2013 Air Quality Progress Report for Perth and Kinross Council

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

April 2013

Local Authority Officer	Jim Dixon
Department	The Environment Service
Address	Pullar House 35 Kinnoull Street Perth PH1 5GD
Telephone	01738 476457
e-mail	JJDixon@pkc.gov.uk
Report Reference number	PR2013
Date	22 October 2013

Executive Summary

The report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environmental Act (1955), 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 exceedances are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives

Perth & Kinross Council declared the whole of Perth an AQMA in May 2006 after the Detailed Assessment in 2004 found that there would be areas of exceedances for NO_2 and PM_{10} where relevant exposure occurred. The 2007 Further Assessment confirmed the conclusions of the Detailed Assessment and recommended that Perth & Kinross Council retain their city wide Air Quality Management Area for NO_2 and PM_{10} and exceedances of these pollutants are due mainly to queuing and congested traffic specifically HDV traffic. The Progress Reports to date showed that all sites in Perth which are above or close to the objectives lie within the city centre or close to it on the main through routes and are within the existing AQMA, showing that there is a trend of a slight increase year on year at these sites.

This Progress Report considered monitoring data from 61 sites within Perth and Kinross and when assessing the bias corrected annual mean nitrogen dioxide concentrations against the national standard, there are exceedances at 19 sites, and 3 out with Perth (all in Crieff). The permitted number of exceedances of the 1 hour standard was not met at Atholl St which had 25.

The annual mean PM_{10} standard was exceeded at only Atholl St real time monitor as was the Daily Mean standard for the third year in a row. This is again thought to be episodic and transboundary in nature and some analysis of air mass movements on exceedance days is provided to support this assertion.

Perth and Kinross Council has already commissioned a detailed assessment in Crieff and the results of this confirmed the need to declare an AQMA in Crieff due to exceedances of both the

PM_{10} and NO_2 annual mean standards. The process of declaration has begun and Crieff AQMA should be in place later this year.

Table of Contents

List of Tables

List of Figures

Appendices

1 Introduction

1.1 Description of Local Authority Area

The Perth & Kinross local authority area is made up of Perthshire and Kinrossshire, collectively the Perth and Kinross area was formerly known as Perthshire. Perth and Kinross is one of the 32 unitary council areas into which Scotland has been divided since 1996. Perth and Kinross is the 5th largest council area in Scotland, but it is only the 14th largest in terms of population, reflecting its extensive rural and upland areas. Important settlements in Perth and Kinross include Perth, Kinross, Auchterarder, Aberfeldy, Blairgowrie, Blair Atholl, Pitlochry, Coupar Angus and Crieff.
The 'Fair City' Perth lays to the east, on the banks of the Tay, the largest river in Britain. Blairgowrie and East Perthshire have quiet glens, peaceful lochs and the mountains of Glenshee.

Known as the 'big county', Perth & Kinross, is the gateway to the Highlands and home to around 140,000 people. The 'big county refers to not only its physical area, but to the diversity of towns and countryside. Perth and Kinross feature everything you associate with Scotland including lochs, mountains, forests and castles.

Perth and Kinross is bordered on its north by Highland and Aberdeenshire; on its east by Angus and the City of Dundee; and on its south by Fife, Clackmannanshire and Stirling

It covers 5,406 sq km (includes fresh and tidal waters); land area is 5,311 sq km.

Perth is a hub for employment, commerce, leisure and tourism for the wider area of Perth and Kinross and this contributes to the traffic issues that arise within our designated, Air Quality Management Area.

The main and strategic roads within Perth & Kinross include the A90, A9, M90, A85, A827 and the two roads A93 and A94 which are the major road links associated with

the proposed Cross-Tay Link Road (CTLR). Also four rail lines converge in the city of Perth.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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 exceedance of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/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

Perth and Kinross Council has completed the following Review and Assessments of air quality to date:

- Stage 1 March 1999, Stage 1 (Revised)
- Stage 2 (September 2002)
- Upgrading and Screening Assessment (2003)
- Detailed Assessment (2004) NO_2 & PM_{10}
- Progress Report (2005)
- Air Quality Management Area Declared (May 2006) for NO_2 &PM_{10}
- Updating and Screening Assessment (2006)
- Progress Report (2007)
- Further Assessment (2007) NO_2 & PM_{10}
- Progress Report (2008)
- Updating and Screening Assessment (2009)
- Air Quality Action Plan adopted by council and approved by Scottish Government (2009)
- Progress Report (2010)
- Progress Report (2011)
- Updating and Screening Assessment (2012)
- Detailed Assessment of Air Quality A85 at Crieff (2012)

The previous assessments of the air quality in Perth and Kinross concluded that there were likely exceedances of the annual mean objectives for NO_2 as a result of traffic sources in Perth. Projections also indicated likely exceedances of the annual mean objectives for PM_{10} in 2010.

Perth & Kinross Council declared the whole of Perth City centre an Air Quality Management Area (AQMA) for both pollutants in May 2006. Figure 1.4 shows the extent of the AQMA. The decision to designate the whole of Perth an AQMA was made to ensure that areas that are close to, but do not at present exceed, the objectives are covered and also it allows the Action Plan to take in a wider area,

thus avoiding moving problems to other parts of the city, while dealing with the areas which are exceeding the objectives. It also helped to ensure that the Air Quality Action Plan (AQAP) would be integrated with other council policies.

Perth & Kinross Council has taken account of the effect of the proposed Air Quality Action Plan on greenhouse gas emissions in accordance with Scottish Government guidance. To inform this process, AEA Energy & Environment was commissioned to undertake a study in terms of the effect of the Air Quality Action Plan on greenhouse gas emissions (GHG) for the whole of the Perth & Kinross Council area, rather than just the AQMA, this assessment was completed in May 2007.

The 2007 Progress Report, using 2006 data, concluded that nitrogen dioxide concentrations at 17 sites were breaching the 2005 annual mean objective of 40ug/m^3, and at 8 sites were between 35 – 39 ug/m^3, all close to Perth city centre, and levels of PM_{10} at both High Street and Atholl Street monitoring sites appear to be increasing by a small margin year on year.

The 2008 further assessment confirmed the conclusions of the 2007 detailed assessment and to test the city centre traffic management (CCTMR) scenarios to assess the likely impact they may have on pollutant concentrations. The report included an assessment of source apportionment and identified emissions from heavy duty vehicle and congested traffic as the main local contributors to elevated levels of nitrogen dioxide and PM_{10} in Perth.

The 2008 Progress Report, using 2007 data, concluded that nitrogen dioxide concentrations at 19 sites in Perth are above the annual mean objective of 40ug/m^3 and 4 are between 35-40ug/m^3. Also in Crieff, 1 site is now above 40ug/m^3 and 2 sites are between 35 – 40 ug/m^3. As the sites which are exceeding the standard are kerbside and not representative of exposure for the annual standard and the façade level tubes are below 40 ug/m^3, it was decided not to proceed to a Detailed Assessment this year, but instead to undertake automatic monitoring in Crieff.

Draft Air Quality Action Plan, Strategic Environmental Assessment Environmental Report (2008), Climate Change Implication of the Draft Air Quality Action Plan (2008) and the Further Assessment (2008) all went out for consultation June (2008).

The 2009 Updating and Screening Assessment, using 2008 data, concluded that nitrogen dioxide concentrations at 23 sites within Perth's AQMA are above the annual mean objective of 40ug/m^3 and two sites in Crieff out with Perth's AQMA. Two additional monitoring sites at the façade of buildings were introduced at Crieff.

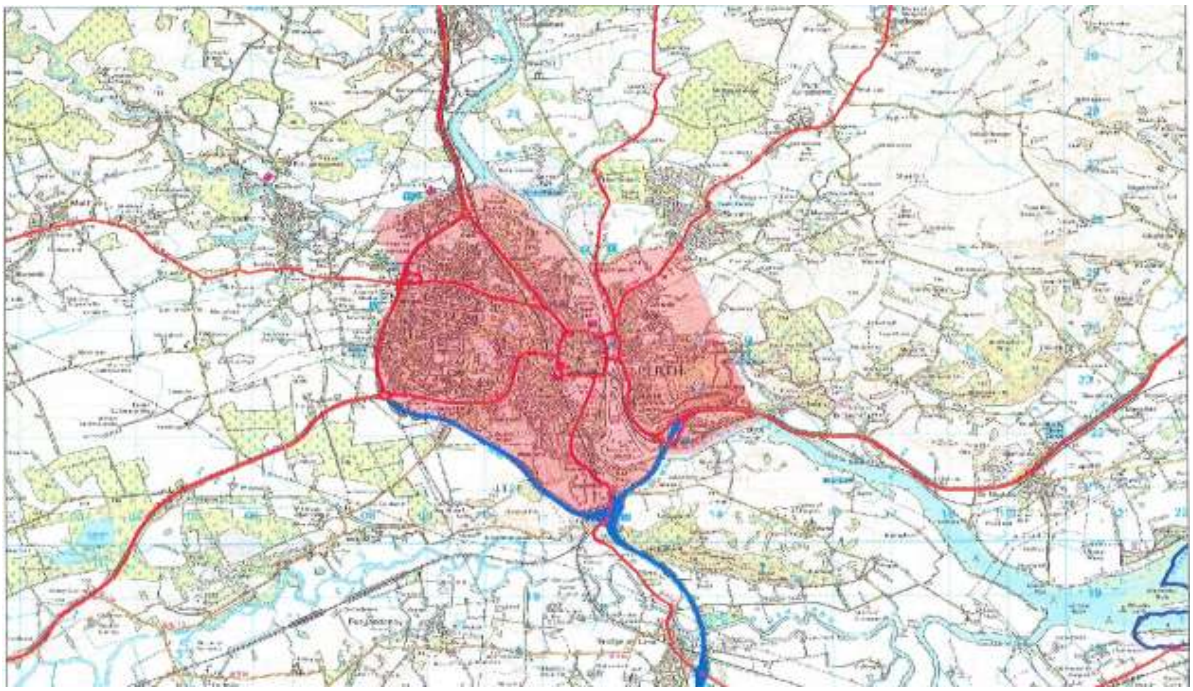
Perth & Kinross Council's Air Quality Action Plan was approved by The Scottish Government and Adopted as Council Policy in August 2009.

The 2010 progress report showed exceedances at 16 sites within the AQMA and a reduction at both High St and Atholl St real time monitors of 27 to 25 $\mu g/m^3$ and 60 to 56 $\mu g/m^3$. There was one site out with the AQMA (7 West High St Crieff) above the objective. This is a road side site with the corresponding façade level tubes being slightly below the objective.

The 2011 progress report recorded exceedances at 20 diffusion tube sites within the Perth AQMA and 3 outside (all in Crieff). The Atholl St real time monitor remained at an annual average of 56ugm^{-3}, whilst the High St Monitor saw an increase to 30ugm^{-3}.

The 2012 Updating and Screening Assessment saw no significant change in NO_2 and PM_{10}. The diffusion tubes in Crieff continue to show NO_2 levels above the objective; therefore Perth and Kinross Council commissioned AEA to conduct a Detailed Assessment which confirmed exceedances of both PM_{10} and NO_2 annual mean objectives. Perth and Kinross Council are currently in the process of declaring this part of Crieff an AQMA.

Figure 1.1 Map of AQMA Boundaries



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Figure 2.1a Map of Automatic Monitoring Crieff

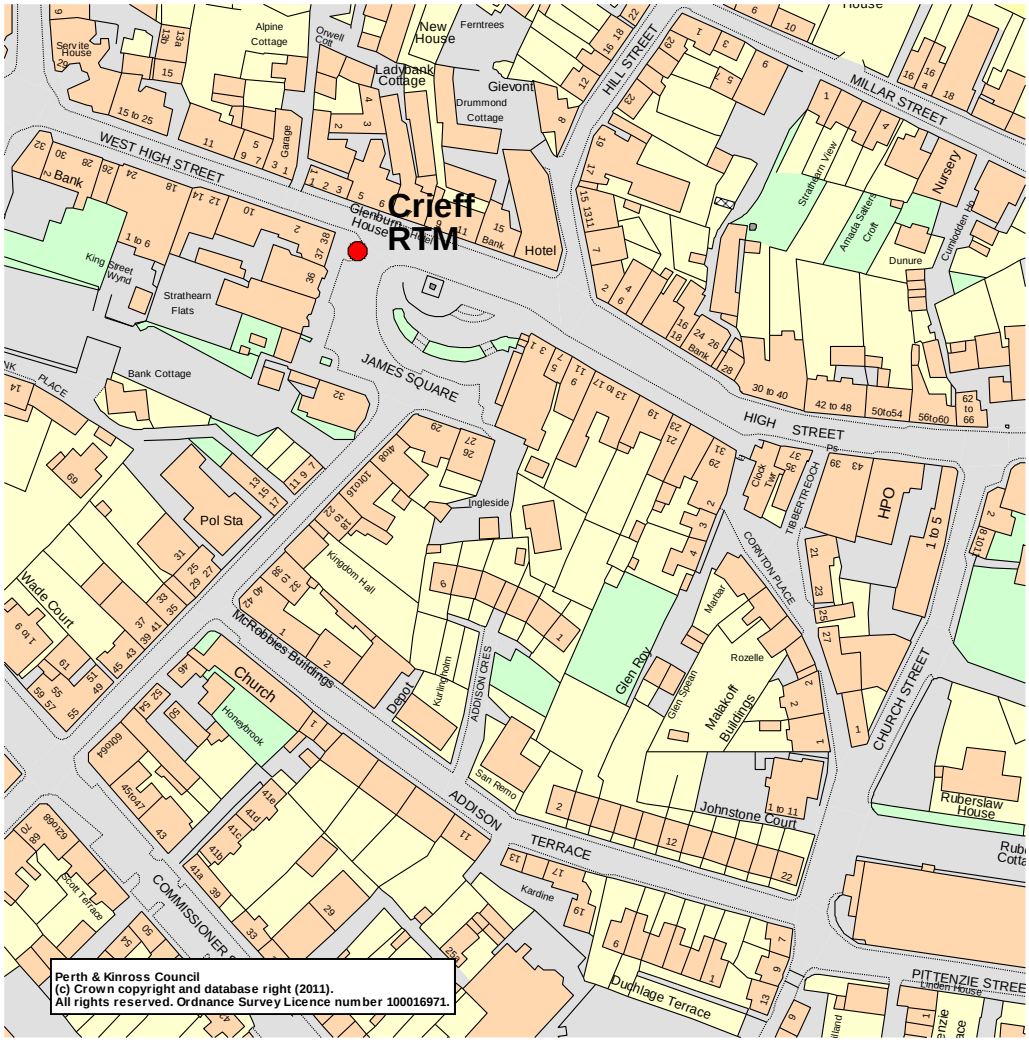


Figure 2.1b Map of Automatic Monitoring Perth City Centre

Figure 2.1c Map of Automatic Monitoring Perth Muirton

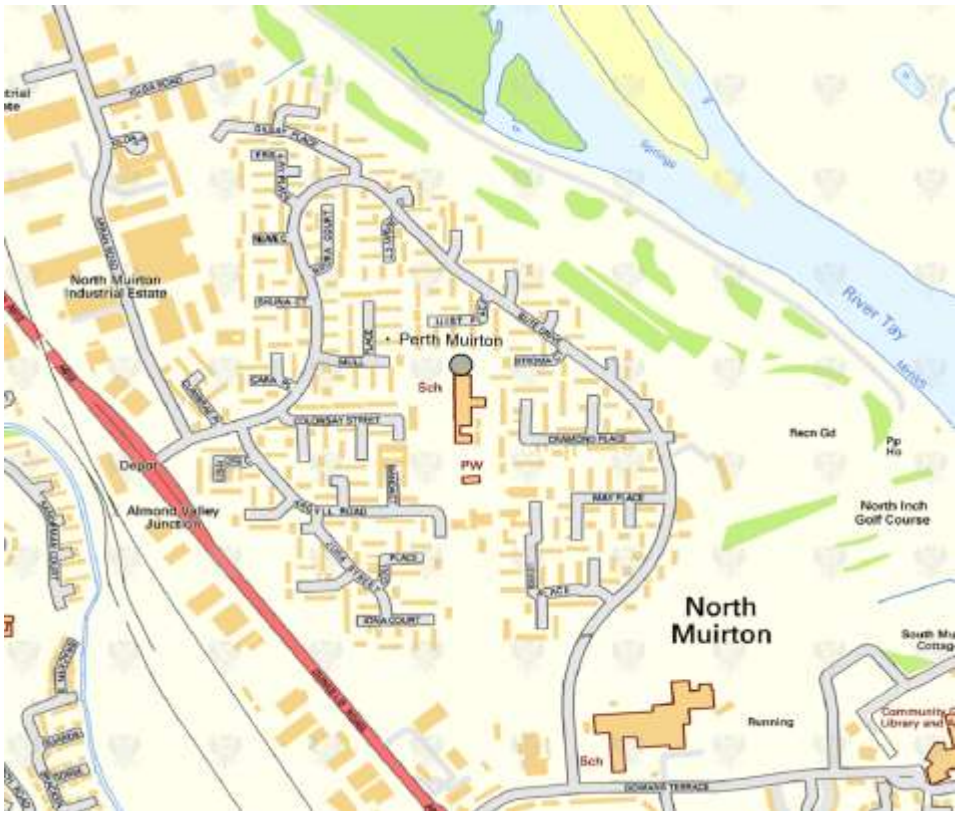
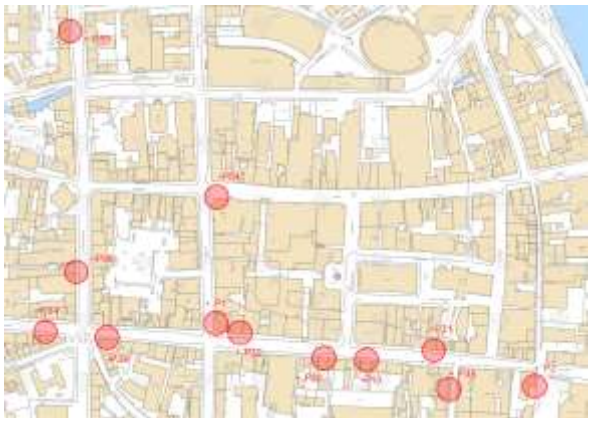


