Down District Council

2012 Air Quality Updating and Screening Assessment for Down District Council

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

July 2012

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INVESTORS IN PEOPLE

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Executive Summary

Down District Council comprises a largely rural area of around 65,000 hectares in the south east of Northern Ireland, with a population of some 68,000. The main centres of population are located in Downpatrick, Newcastle and Ballynahinch. Agriculture and tourism form by far the most significant economic base in the area, with relatively little heavy industry

There have been no exceedences of the Air Quality Strategy objectives within Down District Council area.

With respect to Nitrogen Dioxide, the 2010 Progress Report identified two exceedences of the Nitrogen Dioxide annual mean objective at diffusion tube monitoring sites in Downpatrick i.e. Market Street and Church Street. A Detailed Assessment for NO_2 was submitted by Down District Council in 2010. As a result of this in July 2010 a real time analyser was installed in Market Sreet, in the prime location in accordance with the technical guidance. The results from this site are below the objective and therefore no AQMA has been declared. Further monitoring is to continue at this site in 2012 along with diffusion tube monitoring in the surrounding area.

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1 Introduction

1.1 Description of Local Authority Area

The main centres of population are located in Downpatrick, Newcastle and Ballynahinch. Agriculture and tourism form by far the most significant economic base in the area, with relatively little heavy industry. The Irish Sea and the inlet to Strangford Lough form a natural boundary for the south and east of the District. Much of this boundary has Area of Special Scientific Interest (ASSI) status. To the south of the District are the Mourne Mountains which may form the centre of Northern Ireland's first National Park. The Ards and Down Area Plan prepared under Part III of the Planning (Northern Ireland) Order 1991 will have future impacts on air quality within Down District Council. The Council has five neighbouring council areas: Ards Borough Council; Castlereagh Borough Council; Lisburn Borough Council; Banbridge District Council and Newry and Mourne District Council.

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 micrometres 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

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

Stage 1 Report (DDC, 2000)	The first stage assessment identified all significant pollutant sources with Down District Council area. The air quality objectives were unlikely to be exceeded and no detailed assessment was necessary.
Stage 2/3 Air quality review (DDC, 2003)	The conclusions of this review stated that there was no need to progress to the third stage review and assessment and that no Air Quality Management Areas (AQMA'S) needed to be declared.
Progress report (DDC, 2005)	The progress report concluded that NO_2, SO_2 and PM_{10} were not predicted to cause exceedances of the air quality objectives at relevant receptors.
Updating and Screening Assessment (DDC, 2006)	The USA was carried out according to Local Air Quality Management Policy Guidance LAQM.TG(03). The assessment looked at seven pollutants and no detailed assessments were required. No AQMA's were required in Down District Council and there was no need for a detailed assessment in 2007.
Progress Report (EG, 2008)	Diffusion tube monitoring indicated that the annual average objective for NO_2 was being exceeded at the Irish street location in Downpatrick. Down DC Officers evaluated sites with a view to installing real time monitoring equipment. There are currently no Air Quality Management Areas (AQMA'S) within the Down District Council area. Diffusion tube measurements made in the Irish Street area during 2007 and 2008 indicated exceedances in relation to NO_2. A detailed assessment involving additional diffusion tubes was commenced in late 2008 at this Irish Street location.
Updating and Screening Assessment (DDC, 2009)	The main conclusion from the 2009 Updating and Screening Assessment (USA) was that diffusion tube measurements at Irish Street junction, Downpatrick indicated exceedances of the annual mean objective for nitrogen dioxide in both 2007 and 2008. There is relevant exposure at this location. The measurement of nitrogen

