2013 Air Quality Progress Report for *ARGYLL AND BUTE COUNCIL*

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

April 2013

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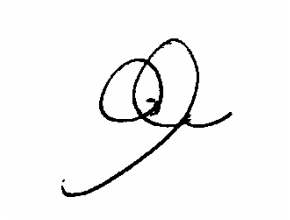
Signature	

Executive Summary

The continuing work to assess local air quality within Argyll and Bute Council has established that there is no requirement to progress to a Detailed Assessment for any pollutants and that:-

(a) Diffusion tube results indicate that the 2004 annual mean objective for nitrogen dioxide (NO_2) continues to be met

(b) PM_{10} monitoring during the first part of the year indicated compliance with 2010 24 hour mean and annual mean objectives.

A review of planning applications submitted in 2012 did not reveal any developments with the potential to significantly affect local air quality. There were no new permitted processes opened in 2012 with the capacity to affect local air quality. No new landfill sites or quarries opened with relevant public exposure.

In reviewing the annual mean concentration levels of PM_{10} monitoring at Tarbert, monitoring indicates compliance with national standards. However, more importantly from 2007, there is a downwards trend in concentrations and improving air quality

Conclusions

1. There is no requirement for Argyll and Bute Council to progress to Detailed Assessment. In the course of our work we have identified this position through objective monitoring and assessment of development
2. The Council has reviewed its local air quality monitoring programme and has decommissioned the TEOM PM_{10} monitor at Tarbet.

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1 Introduction

1.1 Description of Local Authority Area

The Argyll and Bute Council area covers approximately 6900 square kilometres and borders upon Stirling, Highland, West Dunbartonshire, and Perth and Kinross Councils. Much of the land area is occupied by mountain and moorland, particularly in the north eastern portion. Off the coastline lie some 550 islands, 25 of which are inhabited. The principal islands are Bute, Islay, Mull, Luing, Jura, Coll, Lismore, Iona, Colonsay and Gigha, and the main settlements are located at Bowmore, Campbeltown, Dunoon, Lochgilphead, Oban, Rothesay, Tobermory, Tarbert, Inveraray and Helensburgh.

The combination of mountain, moorland, coastline, particularly the long indented sea lochs, as well as several large fresh water lochs, give the area a distinctive character. The designations of several National and Regional Scenic Areas and the Loch Lomond and the Trossachs National Park reflect this.

Industries

Industries tend to be related to the natural assets of the area. Forestry and agriculture are prevalent inland, whilst in coastal areas there are a large number of distilleries, fish farms and fishing businesses. Tourism makes a significant and important contribution to the Argyll and Bute economy.

Those industries that are regulated by the Scottish Environmental Protection Agency (SEPA) because of their potential to cause pollution i.e. prescribed processes in terms of the Pollution Prevention & Control (Scotland) Regulations 2000, are mapped in Appendix C.

Population

The average population density of Argyll and Bute is less than 13 people per square kilometre with 75% of the population living in areas classified by the Scottish Government as either 'remote rural' or 'remote small towns' (Table 1.1).

Table 1.1 6 Fold Classification of Population Distribution

Scottish Government Urban-Rural classification	Population living within classification	% total population	% of total land area
1: Large urban areas	0.0	0.0	0.0
2: Other urban areas	15,994	17.2	0.1
3: Accessible small towns	0.0	0.0	0.0
4. Remote small towns	27,977	30.0	0.6
5: Accessible rural	6,856	7.6	2.8
6: Remote rural	40,523	45.2	96.5
Total	**91,350**	**100.0**	**100.0**

Over 47,000 people live in the six main population centres of Campbeltown, Dunoon, Helensburgh, Lochgilphead, Oban and Rothesay (Table 1.2). Around 17% of the population live on islands.

Table 1.2 Main Population Centres and their Population and Classification

Town	Population	Scottish Government Urban-Rural classification
Campbeltown	5400	Remote small town
Dunoon	9400	Remote small town
Helensburgh	15900	Other urban area
Lochgilphead/Ardrishaig	3600	Remote rural area
Oban	8050	Remote small town
Rothesay	4850	Remote small town
Total	**47200**	

Road Network and Transport

The topography of the area, together with the relatively dispersed population, means that the majority of transport movements involve long road journeys. Most of the main roads follow the coastline and have to make long detours around the head of extensive sea lochs. The only large towns served by the rail network are Oban and Helensburgh. Throughout the area heavy reliance is therefore placed upon road transport, both by the resident population and visitors. Between 1995 and 1997, 82% of the 1.8 million trips made into the Argyll, the Isles, Loch Lomond, Stirling and the Trossachs Tourist Board area were made by road transport. Summertime traffic flows are consequently higher than those experienced during the winter months.

Regular car ferry services connect the larger islands and there are numerous smaller car and passenger ferries serving the smaller islands. In addition, ferry services operate between mainland settlements for commuter, freight and tourist traffic, for example Dunoon to Gourock. The main ferry terminals are located at Dunoon, Oban, Rothesay and Kennacraig.

Airports operating scheduled flights between island and mainland communities are found at Coll, Colonsay, Tiree, Campbeltown, Islay and Oban.

A map showing the location of ferry terminals and airports is included in Appendix C.

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 micrograms 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 1.3 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

Table 1.4 Summary of Previous Reports.

Report	Date	Outcome
First Stage Assessment	1998	Further assessment of NO_2 & SO_2 required
Second Stage Assessment (USA)	2003	Detailed assessments required for PM_{10} and SO_2 in relation to the combustion of solid fuel in Tarbert. Further assessment recommended for Port Ellen Maltings.
Detailed Assessment – PM_{10} & SO_2 from solid fuel combustion in Tarbert	2005	Indicated compliance with PM_{10} & SO_2 objectives.
Further Assessment for industrial process at Port Ellen	2005	Recommended monitoring for CO at Port Ellen
Progress Report	2005	Recommended monitoring for CO at Port Ellen
Updating & Screening Assessment	2006	Continue monitoring PM_{10} related to solid fuel combustion at Tarbert and detailed assessment for CO at Port Ellen Maltings
Progress Report & Detailed Assessment	2007	Detailed assessment reported Port Ellen Maltings should comply with CO objective.
Progress Report	2008	Continued monitoring indicates compliance with CO & PM_{10} objectives
Updating & Screening Assessment	2009	Continued monitoring indicates compliance with CO & PM_{10} objectives
Progress Report	2010	Continued monitoring indicates compliance with CO & PM_{10} objectives
Progress Report	2011	Continued monitoring indicates compliance with CO & PM_{10} objectives
Updating & Screening Assessment	2012	Continued monitoring indicates compliance with PM_{10} objectives

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Table 2.1 provides details of the automatic monitoring site within Argyll and Bute. The site was originally established to support a Detailed Assessment undertaken to further consider the PM_{10} emissions from coal burning in Tarbert[1]. The conclusion was that the designation of an Air Quality Management Area was not necessary although it was decided to maintain the operation of the automatic monitoring site. A review of monitoring in 2011 concluded that there was continuing compliance with the PM_{10} objectives as reported in previous LAQM reports. Accordingly, the PM_{10} monitor at Tarbert was decommissioned in June 2012. Results for the period January to June 2012 are presented in section 2.2.2 and details of QA/QC procedures are included in Appendix A.

