2012 Air Quality Updating and Screening Assessment for Castlereagh Borough Council

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

June 2012

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Report Reference number	USA 2012
Date	June 2012

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 2009,with two interim progress reports. This report is the 2012 (USA) report, the assessment is fully compliant with the applicable policy and technical guidance.

Castlereagh Borough lies to the southeast of Belfast in Northern Ireland. The Borough is of mixed urban and rural character. It is mainly residential with no significant industrial activity. Many residents work in Belfast and this, combined with the major arterial routes passing through the Borough, makes road transport the major air pollution concern. There is currently an Air Quality Management Area within the Borough.

Following the 2009 Update and screening assessment 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 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 draft Action plan is presently out to consultation.

There are no other air quality exceedences within the Borough previous realtime monitoring was carried out for NO_2 and PM_{10} at Lougview but due to levels being continuously below the objective this site was decommissioned at the end of 2010. PM_{10} monitoring also ceased at Dundonald at this time

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1 Introduction

1.1 Description of Local Authority Area

Castlereagh Borough Council covers an administrative area of 84Km² to the Southeast of Belfast and in 2006 was home to a population of 66,633. The Borough is of mixed and urban rural character and the predominant wind direction is from the Southwest.
The Borough is surrounded by five neighbouring councils. Its position in relation to Belfast, has made it a very popular area to live. Commuting time to the city centre from the Borough is relatively short and this combined with major arterial routes passing through the Borough into Belfast, has made road transport the major air pollution concern.

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1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in the Environment (Northern Ireland) Order 2002, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

1.3 Air Quality Objectives

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

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Northern Ireland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Castlereagh Borough Council has completed the following reviews and assessments of air quality in earlier rounds of the assessment process:

Table 1.1 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 exceedences of the air quality objectives
Progress report (CBC2005)	The progress reported for 2004 concluding that PM10, NO2 and SO2 were not predicted to cause exceedences 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 exceedences 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 NO2 at Normandy Court Dundonald and details of the AQMA Castlereagh Borough Council declared in January 2011.

