2011 Air Quality Progress Report for *North Down Borough Council*

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

17 May 2011

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Glossary

QA/QC	**Quality Assessment Quality Control.**
AQMA	**Air Quality Management Area**
UWE	**University of the West of England**
WASP	**Workplace Analysis Scheme for Proficiency**

Executive Summary

The Environment (Northern Ireland) Order 2002, requires North Down Borough Council to undertake Air Quality Reviews and Assessments in their local areas and to meet the local air quality targets and objectives set out in the UK National Air Quality Strategy (2000). The production of an annual air quality report is now a statutory duty for all local authorities. The process is set out in the Department of Environment's Local Air Quality Management Policy Guidance LAQM PGNI (03).

This report is prepared by the North Down Borough Council to meet its statutory obligations under the above regime and has been prepared using the recommended template. The report has been prepared in accordance with the policy guidance mentioned above and with the relevant technical guidance Local Air Quality Management (LAQM.TG(09)

The Borough of North Down is geographically one of the smallest Council areas in Northern Ireland, but is regarded as economically one of the wealthiest. Population has increased steadily over recent years and is now in the region of 78,900. Air Quality in North Down is generally good as there is good ventilation from sea breezes. There are few industrial processes in the area that are significantly detrimental to air quality and heavy fuel oil is not widely used for heat generation.

However, there are a number of very busy trunk roads in the area the busiest being the A2 commuter route from Bangor to Belfast with average daily traffic flows of 44,000 vehicle movements per day at Holywood. The A2 has now been identified as the only area of concern with relation to Air Quality. All monitoring sites are now located at relevant exposure along this main arterial route to Belfast, and the SO2 and PM10 Automatic station in Bangor, was decommissioned on 1st April 2010 as there had been no exceedences of the Air Quality Objectives since the analysers were installed in 2003, though because of the high level of solid fuel use in the area very high peak levels of PM10 had been measured on occasion.

All present monitoring indicates that the objectives in the air quality strategy are not currently being exceeded in the area and that detailed assessments or the declaration of Air Quality Management Areas are not required.

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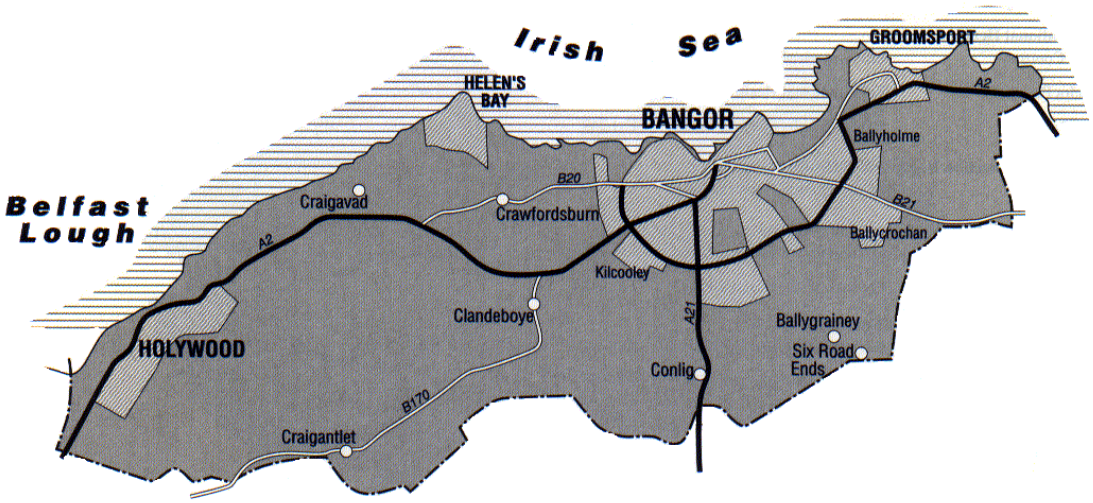
1 Introduction

1.1 Description of Local Authority Area

The Borough of North Down is geographically one of the smallest Council areas in Northern Ireland, but is regarded as economically one of the wealthiest. Population has increased steadily over recent years and is now in the region of 78,900.



