2015 Updating and Screening Assessment for

Lisburn & Castlereagh City Council

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

September 2015

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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 with two interim progress reports.

This report is the 2015 USA for Lisburn and Castlereagh City Council and has been completed using the recommended template. The assessment is fully compliant with the applicable policy and technical guidance.

Lisburn city council was located southwest of Belfast and was the second largest Council in Northern Ireland, it covered 174 square miles and had a population of over 121,000. Castlereagh Borough Council lay to the southeast of Belfast and had a population of 67,272 Local authorities in Northern Ireland amalgamated on 1st April 2015 creating 11 new councils. Lisburn & Castlereagh City Council (LCCC) is one of the new 11 councils, with a population of 134,841, and an area of approximately 200 square miles. It has been predominately made up from the previous council areas of Lisburn City and Castlereagh Borough with a substantial portion moving into Belfast City Council.

This USA report identified no exceedances with relevant exposure, of the Air Quality Strategy objectives for 2014 for any of the pollutants assessed, although Sprucefield Court site was elevated in 2014. This site is situated next to the M1 motorway, monitoring will continue in 2015 and a detailed assessment carried out in 2016 if levels continue to rise.
With the amalgamation of the Council the Air Quality management Area (AQMA) previously declared by Castlereagh Borough Council, moved within the new boundaries of Lisburn & Castlereagh City Council.
Following the 2009 Update and screening assessment carried out within Castlereagh Borough Council a detailed assessment was carried out. This concluded the NO_2 air quality objective was exceeded on A20 Upper Newtownards Road and relevant exposure was identified, ie Normandy Court.
Following this detailed assessment the triplicate NO_2 diffusion tubes positioned kerb side were moved to the façade of Normandy Court at the end of 2009. Although the levels of NO_2 have decreased by approximately 40%, they have remained slightly above or close to the objective so Castlereagh Borough Council declared the six apartments to the front of Normandy Court, an Air Quality Management area on the 30th January 2011 and an Air Quality Action plan has since been produced and submitted to the Department. Reported levels are now below the objective but remain close, the AQMA therefore will remain in place.

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1 Introduction

1.1 Description of Local Authority Area

Local authorities in Northern Ireland amalgamated on 1st April 2015 creating 11 new councils. Lisburn & Castlereagh City Council (LCCC) is one of the new 11 councils, with a population of 134,841, and an area of approximately 200 square miles. It has been predominately made up from the previous council areas of Lisburn City and Castlereagh Borough with a portion moving into Belfast City Council.

Lisburn City Council covered an area totalling 174 square miles with a population of 121,000 and Castlereagh 32 square miles with a population of 67,000. Both councils were of mixed and urban rural character and the predominant wind direction is from the Southwest. They were bounded to a number of other council areas and were two of the largest boundaries of Belfast City Council. This made them very popular residential areas due to the ease of the commute to Belfast City Centre. With the number of neighbouring councils, a large number of main atErial routes into Belfast existed in both Lisburn City Council and Castlereagh Borough Council with Lisburn being dissected by the M1 motorway.
The new council LCCC geographically remains very similar, road transport remains one of the main concerns, and solid fuel use, as a secondary fuel, is still quite common in the Lisburn area.

Lisburn City Council and Castlereagh Borough Council road structure

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 exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

1.3 Air Quality Objectives

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

The two tables below show a summary of previous reviews and assessments of air quality for Lisburn City Council and Castlereagh Borough Council before they amalgamated on 1st April 2015.

Table 1.2 Previous reports submitted by Lisburn City Council

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 exceedances 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 exceedances of the air quality objectives at relevant receptors.
Updating and Screening Assessment (USA, 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 and no exceedances were found.
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 all measured data was within the objectives.
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.
Progress Report (LCC,2013)	This reported 2012 measurements and all current objectives were achieved
Progress Report (LCC,2014)	This reported 2013 measurements below the objectives and no detailed assessment required.

Table 1.3 Previous reports submitted by Castlereagh Borough Council

Stage 1 Report (CBC, 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, PM10 and sulphur dioxide were all unlikely to be achieved by 2003-2005.
Stage 2/3 Air Quality Review CBC, 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 NO2, PM10 and SO2, as there were not predicted to be exceedances of the air quality objectives
Progress report (CBC2005)	The progress reported for 2004 concluding that PM10, NO2 and SO2 were not predicted to cause exceedances of the air quality objectives at relevant receptors.
Updating and Screening Assessment (USA, 2006)	This reported data for 2005.This indicated that current objectives in relation to SO2, NO2 and PM10 would be achieved at the location of the automatic monitoring stations. The diffusion tube measurements at the A20 Upper Newtownards road in Dundonald indicated the possibility of exceedances in relation to NO2
Progress report (EG, 2007)	This reported the 2006 measurements and the decommissioning of the SO2 automatic site in Espie way and the analyser to be replaced with an NO_2. The station was relocated to Dundonald, where the NO_2 diffusion results were close to the objective.
Progress report (EG, 2008)	This reported the 2007 measurements. Although based on 76% data capture, the annual mean NO2 concentration at the Dundonald automatic monitoring site was below the objective.
Updating and Screening Assessment (USA, 2009)	This reported 2008 measurements. The A20 Dundonald NO2 diffusion tube site exceeded the the objective, and a detailed assessment was initiated.
Detailed assessment	A detailed assessment was carried out for NO2 for the A20 in the Dundonald area
Progress report (CBC 2010)	This reported the 2009 measurements and the relocation of the NO_2 diffusion tubes on the A20 to the façade of the relevant exposure ie: Normandy Court
Progress report (CBC 2011)	This reported the continued elevated levels of NO_2 at Normandy Court Dundonald and details of the AQMA Castlereagh Borough Council declared in January 2011.
Updating and Screening Assessment (USA, 2012)	This reported the 2011 measurements and further details of the AQMA and Action Plan.
Progress report (CBC 2013)	This reported the 2012 measurements and the submission of an action plan in January 2013.
Progress report (CBC 2014)	This reported the 2013 data and details of the action plan progress

MAPS of AIR QUALITY MANAGEMENT AREA (AQMA)

No's 2,6,10,1,5,7 Normandy Court Dundonald BT16 2LA

Figure 1.1 Map showing position of Dundonald Village within LCCC

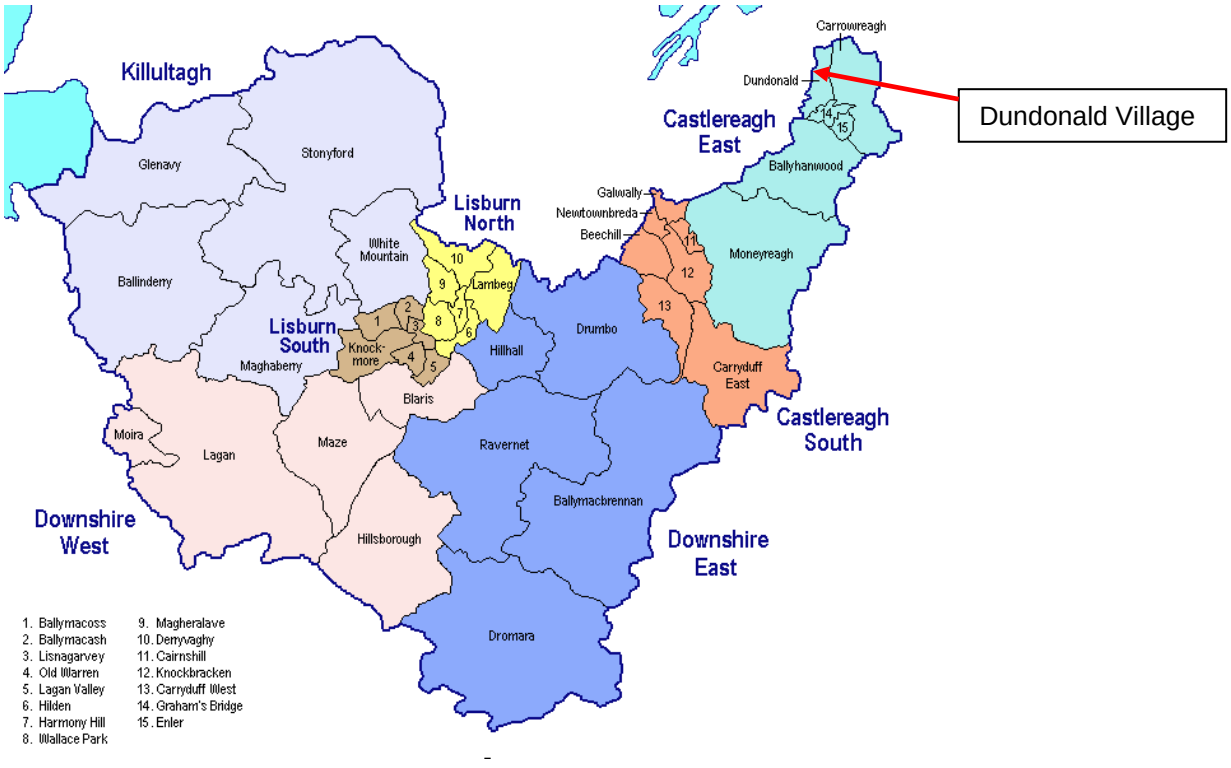
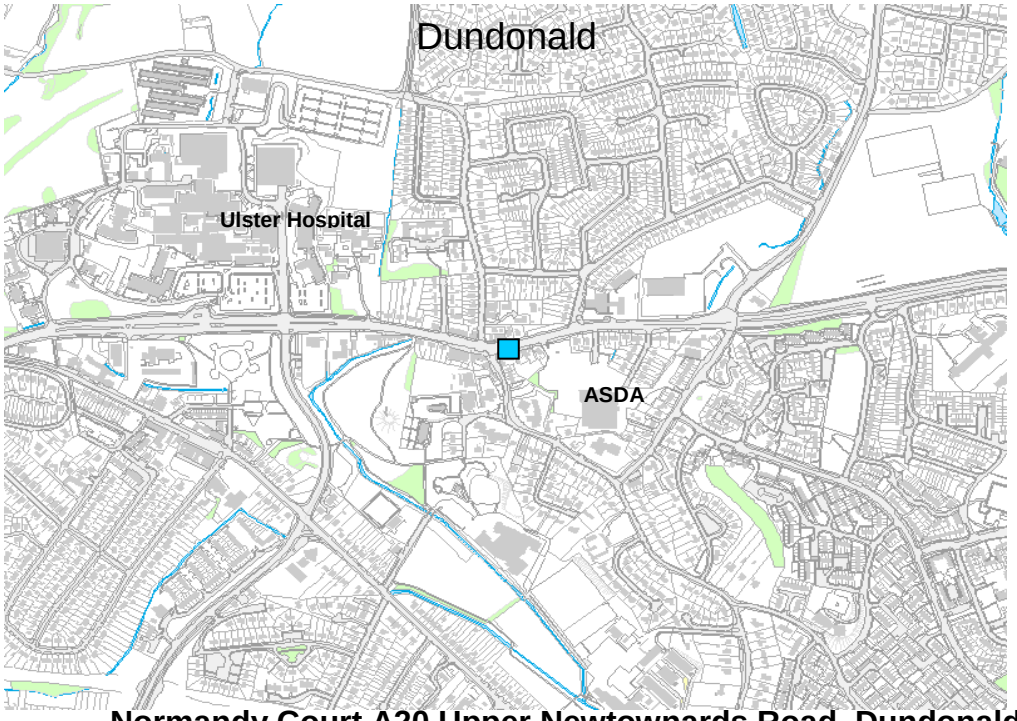


