LISBURN
CITY COUNCIL

2013 Air Quality Progress Report for Lisburn City Council

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

May 2013

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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 2012 and the next is due by the end of April 2015, with two interim progress reports.

This report is the 2013 progress 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 174square 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 progress report identified no exceedences with relevant exposure, of the Air Quality Strategy objectives for 2012 for any of the pollutants assessed. No AQMA's are currently declared in Lisburn City Council Area.

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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 114,000 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 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.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

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 microgrammes 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 Local Air Quality Management in Northern Ireland.

Pollutant	Concentration	Measured as	Date to be achieved by
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 (PM10) (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

Lisbum 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
Updating and Screening Assessment (USA, 2012)	This reported 2011 measurements, none of the pollutants monitored exceed the objective and a detailed assessment is not required.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

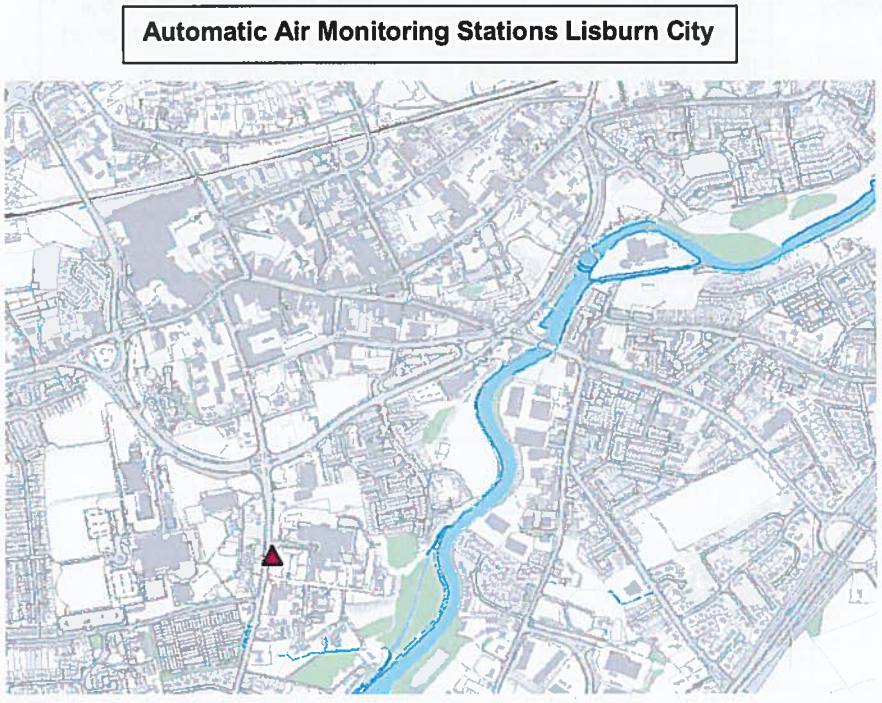
2.1.1 Automatic Monitoring Sites

Lisbum City Council monitored NOx using a chemiluminescence analyser at Lagan Valley Hospital.
The Dunmurry High School site monitoring, SO_2, PM10 and $PM_{2.5}$, had to be urgently relocated in June 2012 due to the closure of the school.

A new site was identified at Kilmakee Activity Centre, this was found to be suitable to relocate all the analysers to. Including the PAH and black carbon and therefore meeting the requirement for the AURN specifications.
This new site was not fully operational until 30th Sept 2012, and due to teething problems there was no reliable data available until Nov 2012. Therefore this data has not been included in the this 2013 progress report.

See Appendix A: Details of Quality Assurance and Quality Control

Figure 2.1 Map(s) of Automatic Monitoring Sites



Air Monitoring Site Dunmurry High School

(site decommissioned 30th June 2012)

New site Kilmakee Activity Centre Dunmurry

▲ **New site Kilmakee**
▲ Decommissioned site Dunmurry High School

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQ MA ?	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 (a)	Urban Background	X328595	Y367325	PM10, PM2.5 SO2	TEOM FDMS UV Analyser	NO	YES 40M	50M	NO
Kilmakee Activity Centre (b)	Urban Background	X327	Y364	PM10, PM2.5 SO2	TEOM FDMS UV Analyser	NO	YES 10M	NA	YES
Lagan Valley Hospital	Roadside	X326537	Y363700	NO2	chemiluminescence analyser	NO	YES 40M	5M	YES

(a)Dunmurry High School site was decommissioned on the 27th June 2012
(b) New site in Kilmakee Dunmurry no reliable data in 2012

2.1.2 Non-Automatic Monitoring

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 and the Moira site show results slightly exceeding the objective. 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 adjacent to relevant exposure, and permission has now been obtained to move the Moira site to the nearest relevant exposure at the beginning of 2013. There were also two historical background sites, one of these (Edgewater) was removed in 2011,and due to previous proposals to extend the Bentrim Road Tesco store, a new diffusion tube site at relevant exposure in Bentrim Road was identified and monitoring commenced in January 2012. 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

