



ENVIRONMENTAL HEALTH DEPARTMENT

UPDATING AND SCREENING ASSESSMENT

November 2006

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Executive Summary

Since 1998 Limavady Borough Council has been reviewing and assessing air quality within the Borough. Initially a “desktop” assessment highlighted possible exceedences of three pollutants namely,

nitrogen dioxide (NO₂) – from traffic sources
sulphur dioxide (SO₂) – from the burning of solid/smokeless fuel, and,
particulate matter (PM₁₀) – from the burning of solid/smokeless fuel

Further modelling and monitoring of these pollutant levels has been conducted and data would suggest that the national air quality objectives for both sulphur dioxide and particulate matter will be achieved. It is intended that this local continuous data will be used to validate dispersion modelling carried out in 2004.

Monitoring of nitrogen dioxide concentrations would suggest that traffic emissions within one small area of Dungiven are contributing to elevated levels of nitrogen dioxide. One diffusion tube which had been located at the junction of the main A6 and B68 roads indicated elevated levels of nitrogen dioxide. The tube was placed at the façade of dwellings which are close to the roadside. Council has declared an air quality management area (AQMA) within this area. Further monitoring will be carried out within this area. This study would involve the exposure of several sets of tubes at the facades of dwellings adjacent to the road over a period of twelve months. Consultation with other relevant authorities and those residents living within the area will take place and an action plan will be drawn up to address this issue.

Consideration will be given to those other pollutants which may not be exceeding the objective levels at present but if change occurs may require further assessment.

Table 1 below sets out the pollutants which require assessment within each council area, the national air quality objectives for each pollutant and the date by which these objectives must be met.

Table 1 Air Quality Objectives

Pollutant	Objective Concentration	Measured as	To be achieved by
Benzene	16.25µg/m ³ (5ppb)	running annual mean	31 December 2003
1,3-Butadiene	2.25µg/m ³ (1ppb)	running annual mean	31 December 2003
Carbon monoxide	11.6µg/m ³ (10ppm)	running 8 hour mean	31 December 2003
Lead	0.5µg/m ³	annual mean	31 December 2004
	0.25µg/m ³	annual mean	31 December 2008
Nitrogen dioxide	200µg/m ³ (105ppb) not to be exceeded more than 18 times a year	1 hour mean	31 December 2005
	40µg/m ³ (21ppb)	annual mean	31 December 2005
Particles (PM ₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40µg/m ³	annual mean	31 December 2004
Sulphur dioxide	350µg/m ³ (132ppb) not to be exceeded more than 24 times a year	1 hour mean	31 December 2004
	125µg/m ³ (47ppb) not to be exceeded more than 3 times a year	24 hour mean	31 December 2004
	226µg/m ³ (100ppb) not to be exceeded more than 35 times a year	15 minute mean	31 December 2005

2. LIMAVADY BOROUGH

The Borough of Limavady is situated in the north-west of the Province. It covers an area of approximately 239 square miles and has a resident population of almost 33,000 people. The main centre of population within the Borough is Limavady town itself. Its population is in the region of 13,000 and is mainly residential in character with a small commercial base. Limavady was previously a market town but in recent years has developed into a commuter base for those persons working in the neighbouring towns of Coleraine and Londonderry.

Outside Limavady town are the smaller communities of Dungiven, Ballykelly, Greysteel, Bellarena and Drumsumn. These smaller areas predominately rely on farming (both arable and pasture) as a source of revenue.

Limavady Borough Council is bounded to the west by Derry City Council, one of the largest authorities in Northern Ireland, Coleraine Borough Council to the east and Magherafelt District Council to the south.



Updating and Screening Assessment

Since 1998 Limavady Borough Council has reviewed and assessed air quality within the Borough. This review has been undertaken in a phased approach involving three stages.

Initially a desktop assessment was carried out in line with Technical Guidance document LAQM.TG (03). Using the information contained in this guidance council established that of the eight pollutants requiring assessment the air quality objectives for benzene, 1-3 butadiene, lead, carbon monoxide and ozone (ozone levels are being assessed nationally) were likely to be met. It did however indicate that further investigation of nitrogen dioxide, sulphur dioxide and particulate matter levels was required.

The second stage concentrated on these three pollutants where uncertainty lay about existing levels and the possibility that the objective levels may be exceeded.

Nitrogen dioxide:

The technical guidance suggested that roads conveying 10000 vehicles per day may give rise to excessive levels of NO₂. A DMRB assessment was carried out on council's behalf by NETCEN. This assessment modelled existing traffic volumes on roads throughout the Borough. The modelling exercise suggested that exceedences were unlikely. However passive monitoring carried out on busy roads within the Borough where relevant locations existed indicated that the air quality objective may be exceeded. Examination of nitrogen dioxide levels continued and monitoring showed that elevated levels of the pollutant were present in Dungiven. The area was declared as an AQMA in March 2006 and monitoring continues. Council are consulting with other statutory agencies and interested parties and an action plan will be drawn up within the year.

Sulphur dioxide and particulate matter:

The main source of these pollutants within the Borough was from the burning of solid/smokeless fuels in domestic properties. To gauge consumption a fuel use survey was undertaken and the results were then modelled. Dispersion modelling indicated that levels of sulphur dioxide were below the threshold levels but that one residential area within Limavady town may experience elevated levels of particulate matter. With regard to particulate matter continuous monitoring was carried out in the residential area over a six-month winter period (October 2004-April 2005). Data obtained indicated that both the 24-hour mean and annual mean objective levels were not exceeded.

This updating and screening assessment will re-evaluate the pollutants and assess if changes have occurred which will adversely effect concentrations within the Borough.

POLLUTANTS

BENZENE

National Air Quality Objective: 16.25µg/ m³ (5ppb) running annual mean. (2003)
Running annual mean: 3.25 µg/ m³ (2010)

Health Effects.

Benzene is a known human carcinogen (cancer causing substance). Occupational exposure to benzene at 1-10 ppm has been associated with the risk of developing leukaemia and liver, lung and stomach cancer

Sources of Benzene.

