

Air Quality Progress Report 2011

May 2011



In fulfilment of the Environment (Northern Ireland) Order 2002: Local Air Quality Management

Local Authority Officer	James Campbell Senior Environmental Health Officer
--------------------------------	---

Department	Environmental Services
Address	24 Strangford Road, Downpatrick
Telephone	02844610824
e-mail	james.campbell@downdc.gov.uk

Report Reference number	
Date	May 2011

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.

With respect to Nitrogen Dioxide, the 2010 Progress Report has 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 NO₂ was submitted by Down District Council in 2010. As a result of this a real time analyser has now replaced the diffusion tubes at the junction of Market Street/ Irish Street, Downpatrick. Realtime data has now been available for six months and the results are below the objective. Further monitoring is to continue at this site.

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

Table of contents

1	Introduction	6
1.1	Description of Local Authority Area	6
1.2	Purpose of Progress Report	7
1.3	Air Quality Objectives	8
1.4	Summary of Previous Review and Assessments	9
2	New Monitoring Data	11
2.1	Summary of Monitoring Undertaken	11
2.2	Comparison of Monitoring Results with Air Quality Objectives	17
3	New Local Developments	22
3.1	Road Traffic Sources	22
3.2	Other Transport Sources	22
3.3	Industrial Sources	22
3.4	Commercial and Domestic Sources	22
3.5	New Developments with Fugitive or Uncontrolled Sources	22
4	Planning Applications	23
5	Conclusions and Proposed Actions	24
5.1	Conclusions from New Monitoring Data	24
5.2	Conclusions relating to New Local Developments	24
5.3	Proposed Actions	24
6	References	25

Appendices

Appendix A: QA:QC Data

Appendix B: NO₂ results for 2010

List of Tables

Table 1.1 Population projections for Down District Council 2009- 2012

Table 1.2 Air Quality Objectives included in Regulations

Table 1.3 Summary of previous reviews

Table 2 Details of Automatic Monitoring sites

Table 2.2 Details of Non- Automatic Monitoring Sites

Table 2.3 Results of Automatic Monitoring Data

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

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes

List of Figures

Figure 1- map of Down District Council

Figure 2.1 Map of Automatic Monitoring site.

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

Figure 2.3 Ballynahinch NO₂ site (Down 6)

Figure 2.4 Newcastle diffusion tube location

Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.

1 Introduction

1.1 Description of Local Authority Area

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 (table 1).



Figure 1- map of Down District Council

Table 1.1 Population projections for Down District Council 2009- 2012

(www.nisra.gov.uk, accessed 23rd September 2009)

	2009	2010	2011	2012
Pop	68,189	68,692	69,189	69,701

The table shows sustained population growth for Down District Council 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 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 1.2. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.2 Air Quality Objectives included in Regulations for LAQM in Northern Ireland.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	3.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, 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:

Table 1.3- Summary of previous reviews

<p>Stage 1 Report (DDC, 2000)</p>	<p>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.</p>
<p>Stage 2/3 Air quality review (DDC, 2003)</p>	<p>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.</p>
<p>Progress report (DDC, 2005)</p>	<p>The progress report concluded that NO₂, SO₂ and PM₁₀ were not predicted to cause exceedances of the air quality objectives at relevant receptors.</p>
<p>Updating and Screening Assessment (DDC, 2006)</p>	<p>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.</p>
<p>Progress Report (EG, 2008)</p>	<p>Diffusion tube monitoring indicated that the annual average objective for NO₂ 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.</p> <p>Diffusion tube measurements made in the Irish Street area during 2007 and 2008 indicated exceedances in relation to NO₂. A detailed assessment involving additional diffusion tubes was commenced in late 2008 at this Irish Street location.</p>

<p>Updating and Screening Assessment (DDC, 2009)</p>	<p>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 NO₂ in the vicinity of Irish Street.</p>
<p>Detailed Assessment 2010</p>	<p>For the purposes of this Detailed Assessment additional NO₂ 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/m³ for Nitrogen Dioxide. Down District Council have committed to installing a real time analyzer 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.</p>
<p>Progress report (DDC, 2010)</p>	<p>Diffusion tube monitoring indicated that the annual average objective for NO₂ 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.</p>

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

An NO₂ realtime analyser was installed in Market Street Downpatrick in June 2010. Data has been available from this site since the 1st July 2010. The site is positioned to give the worst case scenario at relevant exposure.

