
# 2013 Air Quality Progress Report for
# West Dunbartonshire Council

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

April 2013

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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 latest 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 2012 has not identified any exceedences of Nitrogen Dioxide ($NO_2$) objectives. Due to equipment failure it is not possible to provide an update with regard to the $PM_{10}$ levels in the Council area during 2012. The Progress Report has not identified any significant changes in emission 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 2013 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 2012 Update and Screening Assessment.

1. **Dumbarton Roadside**

This unit was affiliated into the national network (AURN) during 2010.
The ratified data from AEA confirms an annual mean of 27µg/$m^3$. However there was only 46% data capture therefore an annualised mean of 22.6µg/$m^3$ for 2012 was calculated. There were no exceedences of the hourly mean.

2. **West Dunbartonshire, Clydebank (Kilbowie Roundabout).**

The ratified data from AEA confirms an annual mean of 24µg/$m^3$ for 2012. There were no exceedences of the hourly mean.

**$NO_2$ Diffusion Tubes**

There were 24 $NO_2$ diffusion tubes (excluding co-located triplicates) at various sites within the West Dunbartonshire Council area during 2012.
During that time one of these tubes – Milton 1 - breached the National Air Quality Objective for $NO_2$. This exceedence is fully discussed further on in this report.
No other diffusion tube breached the National Air Quality Objective for $NO_2$.
West Dunbartonshire Council concludes that there is no need to proceed to Detailed Assessment in respect of Nitrogen Dioxide.

**$PM_{10}$**

The TEOM/FDMS located at West Dunbartonshire Clydebank was non-operational during almost all of 2012. Data recorded after January 2012 has been rejected by AEA. The service/maintenance contractor as yet has been unable to repair the unit despite numerous visits and replacement of parts.

West Dunbartonshire Council are therefore unable to report on $PM_{10}$ levels in its area.

**Conclusion**

**National Air Quality Objectives were not exceeded in 2012 in the West Dunbartonshire Council area. There is therefore no need to proceed to Detailed Assessment for any objective.**

**West Dunbartonshire Council will complete a Progress Report in 2014.**

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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

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. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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 μg/$m^3$ (milligrammes per cubic metre, mg/$m^3$ for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

**Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland**

| Pollutant | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Benzene** | 16.25 µg/m$^3$ | Running annual mean | 31.12.2003 |
| | 3.25 µg/m$^3$ | Running annual mean | 31.12.2010 |
| **1,3-Butadiene** | 2.25 µg/m$^3$ | Running annual mean | 31.12.2003 |
| **Carbon monoxide** | 10 mg/m$^3$ | Running 8-hour mean | 31.12.2003 |
| **Lead** | 0.50 µg/m$^3$ | Annual mean | 31.12.2004 |
| | 0.25 µg/m$^3$ | Annual mean | 31.12.2008 |
| **Nitrogen dioxide** | 200 µg/m$^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 µg/m$^3$ | Annual mean | 31.12.2005 |
| **Particulate Matter ($PM_{10}$) (gravimetric)** | 50 µg/m$^3$, not to be exceeded more than 7 times a year | 24-hour mean | 31.12.2010 |
| | 18 µg/m$^3$ | Annual mean | 31.12.2010 |
| **Sulphur dioxide** | 350 µg/m$^3$, not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 µg/m$^3$, not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 µg/m$^3$, not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |

## 1.4 Summary of Previous Review and Assessments

| 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 |
| Progress Report | 2011 | National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment |
| Update and Screening Assessment | 2012 | National Air Quality Objectives continued to be met therefore no need to proceed to detailed assessment |

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

West Dunbartonshire Council has not declared an Air Quality Management 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. Their location remains unchanged since the 2012 Update and Screening Assessment. Location maps are included as Appendices B & C.

1. **Dumbarton Roadside**

This unit, which contains a real time chemiluminescent NOx 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. In February 2012 the Horiba NOx unit was replaced by a Casella ML2041.

2. **West Dunbartonshire, Clydebank**

This unit houses a real time chemiluminescent NOx 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 has been located here since February 2007.

Details of QA/QC procedures for both 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

**Table 2.1 Details of Automatic Monitoring Sites**

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Inlet Height (m) | Pollutants Monitored | In AQMA? | Monitoring Technique | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A1** | Glasgow Road, Dumbarton (Dumbarton Roadside) | Roadside | 240238 | 675193 | 2.0 | NOx | N | Chemiluminescent ML2014 | Y*(2.5) | 5.0 | N |
| **A2** | West Dunbartonshire, Clydebank | Roadside | 249723 | 672044 | 2.0 | NOx<br>$PM_{10}$ | N | Chemiluminescent Analyser TEOM/FDMS (Type C) | N(18) | 25.0 | N |

* This unit sits 5m back from kerb due to location difficulties. Nearest relevant exposure are residential properties 2.5 metres from kerb

### Non-Automatic Monitoring Sites

West Dunbartonshire Council had 24 $NO_2$ diffusion tubes distributed throughout the Council area during 2012 (excluding co-located triplicates).This is unchanged since the 2012 Update and Screening Assessment.

$NO_2$ 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 $NO_2$ 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.

### Bias Adjustment Factor and Co-location Exercise

All $NO_2$ diffusion tube results have been bias adjusted using the 2012 factor of 0.95 obtained from the Review and Assessment website. A co-location exercise was undertaken at both automatic monitoring sites. Details are included in Appendix A.

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

See appendices D, E and F

**Table 2.2 Details of Non- Automatic Monitoring Sites**

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Site Height (m) | Pollutants Monitored | In AQMA? | Is Monitoring Co-located with a Continuous Analyser (Y/N) | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | Clydebank 1 | Roadside | 248479 | 671115 | 2.5 | $NO_2$ | N | N | Y | 4m | Y |
| T2 | Clydebank 6 | Kerbside | 249725 | 672069 | 2.5 | $NO_2$ | N | N | N(40) | 1m | Y |
| T3 | Dumbarton 1 | Roadside | 240322 | 675177 | 2.5 | $NO_2$ | N | N | N (2.5) | 1m | Y |
| T4 | Dumbarton 11 | Roadside | 240515 | 675078 | 2.5 | $NO_2$ | N | N | N (4) | 1m | Y |
| T5 | Balloch 1 | Kerbside | 238584 | 681562 | 2.5 | $NO_2$ | N | N | N | 12m | Y |
| T6 | Alexandria 1 | Kerbside | 239024 | 680206 | 2.5 | $NO_2$ | N | N | N(5) | 1m | Y |
| T7 | Briar Drive, Triplicate 1 | Roadside | 249723 | 672044 | 2.5 | $NO_2$ | N | Y | N/A | 25m | N/A |
| T8 | Briar Drive, Triplicate 2 | Roadside | 249723 | 672044 | 2.5 | $NO_2$ | N | Y | N/A | 25m | N/A |
| T9 | Briar Drive, Triplicate 3 | Roadside | 249723 | 672044 | 2.5 | $NO_2$ | N | Y | N/A | 25m | N/A |

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Site Height (m) | Pollutants Monitored | In AQMA? | Is Monitoring Co-located with a Continuous Analyser (Y/N) | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T10 | Dumbarton, Triplicate 1 | Roadside | 240238 | 675193 | 2.5 | $NO_2$ | N | Y | N/A | 5m | N/A |
| T11 | Dumbarton, Triplicate 2 | Roadside | 240238 | 675193 | 2.5 | $NO_2$ | N | Y | N/A | 5m | N/A |
| T12 | Dumbarton, Triplicate 3 | Roadside | 240238 | 675193 | 2.5 | $NO_2$ | N | Y | N/A | 5m | N/A |
| T13 | Milton 1 | Kerbside | 242266 | 674235 | 2.5 | $NO_2$ | N | N | N (12) | 1m | Y |
| T14 | Milton 2 | Roadside | 242160 | 674299 | 2.5 | $NO_2$ | N | N | N (2m) | 12m | N |
| T15 | Glasgow Rd, Dumbarton 2 | Roadside | 240178 | 675228 | 2.5 | $NO_2$ | N | N | N (8) | 1m | Y |
| T16 | Glasgow Rd, Dumbarton 3 | Roadside | 240279 | 675196 | 2.5 | $NO_2$ | N | N | N (4.5) | 1m | Y |
| T17 | Clydebank 7 | Roadside | 249913 | 669865 | 2.5 | $NO_2$ | N | N | N (4) | 1m | Y |
| T18 | Clydebank 9 | Kerbside | 248899 | 670784 | 2.5 | $NO_2$ | N | N | N (3) | 1m | Y |