In the United Kingdom the main sources of benzene are petrol engine vehicle exhausts (benzene is added to petrol to act as an anti knocking agent), petrol refining, distribution and uncontrolled emissions from petrol forecourts without vapour recovery systems.

The major source of benzene is motor vehicle emissions which in 1996 accounted nationally for 64% of emissions. Running annual mean concentrations of benzene measured at urban background, roadside and kerbside locations are already below the 2003 objective of 16.25µg/ m³ (5ppb) even close to heavily congested roads. The increasing numbers of vehicles equipped with three-way catalysts will significantly reduce emissions of benzene in future years. Recently agreed additional reductions in vehicle emissions as documented in the Auto-Oil programme are expected to further reduce emissions of benzene from vehicle exhausts. Proposals to control emissions from petrol stations forecourts through vapour recovery are expected to lead to significant reductions. These measures are expected to ensure that the revised air quality objective is achieved by the end of 2003.

National Perspective

A summary of measured benzene concentrations at all urban and background sites throughout the UK during the period 1999 to 2001 were significantly below the 2003 annual mean objective level and more recently the concentrations measured at urban background locations were also well below the tighter 2010 objective. Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective level at all urban background and roadside/kerbside locations. The 2010 objectives are expected to be met at all urban background and at most roadside locations.

Monitoring data

The first stage review and assessment indicated that the annual mean was unlikely to be exceeded within Limavady Borough. Therefore it was not proposed to monitor for this pollutant. No monitoring data is available for benzene.

Background benzene concentrations

Background benzene concentrations as shown in the DETR Air Quality archive website for the Limavady area in 1996 have been calculated as being between 0.25 -

0.50µg/m³. The archive maps for 2001, 2003 and 2010 show that levels have not and are not predicted to exceed 0.3 µg/m³

Local monitoring

No monitoring for benzene has been undertaken within the Limavady Borough Council area. Hydrocarbons have been monitored at 13 sites throughout the UK including a site at Elmwood Avenue, Belfast which has been operational since 1993. Benzene levels measured have not exceeded the standard set since monitoring commenced. Measurements recorded in Belfast are shown in the table 2 below.

Table 2: Benzene levels, South Belfast

Benzene	1993	1994	1995	1996	1997	1998	1999
Annual mean (ppb)	1.9	1.1	0.9	0.9	0.9	0.69	0.6
Max 1 hour (ppb)	14.5	26.3	34.0	23.6	20.8	17.0	13.4

Benzene levels in the Limavady Borough Council area are not expected to exceed those experienced in South Belfast as traffic volumes are significantly less in this area.

Road traffic sources: very busy roads/junctions

Nationally the available monitoring data suggests that the benzene objective level is unlikely to be exceeded other than at locations close to busy roads and in areas with high background concentrations. The guidance suggests that the following criteria for 'very busy' roads and junctions should be assessed:

- Single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day
- Dual carriageways (2 or 3 lanes) with average daily traffic flows which exceed 120,000 vehicles per day
- Motorways with daily average traffic flows which exceed 140,000 vehicles per day
- Traffic flows at junctions to be added to give the combined total to be used against the above criteria.

There are no roads/junctions within Limavady Borough which convey such high volumes of traffic.

Authorised/prescribed processes

Within Limavady Borough Council there are no Part B or C prescribed processes which emit benzene.

New Industrial sources

No new industrial processes have been established within the Borough which generate benzene.

Petrol stations and major fuel storage depots

The technical guidance suggests that all petrol stations with an annual throughput of more than 2000m³ of petrol and with a busy road nearby should be identified. A busy road is defined as one with more than 30,000 vehicles per day. There are three petrol stations within the borough with consumption in excess of 1000m³ which are permitted under Part C of the Pollution Prevention & Control Regulations (Northern Ireland) 2003 for petrol vapour recovery. They are not however in close proximity to roads along which more than 30,000 vehicles per day pass. There are no major fuel storage depots within the Borough.

Conclusion

Having considered the potential sources of benzene it is felt that there is no risk of the thresholds being exceeded and a detailed assessment for benzene is therefore not required.

1,3-BUTADIENE

National Air Quality Objective: 2.25µg/ m³ (1ppb) running annual mean.

Health Effects

1,3-butadiene is an accepted carcinogen for which no absolutely safe level can be defined. It is potentially damaging to the genetic structure within cells.

Sources of 1,3-butadiene

The main sources of 1,3-butadiene within the United Kingdom are emissions from motor vehicle exhausts and its use as an industrial chemical.

The National Perspective

Concentrations of 1,3-butadiene are measured at a few UK national sites. Maximum running annual mean concentrations measured at all urban background/centre and roadside locations are already well below the 2003 objective level.

The standard and objective for 1,3-butadiene

In assessing concentrations of 1,3-butadiene attention should be focussed on:

- monitoring data
- new industrial sources
- existing industrial sources with significantly increased emissions.

Local Monitoring

Whilst no local motoring has been undertaken to assess current 1,3-butadiene levels national monitoring has shown that running annual mean concentrations of 1,3-butadiene measured at all urban background/ centre and roadside locations are already below the 2003 objective level. This is reflected in the fact that background concentrations of 1,3-butadiene as shown in the DETR Air Quality archive website are below 0.1 µg/m³. Monitoring of 1,3-butadiene concentrations has been carried out in Belfast. Table 3 below shows levels in Belfast in 2004.

Table 3: 1,3-butadiene concentrations in Belfast (2004)

Site	Data capture (%)	Calendar year mean concentration 2004, µg/m ³	Running annual mean concentration 2004 µg/m ³
Belfast Centre	90	0.057	-
Belfast Upper Newtownards Road	86	0.073	-

Annual mean levels of this pollutant at these sites are well within the air quality strategy objective of $2.25 \mu\text{g}/\text{m}^3$. It is unlikely that levels within the Limavady area will exceed the objective levels.

The fitting of catalytic converters to petrol vehicles and planned improvements to fuel quality are expected to reduce existing levels. The phased installation of petrol vapour recovery at petrol stations is also expected to keep levels of 1,3-butadiene below 1ppb.

