2009 Air Quality Updating and Screening Assessment for Larne Borough Council

In fulfillment of Part IV of the Environment Act 1995 Local Air Quality Management

Date August 2009

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Executive Summary

This Updating and Screening Report allowed Larne Borough Council to review and assess air quality within the borough 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 Updating and Screening Assessment of air quality in Larne Borough has concluded that for each of the seven key air pollutants the air quality objectives are likely to be met and that a more detailed assessment is not required.

However, monitoring of sulphur dioxide and particulate matter from domestic emissions will continue in the area of Larne town predicated to have the highest concentration of pollutants, as monitoring only commenced in January 2006.

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1 Introduction

1.1 Description of Local Authority Area

Larne Borough is situated on the east coast of Northern Ireland and is often described as 'The Gateway to Ulster' due to the operations of cross channel ferries to and from the port of Larne.

The Borough covers an area of approximately 131km^2, stretching over 36 miles along the Antrim coastline from Islandmagee and Ballycarry in the south to Glenarm and Carnlough in the north. Two of the Glens of Antrim and part of the Antrim Plateau make Larne Borough very scenic with two thirds designated as areas of outstanding natural beauty. (See Figure 1)

The population of the council area is just over 30,000 0f which Larne town alone makes up approximately $^2/_3$ of the total population. Larne is a busy seaport and market town situated 20 miles north of Belfast. It is within easy reach of Northern Ireland's two main airports being 21 miles from Belfast International Airport and 24 miles from Belfast City Airport. The area is supported both by major roads and a continuous rail link to Belfast – Dublin route.
The manufacturing, tourism and agriculture industries provide the main economic base of the Borough

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), 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.

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	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

LAQM Activity	Completion Date	Brief Outcomes
1st Stage Review And Assessment	July 2001	A second stage assessment is required for nitrogen dioxide due to significant road traffic and industrial sources. Second stage assessment is necessary for sulphur dioxide due to significant industrial, domestic and shipping sources. Second stage assessment for PM_{10} is necessary due to significant road traffic, domestic, industrial and shipping sources.
2nd and 3rd Stage Review and Assessment	2004	Air Quality Objectives for NO_2, SO_2 and PM_{10} unlikely to be exceeded. No AQMAs declared.
Progress Report	April 2005	SO_2, NO_2 and PM_{10} objectives met. No AQMA to declare.
Update and Screening Assessment	April 2006	No detailed assessment required for any of the 7 pollutants. Monitoring of SO_2, NO_2 and PM_{10} to continue.
Detailed Assessment	April 2007	Not applicable- no AQMAs
Progress Report	April 2007	SO_2, NO_2 and PM_{10} objectives met. No AQMA to declare.
Progress Report	April 2008	SO_2, NO_2 and PM_{10} objectives met. No AQMA to declare.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Please refer to Appendix A for a map indicating the location of SO_2, PM_{10} and NO_2 monitoring sites.

The SO_2 analyser is calibrated manually every fortnight by trained Larne Borough Council staff. The calibration is performed with zero air from a zero air cylinder and span checks using a certified gas cylinder.

NETCEN, a UKAS accredited laboratory, are appointed to provide QA/QC and data management services. Data is downloaded by NETCEN daily thus any faults or unusual results are detected early and brought to attention of Larne Borough Council. NETCEN carry out 6 monthly site audits and issue a UKAS certificate of calibration. Full ratification of data is provided which is comparable to that produced within the national network.

The equipment is US EPA approved and also approved in the DEFRA Automatic Urban Network. In addition, Envirotechnology Services plc, the supplier of the equipment, service and calibrate the equipment 6 monthly and provide emergency call out visits in the event of technical faults.

The +PM10 is measured using a factor of 0.833333 to give Gravimetric Equivalent concentrations and the data was fully ratified by AEA.

