

Dumfries and Galloway Council

Local Air Quality Management

Environment Act 1995: Part IV

Air Quality Progress Report - April 2005

1. **Introduction**

- 1.1 In terms of Part IV of the Environment Act 1995 every local authority is required to regularly review and assess the air quality in its area to determine whether the Government's air quality objectives will be met. Such reviews and assessments are generally carried out every three years. In the intervening years, unless a more detailed assessment is being carried out, an air quality progress report is required.
- 1.2 The specific atmospheric pollutants for which objectives have been set are:-
- nitrogen dioxide (NO₂),
 - sulphur dioxide (SO₂),
 - particulate matter (PM₁₀),
 - benzene (C₆H₆)
 - 1,3 butadiene,
 - carbon monoxide (CO),
 - lead (Pb)
 - polycyclic aromatic hydrocarbons (PAHs), and,
 - ozone (O₃)
- 1.3 The objectives (see appendix 1) are based on standards set on health grounds and essentially consist of target concentrations to be achieved by specific dates. The current objectives which apply for the purposes of local air quality management in Scotland are prescribed in the Air Quality (Scotland) Regulations 2000 as amended by the Air Quality (Scotland) (Amendment) Regulations 2002. (Objectives for O₃ and PAHs have been set in the Government's Air Quality Strategy [January 2000] and addendum [February 2003] but have not been included in the regulations).
- 1.4 If the results of a review and assessment indicate that any of the prescribed objectives is not likely to be met by the requisite date the local authority is required to declare an air quality management area and to produce an action plan with a view to meeting the objective concerned.
- 1.5 The conclusions of the initial review and assessment¹ of air quality in Dumfries and Galloway were that the air quality objectives were likely to be met. As a consequence no air quality management areas were declared in Dumfries and Galloway (which is still the position to date).

¹ see references on page 8

- 1.6 In 2003, as part of a second round of review and assessment Casella Stanger (consultants) were employed to carry out an initial updating and screening assessment² (USA) of air quality in Dumfries and Galloway. The consultants supported the conclusions of the first round but, in line with the Department for Environment, Food and Rural Affairs' (DEFRA's) revised technical guidance³ in relation to sulphur dioxide, concluded that a detailed assessment of the influence of shipping at the ferry terminals at Stranraer and Cairnryan would be required.
- 1.7 In 2004 a detailed assessment⁴ of the influence of shipping on SO₂ levels at Cairnryan was carried out, the conclusion of which was that an air quality management area was not required. A further assessment will take place when Stena Line Ltd., relocates from Stranraer to Cairnryan (anticipated in 2008).

2. Monitoring Results

2.1 Nitrogen Dioxide (NO₂) (Automatic)

- 2.1.1 A continuous (chemiluminescent) NO₂ monitor (API M200a) is located at the Municipal Chambers, Buccleuch Street, Dumfries and forms part of the UK Automatic Urban and Rural Air Monitoring Network (AURN). Results for the past 3 years are as shown in Table 1. All the results shown are based on ratified data. Ratification is carried out by the QA/QC unit at AEA Technology NETCEN.

Table 1 AURN NO₂ Results at Buccleuch Street Dumfries (Roadside Site)

Year	Annual Mean µg/m ³	Number of exceedences of 200 µg/m ³ hourly mean	Data capture
2002	38.0	0	95.1%
2003	37.6	2	97.9%
2004	37.3	0	96.6%
<i>objective (by 31/12/05)</i>	≤ 40	≤ 18	≥ 90%

µg/m³ = microgrammes per cubic metre

≤ = less than or equal to

≥ = greater than or equal to

- 2.1.1.1 Results in Table 1 are within the objectives.

- 2.1.2 A continuous NO₂ monitor has recently been located at Eskdalemuir as part of the AURN. Monitoring commenced on 9th December 2004 and the results are shown in Table 2. 2005 results are based on provisional (non-ratified) data. Ratification is carried out by the QA/QC unit at AEA Technology NETCEN. (Ozone is also monitored at this site) (see appendix 6 for location plan.)

Table 2 AURN NO₂ Results at Eskdalemuir (Rural Site)

Period	Period Mean µg/m ³	Number of exceedences of 200 µg/m ³ hourly mean	Data capture
9-31 Dec 04	5.7	0	93.1%
Jan-Mar 05	4.1	1	94.9%
<i>objective (by 31/12/05)</i>	annual mean ≤ 40	≤ 18 per year	≥ 90%

µg/m³ = microgrammes per cubic metre

≤ = less than or equal to

≥ = greater than or equal to

2.1.2.1 Interim results in Table 2 are indicative of levels well below the objectives. (The exceedence noted may be eliminated when the data are ratified.)