Table 2.1 Details of Automatic Monitoring Sites

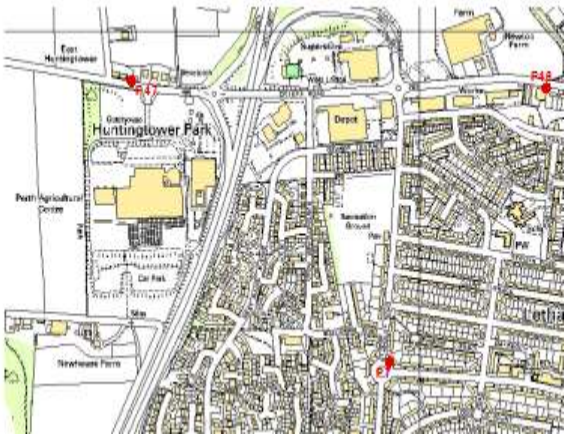
Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Perth 1-High Street	Roadside	311680	723624	NO_2 & PM_{10}	AP1 M200A chemiluminescent analyser for Oxides of Nitrogen & R&P TEOM analyser for PM_{10}	Y	Y (20.4m)	4.8m	Y
Perth 2- Atholl Street	Roadside	311575	723917	NO_2 & PM_{10}	AP1 M200A chemiluminescent analyser for Oxides of Nitrogen & R&P TEOM analyser for PM_{10}	Y	Y (22.3m)	2.3m	Y
Perth3-North Muirton	Urban Background	310658	725658	PM_{10}	FDMS TEOM Analyser	Y	N(30m)	N/A	N
Crieff- St James Sq	Roadside	286363	721614	NO_2 & PM_{10}	AP1 M200A chemiluminescent analyser for Oxides of Nitrogen & FDMS TEOM analyser for PM_{10}	N	Y (9.5m)	5.3m	N

2.1.2 Non-Automatic Monitoring Sites

Figure 2.2a Maps of Non-Automatic Monitoring Sites Diffusion tube locations within AQMA



South Street/Scott Street Area



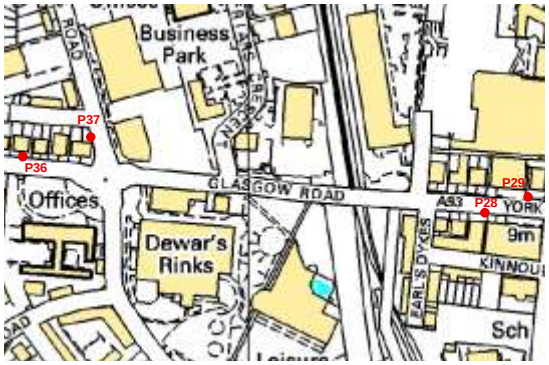
NW Perth Area

Atholl Street

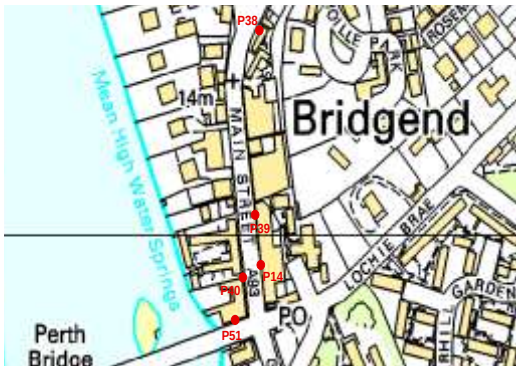
Edinburgh Road

Glasgow Rd West

Lower Muirton Area

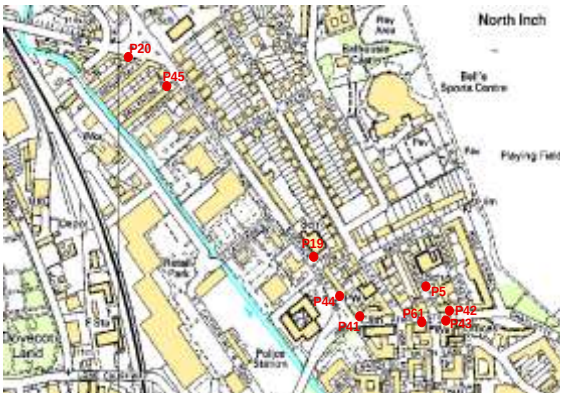


Glasgow Rd Area



Bridgend

Murray Crescent



North Centre Perth

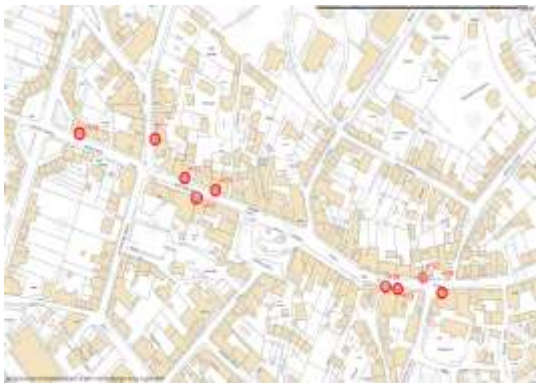
Figure 2.2b Maps of Non – automatic Monitoring Site Diffusion tube locations out with AQMA

Auchterarder

Dunkeld

Kinross

Glencarse



Crieff High St

Crieff Background

Table 2.2a Details of Non- Automatic Monitoring Sites Perth

Site Address	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
42 Scott St, Perth, PH1 5PH	R	NO117235	NO2	Y	Y(3)	2.5	Y
17 Speygate, Perth, PH2 8PJ	UC	NO120234	NO2	Y	Y(2.9)	2.05	Y
15 Murray Crescent, Perth, PH2 0HU	UB	NO105228	NO2	Y	Y(2.9)	2.05	N
8 Stormont Street, Perth, PH1 5NW	UC	NO116239	NO2	Y	Y(10)	1.7	Y
41 Mull Place, Perth, PH1 3DP	UB	NO105257	NO2	Y	Y(6)	1.7	N
257 Rannoch Rd Roundabout,Perth,PH1 2DW	UC	NO089244	NO2	Y	Y(8.3)	2.1	Y
86/88 South Street, Perth,PH2 8PD	R	NO118234	NO2	Y	Y(1)	2.6	Y
9 Main Street, Bridgend, Perth, PH2 7HD	R	NO122239	NO2	Y	Y(1)	2.3	Y
St Ninian's School, Dunkeld Rd, Perth,PH1 5RF	R	NO113241	NO2	Y	Y(3.4)	3.2	Y
2 Crieff Road, Perth, PH1 5RT	R	NO110243	NO2	Y	Y(1)	1.9	Y
28 York Place, Perth, PH2 8EH	R	NO111234	NO2	Y	Y(12)	2.4	Y
37 York Place, Perth, PH2 8EH	R	NO112235	NO2	Y	Y(8)	4.1	Y
104 South Street, Perth, PH2 8PA	R	NO117234	NO2	Y	Y(1)	2.4	Y
45-47 South Street, Perth, PH2 8PD	R	NO119234	NO2	Y	Y(5)	3.5	Y
135 South Street, Perth, PH2 8PA	R	NO117234	NO2	Y	Y(23)	4.6	Y
216 South Street, Perth, PH2 8NY	R	NO116234	NO2	Y	Y(5)	2.5	Y
10 County Place, Perth,PH2 8EE	R	NO115234	NO2	Y	Y(2)	3	Y

17 Princes Street, Perth, PH2 8NG	R	NO119234	NO2	Y	Y(1.5)	1.8	Y
51 Glasgow Road, Perth, PH2 0PE	R	NO107235	NO2	Y	Y(7.2)	2.6	Y
Riggs Road, Perth, PH1 1PR	R	NO108236	NO2	Y	Y(10)	1.9	Y
93-109 Main Street, Bridgend, Perth, PH2 7HE	R	NO122241	NO2	Y	Y(1)	7	Y
39 Main Street, Bridgend, Perth, PH2 7HD	R	NO122240	NO2	Y	Y(7)	2.1	Y
18 Main Street, Bridgend, Perth, PH2 7HB	R	NO122239	NO2	Y	Y(18)	2.4	Y
76 Atholl Street, Perth, PH1 5NL	R	NO114239	NO2	Y	Y(1)	2.5	Y
26-28 Atholl Street, Perth, PH1 6NP	K	NO116239	NO2	Y	Y(2)	0.3	Y
17 Atholl Street, Perth, PH1 5NH	R	NO116239	NO2	Y	Y(2)	3	Y
22 Barrack Street, Perth, PH1 5RD	K	NO114239	NO2	Y	Y(2.7)	0.3	Y
Ballantine Place, Perth, PH1 5RD	UC	N0110243	NO2	Y	Y(4)	1.7	Y
204 A Crieff Road, Perth, PH1 2PE	R	N0093248	NO2	Y	Y(11.5)	2	Y
East Huntingtower, Perth, PH1 3JJ	R	NO083248	NO2	Y	Y(5.5)	1.8	Y
30 Edinburgh Road, Perth, PH2 8BX	R	NO083248	NO2	Y	N(37)	2.5	Y
2 West Bridge Street, Perth, PH2 7HA	R	NO122239	NO2	Y	Y12.5)	3.7	Y
Real Time Monitor adjacent to 176 High Street, Perth,PH1 5EW	R	NO115239	NO2	Y	Y(20.4)	4.8	Y
Real Time Monitor, Atholl Street, Perth,PH1 5NH	R	NO117235	NO2	Y	Y(22.3)	2.3	Y
84 Dundee Road, Perth, PH2 7BA	R	NO125229	NO2	Y	Y(1)	1.7	Y
30 Dundee Road, Perth, PH2 7AQ	R	NO124232	NO2	Y	Y(1.3)	1.4	Y
The Lodge, Isla Road Bridgend PH2 7HG	R	NO122241	NO2	Y	Y(1)	1.4	Y

5-7 Charlotte Street, Perth, PH1 5LW	R	NO119238	NO2	Y	Y(3.3)	2	Y
1 Atholl Street, Perth, PH1 5NH	R	NO116239	NO2	Y	Y(1)	2.3	Y
2 Atholl Street, Perth, PH1 5NP	R	NO116239	NO2	Y	Y(2.5)	0.8	Y
United Free Church of Scotland, Kinnoull Street Perth PH1 5EZ	R	NO116239	NO2	Y	Y(3)	2.6	Y
Leith Buildings, 28 Dunkeld Road, Perth, PH1 5AJ	R	NO110244	NO2	Y	Y(5.1)	2.1	Y
134-140 Dunkeld Road Perth PH1 5AS	R	NO106249	NO2	Y	Y(7.8)	1.5	Y
82 Crieff Road, Perth PH1 2RP	R	NO103240	NO2	Y	Y(1)	2.4	Y
2 Friarton Rd, Perth PH2 8DE	R	NO117812	NO2	Y	Y(4.5)	2.0	Y
202 Glasgow Rd Perth PH2 0NA	R	NO101602	NO2	Y	Y(5.5)	1.5	Y
59 South Methven St Perth PH1 5NX	R	NO115492	NO2	Y	Y(0)	3.2	Y
22 North Methven St Perth PH1 5PN	R	NO115412	NO2	Y	Y(0)	3	Y

Table 2.2b Details of Non- Automatic Monitoring Sites Glencarse

Site Address	**Site Type**	**OS Grid Ref**	**Pollutants Monitored**	**In AQMA ?**	**Relevant Exposure ?** *(Y/N with distance (m) to relevant exposure)*	**Distance to kerb of nearest road** *(N/A if not applicable)*	**Worst-case Location ?**
Opp Wood'n Garden, Glencarse, PH2 7XL	R	NO173235	NO2	N	Y(2.8)	2.8	Y
Linden Garden Centre, Glencarse, PH2 7LX	R	NO173235	NO2	N	Y(6)	2.1	Y

Table 2.2c Details of Non- Automatic Monitoring Sites Dunkeld

Site Address	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
1 Atholl Street Dunkeld PH8 0AH	R	NO026654	NO2	N	Y(0)	2.25	Y
14 Atholl Street Dunkeld PH8 0AR	R	NO026744	NO2	N	Y(0)	2	Y

Table 2.2d Details of Non- Automatic Monitoring Sites Kinross

Site Address	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
124 High Street Kinross KY13 8DE	R	NO119200	NO2	N	Y(0.5)	1.3	Y
76 High St Kinross KY13 8JA	R	NO119360	NO2	N	Y(0)	2	Y

Table 2.2e Details of Non- Automatic Monitoring Sites Auchterarder

Site Address	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
66 High Street Auchterarder PH3 1BN	R	NN945691	NO2	N	Y(1.7)	0.5	Y
176 High Street Auchterarder PH3 1AS	R	NN942671	NO2	N	Y(3.0)	0.5	Y

Table 2.2f Details of Non- Automatic Monitoring Sites Crieff

Site Address	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
7 West High Street, Crieff PH7 3AF	UC	NN866215	NO2	N	Y(10)	0.4	N
39, High Street, Crieff PH7 3HT	UC	NN865215	NO2	N	Y(18)	1.2	N
62, High Street, Crieff PH7 3BS	UC	NN865215	NO2	N	Y(1)	1	Y
9 East High Street, Crieff PH7 3AF	UC	NN866215	NO2	N	Y(5)	0.3	Y
19 West High Street Crieff, PH7 4AU	UC	NN862992	NO2	N	Y(0)	2.5	Y
43 High Street Crieff, PH7 3HT	UC	NN866672	NO2	N	Y(0)	1.4	Y
10/12 West Street Crieff PH7 4DL	UC	NN863192	NO2	N	Y(0)	2	Y
9 Comrie Street Crieff PH7 4AX	UC	NN862692	NO2	N	Y(0)	2.7	Y
1 Lodge Street Crieff PH7 4AX	UC	NN862202	NO2	N	Y(0)	2.2	Y
RTM Crieff St James Sq PH7 4AX	UC	NN863602	NO2	N	Y(9.5)	5.3	N
Hollybush road Crieff PH7 3QD	UB	NN870302	NO2	N	Y(25)	25.0	N

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

Table 2.3 Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2012 % [b]	Annual Mean Concentration µg/m^3				
				2008*[c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
Perth 1	Roadside	Yes	98.2	27	25	30	27	26
Perth 2	Roadside	Yes	94.3	**60**	**56**	**56**	**57**	**54**
Crieff	Roadside	No	80.3			30	34	23

In bold, exceedance of the NO_2 annual mean AQS objective of 40µg/m^3

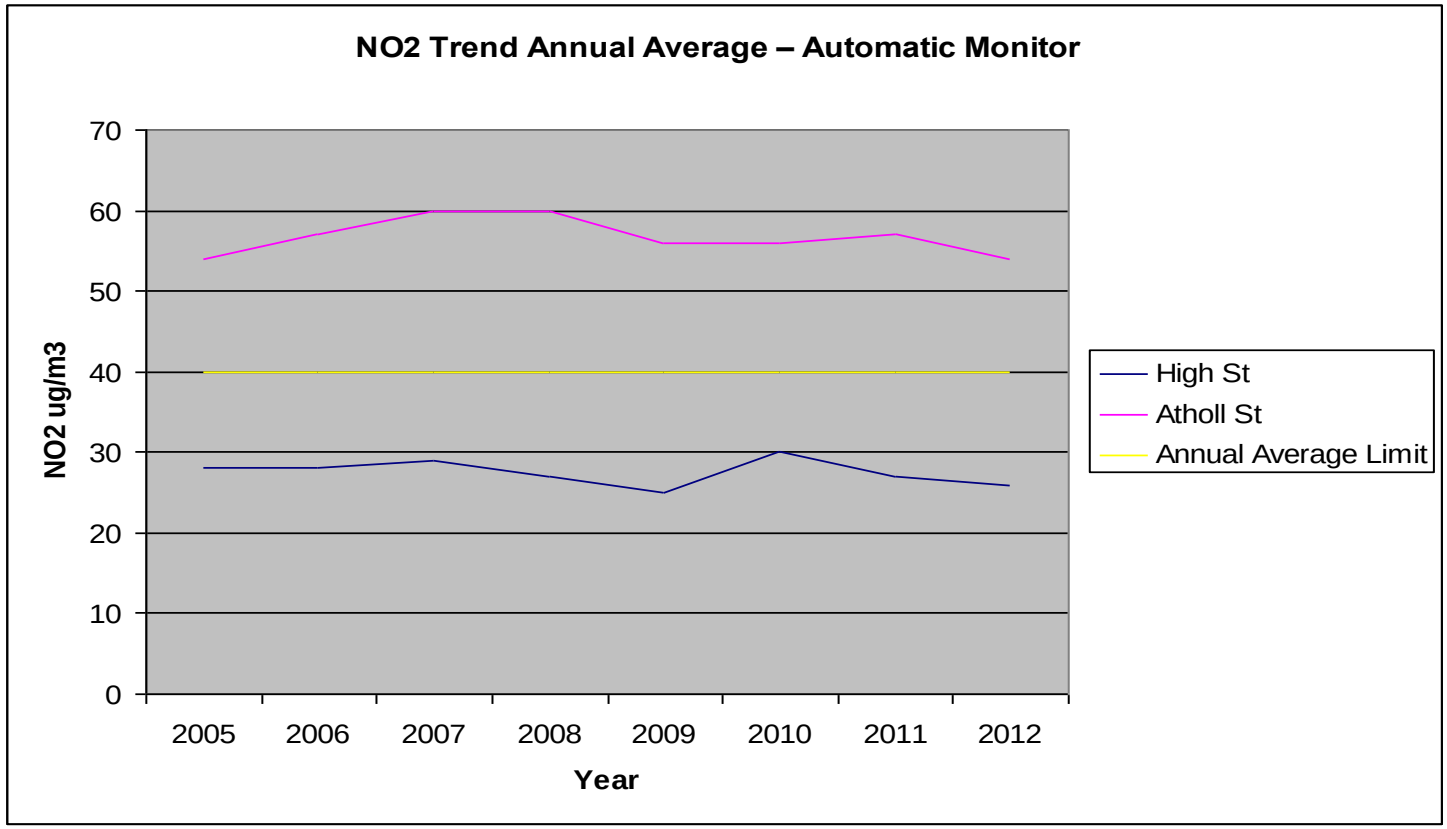
[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Figure 2.3 Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites



Nitrogen dioxide shows no significant trend.