Table 2.1 Details of Automatic Monitoring Sites SO_2 and PM10

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 ?
Example 1	Urban background	X 332395 Y 433175	NO_2	Y	Y (1m)	3m	Y
Craigyhill/ Churchill Road	Suburban	41320175	PM_{10} SO_2	N	N	N/A	Y

2.1.2 Non-Automatic Monitoring

Monthly average concentrations of NO_2 are monitored using passive diffusion tubes located at 8 sites identified as having potentially the highest concentration of NO_2 at the first round of review and assessment.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	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 ?
Example 1	Urban background	X 332395 Y 433175	NO_2	Y	Y (1m)	3m	Y
Antiville Road/A8 Junction	Roadside	3864 0212	NO_2	N	N	N/A	Y
Riverdale/ Latharna House	Urban Background	3968 249	NO_2	N	N	N/A	
Main Street Larne	Urban Centre	4016 0260	NO_2	N	N	N/A	Y
Victoria Rd/Agnew St Junction	Kerbside	4033 0285	NO_2	N	N	Approx 3m	
Upper Cairncastle Rd	Kerbside	3920 0323	NO_2	N	N	Approx 3m	
Larne Harbour RaB	Roadside	4123 0196	NO_2	N	N	N/A	
Coastguard Rd/Castle Terrace	Other	4131 0171	NO_2	N	N	N/A	Y
Ballylumford Rd, Islandmage	Other	4206 0203	NO_2	N	N	N/A	Y

Bureau Veritas have had the contract for supplying and analysing the Nitrogen Dioxide Diffusion Tubes since April 2008 and prior to that Lambeth Scientific Services were used. However for the purposes of this Update and Screening Assessment only the data from Bureau Veritas was used.

Bureau Veristas are UKAS accredited and the WASP results met AEA Energy & Environment's performance criteria in 2006 with an RSD of 5.3% and 9 out of 10 periods have a CV smaller than 20%.

The tubes are analysed by an aqueous extraction followed by automated flow injection analysis/UV spectroscopy.

A Bias Adjustment factor of 0.93 has been applied which was taken from the latest spreadsheet of factors i.e. version 03/09, year 2008- Bureau Veritas (Gradko 50% TEA in Acetone) from the Review and Assessment Website.

The data was Annualised according to Box 3.2 of the Technical Guidance LAQM.TG(09) as there was less than 90% data capture for the year.

Please refer to Appendix C and D for further information.

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Diffusion Tube Monitoring Data

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations 2008 (µg/m^3) Adjusted for bias[1]
A1	1 Example Site	N	95	
L1	Antiville Road/A8 Junction	N	75	28.27
L2	Riverdale/Latharna House	N	75	19.20
L3	Main Street, Larne	N	66.6	36.48
L4	Victoria Rd/Old Glenarm Rd	N	75	31.62
L5	Upper Cairncastle Rd	N	75	22.39
L6	Larne Harbour RaB	N	75	23.44
L7	Coastguard Rd/Castl Terrace	N	75	13.75
L8	Ballylumford Rd, Islandmage	N	75	16.86

In the year 2008 there were no exceedences of the annual mean NO_2 objective of 40 *µg/m^3*