2.2 Nitrogen Dioxide NO₂ (Diffusion tubes)

2.2.1 NO₂ diffusion tubes are deployed for monthly exposure periods at the 9 sites shown in Table 3. Further details of the sites and location maps are shown in appendices 2 and 4 respectively. The tubes are prepared and analysed by Casella CRE Air using UKAS-accredited method AQ/02 (10% TEA in water). Triplicate tubes are used at both sites at Buccleuch Street, Dumfries whereas the rest of the sites have single tubes.

2.2.2 Measurement by diffusion tubes is less accurate than measurement by continuous (chemiluminescent) sampler. Diffusion tubes are however less expensive and more convenient to use. The performance of diffusion tubes supplied by different laboratories can vary significantly but when triplicate diffusion tubes are collocated with a continuous monitor a bias adjustment factor (a measure of how much the tube results deviate over a period from the chemiluminescent sampler results) can be calculated and applied to the results of all of the diffusion tubes used locally (from the same laboratory).

2.2.3 Results of collocation studies carried out by different local authorities using the same laboratory can be combined to give a national bias adjustment factor for the laboratory.

2.2.4 The tubes at Buccleuch Street (East) (Municipal Chambers) have been collocated with the AURN continuous NO₂ monitor since March 2003. The results of this local collocation study have been used to derive the bias adjustment factors shown in Table 3. See appendix 3 for details of the bias adjustment calculation. Table 3 also shows averages obtained using a more sophisticated NETCEN collocation bias adjustment spreadsheet (trial edition) which in addition to calculating the bias gives an estimate of the error in the tube results.

- 2.2.4 The national bias adjustment factors for Casella CRE Air (10% TEA in water) are:-
- 1.01 for 2003 (*amalgamation of 7 studies including Dumfries & Galloway's*)
 - 0.85 for 2004 (*amalgamation of 6 studies including Dumfries & Galloway's*)

Both of these factors are slightly less than the locally-obtained bias adjustment factors therefore if they were applied to the raw data in Table 3 slightly lower diffusion tube averages would be obtained.

Table 3 Diffusion Tube Results

Location of tube		Annual Average 2003 $\mu\text{g}/\text{m}^3$	Annual Average 2003 <i>bias corrected</i> $\times 1.075$	Annual Average using NETCEN Spreadsheet	Average 2004 $\mu\text{g}/\text{m}^3$	Average 2004 <i>bias corrected</i> $\times 0.978$	Annual Average using NETCEN Spreadsheet
M74 Slip Rd	Lockerbie	24.9	26.77	27 \pm 3	32.5	31.79	32 \pm 3
*Buccleuch St. (E)	Dumfries	34.3	36.87	37 \pm 3	37.8	36.97	37 \pm 3
Buccleuch St (W)	Dumfries	30.1	32.36	33 \pm 3	34.9	34.13	35 \pm 3
Loreburn St.	Dumfries	26.6	28.60	29 \pm 3	29.6	28.95	29 \pm 2
St Michael St.	Dumfries	19.2	20.64	21 \pm 2	24.8	24.25	25 \pm 2
Argyll Drive	Dumfries	11.5	12.36	13 \pm 2	12.3	12.03	12 \pm 1
Charlotte St.	Stranraer	18.0	19.35	20 \pm 2	19.6	19.17	19 \pm 2
Port Rodie Car Park	Stranraer	18.8	20.21	20 \pm 2	16.9	16.53	17 \pm 2
A77 Cairnryan	Stranraer	16.6	17.85	18 \pm 2	18.0	17.60	18 \pm 2

* *Triplicate tubes collocated with automatic monitor*
 $\mu\text{g}/\text{m}^3$ = microgrammes per cubic metre

2.2.4.1 All the results in Table 3 are within the objective for the NO₂ annual mean. ($\leq 40 \mu\text{g}/\text{m}^3$).

2.3 PM₁₀ (Dumfries)

2.3.1 A gravimetric PM₁₀ Partisol Sequential Air Sampler is situated on a flat roof adjacent to the Municipal Chambers, Buccleuch Street, Dumfries and forms part of the AURN. (The monitoring site is close to a bus-stop.) Results for the past 3 years are as shown in Table 4. All the results are based on ratified data. Ratification is carried out by the QA/QC unit at AEA Technology NETCEN.