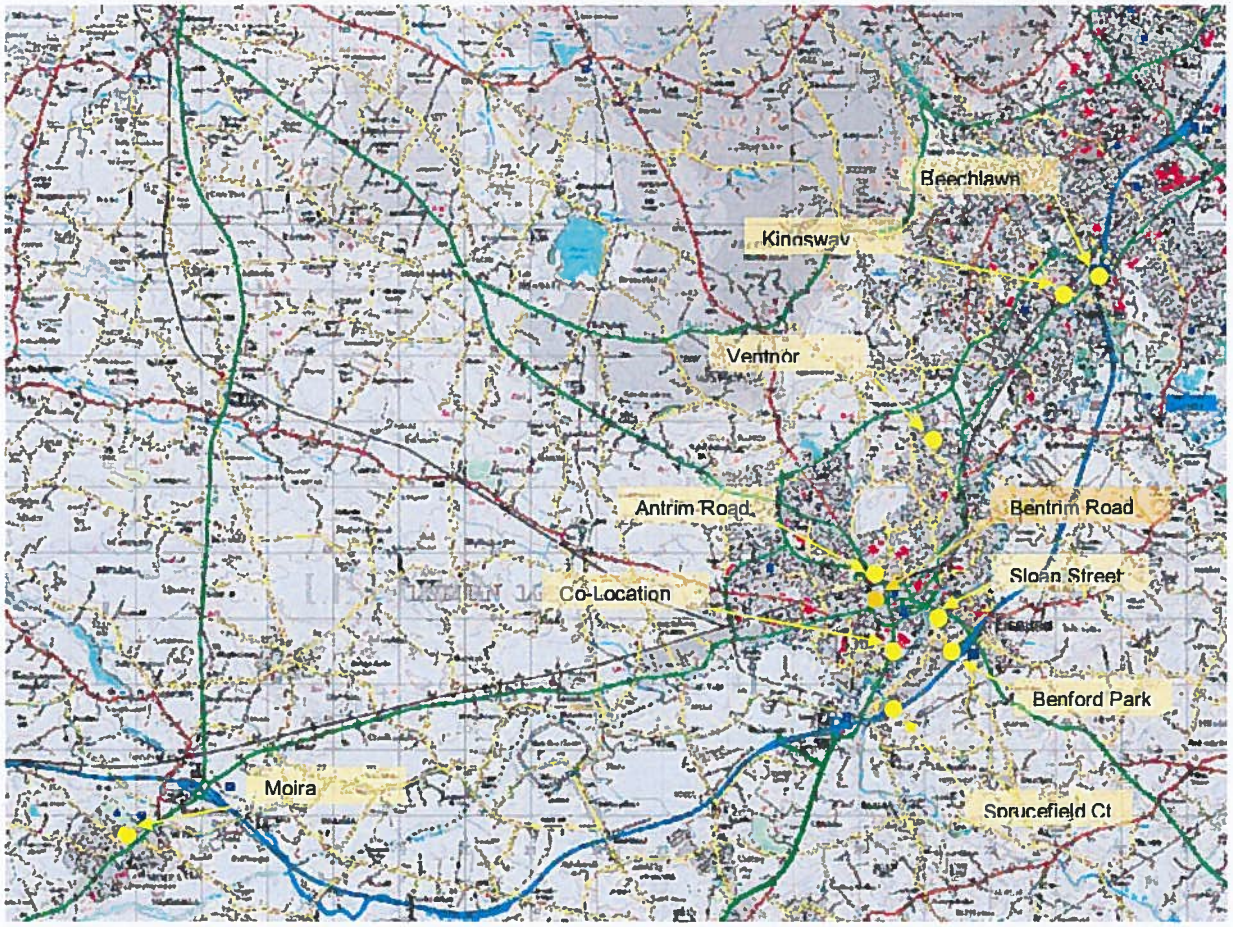


Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Northern bank (removed 31st March 2010)	Roadside	326507	364415	NO_2	No	No	0.5m	No
Antrim Rd	Roadside	326313	364621	NO_2	No	Yes 7m	1m	Yes
Ventnor Pk	Background	326900	362013	NO_2	No	No	0.5m	No
Edgewater (ended Dec 2010)	Background	327202	363718	NO_2	No	No	0.5m	No
Moira	Roadside	315100	360621	NO_2	No	No	0.5m	Yes
Kingsway	Roadside	329502	386915	NO_2	No	Yes 30m	1m	Yes
Lagan Valley Hospital	Co location	329610	369105	NO_2	No	Yes 40m	5m	Yes
Beechlawn	Roadside	326165	362491	NO_2	No	Yes 10m	1mm	Yes
Sprucefield Court	Roadside	327586	363586	NO_2	No	Yes 1m	15m	Yes
Benford Park	Roadside	326507	364415	NO_2	No	Yes 1m	15m	Yes
Sloan Street	Roadside	327236	364102	NO_2	No	Yes 4m	1.5m	Yes
Bentrim Road	Roadside			NO2	No	Yes 4m	1m	Yes

2.2 Comparison of Monitoring Results with Air Quality 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

In the following section results are presented for NO_2 at the automatic and diffusion tube sites and compared with the objective. All sites meet the objective.