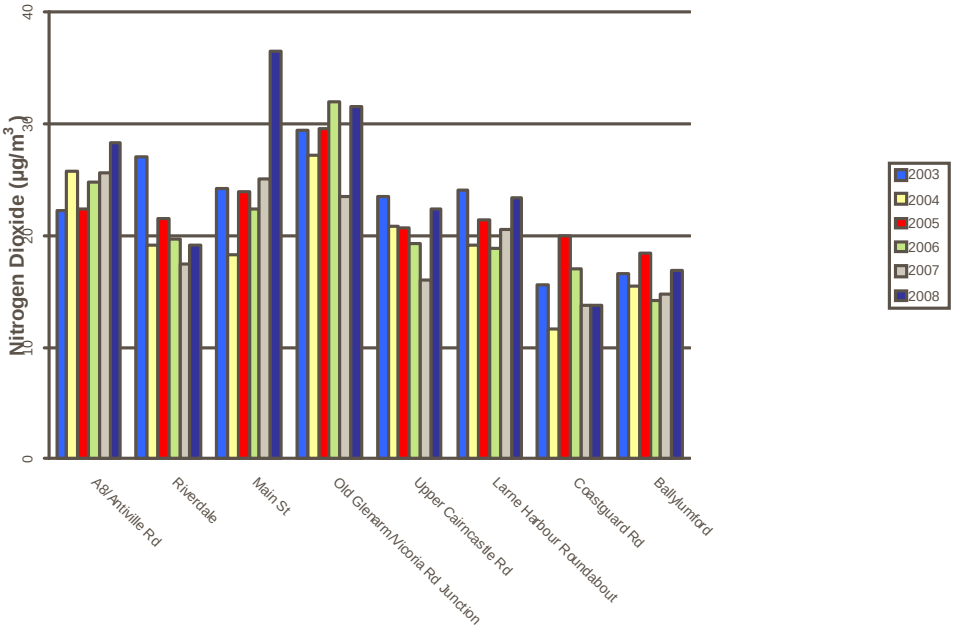
Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations (µg/m^3) Adjusted for bias		
			2006 * [2]	2007 * [3]	2008
			30.1	24.0	25.1
L1	Antiville Road/A8 Junction	N	24.81	25.65	28.27
L2	Riverdale/Latharna House	N	19.75	17.45	19.20
L3	Main Street, Larne	N	22.4	25.00	36.48
L4	Victoria Rd/Old Glenarm Rd	N	31.95	23.49	31.62
L5	Upper Cairncastle Rd	N	19.3	15.95	22.39
L6	Larne Harbour RaB	N	18.78	20.56	23.44
L7	Coastguard Rd/Castl Terrace	N	16.96	13.75	13.75
L8	Ballylumford Rd, Islandmage	N	14.13	14.69	16.86

Please refer to Appendix C for the full data set (monthly mean values) from January 2005-December 2008)

[1] A bias adjustment factor of 0.93 has been applied which was taken from the latest spreadsheet of factors i.e. version 03/09, year 2008- Bureau Veritas (Gradko 50% TEA in Acetone and Annualised using Box 3.2 from the Technical Guidance
[2] A bias adjustment factor of 1.217 was applied – Lambeth Scientific Services
[3] A bias adjustment Factor of 1.056 was applied, taken from the latest spreadsheet of factors i.e.04/08 -Lambeth Scientific Services

Figure 1 Comparison of Measured NO_2 Concentrations 2003-2008



The chart shows that there are no obvious trends over the 6 years of data. The most significant change has been in Main Street however data capture has been an issue at this site which might affect the accuracy of the data and further monitoring will take place.

2.2.2 PM_{10}

In January 2006 the BAM 1020 real time PM_{10} automatic analyser was relocated to Churchhill Road to explore the likelihood of exceedances due to domestic emissions as this area was identified as having the highest density of domestic coal burning in the borough.

The +PM10 is measured using a factor of 0.833333 to give Gravimetric Equivalent concentrations and the data was fully ratified by AEA.

Table: 2.5a Results of PM_{10} Automatic Monitoring: Daily Mean and Annual Mean Objectives at Churchill Road

Pollutant	Air Quality Regulations (Northern Ireland) 2003	2006 (Jan-Dec) Exceedances 74.4% Data Capture	2007 (Jan-Dec) Exceedances 92.5% Data Capture	2008 (Jan-Dec) Exceedances 94.9% Data Capture
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg/m^3	14	5	3
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg/m^3	0	0	0

The number of exceedances have fallen year on year. Monitoring at this site will continue to gather more data to be able to determine if there is a trend.

2.2.3 Sulphur Dioxide

Table 2. : Results of Sulphur Dioxide Monitoring

Pollutant	Air Quality Regulations (Northern Ireland) 2003	2006 (Jan-Dec) Exceedances 98.6% Data capture	2007 (Jan-Dec) Exceedances 98.7% data capture	2008 (Jan-Dec) Exceedances 96.8% Data capture
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	0	0	0
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	0	0	0
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	0	0	0

To date no exceedances have been recorded.