Table 4 AURN PM₁₀ Results at Buccleuch Street, Dumfries

Year	Annual Mean $\mu\text{g}/\text{m}^3$	Number of exceedences of 24-hour mean of 50 $\mu\text{g}/\text{m}^3$	Data capture
2002	21.4	18	93.7%
2003	23.3	22	93.4%
2004	17.5	4	91.8%
<i>objective</i>	<i>by 31/12/04</i>	≤ 40	$\geq 90\%$
	<i>by 31/12/10</i>	≤ 18	

$\mu\text{g}/\text{m}^3$ = microgrammes per cubic metre

\leq = less than or equal to

\geq = greater than or equal to

2.3.2 The results shown for 2004 in Table 4 are within the objectives.

2.4 PM₁₀ (Cairnryan)

2.4.1 An Osiris PM₁₀ monitor (light-scattering device) supplied by Turnkey Instruments Ltd., was affixed to a lamppost on the A77 near Claddyburn Terrace Cairnryan from 19th May 2003 to 8th December 2005 (6¾ months). The location, which was agreed beforehand with the Scottish Environment Protection Agency, was not chosen to represent public exposure over the averaging periods of the objectives for PM₁₀ (the nearest houses are approximately 20 metres from the lamppost - see maps at appendix 5). The location was chosen to obtain some background PM₁₀ data at Cairnryan prior to the proposed re-location of Stena Line Ltd., (shipping terminal) from Stranraer to Cairnryan. The results of the monitoring are summarised in Table 5:-

Table 5 PM₁₀ Results at Claddyburn Terrace Cairnryan

Period		Number of exceedences of 24-hour mean of 50 µg/m ³	Average of 24-hour means over period µg/m ³	Data capture
19/5/04-8/12/04		14	27.4	97%
objective	by 31/12/04	≤ 35 (per year)	≤ 40 annual mean	≥ 90%
	by 31/12/10	≤ 7 (per year)	≤ 18 annual mean	

µg/m³ = microgrammes per cubic metre

≤ = less than or equal to

≥ = greater than or equal to

2.4.1.1 The results shown in Table 5 are from a monitor on a lamppost situated 2m from the edge of the kerb on the A77. Note:- this site is not representative of public exposure over the averaging periods of the objectives for PM₁₀.

2.4.2 The data from the Osiris monitor comprise PM₁₀, PM_{2.5}, PM₁ and total particles measurements logged every 15 minutes throughout the monitoring period and may be subject to further analysis. It is intended to collocate the Osiris with the Partisol PM₁₀ monitor at Dumfries for calibration purposes.

2.5 Carbon Monoxide

2.5.1 A continuous carbon monoxide monitor (API M300) is located at the Municipal Chambers, Buccleuch Street, Dumfries and forms part of the AURN. Results for the past three years are shown in Table 6. All the results are based on ratified data. Ratification is carried out by the QA/QC unit at AEA Technology NETCEN.

Table 6 AURN CO Results at Buccleuch Street, Dumfries

Year	Maximum 8-hour running mean (mg/m ³)	Average 8-hour running mean (mg/m ³)	Maximum hourly mean (mg/m ³)	Data capture
2002	3.875	0.616	5.8	93.0%
2003	2.863	0.614	5.2	97.4%
2004	2.150	0.551	4.3	98.5%
<i>objective (by 31/12/03)</i>	≤ 10	N/A	N/A	$\geq 90\%$

mg/m³ = milligrammes per cubic metre

\leq = less than or equal to

\geq = greater than or equal to

2.5.1.1 The results shown in Table 6 are within the objective.

3. Door-to-door domestic coal-burning survey at Sanquhar.

- 3.1 Sanquhar was a coal-mining area in the past and there are still some families in the village receiving free coal for life as a result of the previous employment of a family-member in the coal industry. As a consequence Sanquhar was identified as an area where domestic coal-burning might be relatively prevalent. Subsequently real-time monitoring for SO₂ was carried out in Sanquhar during the winter of 2001/02 and, as previously reported², the results indicated that the objectives for SO₂ were not likely to be exceeded.
- 3.2 Following the publication in 2003 of DEFRA's revised technical guidance³, in particular in relation to the assessment of PM₁₀, to the effect that "significant solid fuel burning" should be construed as "any area of about 500m x 500m with more than 50 houses burning solid fuel as the primary source of heating", a house-to-house survey was undertaken in Sanquhar in 2003/04 to check whether there were any such areas.
- 3.3 DEFRA's criterion for the significance of solid-fuel-burning in relation to SO₂ is less stringent; significant solid-fuel-burning in this case is to be construed as "any area of about 500m x 500m with more than 100 houses burning solid fuel as the primary source of heating".
- 3.4 The result of the door-to-door survey was that there was no 500m x 500m area within Sanquhar with more than 50 houses burning solid fuel as the primary source of heating. This confirms that solid-fuel-burning in Sanquhar is not significant as far as the objectives for PM₁₀ and SO₂ are concerned.