Table 2.4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 % [b]	Number of Exceedances of Hourly Mean (200 μg/m^3)				
				2008*[c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
Perth1	Roadside	Yes	98.2	1	0	0	2	0
Perth 2	Roadside	Yes	94.3	25	3	10	17	25
Crieff	Roadside	NO	80.1				0	0

Diffusion Tube Monitoring Data

Table 2.5a Results of NO_2 Diffusion Tubes 2012 Perth

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2012 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 ($\mu g/m^3$)
P1	42 Scott St	R	Y	Triplicate	92	N/A	N	**44** (42 -45)
P2	17 Speygate	UC	Y	N/A	100	N/A	N	25 (24 - 26)
P3	15 Murray Cr	UB	Y	N/A	100	N/A	N	21 (21 - 22)
P5	8 Stormont St	UC	Y	N/A	100	N/A	N	23 (22 - 24)
P6	41 Mull Pl	UB	Y	N/A	100	N/A	N	14 (13 - 14)
P7	257 Rannoch Rd	UC	Y	N/A	100	N/A	N	20 (19 - 20)
P13	86 South St	R	Y	N/A	100	N/A	N	39 (37 - 40)
P19	Dunkeld Rd	R	Y	N/A	92	N/A	N	36 (34 - 37)
P20	2 Crieff Rd	R	Y	N/A	100	N/A	N	30 (29 - 32)
P28	28 York Place	R	Y	N/A	100	N/A	N	**44** (43 - 46)
P29	37 York Place	R	Y	N/A	100	N/A	N	39 (38 - 41)
P30	104 South St	R	Y	Triplicate	100	N/A	N	**41** (39 - 42)
P31	45-47 South St	R	Y	N/A	92	N/A	N	31 (29 - 32)
P32	135 South St	R	Y	N/A	100	N/A	N	39 (37 - 41)
P33	216 South St	R	Y	N/A	100	N/A	N	**40** (38 - 41)
P34	10 County Pl	R	Y	N/A	92	N/A	N	**51** (49 - 53)
P35	17 Princes St	R	Y	N/A	100	N/A	N	29 (28 - 30)

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2012 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 (μg/m^3)
P36	51 Glasgow Rd	R	Y	N/A	100	N/A	N	35 (33 - 36)
P37	Riggs Rd	R	Y	N/A	100	N/A	N	30 (29 - 31)
P38	93 Main St Bridgend	R	Y	N/A	100	N/A	N	31 (30 - 33)
P39	39 Main St Bridgend	R	Y	N/A	100	N/A	N	**48** (46 - 50)
P40	18 Main St Bridgend	R	Y	N/A	100	N/A	N	**47** (45 - 49)
P41	76 Atholl St	R	Y	N/A	83	N/A	N	**55** (53 - 57)
P42	26-28 Atholl St	K	Y	N/A	100	N/A	N	**52** (50 - 54)
P43	17 Atholl St	R	Y	Triplicate	100	N/A	N	**55** (53 - 58)
P44	22 Barrack St	K	Y	N/A	96	N/A	N	**47** (45 - 49)
P45	Ballantine Pl	UC	Y	N/A	100	N/A	N	26 (25 - 27)
P46	204 Crieff Rd	R	Y	N/A	100	N/A	N	35 (34 - 36)
P47	5 East Huntingtower	R	N	N/A	100	N/A	N	25 (24 - 26)
P48	30 Edinburgh Rd	R	Y	N/A	100	N/A	N	26 (25 - 27)
P51	2 West Bridge St	R	Y	N/A	100	N/A	N	32 (30 - 33)
P54	176 High St RTM	UC	Y	Collocated	100	N/A	N	27 (26 – 28)
P61	Atholl St RTM	R	Y	Collocated	100	N/A	N	**55** (50 - 60
P62	84 Dundee Rd	R	Y	N/A	100	N/A	N	34 (33 - 35)
P63	30 Dundee Rd	R	Y	N/A	100	N/A	N	39 (38 - 41)
P64	Isla Rd	R	Y	N/A	100	N/A	N	**49** (47 - 51)

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2012 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 (μg/m^3)
P65	5 Charlotte St	R	Y	N/A	100	N/A	N	33 (32 - 34)
P67	1 Atholl St	R	Y	N/A	100	N/A	N	**41** (39 - 42)
P68	2 Atholl St	R	Y	N/A	100	N/A	N	33 (32 - 34)
P69	Church Kinnoull St	R	Y	N/A	100	N/A	N	37 (36 - 39)
P70	28 Dunkeld Rd	R	Y	N/A	100	N/A	N	36 (34 - 37)
P71	134 Dunkeld Rd	R	Y	N/A	100	N/A	N	19 (19 - 20)
P72	82 Crieff Rd	R	Y	N/A	100	N/A	N	**40** (38 - 42)
P79	17 Main St Bridgend	R	Y	Triplicate	92	N/A	N	**40** (39 - 41)
P86	2 Friarton Road	R	Y	N/A	42	Y	N	30 (29 - 31) *
P88	202 Glasgow Road	R	Y	N/A	42	Y	N	**41** (39 - 43)*
P89	59 South Methven St	R	Y	N/A	42	Y	N	**41** (39 - 43)*
P90	22 North Methven St	R	Y	N/A	42	Y	N	**45** (43 - 47)*

* Annualised using the 5 month figure Table A.2 Appendix 1

Table 2.5b Results of NO_2 Diffusion Tubes 2012 Glencarse

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 (μg/m^3)
P49	Opp Wood'n Garden, Glencarse	R	N	N/A	92	N/A	N	24 (23 - 25)
P50	Linden Garden Centre, Glencarse	R	N	N/A	92	N/A	N	24 (23 - 25)

Table 2.5c Results of NO_2 Diffusion Tubes 2012 Dunkeld

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 (μg/m^3)
P84	1 Atholl St	R	N	N/A	67	Y	N	22 (21 - 23)**
P85	14 Atholl St	R	N	N/A	67	Y	N	20 (19 - 20)**

Table 2.5d Results of NO_2 Diffusion Tubes 2012 Auchterarder

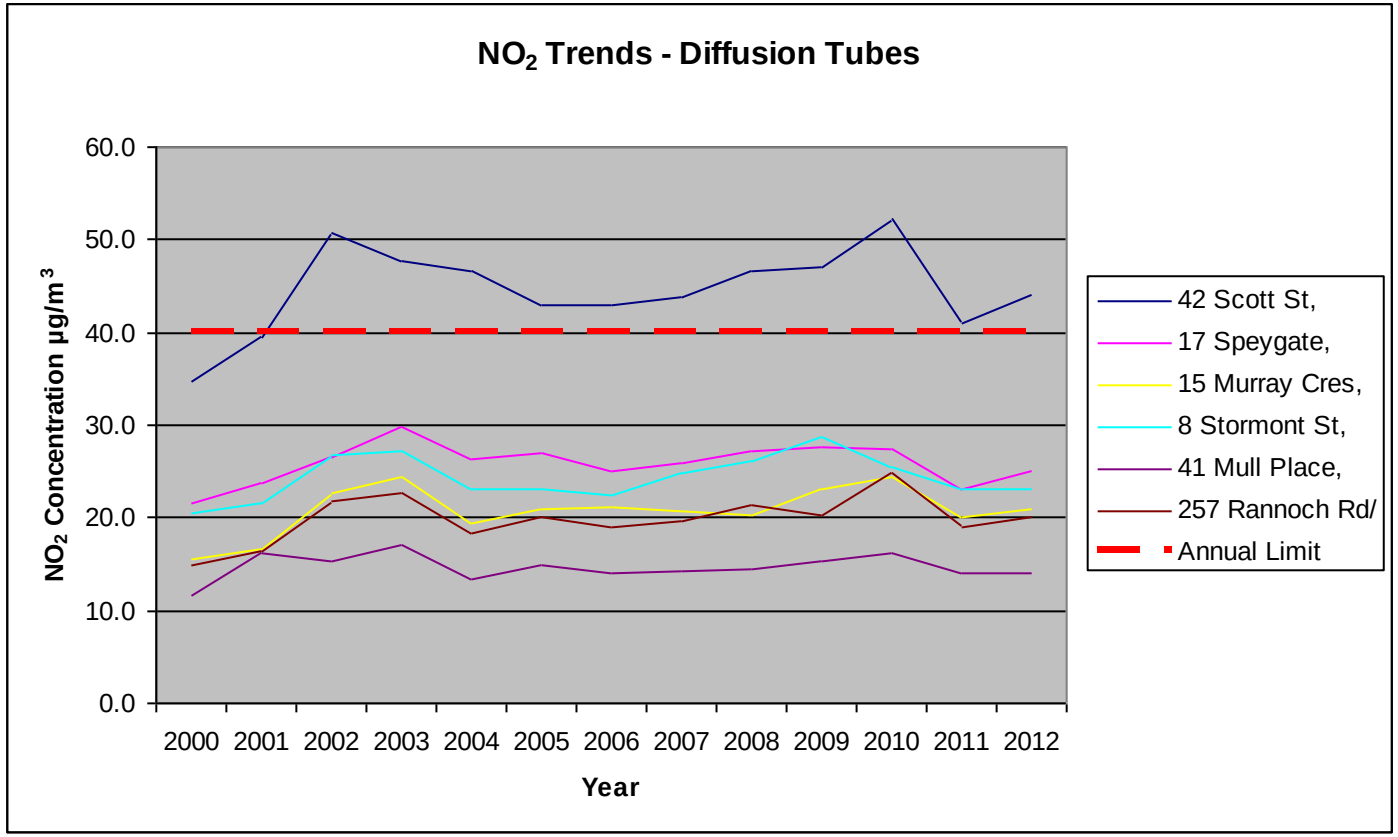
Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 ($\mu g/m^3$)
P82	66 High St	R	N	N/A	67	Y	N	29 (28 - 30)**
P83	176 High St	R	N	N/A	67	Y	N	24 (23 - 25)**

** Annualised using the 8 months figure Table A.1 Appendix 1

Table 2.5e Results of NO_2 Diffusion Tubes 2012 Crieff

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.99)
								2012 ($\mu g/m^3$)
P55	7 West High St	R	N	N/A	83	N/A	N	**52** (50 - 54)
P56	39, High St	R	N	N/A	92	N/A	N	35 (34 - 36)
P57	62, High St	R	N	N/A	92	N/A	N	31 (30 - 32)
P58	9 East High St	R	N	N/A	92	N/A	N	**41** (39 - 42)
P73	19 West High Street	R	N	N/A	92	N/A	N	**42** (41 - 44)
P74	43 High Street	R	N	N/A	92	N/A	N	32 (31 - 34)
P75L	Crieff RTM	R	N	N/A	92	N/A	N	24 (20 – 29)
P76	10/12 West High Street	R	N	N/A	92	N/A	N	39 (37 - 40)
P77	9 Comrie Street	R	N	N/A	92	N/A	N	21 (20 - 22)
P78	1 Lodge Street	R	N	N/A	92	N/A	N	26 (25 - 27)

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



This chart shows the original diffusion tubes which are still in use today and show no major upward or downward trend.

2.2.2 Particulate Matter (PM_{10})

Table 2.6 Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2012 %[b]	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
					2008*[c]	2009*[c]	2010*[c]	2011*[c]	2012[c]
Perth1	Roadside	Y	98.2	Y	20	16	19	19	15
Perth2	Roadside	Y	94.3	Y	26	21	24	25	21
Perth3	UB	Y	37.1	Y					8
Crieff	Roadside	No	88.1	Y			17	19	16

Figure 2.5 Trends in Annual Mean PM_{10} Concentrations

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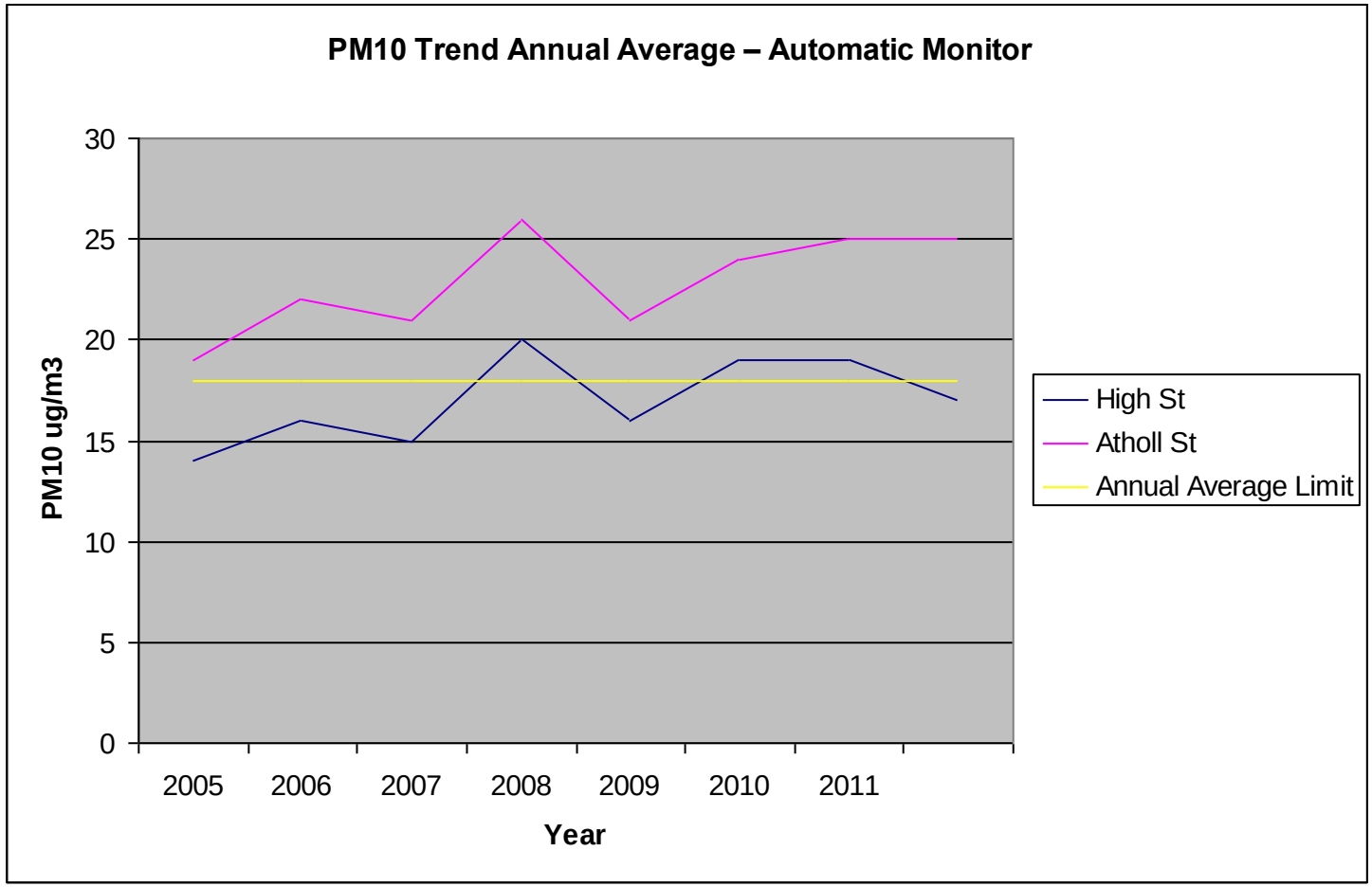


Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %[a]	Valid Data Capture 2012 %[b]	Confirm Gravimetric Equivalent	Number of Exceedances of 24-Hour Mean (50 μg/m^3)				
						2008*	2009*	2010*	2011*	2012
Perth1	Roadside	Y		98.2	Y	0	2	3	3	2
Perth2	Roadside	Y		94.3	Y	5	3	12	17	11
Perth3	UB	Y		37.1	Y					0
Crieff	Roadside	N		88.1	Y				0	1

2.2.3 Sulphur Dioxide (SO_2)

Pollutant not monitored.

2.2.4 Benzene

Pollutant not monitored.

2.2.5 Other Pollutants Monitored

No other pollutants monitored.

2.2.6 Summary of Compliance with AQS Objectives

Perth and Kinross Council has examined the results from monitoring in the district.

Concentrations within the AQMA still exceed the annual average standards for NO_2 and PM_{10} in Perth and the AQMA should remain.

Concentrations outside of the AQMA are all exceeding the objectives at relevant locations, and a Detailed Assessment has been produced and we are in the process of consultation regarding declaring an AQMA

3 New Local Developments

3.1 Road Traffic Sources

There are no newly identified road traffic sources.

3.2 Other Transport Sources

There are no new transport sources.

3.3 Industrial Sources

There is an increase in the number of hens at mains of Duncrub Poultry Farm, this was accompanied by an air quality assessment and no significant increase was predicted.

3.4 Commercial and Domestic Sources

Biomass boilers are assessed at the planning stage and none were predicted to significantly impact on local air quality after mitigation.

3.5 New Developments with Fugitive or Uncontrolled Sources

None

Perth and Kinross 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.

Perth and Kinross Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

Perth & Kinross Council declared the whole of Perth an Air Quality Management Area in May 2006 and our Air Quality Action Plan was approved by Scottish Government and adopted by the Council in 2009. However Perth & Kinross Council had started to implement some of the measures within our AQAP before it was actually adopted by the Council, measures such as Park and Ride Schemes, Healthy Living Campaign, Considering Air Quality in Planning Decisions, School Travel Plans and Car and Lift Share Schemes. Perth and Kinross Council have continued with these measures in 2010 and have made progress on others such as the Freight Consolidation Centre in conjunction with TACTRAN and fitting particulate traps to school buses and refuse vehicles.

5 Planning Applications

Perth and Kinross Council have had several planning applications with the potential to affect local air quality in the last year, the most significant of which are detailed below.

- 11/01579/FLL was an application for a new A9/A85 junction and link road and no significant adverse impacts to air quality were predicted from this development. An associated scoping query for an extension west of this road has been replied to by the Environmental Health Team, and the impacts to air quality arising from this will be suitably assessed and mitigated.
- 11/00788/AMM is the application for an Energy from Waste Gasification plant on Shore Rd, Perth and has been on-going for some time. The original air quality assessment was greatly deficient, however the applicant consultants and consultants working for the Perth and Kinross Council agreed on an updated assessment which contributes of over 2ugm^{-3} of NO_2 to ambient levels on Dundee Rd, an area already exceeding the standard. The application was refused at committee and was subsequently appealed as an Inquiry, the outcome of which was the appeal was dismissed, partially on air quality grounds.
- 12/00378/FLL was an application for a biomass boiler at a hotel in Dunkeld. The stack servicing the boiler was only 6 metres high but located less than 5 metres from a 2 story house. Environmental Health objected to the application due to the short stack and proximity to residential receptors and it was subsequently agreed that the application be resubmitted with an acceptable 8 metre stack.
- 12/00964/IPM was for a large supermarket sited on Crieff Rd, the second in the area. The air quality assessment predicted an increase of 0.83ugm^{-3} in PM_{10} along roads already exceeding the standard therefore Environmental Health objected to this application and it was subsequently refused at Committee.
- 12/01664/FLL was an application for a 198kW biomass boiler adjacent to the bus station in an area thought to be exceeding the PM_{10} standard. Environmental Health requested a detailed assessment of the boiler initially

however after the applicant offered to install ceramic filters with a 96% PM_{10} removal efficiency, this proviso was dropped subject to conditions.

- 12/01692/IPL was a mixed use development along Glasgow Road, Perth and this was supported by an air quality assessment. There were flaws in the assessment showing impacts to be unacceptably high. A second air quality assessment was done which was much more in depth and subsequently the predicted levels were much more acceptable allowing Environmental Health to support the application subject to further conditions.
- 12/02018/FLL was an application which includes provision for a supermarket and the relocation of the park and ride facility in Scone. The application was originally submitted in 2009; however a updated traffic and air quality assessments were requested to quantify the complex air quality effects resulting from this application at one of our worst hot spots, Bridgend.