Air Quality in North Down is generally good as there is good ventilation from sea breezes. There are few industrial processes in the area that are significantly detrimental to air quality and heavy fuel oil is not widely used for heat generation.

There is still significant use of solid fuel within the Borough for domestic heating. Solid Fuel use was subjected to evaluation in accordance with DETR guidance. In addition, there is over 25 years of data from smoke and SO_2 bubbler sites that have been located in Bangor and Holywood. Studies in relation to solid fuel use were carried out in 2002 to assess the risk of exceeding the air quality objectives in relation to SO_2 and PM_{10}.

There are a number of very busy trunk roads in the area as indicated on the above map. Much of the monitoring work in the area is in relation to NO_2 and PM_{10} at relevant locations particularly in relation to the A2 to Belfast between Ballyrobert and Holywood.

1.2 Purpose of Progress Report

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 Local Air Quality Management 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 microgram's 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 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in Northern Ireland.

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

1.4 Summary of Previous Review and Assessments

Table 2 Previous reports

Stages Completed	*Exceedences Identified / Predicted*	*Areas Affected*	*AQMA's Declared*
Stage 1 2001	PM10, SO2, NO2	A2 Bangor to Belfast Road, Clandeboye Road Area.	No
Stage 2&3 2004	PM10, SO2, NO2	A2 Bangor to Belfast Road, Clandeboye Road Area.	No
Progress Report 2005	None	A2 Bangor to Belfast Road, Clandeboye Road Area.	No
USA 2006	None	A2 Bangor to Belfast Road, Clandeboye Road Area	No
Progress Report 2007	None	A2 Bangor to Belfast Road, Clandeboye Road Area	No
Progress Report 2008	NO2	A2 Bangor to Belfast Road,	No
USA 2009	None	A2 Bangor to Belfast Road,	No
Progress Report 2010	None	A2 Bangor to Belfast Road,	No

