



**NORTH AYRSHIRE**  
**COUNCIL**



# **2009 Air Quality Updating and Screening Assessment for North Ayrshire Council**

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

**Date (August 2009)**

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<b>Report Ref No.</b>	2009NACUSA001
<b>Date</b>	August 2009

## **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.

With regard to nitrogen dioxide, it was predicted that a localised area of High Street, Irvine would continue to be subject to concentration levels in excess of the guideline limit for the annual mean ( $40\mu\text{g}/\text{m}^3$ ) national air quality standard. An additional 7 sampling points for nitrogen dioxide diffusion tubes were located in this area to establish the extent of the exceedences. Results show the exceedences to be confined to a very localised area (~7m radius), however overall results for High Street, Irvine are within limits.

This year there have been no annual mean exceedences, however this area will continue to be closely monitored.

NO<sub>2</sub> monitoring results for Townhead Street, Dalry and New Street, Dalry show consistent exceedences for the  $40\mu\text{g}/\text{m}^3$  level limit. A detailed assessment was carried out to be included in this report. However a new traffic management scheme has been put in place changing the characteristics of the traffic flow (speed). This has been operational in the area since early 2009 and subsequent monitoring in the area has shown a significant reduction in monthly nitrogen dioxide levels. In view of this it is considered inappropriate to proceed to declaration of an AQMA and it is proposed to extend the Detailed Assessment to allow for the effects of the new traffic system to be further assessed.

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# **1 Introduction**

## **1.1 Description of Local Authority Area (See App 1)**

North Ayrshire can be divided roughly into four main regional character classifications based on landscape and topography. 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) and the Isle of Man, Largs to Millport (Cumbrae), and Lochranza to Claonaig in Argyll.

## **1.2 Purpose of 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.

## **1.3 Air Quality Objectives**

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  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	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	3.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 $\text{mg}/\text{m}^3$	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM <sub>10</sub> ) (gravimetric)	50 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	50 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005



## 1.4 Summary of Previous Review and Assessments

Report	Summary
Stage 1 Review and Assessment (1998)	<p>It is recommended that a second stage review and assessment be undertaken for nitrogen dioxide.</p> <p>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.</p>
Stage 2 Review and Assessment (2000)	<p>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.</p> <p>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.</p>
2003 Updating and Screening Assessment	<p>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.</p> <p>Passive monitoring for nitrogen dioxide should continue in High Street, Irvine to assess the effect of the proposed traffic management scheme.</p> <p>There are no significant industrial sources of nitrogen dioxide within North Ayrshire.</p> <p>There is no requirement to proceed to a detailed assessment for nitrogen dioxide.</p>
2004 Progress Report	<p>With the exception of nitrogen dioxide all guideline limits for the National Air Quality Standards shall be met for 2004.</p> <p>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 (<math>40\mu\text{g}/\text{m}^3</math>) 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.</p> <p>With regard to <math>\text{PM}_{10}</math>, whilst the predicted estimated annual mean concentration for 2004 (<math>21.39\mu\text{g}/\text{m}^3</math>) shall be well below the U.K. Air Quality Objective, for 2010 it is predicted to be <math>19.75\mu\text{g}/\text{m}^3</math>, marginally exceeding the much reduced Scottish Air Quality Objective of <math>18\mu\text{g}/\text{m}^3</math>.</p> <p>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.</p>



Report	Summary
<b>2005</b> Progress Report	<p>With the exception of nitrogen dioxide all guideline limits for the National Air Quality Standards shall be met for 2004.</p> <p>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 (<math>40\mu\text{g}/\text{m}^3</math>) national air quality standard at the end of 2005. However, this is <b>not</b> an area of <b>relevant public exposure</b>. Consequently, a detailed assessment for nitrogen dioxide remains unnecessary.</p> <p>There is no need to proceed to a detailed assessment for any of the seven air pollutants.</p>
<b>2006</b> Updating and Screening Assessment Report	<p>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.</p> <p>DMRB screening shows that there are no areas within North Ayrshire, which are likely to fail the objective due to road traffic.</p> <p>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.</p> <p>There continues to be no need to proceed to a detailed assessment for nitrogen dioxide.</p>
<b>2007</b> Progress Report	<p>All guideline limits for the National Air Quality Standards should be met for 2010.</p> <p>With regard to nitrogen dioxide, it is predicted that a highly localised area of High Street, Irvine may continue to be subject to concentration levels in excess of the guideline limit for the annual mean (<math>40\mu\text{g}/\text{m}^3</math>) 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.</p> <p>With the exception of Nitrogen Dioxide there is no need to proceed to a detailed assessment for any of the air pollutants.</p>
<b>2008</b> Progress Report & Detailed Assessment	See text below

### 2008 Progress Report

NO<sub>2</sub> monitoring results for **Townhead Street, Dalry** and **New Street, Dalry** show consistent exceedences for the **40  $\mu\text{g}/\text{m}^3$**  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. This route is one of the main thoroughfares for traffic to and from Glasgow serving North Ayrshire. This route is also subject to proposals for a bypass which it is anticipated would reduce the elevated levels.

With regard to nitrogen dioxide, it is predicted that 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 ( $40\mu\text{g}/\text{m}^3$ ) national air quality standard. However, it is not known whether this level of pollution exists at the window height of the first floor dwellings and additional diffusion tube monitoring sites have been established in that area at a height of 4 metres.

With regard to PM<sub>10</sub>, whilst the predicted estimated annual mean concentration for 2004 (21.39µg/m<sup>3</sup>) shall be well below the U.K. Air Quality Objective, for 2010 it is predicted to be 19.75µg/m<sup>3</sup>, marginally exceeding the much reduced Scottish Air Quality Objective of 18µg/m<sup>3</sup>. However the monitoring location is not in an area of relevant public exposure. Consequently a detailed assessment for particulate matter PM<sub>10</sub> remains unnecessary.

Passive sampling shall continue in the area to monitor ambient levels of nitrogen dioxide.

With the exception of Nitrogen Dioxide there was no need to proceed to a detailed assessment for any of the air pollutants.

In view of the inconsistencies highlighted above, there is a reluctance to declare a Local Air Quality Management Area at this time. It is proposed that additional monitoring of nitrogen dioxide by means of passive diffusion tubes be undertaken at a height of 4 metres, the height of the first floor windows of the flatted dwellings over the commercial properties. Additionally, further diffusion tubes will be sited in the area to assess the lateral extent of the exceedance area. It would be preferred to deploy a real time NOx analyser at the site of concern. However, as stated above there is limited space and so, on the grounds of pedestrian safety, it is not considered prudent. Scottish Executive have granted funding to locate an NOx analyser and PM<sub>10</sub> 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. It is hoped that this equipment shall be commissioned for the start of 2009.

Siting nitrogen dioxide diffusion tubes at 4 metres high and adding more monitoring sites in the vicinity shall provide greater confidence in the level of relevant exposure actually being caused. As the decision shall be based solely on diffusion tube monitoring. North Ayrshire Council then shall be better able to justify whether Local Air Quality Management Area status is required at this location.

With regards to Townhead Street/New Street, Darily North Ayrshire Council shall progress to a detailed assessment of NO<sub>2</sub>. 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. Additional diffusion tube monitoring sites have been established and as with High Street, Irvine have been fixed at the height of windows providing ventilation for dwellings (approximately 4 metres in most cases)



## 2 New Monitoring Data

### 2.1 Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

The Groundhog unit is shared with Inverclyde Council and was scheduled to be transferred to Greenock during July 2009. A purchase request for a Romon unit containing NO<sub>2</sub> analyser and BAM has been approved and will be operational from January 2009 onwards at the old Groundhog site in High Street, Irvine (which is subject to Detailed Assessment).

**Table 2.1 Details of Automatic Monitoring Sites**

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
Example 1	Urban background	X 332395 Y 433175	NO <sub>2</sub>	Y	Y (1m)	3m	Y
GroundHog	Kerbside	X 232182 Y 638867	NO <sub>2</sub> , PM10	No		2.5m	Y
Romon	Kerbside	X 232182 Y 638867	NO <sub>2</sub> , PM10	No		2.5m	Y

#### 2.1.2 Non-Automatic Monitoring

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

Monitoring of nitrogen dioxide was undertaken at 37 sites using passive diffusion tubes. Tubes were relocated from 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).

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					
1	Cunninghame House, Irvine	UB	231627	638718	NO <sub>2</sub>	N	N	N/A	N
2	35 East Road Irvine	K	232323	638892	NO <sub>2</sub>	N	N	5m	N
3	Irvine Police Station	UB	232255	638910	NO <sub>2</sub>	N	N	5m	N
	74 High Street, Irvine (Mama's)	K	232195	638878	NO <sub>2</sub>	N	N	3m	Y
4	70 High Street Irvine (Somerfield)	K	232172	638894	NO <sub>2</sub>	N	N	1.5m	Y
5	18 Bank St, Irvine (Pitchers)	K	232202	638952	NO <sub>2</sub>	N	Y (1m)	3m	Y
	19 Bank St, Irvine (Indigo Sun)	K	232182	638960	NO <sub>2</sub>	N	Y (2m)	3m	Y
6	19 Bank St Irvine (King World Travel)	K	232210	638976	NO <sub>2</sub>	N	Y (1m)	3m	Y

(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?
7	147 High Street, Irvine (Brownings)	K	232077	638990	NO <sub>2</sub>	N	Y	3m	Y
8	3 Bridgegate, CCTV Camera	K			NO <sub>2</sub>	N	N	3m	Y
9	97 High St, Irvine (R.S.McColl) LOW	K	232135	638907	NO <sub>2</sub>	N	Y (3m)	3m	Y
10	97 High St, Irvine (RS McColls) HIGH	K	232142	638897	NO <sub>2</sub>	N	Y (1m)	3m	Y
11	91 High St, Irvine (Oxfam Sign) LOW	K	232147	638892	NO <sub>2</sub>	N	Y (1m)	3m	Y
12	85 High St, Irvine (Indian Palace)	K	232158	638882	NO <sub>2</sub>	N	Y (1m)	3m	Y
13	79 High St, Irvine (Fishmmonger)	K	232169	638878	NO <sub>2</sub>	N	N	3m	Y
14	75 High St, Irvine (OK Joes) LOW	K	232170	638871	NO <sub>2</sub>	N	Y (3m)	3m	Y
15	75 High St, Irvine (OK Joes) HIGH	K	232170	638871	NO <sub>2</sub>	N	Y (1m)	3m	Y
16	71 High St, Irvine (Stagecoach Sign)	K	232174	638868	NO <sub>2</sub>	N	Y (1m)	1m	Y
17	65a High Street, Irvine, (AUTO MONITOR STATION)	K	232182	638867	NO <sub>2</sub>	N	N	2.5m	Y
18	65 High Street, Irvine, (AUTO MONITOR STATION)	K	232182	638867	NO <sub>2</sub>	N	N	2.5m	Y
19	63 High Street, Irvine, (AUTO MONITOR STATION)	K	232182	638867	NO <sub>2</sub>	N	N	2.5m	Y
20	34 Kirkgate Irvine	UB	232085	638774	NO <sub>2</sub>	N	N	N/A	N
21	Eglinton Street Irvine	K	231997	639252	NO <sub>2</sub>	N	N	N/A	N
22	25 Main Rd, Springside	K	236813	638659	NO <sub>2</sub>	N	N	N/A	N
	Greenwood Academy	K	234409	637921	NO <sub>2</sub>	N	N	N/A	N
23	Main St, Drybridge	SP	235946	636597	NO <sub>2</sub>	N	N	N/A	N
	Shewalton Moss Estate	SP	235751	636637	NO <sub>2</sub>	N	N	N/A	N
	Dreghorn Primary School	K	235547	638410	NO <sub>2</sub>	N	N	N/A	N
24	Auchengate (Bridge)	SP	233332	635558	NO <sub>2</sub>	N	N	N/A	N
	Auchengate (House)	SP	233700	634078	NO <sub>2</sub>	N	N	N/A	N
	Auchengate (Road)	SP	233731	634067	NO <sub>2</sub>	N	N	N/A	N
25	Dalry Rd , Kilwinning (Cornerstone)	K	229928	643400	NO <sub>2</sub>	N	N	N/A	N



(cont)

(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?
26	Byrehill , Kilwinning (Cycle Track Sign)	K	229520	642319	NO <sub>2</sub>	N	N		
27	12 Garnock St, Dalry	UB			NO <sub>2</sub>	N	Y (1m)	1.5	N
28	69 New St Dalry	K			NO <sub>2</sub>	N	Y (2m)	2.5	Y
29	67 New St, Dalry (Royal Hotel)	K			NO <sub>2</sub>	N	Y (1m)	2m	Y
30	45 New St Dalry	K			NO <sub>2</sub>	N	Y (1m)	1.5m	Y
31	60 New St Dalry (Column House)	K			NO <sub>2</sub>	N	Y (1m)	1.5m	Y
32	44 New St Dalry (RBS Bank)	K			NO <sub>2</sub>	N	Y (1m)	1.5m	Y
33	3 Townhead St, Dalry (Post Office)	K			NO <sub>2</sub>	N	N	2m	Y
34	2 Townhead St, Dalry (NAC Offices)	K			NO <sub>2</sub>	N	Y (1m)	2m	Y
35	Highfield Hamlet , Dalry	K	230943	650280	NO <sub>2</sub>	N	N	N/A	N
36	85 Main Street , Largs	K	220333	659322	NO <sub>2</sub>	N	N	N/A	N
	Goldenberry Farm Road	SP	219199	651163	NO <sub>2</sub>	N	N	N/A	N
	Seamill/ Hunterston Rd (layby)	SP	220017	650320	NO <sub>2</sub>	N	N	N/A	N
37	Hunterston Road/Cycle Track	SP	219582	650020	NO <sub>2</sub>	N	N	N/A	N

- Site no longer monitored
- Locations subject to Detailed Assessment
- New monitoring site

Details of QA/QC are detailed in Appendix A

North Ayrshire Council did not have a co-location study for 2008, however one is planned for 2009 located at the automatic monitoring site.

