Lisburn & Castlereagh City Council

2017 Air Quality Progress Report

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

June 2017

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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 with two interim progress reports. The last updating and screening assessment of air quality was undertaken in 2015, this followed with a progress report in 2016. This is the 2017 progress report for Lisburn and Castlereagh City Council (LCCC) and has been completed using the recommended template. The report is fully compliant with the applicable policy and technical guidance.

This report identified no exceedances with relevant exposure, of the Air Quality Strategy objectives during 2016 for any of the pollutants assessed. NO_2 levels due to vehicle emissions is still the main source of concern within Lisburn & Castlereagh City Council (LCCC) and is also one of the main commuter belts of Greater Belfast. A number of diffusion tube sites were elevated in 2016 but LCCC has determined this is most likely due to the uncertainty of diffusion tubes rather than an increase in NO_2 levels. The real-time analyser with good data capture and accurate results showed a decrease in NO_2 in 2016.

Monitoring shall continue within the AQMA and throughout the Council area using NO_2 tubes to ascertain further trends. In 2017 the AQMA shall remain in the Dundonald area, as a continuing trend in a reduction of NO_2 has not been determined.

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1.1 Description of Local Authority Area

LCCC has a population of 141,200 and an area of approximately 200 square miles. The area is of urban rural character and the predominant wind direction is from the Southwest. It is bounded by a number of other council areas and has the largest boundary with Belfast City Council. This has made LCCC a very popular residential area due to the ease of the commute to Belfast City Centre. There are several main arterial routes into Belfast City centre through LCCC, and the Council is located within Belfast Metropolitan Transport plan. (www.infrastructure-ni.gov.uk/publications/belfast-metropolitan-transport-plan). Road transport remains one of the main concerns, however solid fuel use as a secondary fuel is still quite common in the Lisburn area.

Belfast Metropolitan Transport Plan Boundary

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) 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.

For Local Authorities in Northern Ireland, Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Northern Ireland** are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003, no. 342, and are shown in Table 1.1. This table shows the objectives in units of micrograms 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 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 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
Particulate matter (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

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. In September 2015 LCCC submitted an Update and Screening Assessment, reference was made in this report of the new boundaries and previous relevant reports, and a further progress report was submitted in 2016.

Figure 1.1 – Map of AQMA Location

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

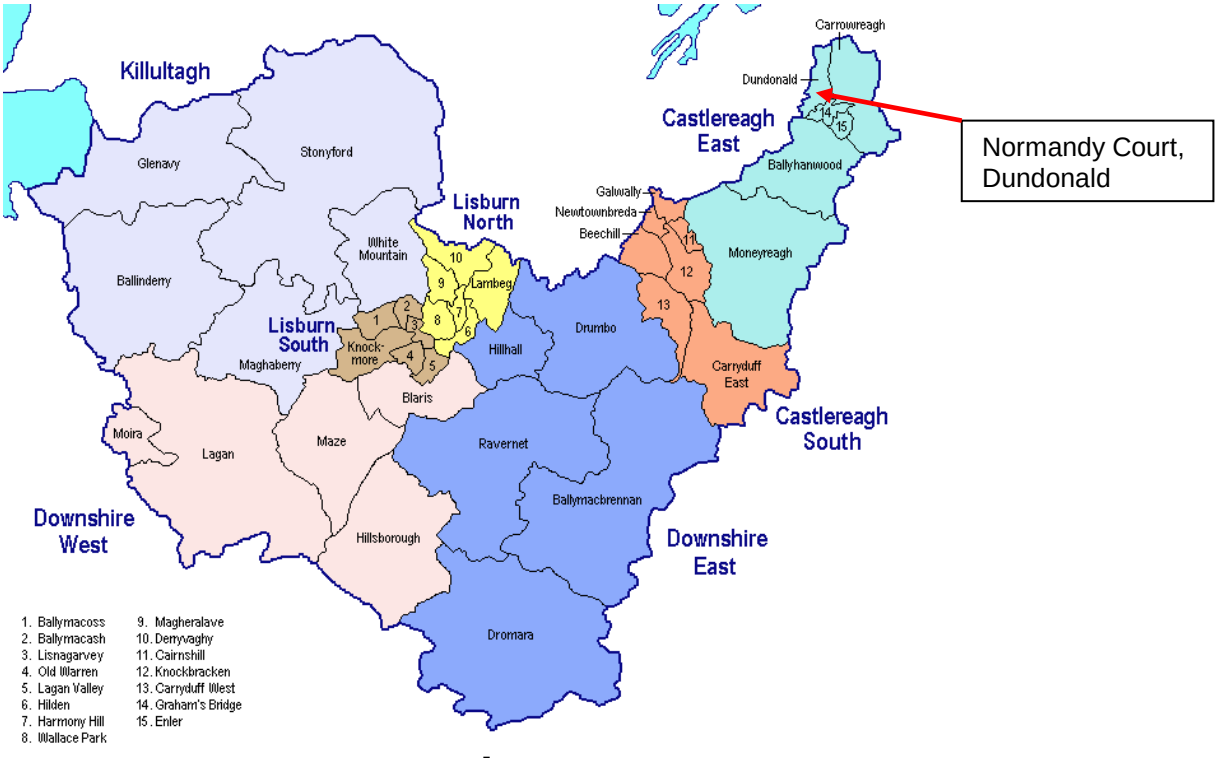
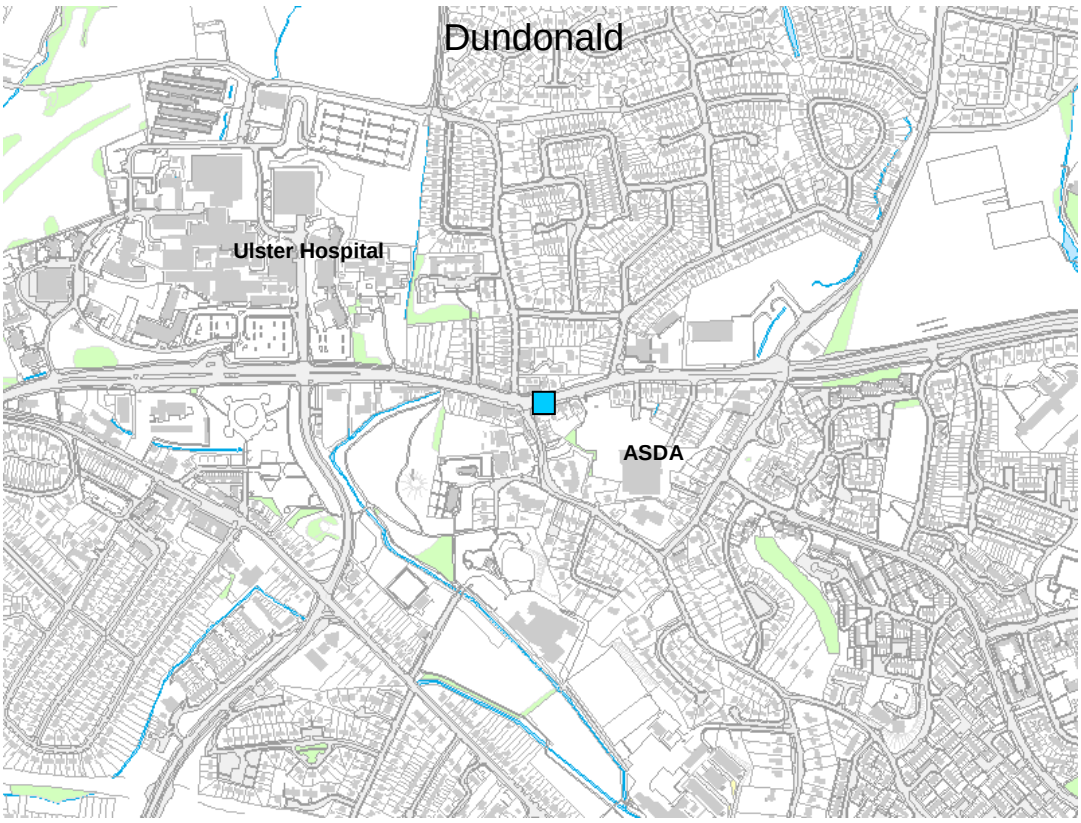


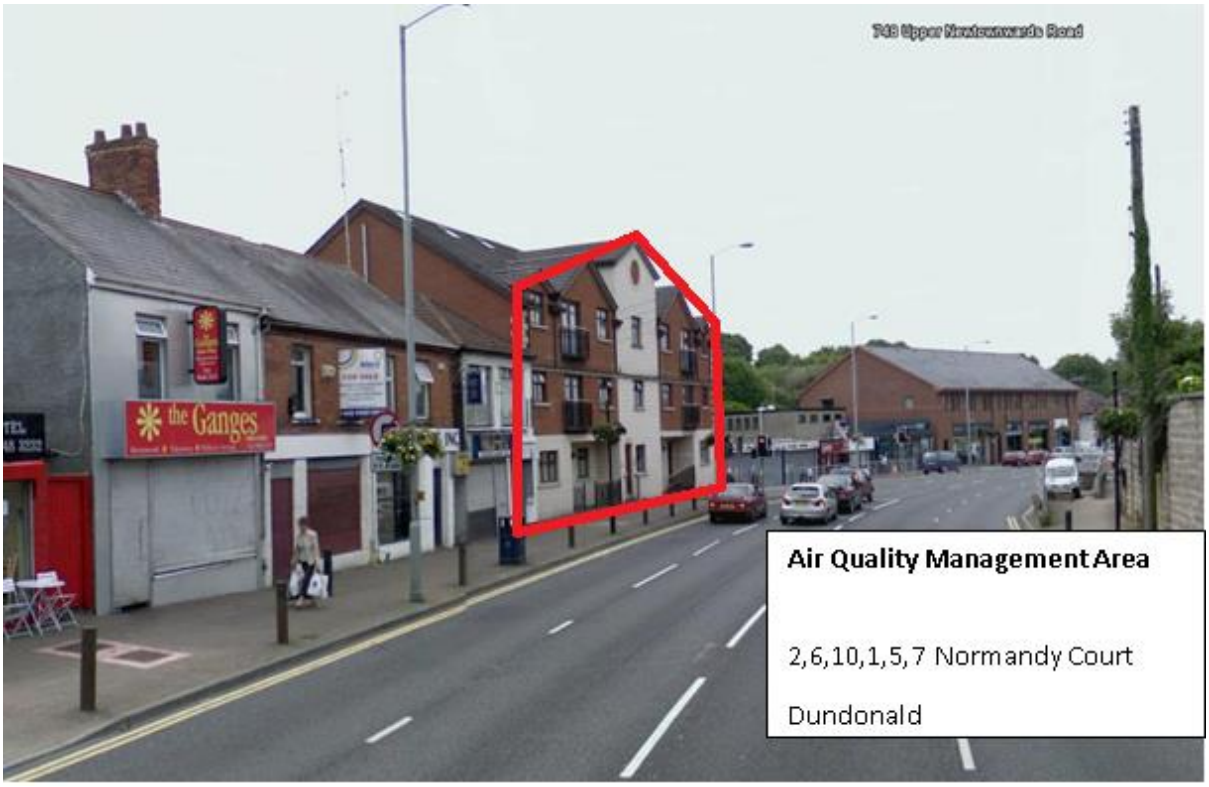
Figure 1.2 Map showing position of AQMA in Dundonald Village



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 Seymour Hill

Measuring SO_2 and PM_{10}, this site also houses a Defra network PAH and black carbon monitor and therefore meets the requirements for the AURN specifications. Data has been available from this site since Nov 2012. This site is now well established and the 2013 - 2016 data is included in this report.

