LISBURN
CITY COUNCIL

2012 Air Quality Updating and Screening Assessment for Lisburn City Council

In fulfillment of Environment (Northern Ireland) Order 2002
Local Air Quality Management

September 2012

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Executive Summary

The Air Quality Strategy has established the framework for air quality management in the UK. Local Authorities have a duty under the Environment Act 1995 and subsequent regulations to review and assess air quality in their areas on a periodic basis so as to identify all areas where the air quality objectives are being or are likely to be exceeded. A phased approach has been adopted for the review and assessment process so that the level of assessment undertaken is commensurate with the risk of an exceedence of an air quality objective.
An updating and screening assessment (USA) is required to be prepared every three years by all local authorities in the UK. The last updating and screening assessment of air quality was undertaken in 2009 with two interim progress reports.

This report is the 2012 (USA) report and has been completed using the recommended template. The assessment is fully compliant with the applicable policy and technical guidance.

Lisburn City council is located southwest of Belfast and is the second largest Council in Northern Ireland, it covers 174 square miles and has a population of over 114,000. Spanning parts of southwest County Antrim and Northwest County Down, the Council stretched from Glenavy and Dundrod in the north to Dromara and Hillsborough in the South, and from Drumbo in the east to Moira and Aghalee in the west.

The 2011 progress report identified no exceedences of the Air Quality Strategy objectives for 2010 for any of the pollutants assessed. No AQMA's are currently declared in Lisburn City Council Area.

Within this 2012 USA sources of pollution in Lisburn City Council have been re-examined and any aspects that have changed since the previous round of review and assessment have been identified. New monitoring data has been used to assess compliance with the relevant national air quality objectives. None of the pollutants monitored exceed the objective and a detailed assessment is not required.

Table of contents

List of Tables

List of Figures

Appendices

1 Introduction

1.1 Description of Local Authority Area

Lisburn City Council covers an area totalling 174 square miles of southwest Antrim and northwest Down stretching from Glenavy and Dundrod in the north to Dromara and Hillsborough in the south, and from Drumbo in the east to Moira and Aghalee in the west. The population is approximately 117,800 and it is bounded by Belfast City Council, Craigavon Borough Council, Castlereagh Borough Council, Banbridge District Council, Antrim Borough Council and Down District Council.

The major road network within the Lisburn area consists of the M1 dissecting the Borough on its route from Belfast and bordering on Dunmurry, Lisburn and Moira.

The A1 takes a route out of Belfast through the centre of Dunmurry and Lisburn town. At Sprucefield it forms a junction with the M1 and then takes a route, bordering on Hillsborough, towards Dublin.
Road transport and domestic fuel are the main air pollution concerns.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in the Environment (Northern Ireland) Order 2002, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Northern Ireland** are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003, no. 342, and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Northern Ireland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Lisburn City Council has completed the following reviews and assessments of air quality in earlier rounds of the assessment process:

Stage 1 Report (LBC, 2000)	The first stage review and assessment found that the air quality objectives for 4 of the 7 specified parameters namely carbon monoxide, nitrogen dioxide, PM_{10} and sulphur dioxide were all unlikely to be achieved by 2003-2005.
Stage 2/3 Air Quality Review (LCC, 2003, 2004)	The stage 2/3 review for road emissions and domestic fuel combustion concluded that an Air Quality Management Area (AMQA) should not be declared for NO_2, PM_{10} and SO_2, as there were not predicted to be exceedences of the air quality objectives.
Progress report (LCC,2005)	This reported data for 2004.The progress report concluded that PM_{10}, NO_2 and SO_2 were not predicted to cause exceedences of the air quality objectives at relevant receptors.
Updating and Screening Assessment (USE, 2006)	This reported data for 2005. This indicated that current objectives in relation to SO_2, NO_2 and PM_{10} would be achieved at the location of the automatic monitoring stations.
Progress report (EG, 2007)	This reported the 2006 measurements
Progress report (EG, 2008)	This reported the 2007 measurements It continues to be the case that no current air quality objectives are being exceeded in the Lisburn City Council area. PAH levels are being monitored in Dunmurry as earlier studies have indicated elevated levels of this pollutant.
Updating and Screening Assessment (USA, 2009)	This reported 2008 measurements.
Progress Report (LCC,2010)	This reported 2009 measurements and all current objectives were achieved.
Progress Report (LCC,2011)	This reported 2010 measurements and all current objectives were achieved.

Figure 1.1 Map of AQMA Boundaries (if applicable)

Lisburn City council does not have an AQMA

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

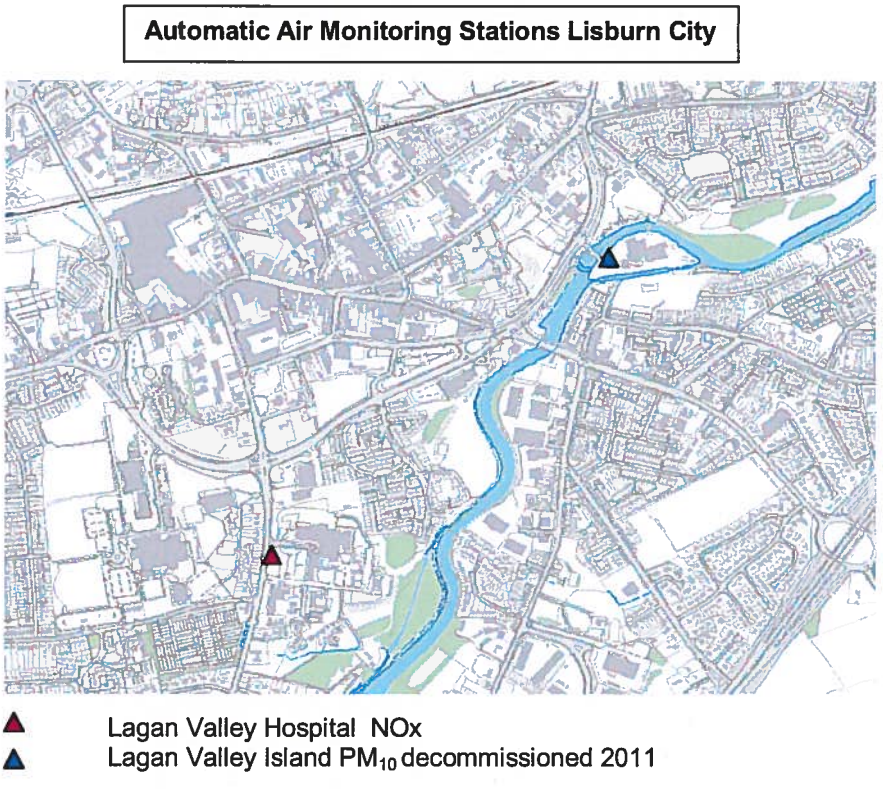
2.1.1 Automatic Monitoring Sites

Lisburn City Council had three automatic sites in 2010 measuring NOx, SO_2, PM_{10} and $PM_{2.5}$ using chemiluminescence analysers for the NOx , UV analyser for the SO_2, and the TEOM measured as an FDMS instrument for PM and reported in gravimetric units ug/m^3.
In consultation with the DOE a decision was made to reduce this to two in 2011 and the Lagan Valley Island PM_{10} site was decommissioned. Levels remained continually below the objective and the site at Dunmurry monitoring PM_{10} using FDMS was better positioned to ascertain any emerging issues.

