



2013 Air Quality Progress Report for  
*Fife Council*

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

July, 2013

**Customer:**

Fife Council

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## Executive Summary

This Progress Report has considered the following new monitoring data for calendar year 2012. During 2012, Fife Council undertook ambient monitoring of NO<sub>2</sub> tubes at 51 locations within Fife. When assessing the 2012 annual mean nitrogen dioxide concentrations (bias adjusted) against the Air Quality Strategy (AQS) annual mean objective of 40 µg m<sup>-3</sup>, exceedances are evident at the following diffusion tube monitoring sites:

- Appin Crescent 2, Dunfermline (41 µg m<sup>-3</sup>)
- Appin Crescent 5 (A, B & C), Dunfermline (42 µg m<sup>-3</sup>)
- Appin Crescent 6 (A, B & C), Dunfermline (46 µg m<sup>-3</sup>)
- St Clair Street 1, Kirkcaldy (45 µg m<sup>-3</sup>)
- St Clair Street 2, Kirkcaldy (44 µg m<sup>-3</sup>)

Exceedances of the annual mean NO<sub>2</sub> objective were measured at three locations within Appin Crescent, Dunfermline, which has been declared an Air Quality Management Area (AQMA). Fife Council's Air Quality Action Plan (AQAP) for Appin Crescent intends to address these exceedances through the implementation of appropriate measures.

An exceedance of the annual mean NO<sub>2</sub> objective has been measured at St Clair Street 1 and 2, Kirkcaldy for five years since 2008. The Detailed Assessment of St Clair Street, Kirkcaldy (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area. This modelling study, found that the annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. NO<sub>2</sub> concentrations in excess of the annual mean objective are not occurring where ground level or first floor residential properties are present within the study area.

Annual mean NO<sub>2</sub> concentrations of 39 µg m<sup>-3</sup> and 36 µg m<sup>-3</sup> were measured at Bell St 1 and 2, St Andrews, respectively. Although these measured concentrations are below the AQS annual mean objective, the data between 2007 and 2012 show a possible upward trend in annual mean NO<sub>2</sub> concentrations.

PM<sub>10</sub> concentrations are measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2012 concentrations were below the PM<sub>10</sub> annual mean objective with no exceedances of the daily mean objective at all sites.

Fife Council undertook a Detailed Assessment (2012) following 2011's annual mean PM<sub>10</sub> exceedance at Admiralty Road, Rosyth. From this, it was concluded that Fife Council should defer its decision as to whether or not to declare an AQMA at Admiralty Road Rosyth, until at least six months monitoring data is available using a new FDMS drier in PM<sub>10</sub> monitoring equipment. This new FDMS drier was installed on the 26<sup>th</sup> September 2012 at Admiralty Road. The latest PM<sub>10</sub> data for the periods 01/10/2012 to 31/03/2013 and 01/04/2012 to 31/03/2013 show measured average PM<sub>10</sub> concentrations of 13 µg m<sup>-3</sup> and 15 µg m<sup>-3</sup> respectively with no exceedances of the daily mean objective. As a result, Fife Council is not required to declare an AQMA at Admiralty Road, Rosyth.

The review of all available data relating to sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), benzene and 1,3 butadiene during 2012 indicates that it is unlikely that any AQS objectives relating these pollutant

were exceeded during 2012. In particular, the review of benzene data in the vicinity of Little Raith Wind Farm show that the running annual mean benzene concentrations measured at Cowdenbeath (LR01), Lochgelly (LR02) and Little Raith Farm (LR03) monitoring locations are below the AQS Objective of  $3.25 \mu\text{g m}^{-3}$ . In addition, these data also indicate that benzene concentrations have not increased as a result of the commissioning of Little Raith Wind Farm.

Lead (Pb) is not monitored within the Fife Council boundary and no new sources have been identified that are likely to result in an exceedance of the AQS objective for lead.

Fife Council has identified one poultry farm (Mill View Farm formerly Diddlum Farm) which meets the specified criteria stated within Technical Guidance (09). Mill View Farm consists of 4 sheds housing up to 492,800 hens and located between 90 m and 150 m from 3 residential receptors. The 98<sup>th</sup> percentile of maximum daily mean  $\text{PM}_{10}$  concentrations was calculated to be  $39.2 \mu\text{g m}^{-3}$ . As a result, it is unlikely that the daily mean  $\text{PM}_{10}$  objective of no more than 7 exceedances of  $50 \mu\text{g m}^{-3}$  in a year will be exceeded at any receptor due to emissions from the four poultry sheds at Mill View Farm. It is therefore also concluded that Fife Council are not required to proceed to a Detailed Assessment.

The review of all other local developments has not identified any locations where there may be a risk of the air quality objectives being exceeded and so no additional air quality assessment is recommended at this time.

There are currently two AQMA's for  $\text{NO}_2$  and  $\text{PM}_{10}$  located within the Fife Council boundary:

- Bonnygate, Cupar, declared in October 2008
- Appin Crescent, Dunfermline, declared in November 2011 for  $\text{NO}_2$  and November 2012 for  $\text{PM}_{10}$ .

The Air Quality Action Plan (AQAP) for the Bonnygate, Cupar AQMA is now well established and has been successful in reducing both  $\text{NO}_2$  and  $\text{PM}_{10}$  concentrations within the Bonnygate; principally as a result of the traffic signalling and road layout improvements carried out during 2009. No exceedances of  $\text{NO}_2$  or  $\text{PM}_{10}$  AQS objectives were measured within the Bonnygate AQMA during 2012. Although, the  $\text{PM}_{10}$  annual mean concentration measured at the Bonnygate automatic monitoring site was  $18 \mu\text{g m}^{-3}$  and so is still close to exceeding the objective.

The Draft AQAP for Appin Crescent, Dunfermline was submitted for consultation in October and November 2012 and the finalised AQAP will now be submitted for approval to City of Dunfermline Area Committee meeting on 8<sup>th</sup> May 2013.