Existing and new industrial sources

Technical guidance document TG(03) lists the processes with the potential to emit significant quantities of 1,3-butadiene. The following processes are listed:

- Petrochemical processes (95%)
- Manufacture and use of organic chemicals (3%)
- Petroleum processes (2%)

There are no Part B or Part C prescribed processes with Limavady Borough which would be considered as significant sources of 1,3-butadiene. It is unlikely that future development will impact on concentrations of 1,3-butadiene. There are no neighbouring sources of 1,3-butadiene which will impact on these concentrations.

Conclusion

A detailed assessment of 1,3-butadiene is not required.

CARBON MONOXIDE

National Air Quality Objectives:

11.6mg/ m³ (10ppm) running 8 hour mean to be achieved by 31 December 2003

10 mg/m³ maximum daily running 8-hour mean concentration to be achieved by the end of 2003

Health effects

Carbon Monoxide when inhaled diminishes the oxygen carrying capacity of the blood. It combines with haemoglobin in blood to form carboxyhaemoglobin. In low concentrations carbon monoxide causes headaches and impairs concentration. At levels of 2-3% it can increase the risk of heart problems in individuals with cardiovascular disease. At higher concentrations and in confined spaces prolonged exposure can lead to poisoning. Other concerns surrounding carbon monoxide include loss of co-ordination and foetal growth retardation.

Sources of carbon monoxide

The main source of carbon monoxide in the United Kingdom is currently road transport, which accounts for 67% (2000) of emissions. Road traffic emissions account for a larger proportion of the total within urban areas where maximum concentrations are most likely near busy congested roads. Annual emissions of carbon monoxide have been falling steadily since the 1970's and are expected to continue to do so. Projections indicated that road transport emissions would decline by a further 42% between 2000 and 2005.

The standards and objective for carbon monoxide

The Government has adopted an 8-hour running mean of 11.6 mg/m³ (10ppm) as the air quality standard for carbon monoxide. A new objective has been set at a slightly tighter level of 10 mg/m³ as a maximum daily running 8-hour mean concentration to be achieved by the end of 2003 bringing it into line with the second Air Quality Daughter Directive limit value.

Anticipated levels

Studies at a national level based on both measured and modelled data suggest that there is little likelihood of the new objective level being exceeded by 2003.

Monitoring data

No local monitoring of carbon monoxide has been carried out within Limavady Borough. Monitoring within Northern Ireland has been restricted to two sites, one in Londonderry (Brooke Park) and one in Belfast City Centre (Lombard Street). Table 4 shows the results of automated CO monitoring at these sites in 2004.

Table 4: Automated CO monitoring 2004

Site	Data capture (%)	Annual Mean mg/m ³	Max. running 8-hr mean mg/m ³	No. of exceedences of EC Limit value	No. of exceedences of the AQS objective
Belfast City Centre	96	0.2	2.8	0	0
Londonderry	97	0.3	1.4	0	0

Both sites have achieved the air quality strategy objective by the end of December 2003 and the new objective level of 10 mg/m³ by 1 January 2005.

The DETR archive maps illustrate that concentrations of carbon monoxide within the Limavady area are below 0.2 mg/m³

Road traffic sources

Technical guidance (TG (03)) suggests that very busy roads and junctions in built-up areas should be examined. Very busy roads are defined as

- Single carriageway roads with daily average traffic flows which exceed 80,000 vehicles per day
- Dual carriageways (2 or 3 lanes) with average daily traffic flows which exceed 120,000 vehicles per day
- Motorways with daily average traffic flows which exceed 140,000 vehicles per day
- Traffic flows at junctions to be added to give the combined total to be used against the above criteria.

Current data (2006) relating to traffic flow indicates that there are no roads within Limavady Borough with average daily flows in excess of 20,000. Data relating to traffic volumes on the main arteriole routes through Limavady Borough indicate that flows do not exceed 18,000 per day. Traffic projections for the Borough do not show any roadways which will exceed these daily average flows. A bypass has been constructed which will alleviate congestion within the Limavady town centre.

Conclusion

With these facts in mind it will not be necessary carry out a detailed assessment for carbon monoxide.

LEAD

National Air Quality Strategy Objectives:

0.5 µg/ m³ annual mean by end of 2004.

0.25 µg/ m³ annual mean by end of 2008.

Health effects

Lead has been shown to have a pronounced effect on human health and has been associated with acute and chronic damage to the nervous system and kidney damage. Exposure to high concentrations of lead is toxic.

Sources of lead

Within the United Kingdom the most common source of lead emissions is petrol engine vehicles which account for 65% of emissions (1996) and industrial sources (18%) (1996). It is added to petrol in the form of tetraethyl lead to enhance the octane rating of fuel. Other uses include the manufacture of batteries, paints, glazes and radiation shielding. The concentration of lead in air has significantly decreased in recent years with restrictions having been placed on the maximum permissible lead content of petrol.

National perspective

Agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels has led to a ban on sales of leaded petrol in the UK since 1 January 2000. Annual mean concentrations measured at urban background and kerbside sites have decreased significantly over recent years as a result of the conversions to unleaded petrol. Concentrations at such sites are below those thresholds set for the end of 2004 and 2008.

It is expected that only those local authorities with significant industrial sources located within their catchment area will be required to assess for lead.

Detailed assessments of the potential impact of lead emissions from industrial processes have been undertaken by the Government and devolved administrations. A 12 months monitoring survey in the vicinity of 30 key industrial sites in the UK. There have been no exceedences of the 2004 and 2008 objective levels.

Anticipated levels

Pollutant specific guidance (TG (03)) states that the only those authorities with relevant locations in the vicinity of major industrial processes that emit significant quantities of lead will need to progress beyond the updating and screening assessment.

Local monitoring

Historically no long term monitoring of lead concentrations has been carried out by local authorities in Northern Ireland.

New industrial sources/ industrial sources with substantially increased emissions or new relevant exposure

Annex 2 of the technical guidance lists those processes which would contribute to elevated lead levels. Those listed include

Furnaces for the extraction of non-ferrous metals from scrap

Electrical or rotary furnaces

Hot land cold blast cupolas

Aluminium and aluminium alloy processes

Zinc and zinc alloy processes

Copper and copper alloy processes

Lead glass manufacturing processes

None of the aforementioned prescribed processes are currently operating within Limavady Borough and none are anticipated.

