NORTH AYRSHIRE
COUNCIL

2011 Air Quality Progress Report for **North Ayrshire Council**

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

Date (April 2011)

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Cover Photo: View from Ardeer looking towards Saltcoats (Isle of Arran in background)

Executive Summary

The Environment Act 1995 makes a requirement for Local Authorities to review and assess air quality in their areas. The Air Quality Regulations 1997 provided National Air Quality objectives for 7 key pollutants, local authorities must assess whether these objectives are liable to be met. Any Local Authority, which identifies any areas where objectives are not met, must declare an Air Quality Management Area.

This report was prepared in accordance with the Local Air Quality Management, Technical Guidance LAQM, TG(09) and sets out the air quality monitoring carried out in North Ayrshire, with results and conclusions.

The 2010 annual mean for nitrogen dioxide (NO_2) diffusion tube locations in Dalry continue to be below the 40 $\mu g/m^3$ air quality objective. This location will continue to be closely monitored until there is significant confidence that the levels will remain below the objective limits and long term trends are established.

With regard to NO_2, it was predicted that a localised area of High Street, Irvine would continue to be subject to elevated levels bordering on or exceeding the air quality objective annual mean concentration of 40$\mu g/m^3$. Currently 17 of the 37 NO_2 diffusion tubes located in North Ayrshire Council district are situated in High Street, Irvine within a 50m stretch of road.

This year there have been 3 exceedences in the air quality objective for NO_2 annual mean concentration of 40 $\mu g/m^3$. All three diffusion tubes are located in High Street, Irvine, and only affect a very localised area around 10m diameter. The High Street in Irvine is used as a bus terminus and adjacent tubes in the same street were 31 $\mu g/m^3$ and 33 $\mu g/m^3$. One of the exceedences is in a relevant location with flats directly above the diffusion tube.

The automatic roadside monitoring (ROMON) unit recorded an NO_2 annual mean concentration of 34 $\mu g/m^3$, however there was an exceedence in the Scottish air quality objective for airborne particulate matter PM_{10}, by 1 $\mu g/m^3$. The European objective was not exceeded for PM_{10}.

High Street, Irvine will be subject of a Detailed Assessment to assess the situation and offer an explanation for the occurrence of this distinctive hot spot, and provide options to remedy the problem. The findings of the Detailed Assessment will be included in the 2012 Updating and Screening Assessment.

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1 Introduction

1.1 Description of Local Authority Area

North Ayrshire can be divided roughly into four main regional character classifications based on landscape and topography. Isle of Arran represents a distinctive landscape from the mainland, whilst at the same time offering a variety of landscape types which have caused it to be referred to as 'Scotland in Miniature'. The Inner Firth of Clyde is another distinctive character area which includes the northern coastal fringe and the Cumbrae Islands. Inland from this, the topography is dominated by the Renfrew heights, which cover the northern part of North Ayrshire. These hills narrow towards a point near Ardrossan and are largely unsettled. The final area comprises the northern part of the Ayr Basin which is heavily populated in comparison with the neighbouring areas, with a dense network of roads and settlements.

The major trunk road network within North Ayrshire consists of the A78 coastal route running from Irvine, to Largs and the A737 Garnock Valley link to the M8 and Glasgow conurbation. Other major routes are the A736 to Barrhead; and the A71 to Kilmarnock road. North Ayrshire is also well served by the rail network and there are stations on the main Glasgow Central to Ayr line at Dalry, Glengarnock, Kilwinning and Irvine; served by a frequent passenger service. In addition the Largs line continues on from Kilwinning and serves the towns of Stevenston, Saltcoats, Ardrossan, West Kilbride, Fairlie and Largs.

North Ayrshire has commercial ports at Ardrossan and Hunterston; which has a deep sea terminal, and leisure facilities are also available at Largs, Irvine, Saltcoats and Millport. Ferry services connect Ardrossan to Brodick (Arran), Largs to Millport (Cumbrae), and Lochranza to Claonaig in Argyll.

Main sources of pollutants affecting areas relevant exposures are caused by road traffic vehicles. Areas particularly affected are High Street, Irvine and Townhead Street/New Street, Dalry. Key focus of this and previous reports has been on these areas.

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 micrograms per cubic metre, $\mu g/m^3$ (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 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	50 $\mu g/m^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	40 $\mu g/m^3$	Annual mean	31.12.2004
	18 $\mu g/m^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Report	Summary
Stage 1 Review and Assessment (**1998**)	It is recommended that a second stage review and assessment be undertaken for nitrogen dioxide. It is recommended that the current air quality monitoring work in North Ayrshire be continued. This will provide data to indicate compliance with the objectives and will be useful in the next review and assessment to be undertaken before 2005.
Stage 2 Review and Assessment (**2000**)	The air quality objective for nitrogen dioxide are likely to be met by the end of 2005, it will, therefore not be necessary to proceed to a stage three review and assessment. It would be prudent to undertake a limited programme of diffusion tube monitoring adjacent to the A78 at Auchengate sawmill to confirm the level of nitrogen dioxide at that location.
2003 Updating and Screening Assessment	DMRB screening shows that there are no areas within North Ayrshire, which are likely to fail the objective due to Road Traffic. The annual mean nitrogen dioxide levels over a short length of High Street, Irvine, however, are marginally in excess of the annual mean objective in 2002. When the "year correction factors" are applied, as allowed in the guidance, all Annual Mean levels for 2005 should meet the Air Quality Objective. It is believed also that the traffic management scheme, already proposed by North Ayrshire Council will minimise the risk of any further increase. Passive monitoring for nitrogen dioxide should continue in High Street, Irvine to assess the effect of the proposed traffic management scheme. There are no significant industrial sources of nitrogen dioxide within North Ayrshire. There is no requirement to proceed to a detailed assessment for nitrogen dioxide.

Report	Summary
2004 Progress Report	With the exception of nitrogen dioxide all guideline limits for the National Air Quality Standards shall be met for 2004. With regard to nitrogen dioxide, it is predicted that a highly localised area of High Street, Irvine shall continue to be subject to concentration levels in excess of the guideline limit for the annual mean ($40\mu g/m^3$) national air quality standard at the end of 2005. With regard to PM_{10}, whilst the predicted estimated annual mean concentration for 2004 ($21.39\mu g/m^3$) shall be well below the U.K. Air Quality Objective, for 2010 it is predicted to be $19.75\mu g/m^3$, marginally exceeding the much reduced Scottish Air Quality Objective of $18\mu g/m^3$. Passive sampling shall continue in the area to monitor ambient levels of nitrogen dioxide. Additionally, the TEOM particulate monitor is due to be re-sited in the area from May 2005 for twelve months. At the end of that period the effects of the traffic management scheme can be further assessed.
2005 Progress Report	With the exception of nitrogen dioxide all guideline limits for the National Air Quality Standards shall be met for 2004. With regard to nitrogen dioxide, a highly localised area of High Street, Irvine continues to be subject to concentration levels in excess of the guideline limit for the annual mean ($40\mu g/m^3$) national air quality standard at the end of 2005. However, this is not an area of relevant public exposure. Consequently, a detailed assessment for nitrogen dioxide remains unnecessary. There is no need to proceed to a detailed assessment for any of the seven air pollutants.
2006 Updating and Screening Assessment Report	The Annual Mean Objective for nitrogen dioxide is now being complied with throughout North Ayrshire as demonstrated by passive monitoring. However, monitoring should continue, especially in High Street, Irvine, to ensure the improvement in air quality is maintained. DMRB screening shows that there are no areas within North Ayrshire, which are likely to fail the objective due to road traffic. There are no significant industrial sources of nitrogen dioxide within, either North Ayrshire or neighbouring areas that would adversely affect local air quality in North Ayrshire. There continues to be no need to proceed to a detailed assessment for nitrogen dioxide.

Report	Summary
2007 Progress Report	All guideline limits for the National Air Quality Standards should be met for 2010. With regard to nitrogen dioxide, it is predicted that a highly localised area of High Street, Irvine **may** have concentrations levels in excess of the guideline limit for the annual mean (40μg/m^3) national air quality standard. However it is expected that a new updated traffic management scheme will see these figures fall. On the advice of the Scottish Government and the Scottish Environment Protection Agency, a detailed assessment for nitrogen dioxide will be carried out for this area. With the exception of Nitrogen Dioxide there is no need to proceed to a detailed assessment for any of the air pollutants.
2008 Progress Report & Detailed Assessment	NO_2 monitoring results for **Townhead Street, Dalry** and **New Street, Dalry** show consistent exceedences for the **40 μg/m^3** level limit. Previous modelling of this area suggested there would be no breaches, however the modelling did not fully account for stationary traffic on an incline at traffic lights. A highly localised area at the façade of **75 High Street, Irvine** may continue to be subject to concentration levels in excess of the guideline limit for the annual mean (40μg/m^3) national air quality standard. Further diffusion tubes will be sited in the area to assess the lateral extent of the exceedence area. There is now an NOx analyser and PM_{10} monitor at a site approximately 25 metres from the "hot spot". This shall provide data on the concentration of these pollutants in the immediate environment. As hoped, this equipment was commissioned for the start of 2009. With regard to PM_{10}, whilst the predicted estimated annual mean concentration for 2004 (21.39μg/m^3) shall be well below the U.K. Air Quality Objective, for 2010 it is predicted to be 19.75μg/m^3, marginally exceeding the much reduced Scottish Air Quality Objective of 18μg/m^3. With the exception of Nitrogen Dioxide there was no need to proceed to a detailed assessment for any of the air pollutants. With regards to Townhead Street/New Street, Dalry North Ayrshire Council shall progress to a detailed assessment of NO_2 once a full calendar year of data is available. However the narrowness of the street and the level of traffic flow will limit the options for carrying out more detailed monitoring in the area.

Report	Summary
2009 Air Quality Updating and Screening Assessment	High Street, Irvine continues to have erratic results bordering on the 40 $\mu g/m^3$ limit. The results do not warrant declaration of an AQMA. However all sampling locations, old and new, will remain within the monitoring programme to establish a more accurate picture of nitrogen dioxide levels in this locality. High Street, Irvine will continue to be closely monitored using nitrogen dioxide diffusion tubes and the automatic monitoring site (ROMON) located in High Street, Irvine which will also be operational for 2009. The ROMON contains a BAM and NO2 analyser and will allow better analysis of NO2 daily trends to identify keys sources affecting the higher readings at tubes in this location. The ROMON will also be the site used in 2009 for a co-location study for nitrogen dioxide diffusion tubes. Nitrogen dioxide levels in Townhead Street/New Street, Dalry continue to exceed 40$\mu g/m^3$ at two relevant locations and are consistent in suggesting a strong correlation with previous traffic congestion in the area. Since 2009 monitoring has shown a reduction in levels as a result of the new traffic management system put in place. Based on the 2008 results for Townhead Street/New Street, Dalry North Ayrshire Council had expected to declare this an AQMA. However the new traffic management scheme has been in operation since February 2009 and results so far have shown a reduction in levels. On this basis, it is proposed to delay declaring an AQMA until a full calendar year of data is available based on the new traffic management.
2010 Progress Report	With regard to nitrogen dioxide (NO_2), it was predicted that a localised area of High Street, Irvine would continue to be subject to elevated levels bordering or exceeding the guideline limit for the annual mean (40$\mu g/m^3$) national air quality standard. There has been increased focus and sampling in this area with additional diffusion tube monitoring sites established to better define the extent of any possible exceedences. Of the total 37 diffusion tubes in North Ayrshire Council, 17 are located in High Street, Irvine within a 50m stretch of road. This year there have been no annual mean exceedences for High Street, Irvine, however this area will continue to be intensely monitored until long term trends are established. Previous NO_2 monitoring results (2007 & 2008) for Townhead Street, Dalry and New Street, Dalry showed consistent exceedences for the 40 $\mu g/m^3$ level limit.

2010 Progress Report (cont)	The 2009 report concluded that a full calendar year of data for 2009 would be required to assess the impact of the traffic management system. The 2009 annual mean concentrations for NO_2 diffusion tube locations in Dalry were all below the 40 $\mu g/m^3$ level limit, suggesting the newly implemented traffic management system has been successful. These locations will be continued to be closely monitored until long term trends are established and there is significant confidence that the levels will remain below the objective limits.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Groundhog mobile monitoring unit has been replaced by a fixed ROMON unit containing NO2 analyser and Beta Attenuation Monitor for PM_{10}. This monitoring station has been operational since early 2009 and is the site being used for the co-location tubes. The unit is permanently located here and is not part of a shared scheme, which will allow for full calendar year data to be collected.

Calibration checks are conducted every 2 weeks on site by Local Authority Officers and collected data is forwarded to AEA Technologies who validate and ratify the data. The unit is calibrated by AEA Technologies every 6 months. AEA reports are included in Appendix 2.

The unit was installed on site in January 2009 and has been collecting data since it was commissioned at the start of February 2009.

The collected data is available on the Scottish Air Quality website www.scottishairquality.co.uk.

Map(s) of Automatic Monitoring Sites

The location of the ROMON is detailed in the Irvine High Street maps in appendices 11 & 12 at the rear of the report.

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?
GroundHog	Kerbside	X232188	Y638861	NO_2, PM_{10}, CO	Permanently replaced by ROMON beginning of 2009				
ROMON	Kerbside	X232188	Y638861	NO_2, PM_{10}	NOx & BAM	No	20m	2.5m	y

2.1.2 Non-Automatic Monitoring

Monitoring of nitrogen dioxide was undertaken at 37 sites using passive diffusion tubes. Tubes were relocated during 2008 from long term sites where there were significantly low levels of nitrogen dioxide to more important positions within Detailed Assessment areas (High Street, Irvine and Townhead/New Street, Dalry). 2010 is the third year of this amended sampling regime.

Maps of Non-Automatic Monitoring Sites and surrounding areas are included in Appendices 7 to 19.

Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID		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?
			EASTINGS	NORTHINGS					
1	Cunninghame House, Irvine	UB	231627	638718	NO_2	N	N	N/A	N
2	35 East Road Irvine	K	232323	638892	NO_2	N	N	5m	N
3	Irvine Police Station	UB	232255	638910	NO_2	N	N	5m	N
4	70 High Street Irvine	K	232172	638894	NO_2	N	N	1.5m	Y
5	18 Bank St, Irvine	K	232202	638952	NO_2	N	Y (1m)	3m	Y
6	19 Bank St Irvine	K	232210	638976	NO_2	N	Y (1m)	3m	Y
7	147 High Street, Irvine	K	232077	638990	NO_2	N	Y	3m	Y
8	3 Bridgegate,	K	232122	638908	NO_2	N	N	3m	Y
9	97 High St, Irvine LOW	K	232135	638907	NO_2	N	Y (3m)	3m	Y
10	97 High St, Irvine HIGH	K	232142	638897	NO_2	N	Y (1m)	3m	Y
11	91 High St, Irvine LOW	K	232147	638892	NO_2	N	Y (1m)	3m	Y
12	85 High St, Irvine	K	232158	638882	NO_2	N	Y (1m)	3m	Y
13	79 High St, Irvine	K	232169	638878	NO_2	N	N	3m	Y
14	75 High St, Irvine LOW	K	232170	638871	NO_2	N	Y (3m)	3m	Y
15	75 High St, Irvine HIGH	K	232170	638871	NO_2	N	Y (1m)	3m	Y

Table 2.2 Details of Non- Automatic Monitoring Sites (cont)

Site ID		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?
			EAST INGS	NORTH INGS					
16	71 High St, Irvine	K	232174	638868	NO_2	N	Y (1m)	1m	Y
17	65a High Street, Irvine, (ROMON)	K	232188	638861	NO_2	N	N	2.5m	Y
18	65 High Street, Irvine, (ROMON)	K	232188	638861	NO_2	N	N	2.5m	Y
19	63 High Street, Irvine, (ROMON)	K	232188	638861	NO_2	N	N	2.5m	Y
20	34 Kirkgate Irvine	UB	232085	638774	NO_2	N	N	N/A	N
21	Eglinton Street Irvine	K	231997	639252	NO_2	N	N	N/A	N
22	25 Main Rd, Springside	K	236813	638659	NO_2	N	N	N/A	N
23	Main St, Drybridge	SP	235946	636597	NO_2	N	N	N/A	N
24	Auchengate (Bridge)	SP	233332	635558	NO_2	N	N	N/A	N
25	Dalry Rd , Kilwinning	K	229928	643400	NO_2	N	N	N/A	N
26	Byrehill , Kilwinning	K	229520	642319	NO_2	N	N	N/A	N
27	12 Garnock St, Dalry	UB	229326	649250	NO_2	N	Y (1m)	1.5	N
28	69 New St Dalry	K	229360	649330	NO_2	N	Y (2m)	2.5	Y
29	67 New St, Dalry	K	229338	649337	NO_2	N	Y (1m)	2m	Y
30	45 New St Dalry	K	229286	649365	NO_2	N	Y (1m)	1.5m	Y
31	60 New St Dalry	K	229311	649363	NO_2	N	Y (1m)	1.5m	Y
32	44 New St Dalry	K	229280	649380	NO_2	N	Y (1m)	1.5m	Y
33	3 Townhead St, Dalry	K	229222	649344	NO_2	N	N	2m	Y
34	2 Townhead St, Dalry	K	229230	649338	NO_2	N	Y (1m)	2m	Y
35	Highfield Hamlet , Dalry	K	230943	650280	NO_2	N	N	N/A	N
36	85 Main Street , Largs	K	220333	659322	NO_2	N	N	N/A	N
37	Hunterston Road	SP	219582	650020	NO_2	N	N	N/A	N

Locations subject to previous Detailed Assessments

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

North Ayrshire Council had previously used a Groundhog for automatic monitoring of NO_2 and PM_{10} which was shared with Inverclyde Council as a joint venture. The unit was transferred between authorities every 12 months. North Ayrshire Council now has a ROMON which will be permanently located at the previous Groundhog, High Street, Irvine site.