Figure 2.1 Map of Automatic Monitoring Site



Table 2 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?
Market Street Downpatrick	Roadside	348655	344596	NO ₂	Chemiluminescence	NO	Y 10M	1.5M	Y

2.1.2 Non-Automatic Monitoring

Down District Council carries out monitoring of NO₂ by diffusion tubes at fourteen sites (one of which is a triplicate) within the District. 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 NO₂, which require more detailed investigation. The aim of the NO₂ monitoring undertaken has been to measure pollutant concentrations at busy roads and junctions especially near residential areas. The tubes are sited using guidelines from NETCEN but are not part of the monitoring network. Up to November 2004, the NO₂ diffusion tubes were supplied and analysed by Ruddock and Sheratt. Since then, Eurofins have supplied and analysed the tubes. The tubes are currently prepared using 20% TEA in water.

Triplicate diffusion tubes have been located at the Irish Street junction in Downpatrick for a number of years. These were removed in July when the automatic site was installed in June 2010 and a co-location study is now being carried out. Additional diffusion tubes are also located at a variety of locations close to the Irish Street junction since October 2008. The diffusion tube studies for Down for the last five years shows an increasing level at the Irish Street site (see figure 2.5). Further information on the diffusion tube measurements and the QA/QC arrangements are given 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 within Downpatrick



OSNI copyright

- Site for Irish Street triplicate tubes 2 M high beside window of 1st floor apartment at 5 Irish Street (This site was discontinued in July 2010 when the automatic site was installed)
- Sites approximately 50M and 100M from existing site (all single tubes)