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Site Height (m) | Pollutants Monitored | In AQMA? | Is Monitoring Co-located with a Continuous Analyser (Y/N) | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T19 | Clydebank 10 | Kerbside | 249759 | 671845 | 2.5 | $NO_2$ | N | N | N (8.5) | 1m | Y |
| T20 | Clydebank 11 | Roadside | 249801 | 672288 | 2.5 | $NO_2$ | N | N | N (22) | 1m | Y |
| T21 | Clydebank 12 | Kerbside | 249747 | 671665 | 2.5 | $NO_2$ | N | N | N (10) | 1m | Y |
| T22 | Clydebank 13 | Kerbside | 249762 | 671790 | 2.5 | $NO_2$ | N | N | N (8.5) | 1m | Y |
| T23 | Clydebank 14 | Kerbside | 249872 | 671854 | 2.5 | $NO_2$ | N | N | N (>25) | 1m | N |
| T24 | Clydebank 15 | Kerbside | 249746 | 671966 | 2.5 | $NO_2$ | N | N | N (8.5) | 1m | Y |
| T25 | Clydebank 16 | Kerbside | 249967 | 672548 | 2.5 | $NO_2$ | N | N | N (10) | 1m | Y |
| T26 | Clydebank 17 | Kerbside | 249987 | 672440 | 2.5 | $NO_2$ | N | N | N (11) | 1m | Y |
| T27 | Clydebank 18 | Kerbside | 249972 | 672351 | 2.5 | $NO_2$ | N | N | N (12) | 1m | Y |
| T28 | Vale of Leven 3 | Roadside | 240115 | 677146 | 2.5 | $NO_2$ | N | N | N(>25) | 4m | Y |

| Site ID | Site Name | Site Type | X OS Grid Reference | Y OS Grid Reference | Site Height (m) | Pollutants Monitored | In AQMA? | Is Monitoring Co-located with a Continuous Analyser (Y/N) | Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure) | Distance to Kerb of Nearest Road (m) (N/A if not applicable) | Does this Location Represent Worst-Case Exposure? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T29 | Vale of Leven 4 | Kerbside | 240164 | 677014 | 2.5 | $NO_2$ | N | N | N (>25) | 1m | Y |
| T30 | Dumbarton 12 | Kerbside | 239410 | 675330 | 2.5 | $NO_2$ | N | N | N (7) | 1m | Y |

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

### 2.2.1 Nitrogen Dioxide ($NO_2$)

West Dunbartonshire Council monitoring results have shown that there was no exceedence of the National Air Quality Objectives for $NO_2$ during 2012.

**Automatic Monitoring Data**

West Dunbartonshire Council has two automatic NOx monitoring stations. During 2012 they were located as detailed below. Neither station breached the National Air Quality Objectives for $NO_2$. Location maps for each unit are included as Appendices B and C.

**Dumbarton Roadside**

This unit contains a real time chemiluminescent NOx analyser and was moved to the A814 (Glasgow Rd, Dumbarton at its junction with Leven Street) in April 2007. The unit is located 5 metres from the kerbside. This unit was affiliated into the national network (AURN) during 2010. In February 2012 the Horiba unit was replaced by a Casella ML 2041.

The ratified data from AEA indicates that the annual average $NO_2$ level for 2012 was 27µg/$m^3$. As there was only 46% data capture from this unit the result was annualised using the method shown in Box 3.2 in TG (09). The annualised result for 2012 is 22.9µg/$m^3$. Details are included in Appendix A.

There were no exceedences of the hourly mean objective during 2012. The nearest receptors are residential properties located 2.5m from the roadside. The $NO_2$ Distance Calculator on the R&A web site was used to predict the $NO_2$ levels at the nearest receptors which are 2.5 metres closer to the roadside than the automatic monitor. The calculator predicted $NO_2$ levels at the façade of the nearest residential property of 24.3µg/$m^3$.

**West Dunbartonshire, Clydebank (Kilbowie Roundabout)**

This unit houses a real time chemiluminescent NOx analyser and a TEOM fitted with a Type C FDMS. 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 $NO_2$ level for 2012 was 24µg/$m^3$. There were no exceedences of the hourly mean objective during 2012. The nearest receptors are residential properties located just over 40 metres from the roundabout.

**Table 2.3 Results of Automatic Monitoring for $NO_2$: Comparison with Annual Mean Objective**

| Site ID | Site Type | Within AQMA? | Valid Data Capture for Monitoring Period % [a] | Valid Data Capture 2012 % [b] | Annual Mean Concentration (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2008* [c] | 2009* [c] | 2010* [c] | 2011* [c] | 2012 [c] |
| A1 | Roadside | N | 99.4 | 99.4 | 24 | 26 | 26 | 21 | 24 |
| A2 | Roadside | N | 46.1 | 46.1 | 19 | 23 | 27 | 19 | 22.9[c] |

C – Figure annualised in accordance with Box 3.2 in TG (09)

**Figure 2.3 Trends in Annual Mean $NO_2$ Concentrations Measured at Automatic Monitoring Sites**

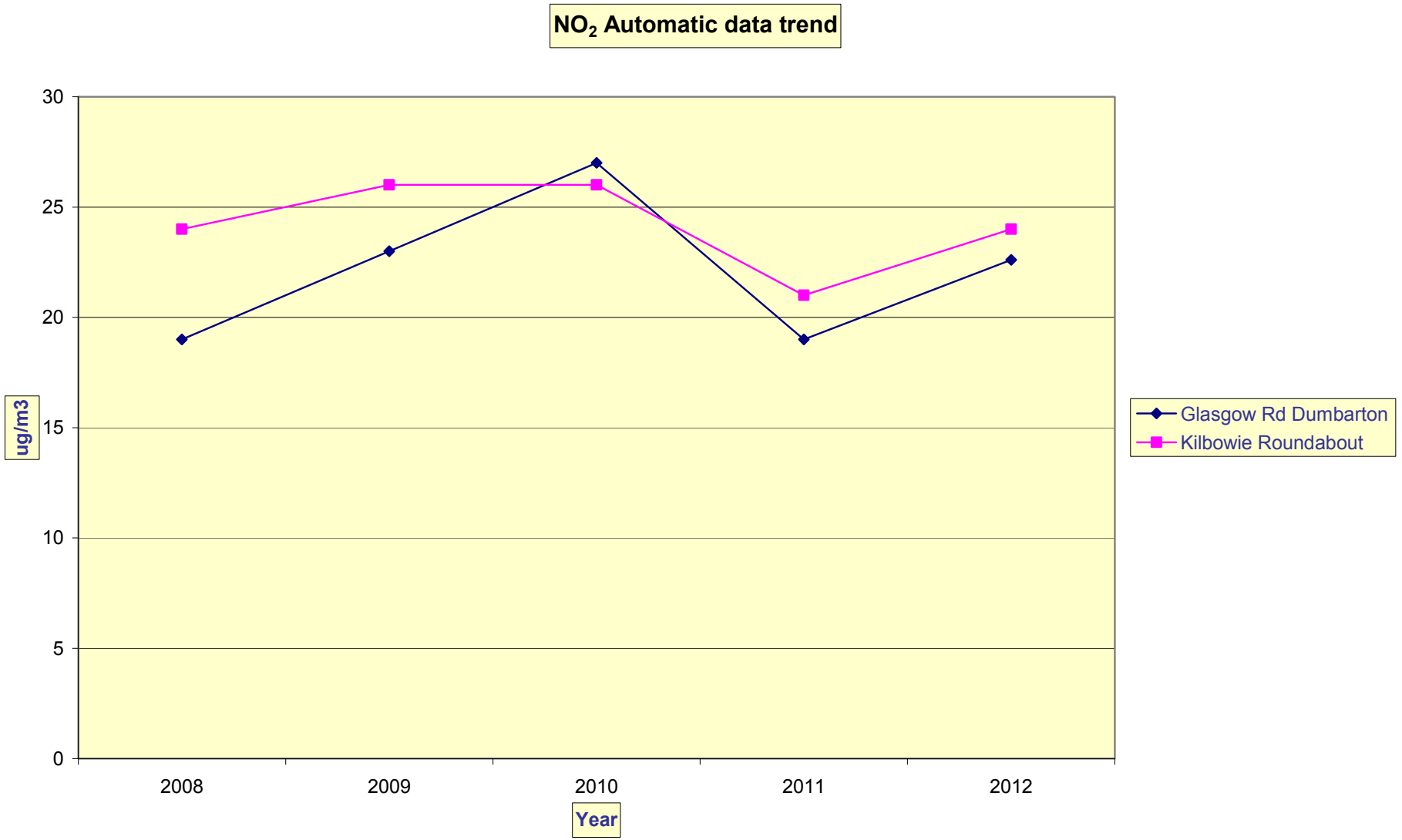


**Table 2.4 Results of Automatic Monitoring for $NO_2$: Comparison with 1-hour Mean Objective**

| Site ID | Site Type | Within AQMA? | Valid Data Capture for Monitoring Period % [a] | Valid Data Capture 2012 % [b] | Number of Hourly Means > 200µg/m$^3$ | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2008* [c] | 2009* [c] | 2010* [c] | 2011* [c] | 2012 [c] |
| A1 | Roadside | N | 99.4 | 99.4 | 0 | 0 | 0 | 0 | 0 |
| A2 | Roadside | N | 46.1 | 46.1 | 0 | 0 | 0 | 0 | 0(143[c]) |

[c] If the data capture for full calendar year is less than 90%, include the 99.8$^{th}$ percentile of hourly means in brackets

**Diffusion Tube Monitoring Data**

West Dunbartonshire Council monitored $NO_2$ using diffusion tubes at 24 locations (excluding co-located triplicates) throughout the Council area during 2012.

All results have been bias adjusted using a factor of 0.95 based on information from the Review and Assessment website.

One of the monitored locations – Milton 1 - was found to exceed the National Air Quality Objective for $NO_2$. This result is discussed below.