2.2.4 Benzene

No monitoring took place as the first round of the review and assessment concluded that there were no significant sources of benzene in the borough or the neighbouring areas and there were no proposals for developments likely to emit the pollutant.

2.2.5 Other pollutants monitored

No other pollutants were monitored.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Larne Borough 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

Larne Borough 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.

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

3.4 Junctions

Larne Borough 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

Larne Borough Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

Larne Borough Council confirms that there are no relevant bus stations in the District.

4 Other Transport Sources

4.1 Airports

Larne Borough Council confirms that there are no airports in the District.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Larne Borough 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

Larne Borough 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)

Larne Borough 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

Larne Borough Counicl 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

Larne Borough 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

Larne Borough 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 Larne Borough Council area.

5.3 Petrol Stations

Larne Borough Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Larne Borough Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Larne Borough Council confirms that there are no biomass combustion planst in the Borough.

6.2 Biomass Combustion – Combined Impacts

Larne Borough Council confirms that there are no biomass combustion plants in the Borough.

6.3 Domestic Solid-Fuel Burning

Larne Borough Council has assessed areas of significant domestic solid fuel use, and concluded that it will not be necessary to proceed to a Detailed Assessment.

7 Fugitive or Uncontrolled Sources

Larne Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the District.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The assessment has indicated that there are no exceedences identified within the borough and the Air Quality objectives are being met.

8.2 Conclusions from Assessment of Sources

After carrying out a detailed assessment of road traffic sources, other transport sources, industrial sources, commercial and domestic sources and fugitive/ uncontrolled sources it has been concluded that there are no new or significant changes to potential sources of air pollutants within the borough.

8.3 Proposed Actions

The Update and Screening Assessment has identified that no Detailed Assessment is required for any of the pollutants.

Work is however going to continue in assessing the impact of domestic emissions from sulphur dioxide and particulate matter as we currently only have 3 years complete data for the current site at Churchill Road. A Progress Report will then be submitted in 2010 when the new data will be available to determine if there is a trend and if further monitoring is required at this site.

9 References

The Environment (Northern Ireland) Order 2002

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000
Department of the Environment's Local Air Quality Management Technical Guidance LAQM. TG(03).

Air Quality Regulations (Northern Ireland) 2003
Local Air Quality Management Policy Guidance LAQM.PGNI(03) (EHS)