Table 2.1 Details of Automatic Monitoring Site

Site ID	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	Worst-case Location?
PM10	Tarbert	Urban background	E 186553 N 668458	PM_{10}	TEOM	N	Y (23m)	N/A	Y

2.1.2 Non-Automatic Monitoring Sites

Argyll and Bute Council undertakes monitoring of nitrogen dioxide using diffusion tubes at 10 sites throughout the district. The diffusion tubes are sited mainly on roads which are perceived to be subject to the highest concentrations due to traffic flow and are possibly associated with other features such as street canyons. Details of current sites are provided in Table 2.2 and QA/QC procedures are included in Appendix A.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure?	Distance to kerb of nearest	Does this location represent worst-case exposure?
N1	George Street 1, Oban	Roadside	185921	729942	NO_2	N	N	Y (5m)	2m	Y
N2	George Street 2, Oban	Roadside	185870	730319	NO_2	N	N	Y (4m)	9m	Y
N3	George Street 3, Oban	Roadside	185880	730250	NO_2	N	N	Y (4m)	9m	Y
N4	Argyll Street, Dunoon	Roadside	217324	676984	NO_2	N	N	Y (6m)	3m	Y
N5	Main St, Campbeltown	Roadside	171918	620330	NO_2	N	N	Y (1m)	3m	Y
N6	Colchester Sq, Lochgilphead	Roadside	186222	687940	NO_2	N	N	Y (10m)	2m	Y
N7	Inverneil	Rural B'ground	186048	729293	NO_2	N	N	Y (3m)	N/A	Y
N8	East Princes St, Helensburgh	Roadside	229809	682326	NO_2	N	N	Y (12m)	2m	N
N9	Main Road, Cardross	Roadside	234350	677771	NO_2	N	N	Y (6m)	2m	Y
N10	Sinclair Street Helensburgh	Roadside	231925	704478	NO_2	N	N	Y (3m)	2m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

Diffusion Tube Monitoring Data

The annual concentrations from diffusion tube monitoring sites (adjusted for bias) are presented in Table 2.4 and a monthly breakdown of results is included in Appendix B. The annual mean concentrations for NO_2 diffusion tubes (adjusted for bias) for the years 2007 to 2012 are presented in Table 2.5 and are shown in graphical format in Appendix B.

Following interference with the Lochgilphead site the tube was moved to a more secure site which is also closer to sensitive receptors and representative of residential property in the area. The results from June 2012 onwards reflect this change and a general increase in readings has been noted due to the more sheltered nature of the site.

Trend lines have been plotted on the graphs where the duration of monitoring and results rendered it meaningful. Table 2.3 summarises the trends which are either level or downward. All sites are significantly below the prescribed 40$\mu g/m^3$ prescribed annual mean.

Table 2.3 NO_2 Diffusion Tube Trends

Site ID	Location	Trend
N1	George Street 1, Oban	Down
N2	George Street 2, Oban	Not plotted
N3	George Street 3, Oban	Not plotted
N4	Argyll Street, Dunoon	Down
N5	Main St, Campbeltown	Very slightly down
N6	Colchester Sq, Lochgilphead	Not plotted
N7	Inverneil	Not plotted
N8	East Princes St, Helensburgh	Down
N9	Main Road, Cardross	Level
N10	Sinclair Street, Helensburgh	Not plotted

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes in 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2012	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.95) 2012 (μg/m^3)
N1	George Street 1, Oban	Roadside	N	N	11 months	N/A	N	22.9
N2	George Street 2, Oban	Roadside	N	N	10 months	N/A	N	24.1
N3	George Street 3, Oban	Roadside	N	N	11 months	N/A	N	22.2
N4	Argyll Street, Dunoon	Roadside	N	N	12 months	N/A	N	15.0
N5	Main St, Campbeltown	Roadside	N	N	11 months	N/A	N	17.5
N6	Colchester Sq, Lochgilphead	Roadside	N	N	9 months	N/A	N	23.4
N7	Inverneil	Rural B'ground	N	N	11 months	N/A	N	2.6
N8	East Princes St, Helensburgh	Roadside	N	N	11 months	N/A	N	13.8
N9	Main Road, Cardross	Roadside	N	N	11 months	N/A	N	13.3
N10	Sinclair Street Helensburgh	Roadside	N	N	10 months	N/A	N	19.4

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes (2008 to 2012) (see also Figures in Appendix B)

Site ID	Location	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
				2008* (Bias Adjustment Factor = 0.97)	2009* (Bias Adjustment Factor = 1.23)	2010* (Bias Adjustment Factor = 1.10)	2011 (Bias Adjustment Factor = 0.94)	2012 (Bias Adjustment Factor = 0.95)
N1	George Street 1, Oban	Roadside	N	27.6	30.5	25.6	23.9	22.9
N2	George Street 2, Oban	Roadside	N	n/a	24.9	24.7	24.1	24.1
N3	George Street 3, Oban	Roadside	N	n/a	27.6	28.0	21.2	22.2
N4	Argyll Street, Dunoon	Roadside	N	17.0	18.5	17.9	15.0	15.0
N5	Main St, Campbeltown	Roadside	N	21.9	25.5	22.2	17.8	17.5
N6	Colchester Sq, Lochgilphead	Roadside	N	9.5	11.8	9.1	10.1	23.4
N7	Inverneil	Rural B'ground	N	2.3	3.1	3.0	2.5	2.6
N8	East Princes St, Helensburgh	Roadside	N	19.8	24.1	19.8	15.6	13.3
N9	Main Road, Cardross	Roadside	N	18.4	20.6	19.4	14.2	13.8
N10	Sinclair Street Helensburgh	Roadside	N	n/a	n/a	21.7	19.2	19.4

2.2.2 PM_{10}

A TEOM PM_{10} monitor was sited at Tarbert Academy following the conclusion of the 2003 USA[2] to progress to a Detailed Assessment in respect of domestic solid fuel combustion. The site is surrounded by housing with many properties at the time burning solid fuel as a primary source of heating and it was considered to be representative of relevant public exposure. It was reported in the 2007 Progress Report and Detailed Assessment[3] that there would be compliance with all the 2004 and 2010 objectives. Monitoring of PM_{10} using the TEOM has continued at the site and has confirmed this position. The results of a review included in the 2011 Progress Report[4] identified that further monitoring was not necessary and the TEOM was consequently decommissioned in June 2012.

The Volatile Correction Model cannot be used for the TEOM monitoring data as there are no FDMS instruments with sufficient data capture within range. The results presented below have been corrected by using the equation *Reference equivalent* PM_{10} *= TEOM x 1.3 – 2.2494* as directed by Defra[5]. Annual means and 24 hour exceedances are presented in graphical form in Appendix B and Tables 2.6 and 2.7 below

A distinct downward trend is apparent from an examination of the annual mean concentrations results of the Tarbert TEOM and is presented in Figure 5. A significant influence may be the conversion of primary heating in houses on the adjacent scheme from coal to electric power. It should be noted that the figure for 2012 only relates to the period January to June.