Figure 2.3 Ballynahinch NO₂ site (Down 6) -



Figure 2.4 Newcastle diffusion tube location

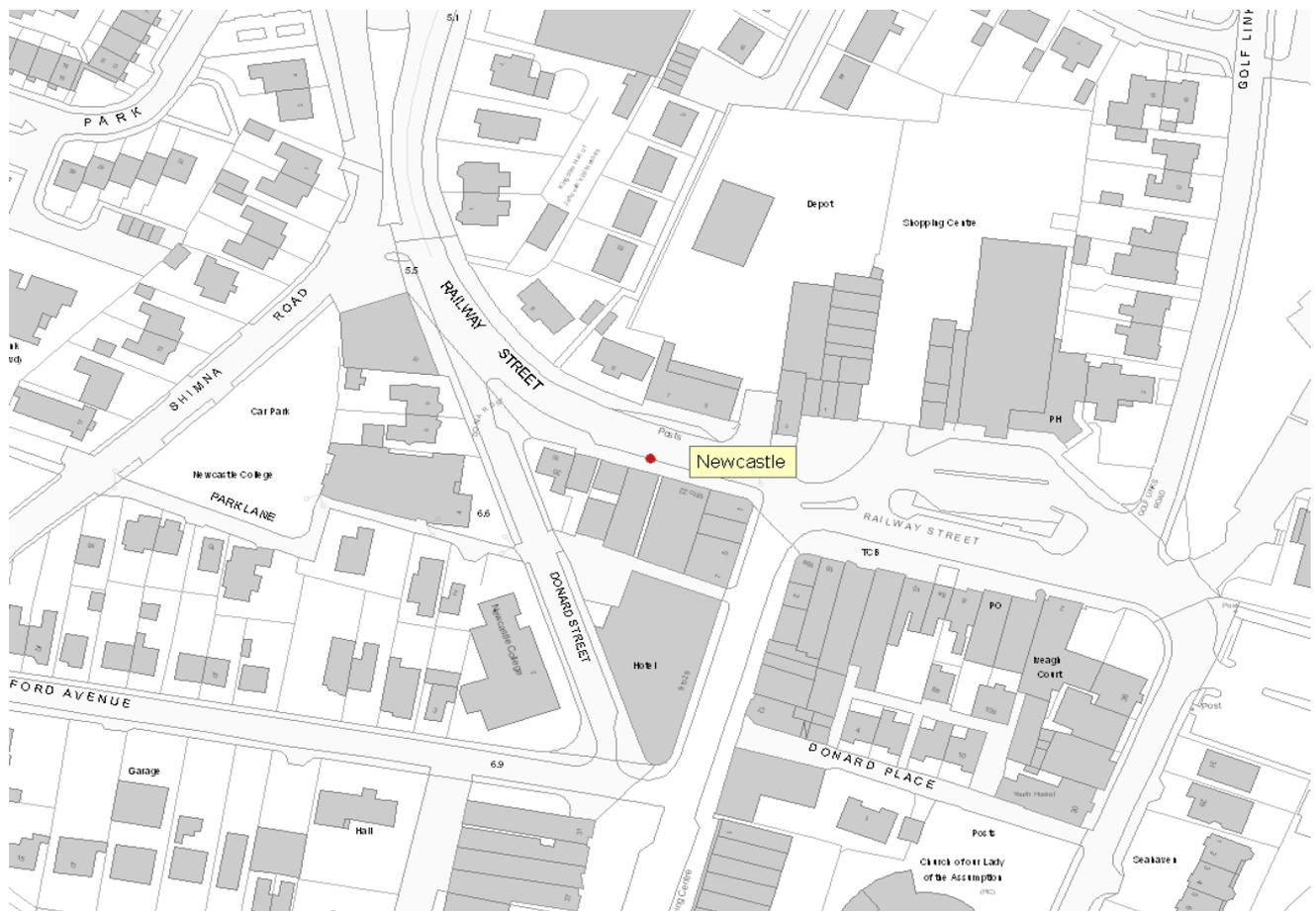


Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	Eastings	Northings	Pollutant 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?
DOWN1-Irish Street- Triplicate	Roadside	348702	344448	NO ₂	N	Y	1	Y
DOWN2-St Patrick's Ave	Kerbside	348542	344448	NO ₂	N	N	1	N/A
DOWN3- Orchard Way	B'ground	348893	345903	NO ₂	N	Y	1	N/A
DOWN4- Stream Street	Kerbside	348915	344207	NO ₂	N	N	1	N/A
DOWN5- Newcastle	Roadside	337818	331601	NO ₂	N	Y	0.5	Y
DOWN6- Ballynahinch	Roadside	336592	352216	NO ₂	N	Y	2	Y
DOWN7-St Patrick's Drive	B'ground	348605	344205	NO ₂	N	Y	1	N/A
DOWN8-English Street	Roadside	348605	344664	NO ₂	N	Y	6	N
DOWN9- Irish Street triplicate	Roadside	348702	344448	NO ₂	N	Y	1	Y
DOWN10- Irish Street Triplicate	Roadside	348702	344448	NO ₂	N	Y	1	Y
DOWN11- Church St (50m)	Roadside	348422	344646	NO ₂	N	Y	1	Y
DOWN12- Church St (100m)	Roadside	348664	344744	NO ₂	N	Y	1	Y
DOWN13- Market Street (50m)	Roadside	348686	344509	NO ₂	N	Y	1	Y
DOWN14- Market St (100m)	Roadside	348598	344531	NO ₂	N	Y	1	Y
DOWN15-Irish St (50m)	Roadside	348702	344609	NO ₂	N	Y	1	Y
DOWN16- Irish St (100m)	Roadside	348735	344566	NO ₂	N	Y	1	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

In the following sections, statistics are presented for Nitrogen Dioxide (NO₂), derived from the automatic station and diffusion tube measurements. These statistics are compared with the objectives for the different pollutant (see table 1-2) to identify exceedances. Down District Council does not carry out any monitoring for other pollutants.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 2.3 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
Downpatrick	2-8 Market Street	N	50	50	N/A	N/A	35.36(a)

(a)-The Automatic site was installed in June 2010 therefore only 6 months data is available, this figure is an estimation of the annual mean in accordance with 3.16 of the Technical Guidance (09). A table of this method can be found in Appendix C. Unfortunately there was not two background sites within a 50 mile radius to estimate the data, as recommended in TG(09) and therefore there is an increased level of uncertainty of the result.

Table 2.4 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
Downpatrick	2-8 Market Street	N		50	N/A	N/A	2 (a)

(a)-Automatic site installed in June 2010 therefore only 6 months data available

In the following section monitoring results are presented for all diffusion tube sites and comparison made with the objective.

Diffusion Tube Monitoring Data

Down District Council currently have 14 monitoring locations for NO₂, and one location uses triplicate tubes. Detailed NO₂ monitoring commenced at the end of 2008 in the vicinity of Irish Street, Downpatrick. There were sensitive receptors at the Irish Street location. A bias adjustment factor of 0.84 was used in 2010. This was taken from the bias-adjustment spreadsheet available from the LAQM page of the National Air Quality website

[http://laqm.defra.gov.uk/documents/Diffusion Tube Bias Factors v04_11_v6.xls](http://laqm.defra.gov.uk/documents/Diffusion_Tube_Bias_Factors_v04_11_v6.xls)

There was less than 90% data capture at Down 1, Irish street, this was due to the site being discontinued in June 2010. A number of other sites had less than 90% data capture due to these diffusion tubes being located in populated areas and were destroyed or stolen on 2 or more occasions during 2010.