**Milton 1 – bias adjusted annual average of 51.7µg/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.
The nearest receptors are residential properties located approximately 12 metres back from the kerb. An additional diffusion tube was placed in the front garden of one of the houses approximately 5 metres from the front façade to obtain data regarding $NO_2$ levels at the residences. The tube, designated Milton 2, has been at this site since 2008. The 2012 bias adjusted annual mean for Milton 2 was 21.1µg/m3. The $NO_2$ Distance Calculator from the Air Quality Archive web site was used to predict $NO_2$ levels at the residences based on the results of Milton 1 diffusion tube. The calculator predicted the $NO_2$ levels at the residences to be 25.4µg/$m^3$ which although slightly higher than the Milton 2 diffusion tube result remains within the National Air Quality Objective for $NO_2$. There is therefore no need to proceed to Detailed Assessment at this location.

**Table 2.5 Results of $NO_2$ Diffusion Tubes 2012**

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2012 (Number of Months or %) [a] | 2012 Annual Mean Concentration (µg/m$^3$) - Bias Adjustment factor = 0.95 [b] |
|---|---|---|---|---|---|---|
| T1 | Clydebank 1 | Roadside | N | N | 11 | 30.9 |
| T2 | Clydebank 6 | Kerbside | N | N | 12 | 36.2 |
| T3 | Dumbarton 1 | Roadside | N | N | 12 | 27.9 |
| T4 | Dumbarton 11 | Roadside | N | N | 10 | 33.9 |
| T5 | Balloch 1 | Kerbside | N | N | 12 | 24.6 |
| T6 | Alexandria 1 | Kerbside | N | N | 11 | 25.7 |
| T7 | Briar Drive, Triplicate 1 | Roadside | N | Triplicate and co-located | 12 | 23.9 |
| T8 | Briar Drive, Triplicate 2 | Roadside | N | Triplicate and co-located | 12 | 25.2 |
| T9 | Briar Drive, Triplicate 3 | Roadside | N | Triplicate and co-located | 12 | 26.9 |
| T10 | Dumbarton, Triplicate 1 | Roadside | N | Triplicate and co-located | 12 | 20.3 |
| T11 | Dumbarton, Triplicate 2 | Roadside | N | Triplicate and co-located | 11 | 23.3 |
| T12 | Dumbarton, Triplicate 3 | Roadside | N | Triplicate and co-located | 11 | 21.1 |
| **T13** | **Milton 1** | **Kerbside** | **N** | **N** | **10** | **51.7** |

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2012 (Number of Months or %) [a] | 2012 Annual Mean Concentration (µg/m$^3$) - Bias Adjustment factor = 0.95 [b] |
|---|---|---|---|---|---|---|
| T14 | Milton 2 | Roadside | N | N | 12 | 21.1 |
| T15 | Glasgow Rd, Dumbarton 2 | Roadside | N | N | 12 | 34.6 |
| T16 | Glasgow Rd, Dumbarton 3 | Roadside | N | N | 11 | 32.6 |
| T17 | Clydebank 7 | Roadside | N | N | 12 | 28.9 |
| T18 | Clydebank 9 | Kerbside | N | N | 12 | 25.3 |
| T19 | Clydebank 10 | Kerbside | N | N | 12 | 27.9 |
| T20 | Clydebank 11 | Roadside | N | N | 12 | 25 |
| T21 | Clydebank 12 | Kerbside | N | N | 12 | 26.2 |
| T22 | Clydebank 13 | Kerbside | N | N | 12 | 25.2 |
| T23 | Clydebank 14 | Kerbside | N | N | 10 | 17.2 |
| T24 | Clydebank 15 | Kerbside | N | N | 11 | 28.4 |
| T25 | Clydebank 16 | Kerbside | N | N | 12 | 22.9 |
| T26 | Clydebank 17 | Kerbside | N | N | 11 | 25.4 |

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Co-located Tube | Full Calendar Year Data Capture 2012 (Number of Months or %) [a] | 2012 Annual Mean Concentration (µg/m$^3$) - Bias Adjustment factor = 0.95 [b] |
|---|---|---|---|---|---|---|
| T27 | Clydebank 18 | Kerbside | N | N | 9 | 29.4 |
| T28 | Vale of Leven 3 | Roadside | N | N | 12 | 23.1 |
| T29 | Vale of Leven 4 | Kerbside | N | N | 12 | 22 |
| T30 | Dumbarton 12 | Kerbside | N | N | 12 | 20.5 |

In bold, exceedence of the $NO_2$ annual mean AQS objective of 40µg/m$^3$

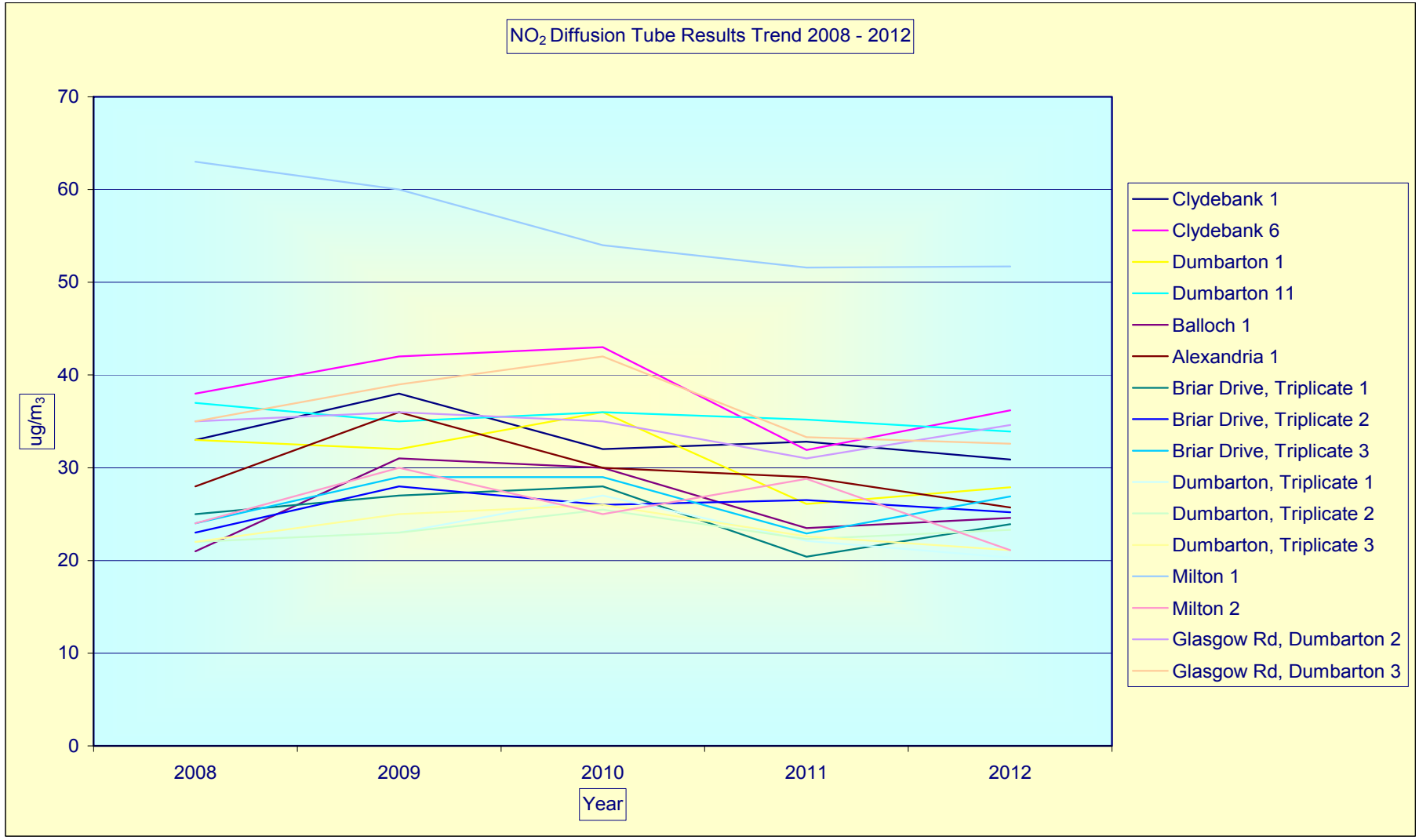
**Table 2.6 Results of $NO_2$ Diffusion Tubes (2008 to 2012)**

