

2015 Air Quality Updating and
Screening Assessment
for
Dumfries and Galloway Council

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

May 2016

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Summary

This report comprises Dumfries and Galloway Council's fifth updating and screening assessment (USA) of air quality within the Council's area. Any new or changed sources of potential air pollution which may give rise to a risk of an exceedance of an air quality objective have been considered. Results of NO₂ monitoring within the Council's area are also presented and evaluated in relation to the objectives.

Previous air quality assessments have concluded that concentrations of carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide and nitrogen dioxide are all unlikely to exceed the objectives.

Recent monitoring results for NO₂ have not identified any new requirement to proceed to a detailed assessment with concentrations all below the objectives.

Previous monitoring for PM₁₀ at a worst-case junction in Dumfries showed that no air quality management areas were required to be designated for PM₁₀ in Dumfries. PM₁₀ monitoring is currently being carried out at Cairnryan in view of a perceived increase in traffic levels following the re-location of the Stena Line port from Stranraer to Old House Point, Cairnryan. An Osiris PM₁₀ monitor is being used with a view to establishing whether it will be necessary to proceed to a detailed assessment.

To date no air quality management areas have been designated within the Council-area.

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1. Introduction

1.1 Description of Local Authority Area.

Dumfries and Galloway is located in south-west Scotland. To the north, the region shares borders with South Ayrshire, East Ayrshire and South Lanarkshire; to the east with Scottish Borders; and to the south with the county of Cumbria. Lying to the north of the Solway Firth and to the east of the Irish Sea, Dumfries and Galloway occupies a land area of approximately 6,439 km², making it the third largest of Scotland's 32 local authorities. Its population of approximately 147,284 is projected to fall to around 146,000 over the next 10 years. The largest town is Dumfries (31,600), followed by Stranraer (10,800) and Annan (8,300), with other settlements having populations of 4,500 or fewer. The economy of the region is based primarily on agriculture and forestry with light industry and tourism making significant contributions. Some 30% of Scotland's dairy cattle come from Dumfries and Galloway, and textiles, engineering and food processing are important industries in towns such as Dumfries, Kirkcudbright, Wigtown, Newton Stewart, New Galloway, Moffat, Lockerbie, Annan, Castle Douglas and Dalbeattie. The ferry ports at Cairnryan provide links to Belfast and Larne via Loch Ryan and the Irish Sea.

1.2 Purpose of report.

This report fulfils the requirements of the local air quality management (LAQM) process as set out in Part IV of the Environment Act 1995ⁱ, 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 designate as an air quality management area the part or parts of its area in which it appears likely that exceedences will occur and prepare an air quality action plan setting out the measures it intends to put in place in pursuit of the objectives.

The purpose of an updating and screening assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and to determine whether there is a need for a detailed assessment to be carried out. The report should provide an update of any outstanding information from previous review and assessment reports.

1.3 Air quality objectives.

The air quality objectives applicable to local air quality management in Scotland are set out in the Air Quality (Scotland) Regulations 2000ⁱⁱ (Scottish Statutory Instrument No. 97) and the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish Statutory Instrument No. 297). Table 1 shows the objectives in units of microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$) apart from the carbon monoxide objective which is expressed in milligrammes per cubic metre (mg/m^3) with the number of exceedences in each year that are permitted (where applicable). (The air quality objectives for other parts of the UK can be found in the Government's Air Quality Strategy for England, Scotland, Wales and Northern Irelandⁱⁱⁱ).

^{i,ii,iii} See references on page 26

Table 1 Air quality objectives prescribed 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 µg/m ³ (or less)	Running annual mean	31/12/2003
	3.25 µg/m ³ (or less)	Running annual mean	31/12/2010
1,3-butadiene	2.25 µg/m ³ (or less)	Running annual mean	31/12/2003
Carbon monoxide	10.0 mg/m ³ (or less)	Running 8-hour mean	31/12/2003
Lead	0.5 µg/m ³ (or less)	Annual mean	31/12/2004
	0.25 µg/m ³ (or less)	Annual mean	31/12/2008
Nitrogen dioxide	200 µg/m ³ (or less) not to be exceeded more than 18 times a year	1-hour mean	31/12/2005
	40 µg/m ³ (or less)	Annual mean	31/12/2005
Particles (PM ₁₀)	50 µg/m ³ (or less) not to be exceeded more than 7 times a year	24-hour mean	31/12/2010
	18 µg/m ³ (or less)	Annual mean	31/12/2010
Sulphur dioxide	350 µg/m ³ (or less) not to be exceeded more than 24 times a year	1-hour mean	31/12/2004
	125 µg/m ³ (or less) not to be exceeded more than 3 times a year	24-hour mean	31/12/2004
	266 µg/m ³ (or less) not to be exceeded more than 35 times a year	15-minute mean	31/12/2005

- 1.4 Summary of previous review and assessments^{iv} (see page 9 for summary in brief)
- 1.4.1 The findings of the first review and assessment of air quality in Dumfries and Galloway (commenced in 1998) were that the air quality objectives were likely to be met. As a consequence no air quality management areas were declared (which is still the position to date).
- 1.4.2 In 2003 an updating and screening assessment was carried out, the results of which generally supported the conclusions of the first round. However, in line with the Department for Environment, Food and Rural Affairs' (DEFRA's) revised technical guidance (2003), it was found that a detailed assessment of sulphur dioxide (SO₂) levels at the ferry ports of Stranraer and Cairnryan would be required.
- 1.4.3 In 2004 a detailed assessment 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. With regard to the detailed assessment at Stranraer this was initially put on hold pending Stena Line's proposed re-location to Cairnryan but subsequent to DEFRA's amendment of their technical guidance (2006) which relaxed the screening criteria for SO₂ related to shipping it was found that a detailed assessment for SO₂ at Stranraer was no longer required.
- 1.4.4 In 2005 monitoring results detailed in a progress report indicated that there was no requirement to proceed to a detailed assessment for any of the relevant pollutants.
- 1.4.5 In 2006 the conclusions of an updating and screening assessment were that the relevant air quality objectives would be met and that consequently there was no requirement to undertake a detailed assessment. Three road junctions in Dumfries were however predicted to marginally exceed the 2010 annual mean PM₁₀ objective.
- 1.4.6 Monitoring results detailed in the 2007 progress report showed that the current air quality objectives for the relevant pollutants were being met. Projected PM₁₀ levels at the monitoring site at Buccleuch Street, Dumfries indicated that the 2010 annual mean PM₁₀ objective would not be met but there was no relevant exposure at this roadside site. With regard to the marginal exceedences of the PM₁₀ annual mean predicted at three road junctions in the 2006 updating and screening assessment, traffic flows would be checked at the relevant areas to see if they were in line with estimated levels.
- 1.4.7 The main findings of the 2008 progress report were that whilst the air quality objectives in force at the time were being met, PM₁₀ levels at Buccleuch Street, Dumfries were again predicted to exceed the 2010 PM₁₀ annual mean objective and after a re-assessment of relevant exposure it was decided that a detailed assessment for PM₁₀ should be carried out to include Buccleuch St., Dumfries and the three road junctions in Dumfries which had previously been predicted to marginally exceed the 2010 PM₁₀ annual mean objective.
- 1.4.8 A detailed assessment for PM₁₀ was commenced in 2008 covering Buccleuch Street, and the junctions of Brooms Road/Annan Road, Glasgow Street/Galloway Street and Whitesands/Buccleuch Street, all in Dumfries. Concentrations of PM₁₀ were modelled for 2010 using the ADMS roads dispersion model. Projections of measured PM₁₀ concentrations did not identify an exceedence at the site of the Buccleuch Street PM₁₀ monitor itself; however exceedences of the 2010 annual mean objective were predicted at all three junctions and exceedence of the 2010 PM₁₀ 24-hour mean objective was predicted at one junction (Whitesands/Buccleuch Street). It had been intended to carry out PM₁₀ monitoring at these junctions to supplement this assessment. PM₁₀ monitoring at the Buccleuch St./Whitesands junction was commenced on 10/08/10.

