2012 Air Quality Updating and Screening Assessment for Larne Borough Council

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

August 2012

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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.

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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 31,000 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

Figure 1

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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 microgrammes per cubic metre μg/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 μg/m^3	Running annual mean	31.12.2003
	3.25 μg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 μg/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 μg/m^3	Annual mean	31.12.2004
	0.25 μg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 μg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 μg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 μg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 μg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 μg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 μg/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.
Update and Screening Assessment	August 2009	No detailed assessment required for any of the 7 pollutants. Monitoring of SO_2, NO_2 and PM_{10} to continue. SO_2, NO_2 and PM_{10} objectives met.
Progress Report Addendum to Update and	April 2010	SO_2, NO_2 and PM_{10} objectives met. No AQMA to declare.

Screening Assessment Report 2009		Air quality objectives for SO_2 and PM_{10} met over the past 4 years and therefore continued monitoring no longer required. Air quality monitoring station decommissioned.
Progress Report	April 2011	NO_2 met. No AQMA declared.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

No Automatic Monitoring has been carried out since April 2010

2.1.2 Non-Automatic Monitoring Sites

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.

Environmental Scientifics Group (ESG) 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.

ESG are UKAS accredited and demonstrate satisfactory performance in the Workplace Analysis Scheme for Proficiency (WASP) over the past five quarterly rounds as verified on the Defra Local Air Quality Management Web pages.

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

A Bias Adjustment factor of 0.83 has been applied which was taken from the latest spreadsheet of factors i.e. version 07/12, year 2011- Environmental Scientifics Group - Didcot (50% TEA in Acetone) from the Review and Assessment Website.
Data from site reference L1 was annualised.

Please refer to Appendix A for diffusion tube locations

Appendix B for full data set (monthly mean values) from January 2005-December 2011

Appendix C for annualised data

Appendix D for quality assurance information

Table 2.1 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?
L1	Roadside	3864	0212	NO_2	N	N	N	n/a	Y
L2	Urban Background	3968	249	NO_2	N	N	N	n/a	
L3	Urban Centre	4016	0260	NO_2	N	N	N	Approx 1m	Y
L4	Kerbside	4033	0285	NO_2	N	N	N	Approx 3m	Y
L5	Kerbside	3920	0323	NO_2	N	N	N	Approx 3m	
L6	Roadside	4123	0196	NO_2	N	N	N	n/a	Y
L7	Other	4131	0171	NO_2	N	N	N	n/a	
L8	Other	4206	0203	NO_2	N	N	N	n/a	Y

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Diffusion Tube Monitoring Data

Table 2.2 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 [1](Y/N)	Annual mean concentration (Bias Adjustment factor = 0.83) 2011 (µg/m^3)
L1	Antiville Road/A8 Junction	Roadside	N	N	8 months	Y	N	32.30
L2	Riverdale/ Latharna House	Urban Background	N	N	11 months	N	N	19.36
L3	Main Street, Larne	Urban Centre	N	N	10 months	N	N	24.14
L4	Victoria Rd/Old Glenarm Rd	Kerbside	N	N	11 months	N	N	33.12

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 [1](Y/N)	Annual mean concentration (Bias Adjustment factor = 0.83) 2011 (µg/m^3)
L5	Upper Cairncastle Rd	Kerbside	N	N	12 months	n/a	N	21.78
L6	Larne Harbour Roundabout	Roadside	N	N	10 months	N	N	20.21
L7	Coastguard Rd/Cas Terrace	Other	N	N	11 months	N	N	12.05
L8	Ballylumford Rd, Islandmage	Other	N	N	10 months	N	N	12.46

[1] It should be noted that the monitoring sites are not representative of public exposure. However as there were no exceedences it was not necessary to use the procedure specified in Box 2.3 of TG(09) to estimate the concentration at the nearest receptor.