4. New Local Developments (with the potential to significantly affect air quality)

- Construction has commenced on a refuse-derived-fuel (RDF) waste treatment plant at Dargavel (Locharmoss) near Dumfries. Treatment consists primarily of shredding, drying, separation of recyclable material and compaction. The RDF plant is part of the Council's Waste Management/Recycling Private Finance Initiative.
- Construction of a pyrolysis plant (a type of incinerator) also referred to as an energy-from-waste (EFW) plant for which planning consent has been granted in respect of a site near the RDF plant at Dargavel has not commenced as yet.
- The first crematorium in Dumfries and Galloway has recently commenced operation at Roucan Loch, which is situated between Collin and Dumfries. The Scottish Environment Protection Agency (SEPA) granted a Pollution, Prevention and Control (PPC) permit for the crematorium subject to the condition that mercury and particulate abatement plant shall be installed by 31/12/06 or by such other time agreed in writing with SEPA.
- Planning consent has recently been granted for a 40MW wood-burning power station to be constructed at Steven's Croft 2½ miles north of Lockerbie. The main fuel will be forestry-related materials in the form of small roundwood and sawmill co-products but the plant will be designed to burn a percentage of short-rotation coppice and recycled timber. Preliminary works are planned to commence later this year. The plant will be adjacent to an existing sawmill.
- As noted above Stena Line Ltd., ferry operators at Stranraer (to Belfast/Larne) intend to move their ferry terminal at Stranraer to Cairnryan (anticipated date 2008).
- PPC applications have been received for existing milk processing premises at The Creamery, Stranraer, The Creamery, Kirkcudbright and The Cheese Company, Lockerbie.
- A waste-composting plant is to be provided at the existing landfill site for municipal waste at Galdenoch near Stranraer. PPC applications are currently lodged for Galdenoch and 2 other existing landfill sites at Aucheninnes, Dalbeattie, (municipal waste) and at Barncrosh, Dalbeattie (privately-operated) all of which have waste management licences at the moment.
- Works are expected to commence shortly on a new opencast coal site at Glenmucklock near Kirkconnel.
- Planning consent has been granted for an existing quarry/lorry park (the land after excavation is to be used as a lorry park) at Beattock and for a proposed new quarry at Nether Murthat, Moffat.
- A new Tesco superstore and petrol station have opened at Cuckoo Bridge on the outskirts of Dumfries.
- Applications for permits in respect of existing transitional industrial processes have been received by SEPA as part of the required transfer to the PPC regime and this has enabled re-assessment of the impact on local air quality of these processes for example, Dundas Chemical Co (Mosspark) Ltd., an animal remains incinerator situated just outside the eastern boundary of Dumfries.

5. References

- ¹ (a) Dumfries and Galloway Air Quality Review - Cordah/DUM.001/1999
 - (b) Supplementary Air Quality Report - First-Stage Review and Assessment - Cordah/DUM.003/2000
 - (c) Ambient Air Quality Monitoring Programme for 1,3 butadiene - BMT Cordah/DUM.005/2001
 - (d) Review of 1,3 butadiene data - Clyde Analytical Ref 37743R/DUM&GAL.SAM (2002)
- ² Dumfries and Galloway Council - Local Air Quality Management - Updating and Screening Assessment Casella Stanger Ref. CS/AQ/141160102/CW July 2003
- ³ Department for Environment, Food and Rural Affairs (DEFRA) - Part IV of the Environment Act 1995 - Local Air Quality Management Technical Guidance - LAQM.TG(03) 2003.
- ⁴ Detailed Assessment of Sulphur Dioxide at Cairnryan - Ambient sulphur dioxide monitoring at Cairnryan village hall. (January 2004 to December 2004) (UPR SE/013/04) March 2005 by J Green, D Gardiner and I S McCrae TRL Ltd.