North Ayrshire Council also has 37 NO_2 diffusion tubes located throughout the district which record monthly levels of nitrogen dioxide. 25 of these tubes are located with two areas of particular concern, High Street, Irvine and Townhead Street/New Street, Dalry. These areas have had exceedences in previous reports and have been subject to detailed assessments.

Automatic Monitoring Data

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations (µg/m^3)			
					2007	2008	2009	2010
ROMON	High St, Irvine	N	89.9	89.9	[redacted]		26	34

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Number of Exceedences of hourly mean (200 µg/m^3)			
					2007 [c]	2008 [c]	2009	2010
ROMON	High St, Irvine	N	89.9	89.9	[redacted]		0	1

Diffusion Tube Monitoring Data

New sites were introduced in July 2008. A table containing the last 10 years historical data for NO_2 diffusion tube monitoring annual mean results is included in Appendix 20.

North Ayrshire Council had its first official co-location study started in 2009 which was continued in 2010. The sampling point for the co-location was at the ROMON site, High Street, Irvine, where NO_2 diffusion tubes were located ~20cm away from the ROMON sampling inlet.

The corresponding data was entered in the "Checking Precision and Accuracy of Triplicate Tubes" spreadsheet provided by AEA Energy & Environment (Appendix 5). The resulting Bias Correction Factor is 0.93.

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Annual mean concentrations (μg/m^3)			
					2007	2008	2009	**2010**
1	Cunninghame House, Irvine	N	100	100	12	10	12	13
2	35 East Road Irvine	N	100	100	26	24	25	27
3	Irvine Police Station	N	100	100	12	12	13	15
4	70 High Street Irvine	N	83	83	29	26	25	33
5	18 Bank St, Irvine	N	100	100		33	26	27
6	19 Bank St Irvine	N	100	100	24	26	23	25
7	147 High Street, Irvine	N	100	100	29	34	29	26
8	3 Bridgegate, CCTV Camera	N	100	100		24	22	24

Exceedences **Borderline Results in Bold**

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes (Cont)

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Annual mean concentrations (µg/m^3)			
					2007	2008	2009	**2010**
9	97 High St, Irvine LOW	N	92	92	32	28	28	30
10	97 High St, Irvine HIGH	N	100	100		30	29	29
11	91 High St, Irvine LOW	N	100	100		34	32	33
12	85 High St, Irvine	N	100	100		34	27	31
13	79 High St, Irvine	N	92	92	**44**	**39**	37	**50**
14	75 High St, Irvine LOW	N	100	100	**48**	37	35	**44**
15	75 High St, Irvine HIGH	N	100	100		**44.6**	37	**41**
16	71 High St, Irvine	N	92	92		35	29	33
17	65a High Street, Irvine, (ROMON)	N	100	100	35	31	29	32
18	65 High Street, Irvine, (ROMON)	N	100	100	N/A	30	29	31
19	63 High Street, Irvine, (ROMON)	N	100	100	N/A	29	30	31
20	34 Kirkgate Irvine	N	100	100	11	8	16	14

Exceedences **Borderline Results in Bold**

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes (Cont)

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Annual mean concentrations (µg/m^3)			
					2007	2008	2009	**2010**
21	Eglinton Street Irvine	N	100	100	22	27	26	27
22	25 Main Rd, Springside	N	100	100	17	16	17	17
23	Main St, Drybridge	N	100	100	9	6	12	14
24	Auchengate (Bridge)	N	100	100	14	12	15	13
25	Dalry Rd , Kilwinning	N	100	100	25	19	21	21
26	Byrehill , Kilwinning	N	100	100	10	8	13	16
27	12 Garnock St, Dalry	N	100	100	9	11	15	15
28	69 New St Dalry	N	92	92	28	29	26	30
29	67 New St, Dalry	N	100	100		34	34	33
30	45 New St Dalry	N	100	100	**48**	**45**	**39**	37
31	60 New St Dalry	N	100	100		36	33	33
32	44 New St Dalry	N	100	100	**47**	**51**	**39**	**39**
33	3 Townhead St, Dalry	N	92	92	**47**	**42**	33	**39**
34	2 Townhead St, Dalry	N	100	100	29	26	25	30

Exceedences **Borderline Results in Bold**

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Annual mean concentrations (μg/m^3)			
					2007	2008	2009	
35	Highfield Hamlet , Dalry	N	100	100	15	15	21	19
36	85 Main Street, Largs	N	92	92	26	22	19	23
37	Hunterston Road	N	100	100	4	5	8	6

Appendices 9, 10, 11 and 12 illustrate tube locations and concentrations in High Street, Irvine for 2007, 2008, 2009 and 2010 respectively.

Appendices 17, 18 and 19 illustrate tube locations and concentrations in Townhead Street/New Street, Dalry for 2008, 2009 and 2010 respectively.

The charts in Fig 2.4 illustrate the NO2 trends oven the last few years for High Street, Irvine and Dalry.

High Street, Irvine

In the past there have been exceedences in the air quality objective of 40μg/m^3, however these have been trending downwards and were complied with in 2008 and 2009. However the 2010 annual mean concentration of NO_2 has dramatically increased in one very localised area, despite only a marginal increase in the annual mean concentration of the co-located NO_2 tubes (triplicate) situated nearby.

The affected location (3 tubes) is approximately 10m diameter and all 9 neighbouring NO_2 diffusion tubes have an annual mean concentration of <33μg/m^3.

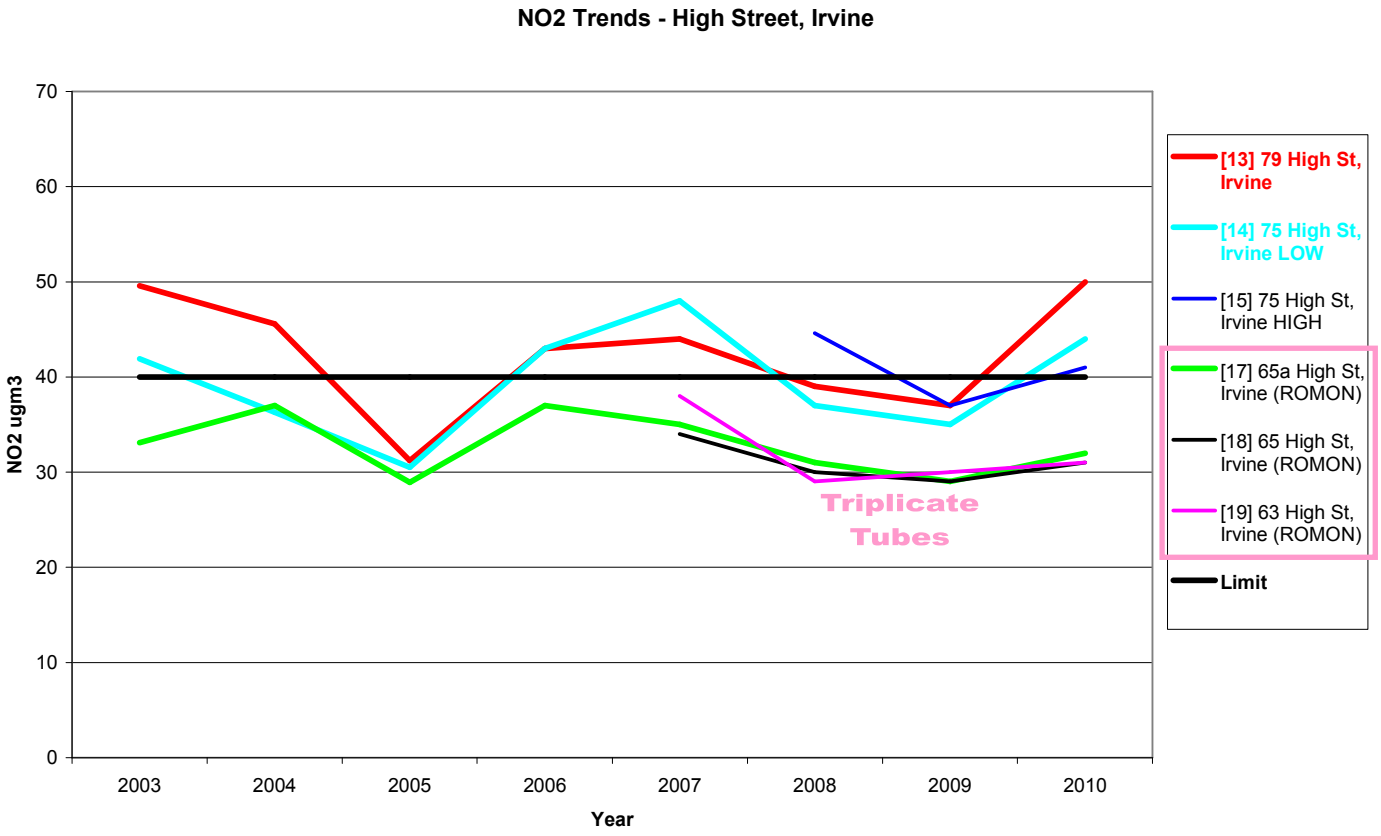
Potentially over subscribed bus routes and associated congestion at this area are suspected to be the primary contributing factors to the increase in NO_2 levels. Partnership working between the Local Authority and bur route operators is currently underway to assess the situation.

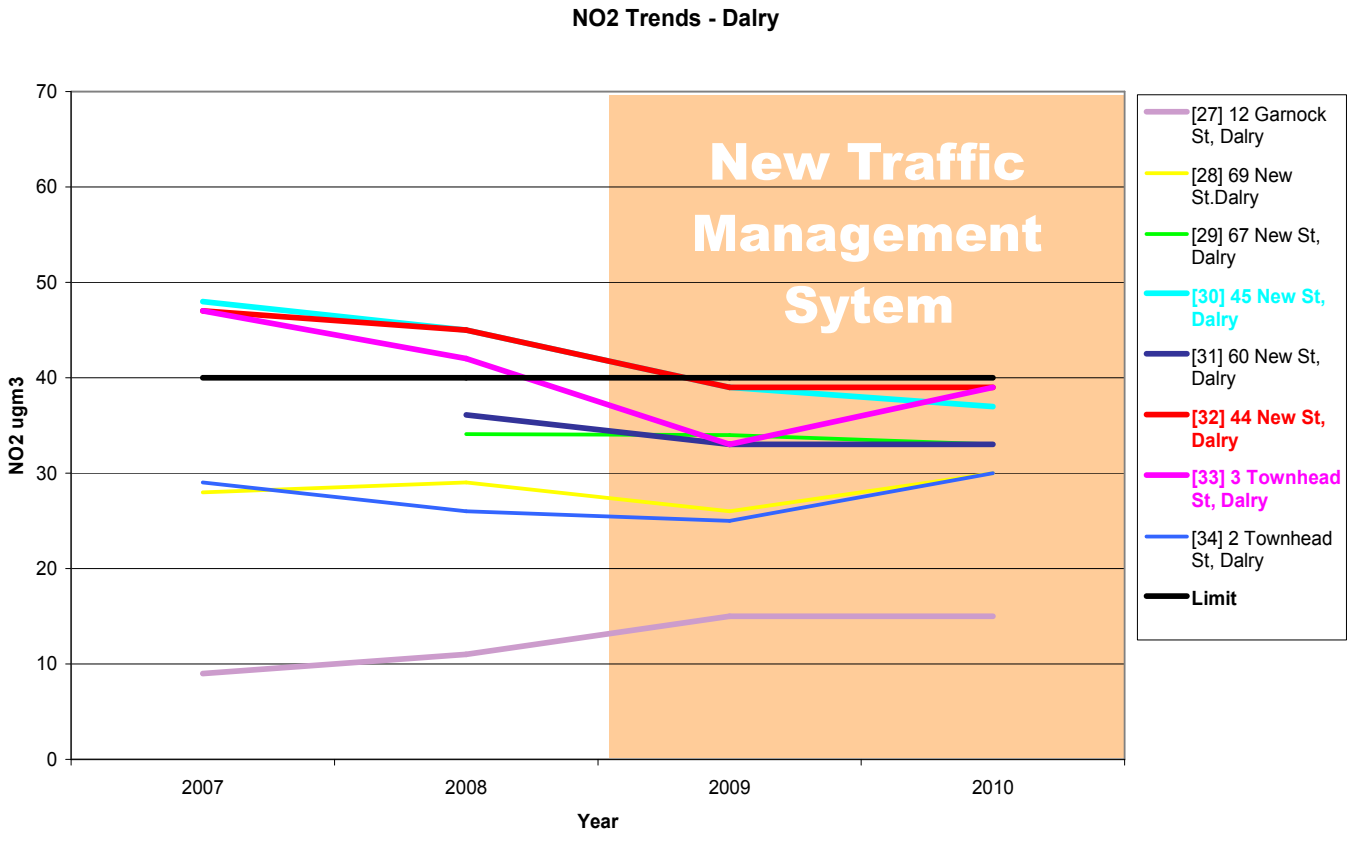
Dalry

The 2009 Report (2008 results) concluded that although there were exceedences of the NO_2 air quality objective in this area, early 2009 NO_2 monitoring results suggested that the new traffic management system was having a positive effect of reducing NO_2 levels. The 2010 Report (2009 results) concluded that the altered traffic priorities had been successful in reducing annual mean concentration of NO_2 and there were no exceedences in the air quality objective.

2010 results confirm that there continues to be no exceedences in the air quality objective in this area, however the annual mean concentration for NO_2 remains borderline and this area will continue to be closely monitored.

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





2.2.2 PM_{10}

The automatic monitoring site (ROMON) also houses a Met-One Beta Attenuation Monitor (BAM) which has been monitoring PM_{10} since the ROMON was commissioned in February 2009. The monitor is checked every 2 weeks during calibration of the NO_2 monitor and the filter tape is replaced every 8 weeks. This unit continues to be a permanent installation and will allow data collection for each full year.

The Air Quality objective of "*50µg/m^3, not to be exceeded more than 7 times a year*" has not been exceeded during any monitoring. However, the Scottish annual mean concentration limit of 18 µg/m^3 was borderline in 2009 and marginally exceeded in 2010 by 1 µg/m^3. The European Air Quality objective of 40 µg/m^3 has never been exceeded.

The 1 µg/m^3 exceedence in PM_{10} was in High Street, Irvine which was also where the NO_2 exceedence occurred. Use of this road is mainly restricted to buses and delivery vehicles and it is suspected that potentially over subscribed bus routes and associated congestion at this highly localised area has caused the failure in the air quality objective. There is ongoing work between the Local Authority and bus route operators to investigate the situation.