Conclusions

It is not felt that lead emissions will exceed the thresholds stated and a detailed assessment is therefore not required.

NITROGEN DIOXIDE

National Air Quality Objective:

200ug/m³ (105ppb) 1 hour mean not to be exceeded more than 18 times per year (2005),
40 ug/m³ annual mean (2005)

Health effects

Nitrogen Dioxide (NO₂) and nitric oxide (NO) are both oxides of nitrogen and are collectively referred to as NO_x. Nitrogen dioxide is produced by the oxidation of nitric oxide in the atmosphere and there is a complex relationship between emissions of NO_x and the resulting concentration of NO₂. Nitrogen dioxide is associated with adverse effects on human health. It can at certain levels affect lung function. Repetitive exposure causes changes in lung structure, lung metabolism and the lungs ability to fight bacterial infection. Animal toxicological studies suggest that peak concentrations contribute more to the toxicity than does the duration of exposure although the latter is relevant. For this reason the Government have set two national air quality objectives; both hourly means and an annual mean.

Sources of NO_x

The main sources of NO_x in the United Kingdom are

- road transport which accounted for 50% of total emissions in 1995
- the generation of electricity (20%)
- commercial and industrial operations (12%)

Background levels

The DETR archive maps illustrate that concentrations of nitrogen dioxide within the Limavady area do not exceed or are not expected to exceed 10mg/m³

Road transport

The technical guidance required Council to examine NO_x levels at relevant locations close to roads used by more than 10000 vehicles per day.

Initially a DMRB assessment was carried out by NETCEN on Council's behalf. This assessment suggested that traffic emissions within the Borough were below the national objective levels. However passive monitoring suggested that two potential 'hotspots' existed, namely Main Street Dungiven and Irish Green Street in Limavady town. Further monitoring determined that the junction at Irish Green Street was below the national air quality objectives but it did show that levels were excessive in Dungiven. This area was declared an air quality management area and Council are in the process of consulting with relevant statutory agencies to establish what actions can be taken to reduce levels.

There are several other roads within the Borough which convey in excess of 10000 vehicles per day. These are listed in table 5.

Table 5

Street	Vehicles per day (2006)
Catherine Street, Limavady	11000
Irish Green Street (upper), Limavady	10500
Irish Green Street (lower), Limavady	10300
Greystone Road, Limavady	10800
Broad Road, Limavady	10300
Lower Main Street Dungiven	16100

These roads, with the exception of Lower Main Street Dungiven, are not however close to relevant locations and do not require further investigation.

Narrow congested streets with residential properties close to the kerb

This is the scenario with regard to Lower Main Street Dungiven and Linenhall Street, Limavady. As stated earlier monitoring in Linenhall Street indicated that NO₂ levels did not exceed the national objective level. Lower Main Street, Dungiven has been declared as an AQMA and monitoring continues in this area.

Busy junctions

A busy junction can be taken to be one with more than 10000 vehicles per day. In addition they need only be considered if there is relevant exposure within 10 metres of the kerbside. In light of the traffic data and discussions with DRD Roads Service the junction of Main Street and Ballyquin Road in Dungiven is the only junction which may require further investigation. This junction is within the AQMA and will be assessed accordingly.

Busy streets where people may spend 1 hour or more close to traffic

An exceedence of the hourly objective level may occur where members of the public regularly spend one hour or more close to (within 5m) busy streets. The likelihood of an exceedence of the objective will occur at these locations where the traffic flow is greater than 10000 vehicles per day. These roads are listed in table 5 above. None of these streets have locations where members of the public would be present for an hour or more. No further assessment is therefore required.

Roads with a high flow of buses and/or HGV's

Where there is an unusually high proportion of heavy duty vehicles (i.e.greater than 25%) on roads there is a risk that the national air quality objective for nitrogen dioxide will be exceeded where there is relevant exposure within 10 metres of the road. Discussions with DRD Roads Service suggest that there are no roads within Limavady Borough with a flow of buses/HGV's in excess of 25%. Therefore no further consideration of this is required.

New roads constructed or proposed since the first review and assessment.

The only new road which has been brought into operation since our first review and assessment has been the Limavady Bypass. Traffic data shows that 10300 vehicles per day use this road. Whilst this flow slightly exceeds the 10000 vehicles per day at which roads should be considered there are no relevant locations in close proximity to this road.

Roads with significantly changed traffic flows or new relevant exposures.

There are no roads within the borough which have experienced a 25% increase in traffic flow. There has been housing development within Limavady town but this has not been in close proximity to busy roads.

Bus stations

Whilst Limavady Borough does have two bus stations these do not have a throughput in excess of 1000 buses per day and therefore do not require further consideration.

Industrial sources

Annex 2 Appendix E lists glass manufacture (excluding lead glass manufacture) as a potential source of significant emissions of nitrogen oxides. There are no glass manufacturing processes within the Borough.

Airports

The technical guidance suggests that an airport with a throughput of 5 million passengers per annum may contribute up to 25 ug/m³ NO_x at the nearest receptor location. City of Derry Airport is on the periphery of the borough. As can be seen from the passenger figures for the years 2001-2005 in table 6 passenger numbers are well below the 5 million level.

Table 6 Passenger Statistics 2001 - 2005

YEAR	SCHEDULED FLIGHTS						CHARTER FLIGHTS					OTHERS	
	M'chester	B'ham	Glasgow (GLA & PIK)	London Stansted	Dublin	Others	Faro	Majorca	Lanzarote	Salou	Misc.	Private / Business	Annual Totals
2001	15975	0	21283	131457	18678	0	0	5033	0	0	2354	4763	199543
2002	16305	0	14730	135440	24244	0	0	5945	0	0	3020	4706	204390
2003	14840	0	15738	134309	29570	0	0	6689	5471	0	4827	5668	217112
2004	11565	9985	14396	143380	30925	330	0	6082	8165	6710	3592	3744	238874
2005	17271	9200	14287	106219	28775	184	3327	6327	5238	6124	2941	5928	205821

www.cityofderryairport.com

There is no significant effect on local NO_x levels from this facility.

