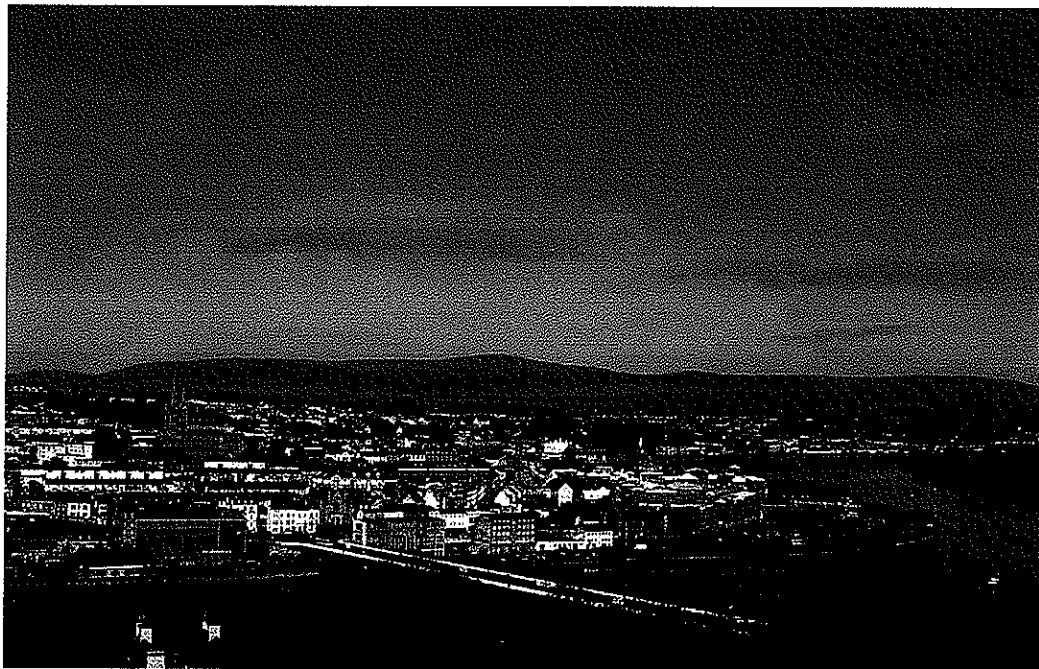


Derry City Council

Air Quality Review and Assessment: Progress Report June 2005



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Executive Summary

This progress report provides a review and update on air quality issues within Derry City Council area and includes new monitoring results and information on developments that may have an impact on air quality.

The new monitoring results across the district show that the Air Quality Management Area (AQMA) at Creggan Road/Infirmary Road junction shall remain, although there is evidence to conclude that the boundaries of the AQMA should be changed to exclude those areas in the designated area where there is not predicted to be exceedence of the pollutant objective.

New continuous chemi-luminescent monitoring results for Nitrogen Dioxide (NO₂) indicate exceedence of the annual mean pollutant limit value at the Dale's Corner traffic junction in the District. Also, NO₂ diffusion tube results at several other traffic junctions indicate that there may be exceedences of the annual mean limit. Due to the new monitoring results, further advanced dispersion modelling is to be undertaken at all these traffic junctions to determine the extent of any areas of exceedence where there is relevant public exposure, in which case recommendations may be made for the declaration of further Air Quality Management Areas.

New continuous monitoring results for Particulate Matter (PM₁₀) and Sulphur Dioxide (SO₂) at the Brandywell show a large drop in the number of exceedences of the daily mean and 15 minute limit values respectively, reflecting the substantial decline in the use of solid fuel for home heating purposes, as evidenced in the recent fuel use survey conducted in this area. As previous dispersion modelling was verified using the data from this continuous monitor, it is now likely that the PM₁₀ exceedences predicted for the years 2004 and 2010 will not be real. Further advanced dispersion modelling is to be undertaken at these locations to predict future pollutant levels.

Trends at the background Automatic Urban and Rural Network monitoring station at Brooke Park demonstrate a small increase in NO₂ but general decrease in SO₂, PM₁₀ and Carbon Monoxide (CO) concentrations. There is no clear trend with Ozone (O₃) concentrations although year to year variation is evident. Regarding the continuous Brandywell station, there is a clear decrease, as mentioned above, in PM₁₀ and SO₂ concentrations. At the Dale's Corner monitoring station, there is not yet sufficient data to determine annual trends.

New local developments, which may have an impact on air quality, have been identified and listed in the report. These include proposed new major roads close to existing and new housing developments and also new industrial processes.

Chapter 1

1.1 Introduction

The preparation of air quality Progress Reports form part of the Local Air Quality Management (LAQM) system introduced under the Environment (NI) Order 2002. Progress Reports are designed to ensure continuity in the Local Air Quality Management process (LAQM). A local authority is only required to produce a Progress Report in years when the authority is not carrying out an Updating and Screening Assessment or a Detailed Assessment. The Reports are of value to local authorities in that they will assist Councils in responding to requests for up to date information on air quality, provide a means of communicating air quality information to members of the public and maximise the value of investment in monitoring equipment.

The Progress Report will also ensure that changing circumstances, requiring a detailed assessment, are identified early and acted upon.

To assist in writing the report, technical guidance LAQM.PRG(03) has been considered.

Chapter 2

2.1 New Monitoring Results

Derry City Council uses two types of monitoring methods to obtain data on air quality within the district. These are real time analysers and NO₂ passive diffusion tubes.

2.2 Real Time Analysis

Real time analysers are regarded as the most accurate method of monitoring pollutants. Derry City Council uses a range of electronic equipment positioned strategically throughout the Council District to maintain a continuous system of data collation for reporting purposes. A background monitoring station located at Brooke Park in the District is affiliated to the Automatic Urban and Rural Network (AURN) and continuously monitors Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂), Carbon Monoxide (CO), Particulate matter (PM₁₀) and Ozone(O₃). Appendix 1 illustrates recent monitoring data.

Trends at the background Automatic Urban and Rural Network monitoring station at Brooke Park demonstrate a small increase in NO₂ but general decrease in SO₂, PM₁₀ and Carbon Monoxide (CO) concentrations. There is no clear trend with Ozone (O₃) concentrations although year to year variation is evident.

The second real-time analyser is situated in the Brandywell area, where there is perceived to be significant use of solid fuel for home heating purposes. The pollutants monitored here are SO₂ and PM₁₀ as these are associated with emissions from coal/solid fuel. Appendices 2 and 3 illustrate recent monitoring data.

New continuous monitoring results for Particulate Matter(PM₁₀) and Sulphur Dioxide(SO₂) at the Brandywell show a large drop in the number of exceedences of the daily mean and 15 minute limit values respectively, reflecting the substantial decline in the use of solid fuel for home heating purposes.

In the Stage 3 Report, PM₁₀ levels were predicted to exceed objective limits at the rural location of Claudy. In order to determine background particulate levels, it is proposed to locate a real-time PM₁₀ analyser in this area.

A third continuous analyser is located at kerbside at a busy road in Dale's Corner in the Waterside area of the District. This is one of the main traffic junctions on the approach to the city and several residential buildings are in close proximity to traffic sources. This monitoring station measures NO₂, which is one of the main

pollutants associated with exhaust emissions. Appendix 4 shows recent results for this site

The new continuous chemi-luminescent monitoring results for Nitrogen Dioxide (NO₂) indicate exceedence of the annual mean pollutant limit value at the Dale's Corner traffic junction in the District. There is however, insufficient data at the Dale's Corner site to determine annual trends.

