



2011 Air Quality Progress Report for West Dunbartonshire Council

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

April 2011

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Executive Summary

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act 1995, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. It represents West Dunbartonshire Council's sixth Progress Report. Results from monitoring in the Council area are presented and any potentially significant sources of air pollution are identified. The Progress Report evaluates those changes since the last assessment which could lead to the risk of an air quality objective being exceeded.

Monitoring carried out in the area during 2010 has not identified any exceedences of the PM₁₀ or nitrogen dioxide (NO₂) objectives.

The Progress Report has not identified any significant changes in emissions sources within the Council area. There have been no new relevant industrial installations and no new or substantially altered roads within the Council area. There are also no new significant commercial, domestic or fugitive sources of emissions.

The main findings of the 2011 Progress Report are summarised below

Nitrogen Dioxide (NO₂)

Real Time Monitoring

West Dunbartonshire Council has two automatic monitoring stations. The location of these units has not changed since the 2010 Progress Report.

1. Glasgow Road, Dumbarton (A814)

The ratified data from AEA confirms an annual mean of 27µg/m³ for 2010. There were no exceedences of the hourly mean. This unit was affiliated into the national network (AURN) during 2010 and has been re-designated Dumbarton Roadside.

2. West Dunbartonshire, Clydebank (Kilbowie Roundabout).

The ratified data from AEA confirms an annual mean of 26µg/m³ for 2010. There were no exceedences of the hourly mean.

Diffusion Tubes

West Dunbartonshire Council had 27 NO₂ diffusion tubes (excluding co-located triplicates) at various sites within its area during 2010.

During that time five of these tubes breached the National Air Quality Objective for NO₂. While these results are fully discussed further on in this report it has been concluded that there is no need to progress to detailed assessment.

PM₁₀

West Dunbartonshire Council has one Tapered Element Oscillating Microbalance (TEOM) with a Type C FDMS which was located at West Dunbartonshire, Clydebank throughout 2010. The ratified annual average confirmed by AEA for 2010 was 18µg/m³. There were three exceedences of the daily mean objective. This result is discussed further on in this report however it has been concluded that there is no need to proceed to Detailed Assessment at this time. PM₁₀ monitoring at this location will continue for the foreseeable future.

Additionally a light scattering device (Osiris) was located in McKenzie Drive, Balloch to monitor what effect, if any, a biomass boiler installed at the headquarters of the Loch Lomond and Trossachs National Park Authority was having on local air quality. The Osiris was installed for the last four months of 2010. The annualised annual average was 12.1µg/m³. Using the factors indicated in TG (09) this annualised figure was multiplied by 1.3 and 1.14 giving corrected annualised means of 15.7 and 13.8 µg/m³ respectively. There were no exceedences of the 24 hour mean.

National Air Quality Objectives were not exceeded in 2010 in West Dunbartonshire Council area. There is therefore no need to proceed to detailed assessment.

West Dunbartonshire Council will carry out an Update and Screening Assessment in 2012.

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1 Introduction

1.1 Description of Local Authority Area

West Dunbartonshire Council is the 4th smallest Scottish Council in terms of land area covering 17,792 hectares. Population is mid placed in the table of 32 Councils at approximately 96,000 in 43,000 households.

The Authority comprises two main areas:

Clydebank situated on the north of the River Clyde. Almost half the population of West Dunbartonshire Council lives in the Clydebank area giving it a population density level similar to large cities.

Dumbarton and the Vale of Leven are less densely populated areas extending along the banks of the River Leven to Loch Lomond.

The dominant landscape is moorland alongside rolling farmlands and rugged hills and ridges. West Dunbartonshire is widely recognised as containing some of the finest lowland countryside in Scotland. Although West Dunbartonshire is not a particularly agricultural area, a high proportion of the area is classed as open countryside. Contrastingly the level of urban development is significantly higher than the Scottish average. The area has the highest proportion of fresh water in Scotland, much of it of very high quality.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a detailed assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre, $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in Scotland.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	3.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	18 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 2.0

Report	Date	Outcome
Stage 1	1999	Proceed to Stage 2
Stage 2	2002	Continue monitoring until 2003 and report further
Update And Screening Assessment	2003	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Progress Report	2004	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Progress Report	2005	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Update And Screening Assessment	2006	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Progress Report	2007	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Progress Report	2008	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Update And Screening Assessment	2009	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment
Progress Report	2010	National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment

No exceedences of the National Air Quality Objectives have been identified during previous rounds of review and assessment in the West Dunbartonshire Council area.

Figure 1.1 Map of AQMA Boundaries (if applicable)

There are no Air Quality Management Areas in the West Dunbartonshire Council area.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

West Dunbartonshire Council has two automatic monitoring stations and a light scattering PM₁₀ screening device which was installed at MacKenzie Drive, Balloch in September 2010.

The location of the two automatic monitors remains unchanged since the last Progress Report. During 2010 they were sited at the following locations (location maps for all three units are included as Appendices B, C and D)

1. Glasgow Road, Dumbarton (Dumbarton Roadside)

This unit, which contains a real time chemiluminescent NO_x analyser was moved to the A814 (Glasgow Road, Dumbarton at its junction with Leven Street) in April 2007. This unit was affiliated into the national network (AURN) during 2010 and has been subsequently re-designated Dumbarton Roadside.

2. West Dunbartonshire, Clydebank

This unit houses a similar real time NO_x analyser and a TEOM fitted with a Type C FDMS. This unit is located at Kilbowie Roundabout which is the busiest junction in the West Dunbartonshire Council area. This unit was located here in February 2007.

3. McKenzie Drive, Balloch

A light scattering device (Osiris) was installed towards the end of 2010 at this location to provide screening data for PM₁₀ levels. This was of interest because of a biomass boiler installed at an office development nearby.

Details of QA/QC procedures for the three automatic monitors are included as Appendix A in this report

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

See Appendices B, C and D

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?
Glasgow Road, Dumbarton (Dumbarton Roadside)	Roadside	X240238	Y675193	NO _x	Chemiluminescent analyser	N	Y*(2.5m)	5m	N
McKenzie Drive, Balloch	Urban background			PM ₁₀	Light scattering device	N	N	N/A	N
West Dunbartonshire, Clydebank	Roadside	X 249723	Y672044	NO _x PM ₁₀	Chemiluminescent analyser TEOM with FDMS Type C	N	N (18m)	25m	N

* this unit is located 5m back from kerb due to location difficulties. Nearest relevant exposure are residential properties set back 2.5 metres from kerb.

2.1.2 Non-Automatic Monitoring

West Dunbartonshire Council had 27 NO₂ diffusion tubes distributed throughout the Council area during 2010 (excluding co-located triplicates).

This number had been reduced from 35 at the end of 2009. The tubes which were removed were all from background locations or locations with no relevant exposure. A list of the removed tubes is included as Appendix E.

NO₂ tubes are supplied and analysed by Glasgow Scientific Services (GSS).

The tube preparation method used by GSS is 20% triethanolamine (TEA) in water.

The tubes are used in accordance with the report "Diffusion Tube for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users: Report to DEFRA and the Devolved Administrations: ED48673043: Issue 1a: February 2008.

Full QA/QC procedures for GSS are included in Appendix A. GSS participates in the Workplace Analysis Scheme for Proficiency (WASP) and received a "good" rating in both old and new criteria.

Bias Adjustment Factor and Co-location Exercise

All NO₂ diffusion tube results have been bias adjusted using a factor of 1.1 obtained from the Review and Assessment website (version 04/11)

A locally derived bias adjustment factor was determined using triplicate diffusion tube results co-located with the Glasgow Road, Dumbarton automatic NO_x analyser. The bias result from the spreadsheet on the R&A website was 1 however it was decided that the 1.1 factor would be applied to results in order to be as conservative as possible. A copy of the spreadsheet can be found as Appendix F.

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

See Appendices J, K and L.

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?
Clydebank 1	Roadside	X248479	Y671115	NO ₂	N	N	4m	Y
Clydebank 6	Kerbside	X249725	Y672069	NO ₂	N	N(40)	1m	Y
Dumbarton 1	Roadside	X240322	Y675177	NO ₂	N	N (2.5)	1m	Y
Dumbarton 11	Roadside	X240515	Y675078	NO ₂	N	N (4)	1m	Y
Balloch 1	Kerbside	X238584	Y681562	NO ₂	N	N	12m	
Alexandria 1	Kerbside	X239024	Y680206	NO ₂	N	N(5)	1m	Y
Briar Drive, Triplicate 1	Roadside	X249723	Y672044	NO ₂	N	N/A	25m	
Briar Drive, Triplicate 2	Roadside	X249723	Y672044	NO ₂	N	N/A	25m	
Briar Drive, Triplicate 3	Roadside	X249723	Y672044	NO ₂	N	N/A	25m	
Dumbarton, Triplicate 1	Roadside	X240238	X675193	NO ₂	N	N/A	5m	
Dumbarton, Triplicate 2	Roadside	X240238	X675193	NO ₂	N	N/A	5m	
Dumbarton, Triplicate 3	Roadside	X240238	X675193	NO ₂	N	N/A	5m	
Milton 1	Kerbside	X242266	Y674235	NO ₂	N	N (12)	1m	Y
Milton 2	Roadside	X242160	Y674299	NO ₂	N	N (2m)	12m	N
Glasgow Rd, Dumbarton 2	Roadside	X240178	Y675228	NO ₂	N	N (8)	1m	Y
Glasgow Rd, Dumbarton 3	Roadside	X240279	Y675196	NO ₂	N	N (4.5)	1m	Y
Glasgow Rd, Dumbarton 4	Roadside	X240425	Y675131	NO ₂	N	N (5)	1m	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?
Clydebank 7	Roadside	X249913	Y669865	NO ₂	N	N (4)	1m	Y
Clydebank 9	Kerbside	X248899	Y670784	NO ₂	N	N (3)	1m	Y
Clydebank 10	Kerbside	X249759	Y671845	NO ₂	N	N (8.5)	1m	Y
Clydebank 11	Roadside	X249801	Y672288	NO ₂	N	N (22)	1m	Y
Clydebank 12	Kerbside	X249747	Y671665	NO ₂	N	N (10)	1m	Y
Clydebank 13	Kerbside	X249762	Y671790	NO ₂	N	N (8.5)	1m	Y
Clydebank 14	Kerbside	X249872	Y671854	NO ₂	N	N (>25)	1m	N
Clydebank 15	Kerbside	X249746	Y671966	NO ₂	N	N (8.5)	1m	Y
Clydebank 16	Kerbside	X249967	Y672548	NO ₂	N	N (10)	1m	Y
Clydebank 17	Kerbside	X249987	Y672440	NO ₂	N	N (11)	1m	Y
Clydebank 18	Kerbside	X249972	Y672351	NO ₂	N	N (12)	1m	Y
Vale of Leven 1	Kerbside	X240115	Y677101	NO ₂	N	N (>25)	1m	Y
Vale of Leven 2	Kerbside	X240093	X677482	NO ₂	N	N (>25)	1m	Y
Vale of Leven 3	Roadside	X240115	X677146	NO ₂	N	N(>25)	4m	Y
Vale of Leven 4	Kerbside	X240164	Y677014	NO ₂	N	N (>25)	1m	Y
Dumbarton 12	Kerbside	X239410	Y675330	NO ₂	N	N (7)	1m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

West Dunbartonshire Council monitoring results have shown that there was no exceedence of the National Air Quality Objectives for NO₂ or PM₁₀ during 2010.

Eight NO₂ diffusion tubes have been removed from the network since 2009 as part of a cost cutting exercise. No new diffusion tube locations have been added to the network.

Nitrogen Dioxide

Automatic Monitoring Data

West Dunbartonshire Council has two automatic NO_x monitoring stations. During 2010 they were located as detailed below. Neither station breached the National Air Quality Objective for NO₂. Location maps for each unit are included in the Appendices B and C.