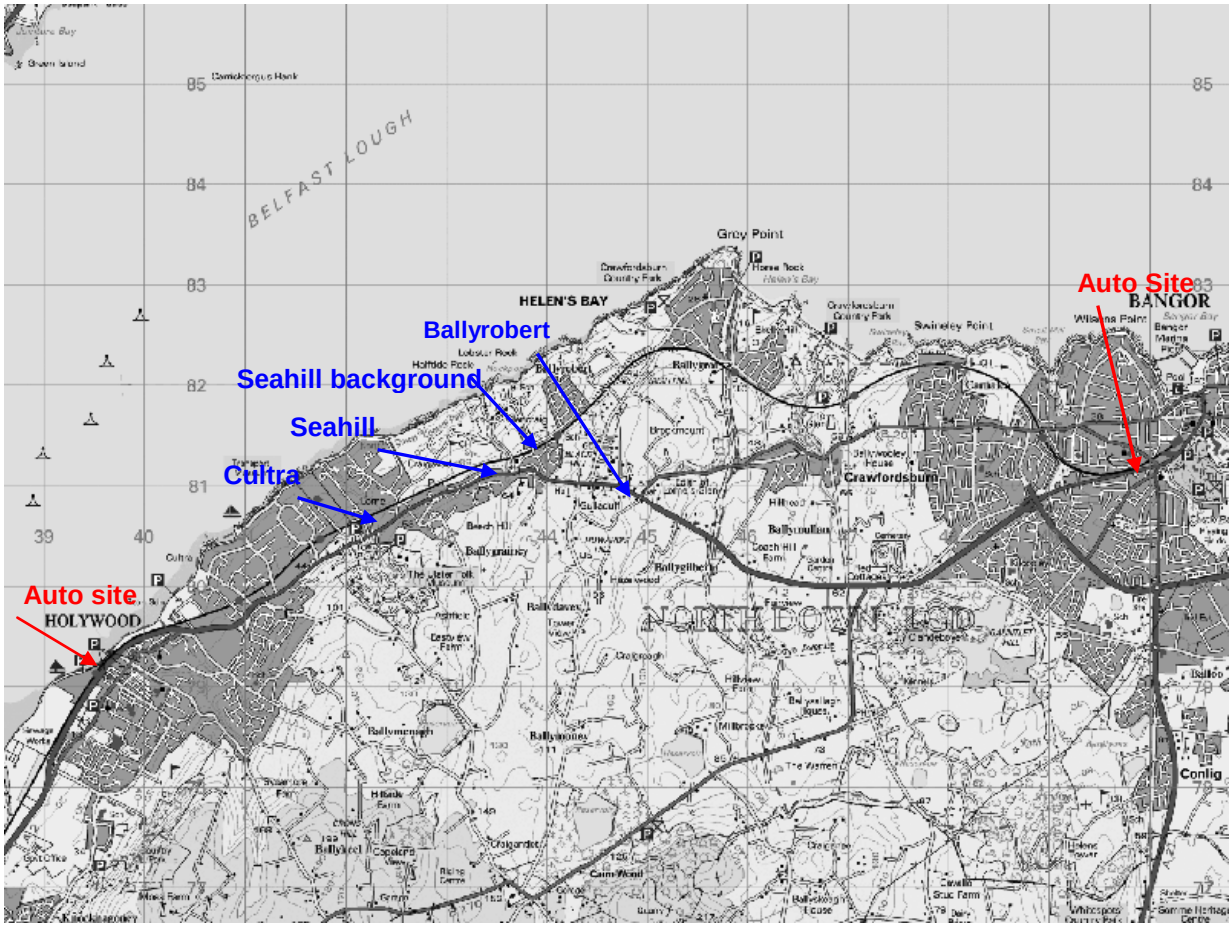
2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The map below indicates the location of all present monitoring sites.

Figure 1 Map of North Down Borough Council Air Quality Monitoring Sites.



Automatic site A2 Holywood	NO2 and PM10	
Automatic site Bangor	SO2 and PM10	(decommissioned 01/04/2010)
Cultra	NO2 Diffusion Tubes	
Seahill	NO2 Diffusion Tubes	
Seahill Background	NO2 Diffusion Tubes	
Ballyrobert	NO2 Diffusion Tubes	

2.1.1 Automatic Monitoring Sites

North Down Borough Council contracted AEA technology to carry out the QA/QC for the automatic monitoring sites. This includes data handling, ratification of data and 6monthly site visits. The Eastern Group Air Quality technical officer visits the sites on a on a weekly basis and calibrates the equipment on a fortnightly programme.

Figure 2 Marine Parade A2 Automatic AQM Site.

Figure 3 Church Street Automatic Monitoring Site. **(Decommissioned 1st April 2010)**