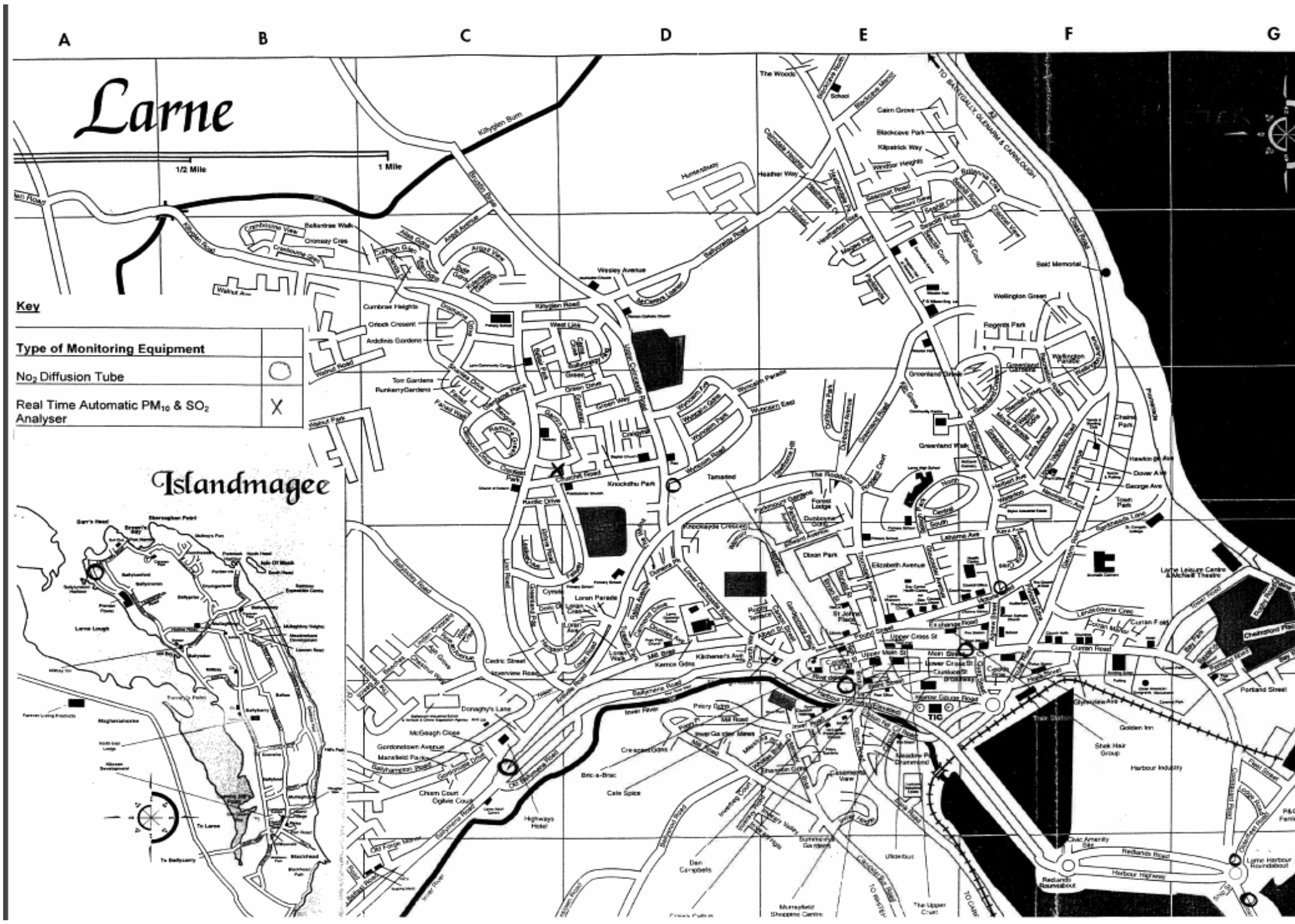
Larne Borough Council First Stage Review and Assessment of Air Quality 2001

Air Quality Review and Assessment Stage 2 AEA/ENV/R/1010

Air Quality Review and Assessment Stage 3 – Domestic Fuel Combustion. Report produced for Larne Borough Council Netcen/ED49246/Issue 1/AEAT/ENV/R/1642 January 2004

Local Air Quality Management Technical Guidance LAQM.TG (09)

Appendix A: Maps of Locations



Appendix B: WASP and Precision Data for Bureau Veritas

Workplace Analysis Scheme for Proficiency (WASP): Summary of Results for 2006

Nitrogen Dioxide Diffusion Tube Analysis

Laboratory: **Bureau Veritas**

The WASP scheme is an independent proficiency testing scheme operated by the Health and Safety Laboratory (HSL). Each month a diffusion tube doped with nitrite is distributed to each participating laboratory; participants then analyse the tube and report the results to HSL. The nominal mass of nitrite on the doped tubes is different each month, and is intended to reflect the range encountered in actual monitoring.

For the purpose of diffusion tube QA/QC in the context of Local Air Quality Management, AEA Energy & Environment carry out an assessment of laboratory performance for each full calendar year. This was based on the following criteria, which were agreed with Defra and HSL:

1. Participating laboratories must complete at least 10 of the 12 monthly WASP rounds.
2. The year's single worst result is ignored: this makes some limited allowance for one-off problems with analytical equipment etc.
3. Each laboratory's monthly standardised results are then combined to give a standard uncertainty for the full year, expressed as a relative standard deviation (%RSD)
4. The RSD must be within 15%.