1. Glasgow Road, Dumbarton

This unit contains a real time chemiluminescent NO_x analyser and was moved to the A814 (Glasgow Rd, Dumbarton at its junction with Leven Street) in April 2007. The unit was moved here to provide real time data following an apparent breach (diffusion tube results) of the NO₂ National Air Quality Objective at the site in 2006. The unit is located 5metres from the kerbside. This unit was affiliated into the national network (AURN) during 2010 and has been re-designated Dumbarton Roadside.

The ratified data from AEA indicates that the annual average NO₂ level for 2010 was 27µg/m³. There were no exceedences of the hourly mean objective during 2010. The nearest receptors are residential properties located 2.5m from the roadside. The NO₂ Distance Calculator on the R&A web site was used to predict the NO₂ levels at the nearest receptors which are 2.5 metres closer to the roadside than the automatic monitor. The calculator predicted NO₂ levels at the façade of the nearest residential property of 30.5µg/m³.

2. West Dunbartonshire, Clydebank (Kilbowie Roundabout)

This unit houses a real time chemiluminescent NO_x analyser and a TEOM. It has been located there since February 2007. Kilbowie Roundabout is the busiest junction within the West Dunbartonshire Council area. The unit is located approximately 25 metres from the roundabout. The ratified data from AEA indicates that the annual average NO₂ level for 2010 was 26µg/m³. There were no exceedences of the hourly mean objective during 2010. The nearest receptors are residential properties located just over 40 metres from the roundabout.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations (µg/m ³)		
						2008 ^{c, d}	2009 ^{c, d}	2010 ^c
West Dunbartonshire, Clydebank	Briar Dr, Clydebank (Kilbowie Roundabout)	N	N	93	93	24	26	26
Glasgow Rd, Dumbarton	Glasgow Rd, Dumbarton	N	N	92	92	19	23	27

Data capture for West Dunbartonshire, Clydebank 2008 – 96.6%
Data capture for West Dunbartonshire, Clydebank 2009 – 98.7%
Data capture for Glasgow Road 2008 – 99.3%
Date capture for Glasgow Road 2009 – 98.2%

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

We have only four years worth of data from our automatic sites. The graph below indicates a general upward trend in NO₂ levels recorded at both sites. This trend is echoed in diffusion tube results.

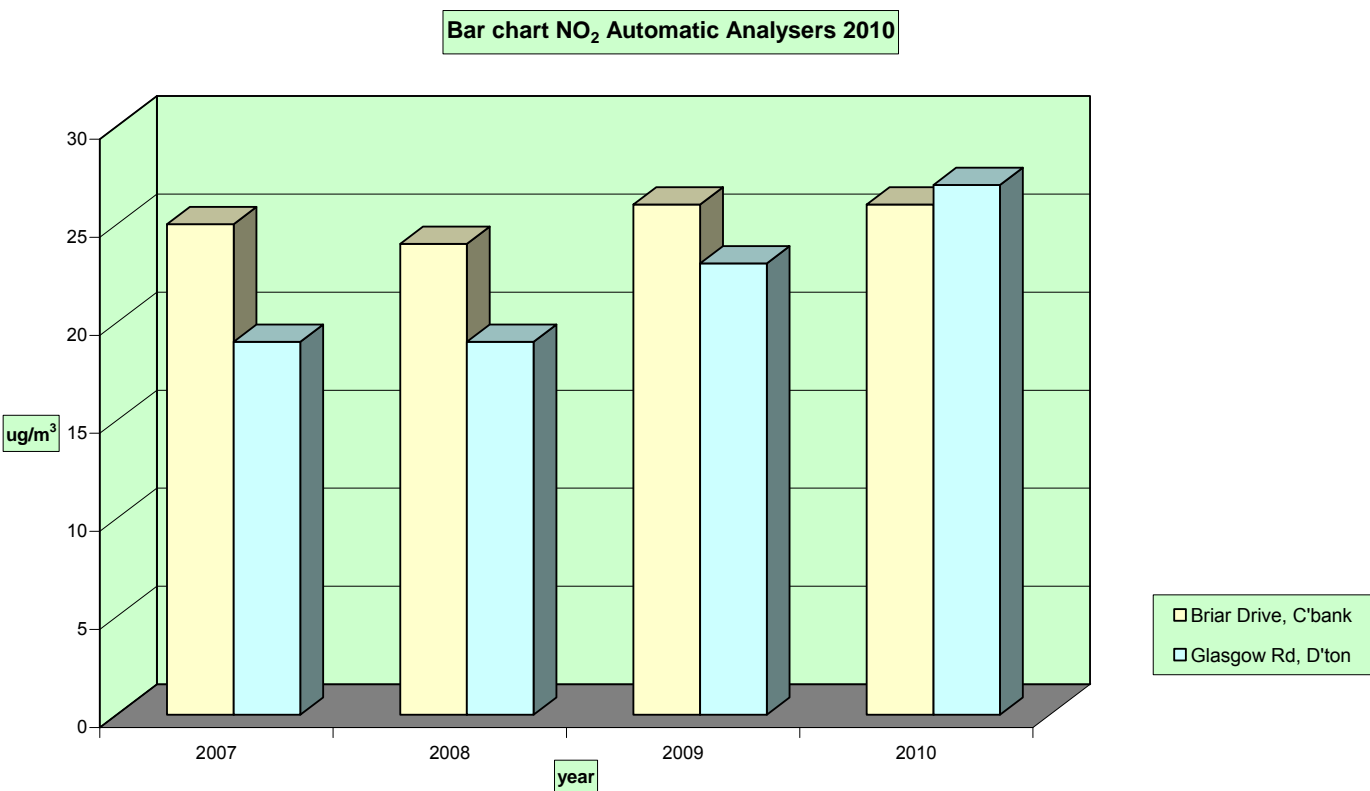


Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Number of Exceedences of hourly mean (200 µg/m ³) If the period of valid data is less than 90% of a full year, include the 99.8 th percentile of hourly means in brackets.		
						2008 ^c	2009 ^c	2010
West Dunbartonshire, Clydebank	Briar Dr, Clydebank (Kilbowie Roundabout)	N	N	93	93	0	0	0
Glasgow Rd, Dumbarton	Glasgow Rd Dumbarton.	N	N	92	92	0	0	0

Diffusion Tube Monitoring Data

West Dunbartonshire Council monitored NO₂ at 27 locations (excluding co-located triplicates) throughout the Council area during 2010 using NO₂ diffusion tubes.

All results have been bias adjusted using a factor of 1.1 based on information from the Review and Assessment website (Version 04/11).

Five of the monitored locations were found to exceed or approach exceedence of the National Air Quality Objective for NO₂ and are discussed below.

Diffusion tubes exceeding the National Air Quality Objective.

1. Clydebank 6 – bias adjusted annual average of 43.1µg/m³.

This tube is located on a lamppost on Kilbowie Roundabout - the busiest junction in the West Dunbartonshire Council area. Prior to 2009 this location has never breached the National Air Quality Objective although it was highlighted as approaching a breach in our 2009 Update and Screening Assessment. An automatic monitor designated Glasgow Road, Clydebank is located approximately 25 metres back from the roundabout. The ratified data from AEA for Glasgow Road, Clydebank indicates an annual average of 26µg/m³ with no exceedences of the hourly mean. The nearest receptors at this location are residences located 40 metres from the roundabout. The NO₂ Distance Calculator from the R&A web site was used to predict NO₂ levels at residences based on the results of Clydebank 6 diffusion tube. The calculator predicted the NO₂ level at the residences to be 18.6µg/m³.

For interest the distance calculation was also applied to the West Dunbartonshire, Clydebank automatic monitor result of 26µg/m³. The calculator predicted the NO₂ at the residences in this case to be 21.7µg/m³. Both results are within the National Air Quality Objective for NO₂. There is therefore no need to proceed to Detailed Assessment in this location.

2. Milton 1 – bias adjusted annual average of 54.3µg/m³.

This tube is located at the Dumbuck traffic light junction on the A82. The A82 is the main trunk road access to the West of Scotland and is the busiest road within the Council area. It is not possible to locate an automatic monitor at the location as there is no suitable site.

However as the nearest receptors are residential properties, located approximately 12 metres back from the kerb, it was decided to locate an additional diffusion tube in the front garden approximately 5 metres from the front façade of one of the houses to gain data of NO₂ levels at the residences. The tube, designated Milton 2, has been at this site since 2008. The 2010 bias adjusted annual mean for Milton 2 was 24.5µg/m³. Additionally the NO₂ Distance Calculator from the Air Quality Archive web site was used to predict NO₂ levels at the residences based on the results of Milton 1 diffusion tube. The calculator predicted the NO₂ levels at the residences to be 31.4µg/m³ which although higher than the Milton 2 diffusion tube results remains within the National Air Quality Objective for NO₂. There is therefore no need to proceed to Detailed Assessment in this location

3. Glasgow Road, Dumbarton 3 - annualised bias adjusted average of 42µg/m³.

This tube is located on a lamppost at the kerb outside 77 Glasgow Road, Dumbarton (A814). The nearest receptors are residences located 4.5 metres back from the kerb. The NO₂ Distance Calculator from the Air Quality Archive web site was used to predict NO₂ levels at residences based on the results of this diffusion tube. The calculator predicted the NO₂ level at the residences to be 36µg/m³. There is therefore no need to proceed to Detailed Assessment in this location

4. Clydebank 10 – annualised bias adjusted average of 39.3µg/m³.

This tube is located on a lamppost on the kerb outside 455 Kilbowie Road, Clydebank. The nearest receptors are residences located 8.5 metres back from the kerbside. The NO₂ Distance Calculator from the Air Quality Archive web site was used to predict NO₂ levels at residences based on the results of this diffusion tube. The calculator predicted the NO₂ level at the residences to be 28.2µg/m³. There is therefore no need to proceed to Detailed Assessment in this location

5. Clydebank 13 – annualised bias adjusted average of 40.8µg/m³.

This tube is located on a lamppost on the kerb outside 437 Kilbowie Road, Clydebank. The nearest receptors are residences located 9 metres back from the kerbside. The NO₂ Distance Calculator from the Air Quality Archive web site was used to predict NO₂ levels at residences based on the results of this diffusion tube. The calculator predicted the NO₂ level at the residences to be 29.1µg/m³. There is therefore no need to proceed to Detailed Assessment in this location.