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

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Annual mean concentrations (µg/m^3)			
					2007	2008	2009	2010
ROMON	High St , Irvine	N	96.1	96.1	[redacted]		18	**19**

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Number of Exceedences of daily mean objective (50 µg/m^3)			
					2007	2008	2009	2010
ROMON	High St , Irvine	N	96.1	96.1	[redacted]		1	0

2.2.3 Sulphur Dioxide

Monitoring for sulphur dioxide and smoke has been discontinued in North Ayrshire since 2004. Historical monitoring data is available for nearly every town in the area and there is no indication from these results that the air quality standard is likely to be breached even around local industrial sources.

Previous reviews concluded that:

1. The extensive smoke control programme undertaken by Cunninghame District Council has improved sulphur dioxide levels in the area due to the shift to natural gas and electricity.
2. The extensive historical monitoring programmes for sulphur dioxide in North Ayrshire has covered every urban area and results indicate the air quality standard continues to be met.
3. There is no need to progress to a detailed assessment for sulphur dioxide.
4. The rail link serving North Ayrshire is electrified therefore there are very few diesel-powered passenger trains each day. Goods trains on the network are diesel-powered. There are no major stockyards apart from those serving Hunterston coal terminal. These, however, are not within 15 metres of a relevant location Neither are there any stations or signal junctions where diesel locomotives are likely to be stationary for 15 minutes or more within 15 metres of a relevant exposure.

There has been no evidence of any change to sulphur dioxide production or release in North Ayrshire. Similarly, there has been no development likely to result in any increase in sulphur dioxide levels at locations where there could be relevant public exposure.

2.2.4 Benzene

No recent monitoring of benzene has been undertaken. However, previous reviews have concluded that:

1. There was no significant industrial source of benzene located either within North Ayrshire or neighbouring areas which is likely to adversely affect air quality within North Ayrshire.
2. There was no need to proceed to a detailed assessment for benzene.

Since the last report there has been no evidence of any change to benzene production or release in North Ayrshire. Similarly, there has been no development likely to result in any increase in benzene levels at locations where there could be relevant public exposure.

2.2.5 Other pollutants monitored

Radiation Monitoring

North Ayrshire Council previously had a Radiation – Food and Environment Programme which involved collecting monthly samples of foods, soils, seawater, etc for analysis by Glasgow Scientific Services, for the purpose of monitoring background levels of radiation in the environment. This sampling programme was terminated in 2010.

Additional environmental monitoring continues to be conducted by officers on a monthly basis using a portable Mini 680 monitor to measure background levels of radiation at 7 sites located throughout the district.

Dust Deposition

3 dust deposit gauges are located in Fairlie specifically to monitor dust from the coal stockyard at Clydeport Hunterston. The dust deposit gauges are checked every month in conjunction with the NO_2 diffusion tubes being changed. The samples are sent to Glasgow Scientific Services and analysed for total rainfall, pH, Total Dissolved Solids (TDS), Total Dried Undissolved Matter (TDUM), Combustible Matter and ash. Reports will include breakdown of additional parameters (metals etc) if detected at significant levels.

There are no British Standards with which to compare results. Assessment is based on any significant changes in the amount of particulate, etc which is present in the samples.

2.2.6 Summary of Compliance with AQS Objectives

North Ayrshire Council has measured concentrations of NO_2 and PM_{10} above the annual mean objective at relevant locations and **will need to proceed to a Detailed Assessment**, for High Street, Irvine

3 New Local Developments

3.1 Road Traffic Sources – nil

3.2 Other Transport Sources – nil

3.3 Industrial Sources

In 2010 planning permission (Ref: 10/00369/CON) was sought for a coal fired power station to be located at Hunterston, Fairlie. An Environmental Impact Assessment was submitted with the application which addressed air quality.

The report concluded that, *"the controls built into the proposed power station mean that emissions to air will have no significant adverse effects on air quality or the health of the local people."*

The report also stated that *"an emissions monitoring programme will be proposed for agreement with the regulator (SEPA) under the PPC process, to ensure compliance with the emissions levels used as the basis of the assessment"*

Sampling results for the power station will be included in future Air Quality Reports should the project be approved.

3.4 Commercial and Domestic Sources

3.5 New Developments with Fugitive or Uncontrolled Sources

North Ayrshire 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.

4 Conclusions and Proposed Actions

4.1 Conclusions from New Monitoring Data

Monitoring data for 2010 has shown that 3 very localised NO_2 diffusion tubes, out of a total of 37, failed to meet the air quality objective. All other NO_2 diffusion tube sites and automatic monitoring complied with the 40 $\mu g/m^3$ NO_2 air quality objective set out in the directive.

The 3 tubes that failed the objective are located in High Street, Irvine, adjacent to a major bus route in the town. Diffusion tube monitoring has shown that the area is highly localised and only covers and area approximately 10m wide. The 2 nearest tubes are about 10m away and had NO_2 annual mean concentrations of 31 $\mu g/m^3$ and 33 $\mu g/m^3$. All the remaining tubes in the same vicinity ranged between 25 $\mu g/m^3$ and 32 $\mu g/m^3$ confirming that the majority of the street used by the buses complies with the air quality objective and the exceedences are concentrated in a very focused spot.

The Scottish air quality objective of 18 $\mu g/m^3$ for PM_{10}, was exceeded by 1 $\mu g/m^3$ in High Street, Irvine. The European Directive air quality directive (40 $\mu g/m^3$)was not exceeded.

For the second year running, annual mean concentration of in NO_2 Townhead Street/New Street, continues to meet the air quality objective. However the results are borderline and this are will continue to be closely monitored.

4.2 Conclusions relating to New Local Developments

The Environment Impact Assessment (EAIA) for the proposed coal fired power station suggests there will be no impact on air quality therefore there are no implications from New Local Developments.

4.3 Proposed Actions

A detailed Assessment will be conducted in High Street, Irvine with particular attention to specific bus routes and the number of vehicles now on each route. Previous detailed assessments revealed buses occasionally “laying up” time at South High Street, Irvine which may have lead to increases in the annual mean concentration of NO_2. Strathclyde Partnership for Transport (SPT) had additional monitoring carried out in the North Ayrshire Area which revealed some buses exceeding stoppage times with their engines running.

The situation appeared to have improved in 2008 and 2009, however, it is understood that although the number of routes using 2 particular stances within High Street, Irvine, has remained the same, there has been an increase in individual buses subscribed to each route.

The Detailed Assessment will focus on the quantity of vehicles subscribed to the 2 particular stances in the hot spot area and also how the full length of High Street (North & South) can be utilised to distribute traffic and reduce NO_2 levels.

As part of the Detailed Assessment, North Ayrshire Council will be engaging with local public transport operators and Strathclyde Partnership for Transport (SPT) to assess the public transport activities in High Street, Irvine to review bus routes and quantity of vehicles congregating in South High Street, Irvine .

A review of NO_2 diffusion tube sampling locations was undertaken to identify areas where sampling could confidently be reduced. The results of this and any changes will be included in the 2012 Report. The co-location NO_2 diffusion tubes will still continue to be used to provide locally derived bias adjustment factors.

Next course of action will be to submit the 2012 Updating and Screening Assessment with Detailed Assessment for High Street, Irvine.

5 References

1. Local Air Quality Management, Technical Guidance LAQM.TG (09), February 2009.
2. National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 04/11, accessed at LAQM Helpdesk Website, April 2011. (Appendix 3)
3. Checking Precision and Accuracy of Triplicate Tubes (Version 04 - Feb 2011) . (Appendix 5)

Appendices

Appendix 1: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Tubes supplied and analysed by

Glasgow Scientific Services **Glasgow City Council**	
Address: Glasgow Scientific Services 64 Everard Drive Glasgow United Kingdom G211XG	**Contact:** Mr T Platt **Tel:** +44(0)141-276 0619 **Fax:** +44(0)141-276 0669
Testing performed at permanent laboratory	

Diffusion Tube Bias Adjustment Factor for tubes provided by Glasgow Scientific Services is listed in Appendix 3. The resultant bias for Glasgow Scientific Services is **1.10** based on 5 studies with 3 poor precision and 2 good precision.

The bias factors for all national laboratories are listed in Appendix 4. It should be noted that the average bias factor is **0.87**. With the exception of 4 out of the 21 national laboratories, the highest factor is 0.92. The highest factor being 1.10 allocated by Glasgow Scientific Services derived from 5 studies, 3 of which had poor tube precision.

Factor from Local Co-location Studies

The automatic monitoring station (ROMON) has been operational since early 2009 and is the site being used for 3 co-location tubes. The unit is permanently located here and is not part of a shared scheme, which allows for full “calendar year” data to be collected.

The ROMON has fortnightly checks carried out in accordance with the prescribed methodology as issued by AEA Technologies.

Corresponding data was entered in the “Checking Precision and Accuracy of Triplicate Tubes” spreadsheet provided by AEA Energy & Environment (Appendix 5). The resulting Bias factor is **0.93**.

Discussion of Choice of Factor to Use

Local Air Quality Management Technical Guidance LAQM TG (09) explains that where the Review and Assessment Helpdesk spreadsheet contains data from fewer than 5 other studies using the same laboratory, then the co-location study is preferred. It should also be noted that 60% of the studies listed for Glasgow Scientific Services have poor precision, further undermining the confidence in the 1.10 correction factor.

The co-location study for North Ayrshire Council has “good” precision and high quality results from the ROMON, supporting the case for the use of the locally obtained bias adjustment factor which is shown to be more representative.

Appendix 1: QA:QC Data (cont)

PM Monitoring Adjustment

The PM_{10} data collected by the ROMON is handled and ratified by AEA Technologies. The Air Pollution Report for North Ayrshire, Irvine High Street for 1st January 2010 to 31st December 2010 is included in Appendix 2

QA/QC of automatic monitoring

The automatic monitoring station (ROMON) is calibrated and data rescaled every 2 weeks. All checks are carried out in accordance with procedures laid out by AEA Technologies and calibration check sheets are forwarded to them after each visit. The site is visited by AEA engineers every 6 months to carry out calibration tests

Appendix 2: AEA Air Pollution Report

Air Pollution Report

Produced by AEA on behalf of the Scottish Government

NORTH AYRSHIRE IRVINE HIGH ST
1st January to 31st December 2010

These data have been fully ratified by AEA

.

POLLUTANT	PM_{10}*	NO_2	NO_X
Number Very High	0	0	-
Number High	0	0	-
Number Moderate	0	0	-
Number Low	8340	7871	-
Maximum 15-minute mean	132 µg m^{-3}	785 µg m^{-3}	2187 µg m^{-3}
Maximum hourly mean	132 µg m^{-3}	229 µg m^{-3}	957 µg m^{-3}
Maximum running 8-hour mean	59 µg m^{-3}	142 µg m^{-3}	561 µg m^{-3}
Maximum running 24-hour mean	46 µg m^{-3}	103 µg m^{-3}	346 µg m^{-3}
Maximum daily mean	46 µg m^{-3}	102 µg m^{-3}	342 µg m^{-3}
Average	19 µg m^{-3}	34 µg m^{-3}	90 µg m^{-3}
Data capture	96.1 %	89.9 %	89.9 %

* PM_{10} instruments:
BAM using a gravimetric factor of 0.83333 for Gravimetric Equivalent from 1st January 2010
All 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
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	1	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	1	1

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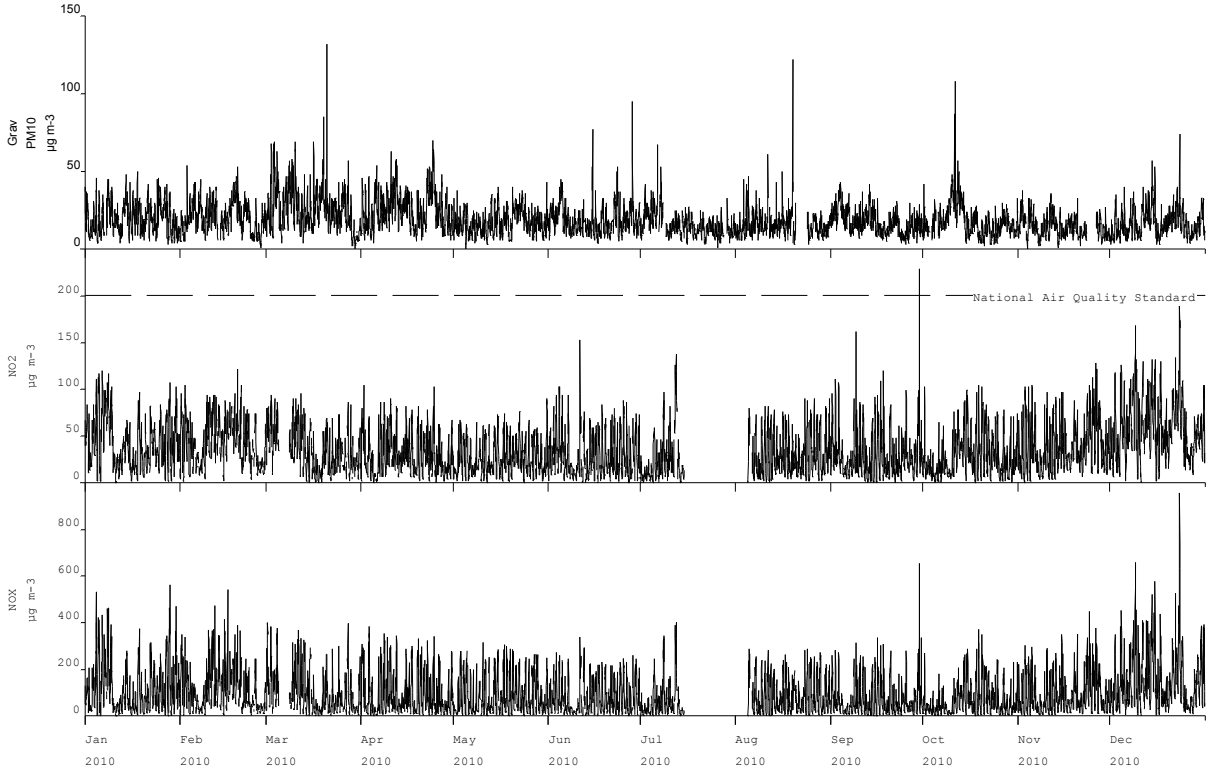
Appendix 2: AEA Air Pollution Report (cont)

Air Pollution Report

Produced by AEA on behalf of the Scottish Government

North Ayrshire Irvine High St Air Monitoring
Hourly Mean Data for 1st January to 31st December 2010



Stephen Stratton
Ambient Air Quality Monitoring
AEA Group PLC
Glengarnock Technology Centre
Caledonian Road
Lochshore Business Park
Glengarnock
Ayrshire
KA14 3DD

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AEA

Appendix 3: Bias Factor Spreadsheet GSS

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 04/11

Follow the steps below in the correct order to show the results of relevant co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated in late June 2011 on the LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4:

Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution.

Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Glasgow Scientific Services	20% TEA in Water	2010	K	Marylebone Road Intercomparison	12	85	93	-8.8%	G	1.10
Glasgow Scientific Services	20% TEA in Water	2010	UB	Glasgow City Council	9	35	39	-9.5%	P	1.10
Glasgow Scientific Services	20% TEA in Water	2010	R	Glasgow City Council	10	49	48	3.3%	P	0.97
Glasgow Scientific Services	20% TEA in Water	2010	UC	Glasgow City Council	12	38	43	-11.0%	P	1.12
Glasgow Scientific Services	20% TEA in Water	2010	K	Glasgow City Council	11	67	81	-16.9%	G	1.20
Glasgow Scientific Services	20% TEA in Water	2010		Overall Factor[3] (5 studies)				Use		1.10

Appendix 4: Bias Factor Spreadsheet National Results

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 04/11

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated in late June 2011 on the LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:									
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.									
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953									
Analysed By[1]	**Method** To undo your selection, choose (All) from the pop-up list	**Year**[5] To undo your selection, choose (All)	**Site Type**	**Local Authority**	**Length of Study (months)**	**Diffusion Tube Mean Conc. (Dm) (µg/m³)**	**Automatic Monitor Mean Conc. (Cm) (µg/m³)**	**Bias (B)**	**Tube Precision**[6]	**Bias Adjustment Factor (A) (Cm/Dm)**		
Aberdeen CC	20% TEA in Water	2010		Overall Factor[3] (1 study)				Use	0.82	1/1	Good	
Bristol Scientific Services	20% TEA in Water	2010		Overall Factor[3] (7 studies)				Use	0.85	6/7	Good	
Cardiff Scientific Services	50% TEA in Acetone	2010		Overall Factor[3] (4 studies)				Use	0.85	4/4	Good	
Edinburgh Scientific Services	50% TEA in Acetone	2010		Overall Factor[3] (2 studies)				Use	1.02	2/2	Good	
Environmental Scientific Groups	20% TEA in Water	2010		Overall Factor[3] (10 studies)				Use	0.84	5/10	Good	
Environmental Scientific Groups	50% TEA in Acetone	2010		Overall Factor[3] (3 studies)				Use	0.83	3/3	Good	
Glasgow Scientific Services	20% TEA in Water	2010		Overall Factor[3] (5 studies)				Use	1.10	3/5	Poor	
Gradko	20% TEA in Water	2010		Overall Factor[3] (39 studies)				Use	0.92	31/39	Good	
Gradko	50% TEA in Acetone	2010		Overall Factor[3] (17 studies)				Use	0.99	15/17	Good	
Harwell Scientific Services	50% TEA in Acetone	2010		Overall Factor[3] (18 studies)				Use	0.85	16/18	Good	
Harwell Scientific Services	20% TEA in Water	2010		Overall Factor[3] (1 study)				Use	0.77	1/1	Good	
Kent Scientific Services	20% TEA in Water	2010		Overall Factor[3] (1 study)				Use	0.78	1/1	Good	
Kirklees Council Scientific Services	50% TEA in Acetone	2010		Overall Factor[3] (1 study)				Use	0.78	1/1	Good	
Lambeth Scientific Services	50% TEA in Acetone	2010		Overall Factor[3] (3 studies)				Use	1.08	2/3	Poor	
Lancashire CC	50% TEA in Acetone	2010		Overall Factor[3] (1 study)				Use	0.90	1/1	Poor	
Milton Keynes Council	20% TEA in Water	2010		Overall Factor[3] (6 studies)				Use	0.84	6/6	Good	
Northampton BC	20% TEA in Water	2010		Overall Factor[3] (3 studies)				Use	0.73	3/3	Good	
South Yorkshire Labs	50% TEA in Acetone	2010		Overall Factor[3] (5 studies)				Use	0.88	3/5	Good	
Staffordshire Scientific Services	20% TEA in Water	2010		Overall Factor[3] (8 studies)				Use	0.85	8/8	Good	
Tayside SS	20% TEA in Water	2010		Overall Factor[3] (4 studies)				Use	0.78	4/4	Good	
West Yorkshire Analytical Services	50% TEA in Acetone	2010		Overall Factor[3] (12 studies)				Use	0.90	8/12	Good	

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the ALA group

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	06/01/2010	03/02/2010	40.8	47.1	35.1	41	6.0	15	14.9
2	03/02/2010	03/03/2010	40.1	42.7	31.5	38	5.9	15	14.6
3	03/03/2010	31/03/2010	36.1	39.0	36.4	37	1.6	4	4.0
4	31/03/2010	29/04/2010	24.0	24.4	28.6	26	2.5	10	6.3
5	29/04/2010	03/06/2010	27.4	25.9	25.8	26	0.9	3	2.2
6	03/06/2010	30/06/2010	32.1	32.1	32.9	32	0.5	1	1.1
7	30/06/2010	04/08/2010	31.1	30.3	27.7	30	1.8	6	4.4
8	04/08/2010	02/09/2010	42.2	36.4	47.6	42	5.6	13	13.9
9	02/09/2010	30/09/2010	23.0	25.1	32.6	27	5.0	19	12.5
10	30/09/2010	03/11/2010	22.2	24.3	23.0	23	1.1	5	2.6
11	03/11/2010	01/12/2010	45.6	45.2	41.7	44	2.1	5	5.3
12	01/12/2010	05/01/2011	44.6	33.3	36.3	38	5.9	15	14.5
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
40.1	95.9	Good	Good
40.1	94.8	Good	Good
26.7	83.5	Good	Good
24.8	97	Good	Good
21	97.4	Good	Good
22.9	97.5	Good	Good
13.4	38.3	Good	or Data Capture
30.6	91.8	Good	Good
28.7	97.7	Good	Good
26.7	97.7	Good	Good
38.2	97.7	Good	Good
49.7	97.3	Good	Good
Overall survey -->		Good precision	Good Overall DC

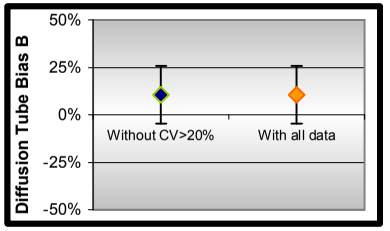
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 12 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	0.93 (0.82 - 1.09)
Bias B	7% (-8% - 23%)
Diffusion Tubes Mean:	34 μgm^{-3}
Mean CV (Precision):	10
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	95%
Adjusted Tubes Mean:	32 (28 - 37) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.93 (0.82 - 1.09)
Bias B	7% (-8% - 23%)
Diffusion Tubes Mean:	34 μgm^{-3}
Mean CV (Precision):	10
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	95%
Adjusted Tubes Mean:	32 (28 - 37) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tube Measurements															
Site Name/ID	Periods													Raw Mean	Valid periods
	1	2	3	4	5	6	7	8	9	10	11	12	13		
1. Cunninghame House	23.9	26.5	15.2	6.6	5	6.7	7.1	8	8.7	8	24.7	22.5		13.6	12
2. East Road, irvine	43.4	45.5	31.2	26.2	16.3	20.7	21.9	24	16.9	23.2	43.1	36.5		29.1	12
3. Irvine Police Station	24	31.3	17.4	10	10.3	9.3	9.1	8.3	5.2	11.2	25.9	32.7		16.2	12
4. 70 High St Irvine	51.8	50.8	33.8		23.7	13.5		24.6	22.6	38.8	62.5	29.7		35.2	10
5. 18 Bank St, Irvine	44.2	39.2	34.3	16.2	20.8	16.7	19.5	41	17.4	25.6	41.8	27.7		28.7	12
6. 19 Bank St Irvine	36.9	43.5	30.1	18.3	23.1	10.7	18.3	21.9	16.3	22.2	39.3	40		26.7	12
7. 147 High Street, Irvine	28.4	36.1	35.2	18.8	20.7	16.7	18.3	26.5	23	25.4	42.8	39.4		27.6	12
8. 3 Bridgegate, CCTV Camera	39.1	45.5	22.9	14.8	15.8	10.8	15.3	22.2	18	24.6	42.5	36.4		25.7	12
9. 97 High St, Irvine LOW	48	41.1	37.2	20.4	22.9	22.1	27.9	34.6	20		44.3	34		32.0	11
10. 97 High St, Irvine HIGH	45.3	38.1	35.2	26.7	24.7	18.4	29.8	30.7	27.4	31.2	41.4	27.1		31.3	12
11. 91 High St, Irvine LOW	46.8	45.7	33.8	26.6	30.4	25.4	29.3	36.9	28.3	33.7	41.3	41.2		35.0	12
12. 85 High St, Irvine	44.8	32.6	38	22.3	28.1	24.1	35.5	34.6	19.9	35.1	38.4	40.8		32.9	12
13. 79 High St, Irvine	52.3	43.2	47.7	27.1		66.7	63	83.2	42.5	58	58.9	44.1		53.3	11
14. 75 High St, Irvine LOW	49.1	28	50.8	34.3	30.8	56.6	57.2	71.3	41.1	45.3	55	49.9		47.5	12
15. 75 High St, Irvine HIGH	43.7	39.2	40.8	27.9	25	57.1	77.7	69	30.5	29.5	50	40.6		44.3	12
16. 71 High St, Irvine	43.2	42.6	34.7	25.7	27.7	30.6		46.4	30.3	30	40.8	40.4		35.7	11
17. 65a High Street, Irvine	40.8	40.1	36.1	24	27.4	32.1	31.1	42.2	23	22.2	45.6	44.6		34.1	12
18. 65 High Street, Irvine	47.1	42.7	39	24.4	25.9	32.1	30.3	36.4	25.1	24.3	45.2	33.3		33.8	12
19. 63 High Street, Irvine	35.1	31.5	36.4	28.6	25.8	32.9	27.7	47.6	32.6	23	41.7	36.3		33.3	12
20. 34 Kirkgate Irvine	26.7	25.2	17.7	6.6	5	6.6	7.9	8.6	9.6	7.9	27.7	30.4		15.0	12
21. Eglinton Street Irvine	44.9	46.4	41.3	21	16	21.7	23.9	22.5	21.6	20.7	35.4	35.3		29.2	12
22. 25 Main Rd, Springside	32.3	34.9	20.7	11.6	8.3	10.3	12.8	12.8	9.9	17.4	27.6	16.8		18.0	12
23. Main St, Drybridge	24.9	26.8	15.4	7.6	6.4	9.1	8.7	10.7	8	11	24.3	24.1		14.8	12
24. Auchengate (Bridge)	26.8	25.6	18.4	9.7	9.6	6.5	8.6	11.7	5.3	7	21.9	18.6		14.1	12
25. Dalry Rd , Kilwinning	34.8	34.5	28.3	12	17.1	14.1	15	19	15.1	12.9	34	30.2		22.3	12

Adjusted measurement (95% confidence interval) with all the data 11 periods used in this calcuations	
Bias Factor A 0.93 (0.82 - 1.09)	
Bias B 7% (-8% - 23%)	
Tube Precision: 10	Automatic DC: 95%
Adjusted with 95% CI	13 (11 - 15)
Adjusted with 95% CI	27 (24 - 32)
Adjusted with 95% CI	15 (13 - 18)
Adjusted with 95% CI	33 (29 - 38)
Adjusted with 95% CI	27 (24 - 31)
Adjusted with 95% CI	25 (22 - 29)
Adjusted with 95% CI	26 (23 - 30)
Adjusted with 95% CI	24 (21 - 28)
Adjusted with 95% CI	30 (26 - 35)
Adjusted with 95% CI	29 (26 - 34)
Adjusted with 95% CI	33 (29 - 38)
Adjusted with 95% CI	31 (27 - 36)
Adjusted with 95% CI	50 (44 - 58)
Adjusted with 95% CI	44 (39 - 52)
Adjusted with 95% CI	41 (36 - 48)
Adjusted with 95% CI	33 (29 - 39)
Adjusted with 95% CI	32 (28 - 37)
Adjusted with 95% CI	31 (28 - 37)
Adjusted with 95% CI	31 (27 - 36)
Adjusted with 95% CI	14 (12 - 16)
Adjusted with 95% CI	27 (24 - 32)
Adjusted with 95% CI	17 (15 - 20)
Adjusted with 95% CI	14 (12 - 16)
Adjusted with 95% CI	13 (12 - 15)
Adjusted with 95% CI	21 (18 - 24)

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

Adjustment of SINGLE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tube Measurements

Site Name/ID	Periods													Raw Mean	Valid periods
	1	2	3	4	5	6	7	8	9	10	11	12	13		
26. Byrehill , Kilwinning	33.9	31.3	17.5	7.6	6.5	6	9.7	9	13.9	12.8	24.7	28.4		16.8	12
27. 12 Garnock St, Dalry	30.8	40.1	23.5	7	5	5.9	6.9	6	8.8	9.7	25.2	26		16.2	12
28. 69 New St Dalry	41.4	54.1	34.1		20	25.2	24.8	31	20.7	22.8	39.4	41.9		32.3	11
29. 67 New St, Dalry	45.8	44.4	44.4	15.3	26.9	37.4	36.2	40	28.1	24.3	38.8	40.9		35.2	12
30. 45 New St Dalry	54.5	50.7	51	17.9	33.7	34.4	28	45	38	36.4	47.2	45.3		40.2	12
31. 60 New St Dalry	52.3	58.7	36.2	11	<1.7	27.6	23.3	39.9	27.9	23.6	44.3	42.9		35.2	11
32. 44 New St Dalry	61.6	65.6	54.9	18.3	22.7	35.2	26.1	36.4	29.3	38.4	63.6	45.8		41.5	12
33. 3 Townhead St, Dalry	58.1	71.3	45.7	14.4	23.7	38.5	29.1	46.9	36.7	36.6		55.6		41.5	11
34. 2 Townhead St, Dalry	48	39.8	37.8	14	26.7	22.1	21.7	29	30.9	31.8	44	39.4		32.1	12
35. Highfield Hamlet , Dalry	31.6	32.7	21.6	6.5	10.2	12.5	15	14.2	17	23.1	28.7	28.4		20.1	12
36. 85 Main Street , Largs	37	32		17.8	25.9	22	19.1	26.9	19.7	19	31.7	24.7		25.1	11
37. Hunterston Road	10.6	13.4	7	4.6	4.9	3.2	4.2	6	3.7	5.4	10.9	9.3		6.9	12

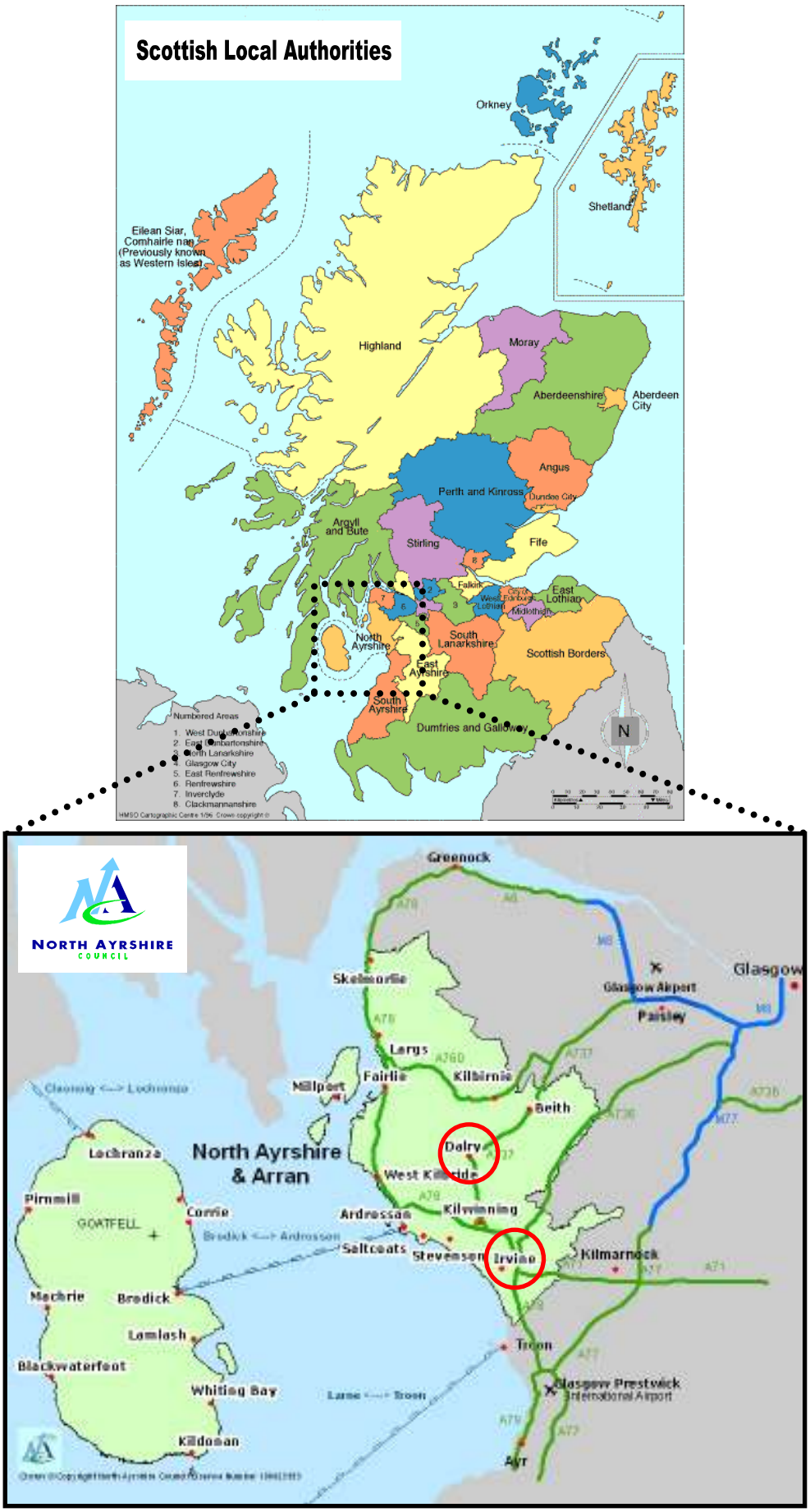
Adjusted measurement (95% confidence interval)
with all the data
11 periods used in this calcuations

