)	7.3 m	4.8 m
Main Street, Ballynure	6.0 m	2.2 m
Main Street, Ballyclare	9.0 m	2.4 m
Rashee Road, Ballyclare	9.5 m	2.8 m
Main Street, Doagh	6.6 m	2.5 m
Ballyclare Road, Doagh	7.7 m	2.0 m
Doagh Road, Ballyclare	9.1 m	4.6 m
Mill Road, Newtownabbey	7.3 m	5.0 m

	In the first round of review and assessment a number of the above locations were assessed using DMRB assessment (1999 and 2003). In addition, monitoring of NO_2 using diffusion tubes and automatic analysers has taken place at a number of these locations. Based on the DMRB assessments and measurement none of the locations are likely to exceed the 2005 objective. The locations which were not considered in the first round of review and assessment are: Rashee Road, Ballyclare Mill Road, Newtownabbey DRD Roads Service has confirmed that Rashee Road does not have traffic flows greater than 10,000 vehicles per day. Traffic flows are not available for Mill Road, Newtownabbey. The location on the Mill Road is approximately 508m from the automatic analyser on the Shore Road. The roadside analyser is approximately 8m from the kerb, is adjacent to a junction and traffic flows are greater than 10,000 vehicles per day. The annual mean NO_2 concentration at the analyser for 2005 is 29 μgm^{-3}. As a precautionary measure consideration will however be given to siting a diffusion tube at the relevant location on the Mill Road.
D) Junctions	Junctions were considered during the First Found of Review and Assessment. Using DMRB (2003) assessment two junctions were predicted to exceed the 2005 air quality objective of 40μgm^{-3}: Longwood Road/Shore Road junction Mallusk Road/Bernice Road junction Following this assessment an automatic NOx analyser was situated at the Longwood Road/Shore Road junction and an NO_2 diffusion tube was sited at the Mallusk Road/Bernice Road junction. The mean nitrogen dioxide concentration for 2005 for both locations are: Shore Road: 29μgm^{-3} Bernice Road: 18 μgm^{-3} (bias adjusted) Both these levels are below the objective of 40μgm^{-3}

E) Busy streets where people may spend 1hour or more close to traffic	Busy streets where members of the public may regularly spend one hour or more were not considered in the first round of review and assessment. Busy streets in Newtownabbey where members of the public may be exposed within 5m of the kerb and where the AADT is more than 10,000 include: Main Street, Ballyclare Antrim Road (town centre), Glengormley A diffusion tube is located at Main Street, Ballyclare and the annual mean concentration for 2005 is 29 μgm^{-3} (bias adjusted). A diffusion tube is located at Hightown Road, Glengormley in the centre of Glengormley. The annual mean concentration for 2005 at this location is 26.4 μgm^{-3} (bias adjusted). Both these levels are below the objective of 40 μgm^{-3}.
F) Roads with a high flow of buses and/or HGVs (Background? Roads >2500 HDV? Exposure? Data? Calculations? Exceedences?)	There are no roads within Newtownabbey Borough Council with greater than 25% heavy goods vehicles.

G) New roads constructed or proposed since the first round of R&A	Since the first round of review and assessment the following roads have been constructed: • A8 dual carriageway and roundabout scheme from Linden Lea to Hillhead Road • Ballynure by-pass • Northcott Link Road between Antrim Road and Ballyclare Road, Glengormley • Mallusk Road/Scullions Road junction serving Mayfield development, Mallusk • Roundabout scheme – The Longshot There are no relevant locations within 10m of the new roads. A widening scheme has also been proposed for the M2 southbound from Sandyknowes (Junction 4) to Greencastle interchange (Junction 2). The improvements include the widening of the existing 2-lane, city bound carriageway to 3 lanes. An air quality assessment has been carried out in accordance with the requirements of DMRB and the results indicate there will be no significant effect on local air quality.
H) Roads close to the objective during the first round of R&A	A number of roads were considered during the First Round of Review and Assessment. 42 kerbside locations were assessed using DMRB in 2002. 16 locations were further assessed in 2003 using revised DMRB assessment. No roadside location was predicted to exceed the annual mean air quality objective for 2005 of 40µgm^{-3}.
I) Roads with significantly changed traffic flows	There are no roads of 10,000 AADT or higher that have experienced a 25% increase in traffic flow.
J) Bus stations	There is one bus depot and one bus station in Newtownabbey. The bus depot at Monkstown Avenue, Newtownabbey does not have relevant exposure within 10m. The bus station at Mill Road, Ballyclare does have relevant exposure within 10m. However, the flow of vehicles is less than 1000 buses per day.
K) New Industrial Sources	There are no new industrial processes within Newtownabbey Borough Council to consider for the purpose of this assessment.