2.2.1 Quality Assurance/Quality Control (QA/QC)

To ensure that the information obtained from the analysers is as accurate as possible and to quantify any instrument drifts a stringent QA/QC protocol is followed. Netcen undertake this contract for Derry City Council at all of the automatic monitoring sites. Details of calibration certificates and associated QA/QC documentation is available on request.

2.2.2 Manual Calibration of continuous monitors

Every two weeks manual calibration checks are carried by Council officers out on both instruments. This allows the instrument drifts to be fully qualified and documented using traceable calibration gas standards and the results are used to scale data. All calibration records are sent to Netcen to conduct the QA/QC checks.

2.2.3 Six Monthly Checks

Six monthly services are carried out on equipment by our suppliers, Enviro Technology Ltd and Signal Ambitech Ltd. Netcen independently audit the equipment also on a six monthly basis. They ensure that the measurements from the analysers are representative and inter-comparable. Additionally, any site-specific problems that may have remained undetected will be fully quantified.

2.3 Nitrogen Dioxide Diffusion Tubes

An extensive network of diffusion tubes has been established at key locations where people live close to traffic sources throughout the Council area. There are five main traffic junctions/road sections of concern and a number of tubes have been strategically positioned to give long-term annual average concentrations. The site locations can be seen in Appendix 5

Six tubes are distributed throughout the Air Quality Management Area (AQMA) at the Creggan Road/Infirmary Road junction to determine the spread of pollutant

concentration. All diffusion tubes are positioned at locations of relevant public exposure on building facades at kerbside. This will provide better data than previously at this location, where only one diffusion tube was exposed and the results formed the basis of the need to declare an AQMA.

Derry City Council uses diffusion tubes prepared and analysed by Lambeth Scientific Ltd. The laboratory participates in a field inter-comparison scheme which is controlled by Netcen and this assists in assessing the performance of the laboratory.

Table 2 in Appendix 6 shows the annual average concentrations of nitrogen dioxide at each of the sites since the new monitoring programme began in October 2004. A bias correction factor was obtained from the spreadsheet available on the University of the West of England AQM Resource Centre website. The most recent (2004) overall factor for 4 collocation studies (of which 3 were roadside) that use Lambeth Scientific Services was 1.21.

It should be noted that Derry City Council is giving consideration to choice of adjustment factor. To demonstrate the difference between co-location results at roadside and background continuous monitoring stations, Table 3 in Appendix 7 shows the bias factor obtained at Derry's background AURN at Brooke Park and also the bias factor for the roadside continuous NO₂ monitoring station at Dale's Corner for the same monthly periods since co-located data was available in December 2003. Data from the background site shows that the diffusion tubes are under-reading by a factor of 1.45. For the roadside monitor, the bias factor is 2.15.

For the most recent data set - year 2004, Table 4 in Appendix 8 demonstrates an overall average bias factor of 1.84 for continuous monitoring versus diffusion tube monitoring. This data is currently being forwarded for inclusion in the UWE AQM Resource Centre co-location spreadsheet.

An in-house exercise has already been done to collate Derry's 2004 data in the spreadsheet. This now gives an overall factor for 6 collocation studies (of which 4 were roadside and 2 background) that use Lambeth Scientific Services, of 1.44. Review and Assessment guidance allows the local authority to exercise discretion in choice of bias adjustment factor. It is acknowledged that Derry City Council's own co-location factor is higher than the UWE spreadsheet average.

The factor of 1.44 will be used in the interim by Derry City Council for diffusion tube correction adjustment. However, this choice may be subject to review to reflect the worst case local scenario.

Chapter 3

3.1 Results of the Fuel Use Survey at Brandywell

In relation to the above, the initial appraisal conducted by the consultants appointed by the Environment and Heritage Service indicated that there was sufficient evidence to declare an AQMA at the Brandywell area. Derry City Council consequently demarcated an area of exceedence, based on the modelled pollutant concentration contours, and conducted an updated Fuel Use Survey in this provisional AQMA.

It was found that there had been a significant shift from coal to oil fired domestic heating and this trend was set to continue. It was evidenced that, out of a total of 372 houses within the provisional AQMA, covering an area of approximately 1 km squared, only 90 properties use solid fuel for home heating purposes. Table 5 in Appendix 9 relates these findings. A map of the provisional AQMA is also shown.

These findings were accepted by the Department and Air Quality Consultants with the proviso that improved modelling and continued monitoring be conducted for the Brandywell area.

Monitoring will be ongoing for the foreseeable future at the current location. It would appear to be impractical to move the monitor a small number of metres from its current location so as to be located at the contour of highest concentration determined by the modelling exercise.

Also, the number of PM₁₀ exceedences at the Brandywell monitoring site has decreased substantially in comparison to previous years, as shown in Appendices 2 and 3. This fact, along with the reduction in the number of coal burning properties, will reduce pollutant outputs significantly. It is felt that the Brandywell area will not pose a threat to exceedence of the objective limits. However, confirmation cannot be made until dispersion modelling is conducted with revised fuel use and monitoring data.

Chapter 4

4.1 New Local Developments

This section of the report looks at changes that have taken place that may affect air quality as well as looking at major developments under consideration. The areas considered include new industrial processes included in the list in appendix 2 of TG(03), new developments with an impact on air quality, especially those that will significantly change traffic flows. There are no new landfill sites or quarries.

Table 6 in Appendix 10 shows summary information on any new developments.

4.2 New Part A Processes

There are two new/proposed Part A processes in Derry City Council District. A permit was recently issued to TBA Galvanising. Assessment of the application has shown that the predicted emissions to air from point sources for lead and particulate matter are within current sector guidance limits and this conclusion is based on estimates from similar galvanizing operations in the UK. It is concluded that this operation is not highlighted as a process likely to release significant quantities of the specified substances to air as stated in appendix 2 of LAQM.TG(03). Emissions from this source will, however, be included in a proposed inventory to be completed for the Council District.

The other Part A process for which application for permit is currently being made, is the Foyle Meats/Proteins plant. The application covers animal slaughter, meat processing and rendering activities. The principal point source emissions of possible concern from the site are Particulates including (PM₁₀), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x) and Carbon Monoxide (CO) from the boiler and thermal oxidizer. Other emissions to air have been deemed insignificant. Emissions reduction is achieved through regular maintenance via Planned Preventative Maintenance (PPM), use of low sulphur fuel and low NO_x burner. It is concluded that this operation also is not highlighted as a process likely to release significant quantities of the specified substances to air as stated in appendix 2 of LAQM.TG(03). Emissions from this source will, however, be included in a proposed inventory to be completed for the Council District.

4.3 New Part B Processes

There are no new Part B processes

4.4 New Part C Processes

Four new /proposed Part C processes have been identified in the District.

- Eglinton Timber manufactures timber pallets. Application has been made for a permit to operate an installation for the combustion of solid waste in an appliance between 0.4 and 3MW rated thermal input. The premises is in close proximity to existing and proposed housing on two sides. Although there is potential for release of Particulate matter and Carbon Monoxide, the only pollutants relevant to the Air Quality Review and Assessment regime in this case, stringent permitting conditions will minimize/ effectively control potential emissions.
- Irish Agricultural Wholesale Suppliers(IAWS) was authorized by Derry City Council early in 2003 to operate a cement process, namely the handling and storage of bulk cement, at Londonderry Port and Harbour. The premises is in an industrial setting, remote from residential areas. As above, permitting conditions will minimize/ effectively control potential Particulate emissions.
- Perfecseal Ltd is in the process of making an application for permit to undertake the coating process of printing flexible packaging. The premises is in an industrial setting, remote from residential areas. It is accepted that the permit conditions will control any Carbon Monoxide or Oxides of Nitrogen emissions associated with the operation of this process.
- Flemings Engineering has also applied for a permit for the coating of metal and plastic in an agricultural context. The premises is in an industrial setting, quite remote from residential areas.