Railways and Shipping

NO_x emissions from railways will only be associated with diesel trains. Emissions are unlikely to have a significant impact alongside railway tracks but there is the potential for problems to occur in close proximity to large numbers of stationary idling engines as may be the case in terminals and depots. The impact is unlikely to extend beyond a distance of 50 metres. Within Limavady Borough there is on NIR halt. Not all trains stop at this halt and those which do would be stationary for a few minutes. This is a single track so only one train can operate at any given time.

Whilst Limavady Borough has a coastline there are no ports within the area.

Conclusion

Traffic emissions continue to be the main source of NO₂ within Limavady Borough. The issue of excessive levels in Lower Main Street Dungiven is being addressed at present. The area was declared an AQMA and as such council is required to continuously monitor levels and to develop an action plan with other relevant authorities.

SULPHUR DIOXIDE

National Air Quality Objective

350µg/m³ (132ppb) 1hour mean to be achieved by end 2004 (not to be exceeded more than 24 times per year)

125µg/m³ (43.7ppb) 24 hour mean to be achieved by end 2004 (not to be exceeded more than 3 times per year)

266µg/m³ (1000 ppb) 15 minute mean to be achieved by end 2005 (not to be exceeded more than 35 times per year)

Health effects

Sulphur dioxide is a colourless corrosive acidic gas with a choking taste. At high concentrations it is a strong irritant to the eyes and mucus membranes. At very low concentrations sulphur dioxide is an acute respiratory irritant causing airways to narrow and inducing coughing. Whilst these effects are reversible in healthy individuals the consequences can be more severe in those persons who have ailments of the cardio-respiratory system. Recent studies have shown that individuals who suffer from asthma may be particularly susceptible to those concentrations which are experienced during pollution episodes. Sulphur dioxide may also be converted through chemical reactions in the atmosphere to form sulphate particulate matter. Sulphur dioxide combines with water vapour in the atmosphere to produce acid rain. This acidic solution is very corrosive and damages the stone work of buildings.

Sources of sulphur dioxide

Throughout the UK the main sources of sulphur dioxide (2000) are

- coal fired power stations (71%)
- industry
- domestic (4%)
- road transport (<1%)

Background concentrations

Concentrations of sulphur dioxide have been monitored at UK national network sites during the period 1999-2001. Levels have fallen at all sites with the exception of one exceedence at the Belfast site where elevated levels from the burning of domestic fuel have been detected.

Monitoring data

The DETR Archive maps show that within Limavady Borough the estimated annual mean for 2001 does not exceed $2 \mu\text{g}/\text{m}^3$

Industrial sources

Annex 2 Appendix E of TG(03) lists those processes which contribute to emissions of sulphur dioxide namely,

- combustion plant 20-50mwth,
- reheat furnaces 20-50mwth,
- hot land cold blast cupolas,
- aluminium and aluminium alloy processes,
- zinc and zinc alloy processes,
- copper and copper alloy processes,
- manufacture of heavy clay,
- glass manufacture,
- lead glass manufacture and
- roadstone coating processes.

None of those listed operate within Limavady Borough. It is not thought that any of these processes are likely to operate in this area in coming years.

Assessment of domestic sources

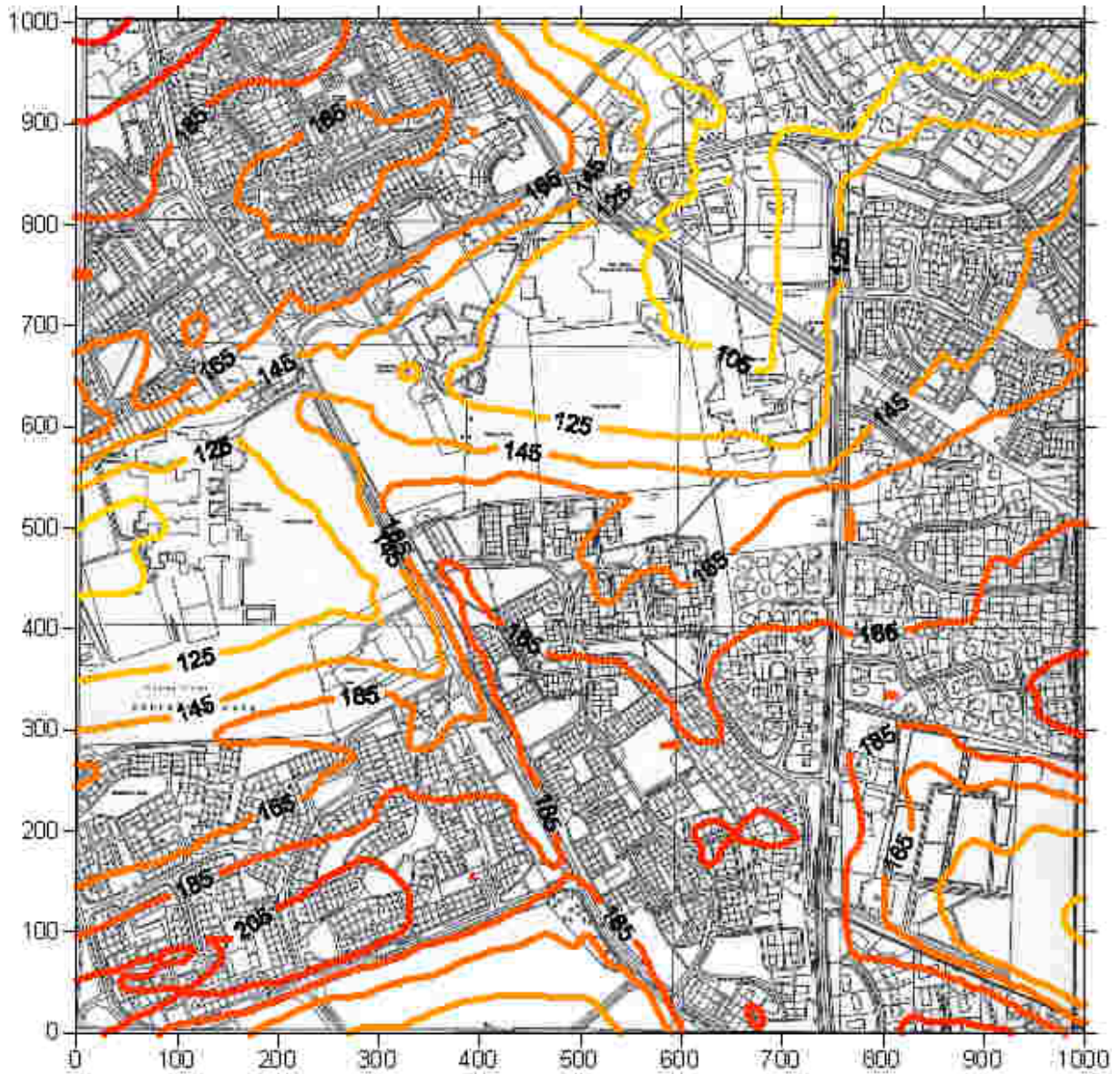
To assess the impact that coal burning in domestic properties has on sulphur dioxide levels Council is required to examine the density of properties within the Borough where solid/smokeless fuels are used as a primary source of heating and to determine if this is a 'significant' source. 'Significant' is defined as any area of 500m x 500m where there are more than 100 houses burning solid/smokeless fuel as their primary source of heating. Following Councils first stage assessment a fuel use survey was carried out to assess fuel consumption within the Borough and this data was then modelled by NETCEN to determine if the air quality objectives were likely to be exceeded. The modelling exercise suggested that sulphur dioxide emissions from residential sources do not exceed the objective levels.