Dundonald

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 submitted to the national data base for 2016 to be included in the June data.

Manual calibrations are carried out every two weeks by the Local Air Quality officer. AQDM (Air Quality Data Management) are employed to ratify and validate the data. A specialist engineer is employed to service and maintain the site as required. Results and correction factors are detailed in Appendix A.

Map(s) of Automatic Monitoring Sites

Figure 2.1 - Position of Automatic monitoring sites within LCCC

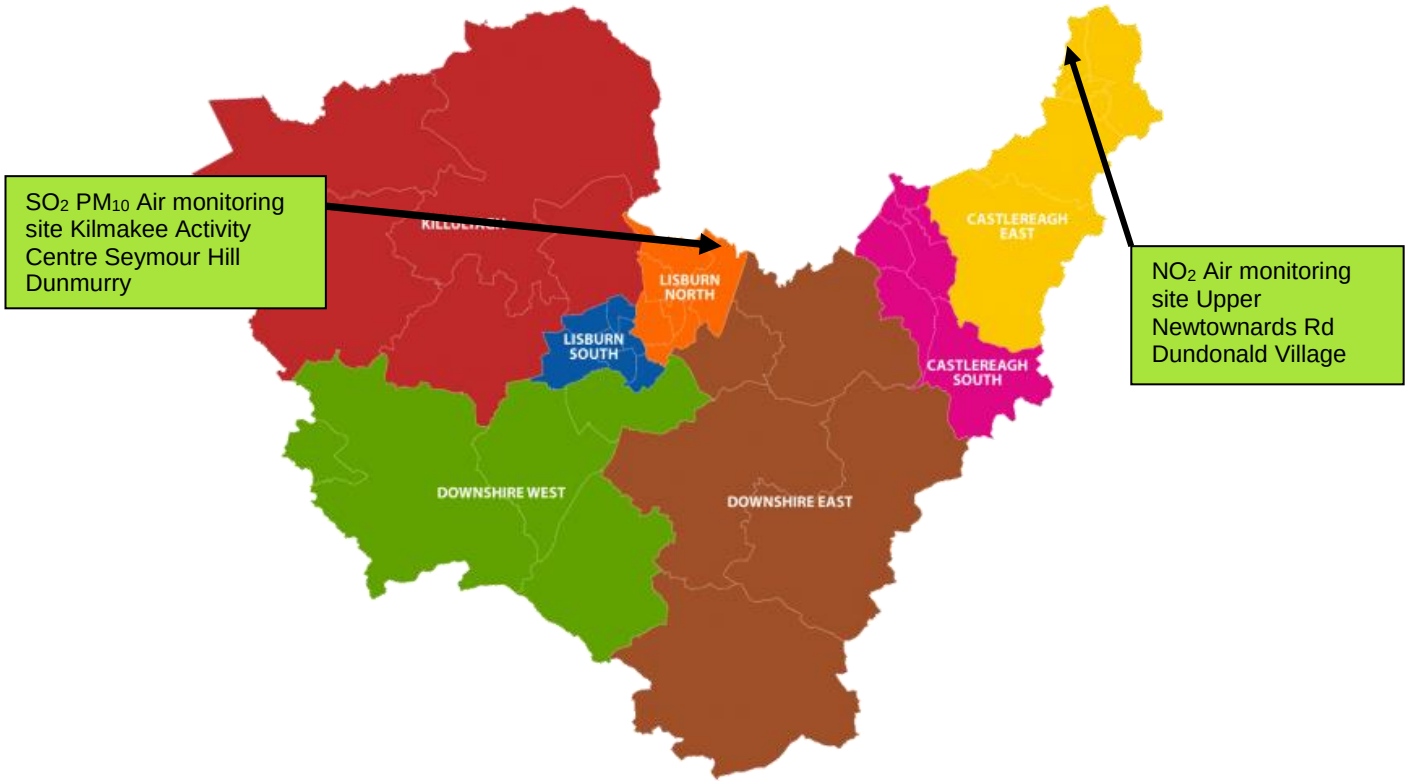


Figure 2.2 Position of Air monitoring site in Seymour Hill

▲ **Kilmakee Activity Centre Seymour Hill**

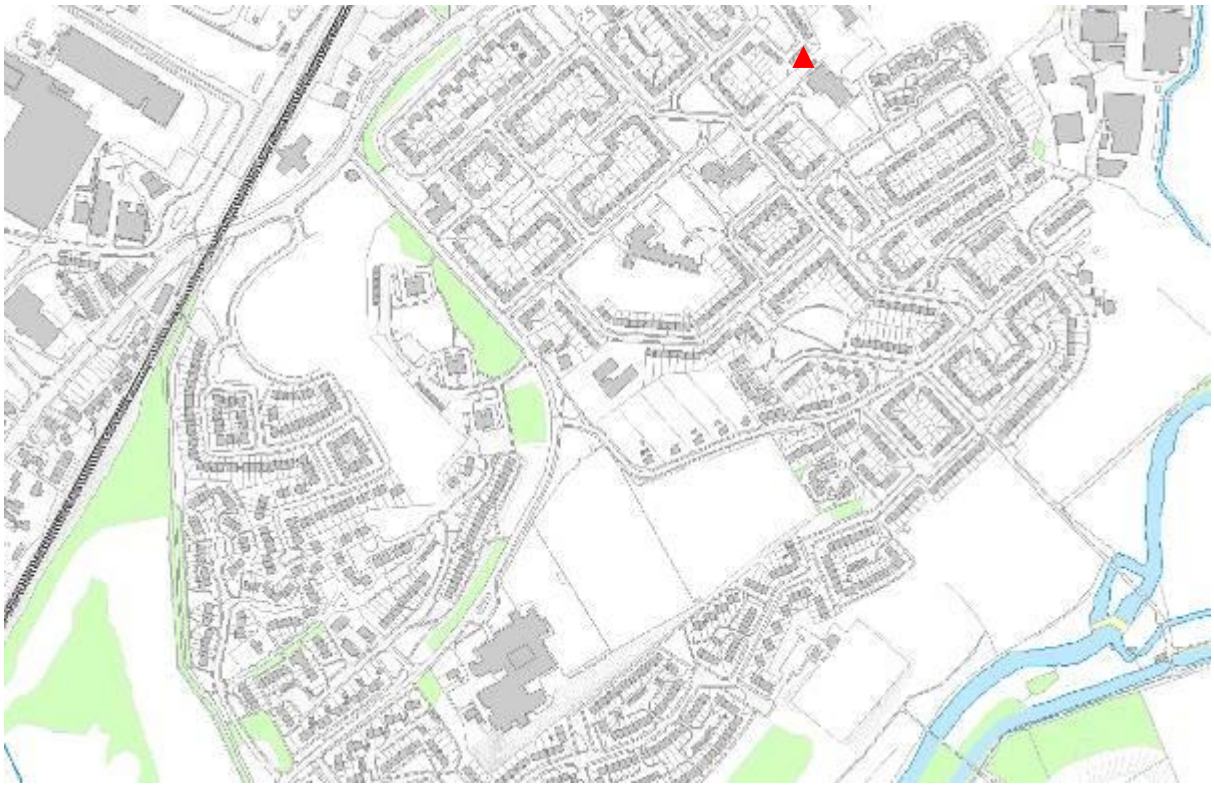


Figure 2.3 Position of Automatic Monitoring Site at Kilmakee Activity Centre

■ Air monitoring station

Figure 2.4 Picture of Automatic Monitoring Stations at Kilmakee Activity Centre

Figure 2.5 Position of automatic monitoring site in Dundonald Village

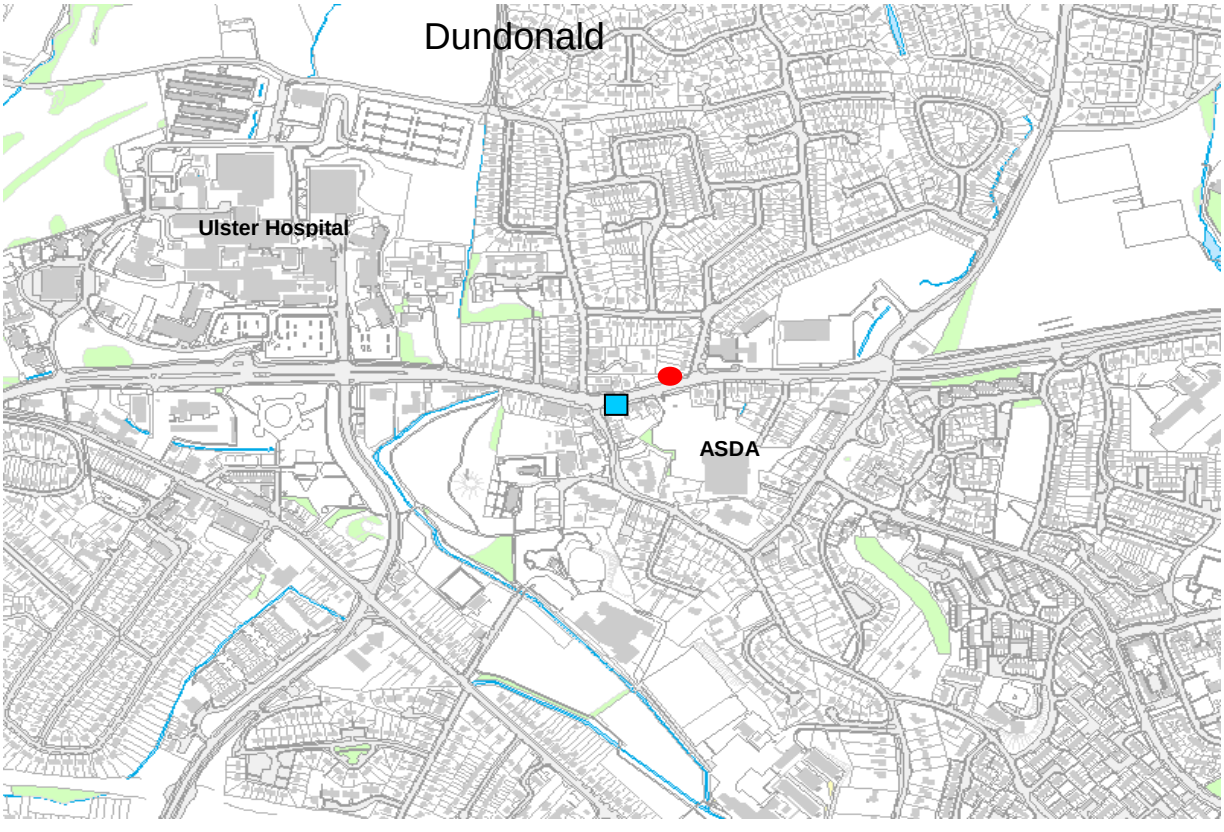


Figure 2.6 Picture of Automatic Monitoring Station in Dundonald Village

Table 2.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	Irish Grid Reference	Irish Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
	Kilmakee Activity Centre	Urban Background	E328956	N367973	**2.5**	PM_{10}, SO_2	NO	TEOM FDMS UV Analyser	YES 10m	NA	YES
	Dundonald Village	Roadside	E342016	N374041	**2.5**	NO_2,	NO	Chemiluminescence	YES 22m	3M	YES (30m from AQMA)

2.1.2 Non-Automatic Monitoring Sites

Lisburn and Castlereagh City Council in 2016 had 19 passive monitoring NO_2 diffusion tubes, at 12 roadside and background sites and a co-location study with the automatic station in Dundonald. Most are positioned along the main arterial routes into Belfast, triplicate tubes are positioned on the façade of Normandy Court within the AQMA and in April 2015 the single tube at Newtonbreda was changed to triplicate for improved accuracy, due to results being elevated since 2012. A co-location study is carried out at the automatic station in Dundonald. The results of this study were submitted into the national data base. The diffusion tube studies for the past five years do not show any particular trends. (See Fig. 2.16) All sites have showed a reduction in levels 2015, this is most likely to be as a result of mild climatic conditions, although the introduction of cleaner vehicles and the increasing use of the park & ride/share schemes established is also likely to be contributing.
http://www.translink.co.uk/Services/Other-Translink-Services/Park--Ride/Park--Ride-Locations/.
The results showed an increase in 2016 however there is no indication of increased traffic and the new Park & Ride has grown in popularity. The increase in the levels of NO_2 at all sites is possibly due to a combination of uncertainty of passive monitoring tubes and climatic conditions

The NO_2 diffusion tubes were supplied and analysed by Gradko Environmental.

