DERRY CITY COUNCIL

LOCAL AIR QUALITY MANAGEMENT - ANNUAL PROGRESS REPORT 2010

BV/AQ/AGGX3995788/EC/2669

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Executive Summary

Environment (Northern Ireland) Order 2002 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work. This Progress Report is a requirement of the Review and Assessment and is a requirement for all local authorities. The Report has been undertaken in accordance with the Technical Guidance LAQM.TG (09) and associated tools (as updated in 2010).

This Progress Report considers all new monitoring data and assesses the data against the Air Quality Objectives. It also considers any development changes that may have an impact on air quality as well as updating on any relevant strategy and policy changes.

Having considered the latest monitoring data and development updates, it is concluded that the air quality objectives for benzene, 1,3-butadiene, carbon monoxide, lead, PM_{10} and sulphur dioxide will be met. There is no requirement to undertake a detailed assessment for these pollutants.

Six sites exceeded the annual mean NO_2 objective of 40µg/m^3, including three within the Creggan Road / Infirmary Road AQMA and two sites at Dale's Corner, where an AQMA is about to be declared. The last site exceeding the objective is located at the Buncrana Road / Racecourse Road junction. A Detailed Assessment has been carried out earlier in 2010, with the conclusions that an AQMA was required for the junction. Following these recommendations, the Council will soon declare a third AMQA in Derry at this location.

NO_2 results at the monitoring sites installed in 2009 in Francis Street, John Street and Spencer Road are all below the NO_2 annual mean AQS objective, and therefore a full Detailed Assessment is not required at this stage for these sites.

A new proposed biomass CHP plant near Londonderry Port has been given planning permission. An Air Quality Impact Assessment concluded that the impact of the CHP plant on air quality will be negligible.

The Air Quality Action Plan for the Creggan Road / Infirmary Road AQMA was completed in 2008, and actions are being progressed and reported annually. Following the upcoming AQMAs in Dale's Corner, and at the Buncrana Road / Racecourse Road junction, the Action Plan is being revised to incorporate a new set of measures to tackle air pollution at these two other locations.

Proposed actions arising from the Progress Report are as follows:

- Proceed to a Further Assessment of air quality for the new AQMA in Buncrana Road / Racecourse Road, to provide further information and support potential measures to be included in the Derry Air Quality Action Plan.
- Progress to the next Annual Progress Report by April 2011.

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1 Introduction

1.1 Description of Local Authority Area

Derry City is located on the coast, in the west of Northern Ireland, spreading across the banks of the River Foyle, with two bridges connecting the parts of the City. The City is very near the border with County Donegal in the Republic of Ireland, and is the second largest city in Northern Ireland.

Within the local authority boundaries lie Londonderry Port and the City of Derry Airport. Road transport emissions have previously been found to be the dominant source of air pollution within the Derry City Council area.

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 Local Air Quality Management (LAQM) in Northern Ireland are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003 (No. 342). The objectives are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (for carbon monoxide the units used are milligrammes per cubic metre, mg/m^3). Table 1.1 includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 - Air Quality Strategy objectives in Regulations for LAQM in Northern Ireland

Pollutant	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

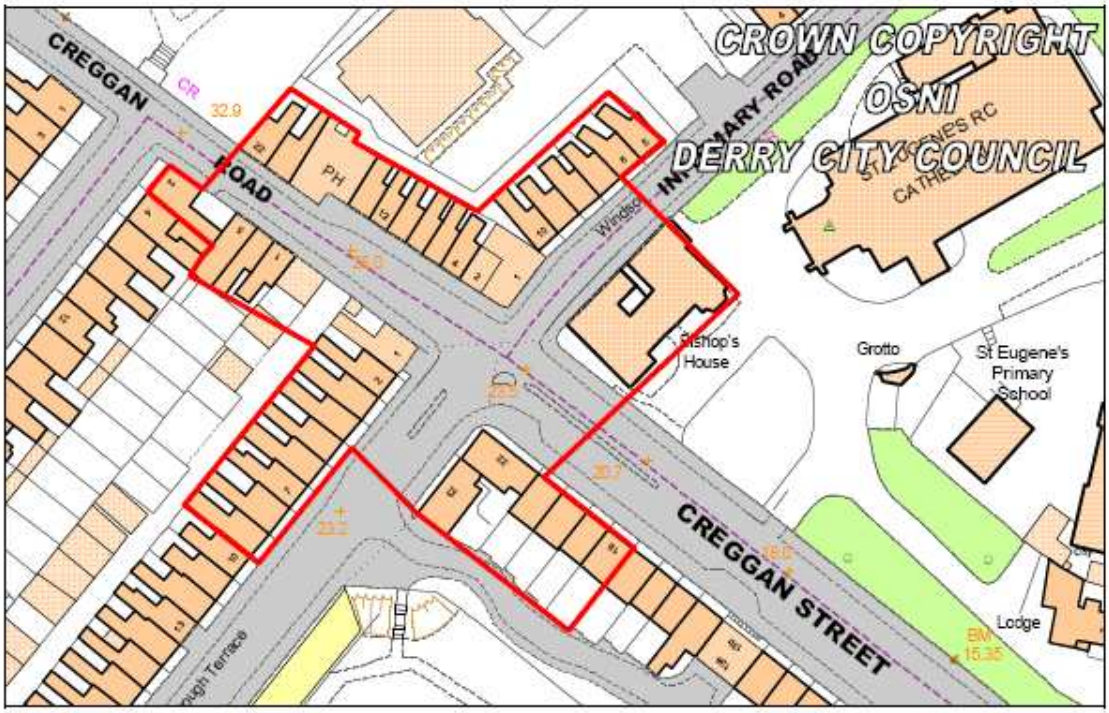
1.4 Summary of Previous Review and Assessments

Table 1.2 provides a summary of the previous reports completed by Derry City Council as part of the Local Air Quality Management Review and Assessment process. An Air Quality Management Area (AQMA) was declared in February 2005 at the Creggan Road / Infirmary Road junction in Derry following exceedence of the annual mean objective for NO_2. The AQMA is illustrated in Figure 1.1.

Table 1.2 - Summary of Local Air Quality Management Review & Assessment reports

Report	Summary
2004 Detailed Air Quality Modelling of Domestic Fuel Use and Road Traffic Emissions in Derry (Stage 3)	Exceedences of the annual mean NO_2 concentrations were modelled at the Creggan Road / Infirmary Road junction, and DCC subsequently declared an AQMA in February 2005 (Figure 1.1), and a draft Air Quality Action Plan was released in November 2006. The 2004 Detailed Assessment concluded that PM_{10} exceedences were not expected; however it was not possible to rule out potential exceedences of the SO_2 or PM_{10} objectives due to the resolution of the modelling undertaken.
2005 Progress Report	The 2005 Progress Report provided a review of the most recent monitoring data within the Local Authority. Automatic monitoring of SO_2 and PM_{10} at Brandywell indicated a large drop in the number of 15-minute and daily mean exceedences, reflecting the decreased use of solid fuel in the area.
2006 Updating & Screening Assessment	The Updating & Screening Assessment identified 2 locations to consider for the Detailed Assessment of NO_2: Dale's Corner and the Buncrana Road / Racecourse Road Junction. It was concluded that no further assessment was required for carbon monoxide, benzene, 1,3-butadiene, lead or sulphur dioxide, however assessment was required for PM_{10} at a rural area near Claudy, and in the Culmore Point area.
2007 Detailed Assessment and Further Assessment	A Detailed Assessment was undertaken for Dale's Corner and Buncrana Road / Racecourse Road Junction following measured exceedence of the NO_2 annual mean objective. It was determined that a declaration of an AQMA at either location was not required as the air quality objectives were unlikely to be exceeded at locations of relevant exposure. A Further Assessment was undertaken for the existing AQMA at Creggan Road / Infirmary Road, and it was concluded that there was a continuing need for the AQMA, though no extension was considered necessary.
2008 Progress Report	Review of the most recent monitoring data recorded at the Creggan Road / Infirmary Road NO_2 AQMA confirmed the continuing need for the designation. Decreases were seen in concentrations of SO_2. The Progress Report proposed that new detailed dispersion modelling be undertaken at the Dale's Corner junction due to exceedences of the NO_2 annual mean objective recorded at a new monitoring diffusion tube site at no.5 Glendermott Road
2008 Final Air Quality Action Plan	The Air Quality Action Plan included detailed dispersion modelling to quantify the potential impact of various scenarios which may be undertaken to reduce air pollution in the area of the Creggan Road / Infirmary Road Junction. Proposals include the removal of HGVs on specific road links within the AQMA.
2009 Updating & Screening Assessment	The Updating & Screening Assessment reviewed and assessed new monitoring data and potential new sources of pollutants within the area. There were no new or significantly changed sources identified which may cause potential exceedences of the Air Quality Strategy standards. The assessment highlighted that a Detailed Assessment was required with regard to NO_2 derived from road transport for four narrow congested streets with residential properties close to the kerb and also at Buncrana Road / Racecourse Road junction. However it was decided to collate monitoring data (based on NO_2 diffusion tubes) before proceeding to an assessment.

Figure 1.1 - Derry City Council NO_2 AQMA, Creggan Road / Infirmary Road Junction



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2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

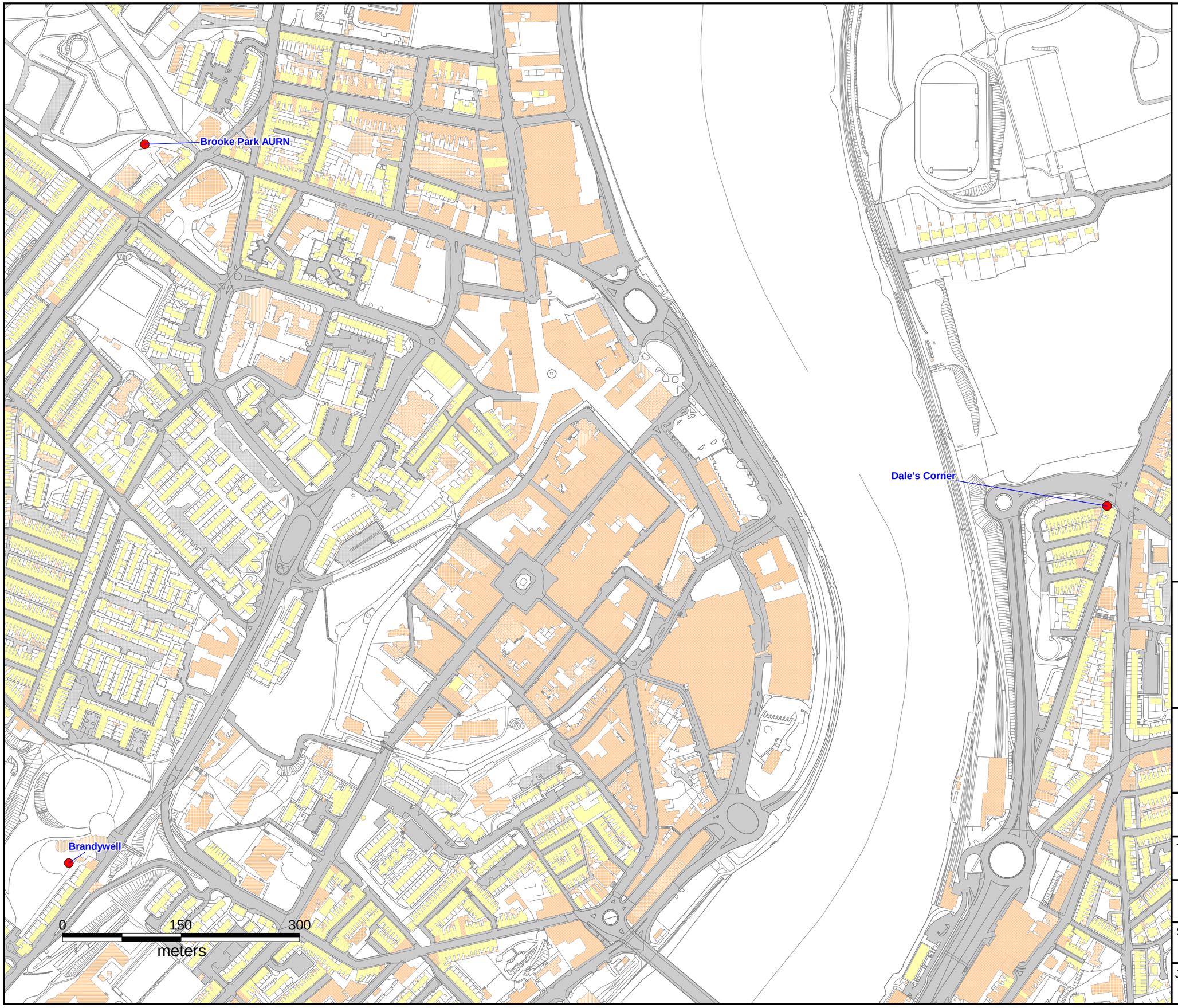
There are three automatic monitoring sites installed in Derry, all outside the AQMA. Table 2.1 provides details of these sites.