	dioxide at the remaining monitoring sites has shown no exceedances of air quality objectives. Down District Council then undertook a Detailed Assessment for NO_2 in the vicinity of Irish Street.
Detailed Assessment 2010	For the purposes of this Detailed Assessment additional NO_2 diffusion tubes were placed along Market Street, Irish Street, English Street and Church Street, Downpatrick. These additional tubes were installed in October 2008 and a full year of monitoring has now occurred. Following a bias adjustment of the diffusion tube results it was found that the tubes at Down 1(Irish Street location) Down 11 (Church Street) and Down 13 (Market Street) exceeded the air quality limit of 40ug/m^3 for Nitrogen Dioxide. Down District Council have committed to installing a real time analyser on Market Street junction, Downpatrick, as local authorities are advised not to rely upon diffusion tube data alone to declare an Air Quality Management Area (A1.42 LAQM Technical Guidance LAQM .TG(09)). It is expected that this equipment will be operational at the beginning of June 2010 and the results obtained over the following six month period will influence Down District Council in declaring an Air Quality Management Area (AQMA). Down District Council are still awaiting acceptance of this Detailed Assessment by DOE.
Progress report (DDC, 2010)	Diffusion tube monitoring indicated that the annual average objective for NO_2 continued to exceed the objective at the Irish street location in Downpatrick, and that the intention was to install an automatic station at this site in June 2010 at relevant exposure.
Progress report (DDC, 2011)	This reported the continued monitoring of NO_2 and the conclusions from the new data from a realtime analyser installed in Market Street

Figure 1.1 Map of AQMA Boundaries (if applicable)

There is presently no AQMA in the Down District Council area

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

NO_2 diffusion tubes sited at the junction of Church Street, Irish Street and Market Street, had shown levels of NO2 to be above the objective. These were replaced in June 2010 with an automatic station monitoring NO_2 real time data using Chemiluminescence technique. The site is positioned to give the worst case scenario at relevant exposure.

Figure 2.1 Map(s) of Automatic Monitoring Sites (if applicable)