L) Industrial Sources with Substantially Increased Emissions	There are no industrial sources with substantially increased emissions to consider for the purpose of this assessment.
M) Aircraft	There are no airports in Newtownabbey Borough Council area.
CONCLUSION	**The assessment has indicated that the nitrogen dioxide objectives are unlikely to be exceeded at any location in Newtownabbey and a detailed assessment will not be required. Consideration will be given to siting a diffusion tube adjacent to the relevant location in Mill Road and the Council will continue with its plans to resite the Antrim Road, Sandyknowes analyser adjacent to the relevant location in Sandyholme Way.**

REVIEW AND ASSESSMENT FOR SULPHUR DIOXIDE

Sulphur dioxide is an acute respiratory irritant, hence the short averaging time for its objective. The main source of sulphur dioxide in the UK is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions (LAQM.TG03).

Pollutant	Objective	To be achieved by
Sulphur Dioxide	35µg/m^3 (132ppb) when expressed as a 1 hour mean, not to be exceeded more than 24 times a year	31 December 2004
Sulphur Dioxide	125µg/m^3 (47ppb) when expressed as a 24 hour mean, not to be exceeded more than 3 times a year	31 December 2004
Sulphur Dioxide	266µg/m^3 (100ppb) when expressed as a 15 minute mean, not to be exceeded more than 35 times a year	31 December 2005

Conclusion from First Round of Review and Assessment

The First Stage Review and Assessment recommended to proceed to a Second Stage Review and Assessment for sulphur dioxide due to at least four 1 x 1 km squares within the Borough with potentially more than 300 households burning coal. At Second/Third Stage it was recommended that automatic monitoring of sulphur dioxide commence within the proposed Air Quality Management Area and further modelling be undertaken. At Progress Report Stage it was recommended that continuous monitoring continue to enable verification of the model using local monitoring data.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of sulphur dioxide.

	Relevant Section of Technical Guidance LAQM. TG(03)
A) Monitoring data outside an AQMA	The Council has an SO_2 real-time analyser within a residential area in the Ballyclare PM_{10} AQMA. The Council has a QA/QC contract with Netcen and six-monthly QA/QC visits are made. The Annual Mean for the Ballyclare site (from May 2005 to April 2006) is 4 μgm^{-3}. There were no exceedances of the 15 minute, 1 hour or 24 hour means.
B) Monitoring data inside an AQMA	The Council does not have an Air Quality Management Area for Sulphur Dioxide.
C) New Industrial Sources	There are no new industrial sources to be considered for the purpose of the assessment.
D) Industrial Sources with Substantially Increased Emissions	There are no industrial sources with substantially increased emissions.

E) Areas of Domestic Coal Burning	In the first round of Review and Assessment information was collected on the use of domestic coal in a number of areas within the Borough. Five of these areas namely Ballyclare, Carnmoney, Monkstown, Mossley and Old Mossley were subsequently modelled by Netcen and none were predicted to exceed the air quality objectives for sulphur dioxide. Using more detailed fuel use information Netcen in 2005 remodelled the Ballyclare and Old Mossley areas. The modelling predicted that the 15 minute mean objective for SO_2 was unlikely to be exceeded. This modelling however was verified with automatic monitoring data from the closest site, Carrickfergus, because at the time of modelling there was not enough automatic monitoring at our Ballyclare site. Model verification using data from the SO_2 analyser at Ballyclare (May 2005-April 2006) has now been completed by Netcen and it predicts that the 15 minute mean objective for SO_2 is not likely to be exceeded in Ballyclare or Old Mossley.