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Air Quality Objectives

Substance	Air Quality Objective	Prescribed date
Benzene	$\leq 16.25 \mu\text{g}/\text{m}^3$ <i>(when expressed as a running annual mean)</i>	31 st December 2003
	$\leq 3.25 \mu\text{g}/\text{m}^3$ <i>(when expressed as a running annual mean)</i>	31 st December 2010
1,3 butadiene	$\leq 2.25 \mu\text{g}/\text{m}^3$ <i>(when expressed as a running annual mean)</i>	31 st December 2003
Carbon monoxide	$\leq 10 \text{mg}/\text{m}^3$ <i>(when expressed as a running 8-hour mean)</i>	31 st December 2003
Lead	$\leq 0.5 \mu\text{g}/\text{m}^3$ <i>(when expressed as an annual mean)</i>	31 st December 2004
	$\leq 0.25 \mu\text{g}/\text{m}^3$ <i>(when expressed as an annual mean)</i>	31 st December 2008
Nitrogen dioxide	$\leq 200 \mu\text{g}/\text{m}^3$ <i>(when expressed as an hourly mean)</i> <i>(not to be exceeded more than 18 times a year)</i>	31 st December 2005
	$\leq 40 \mu\text{g}/\text{m}^3$ <i>(when expressed as an annual mean)</i>	31 st December 2005
Particles (PM ₁₀)	$\leq 50 \mu\text{g}/\text{m}^3$ <i>(when expressed as a 24-hour mean)</i> <i>(not to be exceeded more than 35 times a year)</i>	31 st December 2004
	$\leq 50 \mu\text{g}/\text{m}^3$ <i>(when expressed as a 24-hour mean)</i> <i>not to be exceeded more than 7 times a year</i>	31 st December 2010
	$\leq 40 \mu\text{g}/\text{m}^3$ <i>(when expressed as an annual mean)</i>	31 st December 2004
	$\leq 18 \mu\text{g}/\text{m}^3$ <i>(when expressed as an annual mean)</i>	31 st December 2010
Sulphur dioxide	$\leq 350 \mu\text{g}/\text{m}^3$ <i>(when expressed as an hourly mean)</i> <i>(not to be exceeded more than 24 times a year)</i>	31 st December 2004
	$\leq 125 \mu\text{g}/\text{m}^3$ <i>(when expressed as a 24-hour mean)</i> <i>(not to be exceeded more than 3 times a year)</i>	31 st December 2004
	$\leq 266 \mu\text{g}/\text{m}^3$ <i>(when expressed as a 15-minute mean)</i> <i>(not to be exceeded more than 35 times a year)</i>	31 st December 2005

$\mu\text{g}/\text{m}^3$ microgrammes per cubic metre

mg/m^3 milligrammes per cubic metre

\leq - less than or equal to

Further Details of NO₂ Diffusion Tube Locations

Location of tube		Grid Reference	Type	Distance from edge of kerb (m)	Width of pavement (m)	Height of tube (m)
M74 Slip Rd	Lockerbie	NY133814	Intermediate	1.930	on grass	2.600
Buccleuch St. (E)	Dumfries	NX970762	Roadside	4.290	4.000	2.171
Buccleuch St. (W)	Dumfries	NX969762	Kerbside	1.000	2.640	2.700
Loreburn St.	Dumfries	NX974762	Kerbside	1.000	2.800	2.800
St. Michael St.	Dumfries	NX975756	Roadside	3.120	2.290	2.970
Argyll Drive	Dumfries	NX994788	Background	1.730	1.730	2.780
Charlotte St.	Stranraer	NX061608	Kerbside	0.500	2.570	2.620
Port Rodie Car Park	Stranraer	NX063610	Other	N/A	N/A	2.600
A77 Cairnryan	Stranraer	NX073674	Roadside	1.950	1.900	2.900

Notes

M74 Slip Rd., Lockerbie

Nearest houses are approximately 32m from the tube location. Tube location is approximately 100m from the M74.

Buccleuch St., East (E) & West (W), Dumfries

Both triplicate sets of tubes are on same side of street about 100m apart. Tubes at Buccleuch St (E) have been collocated with an automatic monitor since March 2003. Nearest houses are on Buccleuch Street approximately 100m to the west of tube location (W). The houses are located approximately 3.25m from the edge of the kerb at the junction of Buccleuch Street and Whitesands. Buccleuch Street is a shopping street close to the pedestrianised town centre.

Loreburn St., Dumfries

One-way street close to town centre. The nearest houses are situated on the first and second floors above a public house at Loreburn St. The facade of this building is 2.8m from the edge of the kerb.

Argyll Drive, Heathhall, Dumfries

Formerly used for sulphur dioxide diffusion tube location. In a residential area in the vicinity of rubber factories at Heathhall. Urban background for NO₂ monitoring purposes.

St. Michael St., Dumfries

At busy intersection, nearest houses are on opposite side of St Michaels Bridge Road.

Charlotte St., Stranraer

Busy shopping street - one-way traffic. Nearest houses are on opposite side of street on first floor above shops. Sunbathers in summer lie on grassy area just off pavement at the tube location.

Port Rodie Car Park

Car park for Stena Line ferry to Belfast/Larne.