Lagan Valley Hospital	NOx
Dunmurry High School	SO_2,PM_{10} and $PM_{2.5}$
Lagan Valley Island	PM_{10} (decommissioned end of 2010)

Details of the QA/QC for the above sites can be found in appendix A

Figure 2.1 Maps of Automatic Monitoring Sites



Air Monitoring Site Dunmurry

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Dunmurry High School	Urban Background	X328595	Y367325	PM_{10}, $PM_{2.5}$ SO_2	N	TEOM FDMS UV Analyser	YES 40M	50M	NO
Lagan Valley Hospital	Roadside	X326537	Y363700	NO_2	N	Chemiluminescence analyser	YES 40M	5M	YES
Island Civic Centre (decommissioned end 2010)	Urban Background	X327202	Y364336	PM10	N	TEOM	YES 300M	40M	NO

2.1.2 Non-Automatic Monitoring Sites

Lisburn City Council has maintained a number of NO_2 diffusion tubes at roadside and background sites for a number of years. The diffusion tube studies for Lisburn for the past five years do not show any particular trends. (See Fig. 2.4) Only the Northern Bank site showed an exceedence of the objective. However, this was a historical kerb side site without relevant exposure and was removed at the beginning of 2010 and re-located to Sloan Street adjacent to relevant exposure. Annual variation is more likely to be as a result of climatic conditions rather than changes in emissions. All other monitoring has shown results below the current objectives.

The NO_2 diffusion tubes are supplied and analysed by ESG (Environmental Scientifics Group).
Further information on the QA/QC can be found in appendix A.

Figure 2.2 Map (s) of Non-Automatic Monitoring Sites (if applicable)

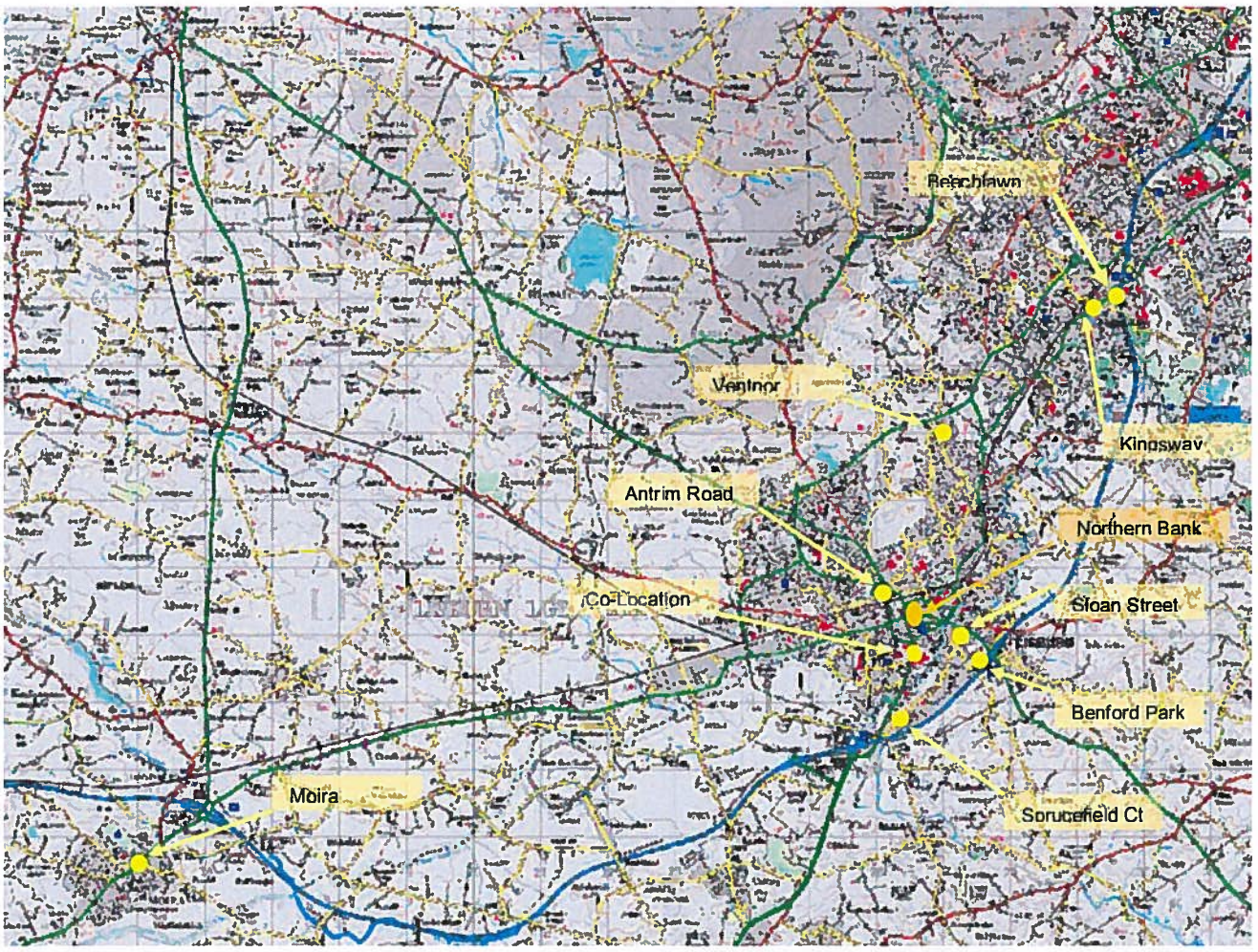


Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Northern Bank (monitoring ceased at beginning of 2010)	Roadside	326507	364415	NO_2	No	N	No	0.5m	N
Antrim Rd	Roadside	326313	364621	NO_2	No	N	Yes 7m	1m	Y
Ventnor Pk	Background	326900	362013	NO_2	No	N	No	0.5m	N
Moira	Roadside	315100	360621	NO_2	No	N	No	0.5m	Y
Kingsway	Roadside	329502	386915	NO_2	No	N	Yes 30m	1m	Y
Lagan Valley Hospital	Co location	329610	369105	NO_2	No	Y	Yes 40m	5m	Y
Beechlawn	Roadside	326165	362491	NO_2	No	N	Yes 10m	1m	Y
Sprucefield Court	Roadside	327586	363586	NO_2	No	N	Yes 1m	15m	Y
Benford Park	Roadside	326507	364415	NO_2	No	N	Yes 1m	15m	Y
Sloan Street	Roadside	327236	364102	NO_2	No	N	Yes 4m	1.5m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