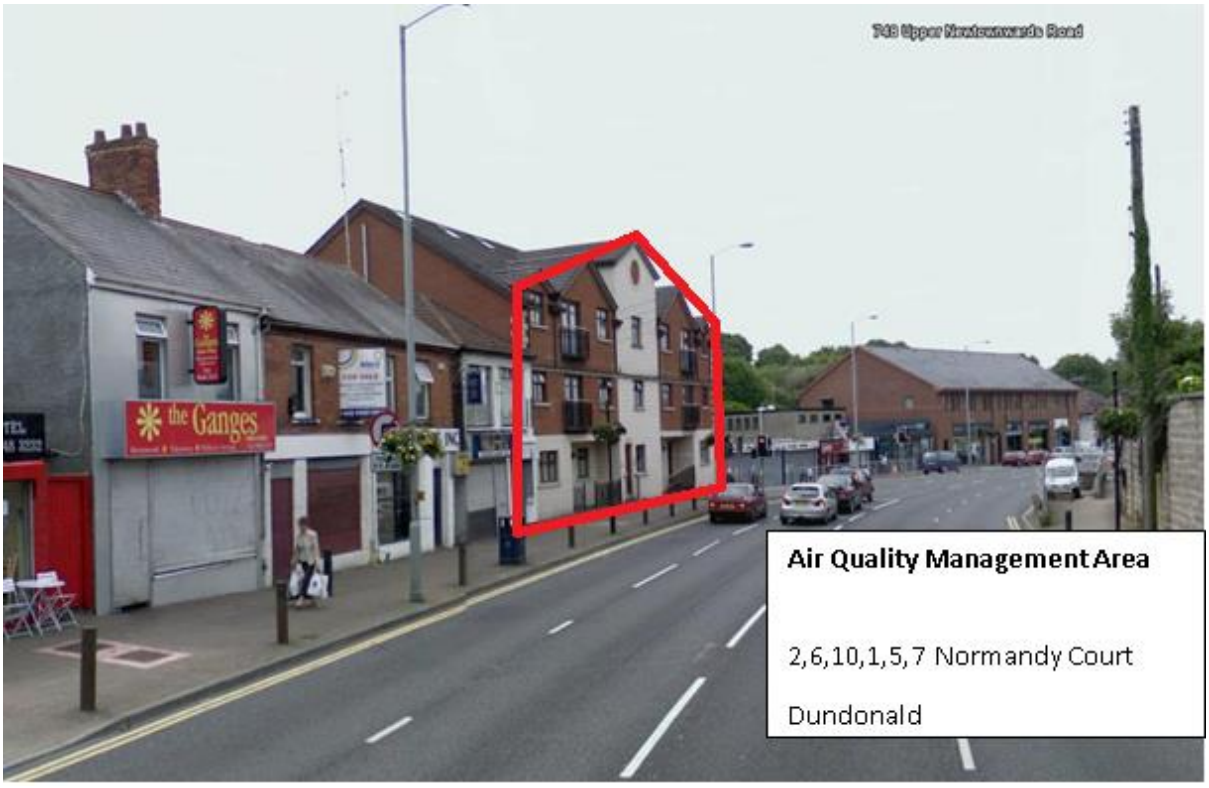
Figure 1.2 Map showing position of AQMA in Dundonald Village



Normandy Court A20 Upper Newtownards Road, Dundonald

Figure 1.3 Ariel photograph showing position of AQMA in Dundonald Village

Figure 1.4 Photograph showing position of Normandy Court within AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Lisburn & Castlereagh City Council has two automatic monitoring sites.

Kilmakee Activity Centre Dunmurry measuring, SO_2, PM_{10} and $PM_{2.5}$, this site also houses a PAH and black carbon monitor and therefore meeting the requirement for the AURN specifications.
Data has been available from this site since Nov 2012. This site is now well established and the 2013 and 2014 data is included in this report.

Dundonald site measuring NOx using a chemiluminescence analyser, this site is within 30m of an AQMA. A co-location study for the NO_2 diffusion tubes is also carried out at this site. Results from this study were not submitted to the national data base in 2014 due to the analytical lab changing mid-year.

Calibrations are carried out every two weeks, and the sites are independently audited by NPL (National Physical Laboratory) every six months. AQDM (Air Quality Data Management) are also employed to ratify and validate the data. Results and correction factors are detailed in Appendix A.