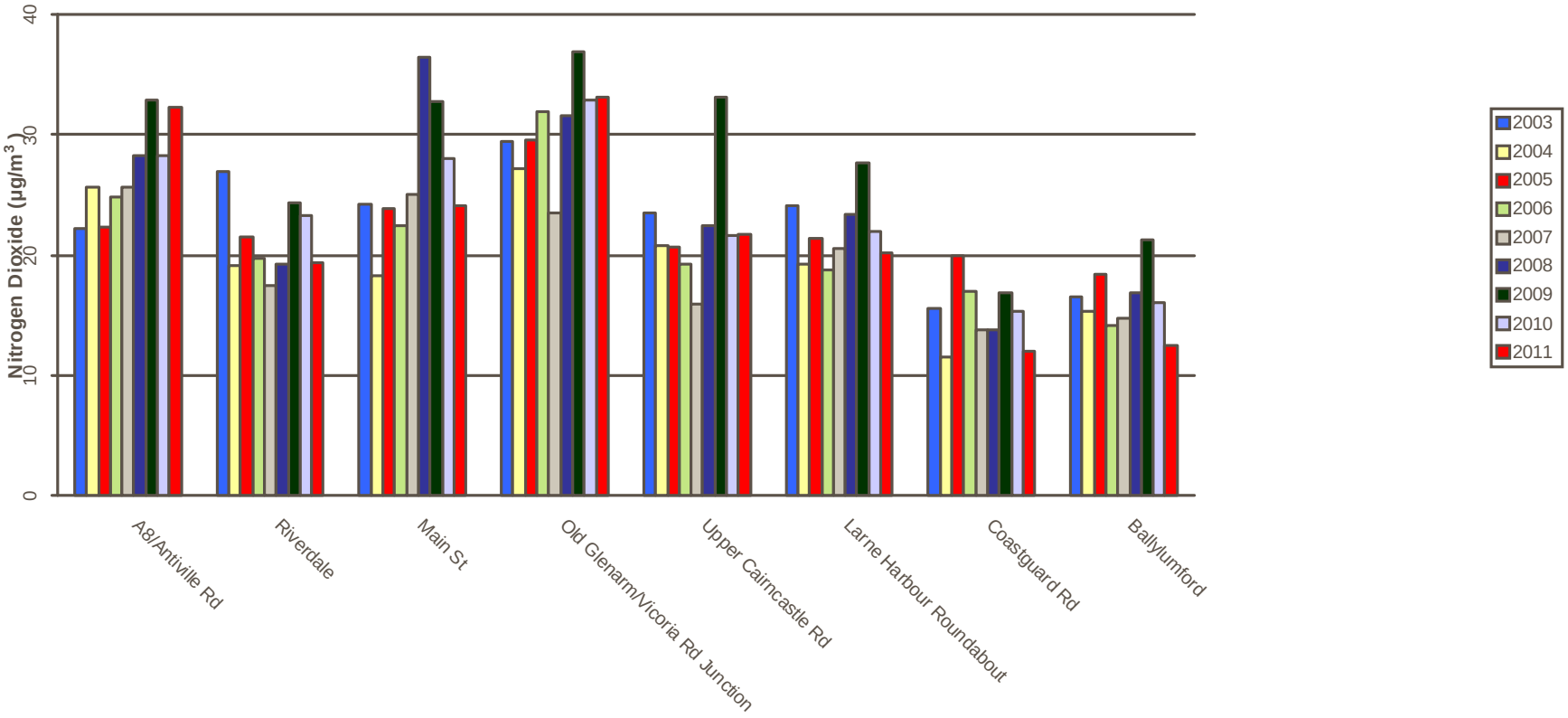
Table 2.3 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3				
			2007* (Bias Adjustment Factor = 1.056	2008* (Bias Adjustment Factor = 0.93)	2009* (Bias Adjustment Factor =0.99)	2010* (Bias Adjustment Factor = 0.83)	2011 (Bias Adjustment Factor = 0.83)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3				
			2007* (Bias Adjustment Factor = 1.056	2008* (Bias Adjustment Factor = 0.93)	2009* (Bias Adjustment Factor =0.99)	2010* (Bias Adjustment Factor = 0.83)	2011 (Bias Adjustment Factor = 0.83)
L1	Antiville Road/A8 Junction	N	25.65	28.27	32.9	28.32	32.3
L2	Riverdale/Latharna House	N	17.45	19.20	24.39	23.23	19.36
L3	Main Street, Larne	N	25.00	36.48	32.8	28	24.14
L4	Victoria Rd/Old Glenarm Rd	N	23.49	31.62	36.96	32.94	33.12
L5	Upper Cairncastle Rd	N	15.95	22.39	33.09	21.66	21.78
L6	Larne Harbour Roundabout	N	20.56	23.44	29.7	21.92	20.21
L7	Coastguard Rd/Cast Terrace	N	13.75	13.75	16.9	15.26	12.05
L8	Ballylumford Rd, Islandmage	N	14.69	16.86	21.29	15.99	12.46