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. No new sites were identified in 2016.

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

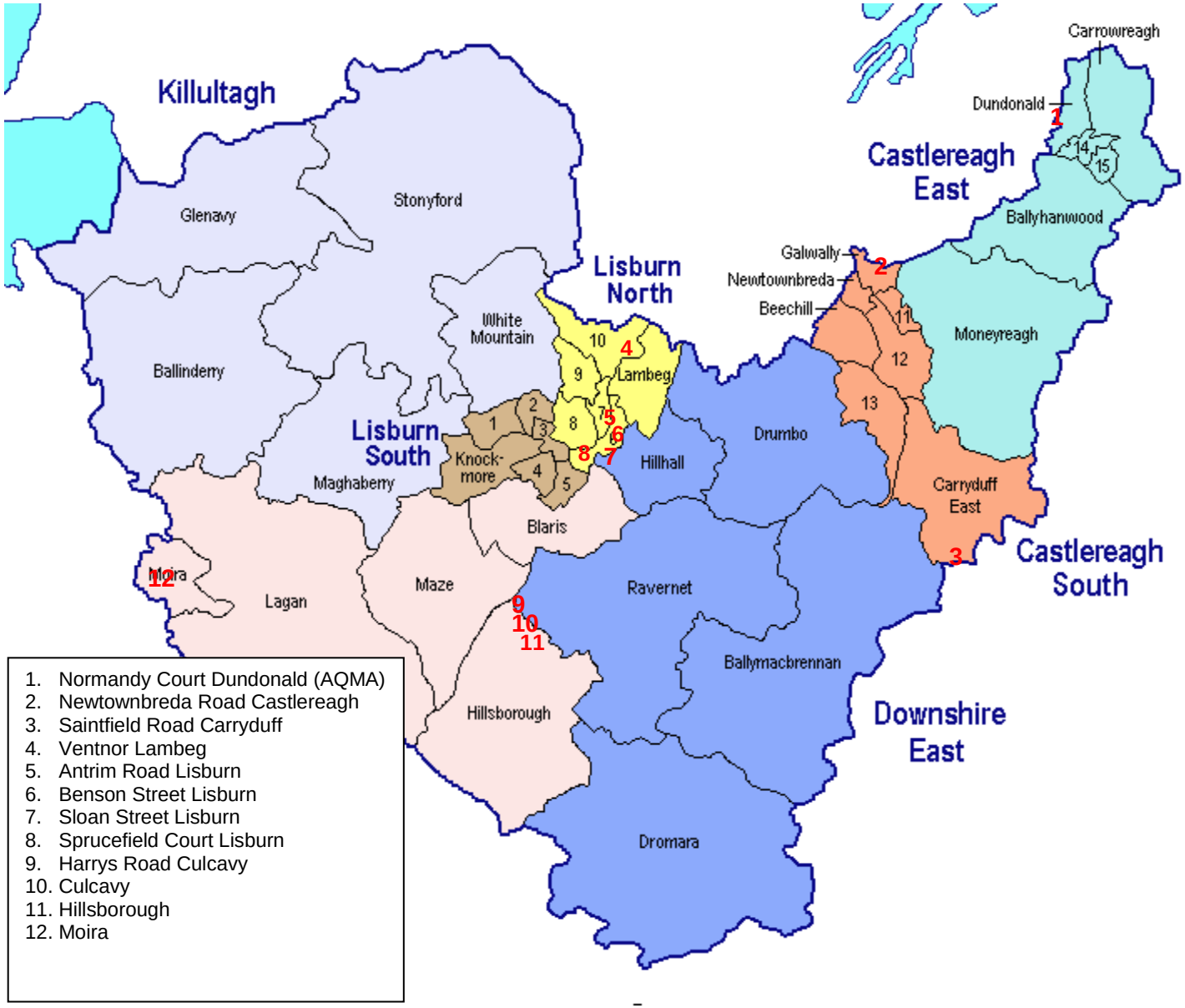


Figure 2.8 Position of tube 1. Dundonald village in AQMA

Figure 2.9 Picture of NO_2 Tubes in AQMA Normandy Court Dundonald

Figure2.10 Position of tubes Castlereagh area (Newtownbreda)