Table 2.6 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m³				
						2008	2009	2010	2011	2012 (Jan to Jun)
Tarbert	Urban background	N	N/A	99	Y	16.9	14.3	13.8	13.8	13.1

Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m³)				
						2008	2009	2010	2011	2012 (Jan to Jun)
Tarbert	Urban background	N	96	N/A	Y	0	0	0	0	0

2.2.3 Summary of Compliance with AQS Objectives

Argyll and Bute Council has examined the results from monitoring in its area. Concentrations are all well below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Commercial and Domestic Sources

Since the 2012 USA was prepared planning permission for a number of biomass boilers has been granted for schemes in excess of 100kW net thermal input. These individual installations are listed below.

Table 3.1 New biomass boilers >100kW

Site	Rating kW	Stack Height	Building Height	Effective Stack Height	Stack Diameter
Combie Court, Oban	200	13	12	11.5	0.21
Islay High School	360	4.6	3.6	1.7	0.50

3.2 New Developments with Fugitive or Uncontrolled Sources

There are numerous haul unmetalled roads associated with forestry extraction or windfarm construction that are of a temporary nature and are hard surfaced with graded and rolled aggregate. These roads are invariably remote, inherently damp and do not threaten to cause breaches of PM_{10} objectives. The Council does not propose to carry out individual assessments of these sources unless particular circumstances indicate that it would be appropriate.

Argyll and Bute Council has confirms that all the following have been considered:

- Road traffic sources
- Other traffic sources
- Industrial sources
- Commercial and development sources
- New developments with fugitive or uncontrolled sources

The Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area.

Biomass boiler installations at:

Combie Court, Oban
Islay High School, Bowmore

These will be taken into consideration in the next Updating and Screening Assessment

4 Conclusions and Proposed Actions

4.1 Conclusions from New Monitoring Data

Indicative monitoring of PM_{10} at Tarbert has consistently indicated compliance with the PM_{10} 2010 annual mean objective in the Council's densest area of primary coal combustion. It was proposed that PM_{10} monitoring would be discontinued and the TEOM was decommissioned in June 2012.

The nitrogen dioxide diffusion tube network has continued in operation and reference to the graphs in Appendix B show that no rising trends have been revealed or that any measured concentrations are close to the annual mean objective.

4.2 Conclusions relating to New Local Developments

Further consideration will be given to new biomass plant in the 2015 Updating and Screening Assessment. None of the installations described in this report give rise for the need to undertake a Detailed Assessment

4.3 Proposed Actions

The 2013 Progress Report has not identified any need to proceed to a Detailed Assessment for any pollutant.

The matters considered by this Progress Report will be considered and presented in the Progress Report in April 2014 and the Updating and Screening Assessment in April 2015.

5 References

1) Argyll and Bute Council, Detailed Assessment of Emissions from Domestic Solid Fuel Burning in Tarbert, November 2005

(2) Argyll & Bute Council, Updating & Screening Assessment of Air Quality, May 2003

(3) Argyll and Bute Council, Local Air Quality Management Progress Report and Detailed Assessment, April 2007

(4) Argyll and Bute Council, Local Air Quality Management Progress Report and Detailed Assessment, April 2011

(5) http://uk-air.defra.gov.uk/news?view=120

(6) http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Nitrogen dioxide diffusion tubes are supplied and analysed by Glasgow Scientific Services. The laboratory scored 100% in the latest WASP assessment dated September 2012. The preparation method used is 20% TEA in water and the 2012 bias adjustment factor of 0.95 was obtained from Spreadsheet Version 03/13[6]. No local co-location studies were available to produce bias adjustment factors.

PM Monitoring Adjustment

The Volatile Correction Model cannot be used for the TEOM monitoring data as there are no FDMS instruments within range. The results for the annual mean have been corrected to gravimetric equivalence by applying the equation Reference equivalent PM_{10} = TEOM x 1.3 – 2.2494 as directed by Defra at: http://uk-air.defra.gov.uk/news?view=120.

QA/QC of automatic monitoring

PM_{10} Monitoring

This section refers to the TEOM that was installed at Tarbert which was decommissioned in June 2012.

Service of TEOM

The TEOM is covered by a service and maintenance contract with Air Monitors Ltd which covers cleaning of components, calibration checks, flow and leak checks, and replacement of consumable items. The performance of the tapered element is checked against a pre-weighed filter & the result checked against the stated

calibration constant. Records are kept of any service or maintenance of the analyser.

Data Handling and Validation

Raw data is downloaded at intervals not exceeding 25 days. The raw data file is opened in Excel and is visually examined for suspect data which is deleted from the data set before subsequent calculation of periodic means. Readings that are generally considered invalid are:

- Readings indicated by the analyser as invalid
- Several consecutive zero readings
- Minus concentrations

The raw data file is retained so it can re-examined at a late date if deemed necessary. The validated data file is saved in an Excel spreadsheet where it is used to calculate the 24 hour mean and to allow subsequent presentation in graphical format. All concentrations are multiplied by corrected to gravimetric equivalence by application of the Reference equivalent PM_{10} = TEOM x 1.3 – 2.2494. 24 hour mean values are only calculated where data capture in the 24 hour period exceeds 75%. A separate spreadsheet is produced for each quarter starting January 1st. A fifth spreadsheet is produced as a combination of the four quarterly spreadsheets. This allows for calculation of the annual mean and presentation of graphical results.

Data ratification

Completed quarterly spreadsheets are checked periodically to ensure that the data results are reliable and consistent. This includes:

- Checking the characteristics of the plotted results to highlight any potential baseline drift or departure from the normal range of readings.
- Check any high readings against the results from other sites to help identify any possible PM_{10} episodes.

- Investigate potential local changes in the local environment that may have produced changes in PM_{10} concentrations.

QA/QC of diffusion tube monitoring

The NO_2 diffusion tubes are supplied and analysed by Glasgow Scientific Services and prepared by using 20% TEA in water. The duration of exposure is normally the 4/5 week period suggested by the calendar provided by Defra. Glasgow Scientific Services have adopted the procedures for preparation and analysis contained in the document "Diffusion Tubes for Ambient NO_2 Monitoring:- Practical Guidance." Section 3 of this document also provides the basis for the operation of the Council's diffusion tube network.

A bias adjustment factor was applied to the annual mean NO_2 concentrations for 2012. The factor of 0.95 was obtained from Spreadsheet Version Number 03/13 downloaded from http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html .