Bias factor applied was selected using the excel spreadsheet from the review and assessment helpdesk website (Appendix 3) the bias factor was calculated for GSS in 2008 at **0.97** and was applied to all sites.

## **2.2 Comparison of Monitoring Results with AQ Objectives**

### **2.2.1 Nitrogen Dioxide**

In North Ayrshire monitoring of nitrogen dioxide by passive diffusion tubes has been undertaken regularly since 1993, after earlier involvement in the two short national surveys.

The aim of the nitrogen dioxide monitoring undertaken so far in North Ayrshire has been to measure pollutant concentrations at busy roads and junctions especially near residential areas. Monitoring has also been undertaken at sites where the continuous frontage of buildings provides a canyon effect and allows pollutant levels to accumulate.

Additional site locations in Dalry have now been included in the monitoring of NO<sub>2</sub> using diffusion tubes. Sites are located on the road through the town, which serves as one of the main traffic routes between Glasgow and North Ayrshire (see Appendix 12). DMRB screening from previous reports suggested this area would not fail objectives, however for October 2006, the monthly mean concentration at 2 locations were 59 and 60 µg/m<sup>3</sup> (3 months monitoring period).

The subsequent monitoring for this area for 2007 and 2008 has shown continued monthly mean NO<sub>2</sub> levels in excess of the 40 µg/m<sup>3</sup> annual mean limit, confirming the modelling did not accurately reflect emissions from vehicles. Further Detailed Assessment of this area is currently ongoing.

A new traffic management scheme for Dalry became effective in March 2009 (see Appendix 14) with part of New Street being designated one way and additional traffic lights located on the Townhead Street (A737) and Roche Way junction. As a result, the period for detailed assessment has been extended to review the effect of the new traffic management on air quality.

### **Automatic Monitoring Data**

The Groundhog unit suffered major electrical failures and despite repeated attempts by electricians and engineers to stabilise the unit no suitable data was obtained for 2008

### **Diffusion Tube Monitoring Data**

Nitrogen dioxide levels were monitored using passive diffusion tubes at 37 separate locations in North Ayrshire during 2008. As part of the detailed assessment an additional 7 tubes located have been located in Irvine Town Centre around the hot spot to get a more detailed picture of the levels experienced here (see appendices 8 & 9)

The diffusion tube locations are described in Table 2.4a.



Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA	Data Capture 2008 %	Annual mean concentrations
1	Cunninghame House, Irvine	N	100	10
2	35 East Road Irvine	N	100	24
3	Irvine Police Station	N	100	12
	74 High Street, Irvine (Mama's)	N	50 (Jan-Jun)	23.6
4	70 High Street Irvine (Somerfield)	N	100	26
5	18 Bank St, Irvine (Pitchers)	N	50 (Jul-Dec)	32.5
	19 Bank St, Irvine (Indigo Sun)	N	50 (Jan-Jun)	28.5
6	19 Bank St Irvine (King World Travel)	N	100	26
7	147 High Street, Irvine (Brownings)	N	100	34
8	3 Bridgegate, CCTV Camera	N	50 (Jul-Dec)	23.9
9	97 High St, Irvine (R.S.McColl) LOW	N	100	28
10	97 High St, Irvine (RS McColls) HIGH	N	50 (Jul-Dec)	29.4
11	91 High St, Irvine (Oxfam Sign) LOW	N	50 (Jul-Dec)	34.1
12	85 High St, Irvine (Indian Palace)	N	50 (Jul-Dec)	34.1
13	79 High St, Irvine (Fishmonger)	N	100	39
14	75 High St, Irvine (OK Joes) LOW	N	83.3	37
15	75 High St, Irvine (OK Joes) HIGH	N	50 (Jul-Dec)	44.6*
16	71 High St, Irvine (Stagecoach Sign)	N	50 (Jul-Dec)	34.8

\*6 months only (Jul-Dec) –

NOTE: 2008 results were lower in the first 6 months of the year (See Appendix 12). The annual mean for this new site may be lower over the full calendar year

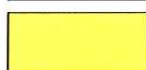
(Cont)

Site ID	Location	Within AQMA	Data Capture 2008 %	Annual mean concentrations
17	65a High Street, Irvine, (AUTO MONITOR STATION)	N	100	31
18	65 High Street, Irvine, (AUTO MONITOR STATION)	N	100	30
19	63 High Street, Irvine, (AUTO MONITOR STATION)	N	100	29
20	34 Kirkgate Irvine	N	100	8
21	Eglinton Street Irvine	N	100	27
22	25 Main Rd, Springside	N	100	16
	Greenwood Academy	N	50 (Jan-Jun)	15.8
23	Main St, Drybridge	N	100	6
	Shewalton Moss Estate	N	50 (Jan-Jun)	7.3
	Dreghorn Primary School	N	50 (Jan-Jun)	13.1
24	Auchengate (Bridge)	N	100	12
	Auchengate (House)	N	50 (Jan-Jun)	11.6
	Auchengate (Road)	N	50 (Jan-Jun)	11.3
25	Dalry Rd , Kilwinning (Cornerstone)	N	100	19
26	Byrehill , Kilwinning (Cycle Track Sign)	N	83.3	8
27	12 Garnock St, Dalry	N	91.7	11
28	69 New St Dalry	N	100	29
29	67 New St, Dalry (Royal Hotel)	N	50 (Jul-Dec)	34.1



(Cont)

Site ID	Location	Within AQMA	Data Capture 2008 %	Annual mean concentrations
30	45 New St Dalry	N	100	45
31	60 New St Dalry (Column House)	N	50 (Jul-Dec)	36.1
32	44 New St Dalry (RBS Bank)	N	91.6	51
33	3 Townhead St, Dalry (Post Office)	N	100	42 Non-relevant Location
34	2 Townhead St, Dalry (NAC Offices)	N	100	26
35	Highfield Hamlet , Dalry	N	100	15
36	85 Main Street , Largs	N	91.6	22
	Goldenberry Farm Road	N	50 (Jan-Jun)	7.9
	Seamill/ Hunterston Road (layby)	N	50 (Jan-Jun)	5.7
37	Hunterston Road/Cycle Track	N	100	5



Part of Detailed Assessment



New Monitoring Locations



Discontinued monitoring locations

Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Adjusted for bias		
			2006 *	2007 *	2008
1	Cunninghame House, Irvine	N	14	12	10
2	35 East Road Irvine	N	33.2	26	24
3	Irvine Police Station	N	15	12	12
	74 High Street, Irvine (Mama's)	N	25	25	23.6
4	70 High Street Irvine (Somerfield)	N	31	29	26
5	18 Bank St, Irvine (Pitchers)	N			32.5
	19 Bank St, Irvine (Indigo Sun)	N	31	28	28.5
6	19 Bank St Irvine (King World Travel)	N	28	24	26
7	147 High Street, Irvine (Brownings)	N	31	29	34
8	3 Bridgegate, CCTV Camera	N			23.9
9	97 High St, Irvine (R.S.McColl) LOW	N	38	32	28
10	97 High St, Irvine (RS McColls) HIGH	N			29.4
11	91 High St, Irvine (Oxfam Sign) LOW	N			34.1
12	85 High St, Irvine (Indian Palace)	N			34.1
13	79 High St, Irvine (Fishmonger)	N	43	44	39
14	75 High St, Irvine (OK Joes) LOW	N	43	48	37
15	75 High St, Irvine (OK Joes) HIGH	N			44.6*
16	71 High St, Irvine (Stagecoach Sign)	N			34.8
17	65a High Street, Irvine, (AUTO MONITOR STATION)	N	37	35	31

\*6 months only (Jul-Dec) –

NOTE: 2008 results were lower in the first 6 months of the year. The annual mean for the new tubes may be lower over the full calendar year.

(Cont)

Site ID	Location	Within AQMA?	Annual mean concentrations (µg/m <sup>3</sup> ) Adjusted for bias		
18	65 High Street, Irvine, (AUTO MONITOR STATION)	N	N/A	N/A	30
19	63 High Street, Irvine, (AUTO MONITOR STATION)	N	N/A	N/A	29
20	34 Kirkgate Irvine	N	14	11	8
21	Eglinton Street Irvine	N	26	22	27
22	25 Main Rd, Springside	N	19.2	17	16
	Greenwood Academy	N	21.5	17	15.8
23	Main St, Drybridge	N	11.3	9	6
	Shewalton Moss Estate	N	10.1	8	7.3
	Dreghorn Primary School	N	18	13	13.1
24	Auchengate (Bridge)	N	15	14	12
	Auchengate (House)	N	15	13	11.6
	Auchengate (Road)	N	12	11	11.3
25	Dalry Rd , Kilwinning (Cornerstone)	N	30	25	19
26	Byrehill , Kilwinning (Cycle Track Sign)	N	13	10	8
27	12 Garnock St, Dalry	N		9	11
28	69 New St Dalry	N		28	29
29	67 New St, Dalry (Royal Hotel)	N			34.1
30	45 New St Dalry	N		48	45 <sup>[1]</sup>
31	60 New St Dalry (Column House)	N			36.1
32	44 New St Dalry (RBS Bank)	N		47	51

[1] Non relevant location



(Cont)

Site ID	Location	Within AQMA?	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Adjusted for bias		
33	3 Townhead St, Dalry (Post Office)	N		47	42
34	2 Townhead St, Dalry (NAC Offices)	N		29	26
35	Highfield Hamlet , Dalry	N	19	15	15
36	85 Main Street , Largs	N	26	26	22
	Goldenberry Farm Road	N	6	5	7.9
	Seamill/ Hunterston Road (layby)	N	9	6	5.7
37	Hunterston Road/Cycle Track	N	6	4	5

### 2.2.2 PM<sub>10</sub>

No Data for 2008 recorded from the automatic monitoring site.

### 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.

### **3 Road Traffic Sources**

#### **3.1 Narrow Congested Streets with Residential Properties Close to the Kerb**

North Ayrshire Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

#### **3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic**

North Ayrshire Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

#### **3.3 Roads with a High Flow of Buses and/or HGVs.**

North Ayrshire Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

#### **3.4 Junctions and Busy Roads**

North Ayrshire Council confirms that there are no new/newly identified busy junctions/busy roads.

#### **3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment**

North Ayrshire Council confirms that there are no new/proposed roads.

### **3.6 Roads with Significantly Changed Traffic Flows**

North Ayrshire Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

Although it should be noted that there is a new traffic management scheme in Dalry which has redirected a small portion of the total traffic, however the additional traffic lights on the main corridor appear to have caused increase congestion in the area.

### **3.7 Bus and Coach Stations**

There are no bus stations within the North Ayrshire Council area.

North Ayrshire Council confirms that there are no relevant bus stations in the Local Authority area.



## **4 Other Transport Sources**

### **4.1 Airports**

North Ayrshire Council confirms that there are no airports in the Local Authority area.

### **4.2 Railways (Diesel and Steam Trains)**

#### **4.2.1 Stationary Trains**

The only area where trains are stationary for more than 15 minutes is at Clydeport Hunterston Terminal, Fairlie. There are no relevant exposures at this location.

North Ayrshire Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

#### **4.2.2 Moving Trains**

North Ayrshire Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

### **4.3 Ports (Shipping)**

North Ayrshire Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

## 5 Industrial Sources

### 5.1 Industrial Installations

#### 5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

North Ayrshire Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

#### 5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

North Ayrshire Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

#### 5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

North Ayrshire Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### 5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

### 5.3 Petrol Stations

North Ayrshire Council confirms that there are no petrol stations meeting the specified criteria.