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA ?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations (µg/m ³)		
						2008 ^{c, d}	2009 ^{c,d}	2010 ^{c***}
Clydebank 1	Drain pipe on front door. Dalmuir Park H.A. 631 Dumbarton Rd Dalmuir	N	N	83	83	33	38	32.3
Clydebank 6	Lamp-post outside Briar Drive, Clydebank	N	N	75	75	38	42	43.1
Dumbarton 1	Lamp-post outside 62 Glasgow Rd, Dumbarton	N	N	75	75	33	32	36.1
Dumbarton 11	Lamp-post, 151 Glasgow Road, Dumbarton	N	N	83	83	37	35	36.2
Milton 1	Lamp-post on A82 At Dumbuck lights, Milton	N	N	83	83	63	60	54.3
Milton 2	Fencing at Cruachan bungalow Dumbuck, Milton	N	Y	83	83	24	30	24.5
Glasgow Rd Dumbarton 2	Lamp-post outside 55 Glasgow Road, Dumbarton	N	N	58	58	35	35.9*	35.2*
Glasgow Rd Dumbarton 3	Post outside 77 Glasgow Road, Dumbarton	N	N	50	50	35	39	42*

Site ID	Location	Within AQMA ?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations (µg/m ³)		
						2008	2009	2010
Glasgow Rd Dumbarton 4	Post outside 177 Glasgow Road, Dumbarton	N	N	75	75	36	39	31.9
Clydebank 7	Post – Corner of Argyll St/Glasgow Rd, Clydebank	N	N	83	83	N/A	28	37.2
Clydebank 9	Post – along from 404 Dumbarton Rd Clydebank	N	N	75	75	N/A	29.4*	26.9
Clydebank 10	Post – outside 455 Kilbowie Road, Clydebank	N	N	58	58	N/A	34	39.3*
Clydebank 11	South end Road, In front of firemen's Houses	N	N	83	83	N/A	27	28.2
Clydebank 12	corner of 425 Kilbowie Rd & Hawthorn Street, C'Bank	N	N	83	83	N/A	34	30.3
Clydebank 13	Post at 437 Kilbowie Road, Clydebank	N	N	66	66	N/A	40.8*	40.8
Clydebank 14	Post at 2 Morar Drive, Clydebank	N	N	83	83	N/A	38	19.3
Clydebank 15	Post outside 489 Kilbowie Road, Clydebank	N	N	83	83	N/A	34	30
Clydebank 16	Post – Kilbowie Rd Across from 1 Gavins Rd, C'bank	N	N	83	83	N/A	31	26.2

Site ID	Location	Within AQMA ?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations (µg/m ³)		
						2008	2009	2010
Clydebank 17	Post – Kilbowie Rd Across from 12 Gavins Rd, C'bank	N	N	83	83	N/A	29	27.9
Clydebank 18	Post – Kilbowie Rd Across from 19 Gavins Rd, C'bank	N	N	83	83	N/A	30	28.1
Dumbarton 12	Post – High Street D'ton, next to Church	N	Y	83	83	N/A	25	25.2
Vale of Leven 1	On Stirling Road, A813 Dumbarton	N	N	66	66	N/A	30	36.1*
Vale of Leven 2	On Stirling Road, A813 Dumbarton	N	N	58	58	N/A	33	23.1*
Vale of Leven 3	On Stirling Road, A813 Dumbarton	N	N	83	83	N/A	32	26.3
Vale of Leven 4	On Stirling Road, A813 Dumbarton	N	N	66	66	N/A	32	23.0*
Briar Drive Triplicate 1	On Briar Drive air Quality unit	N	N/A	83	83	25	27	27.6
Briar Drive Triplicate 2	On Briar Drive air Quality unit	N	N/A	83	83	23	28	26.4
Briar Drive Triplicate 3	On Briar Drive air Quality unit	N	N/A	83	83	24	29	29.4
Dumbarton Triplicate 1	On Glasgow Road Air quality unit	N	N/A	83	83	22	23	27.0
Dumbarton Triplicate 2	On Glasgow Road Air quality unit	N	N/A	83	83	22	23	25.5
Dumbarton Triplicate 3	On Glasgow Road Air quality unit	N	N/A	83	83	22	25	25.6

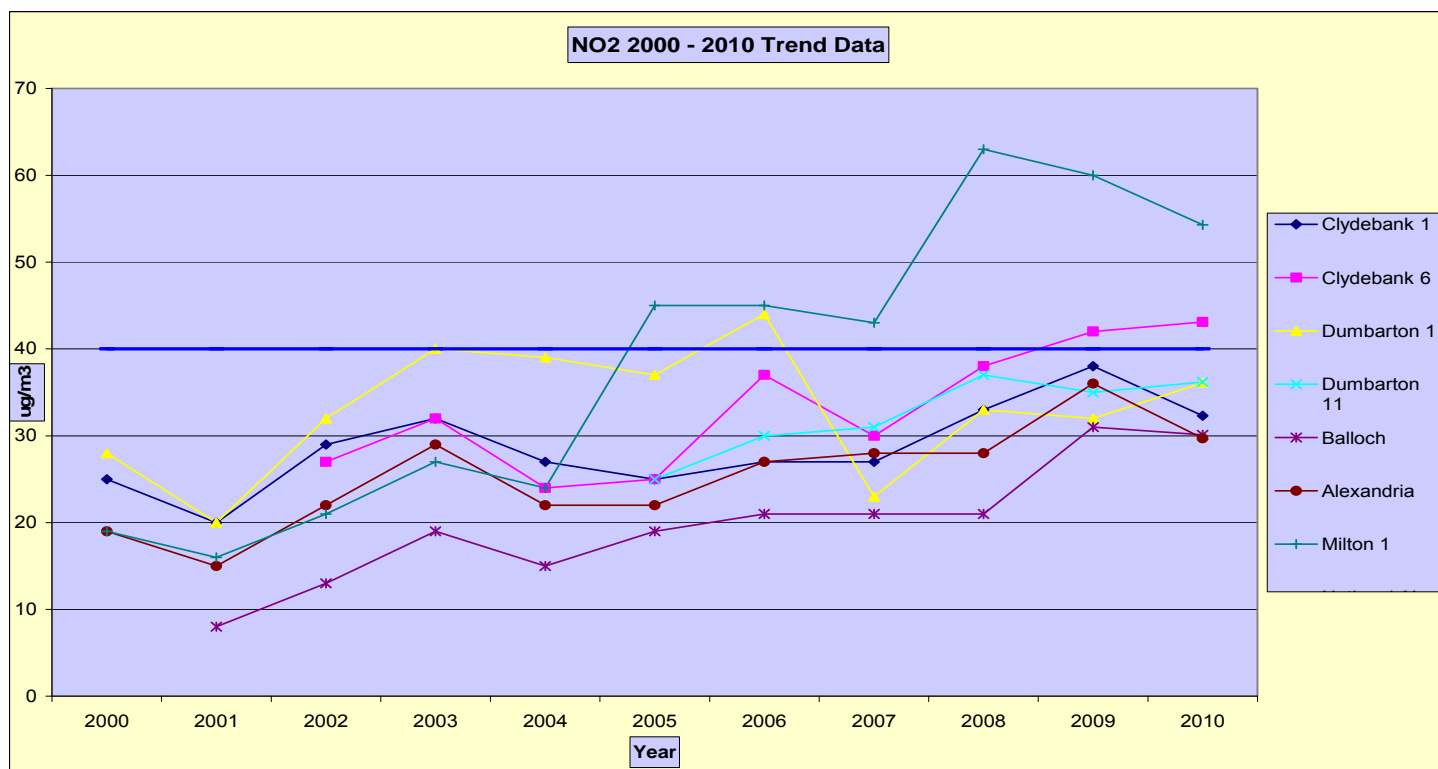
Site ID	Location	Within AQMA ?	Relevant public exposure? Y/N	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations (µg/m ³)		
						2008	2009	2010
Balloch 1		N	N	75	75	20.6	31	30.1
Alexandria 1	Fountain, Bank St, Alexandria	N	N	83	83	28	36	29.7

* denotes tube where the data have been annualised.

Exceedences or approaching exceedence are highlighted in bold

2008 bias - 0.97
2009 bias – 1.23

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.



Following the reduction in the number of NO₂ diffusion tube monitoring locations we only have seven tubes which have been on site for a significantly long enough time to indicate trends in NO₂ levels.

It appears that NO₂ levels over the last ten years in the West Dunbartonshire Council area continue to increase. We have no sources of NO₂ within the Council area which would account for this increase other than road traffic.

2.2.1 PM₁₀

West Dunbartonshire Council has one TEOM fitted with a Type C FDMS designated West Dunbartonshire, Clydebank. This is in very close proximity to Kilbowie Roundabout which is the busiest junction in the Council area.

The TEOM unit is located 25 metres back from the roundabout. The nearest relevant receptors are residences located just over 40 metres from the roundabout some 15 metres further back from the location of the automatic monitor.

The ratified data from AEA has shown that annual average for this location for 2010 was 18µg/m³.

Advice sought from the R&A Helpdesk has been that as a Type C FDMS is not equivalent there is no published correction factor which can be applied to the data. This data has therefore not undergone any correction. Although the recorded level of PM10 at this location has hit the annual level, PM10 levels tend to fall off rapidly, on average, with increasing distance from the road, although on individual days the rate of fall off depends on the wind direction and speed. Zhu et al. (2009) found that PM concentrations returned to background concentrations within 100m of a road, with the smaller fraction (PM2.5) decaying faster than coarse fractions. The Air Quality Expert Group (AQEG) in the UK, on the other hand, reported monitoring data which showed that beyond 20-50 m from the edge of the road, concentrations are essentially indistinguishable from local background, taking account of the measurement uncertainty and the normally high background contribution to measured roadside concentrations (AQEG)

West Dunbartonshire Council was aware that the amount of traffic passing through this junction may have increased since the road tolls were removed from the A898 Erskine Bridge. A STAG report was initially commissioned by West Dunbartonshire Council in partnership with Strathclyde Passenger Transport our Regional Transport Partner in 2008 and undertaken by MVA consultancy. The purpose of the report was to assess the traffic usage and patterns on and around the Kilbowie Roundabout with a view to improving efficiency and journey times for all users but specifically public transport users. The appraisal was carried out in accordance with the Scottish Government's Scottish Transport Appraisal Guidance (STAG). This approach requires a systematic approach to problem identification, option identification, option sifting and eventually detailed option assessment and development. This then leads to a single preferred solution (or package of measures) which have been fully developed into a robust business case for future implementation once funding permits.

The 2008 STAG appraisal identified numerous options and a STAG Part 2 report was commissioned and was provided in draft format to West Dunbartonshire Council on 23 March 2011. The recommendations for a short term solution to the road traffic issues are currently under consideration with a preferred option having been identified. Due to the very recent issue of this draft report no decisions have yet been reached regarding the way forward with this junction. However the need to improve traffic flow through this junction has been recognised by West Dunbartonshire

Council. An update on this process will be included in next years Update and Screening Assessment.

In September 2010 a light scattering device (Osiris) was located at McKenzie Drive, Balloch. The device was placed here to monitor what effect, if any, a biomass boiler at the Loch Lomond and Trossachs National Park Authority headquarters building in Carrochan Road, Balloch was having on local air quality. The nearest receptors to the building are residences approximately 100metres away. The Osiris was located on a pole a few metres from the houses. A location map is included as Appendix D

The biomass boiler, a Froeling Turbomatic 110kW, was installed in the building in 2008. The unit was included in the approved appliance legislation in 2008. It was assessed in accordance with guidance (TG (09)) in our 2009 Update and Screening Assessment. It was concluded in that assessment that there was no need to proceed to detailed assessment however it was decided to install the Osiris to assess the effects of the boiler.

The annualised average for the Osiris was $12.1\mu\text{g}/\text{m}^3$. The data was “annualised” using the methodology detailed in Box 3.2 of guidance (TG (09)). See Appendix A for annualisation details. This annualised figure was multiplied by 1.3 and 1.14 correction factors again as dictated by guidance TG (09). The corrected results are $15.7\mu\text{g}/\text{m}^3$ and $13.8\mu\text{g}/\text{m}^3$ respectively. Both results are within the National Air Quality Objective for PM_{10} .

Table 2.5a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture for full calendar year 2010 ^b %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
					2008 ^{c, d}	2009 ^{c, d}	2010 ^c
West Dunbartons C'bank	Briar Dr, Clydebank (Kilbowie Roundabout)	N	92	92	13.2	17	18
McKenzie Drive, Balloch	McKenzie Dr Balloch	N	93	33	N/A	N/A	13.8/15.7*

*Annualised data multiplied by 1.14 and 1.3 factors as per TG (09)

Table 2.5b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period ^a %	Data Capture 2010 ^b %	Number of Exceedences of daily mean objective (50 µg/m ³) If data capture < 90%, include the 98 th percentile (in Scotland) of daily means in brackets.		
					2008 ^c	2009 ^c	2010 ^c
West Dunbartonshire C'bank	Briar Dr, Clydebank (Kilbo Roundabout)	N	92	92	0	3	3
Balloch	McKenzie Drive, Balloch	N	93	33	-	-	0 (0)

Figure 2.5 Trends in Annual Mean PM₁₀.

We have less than five years worth of data for PM₁₀ therefore a trend chart has not been included.