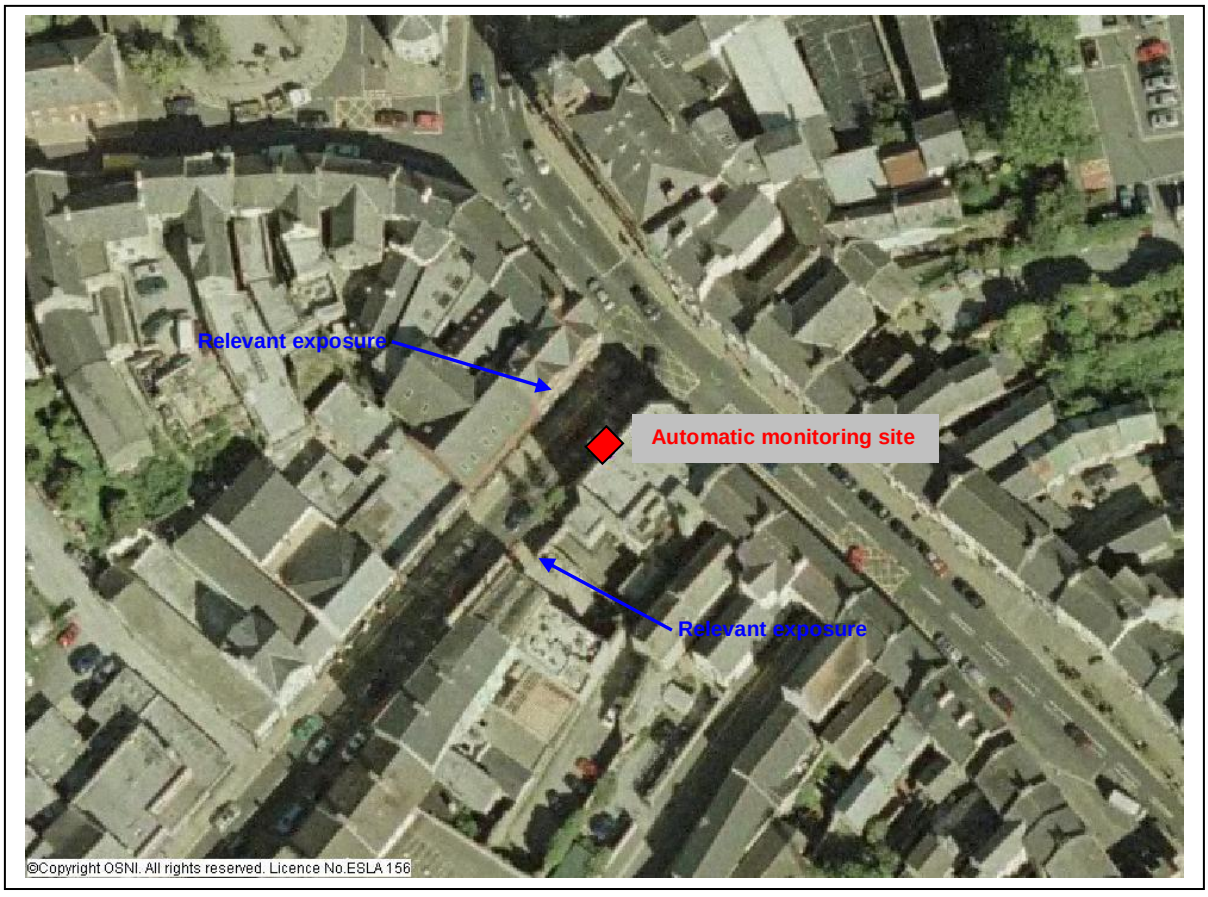


Table 2.1 Details of Automatic Monitoring Sites

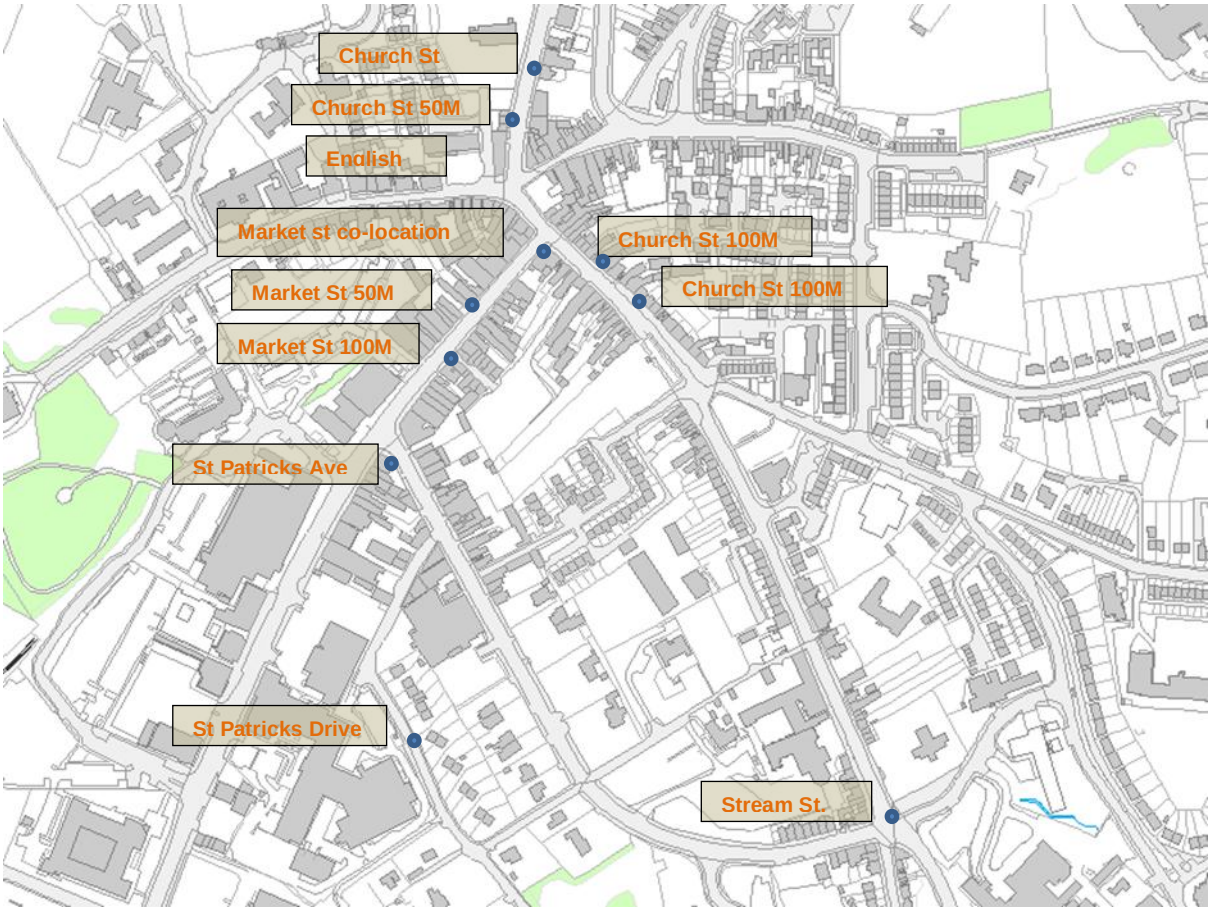
Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Market Street Downpatrick	Roadside	348655	344596	NO2	NO	Chemiluminescence	Y 10M	1.5M	Y