Figure 2.1 Position of the two air monitoring sites within LCCC

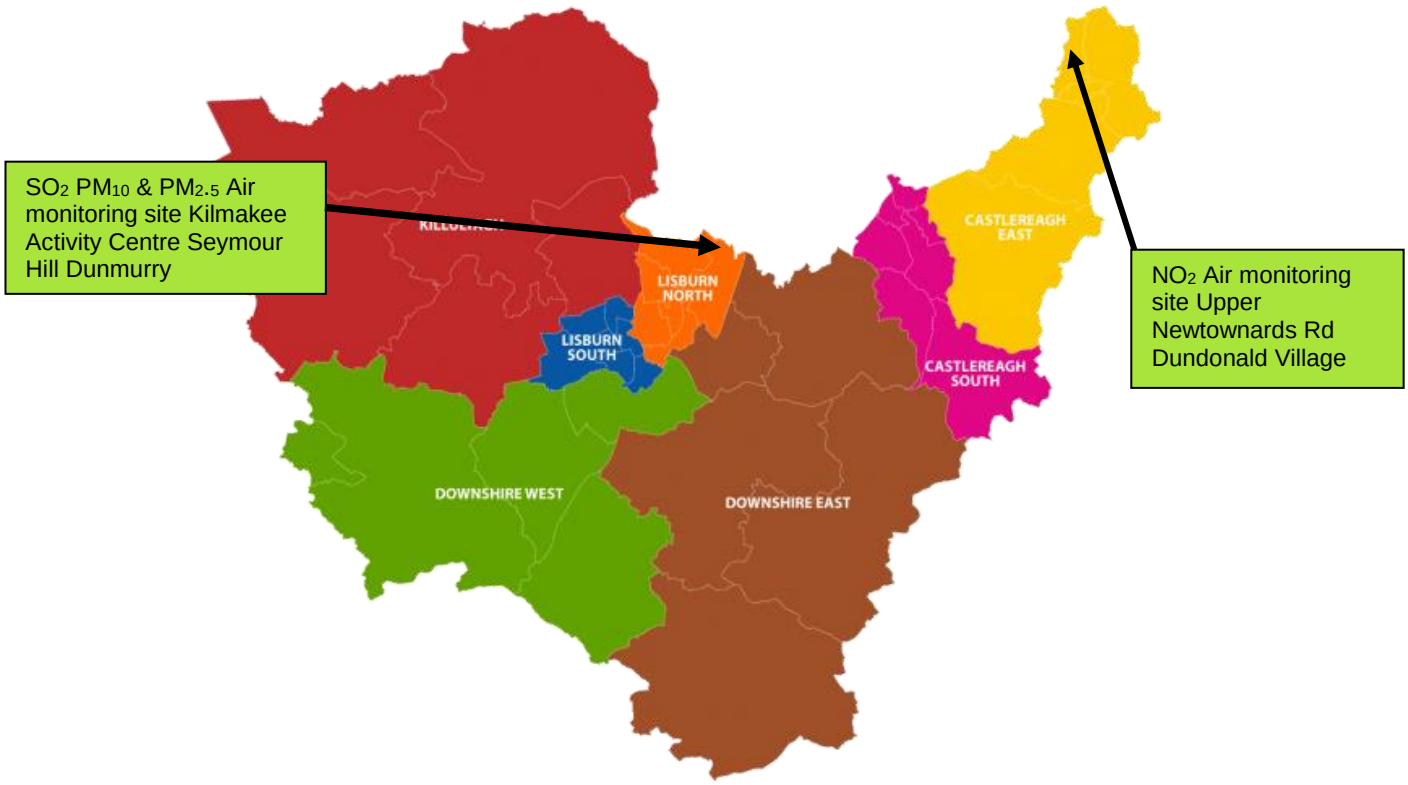
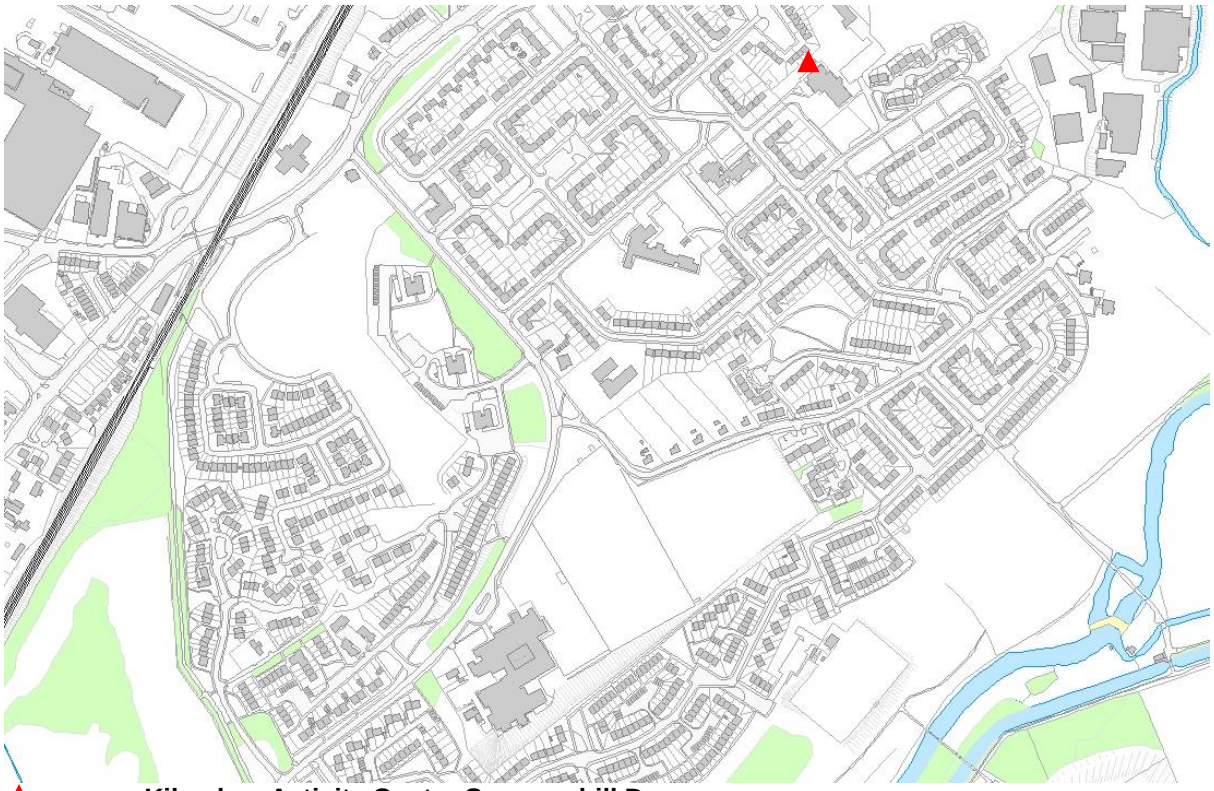
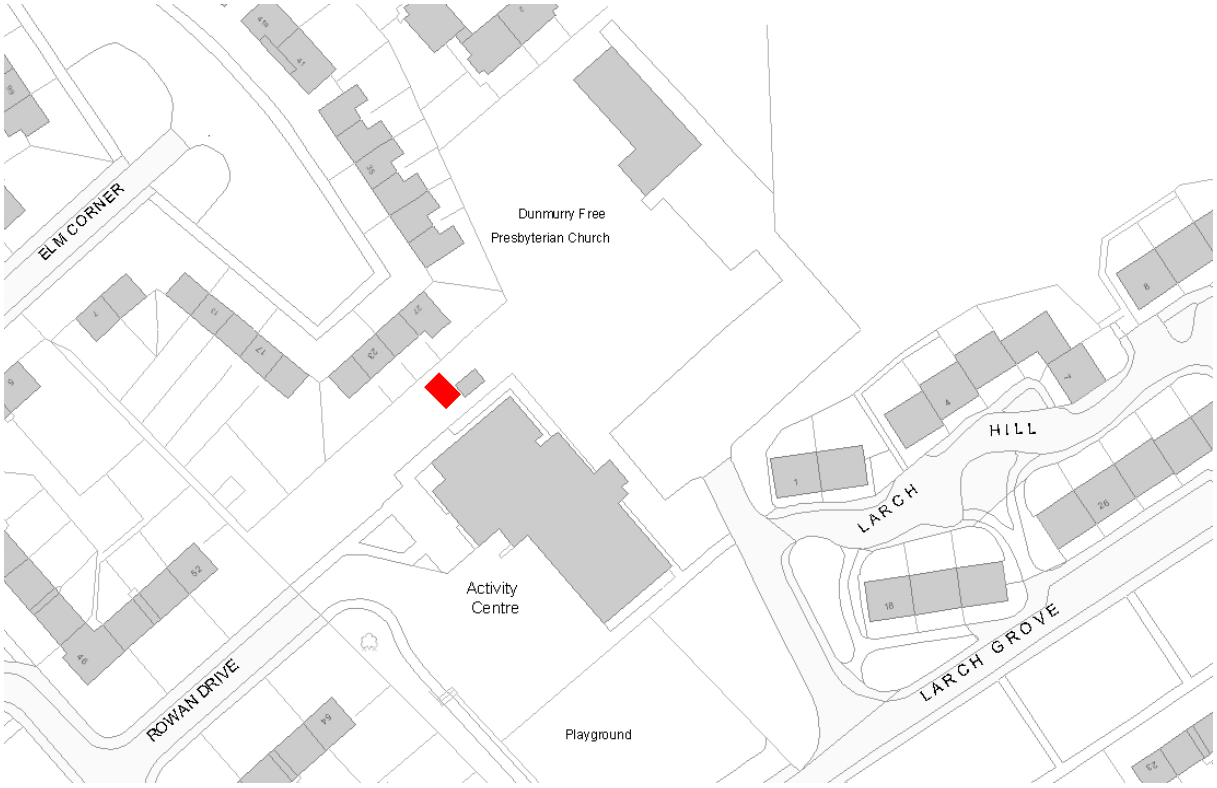


Figure 2.2 Position of Air monitoring site Kilmakee Activity Centre Seymourhill Dunmurry



Kilmakee Activity Centre Seymourhill Dunmurry

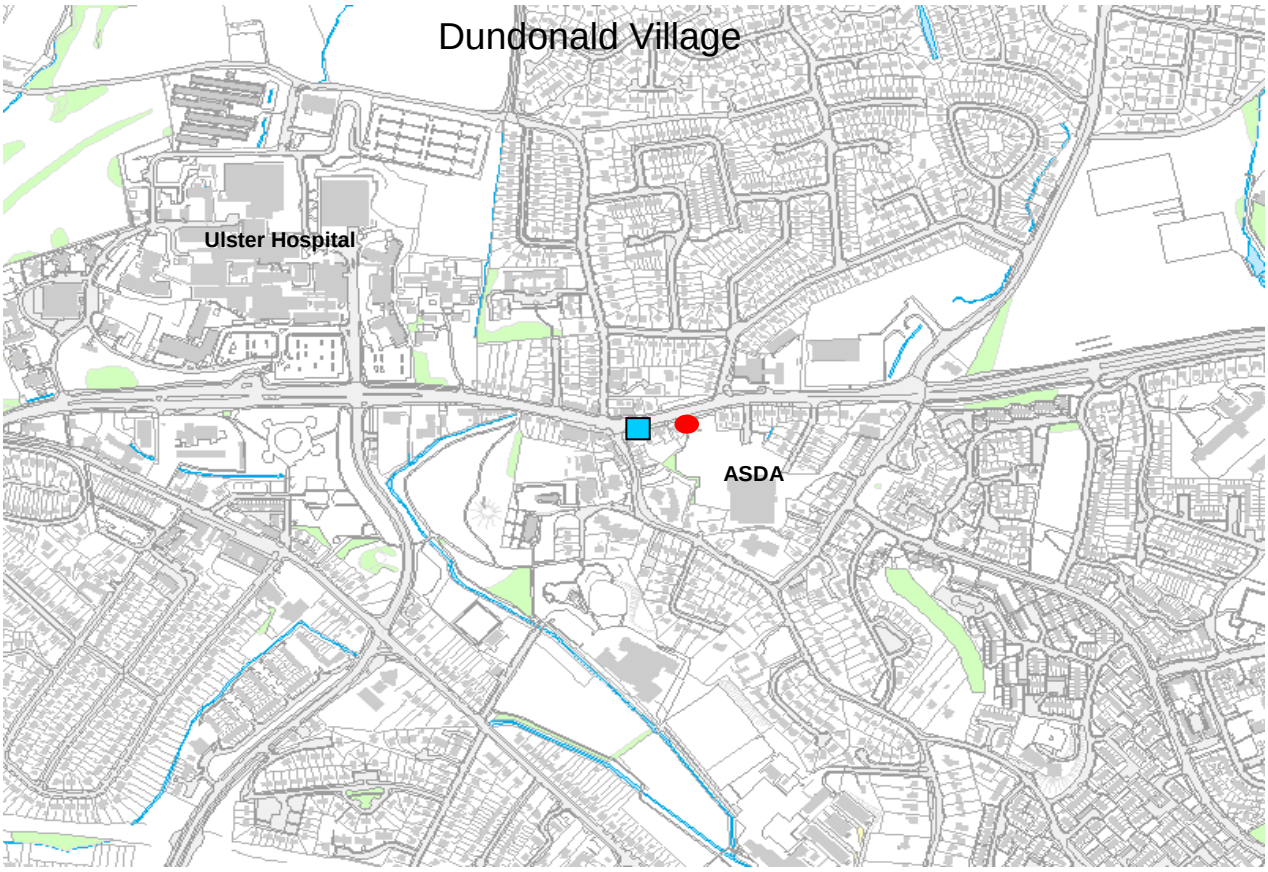
Figure 2.3 Position of Automatic Monitoring Site at Kilmakee Activity Centre