2.2.2 Sulphur Dioxide

Sulphur dioxide is not monitored in the West Dunbartonshire Council area.

2.2.3 Benzene

Benzene is not monitored in the West Dunbartonshire Council area.

2.2.4 Other pollutants monitored

West Dunbartonshire Council is not currently monitoring any other pollutants.

2.2.5 Summary of Compliance with AQS Objectives

West Dunbartonshire Council has examined the results from monitoring in the Council area. Concentrations are all on or below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

There are no new/newly identified road traffic sources in the West Dunbartonshire Council area.

3.2 Other Transport Sources

There are no new/newly identified non-road traffic sources in the West Dunbartonshire Council area.

3.3 Industrial Sources

There are no new/newly identified industrial sources in the West Dunbartonshire Council area.

3.4 Commercial and Domestic Sources

There are no new/newly identified commercial and domestic sources in the West Dunbartonshire Council area.

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new/newly identified uncontrolled sources in the West Dunbartonshire Council area.

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

West Dunbartonshire Council confirms that all the following have been considered –

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

In 2004 an in-house working group was set up to allow officers from different West Dunbartonshire Council services to come together and discuss what actions were already being taken which had a positive effect on local air quality. The group also discussed additional actions West Dunbartonshire Council, local businesses and residents could take which would have a positive impact on local air quality. The purpose of the working group was to produce a Local Air Quality Strategy as recommended within LAQM Policy Guidance (LAQM.PG (03) and LAQM.PG(S) (03)).

The strategy was put out for consultation in October 2004. A copy of the consultative document was forwarded to all community groups perceived to have an interest in local air quality. The draft strategy was also published on the West Dunbartonshire Council web site and comments were invited.

The finalised strategy was approved by Councillors in May 2005 and published in June the same year. An abridged version of the strategy was prepared as it was considered that the public would be more likely to read a condensed format. Both formats were distributed to all local libraries and Council buildings. The full format is available on our web site.

West Dunbartonshire Council is committed to improving air quality within the area and the Environmental Health section will be reviewing the Air Quality Strategy in 2011/12 as detailed within the Environmental Health Operational Plan for 2011/12.

As part of our Corporate Plan to create a better environment and promote health and well-being West Dunbartonshire Council has two air quality publicity campaigns running:

The general campaign "If you breathe you're involved" and a campaign directed at vehicles and their drivers "Idling Gets You Nowhere"

The "If you breathe you're involved" campaign is aimed at forging partnerships with local businesses, industry, residents of West Dunbartonshire Council and most particularly local schools to encourage sustainable improvements in the local air quality.

The "Idling Gets You Nowhere" campaign urges local drivers to help improve local air quality by switching off their engine when parked and where possible leave their car at home and either use public transport or walk/cycle to their destination.

During 2010 more that 150 signs were placed on lampposts outside schools, stations, taxi ranks etc advising car drivers of the possible financial penalty they could pay if they fail to switch of their engine while parked.

West Dunbartonshire Council work in partnership with East Dunbartonshire Council, Glasgow City Council, Renfrewshire Council, South Lanarkshire Council and North Lanarkshire Council to raise awareness regarding air quality specifically in relation to idling engines. Adverts on national television, newspapers adverts, billboards and radio adverts have all be utilised to raise the profile of air quality. This is also a first class example of partnership working.

Vehicle Emissions Testing

In September 2005 the Council elected to adopt the provisions of the Road Traffic (Vehicle Emissions) (Fixed Penalty) (Scotland) Regulations 2003 and were duly authorised by the Scottish Executive on 29 March 2006.

Roadside vehicle emission testing days are undertaken in partnership with staff from Glasgow City Council and Strathclyde Police.

In partnership with Strathclyde Police, Officers regularly visit taxi ranks and bus termini to ensure that waiting vehicles are switching off their engines. To date it has not been necessary to issue any Fixed Penalty Notices as all drivers have co-operated with our requests to switch off their engines.

5 Planning Applications

No planning applications which would adversely affect local air quality were approved in the West Dunbartonshire Council area during 2010

6 Air Quality Planning Policies

West Dunbartonshire Council does not have an air quality planning policy.

7 Local Transport Plans and Strategies

West Dunbartonshire Councils current Local Transport Strategy ran from 2007 to 2010. The Councils Roads Department advise that there will be a review of the document during 2011.

The following is an extract from West Dunbartonshire Councils current Local Transport Strategy which particularly refers to local air quality.

The current document can be viewed at West Dunbartonshire Councils website - <http://www.west-dunbarton.gov.uk/transport-and-streets/local-transport-strategy/?locale=en>

LTP103 – The Council will continue to monitor and work to meet statutory air quality requirements as appropriate.

LTP104 – Improve air quality by reducing the impact of transport through the promotion of more sustainable travel, minimising long term congestion at sensitive locations and promoting improved technology in vehicles and fuel.

The following are actions which will be undertaken by the council to monitor and improve local air quality

LTA126 – Assessment to be made of transport-related new developments to ensure that air quality continues to meet or exceed air quality objectives for Scotland.

LTA127 – The council will operate their continuous equipment in the areas which are most likely to be closest to breaching the 2010 objective for PM₁₀.

8 Climate Change Strategies

West Dunbartonshire Council signed up to Scotland's Climate Change Declaration in January 2007. The Declaration is a public statement wherein local authorities acknowledge the reality and implications of climate change and their responsibility to respond effectively. The Declaration also welcomes the actions of the UK and Scottish governments and the opportunities for local authorities to work in partnership with others in responding to climate change.

As signatories to Scotland's Climate Change Declaration, each Scottish local authority is committed to taking action across a range of key areas. These can be summarised as:

1. Providing effective leadership, governance and management on climate change.
2. Reducing the local authority's own direct greenhouse gas emissions from their estate and services.
3. Taking action to reduce emissions from the local authority area
4. Assessing the risks of climate change impacts and working with others to adapt to the impacts of climate change.
5. Developing effective partnership working and climate change communications, including producing an annual statement of plans, activities and achievements.

West Dunbartonshire Council produces an annual report on progress towards meeting these commitments.

Carbon Management Plan

West Dunbartonshire Council has produced a Carbon Management Plan. This Plan investigates opportunities and practical measures to reduce the Council's carbon emissions. As part of the development of the Plan, a target was set to reduce emission by one third (from a 2006 baseline) by 2014/15. Implementation of the Plan will enable the Council to achieve some of the commitments set out in the Climate Change Declaration and work towards the Scottish Government Climate Change Act targets. The Plan features projects to reduce energy consumption, reduce fuel consumption, and minimise waste production.

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Monitoring during 2010 within the West Dunbartonshire Council area has not identified any exceedences of the National Air Quality Objectives.

The National Air Quality Objective for PM₁₀ in Scotland of 18µg/m³ has been reached at the West Dunbartonshire, Clydebank automatic monitor. This is the busiest junction within the Council area however the unit is located 25 metres from the roundabout and the nearest receptor is located 40 metres from the roundabout. The PM₁₀ level at this location has steadily increased since it was first reported on in our 2008 Progress Report from 13.2µg/m³.

Advice sought from the R&A Helpdesk has been that as a Type C FDMS is not equivalent there is no published correction factor which can be applied to the data. This data has therefore not undergone any correction. Although the recorded level of PM₁₀ at this location has hit the annual level, PM₁₀ levels tend to fall off rapidly, on average, with increasing distance from the road, although on individual days the rate of fall off depends on the wind direction and speed. Zhu et al. (2009) found that PM concentrations returned to background concentrations within 100m of a road, with the smaller fraction (PM_{2.5}) decaying faster than coarse fractions. The Air Quality Expert Group (AQEG) in the UK, on the other hand, reported monitoring data which showed that beyond 20-50 m from the edge of the road, concentrations are essentially indistinguishable from local background, taking account of the measurement uncertainty and the normally high background contribution to measured roadside concentrations (AQEG)

West Dunbartonshire Council was aware that the amount of traffic passing through this junction may have increased since the road tolls were removed from the A898 Erskine Bridge. A STAG report was initially commissioned by West Dunbartonshire Council in partnership with Strathclyde Passenger Transport our Regional Transport Partner in 2008 and undertaken by MVA consultancy. The purpose of the report was to assess the traffic usage and patterns on and around the Kilbowie Roundabout with a view to improving efficiency and journey times for all users but specifically public transport users. The appraisal was carried out in accordance with the Scottish Government's Scottish Transport Appraisal Guidance (STAG). This approach requires a systematic approach to problem identification, option identification, option sifting and eventually detailed option assessment and development. This then leads to a single preferred solution (or package of measures) which have been fully developed into a robust business case for future implementation once funding permits.

The 2008 STAG appraisal identified numerous options and a STAG Part 2 report was commissioned and was provided in draft format to West Dunbartonshire Council on 23 March 2011. The recommendations for a short term solution to the road traffic

issues are currently under consideration with a preferred option having been identified. Due to the very recent issue of this draft report no decisions have yet been reached regarding the way forward with this junction. However the need to improve traffic flow through this junction has been recognised by West Dunbartonshire Council. An update on this process will be included in next years Update and Screening Assessment.

9.2 Conclusions relating to New Local Developments

West Dunbartonshire Council has not identified any new local developments that will require more detailed consideration in the next Update and Screening Assessment.

9.3 Proposed Actions

Monitoring local air quality throughout 2010 has shown that there have been no breaches of National Air Quality Objectives for NO₂ or PM₁₀ where members of the public might be regularly exposed. There is therefore no need to proceed to Detailed Assessment.

West Dunbartonshire Council will submit an Update and Screening Assessment in 2012.

10 References

- Local Air Quality Management Technical Guidance (TG09)
- The Environment Act 1995
- The Air Quality (Scotland) Regulations 2000
- The Air Quality (Scotland) (Amendment) Regulations 2002
- West Dunbartonshire Council Local Transport Strategy 2007 -2010
- West Dunbartonshire Council Carbon Management Plan
- West Dunbartonshire Council Air Quality Progress Report 2010
- West Dunbartonshire Council Update and Screening Assessment 2009
- West Dunbartonshire Council Air Quality Progress Report 2008
- West Dunbartonshire Council Air Quality Progress Report 2007
- West Dunbartonshire Council Update and Screening Assessment 2006
- West Dunbartonshire Council Air Quality Progress Report 2005
- West Dunbartonshire Council Air Quality Progress Report 2004

Appendices

Appendix A: QA/QC Data

Appendix B: Location map showing West Dunbartonshire, Clydebank automatic monitoring station

Appendix C: Location map showing Glasgow Road, Dumbarton (now Dumbarton Roadside) automatic monitoring station

Appendix D: Location map showing light scattering device at Mackenzie Drive, Balloch

Appendix E: NO₂ diffusion tubes removed from network

Appendix F: Completed bias spreadsheet used to derive local bias

Appendix G: AEA Pollution Report for Glasgow Road, Dumbarton/ Dumbarton Roadside

Appendix H: AEA Pollution Report for West Dunbartonshire, Clydebank

Appendix I: 2010 Monthly diffusion tube results

Appendix J: Clydebank NO₂ diffusion tube monitoring locations

Appendix K: Vale of Leven NO₂ diffusion tube monitoring locations

Appendix L: Dumbarton NO₂ diffusion tube monitoring locations

Appendix M: Key for NO₂ diffusion tube monitoring locations

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

West Dunbartonshire Council use Glasgow Scientific Services (GSS) for NO₂ tube analysis. Tubes are provided and analysed by GSS.

The NO₂ tube preparation method used is 20% triethanolamine (TEA) in water.

A bias adjustment figure of 1.1 for GSS in 2010 has been applied to all NO₂ results. This bias figure was obtained from the Review and Assessment website spreadsheet (version 04/11)

Factor from Local Co-location Studies (if available)

A local bias adjustment figure based on nine months worth of data from the real-time chemiluminescent NO_x analyser located in Glasgow Road, Dumbarton and the triplicate co-located NO₂ diffusion tubes was derived using the spreadsheet on the R&A website. It was submitted to the R&A email address on the form.

