



# 2010 Air Quality Progress Report for *Renfrewshire Council*

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

May 2010



|                                |   |
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## **Executive Summary**

A review of new pollutant monitoring data and atmospheric emissions sources within the Renfrewshire Council area has been undertaken. The assessment compared the available monitoring data to national air quality standards in order to identify any existing exceedences of the standards.

Data was gathered from various national and local sources with regards to atmospheric emissions from: road traffic; rail; aircraft; shipping; industrial processes; intensive farming operations; domestic properties; biomass plants; and dusty processes. The screening methods outlined in the technical guidance were used to determine the likelihood that a particular source would result in an exceedence of national air quality standards.

The review of new and changed emission sources identified no sources that were likely to result in an exceedence of the NAQS objectives.

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# **1 Introduction**

## **1.1 Description of Local Authority Area**

The Renfrewshire Council area is situated to the west and south-west of Glasgow. It covers approximately 261km<sup>2</sup> and is bordered by Glasgow City, East Renfrewshire, Inverclyde and West Dunbartonshire Council areas. Renfrewshire has a population of around 170,000 which inhabits several main towns including Paisley, Renfrew, Johnstone and Erskine. Paisley is the largest town in Scotland with a population of over 75,000.

## **1.2 Purpose of Progress Report**

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

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

## **1.3 Air Quality Objectives**

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre, µg/m<sup>3</sup> (milligrammes per cubic metre, mg/m<sup>3</sup> 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                                   |   |                     | 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             |
|   | 50 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 7 times a year   | 24-hour mean        | 31.12.2010             |
|   | 40 $\mu\text{g}/\text{m}^3$   | Annual mean         | 31.12.2004             |
|   | 18 $\mu\text{g}/\text{m}^3$   | Annual mean         | 31.12.2010             |
| Sulphur dioxide                             | 350 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a year | 1-hour mean         | 31.12.2004             |
|   | 125 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a year  | 24-hour mean        | 31.12.2004             |
|   | 266 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year | 15-minute mean      | 31.12.2005             |

## 1.4 Summary of Previous Review and Assessments

Since 1998 Renfrewshire Council have undertaken regular reviews of air quality; the various assessments undertaken since 2006 are described below and summarised in Table 1.2.

**Table 1.2 Summary of historic review and assessment reports**

| Report Title  | Date completed | Conclusion   |
|---|----------------|--|
| U&SA 2006 <sup>1</sup>                                  | January 2007   | Detailed Assessment required for PM <sub>10</sub> in Paisley town centre.  |
| Detailed Assessment <sup>2</sup>                        | February 2008  | AQMA to be declared within Paisley town centre with regard to PM <sub>10</sub> 2010 annual mean objective and NO <sub>2</sub> annual mean objective.   |
| Progress Report 2008 <sup>3</sup>                       | April 2008     | Detailed Assessment of NO <sub>2</sub> required for both High St Johnstone and Hairst St Renfrew.  |
| U&SA 2009 <sup>4</sup>                                  | May 2009       | No new potential exceedences of objectives identified. No requirement to proceed to a Detailed Assessment for any pollutant or due to any emissions sources.   |
| Detailed Assessment of Johnstone & Renfrew <sup>5</sup> | June 2009      | Modelling predictions for Johnstone indicated that NO <sub>2</sub> objectives would be met at specified receptor locations.<br>The modelling predictions for Renfrew indicated that exceedences of the NO <sub>2</sub> annual mean objective were predicted at numerous locations adjacent to the M8 within Renfrew. Report recommended that further monitoring should be carried out to verify modelling predictions. |

As part of the Detailed Assessment, undertaken in 2007/08, a dispersion modelling study was undertaken to determine the spatial extent of the exceedence of the PM<sub>10</sub> annual mean objective. The modelling predictions, adjusted and verified against local monitoring data, indicated that the annual mean objective would be widely exceeded across most of Paisley town centre. It was therefore proposed to extend the Central Road AQMA to cover the whole of Paisley town centre to designate a single AQMA, known as Paisley Town Centre AQMA. This amended AQMA was declared in August 2009 for both the PM<sub>10</sub> annual mean objective, NO<sub>2</sub> 1hr mean objective and the NO<sub>2</sub> annual mean objective. A map of the AQMA is provided in Figure 1 in Appendix B.

The Detailed Assessment of NO<sub>2</sub> concentration in High Street Johnstone and Renfrew undertaken in 2009 concluded that the modelling predictions for Johnstone indicated that NO<sub>2</sub> objectives would be met at specified receptor locations. The modelling predictions for Renfrew indicated that exceedences of the NO<sub>2</sub> annual mean objective were predicted at numerous locations within Renfrew. It was recommended that further monitoring of NO<sub>2</sub> concentrations was undertaken to provide greater spatial coverage in measuring NO<sub>2</sub> concentrations at the areas of predicted exceedence, including locations more representative of residential public exposure.

Previous review and assessments have concluded that there is no potential for exceedence of the NAQS objectives for CO, benzene, 1, 3-butadiene, lead and SO<sub>2</sub>.

<sup>1</sup> Renfrewshire Council LAQM Updating and Screening Assessment 2006,

<sup>2</sup> Renfrewshire Council Detailed Assessment of PM<sub>10</sub> and NO<sub>2</sub> in Paisley Town Centre, BMT Cordah Ltd

<sup>3</sup> Renfrewshire Council LAQM Progress Report 2008, Renfrewshire Council

<sup>4</sup> Renfrewshire Council LAQM Updating and Screening Assessment 2009, BMT Cordah Ltd

<sup>5</sup> Renfrewshire Council LAQM Detailed Assessment of Johnstone and Renfrew, BMT Cordah Ltd

## **2 New Monitoring Data**

### **2.1 Summary of Monitoring Undertaken**

During 2009 Renfrewshire Council monitored both PM<sub>10</sub> and NO<sub>2</sub> at several locations throughout the council area using both automatic and passive sampling methods.

All automatic monitoring NO<sub>2</sub> and PM<sub>10</sub> data have been fully ratified by AEA Technology on behalf of the Scottish Government. Diffusion tube data have been corrected using a local bias correction. Details of the quality control and data correction processes carried out are reported in Appendix A

#### **2.1.1 Automatic Monitoring Sites**

Renfrewshire Council operates three automatic NO<sub>2</sub> analysers and one TEOM/FDMS PM<sub>10</sub> analyser. These are located at three sites:

1. Central Road, Paisley
2. Glasgow Airport, Paisley
3. Gordon St/ Causeyside St, Paisley

Each monitoring site has an NO<sub>2</sub> analyser; Gordon St monitoring station also has a TEOM/FDMS. Automatic monitoring locations are shown in Figure 2 in Appendix B. The automatic monitoring results for NO<sub>2</sub> and PM<sub>10</sub> are presented in tables 2.3, 2.4, 2.5 & 2.6

**Table 2.1 Details of Automatic Monitoring Sites**

| Site Name       | Site Type | OS Grid Ref |        | Pollutants Monitored               | Monitoring Technique | In AQMA? | Relevant Exposure?<br>(Y/N with distance (m) to relevant exposure) | Distance to kerb of nearest road<br>(N/A if not applicable) | Does this location represent worst-case exposure? |
|-----------------|-----------|-------------|--------|------------------------------------|----------------------|----------|--|---|---|
| Central Road    | Roadside  | 248438      | 664192 | NO <sub>2</sub>                    | CM                   | Y        | Y (2m)   | 1.5m  | Y   |
| Glasgow Airport | Special   | 248297      | 666545 | NO <sub>2</sub>                    | CM                   | N        | N(60m)   | 40m   | N   |
| Gordon Street   | Roadside  | 248316      | 663612 | NO <sub>2</sub> , PM <sub>10</sub> | CM, FDMS             | Y        | Y(9m)  | 6m  | Y   |

### **2.1.2 Non-Automatic Monitoring**

Renfrewshire Council operates a network of forty-three NO<sub>2</sub> diffusion tube sites, located across the council area. The monitoring sites represent public exposure and areas of high pollution concentrations at a variety of kerbside, roadside and urban background locations and are presented in Table 2.2. Maps annotating the locations of the diffusion tube sites are included in Appendix B, Figures 3 to 6.

The NO<sub>2</sub> concentrations recorded within Renfrewshire Council area since the 2009 Updating and Screening Assessment are presented in Table 2.5.

The QA/QC procedures followed by the Council and the laboratory and details of the bias correction factors used are presented in Appendix A.