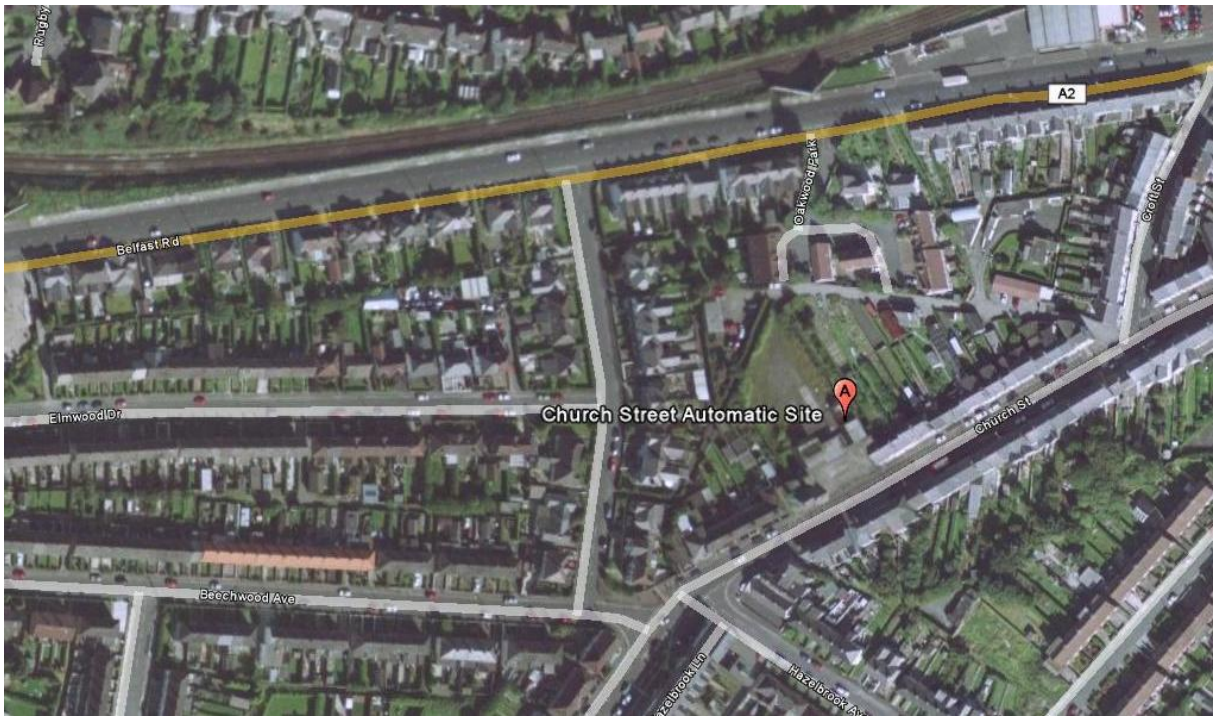


Table 3 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	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?
Marine Parade Holywood A2	Roadside	X339481	Y379328	NO2, PM10	Chemiluminescence TEOM	NO	Y 30M	4.6M	Y
Church Street Bangor	Urban	X349855	Y381044	SO2, PM10	UV TEOM	NO	Y 30M	N/A	Y

2.1.2 Non-Automatic Monitoring

The NO_2 diffusion tubes are supplied by Bureau Veritas and analysed by Eurofins. Preparation method is 20% TEA in water. A bias adjustment factor has been applied using the national figure of 0.84.A co-location study is carried out at the automatic site in Holywood, and the bias adjustment factor for 2010 was 0.76. There are 4 co-location studies carried out within the local Eastern Group area and the average of these is 0.84, and therefore a decision was made to use the LAQM data base figure for Eurofins which was also 0.84.

http://laqm.defra.gov.uk/documents/Diffusion_Tube_Bias_Factors_v04_11_v6.xls

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

Included in Fig 1 above.

Table 4 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref (Irish 1964)	Pollutants Monitored	In AQMA ?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location ?
Ballyrobert A2	Roadside	X345002 Y380823	NO_2 Tubes	N	Y (<1m)	3m	Y
Seahill Background	Urban B'Ground	X344128 Y381294	NO_2 Tubes	N	N\A	250m	N\A
Seahill A2	Roadside	X343545 Y381102	NO_2 Tubes	N	Y (<1m)	10m	Y
Cultra A2	Roadside	X342475 Y380672	NO_2 Tubes	N	Y (<1m)	6.3m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

No Objectives for NO2 have been exceeded.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 5 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA ?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2010 [b] %	Annual mean concentrations (μg/m^3)		
					2008 [c,d]	2009 [c,d]	2010 [c]
Marine Parade Holywood	X339481 Y379328	N		96.6	32	35	34