6 Air Quality Planning Policies

The Perth & Kinross Structure Plan, approved by Scottish Ministers in June 2003, is the key strategic land-use planning document which guides the development of Perth & Kinross to 2020.
The Structure Plan provides the framework for local plans which contain more detailed and site-specific policies. The Plan is based on three themes-

- Building Sustainable Communities
- Creating a Sustainable Economy
- Sustaining the Environment and Resources

Perth and Kinross has six Local Plans:

- Eastern Area
- Highland Area
- Kinross Area
- Perth Central
- Perth Area
- Strathearn Area

The Council under the new Planning Act has produced a Local Development Plan and a Main Issue Report (MIR) in October 2010. This document will cover the entire Council area and when adopted will replace the current Local Plans.

The MIR is the first stage in the process and will be followed by the production of the Proposed Local Development Plan. The MIR is not a decision making document but was produced to stimulate discussion on the key issues that the LDP will require to address. Issues such as Climate Change section 4.5 of the document and page 151 addresses proposed thoughts on direction of air quality policy.
www.pkc.gov.uk/mainissuesreport

The Structure Plan will in time also be replaced by a Strategic Development Plan which will be called the TAYplan and this will cover Angus, Dundee, part of the North East of Fife and Perth & Kinross (except those areas within the National Parks)

A proposed TAYplan is due to be published for consultation on 6 June 2011. Following the consultation the representations will be considered, modifications may be made before the plan is sent to Scottish Ministers by January 2012 for them to decide if an examination is required.

The Environment Service is consultants for Perth and Kinross Planning Authority and the Service make recommendations with regards to air quality and dust issues.

7 Local Transport Plans and Strategies

Transport policy is governed by the National Transport Strategy (NTS), produced by the Scottish Government. This sets out the priorities that the Scottish Government has for transport as a whole across the country. Regional policy is set by Regional Transport Partnerships (RTPs). Perth & Kinross Council is a member of TACTRAN the RTP that covers the Angus, Dundee City, Stirling and Perth & Kinross Council areas. TACTRAN produce a Regional Transport Strategy (RTS) that covers a 15 year period and is refreshed every four years.

Local policies and strategies must take account of the NTS and the RTS as well as the Development Plans drawn up by the Planning Service that look at land use issues. Current policy issues that the Transport Planning team has been considering include the following.

- A possible third Tay Crossing
- Improvements to the A9/A85 junction at Newhouse Road
- The development of the Perth Western Edge
- Wider transport issues in Perth City
- The possible redevelopment of the Railway and Bus Stations in Perth
- The possibility of more Park and Ride Sites around Perth
- Improved rail services between Inverness, Perth and Edinburgh

These policies and strategies all have to be appraised and evaluated according to procedures set down by the Scottish Government's transport agency Transport Scotland. In order for any proposed scheme to qualify for Government money, then the appraisal process known as the Scottish Transport Appraisal Guidance (STAG) must be carried out. This sets out a very rigorous evidence based appraisal programme that should be followed before any proposed scheme can be taken forward towards the implementation stages.

The Environment Service AQ team is consulted through out the appraisal programme procedure and has secured funding through our AQ budget for certain initiatives that are within our AQAP.

The Transport Planning team also tries to predict the future growth of traffic on the transport network using transport modelling software such as S -Paramics to determine where future bottlenecks might occur. This information is then used to help determine future strategies for transport within Perth and Kinross.

8 Climate Change Strategies

The Council signed up to Scotland's Climate Change Declaration (SCCD) in January 2007. In June 2008, the Council produced its first annual progress report on delivering the commitments made in the Declaration - Perth & Kinross Council: Scotland's Climate Change Declaration - Annual Report 2008. The Council has made progress on all seven commitments, particularly in relation to reducing greenhouse gas emissions from its own operations, through the Council's Carbon Management Strategy & Implementation Plan 2007-2017. This has been recognized by the Council achieving certification of the Carbon Trust Standard in January 2009.

The Council has also recently produced a Local Climate Impacts Profile (LCLIP) to increase the awareness of local climate change and adaptation that is likely to be required in Perth & Kinross. Perth & Kinross Council - LCLIP

9 Implementation of Action Plans

Table 9.1 Action Plan Progress

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Cross Tay Link	New crossing of the Tay linking the A9 to the A94 north of Scone, including a package of associated bus priority, cycle and pedestrian measures 'locking in the benefits' to Perth city centre	PKC Tactran Transport Scotland		2009- ongoing to circa 2018	It is not possible at this stage to assign a quantitative indicator. We will report outputs of feasibility work/ air quality assessments as they arise and update timescales as appropriate	High	STAG report and summary strategy paper finalised& public consultation carried out 2010/11 Final consultation report & SEA Environmental Addendum published in 2011 Special Council meeting held in 2012 'Shaping Perth's Future' and council decided to take process to the next stage	STAGE 2 DMRB Assessment & SEA is under way Work is also progressing on the A9 & A85 junction. A Project board has been set up to carry out this work including CPO. This also includes the 1st part of CTLR work	2018	

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Integrate AQ into Regional Transport Strategy	Ensure that this AQAP is integrated into the delivery of the Regional Transport Strategy	PKC Tactran		2009/10 and as RTS is delivered	We will report annually on our meetings with TACTRAN, and provide a discussion as to how the AQAP is influencing delivery of the RTS	Medium-High	AQ considerations are influencing RTS delivery, in past 3years. Studies have been commissioned into feasibility of a freight consolidation centre for Perth, development of proposals for a trial scheme, development and submission of a bid for EU funding for implementation, and tendering for a private sector operator	PKC and Tactran continue to work in conjunction to ensure AQ is considered in the RTS in projects such as freight consolidation, park & rides, liftshare, walking &cycling initiatives	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Integrate AQ into Local Transport Strategy	Ensure that this AQAP is integrated into the delivery of the Local Transport Strategy. A new strategy is being developed so there is an opportunity to integrate AQ fully into this	PKC		LTS published by year 3 of this AQAP, then ongoing implementation of schemes	This is a strategic option but we will report on development of the new LTS and comment on specific air quality provisions contained in it. As the Strategy unfolds we may need to reassess this measure and make it more specific.	Medium-High	Transport Strategy for Perth and the wider region document published October 2010. The LTS preferred strategy is one of an Integrated approach and air quality is on of the Strategy objectives ' To work towards meeting national air quality standards and prevent further breach/exceedance & 'To reduce transport emissions which contribute to climate change, in line with National Guidance'.	Environmental Health Team continues to attend workshops and meetings with PKC's Transport planning Team for projects such as Perth City Centre Traffic, Shaping Perth's Transport Future and Perth Public Transport Interchange Study	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Park and Ride	Operate existing Park and Ride schemes and maintain high levels of usage. We will carry out intermittent surveys to assess vehicles using the site.	PKC		2009- Ongoing	Annual usage statistics. A calculation of avoided NOx/PM10 will be provided Annually.	Medium	The passenger waiting facility constructed at the Broxden P&R site for both P&R users and Megabus passengers, which is manned by Megabus staff, has been well received by the general public. Electric car charging points have been installed at the Broxden and Kinross P&R sites and these will be commissioned in summer 2013	The Broxden P&R bus service was retendered and since August 2012 has been operated by Stagecoach Perth. The timetable was amended to reflect demand and fares revised: passengers now benefit by being able to use Stagecoach network tickets(Dayrider & Megarider) Monthly usage of P&R from September 2012 to March 2013 was 11,802 passengers per month Monday to Saturday	Ongoing	Avoided NOx was 23.051 g/km Avoided PM10 was 2.919 g/km

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Investigate a new Park and Ride/ Park and Choose site at Walnut Grove, Perth	Tactran PKC		2009- ongoing to circa 2018 A feasibility study has been undertaken and detailed design work is in progress. More specific timescales are available in TACTRANS RTS Delivery Plan	We will report outputs of feasibility work/detailed design and air quality assessments led by TACTRAN as they arise and update timescales as appropriate	High	Investigations of the scope for implementing the project have been concluded and detailed design is in progress. A preferred site layout has been agreed Tactran, in partnership with PKC, commissioned consultants to investigate opportunities for bus priority to serve the site and to undertake detailed design of the P&R car park including access on to the trunk road. A preferred site layout has been agreed	Discussions are still on – going about the acquisition of the preferred site and the detailed design of the facility. Public transport options for serving the site are also under consideration, including how they may be funded	2018	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Programme of improvements to existing P7R sites(e.g. Better waiting areas, lighting etc)	PKC		2009-Ongoing	Report of any improvements made, tied into occupancy rate	Small	A passenger waiting facility has been constructed at Broxden P&R	5 electric car charging points have been installed at the Broxden P&R	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Bus Quality Improvements	Bus Strategy and Quality Bus Partnerships. PKC- Work with TACTRAN, operators and other relevant stakeholders to create a bus strategy for the region. TACTRAN – Work in partnership with Councils, bus operators and other relevant stakeholders to identify and deliver improvements to the quality and accessibility of vehicles, services and associated facilities across the Region, particularly	Tactran PKC		2009- ongoing to 2024 More specific timescales are available in TACTRAN RTS Delivery Plan/ capital and revenue programmes	Shift to alternative modes- this will be monitored by TACTRAN as part of the evaluation process of their RTS Delivery Plan.	Medium	Tactran conducted a feasibility study that reviewed and recommended potential options for Real Time passenger information system and possible links to an Urban Traffic Management Control System covering the Perth area	A review was undertaken of current public transport interchange provisions within the Perth City centre giving consideration to location; interchange between and within modes; quality of facility and accessibility by rail, bus ,walk and cycle Tactran have provided upgraded bus stop and shelter facilities on the Perth-Blairgowrie-corridor funded from 2012/13 capital programme.	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		across the Region, particularly maximising funding and grant opportunities in support of these measures							This has included design of an improved bus interchange at Wellmeadow in Blairgowrie		
		Ensure air quality is formally considered in future public transport procurement decisions (i.e. for subsidised public services, school buses, school taxis	Ensure air quality is formally considered in future public transport procurement decisions (i.e. for subsidised public services, school buses, school taxis		2009 then Ongoing (as contracts are renewed	Outcome of any procurement decisions. As cleaner vehicles come on stream, an annual calculation of the avoided NOx and PM10 will be provided.	Medium	The consideration of air quality within the procurement decision is still under review, due to the pressures of the current economic climate Although AQ is still not part of the procurement process, it has been noted that there is an improvement in fleet engine standards due to other Statutory requirements such as DGA.	No Progress	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Freight Improvements	Establish a TACTRAN-wide Freight Quality Partnership, in liaison with freight interests and Councils drawing upon established guidance, to help deliver cost effective packages of freight related interventions across the region	Tactran PKC		Ongoing to 2024 More specific timescales are available in TACTRAN RTS Delivery Plan/ capital and revenue programmes	PKC will seek regular updates from TACTRAN on progress and report on these annually	High	A Tactran-wide freight quality partnership has been formed including interest from PKC, Scottish Enterprise, and private sector freight Interests EH Manager is a member of the Freight Quality Partnership. AQ is integrated into Freight Quality Partnership. Dundee's Environmental manager is also now a member of the Freight Quality Partnership	Continue to attend meetings to ensure AQ is integrated into FQP	2024	

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Development of a freight consolidation scheme or commercial delivery strategy.	Tactran PKC		Feasibility work, subject to funding, will be carried out in Years 1 and 2 of this AQAP	Initially we will report on feasibility work as and when it is carried out. If developed we could use the number of vehicle km avoided to calculate Emissions savings.	Medium-High	Freight Consolidation A Feasibility Study was completed and a draft feasibility report published in January 2010 recommending a trial scheme. Detailed proposals for a trial scheme have been developed including consideration for supporting funding. Development and submission of a bid for EU funding for implementation, and tendering for a private sector operator	Further work has been carried out with Tactran and Consultants JMP. Procurement issues have now been resolved and PKC have decided that the tendering process should be carried out through competitive dialogue procurement. Advertisement for the intended tender for the project has been registered with OGC and Pre Qualifying Questionnaires posted. PKC, after	2014	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									agreement for the proposal from PKC's Environmental Committee, and Tactran put in a bid for match funding through EU INTERREG (LaMilo). This was approved in November 2012		

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Travel Planning	PKC Staff Travel Plan; including encouraging Flexible working, car/lift sharing/ alternative modes, salary sacrifice bicycle scheme	PKC		Initiated year 2 of this AQAP then ongoing	Activity data will be collected by survey to support the working of the PKC GTP. A base survey of staff travel habits will also be carried out. We will estimate vehicle km avoided in the AQMA and report reduced emissions of NOx and PM10	Medium	Staff Travel Plan was launched in September 2010 and a staff travel plan summary leaflet was produced along with a staff travel Plan web page. Events such as Walk to Work Week and Family bike events in Perth Promoted via PKC staff intranet.	Due to budget restraints, cuts were made in general sustainable transport budget. Therefore although the staff travel plan has been approved at SPR in 2010, no additional promotional work was carried out in 2012.The Lift share website and the Salary Sacrifice bike to work scheme are still continuing.	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		We will work with our regional partners to further encourage development and employee use of Green Travel Plans in our large Employers within Perth Kinross.	Tactran (through the Sustainable Travel Liaison Group) PKC		2009 then ongoing	Activity data will be sought from the main employers as to the journeys avoided from their GTPs. If this is provided will estimate vehicle km avoided in the AQMA and report reduction in emissions of NOx and PM10	Medium	Tactran has been represented on SSE's Travel Plan Steering Group and provided advice and promotional material. Perth College has also been given information and support of use of liftshare. Aviva, PRI and Murray Royal Hospital have been given advice and guidance in travel planning process and PRI provided with grants for travel planning measures.	Murray Royal Hospital given advice and guidance in travel planning process. Promotion of travel plan implementation software, tactran travelknowhow to support businesses developing and implementing travel plans.	Ongoing	A baseline is still being developed

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		We will continue to support schools in developing Green Travel Plans through our school co-ordinator and collect activity data to assess their use through our school co-ordinators.	PKC		2009 then ongoing	Survey data will be requested from PKC schools as to the journeys avoided from their GTPs. We will estimate vehicle km avoided in the AQMA and report reduction in emissions of NOx and PM10.	Medium	A number of schools have developed or are developing Green travel Plans. Grant funding was awarded in 2012 to support schools with travel plans and further funding was sought for further measures in 2013. 95.12% of schools have STPs with 100% working on STP activities	PKC receive official figures from Sustrans, on the Hands Up Survey, in June 2013 therefore are unable to comment on 2012 results	Ongoing	School Hands up Survey (current travel modes) will be carried out in September again with last years results due next in June

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Regional/ PKC Car and Lift Share schemes- there is both a wider scheme, and one specific to PKC employees. We will improve use of the PKC scheme through our own GTP	TACTRAN PKC		2009 then ongoing	Activity data will be collected annually from both schemes and we will estimate vehicle km avoided in the AQMA and report reduction in emissions of NOx and PM10.	Small-Medium	Further promotion was undertaken of the liftshare	Further promotion was undertaken of Liftshare including .PKC participation in national Liftshare week, taxi advertising and leaflet promotion through employers	Ongoing	A baseline is still being developed
		Green Travel Plans for new Developments. We will continue to seek travel plans from large developments under existing planning arrangements.	PKC		2009 then ongoing	Number of GTPs and estimation of effect specified in reporting year	Low	This is a continual process through planning developments e.g. Murray Royal Hospital had to provide travel plans at the initial application stage.	This is a continual process through planning developments	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Traffic Management	Keep "City Centre Traffic Management Review" under continual review. Our Traffic and Environmental teams will liaise regularly to discuss the effects of component measures of the CCTMR on air Quality	PKC		Ongoing as required	We will report annually on any changes to the CCTMR and how we anticipate this affecting air quality	Medium	20 Motes and 3 Gateways have been installed and running, however problems have occurred due to battery life issues. Data is now being collected but is still not validated. The Mote project is also linked in with Transport Scotland TANNOISE Project	Due to problems with data, Scoot system compatibility, PKC have invested, through SG funding, in a new Stratos (a new cloud based) UTMC Common database which will connect to the Envirowatch Mote System. PKC are in talks with Envirowatch and Strathclyde University to try and find a way forward to make data collected usable.	Ongoing	Due to problems with data collection and validation No base line can be established.

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Planning and AQ	Consider air quality as an issue for the Local Development Plan	PKC		2009-12	It is not possible to assign a quantitative Indicator. We will report on delivery of Local Development Plan, and provide evidence that air quality considerations have been formalised within it	Medium	PKC are holding workshops, Environmental Health is a stakeholder, for discussion on Air Quality.	Environmental health attended a general work shop with other stakeholders with regards to the proposed City Enhancement Package in connection to the Cross Tay-Link.	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Investigate development of supplementary planning guidance on air quality	PKC		2010-14	It is not possible to assign a quantitative indicator. We will report progress on development of new guidance, though it is explicitly linked to the forth coming LDP.	Small	Supplementary Planning guidance on air quality has been developed and is in draft form awaiting approval. There was a delay in this process in 2012.	Environmental health have worked closely with PKC planning authority to develop supplementary planning guidance on air quality and a draft documents has been written and is awaiting approval.	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Consider air quality in planning decisions and formalise decision making process/ interaction with Environmental Health. This can relate not only to new transportation sources, but also to new biomass installations or industrial sources.	PKC		Ongoing as required	It is not possible to assign a quantitative indicator. We will report on cases where air quality was a consideration in the reporting period, and the outcome of any decisions made.	Low	Environmental Health will continue to check the weekly planning list and comment on applications which may adversely impact on local air quality	Environmental Health continue to check weekly planning list and comment on applications which may adversely impact on local air quality Such as planning application 11/00788/AMM for the formation of Waste to energy facility for Grundon Waste Management Ltd was refused planning permission on the ground of amenity on noise, odour and air quality. Awaiting Appeal Deceision	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Decision from Scottish Reporter. Planning application 12/01692/IPL for a mixed used development along Glasgow Road in Perth was requested to resubmit AQ assessment when failings were highlighted in original submission		

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
0	Procurement and AQ	AQ will be formally considered in the tender process for new PKC vehicles. PKC currently specify a more stringent Euro standard than necessary. A fleet survey will be necessary in the short term to establish the baseline for improvement	PKC		Fleet survey in year 1 of AQAP, then on going as tenders arise as part of the standard specification	If vehicles are replaced like for like, the number will be reported annually, with their Euro standard and that of the vehicle replaced. This will be fed into an emissions calculation and the saving in NO_x and PM_{10} will be reported annually. If additional vehicles bought, Euro standards will be reported and an estimation of impact of specifying a more stringent standards will be reported	Small - Medium	PKC through funding have installed electric points at all council Operations depots 10 Euro 3 refuse vehicles have been fitted with Pirelli Feelpure diesel particulate systems reducing vehicle particulate emissions by up to 95% bringing them into line with Euro 4 PKC to date have purchased: 4 electric cars-Nissan Leafs;4 Hybrid transits;1 electric Peugeot Boxer and 1 electric minibus	25 vehicles purchased under 3500kgs with a move from Euro 3 to Euro 5 11 vehicles over 3500kgs purchased with a move from Euro 3 to Euro 5 7 Heavy Plant items purchased with a move from Tier3 to Tier4	Ongoing	Overall initiative will save around 114kg of harmful street side particulate emissions per annum

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Eco-driver Training	PKC will seek to expand the existing provision of eco-driver training by utilising the newly formed training team to develop and add an eco-driving training course into our existing modular training syllabus. The eco-driving module will become part of our regular driver CPC training package which will be delivered to all LGV drivers on an ongoing	PKC		Expanded programme by 2011 then ongoing	PKC intend to assess drivers after they have completed the training. The outcomes of these assessments (i.e. the fuel saving per driver) will allow simple calculation of avoided emissions of NOx and PM_{10}.		4 Trainers have been trained PKC have now been licensed to deliver Drivers CPC Programme this was rolled out in September 2011. PKC won the tender to deliver CPC Training to Angus PKC now run an in house, Service need, LGV Training Centre. PKC now have a Qualified LGV driving instructor to deliver LGV Training to staff.	PKC continues to deliver Drivers CPC Programme to PKC Staff and Angus.	Ongoing	Due to limited resources and issues with the recording system , fuels record figures have not been progressed , due to inaccurate figures

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		basis. The eco-module will also form part of future training modules for all council drivers as part of the driver assessment programme, which will also cover the driver's responsibilities on legislation and what pre-use vehicle checks need to be carried out and documented									

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
2	Provision of Travel Information	Develop, promote and maintain a comprehensive Travel Information System, covering all modes and users and make this information available in on-line formats. Delivered through TACT Ran's Regional Travel Information Strategy.	TACTRAN PKC		Study/develop strategy by 2011 Specific measures ongoing to circa 2018.	We will liaise with TACTRAN and report annually on the findings of the feasibility work. As initiatives are implemented we will report progress on these individually.	Medium	A web – based regional travel information database and journey planner (tactran connect)was developed in May 2010 and will be upgraded over time	Further developments of tactranconnect including provision of information for logistics sector/lorry drivers	Ongoing	
3	Signage	Investigate the potential of Variable Message Signage linked to pollution monitoring systems.	PKC		Feasibility work by 2011	We will report annually the findings of any feasibility work that is carried out and develop the measure further based on their findings.	Medium	No progress	No progress in this area at this time.		