Figure2.11 Position of tube Carryduff

Figure2.12 Position of tube Lambeg

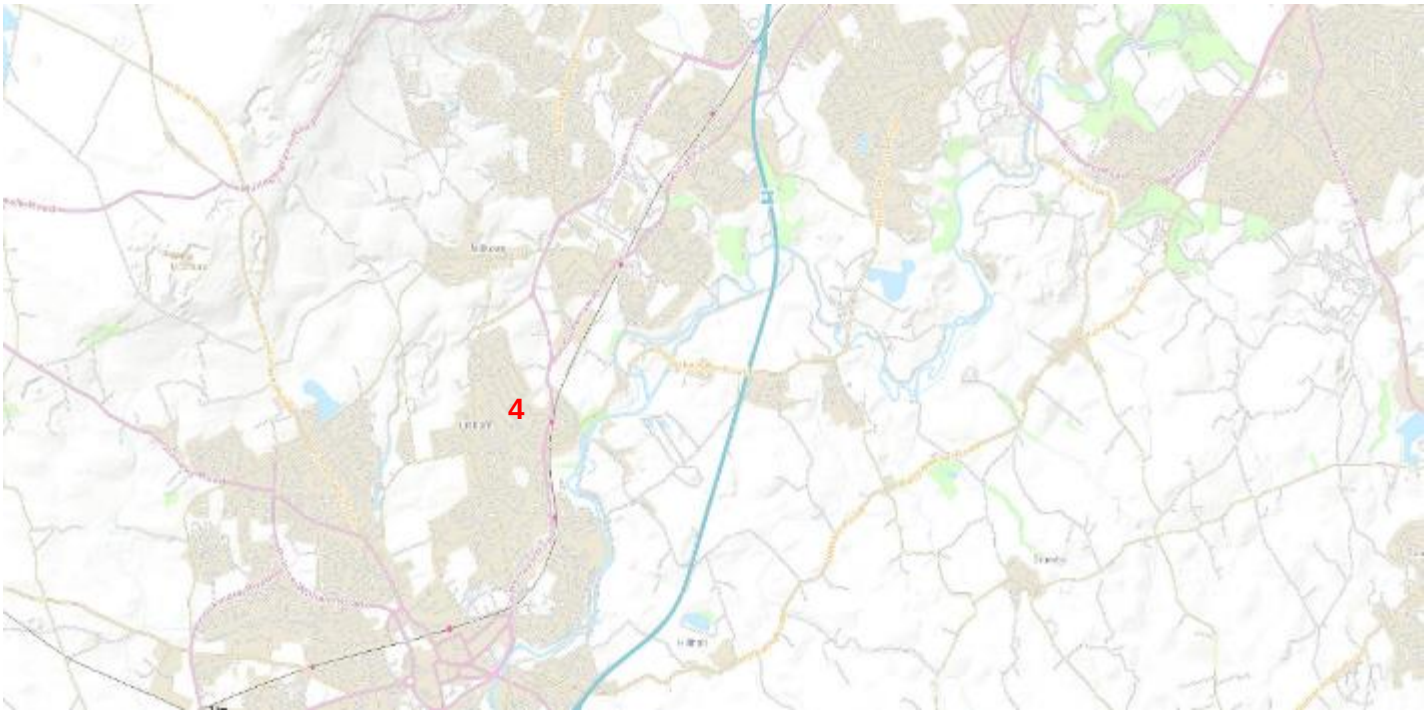


Figure 2.13 Position of tubes in Lisburn City

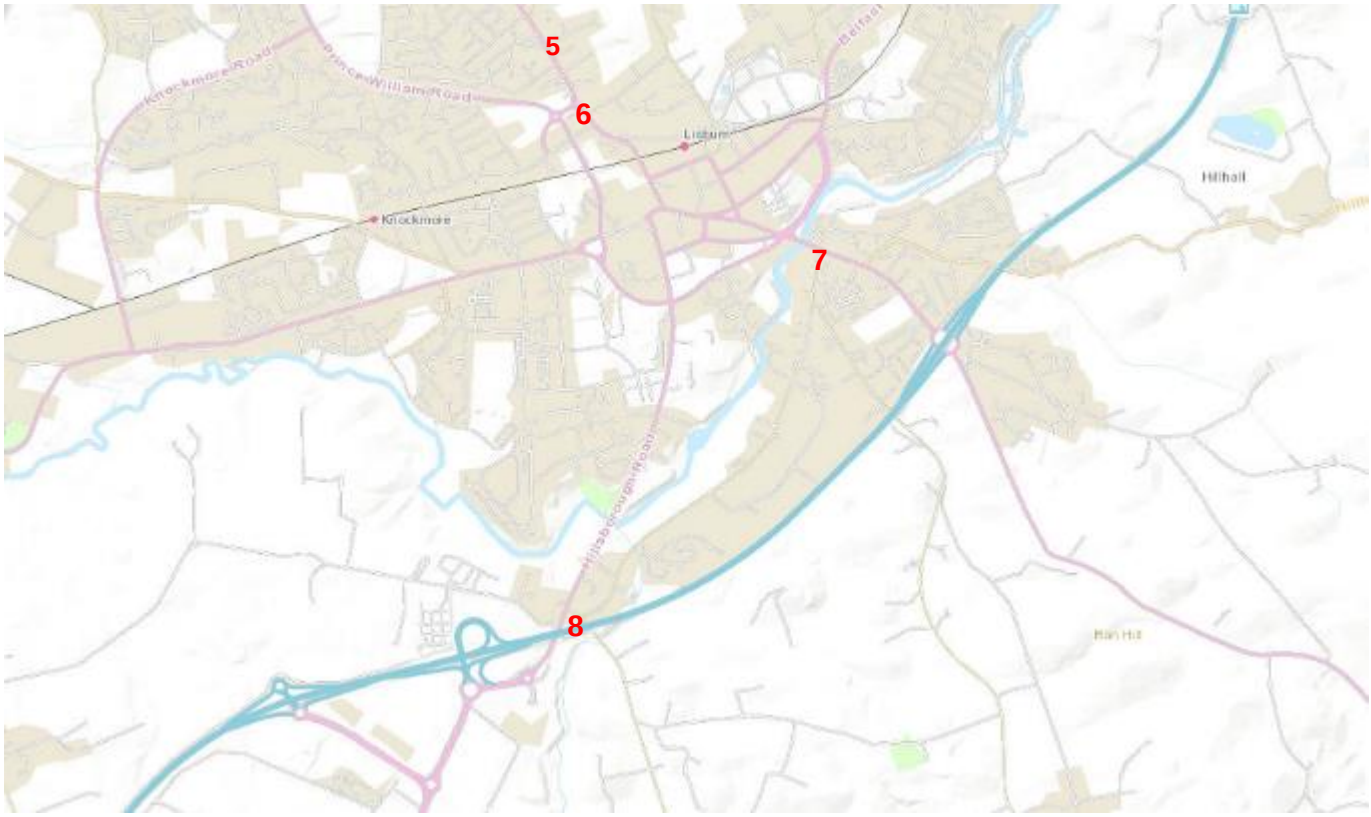


Figure 2.14 Map of tubes in Culcavy and Hillsborough

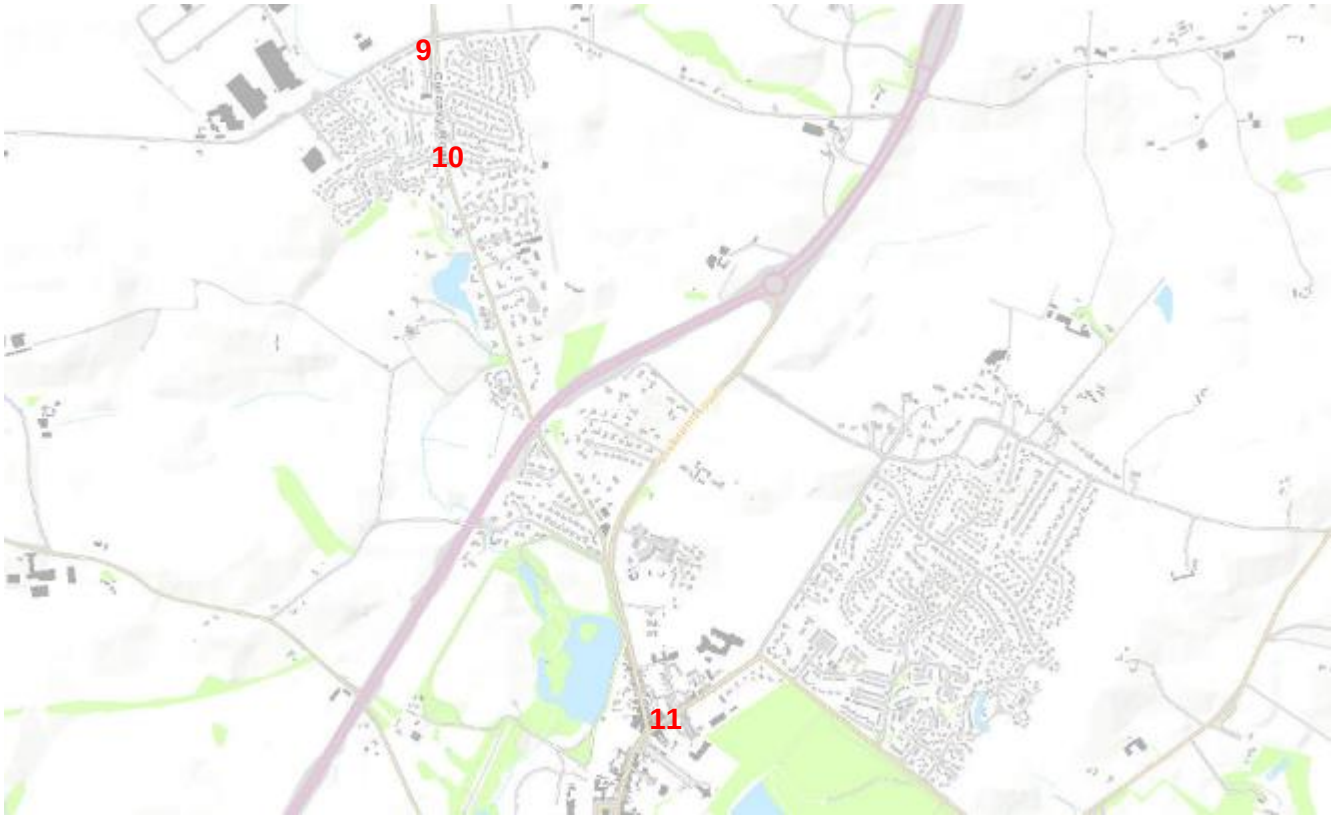


Figure 2.15 Position of tube in Moira

Table 2.2 – Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
1	Normandy Court Dundonald (AQMA)	Roadside	341991	374013	3m	NO_2	Yes	No	Yes (0m)	0.5m	Yes
2	Newtownbreda Road Castlereagh	Roadside	335246	370061	2.5m	NO_2	No	No	Yes (12m)	2.5m	Yes
3	Saintfield Road Carryduff	Roadside	336832	365625	2m	NO_2	No	No	Yes (70m)	10m	Yes
4	Ventnor Pk Lambeg	Background	326900	362013	2.5m	NO_2	No	No	No (6m)	0.5m	No
5	Antrim Rd Lisburn	Roadside	326313	364621	2.5m	NO_2	No	No	Yes (7m)	1m	Yes
6	Benson Street Lisburn	Roadside	326090	364619	2m	NO_2	No	No	Yes (0.1m)	Yes	Yes
7	Sloan Street Lisburn	Roadside	327236	364102	2.5m	NO_2	No	No	Yes (1.5m)	2m	Yes

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
8	Sprucefield Court Lisburn	Roadside	327586	363586	2m	NO_2	No	No	Yes (1m)	15m	Yes
9	Harry's Road Culcavy	Roadside	323811	360577	3m	NO_2	No	No	Yes (10m)	5m	Yes
10	Culcvavy Road Culcavy	Roadside	323849	360318	2.5m	NO_2	No	No	Yes (10m)	2m	Yes
11	Hillsborough	Roadside	324404	358876	2m	NO_2	No	No	Yes (0.1m)	1m	Yes
12	58-62 Main Street Moira	Roadside	314994	360589	3m	NO_2	No	No	Yes (4m)	1.5m	Yes

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 progress report. All monitored pollutant concentrations have been below their respective air quality objective limits at relevant exposure. In the following section results are presented for NO_2 at the automatic and diffusion tube sites and compared with the objective. All diffusion tube sites have shown an increase in 2016 although the automatic site shows a decrease.

2.2.1 Nitrogen Dioxide (NO_2)

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 2.3 presents the annual mean concentrations of NO_2 determined at the automatic site in 2016 from the hourly measurements.

Table 2.3 – Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

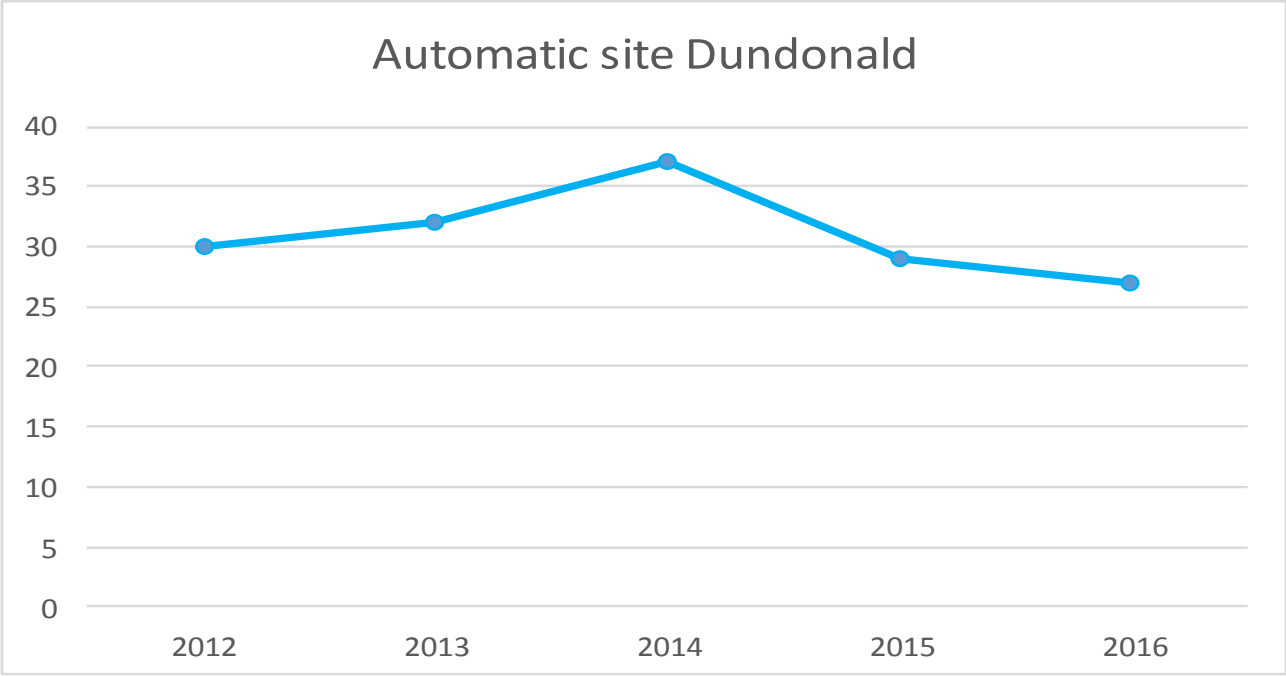
Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Annual Mean Concentration (µg/m^3)				
					2012	2013	2014	2015	2016
Castlereagh Dundonald	Roadside	N (within 30M)	N/A	99.8%	30	32	37	29	27

Table 2.4 – Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Number of Hourly Means > 200µg/m^3				
					2012	2013	2014	2015	2016
Normandy Court Dundonald (AQMA)	Roadside	Y	N/A	99.8%	3	0	5	0	0

Trends in Annual Mean NO_2 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. There was a noticeable reduction in 2015 and the trend has continued in 2016, this coincides with the opening of the Park & Ride in 2014.