Automatic sites

Figure 2.4 Picture of Automatic Monitoring Stations at Kilmakee Activity Centre

Figure 2.5 Position of automatic monitoring site in Dundonald Village



Automatic monitoring site

AQMA

Figure 2.6 Picture of Automatic Monitoring Station in Dundonald Village

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	Irish Grid Ref	Irish Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Kilmakee Activity Centre	Urban Background	E328956	N367973	PM_{10}, $PM_{2.5}$ SO_2	NO	TEOM FDMS UV Analyser	YES 10m	NA	YES
Dundonald Village	Roadside	E342016	N374041	NO_2,	NO	Chemiluminescence	YES 22m	3M	YES (30m from AQMA)

2.1.2 Non-Automatic Monitoring Sites

Lisburn and Castlereagh City Council has 16 NO_2 diffusion tubes at roadside and background sites. Most are positioned along the main arterial routes into Belfast, triplicate tubes are positioned on the façade of Normandy Court within the AQMA and a co-location study is carried out at the automatic station in Dundonald. The results of this study were unable to be submitted into the national data base as the analytical lab changed mid-year. The diffusion tube studies for the past five years do not show any particular trends. (See Fig. 2.16) Annual variation is more likely to be as a result of climatic conditions rather than changes in emissions. All other monitoring has shown results within the objectives.

The NO_2 diffusion tubes were supplied by Eurofins Public Analyst Scientific Services and analysed by ESG (Environmental Scientifics Group) for the first six month in 2014. From the 1st July 2014 the tubes were supplied by Worcestershire Scientific Services and analysed by Gradko Environmental.

The bias adjustment factor from the co-location study is **0.86.** This was calculated using the R&A support precision and accuracy spread sheet. A decision was made to apply this higher figure rather than the national average bias adjustment figure of 0.855.
Details of the QA/QC for the diffusion tubes and the reason for the use of the bias adjustment factor can be found in Appendix A
Below are maps of the diffusion tube sites 13,14 and 15 were new sites in 2014, Lisburn City Council located three new diffusion tubes sites in Culcavy village and Hillsborough village due to concerns from residents about increasing traffic, particularly heavy goods vehicles, using the main through route.

Figure 2.7 Map(s) of Non-Automatic Monitoring Sites

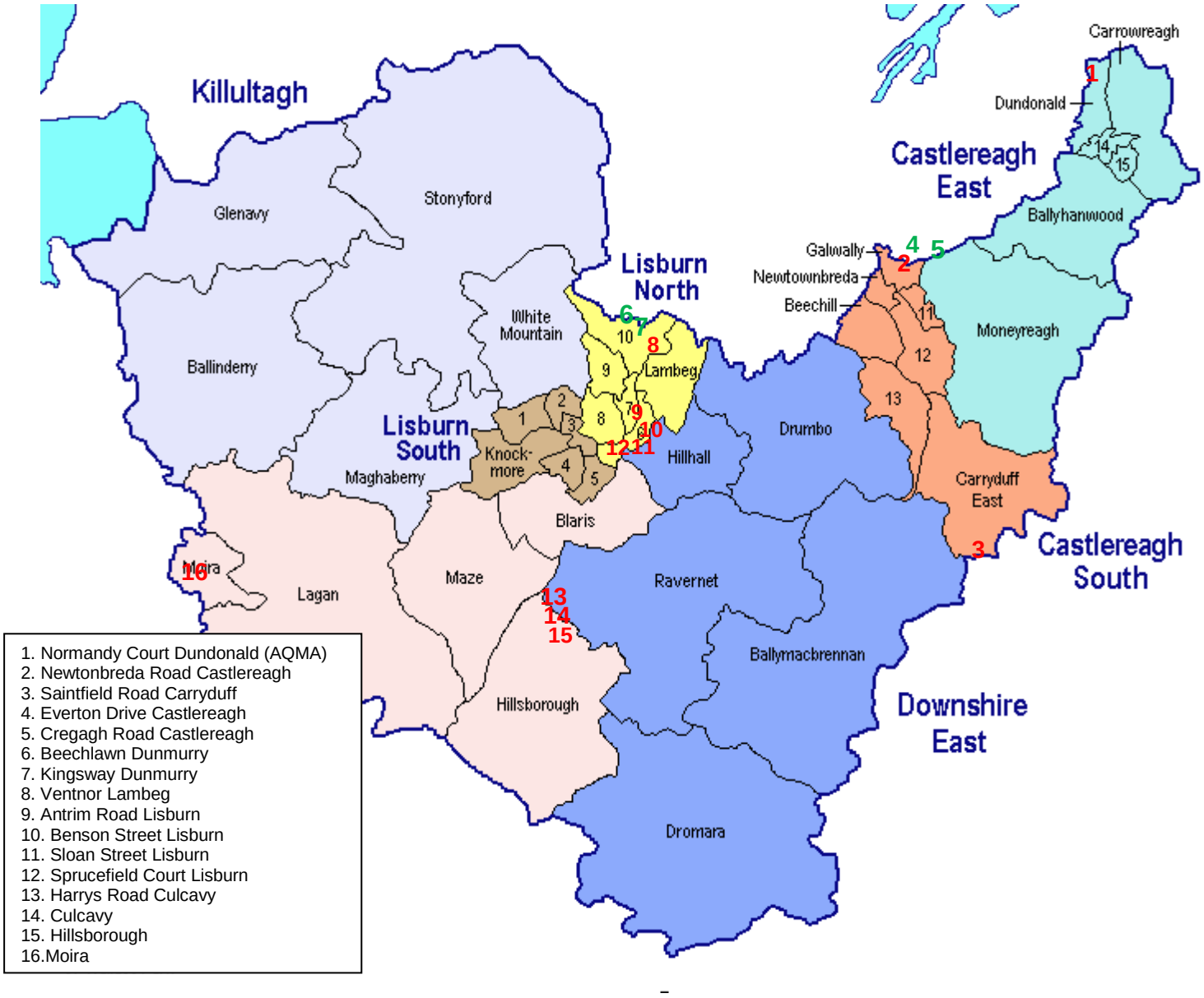
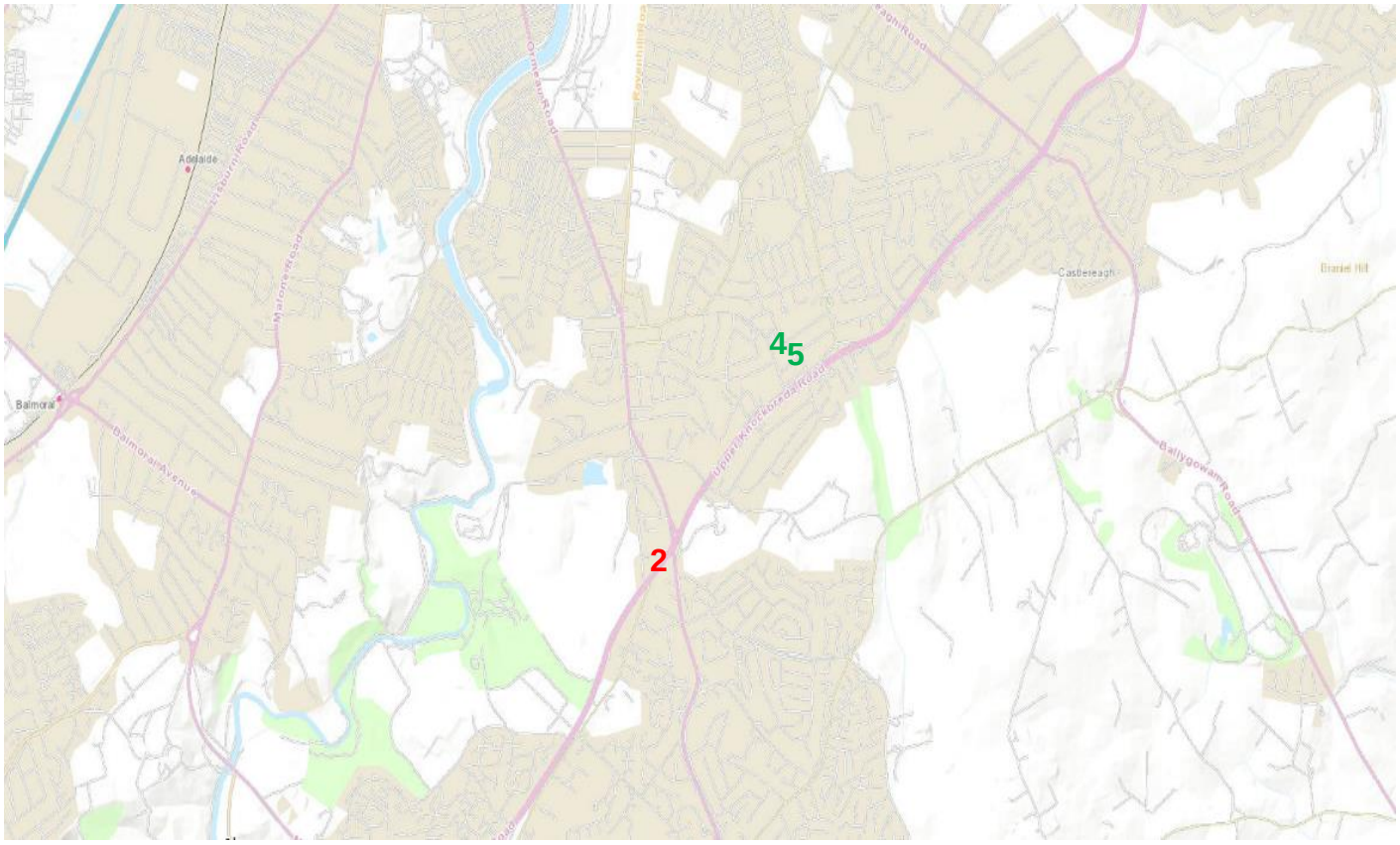