Following the review of all available 2012 data it is recommended that Fife Council carry out the following actions:

1. Submit the next Air Quality Progress Report in May 2014.
2. Include the Air Quality Action Plan Progress Reports for both the Appin Crescent and Bonnygate Air Quality Management Areas within the 2014 Air Quality Progress Report.
3. Maintain the current monitoring programme.

## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Description of Local Authority Area	1
1.2	Purpose of Progress Report	1
1.3	Air Quality Objectives	2
1.4	Summary of Previous Review and Assessments	3
<b>2</b>	<b>New Monitoring Data</b>	<b>10</b>
2.1	Summary of Monitoring Undertaken	10
2.2	Comparison of Monitoring Results with Air Quality Objectives	21
<b>3</b>	<b>New Local Developments</b>	<b>45</b>
3.1	Road Traffic Sources	45
3.2	Other Transport Sources	45
3.3	Industrial Sources	45
3.4	Commercial and Domestic Sources	46
3.5	New Developments with Fugitive or Uncontrolled Sources	46
<b>4</b>	<b>Local / Regional Air Quality Strategy</b>	<b>49</b>
<b>5</b>	<b>Planning Applications</b>	<b>50</b>
<b>6</b>	<b>Implementation of Action Plans</b>	<b>53</b>
<b>7</b>	<b>Conclusions and Proposed Actions</b>	<b>56</b>
7.1	Conclusions from New Monitoring Data	56
7.2	Conclusions relating to New Local Developments	57
7.3	Conclusions relating to Air Quality Action Plans	58
7.4	Proposed Actions	58

## List of Tables

<b>Table 1.1</b>	Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland
<b>Table 2.1</b>	Details of Automatic Monitoring Sites
<b>Table 2.2</b>	Bias correction factors for 2012 for NO <sub>2</sub> diffusion tubes in Fife
<b>Table 2.3</b>	Details of Non-Automatic Monitoring Sites
<b>Table 2.4</b>	Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective
<b>Table 2.5</b>	Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective
<b>Table 2.6</b>	Results of NO <sub>2</sub> Diffusion Tubes 2012
<b>Table 2.7</b>	Results of NO <sub>2</sub> Diffusion Tubes (2007 to 2012)
<b>Table 2.8</b>	Results of Automatic Monitoring for PM <sub>10</sub> : Comparison with Annual Mean Objective
<b>Table 2.9</b>	Results of Automatic Monitoring for PM <sub>10</sub> : Comparison with 24-hour Mean Objective
<b>Table 2.10</b>	Results of Automatic PM <sub>10</sub> Monitoring – 01/10/2012 to 31/03/2013
<b>Table 2.11</b>	Results of Automatic PM <sub>10</sub> Monitoring – 01/04/2012 to 31/03/2013
<b>Table 2.12</b>	Results Automatic SO <sub>2</sub> Monitoring for Blair Mains (µg/m <sup>3</sup> ): Comparison with Annual Mean Objective
<b>Table 2.13</b>	Little Raith Running Annual Mean Benzene Concentrations – 31/01/2011 to 11/03/2013 (µg m <sup>-3</sup> )
<b>Table 2.14</b>	Fife Council PM <sub>2.5</sub> Monitoring Results from of 6th September 2011 to 6th March 2012
<b>Table 2.15</b>	Fife Council CO Monitoring Results
<b>Table 2.15</b>	Receptors within 150 m of a Poultry Shed and Potential PM <sub>10</sub> Exceedances
<b>Table 9.1</b>	Action Plan Progress
<b>Table C1</b>	National Diffusion Tube Bias Adjustment Spreadsheet
<b>Table C2</b>	Locally Derived Bias Adjustment Factor – Rosyth
<b>Table C3</b>	Locally Derived Bias Adjustment Factor – Kirkcaldy
<b>Table C4</b>	Locally Derived Bias Adjustment Factor – Dunfermline
<b>Table C5</b>	Locally Derived Bias Adjustment Factor – Cupar

## List of Figures

- Figure 1.1** Map of Appin Crescent AQMA Boundary
- Figure 1.2** Map of Bonnygate AQMA Boundary
- Figure 2.1** Bonnygate, Cupar, Automatic Monitoring Location
- Figure 2.2** Appin Crescent, Dunfermline, Monitoring Locations
- Figure 2.3** Admiralty Road/ Kings Road, Rosyth, PM<sub>2.5</sub> Automatic Monitoring Location
- Figure 2.4** Admiralty Road, Rosyth, Monitoring Locations
- Figure 2.5** St Clair Street, Kirkcaldy, Monitoring Locations
- Figure 2.6** Benzene Diffusion Tube Monitoring Locations – Little Raith Monitoring Programme
- Figure 2.7** Graph of Little Raith Running Annual Mean Benzene Concentrations – 31/01/2011 to 11/03/2013 ( $\mu\text{g m}^{-3}$ )
- Figure 3.1** Relevant Receptors - Mill View Poultry Farm 2012
- Figure 6.1** Annual Mean NO<sub>2</sub> Concentrations at Fife Cupar – 2007 to 2012
- Figure 6.3** Annual Mean PM<sub>10</sub> Concentrations at Fife Cupar – 2007 to 2012

## Appendices

- Appendix A** Automatic Monitoring Sites
- Appendix B** QA/ QC Data
- Appendix C** Diffusion Tube Bias Adjustment Factor Calculations
- Appendix D** NO<sub>2</sub> Diffusion Tube Data
- Appendix E** Bonnygate Air Quality Action Plan Progress Report – Summary Table
- Appendix F** Poultry Farm Screening Tool
- Appendix G** Fife Council “TRY IT” Initiative Update Report 2012
- Appendix H** Fife’s Health and Wellbeing Plan 2011 -2014
- Appendix I** Asset Based Approach to Local Air Quality Management
- Appendix J** Fife Council Air Quality Development Guidelines Leaflet



# 1 Introduction

## 1.1 Description of Local Authority Area

Fife is an area in eastern Scotland bordered on the north by the Firth of Tay, on the east by the North Sea and the Firth of Forth to the south. The route to the west is partially blocked by the mass of the Ochil Hills. Almost all traffic into and out of Fife has to pass over one of four bridges, south on the Forth Road Bridge, west on the Kincardine Bridges or north east via the Tay Road Bridge, the exception being traffic headed north on the M90.