Results of modelling

Figure 1 shows predicted SO₂ concentrations in the Limavady area. The model predicts that the 99.9 percentile of the 15 minute mean SO₂ concentration will not be exceeded in any parts of the Borough. It has been assumed that domestic fuel burning in the area will not change between when the survey was carried out and 2004/5. As no data was

available for the Limavady area with regard to SO₂ the modelling exercise was bias adjusted using data from Strabane District Council.

Figure 1: 99.9-percentile 15 minute mean SO₂ concentrations for the Limavady grid (model results corrected for bias using monitoring data from Strabane)



Assessment of transport sources (shipping, railway locomotives)

The technical guidance suggests that significant shipping movements within major ports are likely to generate significant emissions. There are no ports within Limavady Borough.

Diesel and coal fired locomotives emit SO₂. Moving locomotives do not contribute significantly to emissions but those which are stationary may affect the 15 minute objective. Whilst there is one halt within the Borough trains do not remain stationary at it for periods of 15 minutes or more.

Conclusion

Having considered all possible sources of sulphur dioxide it is not felt that a detailed assessment of this pollutant is required.

PARTICULATE MATTER (PM₁₀)

National air quality objective

40µg/m³ as the annual mean, and,

50µg/m³ as the fixed 24- hour mean to be exceeded no more than 35 days per year.

These objectives are to be achieved by the end of 2004

Health effects

PM₁₀ emissions contain a wide range of particles all with a diameter less than 10 microns (10 µm). At this size they are inhalable and can enter the respiratory tract. PM₁₀ and particles in general have been linked to increases in morbidity and premature mortality. Its effects extend throughout the respiratory system. Department of Health assessments suggest that in Great Britain particles may contribute to more than 8000 premature deaths annually and 10 - 20000 hospital admissions.

Sources of PM₁₀

There are several emission sources which contribute to PM₁₀ concentrations in the UK. They can be divided into three main categories:

- Primary combustion particles - particles emitted directly from combustion processes such as road traffic, power generation and industry. The diameter of these particles ranges from 1µm to 2.5µm.
- Secondary particles - particles formed in the atmosphere after release in their gaseous phase. These include sulphates and nitrates formed from emissions of sulphur dioxide and nitrogen dioxide. These particles are generally less than 2.5µm in diameter.
- Coarse particles - these include a wide range of emissions from non-combustion sources e.g. dust from construction and mineral extraction processes. These particles are generally greater than 2.5µm in diameter.

Background concentrations.

Estimated annual mean background gravimetric concentrations are as follows:

2004 below 10µg/m³

2005 below 10µg/m³

2010 below 10µg/m³

Estimated annual mean secondary gravimetric concentrations for 2004 are in the range of 2-4µg/m³