The NO₂ diffusion tube data are summarised in the table 2.4. The full dataset (monthly mean values) are included in Appendix B.

The 2010 diffusion tube results show three sites within Downpatrick town centre where exceedences of the annual mean NO₂ objective are occurring:

Site Down 1 – Irish Street

Site Down 11- Church Street 50m from Down1

Site Down 13- Market Street 50m from Down1

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

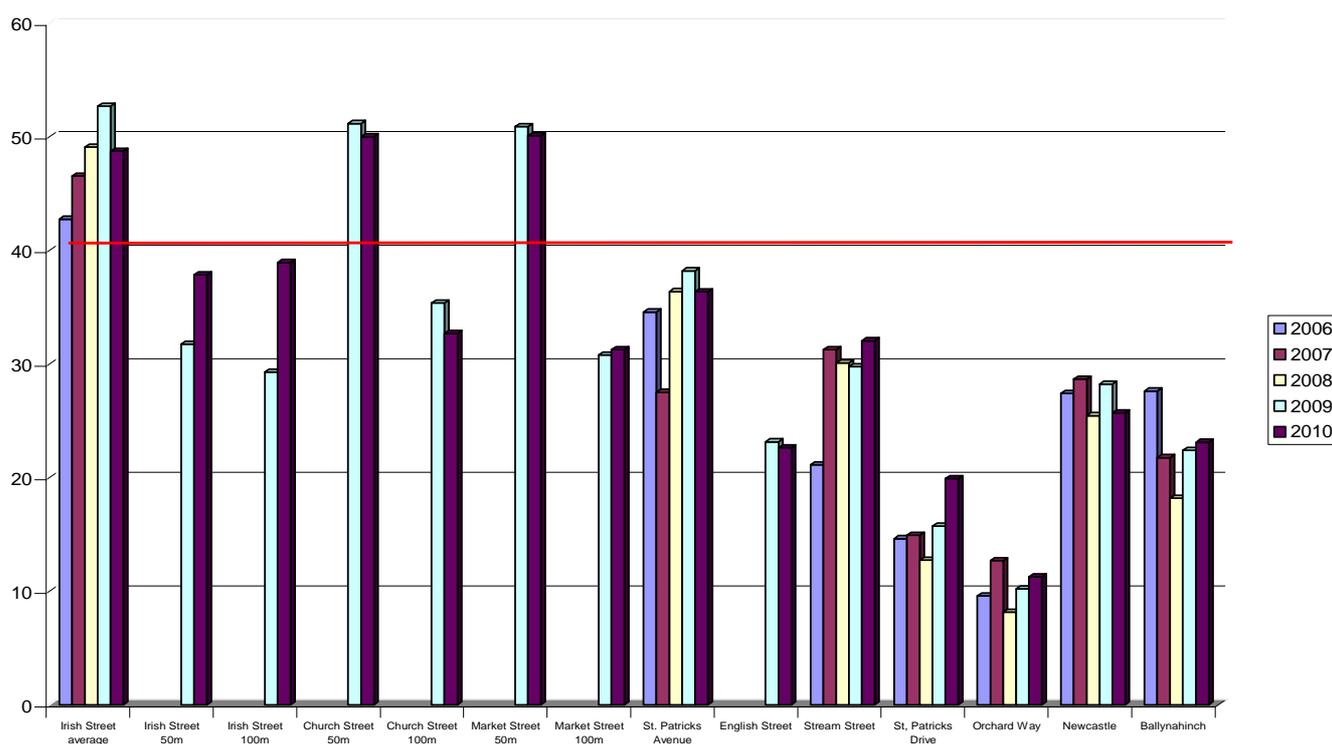
Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
					2008	2009	2010
Down 1	Irish Street (average)(a)	N	50	50	49.	53	42.40(c)
Down 2	St. Patricks Avenue	N	100	100	36	38	36
Down 3	Orchard Way	N	100	100	8	10	11
Down 4	Stream Street	N	83	83	30	30	32
Down 5	Newcastle	N	100	100	25	28	26
Down 6	Ballynahinch	N	83	83	18	22	23
Down 7	St, Patricks Drive	N	100	100	13	16	15
Down 8	Killyleagh (b)		N/A	N/A	19	N/A	N/A
Down 8	English Street	N	83	83	N/A	23	23
Down11	Church Street 50m	N	92	92	N/A	51	50
Down12	Church Street 100m	N	100	100	N/A	35	33
Down13	Market Street 50m	N	75	75	N/A	51	50
Down14	Market Street 100m	N	92	92	N/A	31	31
Down15	Irish Street 50m	N	92	92	N/A	32	38
Down16	Irish Street 100m	N	83	83	N/A	29	39

(a) discontinued in July2010

(b)- removed in October 2008

(c) Estimated annual data as only 6 months data available method used included in Appendix B

Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.