Automatic Monitoring results

Table 2.3a presents the annual mean concentrations of NO_2 determined at the automatic site in 2012 from the hourly measurements.

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured 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 2.3a Results of Automatic Monitoring for 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				
					2008	2009	2010	2011	2012
Lagan Valley Hospital	Roadside	N	81.8%	81.8%	26	25	33	28	24

Table 2.3b 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)				
					2008	2009	2010	2011	2012
Lagan Valley Hospital	Roadside	N	81.8%	81.8%	0	0	0	6	0 (99.8 percentile 124ug/m3)

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. The diffusion tube studies for Lisburn for the past five years do not show any particular trends. Only the Northern Bank and Moira sites show exceedences above and close to the objective. 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 .A new site at relevant exposure has been identified in Moira and monitoring will commenced in 2013. The diffusion tube from the historical background site at Edgewater was removed at the end of 2010 . The Tesco store at Bentrim Road had previously proposed extending so a new monitoring site was identified at Bentrim Road which commenced in January 2012. .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 2012 local bias was 0.88. There are 4 co-location studies carried out within the local Eastern Group area and the average of these is 0.75, 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 **0.75** can be found in appendix A

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

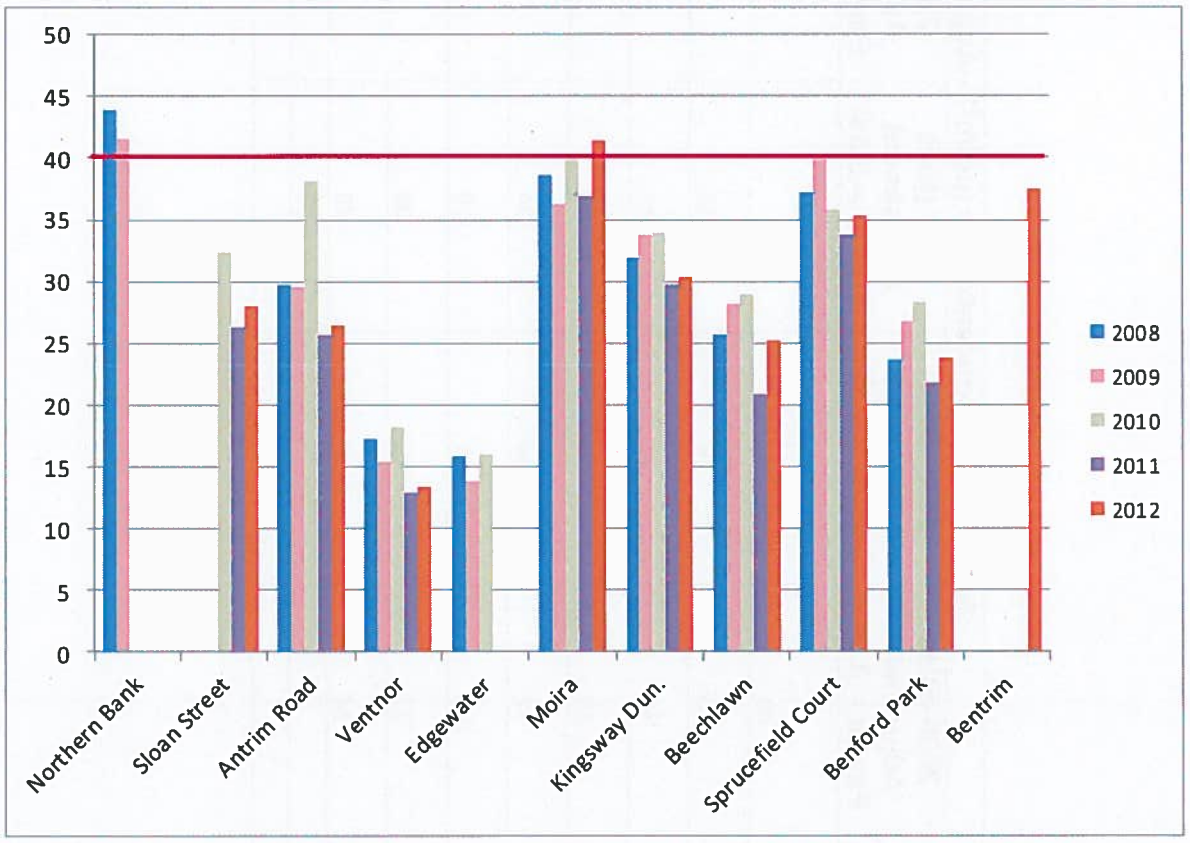
Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months [a]	2012 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.75 [b]
	Antrim Road Lisburn	Roadside	N	N	12	26
	22 Ventnor Park Lambeg	Background	N	N	12	13
	Main Street Moira	Roadside	N	N	12	**41(b)**
	18 Kingsway Dunmurry	Roadside	N	N	11	30
	10 Beechlawn Park Dunmurry	Roadside	N	N	12	25
	9 Sprucefield Court Lisburn	Roadside	N	N	12	35
	18 Benford Park Lisburn	Roadside	N	N	12	24
	Sloan Street	Roadside	N	N	12	28
	Lagan Valley Hospital	Roadside	N	Triplicate co-location	12	29
	Bentrim Road	Roadside	N	N	12	38