All of the emissions, where available, from these point sources will also be included in a proposed inventory to be completed for the Council District.

4.5 New road schemes

Major new road schemes that may have an impact on air quality are listed below.

Crescent Link, Waterside, Derry.

This road has been upgraded from dual in one direction and single carriageway in the other to dual carriageway in both directions, to accommodate new residential and other development as detailed below. The Environmental Statement submitted with the planning application has shown that there will be increased traffic flow along the Crescent Link road. Although peak-time queuing occurs at roundabouts at two locations along this road, there is no relevant public exposure, as the nearest dwellings are remote from these traffic sources.

Skeoge Link Road, Galliagh, Derry City Council

Review of the Environmental Statement accompanying the planning application has indicated that there will be an improvement in air quality at certain locations where traffic flows will be displaced from existing roads onto the link road. However, this is equally true of other existing locations, not considered in the Environmental Statement, where traffic will be increased due to this scheme.

Extensive queuing is expected close to an existing residential area at the Buncrana Road / Upper Galliagh Road and also at a new roundabout location on the new Link Road. The developer has been requested to conduct additional modelling to examine possible exceedences of air quality limit values at these locations.

Department of Regional Development Roads Service (NI) are also currently collating details of road schemes in the Council District which may have an impact on air quality at areas of potential relevant public exposure.

4.6 New mixed use developments (residential /commercial)

Residential, Retail and Leisure Development, Crescent Link, Waterside, Derry.

This is a large development with residential forming the major component. All domestic properties in the proposed development will have oil-fired central heating for home heating purposes. Schemes of this size would have the

potential to exceed PM₁₀ air quality limit values should there have been extensive use of solid fuel (even smokeless).

Derry City Council is therefore addressing this issue at planning stage to ensure that choice of home heating appliances at design stage will not potentially adversely affect air quality.

Proposed Housing and Associated Facilities for New Residential Neighbourhood at lands between Upper Galliagh Road, Beragh Hill Road and Skeoge Road.

It has been recommended by Derry City Council that, due to the size of this housing scheme, the recommended choice of fuel for domestic heating purposes be home heating grade oil or natural gas, if available. This is to exclude the possibility of exceedence of PM₁₀ air quality limit values should there have been extensive use of solid fuel (even smokeless).

Chapter 5

5.1 Action Plan

An Order designating an Air Quality Management Area at the Creggan Road/Infirmary road junction was passed on 23 February 2005, in accordance with LAQM requirements.

Currently, officers in the Environmental Health Department are being trained in the use of the advanced air quality dispersion model ADMS-Urban Light. Once proficient in its use, model runs can be conducted to assess such outcomes as the reduction in traffic required to lower the emissions of NO₂ to below the Air Quality Limit at the road junction above. The model will permit some options to be explored and formatted as part of the Action Plan.

A full GIS system is also currently being implemented in Derry City Council and this will permit accurate input data for modelling purposes and also enhance the quality of detailed mapping reports at key locations in the District where there are/ may be predicted exceedences of the Air Quality Objective limits from the different pollutants of concern.

Regarding consultation with relevant bodies, our Stage 3 Report and associated Executive Summary along with a copy of the AQMA Order and map were distributed to key organisations, inviting comments and commitment to membership of a working group to advance the formulation of an action plan for the designated AQMA.

It is our intention to produce a draft action plan as soon as reasonably possible and to arrange submission of a final plan by February 2006, twelve months after declaration of the AQMA. Meetings are currently being organised with DRD Roads Service and Northern Ireland Housing Executive, among others to this end.

Additionally, informative letters were sent to all householders/ business addresses in the designated AQMA. A meeting is to be organised in the near future at a local venue to which all residents will be invited.

CHAPTER 6

6.1 Conclusion

The AQMA at the Creggan Road/Infirmary Road junction will remain and the production of an Action Plan, in collaboration with relevant bodies, is currently underway.

Evidence from recent NO₂ monitoring results would suggest that the boundaries of the AQMA at Creggan Road/Infirmary Road junction could be changed to exclude those areas in the designated area where there is not predicted to be exceedence of the pollutant objective. When more monitoring data is available to provide a more accurate annual mean for NO₂ at this location, the above can be enacted.

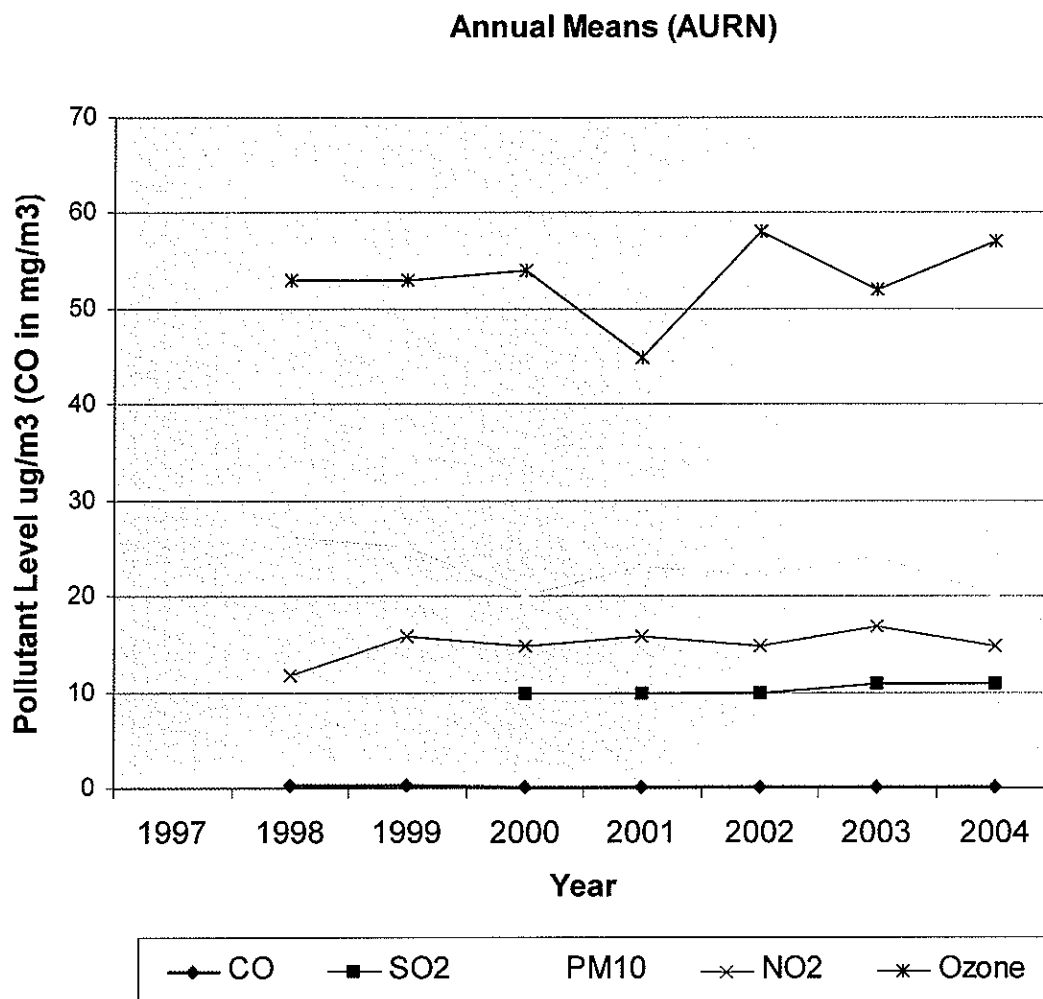
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The number of PM₁₀ exceedences at the Brandywell monitoring site has decreased substantially in comparison to previous years. This fact, along with the reduction in the number of coal burning properties, will reduce pollutant outputs significantly. It is felt that the Brandywell area will not pose a threat to exceedence of the objective limits. However, confirmation cannot be made until dispersion modelling is conducted with revised fuel use and monitoring data.