### 5.4 Poultry Farms

There is only one poultry farm in the North Ayrshire Area which is run by Glenrath Farms Ltd and the site is called Arranview & Jameston moss poultry farm. PPC ref (PPC/A/1016746). Total birds according to the permit is 84,300 and therefore does not meet the criteria.

North Ayrshire Council confirms that there are no poultry farms meeting the specified criteria.

## **6 Commercial and Domestic Sources**

### **6.1 Biomass Combustion – Individual Installations**

There is a new Combined Heat and Power (CHP) Plant located at the Caledonian Paper Mill, Irvine. It is designed to utilise various types of biomass up to approximately 350,000 tonnes per annum. The plant will also utilise the mill's own site derived residues from its paper production processes. The Bubbling Fluidised Bed combustion system will use wood fuel, including waste wood, to generate 26MW of electricity and up to 99MW of heat energy.

Construction commenced at the Irvine site in September 2007 and has been operational since May 2009. Projected emissions detailed in UPM Caledonian Air Quality Modelling (Appendix 18) suggests that there will be no significant impact from this installation.

North Ayrshire Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **6.2 Biomass Combustion – Combined Impacts**

At the moment there is only one biomass boiler in the area, this is detailed above. There are plans being submitted for another location on Arran.

North Ayrshire Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **6.3 Domestic Solid-Fuel Burning**

North Ayrshire Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.



## **7 Fugitive or Uncontrolled Sources**

North Ayrshire Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

## **8 Conclusions and Proposed Actions**

### **8.1 Conclusions from New Monitoring Data**

High Street, Irvine continues to have erratic results bordering on the  $40 \mu\text{g}/\text{m}^3$  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.

Nitrogen dioxide levels in Townhead Street/New Street, Dalry continue to exceed  $40 \mu\text{g}/\text{m}^3$  at two relevant locations and are consistent in suggesting a strong correlation with the 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.

### **8.2 Proposed Actions**

High Street, Irvine will continue to be closely monitored and will be the focus of nitrogen dioxide diffusion tubes. The automatic monitoring site (Romon) located in High Street, Irvine will also be operational for 2009. The Romon contains a BAM and NO<sub>2</sub> analyser and will allow better analysis of NO<sub>2</sub> daily trends to identify key sources affecting the higher readings at tubes 14 & 15.

The Romon unit will also be the site used in 2009 for a co-location study for nitrogen dioxide diffusion tubes.

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.

## **9       References**

1. Local Air Quality Management, Technical Guidance LAQM.TG (09), February 2009.
2. Spreadsheet of Bias Adjustment Factors, version 05/09, accessed at [www.uwe.ac.uk/aqm](http://www.uwe.ac.uk/aqm), April 2009. (Appendix 3)



# Appendices

## Appendix 1: QA:QC Data

### Diffusion Tube Bias Adjustment Factors

Tubes supplied and analysed by

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

### Discussion of Choice of Factor to Use

Bias Factor chosen in accordance with Spreadsheet of Bias Adjustment Factors, version 05/09, accessed at [www.uwe.ac.uk/aqm](http://www.uwe.ac.uk/aqm), May 2009. (Appendix 3)

### QA/QC of diffusion tube monitoring

Precision checks and details of laboratory used are listed in Appendix 2

## Appendix 2: Diffusion Tube Accuracy

## Checking Precision and Accuracy of Triplicate Tubes

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Diffusion Tubes Measurements			Coefficient of Variation (CV)	95% CI of mean
			Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$		
1	03/01/2008	30/01/2008	165.2	161.6	159.5	2	7.2
2	30/01/2008	27/02/2008	156.9	152.7	151.7	2	6.9
3	27/02/2008	02/04/2008	124.7	130.7	122.7	3	10.3
4	02/04/2008	30/04/2008	129.6	142.1	136.3	5	15.6
5	30/04/2008	29/05/2008	129.0	122.9	116.5	5	15.5
6	29/05/2008	03/07/2008	127.9	110.7	121.1	7	21.4
7	03/07/2008	01/08/2008	137.7	153.0	148.1	5	19.4
8	01/08/2008	03/09/2008	144.6	149.1	143.0	2	7.8
9	03/09/2008	01/10/2008	124.3	129.2	118.3	4	13.6
10	01/10/2008	29/10/2008	125.9	135.8	153.7	10	34.9
11	29/10/2008	03/12/2008	120.5	109.0	119.7	6	15.9
12	03/12/2008	07/01/2009	102.4	105.8	107.6	3	6.6
13							

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

Site Name/ID:	Glasgow - Field Intercomp. 2008
<b>Accuracy</b> (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.87 (0.83 - 0.91)
Bias B	15% (10% - 20%)
Diffusion Tubes Mean:	133 $\mu\text{gm}^{-3}$
Mean CV (Precision):	4
Automatic Mean:	116 $\mu\text{gm}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	116 (110 - 121) $\mu\text{gm}^{-3}$

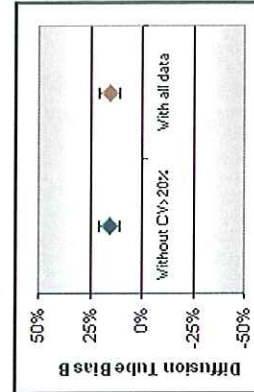
Overall survey ->

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

<b>Accuracy</b> (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.87 (0.83 - 0.91)
Bias B	15% (10% - 20%)
Diffusion Tubes Mean:	133 $\mu\text{gm}^{-3}$
Mean CV (Precision):	4
Automatic Mean:	116 $\mu\text{gm}^{-3}$
Data Capture for periods used:	99%
Adjusted Tubes Mean:	116 (110 - 121) $\mu\text{gm}^{-3}$

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
130	99.4	Good	Good
138	98.7	Good	Good
117	99.2	Good	Good
120	99.4	Good	Good
100	95	Good	Good
106	99.6	Good	Good
126	99.4	Good	Good
128	98.4	Good	Good
108	99.4	Good	Good
138	99	Good	Good
90	99.2	Good	Good
88	99.5	Good	Good
Overall survey ->		Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)



Jaume Targa  
[jaume.targa@aeat.co.uk](mailto:jaume.targa@aeat.co.uk)  
 Version 03 - November 2006



## Appendix 3: Bias Factor Spreadsheet

Spreadsheet Version Number: 05/09										
Follow the steps below in the correct order to show the results of relevant co-location studies										
Data <b>only</b> apply to tubes exposed monthly and are <b>not</b> suitable for correcting individual short-term monitoring periods										
Whenever presenting adjusted data, you should state the adjustment factor used										
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.										
Published by Air Quality Consultants Ltd on behalf of Defra, the Welsh Assembly Government, the Scottish Government and the Department of the Environment Northern Ireland										
R&A website										
<b>Step 1:</b>	<b>Step 2:</b>	<b>Step 3:</b>	<b>Step 4:</b>							
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 <sup>3</sup> 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 <sup>2</sup>	If you have your own co-location study then see footnote <sup>4</sup> . If uncertain what to do then contact the Review and Assessment Helpdesk 0117 328 3668 aqm-review@uwe.ac.uk.							
<b>Analysed By<sup>1</sup></b>	<b>Method</b>	<b>Year<sup>5</sup></b>	<b>Site Type</b>	<b>Local Authority</b>	<b>Length of Study (months)</b>	<b>Diffusion Tube Mean Conc. (Dm) (µg/m<sup>3</sup>)</b>	<b>Automatic Monitor Mean Conc. (Cm) (µg/m<sup>3</sup>)</b>	<b>Bias (B)</b>	<b>Tube Precision<sup>6</sup></b>	<b>Bias Adjustment Factor (A) (Cm/Dm)</b>
Glasgow Scientific Services	20% TEA in Water	2008	R	East Dunbartonshire Council	10	29	31	-6.7%	P	1.07
Glasgow Scientific Services	20% TEA in Water	2008	R	East Dunbartonshire Council	11	42	45	-5.3%	G	1.06
Glasgow Scientific Services	20% TEA in Water	2008	R	East Dunbartonshire Council	11	40	35	12.8%	P	0.89
Glasgow Scientific Services	20% TEA in Water	2008	K	AEA Tech Intercomparison	12	133	116	14.9%	G	0.87
Glasgow Scientific Services	20% TEA in Water	2008		Overall Factor <sup>3</sup> (4 studies)					Use	0.97

<sup>1</sup> For Casella Stanger/Bureau Veritas (NOT Bureau Veritas Labs) use Gradko 50% TEA in Acetone; for Bureau Veritas Labs and Eurofins use Casella Seal/GMSS/Casella CRE/Bureau Veritas Labs/Eurofins; for Staffordshire County Analyst use Staffordshire CC SS; for Bodycote Health Sciences use Clyde Analytical Laboratories. From 2008 Dundee CC are Tayside SS.

<sup>2</sup> In this situation it would be reasonable to use data from the nearest year.

<sup>3</sup> Overall factors have been calculated using orthogonal regression to allow for uncertainty in both the automatic monitor and diffusion tube. The uncertainty of the diffusion tube has been assumed to be double that of the automatic monitor.

<sup>4</sup> If you have your own co-location study, please send your data to us, so that it can be included here. If this is not possible, but you wish to combine these factors with your own, select and copy the relevant data from this spreadsheet and paste them into a new one (otherwise your calculations will include hidden data). Then add your own data and calculate the bias. To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e.  $-16\% \text{ is } -0.16$ . Next add 1 to this value, e.g.  $-0.16 + 1.00 = 0.84$  in this example, then take the inverse to give the bias adjustment factor  $1/0.84 = 1.19$ . (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).

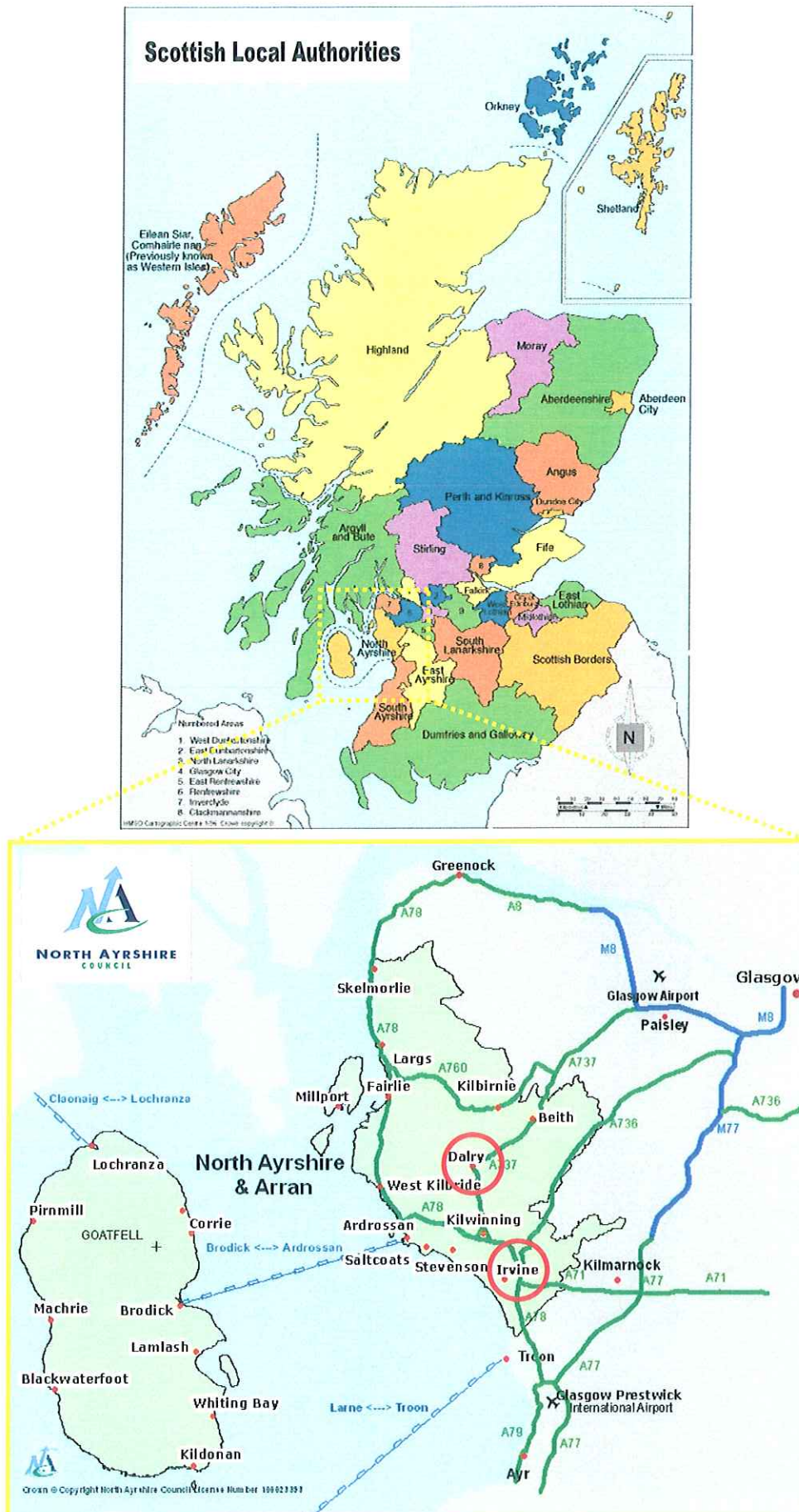
<sup>5</sup> Where an annual data set falls into two years it has been ascribed to the year in which most of the data fall.