No exceedences of the AQS objectives have been identified from the monitoring data collected since the last Update and Screening Assessment. All monitored pollutant concentrations have been well below their respective air quality objective limits.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

In the following section results are presented for NO_2 at the automatic site situated at Lagan Valley Hospital. The annual average from this site in 2011 was 28 ug/m^3 The results since 2007 are shown in table 2.3.
Details of the QA/QC of all the automatic sites and the ratified data can be found in appendix A.

Table 2.3 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Annual Mean Concentration µg/m^3				
					2007	2008	2009	2010	2011
Lagan Valley Hospital	Roadside	N	99.7%	99.7%	25	26	25	33	28

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites
Results have been consistent since installation of automatic station, there was a slight elevation in 2010 but this was more likely due to the severe climate conditions.

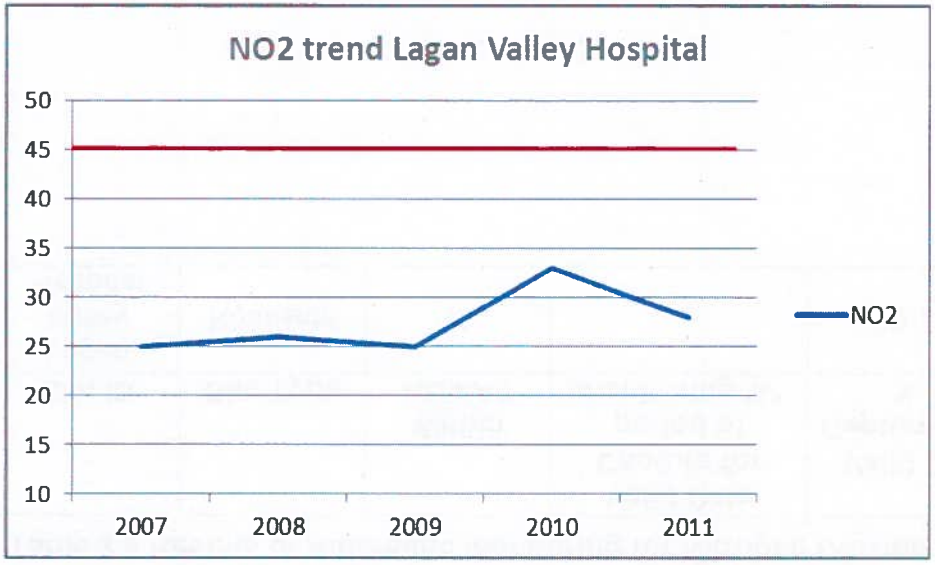


Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Number of Exceedences of Hourly Mean (200 µg/m^3)				
					2007	2008	2009	2010	2011
Lagan Valley Hospital	Roadside	N		99.7%	1	0	0	0	6

Diffusion Tube Monitoring Data

Lisburn City Council has maintained a number of NO_2 diffusion tubes at roadside and background sites for a number of years. and sited in accordance with the technical guidance.LAQM.TG(09) The diffusion tube studies for Lisburn for the past five years do not show any particular trends. Only the Northern Bank site shows previous exceedences of the objective and in 2010 the site in Moira averaged at 40 ug/m3. However, these are historical kerb side sites without relevant exposure. The Northern bank site was removed at the beginning of 2010 and re-located to Sloan Street.The background site at Edgewater was also removed at the end of 2010 as there was a similar site at Ventnor. Annual variation is more likely to be as a result of climatic conditions rather than changes in emissions.
A co-location study has been carried out at the Lagan Valley Hospital site, and its results included in the LAQM data base. The 2011 local bias was 0.67. There are 4 co-location studies carried out within the local Eastern Group area and the average of these is 0.71, a decision was made to use this factor.
Details of the QA/QC for the diffusion tubes and the reason for the use of the bias adjustment factor **0.71** can be found in appendix A

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations measured

NO_2 diffusion tube results have remained consistent any annual variation is more likely to be as a result of climatic conditions rather than changes in emissions.