In the Stage 3 Report, PM₁₀ levels were predicted to exceed objective limits at the rural location of Claudy. In order to determine background particulate levels, it is proposed to locate a real-time PM₁₀ analyser in this area.

Appendices

Appendix 1: Figure 1: Graph showing Annual Mean Pollutant Concentrations at Brooke Park Urban Background Air Quality Monitoring Station



**Table 1: Annual Mean Pollutant Concentrations at
Brooke Park Urban Background Air Quality Monitoring Station**

	1998	1999	2000	2001	2002	2003	2004
CO (mg/m ³)	0.5	0.4	0.3	0.3	0.2	0.2	0.3
SO2 (ug/m ³)			10	10	10	11	11
PM10 (ug/m ³)	26	25	20	23	22	24	20
NO2 (ug/m ³)	12	16	15	16	15	17	15
Ozone (ug/m ³)	53	53	54	45	58	52	57

Appendix 2: Pollutant Concentrations (SO₂ and PM₁₀) at Brandywell Air Quality Monitoring Station, 2003

Produced by netcen on behalf of Derry City Council

DERRY BRANDYWELL **01 January to 31 December 2003** These data have been fully ratified by netcen

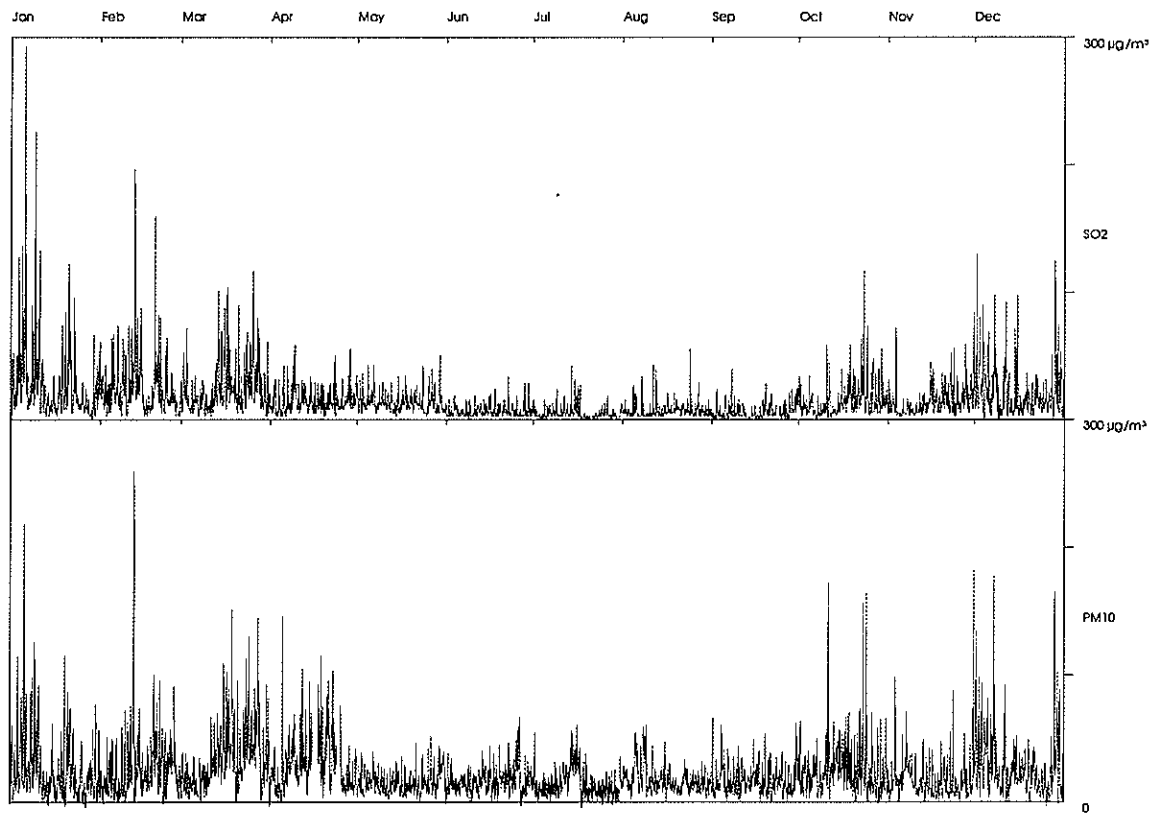
POLLUTANT	SO ₂	PM ₁₀
Number Very High	0	0
Number High	0	22
Number Moderate	4	333
Number Low	34098	8286
Maximum 15-minute mean	293 µg m ⁻³	260 µg m ⁻³
Maximum hourly mean	293 µg m ⁻³	260 µg m ⁻³
Maximum running 8-hour mean	170 µg m ⁻³	178 µg m ⁻³
Maximum running 24-hour mean	98 µg m ⁻³	93 µg m ⁻³
Maximum daily mean	89 µg m ⁻³	87 µg m ⁻³
Average	15 µg m ⁻³	22 µg m ⁻³
Data capture	98.4 %	98.7 %

All mass units are at 20°C and 1013mb

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Sulphur Dioxide	15-minute mean > 266 µg m ⁻³	4	1
Sulphur Dioxide	Hourly mean > 350 µg m ⁻³	0	0
Sulphur Dioxide	Daily mean > 125 µg m ⁻³	0	0
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	34	34
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 40 µg m ⁻³	0	-

Produced by netcen on behalf of Derry City Council

**Derry Brandywell Air Monitoring
Hourly Mean Data for 01 January to 31 December
2003**



Appendix 3: Pollutant Concentrations (SO₂ and PM₁₀) at Brandywell Air Quality Monitoring Station, 2004