A77 Cairnryan

On A77 at entrance to P&O ferry terminal to Larne.

Appendix 3 Collocation Study at Buccleuch Street Dumfries (Commenced March 2003)

Date	Average (continuous) ($\mu\text{g}/\text{m}^3$)	Data capture %	Average Diffusion Tube ($\mu\text{g}/\text{m}^3$)	Ratio:- continuous/ diffusion tube result
2003				
March	43.0 (R)	98.95	43.3	0.993
April	37.4 (R)	98.81	39.0	0.959
May	31.5 (R)	98.81	28.0	1.125
June	28.6 (R)	99.26	31.7	0.902
July	27.9 (R)	94.52	25.0	1.116
August	36.6 (R)	92.75	32.0	1.144
September	36.7 (R)	99.56	34.0	1.079
October	39.8 (R)	99.52	38.0	1.047
November	40.1 (R)	99.70	34.7	1.156
December	46.4 (R)	98.97	36.7	1.264
2004				
January	38.7 (R)	99.17	31.7	1.221
February	48.8 (R)	96.40	43.7	1.117
March	37.4 (R)	99.26	33.3	1.123
April	34.2 (R)	99.52	38.7	0.884
May	37.2 (R)	96.13	42.0	0.886
June	31.5 (R)	99.55	33.3	0.946
July	33.1 (R)	99.23	34.0	0.974
August	35.2 (R)	95.49	41.3	0.852
September	28.7 (R)	95.54	30.0	0.957
October	37.9 (R)	95.47	39.3	0.964
November	45.3 (R)	95.52	47.3	0.958
December	37.2 (R)	95.16	40.3	0.923
2005				
January	35.0 (P)	88.4	42.3	0.827
February	42.9 (P)	99.7	43.0	0.998
March	39.9 (P)	98.8	43.3	0.921
10-month average Mar 03-Dec 03 Ratified data	36.8	98.1	34.24	*1.075
12-month average Jan 04-Dec 04	37.10	97.2	37.91	*0.978

P = provisional data

R = ratified data

2003 diffusion tube bias = (diffusion tube mean minus continuous mean)/continuous mean = $34.24 - 36.8 / 36.8 = -0.07$ ie tubes under-read by 7%

2004 diffusion tube bias = $37.91 - 37.1 / 37.1 = 0.02$ ie tubes over-read by 2%

* NETCEN's trial bias adjustment spreadsheet calculates the bias adjustment factors as

1.089 ± 0.075 for 2003 and

0.988 ± 0.075 for 2004.

Diffusion Tube Location Maps

Appendix 4

Buccleuch St East (also AURN site) and West + Loreburn St, Dumfries



St Michael St Dumfries



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Diffusion Tube Location Maps (Continued)
Argyll Drive, Heathhall, Dumfries