Figure 1.1 Map showing position of AQMA in Dundonald Village

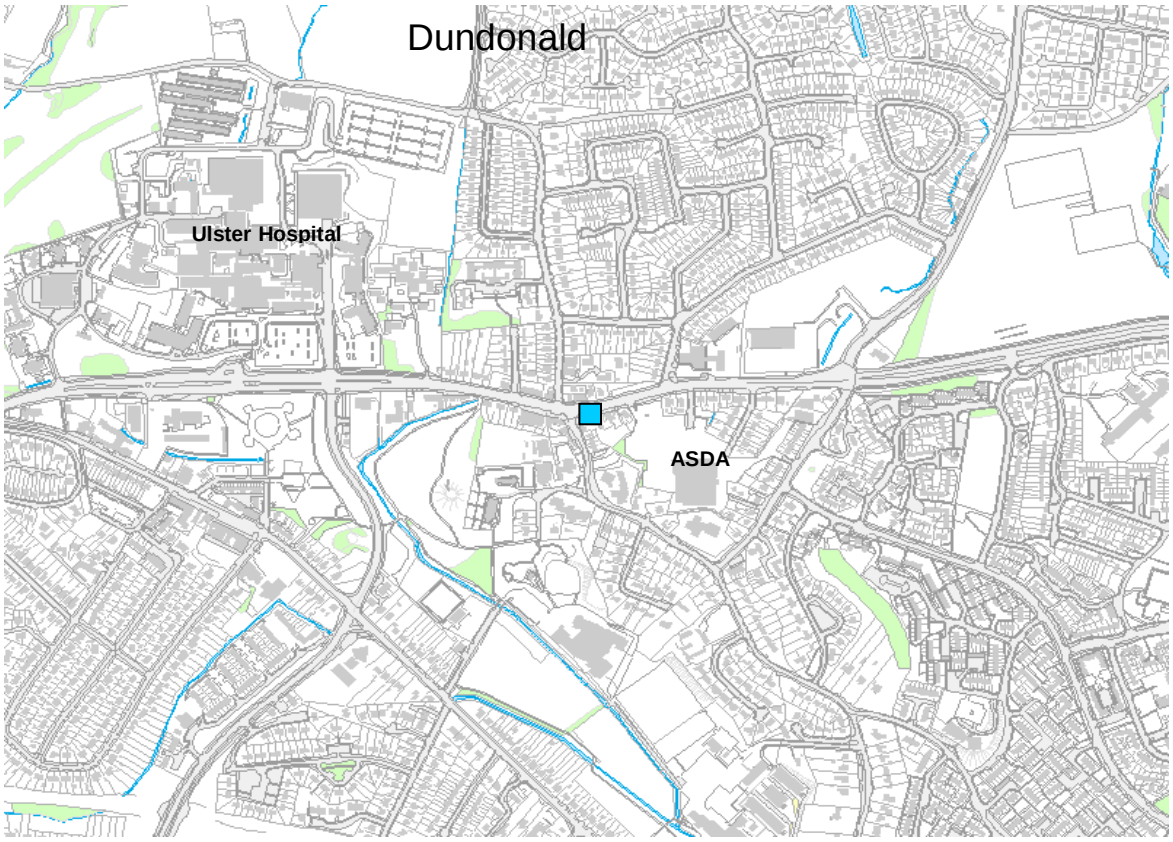
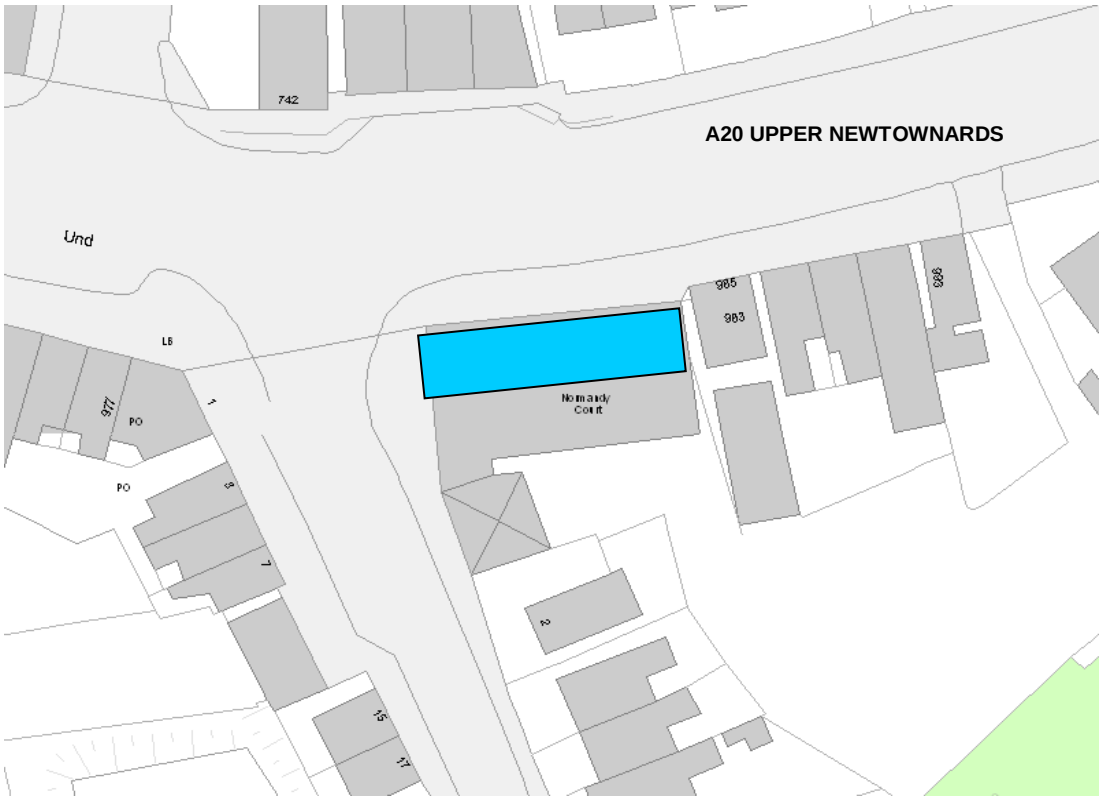


Figure 1.2 Map showing position of no's 1,5,9,2,6,10 Normandy Court AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Castlereagh Borough Council had two automatic sites both measuring NOx and PM_{10} using chemiluminescence analysers and the TEOM technique respectively. The TEOM data was corrected and reported using Volatile Correction Model.
Calibrations were carried out every two weeks, both sites were independently audited by AEA who were also employed to ratify and validate the data.

2003 - 2011 Castlereagh Lough View Drive (A1) NOx and PM_{10}
2007 - 2011 Castlereagh Dundonald (A2) PM_{10}
2007- Castlereagh Dundonald (A2) NOx

A decision was made at the end of 2010 to decommission and remove the monitoring site at Loughview Drive as the levels of both NO_2 and PM_{10} continued to be well below the objective since monitoring began in 2003.
At the same time a decision was made to cease monitoring PM_{10} at the Dundonald site as levels here also remained very low.
Real time monitoring has continued in 2011 at Dundonald for NOx as the site is within 30 metres of the AQMA.
The site was audited by AEA at six monthly periods in 2011 and they were also employed to ratify and validate the data. Manual calibrations were carried out by the LSO on a fortnightly basis.