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

| Site Name                | Site Type        | OS Grid Ref |        | Pollutants Monitored | In AQMA ? | Relevant Exposure?<br>(Y/N with distance (m) to relevant exposure) | Distance to kerb of nearest road<br>(N/A if not applicable) | Worst-case Location? |
|--------------------------|------------------|-------------|--------|----------------------|-----------|--|---|----------------------|
| <b>Paisley 1</b>         | Urban Centre     | 248350      | 664082 | NO2                  | Y         | Y (70)   | 68  | N                    |
| <b>Paisley 2</b>         | Urban Background | 247925      | 664052 | NO2                  | Y         | Y (11)   | 35  | Y                    |
| <b>Paisley 3</b>         | Urban Background | 249004      | 662142 | NO2                  | N         | Y (8)  | 1.5   | Y                    |
| <b>Paisley 4</b>         | Urban Background | 249668      | 664367 | NO2                  | N         | Y (11)   | 2   | Y                    |
| <b>Paisley 5</b>         | Kerbside         | 248432      | 664208 | NO2                  | Y         | Y(1)   | 0   | Y                    |
| <b>Johnstone 7</b>       | Kerbside         | 242914      | 663198 | NO2                  | N         | Y(1.5)   | 0   | Y                    |
| <b>Renfrew 8</b>         | Kerbside         | 250659      | 667546 | NO2                  | N         | Y (20)   | 3   | Y                    |
| <b>Bishopton 9</b>       | Roadside         | 243947      | 670550 | NO2                  | N         | Y (7)  | 3   | Y                    |
| <b>Paisley 13</b>        | Urban Background | 247371      | 665674 | NO2                  | N         | Y (12)   | 21  | Y                    |
| <b>Paisley 14</b>        | Urban Background | 247347      | 665796 | NO2                  | N         | Y (32)   | 5   | Y                    |
| <b>Paisley 15</b>        | Urban Background | 249196      | 665711 | NO2                  | N         | Y (17)   | 30  | Y                    |
| <b>Renfrew 17</b>        | Urban Background | 251528      | 666287 | NO2                  | N         | Y (5)  | 28  | Y                    |
| <b>Paisley 18</b>        | Roadside         | 248654      | 664206 | NO2                  | Y         | Y (16)   | 5   | Y                    |
| <b>Paisley 19</b>        | Roadside         | 245709      | 663581 | NO2                  | N         | Y (2)  | 1.5   | Y                    |
| <b>Johnstone 20</b>      | Kerbside         | 242665      | 663290 | NO2                  | N         | Y (1.5)  | 0   | Y                    |
| <b>Paisley 21</b>        | Roadside         | 248316      | 663612 | NO2                  | Y         | Y (9)  | 6   | Y                    |
| <b>Renfrew 23</b>        | Roadside         | 251869      | 666628 | NO2                  | N         | Y (16)   | 7   | Y                    |
| <b>Renfrew 24</b>        | Roadside         | 251687      | 666790 | NO2                  | N         | Y (19)   | 16  | Y                    |
| <b>Renfrew 25</b>        | Urban Industrial | 249698      | 666863 | NO2                  | N         | Y (3)  | 3   | Y                    |
| <b>Bishopton 27</b>      | Suburban         | 243121      | 671189 | NO2                  | N         | Y (7)  | 2   | Y                    |
| <b>Linwood 30</b>        | Urban Background | 243302      | 663998 | NO2                  | N         | Y(17)  | 1.5   | Y                    |
| <b>Wst Walkingshaw31</b> | Roadside         | 246197      | 666132 | NO2                  | N         | Y (3)  | 15  | Y                    |

| Site Name  | Site Type | OS Grid Ref |        | Pollutants Monitored | In AQMA ? | Relevant Exposure?<br>(Y/N with distance (m) to relevant exposure) | Distance to kerb of nearest road<br>(N/A if not applicable) | Worst-case Location? |
|------------|-----------|-------------|--------|----------------------|-----------|--|---|----------------------|
| Paisley 32 | Roadside  | 248363      | 663603 | NO2                  | Y         | Y (0)  | 1.5   | Y                    |
| Paisley 33 | Roadside  | 248277      | 663524 | NO2                  | Y         | Y (0.5)  | 2   | Y                    |
| Paisley 34 | Roadside  | 248305      | 663559 | NO2                  | Y         | Y (1.5)  | 0   | Y                    |
| Paisley 35 | Roadside  | 248360      | 664272 | NO2                  | Y         | Y (0)  | 1.5   | Y                    |
| Paisley 36 | Roadside  | 247932      | 664696 | NO2                  | Y         | Y (6)  | 6   | Y                    |
| Paisley 37 | Roadside  | 248438      | 664192 | NO2                  | Y         | Y (2)  | 1.5   | Y                    |
| Renfrew 38 | Roadside  | 250107      | 666857 | NO2                  | N         | Y (3)  | 3   | Y                    |
| Paisley 39 | Special   | 248297      | 666545 | NO2                  | Y         | N/A (Hotel approx 600m)  | 40  | N                    |
| Renfrew 40 | Roadside  | 250759      | 667631 | NO2                  | N         | Y (1)  | 6   | Y                    |
| Paisley 41 | Roadside  | 248465      | 664187 | NO2                  | Y         | Y (15)   | 2   | Y                    |
| Paisley 42 | Roadside  | 248371      | 664187 | NO2                  | Y         | Y (50)   | 1.5   | N                    |
| Paisley 43 | Roadside  | 248480      | 664154 | NO2                  | N         | Y (13)   | 1.5   | Y                    |
| Paisley 44 | Roadside  | 248208      | 664473 | NO2                  | Y         | Y (0)  | 1.5   | Y                    |
| Renfrew 45 | Kerbside  | 251253      | 667881 | NO2                  | N         | Y (12)   | 1   | Y                    |
| Renfrew 46 | Kerbside  | 251797      | 667378 | NO2                  | N         | Y (17)   | 0.5   | Y                    |
| Paisley 47 | Roadside  | 249914      | 665059 | NO2                  | N         | Y(5)   | 2.5   |                      |
| Renfrew 48 | Other     | 251514      | 666954 | NO2                  | N         | Y (7.5)  | 1.5 from Glen Sax Drive, 40m from motorway                  | N                    |
| Renfrew 49 | Other     | 251470      | 666323 | NO2                  | N         | Y(5)   | 30m from Glen Sax Drive, 80m from M8                        | N                    |
| Renfrew 50 | Roadside  | 248985      | 665494 | NO2                  | N         | Y(7.5)   | 12m from Renfrew Rd, 3m from access road                    | Y                    |
| Linwood 51 | Other     | 243344      | 663960 | NO2                  | N         | Y(4.5)   | 29m from Kintyre Ave, 35m from M8                           | Y                    |
| Glasgow 52 | Roadside  | 251514      | 666954 | NO2                  | N         | Y(4.5)   | 3m  | Y                    |

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

A comparison of measured NO<sub>2</sub> and PM<sub>10</sub> concentrations with relevant air quality objectives is provided in Sections 2.2.1 and 2.2.2.

### 2.2.1 Nitrogen Dioxide

During 2009 there were 761 recorded exceedences of the 1 hr mean NO<sub>2</sub> objective, 760 of which were recorded within the Central Road AQMA. The annual mean objective was also exceeded at Central Road.

#### Automatic Monitoring Data

The annual mean and 1-hour mean NO<sub>2</sub> automatic monitoring data for 2009 and previous years are presented in Tables 2.3 and 2.4 respectively.

The monitoring data indicates that the annual mean objective for NO<sub>2</sub> is exceeded at Central Road monitoring station; however the site is at a location with no relevant public exposure. The measured annual mean concentration at the Glasgow Airport monitoring site was substantially below the 2005 annual mean NO<sub>2</sub> objective. The measured annual mean NO<sub>2</sub> concentration at Gordon Street was below the annual mean NO<sub>2</sub> objective and has decreased from 2008.

The data capture rate at each of the monitoring stations was 100% at Glasgow Airport and 89% at Gordon Street. A data capture rate of 82% measured at the Central Road monitoring station reflected a temporary closure of the site in November and December 2009 whilst road layout improvements were being carried out.