Appendix 4



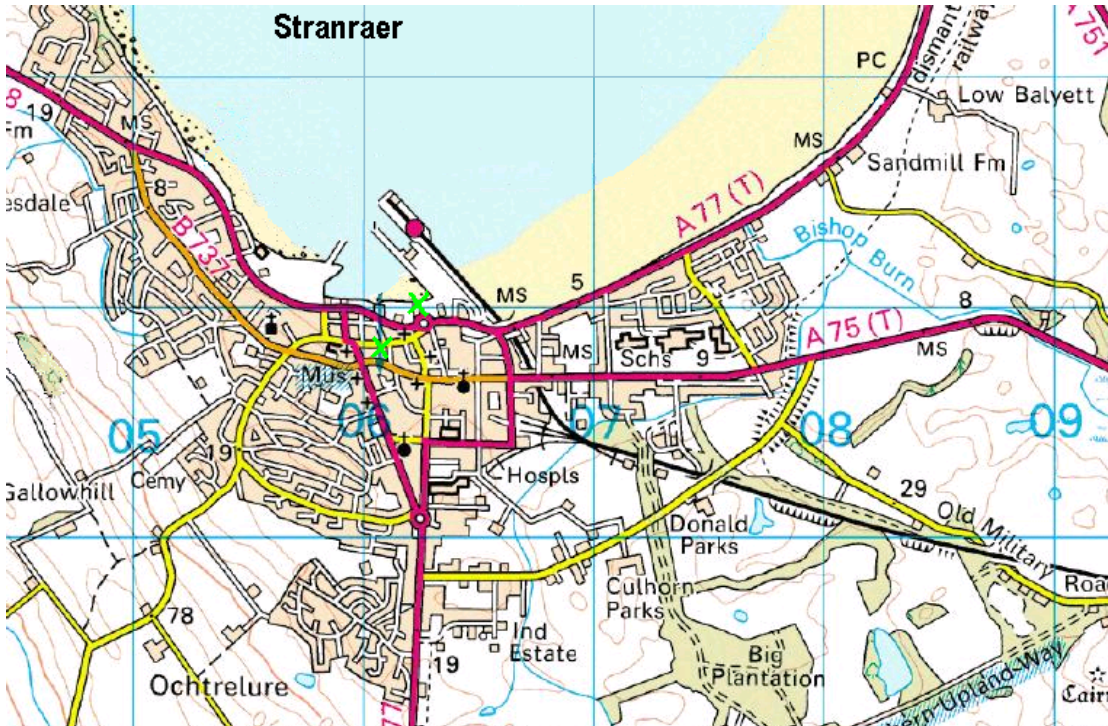
M74 Lockerbie



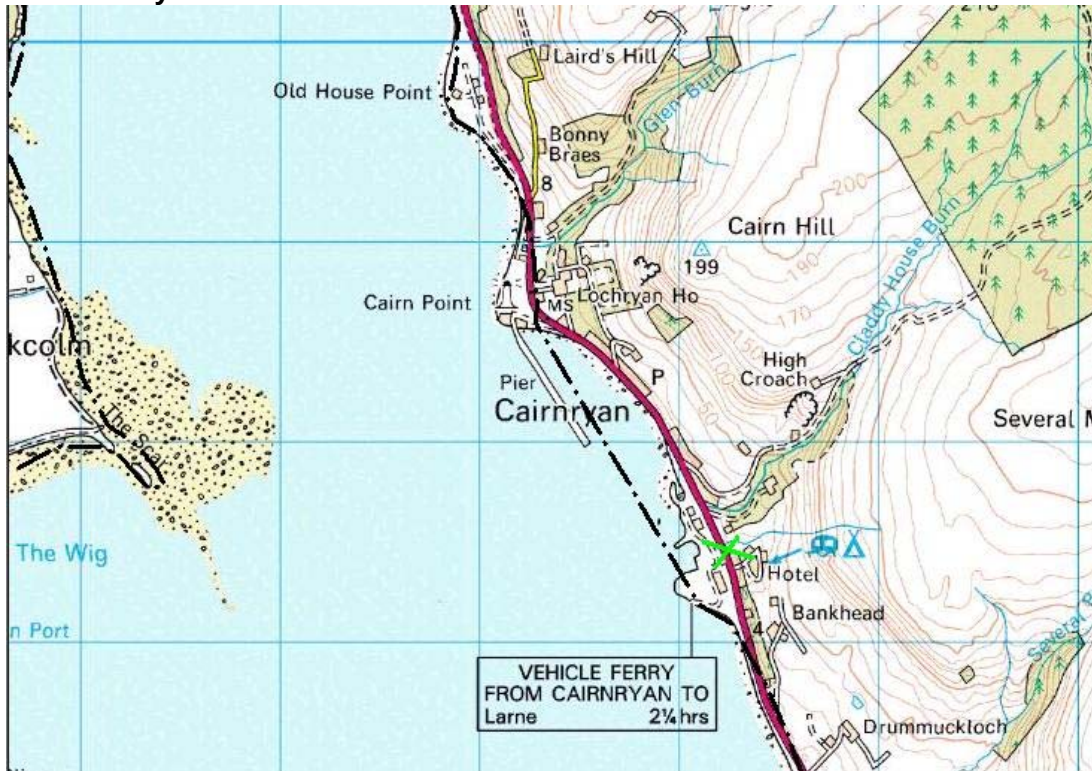
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Diffusion Tube Location Maps (Continued)