Appendix B: Monitoring Results and Graphs

Table B.1 Monthly Nitrogen Dioxide Diffusion Tube Monitoring Results

2011	George St 1 Oban	George St 2 Oban	George St 3 Oban	Lochgilphead	Campbeltown	Mid Argyll Rural	Dunoon	East Princess St Helensburgh	Sinclair St Helensburgh	Cardross
January	13.9		21.7	7	15	3	21.8	16.2	17.6	18.6
February										
March	24.9	26.3	21.5		20	3	18.6	15.7	10.9	15.5
April	22.1	29.6	22.0	6.4	17.5	2	18.7	13.0	21.4	14.7
May	22.0	21.5	19.1	11.8	20	7	12.1	13.2		15.9
June	26.5	23.9		21.9[#]	20	5	7.8	11	17	11.4
July	22.1	30.4	21.7	18.4	11	2		8	16	7.9
August	25.2	18.0	8.2	15.3	10	2	5.3	12	18	6.1
September	23.9	20.1	29.1	22.7	17	2	14.2	10	19	14.3
October	27.4	27.5	30.1	27.9	22	2	21	18	20	17.4
November	23.4	28.0	30.0		25	2	20.4	18	24	21.6
December	33.8	28.7	30.0	41.4*	24	4	23.7	24	30	19.1