2.1.2 Non-Automatic Monitoring Sites

Down District Council carries out monitoring of NO_2 by diffusion tubes at 11 sites and a co-location study is carried out at the automatic site. The bias adjustment factor from the co-location study is **0.72**.and the results from this have been included in the national data base. Diffusion tube data cannot be compared directly with air quality limit values based on short-term averages; however, they can be used to help identify areas with high concentrations of NO_2, which require more detailed investigation. The aim of the NO_2 monitoring undertaken has been to measure pollutant concentrations at busy roads and junctions especially near residential areas. The tubes are sited in accordance with the technical guidance LAQM.TG(09)
Triplicate diffusion tubes were located at the Irish Street /Market Street / Church Street junction in Downpatrick. for a number of years, the results from these exceeded the objective and therefore were removed in 2010 and an automatic site was installed in June 2010 to gain more accurate results at this location. Additional diffusion tubes are also located at a variety of locations close to the Irish Street junction since October 2008. The results at these sensitive locations in 2011 are below the objective and considerably lower than in previous years due to the more accurate local bias adjustment factor applied. A decision was made to apply the local bias adjustment factor of **0.72** to the diffusion tubes, further information on the decision to use this bias adjustment factor and details of the QA/QC of the diffusion tubes can be found in appendix A

Details of sites are given in figure 2.2 and table 2.2.

Figure 2.2 Map (s) of Non-Automatic Monitoring Sites (if applicable)