- 1.4.9 In 2009 an updating and screening assessment was carried out having regard to DEFRA's further revision of their technical guidance TG(09)^v published in February 2009. The results of monitoring together with the evaluation of new and changed sources to identify those that might give rise to a risk of an exceedence of an air quality objective did not identify any new requirement to proceed to a detailed assessment. A previous commitment to carry out a detailed assessment of PM₁₀ at Cairnryan in the event that Stena Line re-located from Stranraer to Cairnryan was reiterated.
- 1.4.10 A progress report in 2010 found that NO₂ levels monitored during the previous year met the relevant objectives. PM₁₀ monitoring at the junction of Whitesands and Buccleuch Street had commenced but no new PM₁₀ data were reported as the BAM monitor had only recently been set up. No new requirement to proceed to a detailed assessment was identified as a result of monitoring or new developments.
- 1.4.11 A report, dated 24/08/11, supplementary to the PM₁₀ detailed assessment carried out in 2008/09, gave details of the results of PM₁₀ monitoring which took place over a period of six months at the junction of Buccleuch Street and Whitesands, Dumfries using a BAM monitor. The results when annualised for 2010 showed an annual mean of 15.75 µg/m³ and no exceedences of the 24-hour mean. Originally it had been intended to monitor at three junctions but as the modelling had indicated a higher annual mean and more exceedences of the 24-hour mean at the Buccleuch Street/Whitesands road junction than at the other two junctions (i.e. it was the worst case) it was concluded in the report that the objectives were also being met at the other two junctions and that there was no need to designate any air quality management areas.
- 1.4.12 The progress report submitted in November 2011 concluded that the objectives for NO₂ were being met, that there was no requirement for a detailed assessment for NO₂ and that monitoring at the junction of Whitesands and Buccleuch Street, Dumfries met the objectives for PM₁₀ therefore no air quality management areas were required.
- 1.4.13 The 2012 updating and screening assessment showed that the results of NO₂ monitoring together with the evaluation of new and changed sources to identify those that might give rise to a risk of an exceedence of an air quality objective did not identify any new requirement to proceed to a detailed assessment for any pollutant.
- 1.4.14 The conclusions of the 2013 progress report were that the objectives for NO₂ were being met and that no new requirement to proceed to a detailed assessment for any of the relevant pollutants had been identified as a result of new local developments. A previously planned detailed assessment for PM₁₀ at Cairnryan had been postponed pending completion of further developments at the Stena Line Port at Old House Point.
- 1.4.15 Similarly the 2014 progress report findings were that the objectives for NO₂ were being met and that no new requirement to proceed to a detailed assessment for any of the relevant pollutants had been identified as a result of new local developments. It was reported that screening monitoring for PM₁₀ would be carried out at Cairnryan with a view to establishing whether it would be appropriate to proceed to a detailed assessment.

Table 2 Brief summary of previous review and assessments.

Report	Date	Outcome
First-stage Review and Assessment	10/03/99	Air quality objectives were assessed as likely to be met. No requirement to proceed to a full stage 2 or 3 for any pollutant.
Supplementary Air Quality Report	15/02/01	
Supplementary Air Quality Report No.2	04/10/01	
(First) Updating and Screening Assessment 2003	01/07/03	Detailed assessment required for SO ₂ (To assess the impacts of shipping at Cairnryan)
Detailed Assessment for SO ₂ at Cairnryan 2004	21/04/05	Air quality management area not required.
Progress Report 2005	01/06/05	No detailed assessment required.
(Second) Updating and Screening Assessment 2006	31/05/06	No detailed assessment required.
Progress Report 2007	20/06/07	No detailed assessment required.
Progress Report 2008	30/04/08	Detailed assessment required for PM ₁₀ . (To assess traffic impacts in areas of Dumfries)
Detailed Assessment for PM ₁₀ .	20/07/09	Exceedences of PM ₁₀ objectives modelled at three road junctions in Dumfries. Additional monitoring proposed to supplement the Detailed Assessment.
(Third) Updating and Screening Assessment 2009	03/09/09	No (new) detailed assessment required.
Progress Report 2010	08/11/10	No detailed assessment required.
Progress Report 2011	23/11/11	No detailed assessment required.
Supplement to Detailed Assessment for PM ₁₀ .	24/08/11	Air quality management area(s) not required.
(Fourth) Updating and Screening Assessment 2012	24/05/13	No detailed assessment required.
Progress Report 2013	24/05/13	No detailed assessment required.
Progress Report 2014	26/06/15	No detailed assessment required.

2. New monitoring data

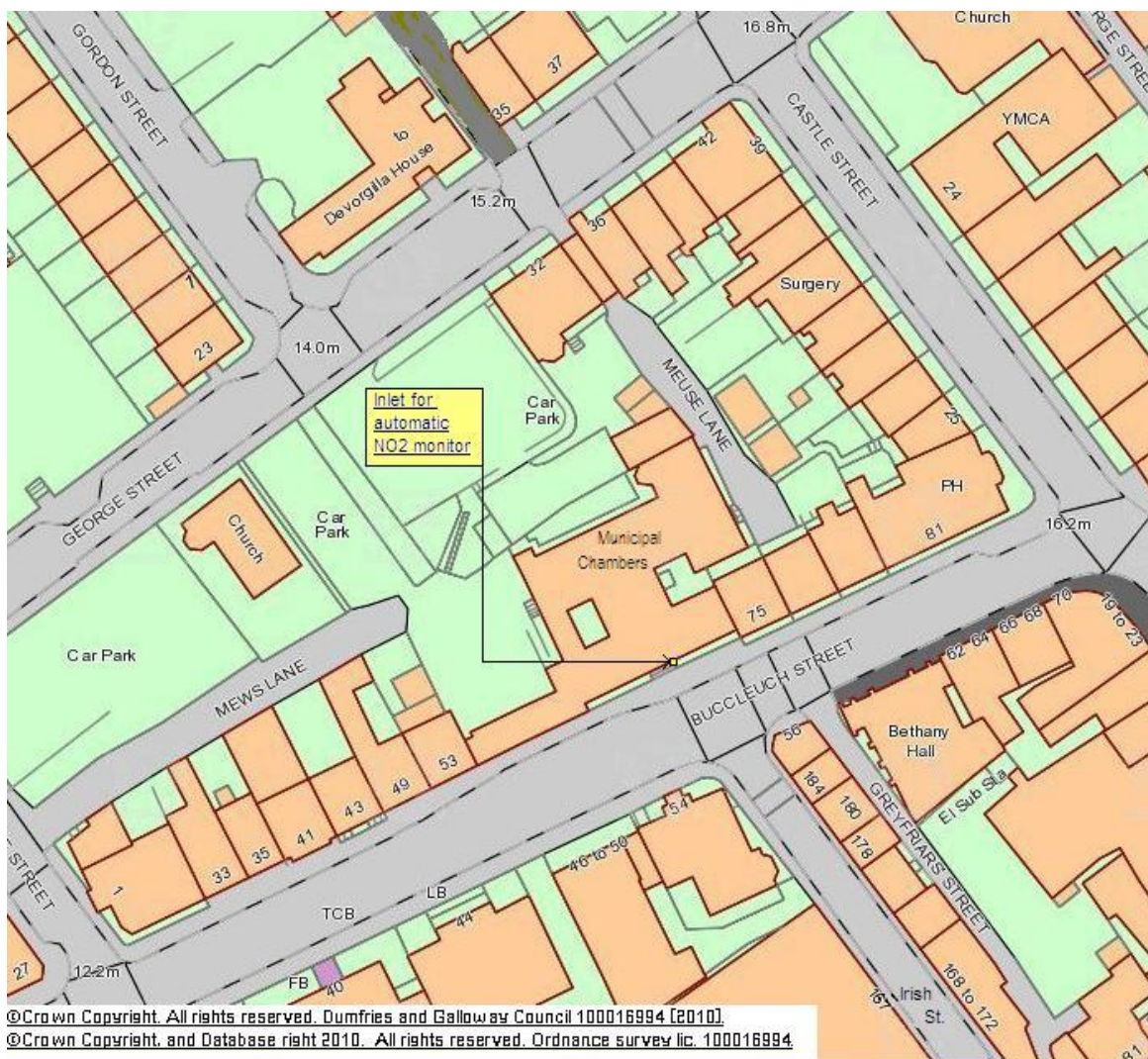
2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

2.1.1.1 Dumfries NO₂

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 Quality Monitoring Network (AURN). Routine calibrations of the automatic monitor are carried out fortnightly by Council staff, with six-monthly audits carried out by AEA Energy and Environment. Ratification is carried out by the Quality Assurance and Control (QA/QC) Unit at AEA Energy & Environment.