Monitored 1-hour mean NO<sub>2</sub> concentrations at Central Road indicated that the 1-hour mean objective level of 200µg/m<sup>3</sup> was exceeded on a total of 760 hours in 2009, substantially above the permitted 18 exceedences per year. One exceedence of the 1-hour mean objective was measured at the Gordon Street monitoring site, whilst no exceedences were measured at the Glasgow Airport site. As the data capture rate at both Central Road and Gordon Street was below 90%, the 99.9<sup>th</sup> percentiles of hourly mean concentrations are also reported for reference. The percentile concentrations indicate that the 1-hour mean objective was exceeded at Central Road but not at Gordon Street. A trend chart of historic automatic NO<sub>2</sub> monitoring data is also presented in Chart 2.3

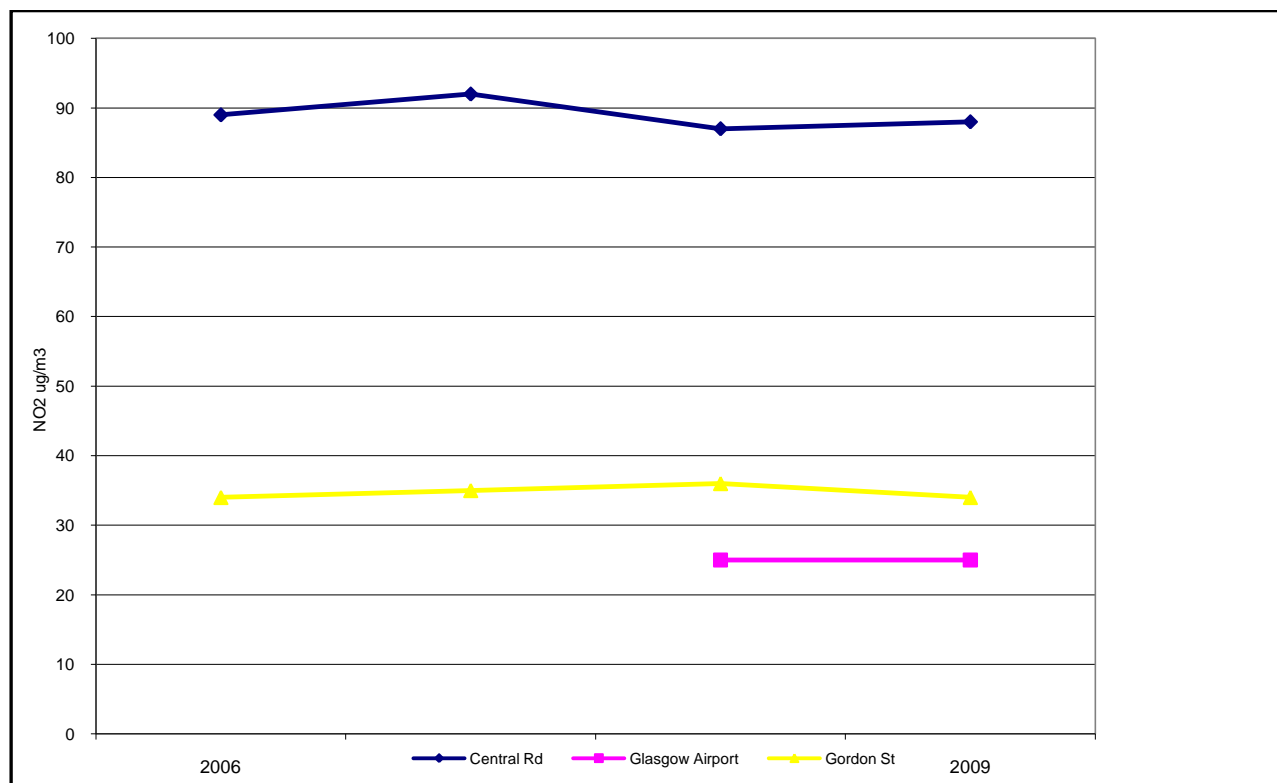
**Table 2.3 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective**

| Site ID         | Location        | Within AQMA? | Data Capture for monitoring period % | Data Capture for full calendar year 2009 % | Annual mean concentrations (µg/m <sup>3</sup> ) |      |           |
|-----------------|-----------------|--------------|--------------------------------------|--|---|------|-----------|
|                 |                 |              |                                      |  | 2007  | 2008 | 2009      |
| Central Rd      | Central Rd      | Y            | 82                                   | 82   | 92  | 87   | 88 (459)* |
| Glasgow Airport | Glasgow Airport | N            | 100                                  | 100  | -   | 25   | 25        |



|                                |           |   |    |    |    |    |           |
|--------------------------------|-----------|---|----|----|----|----|-----------|
| Gordon St                      | Gordon St | Y | 89 | 89 | 35 | 36 | 34 (155)* |
| *99.9 <sup>th</sup> percentile |           |   |    |    |    |    |           |

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



Measured NO<sub>2</sub> concentrations at the three automatic monitoring stations within Renfrewshire have remained relatively constant since 2006.

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

| Site ID                        | Location        | Within AQMA? | Data Capture for monitoring period <sup>a</sup> % | Data Capture for full calendar year 2009 % | Number of Exceedences of hourly Mean objective (200 µg/m <sup>3</sup> ) |            |           |
|--------------------------------|-----------------|--------------|---|--|---|------------|-----------|
|                                |                 |              |   |  | 2007  | 2008       | 2009      |
| Central Rd                     | Central Rd      | Y            | 82  | 82   | 999   | 715 ( 452) | 760(459)* |
| Glasgow Airport                | Glasgow Airport | N            | 100   | 100  | -   | 1 (113)    | 0         |
| Gordon St                      | Gordon St       | Y            | 89  | 89   | 0   | 0 (159)    | 1(155)*   |
| *99.9 <sup>th</sup> percentile |                 |              |   |  |   |            |           |

### Diffusion Tube Monitoring Data

The NO<sub>2</sub> diffusion tube monitoring data for 2009 is presented in Table 2.5. Measured concentrations exceeding the annual mean objective level have been highlighted for ease of reference. Where the data capture is less than 75% the data have been annualised following the method described in technical guidance. The diffusion tube monitoring results have been adjusted for laboratory bias. Further detail of the annualisation and laboratory bias adjustment is provided in Appendix A. Trend charts of historic diffusion tube data at urban background, roadside and kerbside sites are presented in Charts 2.4a, 2.4b and 2.4c respectively.

**Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes**

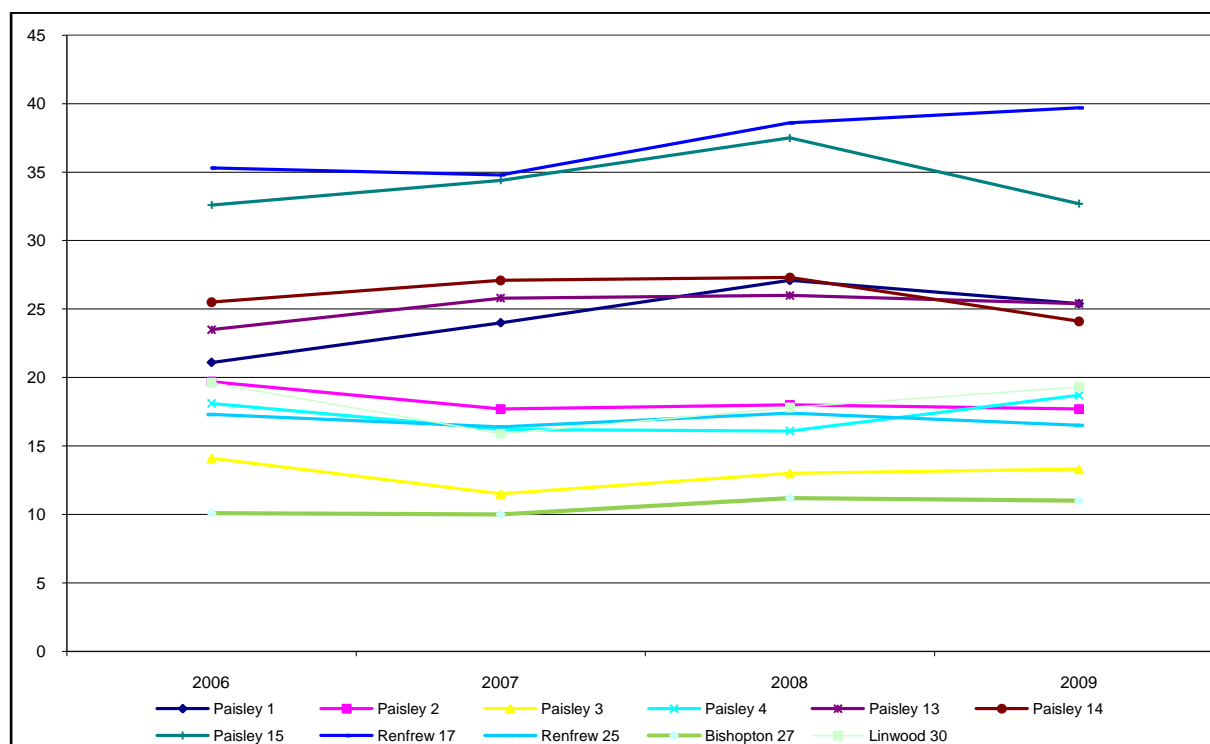
| Site ID       | Location                                | Within AQMA? | Data Capture for monitoring period % | Data Capture for full calendar year 2009 % | Annual mean concentrations (µg/m <sup>3</sup> ) |             |              |
|---------------|---|--------------|--------------------------------------|--|---|-------------|--------------|
|               |   |              |                                      |  | 2007  | 2008        | 2009         |
| Paisley 1     | Gilmour Street, Paisley                 | Y            | 83                                   | 83   | 24.0  | 27.1        | 25.4         |
| Paisley 2     | Oakshaw Street, Paisley                 | Y            | 100                                  | 100  | 17.7  | 18.0        | 17.7         |
| Paisley 3     | Lochfield Drive, Paisley                | N            | 100                                  | 100  | 11.5  | 13.0        | 13.3         |
| Paisley 4     | Regent Street, Paisley                  | N            | 92                                   | 92   | 16.2  | 16.1        | 18.7         |
| Paisley 5     | Central Road, Paisley                   | Y            | 67                                   | 33   | <b>76.0</b>                                     | <b>79.1</b> | <b>*79.6</b> |
| Johnstone 7   | High Street, Johnstone                  | N            | 100                                  | 100  | 33.5  | 34.3        | 30.8         |
| Renfrew 8     | Hairst Street, Renfrew                  | N            | 92                                   | 92   | 2 months data only                              | 37.9        | <b>43.4</b>  |
| Bishopton 9   | Station Road, Bishopton                 | N            | 92                                   | 92   | 16.3  | 13.7        | 15.3         |
| Paisley 13    | Greenock Road, Paisley                  | N            | 92                                   | 92   | 25.8  | 26.0        | 25.4         |
| Paisley 14    | Arkleston Rd, Paisley                   | N            | 75                                   | 75   | 27.1  | 27.3        | *24.1        |
| Paisley 15    | Montgomery Drive, Paisley               | N            | 100                                  | 100  | 34.4  | 37.5        | 32.7         |
| Renfrew 17    | Tanar Way, Renfrew                      | N            | 71                                   | 42   | 34.8  | 38.6        | *39.7        |
| Paisley 18    | Incle Street, Paisley                   | Y            | 100                                  | 100  | <b>53.9</b>                                     | <b>49.2</b> | <b>44.0</b>  |
| Paisley 19    | Linwood Road, Paisley                   | N            | 100                                  | 100  | 30.9  | 31.7        | 30.3         |
| Johnstone 20  | High Street, Johnstone                  | N            | 100                                  | 100  | 44.3  | 34.5        | 36.1         |
| Paisley 21(1) | Causeyside Street, Paisley (Triplicate) | Y            | 94                                   | 94   | 38.7  | 39.4        | 37.6         |
| Renfrew 23    | Hillington Road, Renfrew                | N            | 100                                  | 100  | 30.2  | 31.6        | 30.2         |