Figure 4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

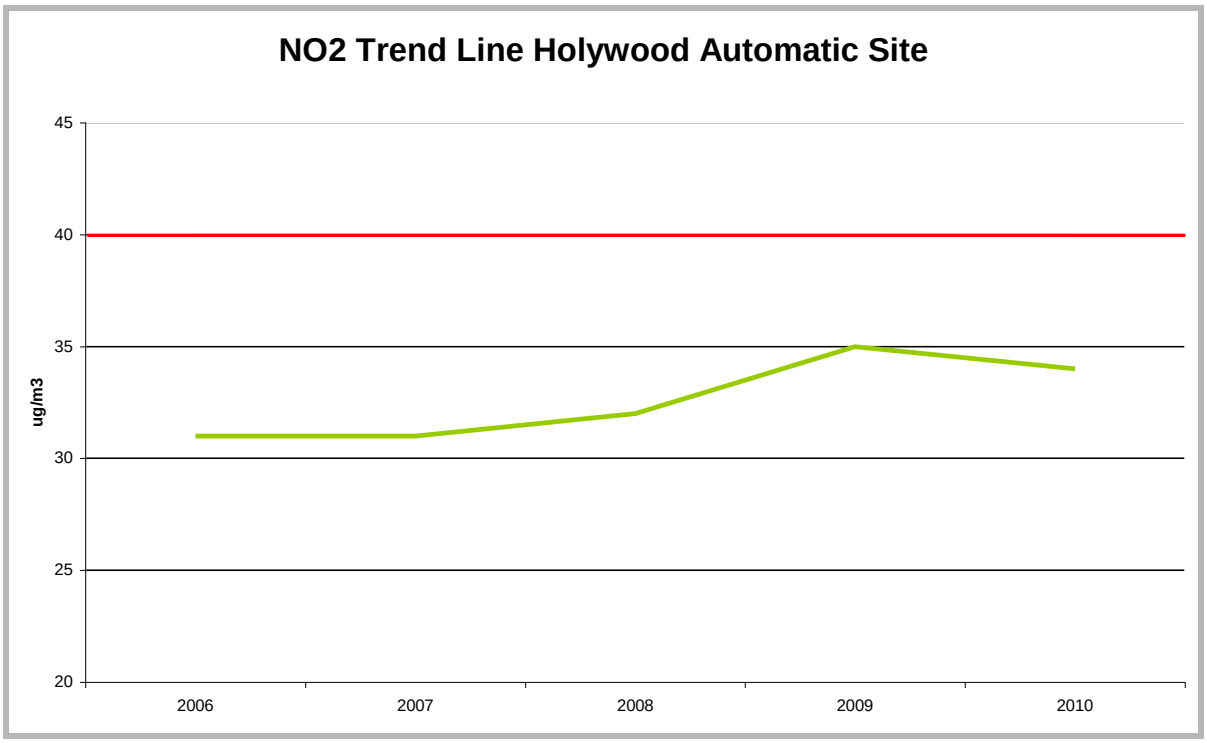
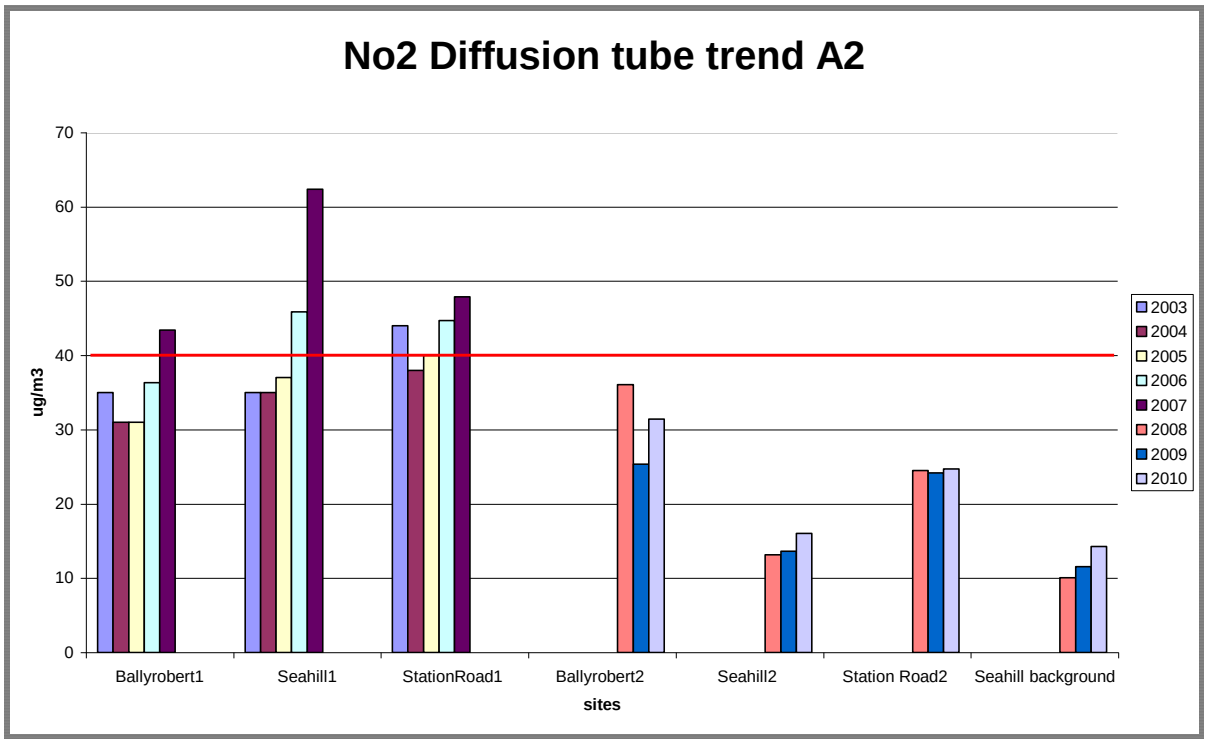