Figure 1 - Map of NO₂ automatic monitoring site at Buccleuch St., Dumfries.



The air intake for the monitor is situated at a height of approximately 2.2 metres in the supporting framework of one of two decorative lamps on either side of the Municipal Chambers entrance. The air-intake tube goes through a window to the monitor which is located in the basement of the building.

2.1.1.2 Eskdalemuir NO₂

Since December 2004 a continuous NO₂ monitor has been located at the Observatory at Eskdalemuir as part of the AURN. The Observatory^{vi} is currently managed by the British Geological Society and the Met Office. Ratification is carried out by the QA/QC unit at AEA.

Figure 2 - Map of NO₂ automatic monitoring site at Eskdalemuir Observatory.

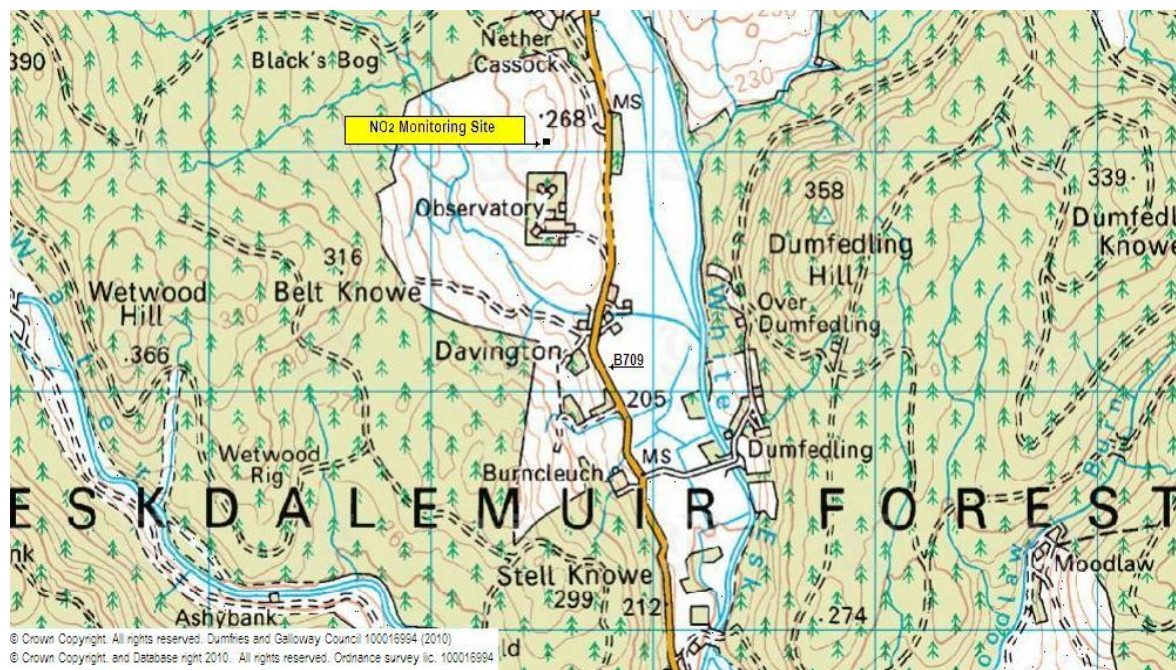


Table 3 Details of automatic monitoring sites.

Site Name	Site Type	Grid Ref.	Pollutant	Monitoring Technique	Within AQMA?	Relevant Exposure?	Distance to kerb (metres)	Worst-case Exposure?
Buckleuch Street Dumfries	Roadside	297025 576259	NO ₂	Chemi-luminescence	No	Yes	4.3	Yes
Eskdalemuir	Rural	323551 603022	NO ₂	Chemi-luminescence	No	No	n/a	n/a

2.1.2 Non-automatic monitoring.

Maps of non-automatic sites (diffusion tube locations) are shown in Appendix 2 Figures 8 to 16.

NO₂ diffusion tubes are currently deployed for monthly exposure periods at the twelve sites shown in Table 4. Triplicate tubes are used at two sites namely at Buccleuch Street (East), and Buccleuch Street Bridge, with duplicate tubes at Buccleuch Street (West), while the rest of the sites have single tubes.

From January 2014 three new single-tube locations have been established (as highlighted in Table 4). Two of the new sites namely, Castle Break, Ecclefechan and Gretna Loaning, Gretna have been set up due to their proximity to the M74 whereas a new site at a busy road junction at Nithbank Dumfries has been established following receipt of complaints about traffic/pollution in this area.

The diffusion tubes were prepared and analysed by Environmental Scientifics Group using 50% triethanolamine (TEA) in acetone. Environmental Scientifics Group demonstrated good performance for 2014 in the Workplace Analysis Scheme for Proficiency (WASP) (an independent analytical performance-testing scheme).

The triplicate tubes at Buccleuch St., (East) are co-located with the NO₂ automatic monitor. The local bias-adjustment factor was 0.86 whereas the national bias-adjustment factor for 2014 was 0.81 (version no.6-15) derived by amalgamation of 30 studies including Dumfries and Galloway's. Further details of the local co-location study are provided in Appendix 1.

Sites discontinued at the end of 2013 are shown in Table 5. The Port Rodie Car Park tube has been discontinued as the car park is no longer used by ferry traffic following the re-location of the Stena Line Port from Stranraer to Cairnryan. The sites at Loreburn Street and Nith Place, both one-way streets in Dumfries, have also been discontinued following a rationalisation of sites.

Table 4 Details of current NO₂ diffusion tube sites.
(see maps at appendix 2)

Site Name	Site Type	OS Grid Ref	Height of tube(s) (m)	Number of tubes	Within AQMA?	Relevant Exposure?	Distance to kerb of nearest road (metres)	Worst-case Location?
M74 Slip Road. Lockerbie	Intermediate	313345 581416	2.6	single	No	No (32m)	1.9	Yes
Buccleuch St. (E) Dumfries	Roadside	297025 576259	2.2	triplicate (co-located with automatic monitor)	No	Yes (<1m)	4.3	Yes
Buccleuch St. (W) Dumfries	Kerbside	296949 576218	2.9	duplicate	No	Yes (<1m)	1.0	No
Buccleuch St. (S) Dumfries	Kerbside	296978 576219	2.9	single	No	Yes (<1m)	0.6	No
Buccleuch St. Bridge Dumfries	Roadside	296868 576182	3.0	triplicate	No	Yes (<1m)	5.0	Yes
St. Michael St. Dumfries	Roadside	297457 575692	2.9	single	No	Yes (<1m)	3.1	No
Argyll Drive Dumfries	Background	299378 578847	2.8	single	No	Yes (1m)	1.7	No
Charlotte St. Stranraer	Roadside	206085 560859	2.2	single	No	Yes (<1m)	4.0	No
A77 Cairnryan	Roadside	207216 567422	2.4	single	No	No (19m)	2.0	Yes
Nithbank Dumfries	Roadside <i>(new from 01/01/14)</i>	297712 575254	2.6	single	No	Yes (<1m)	1.7	Yes
Castle Break Ecclefechan	Roadside <i>(new from 01/01/14)</i>	319272 575029	2.6	single	No	Yes (1m)	1.5	Yes
Gretna Loaning Gretna	Roadside <i>(new from 01/01/14)</i>	332110 568264	2.6	single	No	Yes (1m)	1.4	Yes

Table 5 Details of NO₂ diffusion tube sites discontinued at the end of 2013.