| Site ID            | Location   | Within AQMA? | Data Capture for monitoring period % | Data Capture for full calendar year 2009 % | Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) |             |              |
|--------------------|--|--------------|--------------------------------------|--|---|-------------|--------------|
|                    |  |              |                                      |  | 2007  | 2008        | 2009         |
| Renfrew 24         | Glasgow Road, Renfrew                                  | N            | 100                                  | 100  | 26.0  | 24.2        | 24.0         |
| Renfrew 25         | French Street, Renfrew                                 | N            | 100                                  | 100  | 16.4  | 17.4        | 16.5         |
| Bishopton 27       | Rossland Gardens, Bishopton                            | N            | 100                                  | 100  | 10  | 11.2        | 11.0         |
| Linwood 30         | Kintyre Avenue, Linwood                                | N            | 100                                  | 100  | 15.9  | 17.8        | 19.3         |
| West Walkingshaw31 | West Walkingshaw                                       | N            | 83                                   | 83   | 25.5  | 28.0        | 25.9         |
| Paisley 32         | Gordon Street, Paisley                                 | Y            | 92                                   | 92   | <b>44.9</b>   | <b>47.9</b> | <b>40.4</b>  |
| Paisley 33         | 76 Causeyside Street, Paisley                          | Y            | 100                                  | 100  | <b>40.6</b>   | <b>44.4</b> | <b>41.4</b>  |
| Paisley 34         | 63 Causeyside Street, Paisley                          | Y            | 100                                  | 100  | <b>41.7</b>   | <b>44.7</b> | <b>41.7</b>  |
| Paisley 35         | Old Sneddon Street, Paisley                            | Y            | 100                                  | 100  | <b>51.7</b>   | <b>49.9</b> | <b>42.9</b>  |
| Paisley 36         | 37 Caledonia Street, Paisley                           | Y            | 100                                  | 100  | 37.5  | 34.5        | 30.4         |
| Paisley 37         | Central Road, Monitoring Station, Paisley (Triplicate) | Y            | 100                                  | 75   | <b>73.5</b>   | <b>68</b>   | <b>60.9</b>  |
| Renfrew 38         | 99 Paisley Road, Renfrew                               | N            | 100                                  | 100  | 34.3  | 37.5        | 34.2         |
| Paisley 39         | Glasgow Airport, Paisley (Triplicate)                  | N            | 100                                  | 100  | 25.2  | 22.6        | 21.9         |
| Renfrew 40         | Hairst Street, Renfrew                                 | N            | 100                                  | 100  | 36.5  | 22.3        | 32.8         |
| Paisley 41         | Smithhills Street (West), Paisley                      | Y            | 75                                   | 75   | <b>63.7</b>   | <b>62.3</b> | <b>*56.1</b> |
| Paisley 42         | Central Road (West), Paisley                           | Y            | 75                                   | 75   | <b>47.2</b>   | <b>46.2</b> | <b>*42.7</b> |
| Paisley 43         | Smithhills Street (East), Paisley                      | Y            | 100                                  | 100  | <b>50.4</b>   | <b>48.7</b> | <b>42.1</b>  |
| Paisley 44         | Love Street, Paisley                                   | Y            | 100                                  | 100  | 28.4  | 32          | <b>45.8</b>  |
| Renfrew 45         | Xscape, Renfrew  | N            | 100                                  | 100  | N/A   | 33.7        | 28.2         |
| Renfrew 46         | Ferry Village, Renfrew                                 | N            | 92                                   | 92   | N/A   | 20.6        | 24.3         |
| Paisley 47         | Arkleston Road   | N            | 92                                   | 92   | 24.0  | 27.1        | 29.9         |
| Renfrew 48         | Glen Sax Drive, Renfrew                                | N            | 100                                  | 33   | N/A   | N/A         | <b>*27.3</b> |

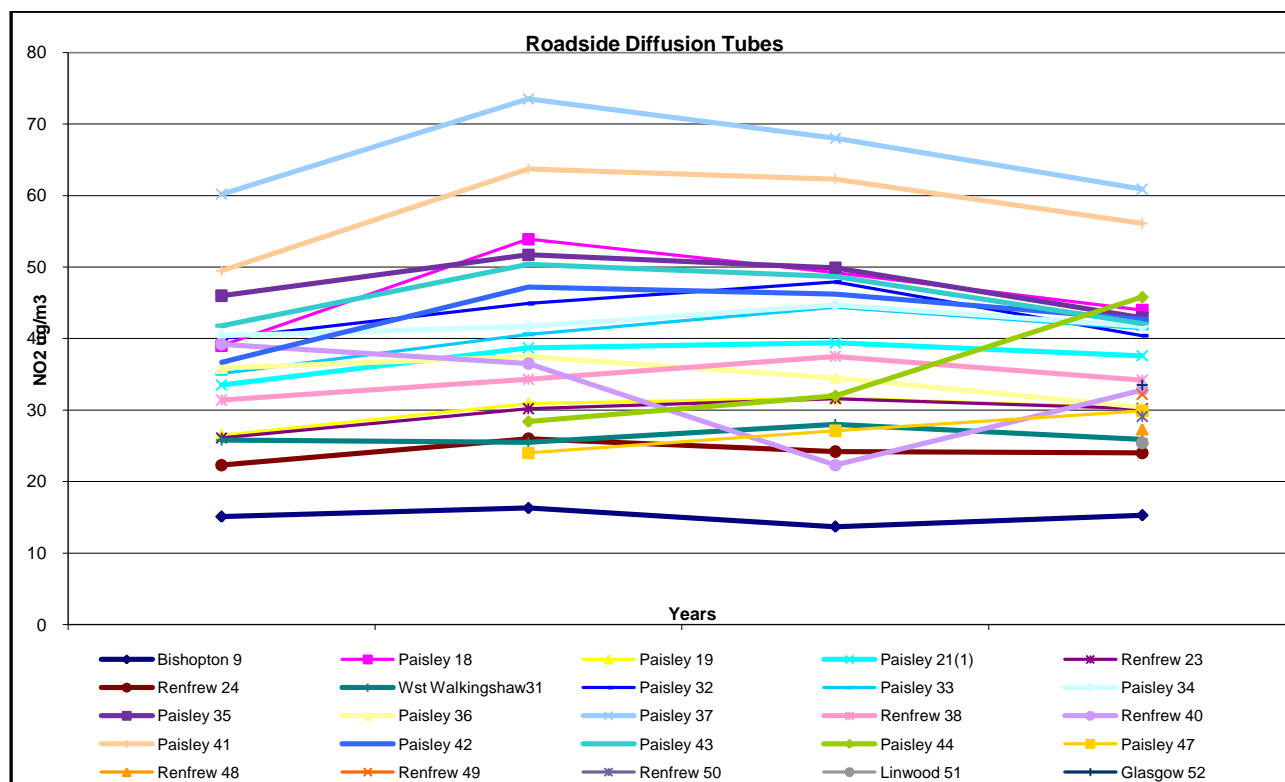
| Site ID    | Location                  | Within AQMA? | Data Capture for monitoring period % | Data Capture for full calendar year 2009 % | Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) |      |       |
|------------|---------------------------|--------------|--------------------------------------|--|---|------|-------|
|            |                           |              |                                      |  | 2007  | 2008 | 2009  |
| Renfrew 49 | Tanar Way , Renfrew       | N            | 100                                  | 33   | N/A   | N/A  | *32.2 |
| Renfrew 50 | Renfrew Road, Paisley     | N            | 100                                  | 33   | N/A   | N/A  | *29.1 |
| Linwood 51 | Kintyre Avenue 2, Linwood | N            | 100                                  | 25   | N/A   | N/A  | *25.4 |
| Glasgow 52 | Glasgow Road 2, Renfrew   | N            | 100                                  | 25   | N/A   | N/A  | *33.5 |