AEA Energy and Environment undertake the Quality Assurance/Quality Control (QA/QC) procedures at these monitoring sites, ensuring that measurements from the analysers are as accurate as possible, and that measurements recorded at each site can be compared with other sites.

Manual calibration of automatic monitors is undertaken every two weeks by Derry City Council officers. This allows the instrument drifts to be fully quantified and documented using traceable calibration gas standards and the results are used to scale data. All calibration records are sent to AEA who conduct the QA/QC checks.

The analysers are checked and serviced every six months by suppliers Air Monitors. The reports are sent to AEA.

Derry City Council also monitored PM_{10} at Culmore Point Road following residents' complaints. This site was running for approximately 12 months and closed in November 2008.



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Location **Derry**

Title **Air Quality Continuous Monitoring Sites**

By	Checked	Approved
EC	**LL**	**LL**

Scale	Date
N.T.S.	**May 2010**

Job No.	Fig. No.
AGGX3995788	**Figure 2.1**

Table 2.1 - 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?
Brooke Park (AURN)	Urban background	X 242962	Y 417217	O_3, NO_2, NO_X, SO_2, PM_{10}, $PM_{2.5}$	FDMS	N	N (approx 50m, background site)	N/A	N/A
Dale's Corner	Roadside	X 244178	Y 416760	NO_2, NO_X	-	N	Y	2m	Y
Brandywell	Urban background	X 242866	Y 416309	PM_{10}, SO_2	TEOM	N	Y	N/A	Y

Particulate matter is monitored at the Brandywell monitoring location using TEOM instruments. The data is adjusted to account for the loss of volatile and semi-volatile components due to its operation at a high temperature. The Brooke Park particulate analysers were upgraded to an FDMS (Filter Dynamics Measurement System) in March 2008, which measures both the core and volatile fractions of particulate matter.

2.1.2 Non-Automatic Monitoring

Table 2.2 provides details of non-automatic monitoring locations within Derry City. Non-automatic monitoring is undertaken using passive diffusion tubes.

The Council monitored NO_2 at 36 sites across the city in 2009, many of which are either duplicate or triplicate sites. There have been changes in the number and location of monitoring sites since the 2009 Updating and Screening Assessment (USA). A number of new sites have been installed near the locations identified in the USA as being at risk, and subject to a Detailed Assessment.

Six new duplicate sites were also established in June 2009 in Francis Street, John Street and Spencer Road, for which Detailed Assessments were recommended. However it was first decided to collate at least 6-months worth of monitoring data, with a view to proceed to a full detailed assessment (including detailed modelling) if an exceedence of the annual mean NO_2 objective was confirmed at these sites. Details of the site location is provided below:

Francis Street diffusion tubes

- FS1/2 Duplicate site at 3 Francis Street
- FS3/4 Duplicate site at 47 Francis Street

John Street diffusion tubes

- JS1/2 Duplicate site at 10 John Street
- JS3/4 Duplicate site at 12 John Street

Spencer Road diffusion tubes

- SP1/2 Duplicate site at 70 Spencer Road
- SP3/4 Duplicate site at 92 Spencer Road

Three new sites were also established near properties along Glengalliagh Road:

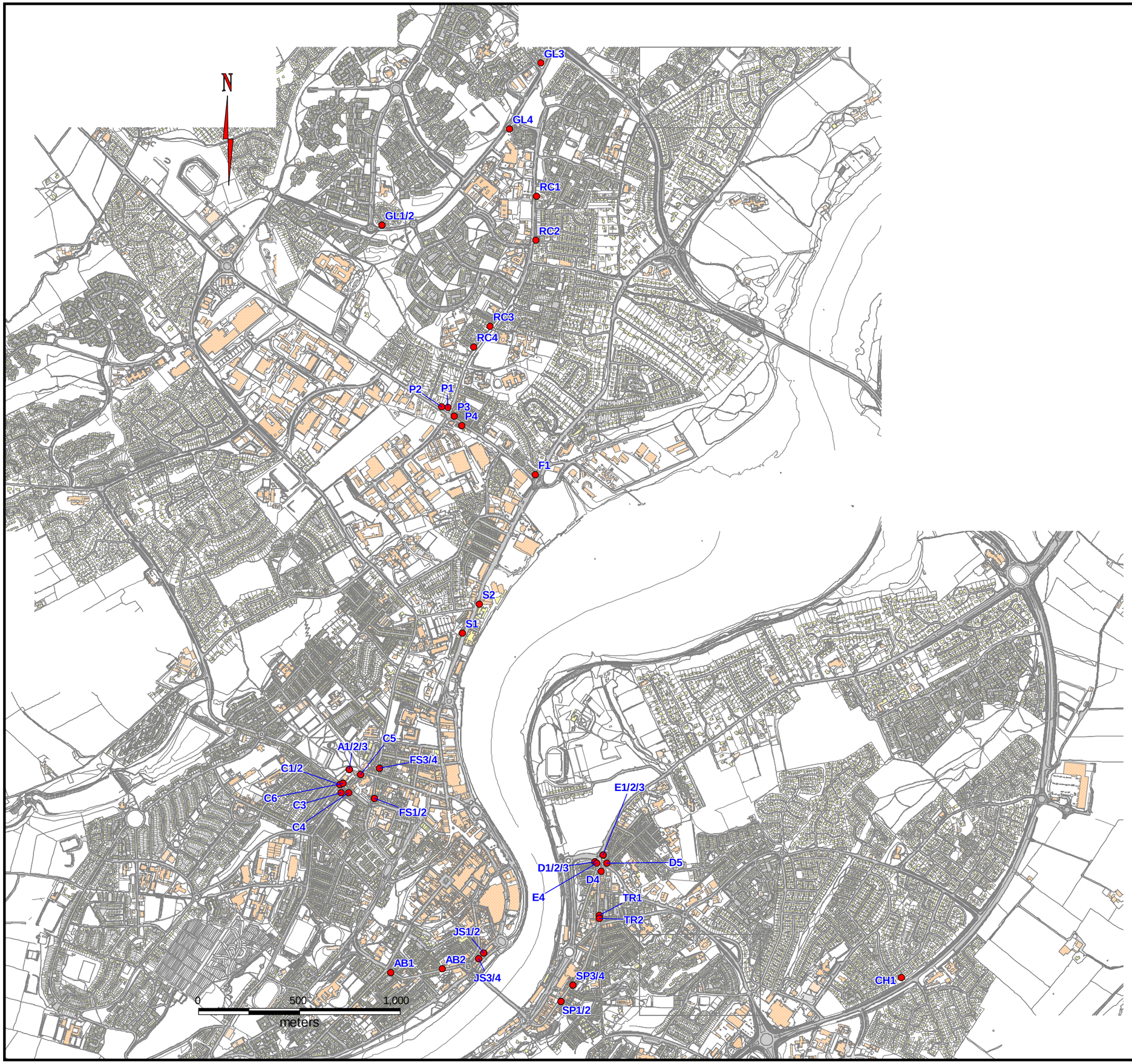
- GL1/2 Duplicate site at 38 Glengalliagh Park, installed in January 2009
- GL3 7 Capall Court, installed in January 2009
- GL4 49 Bradley Park, installed in May 2009

Four new single tubes monitoring sites were established in May 2009 in Racecourse Road, near the junction with Buncrana Road, for which a Detailed Assessment has been carried out earlier in 2010, following identified exceedence of the NO_2 annual mean objective. The report concluded that an AQMA was required for the junction.

Racecourse Road diffusion tubes

- RC1 Racecourse Road
- RC2 1 Castleview Park
- RC3 31 Balmoral Avenue
- RC4 1 Maybrook Park

Finally, two other sites were installed in October 2009; E4 outside 17 Melrose Terrace and CH1 outside 10 Cheadle Park.



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Location	**Derry**		
Title	**Air Quality - NO2 Diffusion Tube Sites**		
By **EC**	Checked **LL**	Approved **LL**	
Scale **N.T.S.**	Date **May 2010**		
Job No. **AGGX3995788**	Fig. No. **Figure 2.2**		

Table 2.2 - Details of Non- Automatic Monitoring Sites

Site Name		Site Type	OS Grid Ref	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 ?
Brooke Park								
A1 A2 A3	Brooke Park	B	242962 417217	NO_2	N	N	N/A	N/A
Creggan Road Junction								
C1 C2	3 Creggan Rd	K	242913 417144	NO_2	Y	Y - 0m	1m	Y
C3	6 Marlborough Terrace	R	242921 417101	NO_2	Y	Y - 0m	4m	Y
C4	22A Creggan Street	R	242959 417102	NO_2	Y	Y - 0m	3m	Y
C5 [a]	10 Windsor Terrace [a]	R	242962 417142	NO_2	Y	Y - 0m	3m	Y
C5 [a]	1 Windsor Terrace	R	243017 417191	NO_2	N	Y - 0m	3m	Y
C6	14 Creggan Road	R	242928 417148	NO_2	Y	Y – 0m	3m	Y
Dale's Corner and Farren Park								
D1 D2 D3	Dale's Corner Automatic Monitor	R	244178 416760	NO_2	N	Y – 1.5m	3m	Y
D4	52 Clooney Terrace	R	244210 416714	NO_2	N	Y - 0m	5m	Y
D5	5 Glendermott Road	K	244238 416753	NO_2	N	Y – 0m	1m	Y
E1 E2 E3	4 Ebrington Terrace	R	244219 416794	NO_2	N	Y – 0m	4m	Y
E4	17 Melrose Terrace	R	244190 416754	NO_2	N	Y - 0m	3m	Y
F1	3 Farren Park	R	243884 418678	NO_2	N	Y - 0m	13m	Y
Pennyburn								
P1	53 Messines Park	R	243449 419013	NO_2	N	Y - 0m	14m	Y
P2	57 Messines Park	R	243418 419016	NO_2	N	Y - 0m	11m	Y

Site Name		Site Type	OS Grid Ref	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 ?
P3	19 St Patricks Terrace	R	243480 418970	NO_2	N	Y – 0m	5m	Y
P4	5 Collon Terrace	R	243519 418921	NO_2	N	Y – 0m	5.5m	Y
Strand Road								
S1	99 Strand Road	R	243522 417894	NO_2	N	Y – 0m	3m	Y
S2	Rockmills	R	243607 418037	NO_2	N	Y - 0m	6.5m	Y
Abercorn Road								
AB1	63 Abercorn Road	R	243166 416211	NO_2	N	Y – 0m	1.5m	Y
AB2	8 Abercorn Road	R	243422 416230	NO_2	N	Y – 0m	1.5m	Y
CH1	10 Cheadle Park	B	245701 416186	NO_2	N	Y – 0m	33m	N/A
Triangle								
TR1	1 Clooney Terrace	R	244202 416493	NO_2	N	Y – 0m	8m	Y
TR2	17 Duddy's Court	R	244202 416479	NO_2	N	Y – 0m	7m	Y
Francis Street								
FS1	3 Francis St	R	243084 417075	NO_2	N	Y – 0m	1.5m	Y
FS2								
FS3	47 Francis St	R	243110 417225	NO_2	N	Y – 0m	1.5m	Y
FS4								
Glengalliagh								
GL1	38 Glengalliagh Park	R	243122 419915	NO_2	N	Y – 0m	14m	Y
GL2								
GL3	7 Capall Court	R	243912 420720	NO_2	N	Y – 0m	23m	Y
GL4	49 Bradley Park	R	243756 420392	NO_2	N	Y – 0m	10m	Y
John Street								
JS1	10 John St	R	243627 416308	NO_2	N	Y – 0m	2m	Y
JS2								
JS3	12 John St	R	243602 416279	NO_2	N	Y – 0m	2m	Y
JS4								
Racecourse Road								
RC1	76 Racecourse Road	R	243889 420061	NO_2	N	Y – 0m	7m	Y