<sup>6</sup> Tube precision is determined as follows: G = Good precision - coefficient of variation (CV) of diffusion tube replicates is considered good when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; P = Poor precision - CV of four or more periods >20% and/or average CV >10%; S = Single tube, therefore not applicable; na = not available.

To add data download a questionnaire  
or contact: [KitBrown@aqiconsultants.co.uk](mailto:KitBrown@aqiconsultants.co.uk)



## Appendix 4: Map of Locality & Surrounding Area



## Appendix 5: NO<sub>2</sub> Monitoring Sites - Sites no longer monitored

NO <sub>2</sub> Tube Sites – 2008 –			
Site Name	Eastings	Northings	Description
1. CUNNINGHAME HOUSE, IRVINE	231627	638718	1 <sup>st</sup> FLOOR EAST WING
2. 35 EAST ROAD, IRVINE	232323	638892	LAMPPOST OPP. POLICE STN GARAGE
3. IRVINE POLICE STATION	232255	638910	DRAINPIPE POLICE STN OPP. TOWNHOUSE
4. <b>74 HIGH STREET, IRVINE (Mamma's)</b>	<b>232195</b>	<b>638878</b>	<b>LAMPPOST OUTSIDE SHOP TOWARDS KERBSIDE</b>
5. 70 HIGH STREET, IRVINE (Somerfield)	232172	638894	LAMPPOST OUTSIDE SHOP FRONT DOOR
6. 97 HIGH STREET, IRVINE (RS McColls)	232135	638907	LAMPPOST ADJACENT TO SHOP FRONT
7. 79 HIGH STREET, IRVINE (No79 Doorway)	232169	638878	LAMPPOST TOWARDS KERBSIDE
8. 75 HIGH STREET, IRVINE (OK Joes)	232170	638871	DRAINPIPE OUTSIDE SHOP FRONT
9. 65 HIGH STREET, IRVINE (GROUND HOG)	232182	638867	LAMPPOST/TRAILER 65 HIGH ST IRVINE
10. 34 KIRKGATE, IRVINE	232085	638774	LAMPPOST HALF WAY UP HILL KIRKGATE
11. <b>19 BANK ST, IRVINE (Indigo Sun)</b>	<b>232182</b>	<b>638960</b>	<b>DRAINPIPE RIGHT HAND CORNER OF SHOP</b>
12. 19 BANK ST, IRVINE (King World Travel)	232210	638976	DRAINPIPE LEFT HAND CORNER OF SHOP
13. 147 HIGH STREET, IRVINE	232077	638990	ON DRAINPIPE LEFT HAND SIDE OF SHOP
14. EGLINTON STREET, IRVINE	231997	639252	DRAINPIPE CNR EGLINTON ST /CASTLE RD
15. <b>GREENWOOD ACADEMY, DREGHORN</b>	<b>234409</b>	<b>637921</b>	<b>LAMP POLE MAIN GATE</b>
16. MAIN STREET DRYBRIDGE	235946	636597	LAMPPOST OPPOSITE OLD SCHOOL SITE
17. <b>SHEWALTON MOSS, DRYBRIDGE</b>	<b>235751</b>	<b>636637</b>	<b>LAMPPOST ENTRANCE TO ESTATE</b>
18. <b>PRIMARY SCHOOL DREGHORN</b>	<b>235547</b>	<b>638410</b>	<b>LAMPPOST OPPOSITE PRIMARY SCHOOL</b>
19. MAIN ROAD SPRINGSIDE	236813	636659	LAMPPOST CNR STATION RD/SPRINGHILL TERR
20. AUCHENGATE (BRIDGE), IRVINE	233332	635558	PEDESTRIAN BRIDGE NORTH OF PAPER MILL
21. <b>AUCHENGATE (HOUSE), IRVINE</b>	<b>233700</b>	<b>634078</b>	<b>HOUSE BEHIND AUCHENGATE SAWMILL</b>
22. <b>AUCHENGATE (ROAD), IRVINE</b>	<b>233731</b>	<b>634067</b>	<b>ROAD IN AUCHENGATE SAWMILL</b>
23. DALRY ROAD, KILWINNING	229920	643400	LAMPPOST DOWN FROM TRAFFIC LIGHTS
24. BYREHILL, KILWINNING	230943	650280	GRID REF NS 229520 642319
25. HIGHLFIELD HAMLET, DALRY	220333	659322	LAMPPOST AT CNR CYCLE TRACK TO GLENGARNOCK
26. MAIN STREET, LARGS	229520	642319	LAMPPOST AT PEDESTRIAN CROSSING
27. <b>GOLDENBERRY FARM ROAD</b>	<b>219199</b>	<b>651163</b>	<b>SOUTH OF HUNTERSTON POWER STATION</b>
28. <b>SEAMILL/HUNTERSTON ROAD(LAYBY)</b>	<b>220017</b>	<b>650320</b>	<b>LAYBY A78 SEAMILL TO HUNTERSTON</b>
29. HUNTERSTON ROAD/CYCLE TRACK	219582	650020	JUNCT. CYCLE TRACK/HUNTERSTON PWR STN RD
30. 69 NEW STREET, DALRY			LAMPPOST
31. 45 NEW STREET, DALRY			LAMPPOST
32. TOWNHEAD ST, DALRY (Post Office)			ON DRAINPIPE
33. 12 GARNOCK STREET, DALRY			ON STREET SIGN
34. 44 NEW STREET, DALRY (RBS)			ON TRAFFIC LIGHT POST
35. 2 TOWNHEAD ST, DALRY (NAC Offices)			ON DRAINPIPE



## Appendix 6: NO<sub>2</sub> Monitoring Sites – Including new sample points

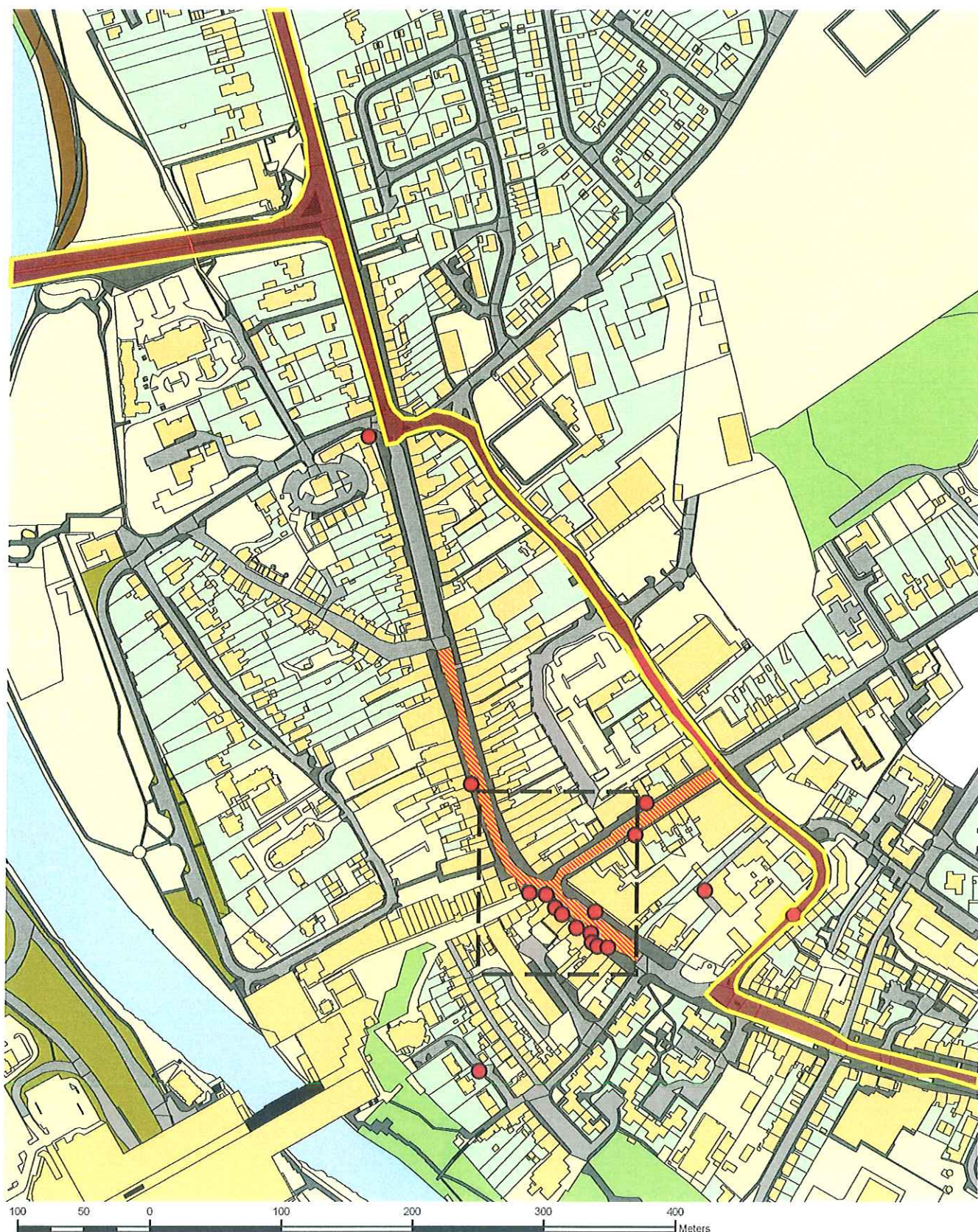
NO <sub>2</sub> Tube Sites (2008 - 2009)			
Site Name	Eastings	Northings	Description
1. CUNNINGHAME HOUSE, IRVINE	231627	638718	1 <sup>ST</sup> FLOOR EAST WING
2. 35 EAST ROAD, IRVINE	232323	638892	LAMPOST OPP. POLICE STN GARAGE
3. IRVINE POLICE STATION	232255	638910	DRAIN PIPE POLICE STN. OPP. TOWNHOUSE
4. 70 HIGH STREET, IRVINE (Somerfield)	232172	638894	LAMPOST OUTSIDE SHOP FRONT DOOR
5. 18 BANK STREET, IRVINE (Pitchers)	232202	638952	
6. 19 BANK ST, IRVINE (King World Travel)	232210	638976	DRAINPIPE LEFT HAND CORNER OF SHOP
7. 147 HIGH STREET, IRVINE (Brownings)	232077	638990	ON DRAINPIPE LEFT HAND SIDE OF SHOP
8. 3 BRIDGEGATE, IRVINE (CCTV Camera)	232122	638908	
9. 97 HIGH STREET, IRVINE (RS McColls) LOW	232135	638907	LAMPOST ADJACENT TO SHOP FRONT
10. 97 HIGH STREET, IRVINE (RS McColls) HIGH	232135	638907	LAMPOST ADJACENT TO SHOP FRONT
11. 91 HIGH STREET, IRVINE (Oxfam sign)	232147	638892	POST ADJACENT TO SHOP FRONT
12. 85 HIGH STREET, IRVINE (Indian Palace)	232158	638882	POST ADJACENT TO SHOP FRONT
13. 79 HIGH STREET, IRVINE (Fishmonger)	232169	638878	LAMPOST TOWARDS KERBSIDE
14. 75 HIGH STREET, IRVINE (OK Joes) LOW	232170	638871	DRAINPIPE OUTSIDE SHOP FRONT
15. 75 HIGH STREET, IRVINE (OK Joes) HIGH	232170	638871	DRAINPIPE OUTSIDE SHOP FRONT
16. 71 HIGH STREET, IRVINE (Stagecoach sign)	232147	638868	OFFICE SIGN
17. 65a HIGH STREET, IRVINE (Romon)	232182	638867	AUTOMATIC MONITORING STATION
18. 65 HIGH STREET, IRVINE (Romon)	232182	638867	AUTOMATIC MONITORING STATION
19. 63 HIGH STREET, IRVINE (Romon)	232182	638867	AUTOMATIC MONITORING STATION
20. 34 KIRKGATE, IRVINE	232085	638774	LAMPOST HALF WAY UP HILL KIRKGATE
21. EGLINTON STREET IRVINE	231997	639252	DRAINPIPE CNR EGLINTON ST /CASTLE RD
22. 25 MAIN ROAD SPRINGSIDE	236813	638659	LAMPOST CNR STATION RD/SPRINGHILL TERR
23. MAIN STREET DRYBRIDGE	235946	636597	LAMPOST OPPOSITE OLD SCHOOL SITE
24. AUCHENGATE (BRIDGE), IRVINE	233332	635558	PEDESTRIAN BRIDGE NORTH OF PAPER MILL
25. DALRY ROAD, KILWINNING (Cornerstone)	229928	643400	LAMPOST DOWN FROM TRAFFIC LIGHTS
26. BYREHILL, KILWINNING (Cycle Track Sign)	230943	650280	GRID REF NS 229520 642319
27. 12 GARNOCK STREET, DALRY	229326	649250	ON STREET SIGN
28. 69 NEW STREET, DALRY	229360	649330	LAMPOST
29. 67 NEW STREET, DALRY (Royal Hotel)	229338	649337	LAMPOST
30. 45 NEW STREET, DALRY	229286	649365	LAMPOST
31. 60 NEW STREET, DALRY (Column House)	229311	649363	LAMPOST
32. 44 NEW STREET, DALRY (RBS Bank)	229280	229280	ON TRAFFIC LIGHT POST
33. 3 TOWNHEAD ST, DALRY (Post Office)	229222	649344	ON DRAINPIPE
34. 2 TOWNHEAD ST, DALRY (NAC Offices)	329230	649338	ON DRAINPIE
35. HIGHFIELD HAMLET, DALRY	220333	659322	LAMPOST AT CNR CYCLE TRACK TO GLENGARNOCK
36. 85 MAIN STREET, LARGS	229520	642319	LAMPOST AT PEDESTRIAN CROSSING
37. HUNTERSTON ROAD/CYCLE TRACT	219582	650020	JUNCT. CYCLE TRACK/HUNTERSTON PWR STN RD