* It should be noted that the monitoring sites are not representative of public exposure. However as there were no exceedences it was not necessary to use the procedure specified in Box 2.3 of TG(09) to estimate the concentration at the nearest receptor.

Figure 2 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites



Although over the last 9 years there have been no exceedences of the annual mean NO_2 objective of 40 $\mu g/m^3$, in the years 2007-2009 there was a year on year increase on NO_2 levels. However, in 2010 levels begun to fall at all sites and in 2011 this trend continued at 5 out of the 8 sites. The remaining sites presented slight increases.

There have been no exceedences of 60 µg/m^3. (This would indicate a risk that the 1-hour objective may also be exceeded.)

2.2.2 PM_{10}

No Monitoring of PM_{10} has been undertaken since 2009

In January 2006 the BAM 1020 real time PM_{10} automatic analyser was relocated to Churchhill Road, Larne, 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.

A summary of previous years monitoring can be found in the table below

Table: 2.4 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	2009 (Jan-Dec) Exceedances 86.6%Data Capture
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg/m^3	14	5	3	2
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg/m^3	0	0	0	0

The number of daily mean exceedances for PM_{10} continued to fall year on year and were within the objectives set for air quality.

Using information contained within the 2009 Update and Screening Assessment it was felt that it would not be necessary to relocate the monitoring station elsewhere in the Borough.

2.2.3 Sulphur Dioxide

No Monitoring of SO_2 has been undertaken since 2009

A summary of previous years monitoring can be found in the table below

Table 2. 5 : 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	2009 (Jan-Dec) Exceedances 96.5%Data Capture
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	0	0	0	2
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	0	0	0	0
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	0	0	0	0

During 2009 there were two exceedances of the 15 minute mean for SO_2 (both occurring on the same day). For the previous three years there had been no exceedances. Air quality objectives for Sulphur Dioxide continued to be met.

Using information contained within the 2009 Update and Screening Assessment it was felt that it would not be necessary to relocate the monitoring station elsewhere in the Borough.

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 monitored

2.2.6 Summary of Compliance with AQS Objectives

Larne Borough Council has examined the results from monitoring in the borough. 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

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

In June of 2012 work is proposed to commence on the A8 Belfast to Larne Dual Carriageway scheme. An air quality assessment was undertaken in accordance with current DMRB guidance and produced as part of the Environmental Statement for the project . Traffic related emissions, namely nitrogen dioxide and PM_{10}, were assessed using the DMRB screening tool to calculate pollutant concentrations at specified receptors near to the A8 and roads affected by the scheme.

The assessment determined that the scheme would not exceed any of the statutory air quality objectives for nitrogen dioxide and PM_{10}

Larne Borough Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

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 Local Authority area.

4 Other Transport Sources

4.1 Airports

Larne Borough Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

There is one railway station within Larne. Northern Ireland railways confirmed that no trains are regularly stationary for periods of 15 mins or more

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)

The Port of Larne offers facilities for both passenger and freight customers. Daily arrivals and departures to Cairnryan are operated by P&O Irish Sea and a summer schedule between March and October operates to Troon.
Port of Larne confirmed that in 2011 there were 7348 movements within the port.
Sulphur Dioxide emissions from Larne Harbour were monitored between 1st April 2003 and end of December 2005 in the vicinity of the port at a site selected on the basis that it was representative of levels at the nearest sensitive receptors which were domestic dwellings on Coastguard Road. The equipment was located at a distance of approximately 25m from said domestic properties and 235 m from the closest mooring quay. An automatic UV fluorescent SO_2 analyser was installed which could provide real time data on short-term objectives.
Air quality objectives were met over the monitoring period and were reported in previous update and assessment reports.