Month	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Mean
WASP Round	*81*	*82*	*83*	*84*	*85*	*86*	*87*	*88*	*89*	*90*	*91*	*92*	
Nominal Value, ug nitrite	*2.15*	*1.54*	*1.32*	*0.99*	*2.34*	*1.21*	*1.29*	*0.74*	*2.60*	*1.86*	*1.47*	*0.86*	
Lab Result, ug nitrite	2.07	1.55	1.35	1.08	2.19	1.16	1.32	0.69	2.40	2.00	1.50	0.75	
Standardised Result	0.96	1.01	1.02	1.09	0.94	0.96	1.02	0.93	0.92	1.08	1.02	0.87	**0.99**

Mean Standardised result (actual result / nominal value) 0.99
Mean percentage under/over-estimation of analysis: -1.5%

Comparison with AEA performance criteria for Local Authority Support:
RSD of Standardised Results, ignoring worst value: 5.3 % **This is within the performance target of 15%.**

Comments: This laboratory's WASP results met AEA Energy & Environment's performance criteria in 2006.

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	04/01/2006	02/02/2006	100.60	100.60	100.90	101	0.2	0	0.4	94	97.1	Good	Good
2	02/02/2006	01/03/2006								93	99.2		Good
3	01/03/2006	05/04/2006	112.90	122.70	110.00	115	6.7	6	16.5	111	91.8	Good	Good
4	05/04/2006	03/05/2006	103.90	94.90	110.60	103	7.9	8	19.6	112	95.2	Good	Good
5	03/05/2006	31/05/2006	135.00	104.00	133.00	124	17.3	14	43.1	113	94.5	Good	Good
6	31/05/2006	28/06/2006	113.00	110.00	102.00	108	5.7	5	14.1	107	99.3	Good	Good
7	28/06/2006	03/08/2006	120.90	92.80	103.60	106	14.2	13	35.2	115	97.9	Good	Good
8	03/08/2006	05/09/2006	89.50	92.30	106.80	96	9.3	10	23.1	80	99	Good	Good
9	05/09/2006	04/10/2006	130.40	119.00	118.40	123	6.8	6	16.8	119	97.6	Good	Good
10	04/10/2006	01/11/2006	82.40	102.60	123.90	103	20.8	20	51.6	125	99.3	Poor Precisior	Good
11	01/11/2006	29/11/2006								143	95.1		Good
12	29/11/2006	04/01/2007	135.00	116.00	148.00	133	16.1	12	40.0	122	99.7	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

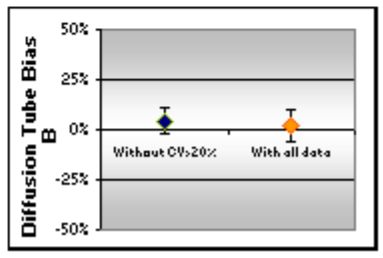
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Bureau Veritas

Precision 9 out of 10 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.96 (0.91 - 1.03)
Bias B	4% (-3% - 10%)
Diffusion Tubes Mean:	112 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	108 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	108 (102 - 115) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	0.99 (0.92 - 1.07)
Bias B	1% (-6% - 9%)
Diffusion Tubes Mean:	111 μgm^{-3}
Mean CV (Precision):	9
Automatic Mean:	110 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	110 (102 - 119) μgm^{-3}