Figure 2.8 Position of tube 1. Dundonald village on AQMA

Figure 2.9 Picture of NO_2 Tubes on AQMA Normandy Court Dundonald

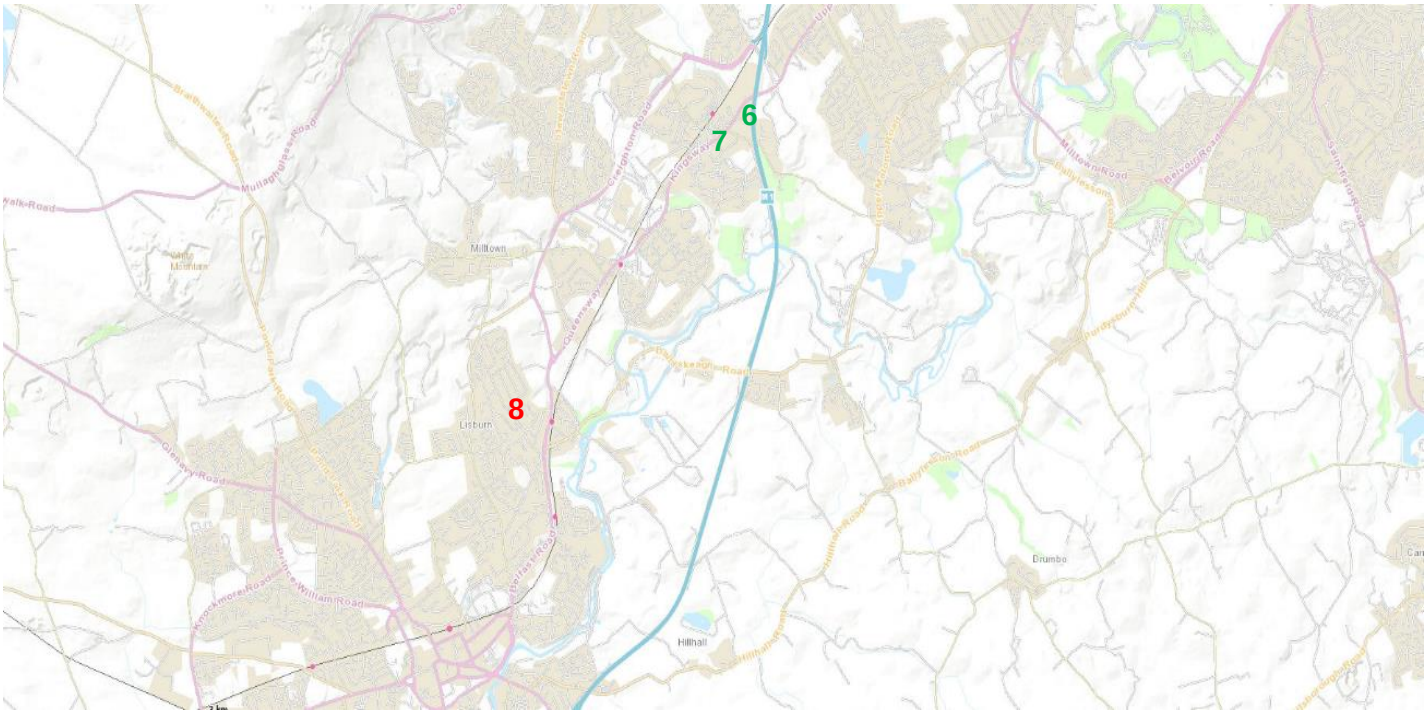
Figure2.10 Position of tubes Castlereagh area



The tubes (4,5) on 1st April 2015 moved into the Belfast City Council area

Figure2.11 Position of tube carryduff

Figure2.12 Position of tubes Dunmurry and Lambeg



The tubes (6,7) on 1st April 2015 moved into the Belfast City Council area

Figure 2.13 Position of tubes in Lisburn City

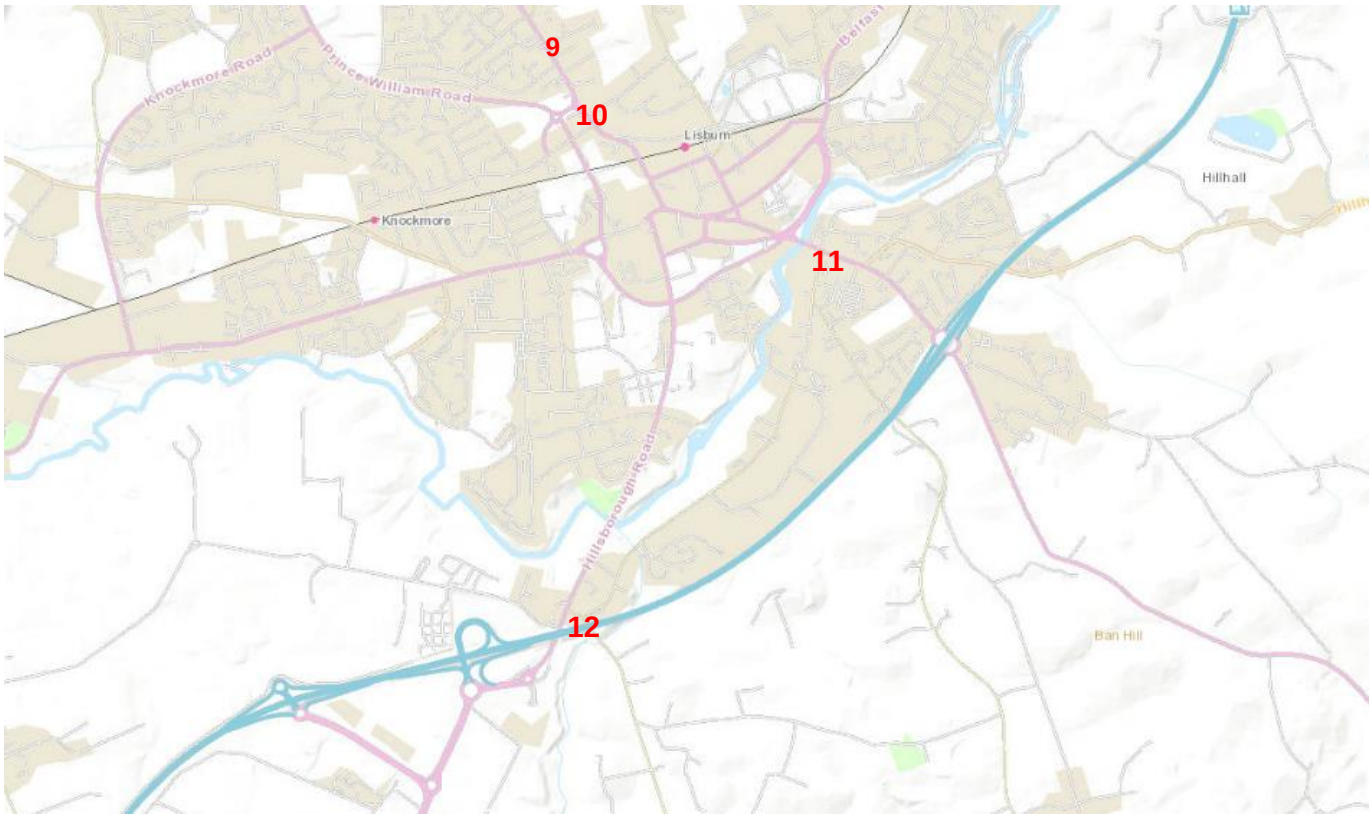


Figure 2.14 Map of tubes in the Culcavy and Hillsborough

Figure 2.15 Position of tube Moira

Picture of location of new sites Culcavy village

Picture of location new diffusion tube site Hillsborough

Table 2.2 Details of Non-Automatic Monitoring Sites

	Site Name	Site Type	Irish Grid Ref East	Irish Grid Ref North	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?
1	Normandy Court Dundonald (AQMA)	Roadside	341991	374013	NO_2	Yes	No	Yes (0m)	0.5m	Yes
2	Newtonbreda Road Castlereagh	Roadside	335246	370061	NO_2	No	No	Yes (12m)	2.5m	Yes
3	Saintfield Road Carryduff	Roadside	336832	365625	NO_2	No	No	Yes (70m)	10m	Yes
4	Everton Drive Castlereag	Background	336132	371141	NO_2	No	No	Yes (98m)	3m	No
5	Cregagh Road Castlereagh	Roadside	336257	371278	NO_2	No	No	Yes (28m)	2m	Yes
6	Beechlawn Dunmurry	Roadside	326165	362491	NO_2	No	No	Yes (10m)	12m	Yes
7	Kingsway Dunmurry	Roadside	329502	386915	NO_2	No	No	Yes (30m)	1m	Yes
8	Ventnor Pk Lambeg	Background	326900	362013	NO_2	No	No	No (6m)	0.5m	No
9	Antrim Rd Lisburn	Roadside	326313	364621	NO_2	No	No	Yes (7m)	1m	Yes
10	Benson Street Lisburn	Roadside	326090	364619	NO_2	No	No	Yes (0.1m)	Yes	Yes
11	Sloan Street Lisburn	Roadside	327236	364102	NO_2	No	No	Yes (1.5m)	2m	Yes