Table 6 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2010 [b] %	Number of Exceedences of hourly mean (200 μg/m^3)		
					2008 [c]	2009 [c]	2010
Marine Parade Holywood	X339481 Y379328	N		98.1	**0**	**4**	**8**

Figure 5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.



***The A2 Diffusion tube kerbside sites were moved in 2008 to new sites ie: the façades of the closest relevant exposure.**

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Diffusion Tube Monitoring Data

Table 7 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for monitoring period[a] %	Data Capture for full calendar year 2010[b] %	Annual mean concentrations (μg/m^3)		
					2008 [c, d]	2009 [c,d]	2010 [c]
Ballyrobert2	A2	N		100%	36	23	31
Seahill2	A2	N		100%	21	12	16
Station Road Cultra2	A2	N		100%	28	22	25
Seahill background	A2	N		91%	10	10	14

2.2.2 PM_{10}

The monitoring data from Holywood remains below the objective. The Bangor site was decommissioned 01/04/2010 as levels monitored in the previous 7 years were consistently below the objective. The PM10 monitor continued to operate until the booth and equipment was removed from the site. The figures obtained from the TEOM during this period are included in the appendices for completeness.

Table 8 Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture for full calendar year 2010 [b] %	Annual mean concentrations ($\mu g/m^3$)		
					2008 [c, d]	2009 [c,d]	2010 [c]
Marine Parade Holywood	A2	N		95.2	24	18	**24**

Table 9 Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period [a] %	Data Capture 2010 [b] %	Number of Exceedences of daily mean objective (50 $\mu g/m^3$)		
					2008 [c]	2009 [c]	2010 [c]
Marine Parade Holywood	A2	N		95.2	9	0	**12**

2.2.3 Sulphur Dioxide

SO2 levels have continued to be insignificant and the site was decommissioned on the 1st April 2010

2.2.4 Summary of Compliance with AQS Objectives

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

3 New Local Developments

North Down Borough Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4 Planning Applications

During 2008 planning applications for approximately 900 dwellings have been approved for the Rathgael Road in Bangor. This will have an impact on the A2 route into Belfast. Due to the economic climate and collapse of the housing market these developments have and continue to be in abeyance. There have been no major new planning applications in 2010.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

There are no exceedences of the Air quality Objectives in North Down Borough Council area. However, as there appears to be a trend toward increased NO2 levels since 2008 at the Holywood A2 site. Therefore, North Down Borough Council has decided to fund further automatic monitoring at this location.

5.2 Proposed Actions

Monitoring will continue at the existing sites along the A2 and a USA will be submitted in 2012.

6 References