[b] The Moira site was slightly above the objective, the nearest relevant exposure is 150m further on the same Road . To use the NO2 fall-off with distance calculator would not be relevant as the volume of traffic and distance from the road similar. Permission has now been granted to attached the diffusion tube to the façade of the nearest relevant exposure. This was carried out in January 2013, if results from the new site are as elevated previous results from the existing site will be taken into consideration.

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2008 (Bias Adjustment Factor = 0.81)	2009 (Bias Adjustment Factor = 0.84)	2010 (Bias Adjustment Factor = 0.84)	2011 (Bias Adjustment Factor = 0.71)	2012 (Bias Adjustment Factor = 0.75)
Northern Bank (decommissioned end 2009)	Roadside	N	44	42			
Antrim Road Lisburn	Roadside	N	30	29	38	26	26
22 Ventnor Park Lambeg	Background	N	13	17	15	18	13
Main Street Moira	Roadside	N	39	36	40	37	41
18 Kingsway Dunmurry	Roadside	N	32	34	34	30	30
10 Beechlawn Park Dunmurry	Roadside	N	26	28	29	21	25
9 Sprucefield Court Lisburn	Roadside	N	37	40	36	34	35
18 Benford Park Lisburn	Roadside	N	24	27	28	22	24
Sloan Street	Roadside	N			32	26	28
Bentrim Road	Roadside	N					38

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.

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.



2.2.2 PM_{10}

Automatic monitoring using an FDMS TEOM of PM10 in 2012 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.
Unfortunately this site had to be relocated due to the closure of the school in June 2012. The data presented below is for the period from 1st January 2012 to 27th June 2012.
An FDMS TEOM monitoring PM 2.5 was installed alongside the PM10 analyser in 2008 results from this have also been included in the table below.

As only six months data is available the result has been "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38).
The Belfast Centre site and Strabane Springhill Park were deemed to be the most suitable.

Table 2.5 Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
						2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
Dunmurry High School (PM_{10})	Urban Background	N	94.4%	50%	N/A	16	18	20	16	13(c)
Dunmurry High School ($PM_{2.5}$)	Urban Background	N	94.4%	50%	N/A	14	15	19	13	12

[c] Result has been annualised as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), as valid data capture is less than 75%

Table 2.6 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 2012 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
						2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 c
Dunmurry High School (PM_{10}	Urban Background	N	94.4%	50%	NA	2	1	0	11	3(32)

[c] data capture 50%for the calendar year , included the 90.4th percentile of 24-hour means in brackets

Figure 2.5 Trends in Annual Mean PM_{10} Concentrations

PM10 has remained consistently low in Dunmurry

2.2.3 Sulphur Dioxide

The SO_2 automatic site at Lagan Valley Island was decommissioned in December 2006 and moved to Dunmurry. Automatic monitoring of SO_2 has taken place since January 2007 and ratified by AEA. Results have been low in common with all previous 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.
Due to the closure of Dunmurry High School in June 2012 only six months data is available.

Table 2.9 Results of Automatic Monitoring for SO_2: Comparison with Objectives

Site ID	Site Type	Within AQMA ?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Number of: [c]		
					15-minute Means > 266µg/m^3	1-hour Means > 350µg/m^3	24-hour Means > 125µg/m^3
Dunmurry High School	Urban Background	N	73%	40%	0	0	0

As there have been no exceedences of the objective since monitoring commenced in 2007 the percentile have not been included, results have continued be very low.

2.2.4 Benzene

No monitoring of Benzene is carried out.