2.2.2 PM₁₀

Down District Council does not carry out monitoring for PM₁₀ pollution at this time.

2.2.3 Sulphur Dioxide

Down District Council ceased monitoring for Sulphur Dioxide in Ballynahinch during 2006. There were no exceedences of the air quality objectives for SO₂ at this site.

2.2.4 Benzene

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

2.2.5 Summary of Compliance with AQS Objectives

Down District Council have measured concentrations of Nitrogen Dioxide above the annual mean objective at relevant locations during 2010. Down District Council has submitted a Detailed Assessment in April 2010, for the area centred on Irish Street, Downpatrick. Down District Council installed a real time analyser in June 2010 at the worst case scenario within this location. Monitoring showed no exceedences of the objective in the first six months of monitoring, and the estimated annual data was also below the objective. Down District Council has decided not to declare an AQMA on the basis the realtime data is more accurate and a co-location study is now being carried to help supply more accurate data from the surrounding diffusion tube sites.

3 New Local Developments

3.1 Road Traffic Sources

Down District Council confirms that there are no new or newly identified road traffic sources which may affect air quality within its local authority area.

3.2 Other Transport Sources

Down District Council confirms that there are no new or newly identified other transport sources which may affect air quality within its local authority area.

3.3 Industrial Sources

Down District Council confirms that there are no new or newly identified industrial sources which may affect air quality within its local authority area.

3.4 Commercial and Domestic Sources

Down District Council confirms that there are no new or newly identified commercial and domestic sources which may affect air quality within its local authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new landfill sites, quarries, unmade roads, waste transfer stations or other potential sources of fugitive particulate emissions within Down District Council area.

Down District 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

There are no approved Planning applications which could impact upon air quality within Down District Council area.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

The results for NO₂ show that there are breaches of the objective in 2010, of 40ug/m³ at Down 11 (Church Street) and Down 13(Market Street) in the vicinity of the Irish Street and Market Street junction in Downpatrick town centre. There are residential properties at elevated heights ranging from 2 - 4 metres from road level at these locations. There are no breaches of the objective limit at the other sites within Downpatrick. The wide variation with the monthly results from the diffusion tube sites, within the town centre introduced a degree of uncertainty over a decision to declare an AQMA in 2010. An ideal location had been identified within this area to site an automatic station for NO₂. Installation of this analyser was completed in June 2010 and six months data is now available, the results show a significant reduction in levels, bringing them well below the objective. The original triplicate diffusion tube site was discontinued at the time, and a co-location study is now being carried out. This will help give more accurate data from the other NO₂ diffusion tube sites within the area.

5.2 Conclusions relating to New Local Developments

N/A

5.3 Proposed Actions

Down District Council has decided to fund a further 12 months monitoring within the area of Irish Street, Downpatrick town centre to continue obtaining more accurate data. An Updating and screening assessment will be carried out in 2012.

6 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 NO₂ 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

Appendix B: NO₂ results for 2010

Appendix C : NO₂ annualisation of data for Irish Street

Appendix A: QA:QC Data

QA/QC of automatic monitoring

Down District Council commissioned Monitor Europe to provide the QA/QC of the automatic measurements of NO₂ from the Market Street site, this is supplied on a monthly basis. Local authority staff act as the local site operator and visit the site on a fortnightly basis carrying out any manual calibration or filter changes required. An audit of the site is carried out 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 and analysed by Eurofins Bureau Veritas Laboratories and Eurofins 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

Diffusion Tube Bias Adjustment Factors

Down District Council obtained the appropriate bias factor from the Review and Assessment Website. A factor of 0.84 was taken from the drop down menus available on the excel spreadsheet matrix.

Information regarding Eurofins Bias Adjustment can be viewed at:

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

Discussion of Choice of Factor to Use

Down District Council 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 Downpatrick but this only commenced in July 2010 and therefore only 6 months data available. 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

Not applicable.

Short-term to Long-term Data adjustment

Not applicable.