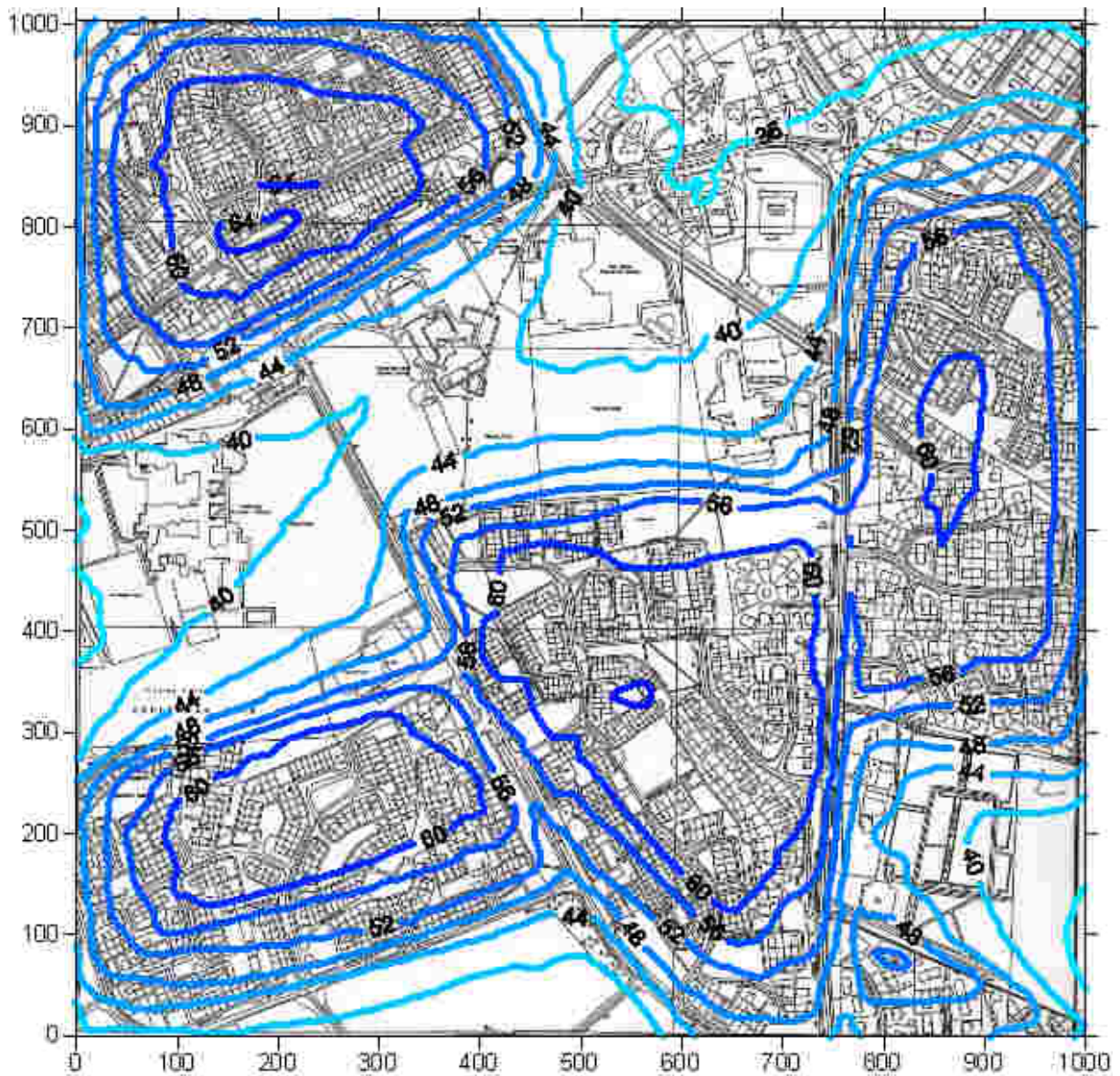
Monitoring data

Other than the data collected in relation to domestic emissions no other monitoring was carried out within the borough.

Domestic coal burning

Within Limavady Borough a fuel use survey was carried out to establish the extent of solid/smokeless fuel use in residential areas. Modelling of the results suggested that emission levels were significant in one area within Limavady town (Coolissan). Figure 2 shows the predicted 90.4 %ile daily mean concentration within the Coolissan area.

Figure 2 – Predicted 90.4 percentile daily mean PM₁₀ concentrations for the Limavady grid (model results corrected for bias using monitoring data from Strabane in 1999)



As modelling showed that PM₁₀ levels may be in excess of the objective level continuous monitoring was carried out in this area. Over a six month winter period between October 2004 and April 2005 a TEOM monitor was located within the Cooleasan area. Figure 3 shows the TOEM monitor in situ

Figure 3: TEOM continuous PM₁₀ monitor, Civic amenity site, Ballyquin Road, Limavady



NETCEN was commissioned by council to provide QA/QC and data management. Table 7 and Figure 4 show the results of continuous PM₁₀ monitoring carried out between Oct 2004 and April 2005

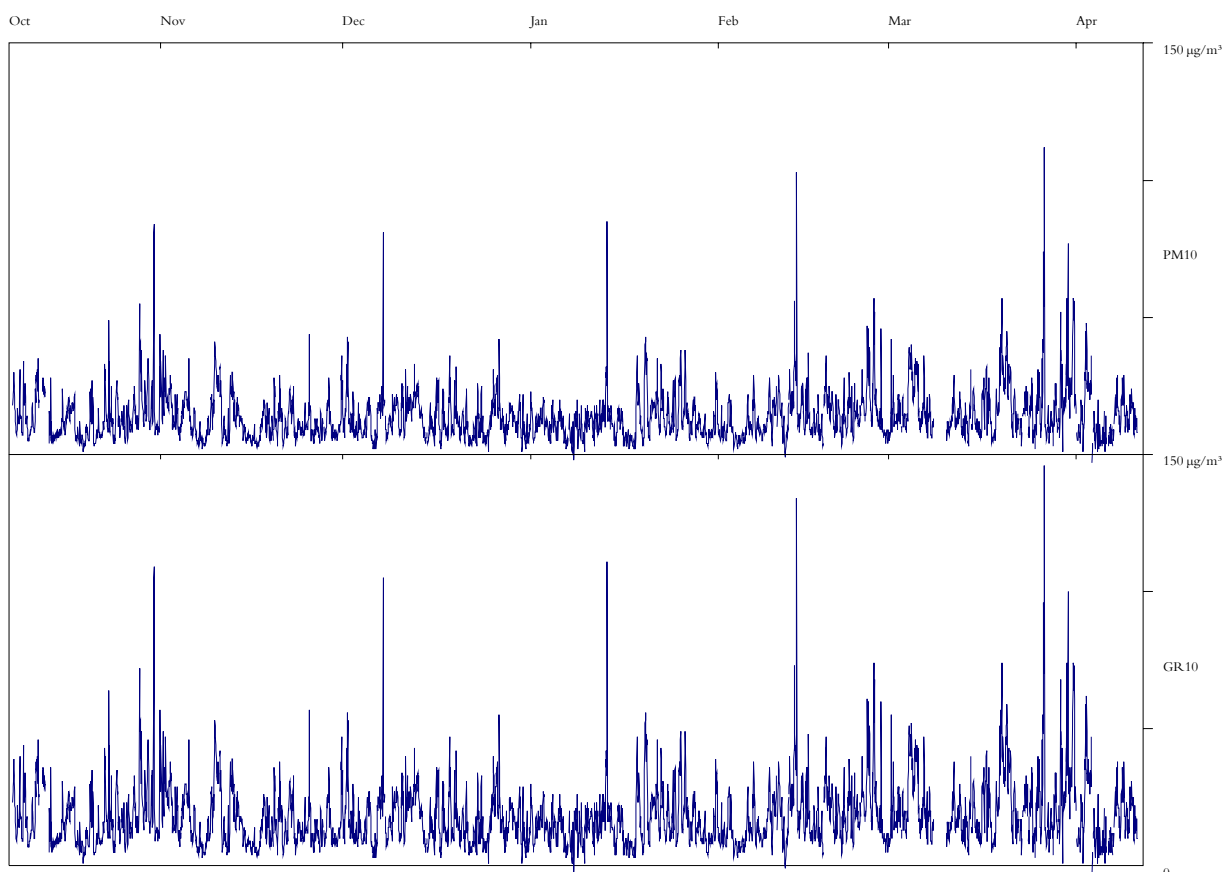
Table 7: Results of continuous PM₁₀ monitoring (Oct 2004 – April 2005)