The coast has some small harbours, industrial docks in Burntisland and Rosyth and also fishing villages of the East Neuk such as Anstruther and Pittenweem. The large area of flat land to the north of the Lomond Hills, through which the River Eden flows, is known as the Howe of Fife. North of the Lomond Hills can be found villages and small towns in a primarily agricultural landscape. The areas in the south and west of Fife, including the towns of Dunfermline, Glenrothes, Kirkcaldy and the Levenmouth region are much more industrial and densely populated.

## 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<sup>1</sup> and Technical<sup>2</sup> 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.

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<sup>1</sup> Part IV of the Environment Act 1995. Local Air Quality Management, Revised Policy Guidance LAQM.PG(09), February 2009  
[www.defra.gov.uk/environment/airquality/local/guidance/pdf/laqm-policy-guidance-part4.pdf](http://www.defra.gov.uk/environment/airquality/local/guidance/pdf/laqm-policy-guidance-part4.pdf)

<sup>2</sup> Part IV of the Environment Act 1995. Local Air Quality Management. Technical Guidance LAQM.TG(09) February 2009.  
[www.defra.gov.uk/environment/airquality/local/guidance/pdf/tech-guidance-laqm-tg-09.pdf](http://www.defra.gov.uk/environment/airquality/local/guidance/pdf/tech-guidance-laqm-tg-09.pdf)

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Scotland are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of 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	$16.25 \mu\text{g m}^{-3}$	Running annual mean	31.12.2003
	$3.25 \mu\text{g m}^{-3}$	Running annual mean	31.12.2010
1,3-Butadiene	$2.25 \mu\text{g m}^{-3}$	Running annual mean	31.12.2003
Carbon monoxide	$10 \text{mg m}^{-3}$	Running 8-hour mean	31.12.2003
Lead	$0.50 \mu\text{g m}^{-3}$	Annual mean	31.12.2004
	$0.25 \mu\text{g m}^{-3}$	Annual mean	31.12.2008
Nitrogen dioxide	$200 \mu\text{g m}^{-3}$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	$40 \mu\text{g m}^{-3}$	Annual mean	31.12.2005
Particulate Matter (PM <sub>10</sub> ) (gravimetric)	$50 \mu\text{g m}^{-3}$ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	$18 \mu\text{g m}^{-3}$	Annual mean	31.12.2010
Sulphur dioxide	$350 \mu\text{g m}^{-3}$ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	$125 \mu\text{g m}^{-3}$ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	$266 \mu\text{g m}^{-3}$ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

## 1.4 Summary of Previous Review and Assessments

This Section summarises the conclusions made by the previous three rounds of air quality review and assessments.

The First Round of Review and Assessment reports concluded that additional assessment was not necessary for any pollutants in the Strategy, and that Fife Council did not need to declare any Air Quality Management Areas (AQMAs).

Since the commencement of the second round of the review and assessment process, Fife Council has completed the following Review and Assessment reports:

- Updating and screening Assessment<sup>3</sup> (2003)
- Progress Report<sup>4</sup> (2004)
- Progress Report<sup>5</sup> (2005)
- Updating and Screening Assessment<sup>6</sup> (2006)
- Progress Report<sup>7</sup> (2007)
- Progress Report<sup>8</sup> (2008)
- Detailed Assessment (2009) Appin Crescent, Dunfermline<sup>9</sup>
- Detailed Assessment (2009) Admiralty Road, Rosyth<sup>10</sup>
- Further Assessment (2010) Bonnygate, Cupar<sup>11</sup>
- Progress Report (2010)<sup>12</sup>
- 2<sup>nd</sup> Detailed Assessment (2011) Appin Crescent, Dunfermline<sup>13</sup>
- Progress Report<sup>14</sup> (2011)
- Further Assessment (2012) Appin Crescent Dunfermline<sup>15</sup>
- Updating and screening Assessment<sup>16</sup> (2012)
- 2<sup>nd</sup> Detailed Assessment for Admiralty Road, Rosyth, Fife<sup>17</sup> (2012)
- Detailed Assessment for Detailed Assessment for Saint Clair Street, Kirkcaldy, Fife<sup>18</sup> (2012)

<sup>3</sup> Air Quality Updating and Screening Assessment for Fife Council 2003. AEAT/ENV/R/1494. August 2003.

<sup>4</sup> Air Quality Review and Assessment Progress Report for Fife Council 2004. AEAT/ENV/R/1678 Issue 2. July 2004

<sup>5</sup> Air Quality Review and Assessment Progress Report for Fife Council - 2004/2005. AEAT/ENV/R/1955 Issue 2. Jun 2005

<sup>6</sup> Air Quality Updating and Screening Assessment for Fife Council – 2006. AEAT/ENV/R/2237 Issue 2, July 2006

<sup>7</sup> Air Quality Review and Assessment Progress Report for Fife Council 2006/7. AEAT/ENV/R/2452 May 2007

<sup>8</sup> Air Quality Review and Assessment Progress Report for Fife Council 2007/8. AEAT/ENV/R/2597 March 2008

<sup>9</sup> Air Quality Detailed Assessment for Fife Council 2008: Appin Crescent, Dunfermline. AEAT/ENV/R/2705, January 2009

<sup>10</sup> Air Quality Detailed Assessment for Fife Council 2008: Admiralty Road, Rosyth, AEAT/ENV/R/2761, April 2009

<sup>11</sup> Air Quality Review and Assessment, Further Assessment, Bonnygate, Cupar 2010

<sup>12</sup> 2010 Air Quality Progress Report for Fife Council, AEAT/ENV/R/2977, July 2010

<sup>13</sup> Detailed Assessment of Air Quality: Appin Crescent, Dunfermline, AEA/ENV/R/3096 Issue 3, January 2011

<sup>14</sup> Air Quality Review and Assessment Progress Report for Fife Council 2011. AEA/ENV/R/3179 Issue 2. May 2011

<sup>15</sup> Air Quality Further Assessment (2012) Appin Crescent Dunfermline, AEA/R/ED56439. Issue 1, March 2012

<sup>16</sup> 2012 Air Quality Updating and Screening Assessment for Fife Council, AEAT/ENV/R/3293, July 2012

<sup>17</sup> Air Quality Detailed Assessment for Admiralty Road, Rosyth, Fife, AEAT/ENV/R/3321

<sup>18</sup> Detailed Assessment of Air Quality 2011 Saint Clair Street, Kirkcaldy, Fife, AEA/ENV/R/3332

- Fife Council, Bonnygate Air Quality Action Plan<sup>19</sup>
- Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline<sup>20</sup>

The second round of Review and Assessment reports (2003 Updating and Screening Assessment (USA) and 2004 & 2005 Progress reports) concluded that the Air Quality Objectives for sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), 1,3-butadiene, benzene and lead are unlikely to be exceeded.