Figure 2.1 Maps of Automatic Monitoring Sites (if applicable)

● Dundonald NOx Automatic monitoring site within Borough

■ AQMA

● Automatic monitoring NOx site position in Dundonald Village

Table 2.1 Details of Automatic Monitoring Sites

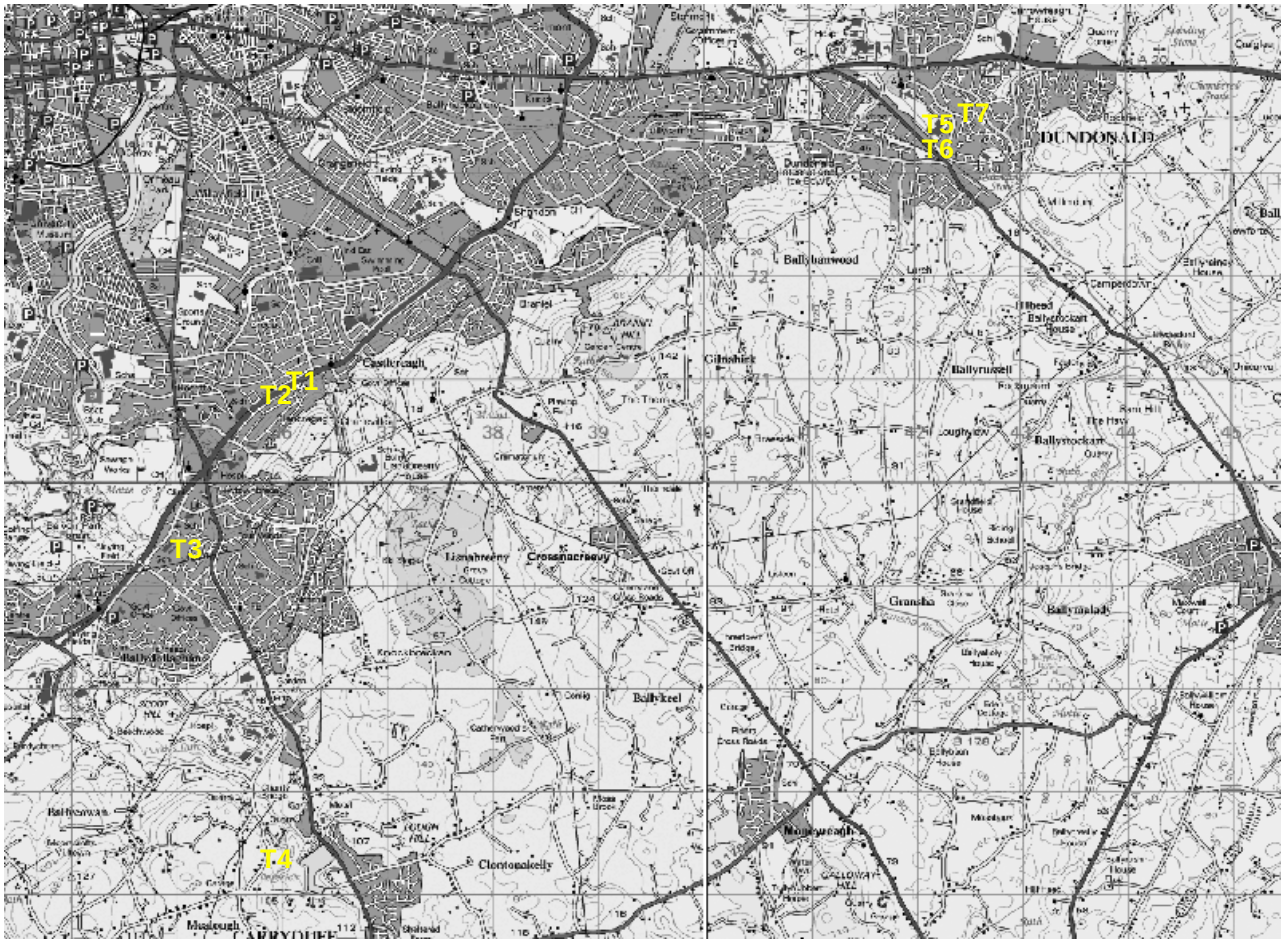
Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Castlereagh Loughview Drive Site Commenced 2003 **decommissioned 2011**	Roadside	E 335749	N370711	PM10 NOx	N	TEOM Chemiluminescent analyser	Y 22M	3m	Y
Castlereagh Dundonald **PM_{10} analyser decommissioned April 2011**	Roadside	E 342016	N374041	PM10 NOx	N	TEOM Chemiluminescent analyser	Y 22M	3m	N (30M from AQMA)