The Glasgow Road, Dumbarton automatic monitor is part of the Automatic Urban and Rural Network (AURN) and as such is subject to the highest QA/QC procedures (see below for details). While diffusion tube results were only available for nine months due to double exposure of tubes during December and January the nine months available demonstrated good precision.

A copy of the completed co-location spreadsheet is included as Appendix F

The locally derived bias adjustment factor for 2010 was 1.0. However in order to be as conservative as possible the bias adjustment factor of 1.1 from the R&A website has been applied to all 2010 NO₂ tube results.

Discussion of Choice of Factor to Use

As stated above in order to be as conservative as possible a bias adjustment factor of 1.1 (obtained from the R&A website – version 04/11) has been applied to NO₂ diffusion tube results.

PM Monitoring Adjustment

Advice sought from the R&A Helpdesk has been that a Type C FDMS is not equivalent and there is no published correction factor which can be applied to the data. This data has therefore not undergone any correction.

The data from the Osiris light scattering device has been corrected by factors of 1.3 and 1.14 as laid down in guidance TG (09).

Short-term to Long-term Data adjustment

Results from seven NO₂ diffusion tubes and one light scattering device required to be annualised.

Nitrogen Dioxide

Clydebank 10. Estimated annual mean* = $34 \times 1.05 = 35.7 \mu\text{g}/\text{m}^3$

Period Mean dates 7/1/10 - 1/4/10, 24/4/10 – 29/6/10, 4/8/10 – 30/9/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	8.4	1.03
Edinburgh St Leonards	Urban background	31	33.5	0.92
Eskdalemuir	Rural	3	2.8	1.07
Grangemouth	Urban Ind.	19	16	1.18
			Average	1.05

Glasgow Road, Dumbarton 2. Estimated annual mean* = $36 \times 0.89 = 32.04 \mu\text{g}/\text{m}^3$

Period mean dates – 7/1/10 – 4/2/10, 2/3/10 – 1/4/10, 3/6/10 – 1/11/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	9.9	0.87
Edinburgh St Leonards	Urban background	31	31.7	0.97
Eskdalemuir	Rural	3	3.8	0.79
Grangemouth	Urban Ind.	19	19.9	0.95
			Average	0.89

Glasgow Road, Dumbarton 3. Estimated annual mean* = $35.4 \times 1.08 = 38.2 \mu\text{g}/\text{m}^3$

Period mean dates – 7/1/10 – 1/4/10, 29/6/10 – 4/8/10, 1/9/10 – 1/11/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	7.8	1.1
Edinburgh St Leonards	Urban background	31	33.3	0.93
Eskdalemuir	Rural	3	2.8	1.07
Grangemouth	Urban Ind.	19	15.2	1.25
			Average	1.08

Clydebank 13. Estimated annual mean* = $30.4 \times 1.22 = 37.1 \mu\text{g}/\text{m}^3$

Period mean dates – 7/1/10 – 3/6/10, 29/6/10 – 1/9/10, 30/9/10 – 1/11/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	6.9	1.26
Edinburgh St Leonards	Urban background	31	27.2	1.13
Eskdalemuir	Rural	3	2.5	1.2
Grangemouth	Urban Ind.	19	14.4	1.3
			Average	1.22

Vale of Leven 1. Estimated annual mean* $24 \times 1.365 = 32.76 \mu\text{g}/\text{m}^3$

Period mean dates – 2/3/10 – 1/11/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	6.2	1.4
Edinburgh St Leonards	Urban background	31	24.4	1.2
Eskdalemuir	Rural	3	2.2	1.36
Grangemouth	Urban Ind.	19	12.5	1.5
			Average	1.365

Vale of Leven 2. Estimated annual mean* $32.1 \times 0.91 = 21.02 \mu\text{g}/\text{m}^3$

Period mean dates – 7/1/10 – 2/3/10, 1/4/10 – 1/9/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	10.5	0.8
Edinburgh St Leonards	Urban background	31	30.1	1.02
Eskdalemuir	Rural	3	3.5	0.86
Grangemouth	Urban Ind.	19	19.75	0.96
			Average	0.91

Vale of Leven 4. Estimated annual mean* $23.7 \times 0.88 = 20.86 \mu\text{g}/\text{m}^3$

Period mean dates – 4/2/10 – 2/3/10, 1/4/10 – 1/11/10

Site	Site Type	Annual Mean	Period Mean	Ratio
Bush Estate	Rural	8.7	11.7	0.74
Edinburgh St Leonards	Urban background	31	31.45	0.98
Eskdalemuir	Rural	3	3.35	0.89
Grangemouth	Urban Ind.	19	20.7	0.9
			Average	0.88

PM₁₀**McKenzie Drive, Balloch. Estimated annual mean** $12.2 \times 0.99 = 12.1 \mu\text{g}/\text{m}^3$**

Site	Site Type	Annual Mean	Period Mean	Ratio
Aberdeen	Urban background	13	11.5	1.13
Glasgow Centre	Urban Centre	29	30.8	0.94
Grangemouth	Urban Ind	14	15.3	0.91
Edinburgh St Leonards	Urban background	14	14.1	0.99
			Average	0.99

*No bias adjustment carried out.

** No correction factor applied

QA/QC of automatic monitoring

Data from West Dunbartonshire Council automatic monitors is downloaded daily by AEA. The data is screened, scaled and ratified by AEA and a comprehensive report is provided.

Additionally AEA carry out an audit of all automatic monitors twice yearly. The Glasgow Road, Dumbarton and the West Dunbartonshire, Clydebank have a comprehensive service contract and are serviced by Horiba at 6 monthly intervals. West Dunbartonshire Council staff change filters and carry out manual calibration of the NO_x analysers on a fortnightly basis. The calibration data is forwarded to AEA for QA/QC purposes. The NO_x units also carry out automatic calibration every three days.

The TEOM head is dismantled and cleaned every four weeks by West Dunbartonshire Council staff.

The units are remotely checked by West Dunbartonshire Council staff each working day to ensure that data capture is optimal.

The Osiris light scattering device has a full service and maintenance contract with its manufacturer. Data from the unit is downloaded weekly and is screened by West Dunbartonshire Council staff. Only the most spurious data is removed in order to be as conservative as possible.

QA/QC of diffusion tube monitoring

This Authority participates in the NO₂ Network and uses diffusion tube measurements for local air quality purposes. Glasgow Scientific Services (GSS) provide and analyse diffusion tubes for all NO₂ diffusion sites within the area and are UKAS accredited for NO₂ diffusion tube analysis. All GSS results are documented and scrutinised by UKAS each year.

GSS participates in the WASP Scheme which is the co-ordination of a quality assurance/quality control (QA/QC) framework, aimed at the analytical laboratories that supply and analyse the diffusion tubes. This currently comprises

Promotion of the independent Workplace Analysis Scheme for Proficiency (WASP) operated by the Health and Safety Laboratory, with yearly assessment against agreed performance criteria.

Operation of a field intercomparison exercise, in which diffusion tubes are co-located with an automatic analyser: from January 2006 this is at a roadside site.

Operation of a QC solution testing scheme. Participation is recommended for any laboratory that prepares or analyses NO₂ diffusion tubes used by Local Authorities for LAQM purposes.

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO₂ Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The WASP scheme is operated independently by HSL. DEFRA and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme. For this reason, although WASP remains an independent proficiency testing scheme, laboratory performance in WASP is also assessed by AEA, according to criteria which have been agreed with DEFRA, the Devolved Administrations and HSL.

As of Round 111 (October 2010), the performance criteria set by HSL was based upon the RPI statistic, and was tightened to the following:

- **GOOD:** Results obtained by the participating laboratory are on average within 7.5% of the assigned value. This equates to an **RPI of 56.25 or less.**
- **ACCEPTABLE:** Results obtained by the participating laboratory are on average within 15% of the assigned value. This equates to an **RPI of 225 or less.**
- **UNACCEPTABLE:** Results obtained by the participating laboratory differ by more than 15% of the assigned value. This equates to an **RPI of greater than 225.**

The latest information from the Local Authority Air Quality Support Website stated that GSS demonstrated "good*" performance in the WASP scheme of analysis of NO₂ diffusion tubes. This performance is judged on the on basis of RPI (new criteria), best 4 out of the 5 rounds 105-109.

(*GOOD: Results obtained by the participating laboratory are on average within 7.5% of the assigned value. This equates to an RPI of 56.25 or less.)

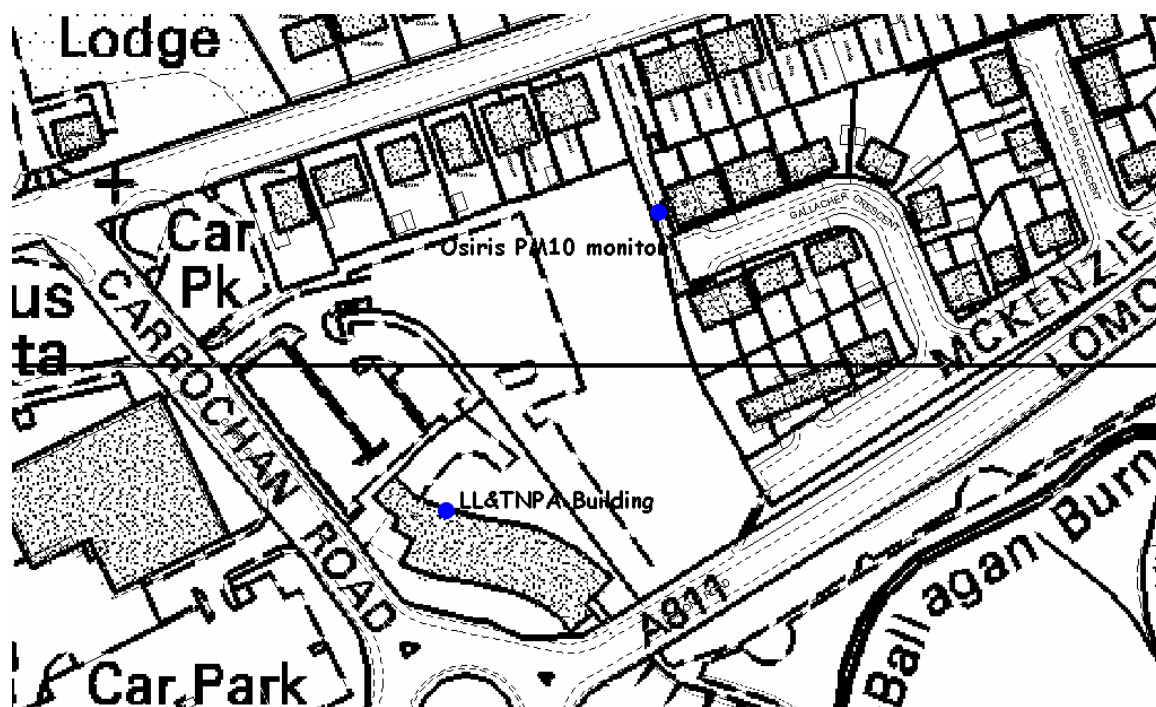
**Appendix B - Location map showing West Dunbartonshire,
Clydebank automatic monitoring station**



**Appendix C – Location map showing Glasgow Road, Dumbarton
(now Dumbarton Roadside) automatic monitoring station**



Appendix D – Location map showing light scattering device at MacKenzie Drive, Balloch.