The 2003 USA<sup>3</sup> identified that high NO<sub>2</sub> concentrations were recorded at kerbside locations in North Approach Road in Kincardine, Carnegie Drive in Dunfermline and Admiralty Road in Rosyth. As this was based on kerbside data it was recommended that further diffusion tube monitoring be undertaken at the façade of the buildings in order to improve the assessment of potential exposure.

The 2005 Progress Report recommended that automatic monitoring of NO<sub>2</sub> be undertaken at Admiralty Road, Rosyth and Bonnygate, Cupar. Additionally, it was recommended that automatic monitoring continue at North Approach Road, Kincardine. PM<sub>10</sub> monitoring also commenced at Admiralty Road, Rosyth and Bonnygate, Cupar.

The 2006 USA recommended that monitoring of NO<sub>2</sub> and PM<sub>10</sub> continue at Bonnygate, Cupar and recommence at Admiralty Road, Rosyth to better assess concentrations of each pollutant.

Automatic monitoring of NO<sub>2</sub> was discontinued at North Approach Road, Kincardine in May 2007 as the relevant Air Quality Objectives were met at this location. As a result of a new bridge crossing and northern bypass road further reductions of NO<sub>2</sub> have been realised at this location.

Monitoring data for 2006 and 2007 (automatic and diffusion tubes) indicated that it was likely the NO<sub>2</sub> and PM<sub>10</sub> Air Quality Objectives would not be met in Bonnygate, Cupar. The 2007 Progress Report concluded that a Detailed Assessment should be carried out at this location. Additionally, the 2008 Progress Report concluded that a Detailed Assessment should be carried out for Appin Crescent, Dunfermline (NO<sub>2</sub>) and Admiralty Road, Rosyth (PM<sub>10</sub>).

The Detailed Assessment (2007/2008) for Bonnygate, Cupar considered NO<sub>2</sub> and PM<sub>10</sub>. The report concluded that an AQMA should be declared for both NO<sub>2</sub> and PM<sub>10</sub>.

The Detailed Assessment (2008) for Appin Crescent, Dunfermline advised that increased monitoring of NO<sub>2</sub> should be carried out to enable improved characterisation of ambient NO<sub>2</sub> concentrations before any further decisions are made.

The Detailed Assessment (2009) for Admiralty Road, Rosyth considered PM<sub>10</sub> concentrations in the area and concluded that no further action was required.

The Further Assessment (2010) for Bonnygate, Cupar concluded that the AQMA was still required and that its boundary was appropriate (see Figure 1.2). The source apportionment found that heavy and light goods vehicles contributed broadly similar oxides of nitrogen (NO<sub>x</sub>) emissions and that action planning should therefore focus on both vehicle types.

An Air Quality Action Plan has been implemented for Bonnygate, Cupar by Fife Council.

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<sup>19</sup> Fife Councils, Bonnygate Air Quality Action Plan, 2010, AEAT/ENV/R/ED05550006

<sup>20</sup> Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline, Fife, ED56439- Issue Number 1

Progress on measures contained in the Bonnygate Cupar Air Quality Action Plan are reported in Appendix E.

The 2010 Progress report concluded that for NO<sub>2</sub> and PM<sub>10</sub> monitoring, no further action was required, over and above that already in progress by Fife Council. It was concluded that if NO<sub>2</sub> concentrations, within the Appin Crescent area exceed the annual mean objective when 12 months diffusion tube data was available then Fife Council should proceed immediately to a Detailed Assessment.

At the end of 2010, a Detailed Assessment was carried out at Appin Crescent, Dunfermline. This Detailed Assessment considered NO<sub>2</sub> concentrations and concluded that Fife Council should consider declaring an Air Quality Management Area (AQMA) at Appin Crescent. Fife Council should therefore proceed with a Further Assessment and work towards preparing an Air Quality Action Plan. Due to the NO<sub>2</sub> concentrations measured at Appin Crescent the Detailed Assessment recommended that automatic measurement of PM<sub>10</sub> should be carried out.

The 2011 Progress Report concluded that monitoring of NO<sub>2</sub> at the three automatic sites in Fife showed that concentrations at Appin Crescent, Dunfermline; Bonnygate, Cupar and Admiralty Road, Rosyth, were below the annual mean objective. However, NO<sub>2</sub> concentrations have increased since 2009 in Admiralty Road along with PM<sub>10</sub> concentrations. Fife Council concludes that to further investigate NO<sub>2</sub> concentrations within Admiralty Road that diffusion tube monitoring should be increased, incorporating more locations of relevant exposure to the general public. If measured concentrations of NO<sub>2</sub> exceed the annual mean objective, after 12 months of data from sites of relevant exposure, then in accordance with the Technical Guidance LAQM. TG (09), Fife Council should proceed with a Detailed Assessment for Admiralty Road.

Local bias adjusted diffusion tube data at 3 locations within Fife exceeded the NO<sub>2</sub> annual mean objective of 40 µg m<sup>-3</sup>. These locations were: Appin Crescent, Dunfermline; Admiralty Road, Rosyth; St Clair Street, Kirkcaldy.