Bias Factor A 0.93 (0.82 - 1.09)
Bias B 7% (-8% - 23%)
Tube Precision: 10 Automatic DC: 95%

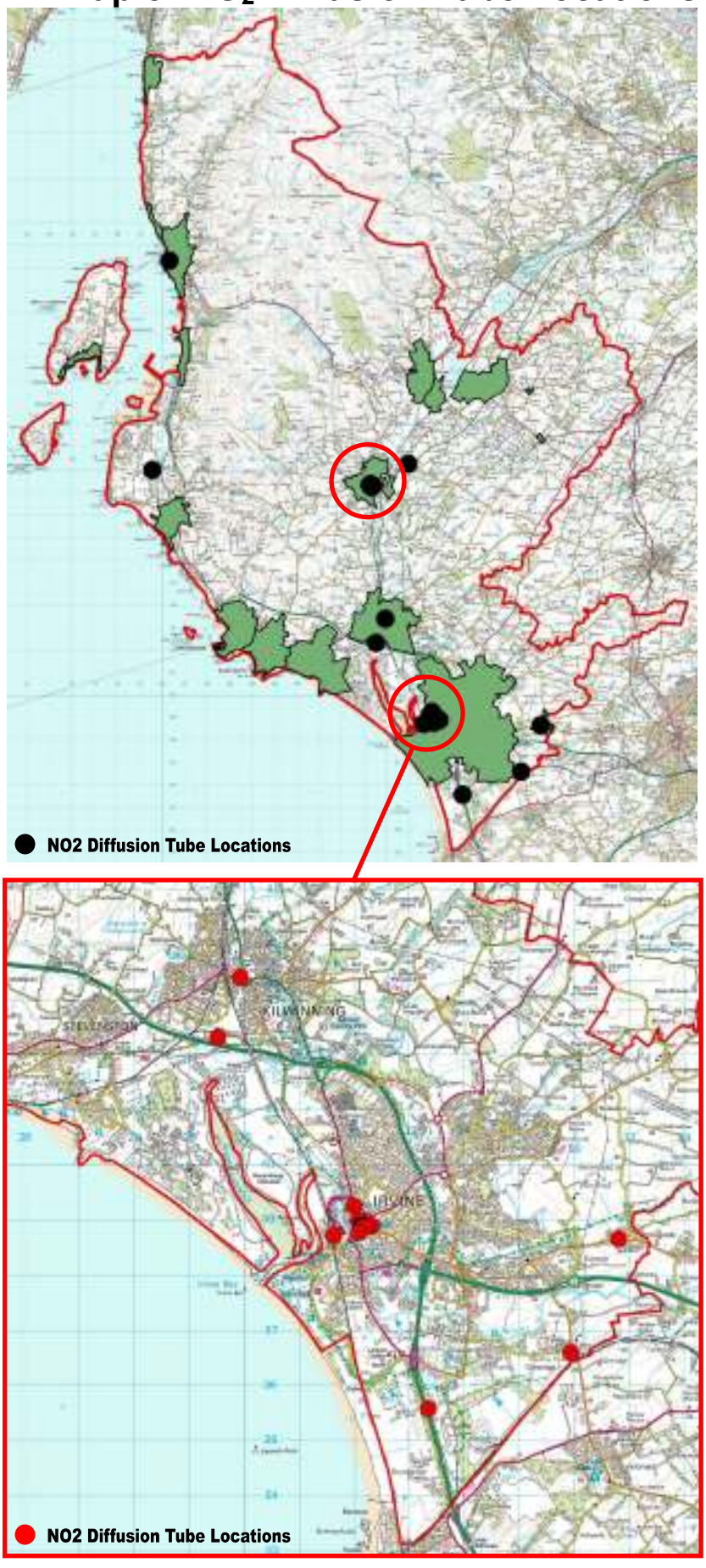
Adjusted with 95% CI	**16 (14 - 18)**
Adjusted with 95% CI	**15 (13 - 18)**
Adjusted with 95% CI	**30 (26 - 35)**
Adjusted with 95% CI	**33 (29 - 38)**
Adjusted with 95% CI	**37 (33 - 44)**
Adjusted with 95% CI	**33 (29 - 38)**
Adjusted with 95% CI	**39 (34 - 45)**
Adjusted with 95% CI	**39 (34 - 45)**
Adjusted with 95% CI	**30 (26 - 35)**
Adjusted with 95% CI	**19 (17 - 22)**
Adjusted with 95% CI	**23 (21 - 27)**
Adjusted with 95% CI	**6 (6 - 8)**

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

Appendix 6: Map of Locality & Surrounding Area



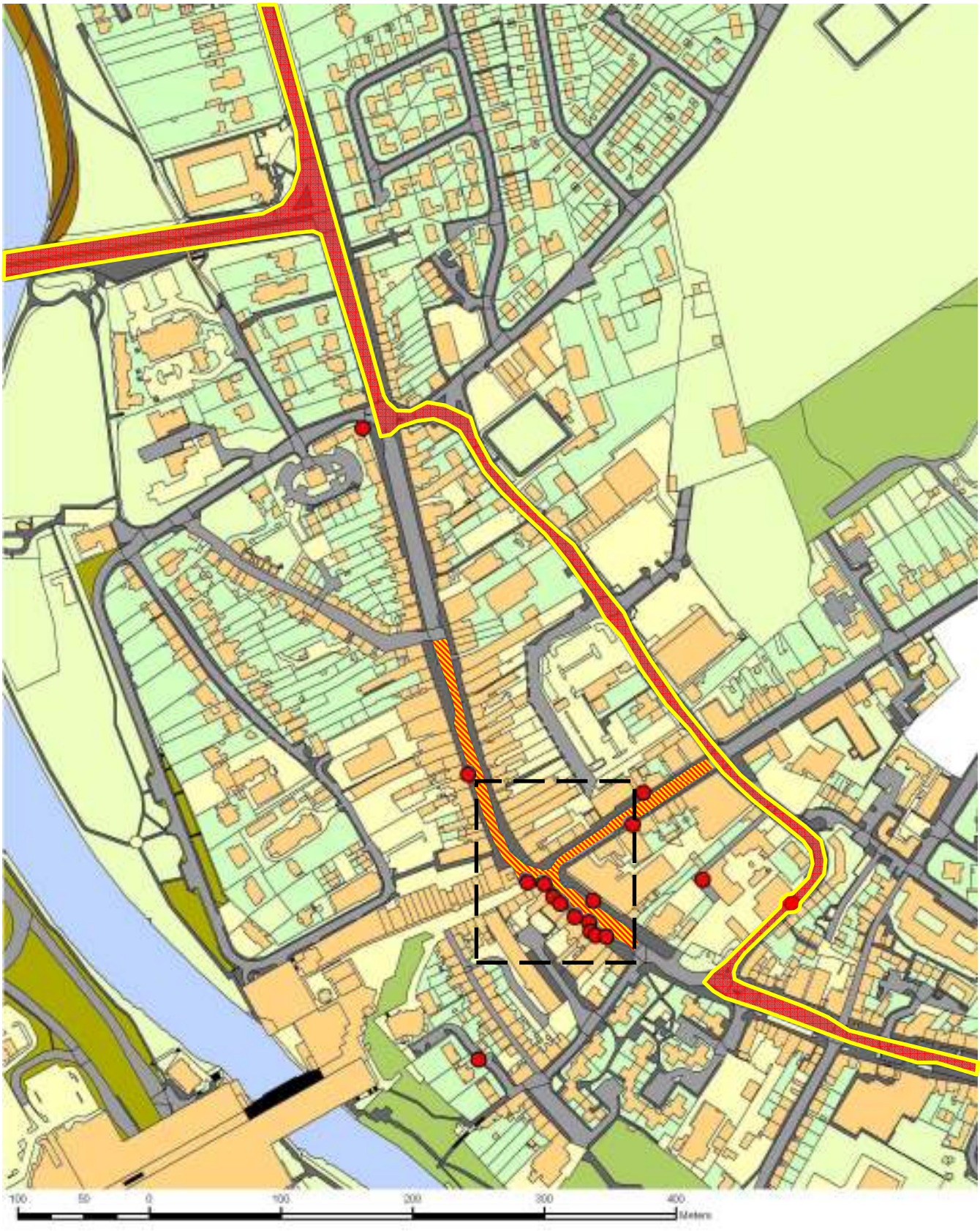
Appendix 7: Map of NO_2 Diffusion Tube Locations