POLLUTANT	PM ₁₀	GR ₁₀ *
Number Very High	0	-
Number High	0	-
Number Moderate	0	-
Number Low	4331	-
Maximum 15-minute mean	194 µg m ⁻³	252 µg m ⁻³
Maximum hourly mean	112 µg m ⁻³	146 µg m ⁻³
Maximum running 8-hour mean	53 µg m ⁻³	69 µg m ⁻³
Maximum running 24-hour mean	35 µg m ⁻³	45 µg m ⁻³
Maximum daily mean	32 µg m ⁻³	42 µg m ⁻³
Average	14 µg m ⁻³	18 µg m ⁻³
Data capture	96.0 %	96.0 %

* GR₁₀ in gravimetric units
 All mass units are at 20°C and 1013mb

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	0	0
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 40 µg m ⁻³	0	-

Figure 4: Hourly Mean Data for 07 October 2004 to 11 April 2005



The 90.4 percentile daily mean PM₁₀ concentration at Limavady Coolessan was 26µg m⁻³. Following Technical Guidance [LAQM.TG(03)], this has been adjusted to 90.4%ile equivalent for 2004 using data from Belfast Centre and Derry AURN Stations. Table 8 below summarises the procedure.

Table 8: Adjustment of 90.4%ile monitored in Limavady Coolessan.

SITE	90.4%ile daily mean PM10 2004	90.4%ile daily mean pm10 Oct 04-April 05	Am/Pm
Belfast Centre	35µg m ⁻³	32µg m ⁻³	1.09
Derry	30µg m ⁻³	35µg m ⁻³	0.86
Limavady Coolessan	*25µg m ⁻³	26µg m ⁻³	-
		Average (Ra)	0.97

*Calculated by multiplying 0.97 by 26µg m⁻³

Data capture of 93% has been achieved over the monitoring period 07 October 2004 through 19 January 2005 (just over 3 months of data). Data capture during this period met the DOENI target of 90% data capture for data sets used within the detailed stage of the review and assessment process.

PM₁₀ concentrations remained in the DOENI “LOW” band across the monitoring period. The maximum daily mean concentration (TEOM) during the period was 28µgm⁻³. Using the LAQM TG(03) TEOM to gravimetric default correction factor of 1.3, the maximum gravimetric equivalent daily mean concentration during the period was 36µgm⁻³ (28 x 1.3). Thus the DOE NI objective value of 50µgm⁻³ based on daily gravimetric equivalent data was not exceeded during the period. The objective allows up to 35 exceedences per year. The mean concentration of 17µgm⁻³ gravimetric equivalent (13 x 1.3) was below the DOE NI objective of 40µg m⁻³ for annual mean data.

The present data set relates to a monitoring period of just over the 3 month period. On the basis of the data recorded to date, it is judged as unlikely that either the daily mean or annual mean objectives will be exceeded within the Limavady Cooleessan area.

Road traffic sources

A) Roads with a high flow of buses and/or HGV's

The technical guidance suggests that roads with an unusually high proportion of buses or heavy duty vehicles may lead to elevated levels of PM₁₀. An unusually high proportion is taken to be greater than 25% of the average daily traffic flow. DRD Roads Service do not estimate that the proportion of buses/ HDV's would exceed 10% within the Limavady area.

B) New roads constructed or proposed since the 1st round of review and assessment

The only new road which has been constructed within Limavady Borough since the first stage review and assessment was completed is the bypass which now circumvents Limavady town. This road is on the periphery of the town and does not take vehicles close to relevant locations.

C) Roads with significantly changed traffic flows or new relevant exposure

Council are not aware of any roads within the Borough where traffic flows have changed significantly or where relevant exposure has been affected.

Industrial sources

Industrial sources will not normally contribute significantly to annual mean concentrations but some could affect the 24-hour objective. The technical guidance suggests that fugitive emissions and those from coal burning boilers and steel works may elevate concentrations. The only potential sources of fugitive emissions within the area are quarries and landfill sites. These were discounted as they are not close to relevant locations. No new quarries have come into operation since our first review and it is not envisaged that any will in the near future. Council's landfill site has closed recently and will not reopen.

Airports/Ports

Whilst Limavady does have a coastline it has no port. City of Derry airport does impinge on Limavady Borough but there is no relevant exposure within 500 metres of the airport boundary.

Conclusion

The updating screening and assessment for PM₁₀ suggests that there are no significant PM₁₀ sources within the Borough and that a detailed site is not required.

CONCLUSION

The updating and screening assessment of air quality has considered all potential sources of the seven pollutants: benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide and particulate matter. The assessment has been carried out in accordance with the methodology detailed in technical guidance LAQM.TG(03) issued by the Department of Environment, Food and Rural Affairs and builds on the work which was carried out in the first round of the air quality review and assessment.

The purpose of this assessment is to identify those issues which have changed since the first review was completed. The assessment examines matters such as new monitoring data, new objectives, new sources of pollution and significant changes within existing sources. Where it is felt that significant change has occurred and that this change will have an effect at relevant locations a detailed assessment will be carried out to determine whether or not an exceedence will occur.

The updating and screening assessment has concluded that each of the prescribed pollutants, with the exception of nitrogen dioxide, will not exceed the air quality objectives. A detailed assessment will therefore not be required for these pollutants.

With regard to nitrogen dioxide an AQMA has been declared in Dungiven to address elevated levels caused by traffic emissions. Monitoring will continue in this area and by March 2007 an action plan will have been devised which will set out the actions which can be taken to reduce nitrogen dioxide levels within this area and hence reduce the risks to residents living in the area.