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 2012 are listed below:-

	2012
Date	$\mu Gy\ hr^{-1}$
26/01/12 0.07	0.07
16/04/12 0.064	0.064
30/07/12 0.07	0.07
31/10/12 0.07	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 at relevant exposure; therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

Lisburn City Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Lisburn City Council Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Planning Applications

Anerobic Digestion Combined heat and Power Plant

It is proposed to develop an anerobic digestion CHP facility at an industrial site in Lisburn. The main potential for air quality impacts include the following:
Emissions to the atmosphere of typical combustion gases such as nitrogen dioxide, sulphur dioxide and carbon monoxide from the CHP unit combustion stack associated with the proposed development.
Emissions to the atmosphere may include particulates from the CHP unit combustion stack

Emissions from the CHP stack may result in localised increases in levels of air quality pollutants although the potential ground level concentration (GLC) of NO2, SO2 and CO at receptors has been predicted using the AERMOD atmospheric dispersion model and the predicted ground level concentrations show levels significantly below the limit values.

5 Local Transport Plans and Strategies

The Belfast Metropolitan Transport Plan 2015, of which Lisburn is part, proposed a number of transportation initiatives, which it stated will further enhance Lisburn's accessibility and support its role as a strategic location within the region, many of these should have a knock on effect on air quality i.e:

- The improvement of the rail services by up to 50% between Lisburn and Belfast, served by trains to/from Belfast and by the Belfast-Dublin Enterprise service;
- The provision of park and ride facilities at Kennedy Way on the M1 and the development of park and ride opportunities at Sprucefield;
- Development of a Quality Bus Corridor between Lisburn and Belfast City Centres;
- The introduction of Intelligent Transport Systems (ITS) solutions including Variable Message Signs (VMS) in conjunction with parking provision; and
- The widening of the M1 and junction improvements on Westlink.

Further significant improvements to the M1 between Blacks Road and Sprucefield, and the connection between the M1 and A1 are proposed. It is expected that the implementation of these measures will be outside the Plan period. However, development pressures in the Sprucefield area or at the Maze area may require these schemes to be implemented earlier, with developers responsible for their funding either in full or in a very substantial part.
In order to encourage greater use of public transport and more walking and cycling, thereby reducing car dependency, a range of measures are proposed which include:

- The development of an integrated network of Quality Walking Routes and cycle routes including the provision of improved links to bus and rail stations;
- Improvements to local bus services and inter urban bus services with improved frequencies on core routes supported by the introduction of bus priority measures at key junctions and in the city centre one way system;
- And a contra-flow bus lane that enables buses to access the bus station without having to pass round the full one-way system.

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

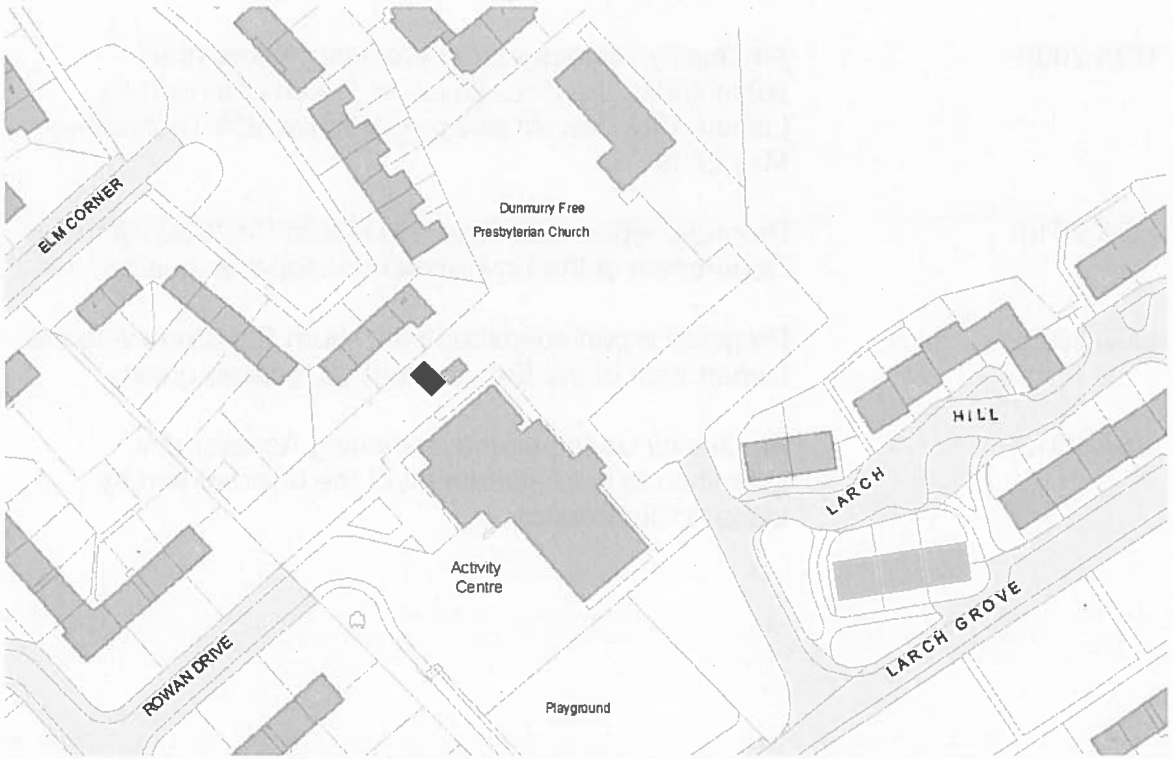
No monitoring sites at relevant exposure within the Council Area have showed exceedences of the air quality objectives.