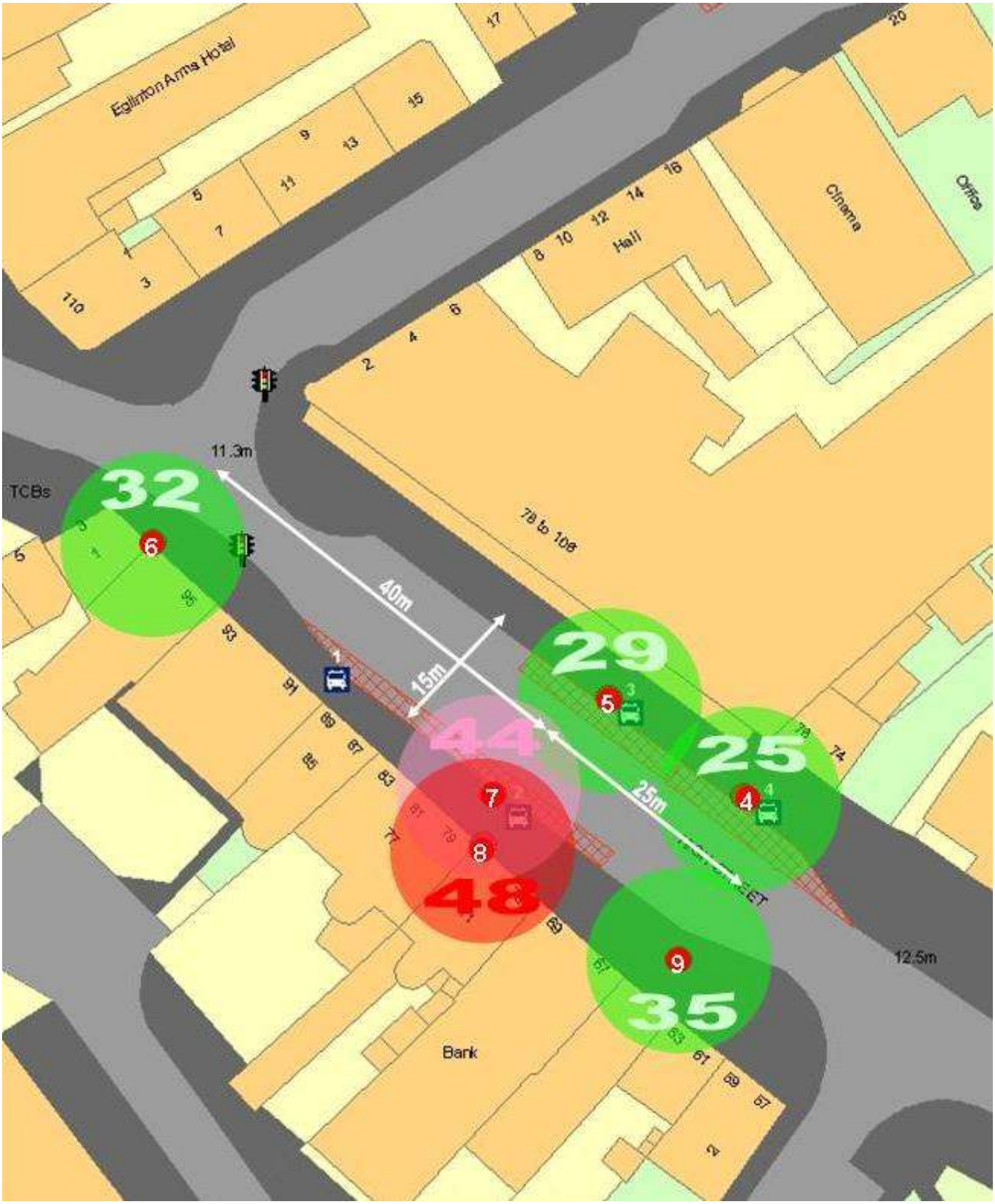
Irvine Area

Appendices 8 to 13

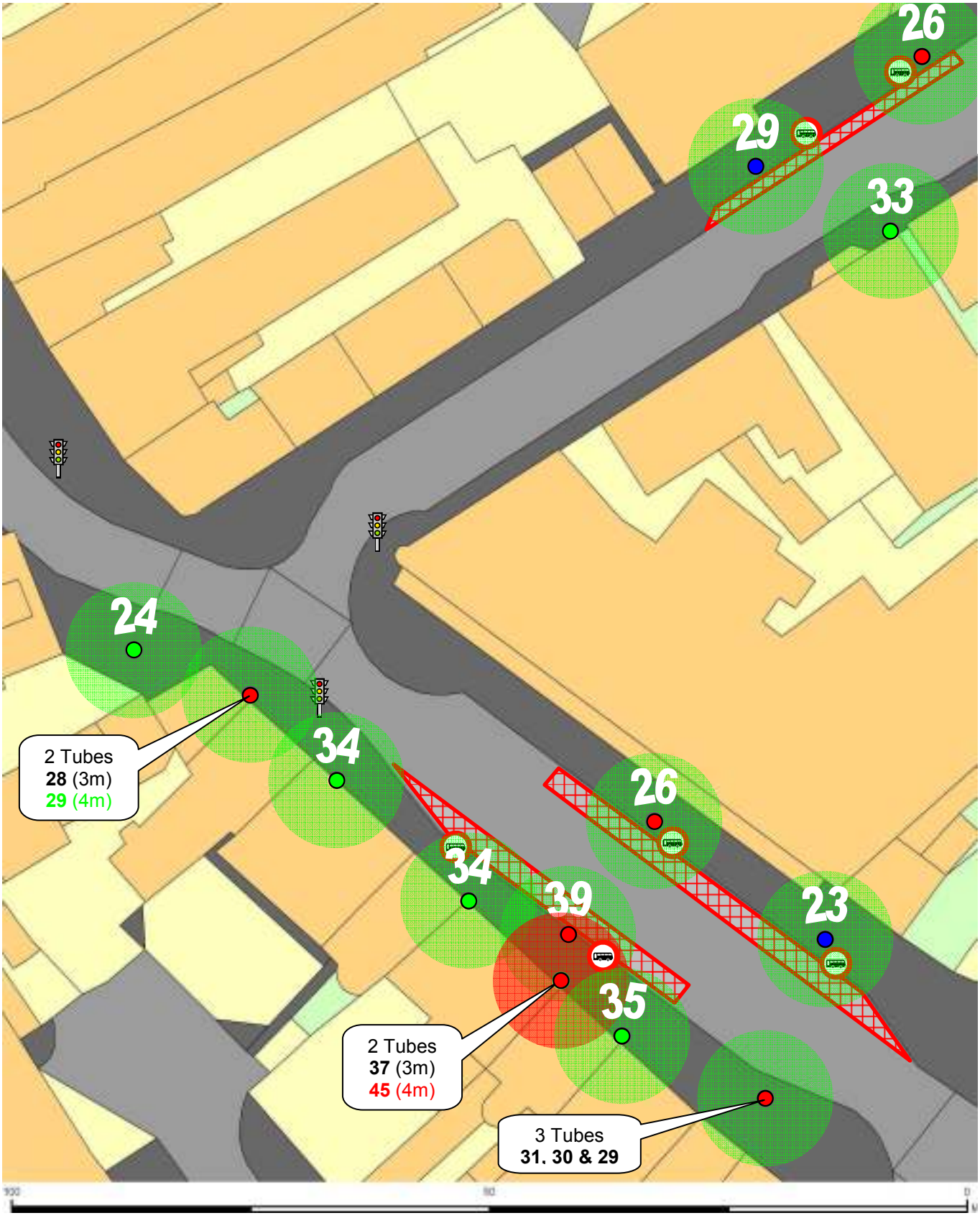
Appendix 8 Irvine Town Centre



Appendix 9: Irvine, High St (2007) NO_2 µg/m^3



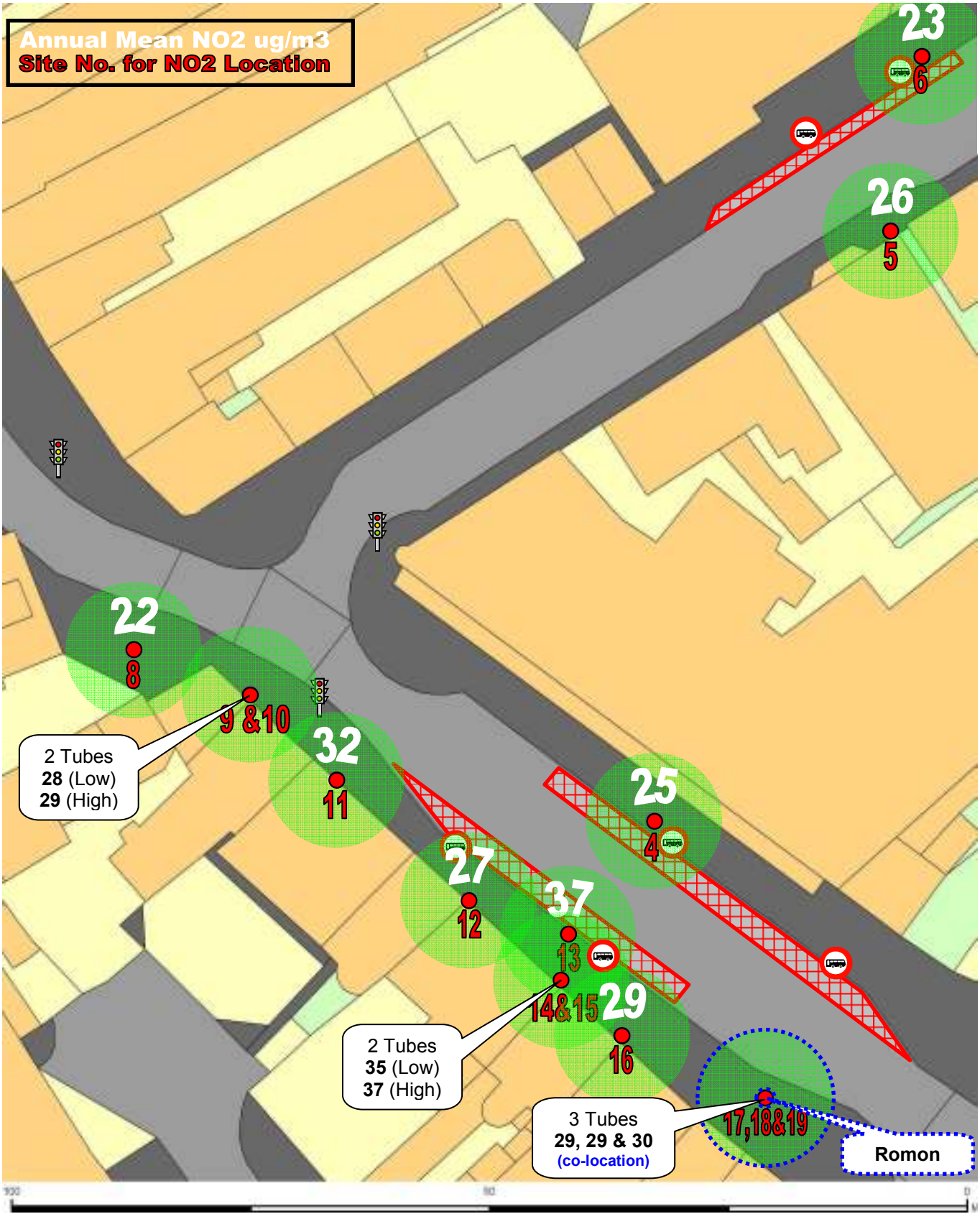
Appendix 10: Irvine, High St (2008) NO_2 µg/m^3



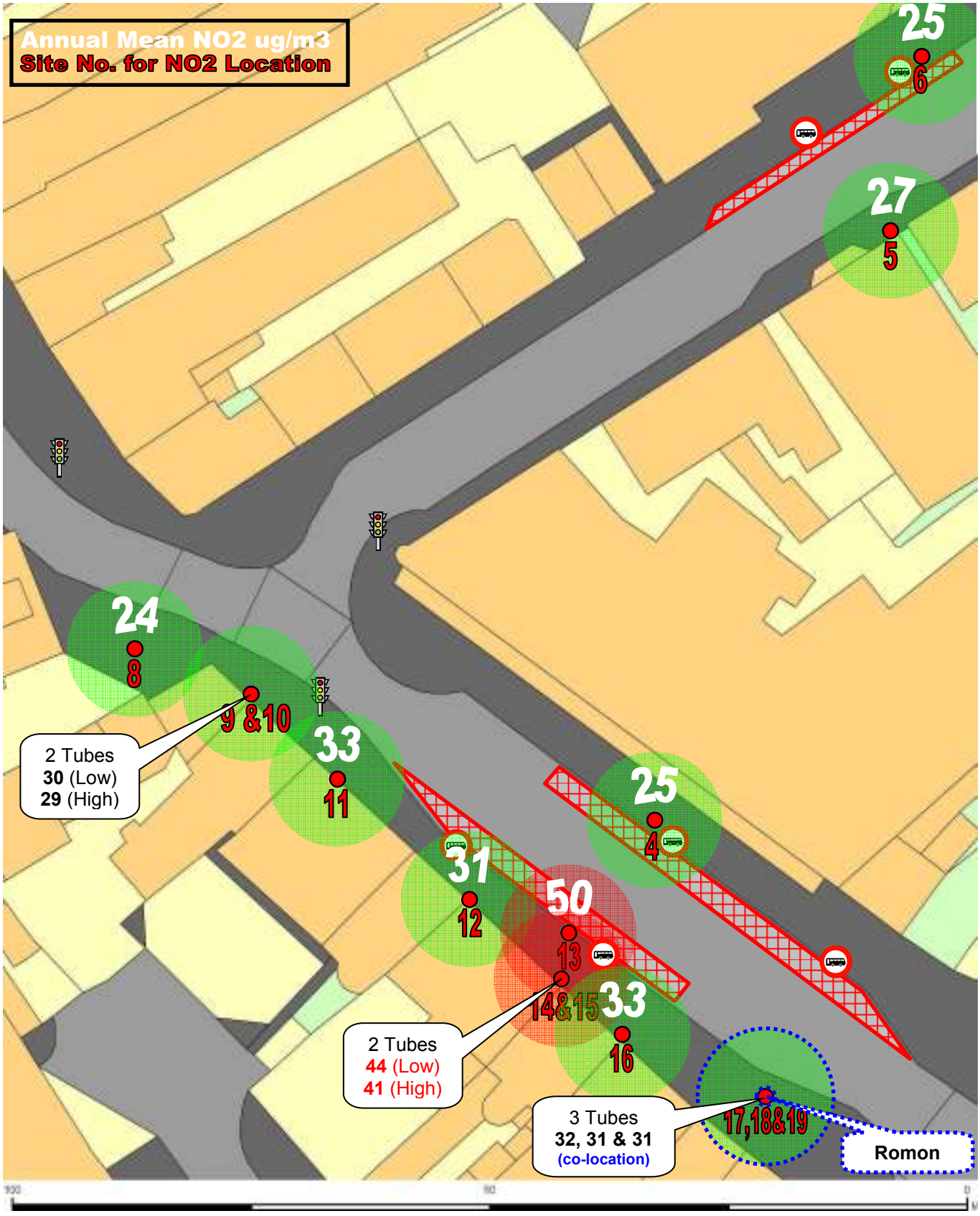
NO2 diffusion tubes

- **Existing**
- **New**
- **Removed**

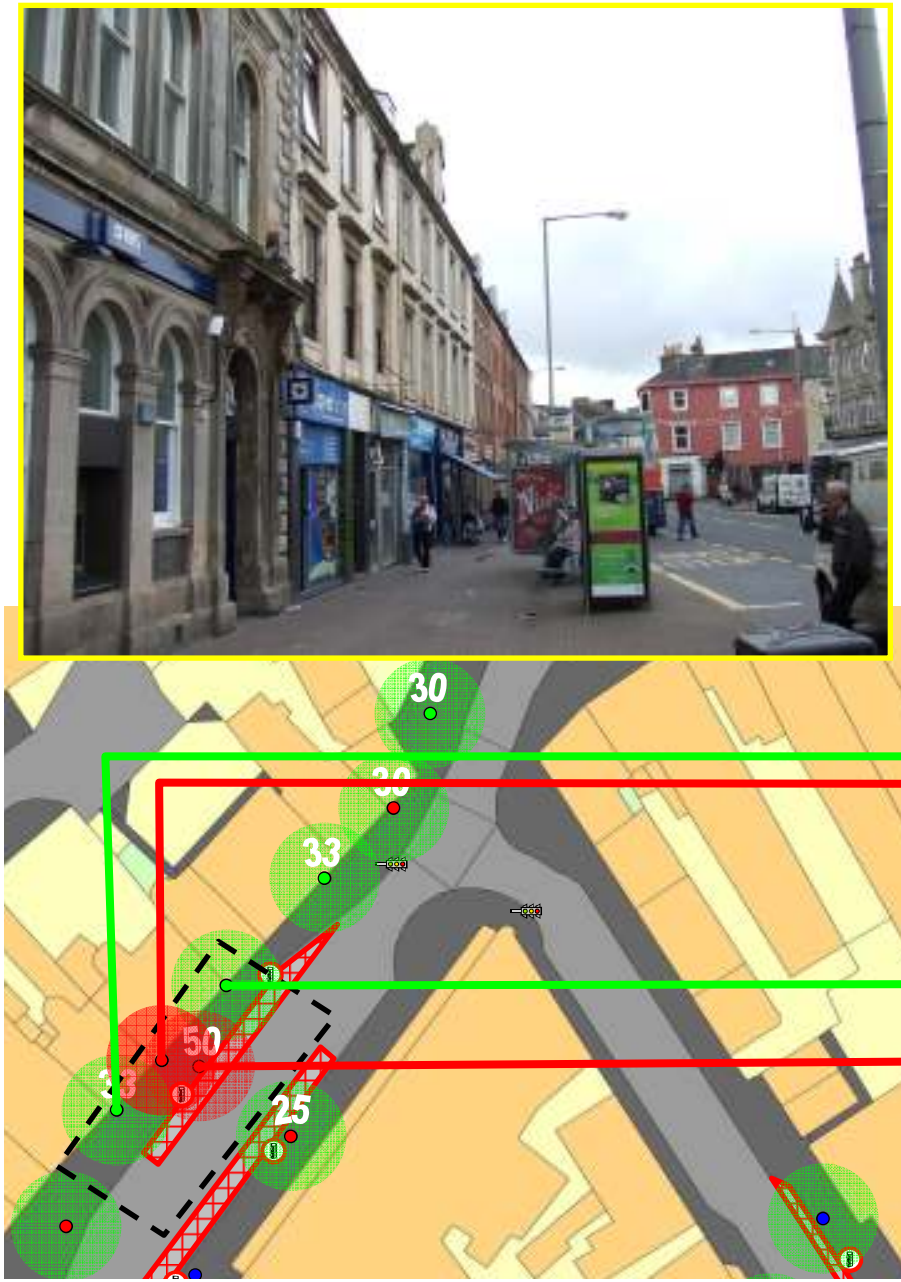
Appendix 11: Irvine, High St (2009) NO_2 µg/m^3



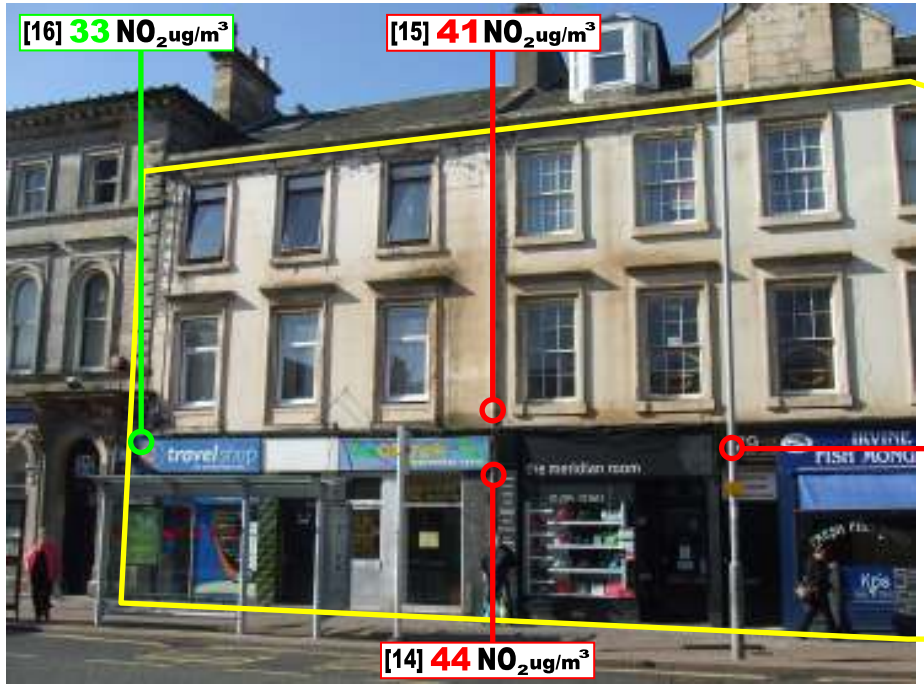
Appendix 12: Irvine, High St (2010) NO_2 µg/m^3



Appendix 13: Irvine, High St – Hot Spot



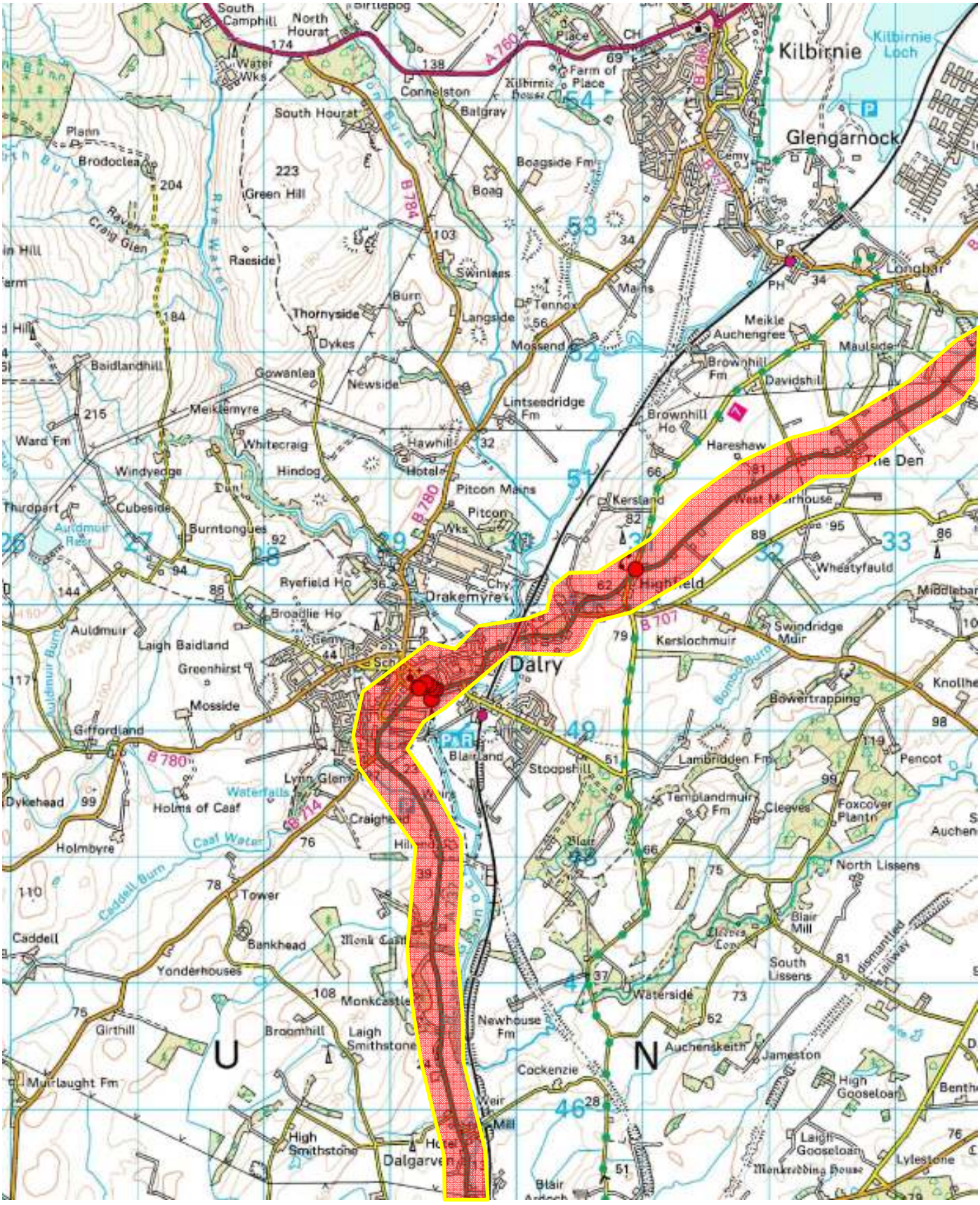
Appendix 13: Irvine, High St – Hot Spot (Cont) 2010 Results