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Alternative Modes	Work closely with TACTRAN to aid delivery of the Walking and Cycling Strategy for the region to ensure walking and cycling are part of an integrated transport system.	TACTRAN PKC		Initial study- 2009/10 Ongoing liaison/review	We will liaise with TACTRAN annually and report progress with individual measures implemented under the Strategy	Medium	Cycle training provided to staff and production of walking and cycling maps has been undertaken. Grant funding has been awarded this year for a variety of walking , cycling and travel planning initiatives Tactran has supported financially the provision of cycle lockers in Perth schools.	SG grant funding was attained for a number of walking/cycling initiatives including training and safety events	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implemen-tation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
5	Better Access to public Transport (note: access to services, not person access to individual buses)	Work with planning colleagues to assess provision of public transport at new and existing developments	PKC		2009 then Ongoing	We will report on findings of reviews and any improvements made to the existing public transport network and on new developments that have been given public transport facilities.	Small	Improvement of operation of Service 11 which operates between Murray Royal and Perth City Centre has been completed, with the addition of two bus shelters along the route at Bridgend/Dundee Road and promotional publicity for SSE and Aviva bus routes.		Ongoing	
6	Idling Emissions reduction	Enforce Vehicle Idling Regulations	PKC		Feasibility study 2010	Number of vehicles subject to enforcement.	Small	No Progress	No Progress		
7	Roadside Emission Testing	Authorised Personnel to carry out roadside testing	PKC initially		Feasibility study involving surrounding Local Authorities by end 2010	Number of vehicles subject to enforcement	Small	No progress	No Progress		

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
3	LAQM Marketing	Enhance existing provisions of publicity materials and ensure they reach their target audience. Organise publicity initiatives in schools, large employers, public sector.	PKC		Commence 2009, then ongoing	Publication of materials, events held website statistics.	Small-Medium	PKC AQ website was ranked one of the Top 5 (LA) website in the UK by Air quality Bulletin Magazine The AQ website has had over 5,000 hits over the year. PKC are constantly updating data and improving the site when possible	2013 SG funding has been obtained to carry out a social marketing campaign within one of our hot spot areas, the Bridgend corridor.	Ongoing	

.	Measure	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
9	LAQM Monitoring and Reporting	PKC will continue to monitor air pollution in the City and will meet its statutory reporting requirements.	PKC		Ongoing	Monitoring data will be provided in annual progress reports to track the overall effect of the AQAP.	Small	2012 USA Report Completed PKC through funding from SG carried out Freight/ Pedestrian and cycle counts in 2011 Data collected was used to carry out an up to date dispersion model by our consultants AEA for Perth City Centre. The results from this modelling will be used to review AQAP. It was also established that local PM 10 background monitoring is required and with SG 2012/13 funding PKC intend to install PM 10 background Monitor.	RTM for background PM_{10} installed in North Muirton end of 2012. Review of AQAP is still to be carried out.	Ongoing	

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

Perth

Diffusion tube data captured within Perth's AQMA show exceedances at 19 locations; this is an increase from 15 identified in the 2012 Updating and Screening Assessment, this is due in the main to an increase in the bias adjustment factor from 0.92 to 0.99.

The automatic monitor at Atholl St show a slight decrease from 57 µg/ m^3 to 54 µg/ m^3 for the annual average; however the number of times the hourly limit was breached increased again from 17 to 25 showing this is still Perth's main hot spot for NO_2.

The Automatic Monitor located on High St shows a slight decrease from 27 µg/ m^3 to 26 µg/ m^3 for the annual mean NO_2 objective and the number of exceedances of the hourly limit decreased to 0.

PM_{10} data at Atholl St and High St shows a decrease with Atholl St decreasing from 25 to 21 µg/m^3 and High St decreasing from 19 to 15 µg/m^3. This is thought to be as part of a regional or national trend as PM_{10} data for Crieff has also dropped from 19-16 µg/m^3

The number of daily exceedances at Atholl Street is again above the Scottish Objective of 7 as it has been for the 2 years previous. This was written off as a short term episodic occurrence, and this year is thought to be the same, caused by transboundary episodes. With the help of AEA we have done some work showing the movement of air masses on the exceedance days to support our conclusion, this is presented in Appendix C.

The short term standard of NO_2 was for the first time also exceeded in 2012; however it would be rash to amend our AQMA Order on the basis of one year's exceedance. Recent changes to the traffic signals on Atholl St also appear to have had a positive effect on the hourly NO_2 values in the short term, which may go some way to preventing this standard being breached this year.

Outwith Perth

Due to previous roadside exceedances at West High St, Crieff, a real time monitor was installed at St James Square in April 2010. This is a reasonably open area so does not represent a worst case scenario. The annual average NO_2 objective levels here were 34 µg/m^3 with no exceedances of the hourly limit in 2011. This has dropped considerably in 2012 to 23 µg/m^3, the reason for this steep decrease is not entirely clear however it is thought to relate to little data being collected from January to March 2012, this is supported by the fact that there is no decrease in the annual mean NO_2 levels reported from the diffusion tubes here

The PM_{10} annual average value was 16 µg/m^3 a reduction from 19, however as noted above this is thought to be part of a national or regional trend. The numbers of tubes showing exceedances, out with Perth, is now at 3, all of which are in Crieff.

A number of diffusion tubes were installed in towns throughout the area, most of which have not had any monitoring before. None of these tubes indicated any problems; however they have only been in place for 8 months.

10.2 Conclusions relating to New Local Developments

The mixed use development at Broxden (12/01692/IPL) described above will have the effect of increasing traffic on this corridor. There is currently little monitoring done here, however an extra diffusion tube has been installed. Cognisance should be paid to installing more if this development should be commenced

10.3 Other Conclusions

The A85 corridor through Crieff has undergone a detailed assessment which confirmed exceedances of both PM_{10} and NO_2 annual mean standard and concluded an AQMA should be declared. Proposals for the consultation of the extent of the AQMA are currently awaiting committee approval and it is anticipated that this section of Crieff should be declare an AQMA later this year.

Transport planning colleagues are undertaking extensive traffic counts and modelling in Crieff which will inform our Further Assessment and help inform our action plan, which we will begin after declaration has been completed.

10.4 Proposed Actions

Monitoring data in Perth has shown little change in levels of PM_{10} and NO_2, therefore the AQMA should stay in place.

Monitoring data in Crieff also continues to show issues along the High St Corridor and as noted above the declaration of this part of Crieff as an AQMA is underway. Perth and Kinross Council will consult on this over the next few months then proceed to Further Assessment and subsequently the formulation of an Air Quality Action Plan.

Monitoring data out with Perth and Crieff has not shown any issues but we will continue to monitor in Kinross, Auchterarder, Glencarse and Dunkeld for a further year before reconsidering their placement.

11 References

Part IV of the Environment Act 1995. Local Air Quality Management Technical Guidance LAQM.TG (03) January 2003.

The Air Quality Regulations (2000) and the Air Quality (Scotland) Amendment Regulations 2002

Department for Environment, Food and Rural Affairs, Air Quality Strategy for England, Scotland Wales and Northern Ireland, 2007

Department for Environment, Food and Rural Affairs, (2009) Local Air Quality Management Technical Guidance LAQM.TG (09)

Spreadsheet of Bias Adjustment Factors accessed at http://laqm.defra.gov.uk/documents/Diffusion_Tube_Bias_Factors_v04_11_v6.xls

UK National Air Quality Information Archive, accessed at http://uk-air.defra.gov.uk/

Air Quality Detailed Assessment. 2004, AEA Technology plc, Report AEAT/ENV/R1708 Issue 1

Air Quality Updating and Screening Assessment 2006, AEA Technology plc Report AEAT/ENV/R2256 issue 2

Further Assessment of Air Quality 2007 AEA Technology plc Report AEA/ED49360001 issue 1

Perth & Kinross Council Progress Report 2007, 2008, 2010 &2011

Perth & Kinross Council Updating and Screening Assessment 2012

Regional Transport Strategy http://www.tactran.gov.uk/documents/TACTRANRTS-FinalNov2008.pdf

National Transport Strategy
http://www.scotland.gov.uk/Publications/2006/12/04104414/0

Scotland's Climate Change Declaration (SCCD) Perth and Kinross Council's first annual progress report http://www.sustainable-scotland.net/documents/6703_annual%20progress%20report.pdf

Perth and Kinross Local Climate Impacts Profile (LCLIP)
http://www.pkc.gov.uk/NR/rdonlyres/E590425C-2665-4D13-B8DD-B70C659B3080/0/PerthandKinrossLocalClimateImpactProfile2008_w.pdf

HSL (on behalf of Defra and the Devolved Administrators), WASP – Annual Performance Criteria for NO2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 116-119 (http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html)April 2012

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix B: Diffusion Tube Raw Data

Appendix C: Air Mass Flows on PM_{10} Daily Exceedance Days

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Factor from Local Co-location Studies

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	04/01/2012	01/02/2012	60.9	73.2	69.6	68	6.3	9	15.7	68	96	Good	Good
2	01/02/2012	29/02/2012		69.1	60.2	65	6.3	10	56.5	68	100	Good	Good
3	29/02/2012	28/03/2012	68.3	69.4	70.6	69	1.2	2	2.9	59	100	Good	Good
4	28/03/2012	25/04/2012	47.9	49.5	49.7	49	1.0	2	2.5	45	100	Good	Good
5	25/04/2012	30/05/2012	42.7	44.2	45.4	44	1.4	3	3.4	44	100	Good	Good
6	30/05/2012	27/06/2012	45.4	45.9	43.5	45	1.3	3	3.1	38	100	Good	Good
7	27/06/2012	01/08/2012								43	70		or Data Capture
8	01/08/2012	29/08/2012	58.9	59.5	54.2	58	2.9	5	7.2	42	100	Good	Good
9	29/08/2012	26/09/2012	52.4	53.6	50.8	52	1.4	3	3.5	45	100	Good	Good
10	26/09/2012	31/10/2012	63.2	55.3	62.7	60	4.4	7	11.0	59	100	Good	Good
11	31/10/2012	28/11/2012	76.1	74.4	77.3	76	1.5	2	3.6	63	100	Good	Good
12	28/11/2012	02/01/2013	62	63.5	60.5	62	1.5	2	3.7	73	100	Good	Good
13													

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

Overall survey --> Good precision | Good Overall DC

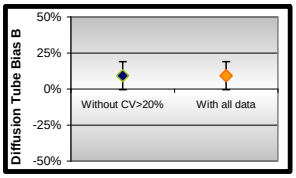
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Atholl St

Precision: 11 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.93 (0.85 - 1.02)
Bias B	7% (-2% - 17%)
Diffusion Tubes Mean:	59 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	55 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	55 (50 - 60) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.93 (0.85 - 1.02)
Bias B	7% (-2% - 17%)
Diffusion Tubes Mean:	59 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	55 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	55 (50 - 60) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Atholl St Perth

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	04/01/2012	01/02/2012	35.6	33.5	33.6	34	1.2	3	2.9			Good	
2	01/02/2012	29/02/2012	39	36	34.6	37	2.2	6	5.6			Good	
3	29/02/2012	28/03/2012	31.8	28.3	30.4	30	1.8	6	4.4			Good	
4	28/03/2012	25/04/2012	24.9	20.7	24.6	23	2.3	10	5.8	20	98	Good	Good
5	25/04/2012	30/05/2012	15.6	16.8	17.7	17	1.1	6	2.6	17	99	Good	Good
6	30/05/2012	27/06/2012	7.7	8	7.6	8	0.2	3	0.5	14	98	Good	Good
7	27/06/2012	01/08/2012	X	X	X					15	99		Good
8	01/08/2012	29/08/2012	20.3	20.7	20.4	20	0.2	1	0.5	16	99	Good	Good
9	29/08/2012	26/09/2012	23.8	23.8	22.1	23	1.0	4	2.4	25	99	Good	Good
10	26/09/2012	31/10/2012	25.8	27	28.9	27	1.6	6	3.9	30	98	Good	Good
11	31/10/2012	28/11/2012	33.3	35.6	35.1	35	1.2	3	3.0	37	98	Good	Good
12	28/11/2012	02/01/2013	32.4	34.2	30.6	32	1.8	6	4.5	33	96	Good	Good
13													

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

Overall survey --> Good precision | Good Overall DC

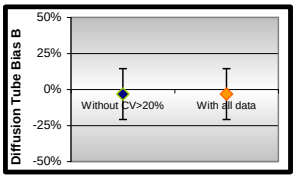
Site Name/ ID:	Crieff RTM

Precision: 11 out of 11 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 8 periods of data	
Bias factor A	1.03 (0.87 - 1.26)
Bias B	-3% (-21% - 14%)
Diffusion Tubes Mean:	23 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	24 µgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	24 (20 - 29) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 8 periods of data	
Bias factor A	1.03 (0.87 - 1.26)
Bias B	-3% (-21% - 14%)
Diffusion Tubes Mean:	23 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	24 µgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	24 (20 - 29) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Crieff

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	04/01/2012	01/02/2012	36.9	37.5	36.5	37	0.5	1	1.3	34	96	Good	Good
2	01/02/2012	29/02/2012	32.6	34.1	32.8	33	0.8	2	2.0	33	100	Good	Good
3	29/02/2012	28/03/2012	29	30.3	29.2	30	0.7	2	1.7	28	100	Good	Good
4	28/03/2012	25/04/2012	25.2	22.2	30.6	26	4.3	16	10.6	26	100	Good	Good
5	25/04/2012	30/05/2012	18.5	16.1	17.6	17	1.2	7	3.0	18	100	Good	Good
6	30/05/2012	27/06/2012		14.4	16.1	15	1.2	8	10.8	15	100	Good	Good
7	27/06/2012	01/08/2012								16	100		Good
8	01/08/2012	29/08/2012	20.2	20.3	19.8	20	0.3	1	0.7	18	95	Good	Good
9	29/08/2012	26/09/2012	20	20.3	20.1	20	0.2	1	0.4	18	100	Good	Good
10	26/09/2012	31/10/2012	30.8	29.7	31.1	31	0.7	2	1.8	33	99	Good	Good
11	31/10/2012	28/11/2012	36.6	36	37.3	37	0.7	2	1.6	37	100	Good	Good
12	28/11/2012	02/01/2013	33.4	37.1	35.4	35	1.9	5	4.6	37	100	Good	Good
13													

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

Overall survey --> Good precision | Good Overall DC

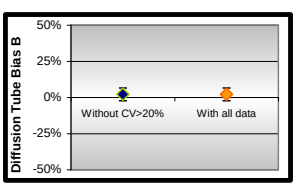
Site Name/ ID:	High St Perth

Precision: 11 out of 11 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.99 (0.95 - 1.03)
Bias B	1% (-3% - 6%)
Diffusion Tubes Mean:	27 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	27 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (26 - 28) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.99 (0.95 - 1.03)
Bias B	1% (-3% - 6%)
Diffusion Tubes Mean:	27 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	27 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	27 (26 - 28) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

High St Perth

Discussion of Choice of Factor to Use

The co-location studies gave factors of 0.99 High Street, 0.93 for Atholl St and 1.08 for Crieff. The factor given on the national database of co-location studies, found at: http://laqm.defra.gov.uk/documents/Diffusion_Tube_Bias_Factors_v04_11_v6.xls was 0.78. Based on advice given in Technical Guidance LAQM TG (09)), it was decided a local factor would be more appropriate. The middle value of the three was chosen.

PM Monitoring Adjustment

TEOM data used by Perth and Kinross Council for the 2 Perth monitors was corrected using the Volatile Correction Model by AEA using daily average purge measurements from the 26 FDMS sites in Central Scotland.

The Crieff monitor is a BAM and is corrected using a gravimetric factor of 0.83333 for Indicative Gravimetric Equivalent.

QA/QC of automatic monitoring

AEA carries out the QA/QC for the automatic monitors and they are calibrated annually and meet the criteria for national network.

QA/QC of diffusion tube monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The outcomes of these QA/QC schemes are evaluated on a regular basis against a set of pre-defined performance criteria. The Performance criteria are due to be changed, at present the criteria are based on the z-score method, however from April 2009; the criteria will be based upon the Rolling Performance Index (RPI) statistic.