# **Irvine Area**

## **Appendices 7 to 12**



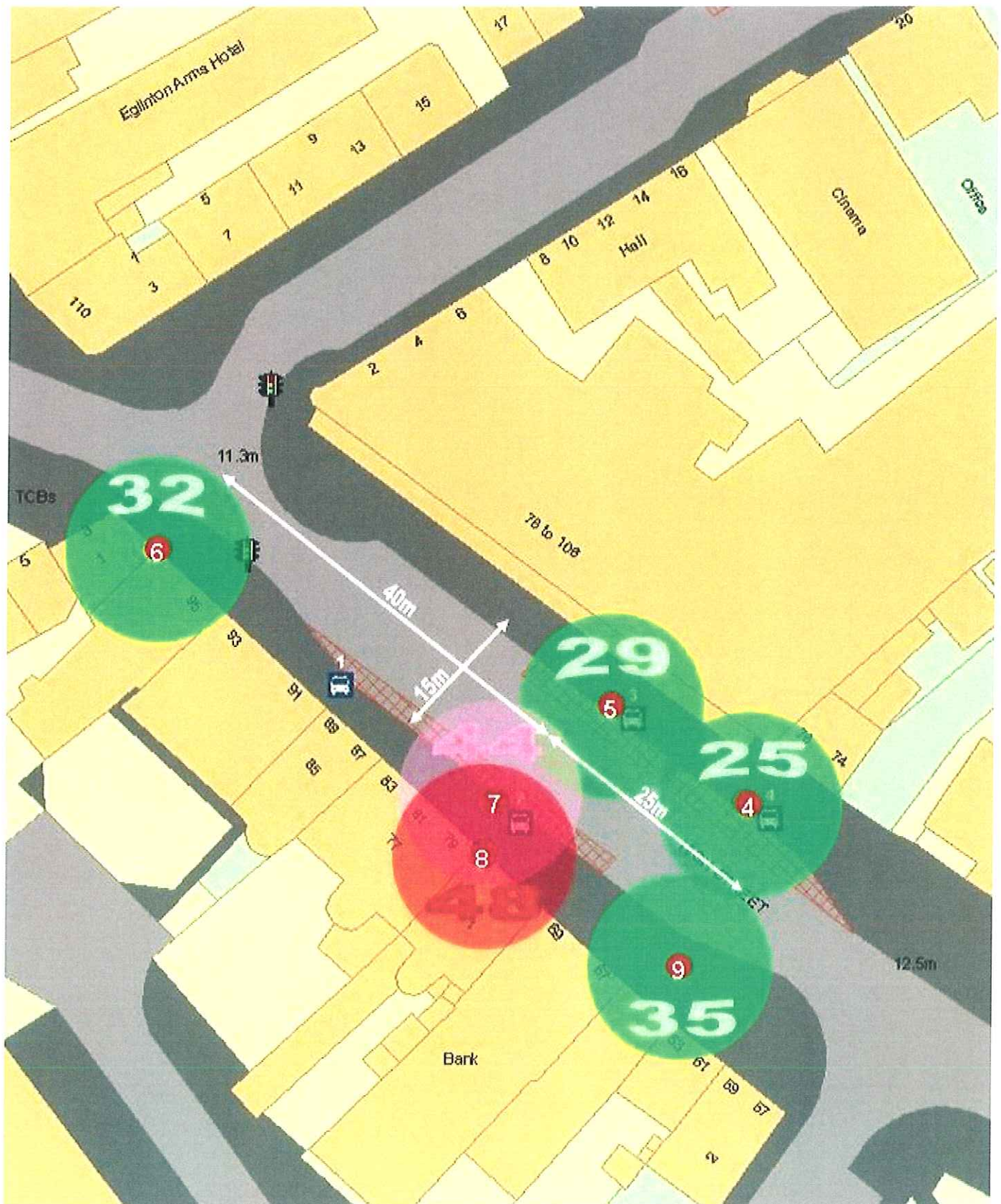
## Appendix 7: Irvine Town Centre



- Main traffic route**
- Restricted Area (buses, taxis & loading only)**
- NO2 diffusion tubes**