Produced by netcen on behalf of Derry City Council

DERRY BRANDYWELL **01 January to 31 December 2004**

These data have been fully ratified by netcen

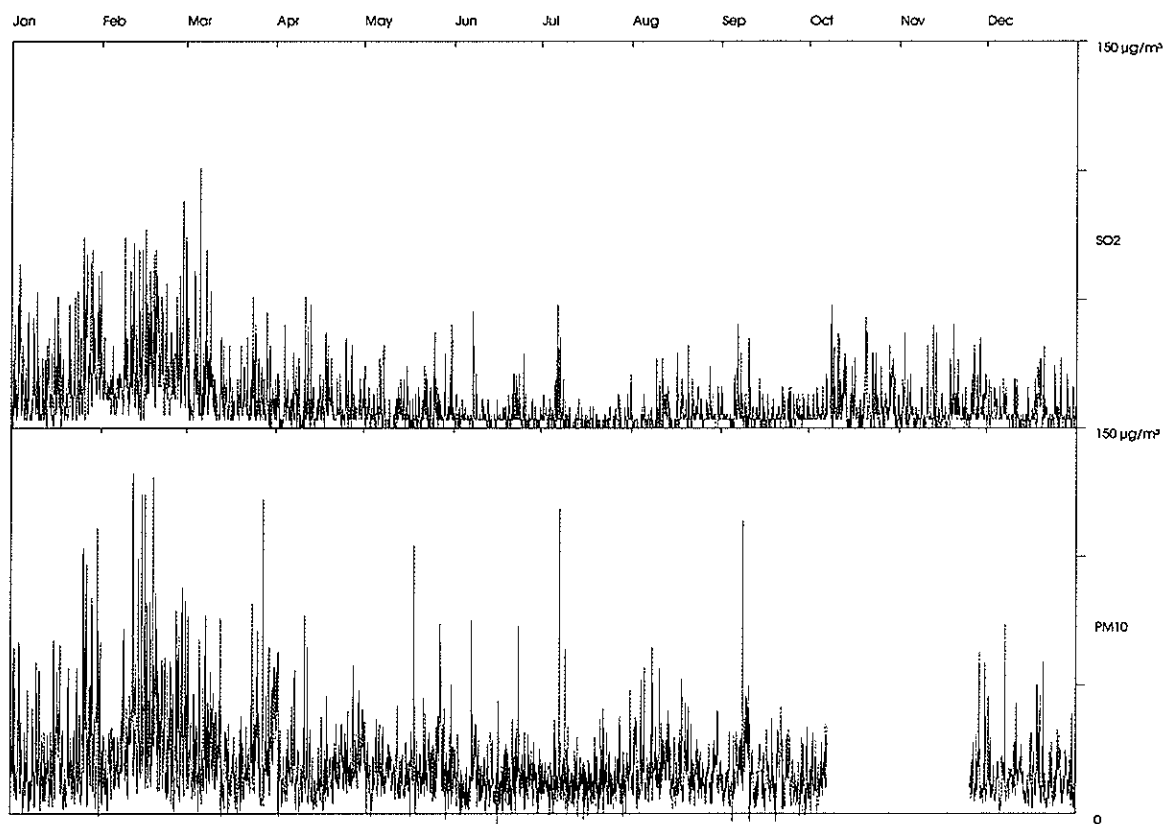
POLLUTANT	SO ₂	PM ₁₀
Number Very High	0	0
Number High	0	0
Number Moderate	0	23
Number Low	34038	7569
Maximum 15-minute mean	141 µg m ⁻³	132 µg m ⁻³
Maximum hourly mean	101 µg m ⁻³	132 µg m ⁻³
Maximum running 8-hour mean	56 µg m ⁻³	94 µg m ⁻³
Maximum running 24-hour mean	42 µg m ⁻³	55 µg m ⁻³
Maximum daily mean	35 µg m ⁻³	48 µg m ⁻³
Average	9 µg m ⁻³	18 µg m ⁻³
Data capture	98.2 %	86.1 %

All mass units are at 20°C and 1013mb

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Sulphur Dioxide	15-minute mean > 266 µg m ⁻³	0	0
Sulphur Dioxide	Hourly mean > 350 µg m ⁻³	0	0
Sulphur Dioxide	Daily mean > 125 µg m ⁻³	0	0
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	9	9
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 40 µg m ⁻³	0	-

Produced by netcen on behalf of Derry City Council

**Derry Brandywell Air Monitoring
Hourly Mean Data for 01 January to 31 December
2004**



Appendix 4: Pollutant Concentrations (NO, NO_x and NO₂) at Dale's Corner Air Quality Monitoring Station, 2004

Produced by netcen on behalf of Derry City Council

DERRY DALE'S CORNER **01 January to 31 December 2004**

These data have been fully ratified by netcen

POLLUTANT	NO	NO ₂	NO _x
Number Very High	-	0	-
Number High	-	2	-
Number Moderate	-	6	-
Number Low	-	6304	-
Maximum 15-minute mean	1214 µg m ⁻³	974 µg m ⁻³	2613 µg m ⁻³
Maximum hourly mean	968 µg m ⁻³	747 µg m ⁻³	2225 µg m ⁻³
Maximum running 8-hour mean	561 µg m ⁻³	434 µg m ⁻³	1291 µg m ⁻³
Maximum running 24-hour mean	225 µg m ⁻³	190 µg m ⁻³	516 µg m ⁻³
Maximum daily mean	213 µg m ⁻³	185 µg m ⁻³	510 µg m ⁻³
Average	31 µg m ⁻³	45 µg m ⁻³	92 µg m ⁻³
Data capture	71.9 %	71.9 %	71.9 %