\* Annualised data

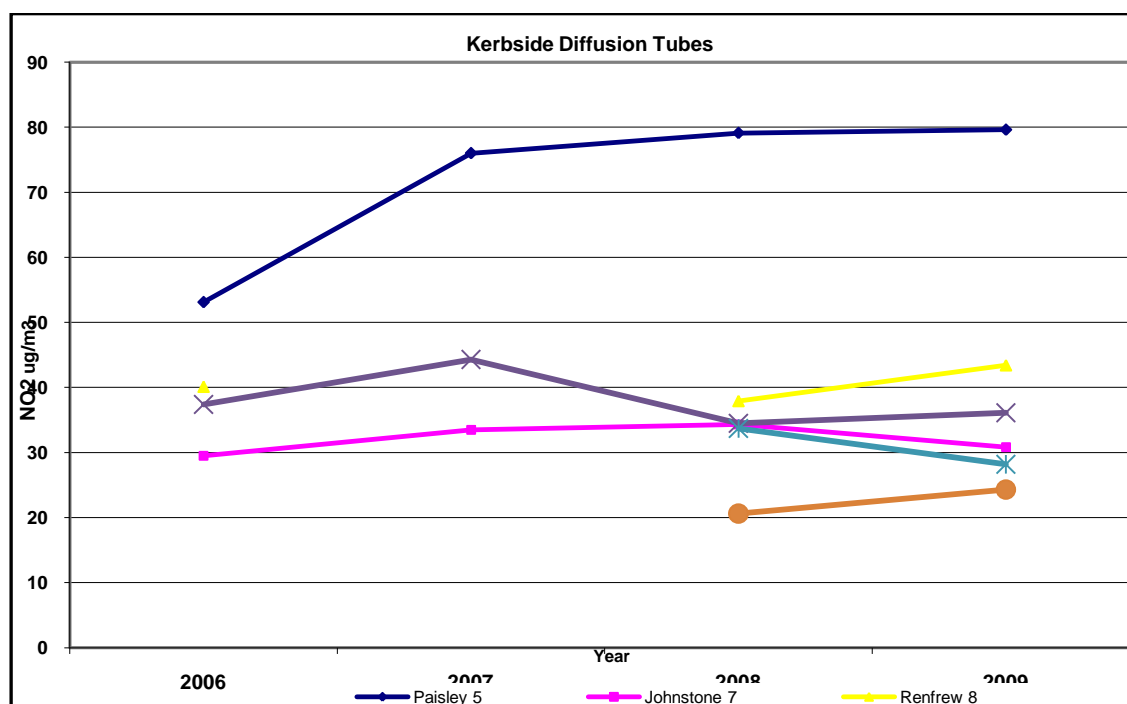
**Chart 2.4a Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Urban Background Diffusion Tube Monitoring Sites.**



**Chart 2.4b Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Roadside Diffusion Tube Monitoring Sites.**



**Chart 2.4c Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Kerbside Diffusion Tube Monitoring Sites.**



Typically, measured NO<sub>2</sub> concentrations within Renfrewshire have not followed national trends set out in the technical guidance, which implies a decrease in NO<sub>2</sub> concentrations. The NO<sub>2</sub> diffusion tubes located at kerbside and urban background locations have generally shown an increase in measured concentrations since 2006. At roadside locations the trend graph shows that levels in 2009 are of a similar concentration to those measured during 2006.

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

Details of measured annual mean and 24-hour mean PM<sub>10</sub> concentrations in 2009 are presented in Tables 2.6 and 2.7 respectively. No data are presented for 2007 as the data capture during 2007 was 12%.

**Table 2.6 Results of PM<sub>10</sub> Automatic Monitoring: Comparison with Annual Mean Objective**

| Site ID   | Analyser  | Within AQMA? | Data Capture for monitoring period % | Data Capture for full calendar year 2009 % | Annual mean concentrations (µg/m <sup>3</sup> ) |      |      |
|-----------|-----------|--------------|--------------------------------------|--|---|------|------|
|           |           |              |                                      |  | 2007  | 2008 | 2009 |
| Gordon St | TEOM FDMS | Y            | 78                                   | 78   | n/a   | 15   | 18   |

**Table 2.7 Results of PM<sub>10</sub> Automatic Monitoring: Comparison with 24-hour Mean Objective**

| Site ID   | Location  | Within AQMA? | Data Capture for monitoring period <sup>a</sup> % | Data Capture 2009 % | Number of Exceedences of daily mean objective (50 µg/m <sup>3</sup> ) |      |      |
|-----------|-----------|--------------|---|---------------------|---|------|------|
|           |           |              |   |                     | 2007  | 2008 | 2009 |
| Gordon St | Gordon St | Y            | 78  | 78                  | N/A   | 1    | 5    |

During 2009 there were no exceedences of the 2004 annual mean objective and five recorded exceedences of the 24-hour mean NAQS objective at the Gordon Street monitoring site.

Measured PM<sub>10</sub> concentrations during 2009 indicate that urban PM<sub>10</sub> concentrations within Paisley town centre are comfortably below the 2004 annual mean objective, however concentrations have only just met the 2010 annual mean objective.

### 2.2.3 Sulphur Dioxide

Renfrewshire Council historically monitored SO<sub>2</sub> concentrations at Glasgow Airport however, as monitoring data indicated a continued decline in measured concentrations in line with national trends, monitoring was ceased. Historic measured concentrations were substantially below the objective level.

### 2.2.4 Benzene

Renfrewshire Council does not monitor for Benzene.

### 2.2.5 Other pollutants monitored

Renfrewshire Council does not undertake monitoring for any other pollutants.

### 2.2.6 Summary of Compliance with NAQS Objectives

Automatic monitoring data from Central Road breached both the 1 hour and the annual mean NO<sub>2</sub> NAQS objectives. Both Gordon Street and Glasgow Airport automatic monitoring sites recorded no exceedences of the annual mean objective and one exceedence of the 1 hour mean objective was recorded at Gordon Street.

There were twelve diffusion tube monitoring locations where exceedences of the NO<sub>2</sub> annual mean objective were measured. All monitoring sites were located within the Paisley Town Centre AQMA with the exception of the Renfrew 8 site, Hairst Street, Renfrew which is located within Renfrew town centre. The diffusion tube site Renfrew 17, Tanar Way Renfrew, which is adjacent to the M8 motorway, recorded an annual mean concentration of 39.7 µg/m<sup>3</sup>, only marginally below the annual mean objective. However it should be noted that the annual mean concentration at this site has been annualised due to poor data capture as a result of roadworks in the area that prevented access to the tube location for several months. A Detailed Assessment of air quality in Renfrew was carried out in 2009 which included both of these locations. The Detailed Assessment concluded that an AQMA was not required at Hairst Street but indicated that there was potential for the NO<sub>2</sub> annual mean objective to be exceeded at receptors close to the Tanar Way site at the M8. Additional diffusion tubes have now been located at other residential receptors close to this site and the M8. Initial results indicate that the objective is being met at these locations.

Renfrewshire Council has successfully received additional funding from the Scottish Government to install an automatic monitoring station at a location close to the residential receptors at the Tanar Way site. It is Renfrewshire Council's intention to defer declaring an AQMA until at least 6 months of continuous monitoring data have been obtained.

During 2009, the measured annual mean PM<sub>10</sub> concentration at the Gordon Street monitoring site in Paisley town centre was below the 2004 PM<sub>10</sub> annual mean objective, but only marginally below the 2010 annual mean objective level. There were five recorded exceedences of the 24-hour mean PM<sub>10</sub> objective, marginally below the permitted seven exceedences in the 2010 objective.

Renfrewshire Council has examined the results from monitoring in the district. With the exception of Hairst St, Renfrew measured concentrations outside of the AQMA are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment. As a Detailed Assessment of Renfrew including the Hairst St site has just been carried out it is not considered necessary to proceed at this time to another DA for this area however monitoring results will continue to be reviewed.