	Site Name	Site Type	Irish Grid Ref East	Irish Grid Ref North	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?
12	Sprucefield Court Lisburn	Roadside	327586	363586	NO_2	No	No	Yes (1m)	15m	Yes
13	Harry's Road Culcavy	Roadside	323811	360577	NO_2	No	No	Yes (10m)	5m	Yes
14	Culcvavy Road Culcavy	Roadside	323849	360318	NO_2	No	No	Yes (10m)	2m	Yes
15	Hillsborough	Roadside	324404	358876	NO_2	No	No	Yes (0.1m)	1m	Yes
16	58-62 Main Street Moira	Roadside	314994	360589	NO_2	No	No	Yes (4m)	1.5m	Yes

(sites listed in green, on the 1st April 2015 transferred into the Belfast City Council area)

(sites listed in blue were new in 2014)

2.2 Comparison of Monitoring Results with Air Quality Objectives

No exceedances 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 at relevant exposure except for two NO_2 diffusion tube sites. In the following section results are presented for NO_2 at the automatic and diffusion tube sites and compared with the objective. The diffusion tube site within the AQMA remains close to the objective. The Newtonbreda Road site remained in 2014 on the objective, as this is a Roadside site it has been distance calculated to the nearest relevant exposure, using the calculation from LAQM.TG(09) Box2.3.

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. The automatic site is 30m from the AQMA (Normandy Court); diffusion tubes are located on the façade of Normandy Court. All sites meet the objective at relevant exposure.

Automatic Monitoring Data

Table 2.3a presents the annual mean concentrations of NO_2 determined at the automatic site in 2014 from the hourly measurements.

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

Site ID	Site Type	Within AQMA?	Valid Data Captu for period of monitoring %[a]	Valid Data Capture 2014	Annual Mean Concentration μg/m^3				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
Castlereagh Dundonald	Roadside	N (within 30M)	N/A	90	**41**	39	30	32	37

Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Automatic Monitoring Sites

The automatic station was installed in Dundonald in 2008 because of high results from NO_2 tubes at the Upper Newtownards Road site at Normandy Court. Results have been consistent at this site except for a slight decrease in 2012 and 2013 but this was probably due to climatic conditions rather than changes in emissions.

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

Site ID	Site Type	Within AQMA ?	Valid Data Captu for period of monitoring %[a]	Valid Data Capture 2014	Number of Exceedances of Hourly Mean (200 μg/m^3)				
					2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
Normandy Court Dundonald (AQMA)	Roadside	Y	N/A	90	0	5	3	0	5

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Diffusion Tube Monitoring Data

Results of the NO_2 diffusion tube sites, situated within the borough are shown below in Table 2.5. This includes four new sites established in 2014 following concerns by local residents of increased use of HGV traffic.
They are sited in accordance with the technical guidance LAQM.TG (09)
A diffusion tube co-location study has been carried out at the Dundonald automatic site. The results of this study were unable to be submitted into the national data base as the analytical lab changed mid-year. The 2014 local bias was **0.86**. A decision was made to apply this local figure, rather than the national figure of **0.835.**
All diffusion tube sites are below the objective.
Details of the QA/QC for the diffusion tubes and the reason for the use of the bias adjustment factor **0.86** can be found in Appendix A

The Newtonbreda Road site has been distance calculated in accordance with LAQM TG.(09). Details of how this was calculated is included in Appendix A..
Results from Sprucefield Court site have been elevated in 2014. Monitoring has been carried out at this site for a number of years as the M1 motorway runs behind the dwelling, levels have remained consistently below the objective. If levels continue to rise during 2015 Lisburn & Castlereagh City Council will carry out a detailed assessment.
Trends for the 16 diffusion tube sites within the Council area are shown in figure 2.16

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.86) 2014 (μg/m^3)
1	Normandy Court Dundonald (AQMA)	Roadside	Y	Triplicate	11 months	N/A	N	39
2	Newtonbreda Road Castlereagh	Roadside	N	single	11 months	N/A	Y	40**(33)**
3	Saintfield Road Carryduff	Roadside	N	single	11 months	N/A	N	17
4	Everton Drive Castlereag	Background	N	single	11 months	N/A	N	14
5	Cregagh Road Castlereagh	Roadside	N	single	11 months	N/A	N	24
6	Beechlawn Dunmurry	Roadside	N	single	12 months	N/A	N	27
7	Kingsway Dunmurry	Roadside	N	single	11 months	N/A	N	32
8	Ventnor Pk Lambeg	Background	N	single	12 months	N/A	NN	14
9	Antrim Rd Lisburn	Roadside	N	single	12 months	N/A	N	29
10	Benson Street Lisburn	Roadside	N	single	12 months	N/A	NN	29
11	Sloan Street Lisburn	Roadside	N	single	10 months	N/A	N	33

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.86) 2014 (μg/m^3)
12	Sprucefield Court Lisburn	Roadside	N	single	12 months	N/A	N	40
13	Harry's Road Culcavy	Roadside	N	single	12 months	N/A	N	18
14	Culcvavy Road Culcavy	Roadside	N	single	12 months	N/A	N	16
15	Hillsborough	Roadside	N	single	12 months	N/A	N	32
16	58-62 Main Street Moira	Roadside	N	single	12 months	N/A	N	28

(*) figure in red is the distance calculated figure

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m³				
			2010 (Bias Adjustment Factor = 0.84)	2011(b) (Bias Adjustment Factor =0.83, 0.71)	2012* (Bias Adjustment Factor = 0.75)	2013* (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.86)
1	Normandy Court Dundonald (AQMA)	Roadside	45	45	38	39	39
2	Newtonbreda Road Castlereagh	Roadside	36	22	42	**44** a(36)	40 a(33)
3	Saintfield Road Carryduff	Roadside	21	23	16	14	17
4	Everton Drive Castlereag	Background	20	18	14	13	14
5	Cregagh Road Castlereagh	Roadside	31	26	24	21	24
6	Beechlawn Dunmurry	Roadside	29	21	25	25	27
7	Kingsway Dunmurry	Roadside	34	30	30	28	32
8	Ventnor Pk Lambeg	Background	15	18	13	13	14
9	Antrim Rd Lisburn	Roadside	38	26	26	26	29
10	Benson Street Lisburn	Roadside					29

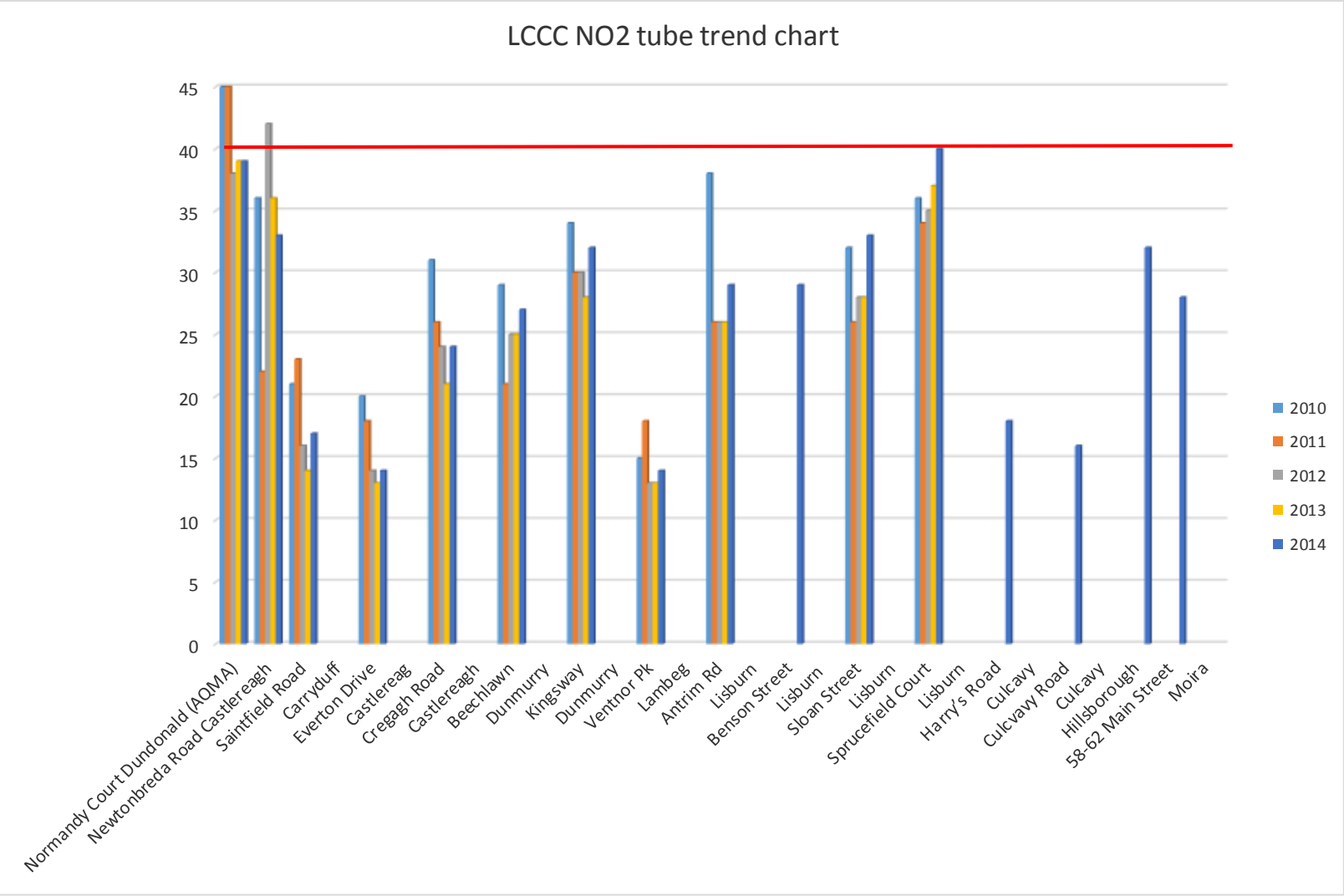
Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2010 (Bias Adjustment Factor = 0.84)	**2011(b) (Bias Adjustment Factor =0.83, 0.71)**	**2012* (Bias Adjustment Factor = 0.75)**	**2013* (Bias Adjustment Factor = 0.80)**	**2014 (Bias Adjustment Factor = 0.86)**
11	Sloan Street Lisburn	Roadside	32	26	28	28	33
12	Sprucefield Court Lisburn	Roadside	36	34	35	37	40
13	Harry's Road Culcavy	Roadside					18
14	Culcvavy Road Culcavy	Roadside					16
15	Hillsborough	Roadside					32
16	58-62 Main Street Moira	Roadside					28