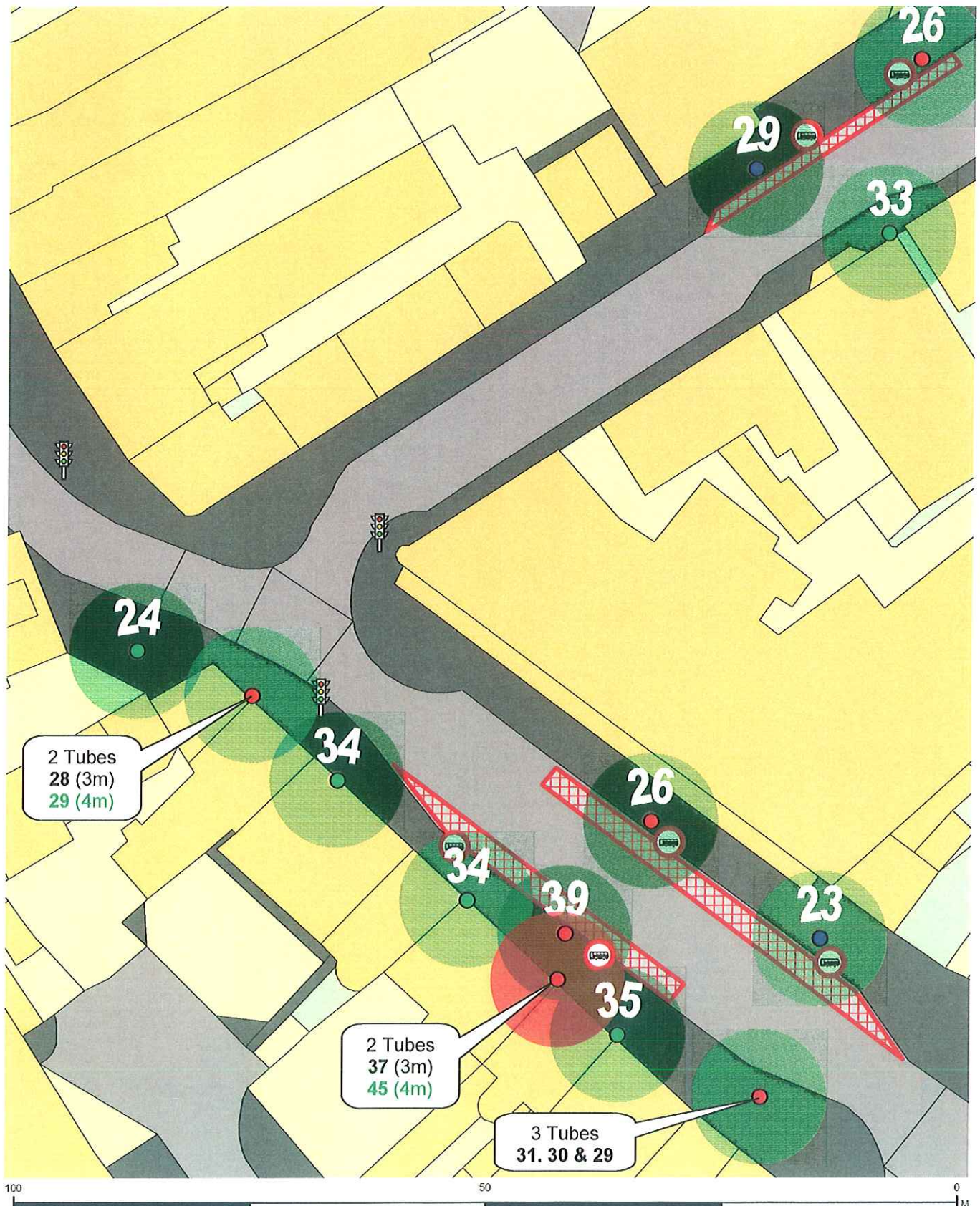


Appendix 8: Irvine, High St (2007) NO<sub>2</sub> µg/m<sup>3</sup>





# Appendix 9: Irvine, High St (2008) NO<sub>2</sub> µg/m<sup>3</sup>

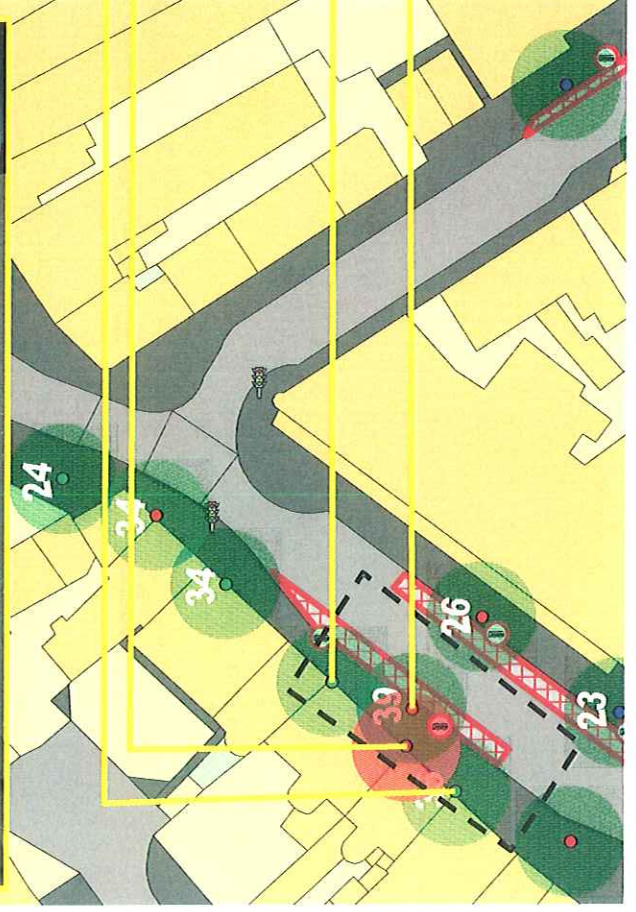
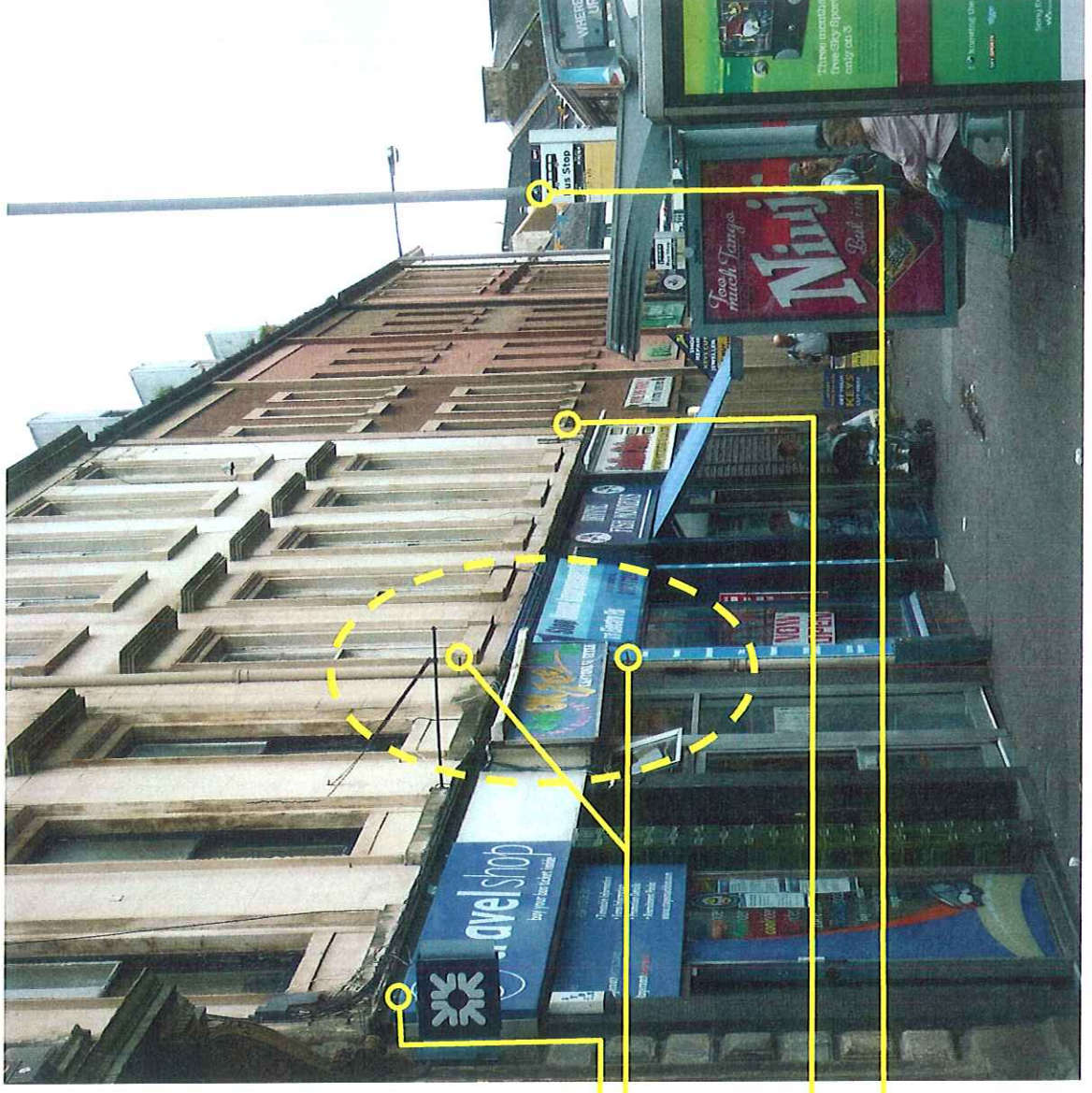