Notes: *= suspect result. #= resited tube

Figure 1 Graph of Annual NO_2 Trends – Mid Argyll Area

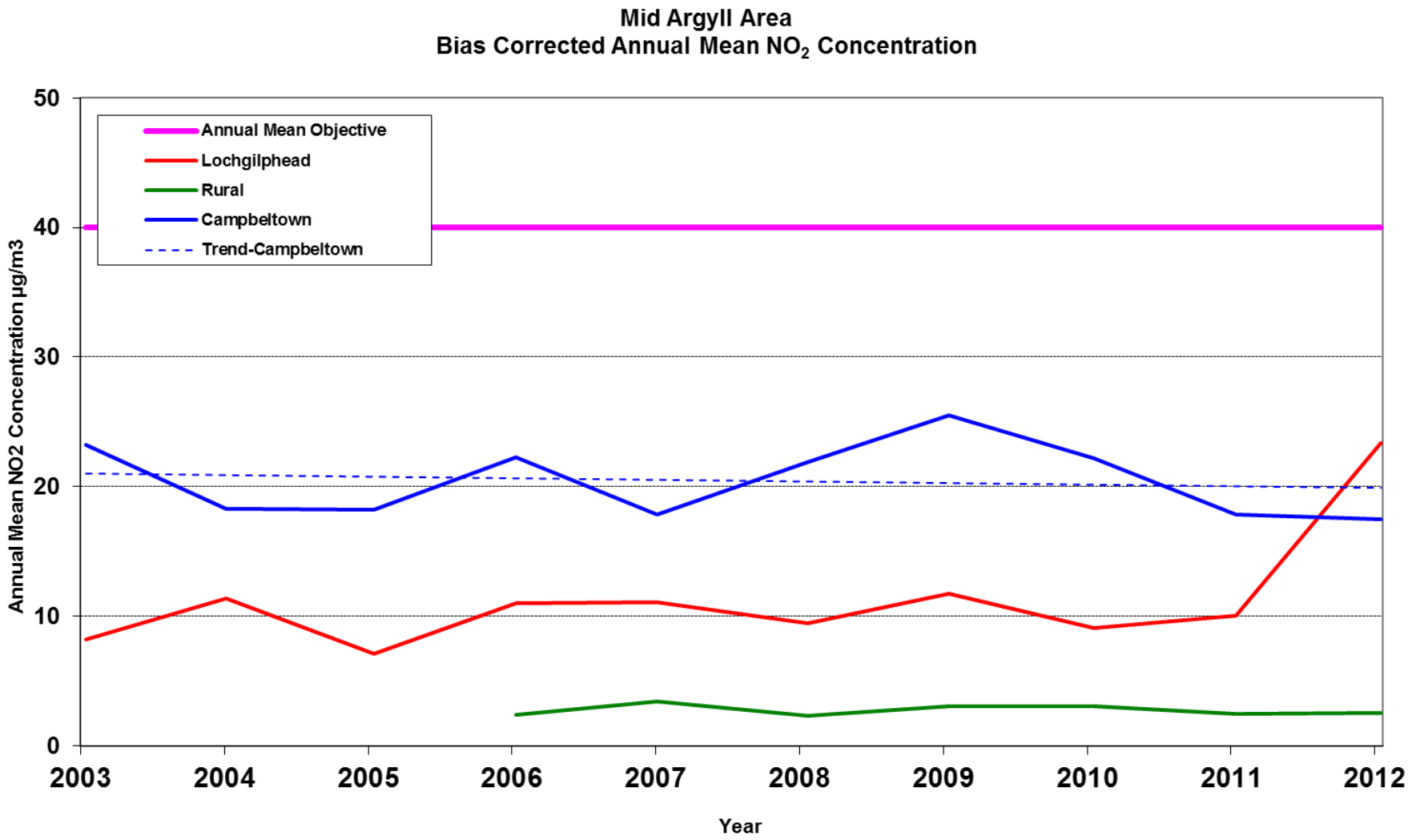


Figure 2 Graph of Annual NO_2 Trends – Bute and Cowal Area