2.1.2 Non-Automatic Monitoring Sites

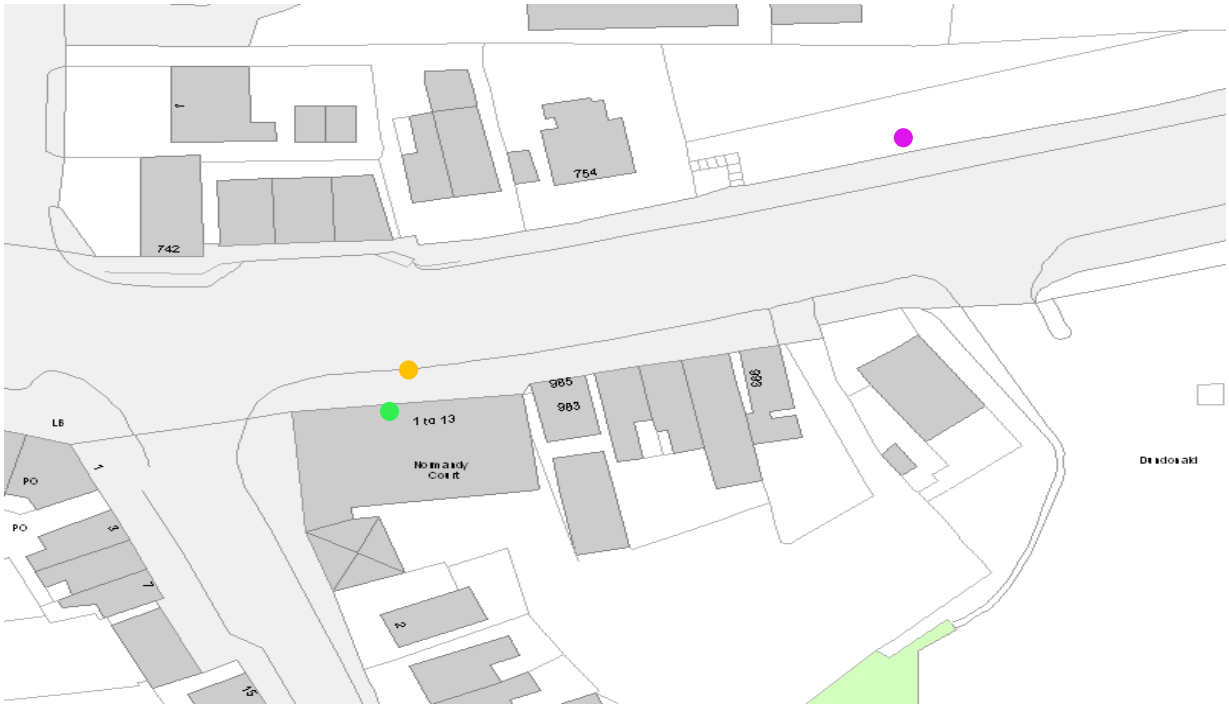
Castlereagh Borough Council presently has five NO_2 diffusion tube sites positioned along the main arterial routes into Belfast, and a co-location study carried out at the Dundonald automatic site.(T7) The results from this have been included in the national data base.
The bias adjustment factor from this co-location study is **0.83** and this has been applied to the diffusion tube results.
A decision to use the local bias adjustment factor was made as the study was carried out within 30m of the diffusion tube s within the AQMA .
All the other diffusion tube sites within the area are also roadside sites and typical of this co-location study.
Further information on the decision to use the local bias adjustment factor can be found in the appendices.

The Normandy Court site (T6) has triplicate tubes, as it is within the AQMA. This site was commenced at the end of 2009 when the results from the kerbside site (T5) on the Upper Newtownards Road, showed levels to be above the objective. The tubes are supplied and analysed by ESG (Environmental Scientifics Group).

Figure 2.2 Map (s) of Non-Automatic Monitoring Sites within Castlereagh Borough



Detailed map of Non-Automatic Monitoring Sites in Dundonald Village



T5 **T6** **T7**

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
T1 Cregagh Road	Roadside	E336257	N371278	NO_2	N	N	Y (28m)	3m	N
T2 Everton Drive	Background	E336132	N371141	NO_2	N	N	Y (98m)	1m	N
T3 Newtownbreda Road	Roadside	E335246	N370061	NO_2	N	N	Y (12m)	2m	Y
T4 Saintfield Road	Roadside	E336832	N365625	NO_2	N	N	Y (70m)	3m	Y
T7 Castlereagh Dundonald	Co-location	E342016	N274041	NO_2	N	Y	Y (22m)	3m	N
T5 Upper Newtownards Road (adjacent to Normandy Court)	Roadside	E341991	N374013	NO_2	N	N	Y (0m)	3.5m	N Removed to Façade of Normandy Court in November 2009
T6 Normandy Court Facade (AQMA)	Roadside	E341991	N374013	NO_2	Y	N	Y (0m)	3.5m	Y Commenced November 2009 within AQMA since January 2011

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

In the following section results are presented for NO_2 at the automatic and diffusion tube sites and compared with the objective. All sites except the diffusion tube site on the A20 Upper Newtownards Road on the façade of Normandy Court meet the objective

Automatic Monitoring Data

Castlereagh Borough Council in 2011 had one automatic analyser monitoring NO_2 in Dundonald. The annual average from this site in 2011 was **39 ug/m3.** The results are shown in table 2.3
The Loughview site had been decommissioned in 2011. .