	Information on the use of domestic coal was also obtained in the Doagh village area in 2002/2003. Doagh has an area of approximately 500m x 500m and there are approximately 700 properties within the village. In a survey of 375 properties 50 were identified as using coal as their main source of heating and 66 properties were identified as using coal as a secondary source of heating. Based on this there is a possibility the density of coal burning premises within the Doagh area exceeds 100 and the Council would be required to proceed to a detailed assessment for SO_2 in Doagh. As stated above the Council has an SO_2 real-time analyser within a residential area in Ballyclare, approximately 2 miles from Doagh. Fuel use survey work was carried out in Ballyclare in 2003 and 2004 when 664 premises were surveyed. Of these, 94 properties were identified as using coal as their main source of heating and 118 properties were identified as using coal as a secondary source of heating. This fuel use information was used by Netcen to model the Ballyclare area and this model has recently been verified by Netcen using monitoring data from the automatic analyser. The model has predicted that the 15 minute mean objective for SO_2 is not likely to be exceeded. In addition, the annual mean recorded for the Ballyclare site from May 2005 to April 2006 is 4μgm^{-3} and there were no exceedances of the 15 minute, 1 hour or 24 hour means. A large proportion of the coal burning properties within the Doagh area are owned by the Northern Ireland Housing Executive and there are plans to convert the coal burning properties within Doagh to oil by 2010.

	Advice was sought from the Review and Assessment Helpdesk and using the automatic monitoring data from Ballyclare and comparing the fuel use data from Doagh and Ballyclare it is unlikely the SO_2 objectives will be exceeded in Doagh. It is therefore not necessary for the Council to proceed to a detailed assessment for SO_2 in Doagh.
F) Small Boilers > 5 MW$_{(thermal)}$	There is one boiler over 5 MW within NBC area. This was considered during the First Round of Review and Assessment not to be a significant source of SO_2.
G) Shipping	There is no port within Newtownabbey Borough Council.
H) Railway Locomotives	There are no locations within the Borough where diesel locomotives are stationary for periods of 15 minutes or more.
CONCLUSION	**The assessment has indicated that the SO_2 objectives are unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

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

Particulate matter is of major health concern, as it has been linked with both increased morbidity and premature mortality. A wide range of emission sources contribute to PM_{10} concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories (APEG, 1999):
I) *Primary particle* emissions are derived directly from combustion sources, including road traffic, power generation, industrial processes etc. (II) *Secondary particles* are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates. (III) *Coarse particles* comprise of emissions from a wide range of sources, including resuspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles. The expected reduction in national particle emissions in future years is different for each source type. For example, emissions from road transport will be governed by legislation on vehicle emission standards; emissions of secondary particles will be largely governed by controls on power generation, industrial and transport SO_2 and NOx emissions, both in the UK and in Europe; emissions of coarse particles are largely uncontrolled, and in general are not expected to decline in future years (LAQM.TG (03)).

Pollutant	Objective	To be achieved by
Particulate Matter	50µg/m^3 when expressed as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
Particulate Matter	40µg/m^3 when expressed as an annual mean	31 December 2004

Conclusion from First Round of Review and Assessment

The First Stage Review and Assessment recommended to proceed to a Second Stage Review and Assessment for Particulate Matter due to two significant Part B processes within Newtownabbey, two neighbouring Part A processes and residential coal burning. At Second/Third Stage it was recommended that an Air Quality Management Area be declared for PM_{10} from domestic sources in the Ballyclare area.

Update Screening and Assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of particulate matter.