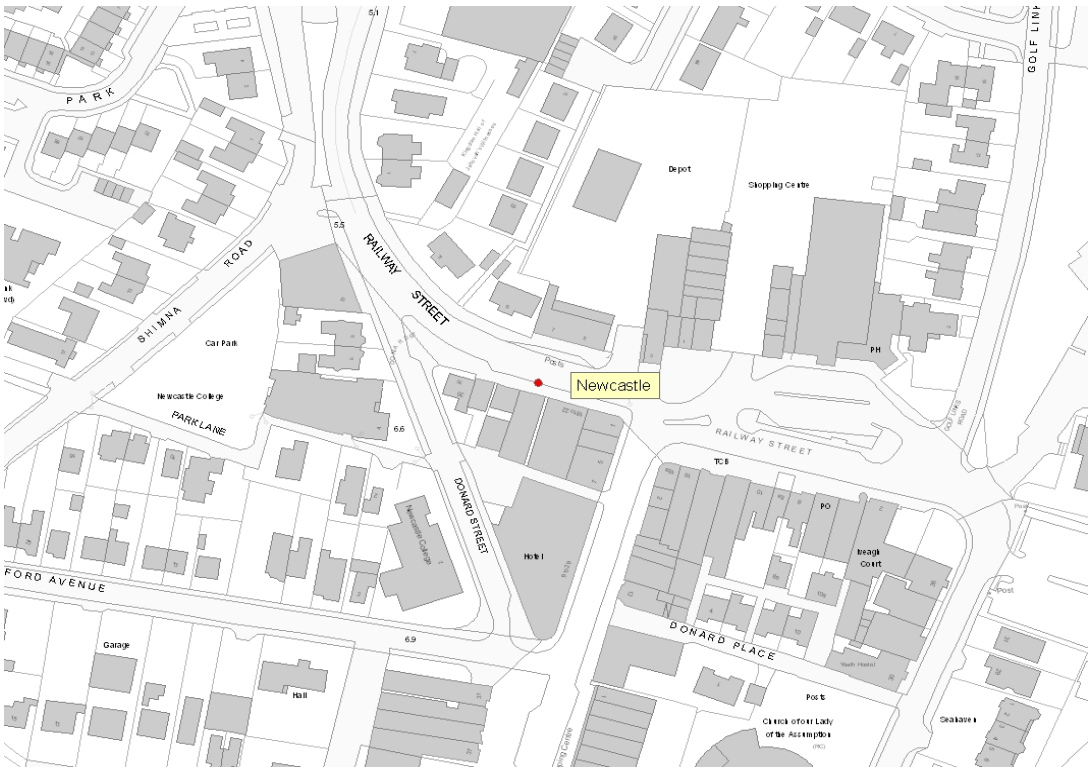


Table 2.2 Details of Non-Automatic Monitoring Sites

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?
Market Street Junction	Roadside	348655	344596	NO_2	N	Y	6M	1.5M	Y
Irish Street 50M	Roadside	348702	344609	NO_2	N	N	3M	1M	Y
Irish Street 100M	Roadside	348735	344566	NO_2	N	N	10M	1M	Y
Church Street 50M	Roadside	348422	344646	NO_2	N	N	12M	1M	Y
Church Street 100M	Roadside	348664	344744	NO_2	N	N	12M	1M	Y
Market Street 50M	Roadside	348686	344509	NO_2	N	N	10M	1M	Y
Market Street 100M	Roadside	348598	344531	NO_2	N	N	10M	1M	Y
St. Patricks Ave	Roadside	348542	344448	NO_2	N	N	20M	1M	N
English Street	Roadside	348605	344664	NO_2	N	N	10M	6M	Y
Stream Street	Roadside	348915	344207	NO_2	N	N	10M	1M	Y
St Patricks Drive	Background	348605	344205	NO_2	N	N	10M	1M	N
Newcastle	Roadside	337818	331601	NO_2	N	N	15M	0.5M	Y

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

The automatic site was installed in Market Street at relevant exposure in June 2010. The results for 2010 have been annualised as there was only 50% data capture. There 2011 data was scaled and ratified from January to March by Monitor Europe and the remainder of the years data was ratified by AEA. AEA carried out two six monthly audits and fortnightly manual calibrations were carried out by the local LSO. Both companies supplied a spread sheet of hourly means in ug/m^3. The data had been rescaled and ratified. This data was combined and an annual mean calculated, it also showed no exceedences of the hourly mean objective.

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]
Market Street	Roadside	N	99.8%	99.8%				35.36(a)	36

[a] Only six months data was available in 2010 and therefore the annual mean has been annualised in accordance with the technical guidance.

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

As there has only been 18 months of data available from the automatic analyser no trend is visible.