### **3 New Local Developments**

Updated data on local emissions sources were collated from Planning and Roads Services of Renfrewshire Council, the Scottish Environmental Protection Agency (SEPA) and Transport Scotland.

#### **3.1 Road Traffic Sources**

Updated traffic count data for 2009 were obtained from Transport Scotland and Renfrewshire Council Roads Services. The data were reviewed to identify any roads with significant increases or new sections of road that have not previously been assessed that fit the screening criteria. It was determined that there have been no significant changes to emissions from traffic sources within the Renfrewshire Council area since the 2009 Updating and Screening Assessment.

#### **3.2 Other Transport Sources**

There have been no significant changes to emissions from rail, shipping or aircraft operations within the Renfrewshire Council area since the 2009 Updating and Screening Assessment.

#### **3.3 Industrial Sources**

SEPA were consulted in relation to any changed processes identified in the public registers. There have been no significant changes to existing process emissions and no new industrial sources identified.

#### **3.4 Commercial and Domestic Sources**

Renfrewshire Council Planning Services were consulted with regards to any new or changed commercial and domestic sources. No new areas of domestic fuel burning were identified.

The 2009 U&SA identified a biomass boiler for which planning permission had been granted. The biomass plant is included in the development of a new Health Centre in Renfrew. No further emission details have been provided since the U&SA 2009. The proposed plant is an automatic wood pellet fed 145kW plant and is located in an area where the background concentration of PM<sub>10</sub> is approximately 11.6 µg/m<sup>3</sup>. Based on the nomograms included in TG (09) and using worse case emissions of 1074kg/ year PM<sub>10</sub> no further assessment is required.

There is no requirement to proceed to a Detailed Assessment for emissions from the biomass plant.



### **3.5 New Developments with Fugitive or Uncontrolled Sources**

SEPA were consulted in relation to any changed waste, landfill or quarry processes identified in the public registers. There have been no significant changes to existing process emissions and no new fugitive sources identified.

Renfrewshire 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 Local / Regional Air Quality Strategy**

Renfrewshire Council does not have a local or regional air quality strategy.

## 5 Planning Applications

A review of planning applications granted since the 2009 USA was carried out in order to identify any developments which may have a significant impact upon the local air quality.

The major developments identified by the council's Planning Services are listed in Table 5.1.

**Table 5.1 Details of planning applications with potential air quality impacts**

| <b>Development Description</b>   | <b>Location</b>  |
|--|--|
| Use of industrial building for the supply of electricity and the installation of 2 diesel generators         | Wellmeadow Street, Renfrew   |
| Erection of building to accommodate a biomass power plant and installation of associated plant and equipment | Tracey Heat & Power Ltd,<br>Burnbrae Road, Linwood                     |
| Erection of Anaerobic Digester Plant and alterations to existing shed  | 150 metres south of Glenlora<br>House, Corsefield Road,<br>Lochwinnoch |
| Tesco supermarket (pending due to Public Inquiry)  | Paisley  |

It was concluded from the emission data and AQ assessments received with these applications that no further assessment was required.

## **6 Air Quality Planning Policies**

Renfrewshire Council does not currently have any air quality planning policies. The council are currently working on an internal Air Quality Planning Guidance document. The guidance document is currently at consultation stage within the council. It is hoped that this document will be finalised once the revised EPUK planning guidance has been reviewed.

## **7 Local Transport Plans and Strategies**

Renfrewshire Council's Local Transport Strategy was updated in 2007, air quality is not considered within this document.

## **8 Implementation of Action Plans**

Renfrewshire Council declared the Paisley Town Centre AQMA in August 2009 and are currently working towards completing their action plan for submission in March 2011.

## **9 Conclusions and Proposed Actions**

### **9.1 Conclusions from New Monitoring Data**

During 2009, the measured annual mean PM<sub>10</sub> concentration at the Gordon Street monitoring site in Paisley town centre was below the 2004 PM<sub>10</sub> annual mean objective, but only just met the 2010 annual mean objective level. There were five recorded exceedences of the 24-hour mean PM<sub>10</sub> objective, marginally below the permitted seven exceedences in the 2010 objective.

Additional monitoring sites were added to the diffusion tube monitoring network in 2009 to monitor NO<sub>2</sub> concentrations at Glasgow Road, Renfrew and close to the M8 in Renfrew and the A736.

There were a number of measured exceedences of the NO<sub>2</sub> annual mean objective, all of which were at monitoring sites located within the Paisley Town Centre AQMA, with the exception of Renfrew 8, Hairst Street Renfrew. The monitoring site Renfrew 17, Tanar Way Renfrew, had a measured annual mean concentration extremely close to the annual mean objective although it should be noted that the annual mean has been annualised due to poor data capture. A Detailed Assessment was carried out in 2009 which considered the sites at Hairst Street and Tanar Way. The Detailed Assessment concluded that an AQMA was not required at Hairst Street but indicated that there was potential for the NO<sub>2</sub> annual mean objective to be exceeded at receptors close to the M8 near Tanar Way. Additional diffusion tubes have now been located at other residential receptors close to the M8 near this area. Initial results indicate that the objective is being met at these locations.

Renfrewshire Council has been awarded additional funding from the Scottish Government to install an automatic monitoring station at a location close to Tanar Way at the residential receptors located near to the M8. It is Renfrewshire Council's intention to defer making a decision on declaring an AQMA at Tanar Way until at least 6 months of continuous monitoring data have been obtained.

### **9.2 Conclusions relating to New Local Developments**

A review of all new local developments was undertaken and it was concluded that there was no need to proceed to a Detailed Assessment.

### **9.3 Other Conclusions**

Renfrewshire Council hope to release their internal Air Quality Planning Guidance document within the next six months.

### **9.4 Proposed Actions**

A new automatic monitoring station measuring both NO<sub>x</sub> and PM<sub>10</sub> will be located close to residential receptors adjacent to the M8 in Renfrew.

There is no requirement to proceed to a Detailed Assessment for any pollutant contained within the NAQS.

The next LAQM requirement for Renfrewshire Council will be submission of a Further Assessment in August 2010.



## **Appendices**

Appendix A: QA/QC Data

Appendix B: Figures

## Appendix A: QA:QC Data

### Diffusion Tube Bias Adjustment Factors

The laboratory analysis of the passive diffusion tubes used by the Council is undertaken by Glasgow Scientific Services. Glasgow Scientific Services is a UKAS accredited laboratory with documented Quality Assurance/Quality Control (QA/QC) procedures for diffusion tube analysis. The laboratory prepares the diffusion tubes using the 20% triethanolamine (TEA) in water method.

Glasgow Scientific Services public analyst participates in the AEA inter-comparison scheme, with bias correction factors calculated and applied annually. The laboratory analyses results from co-location studies at various locations.

The laboratory co-location factors are presented in Table A.1.

**Table A.1 Details of the 2009 bias correction factors for NO<sub>2</sub> diffusion tubes (v03/10)**

| Site Name   | Study duration | Tube precision | Bias correction factor |
|---|----------------|----------------|------------------------|
| East Dunbartonshire Council   | 12             | P              | <b>1.21</b>            |
| East Dunbartonshire Council   | 12             | G              | <b>1.14</b>            |
| East Dunbartonshire Council   | 11             | P              | <b>1.41</b>            |
| AEA Technology  | 11             | G              | <b>1.17</b>            |
| Overall factor from Glasgow Scientific Services co-location studies |                |                | <b>1.23</b>            |

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

| Site Name                                | Study duration | Tube precision | Bias correction factor |
|--|----------------|----------------|------------------------|
| Glasgow Airport                          | 12             | G              | <b>1.12</b>            |
| Gordon Street                            | 12             | G              | <b>0.91</b>            |
| Overall factor from Renfrewshire Council |                |                | <b>1.015</b>           |

### Discussion of Choice of Factor to Use

Renfrewshire Council have chosen to use the local bias adjustment factor. The laboratory bias adjustment factor is mainly made up of results from monitoring undertaken by East Dunbartonshire council. Two of the four co-location studies had poor precisions whilst both of Renfrewshire Council's studies showed good precision. The 1.23 factor from the laboratory co-locations seems quite high in comparison with other laboratories using the same analysis method. It was felt that using the local adjustment factor would prevent any over-estimate of the NO<sub>2</sub> concentrations within the Renfrewshire Council area.

**PM<sub>10</sub> Monitoring Adjustment**

Renfrewshire Council operate a TEOM FDMS which meets the equivalence criteria therefore no adjustment factor was required.

**Short-term to Long-term Data adjustment**

Renfrewshire Council installed five new diffusion tubes in August 2009. Due to construction works 5 sites also stopped monitoring at various stages through 2009. These sites required adjustment to calculate long-term mean concentrations. An adjustment factor was calculated for each group of diffusion tubes using all other diffusion tube results for the Renfrewshire Council area where the data capture rate was greater than 90%.