	Relevant Section of Technical Guidance LAQM. TG(03)
A) Monitoring data outside an AQMA	PM_{10} is not monitored outside the AQMA
B) Monitoring data inside an AQMA	The Council currently has one PM_{10} monitor (TEOM) within a residential area in the Ballyclare AQMA. The Council has a QA/QC contract with Netcen and six-monthly QA/QC visits are made. The Annual Mean for the Ballyclare site from 1 May 2005 to 30 April 2006 is 20μgm^{-3} (gravimetric concentration). This is below the annual objective of 40μgm^{-3} (gravimetric concentration). The 24 hour mean of 50μgm^{-3} was exceeded 2 times during this period. The maximum running 24 hour mean was 78μgm^{-3}.
D) Junctions	In 2002 in the first round of Review and Assessment 42 kerbside locations including junctions were assessed using DMRB assessment (1999 version). The model predicted annual average concentrations of PM_{10} less than 28 μgm^{-3} at all the locations modelled.
E) Roads with a high flow of buses and/or HGVs	There are no roads within Newtownabbey with an unusually high proportion of heavy duty vehicles and relevant exposure.

F) New roads constructed or proposed since the first round of R&A	Since the first round of review and assessment the following roads have been constructed: • A8 dual carriageway and roundabout scheme from Linden Lea to Hillhead Road • Ballynure by-pass • Northcott Link Road between Antrim Road and Ballyclare Road, Glengormley • Mallusk Road/Scullions Road junction serving Mayfield development, Mallusk • Roundabout scheme – The Longshot There are no relevant locations within 10m of the new roads. A widening scheme has also been proposed for the M2 southbound from Sandyknowes (Junction 4) to Greencastle interchange (Junction 2). The improvements include the widening of the existing 2-lane, city bound carriageway to 3 lanes. An air quality assessment has been carried out in accordance with the requirements of DMRB and the results indicate there will be no significant effect on local air quality.
G) Roads close to the objective during the first round of R&A	In 2002 in the first round of Review and Assessment 42 kerbside locations including junctions were assessed using DMRB assessment (1999 version). The model predicted annual average concentrations of PM_{10} less than 28 μgm^{-3} at all the locations modelled.
H) Roads with significantly changed traffic flows	There are no roads of 10,000 AADT or higher that have experienced a 25% increase in traffic flow.

I) New Industrial Sources	NK Coating Ltd, 4 Michelin Road, Mallusk is an IPPC Part A permitted process. The process involves the galvanising of metal to provide a protective layer of zinc. Particulate matter, generated by the sandblasting operation is released to the atmosphere after filtration from a 6.5 metre stack. Flow is approximately 7000 m^3/hr with a velocity of approximately 18m/sec. An air quality assessment was carried out as part of the application process. The latest emission tests (March 2006) show a particulate concentration of 20.4 mg/m^3.
J) Industrial Sources with Substantially Increased Emissions	There are no industrial sources with substantially increased emissions.
K) Areas of Domestic Coal Burning	In the first round of Review and Assessment information was collected on the use of domestic coal in a number of areas within the Borough. Five of these areas namely Ballyclare, Carnmoney, Monkstown, Mossley and Old Mossley were subsequently modelled by Netcen. The model predicted an exceedance of the daily mean PM_{10} objective in the Ballyclare area. An AQMA was subsequently declared covering Ballyclare and automatic monitoring of PM_{10} has been carried out in this area since April 2005. Using more detailed fuel use information Netcen in 2005 remodelled the Ballyclare and Old Mossley areas. The modelling predicted that the daily PM_{10} objective was unlikely to be exceeded. This modelling however was verified with automatic monitoring data from the closest site, Carrickfergus, because at the time of modelling there was not enough automatic monitoring at our Ballyclare site.