## NO<sub>2</sub> diffusion tubes

- Existing
- New
- Removed

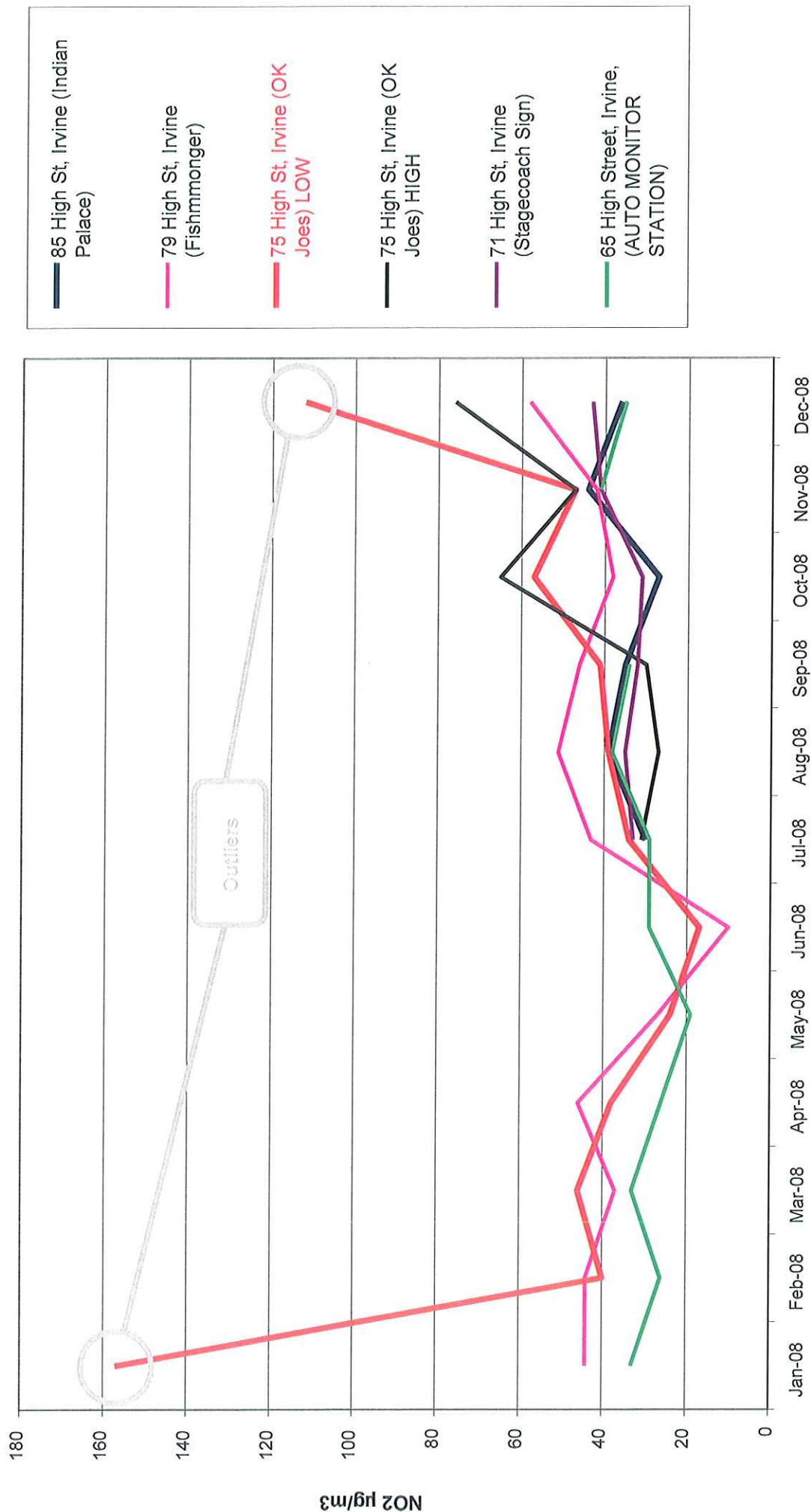


## Appendix 10: Irvine, High St – Hot Spot





## Appendix 11: Irvine, High St NO<sub>2</sub> Trends for 2008



# Appendix 12: Irvine, High St NO<sub>2</sub> - 6 Months Mean Comparison

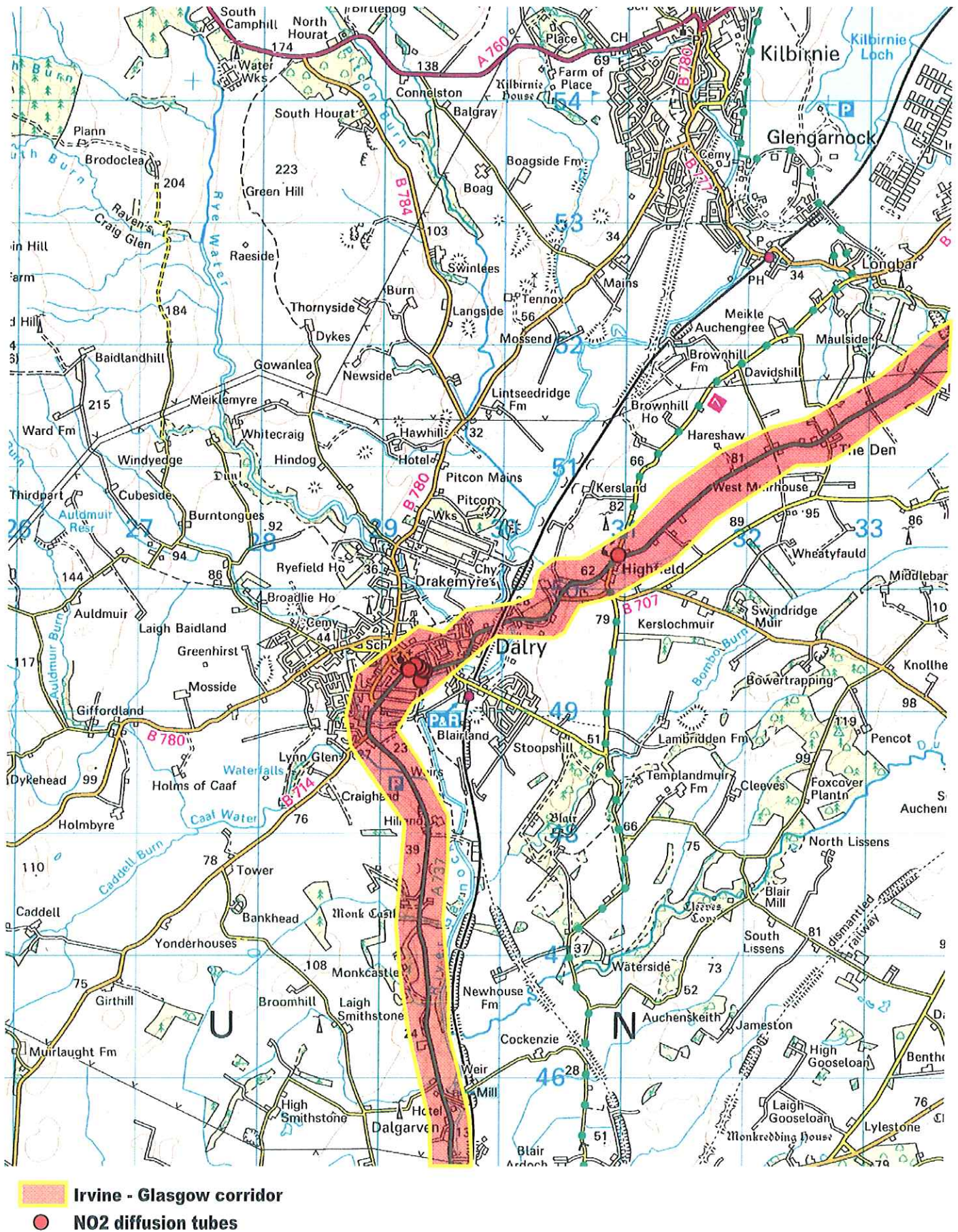


# **Dalry Area**

## **Appendices 13 to 18**

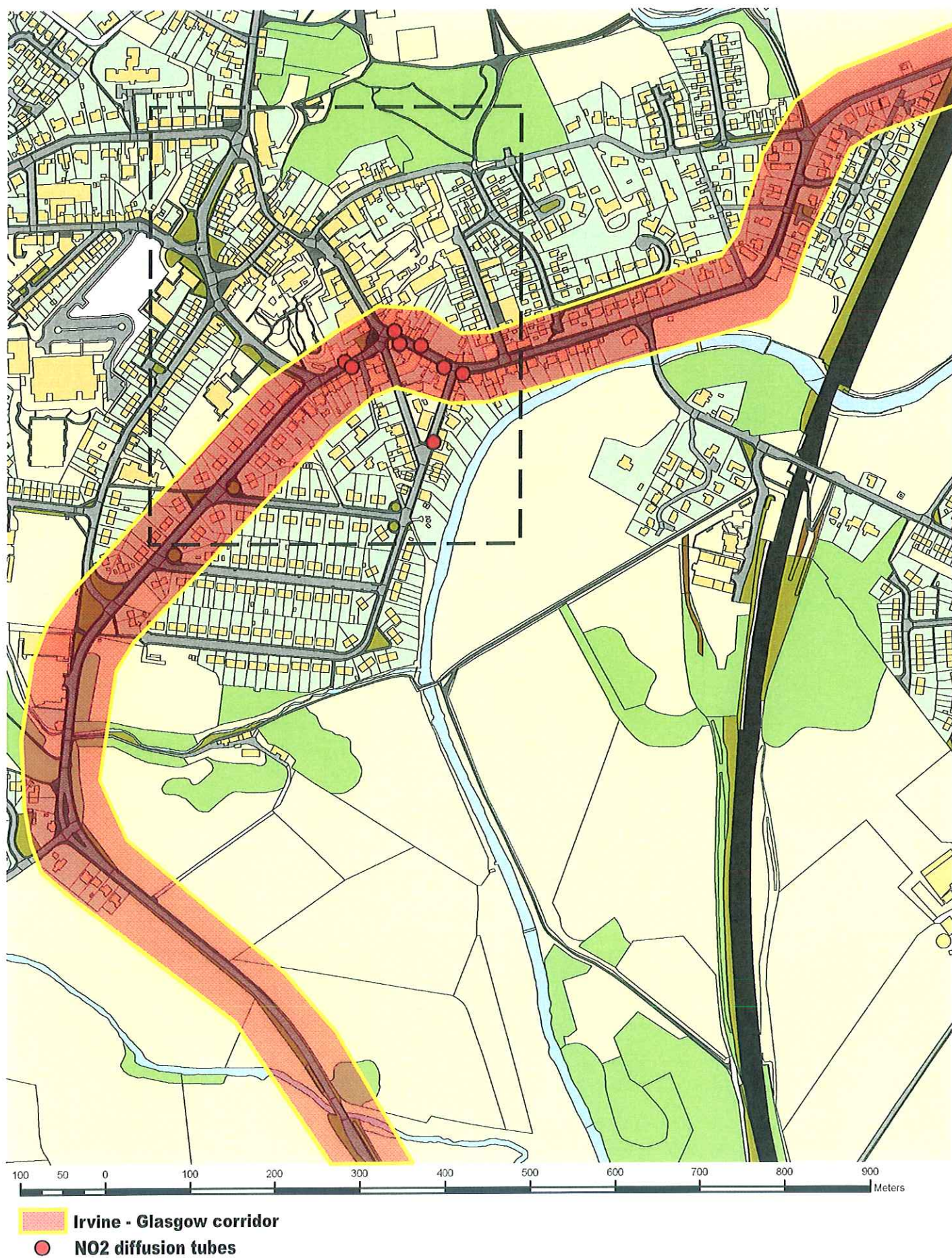


# Appendix 13: Dalry (Ordnance Survey)



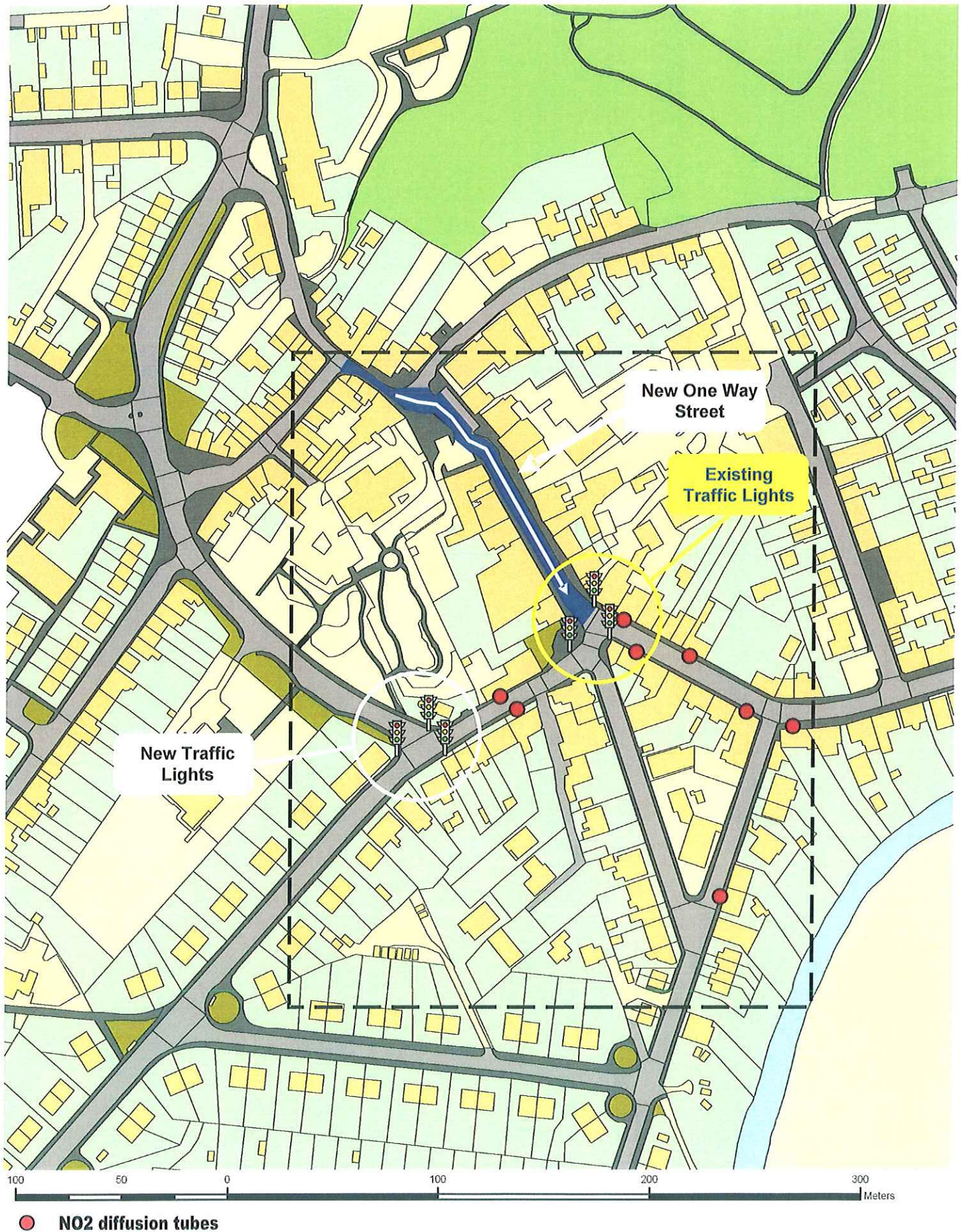


## Appendix 14: Dalry - Town Centre





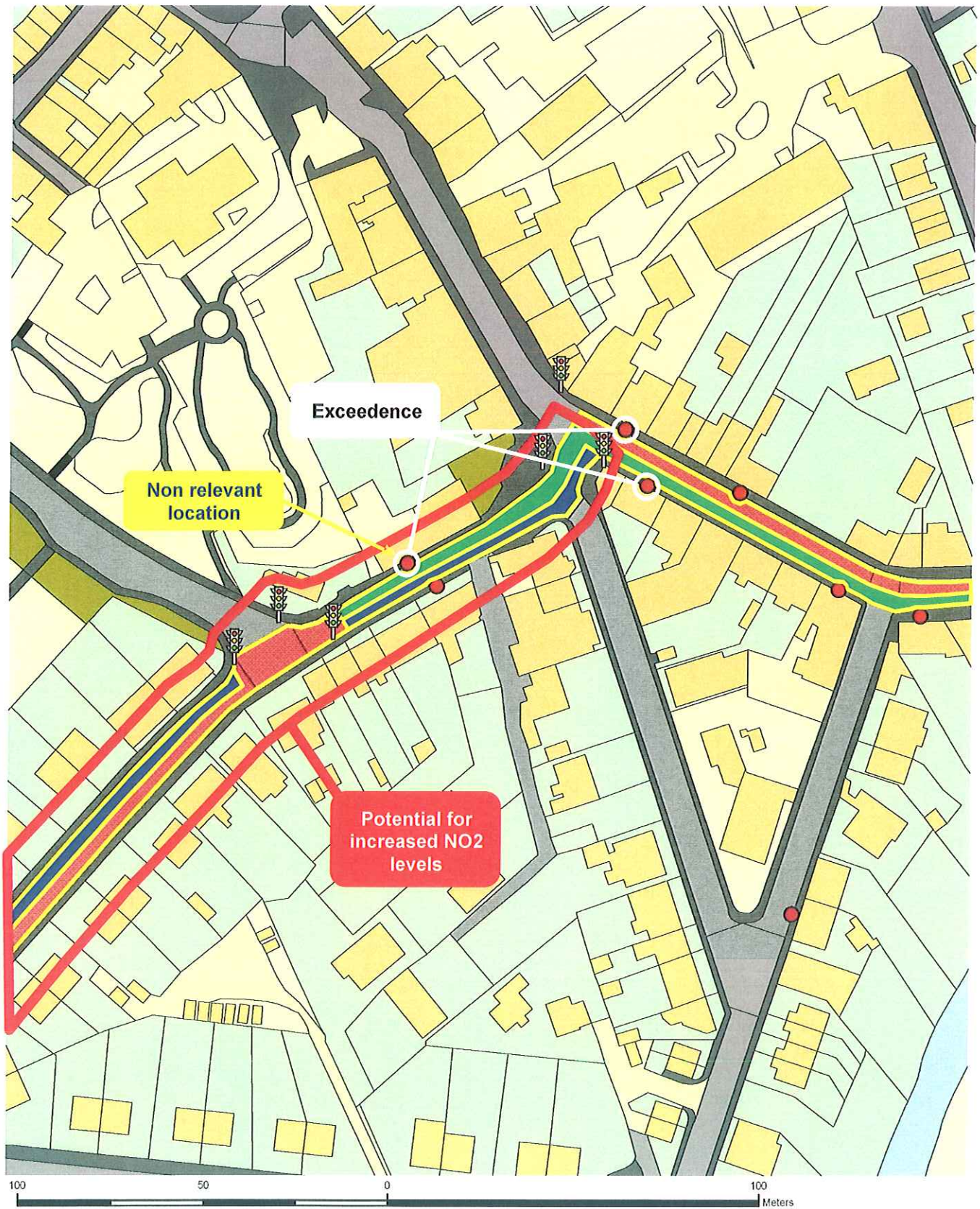
## Appendix 15: Dalry - New Traffic Management



● NO2 diffusion tubes



## Appendix 16: Dalry - Traffic Congestion

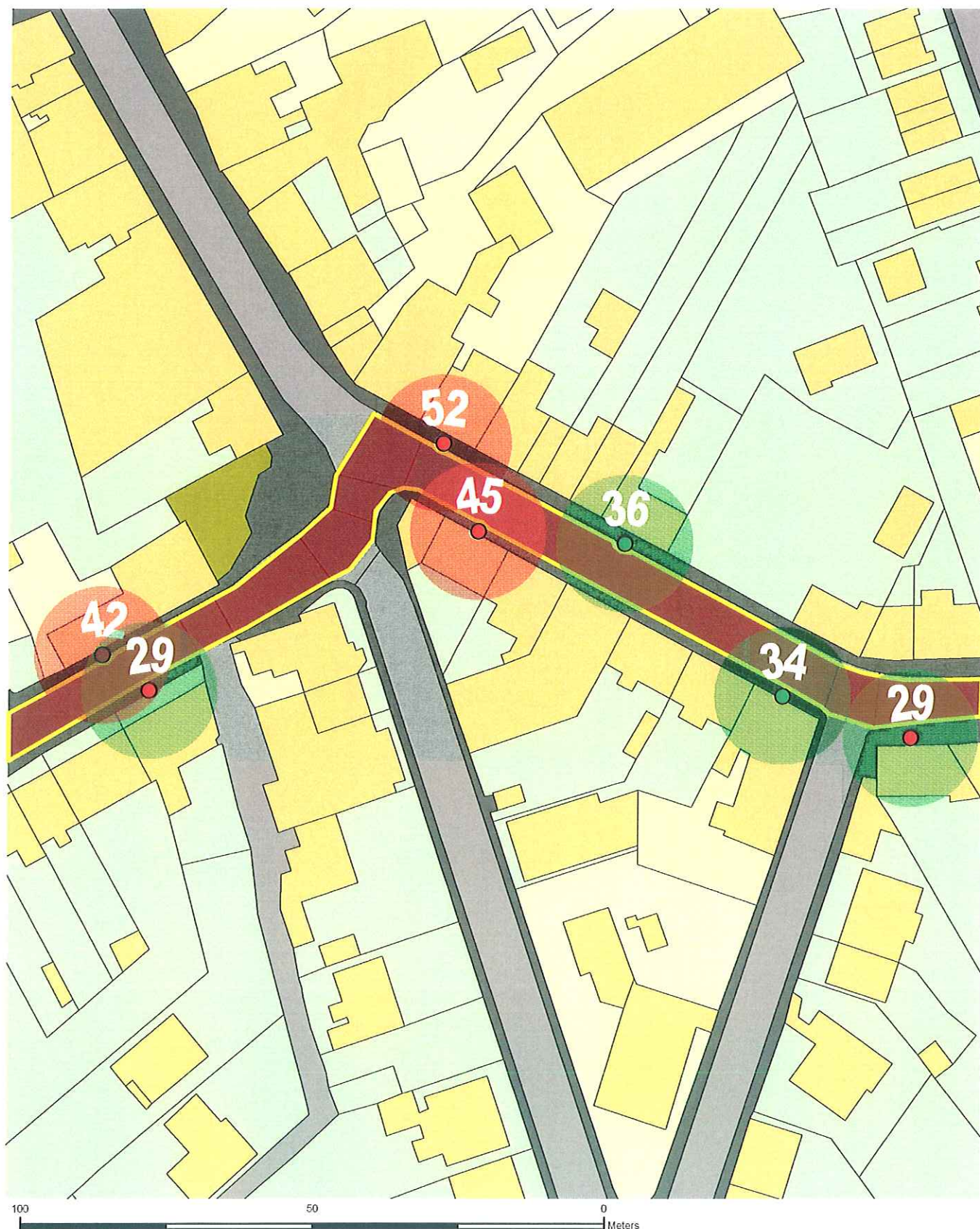


### Queuing traffic

- Only Before new traffic management
- + After new traffic management
- NO2 diffusion tubes