A summary table of the adjustment factors used is presented below:-

| Site       | % Data capture | Factor |
|------------|----------------|--------|
| Renfrew 17 | 42             | 1.045  |
| Paisley 14 | 58             | 0.964  |
| Paisley 5  | 33             | 1.045  |
| Paisley 37 | 75             | 1.158  |
| Paisley 41 | 75             | 1.158  |
| Paisley 42 | 75             | 1.158  |
| Renfrew 48 | 33             | 0.812  |
| Renfrew 49 | 33             | 0.812  |
| Renfrew 50 | 33             | 0.812  |
| Linwood 51 | 25             | 0.719  |
| Glasgow 52 | 25             | 0.719  |

**QA/QC of automatic monitoring**

AEA Technology currently carries out all data ratification on behalf of the Scottish Government for Renfrewshire Council. This consists of:

- polling the data on a daily basis; and
- 6 month site audits.

Renfrewshire Council do not currently carry out manual calibrations on the NO<sub>x</sub> analysers, each analyser carries out an automatic calibration overnight daily. The automatic calibrations are used by AEA to scale and ratify the data.

Renfrewshire Council currently carry out there own filter changes.

**QA/QC of diffusion tube monitoring**

Glasgow Scientific Services is a UKAS accredited laboratory with documented Quality Assurance/Quality Control (QA/QC) procedures for diffusion tube analysis. Glasgow Scientific Services participates in the WASP scheme that is managed by the Health & Safety Laboratory and a monthly intercomparison exercise that is managed by AEA. The performance of Glasgow Scientific Services in the WASP scheme is shown below.

|                             | <b>Performance on basis of<br/>RPI, OLD CRITERIA,<br/>best 4 out of the 5<br/>rounds 103-107</b> | <b>Performance on basis of<br/>RPI, NEW CRITERIA,<br/>best 4 out of the 5<br/>rounds 103-107</b> |
|-----------------------------|--|--|
| Glasgow scientific services | Good   | Good   |

## **Appendix B:**

**Figure 1: AQMA boundary**

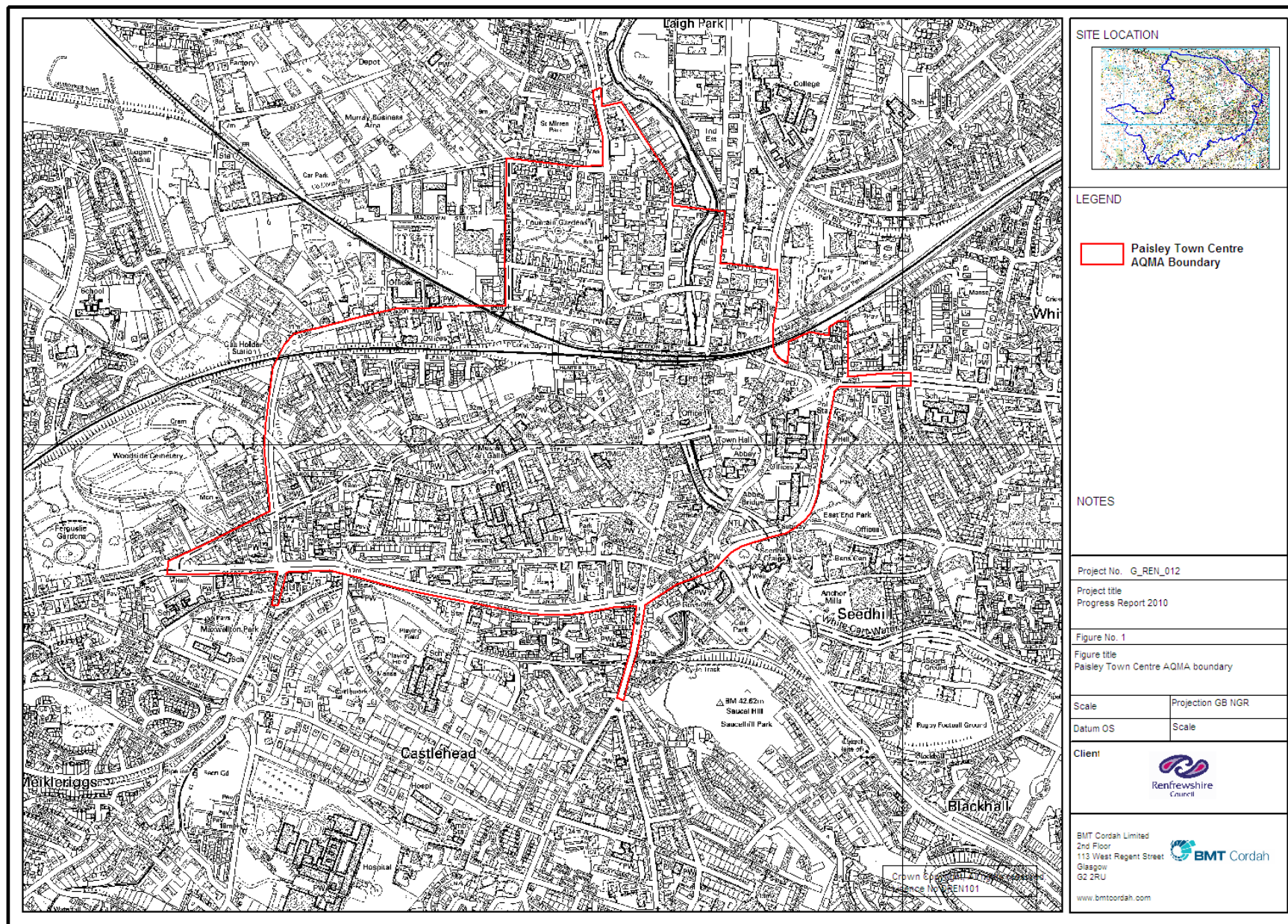
**Figure 2: Automatic monitoring station locations**

**Figure 3: NO<sub>2</sub> diffusion tube location – Paisley**

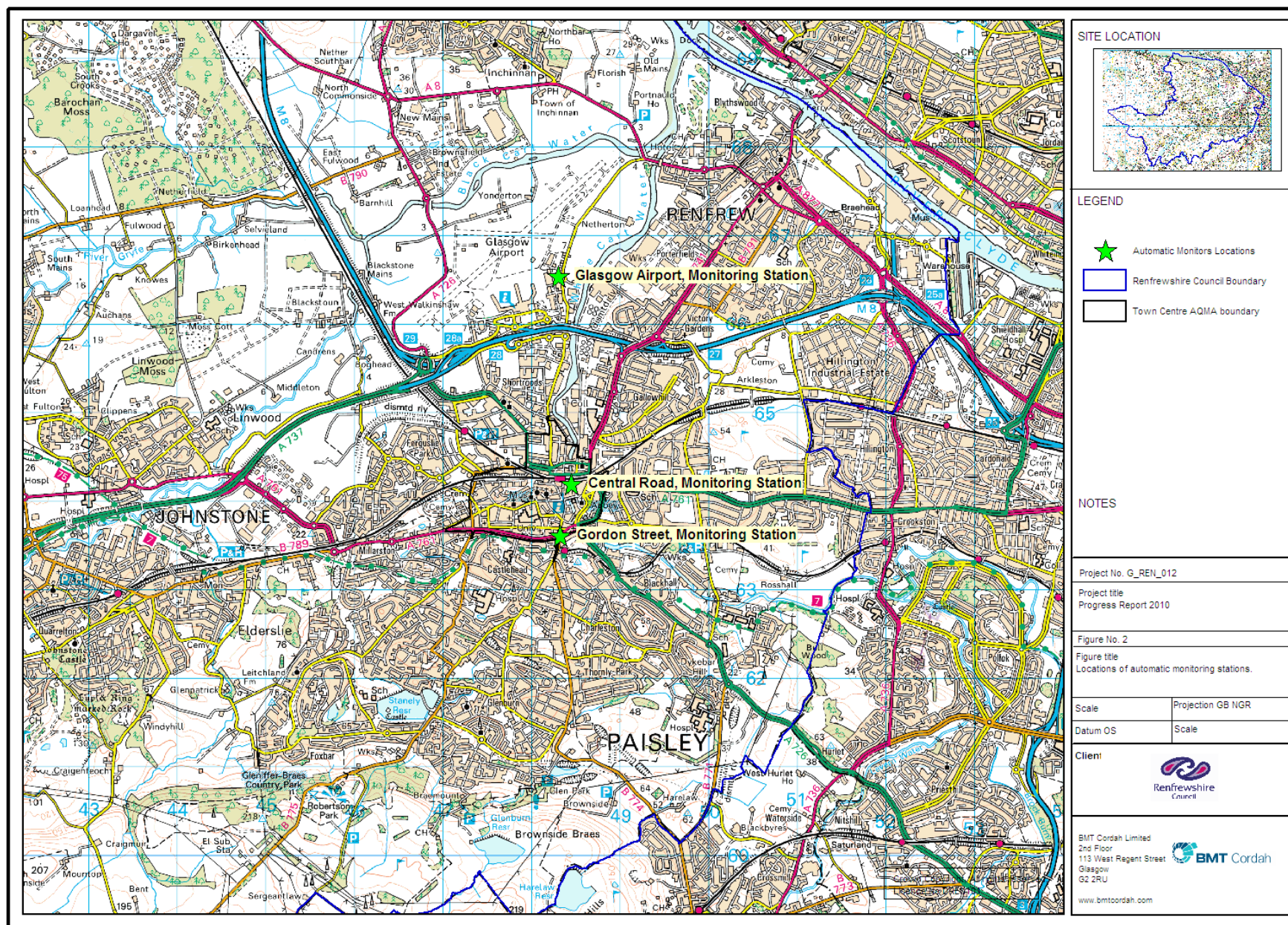
**Figure 4: NO<sub>2</sub> diffusion tube location – Paisley AQMA**