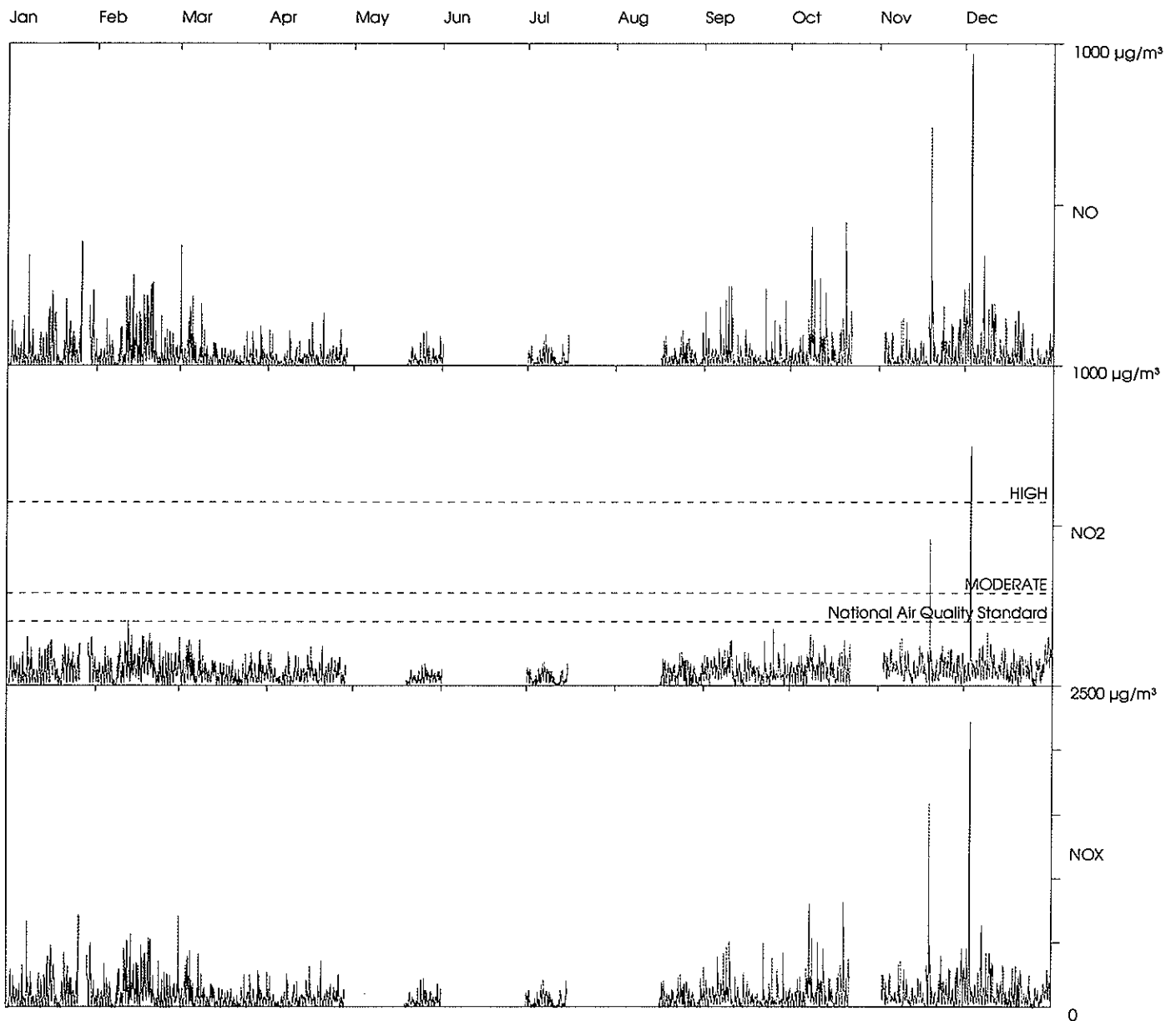
All mass units are at 20°C and 1013mb

NO_x mass units are NO_x as NO₂

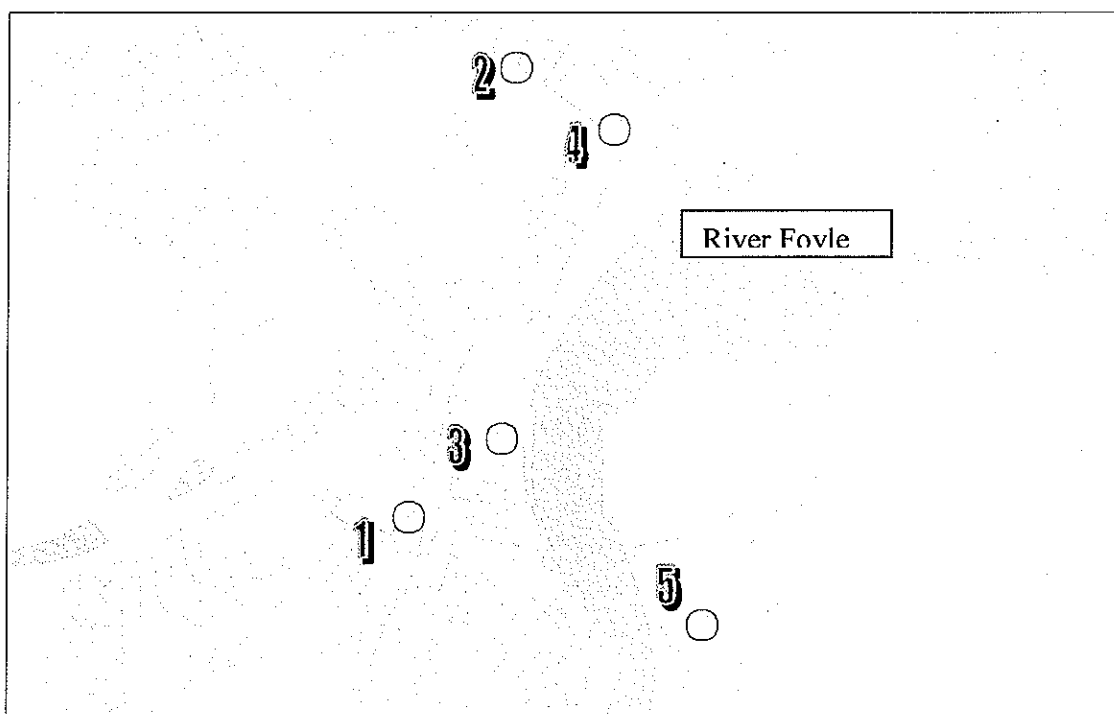
Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	9	3

Produced by netcen on behalf of Derry City Council

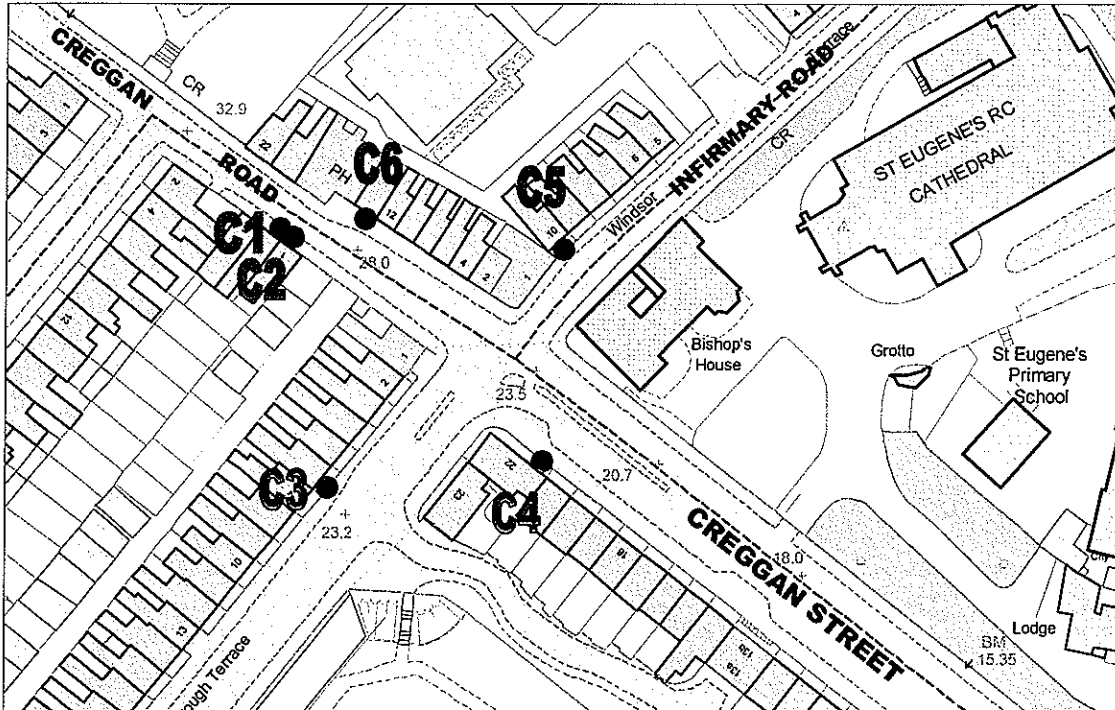
**Derry Dale's Corner Air Monitoring
Hourly Mean Data for 01 January to 31 December
2004**