| Site ID | Site Type | Within AQMA? | Annual Mean Concentration (µg/m$^3$) - Adjusted for Bias [a] | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2008 (Bias Adjustment Factor = 0.97) | 2009 (Bias Adjustment Factor = 1.23) | 2010 (Bias Adjustment Factor = 1.1) | 2011 (Bias Adjustment Factor = 0.94) | 2012 (Bias Adjustment Factor = 0.95) |
| T1 | Roadside | N | 33 | 38 | 32 | 32.8 | 30.9 |
| T2 | Kerbside | N | 38 | 42 | 43 | 31.9 | 36.2 |
| T3 | Roadside | N | 33 | 32 | 36 | 26.1 | 27.9 |
| T4 | Roadside | N | 37 | 35 | 36 | 35.2 | 33.9 |
| T5 | Kerbside | N | 21 | 31 | 30 | 23.5 | 24.6 |
| T6 | Kerbside | N | 28 | 36 | 30 | 29 | 25.7 |
| T7 | Roadside | N | 25 | 27 | 28 | 20.4 | 23.9 |
| T8 | Roadside | N | 23 | 28 | 26 | 26.5 | 25.2 |
| T9 | Roadside | N | 24 | 29 | 29 | 22.9 | 26.9 |
| T10 | Roadside | N | 22 | 23 | 27 | 22.1 | 20.3 |
| T11 | Roadside | N | 22 | 23 | 25.5 | 22.3 | 23.3 |
| T12 | Roadside | N | 22 | 25 | 26 | 22..6 | 21.1 |
| **T13** | **Kerbside** | **N** | **63** | **60** | **54** | **51.6** | **51.7** |
| T14 | Roadside | N | 24 | 30 | 25 | 28.8 | 21.1 |
| T15 | Roadside | N | 35 | 36 | 35 | 31 | 34.6 |
| T16 | Roadside | N | 35 | 39 | 42 | 33.3 | 32.6 |

| Site ID | Site Type | Within AQMA? | Annual Mean Concentration (µg/m$^3$) - Adjusted for Bias [a] | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2008 (Bias Adjustment Factor = 0.97) | 2009 (Bias Adjustment Factor = 1.23) | 2010 (Bias Adjustment Factor = 1.1) | 2011 (Bias Adjustment Factor = 0.94) | 2012 (Bias Adjustment Factor = 0.95) |
| T17 | Roadside | N | N/A | 28 | 37 | 30.9 | 28.9 |
| T18 | Kerbside | N | N/A | 29 | 27 | 28.9 | 25.3 |
| T19 | Kerbside | N | N/A | 34 | 39 | 29.1 | 27.9 |
| T20 | Roadside | N | N/A | 27 | 28 | 28.3 | 25 |
| T21 | Kerbside | N | N/A | 34 | 30 | 24.1 | 26.2 |
| T22 | Kerbside | N | N/A | 41 | 41 | 27 | 25.2 |
| T23 | Kerbside | N | N/A | 38 | 19 | 16.8 | 17.2 |
| T24 | Kerbside | N | N/A | 34 | 30 | 24.3 | 28.4 |
| T25 | Kerbside | N | N/A | 31 | 26 | 29.2 | 22.9 |
| T26 | Kerbside | N | N/A | 29 | 28 | 30.9 | 25.4 |
| T27 | Kerbside | N | N/A | 30 | 28 | 28.4 | 29.4 |
| T28 | Roadside | N | N/A | 32 | 26 | 25.1 | 23.1 |
| T29 | Kerbside | N | N/A | 32 | 23 | 28.1 | 22 |
| T30 | Kerbside | N | N/A | 25 | 25 | 21.7 | 20.5 |

In bold, exceedence of the $NO_2$ annual mean AQS objective of 40µg/m$^3$

**Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites**



### 2.2.2 Particulate Matter ($PM_{10}$)

At the beginning of 2012 the TEOM/FDMS at the site designated West Dunbartonshire, Clydebank began returning faulty data. The problem was reported to the service/maintenance contractor who attended and ordered spare parts. Once installed the new parts did not remedy the fault and despite many visits by the engineers and the installation of replacement parts the unit continued to return faulty data for the rest of the year. AEA have advised that the data recorded during 2012 cannot be used. Therefore West Dunbartonshire Council is unable to report on $PM_{10}$ levels in its area during 2012. Attempts to repair the unit are still taking place.

**Figure 2.5 Trends in Annual Mean $PM_{10}$ Concentrations**

As no data was available from the TEOM/FDMS an update to last years trend chart is not possible.

### 2.2.3 Sulphur Dioxide ($SO_2$)

West Dunbartonshire Council does not carry out monitoring of sulphur dioxide.

### 2.2.4 Benzene

West Dunbartonshire Council does not carry out monitoring of benzene.

### 2.2.5 Other Pollutants Monitored

West Dunbartonshire Council does not carry out monitoring of any other pollutant.

### 2.2.6 Summary of Compliance with AQS Objectives

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

# 3 New Local Developments

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 Planning Applications

In February 2012 approval was granted in respect of a planning application to build a new secondary school in Dumbarton. The Environmental Health Section had provided comments to the Planning Department in respect of the planning application. One of the comments was a request that the applicant be advised to contact the Environmental Health Section as early as possible if biomass was being considered. The request was not forwarded to the applicant by the Planning Section and the Environmental Health Section found out in February 2013 that a biomass boiler was being installed in the new school. Discussions are ongoing with regard to the matter and the biomass boiler will be considered in the next Update and Screening Assessment.

# 5 Local Transport Plans and Strategies

West Dunbartonshire Council have recently completed a consultation exercise for its Local Transport Strategy 2013 -2018. It is hoped that the final document will be available soon.

# 6 Climate Change Strategies

The Council is actively working towards reducing its greenhouse gas emissions and dealing with the impacts of climate change. The recently published Climate Change Strategy outlined the following aims:

- A significant reduction in greenhouse gas emissions from Council operations, and from the Council area as a whole (from homes and business);
- Ensure the Council, and its partners, are better prepared to deal with the current and future impacts/consequences of climate change;
- Identify ongoing activity that contributes to climate change mitigation and adaptation and develop new policy and action to address any gaps in our approach;
- Embed climate change mitigation and adaptation action throughout the organisation to ensure it becomes integral to the operation of the Council;

The Council has also produced a Carbon Management Plan which focuses on reducing carbon emissions from the Council's own activities or other areas over which it has direct control. It outlines a range of projects to reduce carbon emissions, from energy efficiency to alternative fuel vehicles, waste minimisation, and awareness raising and training programmes. This Plan set a target of reducing emissions by one-third by 2015.

# 7 Conclusions and Proposed Actions

## 7.1 Conclusions from New Monitoring Data

West Dunbartonshire Council has not identified any exceedences of the National Air Quality Objectives in its area during 2012.

## 7.2 Conclusions relating to New Local Developments

The proposed biomass boiler in the new West Dunbartonshire Council school will require to be considered in the next Update and Screening Assessment.

## 7.3 Other Conclusions

None applicable

## 7.4 Proposed Actions

The monitoring data for 2012 has not identified a need to proceed to Detailed Assessment. There are no proposed changes to the monitoring programme nor is any additional monitoring required.

West Dunbartonshire Council will submit a Progress Report in 2014.

# 8 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 Update and Screening Assessment 2012

West Dunbartonshire Council Air Quality Progress Report 2011

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 - Dumbarton Roadside Automatic Monitor

Appendix C - West Dunbartonshire Clydebank Automatic Monitor

Appendix D - Clydebank $NO_2$ Diffusion Tube Locations

Appendix E - Dumbarton $NO_2$ Diffusion Tube Monitoring Locations

Appendix F - Vale of Leven Diffusion Tube Locations

Appendix G - Key for $NO_2$ diffusion tube monitoring locations

Appendix H - Completed bias spreadsheets used to derive local bias

Appendix I - AEA Pollution Report for Dumbarton Roadside

Appendix J - AEA Pollution Report for West Dunbartonshire, Clydebank

Appendix K - 2012 Monthly $NO_2$ diffusion tube results

# Appendix A: QA: QC Data

### Diffusion Tube Bias Adjustment Factors

### Factor from Local Co-location Studies (if available)

Local bias adjustment figure based on data from the real-time chemiluminescent NOx analysers designated Dumbarton Roadside and West Dunbartonshire Clydebank and their triplicate co-located $NO_2$ diffusion tubes were derived using the spreadsheet on the R&A website. The completed spreadsheets were submitted to the R&A website. 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). Copies of the completed co-location spreadsheets are included as Appendix H.

The locally derived bias adjustment factors for 2012 were 0.94 for Dumbarton Roadside and 0.94 for West Dunbartonshire Clydebank. These factors are very close to the 0.95 bias for GSS on the R&A website. In order to be as conservative as possible the bias adjustment factor of 0.95 from the R&A website has been applied to all 2012 $NO_2$ tube results.

### Discussion of Choice of Factor to Use

As stated above in order to be as conservative as possible the national bias adjustment factor of 0.95 for GSS has been applied to 2012 $NO_2$ diffusion tube results.

### PM Monitoring Adjustment

It was not possible to provide any data from the TEOM/FDMS for 2012 as all data from the unit was rejected by AEA.

### Short-term to Long-term Data adjustment

As the NOx unit at West Dumbarton Glasgow Road only returned 46% data capture the data required to be adjusted to compensate.

**Table A.1 Short-Term to Long-Term Monitoring Data Adjustment**

| Site | Site Type | Annual Mean (µg/m$^3$) | Period Mean (µg/m$^3$) | Ratio |
|---|---|---|---|---|
| Glasgow Anderston | Background | 33 | 41.35 | 0.798 |
| Glasgow Burgher Street | Background | 34 | 38.8 | 0.876 |
| N. Lanarkshire Cumbernauld | Background | 31 | 39.07 | 0.793 |
| Grangemouth Moray | Background | 18.1 | 25.4 | 0.919 |
| Average | | | | 0.8465 |

**West Dumbarton, Glasgow Road. Estimated annual average = 27 x 0.8465 =22.9µg/m$^3$.**

**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 full report is provided for each calendar year.

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 NOx analysers on a fortnightly basis. The calibration data is forwarded to AEA for QA/QC purposes.