Site Name		Site Type	OS Grid Ref	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 ?
RC2	1 Castleview Park	R	243886 419842	NO_2	N	Y – 0m	8m	Y
RC3	31 Balmoral Ave	R	243658 419416	NO_2	N	Y – 0m	10m	Y
RC4	1 Maybrook Park	R	243578 419311	NO_2	N	Y – 0m	9m	Y
Spencer Road								
SP1 SP2	70 Spencer Road [b]	R	244011 416068	NO_2	N	Y – 0m	2m	Y
SP3 SP4	92 Spencer Road [b]	R	244070 416149	NO_2	N	Y – 0m	2m	Y

B=Background site; K=Kerbside site; R=Roadside site
[a] C5 Changed to no.1 Windsor Terrace, Aug 2008

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Derry City Council undertook monitoring of NO_2 by automatic analyser at two locations in 2009; Brooke Park and Dale's Corner. Table 2.3 shows that the annual mean objective was met at the Brooke Park monitoring site. However, data capture was less than 90 % and the data were annualised. Details of the annualisation factors and the reference sites used are in Appendix A.

The 2009 results also show that concentrations of NO_2 at Dale's Corner have met the annual mean objective, although still close (39µg/m^3). This is consistent with results from previous years. 2007 was also close to the objective, while an exceedence was monitored in 2008 (40.2µg/m^3)

Table 2.3 - Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 %	Annual Mean Concentrations (µg/m^3)		
					2007	2008	2009
Brooke Park	X 242962 Y 417217	N	87	87	12.6 [a]	18.5	15.8 [b]
Dale's Corner	X 244178 Y 416760	N	97	97	38.5 [a]	**40.2**	39.0

Note: [a] Data capture 89%;
[b] Annualised

Figure 2.3 - Trends in Annual Mean NO_2 Concentration - Automatic Monitoring Sites

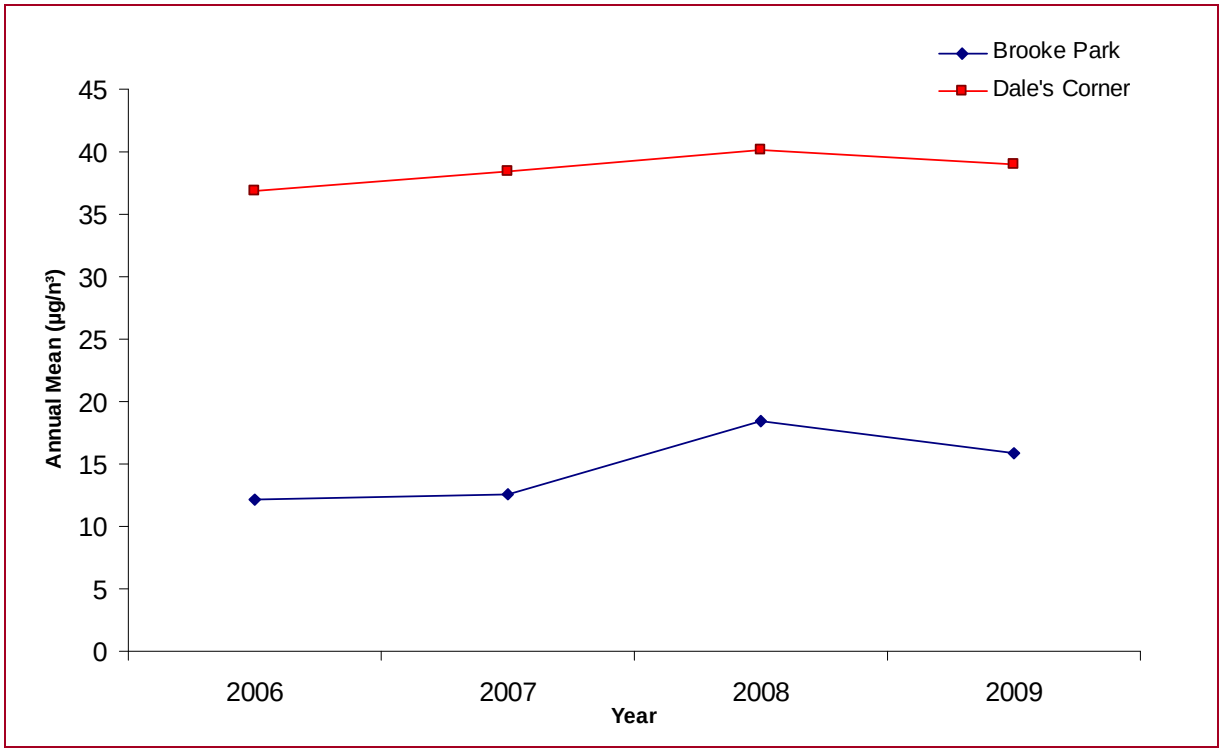


Table 2.4 shows there were no exceedences of the short term 1-hour objective at either monitoring location.

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

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 %	Number of Exceedences of Hourly Mean (200 µg/m³) (If the period of valid data is less than 90% of a full year, the 99.8th percentile of hourly means is shown in brackets)		
					2007	2008	2009
Brooke Park	X 242962 Y 417217	N	87	87	0 (63) [a]	0	0 (79.6)
Dale's Corner	X 244178 Y 416760	N	97	97	0 (155) [a]	11	0

[a] Data capture 89%

Diffusion Tube Monitoring Data

The nitrogen dioxide diffusion tube data are summarised in Table 2.5 below. The full dataset (monthly mean values) are included in Appendix B.

From October 2006 until December 2008 Bureau Veritas Laboratories prepared and analysed the diffusion tubes using the 10% TEA in water preparation. In accordance with the harmonisation of preparation and analysis of NO_2 diffusion tubes in the UK (AEA, 2008), Bureau Veritas changed their methodology to use 20% TEA in water in January 2009. Derry City Council recently (April 2009) switched to use the Gradko labs for preparation and analysis of NO_2 diffusion tubes.

Bias adjustment factors for 2007 and 2008 were taken from the 2009 Updating and Screening Assessment. Results from 2009 are calculated for April to December only due to the change in analytical laboratory and have been bias adjusted with local and national factors as in previous LAQM reports. The results using both factors are presented in Table 2.5.

Comparing the 2009 results (corrected using the more conservative local bias factor) with the objectives show there are exceedences of the annual mean objective of 40µg/m³ at six monitoring locations in Derry. Three of these (C1/2, C4 and C6) are located in Creggan Road within the AQMA. The remaining three (D5 - Glendermott Road, E1/2/3 - Ebrington Terrace, P4 - Collon Terrace) are either roadside or kerbside (D5), have relevant exposure and were previously considered in a Detailed Assessment.

D5 and E1/2/3 are near Dale's Corner, for which an AQMA is about to be declared. P4 is near the Buncrana Road / Racecourse Road junction. A Detailed Assessment has been carried out earlier in 2010 at this junction, which concluded that an AQMA was required. Following these recommendations, the Council is about to declare a third AMQA in Derry at this location.

Annualised NO_2 results at the new diffusion tubes installed in 2009 in Francis Street (FS1/2 and FS3/4), John Street (JS1/2 and JS3/4) and Spencer Road (SP1/2 and SP3/4) are all below the NO_2 annual mean AQS objective, and therefore a full detailed assessment is not required at this stage, as initially recommended in the USA 2009. However, results are close to the objective at sites SP1/2 (38µg/m^3), FS3/4 (37µg/m^3) and JS3/4 (36µg/m^3). Therefore, monitoring will continue and be reported in the next air quality Progress Report (due April 2011) to ensure NO_2 levels still comply with the objective.

With respect to the hourly NO_2 objective, there could be a potential risk of exceedence of this short-term objective, where the annual mean NO_2 concentration is above 60µg/m^3. One site recorded an annual mean concentration which exceeded the short term objective; C1/C2: 3 Creggan Road, which is within the AQMA. Concentrations at this location have either exceeded or were close to exceeding the short term objective since 2007.

Table 2.5 - Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 % *	Annual Mean Concentrations (µg/m^3)			
					2007 (Bias Factor 0.88, National)	2008 (Bias Factor, 0.83 National)	2009 (Bias Factor, 0.93 Local)	2009 (Bias Factor, 0.90 National)
A1	Brooke Park [a]	N	100	75	15	15	16	15
A2								
A3								
C1	3 Creggan Rd [b]	Y	89	**67**	**58**	**63**	**64**	**62**
C2								
C3	6 Marlborough Terrace	Y	100	**75**	31	37	37	35
C4	22A Creggan Street	Y	100	**75**	38	**41**	**42**	40
C5	1 Windsor Terrace	N	100	75		31	23	22
C6	14 Creggan Road	Y	89	**67**	37	38	**41**	39
D1	Dale's Corner [a]	N	92	69	31	33	35	33
D2								
D3								
D4	52 Clooney Terrace	N	89	67	25	27	30	29
D5	5 Glendermott Road	N	100	**75**	**44**	**53**	**48**	**46**
E1	4 Ebrington Terrace [a]	N	78	**58**	22	**47**	**54**	**52**
E3								
E4								
E4	17 Melrose Terrace		33	**25**	-	**-**	27	26
F2	3 Farren Park	N	89	67	25	29	27	26
P1	53 Messines Park	N	100	75	27	21	27	26
P2	57 Messines Park	N	100	75	20	26	28	27
P3	19 St Patricks Terrace	N	100	**75**	20	**42**	37	35
P4	5 Collon Terrace	N	100	**75**	27	**43**	**42**	**40**
S1	99 Strand Road	N	100	**75**	32	36	37	36
S2	Rockmills	N	100	**75**	37	37	37	35
AB1	63 Abercorn Road	N	100	**75**	39	38	36	35
AB2	8 Abercorn Road	N	89	**67**	29	33	31	30
CH1	10 Cheadle Park		44	**33**	-	-	18	17
TR1	1 Clooney Terrace	N	100	75	33	32	22	22

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar Year 2009 % *	Annual Mean Concentrations (µg/m^3)			
					2007 (Bias Factor 0.88, National)	2008 (Bias Factor, 0.83 National)	2009 (Bias Factor, 0.93 Local)	2009 (Bias Factor, 0.90 National)
TR2	17 Duddy's Court	N	100	75	27	-	21	20
FS1	3 Francis St [b]		72	54	-	-	31	30
FS2								
FS3	47 Francis St [d]		78	58	-	-	39	37
FS4								
GL1	38 Glengalliagh Park [e]		78	58	-	-	22	22
GL2								
GL3	7 Capall Court [d]		100	75	-	-	19	19
GL4	49 Bradley Park [e]		89	67	-	-	19	19
JS1	10 John St [bd]		78	58	-	-	37	35
JS2								
JS3	12 John St [bd]		78	58	-	-	37	36
JS4								
RC1	76 Racecourse Road [e]		89	67	-	-	25	24
RC2	1 Castleview Park [e]		89	67	-	-	19	18
RC3	31 Balmoral Ave [e]		89	67	-	-	21	20
RC4	1 Maybrook Park [e]		89	67	-	-	27	26
SP1	70 Spencer Road [bd]		78	58	-	-	40	38
SP2								
SP3	92 Spencer Road [bd]		78	58	-	-	35	34
SP4								