6.2 Conclusions relating to New Local Developments

N/A

6.3 Proposed Actions

Lisburn City Council has decided to fund the Lagan Valley Hospital NO_2 site and continue monitoring for a further 12 months. The Dunmurry High School site was decommissioned in June 2012, due to the closure of the school.
A new site was identified and the SO_2, PM_{10},$PM_{2.5}$ Black carbon and PAH monitors were relocated to this new site at Kilmakee Activity Centre in July 2012. An application has been made to the DOE for continued funding.



■ Position of new site Dunmurry (Kilmakee Activity Centre)

7 References

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
USA 2012	Air Quality Updating and Screening Assessment submitted to the Department of the environment by Lisburn City Council

Appendices

Appendix A: QA/QC Data

Appendix A: QA/QC Data of automatic sites

In 2012 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.

LISBURN LAGAN VALLEY HOSPITAL
01 January to 31 December 2012

These data have been fully ratified

POLLUTANT	NO	NO_2	NO_X
Number Very High	-	0	-
Number High	-	0	-
Number Moderate	-	0	-
Number Low	-	7186	-
Maximum 15-minute mean	870 µg m^{-3}	193 µg m^{-3}	1467 µg m^{-3}
Maximum hourly mean	805 µg m^{-3}	157 µg m^{-3}	1366 µg m^{-3}
Maximum running 8-hour mean	590 µg m^{-3}	131 µg m^{-3}	1011 µg m^{-3}
Maximum running 24-hour mean	352 µg m^{-3}	95 µg m^{-3}	609 µg m^{-3}
Maximum daily mean	333 µg m^{-3}	86 µg m^{-3}	582 µg m^{-3}
99.8th percentile of hourly means	-	124 µg m^{-3}	-
Average	20 µg m^{-3}	24 µg m^{-3}	55 µg m^{-3}
Data capture	81.8 %	81.8 %	81.8 %

All gaseous pollutant mass units are at 20'C and 1013mb.
NO_X mass units are NO_X as NO_2 µgm^{-3}

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

Produced by Ricardo-AEA on behalf of the Eastern Group

LISBURN DUNMURRY HIGH SCHOOL
01 January to 27 June 2012

Site Closed 27 June 2012

POLLUTANT	PM_{10}*+	PM_{25}~	SO_2
Number Very High	0	0	0
Number High	0	0	0
Number Moderate	16	107	0
Number Low	4063	2491	12647
Maximum 15-minute mean	155 µg m^{-3}	121 µg m^{-3}	101 µg m^{-3}
Maximum hourly mean	155 µg m^{-3}	111 µg m^{-3}	27 µg m^{-3}
Maximum running 8-hour mean	114 µg m^{-3}	78 µg m^{-3}	18 µg m^{-3}
Maximum running 24-hour mean	70 µg m^{-3}	52 µg m^{-3}	12 µg m^{-3}
Maximum daily mean	62 µg m^{-3}	50 µg m^{-3}	9 µg m^{-3}
Period Average	18 µg m^{-3}	12 µg m^{-3}	3 µg m^{-3}
Data capture	94.4 %	60.0 %	73.0 %

+ PM_{10} as measured by a FDMS
~ PM_{25} as measured by a FDMS
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
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	3	3
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	-	-
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	0	0
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	0	0
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	0	0

QA/QC of Diffusion Tube Monitoring

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

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 **0.75.**
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 submitted for inclusion in the national bias adjustment factor database.

Lisburn City Council 2012

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	28/12/2011	01/02/2012	32.0	33.0	34.0	33	1.0	3	2.5	27	100	Good	Good
2	01/02/2012	29/02/2012	40.0	38.0	35.0	38	2.5	7	6.3	30	100	Good	Good
3	29/02/2012	28/03/2012	34.0	35.0	27.0	32	4.4	14	10.8	28	100	Good	Good
4	28/03/2012	25/04/2012	22.0	26.0	23.0	24	2.1	9	5.2	28	100	Good	Good
5	25/04/2012	28/05/2012	20.0	20.0	19.0	20	0.6	3	1.4	22	100	Good	Good
6	28/05/2012	27/06/2012	23.0	25.0	28.0	25	2.5	10	6.3	20	100	Good	Good
7	27/06/2012	01/08/2012	10.0	24.0	21.0	18	7.4	40	18.3	18	100	Poor Precision	Good
8	01/08/2012	29/08/2012	21.0	23.0	20.0	21	1.5	7	3.8	17	100	Good	Good
9	28/11/2012	02/01/2013	42.0	40.0	40.0	41	1.2	3	2.9	32	100	Good	Good
10													
11													
12													
13													