The West Dunbartonshire, Clydebank unit is remotely checked by West Dunbartonshire Council staff each working day to ensure that data capture is optimal. Since the installation of the Casella unit in Dumbarton, Glasgow Road we are unable to carry out this daily check on that unit as we do not have the required software. We therefore rely on Ricardo/AEA informing us of any problems at the unit.

## QA/QC of Diffusion Tube Monitoring

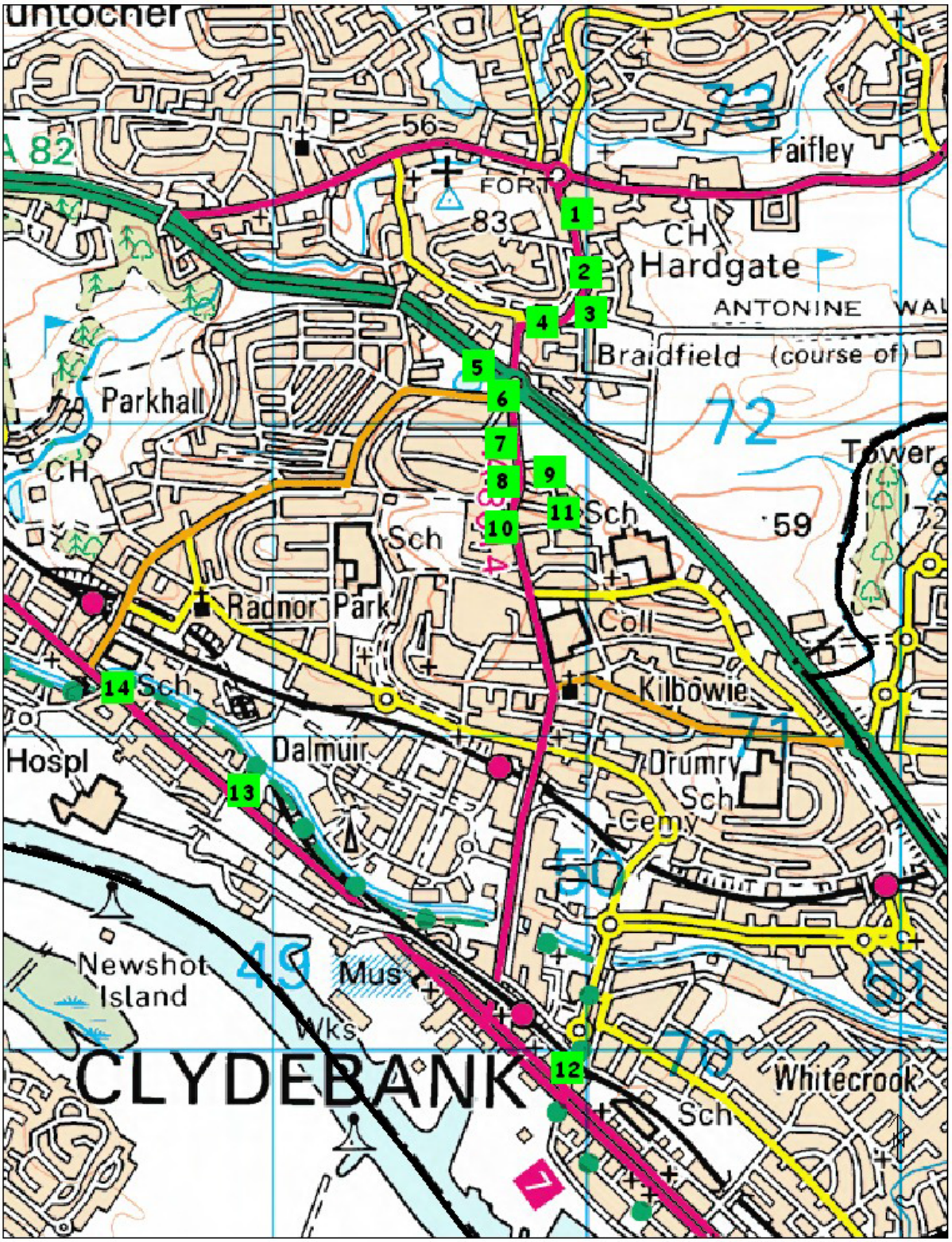
West Dunbartonshire Council use Glasgow Scientific Services (GSS) for $NO_2$ tube analysis. Tubes are provided and analysed by GSS.

The $NO_2$ tube preparation method used is 20% triethanolamine (TEA) in water. Glasgow Scientific Services were one of the UK laboratories undertaking LAQM activities that has participated in recent WASP $NO_2$ PT rounds 112 -119 and the percentage (%) of results submitted which were subsequently determined to be satisfactory based upon a z-score of $< \pm 2$.

**Appendix B – Dumbarton Roadside Automatic Monitor Location (A1)**

## Appendix C – West Dunbartonshire Clydebank Automatic Monitor Location (A2)

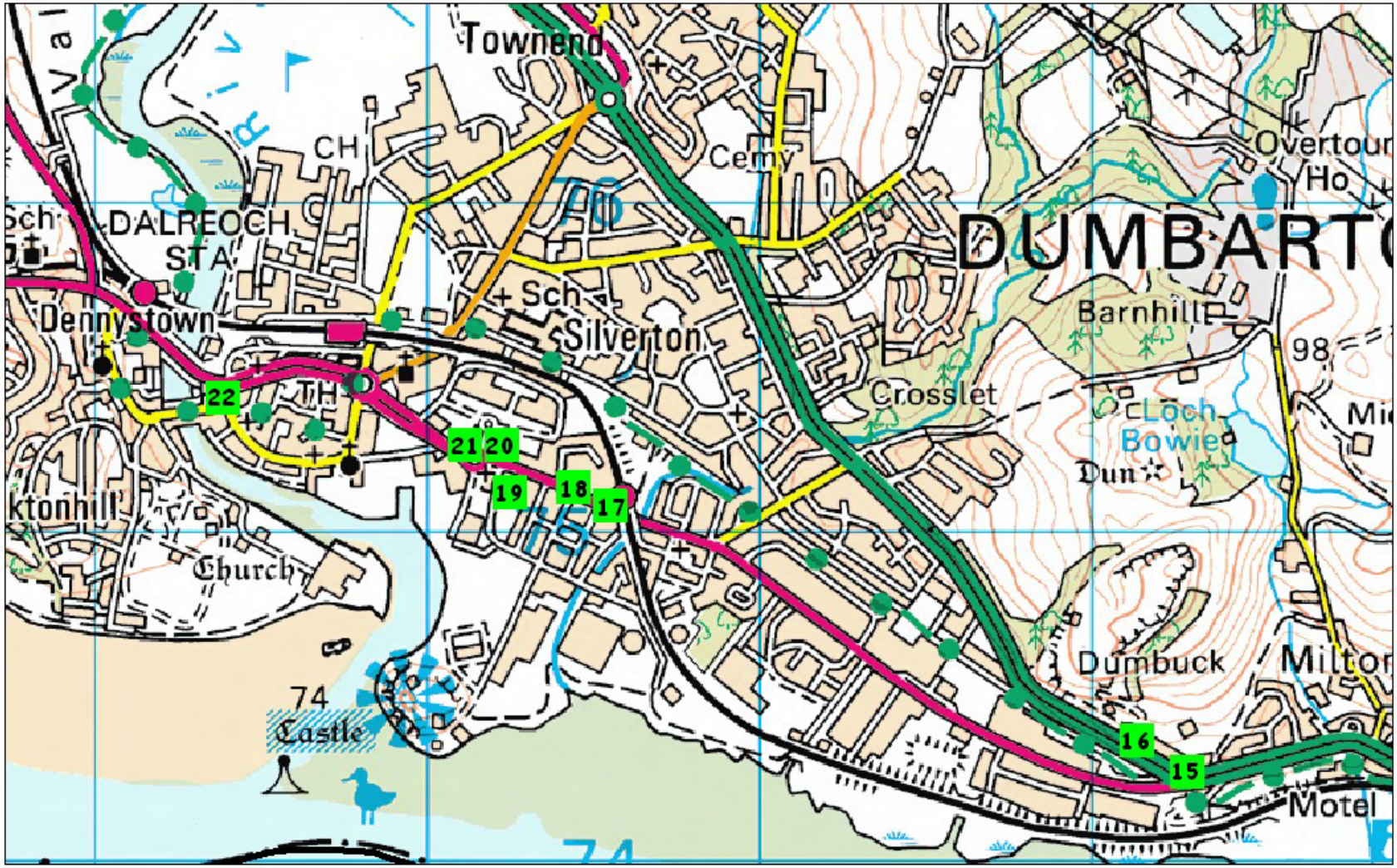
## Appendix D – Clydebank $NO_2$ Diffusion Tube Locations