Within Appin Crescent all diffusion tubes sites (2, 3, 5 and 6) exceeding the objective were located on the south side of Appin Crescent between Park Lane and Couston Street. Diffusion tubes within this area have consistently shown elevated concentrations contrary to those seen at the automatic monitoring site. Data from the 2011 Progress Report supports conclusion made in the 2011 Detailed Assessment for Appin Crescent. It is concluded that Fife Council should consider declaring an AQMA at Appin Crescent, encompassing as a minimum all residential properties which lie between Park Lane and Couston Street. It also concluded that Fife Council should consider declaring an area larger than that stated to account for any uncertainties in monitoring and modelling carried out. Figure 1.1 shows the AQMA boundary encompassing residential properties located on Appin Crescent, Dunfermline.

Diffusion tube data at Bonnygate Cupar did not exceed the 40µg m<sup>-3</sup> objective when using the locally derived bias adjustment factor (0.71). However, when using the National derived bias adjustment factor (0.78) concentrations at one Bonnygate location exceeded the objective at a borderline concentration of 41 µg m<sup>-3</sup>. Data shows that NO<sub>2</sub> diffusion tube concentrations have reduced since the introduction of traffic management measures in 2009. In 2008 Fife Council declared Bonnygate, Cupar as an AQMA for NO<sub>2</sub> and PM<sub>10</sub> and has since adopted an Air Quality Action Plan in 2010 to address the air quality issues. St Clair Street, Kirkcaldy diffusion tubes sites (1 and 2) have consistently measured concentrations around the 40 µg m<sup>-3</sup> objective, with concentrations exceeding the objective in 2008 and 2010. As a result of this, Fife Council have installed an automatic monitoring station (monitoring NO<sub>x</sub> and PM<sub>10</sub>) at St Clair Street to further investigate concentrations in this area, which commenced in February 2011. If measured concentrations of NO<sub>2</sub> continue to

exceed the annual mean objective, after 12 months of data has been collected, then in accordance with the Technical Guidance LAQM. TG (09), Fife Council should proceed with a Detailed Assessment for St Clair Street, Kirkcaldy.

PM<sub>10</sub> data collected for 2010 showed that both Bonnygate and the Admiralty Road sites exceeded the annual mean objective with concentrations of 19 µg m<sup>-3</sup>. Bonnygate Cupar has been declared an AQMA for PM<sub>10</sub> since 2008 and an Action Plan has been adopted since 2010. Figure 1.2 shows the AQMA boundary encompassing Cupar Town Centre.

It has been concluded that Fife Council should continue monitoring PM<sub>10</sub> at Admiralty Road for another year before moving on to a Detailed Assessment. This conclusion was reached due to:

- The annual concentration (19 µg m<sup>-3</sup>) being a borderline exceedance of the objective.
- 2010 being the first year concentrations exceeded the objective in the area.
- Unusual weather conditions for the year may have contributed to the increase in concentrations.

Both Bonnygate and Admiralty Road sites did not exceed the 24 hour mean objective of 50 µg m<sup>-3</sup>, with seven exceedances allowed per year.

Results for SO<sub>2</sub> monitoring in Fife in 2010 indicate that AQS objectives for SO<sub>2</sub> are unlikely to be exceeded. There are no new industrial processes, road or other developments that require detailed assessment with respect to this pollutant. Hence, new information in 2009 confirms the conclusion of previous reports that a Detailed Assessment is not required for SO<sub>2</sub>.

Previous Review and Assessment reports have concluded that concentrations of lead, 1,3-butadiene and benzene are well below their respective objective at all locations in Fife. There has been no change in sources of these pollutants so they are not considered further in this report.

The Further Assessment (2012) for Appin Crescent concluded that there are continued current exceedances of the NO<sub>2</sub> annual mean objective in Appin Crescent, Dunfermline. The spatial extent of the exceedances remains quite small and the current AQMA boundary is adequate for NO<sub>2</sub> (Figure 1.1). The assessment also indicated that there are exceedances of the Scottish annual mean PM<sub>10</sub> objective within the Appin Crescent AQMA and as this pollutant is not currently included in the AQMA order for the location, it is recommended that the order is amended accordingly. The results of the source apportionment indicate that for PM<sub>10</sub>, existing background concentrations are thought to be predominant in the overall concentrations at all locations in Appin Crescent. For NO<sub>x</sub>/NO<sub>2</sub> the contribution from road traffic is dominant overall. The contribution from moving and queuing vehicles was also assessed. The contribution from moving traffic is thought to predominate between the two, although emissions from queuing vehicles are also important, though perhaps more so for NO<sub>x</sub> than PM<sub>10</sub>. Of the vehicle classes assessed, cars and HGVs are the most significant sources of vehicular NO<sub>x</sub>, whilst cars and LGVs have been identified as the most significant sources of vehicular PM<sub>10</sub>. Buses are also an important source of both pollutants.

An Air Quality Action Plan has been implemented for Appin Crescent, Dunfermline by Fife Council. The report on the finalised Appin Crescent Air Quality Action Plan was submitted to City of Dunfermline Area Committee meeting on 8<sup>th</sup> May 2013 for approval.

The Updating and Screening Assessment (2012) concluded that no further action is required with respect to pollutants, Carbon Monoxide, Benzene, 1,3-Butadiene, Lead and Sulphur Dioxide. The assessment also indicated that the 2011 nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>)

monitoring data supports the requirement for Air Quality Management Areas in Bonnygate, Cupar and Appin Crescent, Dunfermline due to exceedances of the annual mean objectives for both pollutants. PM<sub>10</sub> concentrations at Admiralty Road, Rosyth have increased above the annual mean objective of 18 µg m<sup>-3</sup> and it is therefore recommended that Fife Council carry out a further Detailed Assessment to assess PM<sub>10</sub> concentrations in the area of Admiralty Road, Rosyth. The Fife Cupar 2011 monitoring data indicate an overall downward trend in NO<sub>2</sub> concentrations since the introduction of the traffic queue relocation system in the Bonnygate. PM<sub>10</sub> concentrations have also decreased relative to 2007 PM<sub>10</sub> levels and the exceedance is currently marginal.