Larne Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area which have not been assessed.

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 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

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 Local Authority area.

5.3 Petrol Stations

6 petrol stations within the Borough have an annual throughput of more than 2000m^2. These 6 stations are not located near a busy road (road with more than 30 000 vehicles per day)

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 plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Larne Borough Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

In January 2006 the air quality monitoring station was relocated in order to verify the model for domestic emissions and determine the actual likelihood of exceeding the SO_2 objectives in the areas of highest density domestic coal burning in Larne, namely the Criagyhill area. Monitoring took place over a 4 year period with Air quality objectives being met. Monitoring results were discussed in pervious update and screening assessment reports.

Professional judgement was used to identify several other areas in which significant coal burning may be an issue. The areas considered were: - Ballystrudder (Islandmagee), West Street (Ballycarry), Seacourt (Larne), Cannel Vista (Glenarm), Toberwine/Altmore Street (Glenarm), Beachlands (Carnlough) and Croft area (Carnlough).
Maps, data supplied by the Northern Ireland Housing Executive on the types of heating sources within their housing stock and the relevant techncial guidance were used to determine the risk of exceeding the 24 hour mean PM_{10} objective. None of the above areas were considered likely to be a significant area of 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 Local Authority area.

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 an 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.
A progress report will be submitted in 2013

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)

Traffic and Travel Information 2009 – Roads Service

A8 Belfast to Larne Dual Carriageway Environmental Statement – Roads Service January 2011