* Data capture affected by change in analysing laboratory and also missing tubes

[a] Tubes present in triplicate

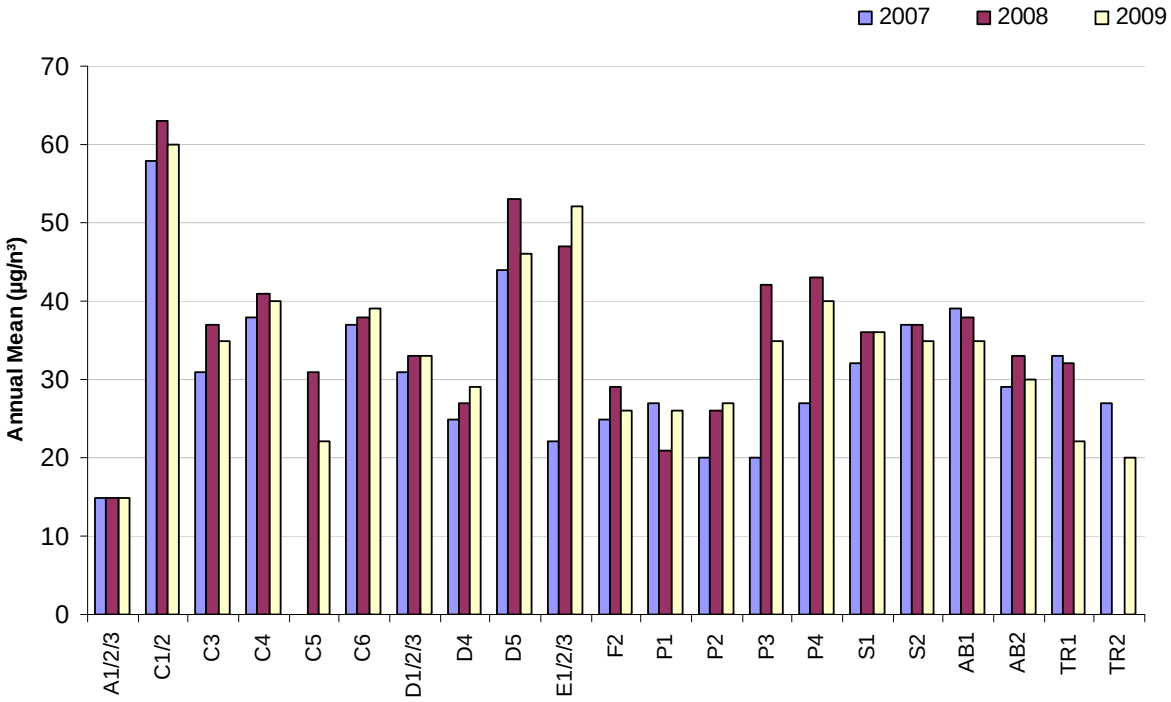
[b] Tubes present in duplicate

[c] Unadjusted results presented due to low data capture

[d] Annualised data 6 months monitoring

[e] Annualised data 7 months monitoring

Figure 2.4 - Trends in Annual Mean NO_2 Concentration - Diffusion Tube Monitoring Sites



2.2.2 Particulates (PM_{10})

Derry City Council undertook monitoring of PM_{10} by automatic analyser at two locations in 2009; Brooke Park and Brandywell. The 2009 results, in Table 2.6 and Table 2.7 below, show that PM_{10} objectives continue to be met at both monitoring sites. Data for 2007 and 2008 are fully ratified; data for 2009 are ratified to October only. Concentrations for previous years were taken from the 2009 USA, data for 2009 from the Northern Ireland Air Network. Historic data were corrected using the old TEOM correction factor. In 2008 the Brooke Park PM_{10} was upgraded to a FDMS and required no correction in 2009. Particulates are still monitored by TEOM at Brandywell and are shown Volatile Correction Model (VCM) corrected. Data capture at Brooke Park was less than 90% therefore results have been annualised. However, as discussed in Appendix A, these corrected and annualised data sets should be used with caution.

Table 2.6 - PM_{10} Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture for Full Calendar year 2009 %	Annual Mean Concentrations (µg/m³)		
					2007	2008	2009
Brooke Park	X 242962 Y 417217	N	73	73	20.6 [a]	23.2 [a]	22.3
Brandywell	X 242866 Y 416309	N	79	79	21.3 [a]	22.1 [a]	20.1 [b]

[a] TEOM data multiplied by 1.3

[b] VCM corrected

Table 2.7 - PM_{10} Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for Monitoring Period %	Data Capture 2009 %	Number of Exceedences of Daily Mean Objective (50 µg/m^3) (If data capture < 90%, the 90th percentile of daily means is included in brackets).		
					2007	2008	2009
Brooke Park	X 242962 Y 417217	N	73	73	6 [b]	13 (36.7)	10 (39.0)
Brandywell	X 242866 Y 416309	N	79	79	6 [c]	9 [c]	7 (32.4) [e]

[a] Data capture 95%

[b] Data capture 99%

[c] TEOM data multiplied by 1.3, replaced by FDMS March 2008

[d] TEOM data multiplied by 1.3

[e] VCM corrected

2.2.3 Volatile and Non-volatile Components of PM_{10}

There is no statutory requirement to report the fraction distribution of particulates. However, the FDMS at Brooke Park measures both fractions, shown in Table 2.8 below. The result for 2009 show PM_{10} is largely comprised of non-volatile particulates.

Table 2.8 - PM_{10} Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Component of PM_{10}	Data Capture 2009 %	2009 Annual Mean Concentration (µg/m^3)
Brooke Park	X 242962 Y 417217	Volatile	73	3.9
		Non-volatile	73	18.4
		Total	73	22.3

Note: [a] Data capture for total PM_{10} varies from non-volatile and volatile components as the TEOM instrument (measuring total PM_{10}) was replaced by an FDMS instrument in March 2008 (measuring volatile and non-volatile components)

2.2.4 Sulphur Dioxide

Sulphur dioxide is measured at Brooke Park and Brandywell monitoring locations. Results for 2009 are in Table 2.9 below.

Concentrations at neither sites exceeded the 15 minute, 1-hour or 24-our objectives. Data capture at the Brandywell monitoring site were less than 90% but have not been annualised.

Table 2.9 - SO_2 Monitoring: Comparison with Objectives

Site ID	Location	Within AQMA AQMA?	Data Capture for Monitoring Period %	Data Capture 2009 %	Number of Exceedences of: (µg/m^3)		
					15-minute Objective (266 µg/m^3) [a]	1-hour Objective (350 µg/m^3) [b]	24-hour Objective (125 µg/m^3) [c]
Brooke Park	X 242962 Y 417217	N	99	99	0	0	0
Brandywell*	X 242866 Y 416309	N	76	76	0 (25.0)	0 (21.0)	0 (9.0)

* Data capture less than 90%; a 99.8th percentile; 99.7th percentile; 99th percentile

2.2.5 Benzene

No monitoring of benzene is undertaken within the Local Authority. The 2006 USA concluded that concentrations recorded in the Belfast area were well below the Air Quality Strategy Standards. It was thus concluded that the objectives in place for benzene were unlikely to be exceeded within Derry City (DCC, 2006), and this is still considered the case.

2.2.6 Other Pollutants Monitored

Ozone

Ozone is a transboundary pollutant measured as 8-hour running mean, and exceedences calculated on the maximum 8-hour running mean in a 24 hour period. Results for 2007 to 2009 are shown in Table 2.10. In previous LAQM reports the total number of 8-hour rolling mean exceedences was reported rather than the number of maxima 8-hour mean in a 24-hour period. As a consequence ozone concentrations were wrongly reported in 2007 and 2008 as exceeding the objective. Ten exceedences are permitted per annum and ozone concentrations have not breeched this objective during 2007 to 2009.

Table 2.10 - O_3 Monitoring: Comparison with 8-hr Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of Maximum 8-hour Running Mean (100 µg/m^3)		
				2007	2008	2009
Brooke Park	X 242962 Y 417217	N	99	0	**10***	**4**

*Reported in 2009 USA as 125 exceedences

Carbon monoxide

Carbon monoxide ceased to be monitored at Brooke Park AURN after September 2008.

$PM_{2.5}$

Directive 2008/50/EC ambient air quality and cleaner air for Europe (CAFE Directive) introduced target and limit values for $PM_{2.5}$. The target value to be met by 1st January 2010 is 25 µg/m³ measured as the annual mean; there is no short term value.

The 2009 results, in Table 2.11 below, show that data capture was too low to determine whether the target would be achieved. Data were not annualised due to low data capture and the paucity of $PM_{2.5}$ analysers in Northern Ireland. Non-volatile particulates compromise the greater fraction of the total $PM_{2.5}$ monitored.

Table 2.11 - Results of $PM_{2.5}$ Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Component of $PM_{2.5}$	Data Capture 2009 %	2009 Annual Mean Concentration (µg/m³) (target 25 µg/m³)
Brooke Park	X 242962 Y 417217	Volatile	14	1.1
		Non-volatile	14	7.1
		Total	14	8.2

2.2.7 Summary of Compliance with AQS Objectives

Derry City Council monitors NO_2 at Brooke Park and Dale's Corner. Data capture for the Dale's Corner monitoring site was above 90% and met both objectives. There were no exceedences of the short term objective which shows significant improvement on 2008. Results for Brooke Park were below the 90% data capture criterion, however, the monitoring station is at an urban background site, and results are well below both the annual mean and short term objectives.

Nitrogen dioxide was measured at 36 locations in Derry with passive diffusion tubes; an increase of 15 monitoring locations since the USA 2009. Three monitoring locations outside of the AQMA exceeded the annual mean objective. Two of these sites are located near Dale's Corner, where an AQMA is about to be declared, and one is near the Buncrana Road / Racecourse Road junction, which is also going to be declared as an AQMA shortly.

Derry City Council monitors PM_{10} by FDMS and TEOM at Brooke Park and Brandywell monitoring stations respectively. Concentrations measured at both locations met both the annual mean and short term objectives and indicate an improvement in concentrations. Non-volatile particulates comprised the greater portion of PM_{10}.

$PM_{2.5}$ was also measured at Brooke Park; data capture was too low to annualise. Non-volatile concentrations comprised the greater fraction of $PM_{2.5}$.

Sulphur dioxide is also monitored at Brooke Park and Brandywell monitoring locations. Data capture was low at the Brandywell site. Concentrations of SO_2 met all the objectives at both sites.

Derry City still considers Benzene concentrations unlikely to exceed the objectives and has not undertaken active monitoring since 2006. Carbon monoxide monitoring ceased in 2008 following the similar conclusions.

Ozone was monitored at the Brooke Park AURN station in 2009. Concentrations exceeded the threshold for the 8-hour running average four times, which is below the objective of 10 exceedences allowed. A previous LAQM report misreported O_3 exceedences in 2008; concentrations met the objective in 2008.

Derry City Council has measured concentrations of nitrogen dioxide above the annual mean objective at relevant locations outside of the AQMA near Dale's Corner and the Buncrana Road / Racecourse Road junction. These areas have already been identified in previous LAQM reports, and:

- A second AQMA is about to be declared at Dale's Corner, encompassing Ebrington Terrace and Glendermott Road. Additional monitoring along Glendermott Road also commenced in 2010.
- A Detailed Assessment of the Buncrana Road / Racecourse Road junction, including Collon Terrace, has been carried out. The assessment concluded that an AQMA was required for the junction. The Council is in the process of declaring a third AQMA in Derry at this location.

3 New Local Developments

3.1 Road Traffic Sources

Derry City Council confirms that no new sources other than those detailed in the Derry City Council 2008 Progress report, and which are ongoing, have been identified.

3.2 Other Transport Sources

Derry City Council confirms that no new transport sources have been identified.

3.3 Industrial Sources

This section should identify new or proposed industrial installations for which an air quality assessment has been carried out, existing installations where emissions have increased substantially or new relevant exposure has been introduced, or new or significantly changed installations with no previous air quality assessment. New or proposed major fuel storage depots storing petrol, petrol stations and poultry farms should also be considered.