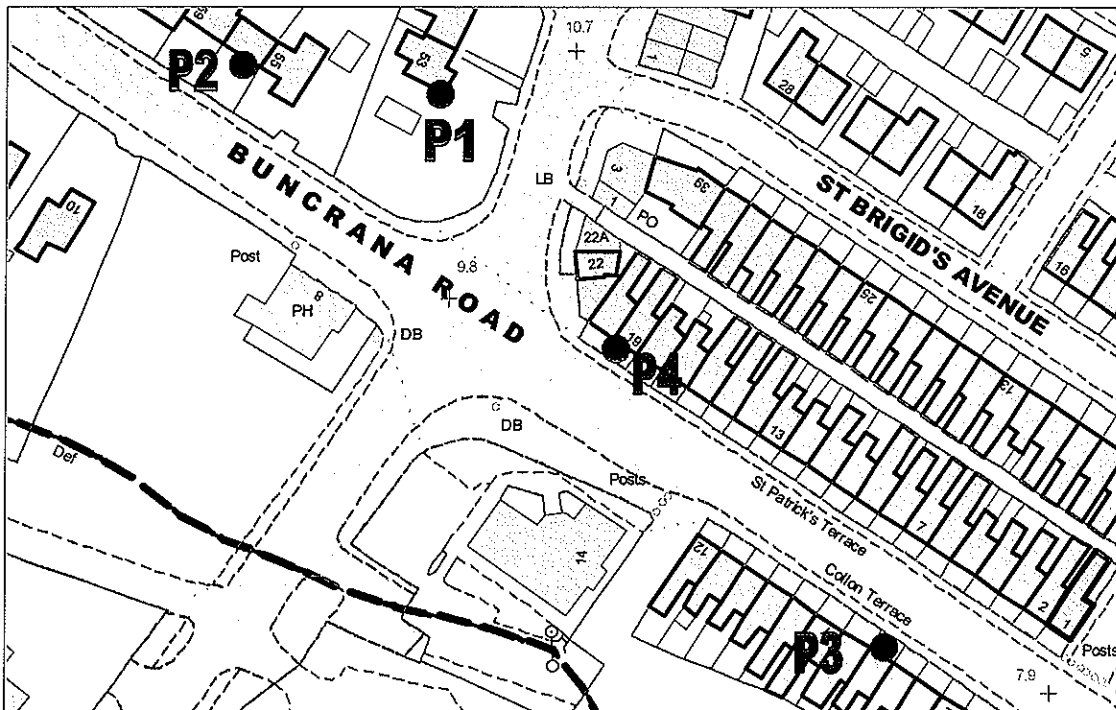
Appendix 5: NO₂ Diffusion Tube locations



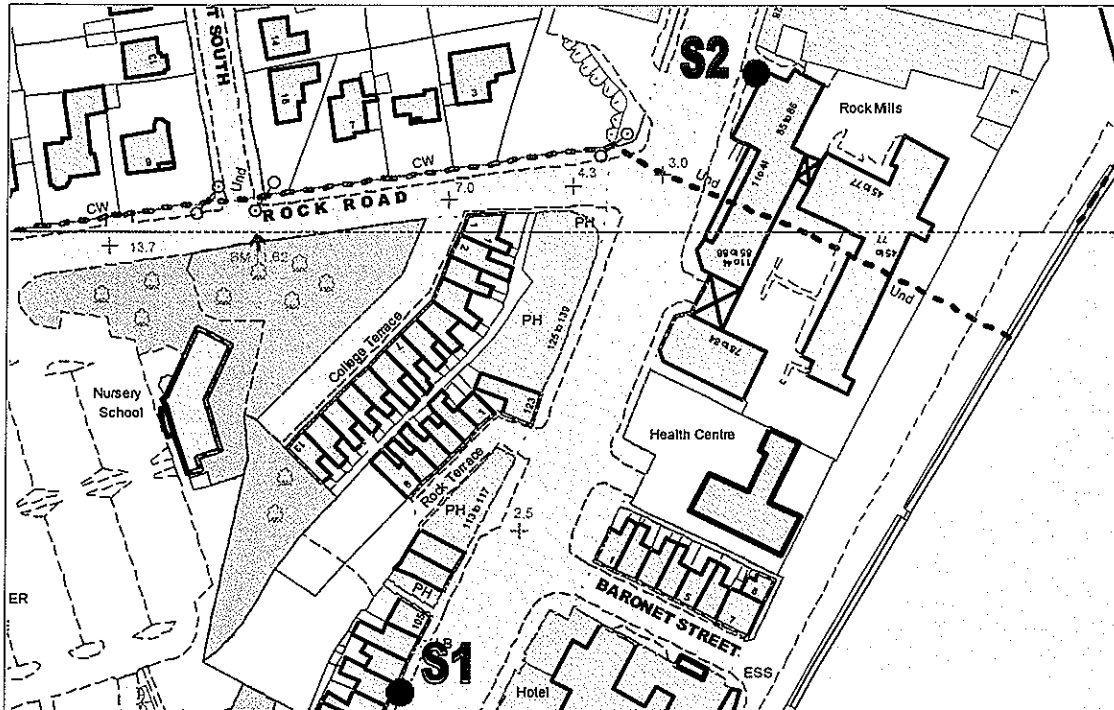
Overview of Traffic locations of Concern in Derry City Council District
(see following pages for detailed maps of the above junctions and locations of each NO₂ tube)



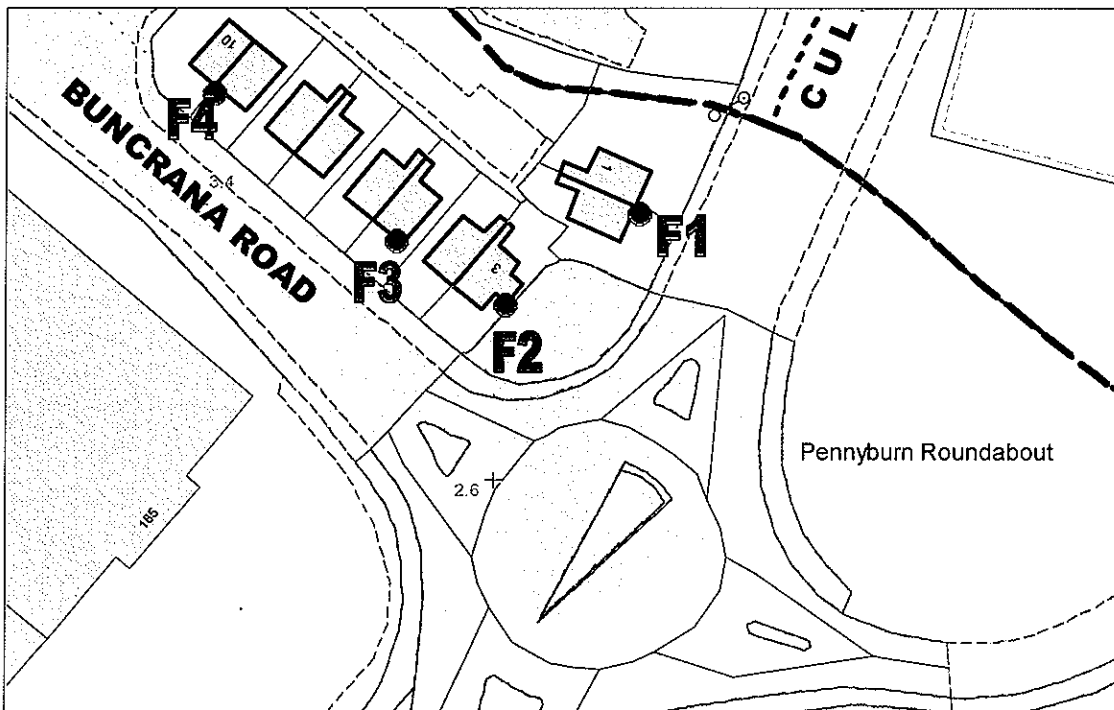
Location No.1: Creggan Road/Infirmary Road Junction