The annual mean NO<sub>2</sub> objective of 40 µg m<sup>-3</sup> was exceeded at 6 diffusion tube sites located in three areas of Fife (Appin Crescent, Dunfermline, St Clair Street, Kirkcaldy and Bonnygate Cupar). All 6 diffusion tube sites are considered to be locations of relevant exposure. Both Appin Crescent and Bonnygate, Cupar are currently included within existing Air Quality Management Areas (AQMA). St Clair Street, Kirkcaldy is not currently included within any existing AQMA and it is therefore recommended that Fife Council carry out a Detailed Assessment for nitrogen dioxide in the area of St Clair Street, Kirkcaldy.

The Detailed Assessment of St Clair Street, Kirkcaldy (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area.

This modelling study, which used the most recent traffic data, NO<sub>2</sub> measurements and meteorological data for the study area indicates that there are no exceedances of the NO<sub>2</sub> annual mean objective at locations with relevant exposure. The annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. NO<sub>2</sub> concentrations in excess of the annual mean objective are not occurring and are not occurring where ground level or first floor residential properties are present within the study area. In light of this Detailed Assessment of Air Quality, Fife Council is not required to declare an Air Quality Management Area at this time. It was recommended that Fife Council continue to monitor NO<sub>2</sub> and PM<sub>10</sub> concentrations at this location and may wish to locate diffusion tube monitoring sites closer to the locations where ground floor residential properties are present on St Clair Street.

The Detailed Assessment of Admiralty Road, Rosyth, Fife (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area. Dispersion modelling indicates that exceedances of the PM<sub>10</sub> annual mean objective of 18 µg m<sup>-3</sup> may have occurred at two receptors; Monitoring Site and Res012. It is also likely that the annual mean objective has been equalled at a further 41 receptors throughout the study area. However, the modelling also indicates that the daily mean objective has not been exceeded at any location on Admiralty Road. In light of this Detailed Assessment it is recommended that Fife Council should consider either declaring an Air Quality Management Area (AQMA) for the PM<sub>10</sub> annual mean objective, which should encompass the study area detailed in this report or to defer any AQMA declaration for a further year following the FDMS drier change in order to confirm the exceedance of the PM<sub>10</sub> annual mean objective.

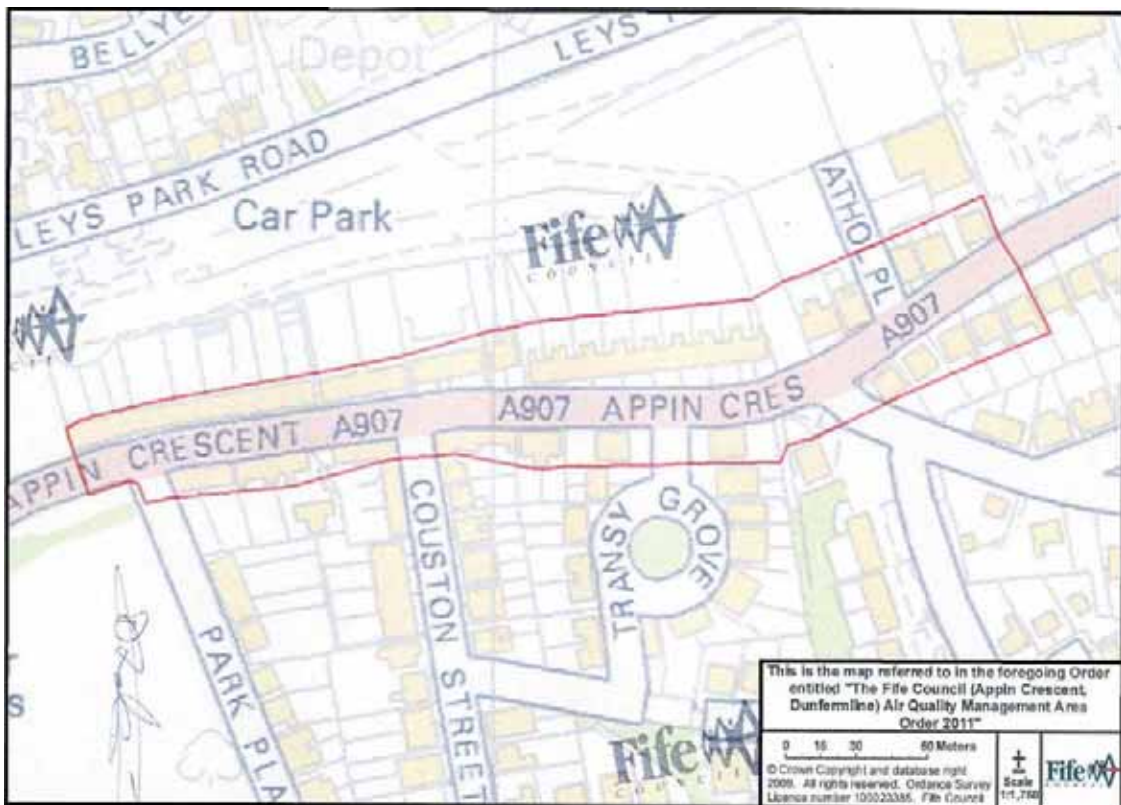
Fife Council currently monitors PM<sub>10</sub> using a Tapered Element Oscillating Microbalance-Filter Dynamic Measurement System (TEOM-FDMS) at one location on Admiralty Road. Recent analyses of FDMS data from the UK Automatic and Urban Network (AURN) has identified baseline offsets in some FDMS analysers. As a result of this study a baseline check of the Rosyth FDMS was carried, which consisted of running particle-free air through the analyser for 3 days. The results from this check indicate that there may be a positive offset in the 2012 Rosyth FDMS data; and as a consequence measured PM<sub>10</sub> concentrations might be over-estimated at this location. Furthermore, the offset may also exist in the 2011 data; however, this cannot be confirmed as a baseline check was

not carried out during 2011. It was recommended that Fife Council change the drier unit to the FDMS analyser at Admiralty Road.

Also for this study, daily traffic flow data and traffic compositions were derived from Transport Scotland traffic counts collected at two automatic counting stations located on Admiralty Road. Speed data and queue data were not available for the study area. As a result professional judgment was used to estimate traffic speeds with slower speeds being used as appropriate to reflect congestion/speed around junctions. It was recommended that Fife Council implement further local traffic surveys in order to better characterise traffic flows and fleet compositions in the area.