A proposed 15 MW biomass CHP (Combined Heat and Power) plant at Londonderry Port has recently been granted planning permission. The plant is to be located on the banks of the River Foyle north of Derry City and directly south of the Londonderry Port Lisahally Terminal. Fuel consumption would be 160,000 tonnes of wood chips per year.

An Air Quality Impact Assessment was carried out as part of the planning application, including dispersion modelling of NO_2, CO, SO_2 and PM_{10} stack emissions based on the Aermod model. Ground level pollutant concentrations were predicted at the nearest residential properties, and on a Cartesian grid covering a 2km x 2km area.

The assessment concluded that the impact of the CHP plant on air quality would be negligible, as predicted contribution to overall concentrations at the worst-case receptor would be well below the AQS objective(s) for each pollutant. Especially for the NO_2 annual mean, a maximum increase of about 1µg/m^3 was predicted. As the AQMAs declared (or about to be declared) in Derry are several miles away and not within the modelled area, based on this air quality impact assessment, it is concluded that the CHP plant will have no impact on NO_2 levels in the AQMAs.

3.4 Commercial and Domestic Sources

Derry City Council confirms that there are no new or newly identified commercial or domestic sources which may have an impact on air quality within the Local Authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

Derry City Council confirms that there are no new or newly identified fugitive or uncontrolled sources which may have an impact on air quality within the Local Authority area.

Derry City Council confirms that there are no new or newly identified local developments since the Updating and Screening Assessment 2009 which may have an impact on air quality within the Local Authority area.

4 Planning Applications

A large area along the Buncrana Road axis was identified in the Derry Area Plan as a zone of development.

Former military sites at Ebrington on the Waterside and Fort George on the City side were released for development in recent years. The development is overseen by ILEX Urban Regeneration Company founded in 2003.

5 Air Quality Planning Policies

5.1 The Derry Area Plan

The Derry Area Plan 2011 noted since 1945 development around the city has occurred in a northerly direction on either side of the River Foyle. A City Development Limit has been established around all future development area beyond which there is a presumption of no further development. This separates Derry City from Culmore, Newbuildings and Strathfoyle and restricts future development to the periphery of the City although it is assumed that this will provide sufficient land for these developments to take place. Thirteen small settlements have been identified in the district which are smaller than villages and do not possess the same range of service provision; these have been selected for limited development such that the character will be reflected in the scale and style of each settlement. The total theoretical provision of future dwellings is 11,500 which is greater the 8,500 dwellings anticipated need.

The Plan outlined development zones within the City Development Limit in which future developments could take place provided that such developments met a number of conditions relating to design. These included the provision of open spaces in housing and commercial developments, satisfactory layouts for pedestrian and cycling linkages and roads layout and car parking and access provision. Proposals close to the City and preserving future access to adjacent parcels would be given greater importance. New Industrial developments in existing industrial areas would only be granted permission if they make full use of the existing infrastructure. Commercial development should consolidate the commercial centre of the City and would not lead to the detrimental impacts on the air quality and traffic movements.

5.2 The Regional Development Strategy

"*Shaping Our Future*" is a Regional Development Strategy (RDS) which offers a strategic and long-term perspective on the future development of Northern Ireland up to the year 2025. The Amendments to the RDS 2025 is the 5-year review of the existing RDS. The RDS strategy for Derry is the improvement and the enhancement of the natural environment, the economic and social opportunities and the encouragement of tourism to the area through improvements in the built environment and transport infrastructure and linkage to the natural gas network. The rural community has greater relevance to maintain the rural way of life whilst providing transport and economic opportunities in a sustainable way. Its overall aim is:

- *"to develop an attractive and prosperous rural area, based on a balanced and integrated approach to the development of town, village and countryside, in order to sustain a strong and vibrant rural community, contributing to the overall well-being of the Region as a whole."*

Specifically, changes in regard to air quality are covered in policy ENV 6.1 - improve air quality by:

- ensuring a level of ambient air quality in public places, which poses no significant risk to health or quality of life, through implementation of the National Air Quality Strategy;
- identifying and addressing air pollution problems through the implementation of the Local Air Quality Management systems (LAQM) introduced via the Environment (NI) Order 2002;
- ensuring that industrial emissions are minimised and effectively controlled, and promote more sustainable energy sources and a diversification of fuel supplies; and
- changing travel patterns to reduce the growth of traffic with potential benefits for air quality

6 Local Transport Plans and Strategies

6.1 Sub-Regional Transport Plan

The Sub-Regional Transport Plan 2015 (SRTP) was developed following the guidance of the Regional Development Strategy and the Regional Transport Strategy. Its purpose is to provide more detailed plans for the urban and rural areas with the Sub-Region and highlights proposals specifically designed for Londonderry. The package of schemes needed to incorporate current and future transport needs and be flexible to accommodate future Government policy.

The SRTP identified separate packages of measures for walking and cycling, bus, rail and highways. These will be subject to availability of land and financial resources and relevant statutory procedures such as planning guidance.

- **Walking** – proposals include: the provision of a continuous pedestrian network, designed and maintained to an appropriate standard and the in-fill of gaps in rural networks, footpaths which accommodate more easily buggies and mobility aids, additional crossing facilities with consideration to traffic flow and safety, upgrades to the existing pedestrian network from town centres to bus and rail stations. Traffic claming measures to facilitate crossing in rural areas. Provision of pedestrian links in new developments to the urban centres.

- **Cycling** – proposals include: networks of cycling routes taking into consideration existing road widths and physical constraints of route sharing, cycling parking at rail and bus stations.

- **Highway Measures** – town centres need to include traffic measures to lessen the forecast increase in traffic flows, reduction of bottlenecks at junctions, re-direction of traffic away from high-pedestrian flow areas. This may include new roads to new development areas which may be financed by the developer if the need is directly consequential to the new development, and /or new roads to reduce congestion in town centres or other sensitive areas.

- **Parking Measures** – provision of short term car parking close to town centres with long stay parking sited further from urban centres, additional provision for blue badge holders, taxi ranks and loading bays, convenience to bus and rail stations.

- **Public Transport Measures** – upgrade number of bus stops in town centres and well used routes from housing centres, improved accessibility for wheelchairs and buggies with low floor buses and better access to rail stations and platforms, bus priority for bus services especially at entry / exit of stations, the refurbishment or new bus and rail stations, if necessary, with disability parking to improve use. Additional taxi ranks with at least one on-street rank wherever practicable. In rural areas every settlement to have at least two modern stops with information on services, a canopy and close access to safe crossing if possible and may require the extension of routes into previously un-serviced settlements. The provision of Demand Responsive Services for mobility impaired residents in rural areas.

The improvement of the highways network through link road provisions is considered to lead to the improvement of air quality as adjacent roads would be relieved of traffic flow but may lead to dispersion over a wider area leading to diffuse worsening of air quality. Widening and junction improvements would reduce congestion and improve air quality on these roads and immediately adjacent roads.

Specifically for Derry-Londonderry there is limited provision of rail services to Belfast and there are no current plans to improve service provision. The co-ordinated bus service is inconvenient for the town centre so commuters have spilled into residential areas for free, unrestricted parking. A commuter coach service running between Derry and Belfast has proved very popular and taxi provision is good. The current problem for Derry is the increasing traffic flow, fuel tourism from the Republic of Ireland and long delays at junctions to the north of the City which have lead to worsening air quality. The Derry Local Transport Study looked at the limitations of the transport network in 2006 and proposed measures to improve transport and air quality. These were further outlined in the Derry Area Plan.

6.2 Derry Area Plan

The Derry Area Plan 2011 outlined transportation needs in the immediate future in Derry City and the wider Derry-Londonderry district. The strategy of the Regional Transport Plan seeks to:

- encourage the use of alternative transport modes and reduce dependency on the private car,
- encourage accessible, reliable and popular public transport,
- maximise the efficiency of the existing transport network through review and implementation of low cost improvements;
- the development of appropriate road networks especially with regard to new industrial and housing developments;
- Implement road works focusing on improvement and upgrading of key strategic routes;
- Improve pedestrian links in the area.

Specific policies for the region are:

- **Policy TR 1: Public Transport** – supporting developments in public transport by local operators to take advantage of improvements to the road network.

- **Policy TR 2: Traffic Measures and Bus Measures** – bus priority measures will be considered in association with traffic management measures and may include bus priority signals and bus lanes along the Core Public Transport Route.

- **Policy TR 3: Improve cycling** facilities and encourage cycling – by the development of a national Cycle Network, the implementation of a Riverside Strategy, new cycle routes, integration of cycling in new housing developments were possible, safe routes to school initiatives, and provision of cycle facilities.

- **Policy TR 4**: Access to Main Traffic Routes

- **Policy TR 5: Car parking provision in new developments** taking into consideration existing provision – zone A (commercial) in which operational parking would be permitted, Zone B (central and mixed use developments) operational and no-operational parking would be permitted, Zone C (all other areas) in which full operational and non-operational parking would be permitted.

- **Proposal TR 1:** Strategic Highway Proposals include the recommendations of the Derry Transportation Study and include the following schemes:
  - Strand Road widening – now substantially complete
  - Culmore Road widening

- Queens Quay widening
- Buncrana Road widening
- Glendermott Road and Dungiven Road widening
- Skeoge Link Road
- Crescent Link dualling
- Maydown to Broadbridge dualling
- Newbuildings to Magheramason widening
- Culmore Road improvements

Local strategies for transportation are included in the Action Plan, specifically the following Measures:

- M1 to restrict the number of HGV vehicles on Creggan Road;
- M2 a targeted Travel Plan to promote alternatives to private car travel;
- M3, a car-sharing scheme in association with DRD Roads Service (NI), Travelwise Group and Donegal; and
- M25 and M16, to encourage cycling through the creation of a Cycling Forum.

6.3 Integrated Transport Strategy

The Urban Regeneration Company, ILEX-URC, was established to promote the physical, economic and social regeneration of the city with specific responsibility to manage and re-develop two former military bases of Ebrington (26 acres) and Fort George (14 acres).

ILEX-URC, as a lead partner in a steering group, commissioned the development of an Integrated Transport Strategy (ITS) for the Derry-Londonderry City region. The Steering Group was formed by an appointed transport planning consultancy with members including ILEX-URC, Derry City Council, Donegal CC, Londonderry Chamber of Commerce, Department of Social Development, North West Regeneration Office, DoE Planning Service, Department of Regional Development Roads Service, Translink and Sustrans. The remit of the group was to prepare the ITS, giving consideration to all modes of transport, integrated with land-use and regeneration for the city and city region including cross-border. The draft ITS was published in April 2009.

In February 2009 ILEX facilitated a Future Search visioning exercise with a representative cross section of our community with varied resources, expertise and formal authority to have a respectful and meaningful conversation about our past, our present and our future. 120 people from the City, the region and other parts of Northern Ireland worked together, to agree a single, shared vision and a set of clear regeneration objectives and priorities for the City. This led to the formation of 12 Sector Working Groups to look at common areas going forward with the development of a Regeneration Plan for the City and its region area. These included:

- Education& Skills
- Marketing the Derry Opportunity
- Development of City Region Assets
- Children and Young People
- Successful Neighbourhoods
- River Asset
- Enterprise and Employment

- Health and Well Being
- Environment & Conservation
- Citizenship and Civic Pride
- Transport and Infrastructure
- Tourism, Arts, Culture and Leisure

The sector working group on Transport and Infrastructure reviewed the ITS in the context of the proposed Regeneration Plan and identified the following priorities:

- Reduce congestion and reliance on the private car;
- Create an integrated public transport system;
- Promote safe and sustainable modes of transport; and
- Enhance access and connectivity to, from and within the region

The draft Regeneration Plan, published in September 2010, makes the following recommendations:

"As part of an overarching Integrated Transport Strategy a number of major projects have been proposed to create a fully integrated transport network. To ensure that there is an effective and efficient transport system operating it is essential that all of the elements of the strategy are implemented, one element will provide minor improvements but it is only through a co-ordinated approach that all elements will be implemented and real transformational changes to the network are achieved that will help target issues of accessibility"

The key projects are:

- Quality Bus Corridors (QBCs) and Feeder Taxi Services;
- Upgrade of the Rail Line and Rolling Stock;
- Upgrade of the A5 and A6 (to include the Atlantic Corridor);
- Orbital Link with the 3rd Road Bridge; and
- Implementation of Walking and Cycling Masterplan.