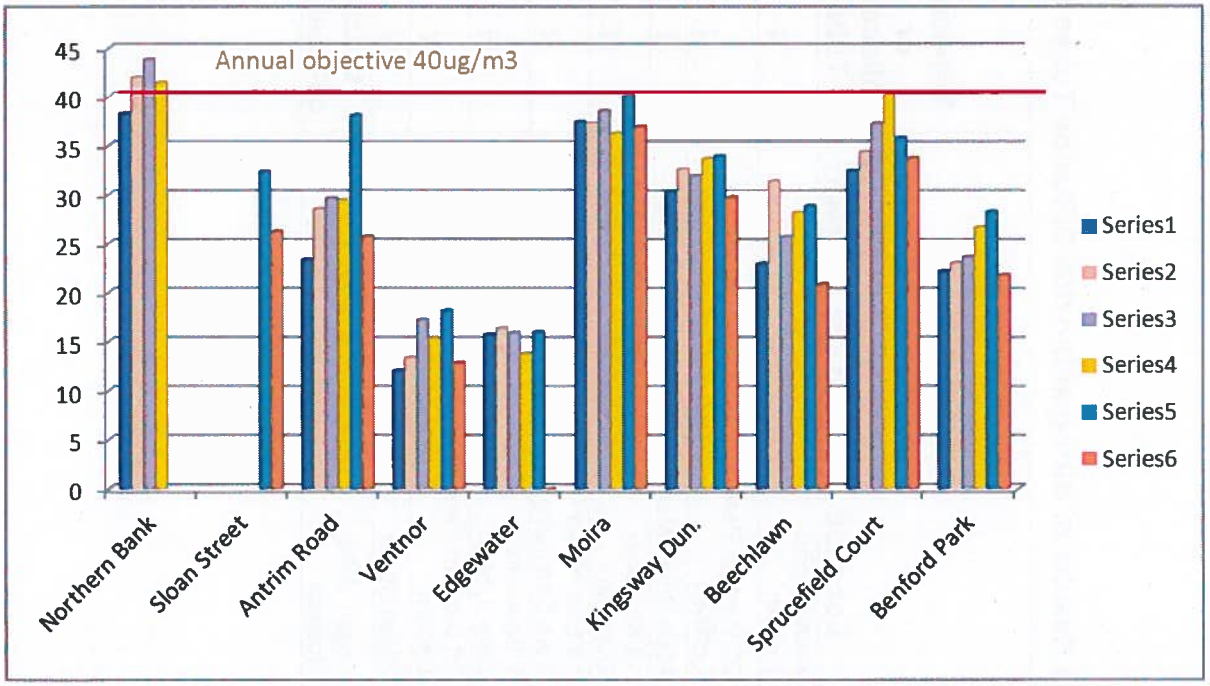


Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.71)
								2011 (μg/m^3)
	Antrim Road Lisburn	Roadside	N	N	100%		N	26
	22 Ventnor Park Lambeg	Background	N	N	100%		N	13
	Main Street Moira	Roadside	N	N	100%		N	37
	18 Kingsway Dunmurry	Roadside	N	N	100%		N	30
	10 Beechlawn Park Dunmurry	Roadside	N	N	100%		N	21
	9 Sprucefield Court Lisburn	Roadside	N	N	100%		N	34
	18 Benford Park Lisburn	Roadside	N	N	100%		N	22
	Sloan Street	Roadside	N	N	100%		N	26
	Lagan Valley Hospital	Roadside	N	Triplicate co-location	100%		N	30

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3				
			2007* (Bias Adjustment Factor = 0.85)	2008* (Bias Adjustment Factor = 0.81)	2009* (Bias Adjustment Factor = 0.84)	2010* (Bias Adjustment Factor = 0.84)	2011 (Bias Adjustment Factor = 0.71)
Northern Bank (decommissioned end 2009)			42	44	42		
Antrim Road Lisburn			29	30	29	38	26
22 Ventnor Park Lambeg			12	13	17	15	18
Main Street Moira			37	39	36	40	37
18 Kingsway Dunmurry			33	32	34	34	30
10 Beechlawn Park Dunmurry			31	26	28	29	21
9 Sprucefield Court Lisburn			34	37	40	36	34
18 Benford Park Lisburn			23	24	27	28	22
Sloan Street						32	26

2.2.2 PM_{10}

Automatic monitoring using an FDMS TEOM of PM_{10} in 2011 was undertaken at Dunmurry High School in the Lisburn City Council area and ratified by AEA. Summaries of this data,with regard to annual and hourly mean objectives, are presented below.
An FDMS TEOM monitoring $PM_{2.5}$ was installed alongside the PM_{10} analyser in 2008 results from this have also been included in the table below. There were no exceedences of the objective in 2011 for PM_{10} and a detailed assessment is not required.
QA/QC and the reported results from this site can be found in appendix A.

Table 2.7 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

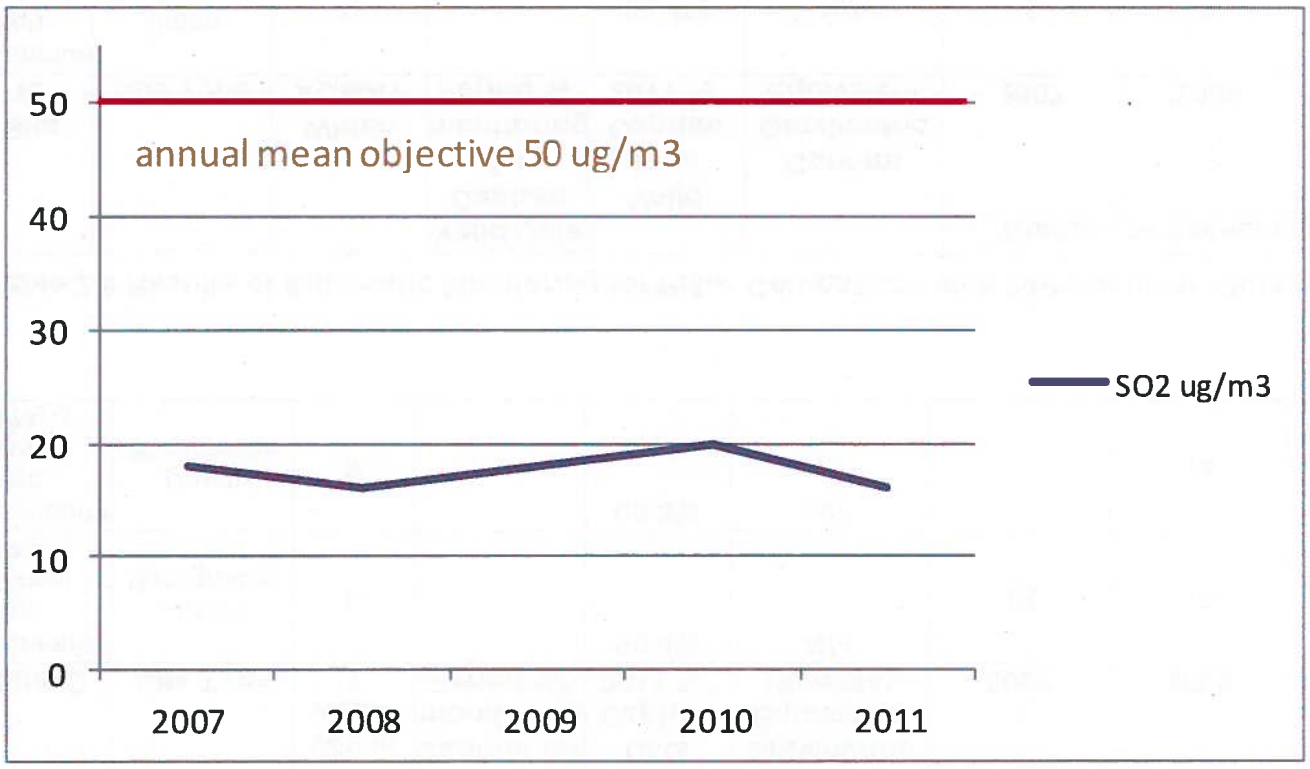
Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2007	2008	2009	2010	2011
Dunmurry High School (PM_{10})	Urban Background	N		96.4%	N/A	18	16	18	20	16
Dunmurry High School ($PM_{2.5}$)	Urban Background	N		68.3%	N/A		14	15	19	13

Table 2.8 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[b]	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m^3)				
						2007	2008	2009	2010	2011
Dunmurr High School (PM_{10}	Urban Background	N		96.4%	N/A	5	2	1	0	11

Figure 2.5 Trends in Annual Mean PM_{10} Concentrations

PM_{10} results have remained consistently low in Dunmurry since 2007



2.2.3 Sulphur Dioxide

Automatic monitoring of SO_2 has taken place since January 2007 in Dunmurry and the results ratified by AEA. Results have been low in common with all SO_2 measurements throughout the Eastern group area. The monitor was moved from its Civic Island site in Lisburn in order to inform the on-going measurements in relation to PAH.
The reported ratified data and QA/QC are included in appendix A.