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

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

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

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

7 Appendices

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors
The tubes are supplied by Bureau Veritas labs and the preparation method is 20% TEA in water. The bias adjustment factor from the R&A helpdesk database is 0.84

http://laqm.defra.gov.uk/documents/Diffusion_Tube_Bias_Factors_v04_11_v6.xls

Factor from Local Co-location Studies (if available)

The bias adjustment factors from the Holywood co-located study is 0.76

This was calculated using the R&A support precision and accuracy spreadsheet.

Appendix B:

2010 Diffusion Tube results with bias adjustment factor applied. (0.84)

Ballyrobert2	38	46	47	44	25	32	20	29	15	20	29	31
Seahill2	24	25	19	19	12	13	9	13	11	12	16	19
StationRoad 2Cultra	29	36	30	27	16	17	13	13	23	25	27	40
Seahill background	20	22	27	14	5	6	6	14	0	10	13	20

Discussion of Choice of Factor to Use

North Down Borough Council used the national bias adjustment factor of 0.84, published on the Review and Assessment helpdesk. A co-location study is carried out at the automatic site in Holywood, and the local bias adjustment factor for 2010 was 0.76. There are 4 co-location studies carried out within the local Eastern Group area and the average of these is 0.84, and therefore a decision was made to use the National figure.

PM Monitoring Adjustment

The PM_{10} TEOM data has been corrected using the Volatile Correction Model (www.volatile-correction-model.info) as detailed on Page 3-10 of LAQM.TG (09).

NORTH DOWN HOLYWOOD A2
01 January to 31 December 2010

These data have been fully ratified by AEA

POLLUTANT	NO_X	NO	NO_2	PM_{10}+	PM_{10} VCM*	PM_{10} GR10
Number Very High	-	-	0	-	-	0
Number High	-	-	0	-	-	0
Number Moderate	-	-	0	-	-	82
Number Low	-	-	8463	-	-	8242
Maximum 15-minute mean	1192 µg m^{-3}	606 µg m^{-3}	265 µg m^{-3}	247 µg m^{-3}	-	321 µg m^{-3}
Maximum hourly mean	1093 µg m^{-3}	556 µg m^{-3}	243 µg m^{-3}	170 µg m^{-3}	-	221 µg m^{-3}
Maximum running 8-hour mean	854 µg m^{-3}	431 µg m^{-3}	196 µg m^{-3}	94 µg m^{-3}	-	123 µg m^{-3}
Maximum running 24-hour mean	522 µg m^{-3}	257 µg m^{-3}	130 µg m^{-3}	62 µg m^{-3}	-	81 µg m^{-3}
Maximum daily mean	503 µg m^{-3}	245 µg m^{-3}	129 µg m^{-3}	55 µg m^{-3}	72 µg m^{-3}	72 µg m^{-3}
90^{th} percentile of daily means				28 µg m^{-3}	38 µg m^{-3}	37 µg m^{-3}
Average	78 µg m^{-3}	29 µg m^{-3}	34 µg m^{-3}	18 µg m^{-3}	24 µg m^{-3}	24 µg m^{-3}
Data capture	96.6 %	96.6 %	96.6 %	95.2 %	84.7%	95.2 %

+ PM_{10} as measured by a TEOM
*PM_{10} VCM – TEOM data corrected using Volatile Correction Model
PM_{10} GR10 - indicative gravimetric corrected, i.e. 'raw' TEOM PM_{10} data with a 1.3 factor applied
Particulate matter concentrations are reported at ambient temperature and pressure.