Port Rodie Car Park & Charlotte St Stranraer



A77 Cairnryan

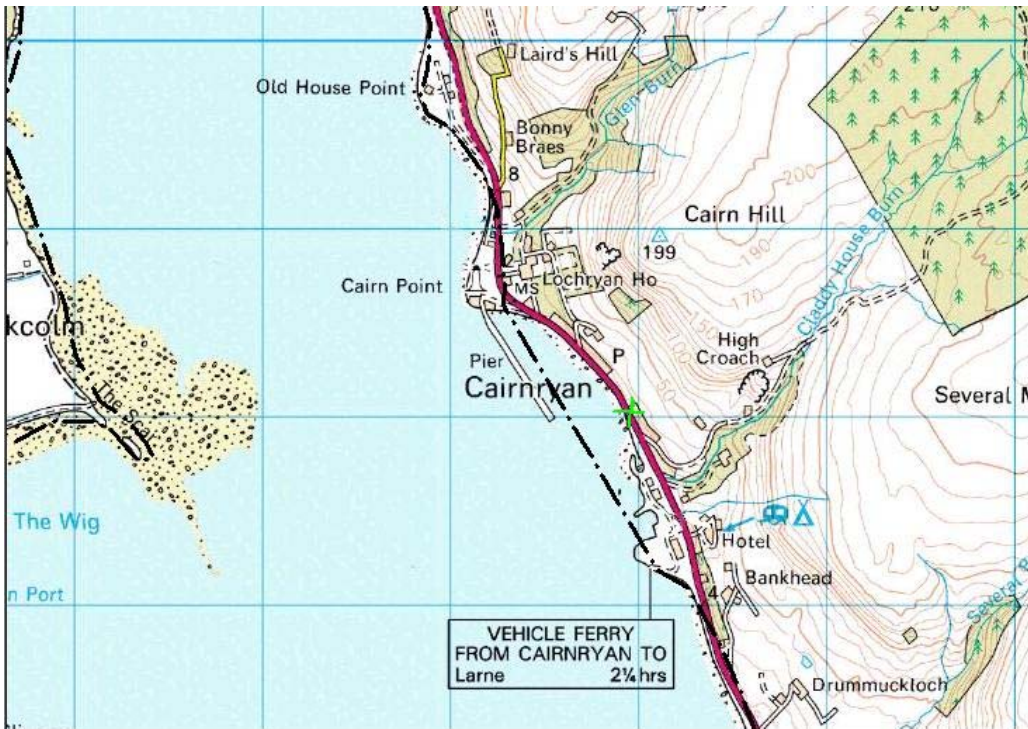


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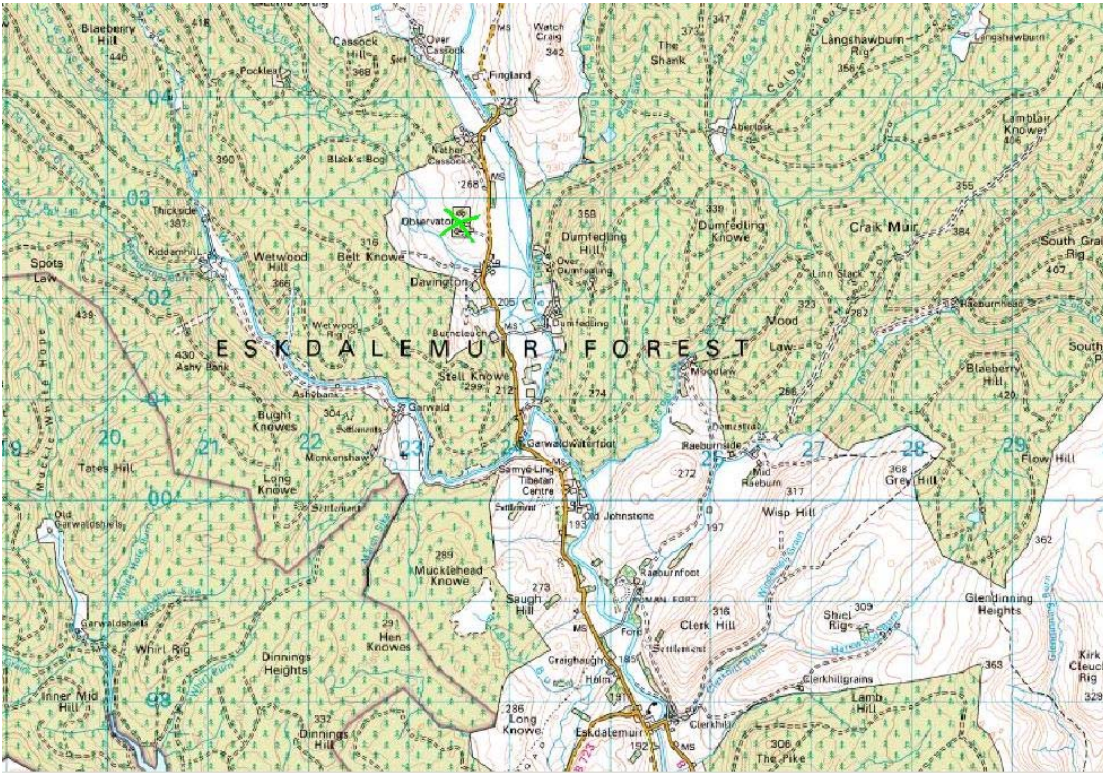
PM₁₀ Osiris Monitor Location Maps

Appendix 5



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NO₂ Automatic Monitor Location at Eskdalemuir



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