Appendices

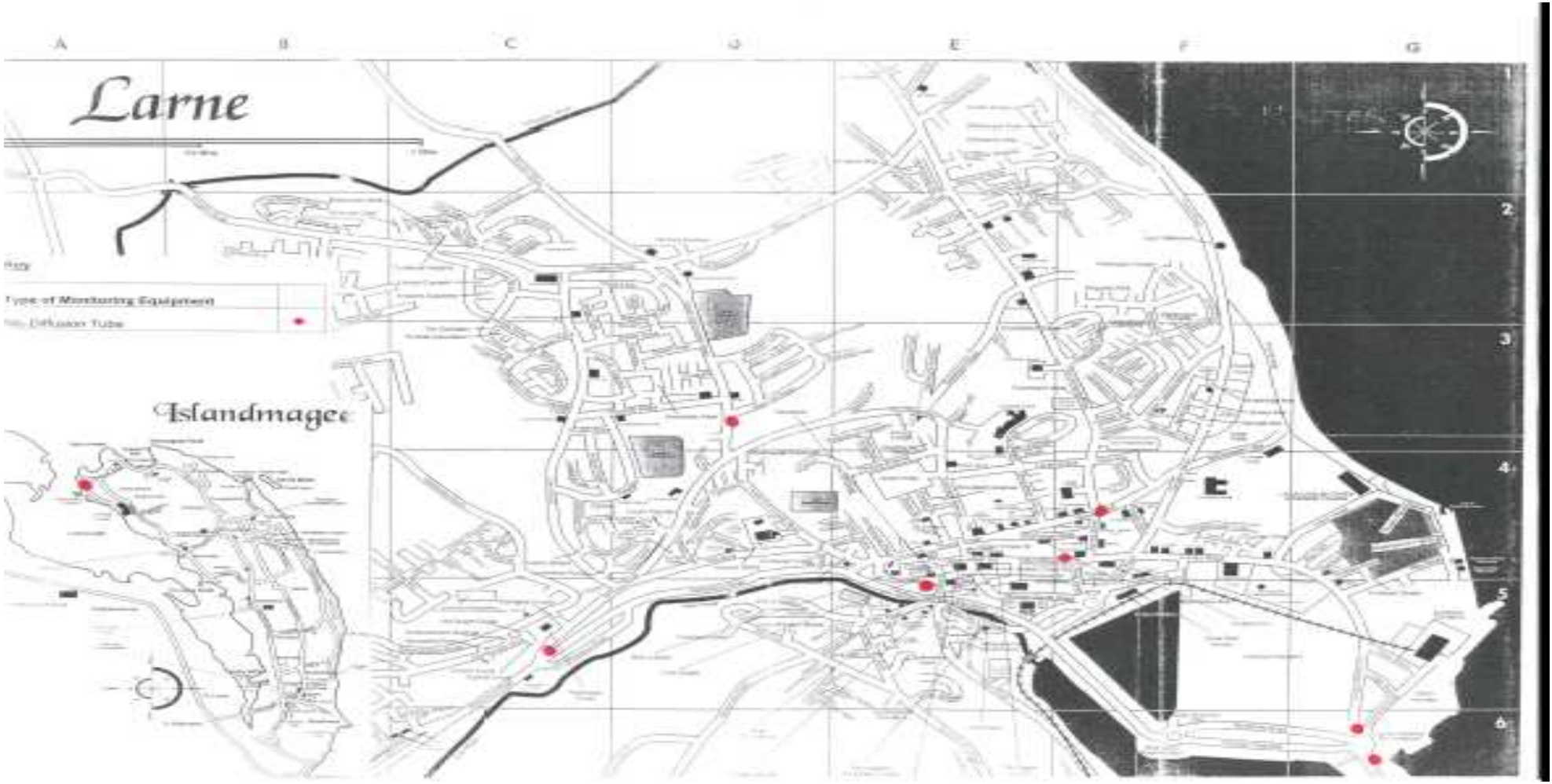
Appendix A - Diffusion tube locations

Appendix B - Full data set (monthly mean values) from January 2005-December 2011

Appendix C - Annualised data

Appendix D - Quality assurance information

Appendix A – Diffusion Tube Locations



Appendix B: 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

Larne Borough Council

	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
January 2009	53	29	36	43	43	36	22	29
February 2009	45	27	43	55	32	31	18	26
March 2009	36	14	31	37	27	24	`12	25
April 2009	36	26	40	40	37	-	18	18
May 2009	34	20	-	38	23	31	13	14
June 2009	-	29	30	-	-	30	28	17
July 2009	2	-	26	-	22	28	12	15
August 2009	-	19	26	-	24	28	11	15
September 2009	46	29	40	6	64	-	20	29
October 2009	24	32	28	79	27	35	14	21
November 2009	37	24	30	40	30	24	13	22
December 2009	44	35	44	46	35	38	24	27

Larne Borough Council

	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 2010	42	55	42	46	33	31	21	27
February 2010	37.71	41.32	46.75	47.06	39.82	44.64	30.77	22.32
March 2010	46.99	29.76	46.68	50.13	33.52	30.08	19.11	29.76
April 2010	34.08	30.87	32.33	43.98	23.59	27.67	23.88	19.19
May 2010	30.40	21.15	28.75	26.70	24.85	22.59	16.64	15.81
June 2010	21.88	13.44	23.80	29.94	16.89	13.82	13.44	9.60
July 2010	32.34	18.58	28.72	37.64	22.68	-	11.58	16.17
August 2010	25.34	11.89	22.84	30.66	14.70	10.64	11.57	16.89
September 2010	30.5	21.7	26.4	40.5	25.4	27.1	13.1	20.1
October 2010	35.4	26.3	29.1	41.8	26.1	25.6	15.1	17.3
November 2010	33	28.6	30.5	36.8	22.4	28.4	19.6	14.5
December 2010	39.8	37.2	46.9	45.1	30.2	29	24.8	22.5
January 2011	42.9	31.8	-	41.1	33.5	29.8	18	19.5
February 2011	51.5	43.9	-	50.2	29.1	46.6	20	22.9
March 2011	42.7	27.5	39.2	43.2	32.6	27.8	17.2	14.1
April 2011	39.3	26.4	37.2	40.1	30.8	30.9	15.7	14.6
May 2011	23	15.4	20.7	31.2	19.8	16.6	7.5	-
June 2011	28.7	17.6	28.8	34.8	22.4	20.6	11.9	14.2
July 2011	19	14.4	23.1	-	19.6	16.4	11.2	9.3
August 2011	-	16	28.2	35	21.5	17.1	11.5	-