One of the key objectives of the strategy is to achieve a modal shift from the private car to other forms of transport. By offering a fully integrated network people have more attractive and efficient modes of travel to chose from and are less likely to rely on private transport and align with the City's commitment to sustainability."

The above proposals are a mixture of short, medium and long term objectives. Benefits to the AQMAs (existing and proposed) are difficult to assess but expected outcomes from their implementation will include:

- Improved Public Transport
- The proposed orbital route will remove HDV traffic from the city centre and congested areas associated with the AQMA
- Travel across the City will be more efficient and less congested
- Increased use of cycling and walking

The proposed steps are City wide proposals and will not negate the need to take other specific measures already mentioned in the Air Quality Action Plan.

7 Climate Change Strategies

7.1 Northern Ireland Climate Change Impacts Partnership

The Northern Ireland Climate Change Impacts Partnership (NICCIP) was established following the release of the 2007 DOE/Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) report "Preparing for Climate Change in Northern Ireland". The NICCIP membership includes business, voluntary and government sectors to widen knowledge and impacts of climate change in Northern Ireland. It promotes adaptation of business and society to climate change and the development of discussion and ideas for the possibility and relevance of mitigation measures and cross-community strategies. The NICCIP produces a regular newsletter and is in the process of compiling a web-based list of contacts in Northern Ireland. It has also published "Climate Change: what will you do?" which is the findings of a survey of people, politicians and key decision makers.

The SNIFFER report on climate change addressed the two key challenges: to reduce emissions and to mitigate emissions. It outlined the likely future impacts on rain, soil moisture, weather patterns and wind speeds and sea level. It also outlined the impacts of climate change on:

- Biodiversity
- Agriculture
- Forestry
- Fisheries
- Water resources
- Coastal and flood risk
- Buildings, construction and planning
- Economic infrastructure – business, insurance, transport, tourism and energy
- Social wellbeing – health, sport and recreation,

The report recommended a multi-party approach to adapt to the climate change through the assessment of adaptive capacity and the delivery of adaptive actions:

Adaptive Capacity

- Increasing awareness, training and knowledge;
- Contribute to the development and use of climate change, and socio-economic scenarios;
- Review the regulatory and legislative frameworks with respect to climate change and the provision of incentives for adaptation;
- Contingency/ emergency planning;
- Incorporation of climate change into models, and impacts and adaptations into scheme –specific assessments;
- Consideration of cross-sector implications of responses.

Delivery of Adaptive Actions

- Increasing resilience through diversification and buffer zones;
- Avoidance of losses (e.g. altering building materials) and the acceptance of unavoidable losses;

- Embracing changes through maximising opportunities, and exploiting new opportunities e.g. forestry management;
- Planning for risks and opportunities in new infrastructure projects (e.g. transport and construction);
- Changes to management practices to accommodate climate change;
- Managing heat gain, energy use and water and environmental deficiencies in building design and construction;
- Enhance health surveillance and responses to heat waves.

7.2 The Regional Development Strategy

The Regional Development Strategy (2006) regarded climate change as the most severe problem facing Northern Ireland. The Regional Development Strategy considered climate change in outlining the development of the whole of Northern Ireland. Amendments to the RDS were issued in June 2005, including specific regard to climate change through the following policies:

- **Policy ENV5.1** – carry out research on the implications of climate change and assess the long term aspects of all plans and prepare strategies for the key impacts identified and assist organisations in preparations.

- **Policy ENV5.2** – promote improvement in building standards to minimise energy use and encourage zero emissions, promote the re-use of brownfield sites and materials, minimise losses of agricultural land and reduced and reverse the losses of woodland and other habitats, and the management and conservation of water resources.

- **Policy ENV5.3** – actions to reduce emissions of greenhouse gases through the promotion of fuel efficiency, use of alternative and renewable energy resources and technology, promotion of energy saving and efficiency measures at all levels, participation in the EU Emissions Trading Scheme, and the promotion of high efficiency, low emission technology in transport.

7.3 Other Documents

The Department of the Environment issued a consultation draft *"EU Emissions Trading Scheme Charging Scheme Northern Ireland"* in November 2009. The trading scheme outlined several proposed legislative measures to reduce or offset climate change including:

- **Amendment to the Environment (Northern Ireland) Order 2002** – authorising the Department of the Environment to initiate a charging scheme covering applications for emission allowances, applications for the retentions of allowances, revocation of a greenhouse gas permit and operator registry charges. The fees chargeable would be a sliding scale based on installation and business size and the greenhouse gas emitted.
- **Draft Greenhouse Emissions Trading Scheme Charging Scheme (Northern Ireland) 2010 and the Regulations for the Scheme (2010).** These outline the powers and remit in the regulation of green housegases emissions and permitting.

Derry City Council incorporated climate change measures in the Action Plan. Measures M10 – M12 outlined the actions to promote energy efficiency at the Council level and reduce carbon dioxide emissions and utilise out-gassing from the Culmore landfill to generated electricity.

8 Implementation of Action Plans

Derry City Council issued an Action Plan in 2008 following the declaration of the AQMA. A summary of Action Plan progress is provided in Table 8.1. Key updates with regards to the implementation of mitigation measures are:

- HGV restriction from Creggan Road could not be implemented due to delays at DRD Roads Service legal department, but the measure should be in place before the end of 2010.
- Progress was made on the Cross Border Travelwise Car Share scheme, aimed at servicing the Derry and Donegal areas. There have been 350 registrations north of the border and 68 south of the border so far, with a 17% match-rate.
- The Council has made progress towards the introduction of Euro compliant fleet vehicles, which will reduce pollutant emissions from Council vehicles. Two new electric vehicles have also been purchased.
- The Council is ahead of schedule for renewable sources of electricity. In 2008, 23% of electricity consumption came from renewable energies. This will increase to 51% in 2010.
- The Council also achieved a 9% decrease in total energy used between 2008 and 2009, working towards the minimisation of energy consumption and the reduction of carbon emissions
- The viability of the management of landfill gas produced at Culmore is currently being tested. The project would see the use of landfill gas to generate electricity and either selling it to national grid or provide additional energy for Council buildings.
- A Cycle to Work Scheme has been approved and a Pilot Scheme will progress in Spring 2011, with a view to encourage Council employees to use bicycles.
- Access to air quality information to the public has been improved through the Northern Ireland Environment Agency website, which now contains the Council's LAQM reports and relevant monitoring data
- The Council continues to develop cycling initiatives through the Derry Access Forum [1] (formerly Derry Cycling Forum). The Access Plan - Year 1 Monitoring Report, compiled in 2010, details the progress made against the objectives set in the Derry-Londonderry Access Plan 2009 -2010, adopted by Council in September 2009. £1.8m was secured towards the development of the urban greenway network in Derry, and progress has been made towards the extension of the Derry Cycle Greenway Network by 15km, including completion of the Drumahoe Link, Greenhaw Road, and Fort George links.
- The Council has been involved in the preparation of the Integrated Transport Strategy (ITS) for Derry, which has been published in draft in 2009. The ITS gives consideration to all modes of transport, integrated with land-use and regeneration for the city and city region including cross-border. One of the key objectives of the strategy is to achieve a modal shift from the private car to other forms of transport. By offering a fully integrated network, people have more attractive and efficient modes of travel to choose from and are less likely to rely on private transport and align with the City's commitment to sustainability. Expected outcomes from the implementation of the ITS proposals will include the following, likely to benefit the AQMAs in Derry:
    - Improved Public Transport
    - The proposed orbital route will remove HDV traffic from the city centre and congested areas associated with the AQMAs
    - Travel across the City will be more efficient and less congested
    - Increased use of cycling and walking

[1] Available online at www.derrycity.gov.uk/access

Table 8.1 - Action Plan Progress

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
Specific Measures to be Implemented at the AQMA											
M1	Restriction of HDVs on Creggan Road plus a 5% reduction in overall traffic at the junction	DRD Roads Service pass Order restricting >3tonne axle weight vehicles and erect signage at strategic locations	DRD Roads Service (NI)	Completed	Ongoing	Reduce numbers of highly polluting vehicles on Creggan Road. Direct reduction in NO_2 levels	Reduction of 30% to 35% in NO_2 annual mean (modelling results included in Action Plan)	Regular liaison with DRD	Lengthy delays at DRD Roads service legal dept. resulting in delay in Order being passed	Late 2010	Access/ deliveries for HDVs will reduce efficacy of the measure. Down to goodwill of motorists
M2	Alternative Travel Plan targeted at 1000 households in and around the AQMA	Make residents in and around AQMA aware of alternative-to-car travel options	Derry City Council	In-house Alternative Travel Attitudinal Survey – Comple-tion December 2010	No funding available for original Alternative Travel Plan, therefore attitudinal survey to now be conducted by student	Reduce number of vehicles at AQMA Reduction in NO_2 levels	As yet unknown	Student to undertake survey as part of Masters degree	Finalising survey area and questionnaire	Survey to commence October 2010	Direct reduction in car usage - Healthier lifestyles. Car-dependency culture barrier to be weakened
To Reduce Air Pollution by DRD Travelwise / Department of Transport in the Republic of Ireland											
M3	Establish a Cross Border Travelwise Car Share scheme in the North West that will service the Derry and Donegal areas	DRD Travelwise group to target organisations / Employers / stakeholders to assess needs and possibilities	DRD Roads Service (NI) Travelwise group	Completed	Ongoing	Direct reduction in car usage	As yet unknown	Establish working web-site with list of named organisations / establishments/ workplaces / individuals who can partake of car-sharing	350 registrations to Car-Share Scheme north of the border and 68 south of the border with 17% match-rate, £100k equivalent of local media coverage and	Ongoing	Car-dependency culture barrier to be weakened

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
									7759 web-site hits.Total cost of £30.5k		
To Reduce Air Pollution from Derry City Council Fleet Vehicles (see summary of fleet in Appendix C)											
M4	Vehicle emission testing	Assess the feasibility of testing vehicle emissions when routine servicing is carried out / compliance with MOT emissions criteria	Derry City Council	Completed	Ongoing	Reduce numbers of highly polluting vehicles on the road.		Implemented	Implemented	Ongoing	Identification of highly polluting vehicles in fleet and reduction in emissions of Nitrogen Dioxide
M5	Cleaning up Council vehicles	Fitting pollution abatement equipment to older heavy goods vehicles depending on EURO classification	Derry City Council	Completed	Ongoing	Reduction in polluting emissions from Council vehicles		Pollution abatement equipment not now to be fitted – rolling programme of Euro-compliant replacement vehicles		2-5 years	Potential capital costs and maintenance implications
M6	Promotion of newer cleaner vehicles or alternative fuels where possible	Use of electrically powered vehicles	Derry City Council	Completed	Ongoing	Reduction in polluting emissions from Council vehicles		Purchase of 2 electrically operated Citroen Berlingos light duty vans for Council use.	Vehicles taken out of use	2-5 years	Potential capital costs, maintenance implications and operational difficulties
M7	Vehicle upgrading programme to comply with EURO emission standards	Replacement programme for Council vehicles	Derry City Council	Completed	Ongoing	Reduction in pollution / noise emissions from Council vehicles and increased fuel efficiency.		Purchase vehicles that comply with the prevailing EURO standard: rolling programme		Ongoing	Capital cost of purchasing new vehicles
	Establish vehicle replacement programme	Programmed replacement of heavy goods vehicles every 7 years	Derry City Council	Completed	Ongoing	Reduction in pollution / noise emissions from Council vehicles. Less		rolling programme	Ongoing	Ongoing	Capital cost of purchasing new vehicles.