Tayside Scientific Services takes part in this scheme and in each of the rounds were scored as satisfactory

Short-term to Long-term Data adjustment

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment 5 Months

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
High	Roadside	26	28.6	0.909
Atholl	Roadside	53.9	56.4	0.956
Average				0.932

Table A.2 Short-Term to Long-Term Monitoring Data Adjustment 8 months

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
High	Roadside	26	24.2	1.074
Atholl	Roadside	53.9	50.2	1.074
				1.074

Appendix B: Diffusion Tube Raw Data

Site No	Address	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
P1L	42 Scott St	48.5	44.1	42.1	50	39.7	42.2	X	39.8	33.3	44.5	53.4	52.5
P1C	42 Scott St	50.4	45.6	43.9	51.8	43	43.8	X	39	33	39.5	45.6	51
P1R	42 Scott St	52	44.4	43.7	47	38	40.5	X	38.6	31.3	42.7	47	50.4
P2	17 Speygate	35.7	32.3	25.7	23.2	12.5	14.1	X	17.9	18.7	27.5	33.4	36.2
P3	15 Murray Cres*	34.4	28.8	24.1	18.1	11.5	11.4	X	12.9	14	23.7	27.7	31.4
P5	8 Stormont St*	31.7	36.4	28.5	16.5	10.6	9.2	X	16.8	17	24.5	36.2	28.5
P6	41 Mull Place	19.1	20.8	16.2	8.3	4.3	4.9	X	7.7	9.3	15.2	22.9	25.9
P7	257 Rannoch Rd	23.8	25	19.1	17.2	12.9	14.1	X	14.3	13	21.8	26.7	31
P 13	86/88 South Street*	48.7	53.4	48.3	35.6	27.1	21.7	X	30.8	32.4	40.8	48.5	44.8
P19	1-5 Dunkeld Rd	52.4	46	41.7	33.2	22.9	19.4	X	24.8	26.1	37.4	47.6	47.1
P20	2 Crieff Road	36.4	X	31	32.4	21.8	23.3	X	24.2	20.7	35.2	40.6	40.6
P28	28 York Place	43.6	51	47.7	40.4	35.7	32.6	X	39.8	35.6	48.5	65.4	52.9
P29	37 York Place	48.4	43.8	37.9	42.2	29.8	28.6	X	33	28.8	42	54	49.6
P30 L	104 South St	53.7	54.8	52.8	36.1	29.3	26.6	X	35.4	35.1	44.9	53	48.3
P30 C	104 South St	50.1	54.1	47.4	33.7	28.8	29.4	X	35.1	32.7	39	48.7	48
P30 R	104 South St	53.4	54.6	45.2	35.2	26.1	27.1	X	35	33.8	41.1	48.5	44.5
P31	45-47 South St	43.3	37.6	35.6	29	21.5	18.4	X	23.3	20.8	32.5	38.2	40.9
P32	135 South St	50.8	47.3	34.7	44.9	26.3	31.8	X	31.3	29.6	42.4	47.2	47.5
P33	216 South Street	45.3	45.9	41.3	36.9	34.8	31.3	X	37.3	31	42	47	47.6
P34 L	10 County Place*	64.7	57.2	68.2	42.7	43.6	38.5	X	48.7	41.3	47.7	64.6	53
P35	17 Princes St	38.9	38	31.9	33	19.9	16.4	X	21.2	22.6	31.9	34.1	37.1
P36	51 Glasgow Rd	47.2	42.2	36.8	34.6	17.8	25.2	X	29.4	26.4	37.2	44.9	43.7
P37	Riggs Rd	40.4	35.9	32.5	27.6	19.5	21.2	X	25.1	21	30	38.1	38.8
P38	93-109 Main St Bridgend	35.3	33	33.4	34.9	29.2	30.4	X	31.6	22.8	29.7	36	32.4
P39	39 Main St Bridgend*	54.3	50.9	49.9	55.3	40.9	50.4	X	48.7	36	47.6	54.5	44.7
P40	18 Main St, Bridgend*	58.8	58.5	56.5	51.7	30.4	32.8	X	36.5	43.2	47.9	57.1	47.7
P41	76 Atholl St*	65.3	57.2	53.9	61.6	46.1	52.4	X	49.2	42.1	60.6	64.7	58.9
P42	26-28 Atholl St	62.6	57.9	53.1	65.7	37.9	39.8	X	41	43.8	57.1	59.5	56.6
P43 L	17 Atholl St, Perth	65.5	63.2	64.8	48.4	43.1	43.6	X	52.4	44.7	54	67.4	61.4
P43 C	17 Atholl St	X	x	64	54.6	46.5	43.1	X	54.6	47.1	53.7	60.3	x
P43 R	17 Atholl St	64.8	68.3	58.3	55.5	42.8	45.2	X	52.6	45.3	58.6	65.2	62.5
P44	22 Barrack St*	55.6	48.2	44.5	51	45.9	37.8	X	39.5	31	48.2	60.8	58.7
P45	Ballantine Place	34.5	29	25.7	25.2	18.4	17.8	X	17.8	14.9	27.2	x	55.4
P46	204 A Crieff Rd	43.7	36.7	36.3	37.2	28.1	28.6	X	32.9	23.1	35.2	44.3	42.9
P47	5 East Huntingtower	1.8	X	X	24.3	x	x	X	25.8	20.3	30.4	33.1	38.2
P48	30 Edinburgh Rd	32.1	28.2	23.4	26.3	19	16.7	X	X	17.2	27.8	33	37
P49	Opp Wood'n Garden, Glencarse	30.2	21.8	26.1	20.9	21.4	22.5	X	21.7	17.1	25.3	28.5	30.8
P50	Linden Garden Centre, Glencarse	30.7	24.5	25.4	19.7	21.2	21.7	X	20.8	16.6	23.5	28	31.7
P51	2 West Bridge St, Bridgend	41.8	36.2	33.2	35.7	23.3	24.2	X	23.6	25.3	32.1	40.4	35.8

P54L	RTM 176 High St,	36.9	32.6	29	25.2	18.5	2.6	X	20.2	20	30.8	36.6	33.4
P54C	RTM 176 High St,	37.5	34.1	30.3	22.2	16.1	14.4	X	20.3	20.3	29.7	36	37.1
P54R	RTM 176 High St,	36.5	32.8	29.2	30.6	17.6	16.1	X	19.8	20.1	31.1	37.3	35.4
P55	7 West High st, Crieff	48.9	50.1	56.4	61	49.3	<0.1	X	54.1	41.1	54	58.6	55.6
P56	39, High St, Crieff	42.4	37.3	41.3	33.6	28.1	31.6	X	34.2	26.8	36.8	44.2	32.1
P57	62, High St, Crieff	41.2	33.9	28	35.2	21.5	29.2	X	26.5	23.2	34.1	35	36.6
P58	9 East High St, Crieff*	50.8	45.7	40	37.8	29	34.7	X	38.7	28.5	42.1	54.4	48.6
P61L	RTM Atholl St	60.9	X	68.3	47.9	42.7	45.4	X	58.9	52.4	63.2	76.1	62
P61C	RTM Atholl St	73.2	69.1	69.4	49.5	44.2	45.9	X	59.5	53.6	55.3	74.4	63.5
P61R	RTM Atholl St	69.6	60.2	70.6	49.7	45.4	43.5	X	54.2	50.8	62.7	77.3	60.5
P62	84 Dundee Rd	47.8	36.9	33.6	40.2	20.6	27.5	X	29.2	24.2	40.4	39.5	36.6
P63	30 Dundee Rd	50.2	40.5	40.5	47.3	32.4	37.1	X	39	31.3	40	44.3	35.6
P64	The Lodge, Bridgend	54.3	56	55.7	x	34.1	40.1	X	42.3	43.6	52.6	63.6	53.5
P65	5-7 Charlotte Street	41.3	35.1	34.5	33.8	25	29.5	X	31.3	22.3	35.3	39.6	39.3
P67	1 Atholl Street	49.7	50.6	51.1	31	x	20.6	X	32.1	34.6	40.7	55.4	45.8
P68	2 Atholl Street	45.3	44.2	37.8	33.3	14.5	19.2	X	24.9	26.1	36.5	43.3	42.3
P69	Church, Kinnoull Street	56.7	43.4	40.8	39.3	24.8	22.3	X	26.2	26.5	37.1	50.2	46.2
P70	28 Dunkeld Rd	45	40.2	34.7	34.8	22.8	23	X	X	35.1	33.5	44	45.6
P71	134-140 Dunkeld Road	27.3	23.2	19.7	17.7	11.9	12.5	X	14.6	11.6	20.2	26.6	29.3
P72	82 Crieff Road	53.1	45.8	47	36.7	24.8	25.1	X	33.4	34.9	40.6	53.3	50
P73	19 West High Street	49.3	42.1	44.5	50.3	35.9	22.1	X	43.9	33.5	49.6	53.2	44.7
P74	43 High Street Crieff,PH7 3HT	39	30.3	31.8	31.6	28.7	12.2	X	29.8	26.8	39.4	54.9	33.7
P75L	Crieff RTM	35.6	39	31.8	24.9	15.6	7.7	X	20.3	23.8	25.8	33.3	32.4
P75C	Crieff RTM	33.5	36	28.3	20.7	16.8	8	X	20.7	23.8	27	35.6	34.2
P75R	Crieff RTM	33.6	34.6	30.4	24.6	17.7	7.6	X	20.4	22.1	28.9	35.1	30.6
P76	10/12 West High Street,Crieff	46.5	43.3	43.6	38.6	35.2	17.4	X	43.7	33.2	38.9	47.8	43.2
P77	9 Comrie Street, Crieff	27.5	21.8	23.9	22.2	20.7	10.6	X	23.9	12.8	21.7	25.8	24.9
P78	1 Lodge Street, Crieff	30.8	27.1	24.9	29.2	26	15.2	X	28.1	18	27.8	30.1	30.2
P79L	17/19 Main Street Bridgend	40.3	40.9	39.9	49.2	37.7	20.5	X	41.1	28.2	45.6	50.2	48.1
P79C	17/19 Main Street Bridgend	51.3	43.3	36.1	46.7	40.6	21.3	X	43.6	32.7	43.8	50.4	47.6
P79R	17/19 Main Street Bridgend	45.1	41	40.1	50.6	40.8	20.4	X	44	29.4	42.4	50.3	45.6
P80	124 High St Kinross Central Café				25.9	14.5	7.7	X	23	19.4	26.5	x	x
P81	76 High St Kinross Opticians				38.3	18.6	11.4	X	28.7	25.8	32.6	x	x
P82	66 High St Auchterarder				29.8	20.3	10.9	X	28.5	24.7	34.6	33.9	37.8
P83	176 High St Auchterarder				21.9	18.2	8	X	19.9	16.2	26.1	46.8	26.8
P84	1 Atholl St Dunkeld Ellas				25.2	14.8	7.6	X	17.3	19.1	25.5	28.1	30.8
P85	14 Atholl St Pet Shop				21.6	16.2	9.2	X	19.3	15.8	21.5	23.3	26.3
P86	2 Friarton Road Perth Lamp							X	29.1	19.7	33.5	39.1	39.3
P87	Crieff Background Hollybush Road Crieff							X	5.2	4.2	8.3		
P88	202 Glasgow Road							X	36.8	31.3	46.2	53.8	53.7
P89	59 South Methven Street							X	34.7	36.3	42.6	54.4	53.6
P90	22 North Methven Street							X	25.7	27.4	48	82	60.3

Appendix C: Air Mass Flows on PM_{10} daily exceedance days

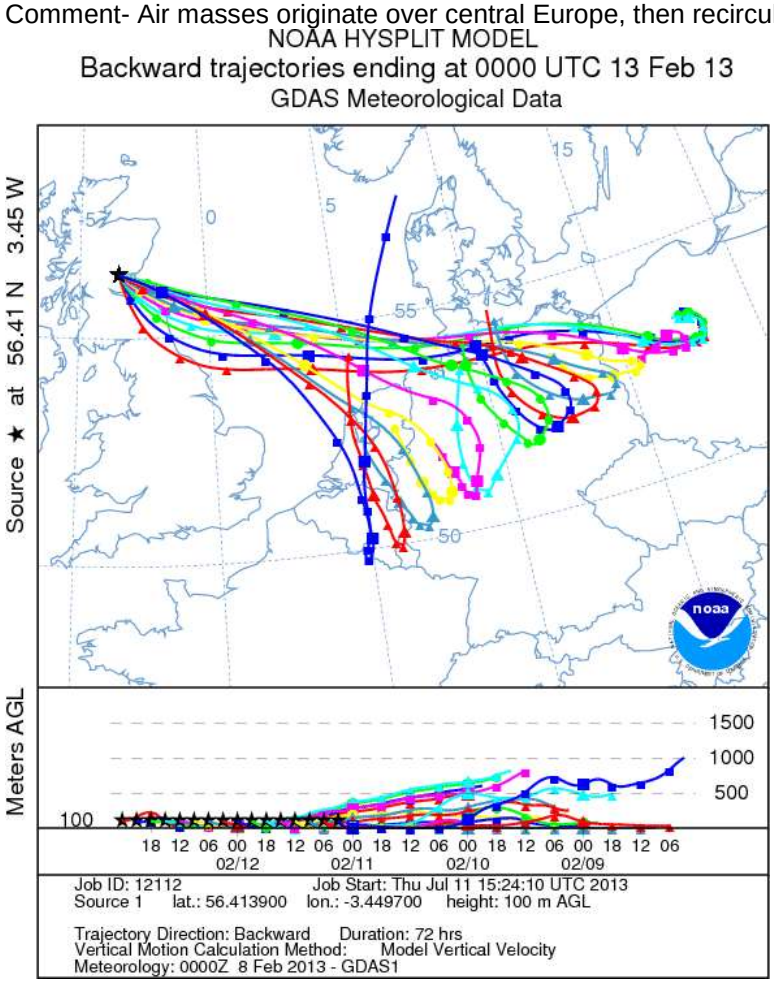
Table Dates with high PM_{10} at Atholl Street

End Date	atholl daily	high daily
12/02/2013	68.96	37.00
18/02/2013	59.50	38.13
21/02/2013	72.54	35.46
22/02/2013	80.92	46.75
01/03/2013	59.46	36.50
03/03/2013	51.92	19.67
04/03/2013	80.83	35.17
05/03/2013	52.33	40.21
19/04/2013	54.29	21.54

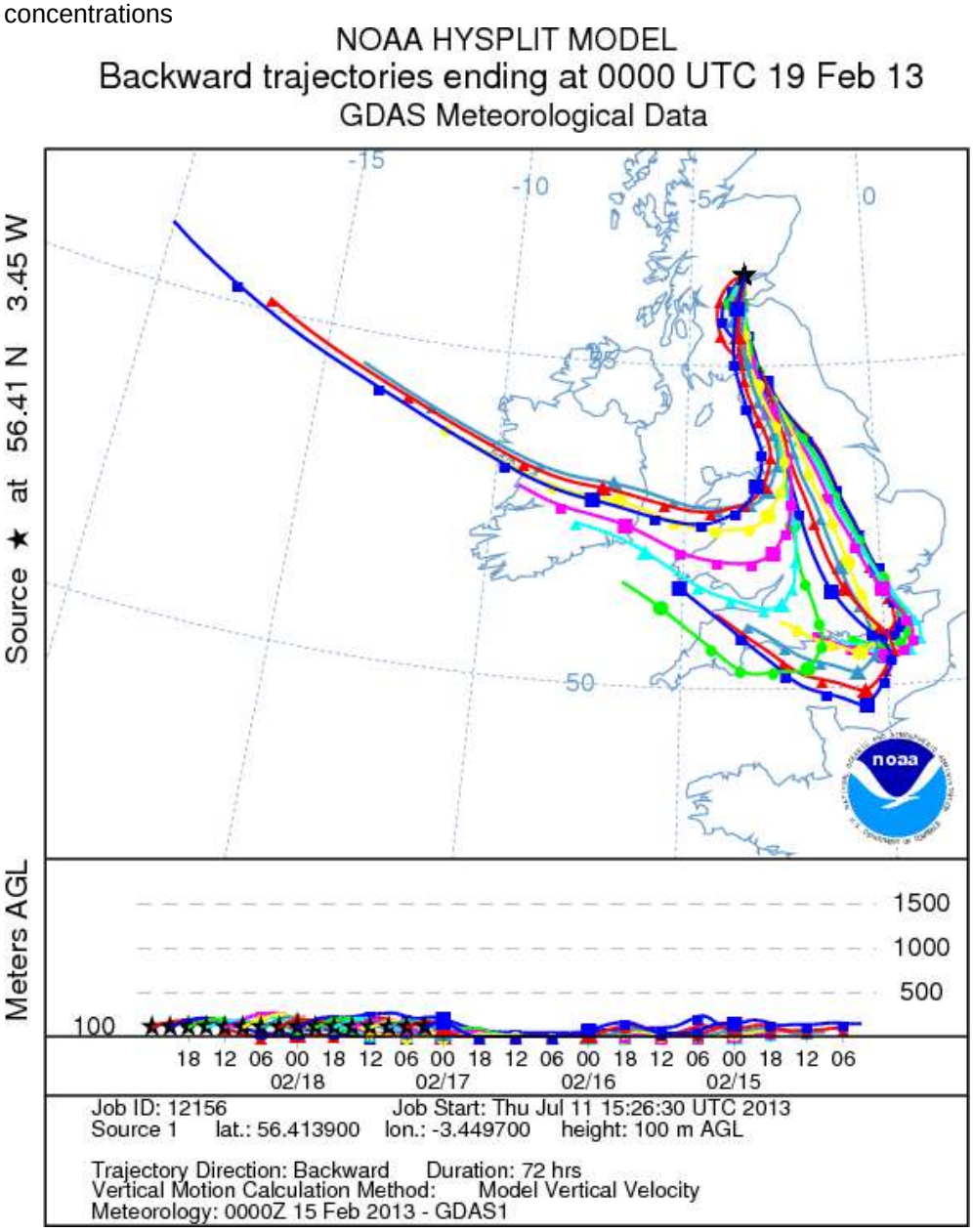
Air mass trajectory plots which shows where the air in Perth on each of these days originated. The end point is Perth at 11.59pm on the day of interest- follow the line back and this shows where the air mass was up to 72 hrs previously.