Diffusion Tube Monitoring Data

Results at the NO_2 diffusion tube sites, situated within the council area are shown below in Table 2.5. They are sited in accordance with the technical guidance LAQM.TG (09)
A diffusion tube co-location study was carried out at the Dundonald automatic site. The results of this study have been submitted into the national data base. The 2016 local bias was **0.68,** which is low compared to 2014 (0.86) and 2015 (0.80). A decision has been made to apply the national bias adjustment factor of **0.92** as 27 studies are included, though there is also uncertainty with this figure as it is unusually high for Gradko the analytical laboratory. 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 **0.92** can be found in Appendix A

The Newtownbreda Road site which has been elevated since 2012 was changed from a single tube to triplicate in April 2015 to give a more accurate average. The 2016 results have again been distance calculated to the nearest relevant exposure to determine if a detailed assessment is necessary. The results showed a reduction from 40ug/m^3 to 33ug/m^3 bringing levels well below the objective.
Results from the Sprucefield Court site were elevated in 2014. Monitoring has been carried out at this site for a number of years as the M1 motorway runs behind the dwelling, and levels are elevated again in 2016, LCCC are investigating further monitoring sites in this area as there are proposals for further major development
The Normandy Court tube site within the AQMA in 2015 showed a reduction in NO_2, subsequent to new Park & Ride in Dundonald opening in December 2014, however results in 2016, although still below the objective showed an increase.
There is an uncertainty with diffusion tubes and in 2016 LCCC determined the elevated result within the AQMA may be due to this uncertainty as the automatic monitor 30 metres from the site showed a decrease at this time.
The Park & Ride is now well established and continues to grow in popularity, LCCC will continue to monitor NO_2 in Dundonald to establish further trends and levels within the AQMA.
Trends for the 12 diffusion tube sites within the Council area are shown in Figure 2.16

Table 2.5 – Results of NO_2 Diffusion Tubes 2016

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2016 (Number of Months or %) [a]	2016 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.92 (annual UK objective 40 µg/m^3)
1	Normandy Court Dundonald (AQMA)	Roadside	Y	triplicate	12 months	39
2	Newtownbreda Road Castlereagh	Roadside	N	triplicate	12 months	40 a(33)
3	Saintfield Road Carryduff	Roadside	N	single	9 months	17
4	Ventnor Pk Lambeg	Background	N	single	9 months	14
5	Antrim Rd Lisburn	Roadside	N	single	12 months	29
6	Benson Street Lisburn	Roadside	N	single	12 months	27
7	Sloan Street Lisburn	Roadside	N	single	11 months	34
8	Sprucefield Court Lisburn	Roadside	N	single	12 months	37
9	Harry's Road Culcavy	Roadside	N	single	11 months	20
10	Culcvavy Road Culcavy	Roadside	N	single	12 months	17
11	Hillsborough	Roadside	N	single	12 months	28
12	58-62 Main Street Moira	Roadside	N	single	12 months	30

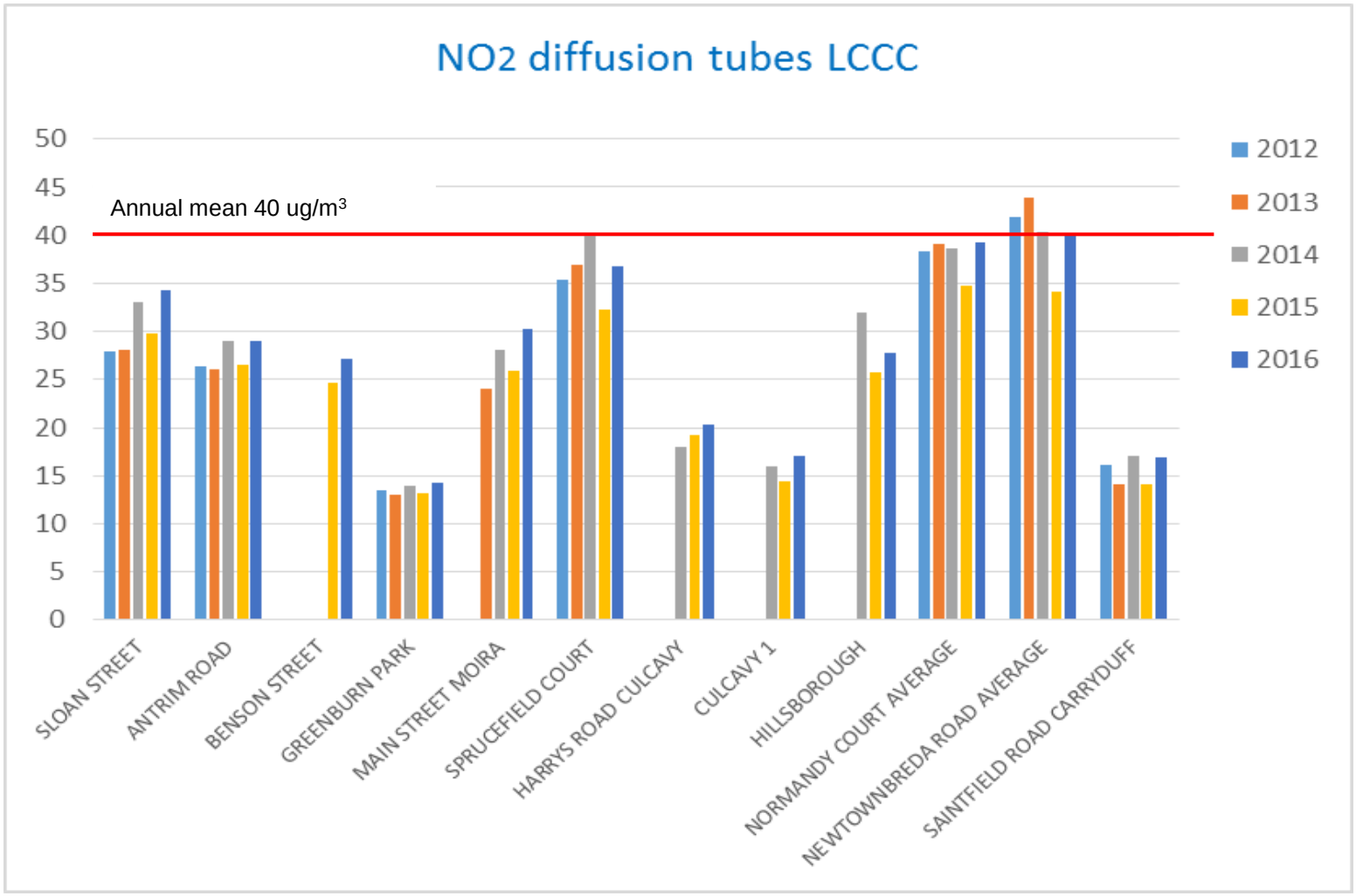
(a) figure in red are the distance calculated figures

Table 2.6 – Results of NO_2 Diffusion Tubes (2011 to 2016)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias [a]				
			2012 (Bias Adjustment Factor = 0.75)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.86)	2015 (Bias Adjustment Factor = 0.88)	2016 (Bias Adjustment Factor = 0.92)
1	Normandy Court Dundonald (AQMA)	Y	38	39	39	34.75	39
2	Newtownbreda Road Castlereagh	N	42	**44** a(36)	40 a(33)	34.10	40 a(33)
3	Saintfield Road Carryduff	N	16	14	17	14.03	17
4	Ventnor Pk Lambeg	N	13	26	14	13.12	14
5	Antrim Rd Lisburn	N	26	33	29	26.51	29
6	Benson Street Lisburn	N			29	24.62	27
7	Sloan Street Lisburn	N	28	28	33	29.81	34
8	Sprucefield Court Lisburn	N	35	37	40	32.27	37
9	Harry's Road Culcavy	N			18	19.19	20
10	Culcvavy Road Culcavy	N			16	14.43	17
11	Hillsborough	N			32	25.82	28
12	58-62 Main Street Moira	N			28	25.86	30

(b) figure in red are the distance calculated figures

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



2.2.2 Particulate Matter (PM_{10})

Automatic monitoring of PM_{10} in 2016 was undertaken at Kilmakee Activity Centre, Rowan Drive, Seymour Hill situated between Lisburn City and Belfast City.

This location is also the site for the AURN PAH and Black Carbon monitors, and was chosen due to the high use of secondary solid fuel use.

In 2016 measurements were recorded using a TEOM instrument, the results are ratified and adjusted accordingly by AQDM, the data management company. Summaries of this data, with regard to annual and hourly mean objectives, are presented below.

All results remain below the objective.

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

Site ID	Site Type	Within AQMA ?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
						2012	2013	2014	2015	2016
Kilmakee Activity Centre (PM_{10})	Urban Background	N	N/A	98.7%	Y	N/A	18	16	14	12

Figure 2.5 – Trends in Annual Mean PM_{10} Concentrations

PM_{10} has remained consistently low in Dunmurry

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 2016 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
						2012	2013	2014	2015	2016
Kilmakee Activity Centre (PM_{10})	Urban Background	N	N/A	98.7%	Y	N/A	5	0	0	2

2.2.3 Sulphur Dioxide (SO_2)

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 is adjacent to relevant exposure. There were no exceedences of the air quality objective in 2016.

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 for SO_2: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2016 % [b]	Number of exceedances:		
					15-minute Means > 266µg/m^3	1-hour Means > 350µg/m^3	24-hour Means > 125µg/m^3
Kilmakee Activity Centre Dunmurry	Urban Background	N	99.9	99.9%	0	0	0

Figure 2.6 – Trends in SO_2 Concentrations

Results have remained very low at this site.

2.2.4 Benzene

No monitoring of Benzene was carried out in 2016.

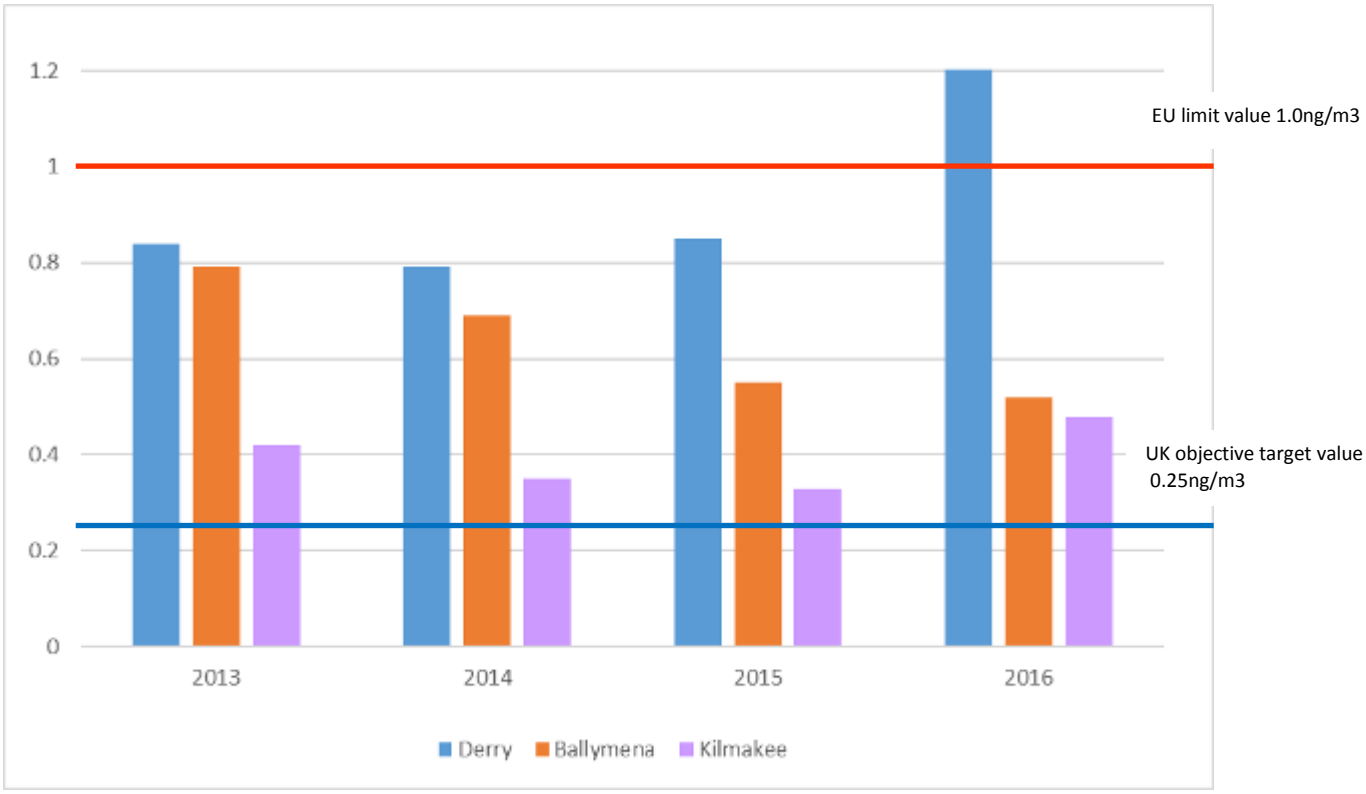
2.2.5 Other Pollutants Monitored

Polycyclic aromatic hydrocarbons (PAH)