Site Name	Site Type	OS Grid Ref	Height of tube(s) (m)	Number of tubes	Within AQMA?	Relevant Exposure?	Distance to kerb of nearest road (metres)	Worst-case Location?
Loreburn St. Dumfries	Kerbside <i>(discontinued from 01/01/14)</i>	297349 576188	2.8	single	No	Yes (<1m)	1.0	N/A
Nith Place Dumfries	Kerbside <i>(discontinued from 01/01/14)</i>	297280 575804	2.9	single	No	Yes (<1m)	0.7	N/A
Port Rodie Car Park Stranraer	Other <i>(discontinued from 01/01/14)</i>	206268 561020	2.6	single	No	No (160m)	N/A	N/A

2.2 Comparison of monitoring results with air quality objectives.

2.2.1 Nitrogen Dioxide

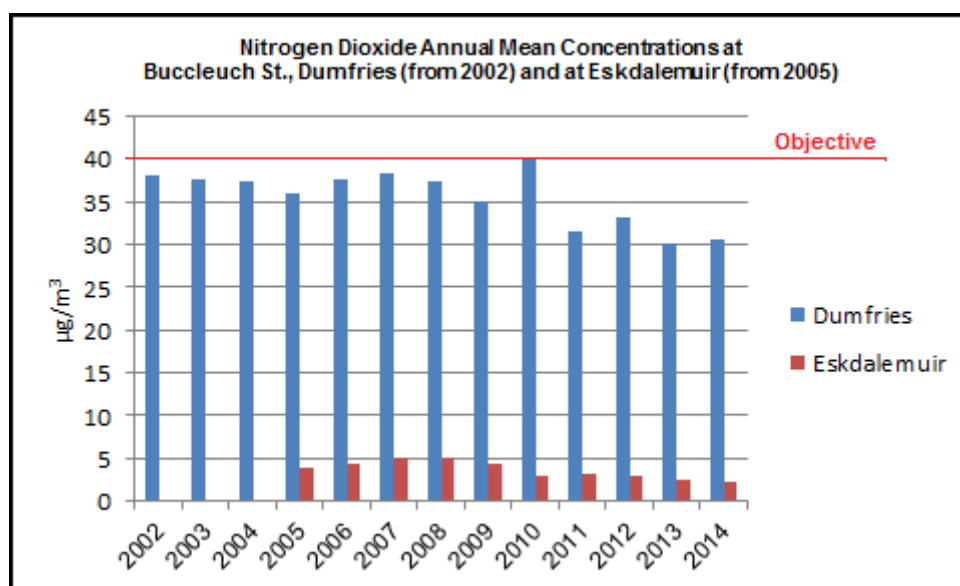
2.2.1.1 Automatic monitoring data.

All NO₂ results from automatic monitoring meet the relevant objectives.

Table 6 Results of automatic monitoring for NO₂ - comparison with annual mean objective (40µg/m³ or less).

Location	Within AQMA?	Data capture for full calendar year 2014 %	Annual mean concentrations (µg/m ³)												
			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Buccleuch St Dumfries (Roadside site)	No	98-87	38.0	37.6	37.3	35.9	37.5	38.3	37.3	35.0	39.9	31.5	33.1	30.2	30.5
Eskdalemuir (Rural site)	No	98-89	n/a	n/a	n/a	3.8	4.3	5.0	5.1	4.3	3.0	3.2	3.0	2.5	2.3

Figure 3 Trends in annual mean NO₂ concentrations at automatic monitoring sites at Dumfries and at Eskdalemuir.



The above chart shows that annual mean concentrations at the roadside site at Buccleuch Street, Dumfries have fallen significantly below the annual mean objective since 2010. The concentrations at Eskdalemuir remain well below the objective reflecting the site's rural background status.

Table 7 Results of automatic monitoring for nitrogen dioxide - comparison with 1-hour mean objective ($200\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times).

Location	Within AQMA?	Data capture for full calendar year 2014 %	Number of hourly means > $200\mu\text{g}/\text{m}^3$												
			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Buccleuch St Dumfries (Roadside site)	No	98.87	0	2	0	1	0	5	4	0	3	2	0	1	1
Eskdalemuir (Rural site)	No	98.89	n/a	n/a	n/a	0	0	0	0	0	0	0	0	0	0

As can be seen, an hourly mean greater than $200\mu\text{g}/\text{m}^3$ has only been recorded a few times at Dumfries over the years and not at all at Eskdalemuir (since automatic monitoring commenced respectively in 2001 and 2004).

2.2.1.2 NO₂ diffusion tube monitoring data.

All bias-corrected NO₂ results from diffusion tube monitoring meet the annual mean objective of 40µg/m³ or less.

Table 8 Annual mean results of nitrogen dioxide diffusion tubes in 2014.

Location	Site Type	Within AQMA	No. of tubes or co-located	Data Capture %	Distance Corrected (Y/N)	Annual mean concentration (bias adjustment factor = 0.86)
						2014 (µg/m ³)
M74 Slip Rd. Lockerbie	Intermediate	No	single	100	No	27.4
Buccleuch St. (E) Dumfries	Roadside	No	Triplicate & co-located with automatic monitor	100	No	30.4
Buccleuch St. (W) Dumfries	Kerbside	No	duplicate	91.7	No	28.6
Buccleuch St. (S) Dumfries	Kerbside	No	single	91.7	No	30.9
Buccleuch St. Bridge Dumfries	Roadside	No	triplicate	97.2	No	26.8
St. Michael St. Dumfries	Roadside	No	single	100	No	20.8
Argyll Drive Dumfries	Background	No	single	100	No	9.2
Nithbank Dumfries	Roadside	No	single	100	No	24.5
Charlotte St. Stranraer	Roadside	No	single	83.3	No	17.6
A77 Cairnryan	Roadside	No	single	100	No	21.5
Castle Break Ecclefechan	Roadside	No	single	100	No	14.4
Gretna Loaning Gretna	Roadside	No	single	100	No	17.9

Table 9 Annual mean results of nitrogen dioxide diffusion tubes 2009 to 2014.

Location		Within AQMA?	Annual mean concentrations (microgrammes per cubic metre)					
			2009 (bias adjusted x 0.83)	2010 (bias adjusted x 0.92)	2011 (bias adjusted x 0.83)	2012 (bias adjusted x 0.88)	2013 (bias adjusted x 0.85)	2014 (bias adjusted x 0.86)
M74 Slip Road	Lockerbie	No	28.2	37.0	30.6	31.6	28.1	27.4
***Buccleuch St. (E)	Dumfries	No	34.2	39.8	31.5	33.2	30.3	30.4
††Buccleuch St. (W)	Dumfries	No	31.3	35.2	30.0	31.4	27.8	28.6
Buccleuch St. (S)	Dumfries	No	32.5	36.1	34.1	31.9	30.3	30.9
†††Buccleuch St Bridge	Dumfries	No	32.3	34.0	28.2	28.8	26.6	26.8
St Michael St.	Dumfries	No	24.9	28.5	23.8	26.7	22.4	20.8
Argyll Drive	Dumfries	No	11.0	12.1	10.7	12.1	8.7	9.2
Charlotte St.	Stranraer	No	18.7	21.8	17.7	18.1	17.9	17.6
A77 Cairnryan	Stranraer	No	19.2	21.6	19.6	21.5	20.9	21.5
Port Rodie Car Park	Stranraer	No	17.5	18.2	16.6	12.4	10.4	Sites discontinued
Nith Place,	Dumfries	No	30.8	35.0	26.8	30.0	27.5	
Loreburn St.	Dumfries	No	26.0	30.8	24.5	30.1	26.4	
Nithbank	Dumfries	No	New site from January 2014					24.5
Castle Break	Ecclefechan	No	New site from January 2014					14.4
Gretna Loaning	Gretna	No	New site from January 2014					17.9

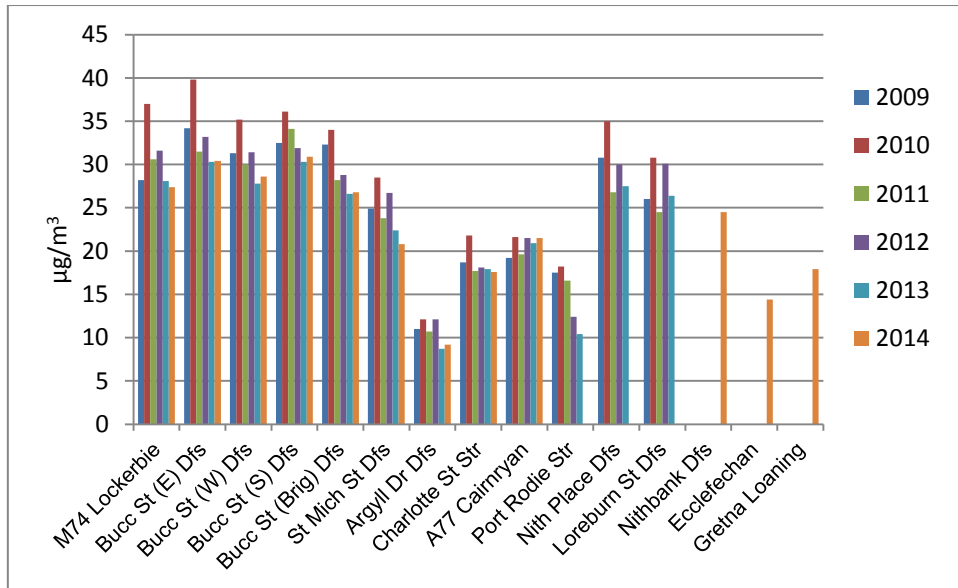
*** Triplicate tubes co-located with AURN automatic monitor

†† Duplicate tubes

††† Triplicate tubes

n/a not applicable i.e. tube not deployed at site in year shown.