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

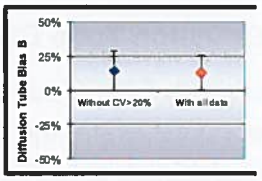
Overall survey --> Good precision | Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 8 out of 9 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%		Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 8 periods of data		Bias calculated using 9 periods of data	
Bias factor A	0.87 (0.78 - 1)	Bias factor A	0.88 (0.79 - 0.99)
Bias B	14% (0% - 29%)	Bias B	13% (1% - 26%)
Diffusion Tubes Mean:	29 µgm^{-3}	Diffusion Tubes Mean:	28 µgm^{-3}
Mean CV (Precision)	7	Mean CV (Precision)	11 caution
Automatic Mean:	26 µgm^{-3}	Automatic Mean:	25 µgm^{-3}
Data Capture for periods used	100%	Data Capture for periods used:	100%
Adjusted Tubes Mean:	25 (23 - 29) µgm^{-3}	Adjusted Tubes Mean:	25 (22 - 28) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Down District Council 2012

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	30/12/2011	02/02/2012	45.0	44.0	58.0	49	7.8	16	19.4	37	100	Good	Good
2	01/03/2012	01/03/2012	52.0	51.0	44.0	49	4.4	9	10.8	35	100	Good	Good
3	29/03/2012	29/03/2012	60.0	60.0	59.0	60	0.6	1	1.4	41	100	Good	Good
4	29/03/2012	26/04/2012	49.0	48.0	49.0	49	0.6	1	1.4	41	100	Good	Good
5	26/04/2012	29/05/2012	55.0	54.0	55.0	55	0.6	1	1.4	49	70	Good	or Data Capture
6	29/05/2012	26/06/2012	54.0	47.0	49.0	50	3.6	7	9.0	42	100	Good	Good
7	02/08/2012	02/08/2012	35.0	54.0	43.0	44	9.5	22	23.7	28	100	Poor Precision	Good
8	02/08/2012	31/08/2012	46.0	47.0	45.0	46	1.0	2	2.5	33	100	Good	Good
9	31/08/2012	27/09/2012	40.0	40.0	41.0	40	0.6	1	1.4	31	100	Good	Good
10	27/09/2012	01/11/2012	51.0	50.0	47.0	49	2.1	4	5.2	43	100	Good	Good
11	01/11/2012	30/11/2012	57.0	59.0	59.0	58	1.2	2	2.9	43	100	Good	Good
12	30/11/2012	04/01/2013	58.0	47.0	57.0	54	6.1	11	15.1	41	100	Good	Good
13													

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

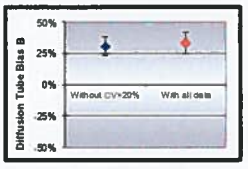
Overall survey --> Good precision | Good Overall DC

(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%		Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data		Bias calculated using 11 periods of data	
Bias factor A	0.77 (0.73 - 0.81)	Bias factor A	0.76 (0.71 - 0.81)
Bias B	30% (23% - 38%)	Bias B	32% (24% - 41%)
Diffusion Tubes Mean:	50 µgm^{-3}	Diffusion Tubes Mean:	50 µgm^{-3}
Mean CV (Precision)	6	Mean CV (Precision)	7
Automatic Mean:	39 µgm^{-3}	Automatic Mean:	38 µgm^{-3}
Data Capture for periods used	100%	Data Capture for periods used:	100%
Adjusted Tubes Mean:	39 (37 - 41) µgm^{-3}	Adjusted Tubes Mean:	38 (35 - 40) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Castlereagh Borough Council 2012

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	29/12/2011	02/02/2012	55.0	49.0	61.0	55	6.0	11	14.9	35	99	Good	Good
2	02/02/2012	01/03/2012	63.0	60.0	64.0	62	2.1	3	5.2	34	99	Good	Good
3	01/03/2012	29/03/2012	56.0	60.0	56.0	57	2.3	4	5.7	39	99	Good	Good
4	29/03/2012	23/04/2012	45.0	48.0	46.0	46	1.5	3	3.8	28	99	Good	Good
5	23/04/2012	28/05/2012	43.0	50.0	42.0	45	4.4	10	10.8	30	99	Good	Good
6	28/05/2012	02/07/2012	41.0	39.0	43.0	41	2.0	5	5.0	23	99	Good	Good
7	02/07/2012	30/07/2012	30.0	32.0	34.0	32	2.0	6	5.0	15	99	Good	Good
8	30/07/2012	31/08/2012	32.0	30.0	31.0	31	1.0	3	2.5	18	99	Good	Good
9	31/08/2012	24/09/2013	39.0	38.0	43.0	40	2.6	7	6.6	23	99	Good	Good
10	24/09/202	29/10/2012	47.0	48.0	43.0	46	2.6	6	6.6	30	99	Good	Good
11	29/10/2012	26/11/2012	59.0	59.0	59.0	59	0.0	0	0.0	36	99	Good	Good
12	26/11/2012	03/01/2013	57.0	61.0	61.0	60	2.3	4	5.7	44	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