Table 2.9 Results of Automatic Monitoring of SO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2011 %[b]	Number of Exceedences (percentile in bracket μg/m³)		
					15-minute Objective (266 μg/m³)	1-hour Objective (350 μg/m³)	24-hour Objective (125 μg/m³)
Dunmurry High School	Urban Background	N	98.2%	98.2%	0	0	0

2.2.4 Benzene

No monitoring of Benzene was carried out in 2011.

2.2.5 Other pollutants monitored

PAHs

Monitoring of PAH has been carried out at Dunmurry High School since 1999 and during the winter of 2007 /2008 additional sites were operated at Seymour Hill and Lisburn. Samples during this time were analysed daily instead of quarterly or monthly as required for the national PAH monitoring network.
The average concentrations of Benzo(a)pyrene (BaP) on days when all three samplers gave valid samples were 1.4ng/m3, 0.92ng/m3 and 0.99ng/m3. The UK National Air Quality Objective for PAHs is an annual average of 0.25ng BaP/m3. The EU target for PAHs is an annual average of 1ng BaP/m3. The annual average would be expected to be perhaps 50% of the values measured over a winter quarter. This suggests that none of the three sites is likely to breech the EU target however all are likely to be in exceedence of the UK national objective.

Further actions would need to be pursued to ensure reduction in emissions below the NAQO however this has not been undertaken to date to due to lack of funding.

$PM_{2.5}$
Automatic monitoring of $PM_{2.5}$ has been carried out in Dunmurry alongside the PM_{10} using TEOM FDMS , the results are included in table 2.7 and the reported ratified data included in appendix A.

Radiation Monitoring

Radiation monitoring has been carried out in Lisburn City Council for a number of years periodically throughout the year.
The measurements for 2011 are listed below:-

	2011
Date	$\mu Gy\ hr^{-1}$
14/01/11	0.06
13/10/11	0.07

2.2.6 Summary of Compliance with AQS Objectives

Lisburn City Council has examined the results from monitoring in the City Council area. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Lisburn City Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Lisburn City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Lisburn City Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Lisburn City Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Lisburn City Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Lisburn City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Lisburn City Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Lisburn City Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Lisburn City Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Lisburn City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Lisburn City Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Lisburn City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Lisburn City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Lisburn City Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

Lisburn City Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

Lisburn City Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Lisburn City Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Lisburn City Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

Lisburn City Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

Lisburn City council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The 2011 monitored data for NO_2, PM_{10} and SO_2 has been assessed and has indicated no exceedences of the national air quality objectives. It is therefore not necessary to proceed to a detailed assessment, however monitoring will continue at key locations to allow for comparison in future rounds of review and assessment.

8.2 Conclusions from Assessment of Sources

Lisburn City Council has found no new or significantly changed sources to have likely impacts on air quality.

8.3 Proposed Actions

This 2012 updating and screening Assessment for Lisburn City Council has identified there is no need to proceed to a detailed assessment for any of the pollutants and no new sites have been identified.
Monitoring sites are sited in accordance with the guidance and at relevant exposure, except the Moira NO_2 diffusion tube site. This is an old kerbside site with no relevant exposure, Lisburn City Council will assess in 2012 the need to continue monitoring at this location and the possibility of re-locating the diffusion tube.
Lisburn City Council intends to continue monitoring NO_2, PM_{10} and SO_2 in 2012 and submit a progress report in 2013.

9 References

TG (2003) **Part IV of the Environment Act 1995. Local Air Quality Management: Technical Guidance LAQM.TG(03)**. Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, January 2003.

TG (2009) **Part IV of the Environment Act 1995. Local Air Quality Management: Technical Guidance LAQM.TG(09)**. Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, February 2009

LCC 2000	Air Quality reported submitted to the Department of the Environment Northern Ireland by Lisburn City Council.
LCC 2003/2004	Second/Third stage review and assessment of local air quality submitted to the Department of the Environment by Lisburn City Council
LCC 2005	Progress report submitted by Lisburn City Council to the Department of the Environment on local air quality
USA 2006	Air Quality Updating and Screening Assessment submitted to the Department of the Environment by Lisburn City Council and prepared by AEA Technology May 2006
EG 2007	Eastern Group Air Quality Progress Report. Annual report on air quality in the Eastern Group of local authorities including Lisburn City Council
EG 2008	Eastern Group Air Quality Progress report. Annual report on air quality in the Eastern Group of local authorities including Lisburn City Council.
USA 2009	Air Quality Updating and Screening Assessment submitted to the Department of the environment by Lisburn City Council and prepared by AEA Technology May 2009
LCC 2010	Progress report submitted by Lisburn City Council to the Department of the Environment on local air quality
LCC 2011	Progress report submitted by Lisburn City Council to the Department of the Environment on local air quality

Appendices A: QA/QC of Data

Appendix A: QA/QC Data of automatic sites

In 2011 Lisburn City Council commissioned AEA Technology to provide the QA/QC of the automatic measurements of NO_2, SO_2 ,PM_{10} and $PM_{2.5}$ at the Lagan Valley Hospital and Dunmurry automatic sites. AEA Technology is the current QA/QC contractor for the national automatic urban and rural network (AURN) operated by the Department for Environment, Food and Rural Affairs and the Devolved Administrations. Local authority staff act as the local site operator and visit the sites on a weekly basis carrying out any manual calibration or filter changes required. Audits of the site are carried by AEA Technology on a six monthly basis. Environmental Monitoring Services were employed to service and maintain the analysers.
Below are the results from the ratified data.