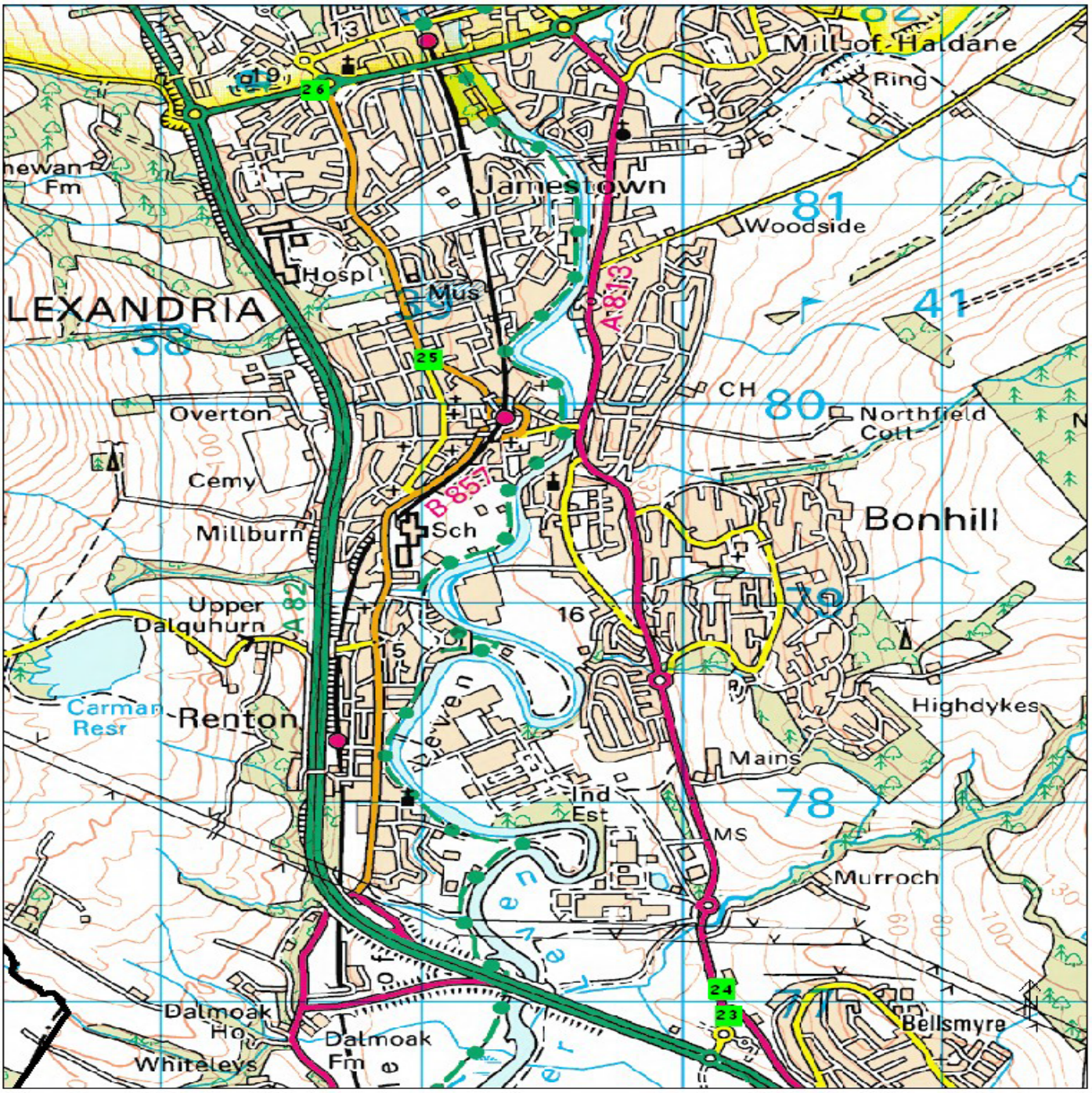

Title : N02 Map - Clydebank

Map No.
Map Reference : NS4971
Scale : 1:15000
Date : 05/04/2012

## Appendix E – Dumbarton $NO_2$ Diffusion Tube Monitoring Locations



## Appendix F – Vale of Leven $NO_2$ Diffusion Tube Monitoring Locations




Title : N02 Map - Vale of Leven



Map No.
Map Reference : NS3979
Scale : 1:20672
Date : 05/04/2012

## Appendix G - Key for $NO_2$ diffusion tube monitoring locations

| Site ID | Map number | Location |
|---|---|---|
| T1 | 14 | Clydebank 1 |
| T2 | 5 | Clydebank 6 |
| T3 | 21 | Dumbarton 1 |
| T4 | 17 | Dumbarton 11 |
| T5 | 26 | Balloch 1 |
| T6 | 25 | Alexandria 1 |
| T7- T9 | 6 | Briar Drive (triplicate) |
| T10 –T12 | 19 | Dumbarton (triplicate) |
| T13 | 15 | Milton 1 |
| T14 | 16 | Milton 2 |
| T15 | 20 | Glasgow Road, Dumbarton 2 |
| T16 | 18 | Glasgow Road, Dumbarton 3 |
| T17 | 12 | Clydebank 7 |
| T18 | 13 | Clydebank 9 |
| T19 | 9 | Clydebank 10 |
| T20 | 4 | Clydebank 11 |
| T21 | 10 | Clydebank 12 |
| T22 | 8 | Clydebank 13 |
| T23 | 11 | Clydebank 14 |
| T24 | 7 | Clydebank 15 |
| T25 | 1 | Clydebank 16 |
| T26 | 2 | Clydebank 17 |
| T27 | 3 | Clydebank 18 |
| T28 | 24 | Vale of Leven 3 |
| T29 | 23 | Vale of Leven 4 |
| T30 | 22 | Dumbarton 12 |

**Appendix H: Completed bias spreadsheets used to derive local bias**

## Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 05/01/2012 | 01/02/2012 | 30.4 | 23.5 | 32.7 | 29 | 4.8 | 17 | 11.9 | 34 | 100 | Good | Good |
| 2 | 01/02/2012 | 29/02/2012 | 37.2 | 27.8 | 38.1 | 34 | 5.7 | 17 | 14.2 | 31.1 | 95 | Good | Good |
| 3 | 29/02/2012 | 28/03/2012 | 23.7 | 24.3 | 24.6 | 24 | 0.5 | 2 | 1.1 | 26 | 100 | Good | Good |
| 4 | 28/03/2012 | 26/04/2012 | 19.2 | 24.9 | 24.0 | 23 | 3.1 | 13 | 7.6 | 21.3 | 100 | Good | Good |
| 5 | 26/04/2012 | 01/06/2012 | 17.9 | 23.2 | 26.6 | 23 | 4.4 | 19 | 10.9 | 21 | 98 | Good | Good |
| 6 | 01/06/2012 | 25/06/2012 | 14.2 | 30.8 | 23.8 | 23 | 8.3 | 36 | 20.7 | 18 | 95 | Poor Precision | Good |
| 7 | 25/06/2012 | 02/08/2012 | 19.0 | 14.3 | 20.6 | 18 | 3.3 | 18 | 8.1 | 15 | 100 | Good | Good |
| 8 | 02/08/2012 | 29/08/2012 | 17.5 | 20.3 | 21.1 | 20 | 1.9 | 10 | 4.7 | 20 | 95 | Good | Good |
| 9 | 29/08/2012 | 26/09/2012 | 17.3 | 16.0 | 14.4 | 16 | 1.5 | 9 | 3.6 | 13 | 95 | Good | Good |
| 10 | 26/09/2012 | 01/11/2012 | 27.8 | 29.5 | 30.0 | 29 | 1.2 | 4 | 2.9 | 25 | 97 | Good | Good |
| 11 | 01/11/2012 | 30/11/2012 | 39.3 | 36.6 | 42.7 | 40 | 3.1 | 8 | 7.6 | 34.2 | 96 | Good | Good |
| 12 | 30/11/2012 | 03/01/2013 | 39.0 | 37.9 | 41.7 | 40 | 2.0 | 5 | 4.9 | 36.5 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

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

| Site Name/ ID: | Briar drive clydebank |
|---|---|

**Precision** 11 out of 12 periods have a CV smaller than 20%

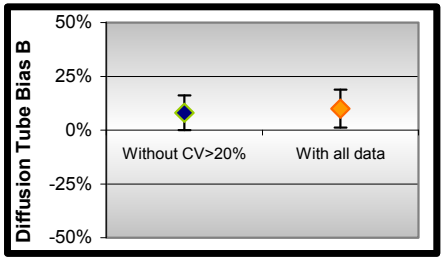
(Check average CV & DC from Accuracy calculations)

**Accuracy (with 95% confidence interval)**
**without periods with CV larger than 20%**
**Bias calculated using 11 periods of data**

| | | |
|---|---|---|
| Bias factor A | 0.94 (0.87 - 1.02) | |
| Bias B | 7% (-1% - 15%) | |
| Diffusion Tubes Mean: | 27 $\mu gm^{-3}$ | |
| Mean CV (Precision): | 11 | caution |
| Automatic Mean: | 25 $\mu gm^{-3}$ | |
| Data Capture for periods used: | 98% | |
| Adjusted Tubes Mean: | 25 (23 - 27) | $\mu gm^{-3}$ |

**Accuracy (with 95% confidence interval)**
**WITH ALL DATA**
**Bias calculated using 12 periods of data**

| | | |
|---|---|---|
| Bias factor A | 0.93 (0.86 - 1.01) | |
| Bias B | 8% (-1% - 17%) | |
| Diffusion Tubes Mean: | 26 $\mu gm^{-3}$ | |
| Mean CV (Precision): | 13 | caution |
| Automatic Mean: | 24 $\mu gm^{-3}$ | |
| Data Capture for periods used: | 98% | |
| Adjusted Tubes Mean: | 25 (23 - 27) | $\mu gm^{-3}$ |