12.2.13 (Tuesday)

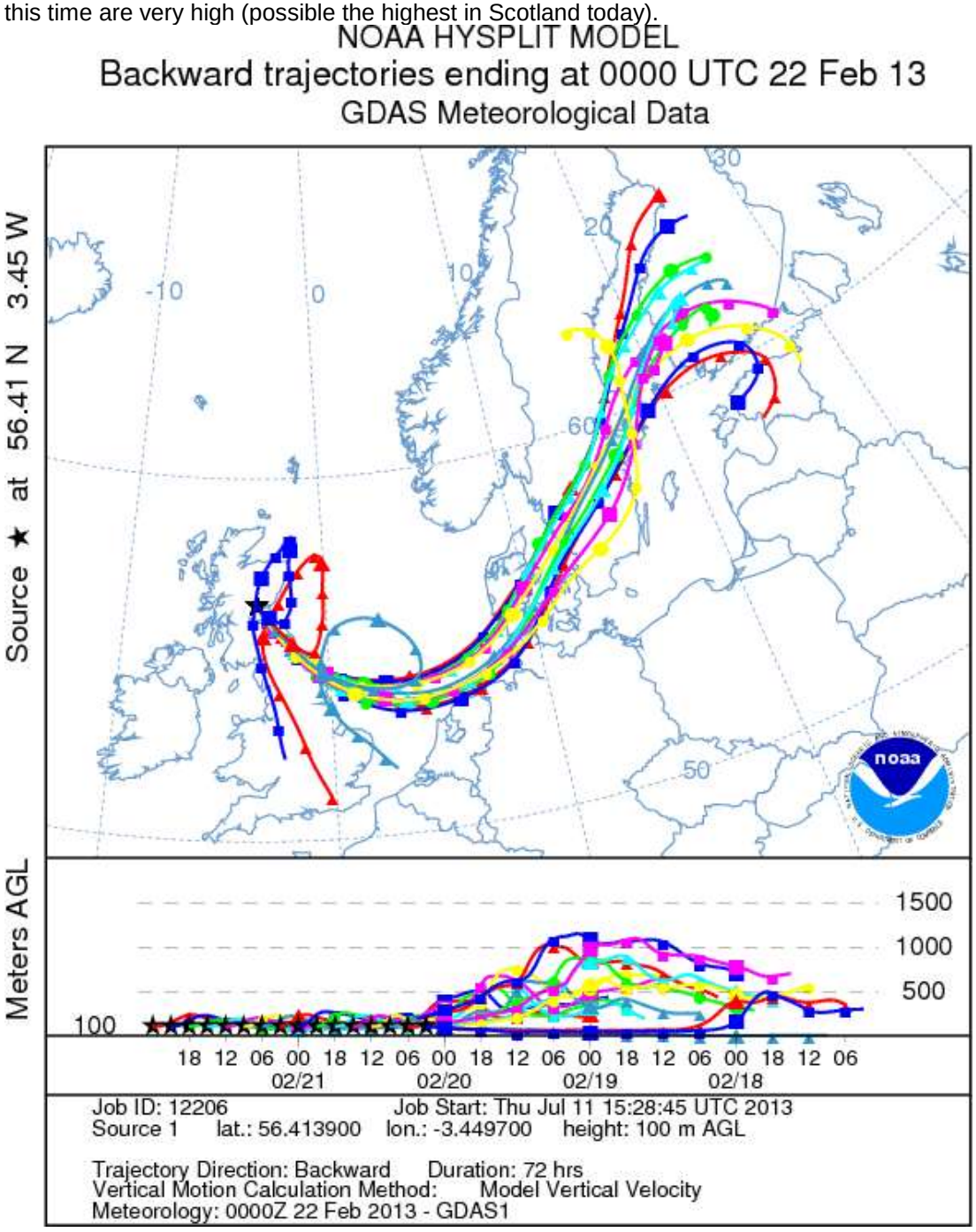
Comment- Air masses originate over central Europe, then recirculate- PM_{10} will definitely be elevated



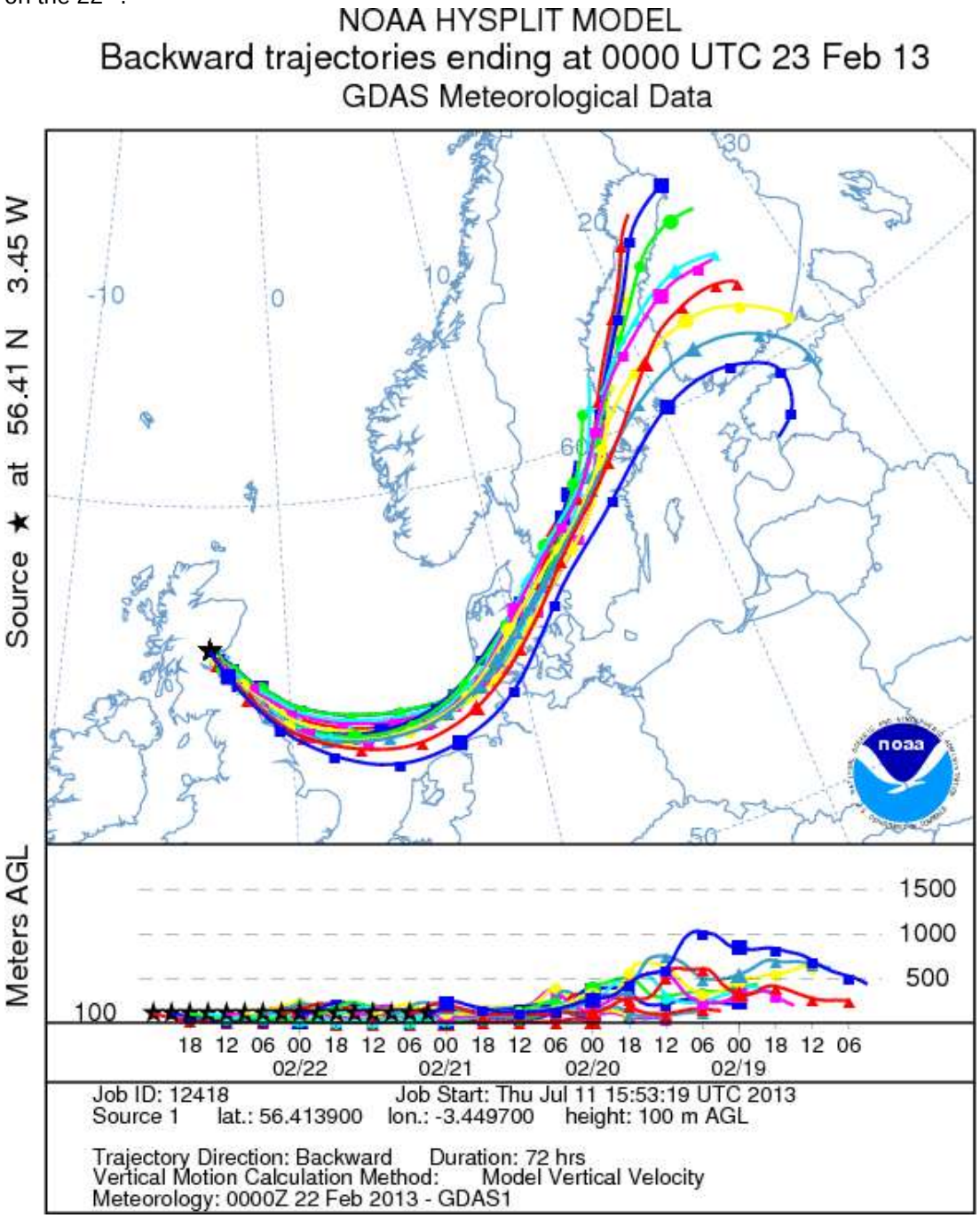
18.2.13 (Monday)
Air masses passed over mainland UK before coming into Scotland- again, this will increase concentrations



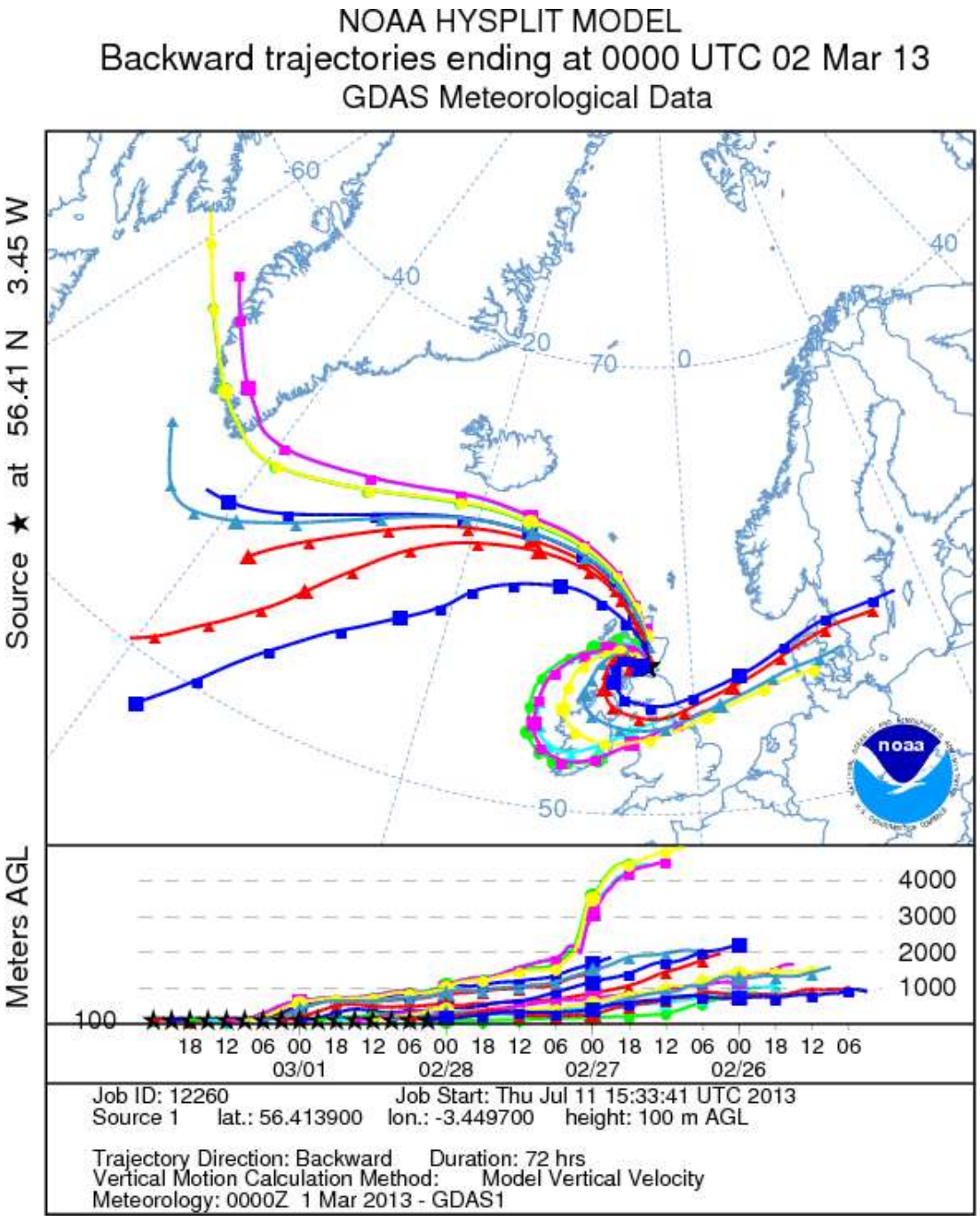
21.2.13 (Thursday)
Air masses from Sweden, Finland, Estonia, Latvia, pass over northern central Europe (Netherlands etc)- lots of solid fuel combustion there which will increase PM_{10}- though the Perth measurements at this time are very high (possible the highest in Scotland today).



22.2.13- Friday
As previously air masses from Europe, pass over northern central Europe- will definitely increase concentrations markedly. In these conditions the baseline wont get below 20 or 30 micrograms, which makes the daily average very difficult to achieve. That said, the measurements were extremely high on the 22nd.

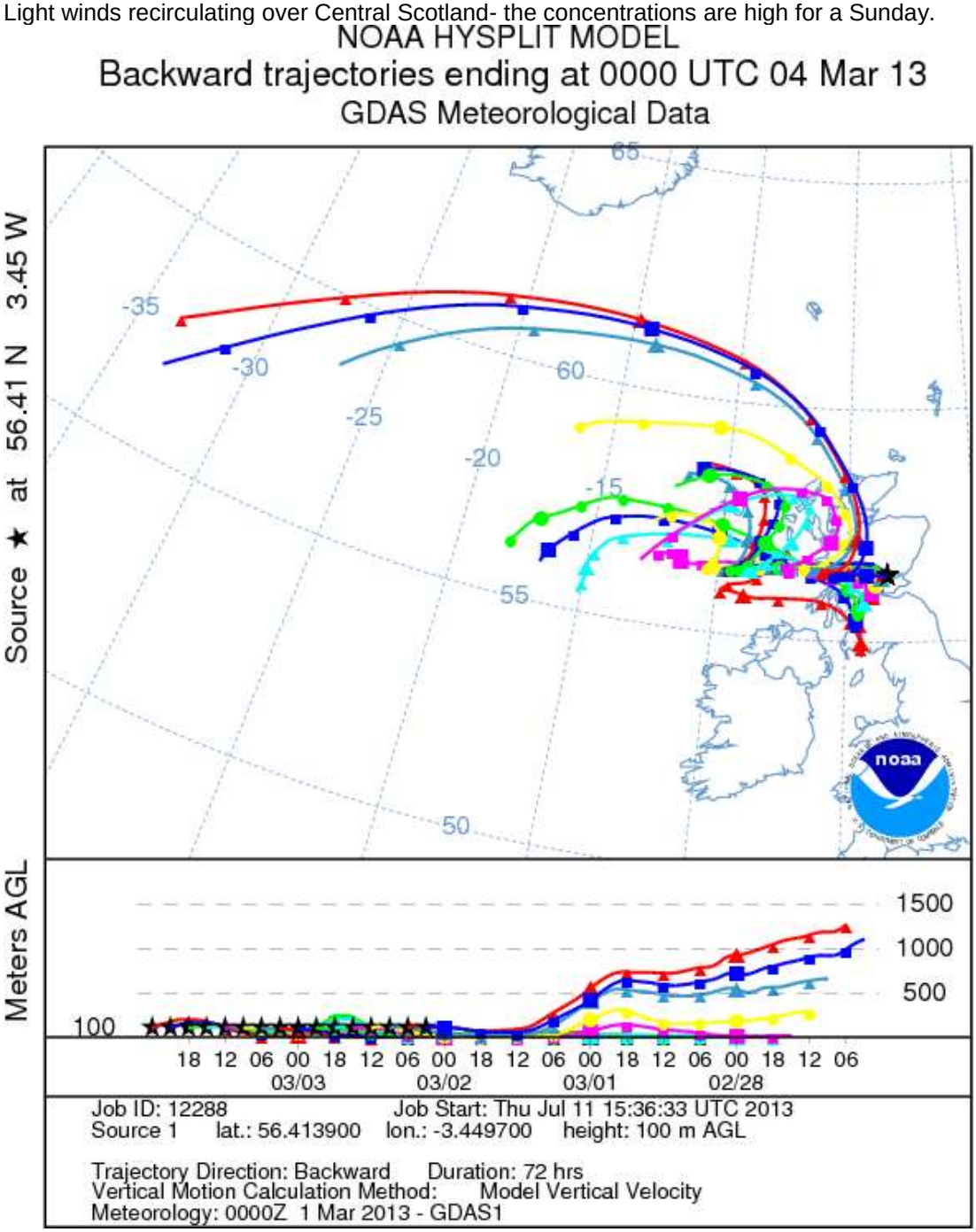


01.3.13 Friday
Air masses from North Atlantic, some from Northern central Europe


NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 02 Mar 13
GDAS Meteorological Data
Source ★ at 56.41 N 3.45 W
60
40
20
70
0
40
50
noaa
Meters AGL
4000
3000
2000
1000
100
18 12 06 00 18 12 06 00 18 12 06 00 18 12 06 00 18 12 06
03/01
02/28
02/27
02/26
Job ID: 12260
Job Start: Thu Jul 11 15:33:41 UTC 2013
Source 1 lat.: 56.413900 lon.: -3.449700 height: 100 m AGL
Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Mar 2013 - GDAS1

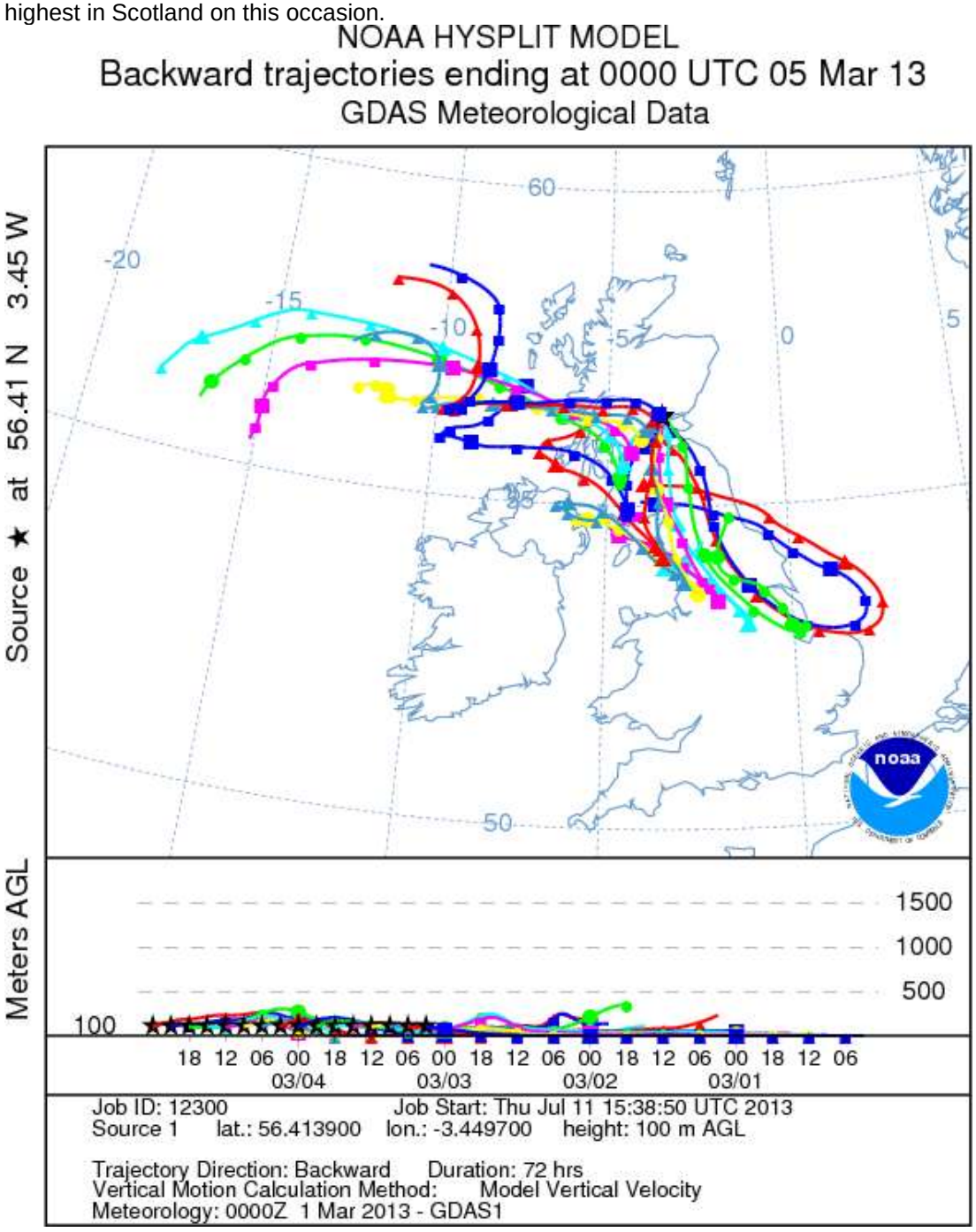
3.3.13- Sunday

Light winds recirculating over Central Scotland- the concentrations are high for a Sunday.