Produced by AEA on behalf of The Eastern Group

LISBURN DUNMURRY HIGH SCHOOL
01 January to 31 December 2011

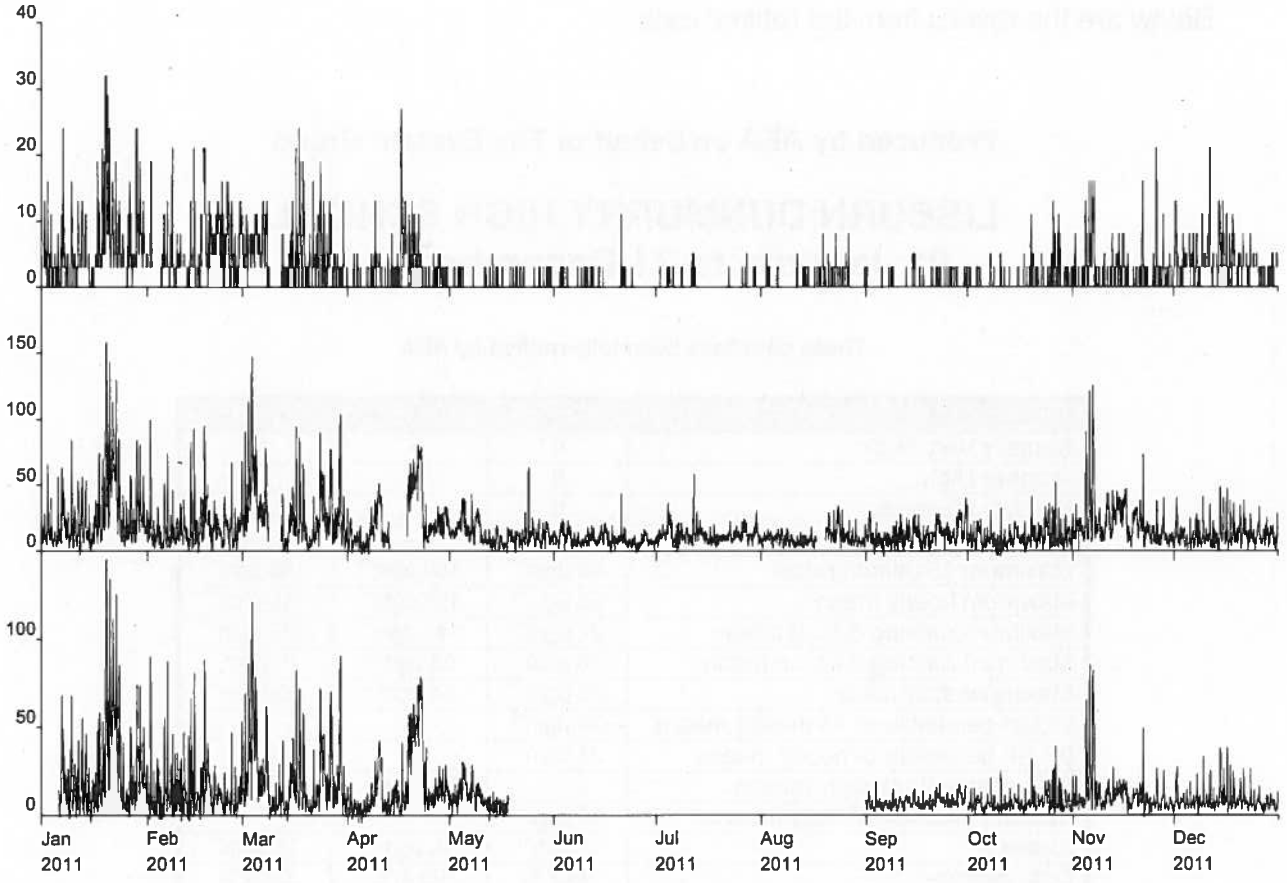
These data have been fully ratified by AEA

POLLUTANT	SO_2	PM_{10}*+	PM_{25}~
Number Very High	0	-	13
Number High	0	-	140
Number Moderate	0	-	207
Number Low	33966	-	5645
Maximum 15-minute mean	43 μgm^{-3}	158 μgm^{-3}	146 μgm^{-3}
Maximum hourly mean	32 μgm^{-3}	158 μgm^{-3}	145 μgm^{-3}
Maximum running 8-hour mean	27 μgm^{-3}	149 μgm^{-3}	139 μgm^{-3}
Maximum running 24-hour mean	18 μgm^{-3}	83 μgm^{-3}	76 μgm^{-3}
Maximum daily mean	16 μgm^{-3}	74 μgm^{-3}	69 μgm^{-3}
99.9th percentile of 15-minute means	24 μgm^{-3}	-	-
99.7th percentile of hourly means	21 μgm^{-3}	-	-
90th percentile of daily means	-	29 μgm^{-3}	-
99.2nd percentile of daily means	10 μgm^{-3}	-	-
Average	2 μgm^{-3}	16 μgm^{-3}	13 μgm^{-3}
Data capture	98.2 %	96.4 %	68.3 %

*+PM_{10} as measures as an FDMS instrument and reported in gravimetric units μgm^{-3}
~ PM_{25} instruments: FDMS from 1 January 2011 to 31 August 2011
TEOM from 1 September 2011
Particulate matter concentrations are reported at ambient temperature and pressure.
All gaseous pollutant mass units are at 20'C and 1013mb.

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Sulphur Dioxide	15-minute mean > 266 μgm^{-3}	0	0
Sulphur Dioxide	Hourly mean > 350 μgm^{-3}	0	0
Sulphur Dioxide	Daily mean > 125 μgm^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 μgm^{-3}	11	11
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 μgm^{-3}	0	-

Lisburn Dunmurry High School
Hourly Mean Data for 01 January to 31 December 2011



Produced by AEA on behalf of The Eastern Group

LISBURN LAGAN VALLEY HOSPITAL
01 January to 31 December 2011

These data have been fully ratified by AEA

POLLUTANT	NO	NO_2	NO_X
Number Very High	-	0	-
Number High	-	0	-
Number Moderate	-	0	-
Number Low	-	8730	-
Maximum 15-minute mean	1009 μgm^{-3}	325 μgm^{-3}	1734 μgm^{-3}
Maximum hourly mean	670 μgm^{-3}	250 μgm^{-3}	1159 μgm^{-3}
Maximum running 8-hour mean	365 μgm^{-3}	181 μgm^{-3}	738 μgm^{-3}
Maximum running 24-hour mean	221 μgm^{-3}	116 μgm^{-3}	454 μgm^{-3}
Maximum daily mean	208 μgm^{-3}	113 μgm^{-3}	431 μgm^{-3}
99.8th percentile of hourly means	-	166 μgm^{-3}	-
Average	20 μgm^{-3}	28 μgm^{-3}	59 μgm^{-3}
Data capture	99.7 %	99.7 %	99.7 %

All gaseous pollutant mass units are at 20'C and 1013mb.
NO_X mass units are NO_X as NO_2 µg m-3

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 μgm^{-3}	6	3

Appendix A: QA:QC Data of NO_2 diffusion tubes

The NO_2 tubes are supplied by ESG (Environmental Scientific Group) in Didcot Oxfordshire. Their preparation method is listed below.

Nitrogen Dioxide Diffusion Tube Analysis Report

The samples have been analysed in accordance with ESG's standard operating procedure HS/WI/1015 issue 15. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance.'