Details of the QA/QC and data ratification can be found in appendix A.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Annual Mean Concentration μg/m^3				
					2007*[c]	2008* [c]	2009* [c]	2010* [c]	2011 [c]
Castlereagh Loughview Drive	Roadside	N	N/A	N/A	22.5	21.8	21	25	Site decommissioned l 2011
Castlereagh Dundonald	Roadside	N	N/A	N/A	N/A	32.3	36	**41**	39

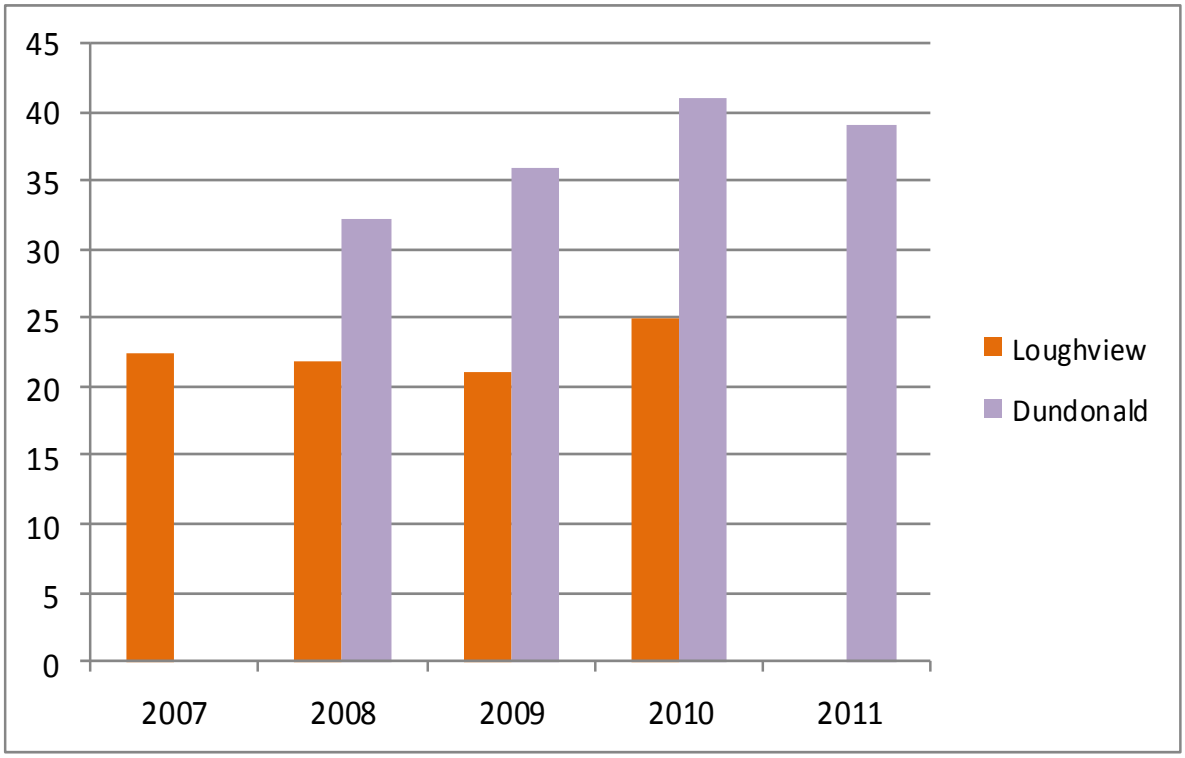
Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %[a]	Valid Data Capture 2011 % [b]	Number of Exceedences of Hourly Mean (200 μg/m^3)				
					2007*[c]	2008* [c]	2009* [c]	2010* [c]	2011 [c]
Castlereagh Loughview Drive	Roadside	N	N/A	N/A	0	0	0	0	0
Castlereagh Dundonald	Roadside	N	N/A	N/A	0	0	0	0	5

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites

Loughview Drive continued to be consistently below the objective and therefore the site was decommissioned in 2011
Results at the Dundonald site continued to rise since installed 2008 and have stayed close to the objective, although there was a slight reduction in 2011. The nearest relevant exposure to this site has been monitored using NO_2 diffusion tubes and a co-location study is carried out at this site.

Figure 2.3



Diffusion Tube Monitoring Data

A trend for the five diffusion tube sites within the Borough is shown in figure 2.4. There has been no significant change. The kerbside site at the Upper Newtownards Road continued in 2009 to exceed the objective, although the Chemiluminescent analyser at that time, 30M further along the road had no exceedences. A detailed assessment was carried out for this site in 2009. The triplicate tubes were moved to the façade of the nearest relevant exposure (Normandy Court) in November 2009. In 2010 this new site showed a reduction of 40% in NO_2 levels. Levels remained slightly above the objective and an AQMA was declared on 31st January 2011 for no's 1,5,9,2,6&10 Normandy Court, Dundonald.
A bias adjustment factor of 0.83 was applied to the results. This was taken from the local co-location study at Dundonald.
Details of the QA/QC for the diffusion tubes and the reason for using the local bias adjustment factor can be found in appendix A.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.83) 2011 ($\mu g/m^3$)
T1	Cregagh Road	Roadside	N	N	12	N/A	N	26
T2	Everton Drive	Roadside	N	N	11	N/A	N	18
T3	Newtonbreda Road	Roadside	N	N	12	N/A	N	22
T4	Saintfield Road	Roadside	N	N	12	N/A	N	23
T6	Normandy Court Facade	Roadside	Y	Y	12	N/A	N	**45**

[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.
*Annual mean concentrations for previous years are optional.