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Version 03 - November 2006

Appendix C: NO_2 Diffusion Tube Monitoring Results

	Average Monthly NO_2 Concentration ($\mu g/m^3$)							
	Location							
Month and Year	**Antiville Rd/A8 (Grid Ref 3864 0212)**	**Riverdale (Grid Ref 3968 0249)**	**Main Street (Grid Ref 4016 0260)**	**Victoria Rd/Agnew Street (Grid Ref 4033 0285)**	**Upper Cairncastle Road (Grid Ref 3920 0323)**	**Larne Harbour Roundabout (Grid Ref 4123 0196)**	**Coastguard Road (Grid Ref 4131 0171)**	**Ballylumford Road (Grid Ref 4206 0203)**
January 2005	18	15	17	22	17	20	15	-
February 2005	22	20	20	29	18	14	13	14
March 2005	20	15	24	16	12	6	8	10
April 2005	14	19	19	19	19	19	12	16
May 2005	18	26	28	24	18	24	21	20
June 2005	35	39	29	33	25	27	21	20
July 2005	18	14	17	23	14	11	13	20
August 2005	13	11	-	22	8	-	13	16
September 2005	21	14	14	31	12	19	8	13
October 2005	16	14	16	24	23	14	46	13
November 2005	4	12	17	20	18	16	11	9
December 2005	24	17	36	29	24	24	16	17
January 2006	29	27	28	62	22	16	12	18
February 2006	22	15	15	20	21	25	12	14
March 2006	11	12	8	15	9	12	6	5
April 2006	16	16	10	19	11	12	9	6
May 2006	22	14	21	25	15	16	16	13
June 2006	21	-	28	19	13	14	8	-
July 2006	19	-	20	25	19	16	13	9
August 2006	16	14	19	20	14	19	12	14
	Average Monthly NO_2 Concentration ($\mu g/m^3$)							
	Location							
Month and Year	**Antiville Rd/A8 (Grid Ref 3864 0212)**	**Riverdale (Grid Ref 3968 0249)**	**Main Street (Grid Ref 4016 0260)**	**Victoria Rd/Agnew Street (Grid Ref 4033 0285)**	**Upper Cairncastle Road (Grid Ref 3920 0323)**	**Larne Harbour Roundabout (Grid Ref 4123 0196)**	**Coastguard Road (Grid Ref 4131 0171)**	**Ballylumford Road (Grid Ref 4206 0203)**
September 2006	22	14	23	28	24	19	9	13
October 2006	19	15	16	19	6	7	11	13
November 2006	17	15	26	28	6	15	35	17
December 2006	29	22	19	25	25	16	9	10
January 2007	21	13	23	24	15	20	8	20
February 2007	37	23	29	24	18	21	11	15
March 2007								
April 2007	21	16	16	9	15	13	20	11
May 2007	-	11	19	13	14	13	10	9
June 2007	61	15	7	-	6	17	13	8
July 2007	14	14	-	25	9	18	11	11
August 2007	17	14	29	26	8	19	12	8
September 2007	24	14	-	26	14	20	13	13
October 2007	28	19	33	-	11	25	15	10
November 2007	26	19	-	30	21	22	14	23
December 2007	38	26	34	-	34	27	16	25

	Average Monthly NO_2 Concentration (($\mu g/m^3$)							
	Location							
Month and Year	**Antiville Rd/A8 (Grid Ref 3864 0212)**	**Riverdale (Grid Ref 3968 0249)**	**Main Street (Grid Ref 4016 0260)**	**Victoria Rd/Agnew Street (Grid Ref 4033 0285)**	**Upper Cairncastle Road (Grid Ref 3920 0323)**	**Larne Harbour Roundabout (Grid Ref 4123 0196)**	**Coastguard Road (Grid Ref 4131 0171)**	**Ballylumford Road (Grid Ref 4206 0203)**
January 2008	34	44	31	40	25	42	21	20
February 2008	31	21	31	37	32	23	18	19
March 2008	30	16	29	33	20	21	10	22
April 2008	26	20	32	32	23	28	14	14
May 2008	32	24	37	37	35	31	27	13
June 2008	25	17	27	32	17	17	14	19
July 2008	24	15	25	11	19	23	13	14
August 2008	27	19	30	33	21	20	9	12
September 2008	33	26	28	43	23	26	15	19
October 2008	33	14	24	38	19	22	10	17
November 2008	25	17	-	31	21	24	14	26
December 2008	42	29	38	41	33	30	14	25

NB Lambeth Scientific Services collected and analysed the data from January 2008 to March 2008. A new contract started with Bureau Veritas in April 2008.

Appendix D: Short-term to Long-term Data adjustment

Adjustment Factor for Main Street Data

Site	Annual Mean	Period Mean	Ratio
Belfast	31.90909	29.875	1.068087
Londonderry	18.72727	19	0.9856459
		Average	1.026866

Adjustment Factor for other data

Site	Annual Mean	Period Mean	Ratio
Belfast	31.90909	25.5	1.251337
Londonderry	18.72727	16	1.1704545
		Average	1.210896