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
						maintenance for newer vehicles and increased fuel efficiency					
M8	Vehicle Fuel Efficiency	Assess Councils vehicle and mobile plant fuel consumption efficiency and make improvement	Derry City Council	Ongoing	Ongoing	Better fleet and mobile plant management operations. Increase vehicle and mobile plant fuel use efficiency		Awaiting available finance to instigate scheme		1-3 years	Purchase software or introduce a system and procedures to establish Council vehicle and mobile plant fuel consumption.
M9	Investigate options for better travel planning amongst Derry City Council employees	Develop a workplace travel plan for Derry City Council Undertake staff travel surveys to establish current travel patterns to and from Council premises. Establish car-sharing practices and encourage use of public transport among staff. Encourage walking and cycling among staff	Derry City Council/ Travelwise NI to assist			Reduced vehicle pollution from staff travelling to and from work Cost savings Healthier workforce	As yet unknown	Travelwise Northern Ireland consultancy expertise secured to progress Travel Plan		½ -1½ years	Reluctance of staff to give up car. Lack of cycle facilities. Safety concerns
To Reduce Air Pollution from Derry City Operations Throughout the City											
M10	Adopt an environmentally friendly source of power for Council	Power Council buildings with electricity generated from renewable sources	Derry City Council	Target of rolling 3% annual exchange to renewable	Ongoing	Percentage of electricity from renewables		2008 - 23% from renewable sources 2010 – 51%	All Council large facilities- leisure centres, civic offices, airport now using	3 years	Promotion of renewable energy sources for the generation of

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
	buildings			sources (ahead of schedule)				from renewable sources Target of rolling 3% annual exchange to renewable sources (ahead of schedule)	electricity generated from renewable sources		electricity. Lack of renewable energy sources of electricity
M11	Employment of a Council Energy Manager	Assessment of Council energy needs and usage. Adopt recommendations made by the Energy Manager to ensure the minimisation of energy consumption and reduction of carbon emissions	Derry City Council	Completed	Ongoing	Reduction in carbon emissions from Council facilities		Total Council Energy Use In 2008 – 22000 kWh In 2009 – 20000 kWh Annual 9% decrease	Implemented	Ongoing	
M12	Reduce Carbon Dioxide	Manage landfill gas production at Culmore landfill site Explore the viability of using landfill gas produced at Culmore landfill site emissions.	Derry City Council	Ongoing	January 2011	Offsetting Council power requirements		Gas to be used to generate electricity to be sold to national grid. Excess to be used on Council buildings at landfill site	Contractor appointed - viability testing currently awaiting planning permission	5 years	Capital cost and resource implications
To Reduce Air Pollution Through Education and Community Initiatives											
M13	Managing bonfire sites	Establish a Council Policy on dealing with bonfires. Educate communities on the types of material that should be burned on bonfires.	Derry City Council	Completed	Ongoing	Reduction of pollution from bonfires. Reduction in the number and size of bonfires		Pilot an agreed Community based initiative to manage bonfire sites	Focus Group formed. Regular monthly meetings. Police and land-owners on board. Consultant appointed (£23k) to explore, agree	Ongoing	Difficulty in engaging and persuading some young people in the community from taking part in such initiatives.

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
									and implement possible socio-cultural alternatives to bonfires		
M14	Education initiatives, Develop an awareness of environmental issues amongst young people	Education campaign for young people highlighting the health and environmental problems associated with air pollution, via a targeted education programmed, which could be delivered online or through schools.eg University of Ulster Step-Up Programme and Health Promoting Schools Award	Derry City Council	Ongoing		Creation of sustainable attitudes to our environment among young people		Ongoing		Ongoing	Resource implications in supporting such initiatives
M15	Cycling Initiatives	Derry Cycling Forum	Derry City Council	Ongoing		Reduced peak hour congestion		Continue working partnerships with Sustrans to ensure that cycling initiatives are supported through the Derry Access Forum Progress made notably in the development of urban greenway network in Derry		Ongoing	Lack of facilities for cyclists
M16	Cycling Initiatives	Promote cycling among staff. Encourage Derry City Council employees to consider the use of bicycles in their daily duties.	Derry City Council	Ongoing		Assess the viability of a cycle usage mileage for employees Health benefits Reduced pollution from non use of vehicles		Council has approved in principle to implement Cycle to Work Scheme		Pilot Scheme for 50 members to progress in Spring 2011	Impracticable for certain staff. Increased response time Staff reluctance to cycle.

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
M17	Improve information provision via electronic methods	Provide the public with air quality information through the Councils web site and links to the Northern Ireland air quality website[2]	Derry City Council	Completed			n/a	Central Northern Ireland Environment Agency (NIEA) web-site up and running and containing Derry CC's LAQM Reports And all monitoring site data/pollutant monitoring		Ongoing	Allows public to keep up to date on current local and provincial air quality issues
M18	Vehicle emission tests	Consider the provision of free vehicle emissions testing for motorists and supporting information about responsible car ownership, highlight vehicle pollution issues, eco driving and alternatives to the motor car	Derry City Council	Ongoing				No emissions testing due to lack of funds New link to Derry CC web-site from NIEA web-site with eco- driving tips and cost savings			Location of sites for testing limited
To Reduce Air Pollution through Statutory Functions											
M19	Development Control	Use Planning Process to ensure potential air quality issues are assessed. Comment upon planning applications to ensure that all relevant air quality issues are highlighted and mitigation measures are considered wherever possible	Derry City Council	Completed	Ongoing	Sustainable development which considers environmental as well as socio-economic impact				Ongoing	Increased capital cost of development Perceived reduction in development opportunities
M20	Sustainable Development	Incorporate sustainable policies in Council Corporate Plan and sub-Regional Transport Plan Continue to influence forthcoming	Derry City Council	Completed	Ongoing	General environmental impact Inform policy and decision makers		Integrated Transport Strategy has been published Draft Regeneration Plan now out to consultation		Ongoing	Perceived reduction in development opportunities

[2] www.airqualityni.co.uk/index.php

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
		development policies for Derry to ensure that sustainable development and air quality considerations are included. Continue to support financially the work locally of the Northern Ireland Energy Agency				Increased awareness of sustainable development issues among a variety of stakeholders					
M21	Industrial Pollution Control	Permitting and inspection of industrial processes and installations under Part C of the Industrial Pollution Control (NI) Order 1997 and the Pollution, Prevention and Control (NI) Regulations 2003	Derry City Council	Completed	Ongoing	Reduced ambient pollution				Ongoing	
M22	Nuisance policy for dealing with burning of commercial and domestic waste	Take enforcement action under Public Health (Ireland) Act 1878 and Pollution Control local Government (NI) Order 1978 in accordance with Council enforcement policy	Derry City Council	Completed	Ongoing	Reduced pollution from burning of commercial and domestic waste		Ongoing		Ongoing	
M23	Recycling	Promoting domestic composting and use of Civic Amenity centres in a bid to reduce pollution from domestic garden bonfires	Derry City Council	Completed	Ongoing	Reduced pollution from uncontrolled burning of commercial and domestic waste		Ongoing			
To Ensure Air Pollution is Monitored											
M24	Monitor ambient air quality throughout the	Continue ambient air quality monitoring programmes	Derry City Council		Ongoing	Decisions on future air quality		Ongoing		Ongoing	Resource implications

No	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in AQMA	Progress to Date	Progress in last 12 months	Estimated Completion Date	Comments Relating to Emission Reductions
M25	City Council area.	Evaluate results from air quality monitoring against air quality objectives				policies based on accurate and ratified monitoring data. Identification of areas of poor air quality.		Detailed Assessment undertaken			Difficulty locating monitoring sites
M26		Install and maintain air quality equipment in areas of potential poor air quality						New diffusion tube sites installed			
M27		Continue to assist with Governmental research studies into the causes of air pollution within Derry and Northern Ireland.						New NO_x monitor to be installed at new Dale's Corner AQMA (replacement of existing monitor)			

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Derry City Council has undertaken real-time monitoring at three sites in 2009, including Brooke Park (NO_2, PM_{10} and SO_2), Dale's Corner (NO_2) and Brandywell (PM_{10} and SO_2). Measured concentrations at all continuous monitoring sites were below the Air Quality Strategy objectives for each pollutant. However, the NO_2 concentration at Dale's Corner was close to the annual mean objective.

The 2009 results from the network of NO_2 diffusion tubes installed across the district show that six sites exceeded the annual mean NO_2 objective of 40µg/m^3, three of these within the Creggan Road / Infirmary Road AQMA. Two sites are near Dale's Corner, which is about to be declared as an Air Quality Management Area (AQMA), following the conclusions of an air quality Detailed Assessment based on dispersion modelling.

The last site exceeding the objective is located at the Buncrana Road / Racecourse Road junction. A Detailed Assessment has been carried out earlier in 2010, with the conclusions that an AQMA was required for the junction. Following these recommendations, the Council is about to declare a third AMQA in Derry at this location.

Annualised NO_2 results at the new diffusion tubes installed in 2009 in Francis Street, John Street and Spencer Road are all below the NO_2 annual mean AQS objective, and therefore a full detailed assessment is not required at this stage, as initially recommended in the USA 2009.

9.2 Conclusions Relating to New Local Developments

No new road, commercial, domestic or fugitive sources have been identified in the district since the USA 2009.

There is a new proposed biomass CHP plant, which has been given planning permission. The plant will be located south of the Londonderry Port Lisahally Terminal on the banks of the River Foyle.

An Air Quality Impact Assessment was compiled as part of the planning application, which concluded that the impact of the CHP plant on air quality will be negligible. The CHP will be several miles away from the current or planned AQMAs in Derry, and therefore it is concluded that the CHP plant will have no impact on NO_2 levels in these AQMAs.

9.3 Other Conclusions

The Air Quality Action Plan for the Creggan Road / Infirmary Road AQMA was completed in 2008, and actions are being progressed and reported annually.

Following the upcoming declaration of a second AQMA in Dale's Corner, and a third one planned for the Buncrana Road / Racecourse Road junction, the Action Plan is being revised to incorporate a new set of measures to tackle air pollution at these two other locations.

9.4 Proposed Actions

Proposed actions arising from the Annual Progress Report are as follows:

- Proceed to a Further Assessment of air quality for the new AQMA in Buncrana Road / Racecourse Road, to provide further information and support potential measures to be included in the Derry Air Quality Action Plan.
- Progress to the next Annual Progress Report by April 2011.

10 References

- Local Air Quality Management Technical Guidance LAQM.TG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Local Air Quality Management Policy Guidance LAQM.PG(09). February 2009. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland
- Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users, Report to Defra and the Devolved Administrations , Feb 2008
- Derry Area Plan 2011. Department for the Environment, 2006
- Derry City Council Detailed Assessment and Action Plan 2008
- Derry City Council Updating and Screening Assessment 2009.
- EU Emissions Trading Scheme Charging Scheme Northern Ireland. Department for the Environment, November 2009
- Preparing for Climate Change in Northern Ireland. DoE/ Scotland and Northern Ireland Forum for Environmental Research, 2007.
- Shaping Our Future: Adjustments to the Regional Development Strategy (RDS) 2025. Department for Regional Development, June 2008
- Sub-Regional Transport Plan 2015. Department for Regional Development, March 2007.
- The Northern Ireland Climate Change Partnership. http://www.sniffer.org.uk/our-work/climate-change/niccip.aspx

Appendices

Appendix A – QA/QC Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes exposed in 2007 and 2008 were 10% TEA in water, the analytical laboratory was Environmental Services Group Ltd (formerly Bureau Veritas Laboratories). Following the publication of the Practical Guidance, 10% TEA in water ceased to be an accepted method of preparation and the laboratory changed to 20% TEA in water in January 2009. Gradko International Ltd became the analytical laboratory used in April 2009. It is from the Gradko prepared tubes that the local bias correction was calculated.

In previous years it has been customary for both the national and local factors to be applied to diffusion tube data. The default for Gradko 20% TEA in water is 0.90 (v03/10.xls).