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]
Market Street	Roadside	N	99.8%	99.8%					0

Diffusion Tube Monitoring Data

There are presently 11 diffusion tube monitoring locations in Down District Council. Irish Street junction site has now been replaced with an automatic analyser. Market Street, Irish Street and English Street all leading into this junction have tubes positioned 50 metres and 100 metres from this sensitive receptor since 2009 to determine the levels of NO_2 further along these incoming roads.
The local bias adjustment factor of **0.72** has been applied to the 2011 results.
The QA/QC and the decision to use this factor can be found in appendix A.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

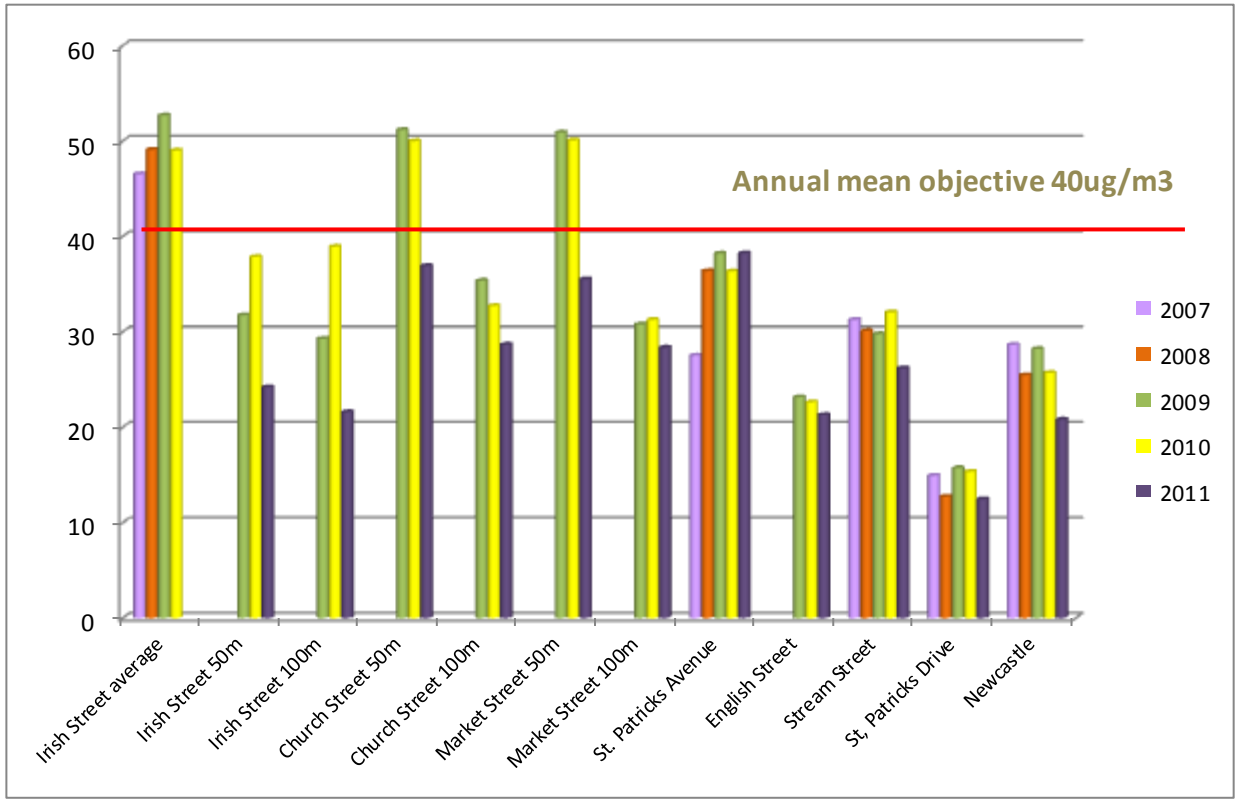
Site ID	Location	Site Type	Within AQMA ?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor =0.72) 2011 ($\mu g/m^3$)
Irish Street 50M	Irish Street	Roadside	N	N	11 Months	N/A		24
Irish Street 100M	Irish Street	Roadside	N	N	12 Months	N/A		22
Church Street 50M	Church Street	Roadside	N	N	12 Months	N/A		37
Church Street 100M	Church Street	Roadside	N	N	12 Months	N/A		29
Market Street 50M	Market Street	Roadside	N	N	12 Months	N/A		36
Market Street 100M	Market Street	Roadside	N	N	10 Months	N/A		28
St. Patricks Ave	St. Patricks Ave	Roadside	N	N	9 Months	N/A		38
English Street	English Street	Roadside	N	N	12 Months	N/A		21
Stream Street	Stream Street	Roadside	N	N	12 Months	N/A		26
St Patricks Drive	St Patricks Drive	Background	N	N	12 Months	N/A		12
Newcastle	Newcastle	Roadside	N	N	12 Months	N/A		21