Following discussions with the Scottish Government, it was agreed that Fife Council should defer its decision as to whether or not to declare an AQMA at Admiralty Road Rosyth, until at least six months monitoring data is available using a new FDMS drier in PM<sub>10</sub> monitoring equipment.

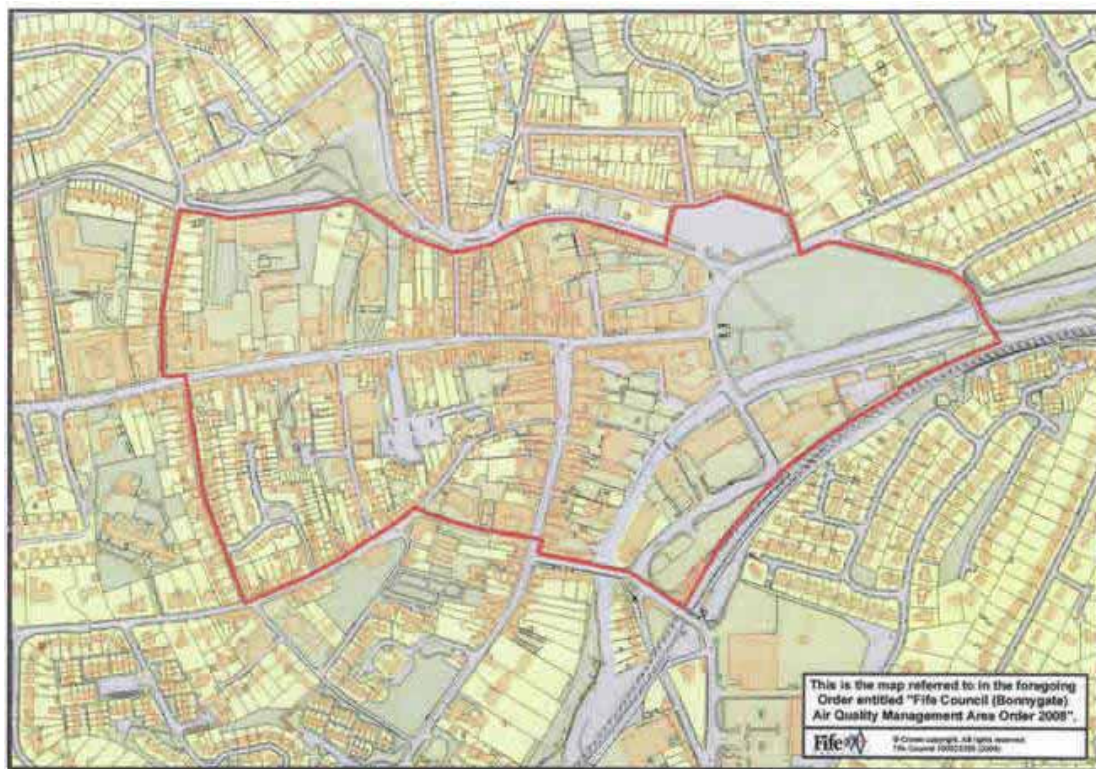
**Figure 1.1 Map of Appin Crescent AQMA Boundary**



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**Figure 1.2 Map of Bonnygate AQMA Boundary**



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## 2 New Monitoring Data

### 2.1 Summary of Monitoring Undertaken

#### 2.1.1 Automatic Monitoring Sites

Fife Council operated four automatic air quality monitoring stations during 2012. NO<sub>x</sub> and PM<sub>10</sub> concentrations are measured at each site. All automatic monitoring of PM<sub>10</sub> was conducted using Tapered Element Oscillating Microbalance - Filter Dynamics Measurement System (TEOM-FDMS) instruments. TEOM-FDMS analysers have been assessed as equivalent to the EU reference method without any adjustment to the data and therefore no adjustment has been applied. Figures 2.1 – 2.5 show location maps of the automatic monitoring sites with surrounding NO<sub>2</sub> diffusion tube sites under operation during 2012.

Short-period CO monitoring has also been undertaken by Fife Council Transportation Department. Automatic SO<sub>2</sub> data are also available from Scottish Power Generation Ltd from a monitoring site close to Longannet Power Station<sup>21</sup>. The station's PPC permit from SEPA requires that air quality impacts around Longannet Power Station be assessed with respect to the Air Quality Strategy (AQS) objectives. The monitoring location is at Blair Mains (Grid Reference NS972864) to the north east of the power station. This location is in the area identified by modelling as likely to experience the maximum impact of the power station plume.