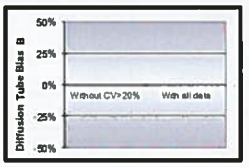
Site Name/ ID:

Precision 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 12 periods of data	
Bias factor A	0.62 (0.57 - 0.67)
Bias B	62% (49% - 75%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision)	5
Automatic Mean:	30 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	30 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.62 (0.57 - 0.67)
Bias B	62% (49% - 75%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision)	5
Automatic Mean:	30 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	30 (27 - 32) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

North Down Borough Council 2012

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	28/12/2011	31/01/2012	54.0	52.0	55.0	54	1.5	3	3.8	33	99	Good	Good
2	31/01/2012	28/02/2012	59.0	58.0	43.0	53	9.0	17	22.3	35	99	Good	Good
3	28/02/2012	27/03/2012	56.0	44.0	59.0	53	7.9	15	19.7	36	99	Good	Good
4	27/03/2012	25/04/2012	35.0	37.0	32.0	35	2.5	7	6.3	25	99	Good	Good
5	25/04/2012	28/05/2012	37.0	39.0	36.0	37	1.5	4	3.8	30	99	Good	Good
6	28/05/2012	26/06/2012	38.0	35.0	36.0	36	1.5	4	3.8	29	99	Good	Good
7	26/06/2012	31/07/2012	38.0	35.0	36.0	36	1.5	4	3.8	25	99	Good	Good
8	31/07/2012	28/08/2012	31.0	33.0	33.0	32	1.2	4	2.9	22	99	Good	Good
9	28/08/2012	25/09/2012	35.0	34.0	31.0	33	2.1	6	5.2	24	99	Good	Good
10	25/09/2012	30/10/2012	48.0	47.0	49.0	48	1.0	2	2.5	42	99	Good	Good
11	30/10/2012	27/11/2012	59.0	63.0	64.0	62	2.6	4	6.6	45	99	Good	Good
12	27/11/2012	03/01/2013	56.0	61.0	61.0	59	2.9	5	7.2	49	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

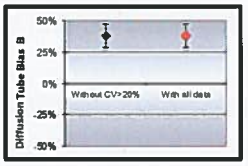
Site Name/ ID:

Precision 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 12 periods of data	
Bias factor A	0.73 (0.69 - 0.78)
Bias B	37% (27% - 46%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.73 (0.69 - 0.78)
Bias B	37% (27% - 46%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) µgm^{-3}



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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 **0.88**, however a decision was made to use an average of the 4 local studies within the Eastern group area of **0.75**

NO_2 diffusion tube results, bias applied **0.75**

	2008	2009	2010	2011	2012
Northern Bank	44	42			
Sloan Street			32	26	28
Antrim Road	30	29	38	26	26
Ventnor	17	15	18	13	13
Edgewater	16	14	16		
Moira	39	36	40	37	41
Kingsway Dun.	32	34	34	30	30
Beechlawn	26	28	29	21	25
Sprucefield Court	37	40	36	34	35
Benford Park	24	27	28	22	24
Bentrim					38

Discussion of Choice of Factor to Use

The national bias adjustment factor for Environmental Scientific Group.is **0.79**

There is a co location study carried out at the Lagan Valley Hospital site in Lisburn and the calculated bias adjustment factor is **0.88.**

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 **0.75**.

Consideration was given to use the national bias adjustment factor but as it would not have changed the overall findings a decision was made to use the average of the 4 local studies. 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.

The table below shows the results from the three studies. The Moira site has exceeded the objective, however there is no relevant exposure at this site. The Moira site has been moved 2013 to the nearest relevant exposure.

Site	Raw Data	Local Bias Lisburn 0.88	4 x Local Average 0.75	National Average 0.79
Sloan Street	37	33	28	29
Antrim Road	35	31	26	28
Ventnor	18	16	13	14
Moira	55	48	41	43
Kingsway Dun.	40	35	30	32
Beechlawn	34	30	25	27
Sprucefield	47	41	35	37
Benford	32	28	24	25
Bentrim	50	44	38	39

Short-term to Long-term Data adjustment

As only six months data was available for the PM10 data from Dunmurry High School, the data has been annualised using the method stated in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38)

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Belfast Centre	Urban Centre	12	12	1
Strabane Springhill Park	Urban background	18	18	1
Average				1

Appendix B: Previous years Automatic monitoring results

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

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	-