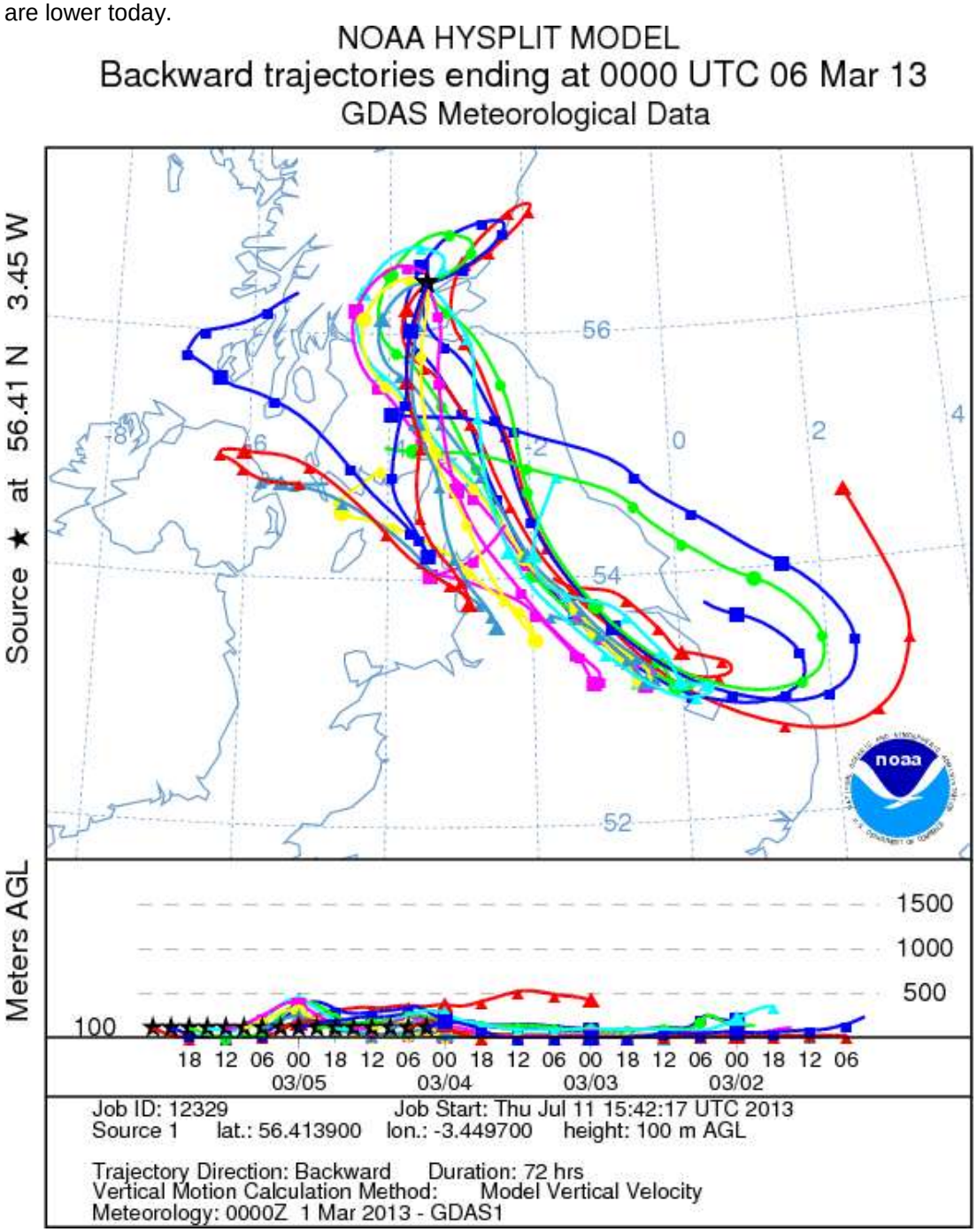
4.3.13 Monday

Recirculation over Northern UK- winds appear very light on this day, so PM_{10} generated in the northern half of the UK is recirculating over Scotland. Perth's measurements were high but weren't the highest in Scotland on this occasion.

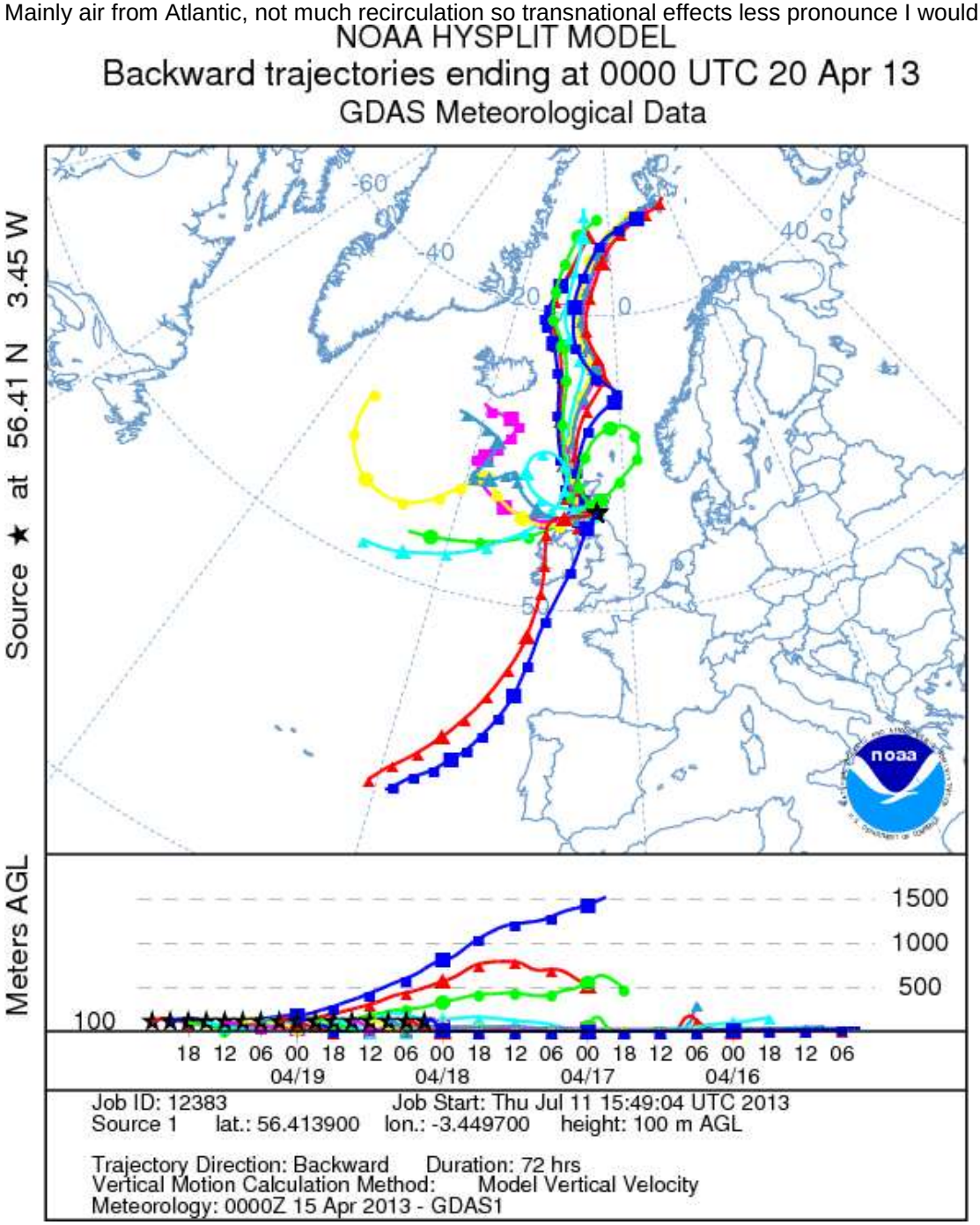


5.3.13 Tuesday

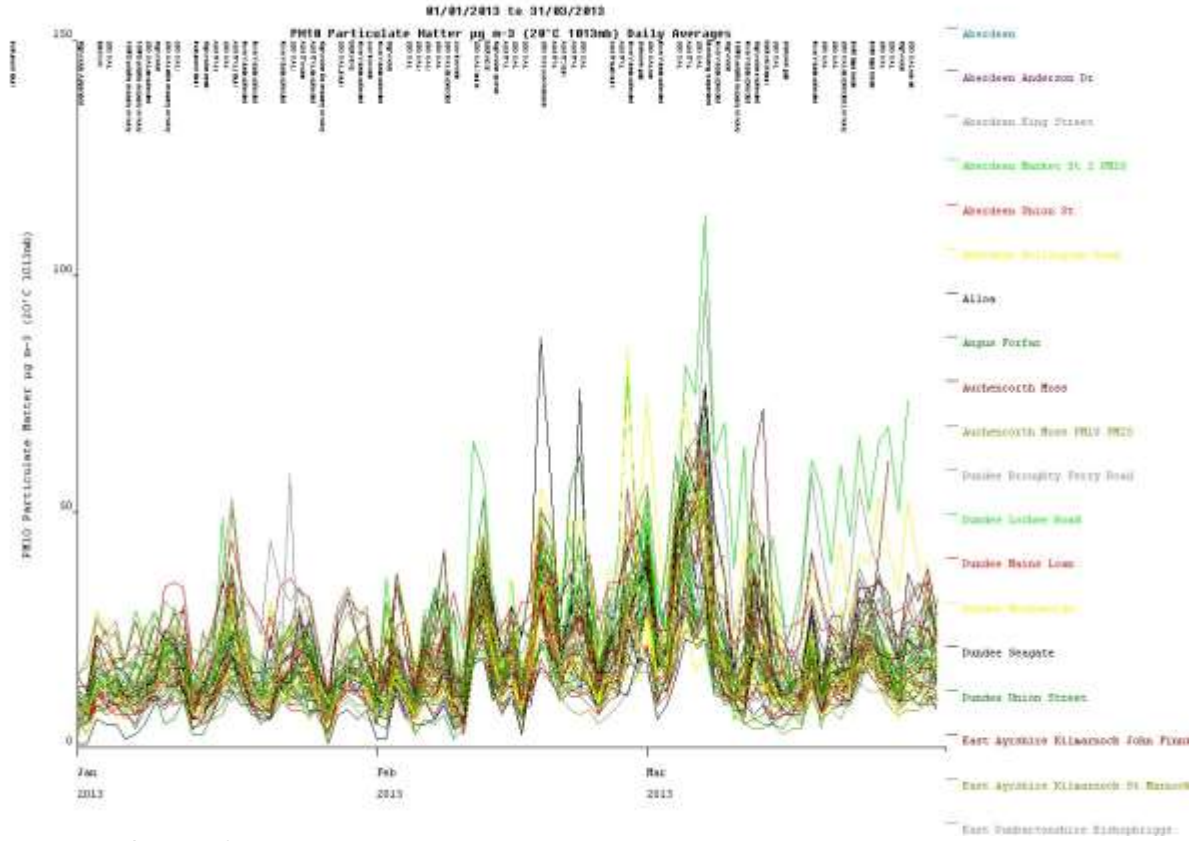
Recirculation of low velocity winds over Northern UK- similar phenomena to before but concentrations are lower today.



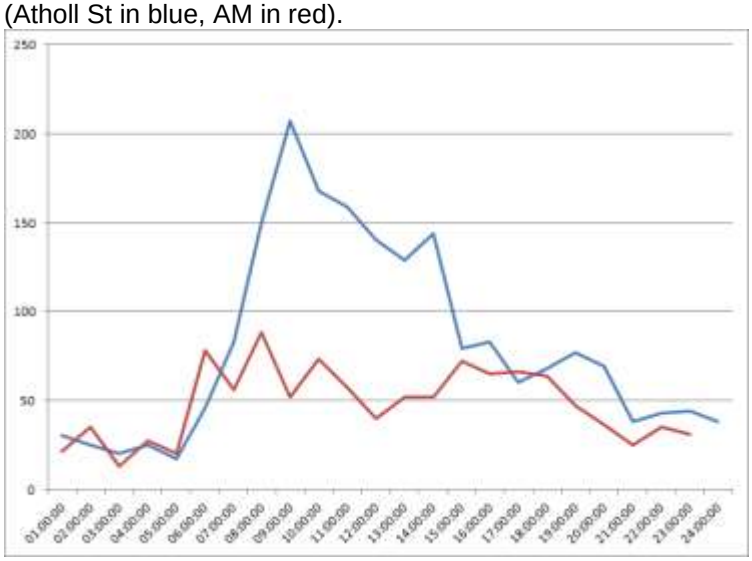
19.4.13- Friday
Mainly air from Atlantic, not much recirculation so transnational effects less pronounce I would expect.



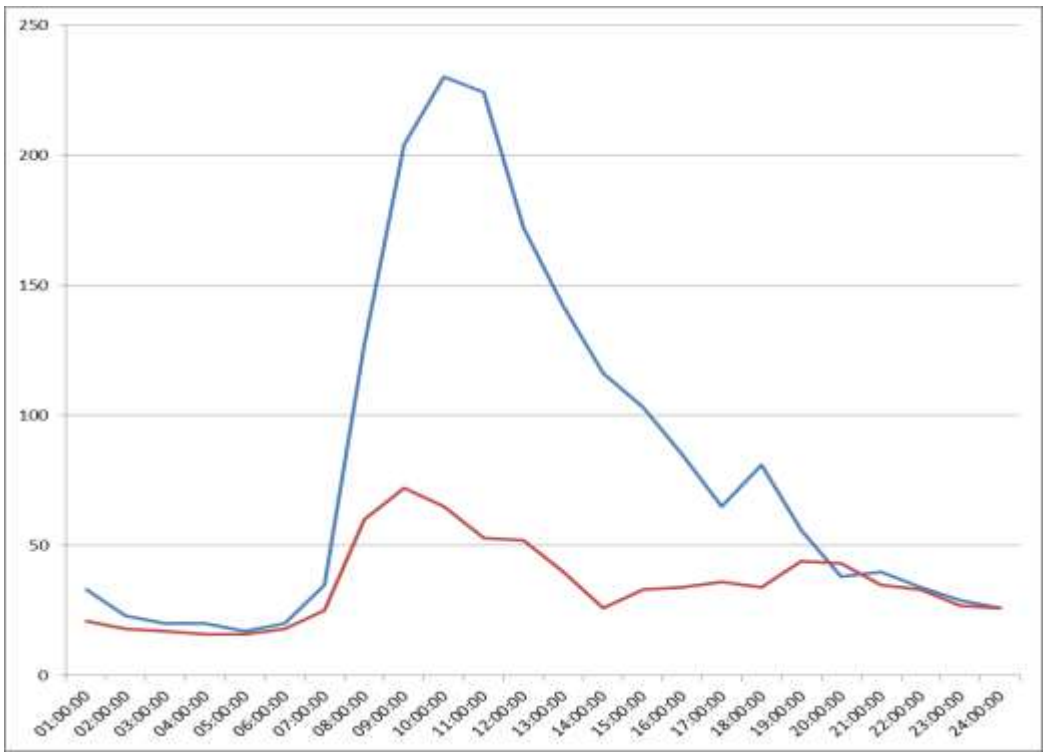
Scottish Government network measurements (please disregard the key, we couldn't fit all the sites on the plot and sometimes the colours are reused because there are so many sites. In the Feb data, the two black spikes are Atholl Street. In March there are several other sites that are higher.



Two worst days so far-
Atholl Street 22nd Feb- baseline from Auchencorth Moss is almost above the daily average standard (Atholl St in blue, AM in red).

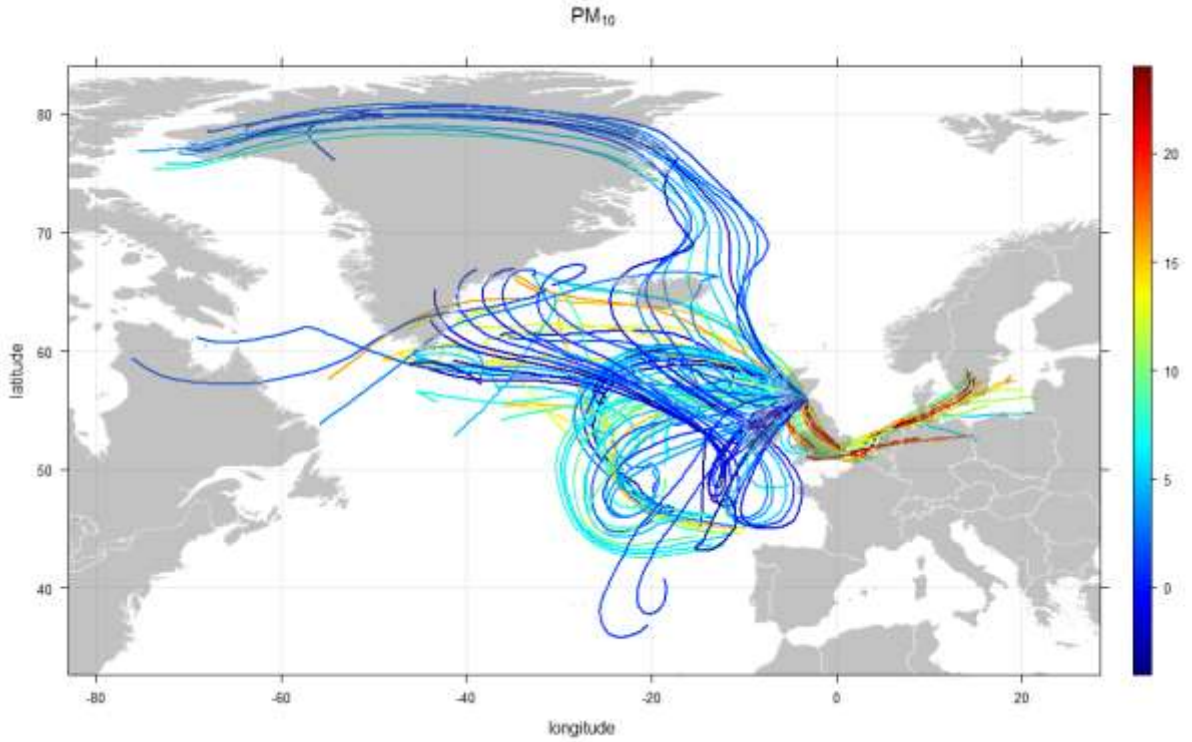


Two worst days so far- Atholl Street 4th March- similar to last example.



The trajectories below are for 2012- but show the general point that elevated background is normally a function of continental air masses entering the UK- if the line is blue, this means low concentration associated with an air mass originating there. The scale on the right is µg.m^{-3} PM10.

Auchencorth moss pm10 during feb 2012- high background associated with mainland europe



Auchencorth moss pm10 Jan to March 2012