(a) figure in red are the distance calculated figures

(b) different bias adjustment figure used for the previous Castlereagh sites from the Lisburn sites

Figure 2.16 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites

A trend chart may be inserted here. Please discuss any trends shown.



2.2.2 PM_{10}

Automatic monitoring of PM_{10} in 2014 was undertaken at Kilmakee Activity Centre, Rowan Drive, Dunmurry in the Lisburn City Council area and ratified by AQDM. This location is also the site for the AURN PAH and Black Carbon monitors, chosen for the high use of secondary solid fuel use.

From January to August measurements were recorded using an FDMS TEOM, from September to December this was reduced to TEOM only.
Summaries of this data, with regard to annual and hourly mean objectives, are presented below.

An FDMS TEOM monitoring $PM_{2.5}$ is installed alongside the PM_{10} analyser in 2014 results from this have also been included in the table below.
Results remain below the objective.

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

Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2010* [c]	2011* [c]	2012* [c]	2013* [c]	2014 [c]
Kilmakee Activity Centre (PM_{10})	Urban Background	N	100%	75%	Y	N/A	N/A	N/A	18	16
Kilmakee Activity Centre ($PM_{2.5}$)	Urban Background	N	100%	68.5%	N/A	N/A	N/A	N/A	12	11

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
* Optional

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

Site ID	Site Type	Within AQMA ?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2014 %[b]	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m³)				
						2010*[c]	2011*[c]	2012*[c]	2013*[c]	2014[c]
Kilmakee Activity Centre (PM_{10})	Urban Background	N	100%	75%	Y	N/A	N/A	N/A	5	0(25)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets
* Optional

Figure 2.5 Trends in Annual Mean PM_{10} Concentrations

PM_{10} has remained consistently low in Dunmurry

2.2.3 Sulphur Dioxide

Lisburn and Castlereagh City Council have an SO_2 automatic site situated at Kilmakee alongside the PM_{10} and PAH analysers, installed at the end of 2012. This site was chosen due to secondary high solid fuel use in the area, and it was adjacent to relevant exposure. There were no exceedences of the air quality objective in 2013 or 2014 results are shown in the table below.
The data has been fully ratified by AQDM.

Details of the QA/QC are available in Appendix A

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

Site ID	Site Type	Within AQMA?	Valid Data Capture fo monitoring Period %[a]	Valid Data Capture 2014 %[b]	Number of Exceedences (percentile in bracket μg/m³)[c]		
					15-minute Objective (266 μg/m³)	1-hour Objecti (350 μg/m³)	24-hour Objec (125 μg/m³)
Kilmakee Activity Centre Dunmurry	Urban Background	N	100	92.5	19	19	9

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).
[c] if data capture is less than 90%, include the relevant percentile in brackets

Figure 2.6 Trends in SO_2 Concentrations

Results have remained very low at this site.

2.2.4 Benzene

No monitoring of Benzene is carried out in 2014.

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 2014 are listed below:-

Date	$\mu Gy\ hr^{-1}$	$\mu Gy\ hr^{-1}$
	Derriaghy (96)	Carryduff (97)
April 2014	0.08	0.08
July 2014	0.08	0.07
October 2014	0.08	0.08

2.2.6 Summary of Compliance with AQS Objectives

Lisburn and Castlereagh City Council has examined the results from monitoring in the area. Concentrations outside of the AQMA are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

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

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

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

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

3.4 Junctions

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

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

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

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

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

5 Industrial Sources

5.1 Industrial Installations

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

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

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

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

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

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

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

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

6.2 Biomass Combustion – Combined Impacts

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

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

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

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

No monitoring sites at relevant exposure within the Council Area have shown exceedances of the air quality objectives, although Sprucefield Court NO_2 diffusion tube site was elevated in 2014. This site was identified and monitoring commenced in 2005, it is situated next to the M1 motorway. Results were consistently below the objective and became elevated in 2014, this may be due to remedial road works. Monitoring will continue in 2015 and a detailed assessment will be carried out in 2016 if levels remain high.

The NO_2 levels within the AQMA reduced in 2012 but have continued to remain below or close to the objective, the AQMA will remain in place until results show a trend of decreasing levels.

A new 520 space Park and Ride site was officially opened in Dundonald on 1st December 2014. Dundonald Park & Ride this forms a key part of the new Belfast Rapid Transit system which is scheduled to start services in 2017.
Lisburn & Castlereagh City Council expect this to assist in helping to reduce levels of NO_2 within the AQMA.

8.2 Conclusions from Assessment of Sources

No new sources were identified.

8.3 Proposed Actions

Lisburn & Castlereagh City Council has decided to continue the monitoring of SO_2, Nox, PM_{10}, Black carbon and PAH at Kilmakee Activity Centre in 2015. An application has been made to the DOE for continued funding.
Monitoring with NO_2 tubes will continue at key location, triplicate tubes will be placed at the Newtonbreda site to obtain a more accurate result.
A progress report will be submitted in 2016.

9 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
LCC 2013	Progress report submitted by Lisburn City Council to the Department of the Environment on local air quality
LCC 2014	Progress report submitted by Lisburn City Council to the Department of the Environment on local air quality

CBC (2000) Air quality report. Report prepared by the Environmental Health Department,

Castlereagh Borough Council (June 2000).

CBC (2003) Second/third stage review and assessment of local air quality. Interim Report prepared by the Environmental Health Department, Castlereagh Borough Council (December 2003).

CBC (2004) Third stage air quality review and assessment. Report prepared by the Environmental Health Department, Castlereagh Borough Council (July 2004).

Defra (2007) Evaluation of support provided by Defra and the Devolved Administrations to Local Authorities for air quality reviews and assessments (2004-2007). Report prepared for Defra and the Devolved Administrations by the Air Quality Management Resource Centre (Universityof the West of England) and Air Quality Consultants Ltd, May 2007.

EG (2007) Eastern Group Air Quality Progress Report. Annual report on air quality in the Eastern group of local authorities in Northern Ireland, April 2008.

EG (2008) Eastern Group Air Quality Progress Report. Annual report on air quality in the Eastern group of local authorities in Northern Ireland, April 2009.

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

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

USA (2006) Air Quality Update and Screening and Assessment. A report (ED 42019001 Issue 1) prepared for Castlereagh Borough Council by AEA Technology, May 2006.

USA (2009) Air Quality Update and Screening and Assessment. A report (ED 42019001 Issue 1) prepared for Castlereagh Borough Council by NPL

CBC (2010) Air quality progress report. Report prepared by the Environmental Health Department, Castlereagh Borough Council

CBC (2011) Air quality progress report. Report prepared by the Environmental Health Department,TG (2003) Part IV of the Environment Act 1995. Local Air Quality Management: Technical Guidance LAQM.TG(09). Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, February 2009.

Updating and Screening
Assessment (USA, 2012) Air Quality Update and Screening and Assessment. A report prepared by Castlereagh Borough Council
(CBC 2013) Air quality progress report. Report prepared by the Environmental Health Department, Castlereagh Borough Council

(CBC 2014) Air quality progress report. Report prepared by the Environmental Health Department, Castlereagh Borough Council

TG (2009) Part IV of the Environment Act 1995. Local Air Quality Management: Technical

Guidance LAQM.TG(09). Guidance prepared by the Department for Environment, Food and Rural Affairs and the Devolved Administrations, February 2009

Appendix A:

QA/QC Data of automatic sites

Lisburn City Council and Castlereagh Borough Council commissioned AQDM Technology to provide the QA/QC of the automatic measurements of NO_2 for the Lisburn Dunmurry and Dundonald A20 sites. 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 were carried out by NPL on a six monthly basis.
Supportingu were employed to service and maintain the analyser.