Appendix E – NO₂ diffusion tubes removed from network

List of removed nitrogen dioxide diffusion tubes 2010

Site	Location	OS Grid Ref
Clydebank 3	Lamp-post in front Of 23 Dean St, Whitecrook	X248479 Y671115
Clydebank 4	Lamp-post outside 90 Craigs Avenue, Faifley	X250264 Y672910
Clydebank 5	Lamp-post beside Police Station car Park, Montrose St, Clydebank	X250067 Y670893
Airport 1	Lamp-post outside 11 Johnston Ave, Clydebank	X250770 Y669653
Bowling 1	Lamp-post on A82 At Bowling Roundabout	X243736 Y673791
Jamestown 1	Post at eastern Side of Bonhill Bridge	X239614 Y679875
Dumbarton 7	Lamp-post, 35 Oxhill Place, D'ton	X238754 Y675258
Dumbarton 9	Lamp-post, Millburn Crescent, Dumbarton	X240880 Y675373

Appendix F – West Dunbartonshire Council locally derived bias spreadsheet

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	04/02/2010	02/03/2010	34.2	32.1	33.2	33	1.1	3	2.6
2	02/03/2010	01/04/2010	26.1	26.2	25.2	26	0.6	2	1.4
3	01/04/2010	27/04/2010	17.2	16.9	18.8	18	1.0	6	2.5
4	27/04/2010	03/06/2010	19.0	19.5	19.7	19	0.4	2	0.9
5	03/06/2010	29/06/2010	19.2	13.8	16.5	17	2.7	16	6.7
6	29/06/2010	04/08/2010	15.9	16.2	12.8	15	1.9	13	4.7
7	04/08/2010	01/09/2010	22.1	22.2	20.2	22	1.1	5	2.8
8	01/09/2010	30/09/2010	25.2	23.1	23.6	24	1.1	5	2.7
9	30/09/2010	01/11/2010	25.5	27.5	24.6	26	1.5	6	3.7
10									
11									
12									
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
47	95	Good	Good
31.8	95	Good	Good
19.6	95	Good	Good
17.2	96	Good	Good
15	89	Good	Good
11	94	Good	Good
17	98	Good	Good
19	99	Good	Good
21	99	Good	Good

Overall survey --> Good precision Good Overall DC

Overall survey -->

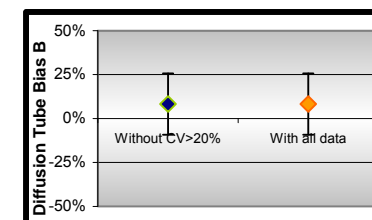
Site Name/ ID:	
----------------	--

Accuracy (with 95% confidence interval)		
without periods with CV larger than 20%		
Bias calculated using 9 periods of data		
Bias factor A	1 (0.85 - 1.21)	
Bias B	0% (-18% - 17%)	
Diffusion Tubes Mean:	22	μgm^{-3}
Mean CV (Precision):	6	
Automatic Mean:	22	μgm^{-3}
Data Capture for periods used:	96%	
Adjusted Tubes Mean:	22 (19 - 27)	μgm^{-3}

Precision	9 out of 9 periods have a CV smaller than 20%
------------------	---

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 9 periods of data	
Bias factor A	1 (0.85 - 1.21)
Bias B	0% (-18% - 17%)
Diffusion Tubes Mean:	22 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	22 μgm^{-3}
Data Capture for periods used:	96%
Adjusted Tubes Mean:	22 (19 - 27) μgm^{-3}

(Check average CV & DC from Accuracy calculations)



Jaume Targa, for AEA

Appendix G – AEA Pollution Report for Glasgow Road, Dumbarton.

Produced by AEA on behalf of the Scottish Government

**WEST DUNBARTONSHIRE GLASGOW ROAD
1st January to 31st December 2010**

These data have been fully ratified by AEA

POLLUTANT	NO ₂	NO _x
Number Very High	0	-
Number High	0	-
Number Moderate	0	-
Number Low	5731	-
Maximum 15-minute mean	216 µg m ⁻³	976 µg m ⁻³
Maximum hourly mean	197 µg m ⁻³	871 µg m ⁻³
Maximum running 8-hour mean	164 µg m ⁻³	665 µg m ⁻³
Maximum running 24-hour mean	133 µg m ⁻³	496 µg m ⁻³
Maximum daily mean	120 µg m ⁻³	431 µg m ⁻³
Average	24 µg m ⁻³	53 µg m ⁻³
Data capture	65.4 %	65.4 %

All mass units are at 20°C and 1013 mb

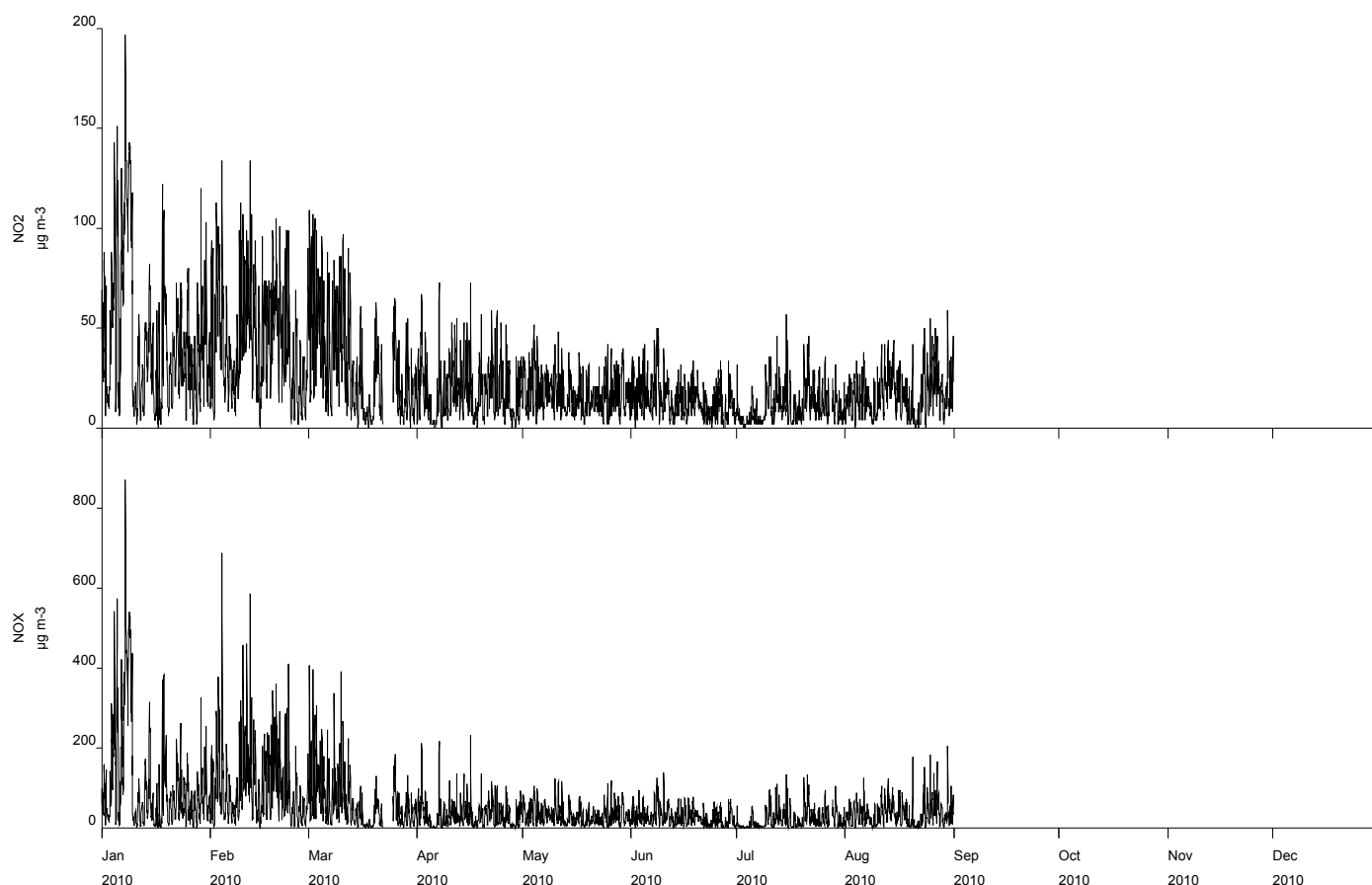
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by AEA on behalf the Scottish Government

**West Dunbartonshire Glasgow Road
Hourly Mean Data for 1st January to 31st December 2010**



Date Created: 08/04/2011

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Produced by AEA on behalf of Defra and the Scottish Government

DUMBARTON ROADSIDE 1st January to 31st December 2010

These data have been fully ratified by AEA

POLLUTANT	NO ₂	NO _x
Number Very High	0	-
Number High	0	-
Number Moderate	0	-
Number Low	2923	-
Maximum 15-minute mean	206 µg m ⁻³	1171 µg m ⁻³
Maximum hourly mean	193 µg m ⁻³	1068 µg m ⁻³
Maximum running 8-hour mean	153 µg m ⁻³	765 µg m ⁻³
Maximum running 24-hour mean	121 µg m ⁻³	537 µg m ⁻³
Maximum daily mean	120 µg m ⁻³	530 µg m ⁻³
Average	32 µg m ⁻³	89 µg m ⁻³
Data capture	33.4 %	33.4 %

All mass units are at 20°C and 1013 mb

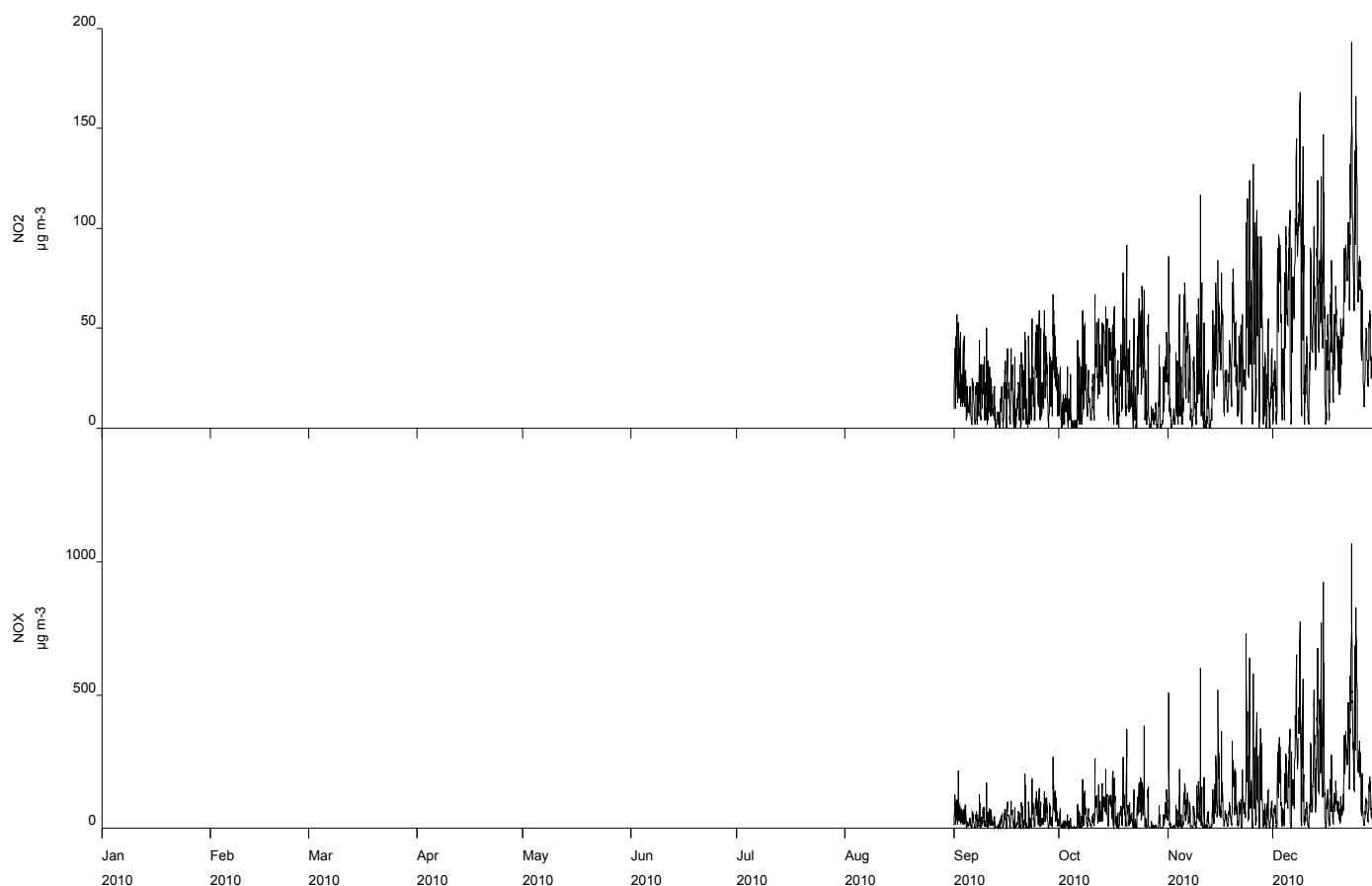
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by AEA on behalf of Defra the Scottish Government