The national network monitoring for PAH includes three monitoring sites in Northern Ireland, Kilmakee Activity Centre, Seymour Hill in LCCC is one of these. The UK National Air Quality Objective for PAH is an annual average of 0.25ng /m3, the EU limit value for PAH is an annual average of 1ng BaP/m3. The Kilmakee site is below the EU objective but over the UK non-mandatory objective. Results have shown an increase in 2016 which is most probably climatic as the Derry site showed a similar percentage increase and there have been no new local developments.

The following table shows the results 2013 - 2016.

Site	2013 ng/m^3 annual mean	2014 ng/m^3 annual mean	2015 ng/m^3 annual mean	2016 ng/m^3 annual mean
Derry	0.84	0.79	0.85	1.29
Ballymena	0.79	0.69	0.55	0.52
Kilmakee	0.42	0.35	0.33	0.48



Radiation Monitoring

Radiation monitoring has been carried out in Lisburn & Castlereagh City Council on a quarterly basis the 2016 results are shown in the table below:

Site	01/01/2016 Gy hr-1	27/04/2016 Gy hr-1	05/08/2016 Gy hr-1	04/11/2016 Gy hr-1
Derriaghy (96)	-	0.08	0.07	-
Carryduff (97)	-	0.07	0.07	-
Glenavy (79)	-	-	-	0.07
Dundrod (80)	-	-	-	0.06

2.2.6 Summary of Compliance with AQS Objectives

Lisburn and Castlereagh City Council has examined the results from monitoring in the area.

Concentrations within the AQMA (Normandy Court, Dundonald) are not exceeding the objective for NO_2 in 2016. LCCC shall continue to monitor levels within the AQMA in 2017.

Concentrations outside of the AQMA are all below the objectives at relevant exposure, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

Lisburn & Castlereagh City Council confirms that there are no new or newly identified local developments in 2016 which may have an impact on air quality within the Local Authority area.

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

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

4 Planning Applications

The following planning applications were commented on by the Environmental Health department in relation to Air Quality

Air quality assessments completed

1. LA05/2016/0700/O - Site for a new cemetery including ancillary reception building, maintenance depot, attenuation pond, bridges, new vehicular access, parking, waste water treatment works, associated infrastructure works and demolition of existing farm buildings. Land North of No. 10 Quarterland Road sandwiched between Carnaghliss Road and Quarterland Road, Dundrod (29/07/16)

   No issues identified

2. LA05/2016/1245/F- Proposed demolition of existing buildings and construction of mixed use development of 2506 m2 retail sales area, 188 m2 office units, ancillary accommodation, 20 no apartments (4 x 1 bed, 15 x 2 bed, 1 x 3 bed) and associated car parking and landscaping. Carryduff Shopping Centre, Church Road, Carryduff (04/01/17)

   No issues identified

Significant application

3. Y/2009/0303/RM - Residential development of 510 dwellings at lands surrounding 9 Millmount Road. Re-consultation (15/03/16)

   AQ report requested but not provided

4. LA05/2016/0451/PAD - Proposed change of use from vacant industrial/commercial site to crematorium with associated car parking and landscaping at 0-25 City Business Park, McKinstry Road, Dunmurry BT17 9HU (13/05/16)

   AQ report requested at the subsequent planning stage

5. LA05/2016/0668/PAD - Proposed cemetery extension to approved cemetery at lands opp 9 Lisburn Road, Moira (bound by Lisburn Road and Lisnabilla Road) (06/07/16)

   AQ report requested at the subsequent planning stage

6. LA05/2016/1078/F - Biogas combined heat and power engine unit (500KW) and associated plant involving gas decompression unit, clean and waste oil storage tanks and 3 no gas ISO containers (in substitution for S/2013/0590/F). Bombardier Aerospace, Dunmurry Industrial Estate, Belfast, BT17 9DH (24/11/16)

   AQ issues addressed

7. LA05/2017/0531/DETEIA - Proposed mixed use development to include new housing (1300 dwellings) and commercial floorspace (770000 sq ft) 1.6km M1-Knockmore link road, riverside parkland and ancillary works. Lands at Blaris, Lisburn. (16/06/17)

   AQ report requested within Environmental Statement

8. LA05/2017/0530/DETEIA - Construction of a new link road (1.6km) connecting the existing M1/A101 roundabout to existing Moira/Knockmore Road junction Lands between the existing M1/A101 roundabout and existing Moira/Knockmore Road Junction. (16/06/17)

   AQ report requested within Environmental Statement

5 Local Transport Plans and Strategies

Lisburn & Castlereagh City Council falls within the Belfast Metropolitan Area Plan and therefore the Belfast Metropolitan Transport plan, https://www.infrastructure-ni.gov.uk/publications/regional-strategic-transport-network-transport-plan-2015 This included the development of the Belfast Rapid Transport System with one of the routes leading from the new Park & Ride in Dundonald into Belfast City Centre.

Department for Regional Development
www.drdni.gov.uk

Objectives of BRT

The Department for Regional Development is implementing the first phase of the new Belfast Rapid Transit (BRT) system which will help to address the current and future transport needs in Belfast and support sustainable economic growth and regeneration.

BRT will provide a modern, safe, efficient and high quality public transport service which will encourage people to travel by public transport instead of by car. It will help to integrate communities and link people to jobs, shops, leisure, health and education services. The first phase of BRT will connect East Belfast, West Belfast and Titanic Quarter via the city centre.

Belfast Rapid Transit

Key Features of BRT

Services

- Operating approximately 05:30 - 23:30 weekdays and later at weekends subject to demand.
- Faster and more reliable journey times with high frequency services.
- Integration with other forms of transport and other public transport services.
- Direct services between East and West Belfast.
- Replace Metro 4 and 10 services with feeder services connecting to residential areas in the Dundonald & Colin Areas.

Vehicles

- Modern high capacity buses with easy access.
- High quality passenger environment with advanced ticketing and information systems.
- Advanced hybrid engine technology producing less noise and emissions.

Halts and interchanges

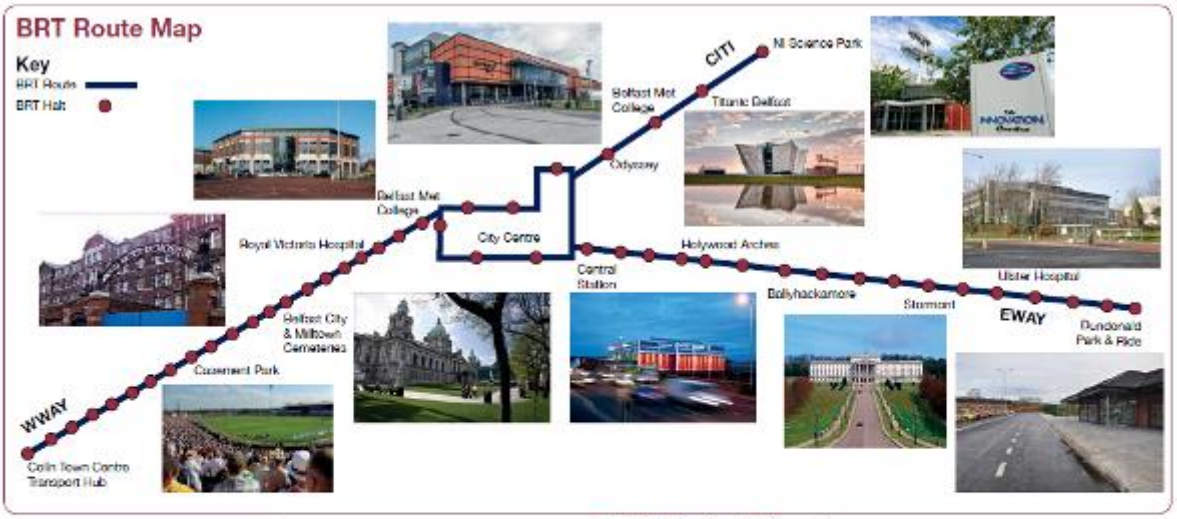
- High quality materials and appearance.
- Real time passenger information.
- CCTV for safety and security.
- Facilate easier boarding.
- Ticket machine and validator.
- Spaced approximately 400m apart on the routes.

Bus lanes

- Extensive bus lanes along the routes with anticipated operating hours of 07:00 – 19:00hrs, Monday to Saturday.
- Traffic lights giving priority for BRT vehicles at junctions.
- Improved pedestrian crossing facilities.
- Improved road surfaces for smoother journeys.

Fares and fare collection

- Use of Smartcard and new technologies.
- Off-board ticketing integrated with other public transport services.
- Concessionary fares will apply.



The Routes

CITI route - from the city centre, via Queen Elizabeth Bridge, along Queen's Quay and Queen's Road to Titanic Quarter, returning via Queen's Road, Queen's Quay, Station Street, Bridge End and Queen's Bridge.

EWAY route - from the city centre along Albertbridge Road and Upper Newtownards Road to a new park and ride site at Dunlady Road in Dundonald.

WWAY route - from the city centre along Divis Street, Falls Road, Andersonstown Road and Stewartstown Road to McKinstry Road Roundabout via a new transport hub at Colin Town Centre.

BRT Project Timeline

2013 - 2014

Detailed Design

Start work on routes and Park & Ride facilities

[This will include road widening and resurfacing along sections of the route]

2015-2018

Finish work on routes and Park & Ride facilities

Introduce bus lanes

[Bus lanes will gradually operate during morning and evening rush hours until 2018 when they will convert to 12 hour operation]

Finalise operations plan

Purchase BRT vehicles

Install halts

2018

BRT operational

6 Implementation of Action Plans

LCCC Updating and Screening Assessment 2015 explained the amalgamation of local authorities in Northern Ireland, and how LCCC was made up from the previous council areas of Lisburn City and Castlereagh Borough with a substantial portion moving into Belfast City Council.

Castlereagh Borough Council declared the AQMA within LCCC area in Dundonald village (apartments Normandy Court), in January 2011 and an Air Quality Action plan was submitted to the Department.