Automatic station reports produced by data management company

Produced by AQDM on behalf of Lisburn

LISBURN DUNMURRY Kilmakee Activity Centre 2014

These data have been fully ratified by AQDM to LAQM TG(09) standards

Air Quality Statistics (Kilmakee Activity Centre)

Pollutant	PM_{10}+	PM_{10}*	$PM_{2.5}$~	SO_2
Number Very High #	0		0	0
Number High #	0		0	0
Number Moderate #	0		3	0
Number Low #	272		244	32303
Maximum 15-minute mean	-	311 µg m^{-3}	112 µg m^{-3}	19 µg m^{-3}
Maximum hourly mean	162 µg m^{-3}	162 µg m^{-3}	112 µg m^{-3}	19 µg m^{-3}
Maximum running 8-hour mean	113 µg m^{-3}	113 µg m^{-3}	70 µg m^{-3}	13 µg m^{-3}
Maximum running 24-hour mean	53 µg m^{-3}	53 µg m^{-3}	51 µg m^{-3}	9 µg m^{-3}
Maximum daily mean	43 µg m^{-3}	43 µg m^{-3}	48 µg m^{-3}	8 µg m^{-3}
99.4th percentile of 15-minute means†	25 µg m^{-3}-		-	
90th percentile of hourly means†	25 µg m^{-3}-		-	
98.08th percentile of daily means†	35 µg m^{-3}		-	
Average	16 µg m^{-3}	16 µg m^{-3}	11 µg m^{-3}	1 µg m^{-3}
Data capture	75.5 %	75.5 %	68.5 %	92.5 %

Daily Air Quality Index (DAQI) as defined by COMEAP January 2012 and revised April 2013
† Percentile required for data capture < 90%
+ PM_{10} as measured by a FDMS using a gravimetric factor of 1 for January to August 2014 and TEOM using the VCM for indicative Gravimetric for September to December 2014
*PM_{10} as measured by a FDMS for January to August 2014 and TEOM for September to December 2014
~ $PM_{2.5}$ as measured by a FDMS
Mass units for the gases are at 20'C and 1013mb

Air Quality Exceedences (Kilmakee Activity Centre)

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Max Conc	Number	Days	Allowed	Exceeded

PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	43 µg m^{-3}	0	0	35 days	No
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	16 µg m^{-3}	0	-	-	No
$PM_{2.5}$ Particulate Matter *	Annual mean > 25 µg m^{-3}	11 µg m^{-3}	0	-	-	No
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	19 µg m^{-3}	0	0	35 15 mins	No
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	19 µg m^{-3}	0	0	24 hours	No
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	8 µg m^{-3}	0	0	3 days	No
Sulphur Dioxide	Annual mean > 20 µg m^{-3}	1 µg m^{-3}	0	-	-	No

* Not set in regulations

Produced by AQDM on behalf of Castlereagh

CASTLEREAGH DUNDONALD 2014

These data have been fully ratified by AQDM to LAQM TG(09) standards

Site Description

Near the Upper Newtownards Road but not quite classed as a roadside site

Air Quality Statistics (Dundonald)

Pollutant	NO_2	NO	NO_X
Number Very High #	**0**	**-**	**-**
Number High #	**0**	**-**	**-**
Number Moderate #	**5**	**-**	**-**
Number Low #	**7879**	**-**	**-**
Maximum 15-minute mean	**258 µg m^{-3}**	**651 µg m^{-3}**	**1253 µg m^{-3}**
Maximum hourly mean	**216 µg m^{-3}**	**551 µg m^{-3}**	**1054 µg m^{-3}**
Maximum running 8-hour mean	**154 µg m^{-3}**	**368 µg m^{-3}**	**716 µg m^{-3}**
Maximum running 24-hour mean	**110 µg m^{-3}**	**187 µg m^{-3}**	**387 µg m^{-3}**
Maximum daily mean	**108 µg m^{-3}**	**180 µg m^{-3}**	**374 µg m^{-3}**
Average	**37 µg m^{-3}**	**33 µg m^{-3}**	**86 µg m^{-3}**
Data capture	**90.0 %**	**90.0 %**	**90.0 %**

Daily Air Quality Index (DAQI) as defined by COMEAP January 2012 and revised April 2013
Mass units for the gases are at 20'C and 1013mb
NO_X mass units are NO_X as NO_2 µg m^{-3}

Air Quality Exceedences (Dundonald)

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Max Conc	Number	Days	Allowed	Exceeded
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	37 µg m^{-3}	0	-	-	No
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	216 µg m^{-3}	5	2	18 hours	No

QA/QC of Diffusion Tube Monitoring

From 1st January 2014 until the 30th June 2014 the NO_2 tubes were supplied by ESG (Environmental Scientific Group) in Didcot Oxfordshire, for Lisburn City Council and Castleregh Borough Council. 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

Factor from Local Co-location Studies

A co-location study was carried out at the Dundonald site and a decision was made to apply this bias adjustment factor **0.86** to all the NO_2 diffusion tubes. It was calculated
The bias adjustment factor calculation of these is shown below.
They were calculated using the R&A support precision and accuracy spreadsheet.

http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html
The lab changed mid-year therefore two separate calculations were calculated and an average of these taken.

Laboratory	**Dates**	**Bias**
Environmental Scientific Group	!st January 2014- 30th June2014	0.76
Worcestershire Scientific Services	1st July 2014- 31st December 2014	0.95
	Average	**0.8550**

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	14/01/2014	06/02/2014	60.8	59.7	56.6	59	2.2	4	5.4
2	06/02/2014	03/03/2014	46.0	52.2	47.1	48	3.3	7	8.2
3	03/03/2014	08/04/2014	49.6	54.6	41.2	48	6.8	14	16.8
4	08/04/2014	29/04/2014	49.7	43.3	51.2	48	4.2	9	10.4
5	29/04/2014	29/05/2014	41.2	44.1	42.0	42	1.5	4	3.7
6	29/05/2014	01/07/2014	22.2	29.0	18.9	23	5.2	22	12.8
7									
8									
9									
10									
11									
12									
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
41.8	99.8	Good	Good
34.4	99.8	Good	Good
36	99.5	Good	Good
35	99.4	Good	Good
30	99.9	Good	Good
27	87	Poor Precision	Good
Overall survey -->		Good precision	Good Overall

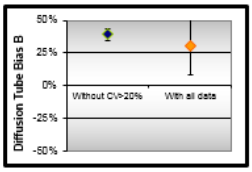
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 5 out of 6 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 5 periods of data
Bias factor A 0.72 (0.69 - 0.75)
Bias B 39% (34% - 44%)
Diffusion Tubes Mean: 49 µgm^{-3}
Mean CV (Precision): 7
Automatic Mean: 35 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 35 (34 - 37) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 6 periods of data
Bias factor A 0.76 (0.65 - 0.91)
Bias B 32% (10% - 54%)
Diffusion Tubes Mean: 45 µgm^{-3}
Mean CV (Precision): 10
Automatic Mean: 34 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 34 (29 - 41) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1									
2									
3									
4									
5									
6									
7	01/07/2014	01/08/2014	36.2	15.9	36.0	29	11.7	40	29.0
8	01/08/2014	01/09/2014	36.3	40.3	26.1	34	7.3	21	18.2
9	01/09/2014	02/10/2014	41.5	43.2	42.0	42	0.9	2	2.2
10	02/10/2014	30/10/2014	39.7	39.2	40.5	40	0.7	2	1.6
11	30/10/2014	04/12/2014	42.4	43.9	39.4	42	2.3	5	5.7
12	04/12/2014	30/12/2014	54.6	47.4	54.2	52	4.0	8	10.1
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
33	58.3	Poor Precision	Poor Data Capture
29	78.8	Poor Precision	Good
40	59.3	Good	Poor Data Capture
37	99.9	Good	Good
47.4	99.9	Good	Good
46.7	99.8	Good	Good
Overall survey -->		Poor precision	Poor Overall

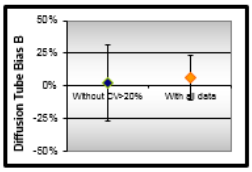
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 4 out of 6 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 3 periods of data
Bias factor A 0.98 (0.76 - 1.38)
Bias B 2% (-27% - 31%)
Diffusion Tubes Mean: 45 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 44 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 44 (34 - 62) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 4 periods of data
Bias factor A 0.95 (0.82 - 1.14)
Bias B 5% (-12% - 22%)
Diffusion Tubes Mean: 42 µgm^{-3}
Mean CV (Precision): 9
Automatic Mean: 40 µgm^{-3}
Data Capture for periods used: 95%
Adjusted Tubes Mean: 40 (34 - 48) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

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The national bias adjustment factor was also calculated taking an average from the two labs, Environmental Scientific Group and Worcestershire scientific services resulting in a figure of **0.80**

This figures can be found on the LAQM support web site
http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Discussion of Choice of Factor to Use

The national bias adjustment factor for Environmental Scientific Group/Worcestershire scientific services.is **0.80**
A decision was made to apply the local average bias adjustment figure of the two labs **0.86**

As LCCC has confidence in the QA/QC of the local study and the lab changed mid year this was deemed to be the more realistic figure.

Method used to distance calculate in accordance to current guidance

Technical Guidance LAQM.TG(09) Box 2.3

$C_z = ((C_y-C_b)/(-0.5476 \times Ln(D_y)+ 2.7171)) \times (-o.5476*Ln(D_z)+2.7171) + C_b$

C_z total predicted concentration at distance D_z

C_y total measured concentration at D_y = 40

C_b local background concentration = 14

D_y distance from kerb at which concentration was measured at Newtonbreda site = 2.5m

D_z distance from kerb concentrations are predicted ie. façade of nearest dwelling = 7.0m

$Ln(D_y)$ natural log = 0.916290732

$Ln(D_z)$ natural log = 1.94591015

C_z = 33.404