**Figure 5: NO<sub>2</sub> diffusion tube location – Renfrew**

**Figure 6: NO<sub>2</sub> diffusion tube location – Johnstone**



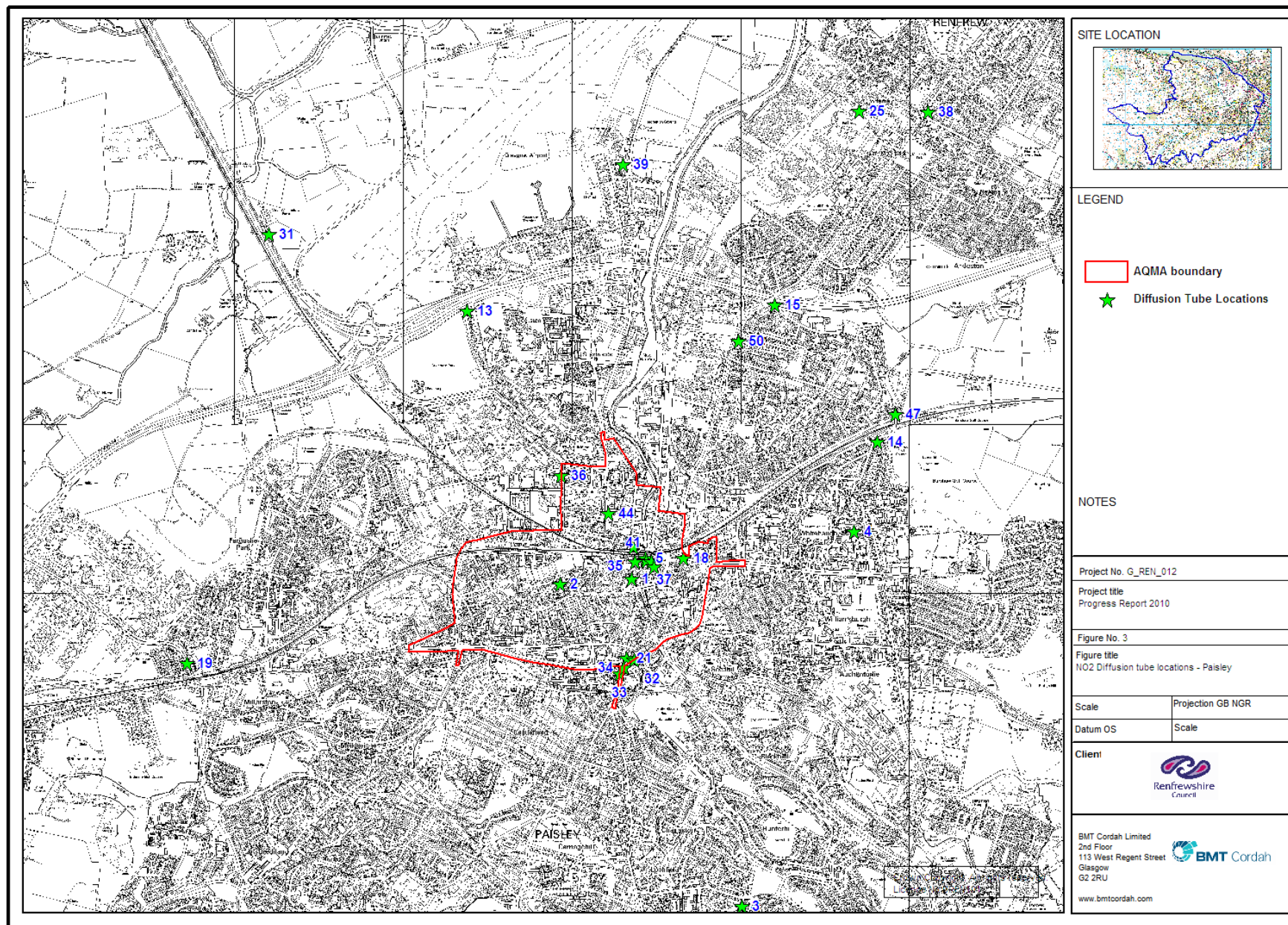




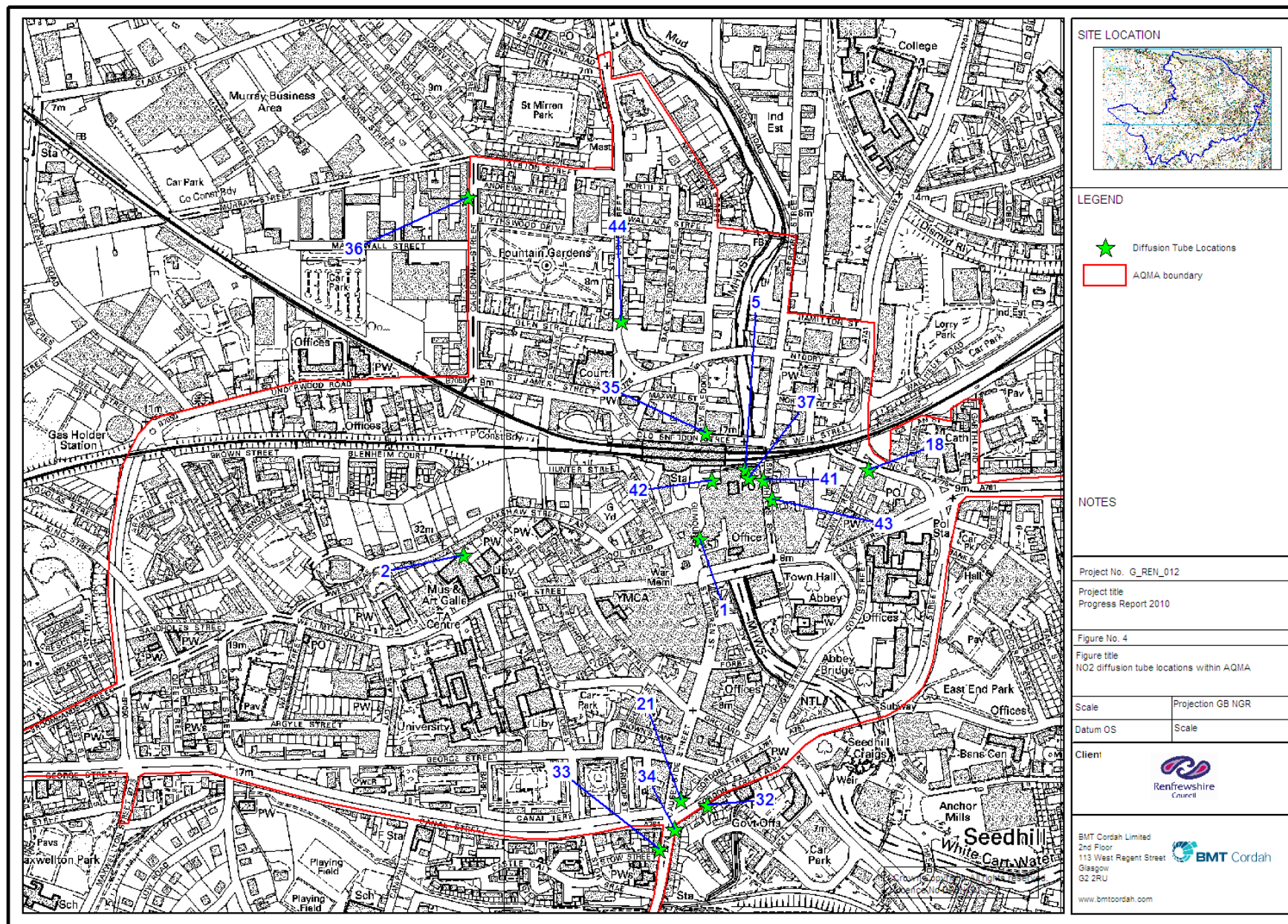


Date (May 2010)

Renfrewshire Council- Scotland









Date (May 2010)

Renfrewshire Council- Scotland