## Appendix 17: Dalry – Townhead St/New St (2008) NO<sub>2</sub> µg/m<sup>3</sup>

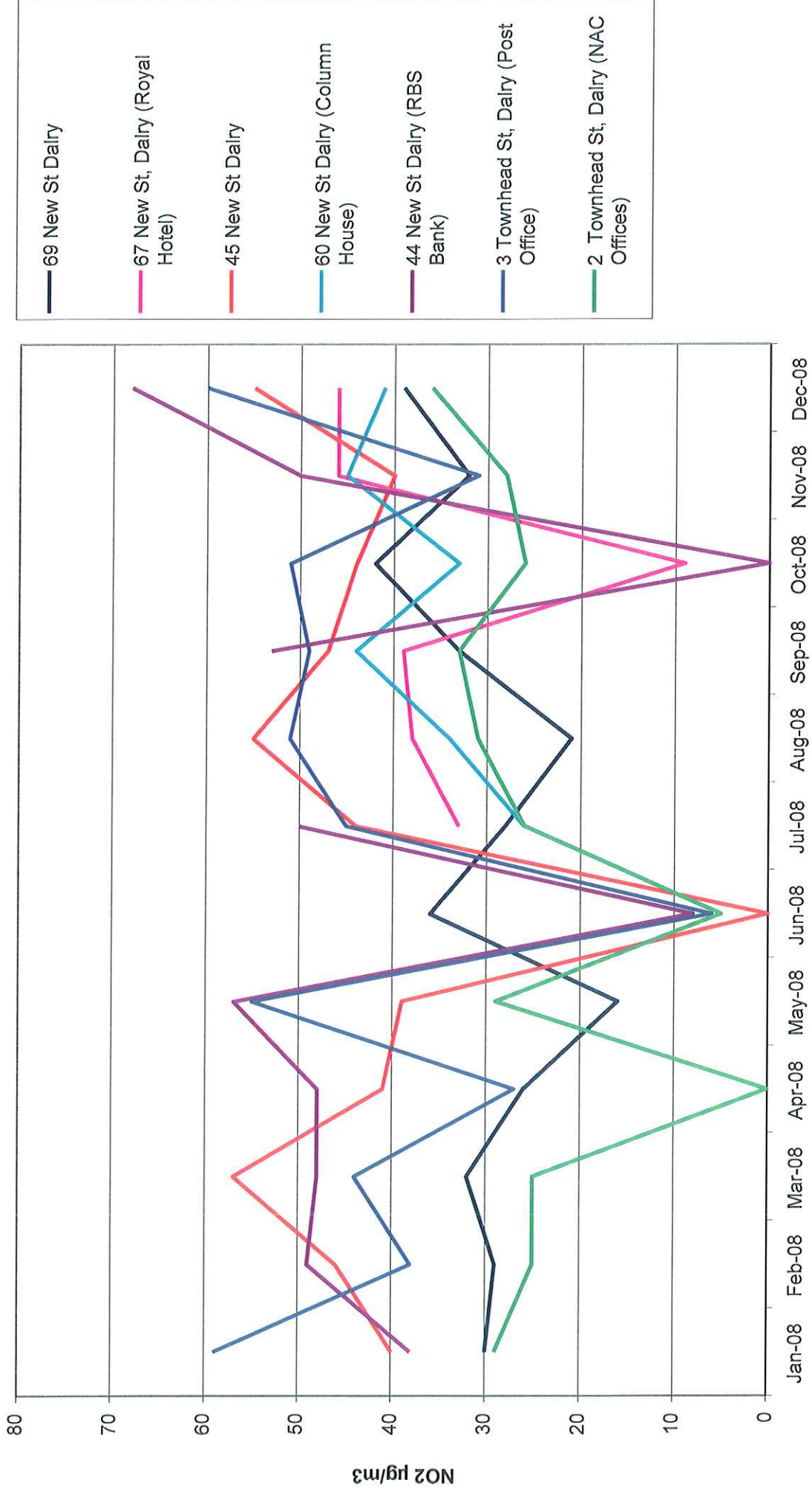


NO<sub>2</sub> diffusion tubes

● Existing

● New

Appendix 18: Dalry, Townhead St/New St NO<sub>2</sub> Trends for 2008





## Appendix 19: UPM Caledonian Air Quality Modelling (extract)

UPM Caledonian Proposed CHP Boiler  
Air Quality Modelling

Mott MacDonald

**Table 5-3: Predicted Environmental Concentrations from Proposed CHP Boiler ( $\mu\text{g}/\text{m}^3$ )**

Pollutant	Averaging Period	Scenario 1				Scenario 2	
		EQS	AC	PEC Max	Max PEC as % of AQS	PEC Max	Max PEC as % of AQS
NO <sub>2</sub>	1 hour (99.79 <sup>th</sup> percentile)	200	31.8	50.8	25.4	51.1	25.5
	Annual	40	15.9	17.9	44.7	17.9	44.8
	15 minute (99.9 <sup>th</sup> percentile)	266	6.8	25.4	9.6	25.4	9.6
SO <sub>2</sub>	1 hour (99.73 <sup>th</sup> percentile)	350	6.8	23.2	6.6	23.2	6.6
	24 hours (99.18 <sup>th</sup> percentile)	125	3.4	12.0	9.6	12.0	9.6
	Annual	50	3.4	4.3	8.5	4.3	8.5
	24 hours (98.08 <sup>th</sup> percentile)	50	15.7	16.7	33.5	17.0	34.0
PM <sub>10</sub>	24 hours (90.41 <sup>th</sup> percentile)	50	15.7	16.2	32.3	16.3	32.5
	Annual	40	15.7	15.8	39.6	15.9	39.6
HCl	1 hour	800	0.4	7.21	0.90	7.33	0.92
	Annual	20	0.2	0.55	2.74	0.55	2.77

Note: AC – Ambient Concentration;

PEC – Predicted Environmental Concentration (PC from Table 5-2 above + AC)

EQS – Environmental Quality Standard

The results in Table 5-2 indicate that similar predicted process contributions for selected pollutants were identified for Scenario 1 and Scenario 2. Table 5-3 indicates that resultant short-term and long-term predicted environmental concentrations for selected pollutants (process contribution plus ambient concentrations) comply with their relevant EQS. The process contributions for both scenarios are therefore not considered significant and do not represent a risk to non-attainment of relevant Scotland air quality objectives and limit values.

## **Appendix 20: SEPA Consultation Response**

Our Ref: CC/LALU/AQ/R&A/AllStages/  
AyrN/USA 2009

Your Ref:

Mr John Murdoch  
North Ayrshire Council  
Environmental Health Department  
Cunninghame House  
Irvine  
KA12 8EE

If telephoning ask for:

Chris Connor  
23 October 2009

Dear John

### **THE ENVIRONMENT ACT 1995, PART IV LOCAL AIR QUALITY MANAGEMENT –UPDATING AND SCREENING ASSESSMENT 2009**

Thank you for your report, which we received 24 August 2009. The following comments are provided by SEPA as statutory consultee in terms of paragraph 1 of Schedule 11 to the Environment Act 1995. SEPA has discussed the report with the Scottish Government in order to share expertise and provide consistent comments.

The report presented is comprehensive and primarily deals with new nitrogen dioxide monitoring and the inclusion of location maps was also very helpful.

The report concludes that it is unlikely that any relevant objectives will be exceeded but recent monitoring for nitrogen dioxide at Dalry would still appear to be marginal, although it is unclear what impact the new traffic management scheme is having. SEPA would therefore agree with the Council that the decision to declare an AQMA should be delayed but should be resolved after one full year of data is collected. SEPA also looks forward to seeing monitoring data from the Beta Attenuation Monitor at High Street, Irvine contained in next years progress report.

I trust the above comments are of assistance. Should you wish to discuss any points raised in this response please do not hesitate to contact me at the East Kilbride office.

Yours sincerely

Chris Connor

Local Air Quality Specialist

## Appendix 21: Scottish Government Consultation Response

Environmental Quality Directorate  
Water, Air, Soils and Flooding Division  
Area 1-G(N)

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

6 OCT 2009



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



Your ref:  
Our ref:  
30 September 2009

Dear John

### LOCAL AIR QUALITY MANAGEMENT: NORTH AYRSHIRE COUNCIL UPDATING AND SCREENING ASSESSMENT 2009

Thank you for submitting the 2009 updating and screening assessment 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 and modelling data obtained since submission of the 2008 progress report and detailed assessment. The report concludes that, other than the ongoing detailed assessment in Dalry, a further detailed assessment is not required.

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. However your attention is drawn to the following points.

#### General comments

The Council proposes to extend the detailed assessment in Dalry and to undertake further monitoring in Irvine before deciding whether Air Quality Management Areas (AQMA) are required in these areas. Whilst the Scottish Government agrees with this course of action, we consider that sufficient information to make these decisions should be available by the

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





time the 2010 annual progress report is submitted. We would therefore like the 2010 report to include a final decision on whether AQMAs are required.

The ongoing detailed assessment in Dalry should be submitted as soon as the Council considers sufficient information is available, if this is before the 2010 report is due to be submitted.

### **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.

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 will be the above mentioned annual progress report in April 2010.

Yours sincerely



**Air Quality Policy Officer**



Local Authority:

North Ayrshire Council

Ref:

USA4-259

## Review & Assessment Appraisal Report

Date Review & Assessment Report Issued: 25<sup>th</sup> August 2009

The Report sets out the Updating and Screening Assessment, which forms part of the Review & Assessment process required under the Environment Act 1995 and subsequent Regulations.

It covers all regulated pollutants, and considers monitoring data, road traffic sources, other transport sources, industrial sources, commercial and domestic sources, fugitive or uncontrolled sources, and concludes that **on going work is necessary in order to determine the need for AQMAs in Irvine and Dalry (Detailed Assessments having previously been submitted or being currently undertaken).**

On the basis of the evidence provided by the local authority, the conclusions reached are **accepted.**

Following the completion of this report, North Ayrshire Council should submit a Progress Report by April 2010, and their Detailed Assessment for Dalry as soon as possible.

Whilst the council's reasons for delaying the submission of the Dalry Detailed Assessment, and the decision over an AQMA in Irvine are accepted, they are encouraged to ensure that a decision regarding these is made as quickly as possible. If an AQMA is declared in either location, further work to verify the need for it and confirm the suitability of boundaries can then be done in a subsequent Further Assessment.





University of the  
West of England



Local Authority:

North Ayrshire Council

Ref:

USA4-259

## Commentary

The report is well structured and provides most of the information specified in the Guidance.

The following specific items are drawn to the local authority's attention to help inform future work. It is strongly recommended that the local authority note these items for future reporting purposes:

1. The report repeatedly refers to monitoring from 2009 showing reductions in Dalry, however no evidence is presented. It would be helpful to present indicative data to support the council's claims
2. It is recommended that future documents uploaded using the Report Submission Tool are done in PDF format.
3. Where data capture figures are provided for monitoring periods less than a complete year, these should be based on the period the monitor was operational, e.g. a diffusion tube deployed in July might achieve 100% data capture over the period of operation, but only 50% across the whole year – the data capture should be cited as 100% (Jul – Dec). TG(09) stipulates that data capture figures must relate to the period of sampling (Footnote 26, page 3-3 in LAQM.TG(09)).
4. Where monitoring periods are less than 9 months, this data should be converted to an annual mean using the methodology set out in TG(09).

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 Updating and Screening Assessment adequately (if required) or in carrying out future Review & Assessment work.

Issues can be followed up through the Review and Assessment helpdesk as follows:

Help desk telephone: 0117 328 3668  
Help desk email: [aqm-review@uwe.ac.uk](mailto:aqm-review@uwe.ac.uk)  
Web site: [www.uwe.ac.uk/aqm/review](http://www.uwe.ac.uk/aqm/review)