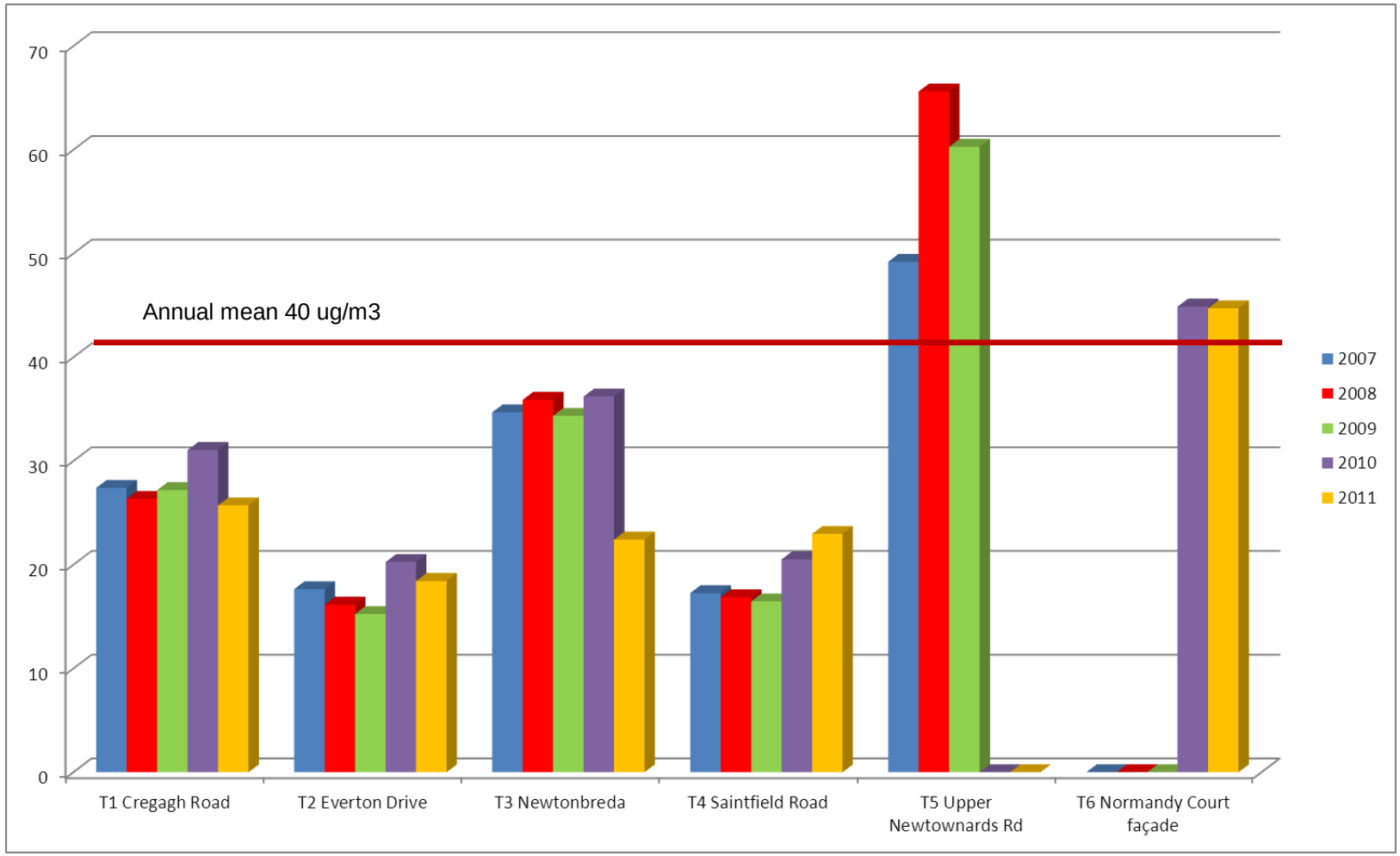
Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007* **(Bias Adjustment Factor = 0.917)**	**2008*** **(Bias Adjustment Factor =0.83)**	**2009*** **(Bias Adjustment Factor = 0.81)**	**2010*** **(Bias Adjustment Factor = 0.84)**	**2011** **(Bias Adjustment Factor = 0.83)**
T1 Cregagh Road	Roadside	N	27.4	25.8	26.9	31	26
T2 Everton Drive	Background	N	17.7	15.1	15.1	20	18
T3 Newtonbreda Road	Roadside	N	34.7	35.9	33.9	36	22
T4 Saintfield Road	Roadside	N	17.3	16.9	16.3	21	23
T5 Upper Newtownards Road (adjacent to Normandy Court)	Roadside	N	49.2	65.6	57.4	n/a	n/a
T6 Normandy Court Façade (AQMA)	Roadside	Y	n/a	n/a	n/a	**45**	**45**

*Optional

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites

All sites show a trend of remain below the objective the Upper Newtownards Road site (T5) was moved 4M back from the Roadside onto the façade of Normandy Court (T6), this show a reduction in levels of NO2 but still remained above the objective



2.2.2 PM_{10}

PM10 monitoring ceased in 2011, monitoring had been carried out within the Borough since 2003 using TEOMs, there had been no exceedences during this period, and levels were consistently low. This was in consultation with the Department of the Environment NI..