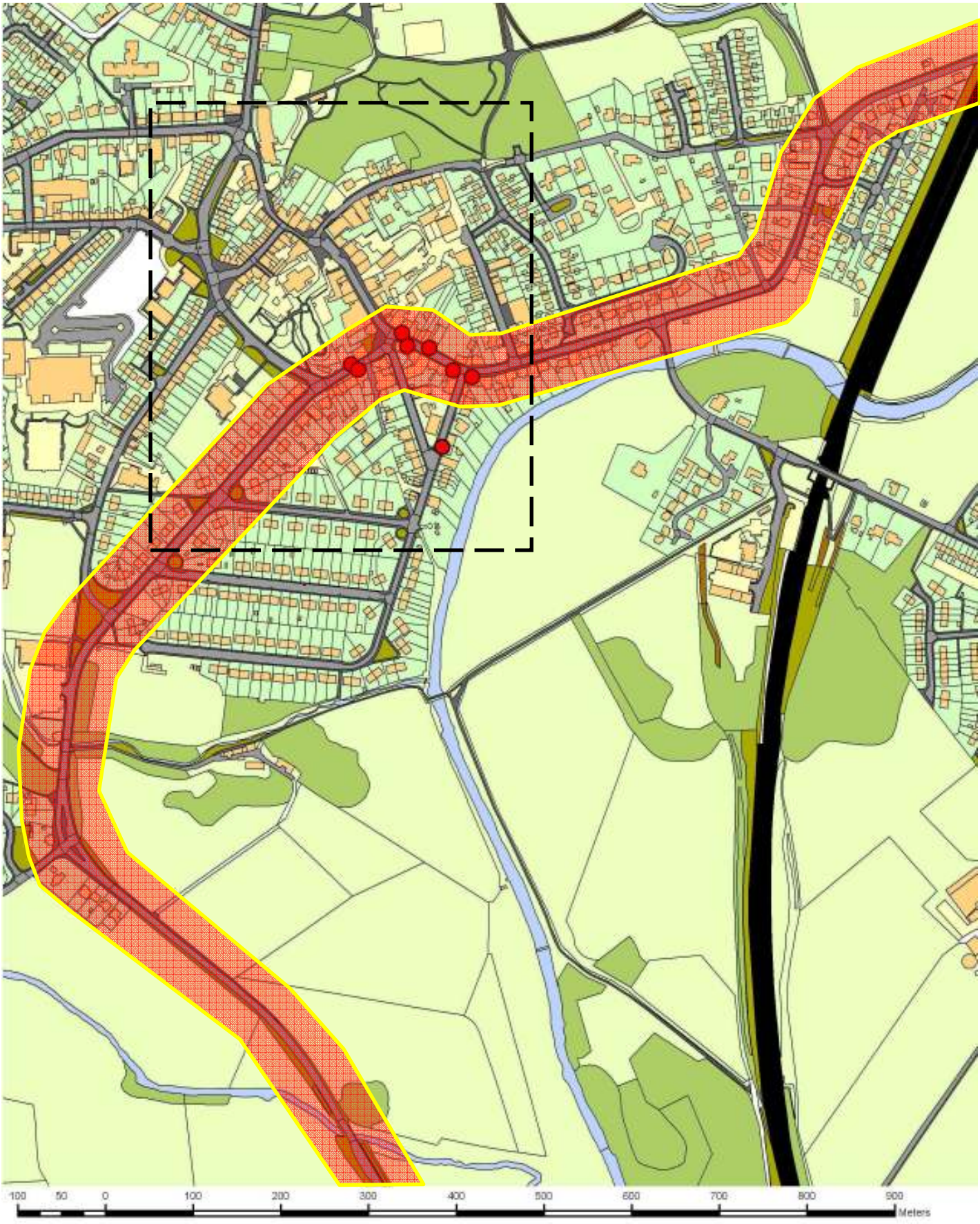
Dalry Area

Appendices 14 to 21

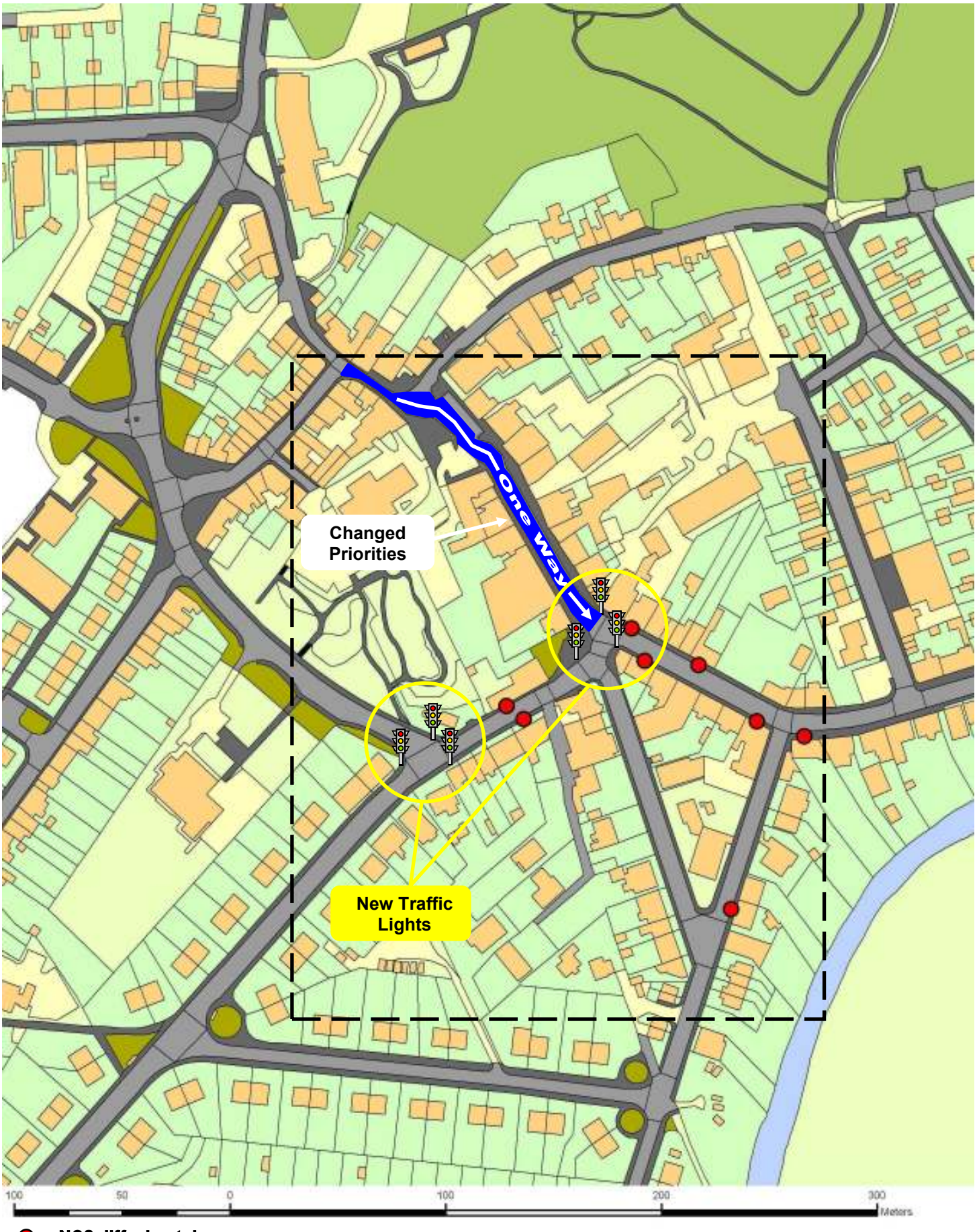
Appendix 14: Dalry (Ordnance Survey)



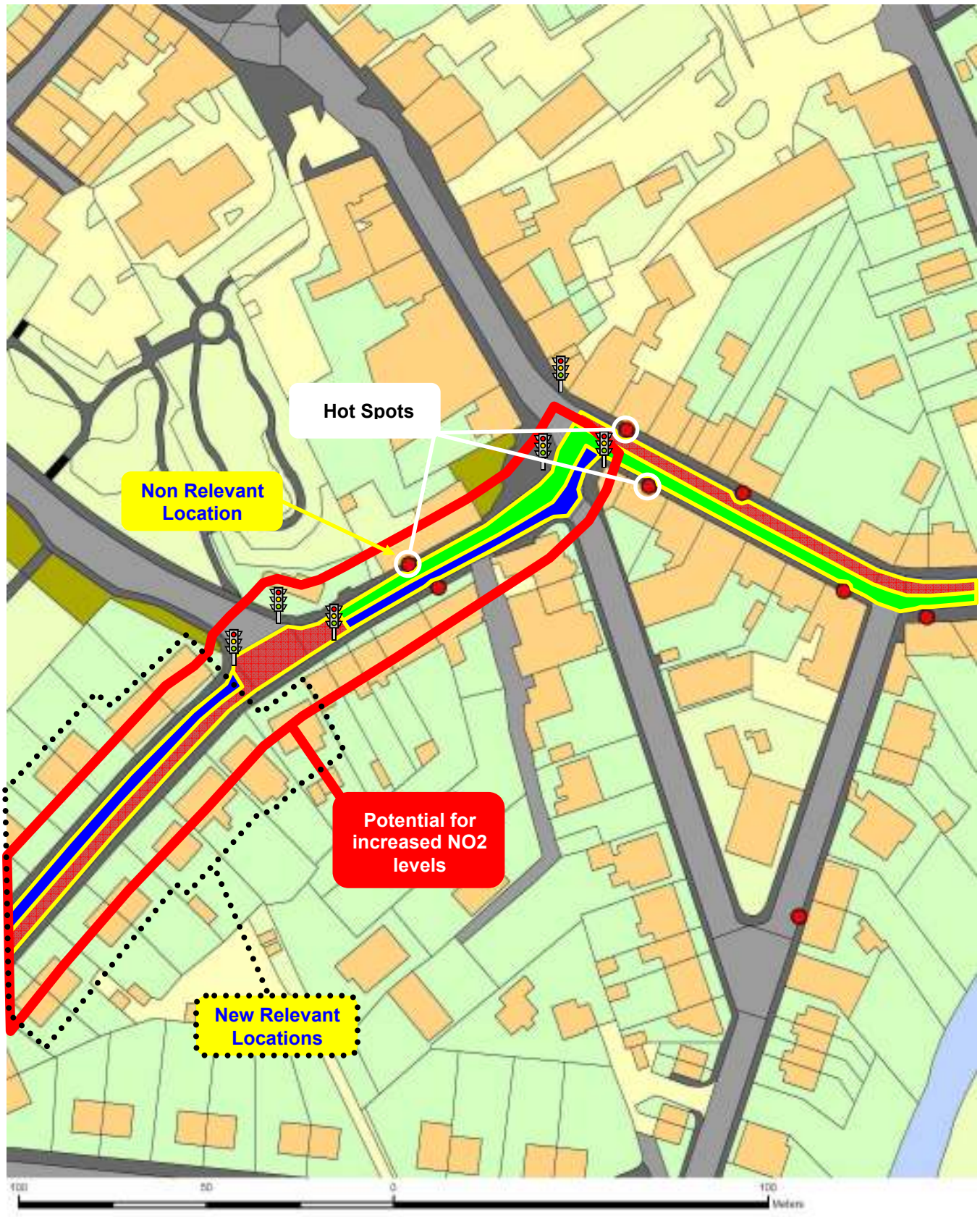
Appendix 15: Dalry - Town Centre



Appendix 16: Dalry - New Traffic Management (Dec 2008)



Appendix 17: Dalry – Potential Traffic Congestion (2009)