Factor from Local Co-location Studies (if available)

Although duplicate tubes are exposed at various locations throughout the city, there are two triplicate co-located with an automatic analyser – Brooke Park and Dale's Corner. Brooke Park is an urban background monitoring site which became affiliated to the AURN. Dale's Corner is a Roadside monitoring site.

Table A.1 – Bias correction summary Brooke Park

Brooke Park AURN (based on 8 periods of data)	
Bias factor A	0.85 (0.79-0.93)
Bias B	17% (7%-27%)
Diffusion Tubes Mean:	17 µg/m³
Mean CV (Precision):	6
Automatic Mean:	15 µg/m³
Data Capture for periods used:	99%
Adjusted Tubes Mean:	15 (14-16) µg/m³

Table A.2 – Bias correction summary Dale's Corner

Dale's Corner (based on 9 periods of data)	
Bias factor A	1.03 (0.93-1.16)
Bias B	-3% (-14%-7%)
Diffusion Tubes Mean:	34 µg/m³
Mean CV (Precision):	3
Automatic Mean:	35 µg/m³
Data Capture for periods used:	95%
Adjusted Tubes Mean:	35 (32-40) µg/m³

Discussion of Choice of Factor to Use

Derry City Council has reported diffusion tube data corrected with the local bias adjustment and separately with the default factor for the laboratory. The 2009 data have been corrected firstly by an average of the two local factors and independently using the default for Gradko.

This is because the local factors have been calculated on less than 75% data capture; also the average local factor would be more conservative than the default national adjustment. These two factors (local average and Gradko) are very similar and suggest the local factor can be considered reliable.

PM_{10} Monitoring Adjustment

PM_{10} monitoring is undertaken at two sites. At Brooke Park PM_{10} is measured using a FDMS. Derry Brandywell monitors PM_{10} using a TEOM; which is not an equivalent method. TG (09) requires TEOM data to be corrected using the VCM model. However, there is paucity of FDMS in Northern Ireland and of the few urban background sites in the region most do not monitor using FDMS. Therefore, the data have been corrected using the VCM model with the data sets it generated; but the reference sites used in the correction for pressure, temperature are more than 50 miles distant.

Table A.3 – VCM settings Derry Brandywell

Summary Derry Brandywell	Text /Value
Site Name	Derry Brandywell
Organisation	Derry City Council
Start Date	01/01/2009
End Date	01/01/2010
TEOM data already corrected with 1.3 factor	Yes
EPA Constant A	3
EPA Constant B	1.03
Instrument Temperature	25
Instrument Pressure	1013
Instrument reports to local ambient readings	No
Timescale	Daily
Pressure Site	Ealing - Southall (EA7)
Pressure Site Warning	BP Distant site (604km).
Temperature Site	UKMO Heathrow Airport (LH1)
Temperature Site Warning	TMP Distant site (603km).
FDMS Site 1	Belfast Centre (BE1)
FDMS Site 1 Warning	FDMS1 Data capture 84%. Distant FDMS1 site (100km).
FDMS Site 2	Derry - AURN FDMS (DY0)
FDMS Site 2 Warning	FDMS2 Data capture 73%.
FDMS Site 3	
FDMS Site 3 Warning	Cannot find third FDMS site within range.

Short-term to Long-term Data adjustment

Derry Brooke Park NO_2 data capture was less than 90%, the analyser did not sample between 23rd February and 9th April 2009. Similarly with the FDMS there is paucity of urban background sites in the Northern Ireland and most do not monitor NO_2. Therefore, annualisation could not wholly follow the methodology in Technical Guidance LAQM.TG(09). However, the closest available sites to Brooke Park with 85% or more data capture were used and the underlying principle of the annualisation process remained the same.

Table A.4 – Annualisation Factors for NO_2 concentrations at Brooke Park

Site	Site Type	Annual Mean	Period Mean	Ratio
Belfast Centre	Urban Centre	32.8	32.8	1.00
Dale's Corner	Roadside	39.0	38.8	1.01
			Average	1.00

Due to the change in analytical laboratory in April 2009, the data capture for long term and new monitoring sites was less than 75% for 2009. Therefore, the diffusion tube concentrations required annualising. There are few sites within Northern Ireland which have long term continuous analysers monitoring NO_2. Therefore, the following sites were used to annualise diffusion tube data: Belfast Centre, Dale's Corner (roadside) and Brooke Park. Although for 2009 Brooke Park failed to attain 90%, over the diffusion tube year the data capture was sufficient for a reference site.

Table A.5 – Annualisation Factors at Diffusion Tube monitoring sites

Monitoring location	Monitoring duration	Uncorrected diffusion tube concentration	Brooke Park annualisation factor	Belfast Centre annualisation factor	Dale's Corner annualisation factor	Average annualisation factor
C1/C2	April – December	66.1	1.040	1.016	1.065	1.040
C6	April – December	42.9	1.002	0.985	1.048	1.012
D1/2/3	April – December	35	1.100	1.074	1.086	1.087
E1/2/3	April – December	49.9	1.207	1.131	1.137	1.158
E4	October-December	37.0	0.724	0.768	0.861	0.784
F1	April – December	24.4	1.247	1.117	1.161	1.175
AB2	April – December	33.3	1.002	0.985	1.048	1.012
CH1	April-December	23.5	0.766	0.818	0.890	0.825
FS1/2	June– December	32.9	1.066	0.998	1.039	1.014
FS3/4	June– December	40.3	1.028	1.013	1.050	1.030
GL1/2	April – December	20.9	1.466	1.271	1.227	1.321
GL4	April – December	19.6	1.058	1.028	1.073	1.053
JS1/2	June– December	37.9	1.028	1.013	1.050	1.030
JS3/4	June– December	38.6	1.028	1.013	1.050	1.030
RC1	May-December	25.3	1.058	1.028	1.073	1.053
RC2	May-December	18.9	1.058	1.028	1.073	1.053
RC3	May-December	21.1	1.058	1.028	1.073	1.053
RC4	May-December	27.0	1.058	1.028	1.073	1.053

Monitoring location	Monitoring duration	Uncorrected diffusion tube concentration	Brooke Park annualisation factor	Belfast Centre annualisation factor	Dale's Corner annualisation factor	Average annualisation factor
SP1/2	June–December	41.1	1.028	1.013	1.050	1.030
SP3/4	June-December	36.8	1.028	1.013	1.050	1.030

QA/QC of automatic monitoring

AEA Energy and Environment undertook the Quality Assurance/Quality Control (QA/QC) procedures at these monitoring sites during January and February 2009, ensuring that measurements from the analysers are as accurate as possible, and that measurements recorded at each site may be compared with other sites. From March 2009 onwards the QA/QC procedures for Derry Dale's Corner and Brandywell were conducted by the National Physical Laboratory. Brooke Park, as an AURN site remained with AEA Energy and Environment for QA/QC checks.

Manual calibration of automatic monitors is undertaken every two weeks by Derry City Council officers. This allows the instrument drifts to be fully quantified and documented using traceable calibration gas standards and the results are used to scale data. All calibration records are sent to AEA Energy and Environment (Brooke Park) or NPL (Derry Dale's Corner and Brandywell) who conduct the QA/QC checks.

The analysers are checked and serviced every six months by suppliers Air Monitors. The reports are sent to AEA Energy and Environment or NPL as appropriate who conduct the QA/QC checks.

QA/QC of diffusion tube monitoring

The Environmental Services Group Ltd (formerly Bureau Veritas laboratories)y participates in the field intercomparison scheme and the Workplace Analysis Scheme for Proficiency (WASP) programme, operated by the Health and Safety Laboratory (HSL). In 2008, 11 out of the 15 collocation studies undertaken by Bureau Veritas labs using 10% TEA in water methodology were considered to be good precision (based upon v05/09 spreadsheet). In 2007, 6 out of the 17 collocation studies undertaken by Bureau Veritas labs using 10% TEA in water methodology were considered to be good precision (based upon v05/09 spreadsheet).

Gradko International Ltd became the analytical laboratory in 2009, the method of preparation remained 20% TEA in water. Gradko also participate in the WASP and AEA Intercomparison schemes and in 2009, 29 out of 33 collocation studies undertaken were considered to be good precision (based on v31/09

Appendix B – Monthly Diffusion Tube Concentrations

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Months	Raw Average Concentration
A1/2/3				17.3	14.7	12.3	10.7	12.7	14.3	19	22.3	31	9	17.1
C1/2					62.5	58*	50.5	55.5	68	65	78.5	86.5	8	62.9
C3				42	34	36	34	27	48	39	39	54	9	39.2
C4				46	39	34	39	39	40	47	56	63	9	44.8
C5				27	24	22	20	18	26	27	25	33	9	24.7
C6				47	37	46	40		34	41	37	61	8	42.9
D1/2/3				37.7	31	36	27.7	24.7	29.7	35.7	53*	52.3	9	35.0
D4				34	26	36	25	18		31	30	47	8	39.2
D5				60	47	65	46	31	44	51	51	68	9	44.8
E1/2/3					53.3	61	43.7	39.3	44	44.5	51	72	8	49.9
E4										33	31	47	3	37.0
F1					23	28	25	24	27	31	36		7	27.7
P1				22	58	24	25	22	22	25	29	37	9	29.3
P2				40	30	37	17	18	25	29	33	39	9	29.8
P3				42	47	48	34	24	32	39	35	51	9	39.1
P4				46	37	39	38	31	46	48	54	63	9	44.7
S1				42	36	46	35	32	38	40	44	47	9	40.0
S2				42	33	38	34	28	32	41	49	55	9	39.1
AB1				40	37	37	32	22	35	38	49	58	9	38.7

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Months	Raw Average Concentration
AB2				34	31	40	26		30	31	30	44	8	33.3
CH1				22						20	22	30	4	23.5
TR1				27	22	26	17	15	21	25	25	37	9	23.9
TR2				22	17	19	18	16	21	23	26	41	9	22.6
FS1/2						39*	26.5	20.5	30.5	33	32.5	52	7	32.9
FS3/4						44	34	25	36	42	42.5	58.5	7	40.3
GL1/2				27	20.5	17	15.5	16	20*	24*	29*	35*	9	20.9
GL3				27	18	18	13	13	16	22	22	36	9	20.6
GL4					18	18	14	12	19	23	21	32	8	19.6
JS1/2						42	36.5	28.5	31	38.5	40	49	7	37.9
JS3/4						44	33	36.5	32	40	41.5	53	7	38.6
RC1					17	68	13	13	17	21	22	31	8	25.3
RC2					16	13	12	14	18	21	25	32	8	18.9
RC3					19	18	14	15	18	23	27	35	8	21.1
RC4					26	25	22	21	24	31	34	33	8	27.0
SP1/2						46.5	35.5	32.5	37.5	36.5	47	52	7	41.1
SP3/4						40	30	25.5	31	36	42	53	7	36.8

Appendix C –Derry City Council Fleet of Road-Worthy Vehicles 2010

Vehicle Type		Quantity	Engine Classification	Additional	Age of Vehicles (years)	Percentage of Vehicles compliant with 7-year Replacement Scheme **
Refuse Collection Vehicles(RCV) 32 tonnes		1	Euro 3	14/29 of RCV's/large sweepers will be Euro 5 category by end of 2010 **(48%)**	1 ½ - 8 (3 vehicles overdue replacement)	85%
Refuse Collection Vehicles(RCV) 26 tonnes		13	6 no. Euro 3 7 no. Euro 5			
Refuse Collection Vehicles(RCV) 7.5 tonnes		2 1	Euro 3 Euro 5			
Street Sweepers	Large 7.5 tonnes	12	Euro 4		1 - 5	100%
	Small	5	Diesel	All vehicles undergo annual PSV and emissions testing		
Vans		45			1 – 13 ½ (19 vehicles overdue replacement) *	42%
Tractors		10			Not as yet part of the 7-year vehicle replacement Scheme (except tractors)	
Airport Foam Tenders		4				
Ancillary Vehicles: mowers/gum-busters		10				
Cars		2				
Electric Vans		0	Disposed of			
Totals		**105**				

* Replacement dependent on financial availability

** Troublesome vehicles may be changed early but others, with low mileage, may be retained more than 7 years