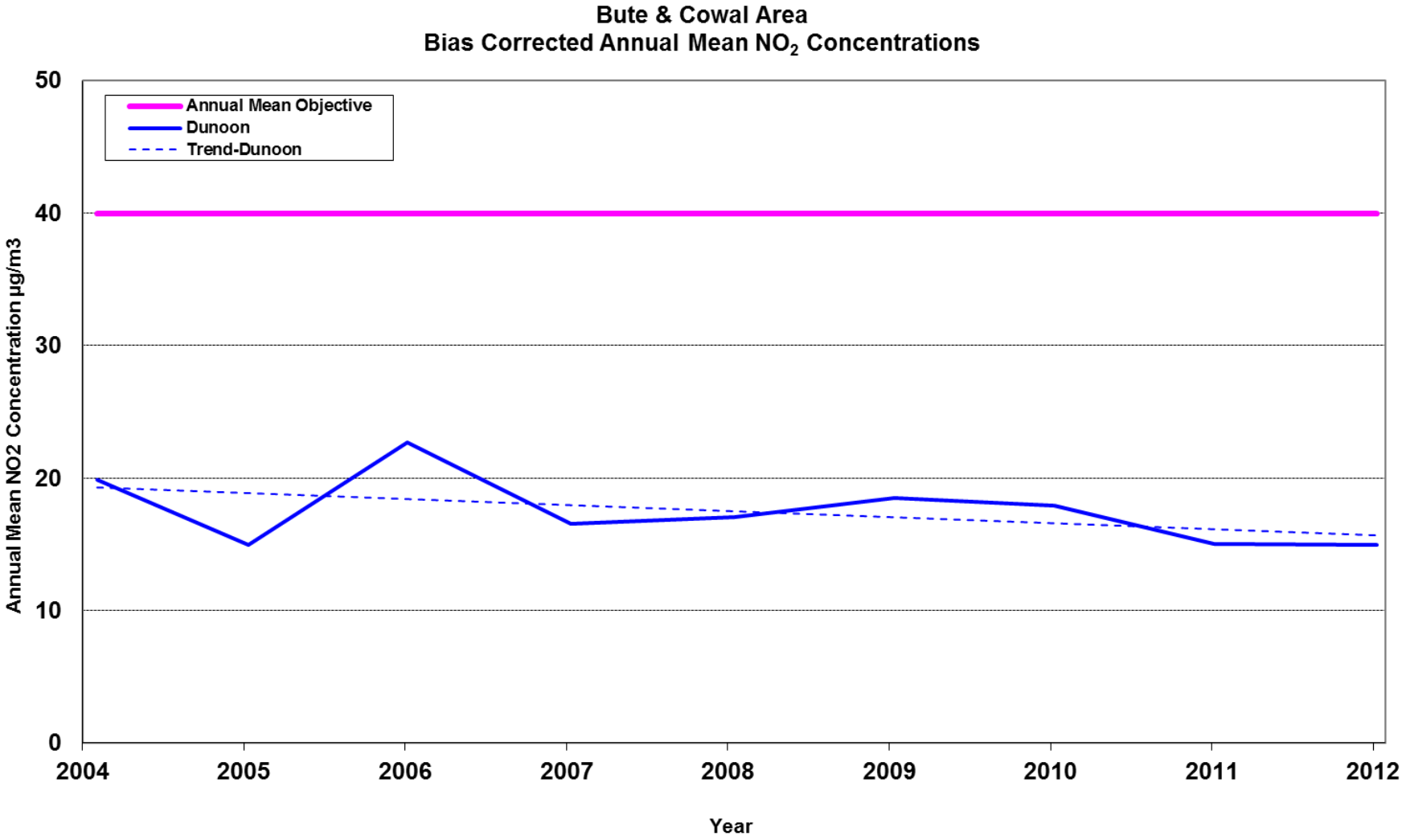


Figure 3 Graph of Annual NO_2 Trends – Oban, Lorn & Isles Area

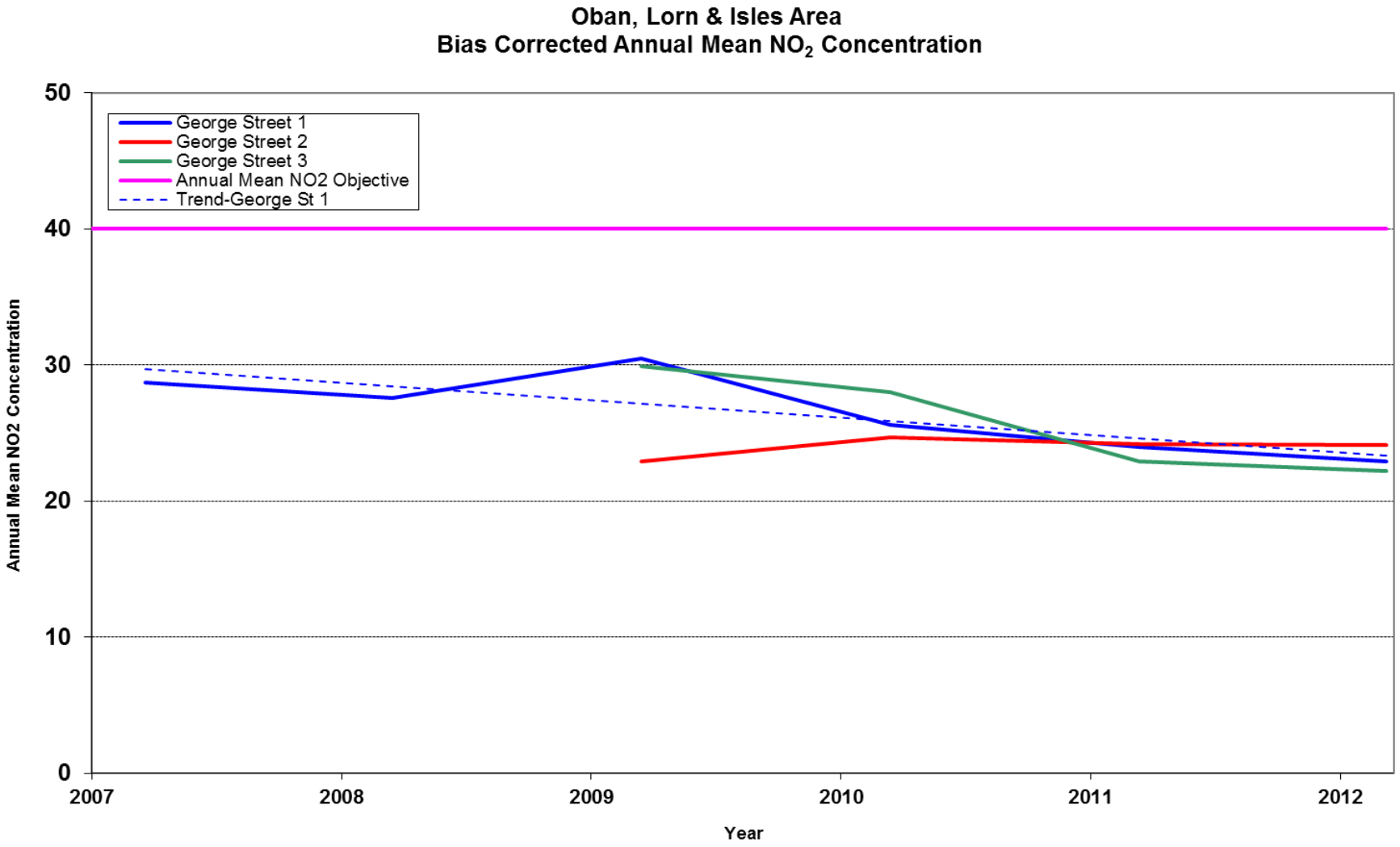


Figure 4 Graph of Annual NO_2 Trends – Helensburgh and Lomond Area