2.2.3 Sulphur Dioxide

There were no measurements of Sulphur Dioxide carried out in 2011

2.2.4 Benzene

There were no measurements of Benzene carried out in 2011

2.2.5 Other pollutants monitored

In 2011 Nitrogren Dioxide was the only pollutant monitored

2.2.6 Summary of Compliance with AQS Objectives

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

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

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

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

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

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

3.4 Junctions

Castlereagh Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

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

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

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

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

5 Industrial Sources

5.1 Industrial Installations

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

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

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

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

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

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

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

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

5.4 Poultry Farms

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

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

6.2 Biomass Combustion – Combined Impacts

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

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

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

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The 2011 monitored data has been assessed and has indicated no exceedences of the national air quality objectives outside of the AQMA. The NO_2 levels within the AQMA did not reduce in 2011.
It is therefore not necessary to proceed to a detailed assessment, however monitoring will continue at key locations outside the AQMA to allow for comparison in future rounds of review and assessment.
Castlereagh Borough Council will continue with their action plan for the AQMA.

8.2 Conclusions from Assessment of Sources

Castlereagh Borough Council has found no new or significantly changed sources to have likely impacts on air quality.

8.3 Proposed Actions

Castlereagh Borough Couincil will continue to monitor at key locations and submit a progress report in 2013.
A draft action plan was submitted in 2012 this will be completed and submitted before the progress report in 2013.

9 References

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Appendices

Appendix A: QA:QC Data

NO_2 diffusion tube results, bias applied 0.83

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cregagh Road	49	34	0	19	15	22	17	25	0	22	28	27
Everton Drive	31	53	23	0	7	9	7	13	8	15	21	14
Downshire Park	0	0	0	0	0	0	0	0	0	0	0	0
Newtownbreda Road	44	18	21	16	19	13	9	33	17	27	27	25
Saintfield Road	24	39	39	31	7	36	22	19	10	11	28	8
Dundonald (Normandy Court)	56	52	54	42	39	42	31	33	49	47	48	45

Factor from Local Co-location Studies (if available)

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	07/01/2011	02/02/2011	77	72	81	77	4.5	6	11.2
2	02/02/2011	03/03/2011	60	65	66	64	3.2	5	8.0
3	02/03/2011	31/03/2011	63	67	60	63	3.5	6	8.7
4	30/03/2011	05/05/2011	44	40	44	43	2.3	5	5.7
5	05/05/2011	02/06/2011	36	30	33	33	3.0	9	7.5
6	01/06/2011	01/07/2011	42	39	43	41	2.1	5	5.2
7	29/06/2011	05/08/2011	24	29	26	26	2.5	10	6.3
8	03/08/2011	31/08/2011	36	35	35	35	0.6	2	1.4
9	31/08/2011	26/09/2011	48	42	47	46	3.2	7	8.0
10	28/09/2011	24/10/2011	43	46	43	44	1.7	4	4.3
11	26/10/2011	02/12/2011	55	53	46	51	4.7	9	11.7
12	30/11/2011	29/12/2011	47	56	52	52	4.5	9	11.2
13									

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

Automatic Method

Period Mean	Data Capture (% DC)
61	99
49	100
55	100
47	100
27	100
29	99
23	100
25	100
26	72
30	92
49	80
43	100

Data Quality Check

Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	or Data Captu
Good	Good
Good	Good
Good	Good
Good precision	Good Overall DC

Overall survey -->

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

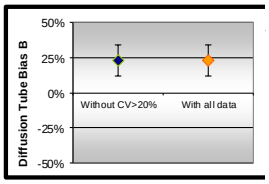
Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 11 periods of data
Bias factor A 0.83 (0.76 - 0.91)
Bias B 21% (9% - 32%)
Diffusion Tubes Mean: 48 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 40 µgm^{-3}
Data Capture for periods used: 97%
Adjusted Tubes Mean: 40 (37 - 44) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 11 periods of data
Bias factor A 0.83 (0.76 - 0.91)
Bias B 21% (9% - 32%)
Diffusion Tubes Mean: 48 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 40 µgm^{-3}
Data Capture for periods used: 97%
Adjusted Tubes Mean: 40 (37 - 44) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

As shown above the local bias adjustment figure is **0.83** this was calculated using the R&A support precision and accuracy spreadsheet.
http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html

This figure was derived from the co-location study carried out at the Dundonald site and in accordance to current guidance summarized in the Technical Guidance LAQM.TG(09).

This result has been included in the national bias adjustment factor database.