	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 2011	-	15.7	20.9	38.4	22.9	22.4	7.9	10.4
October 2011	-	23.6	27.7	44.8	25.5	-	10.9	13.4
November 2011	-	24.9	32.9	48.8	38.7	15.3	27.9	21.6
December 2011	28.4	-	32.1	31.4	18.5	-	-	19.1

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

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

Adjustment Factor for Antiville Road Data

Site	Annual Mean	Period Mean	Ratio
Belfast	28	26.5	1.057
Londonderry	16	13.25	1.208
		Average	1.1325

Appendix D - QA/QC of Diffusion tube Monitoring

Laboratory summary performance for WASP NO_2 PT rounds 108 - 115

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent HSL WASP NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of < ± 2 as defined above.

WASP Round	WASP R108	WASP R109	WASP R110	WASP R111	WASP R112	WASP R113	WASP R114	WASP R115
Round conducted in the period	Jan – March 2010	April – June 2010	June – August 2010	Oct – Dec 2010	Jan -March 2011	April - June 2011	July - Sept 2011	October - December 2011
Aberdeen Public Analysts	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Bristol City Council	75 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	100 %	50 %	100 %	75 %	100 %	100 %	100 %	75 %
Edinburgh City Council	100 %	100 %	75 %	100 %	100 %	100 %	100 %	0 %
Environmental Services Group, Didcot (formerly Bureau Veritas Laboratories, Glasgow and Harwell Scientifics) [1] [2]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Exova (formerly Clyde Analytical)	100 %	50 %	50 %	100 %	100 %	100 %	0 %	75 %
Glasgow Scientific Services	50 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Gradko International [2]	100 %	87.5 %	100 %	100 %	100 %	100 %	100 %	37.5 %
Kent Scientific Services	100 %	100 %	100 %	100 %	50 %	100 %	100 %	75 %
Kirklees MBC	100 %	100 %	100 %	0 %	100 %	0 %	0 %	50 %
Lambeth Scientific Services	50 %	100 %	100 %	100 %	50 %	25 %	100 %	25 %
Lancashire County Analysts [3]	100 %	75 %	50 %	100 %	75 %	-	-	-
Milton Keynes Council	100 %	25 %	50 %	100 %	100 %	75 %	100 %	100 %
Northampton Borough Council	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Somerset Council [4]	-	-	-	-	-	-	-	100 %
South Yorkshire Council Laboratory [5]	25 %	-	-	-	-	-	-	-
South Yorkshire Air Quality Samplers [6]	-	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	100 %	100 %	50 %	100 %	100 %	100 %	100 %	100 %
Tayside (formerly Dundee CC)	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Walsall MBC [7]	-	100 %	100 %	100 %	-	-	-	-
West Yorkshire Analytical Services	100 %	100 %	100 %	100 %	75 %	75 %	100 %	100 %

[1] Bureau Veritas laboratory and Harwell Scientific now part of ESG Group.
[2] Participant subscribes to two sets of test samples (2 x 4 test samples) in each WASP PT round.
[3] No longer involved in NO_2 diffusion tube measurements from R113.
[4] New participant from R115.
[5] No longer involved in NO_2 diffusion tube measurements from R109.
[6] New participant from R109.
[7] Results for WASP R107, R108 and R112 not submitted. No longer involved in NO_2 diffusion tube measurements from R113.

Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies, by Laboratory

ESG Didcot, 50% TEA in Acetone	
2011	G
2011	G
2011	G
2011	G
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2011	G
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2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
2011	P
2011	P
2011	P
2011	P

P	Poor Pre
G	Good Pre
2008	Results o out in 200
2009	Results o out in 200
2010	Results o out in 201
2011	Results o out in 201

Numerical results for in the National Bias / version 07/12