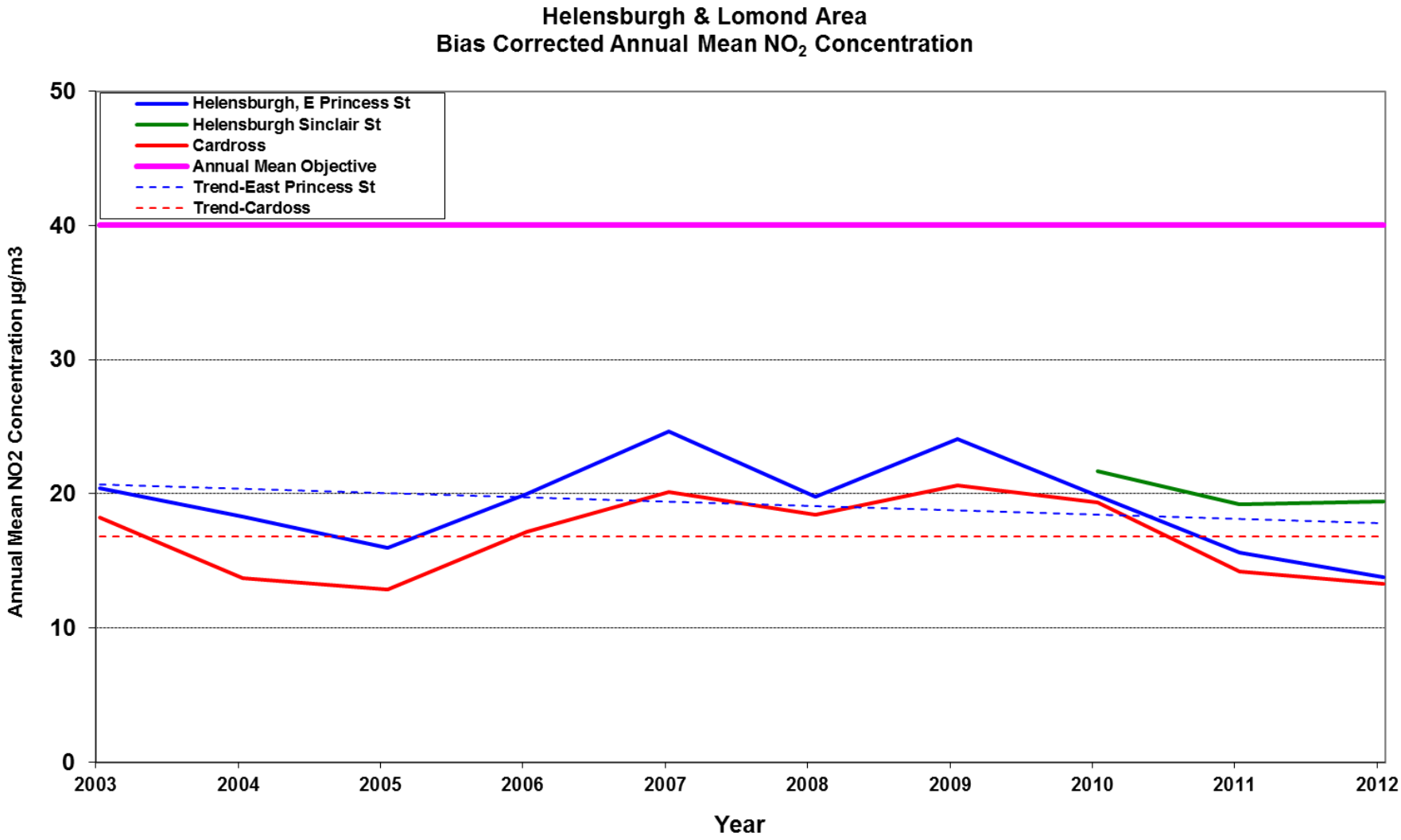


Figure 5 Graph of Annual PM_{10} Trends – Tarbert

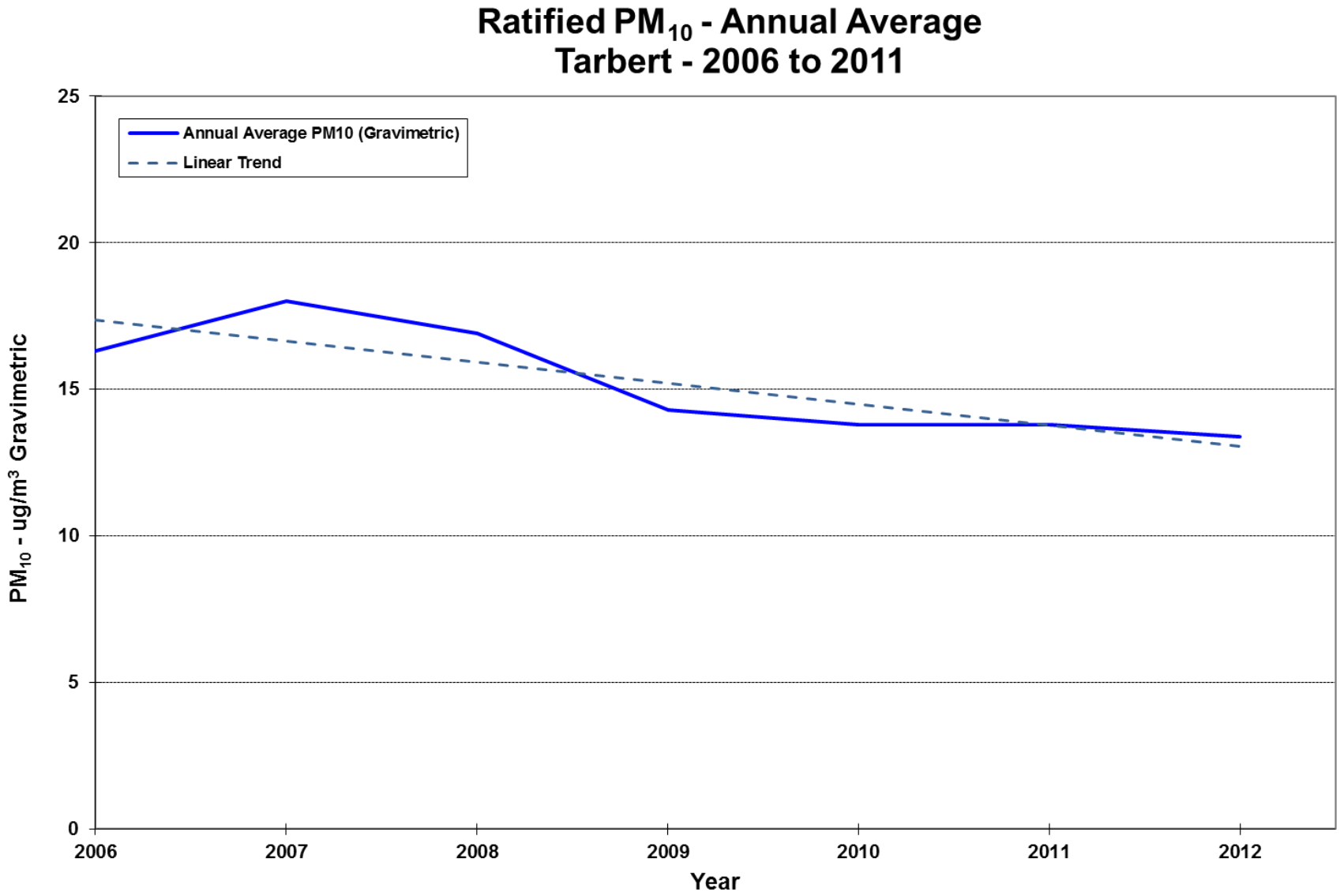
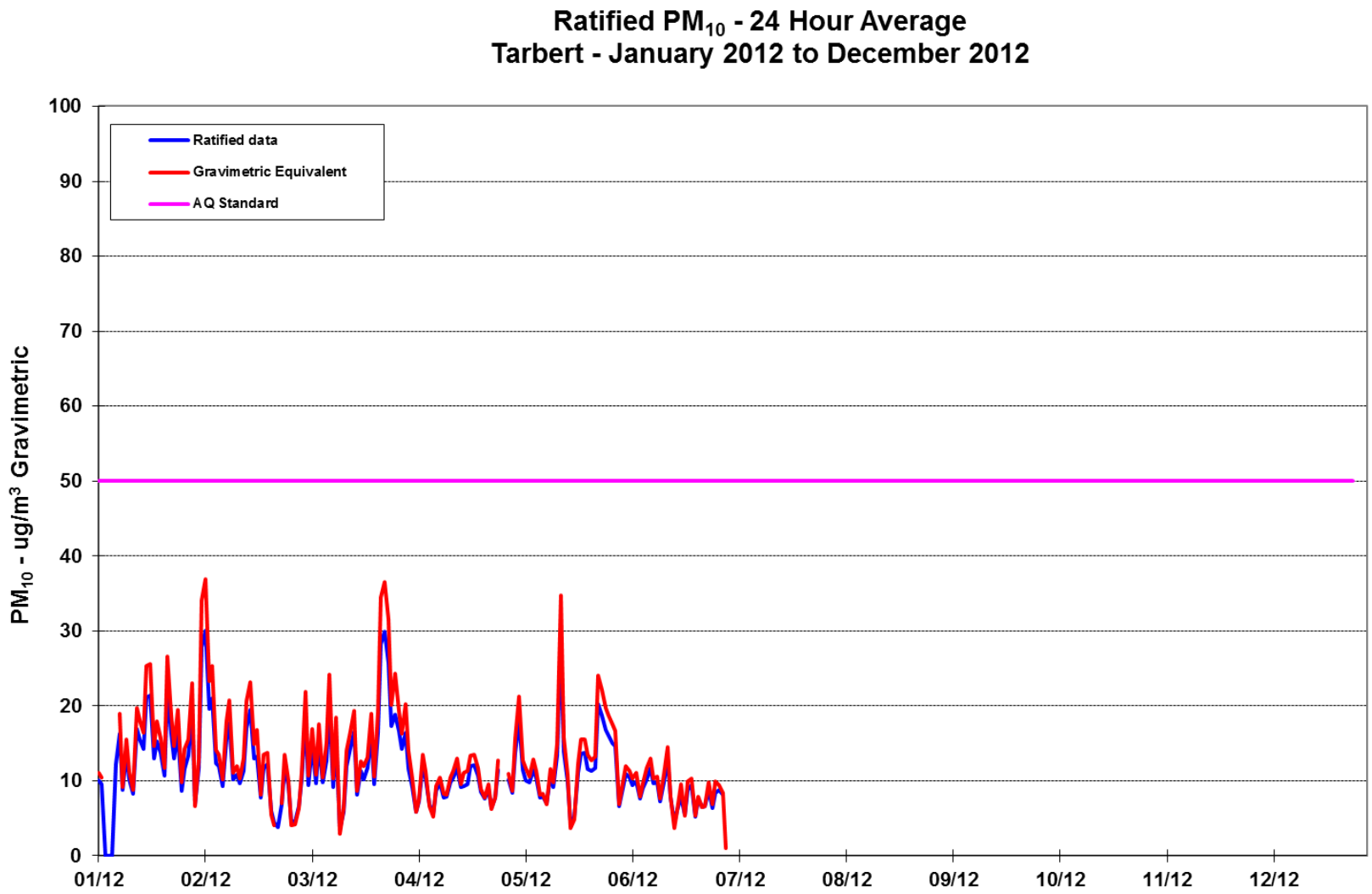