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 =0.72)
Irish Street 50M	Roadside	N	N/A	N/A	32	38	24
Irish Street 100M	Roadside	N	N/A	N/A	29	39	22
Church Street 50M	Roadside	N	N/A	N/A	51	50	37
Church Street 100M	Roadside	N	N/A	N/A	35	33	29
Market Street 50M	Roadside	N	N/A	N/A	51	50	36
Market Street 100M	Roadside	N	N/A	N/A	31	31	28
St. Patricks Ave	Roadside	N	28	36	38	36	38
English Street	Roadside	N	N/A	N/A	23	23	21
Stream Street	Roadside	N	31	30	30	32	26
St Patricks Drive	Background	N	15	13	16	15	12
Newcastle	Roadside	N	29	25	28	26	21

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

Levels have remained consistent at all sites, in 2011 there is a noticeable reduction this is due to a more accurate bias adjustment factor applied.



2.2.2 PM_{10}

Down District Council does not carry out monitoring for PM_{10} pollution at this time.

2.2.3 Sulphur Dioxide

Down District Council does not carry out monitoring for SO_2 pollution at this time.

2.2.4 Benzene

Down District Council does not carry out monitoring for Benzene at this time.

2.2.5 Other pollutants monitored

In 2011 Nitrogen Dioxide was the only pollutant monitored

2.2.6 Summary of Compliance with AQS Objectives

Down District Council has examined the results from monitoring in the district. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Down District 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

Down District 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.

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

3.4 Junctions

Down District 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

Down District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

Down District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Down District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Down District 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

Down District 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)

Down District 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

Down District 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

Down District 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

Down District 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

Down District Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Down District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Down District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Down District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

Down District 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

In previous years NO_2 had been exceeded at the Irish Street junction, monitoring had been carried out using NO_2 diffusion tubes however the installation of an automatic analyser at this location, has ascertained in 2011 the objective was not exceeded. There were no other exceedences identified.

8.2 Conclusions from Assessment of Sources

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

8.3 Proposed Actions

This 2012 Updating and Screening Assessment for Down District Council has identified there is no need to proceed to a detailed assessment for any of the pollutants.
Monitoring sites are sited in accordance with the guidance and at relevant exposure, no new sites have been identified.
Down District Council intends to continue monitoring NO_2 in 2012 and submit a progress report in 2013. If the automatic site ascertains levels of NO_2 in Downpatrick are below the objective in 2012, Down District Council intends to decommission the automatic site and cease monitoring of NO_2 in Downpatrick.

9 References

Diffusion Tubes for Ambient NO2 Monitoring: **Practical Guidance for Laboratories and Users** – AEA

DDC (2009) **Air Quality Update and Screening and Assessment**. DDC, October 2009.

DDC (2009) **Air Quality Update and Screening and Assessment**. DDC, October 2009.

DDC (2010) **Detailed Assessment for NO_2 at Market Street/Irish Street junction, Downpatrick**

Defra (2007). **The Air Quality Strategy for England, Scotland, Wales and Northern Ireland**. http://www.defra.gov.uk/environment/airquality/strategy/ (Accessed April 2010)