Dumbarton Roadside
Hourly Mean Data for 1st January to 31st December 2010



Date Created: 08/04/2011

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Appendix H – AEA Pollution Report for West Dunbartonshire, Clydebank

Produced by AEA on behalf of the Scottish Government

**WEST DUNBARTONSHIRE CLYDEBANK
1st January to 31st December 2010**

These data have been fully ratified by AEA

POLLUTANT	PM₁₀ *	NO₂	NO_x
Number Very High	0	0	-
Number High	0	0	-
Number Moderate	0	0	-
Number Low	7974	8183	-
Maximum 15-minute mean	156 µg m ⁻³	183 µg m ⁻³	987 µg m ⁻³
Maximum hourly mean	155 µg m ⁻³	178 µg m ⁻³	890 µg m ⁻³
Maximum running 8-hour mean	89 µg m ⁻³	146 µg m ⁻³	755 µg m ⁻³
Maximum running 24-hour mean	59 µg m ⁻³	125 µg m ⁻³	606 µg m ⁻³
Maximum daily mean	56 µg m ⁻³	120 µg m ⁻³	573 µg m ⁻³
Average	18 µg m ⁻³	26 µg m ⁻³	71 µg m ⁻³
Data capture	91.6 %	93.4 %	93.4 %

* PM₁₀ as measured by a FDMS using a gravimetric factor of 1

All mass units are at 20°C and 1013 mb

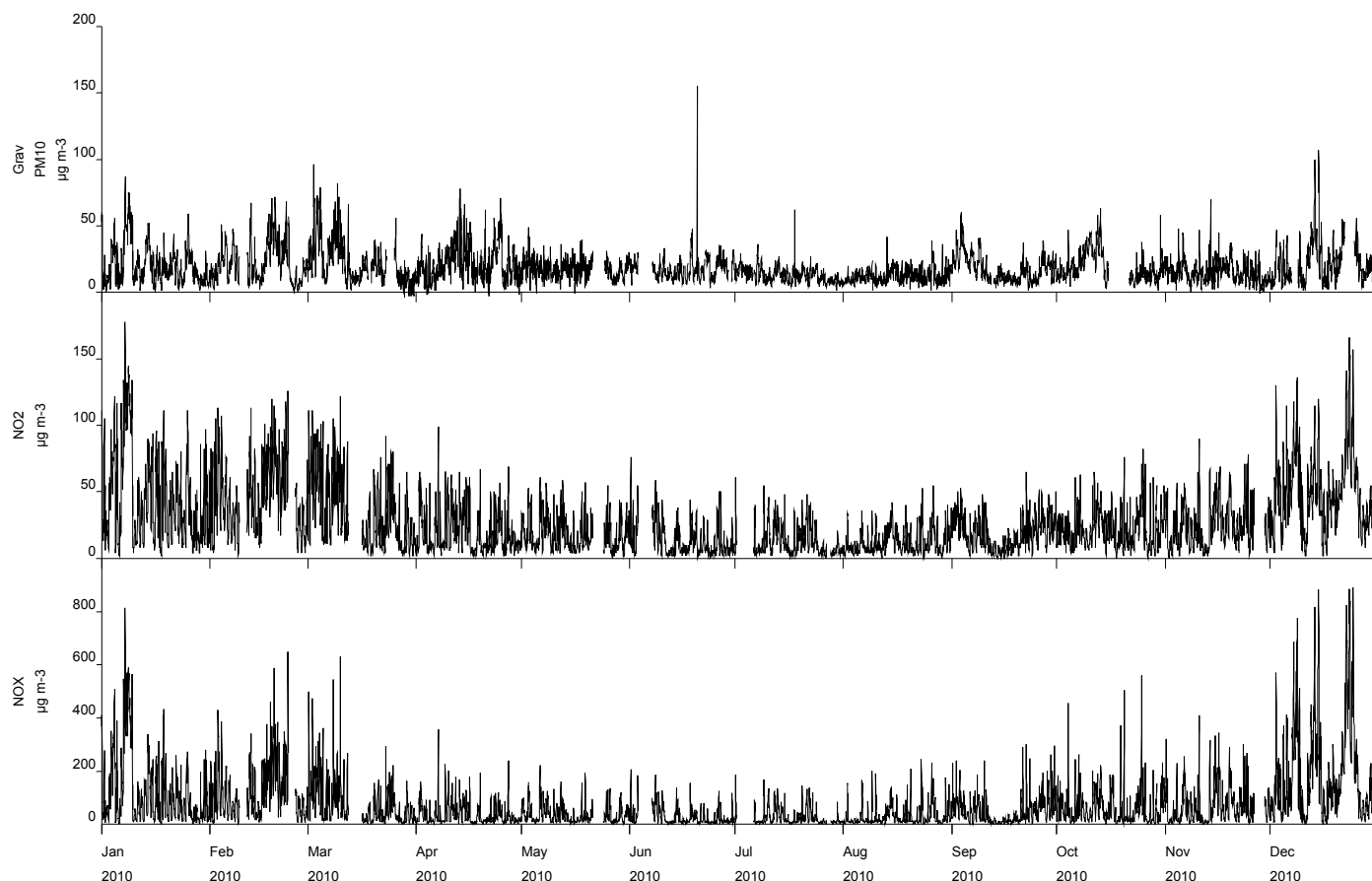
NO_x mass units are NO_x as NO₂ µg m⁻³

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM ₁₀ Particulate Matter (Gravimetric)	Daily mean > 50 µg m ⁻³	3	3
PM ₁₀ Particulate Matter (Gravimetric)	Annual mean > 18 µg m ⁻³	0	-
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by AEA on behalf of the Scottish Government

**West Dunbartonshire Clydebank
Hourly Mean Data for 1st January to 31st December 2010**



Date Created: 08/04/2011

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Appendix I -2010 Monthly diffusion tube results

2010

Site	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov + Dec*
Clydebank 1	43.6	27.9	32.7	27.5	28.2	17.2	26.8	27.6	25.2	37.1	51
Clydebank 6	60.5	51.6		67.7	23.1	20	20.5	29.1	35.5	44.6	50.5
Clydebank 7	37.6	35.5	52	57.7	15.9	20.5	24.9	26.3	30.5	37.1	52.4
Clydebank 9		34.9	31.2	25.8	20.7	23.9	16.2	19.5	25.1	22.8	47.1
Clydebank 10	39.2	42.3	29.2		33.8	21.4		25.7	29.8		50.6
Clydebank 11	43.3	36.1	29.5	21.9	15.8	19	15.4	20.9	24.5	29.9	47
Clydebank 12	45.8	41.7	28.2	23.8	17.5	14.4	17.9	20.4	28.1	37.8	49.7
Clydebank 13	42.9	30.4	32.2	24.4	16		20.2	25.3		29.1	53.4
Clydebank 14	30.5	28.5	21.8	14	11.5	11.7	10.1	13.4	16.2		36.9
Clydebank 15	43.6	38	32.1	22.6	19.3	21.1	16.9	20.4	27	32.1	48.3
Clydebank 16	39.4	24.2	26.3	18.4	19.6	13.8	18.3	27	22.2	29	46.3
Clydebank 17	40.7	26	28.4	17.7	20.6	11.1	21.7	27.2	28.5	32	44.8
Clydebank 18	43.4	23	33	18	17.6	16.4	20.5	25	27.6	30.5	48.1
Dumbarton 1	55.1	38.9	33.9	40.2		15.3	22.8	35.8	26.1	27.1	45.1
Dumbarton 11	45.1	45.7	42.4	29.9	23.9	20.8	20.1	33.8	34.8	32.6	51.2
Dumbarton 12	35.3	35.5	25.8	22.2	10.1	16.2	16.4	18.9	23	25.7	41.2
Glasgow Rd D'ton 2	43.7		36.9			25.5	28.8	20.9	39.4	43.3	49.1
Glasgow Rd D'ton 3	51.7	43.7	38.9				17.3		25.7	34.9	
Glasgow Rd D'ton 4	48.9	40.9	37.5	16	1.6	26.3	26.1	28.7	35.3		
Milton 1	58.5	44.6	55.1	58.6	39.3	31.3	50.7	43.8	52.4	59.1	64.2
Milton 2	32.5	23	25.7	23.8	16.1	14.7	22.1	19.9	24.1	20.6	33.8
Alexandria	40.1	40.8	26.7	30.2	17.3	17.5	23.8	24.2	22.7	27.1	39.6
Balloch 1	45.1	37.3	31.2	20.4		15.3	17.3	26.6	28.7	24.3	42.7
Vale of Leven 1			23.7	18	16.6	23.4	17.2	21.2	26	30.1	40.1
Vale of Leven 2	34.8	20.4		21.5	19	<2.3	20.5	22.2			
Vale of Leven 3	32.9	32.5	19	21.9	18.5	17.8	17.8	24.3	24.3	29.8	37.3
Vale of Leven 4		28.1		22.7	18.7	19.8	20.2	24.1	25	19.9	35.2
Briar Drive 1		39.9	28.2	18.2	11.8	14.8	14.2	17.6	29.9	32.7	49.4
Briar Drive 2		41.5	27.8	17.4	14.3	16.3	13	18.4	23.5	31.2	49.4
Briar Drive 3		53	25	20.9	14.5	13.4	18.8	18.3	27.4	31.5	45.6
Dumbarton Triplicate 1		34.2	26.1	17.2	19	19.2	15.9	22.1	25.2	25.5	42.8
Dumbarton Triplicate 2		32.1	26.2	16.9	19.5	13.8	16.2	22.2	23.1	27.5	40.9
Dumbarton Triplicate 3		33.2	25.2	18.8	19.7	16.5	12.8	20.2	23.6	24.6	47

* All diffusion tubes during November and December 2010 were double exposure and therefore have not been included in the 2010 annual results. The results are included here for information only.