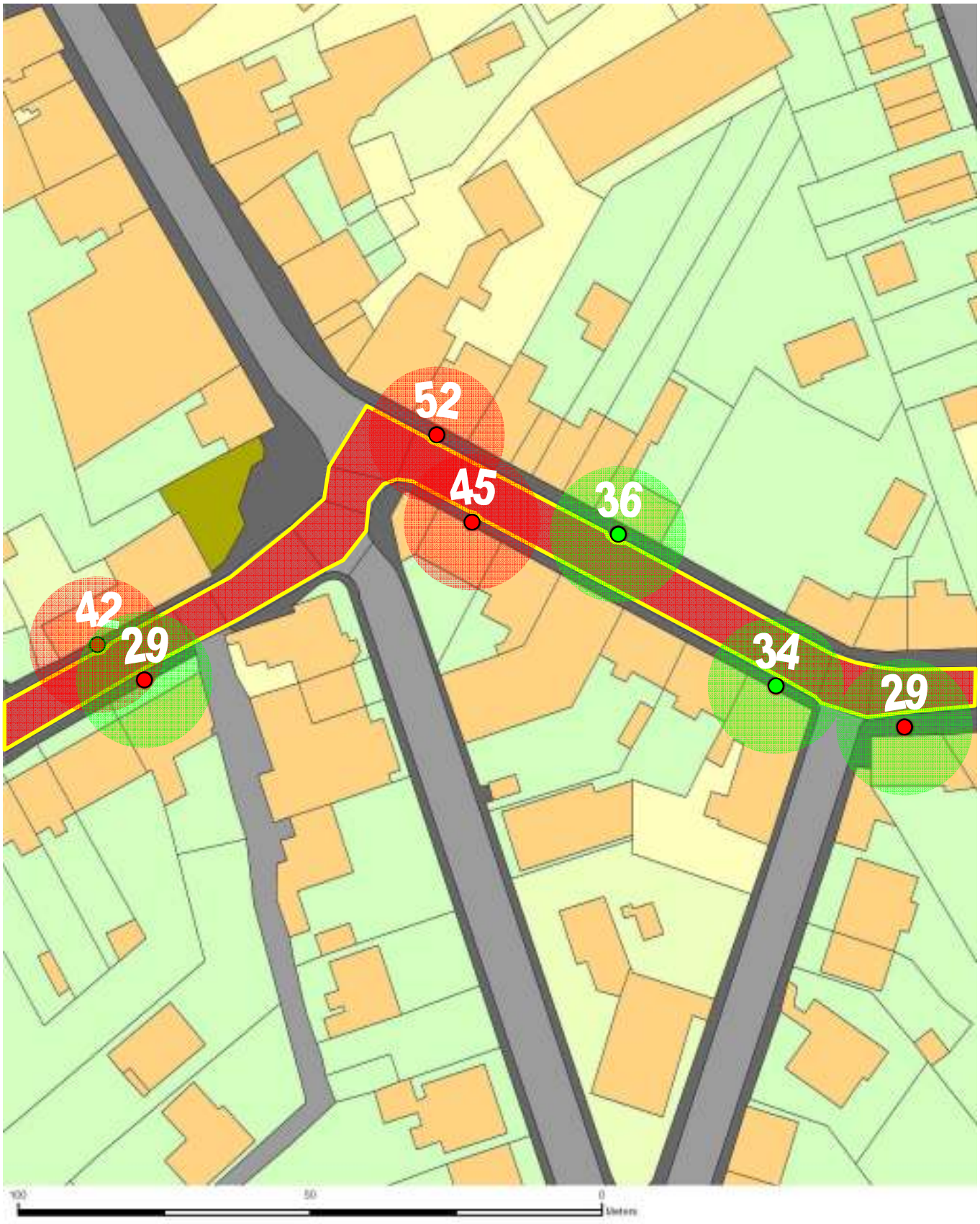
Queuing traffic

Only Before new traffic management

\+ After new traffic management

NO2 diffusion tubes

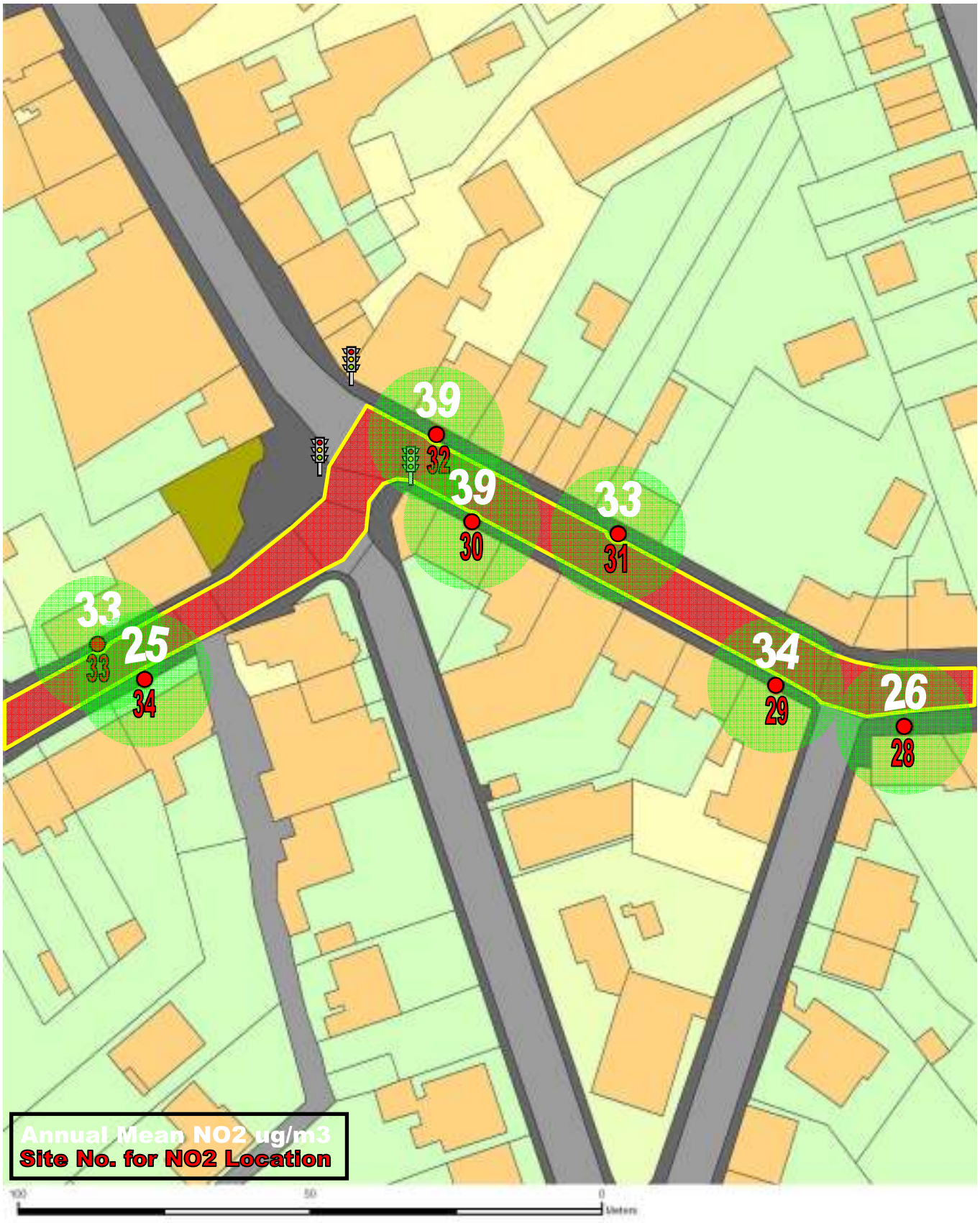
Appendix 18: Dalry – Townhead St/New St (2008) NO_2 µg/m^3



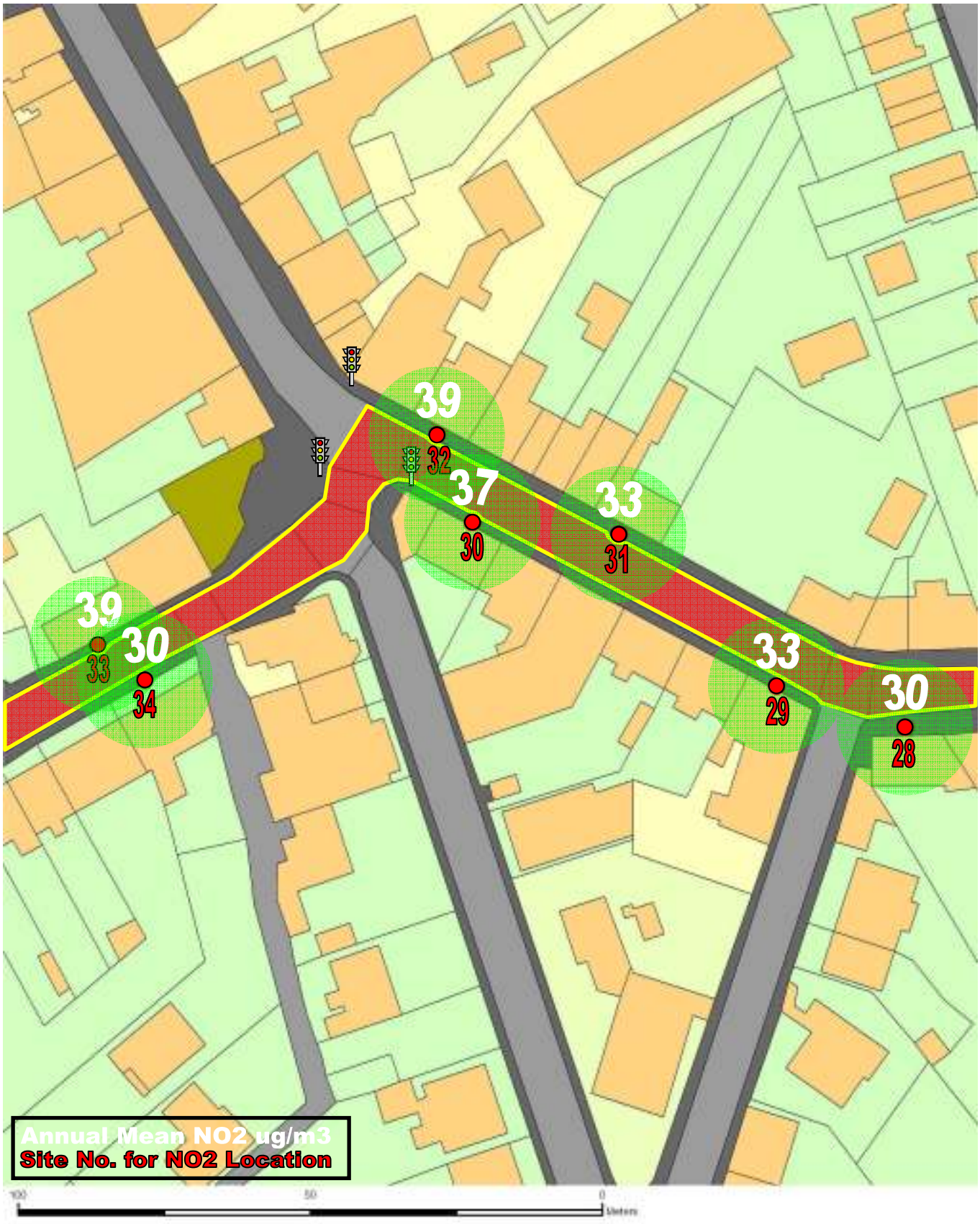
NO2 diffusion tubes

- **Existing**
- **New**

Appendix 19: Dalry – Townhead St/New St (2009) NO_2 µg/m^3



Appendix 20: Dalry – Townhead St/New St (2010) NO_2 µg/m^3



Appendix 21: Historical No2 Results (2000-2010)

Site No.	RESULTS IN UG/M3	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Cunninghame House, Irvine	9.4	10	14	16	12	12	14	12	10	12	13
2	35 East Road Irvine	20	20	30	31	26	23	33	26	24	25	27
3	Irvine Police Station	12	10	15	15	13	12	15	12	12	13	15
	74 High Street, Irvine	14	18	21	29	24	19	25	25	24		
4	70 High Street Irvine	24	25	31	33	28	23	31	29	26	25	33
5	18 Bank St, Irvine									33	26	27
	19 Bank St, Irvine					23	23	28	24	29		
6	19 Bank St Irvine					24	22	31	28	26	23	25
7	147 High Street, Irvine		19	30	32	28	23	31	29	34	29	26
8	3 Bridgegate,									24	22	24
9	97 High St, Irvine	23	22	33	37	33	27	**38**	32	28	28	30
10	97 High St, Irvine HIGH									29	29	29
11	91 High St, Irvine LOW									34	32	33
12	85 High St, Irvine									34	27	31
13	**79 High St, Irvine**	31	31	**41**	**50**	**46**	31	**43**	**44**	**39**	37	**50**
14	**75 High St, Irvine LOW**	30	26	36	**42**	36	30	**43**	**48**	37	35	**44**
15	**75 High St, Irvine HIGH**									**47**	37	**41**
16	71 High St, Irvine									35	29	33
17	65a High St, Irvine,	22	9	31	33	37	29	37	35	31	29	32
18	65 High St, Irvine, (ROMON)								34	30	29	31
19	63 High St, Irvine, (ROMON)								**38**	29	30	31
20	34 Kirkgate Irvine	9	9	14	16	11	12	14	11	8	16	14
21	Eglinton Street Irvine	17	17	23	25	21	19	26	22	27	26	27

Exceedences **Borderline Results in Bold**

Appendix 21: Historical No2 Results (2000-2010) (cont)

Site No.	RESULTS IN UG/M3	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
22	25 Main Rd, Springside	9	10	15	17	16	16	19	17	16	17	17
	Greenwood Academy	11	12	15	18	17	15	22	17	16		
23	Main St, Drybridge	9	8	10	12	10	9	11	9	6	12	14
	Shewalton Moss Estate	8	7	10	12	10	8	10	8	7		
	Dreghorn Primary School	17	11	16	18	15	15	18	13	13		
24	Auchengate (Bridge)	14	10	13	16	15	13	15	14	12	15	13
	Auchengate (House)	11	9	12	13	12	12	15	13	12		
	Auchengate (Road)	9	8	10	12	11	11	12	11	11		
25	Dalry Rd , Kilwinning	16	15	21	25	23	21	30	25	19	21	21
26	Byrehill , Kilwinning	9	9	12	17	11	12	13	10	8	13	16
27	12 Garnock St, Dalry								9	11	15	15
28	69 New St Dalry								28	29	26	30
29	67 New St, Dalry									34	34	33
30	45 New St Dalry								**48**	**45**	**39**	37
31	60 New St Dalry									36	33	33
32	44 New St Dalry								**47**	**45**	**39**	**39**
33	3 Townhead St, Dalry								**47**	**42**	33	**39**
34	2 Townhead St, Dalry								29	26	25	30
35	Highfield Hamlet , Dalry	8	10	16	19	14	14	19	15	15	21	19
36	85 Main Street , Largs	16	13	19	22	22	20	26	26	22	19	23
	Goldenberry Farm Road	5	10	5	4	3	4	6	5	8		
	Seamill/ Hunterston Road	5	5	8	8	5	7	9	6	6		
37	Hunterston Road/Cycle	4	3	5	5	3	4	6	4	5	8	6

Exceedences **Borderline Results in Bold**

Kevin, see me please ICT

Rural and Environment Directorate
Environmental Quality Division
Area 1-H(N)

T: 0131-244 7813 F: 0131-244 0211
E: andrew.taylor2@scotland.gsi.gov.uk

The Scottish Government

John Murray
Environmental Health Officer
North Ayrshire Council
Legal & Protective Services (Env Protection)
Cunninghame House
Irvine
KA12 8EE

Your ref:
Our ref:
9 June 2011

Dear John

LOCAL AIR QUALITY MANAGEMENT: NORTH AYRSHIRE COUNCIL ANNUAL PROGRESS REPORT 2011

Thank you for submitting the 2011 annual progress report of air quality in the North Ayrshire Council area. I acknowledge receipt of the report on behalf of the Scottish Ministers as a statutory consultee in terms of paragraph 1 of Schedule 11 to the Environment Act 1995.

A discussion took place between the Scottish Government and the Scottish Environment Protection Agency (SEPA), also a statutory consultee under Schedule 11 of the 1995 Act, in order to consider your report. This has been done to maximise the expertise available and to exchange views on the information being sent to you. Following this discussion I offer the comments below on behalf of the Government.

The report contains monitoring data and other information obtained since submission of the 2010 annual progress report. The report concludes that a detailed assessment is required for nitrogen dioxide and particles in Irvine High Street.

Your report was found to be thorough, containing most of the evidence specified in the guidance produced by the Government. On the basis of this evidence, the conclusions reached are accepted for all pollutants.

Conclusions

In addition to these comments, the Government uses an independent consultant to give a general overview of each local authority review and assessment document, to help ensure a consistency of approach. The consultant's appraisal of the report is limited to the data provided and does not take account of local knowledge. I enclose a copy this appraisal for information.

Victoria Quay, Edinburgh EH6 6QQ
www.scotland.gov.uk

I trust you find these comments helpful. However, please do not hesitate to contact me if you wish to discuss any issues related to the report.

I also take this opportunity to remind you that the next report due from the Council, in addition to the detailed assessment, will be an updating and screening assessment in April 2012.

Yours sincerely

ANDREW G TAYLOR
Air Quality Policy Manager

Victoria Quay, Edinburgh EH6 6QQ
www.scotland.gov.uk

Local Authority:	N Ayrshire
Reference:	PR4-395
Date of issue	April 2011

Progress Report Appraisal Report

The Progress Report sets out new information on air quality obtained by North Ayrshire Council as part of the Review & Assessment process required under the Environment Act 1995 and subsequent Regulations.

The Review and Assessment Progress Report covers the **minimum requirements for reporting on monitoring and new local developments.** It does not include any of the recommended additional elements.

On the basis of the information provided by the local authority, the report is **accepted for monitoring data and new local developments**. We would advise, however, that the Council address the points raised in the Commentary below and revise the report accordingly.

Following the completion of this report, North Ayrshire Council should submit a Detailed Assessment for NO_2 and PM_{10} for High Street, Irvine by April 2012, in addition to submitting an Updating and Screening Assessment by April 2012.

Local Authority:	N Ayrshire
Reference:	PR4-395
Date of issue	April 2011

Commentary

The report covers all of the minimum requirements specified in the Guidance. The following specific items are drawn to the local authority's attention and we strongly recommended that the local authority note these items and amend their current report where appropriate.

1. Tables 2.3 a and 2.3b present the continuous monitoring data from the ROMON for 2009 and 2010. In these tables the data capture are presented for 2009 rather than for 2010. The Figures for 2010 are included in Appendix 2 - and do not agree with the values presented here – therefore Tables 2.3 a and b should be amended to show the correct data capture rates for 2010

This commentary is not designed to deal with every aspect of the report. It highlights a number of issues that should help the local authority either in completing the Progress Report adequately (if required) or in carrying out future Review & Assessment work.

Issues specifically related to this appraisal can be followed up by returning the attached comment form to Defra, Welsh Assembly Government, Scottish Government or DOE, as appropriate – or by emailing the form to reportappraisal@ttr-ltd.com.

For any other queries please contact the Local Air Quality Management Helpdesk:
Telephone: 0800 0327 953
Email: LAQMHelpdesk@uk.bureauveritas.com

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