Figure 4 Trends in annual mean nitrogen dioxide concentrations measured at diffusion tube monitoring sites.



Most sites show a reduction in NO₂ annual average levels from 2010 to 2014.

Figure 5 Graphs showing annual mean nitrogen dioxide diffusion tube concentrations over the last six years at sites in Buccleuch Street, Dumfries.

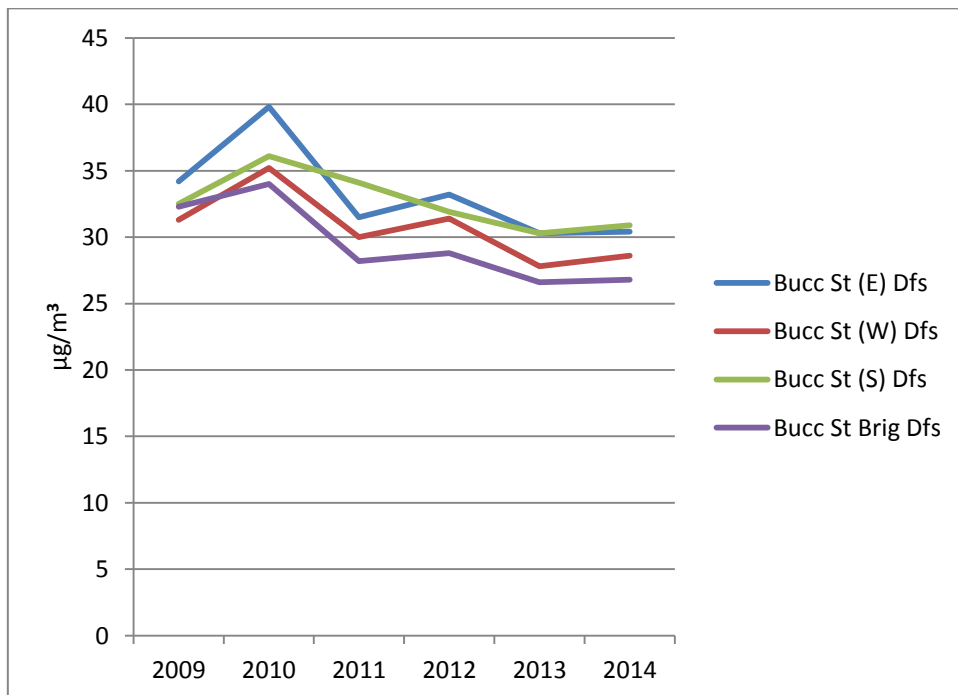


Figure 6 Graphs showing annual mean nitrogen dioxide diffusion tube concentrations over the last six years at sites other than Buccleuch Street, Dumfries. (Excluding new and discontinued sites)

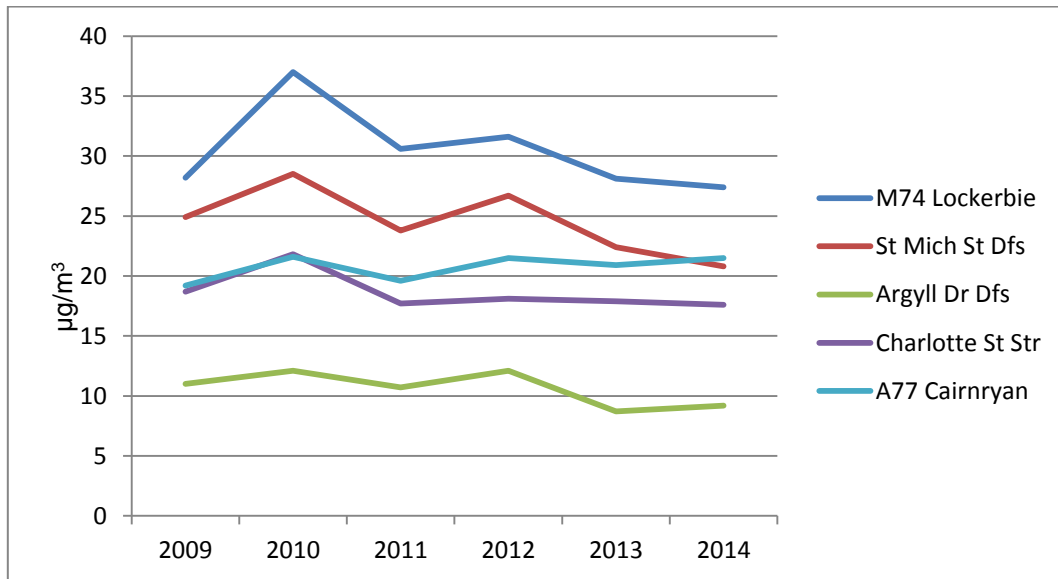
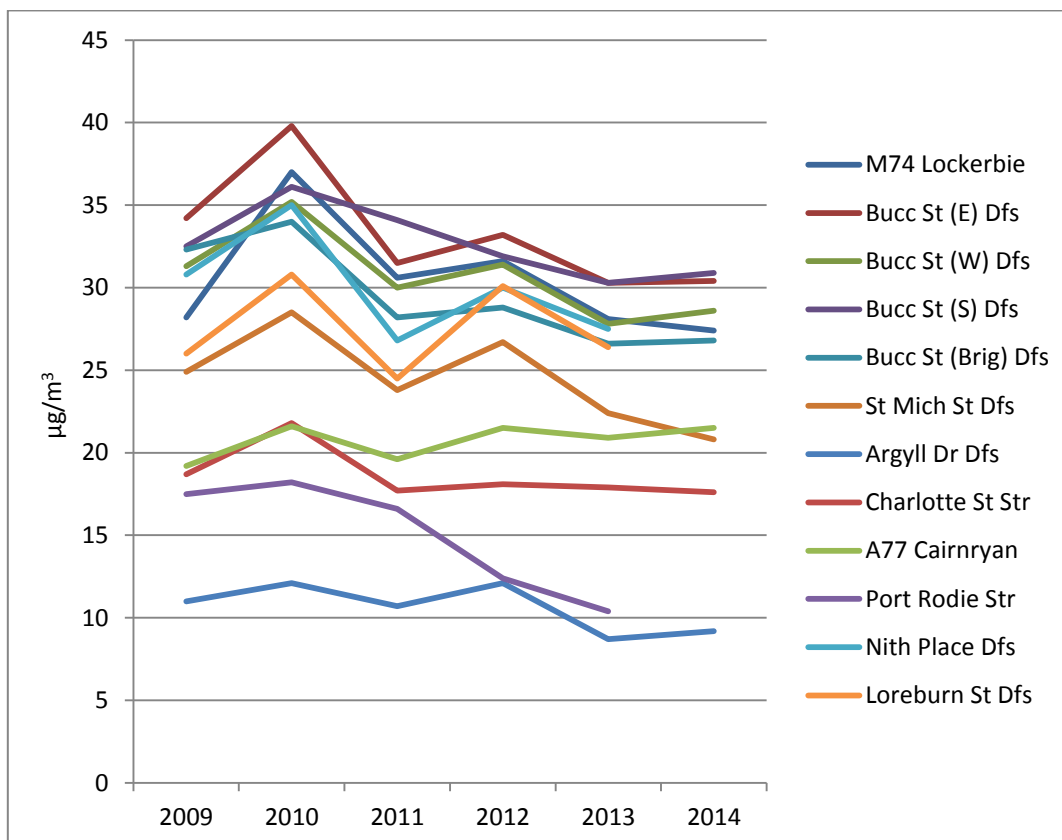


Figure 7 Graphs showing annual mean nitrogen dioxide diffusion tube concentrations over the last six years at all sites (excluding new sites).