Diffusion Tube Bias Adjustment Factors

The NO_2 tubes are supplied by ESG (Environmental Scientific Group) in Didcot Oxfordshire. Their preparation method is listed below.

Nitrogen Dioxide Diffusion Tube Analysis Report

The samples have been analysed in accordance with ESG's standard operating procedure HS/WI/1015 issue 15. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance.'

The tubes were prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. In the WASP intercomparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes, Scientifics is currently ranked as a Category Good laboratory.
This result can be found on the LAQM Support Web site
http://laqm.defra.gov.uk/diffusion-tubes/precision.html

The National Bias adjustment factor for ESG is **0.84** found on the LAQM Support Website http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
Spreadsheet Version Number: 03/12

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/12

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 spreadsheet 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 2012

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 (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	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[6]	Bias Adjustment Factor (A) (Cm/Dm)
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dover District Council	12	42	37	14.0%	G	**0.88**
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Medway Council	12	22	26	-15.6%	G	**1.19**
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	10	52	48	8.9%	G	**0.92**
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	9	38	35	7.5%	G	**0.93**
Environmental Scientific Groups	50% TEA in acetone	2011	R	North East Lincolnshire Council	12	41	31	32.8%	G	**0.75**
Environmental Scientific Groups	50% TEA in acetone	2011	UB	North East Lincolnshire Council	12	22	21	7.5%	P	**0.93**
Environmental Scientific Groups	50% TEA in acetone	2011	B	Medway Council	9	32	20	55.3%	G	**0.64**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wrexham County Borough Council	12	22	19	11.8%	G	**0.89**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Medway Council	9	36	30	19.0%	G	**0.84**
Environmental Scientific Groups	50% TEA in acetone	2011	K	Marylebone Road Intercomparison	11	121	99	21.5%	G	**0.82**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Castlereagh Borough Council	11	48	40	20.9%	G	**0.83**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Down District Council	12	51	36	39.0%	G	**0.72**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Lisburn City Council	12	30	20	49.6%	G	**0.67**
Environmental Scientific Groups	50% TEA in acetone	2011	R	North Down Borough Council	11	45	27	66.7%	G	**0.60**
Environmental Scientific Groups	50% TEA in Acetone	2011	K	Suffolk Coastal District Council	12	51	43	18.7%	G	**0.84**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Dumfries and Galloway Council	12	38	32	20.0%	G	**0.83**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Rugby Borough Council	10	34	34	-0.3%	G	**1.00**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Wycombe District Council	10	43	39	11.5%	G	**0.90**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Tunbridge Wells Borough Council	12	59	43	38.5%	P	**0.72**
Environmental Scientific Groups	50% TEA in acetone	2011	R	LB Newham	12	40	47	-14.3%	G	**1.17**
Environmental Scientific Groups	50% TEA in acetone	2011	UB	Canterbury City Council	11	17	15	17.8%	G	**0.85**
Environmental Scientific Groups	50% TEA in acetone	2011	R	Canterbury City Council	12	39	34	15.5%	G	**0.87**
Environmental Scientific Groups	50% TEA in acetone	2011		**Overall Factor[3] (22 studies)**				Use		**0.84**

Discussion of Choice of Factor to Use

A decision was made to use the local bias adjustment factor; of **0.83**
The tube exposure times were one month
There was 12 months data available with good precision and accuracy of 95% confidence.
There was good QA/QC for both the chemiluminescence analyser and diffusion tubes
The co-location study carried out at the Dundonald site is situated according to the technical guidance and the position is of similar siting of the other tubes in the study

Using the local factor of **0.83** and not the national factor of 0.84 would not have greatly affected the results.

QA/QC of automatic monitoring

Produced by AEA on behalf of the Eastern Group

CASTLEREAGH DUNDONALD
01 January to 31 December 2011

These data have been fully ratified by AEA

POLLUTANT	NO	NO_2	NO_X
Number Very High	-	0	-
Number High	-	0	-
Number Moderate	-	0	-
Number Low	-	8387	-
Maximum 15-minute mean	915 μgm^{-3}	275 μgm^{-3}	1671 μgm^{-3}
Maximum hourly mean	703 μgm^{-3}	218 μgm^{-3}	1285 μgm^{-3}
Maximum running 8-hour mean	332 μgm^{-3}	172 μgm^{-3}	655 μgm^{-3}
Maximum running 24-hour mean	224 μgm^{-3}	122 μgm^{-3}	461 μgm^{-3}
Maximum daily mean	224 μgm^{-3}	119 μgm^{-3}	461 μgm^{-3}
99.8th percentile of hourly means	-	176 μgm^{-3}	-
Average	36 μgm^{-3}	39 μgm^{-3}	95 μgm^{-3}
Data capture	95.7 %	95.7 %	95.7 %

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

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 μgm^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 μgm^{-3}	5	3

Produced by AEA on behalf of the Eastern Group

Castlereagh Dundonald
Hourly Mean Data for 01 January to 31 December 2011