The tubes were prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. In the WASP intercomparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes, Scientifics is currently ranked as a Category Good laboratory.This result can be found on the LAQM Support Web site
http://laqm.defra.gov.uk/diffusion-tubes/precision.html

The National Bias adjustment factor for ESG is **0.84** found on the LAQM Support Website

http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Spreadsheet Version Number: 03/12

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/12

Follow the steps below in the correct order to show the results of relevant co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Where appropriate, you should state the adjustment factor used and the version of the spreadsheet

This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use

This spreadsheet will be updated at the end of September 2012

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.

If you have your own co-location study then see footnote. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By	Method (To undo your selection, choose (All) from the pop-up list)	Year (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dover District Council	12	42	37	14.0%	G	0.88
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Medway Council	12	22	26	-15.6%	G	1.19
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	10	52	48	8.9%	G	0.92
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	9	38	35	7.5%	G	0.93
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	12	41	31	32.8%	G	0.75
Environmental Scientific Groups	50% TEA in acetone	2011	UB	North East Lincolnshire Council	12	22	21	7.5%	P	0.93
Environmental Scientific Groups	50% TEA in acetone	2011	B	Medway Council	9	32	20	55.3%	G	0.64
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wrexham County Borough Council	12	22	19	11.8%	G	0.89
Environmental Scientific Groups	50% TEA in acetone	2011	R	Medway Council	9	36	30	19.0%	G	0.84
Environmental Scientific Groups	50% TEA in acetone	2011	K	Marylebone Road Intercomparison	11	121	99	21.5%	G	0.82
Environmental Scientific Groups	50% TEA in acetone	2011	R	Castlereagh Borough Council	11	48	40	20.9%	G	0.83
Environmental Scientific Groups	50% TEA in acetone	2011	R	Down District Council	12	51	36	39.0%	G	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	Lisburn City Council	12	30	20	49.6%	G	0.67
Environmental Scientific Groups	50% TEA in acetone	2011	R	North Down Borough Council	11	45	27	66.7%	G	0.60
Environmental Scientific Groups	50% TEA in Acetone	2011	K	Suffolk Coastal District Council	12	51	43	18.7%	G	0.84
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dumfries and Galloway Council	12	38	32	20.0%	G	0.83
Environmental Scientific Groups	50% TEA in acetone	2011	R	Rugby Borough Council	10	34	34	-0.3%	G	1.00
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wycombe District Council	10	43	39	11.5%	G	0.90
Environmental Scientific Groups	50% TEA in acetone	2011	R	Tunbridge Wells Borough Council	12	59	43	38.5%	P	0.72
Environmental Scientific Groups	50% TEA in acetone	2011	R	LB Newham	12	40	47	-14.3%	G	1.17
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Canterbury City Council	11	17	15	17.8%	G	0.85
Environmental Scientific Groups	50% TEA in acetone	2011	R	Canterbury City Council	12	39	34	15.5%	G	0.87
Environmental Scientific Groups	50% TEA in acetone	2011		Overall Factor (22 studies)				Use		0.84

Factor from Local Co-location Studies (if available)

The local bias adjustment factor from the co-location study carried out at the Lagan Valley Hospital site in Lisburn City Council is **0.67**, however a decision was made to use an average of the 4 local studies within the Eastern group area of **0.71**

NO_2 diffusion tube results, bias applied 0.71

	2007	2008	2009	2010	2011
Northern Bank	42	44	42		
Sloan Street				32	26
Antrim Road	29	30	29	38	26
Ventnor	13	17	15	18	13
Edgewater	16	16	14	16	0
Moira	37	39	36	40	37
Kingsway Dun.	33	32	34	34	30
Beechlawn	31	26	28	29	21
Sprucefield Court	34	37	40	36	34
Benford Park	23	24	27	28	22

Diffusion Tube Bias Adjustment Factors

Lisburn City Council lies within the Eastern Group area. There are five neighbouring councils within the group. Ards Borough Council does not carry out automatic monitoring of NO_2 but the remaining four have carried out co-location studies.
The bias adjustment factor calculation of these is shown below.
The average of these four studies is **0.71.**
They were all calculated using the R&A support precision and accuracy spreadsheet.

http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html

and in accordance to current guidance summarized in the

Technical Guidance LAQM.TG(09).

These results have been included in the national bias adjustment factor database.

Lisburn City Council co-location study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2011	02/02/2011	55	52	52	53	1.7	3	4.3	52	100	Good	Good
2	02/02/2011	02/03/2011	31	33	38	34	3.6	11	9.0	23	100	Good	Good
3	02/03/2011	30/03/2011	37	27	37	34	5.8	17	14.3	24	100	Good	Good
4	30/03/2011	05/05/2011	23	25	22	23	1.5	7	3.8	10	100	Good	Good
5	05/05/2011	01/06/2011	25	23	25	24	1.2	5	2.9	13	99	Good	Good
6	01/06/2011	29/06/2011	24	27	27	26	1.7	7	4.3	15	100	Good	Good
7	29/06/2011	03/08/2011	22	19	21	21	1.5	7	3.8	13	99	Good	Good
8	03/08/2011	31/08/2011	26	25	24	25	1.0	4	2.5	16	97	Good	Good
9	31/08/2011	28/09/2011	26	22	26	25	2.3	9	5.7	14	100	Good	Good
10	28/09/2011	26/10/2011	33	32	29	31	2.1	7	5.2	19	100	Good	Good
11	26/10/2011	30/11/2011	29	35	30	31	3.2	10	8.0	24	100	Good	Good
12	30/11/2011	28/12/2011	34	33	37	35	2.1	6	5.2	19	100	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

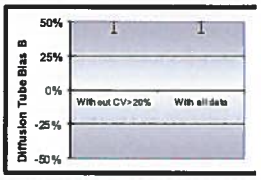
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.67 (0.59 - 0.78)
Bias B	50% (29% - 70%)
Diffusion Tubes Mean:	30 µgm^{-3}
Mean CV (Precision)	8
Automatic Mean:	20 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	20 (18 - 24) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.67 (0.59 - 0.78)
Bias B	50% (29% - 70%)
Diffusion Tubes Mean:	30 µgm^{-3}
Mean CV (Precision)	8
Automatic Mean:	20 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	20 (18 - 24) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