2.2.2 PM₁₀

No monitoring of PM₁₀ has been carried out in Dumfries since February 2011. A supplement^{vii} to a detailed assessment^{viii} for PM₁₀ detailing the results of monitoring for PM₁₀ at a worst-case junction in Dumfries showed that no air quality management areas were required to be designated for PM₁₀ in Dumfries.

As previously reported it had been planned to carry out a detailed assessment for PM₁₀ in Cairnryan due to a perceived increase in traffic levels following the re-location of the Stena Line port from Stranraer to Old House Point, Cairnryan once developments at Old House Point had been completed. As a preliminary measure screening monitoring using an Osiris PM₁₀ monitor has been set up at Cairnryan Village Hall and commenced on the 9th October 2015 with a view to establishing whether a detailed assessment would be necessary. The results of monitoring will be reported at the end of the monitoring campaign.

Excluding the PM₁₀ monitoring results at Cairnryan, Dumfries and Galloway has examined the results from monitoring in the Council-area. Concentrations are below the objectives at relevant locations, therefore there is no need to proceed to a detailed assessment.

3. Road Traffic Sources

3.1 Narrow congested streets with residential properties close to the kerb.

The criteria for assessing narrow congested streets are set out in section A1 of Box 5.3 of TG(09)^v.

Dumfries and Galloway 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 one hour or more close to traffic.

The criteria for assessing busy streets are set out in section A2 of Box 5.3 of TG(09).

Dumfries and Galloway Council confirms that there are no new/newly identified busy streets where people may spend one hour or more close to traffic.

3.3 Roads with a high flow of buses and/or heavy goods vehicles.

The criteria for assessing roads with high flows of buses and/or heavy goods vehicles are set out in section A3 of Box 5.3 of TG(09).

Dumfries and Galloway Council confirms that there are no new/newly identified roads with high flows of buses/heavy goods vehicles.

3.4 Junctions

The criteria for assessing junctions are set out in section A4 of Box 5.3 of TG(09).

Dumfries and Galloway Council confirms that there are no relevant new/newly identified busy junctions/busy roads.

3.5 New roads constructed or proposed since the last round of review and assessment.

The criteria for assessing new roads are set out in section A5 of Box 5.3 of TG(09)

Dumfries and Galloway Council confirms that there are no relevant new/proposed roads.

3.6 Roads with significantly changed traffic flows.

The criteria for assessing roads with significantly changed traffic flows are set out in section A6 of Box 5.3 of TG(09).

Dumfries and Galloway Council confirms that there are no relevant new/newly identified roads with significantly changed traffic flows.

3.7 Bus and coach stations.

The criteria for assessing bus and coach stations are set out in section A7 of Box 5.3 of TG(09).

Dumfries and Galloway Council confirms that there are no relevant bus stations in the Council-area.

4 Other transport sources

4.1 Airports

The criteria for assessing airports are set out in section B1 of Box 5.4 of TG(09).

Dumfries and Galloway Council confirms that there are no airports in the Council-area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

The criteria for assessing stationary locomotives are set out in section B2 of Box 5.4 of TG(09).

Dumfries and Galloway 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 15 metres.

4.2.2 Moving Trains

The criteria for assessing moving diesel locomotives are set out in section B2 of Box 5.4 of TG(09).

Dumfries and Galloway Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term exposure within 30 metres that meet the relevant criteria.

4.3 Ports (Shipping)

The criteria for assessing ports (shipping) are set out in section B3 of Box 5.4 of TG(09). The Stena Line port at Old House Point, Cairnryan does not meet the criteria that would require a detailed assessment for sulphur dioxide to be carried out. The P&O port in Cairnryan situated approximately 2.5 kilometres south of the Stena Line port was the subject of a detailed assessment for sulphur dioxide in 2004^{iv}, the conclusions of which were that an air quality management area was not required.

Dumfries and Galloway Council confirms that there are no ports or shipping which have not previously been assessed in detail that meet the criteria which would require a detailed assessment for sulphur dioxide to be undertaken.

5. Industrial sources

5.1 Industrial Installations

The criteria for assessing industrial installations are set out in section C1 of Box 5.5 of TG(09).

5.1.1 New or proposed installations for which an air quality assessment has been carried out.

Dumfries and Galloway Council confirms that there are no relevant new or proposed industrial installations for which planning approval has been granted within the Council-area or nearby in neighbouring local-authority-areas, so far as is known.

5.1.2 Existing installations where emissions have increased substantially or where new relevant exposure has been introduced.

Dumfries and Galloway Council confirms that there are no existing installations where emissions have increased substantially or where new relevant exposure has been introduced within the Council-area or nearby in neighbouring local-authority-areas, so far as is known.

5.1.3 New or significantly changed installations with no previous air quality assessment.

Dumfries and Galloway Council confirms that there are no new, proposed or significantly changed industrial installations for which planning approval has been granted within the Council-area or nearby in neighbouring local-authority-areas, so far as is known.

5.2 Major Fuel (Petrol) Storage Depots

The criteria for assessing major fuel (petrol) storage depots are set out in section C2 of Box 5.5 of TG(09).

There are no major fuel (petrol) storage depots within the Council-area.

5.3 Petrol Stations

The criteria for assessing petrol stations are set out in section C3 of Box 5.5 of TG(09).

Dumfries and Galloway Council confirms that there are no petrol stations within the Council-area meeting the specified criteria.

5.4 Poultry Farms

The criteria for assessing poultry farms are set out in section C4 of Box 5.5 of TG(09). No farms exceeding the relevant criteria (farms with mechanically-ventilated units housing in excess of 400,000 birds, farms with naturally-ventilated units housing in excess of 200,000 birds or turkey units with more than 100,000 birds) have been identified within the council-area.

Dumfries and Galloway Council confirms that there are no poultry farms meeting the relevant criteria.

6 Commercial and domestic sources

6.1 Biomass Combustion - Individual Installations

The criteria for assessing biomass combustion (individual installations) are set out in section D1a of Box 5.8 of TG(09). Biomass boilers are being or have been installed at several local hospitals, schools and other premises. Assessments have been carried out but no requirement to proceed to a detailed assessment has been identified.

Dumfries and Galloway Council has assessed individual biomass combustion plants and concluded that it will not be necessary to proceed to a detailed assessment.

6.2 Biomass Combustion - combined impacts

The criteria for assessing biomass combustion (combined impacts) are set out in section D1b of Box 5.8 of TG(09). The estimated average PM₁₀ background concentration in the Council-area for 2014 is 9.48 µg/m³ (range 8.67 – 14.1 µg/m³). As previously reported by AQC Air Quality Consultants (in the 2009 updating and screening assessment) “using the nomograms and assuming a worst-case background of 14 µg/m³ in a large town, emissions of at least 1800 kg PM₁₀ per year would be required in a square 500m by 500m in order for this type of emission source to be likely to lead to exceedence of the annual average mean objective for PM₁₀ in Scotland. This is equivalent to a minimum of 70 households within a 500m by 500m grid square all using wood burned in fireplaces as their primary fuel. Alternatively, there would need to be a minimum of 17,500m² of commercial floorspace (approximately equivalent to 3 large supermarkets) heated by biomass boilers within a 500m by 500m grid square using wood as their primary fuel.

Using this fact, and local knowledge of the district, it is considered highly unlikely that there are any areas of biomass combustion exceeding these criteria.” It is noted however that wood-burning stoves are becoming increasingly popular and the situation will be kept under review.

Dumfries and Galloway Council has assessed the combined impact of biomass combustion plants and concluded that it will not be necessary to proceed to a detailed assessment.

6.3 Domestic solid-fuel burning

The criteria for assessing domestic solid-fuel burning (SO₂ emissions) are set out in section D2 of Box 5.8 of TG(09). Domestic solid fuel burning has been considered in previous updating and screening assessments and has not been considered to be significant; this is still the case.

Dumfries and Galloway Council confirms that there are no areas of significant domestic fuel use in the Council-area.

7. Fugitive or uncontrolled sources

The criteria for assessing fugitive or uncontrolled sources are set out in section E1 of Box 5.10 of TG(09).

With reference to the specified criteria Dumfries and Galloway Council confirms that no potential sources of fugitive particulate matter emissions have been identified within the Council-area.