APPENDIX J

West Dunbartonshire Council

Title : Clydebank N02 Monitoring Sites

Date : 15/04/2011

Scale : 1:18000

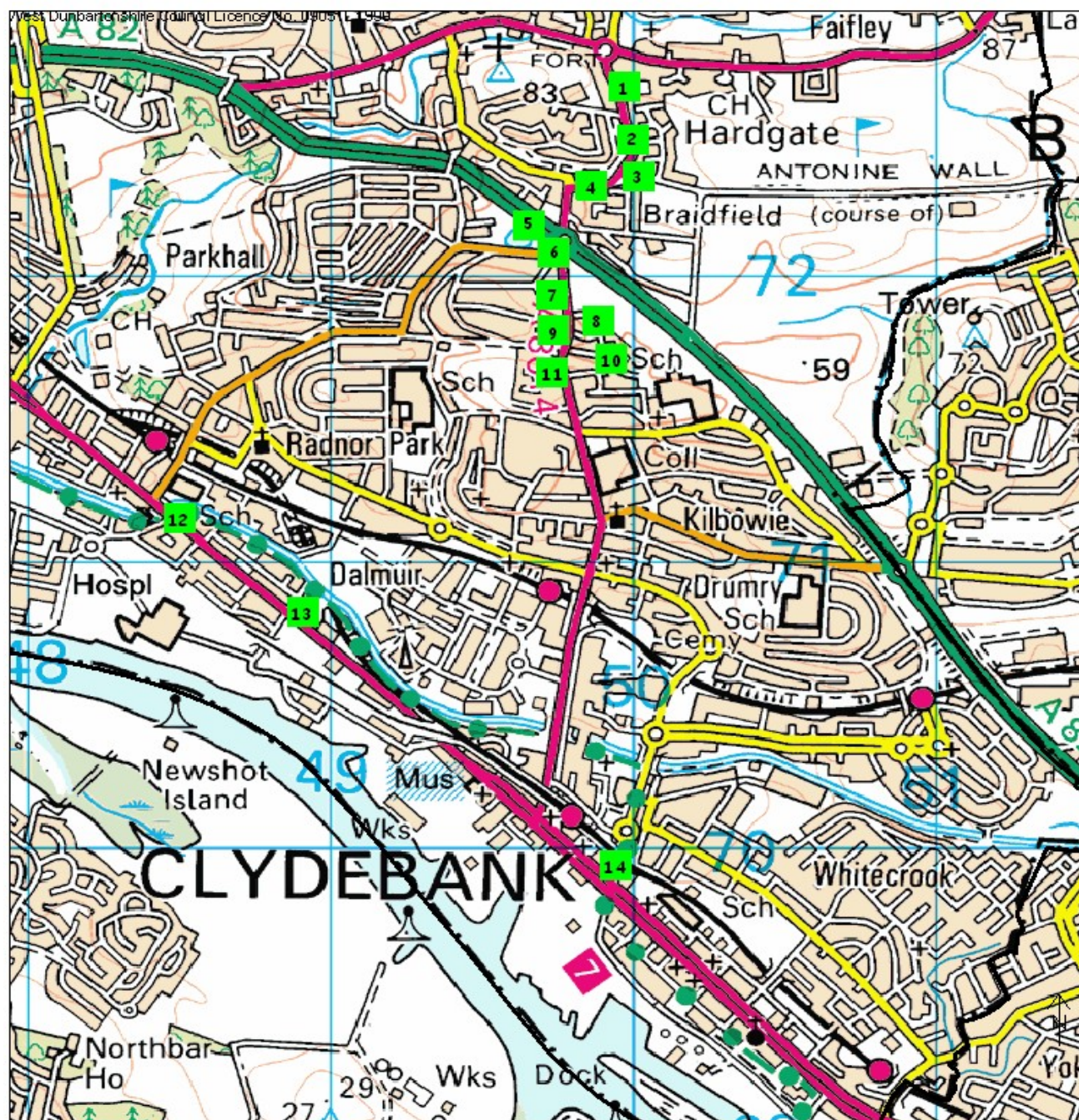
Map Reference : NS4970

Map No.

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APPENDIX L

West Dunbartonshire Council

Title : Vale of Leven N02 Monitoring Sites

Date : 15/04/2011

Scale : 1:24000

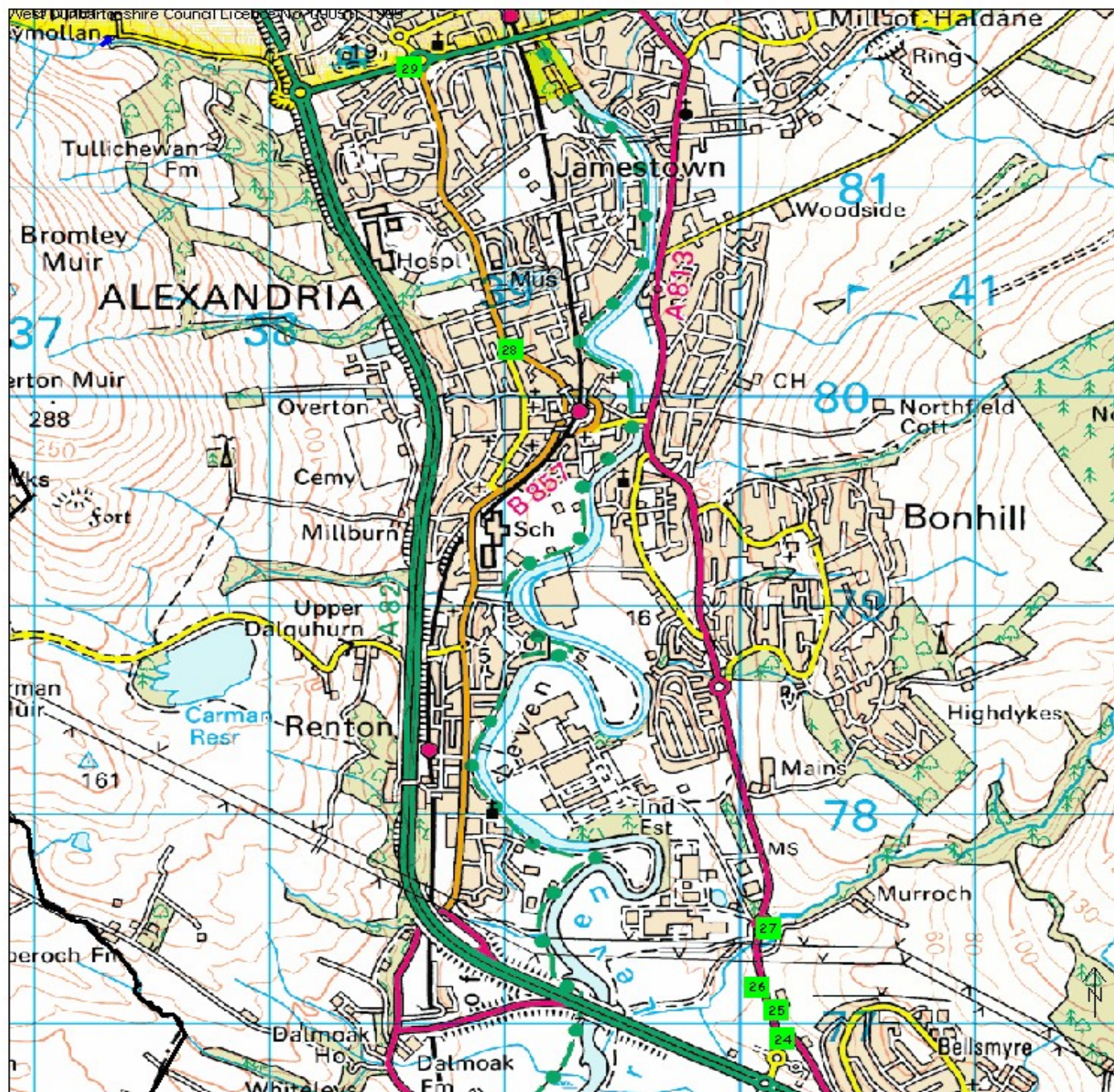
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APPENDIX K

West Dunbartonshire Council

Title : Dumbarton N02 Monitoring Sites

Date : 15/04/2011

Scale : 1:18000

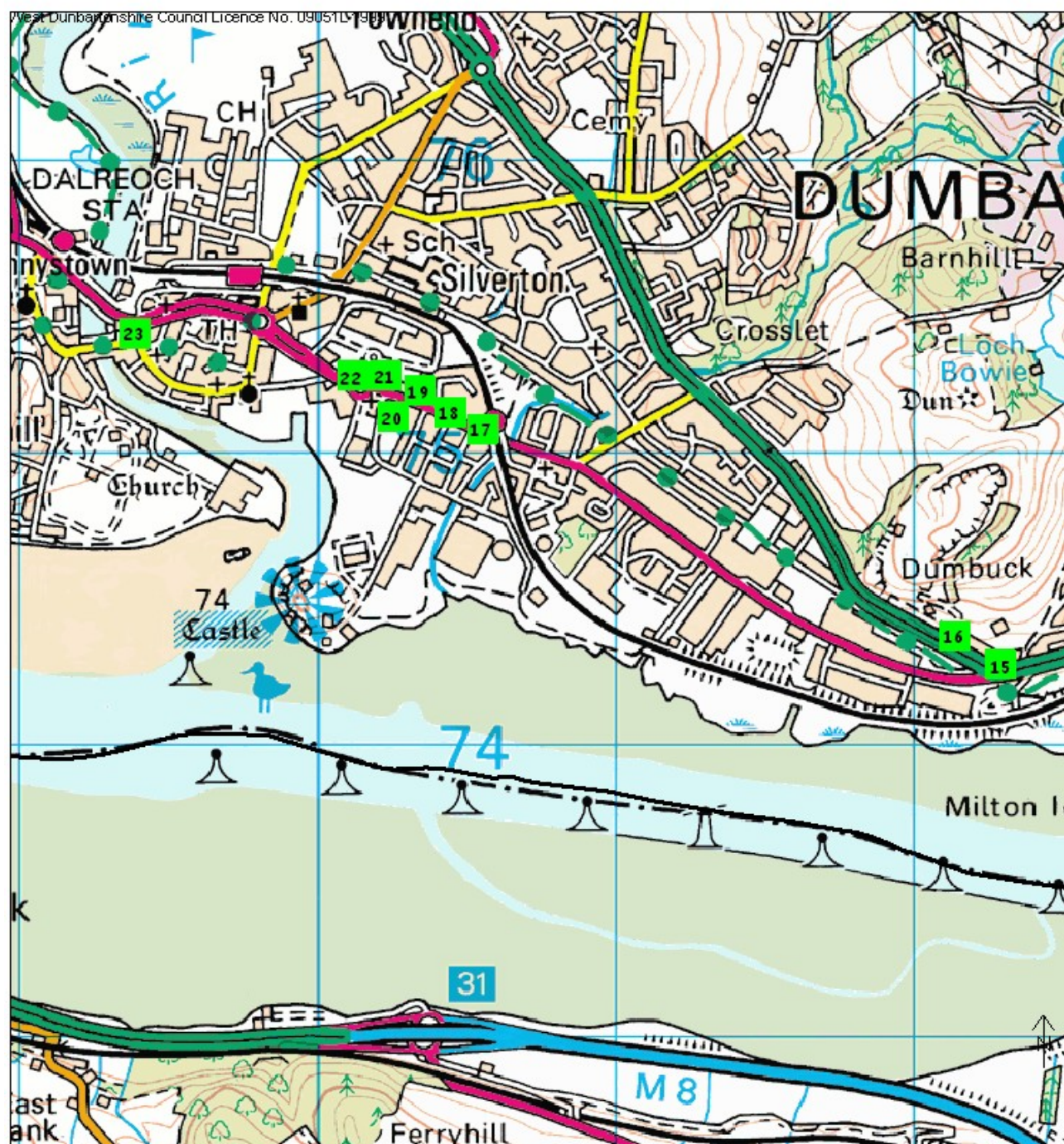
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Appendix M – Key for NO2 diffusion tube monitoring locations

Map Number	Name of Site	Map Number	Name of Site
1	Clydebank 18	8	Clydebank 13
2	Clydebank 17	9	Clydebank 10
3	Clydebank 16	10	Clydebank 14
4	Clydebank 11	11	Clydebank 12
5	Clydebank 6	12	Clydebank 1
6	Briar Drive Triplicates	13	Clydebank 9
7	Clydebank 15	14	Clydebank 7

Map Number	Name of Site	Map Number	Name of Site
15	Milton 1	20	Dumbarton Triplicates
16	Milton 2	21	Dumbarton 3
17	Dumbarton 11	22	Dumbarton 2
18	Dumbarton 1	23	Dumbarton 12
19	Dumbarton 4		

Map Number	Name of Site
24	Vale of Leven 4
25	Vale of Leven 3
26	Vale of Leven 1
27	Vale of Leven 2
28	Alexandria 1
29	Balloch 1