The VCM has been calculated using Belfast AURN (contains some provisional data) and locally source ratified FDMS data (Lisburn Dunmurry High School) plus temperature and pressure as selected by the VCM Model

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	8	3
PM_{10} Particulate Matter (VCM Corrected)	Daily mean > 50 µg m^{-3}	12	12
PM_{10} Particulate Matter (VCM Corrected)	Annual mean > 40 µg m^{-3}	0	-

NORTH DOWN BANGOR
01 January to 31 December 2010

These data have been fully ratified by AEA

POLLUTANT	SO_2	PM_{10}+	PM_{10} VCM*	PM_{10} GR10
Number Very High	0	-	-	0
Number High	0	-	-	17
Number Moderate	0	-	-	32
Number Low	8507	-	-	8711
Maximum 15-minute mean	77 µg m^{-3}	605 µg m^{-3}	-	787 µg m^{-3}
Maximum hourly mean	56 µg m^{-3}	164 µg m^{-3}	-	213 µg m^{-3}
Maximum running 8-hour mean	42 µg m^{-3}	129 µg m^{-3}	-	167 µg m^{-3}
Maximum running 24-hour mean	23 µg m^{-3}	80 µg m^{-3}	-	104 µg m^{-3}
Maximum daily mean	18 µg m^{-3}	76 µg m^{-3}	98 µg m^{-3}	98 µg m^{-3}
90^{th} percentile of daily means		26 µg m^{-3}	38 µg m^{-3}	34 µg m^{-3}
Average	5 µg m^{-3}	16 µg m^{-3}	23 µg m^{-3}	21 µg m^{-3}
Data capture	24.8 %**	99.1 %	89.9 %	99.1 %

**** the data capture is low as the site was decommissioned in April 2010**

+ PM_{10} as measured by a TEOM
*PM_{10} VCM – TEOM data corrected using Volatile Correction Model
PM_{10} GR10 - indicative gravimetric corrected, i.e. 'raw' TEOM PM_{10} data with a 1.3 factor applied
Particulate matter concentrations are reported at ambient temperature and pressure.

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	0	0
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	0	0
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	10	10
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	0	-

The PM_{10} TEOM data has been corrected using the Volatile Correction Model (www.volatile-correction-model.info) as detailed on Page 3-10 of LAQM.TG (09).

The VCM has been calculated using Belfast AURN (contains some provisional data) and locally source ratified FDMS data (Lisburn Dunmurry High School) plus temperature and pressure as selected by the VCM Model

QA/QC of automatic monitoring

North Down Borough Council commissioned AEA Technology to provide the QA/QC of the automatic measurements of NO2-SO2 and PM10 from the two sites. AEA Technology is the current QA/QC contractor for the national automatic urban and rural network (AURN) operated by the Department for Environment, Food and Rural Affairs and the Devolved Administrations. Local authority staff act as the local site operator and visit the sites on a fortnightly basis carrying out any manual calibration or filter changes required. Audits of the two sites are carried by AEA Technology on a six monthly basis.

QA/QC of diffusion tube monitoring

The tubes are supplied by Bureau Veritas labs and the preparation method is 20% TEA in water. Bureau Veritas Laboratories that have demonstrated satisfactory performance in the WASP scheme for analysis of NO2 diffusion tubes. http://www.laqmsupport.org.uk/Summary_of_Laboratory_Performance_in_WASP_R103-107.pdf