8. Conclusions and proposed actions

8.1 Conclusions from new monitoring data

Results of monitoring for NO₂ are all below the objectives therefore no requirement to proceed to a detailed assessment for NO₂ has been identified. Monitoring for PM₁₀ at Cairnryan using an Osiris monitor commenced in October 2015 and the results will be reported at the end of the monitoring campaign.

8.2 Conclusions from assessment of sources

The likely impacts on air quality of road traffic, industrial, commercial, domestic and fugitive or uncontrolled sources of pollution have been assessed but no potential exceedences of the objectives have been identified.

8.3 Proposed actions

No new requirement to proceed to a new detailed assessment has been identified for any pollutant. It had been proposed to carry out a detailed assessment for PM₁₀ in Cairnryan due to a perceived increase in traffic levels following the re-location of the Stena Line port from Stranraer to Old House Point, Cairnryan once developments at Old House Point had been completed. As a preliminary measure screening monitoring using an Osiris PM₁₀ monitor was set up at the Village Hall in Cairnryan on the 9th October 2015 with a view to establishing whether a detailed assessment would be necessary. The results will be reported at the end of the monitoring campaign.

9. References

- i. The Environment Act 1995 (UK Parliament Public General Acts).
http://www.opsi.gov.uk/acts/acts1995/Ukpga_19950025_en_1
- ii. The Air Quality (Scotland) Regulations 2000 Scottish Statutory Instrument (SSI) Number 97.
The Air Quality (Scotland) Amendment Regulations 2002 SSI Number 297
<http://www.opsi.gov.uk/legislation/scotland/ssi2000/20000097.htm>
http://www.opsi.gov.uk/legislation/scotland/ssi2002/ssi_20020297_en.pdf
- iii. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1&2) (July 2007).
<http://archive.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf>
- iv. Previously published LAQM reports for Dumfries and Galloway Council are available at
<http://www.dumgal.gov.uk/index.aspx?articleid=1733>
- v. Local Air Quality Management Technical Guidance LAQM.TG (09): DEFRA February 2009
<http://www.defra.gov.uk/publications/files/pb13081-tech-guidance-laqm-tg-09-090218.pdf>
- vi. Eskdalemuir Observatory.
[Eskdalemuir Magnetic Observatory](#)
- vii. Supplement to Detailed Assessment for PM₁₀ – 2011, Dumfries & Galloway Council.
- viii. Detailed Assessment 2009 Dumfries and Galloway Council – AQC – Air Quality Consultants

Appendix 1 Details of NO₂ co-location study

Table 10 Details of co-location study at Buccleuch Street Dumfries 2014.

Date	Monthly average (continuous monitor) (µg/m ³)	Ratified/provisional data	Data capture %	Monthly average (diffusion tubes) (µg/m ³)	Ratio:- continuous/diffusion tube result
January	30.58	Ratified	95.25	36.47	0.84
February	27.84	Ratified	99.70	35.33	0.79
March	29.30	Ratified	99.55	35.00	0.84
April	29.58	Ratified	99.41	32.77	0.90
May	29.27	Ratified	99.55	34.97	0.84
June	28.28	Ratified	99.52	30.53	0.93
July	25.69	Ratified	95.53	33.40	0.77
August	27.38	Ratified	99.85	32.73	0.84
September	33.85	Ratified	99.41	39.03	0.87
October	28.89	Ratified	99.43	31.07	0.93
November	39.19	Ratified	99.51	43.40	0.90
December	33.91	Ratified	98.95	39.93	0.85
Average	30.31		98.81	35.39	

Bias-adjustment factor = continuous mean/diffusion tube mean = 30.31/35.39 = 0.86

Diffusion tube bias = (diffusion tube mean minus continuous mean) divided by continuous mean = (35.39 - 30.31)/30.31 = 0.17 i.e. tubes over-read by approximately 17%.

Dumfries and Galloway Council

Table 11 Monthly diffusion tube results for 2014

Site	Monthly diffusion tube results (microgrammes per cubic metre)												Average	Adjusted Average. (x 0.86)
	j a n	f e b	m a r	a p r	m a y	j u n	j u l	a u g	s e p	o c t	n o v	d e c		
M74 Slip Road, Lockerbie	38.6	41.3	33.2	33.6	22.4	21.1	29.6	32.2	33.6	26.6	29.6	41.1	31.9	27.4
***Buccleuch St (East), Dumfries	29.4	35.2	33.7	29.3	31.8	29.9	33.2	36.9	38.1	32.6	45.7	41.6	35.4	30.4
	39.8	35.4	37.1	32.3	35.3	30.4	33.0	32.8	39.8	30.3	41.2	39.4		
	40.2	35.4	34.2	36.7	37.8	31.3	34.0	28.5	39.2	30.3	43.3	38.8		
**Buccleuch St (West), Dumfries	40.7	37.6	36.3	V	27.2	25.1	27.0	27.1	34.1	32.5	42.8	39.8	33.3	28.6
	42.7	39.4	32.1	V	33.1	20.1	27.7	30.4	34.8	25.6	40.9	35.8		
Buccleuch St (South), Dumfries	48.3	45.2	46.2	V	34.6	22.8	26.4	26.9	34.1	36.1	37.3	37.6	36.0	30.9
***Buccleuch St Bridge, Dumfries	51.7	35.2	30.9	28.2	26.5	22.1	27.4	19.1	23.8	33.0	44.2	35.4	31.2	26.8
	48.1	41.3	31.0	31.5	25.1	16.8	26.9	22.2	25.7	30.5	39.8	31.0		
	36.8	42.5	31.5	35.3	28.1	21.1	23.9	21.4	27.8	30.9	V	33.0		
Nithbank Dumfries	33.4	25.6	29.2	30.7	23.1	24.1	19.3	22.7	34.6	28.7	45.4	25.4	28.5	24.5
St Michael St Dumfries	38.1	28.3	25.1	21.3	19.3	16.8	15.7	16.7	26.0	20.3	39.7	23.2	24.2	20.8
Argyll Drive Dumfries	17.8	13.5	9.1	9.6	5.0	5.0	6.0	7.3	9.2	10.5	19.6	15.6	10.7	9.2
Castle Break Ecclefechan	23.9	18.7	18.9	17.3	14.6	7.1	12.1	14.5	18.8	18.3	18.9	17.8	16.7	14.4
Gretna Loaning Gretna Green	31.3	28.6	21.3	16.4	14.7	11.3	13.6	21.5	14.8	22.0	26.4	28.1	20.8	17.9
Charlotte St Stranraer	28.5	19.8	22.4	21.5	16.4	14.5	18.9	17.9	V	22.7	V	22.4	20.5	17.6
A77 Cairnryan Stranraer	29.6	26.2	26.5	24.4	23.9	21.9	24.9	17.6	25.9	26.1	27.1	26.4	25.0	21.5

***Triplicate tubes (co-located with automatic monitor)

**Duplicate tubes

***Triplicate tubes

V - Tube(s) vandalised (or otherwise removed or sample tubes contaminated or result[s] rejected).

Appendix 2 Maps of non-automatic monitoring sites (continued).

Figure 10 Map of diffusion tube site at St Michael Street Dumfries



Figure 11 Map of diffusion tube site at Argyll Drive, Heathhall Dumfries.



Appendix 2 Maps of non-automatic monitoring sites (continued).

Figure 12 Map of diffusion tube site at Charlotte St., Stranraer.