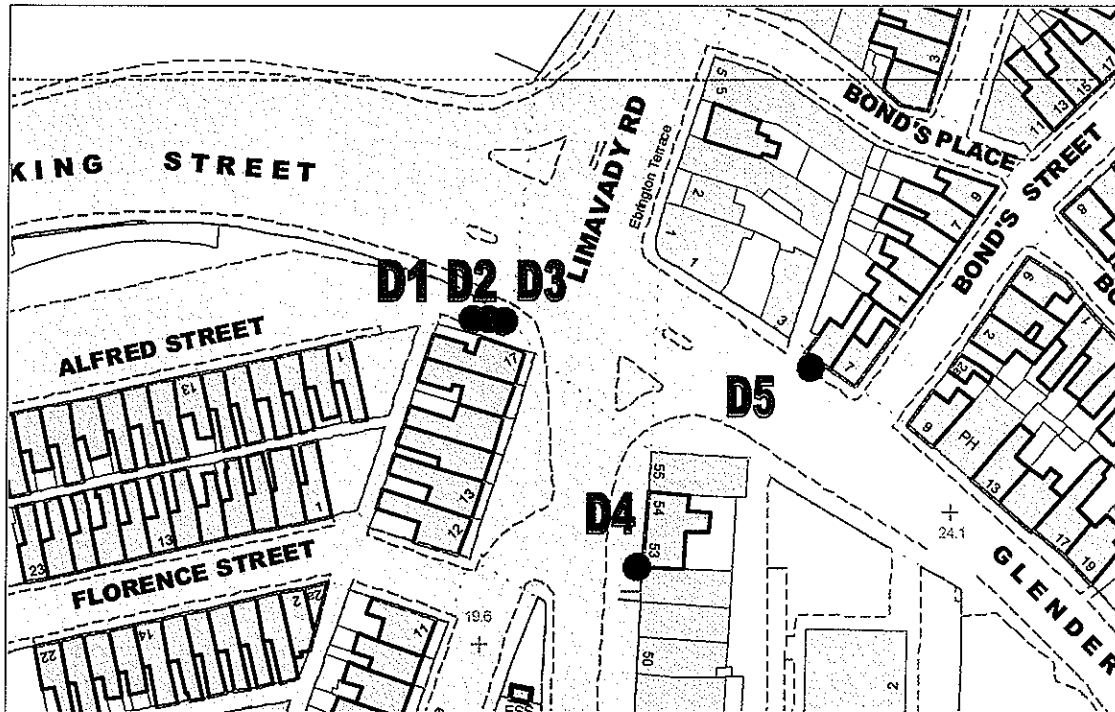
Location No.2 : Buncrana Road/ Racecourse Road Junction



Location No.3 : Strand Road at Rockmills



Location No.4 : Pennyburn Roundabout, Farren Park



Location No.5 : Dale's Corner, Waterside

Appendix 6: Table 2: NO₂ Diffusion Tube Results for period October 2004 to March 2005

Site Ref	Property Address	2004			2005			Average (ppb)	Average (ug/m ³)	Bias Corrected Average (ug/m ³)
		Oct	Nov	Dec	Jan	Feb	Mar			
	AUN	Units (ppb)	Units (ppb)	Units (ppb)	Units (ppb)	Units (ppb)	Units (ppb)			
A1	Brooke Park	4	9	11	5	6	7	7.00	13.4	19.3
A2	Brooke Park	3	7	7	1	9	8	5.83	11.1	16
A3	Brooke Park	2	6	8	5	6	10	6.17	11.8	17
	CREGGAN RD									
C1	3 Creggan Rd	10	22	29	22	23	18	20.67	39.5	57
C2	3 Creggan Rd	8	19	22	18	19	22	18.00	35.4	51
C3	6 Marlborough Terrace		19	14	21	17	16	17.40	33.2	47.8
C4	22A Creggan Street	9	20	12	2	20	13	12.67	24.2	35
C5	10 Windsor Terrace	6	15	13	14	12	12	12.00	22.9	33
C6	14 Creggan Road	9	20	10	17	14	13	13.83	26.4	38
	DALES CORNER									
D1	Monitor	4	9	13	13	14	16	11.50	22.0	31.7
D2	Monitor	5	11	15	12	16	3	10.33	19.7	28.4
D3	Monitor	6	14	13	17	13	10	12.17	23.2	33.4
D4	52 Clooney Terrace	5	11	3	10	14	10	8.83	16.9	24.3
D5	5 Glendermott Road	5	10	14	25	22	15	15.17	29.0	41.8
	FARREN PARK									
F1	2 Farren Park	3	7	8	11	9	8	7.67	14.7	21.2
F2	3 Farren Park	6	12	13	11	13	12	11.17	21.3	30.7
F3	5 Farren Park	6	14	10	10	16	12	11.33	21.6	31.1
F4	9 Farren Park	6	13	14	8	14	12	11.17	21.3	30.7
	PENNYBURN									
P1	53 Messines Park	5	11	11	10	11	11	9.83	18.8	27.1
P2	57 Messines Park	7	14	13	12	12	10	11.33	21.6	31.1
P3	19 St Patricks Terrace		15	16	13	17	11	14.40	27.5	39.6
P4	5 Collon Terrace		15	24	22	13	10	16.80	32.1	46.2
	STRAND RD									
S1	99 Strand Road	7	16	18	17	22	13	15.50	29.6	42.6
S2	Rockmills	4	9	15	16	12	15	11.83	22.6	32.5

Appendix 7: Table 3 : All co-location results for Background and Roadside Sites in Derry City Council Area

Exposure Month	AURN Monthly Average Concentration Value (ug/m ³)	NO ₂ Diffusion Tube Monthly Average Concentration (ug/m ³)	Difference Factor (Continuous v Monitored)	
Dec 2003	26.5	24.7	1.07	
Jan 2004	22	12.3	1.8	
Feb 2004	22	12.3	1.8	
Mar 2004	18.3	19.6	0.93	
Oct 2004	14.7	5.7	2.57	
Nov 2004	15.7	14	1.12	
Dec 2004	15.7	16.6	0.95	
Jan 2005	12.3	7	1.76	
Feb 2005	14.5	13	1.12	
Overall Factor			1.46	
	Dale's Corner Monthly Average Concentration Value (ug/m ³)			
Dec 2003	46	24	1.92	
Jan 2004	49	15.3	3.2	
Feb 2004	53	27.3	1.94	
Mar 2004	39	35	1.11	
Oct 2004	50	No data	-	
Nov 2004	56	21.6	2.6	
Dec 2004	59	25.5	2.31	
Jan 2005	57	27	2.11	
Feb 2005	54	27	2	
Overall Factor			2.15	
				Average Overall Factor 1.81

Appendix 8: Table 4: Year 2004 Co-location results for Background and Roadside Sites in Derry City Council Area

Exposure Month	AURN Monthly Average Concentration Value (ug/m³)	NO₂ Diffusion Tube Monthly Average Concentration (ug/m³)	Difference Factor (Continuous v Monitored)	
Jan 2004	22	12.3	1.79	
Feb 2004	22	12.3	1.79	
Mar 2004	18.3	19.6	0.93	
Oct 2004	14.7	5.7	2.58	
Nov 2004	15.7	14	1.12	
Dec 2004	15.7	16.6	0.95	
Overall Factor			1.53	Average Overall Factor 1.87
	Dale's Corner Monthly Average Concentration Value (ug/m³)			
Jan 2004	49	15.3	3.2	
Feb 2004	53	27.3	1.94	
Mar 2004	39	35	1.11	
Oct 2004		No Data	-	
Nov 2004	56	21.6	2.59	
Dec 2004	59	25.5	2.31	
Overall Factor			2.23	

Appendix 9

Map showing provisional AQMA boundaries at the Brandywell area