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

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: QA/QC Data

		Jan	Feb	Mar	Apr	May	**Jun**	**Jul**	Aug	Sep	Oct	Nov	Dec
Irish Street 50m		37	26	34	25	0	14	22	24	17	23	22	22
Irish Street 100m		34	28	34	21	15	9	19	19	17	22	22	18
Church Street 50m		59	45	47	33	17	23	30	38	35	41	32	43
Church Street 100m		24	32	39	30	32	34	24	35	21	23	30	19
Market Street 50m		57	39	50	33	23	26	29	23	32	39	35	41
Market Street 100m		43	33	38	33	15	24	0	0	19	28	30	20
St. Patricks Avenue		0	41	45	0	35	35	0	32	34	40	39	44
English Street		30	26	27	18	25	33	11	12	17	17	24	17
Stream Street		35	30	29	22	24	22	19	23	25	27	27	30
St, Patricks Drive		21	15	16	8	12	14	6	8	10	12	15	12
Newcastle		27	27	29	23	12	18	18	22	17	19	26	14

Above shows the monthly results from the diffusion tube sites. All sites had more than nine months data available.

Appendix A: QA:QC Data

Factor from Local Co-location Studies (if available)

The local Market Street bias adjustment factor was calculated using the R&A support precision and accuracy spreadsheet.

http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html

and in accordance to current guidance summarized in the

Technical Guidance LAQM.TG(09).

These results has been included in the national bias adjustment factor database.

Down District Council co-location study

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	06/01/2011	03/02/2011	69	67	68	68	1.0	1	2.5
2	03/02/2011	28/02/2011	56	61	61	59	2.9	5	7.2
3	28/02/2011	28/03/2011	65	63	59	62	3.1	5	7.6
4	28/03/2011	06/05/2011	57	44	55	52	7.0	13	17.4
5	06/05/2011	01/06/2011	35	34	54	41	11.3	27	28.0
6	01/06/2011	30/06/2011	49	49	44	47	2.9	6	7.2
7	30/06/2011	04/08/2011	44	45		45	0.7	2	6.4
8	04/08/2011	31/08/2011	45	43	43	44	1.2	3	2.9
9	31/08/2011	29/09/2011	45	44	45	45	0.6	1	1.4
10	29/09/2011	27/10/2011	47	47	48	47	0.6	1	1.4
11	27/10/2011	02/12/2011	54	52	56	54	2.0	4	5.0
12	02/12/2011	30/12/2011	44	39	43	42	2.6	6	6.6
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
43	97	Good	Good
38	100	Good	Good
44	100	Good	Good
36	100	Good	Good
23	100	Poor Precision	Good
37	100	Good	Good
35	96	Good	Good
34	93	Good	Good
33	93	Good	Good
37	98	Good	Good
40	99	Good	Good
36	99	Good	Good
Overall survey -->		Good precision	Good Overall DC

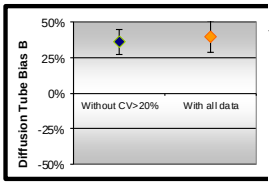
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 11 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: 0.73 (0.69 - 0.78)
Bias B: 37% (28% - 45%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 38 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 38 (35 - 40) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A: 0.72 (0.67 - 0.78)
Bias B: 39% (28% - 50%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 36 µgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 36 (34 - 39) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

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[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[5]	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 **0.72**
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 Market Street site is situated according to the technical guidance and the position is of worst case exposure and positioned at relevant exposure.and is similar siting of the other tubes in the study

Using the local factor of **0.72** and not the national factor of 0.84 has brought the results below the objective, but Down District Council having examined the data from the automatic analyser decided it would be a more realistic bias adjustment.
Also Down District Council lies within the Eastern Group area. There are five neighbouring councils within the group. Ards Borough Council does not carry out automatic monitoring of NO_2 but the remaining four have carried out co-location studies. They are all analysed by Environmental Scientific Group the average of these is **0.71**.
As Down District Council has confidence in the QA/QC of all the four local studies (all using ratified data),also all the sites are situated in similar location in major provincial towns and climatic conditions, it confirmed the local factor of 0.72 was a realistic adjustment.
They were all calculated using the R&A support precision and accuracy spreadsheet.

http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html

and in accordance to current guidance summarized in the

Technical Guidance LAQM.TG(09).

These results has been included in the national bias adjustment factor database.