Figure 6 Graph of PM10 Monitoring Results – Tarbert



Appendix C:Maps

Figure 7 Map of Major Settlements

Figure 8 Map of Major Ports & Airports

Figure 9 Map of Monitoring Locations

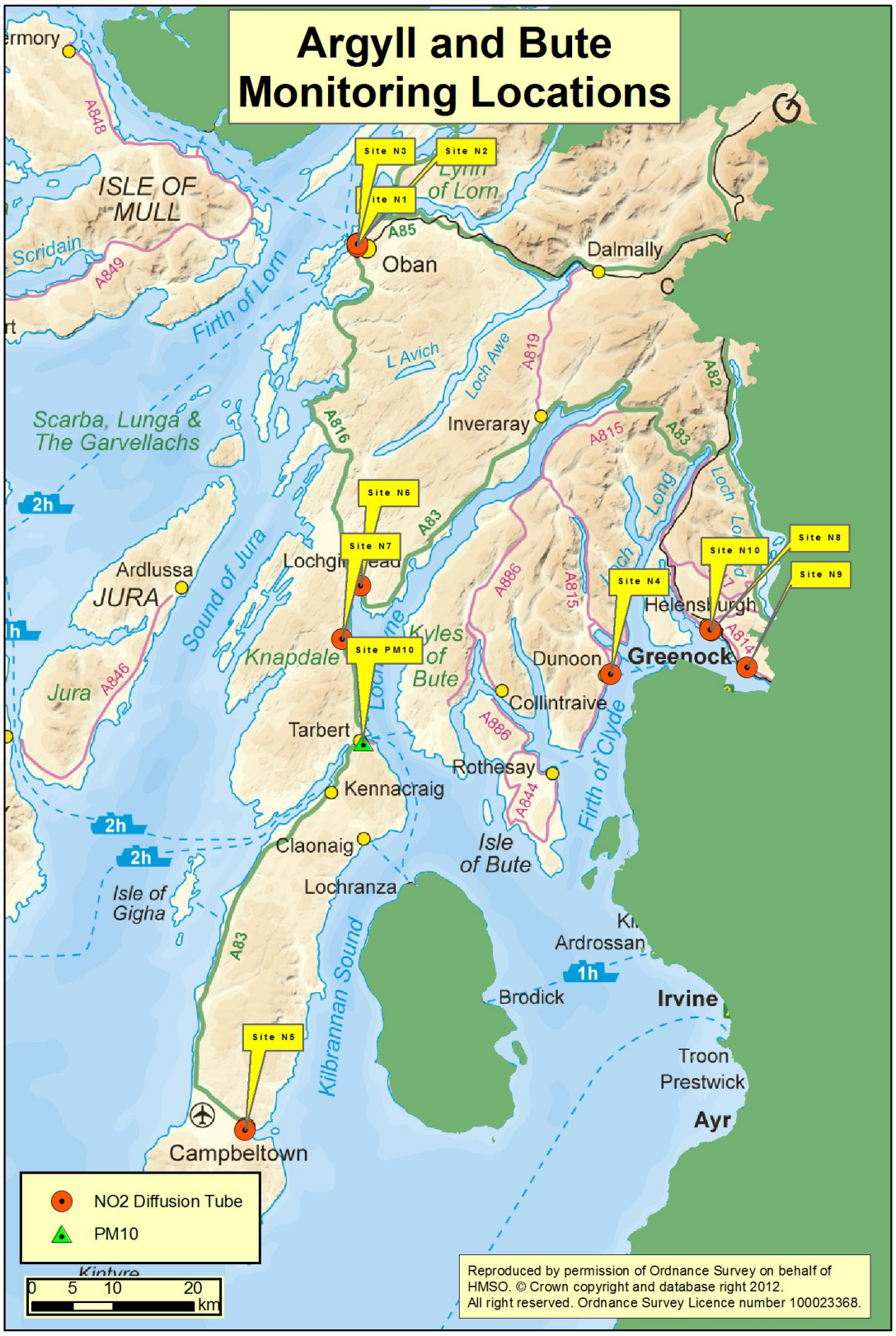


Figure 10 Map of Diffusion Tube Sites, Oban

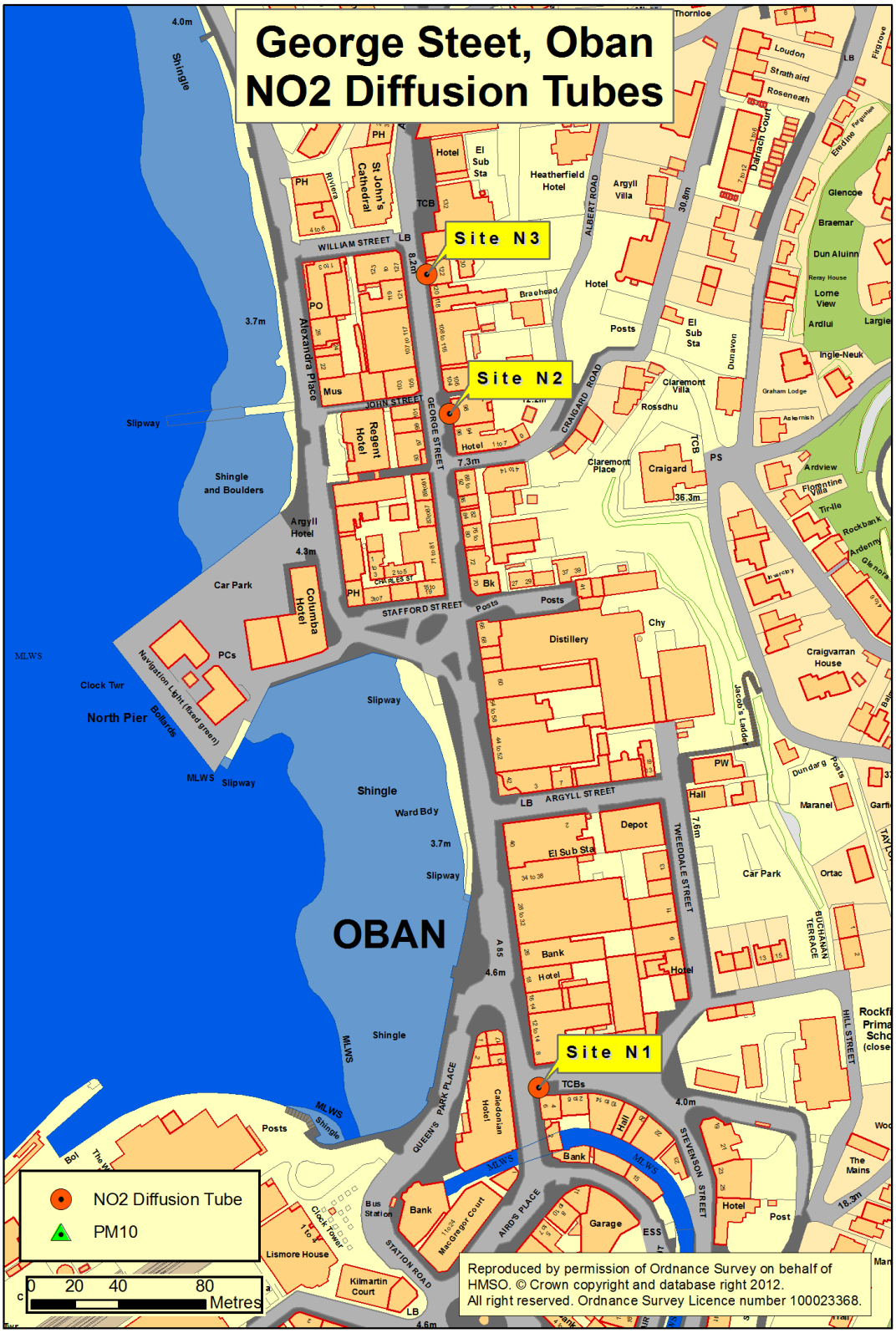


Figure 11 Map of Diffusion Tube Sites, Helensburgh

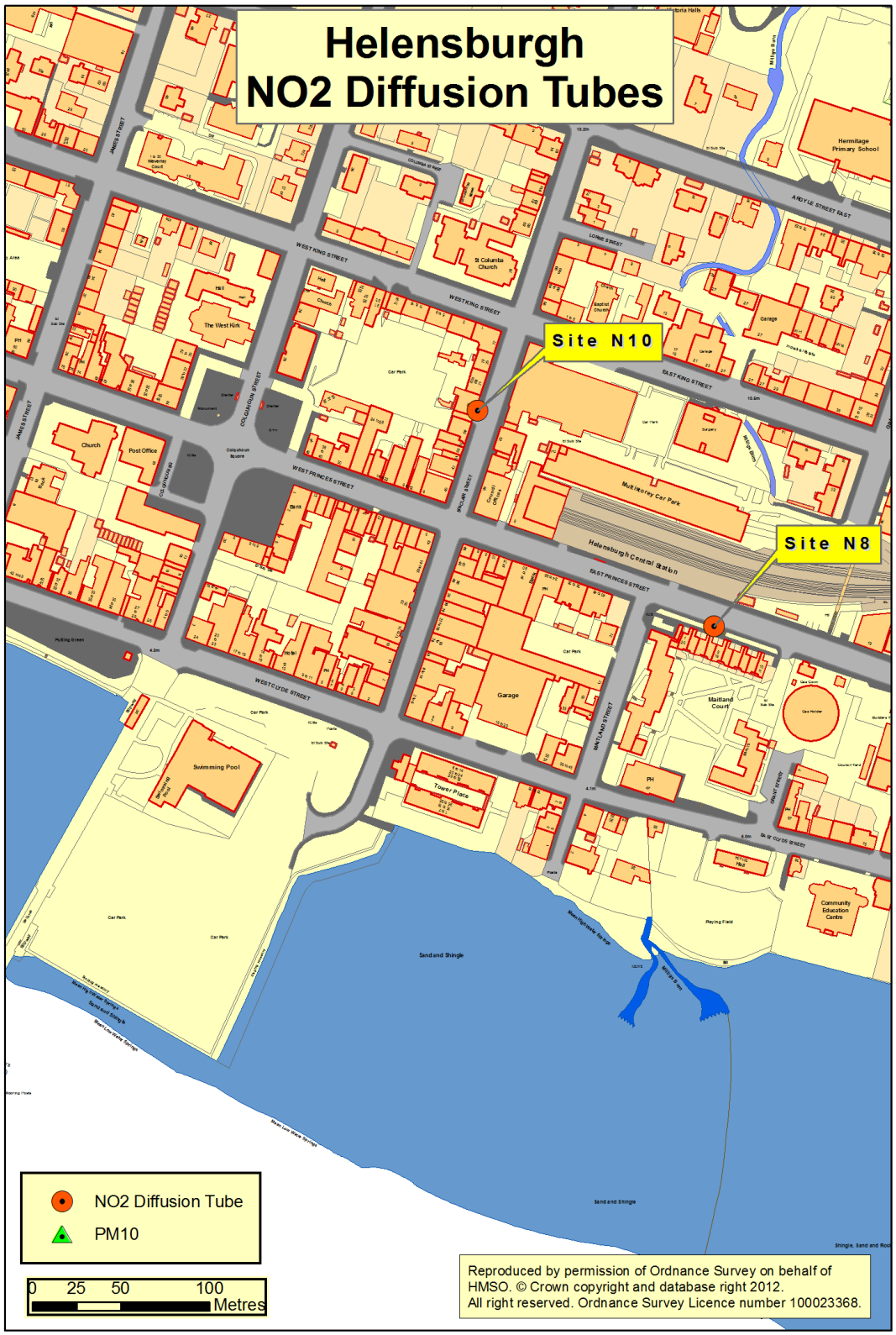


Figure 12 Map of PPC Installations