Appendix B- NO2 results for 2010 and method of estimated annual mean concentration for Irish Street NO2 diffusion tube site

2010 LAB RESULTS FOR NO₂- BIAS NOT APPLIED

Down 1	Irish Street	61	68	71	66	46	36						
Down 4	Irish Street 50m	43	55	53	66	49	38	28	45	32	38	47	46
Down 5	Irish Street 100m	42	55	68	63	44			40	30	34	44	44
Down 6	Church Street 50m	64	86	70	66		37	39	51	51	51	69	71
Down 7	Church Street 100m	46	66	57	45	26	18	18	23	33	38	52	45
Down 8	Market Street 50m	70	94	69	54		35	36			55	66	58
Down 9	Market Street 100m	43	52	40	39	27	14	16		44	42	48	44
Down 10	St. Patricks Avenue	49	57	54	44	31	37	26	29	39	49	51	53
Down 11	English Street	31	40	36	32	16	15	16			25	32	27
Down 12	Stream Street	35	46	59	52	34			17	28	33	40	37
Down 13	St, Patricks Drive	25	30	26	23	12	4	10	8	13	20	25	23
Down 14	Orchard Way	19	18	18	13	7	23	6	6	8	11	20	13
Down 15	Newcastle	32	38	36	44	28	21	28	28	25	30	29	29
Down 16	Ballynahinch	34	47	37	29		15	12	21	17	25	38	

2010 Lab Results for NO₂ –Bias applied

Down 1	Irish Street	51	57	60	56	39	30						
Down 4	Irish Street 50m	36	46	45	56	41	32	24	38	27	32	40	39
Down 5	Irish Street 100m	35	46	57	53	37	0	0	33	25	28	37	37
Down 6	Church Street 50m	54	72	59	55	0	31	33	43	43	43	58	60
Down 7	Church Street 100m	39	56	48	38	22	15	15	19	28	32	44	38
Down 8	Market Street 50m	59	79	58	46	0	29	30	0	0	46	56	48
Down 9	Market Street 100m	36	44	34	33	23	12	14	0	37	35	40	37
Down 10	St. Patricks Avenue	41	48	45	37	26	31	22	24	33	41	43	44
Down 11	English Street	26	33	30	27	13	13	13	0	0	21	26	23
Down 12	Stream Street	29	39	50	44	28	0	0	14	23	28	34	31
Down 13	St, Patricks Drive	21	25	22	19	10	4	8	7	11	17	21	19
Down 14	Orchard Way	16	15	15	11	6	19	5	5	6	9	16	11
Down 15	Newcastle	27	32	30	37	23	18	23	24	21	25	24	24
Down 16	Ballynahinch	29	39	31	24	0	13	10	17	14	21	32	0

Method of estimated annual mean concentration for Irish Street NO₂ diffusion tube site

Site ID	Location	Within AQMA ?	Data Capture for monitoring period ^a %	Data Capture period 2010 ^b	Period concentrations (µg/m ³)
					2010 ^c
Downpatrick	Irish Street	N	50	1 st Jan -30th ^t June	48.74

Long Term background site with more than 90% data capture for 2010	Distance from Irish Street site	Annual Mean 2010	Period mean 2010	Ratio AM/PM
Orchard Way	3miles	11.25	13.68	0.822
Belfast Central	1/2mile	15.33	16.78	0.914
			Ratio average	0.87

ie: Irish Street annual estimated data for 2010 is 42.40ug/m³

(The period mean 48.74 ug/m³ x 0.87 = 42.40ug/m³)

Appendix C- Method of estimated annual mean concentration for Irish Street NO2 automatic site

Site ID	Location	Within AQMA ?	Data Capture for monitoring period ^a %	Data Capture period 2010 ^b	Period concentrations ($\mu\text{g}/\text{m}^3$)
					2010 ^c
Downpatrick	2-8 Market Street	N	50	1 st July -31 st Dec	34

Long Term site with more than 90% data capture for 2010	Distance from Irish Street site	Annual Mean 2010	Period mean 2010	Ratio AM/PM
Derry Brooke Park (a)	97 miles	19.6	18.83	1.017
Belfast Central	27 miles	35.54	33.2	1.07
			Ratio average	1.04

(a) Only other background site available so there will be an uncertainty with the results as this site is not within the recommended 50 miles.

ie: Irish Street annual estimated data for 2010 is 35.36 $\mu\text{g}/\text{m}^3$

(The period mean 34 $\mu\text{g}/\text{m}^3$ x 1.04 = 35.36 $\mu\text{g}/\text{m}^3$)