Jaume Targa, for AEA
Version 04 - February 2011

# Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 05/01/2012 | 01/02/2012 | 20.5 | 27.0 | 23.2 | 24 | 3.3 | 14 | 8.1 | 29.6 | 98 | Good | Good |
| 2 | 01/02/2012 | 29/02/2012 | 21.1 | 24.3 | | 23 | 2.3 | 10 | 20.3 | 28 | 100 | Good | Good |
| 3 | 29/02/2012 | 28/03/2012 | 22.1 | 20.2 | 22.3 | 22 | 1.2 | 5 | 2.9 | 20.1 | 87 | Good | Good |
| 4 | 28/03/2012 | 26/04/2012 | 23.0 | 27.2 | 25.1 | 25 | 2.1 | 8 | 5.2 | 16.2 | 92 | Good | Good |
| 5 | 26/04/2012 | 01/06/2012 | 23.5 | 19.8 | 23.2 | 22 | 2.1 | 9 | 5.1 | 17 | 91 | Good | Good |
| 6 | 01/06/2012 | 25/06/2012 | 19.7 | 24.1 | 17.2 | 20 | 3.5 | 17 | 8.7 | 17 | 100 | Good | Good |
| 7 | 25/06/2012 | 02/08/2012 | 10.0 | | 8.2 | 9 | 1.3 | 14 | 11.4 | 14 | 100 | Good | Good |
| 8 | 02/08/2012 | 29/08/2012 | 15.7 | 14.4 | 16.4 | 16 | 1.0 | 7 | 2.5 | 15 | 100 | Good | Good |
| 9 | 29/08/2012 | 26/09/2012 | 18.3 | 17.9 | 15.9 | 17 | 1.3 | 7 | 3.2 | 15 | 100 | Good | Good |
| 10 | 26/09/2012 | 01/11/2012 | 31.3 | 25.1 | 26.3 | 28 | 3.3 | 12 | 8.2 | 25 | 100 | Good | Good |
| 11 | 01/11/2012 | 30/11/2012 | 31.4 | 32.7 | 30.6 | 32 | 1.1 | 3 | 2.6 | 26.4 | 93 | Good | Good |
| 12 | 30/11/2012 | 03/01/2013 | 20.0 | 37.2 | 35.6 | 31 | 9.5 | 31 | 23.6 | 32.32 | 95 | Poor Precision | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | Overall survey --> | | Good precision | Good Overall DC |

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

(Check average CV & DC from Accuracy calculations)

| Site Name/ ID: | West DC Glasgow Road |
|---|---|

**Precision** 11 out of 12 periods have a CV smaller than 20%

**Accuracy (with 95% confidence interval) without periods with CV larger than 20%**

Bias calculated using 11 periods of data

Bias factor A 0.94 (0.81 - 1.13)

Bias B 6% (-11% - 23%)

Diffusion Tubes Mean: 22 $\mu gm^{-3}$

Mean CV (**Precision**): 10

Automatic Mean: 20 $\mu gm^{-3}$

**Data Capture** for periods used: 96%

Adjusted Tubes Mean: 20 (17 - 24) $\mu gm^{-3}$

**Accuracy (with 95% confidence interval) WITH ALL DATA**

Bias calculated using 12 periods of data

Bias factor A 0.95 (0.83 - 1.13)

Bias B 5% (-11% - 21%)

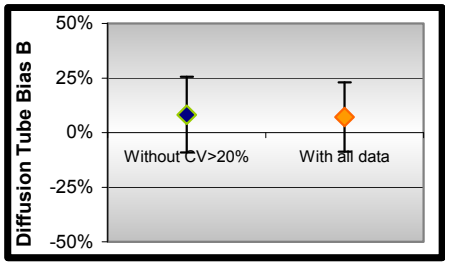
Diffusion Tubes Mean: 22 $\mu gm^{-3}$

Mean CV (**Precision**): 11 caution

Automatic Mean: 21 $\mu gm^{-3}$

**Data Capture** for periods used: 96%

Adjusted Tubes Mean: 21 (18 - 25) $\mu gm^{-3}$




Jaume Targa, for AEA

Version 04 - February 2011

**Appendix I: AEA Pollution Report for West Dunbartonshire, Clydebank**

**Produced by Ricardo-AEA on behalf of the Scottish Government**

# WEST DUNBARTONSHIRE CLYDEBANK
# 1st January to 31st December 2012

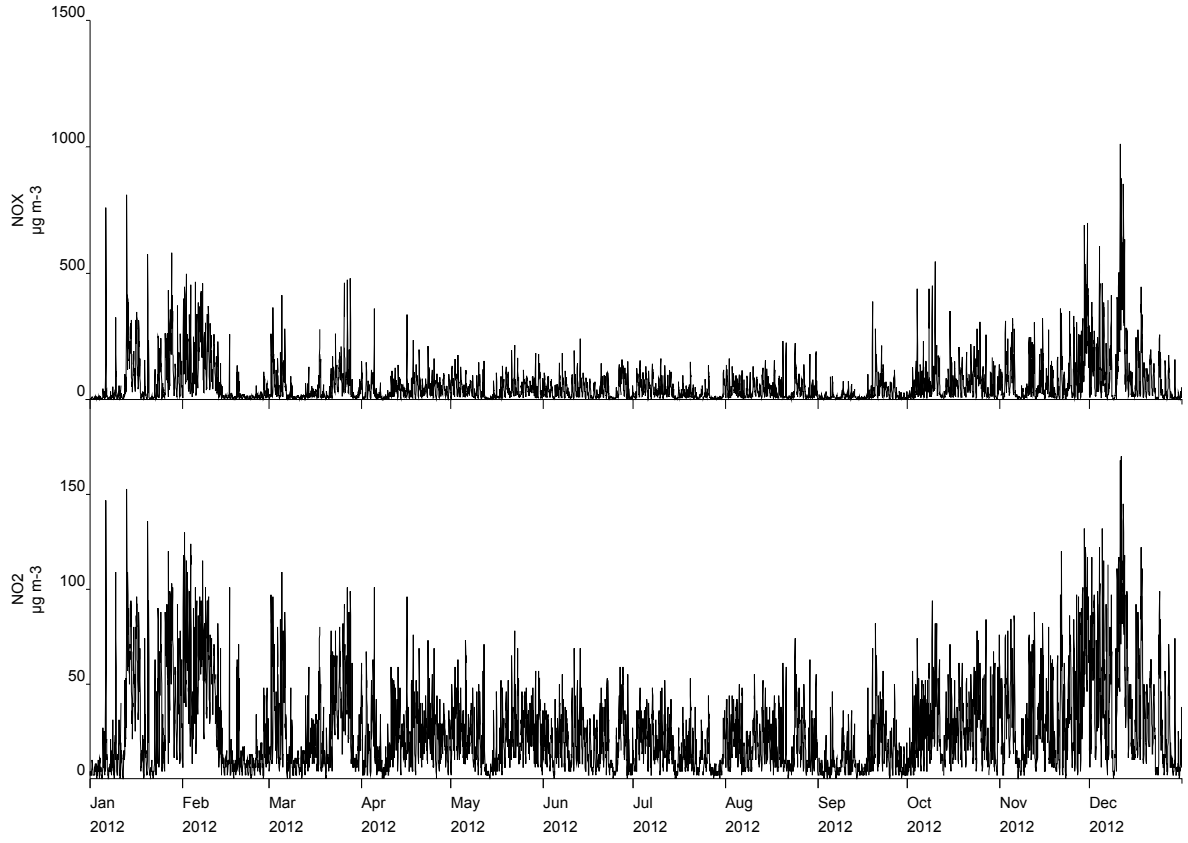
**These data have been fully ratified by Ricardo-AEA**

| POLLUTANT | $NO_X$ | $NO_2$ |
|---|---|---|
| Maximum hourly mean | 1012 µg $m^{-3}$ | 170 µg $m^{-3}$ |
| Average | 56 µg $m^{-3}$ | 24 µg $m^{-3}$ |
| Data capture | 99.4 % | 99.4 % |

All gaseous pollutant mass units are at 20°C and 1013 mb.
$NO_X$ mass units are $NO_X$ as $NO_2$ 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