A survey carried out by TransportNI indicated the Park & Ride situated east of the AQMA in Dundonald could have a possible reduction in road traffic vehicles by 20%. The reduction in 2015 of NO_2 was 10.8% within the AQMA, and a 12% increase in 2016. However NO_2 tubes are used to monitor levels within the AQMA and in 2016 there is an uncertainty with the bias adjustment factor, explained in Appendix A. The automatic site located between the AQMA and the Park & Ride showed a 6.9% reduction in 2016 of NO_2 and LCCC has confidence in the data from this site with 99.8% fully ratified data capture. Monitoring shall continue within the AQMA to enable further trends to be established.

The secure Park & Ride pictured below opens at 6.30 am and is locked at 7.30 pm, however there is an unsecured area where access is available 24 hours.

Figure 2.17 Pictures of the new Park & Ride Dundonald


dundonald
park & ride.
Operating every 15 - 20 minutes during peak times,
Monday - Friday • 7am - 7pm.
Park FREE and
travel from
£3.00*
per day
* £3.00 a day (two single smartlink journeys at £1.50 each)
smartLink
adult
A
Translink
Plan your journey or download a timetable: translink.co.uk
Download the app 'Translink NI' from Google Play & App Store
Translink Contact Centre: 028 90 66 66 30
let's go together
translink.co.uk
Translink


dundonald
park & ride.
Dundonald Park & Ride Departure Points
Belfast City Centre Departure Points
Other Services
From Dundonald Park & Ride
Service Time
4X 0708
4X 0728
4X 0748
4X 0808
4X 0828
4X 0848
4X 0913
7 1005
7 1105
7 1205
7 1305
7 1405
4X 1513
4X 1613
From Belfast City Centre
Service Time
7 1135
7 1235
7 1335
4X 1403
4X 1513
4X 1553
4X 1623
4X 1653
4X 1713
4X 1843
Plan your journey or download a timetable: translink.co.uk
Download the app 'Translink NI' from Google Play & App Store
let's go together
translink.co.uk
Translink

Figure 2.18 Secured area of the Park &Ride

Figure 2.19 Unsecured area of the Park &Ride

Table 9.1 – Action Plan Progress

Action Plan Measure	Lead Authority	Original Timescale	Implementation	On Target	Comments
1.LCCC to investigate using cleaner more sustainable vehicles	Lisburn & Castlereagh City Council	July 2014	No. of vehicles purchased meeting EURO 5 standard rating. Purchase of electric vehicles for trial use within Environmental Health.	Yes	LCCC continues to only purchase vehicles meeting EURO 5 classification. Two electric vans purchased in 2012 and charging points installed for use within the Environmental Health department.
2.Continue to provide Eco bus driver training	Translink	On-going	No of drivers trained and devices fitted	Yes	All drivers have received Eco-Driving Training and Eco-Driving is a continual part of their CPC training.
3.Continue to purchase EURO 5 Classified vehicles and sustainable transport methods	Translink	On-going	Continue to upgrade vehicles	Yes	Translink continue to upgrade their vehicles and consider more sustainable transport links
4.LCCC to introduce/Encourage Sustainable travel	Lisburn & Castlereagh City Council	September 2013	Production of Green Travel Plan		Castlereagh Borough Council's Travel Plan has included: • Bike to Work Scheme
5.Park & Ride Scheme	TransportNI	June 2014	Park & Ride Scheme Implemented	Yes	The Park & Ride opened in Dundonald in December 2014 and has grown in popularity in 2015-16, levels of NO_2 have continued to reduce at the automatic site..
6. Comment on planning applications to ensure that all relevant air quality issues are highlighted and mitigation measures are considered wherever possible	Lisburn & Castlereagh City Council	On-going	No. of plans commented on	Yes	Environmental Health comments on all planning applications in respective any loss of amenity and includes Air quality issues, requesting an air quality assessment when necessary.
7.Promote Sustainable initiatives in conjunction with Travelwise NI	Travelwise NI	On-going	Initiatives undertaken	Yes	LCCC have been working with Travelwise NI in relation to Bike to Work Week and walk to school initiatives.

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

All monitoring at relevant exposure sites within the Council Area have shown an increase in NO_2 although there was no exceedances of the air quality objectives in 2016. Lisburn & Castlereagh City Council will continue monitoring at key locations in 2017 and submit an Update and screening report in 2018.

The NO_2 levels within the AQMA reduced in 2015, this coincided with the opening of the new 520 space Park & Ride site in Dundonald on 1st December 2014. Dundonald Park & Ride forms a key part of the new Belfast Rapid Transit system which is scheduled to start services in 2018. This was a positive early indicator for reduced vehicle emissions in Dundonald village. Levels at the automatic site on the Upper Newtownards Road west towards Belfast City of the Park & Ride have continued to show a reduction. However the results from the NO_2 diffusion tubes within the AQMA 30M west of the automatic site show an increase, Lisburn & Castlereagh City Council shall continue monitoring at this location in 2017 to establish a further trend in NO_2 levels.

7.2 Conclusions relating to New Local Developments

Lisburn & Castlereagh City Council have assessed the NO_2 diffusion tube sites and will make the following changes in 2017.

It is proposed in 2017 all existing monitoring sites continue except for the two in Culcavy. The two sites in Culcavy were sited due to concerns from residents with the possibility of HGV traffic increase if plans to extend industrial sites were granted, however the monitored levels are extremely low.
Five new sites will be positioned on roads where there is likely to be increased traffic congestion due to large residential developments now under construction or planning granted.

The new sites proposed are:-
Blaris Road / Hillborough Road junction
(To monitoring increased traffic from new development Blaris Road)

Saintfield Road / M1 junction
(To monitor levels prior to construct of new development next to garden centre)

Two sites Comber Road, Dundonald
(To monitor levels due to congestion at rush hour and increased traffic from new development at Millmount)

New background site on Kingsway to monitor emissions from Bombardier

The triplicate tubes at the Normandy Court site in Dundonald, within the Air Quality Management area will remain and the other existing sites although below the UK objective are not showing a trend of reduction in NO_2.

7.3 Proposed Actions

DAERA are presently consulting Northern Ireland Councils with regard to a new Air Quality Action Plan (AQAP). It is this Council's view that any new air quality action plan for nitrogen dioxide for Northern Ireland should not solely focus upon delivering limit values within existing Air Quality Management Areas but it should also focus upon improving ambient air quality as a whole.
Therefore LCCC proposes to continue with automatic and passive monitoring of NO_2 so as to reliably inform the AQAP for Northern Ireland.

8 References

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

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

QA/QC Data of automatic sites

Lisburn City & Castlereagh City Council commissioned AQDM Technology to provide the QA/QC of the automatic measurements of NO_2, SO_2, PM_{10}, for the Kilmakee, Seymour Hill 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. The sites were repaired as necessary and Wecare4air were contracted to service the sites.

Automatic station reports produced by the data Management Company

Produced by AQDM on behalf of Lisburn

LISBURN Seymour Hill, Kilmakee Activity Centre 2016

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

Air Quality Statistics (Kilmakee Activity Centre)

Pollutant	PM_{10}^{+}	$PM_{10}^{\sim}$	SO_2	Wind Dir	Wind Speed
Number Very High #	0		0	-	-
Number High #	0		0	-	-
Number Moderate #	2		0	-	-
Number Low #	361		34969	-	-
Maximum 15-min mean	-	139 µg m^{-3}	106 µg m^{-3}	-	2.9 m/sec
Maximum hourly mean	133 µg m^{-3}	126 µg m^{-3}	27 µg m^{-3}	-	2.6 m/sec
Maximum running 8-hr mean	106 µg m^{-3}	101 µg m^{-3}	18 µg m^{-3}	-	1.2 m/sec
Maximum running 24-hr mean	76 µg m^{-3}	72 µg m^{-3}	14 µg m^{-3}	-	0.5 m/sec
Maximum daily mean	71 µg m^{-3}	67 µg m^{-3}	13 µg m^{-3}	-	0.4 m/sec
Average	12 µg m^{-3}	12 µg m^{-3}	1 µg m^{-3}	-	0.1 m/sec
Data capture	98.7 %	98.7 %	99.9 %	100 %	100 %

Daily Air Quality Index (DAQI) as defined by COMEAP January 2012 and revised April 2013
† Percentile required for data capture < 90%
* PM_{10} in gravimetric units µg m-3
+ PM_{10} as measured by a TEOM
~ $PM_{2.5}$ as measured by a FDMS (decommissioned June 2015)
Mass units for the gases are at 20'C and 1013mb

Air Quality Exceedences

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Max Conc	Number	Days	Allowed	Exceeded
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	71 µg m^{-3}	2	2	35 days	No
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	12 µg m^{-3}	0	-	-	No
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	106 µg m^{-3}	0	0	35 15 mins	No
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	27 µg m^{-3}	0	0	24 hours	No
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	13 µg m^{-3}	0	0	3 days	No
Sulphur Dioxide	Annual mean > 20 µg m^{-3}	1 µg m^{-3}	0	-	-	No

CASTLEREAGH DUNDONALD 2016

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

Pollutant	NO_2	NO	NO_X
Number Very High #	0	-	-
Number High #	0	-	-
Number Moderate #	0	-	-
Number Low #	8769	-	-
Maximum 15-min mean	203 µg m^{-3}	656 µg m^{-3}	1178 µg m^{-3}
Maximum hourly mean	157 µg m^{-3}	529 µg m^{-3}	947 µg m^{-3}
Maximum running 8-hr mean	103 µg m^{-3}	279 µg m^{-3}	528 µg m^{-3}
Maximum running 24-hr mean	84 µg m^{-3}	217 µg m^{-3}	414 µg m^{-3}
Maximum daily mean	73 µg m^{-3}	197 µg m^{-3}	357 µg m^{-3}
Average	27 µg m^{-3}	27 µg m^{-3}	68 µg m^{-3}
Data capture	99.8 %	99.8 %	99.8 %

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

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Max Conc	Number	Days	Allowed	Exceeded
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	27 µg m^{-3}	0	-	-	No
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	157 µg m^{-3}	0	0	18 hours	No

QA/QC of Diffusion Tube Monitoring

In 2016 the NO_2 tubes were supplied, prepared and analysed by Gradko International Limited, using the preparation method 20%TEA/Water. Gradko International Ltd. participates in the AIR-PT/WASP scheme, Quarterly summaries of participating laboratories' performance can be found here:

http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-1-12-(April-2014-February-2016)-NO2-report.pdf

Diffusion Tube Bias Adjustment Factors

Factor from Local Co-location Studies

A co-location study was carried out at the Dundonald site and the data submitted to the national data base.
http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

The local bias adjustment figure was **0.68,** this was calculated using the DEFRA precision & accuracy calculation tool.