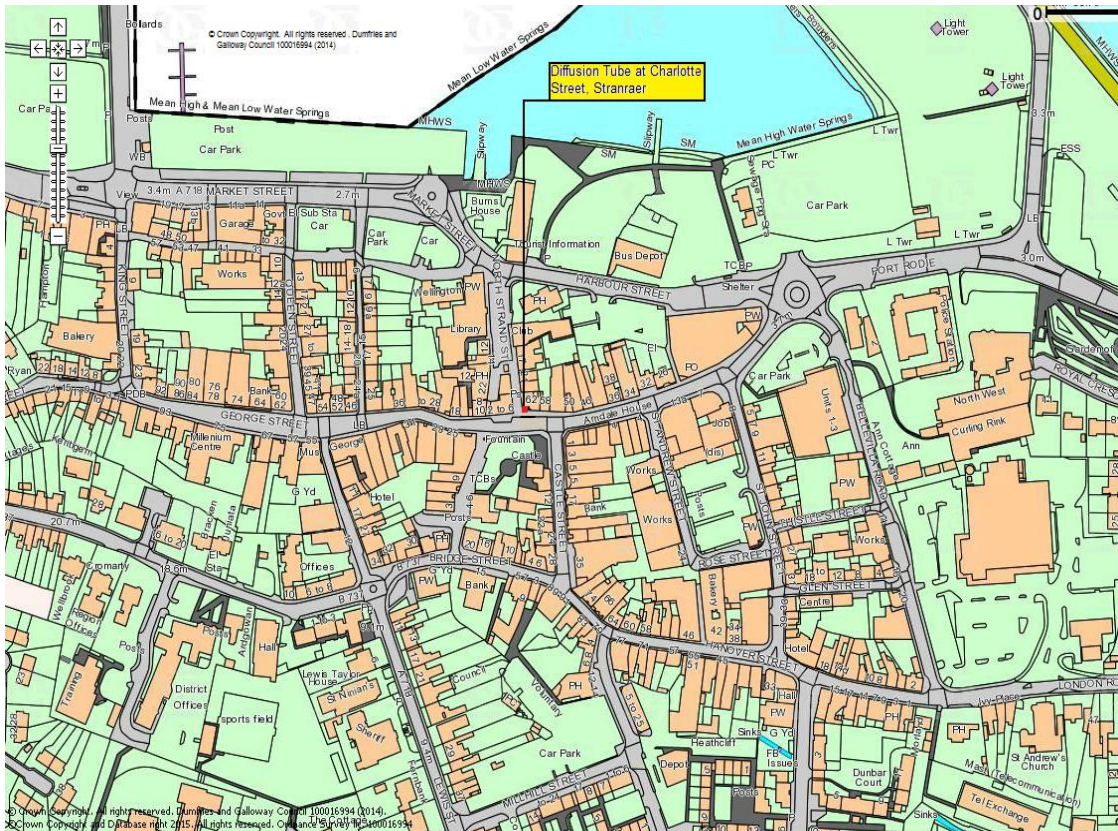
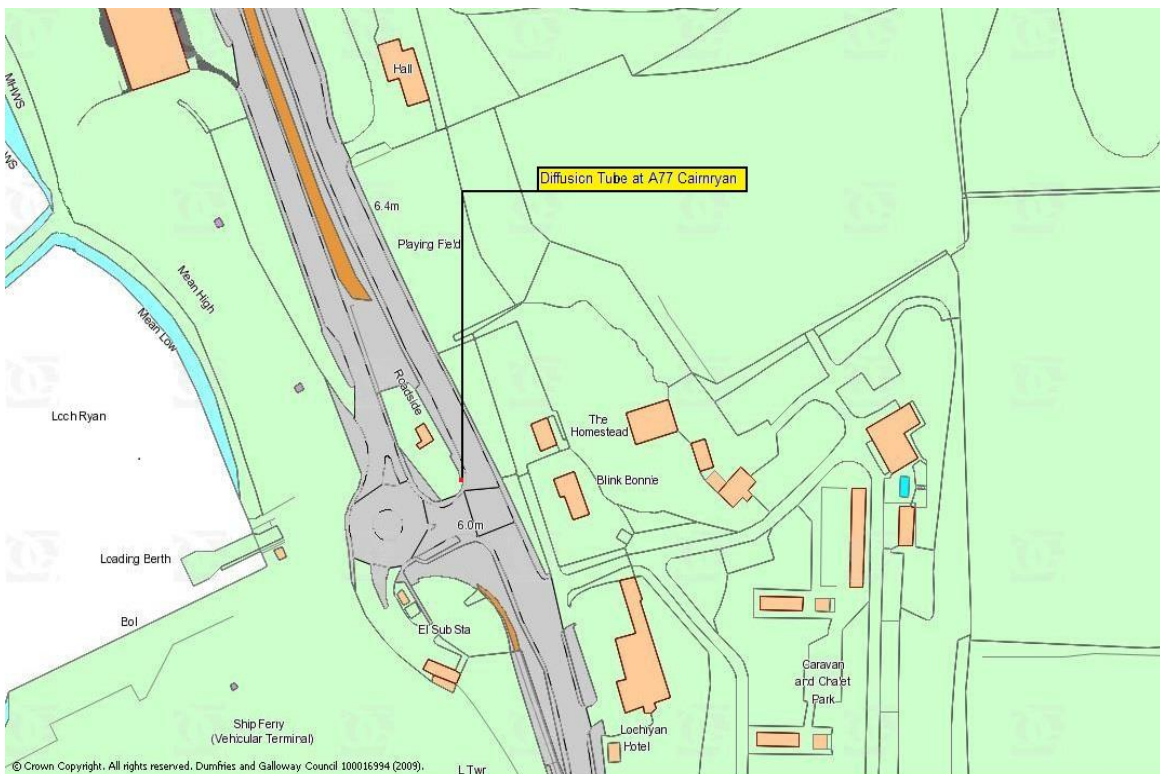


Figure 13 Map of diffusion tube site at A77 Cairnryan.



Appendix 2 Maps of non-automatic monitoring sites (continued).

Figure 14 Map of diffusion tube site at Nithbank, Dumfries.



Figure 15 Map of diffusion tube site at Castle Break, Ecclefechan.



Appendix 2 Maps of non-automatic monitoring sites (continued).

Figure 16 Map of diffusion tube site at Gretna Loaning, Gretna,

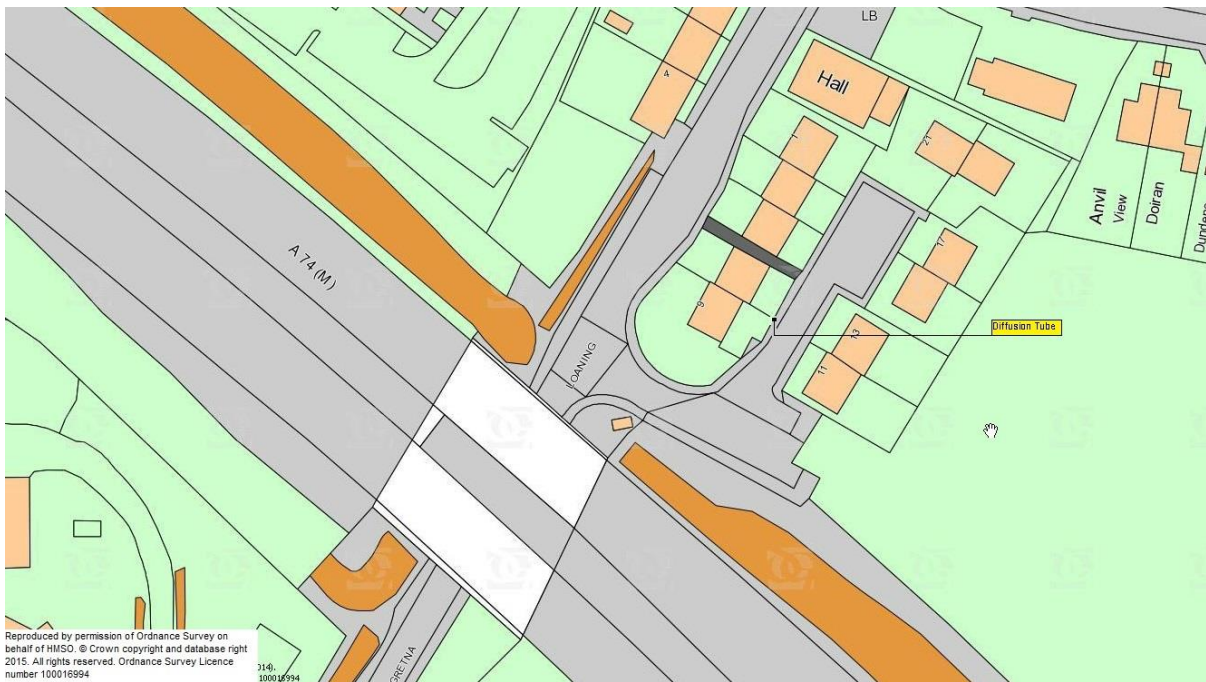


Figure 17 Map of PM₁₀ monitoring site at Cairnryan.