North Down Borough Council co-location study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2011	01/02/2011	81	58	73	71	11.7	17	29.0	52	78	Good	Good
2	01/02/2011	01/03/2011	56	55	51	54	2.6	5	6.6	31	91	Good	Good
3	01/03/2011	29/03/2011	60	58	55	58	2.5	4	6.3	32	97	Good	Good
4	29/03/2011	05/05/2011	32	35	41	36	4.6	13	11.4	19	65	Good	or Data Captu
5	05/05/2011	31/05/2011	29	28	30	29	1.0	3	2.5	13	98	Good	Good
6	31/05/2011	01/07/2011		36	32	34	2.8	8	25.4	20	98	Good	Good
7	01/07/2011	02/08/2011	27	30	28	28	1.5	5	3.8	17	100	Good	Good
8	02/08/2011	30/08/2011	38	36	36	37	1.2	3	2.9	23	89	Good	Good
9	30/08/2011	27/09/2011	38	38	38	38	0.0	0	0.0	22	100	Good	Good
10	27/09/2011	25/10/2011	38	37	53	43	9.0	21	22.3	26	100	Poor Precision	Good
11	25/10/2011	01/12/2011	53	51	56	54	3.6	7	9.0	37	75	Good	Good
12	01/12/2011	28/12/2011	43	51	56	50	6.6	13	16.3	24	100	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

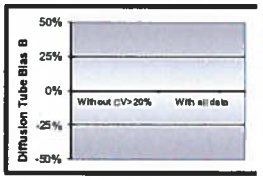
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 10 periods of data	
Bias factor A	0.6 (0.54 - 0.67)
Bias B	67% (48% - 86%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision)	7
Automatic Mean:	27 µgm^{-3}
Data Capture for periods used:	93%
Adjusted Tubes Mean:	27 (24 - 30) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.6 (0.55 - 0.67)
Bias B	67% (50% - 83%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision)	8
Automatic Mean:	27 µgm^{-3}
Data Capture for periods used:	93%
Adjusted Tubes Mean:	27 (25 - 30) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Down District Council co-location study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	06/01/2011	03/02/2011	69	67	68	68	1.0	1	2.5	43	97	Good	Good
2	03/02/2011	28/02/2011	56	61	61	59	2.9	5	7.2	38	100	Good	Good
3	28/02/2011	28/03/2011	65	63	59	62	3.1	5	7.8	44	100	Good	Good
4	28/03/2011	06/05/2011	57	44	55	52	7.0	13	17.4	36	100	Good	Good
5	06/05/2011	01/06/2011	35	34	54	41	11.3	27	28.0	23	100	Poor Precision	Good
6	01/06/2011	30/06/2011	49	49	44	47	2.9	6	7.2	37	100	Good	Good
7	30/06/2011	04/08/2011	44	45		45	0.7	2	6.4	35	96	Good	Good
8	04/08/2011	31/08/2011	45	43	43	44	1.2	3	2.9	34	93	Good	Good
9	31/08/2011	29/09/2011	45	44	45	45	0.6	1	1.4	33	93	Good	Good
10	29/09/2011	27/10/2011	47	47	48	47	0.6	1	1.4	37	98	Good	Good
11	27/10/2011	02/12/2011	54	52	56	54	2.0	4	5.0	40	99	Good	Good
12	02/12/2011	30/12/2011	44	39	43	42	2.6	6	6.6	36	99	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

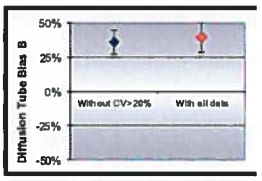
Site Name/ ID:

Precision: 11 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.73 (0.69 - 0.78)
Bias B	37% (28% - 45%)
Diffusion Tubes Mean:	51 µgm^{-3}
Mean CV (Precision)	4
Automatic Mean:	38 µgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	38 (35 - 40) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.72 (0.67 - 0.78)
Bias B	39% (28% - 50%)
Diffusion Tubes Mean:	51 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	36 µgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	36 (34 - 39) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Castlereagh Borough Council co-location study

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2011	02/02/2011	77	72	81	77	4.5	6	11.2	61	99	Good	Good
2	02/02/2011	03/03/2011	60	65	66	64	3.2	5	8.0	49	100	Good	Good
3	02/03/2011	31/03/2011	63	67	60	63	3.5	6	8.7	55	100	Good	Good
4	30/03/2011	05/05/2011	44	40	44	43	2.3	5	5.7	47	100	Good	Good
5	05/05/2011	02/06/2011	36	30	33	33	3.0	9	7.5	27	100	Good	Good
6	01/06/2011	01/07/2011	42	39	43	41	2.1	5	5.2	29	99	Good	Good
7	29/06/2011	05/08/2011	24	28	26	26	2.5	10	6.3	23	100	Good	Good
8	03/08/2011	31/08/2011	36	35	35	35	0.6	2	1.4	25	100	Good	Good
9	31/08/2011	26/09/2011	48	46	47	46	3.2	7	8.0	26	72	Good	or Data Capt
10	28/09/2011	24/10/2011	43	46	43	44	1.7	4	4.3	30	92	Good	Good
11	26/10/2011	02/12/2011	55	53	46	51	4.7	9	11.7	49	80	Good	Good
12	30/11/2011	29/12/2011	47	58	52	52	4.5	9	11.2	43	100	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

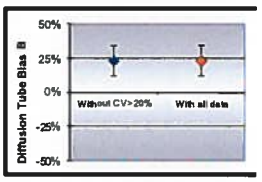
Site Name/ ID:

Precision: 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.83 (0.76 - 0.91)
Bias B	21% (9% - 32%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	40 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	40 (37 - 44) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.83 (0.76 - 0.91)
Bias B	21% (9% - 32%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	40 µgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	40 (37 - 44) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Discussion of Choice of Factor to Use

The national bias adjustment factor for Environmental Scientific Group.is **0.84**

There is a co location study carried out at the Lagan Valley Hospital site in Lisburn and the calculated bias adjustment factor is **0.67**

There are 4 co-location studies carried out within the local Eastern Group area all analysed by Environmental Scientific Group, the average of these is **0.71**.

As Lisburn City Council has confidence in the QA/QC of all the four local studies (all using ratified data),also all the sites are situated in similar location in major provincial towns and climatic conditions, a decision was made to use the average of these 4 local studies rather than the national study which was considerable higher than the local study in Lisburn City Council 0.67.

The table below shows the results from the three studies. Using the national higher figure would have shown an exceedence of the objective, at the Moira site. However there is no relevant exposure at this site.and the local average factor was a more realistic bias adjustment..

Site	Raw Data	Local Bias 0.67	Local Average 0.71	National Average 0.84
Sloan Street	37	25	26	31
Antrim Road	37	25	26	31
Ventnor	18	12	13	15
Moira	52	35	37	44
Kingsway Dun.	42	28	30	35
Beechlawn	30	20	21	25
Sprucefield	48	32	34	40
Benford	31	21	22	26