## Appendix J – AEA Pollution report for Dumbarton Roadside

### Produced by Ricardo-AEA on behalf of Defra and the Scottish Government

# DUMBARTON ROADSIDE
# 1st January to 31st December 2012

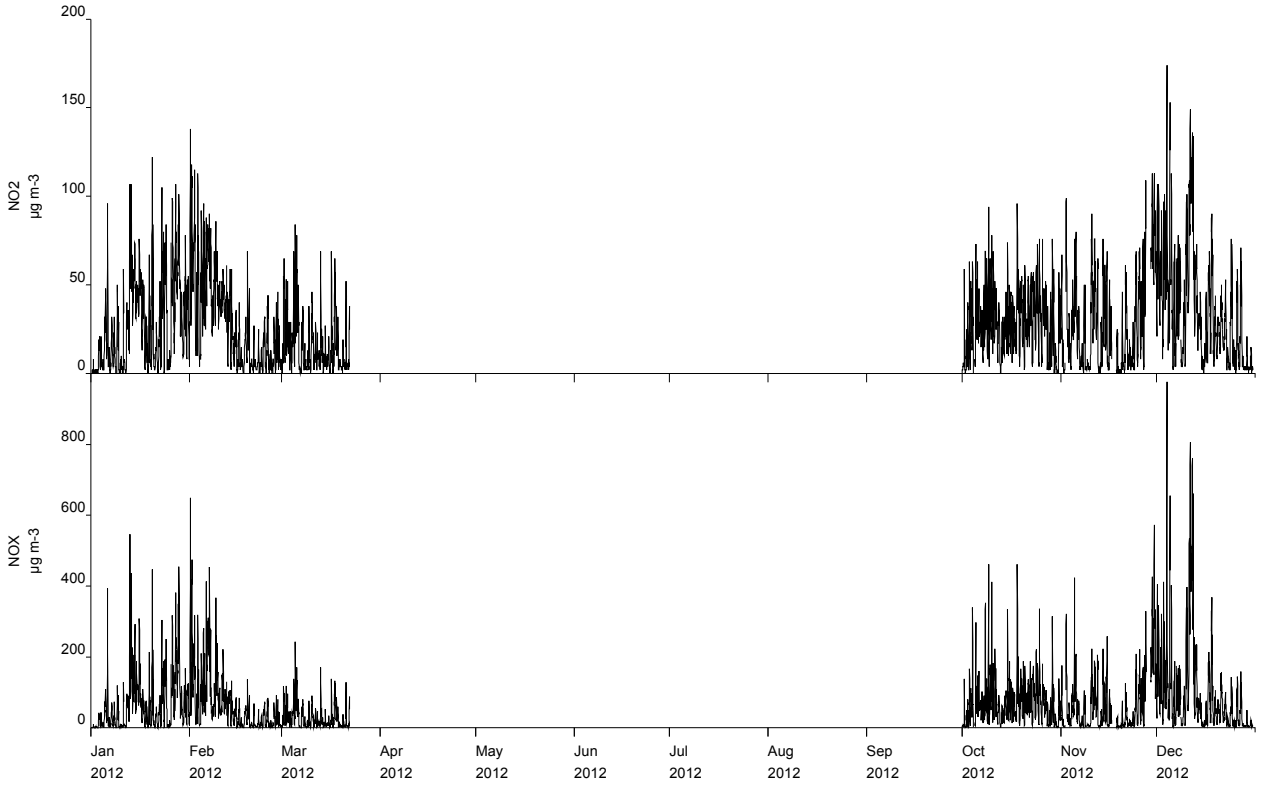
**These data have been fully ratified by Ricardo-AEA**

| POLLUTANT | $NO_2$ | $NO_X$ |
|---|---|---|
| Maximum hourly mean | 174 µg $m^{-3}$ | 976 µg $m^{-3}$ |
| 99.8th percentile of hourly means | 134 µg $m^{-3}$ | - |
| Average | 27 µg $m^{-3}$ | 65 µg $m^{-3}$ |
| Data capture | 46.1 % | 46.1 % |

All gaseous pollutant mass units are at 20°C and 1013 mb.
$NO_X$ mass units are $NO_X$ as $NO_2$ 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



## Appendix K – 2012 Monthly Figures $NO_2$

| N02 tubes 2012 | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clydebank 1 | | 32.7 | 32.2 | 23.8 | 25.6 | 19.9 | 27.3 | 27.1 | 26.7 | 40.6 | 54.8 | 47.1 |
| Clydebank 6 | 36.6 | 42.9 | 27.8 | 27.8 | 44.8 | 28.7 | 36 | 28.8 | 26.8 | 48.2 | 52.1 | 57.3 |
| Clydebank 7 | 30.6 | 32.8 | 28.5 | 24.5 | 26.8 | 22.8 | 24.9 | 28.1 | 23.7 | 34.5 | 46.5 | 41.9 |
| Clydebank 9 | 26.1 | 18.7 | 26.6 | 28.7 | 26 | 21.2 | 23.3 | 21.5 | 20.7 | 31.6 | 39.7 | 35.1 |
| Clydebank 10 | 39 | 24 | 30 | 18.7 | 29.8 | 22.2 | 19.9 | 27.6 | 25.8 | 35.8 | 38.6 | 40.4 |
| Clydebank 11 | 26.9 | 35.3 | 31.8 | 20.4 | 25.7 | 15.4 | 17.5 | 18.3 | 21 | 25.1 | 39.9 | 38.5 |
| Clydebank 12 | 22.2 | 43.6 | 41.9 | 24.2 | 15.1 | 16.3 | 22.1 | 25.3 | 17.8 | 28.2 | 39.2 | 35.4 |
| Clydebank 13 | 26.4 | 33.5 | 28.9 | 29.3 | 19 | 18 | 7.9 | 21.4 | 20.3 | 30.5 | 44.2 | 39.1 |
| Clydebank 14 | | 25.1 | 24.4 | 13.1 | 13 | 11.1 | 11.7 | | 9.7 | 19.2 | 28.9 | 24.5 |
| Clydebank 15 | 22 | 38.8 | 26 | 22.6 | 27.2 | | 19.8 | 29 | 21.5 | 31.6 | 44.7 | 45.8 |
| Clydebank 16 | 21.3 | 22.7 | 29.6 | 19.3 | 14.9 | 17.4 | 13.4 | 22 | 18.9 | 29.9 | 42.9 | 36.9 |
| Clydebank 17 | 26.7 | 41.3 | 30.8 | | 18.1 | 18.4 | 15.2 | 21.2 | 21 | 29.4 | 36 | 36.2 |
| Clydebank 18 | 6.2 | 35.8 | 31.5 | 24.6 | 28.4 | | | | 20.2 | 39.1 | 45 | 47.4 |
| Dumbarton 1 | 39.5 | 26.1 | 32.6 | 22.9 | 19.2 | 28.8 | 22.8 | 25.9 | 22.4 | 35.7 | 38.6 | 37.3 |
| Dumbarton 11 | 38 | 31.5 | 33.9 | | 28 | 24.3 | 25.1 | 55.5 | 21.1 | 57.8 | 41.5 | |
| Dumbarton 12 | 22.4 | 34 | 18 | 18.6 | 19.7 | 18 | 14.8 | 15.4 | 13.3 | 25.4 | 30 | 28.9 |
| Glasgow Rd, D'ton 2 | 46.7 | 47.5 | 46.2 | 32.5 | 27.9 | 26.5 | 33 | 26.9 | 27.3 | 38.8 | 41.6 | 42 |
| Glasgow Rd, D'ton 3 | 35.2 | 27.2 | 25.3 | 43.4 | 39.1 | 43.6 | 28 | 17.3 | 35.5 | 36.5 | 46.2 | |
| **Milton 1** | | **58.9** | **62.7** | **43.1** | **56.7** | **46** | **43.7** | **42.5** | **47.3** | | **74.6** | **68.2** |
| Milton 2 | 22.9 | 25.4 | 28.3 | 8.6 | 12.5 | 14.5 | 16.4 | 12.6 | 23.9 | 45 | 31.2 | 24.7 |
| Alexandria 1 | 29.6 | 22.4 | 30.5 | 28.4 | 23.9 | 18 | 21 | 22 | | 22.9 | 37.2 | 41.4 |
| Balloch 1 | 22.2 | 24.2 | 23.3 | 29.8 | 21 | 27.5 | 22.7 | 21.6 | 15.7 | 26.7 | 36.1 | 39.6 |
| Vale of Leven 3 | 19.7 | 21 | 25.9 | 25.1 | 19.6 | 16.1 | 18.7 | 22.2 | 25 | 31.1 | 38.1 | 28.9 |
| Vale of Leven 4 | 24.2 | 13 | 25.5 | 16.2 | 20.1 | 14.7 | 25.3 | 18.3 | 23.4 | 28 | 36.1 | 32.7 |
| Briar Drive 1 | 30.4 | 37.2 | 23.7 | 19.2 | 17.9 | 14.2 | 19 | 17.5 | 17.3 | 27.8 | 39.3 | 39 |
| Briar Drive 2 | 32.5 | 27.8 | 24.3 | 24.9 | 23.2 | 30.8 | 14.3 | 20.3 | 16 | 29.8 | 36.6 | 37.9 |
| Briar Drive 3 | 32.7 | 38.1 | 24.6 | 24 | 26.6 | 23.8 | 20.6 | 21.1 | 14.4 | 30 | 42.7 | 41.7 |
| Dumbarton triplicate 1 | 20.5 | 21.1 | 22.1 | 23 | 23.5 | 19.7 | 10 | 15.7 | 18.3 | 31.3 | 31.4 | 20 |
| Dumbarton triplicate 2 | 27 | 24.3 | 20.2 | 27.2 | 19.8 | 24.1 | | 14.4 | 17.9 | 25.1 | 32.7 | 37.2 |
| Dumbarton triplicate 3 | 23.2 | | 22.3 | 25.1 | 23.2 | 17.2 | 8.2 | 16.4 | 15.9 | 26.3 | 30.6 | 35.6 |