	Model verification using data from the PM_{10} analyser at Ballyclare (May 2005-April 2006) has now been completed by Netcen and it predicts that the daily PM_{10} (2004) objectives are unlikely to be exceeded in Ballyclare or Old Mossley. The particles objective for 2010 is not yet included in regulation for the purposes of Local Air Quality Management. As a result, Councils are only required to assess against the 2004 objectives. The model however has predicted the annual PM_{10} objective of 20µgm^{-3} in 2010 is likely to be exceeded in Ballyclare and Old Mossley. Based on the 2004 objective the Council will now consider revoking the AQMA in Ballyclare. Information on the use of domestic coal was also obtained in the Doagh village area in 2002/2003. Doagh has an area of approximately 500m x 500m and there are approximately 700 properties within the village. In a survey of 375 properties 50 (13% of the sample) were identified as using coal as their main source of heating and 66 properties were identified as using coal as a secondary source of heating. Advice was sought from the Review and Assessment Helpdesk and using Box 8.8 of the Technical Guidance LAQM.TG(03) the effective number of coal burning houses in Doagh was calculated. Two scenarios were considered. Scenario A considered primary coal use only and Scenario B considered primary and secondary coal use. The threshold density of effective coal burning houses in 2004 with an annual mean background of 13.4µgm^{-3} was over 500 for a small village. For primary coal use (Scenario A) the density of effective coal burning houses was calculated as 69. For primary and secondary coal (Scenario B) use the density of effective coal burning houses was calculated as 153. For both cases the density of coal burning houses is well below the threshold number of 500. As a result there is no need to proceed to a detailed assessment for PM_{10} in the Doagh village area.

L) Quarries/landfill sites/opencast coal/handling of dusty cargoes at ports etc.	In the first round of review and assessment an assessment of the impact on PM_{10} concentrations in Newtownabbey of a number of industrial processes was completed by Netcen. This included James Boyd & Sons (Carnmoney) Ltd quarry. In October 2003 three complaints were received by Newtownabbey Borough Council from local residents regarding dust from quarry blasting at James Boyd & Sons. None of these complaints was substantiated and no new complaints have been received since 2003.
M) Aircraft	There are no airports in Newtownabbey Borough Council area.
CONCLUSION	**The assessment has indicated that the PM_{10} objectives are unlikely to be exceeded at any location in Newtownabbey and therefore a detailed assessment will not be required.**

CONCLUSIONS

Summary of Conclusions

Pollutant	Detailed Assessment Required
Carbon Monoxide	No
Benzene	No
1,3 Butadiene	No
Lead	No
Nitrogen Dioxide	No
Sulphur Dioxide	No
Particulate Matter	No

REFERENCES/BIBLIOGRAPHY

The Environment (Northern Ireland) Order 2002

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000

Department of the Environment's Local Air Quality Management Technical Guidance LAQM. TG(03)

Air Quality Regulations (Northern Ireland) 2003

Local Air Quality Management Policy Guidance LAQM.PGNI(03) (EHS)

DRD Roads Service Traffic and Travel Information 2004

APPENDIX 1

TABLE 1

BIAS ADJUSTMENT FACTOR (2005) FOR MALLUSK (SANDYKNOWES) ANALYSER

Year 2005	Analyser	Tubes			Tube Average	Adjusted Analyser
		36	37	38		
January	29	35	35	27	32.3	29
February	35	31	32	37	33.3	35
March	34	35	34	35	34.7	34
April	30	17	11	22	16.7	30
May	28	22	36	26	28	28
June	28	27	28	31	28.7	28
July	25	12	19	21	17.3	25
August	29	25	24	21	23.3	29
September	28	18	20	20	19.3	28
October	32	32	32	33	32.3	32
November	39	21	26	25	24	39
December	39	32	38	42	37.3	39
					27.3	**31.3**

Bias Adjustment Factor $\frac{31.3}{27.3} = 1.15$

TABLE 2

BIAS ADJUSTMENT FACTOR (2005) FOR SHORE ROAD ANALYSER

Year 2005	Analyser	Tubes			Tube Average	Adjusted Analyser
		39	40	41		
January	27	22	23	29	24.7	27
February	31	25	17	25	22.3	31
March	29	20	15	21	18.7	29
April	26	17	13	14	14.7	26
May	25	27	24	27	26.0	25
June	25	23	28	35	28.7	25
July	24	18	23	21	20.7	24
August	25	22	20	15	19.0	25
September	25	15	18	16	16.3	25
October	30	20	19	27	22.0	30
November	40	8	13	9	10.0	40
December	40	28	32	34	31.3	40
					21.2	**28.9**

Bias Adjustment Factor $\frac{28.9}{21.2} = 1.36$