Lisburn & Castlereagh NO_2 bias

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	04/01/2016	03/02/2016	38.89	45.21	44.69	43	3.5	8	8.7
2	03/02/2016	02/03/2016	46.35	49.57	51.91	49	2.8	6	6.9
3	02/03/2016	30/03/2016	42.06	41.74	42.22	42	0.2	1	0.6
4	30/03/2016	27/04/2016	34.66	30.14	38.19	34	4.0	12	10.0
5	29/04/2016	25/05/2016	38.48	32.35	36.77	36	3.2	9	7.9
6	25/05/2016	06/07/2016	31.46	26.66	29.07	29	2.4	8	6.0
7	11/07/2016	03/08/2016	36.95	35.56	39.07	37	1.8	5	4.4
8	03/08/2016	31/08/2016	30.18	32.87	30.47	31	1.5	5	3.7
9	31/08/2016	28/09/2016	32.36	30.74	32.42	32	1.0	3	2.4
10	28/09/2016	26/10/2016	41.34	44.44	42.25	43	1.6	4	4.0
11	26/10/2016	30/11/2016	48.36	44.1	46.29	46	2.1	5	5.3
12	30/11/2017	04/01/2017	43.77	37.65	44.56	42	3.8	9	9.4
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
29.6	98.6	Good	Good
34.3	98.6	Good	Good
27.4	98.6	Good	Good
26	98.6	Good	Good
21.9	98.6	Good	Good
19.8	98.6	Good	Good
16.7	98.6	Good	Good
19.2	98.6	Good	Good
20.1	98.6	Good	Good
31.7	98.6	Good	Good
37	98.6	Good	Good
33.8	98.6	Good	Good
Overall survey -->		Good precision	Good Overall

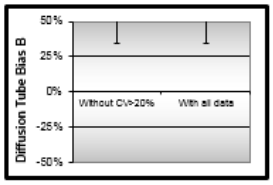
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

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

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.68 (0.61 - 0.77)
Bias B 46% (30% - 63%)
Diffusion Tubes Mean: 39 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 26 (24 - 30) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.68 (0.61 - 0.77)
Bias B 46% (30% - 63%)
Diffusion Tubes Mean: 39 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 26 (24 - 30) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Decision to use the bias adjustment factor 0.92

The local bias adjustment factor is **0.68,** this co-location study is 30M from the AQMA in Dundonald and is on one of the main arterial routes into Belfast City centre. Lisburn & Castlereagh has confidence in the data from the automatic site, with 99.8% data capture, and 95% confidence in precision and accuracy.

The neighbouring council Ards and Northdown Borough has an automatic station, they also use AQDM to ratify their data and the tubes are also supplied and analysed by Gradko
The bias adjustment figure for Ards and North Down Borough Council is **0.78,** with good data capture and 95% confidence in precision and accuracy

Ards and North Down Borough Council

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	04/01/2016	01/02/2016	48	49	52	50	2.1	4	5.2
2	01/02/2016	29/02/2016	41	43	41	42	1.2	3	2.9
3	29/02/2016	31/03/2016	25	34	32	30	4.7	16	11.7
4	31/03/2016	28/04/2016	32	32	34	33	1.2	4	2.9
5	28/04/2016	24/05/2016	33	35	35	34	1.2	3	2.9
6	24/05/2016	06/07/2016	31	27	29	29	2.0	7	5.0
7	11/07/2016	05/08/2016	32	32	31	32	0.6	2	1.4
8	05/08/2016	01/09/2016	33	37	31	34	3.1	9	7.6
9	01/09/2016	27/09/2016	38	33	37	36	2.6	7	6.6
10	29/09/2016	25/10/2016	51	50	48	50	1.5	3	3.8
11	25/10/2016	29/11/2016	47	43	49	46	3.1	7	7.6
12	29/11/2016	05/01/2017	50	50	50	50	0.0	0	0.0
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
32.5	99.9	Good	Good
30.6	96.1	Good	Good
27.9	99.9	Good	Good
25	93.2	Good	Good
24.8	99.8	Good	Good
29.7	88.6	Good	Good
26.3	91.7	Good	Good
25.5	99.8	Good	Good
26.4	88.9	Good	Good
30.5	44.9	Good	or Data Capture
37.1	99.8	Good	Good
36.3	99.7	Good	Good
Overall survey -->		Good precision	Good Overall

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

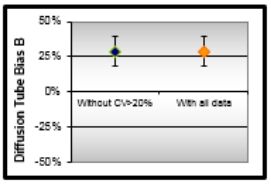
Site Name/ ID:

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.72 - 0.84)
Bias B 29% (19% - 39%)
Diffusion Tubes Mean: 38 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.72 - 0.84)
Bias B 29% (19% - 39%)
Diffusion Tubes Mean: 38 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

The March 2017 National bias adjustment figure for Gradko in 2016 is **0.92**, there were 27 studies included in this study. This bias adjustment figure is unusually high.

These are the bias adjustment factors considered when applying **0.92** to the NO_2 diffusion tubes and the reasoning behind this figure is as follows:

Dundonald LCCC Local bias adjustment figure	0.68
Holywood ANDBC Local bias adjustment figure	0.78
National bias adjustment figure (27 studies)	0.92

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/17

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2017
LAQM Helpdesk Website

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

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

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

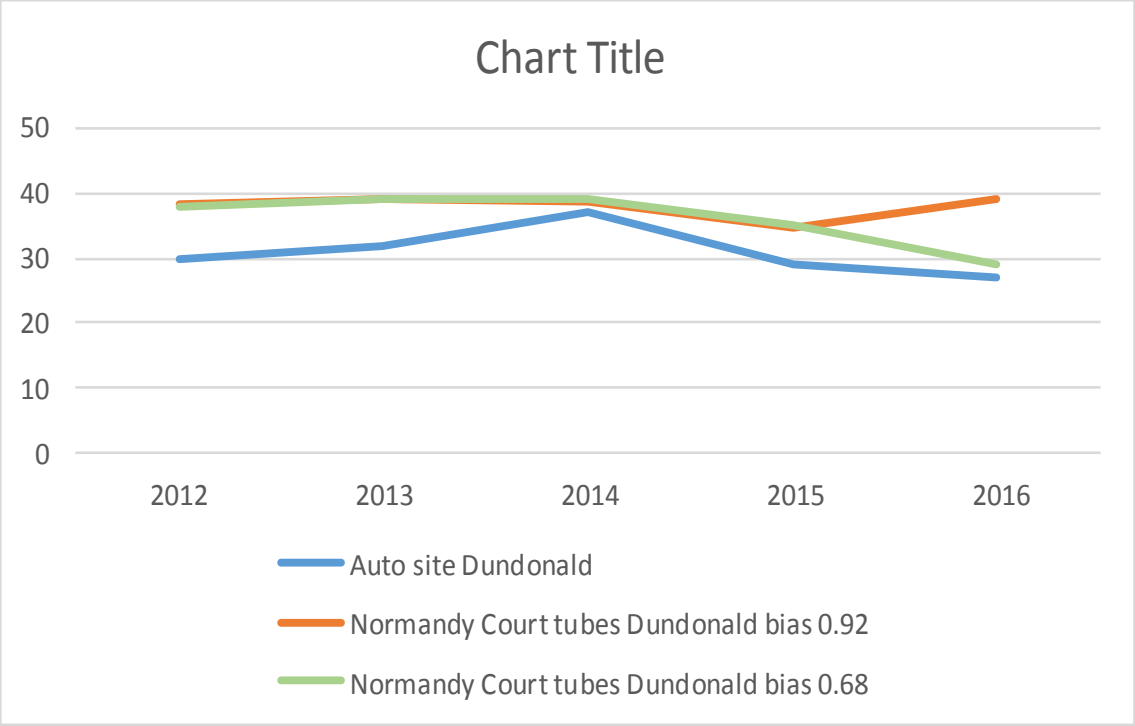
If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[2]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2016	R	Gateshead Council	12	29	26	10.5%	G	**0.90**
Gradko	20% TEA in water	2016	R	Gateshead Council	11	35	37	-6.0%	G	**1.06**
Gradko	20% TEA in water	2016	R	Gateshead Council	12	37	31	19.0%	G	**0.84**
Gradko	20% TEA in water	2016	R	Wokingham Borough Council	11	45	41	9.0%	G	**0.92**
Gradko	20% TEA in water	2016	R	Wokingham Borough Council	11	37	34	9.5%	G	**0.91**
Gradko	20% TEA in water	2016	R	Cheshire West and Chester	12	37	39	-5.3%	G	**1.06**
Gradko	20% TEA in water	2016	R	Thurrock Borough Council	12	29	26	11.0%	G	**0.90**
Gradko	20% TEA in water	2016	R	Borough Council of King's Lynn & West Norf	11	30	25	18.2%	G	**0.85**
Gradko	20% TEA in water	2016	UB	Eastleigh Borough Council	11	29	30	-4.7%	G	**1.05**
Gradko	20% TEA in water	2016	R	Eastleigh Borough Council	12	44	42	2.9%	G	**0.97**
Gradko	20% TEA in water	2016	R	Brighton & Hove City Council	12	52	48	8.8%	G	**0.92**
Gradko	20% TEA in water	2016	R	Eastleigh Borough Council	11	29	37	-22.0%	G	**1.28**
Gradko	20% TEA in water	2016	KS	Marylebone Road Intercomparison	12	99	79	25.2%	G	**0.80**
Gradko	20% TEA in water	2016	R	Monmouthshire County Council	11	39	34	16.6%	G	**0.86**
Gradko	20% TEA in Water	2016	R	Preston City Council	10	30	27	10.0%	G	**0.91**
Gradko	20% TEA in water	2016	R	Dudley MBC	12	37	34	11.0%	G	**0.90**
Gradko	20% TEA in water	2016	UB	Dudley MBC	12	26	22	18.6%	G	**0.84**
Gradko	20% TEA in water	2016	R	Dudley MBC	11	43	38	12.4%	G	**0.89**
Gradko	20% TEA in water	2016	R	Dudley MBC	12	51	54	-5.6%	G	**1.06**
Gradko	20% TEA in water	2016	B	LB Waltham Forest	12	31	30	2.3%	G	**0.98**
Gradko	20% TEA in water	2016	R	NOTTINGHAM CITY COUNCIL	12	37	39	-5.4%	G	**1.06**
Gradko	20% TEA in water	2016	R	LB Hounslow	9	75	58	28.0%	G	**0.78**
Gradko	20% TEA in water	2016	UB	LB Hounslow	9	33	33	0.1%	G	**1.00**
Gradko	20% TEA in water	2016	R	Lisburn & Castlereagh City Council	12	39	26	46.4%	G	**0.68**
Gradko	20% TEA in water	2016	B	Pembrokeshire Council	11	4	3	27.5%	G	**0.78**
Gradko	20% TEA in water	2016	R	Cheltenham Borough Council	11	32	32	-0.9%	G	**1.01**
Gradko	20% TEA in water	2016	R	Lancaster City Council	11	33	32	2.8%	G	**0.97**
Gradko	20% TEA in water	2016		**Overall Factor[3] (27 studies)**				**Use**		**0.92**

The local bias adjustment figure it was not deemed to be realistic due to it being exceptionally low and particularly as the neighbouring council was a much higher figure. The national figure which has been applied, (**0.92)** although unusually high for Gradko, does have 27 studies included.

The following graph shows comparisons if the national bias factor 0.92 is applied and the local bias 0.68 to the Normandy Court diffusion tube site, with accurate results from the automatic site, positioned 30m away.

This chart shows an uncertainty in the bias adjustment figures to the tubes, LCCC has made a decision to apply the higher national figure of 0.92 so that this would determine worst case scenario.



Method used to distance calculate in accordance to current guidance

The following tool was used to distance calculate NO2 levels at the Newtownbreda Road site at relevant exposure

https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

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Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	2.5	metres
Step 2	How far from the KERB is your receptor (in metres)?	7	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	14	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	40	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	33.4	µg/m^3