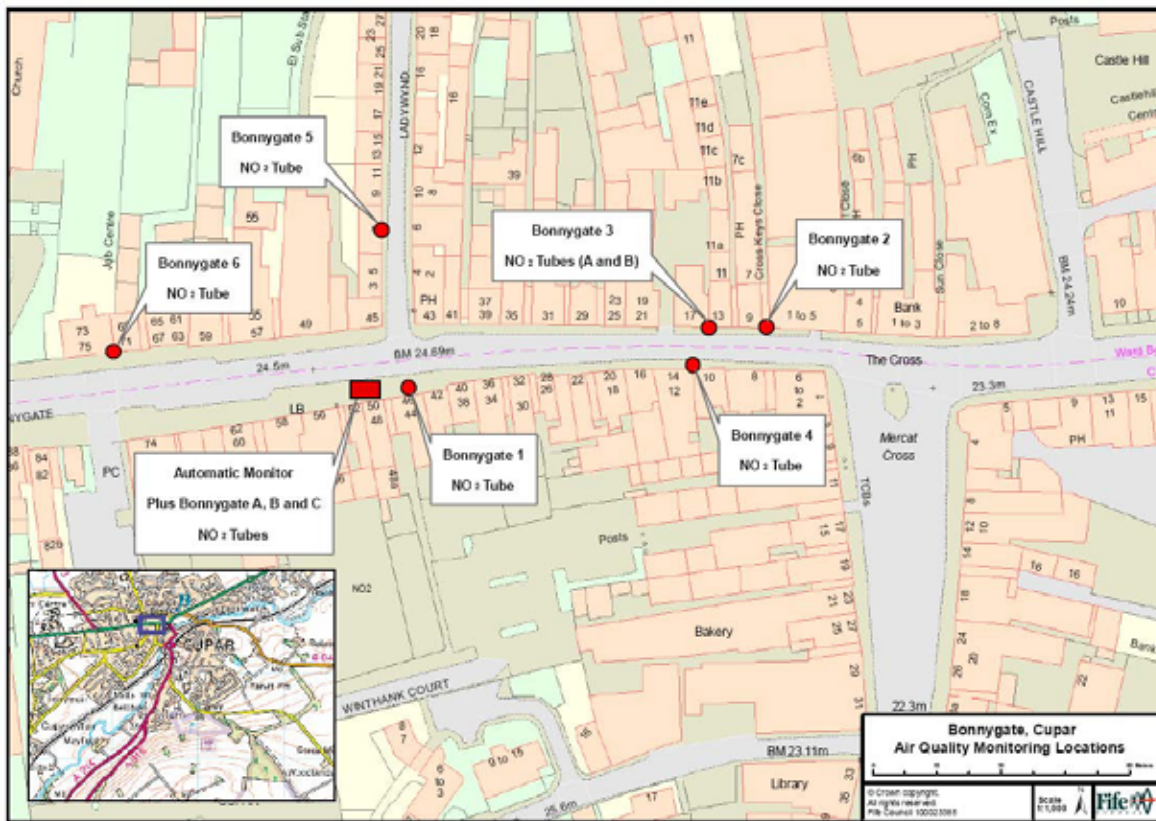
A summary of the INEOS Grangemouth oil refinery in their Annual Community Air Monitoring Report<sup>22</sup> for 2012 is also provided in this Progress Report. The report assesses concentrations of 1,3-butadiene, benzene, nitrogen dioxide and sulphur dioxide.

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<sup>21</sup> Review of Annual Air Quality Impacts around Longannet Power Station compared to Air Quality Strategy Objectives – Calendar year 2012, Iberdrola, Engineering & Construction, March 2013

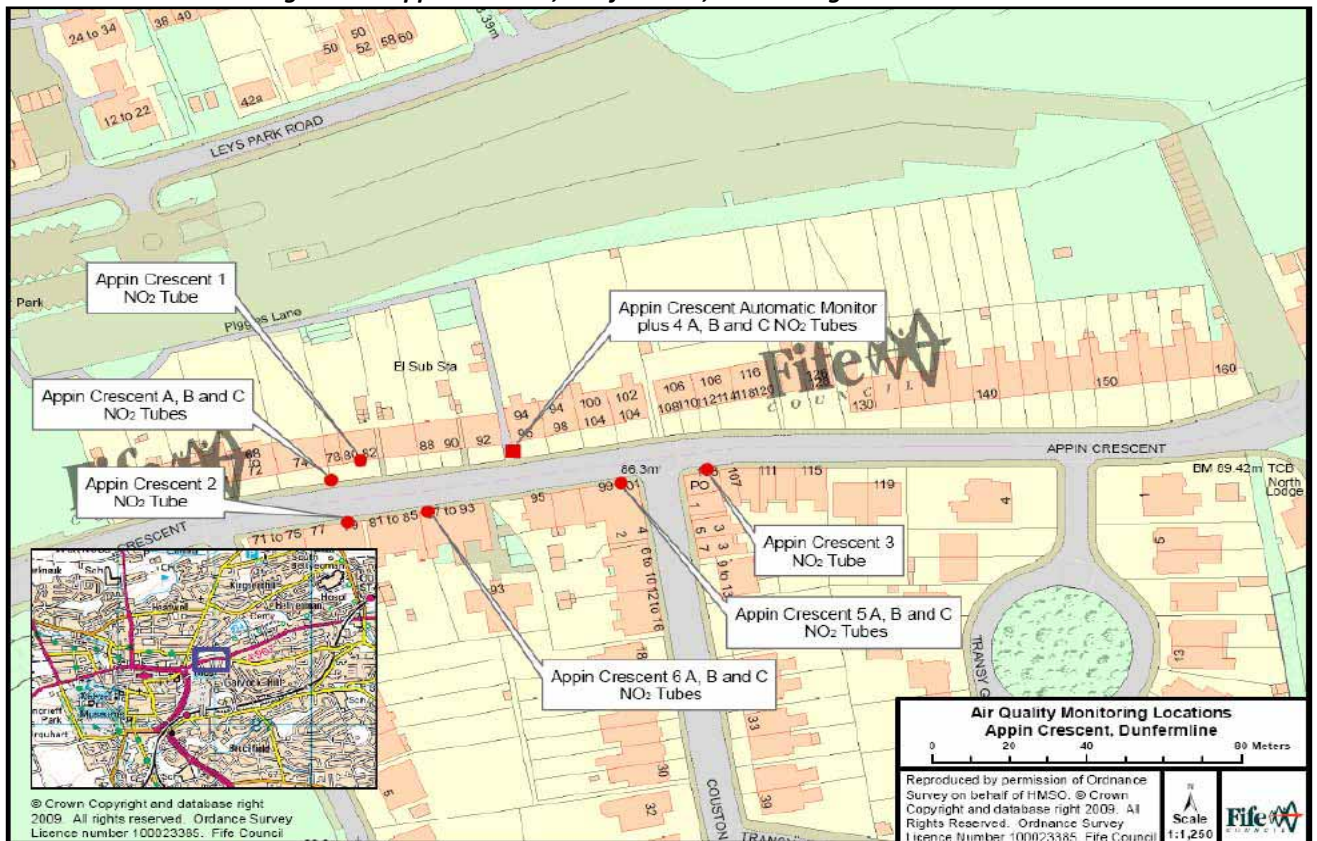
<sup>22</sup> Community Air Quality Monitoring Report, Ambient Atmospheric Survey in the Vicinity of Grangemouth - 2012, INEOS, April 2013

Figure 2.1 Bonnygate, Cupar, Monitoring Locations



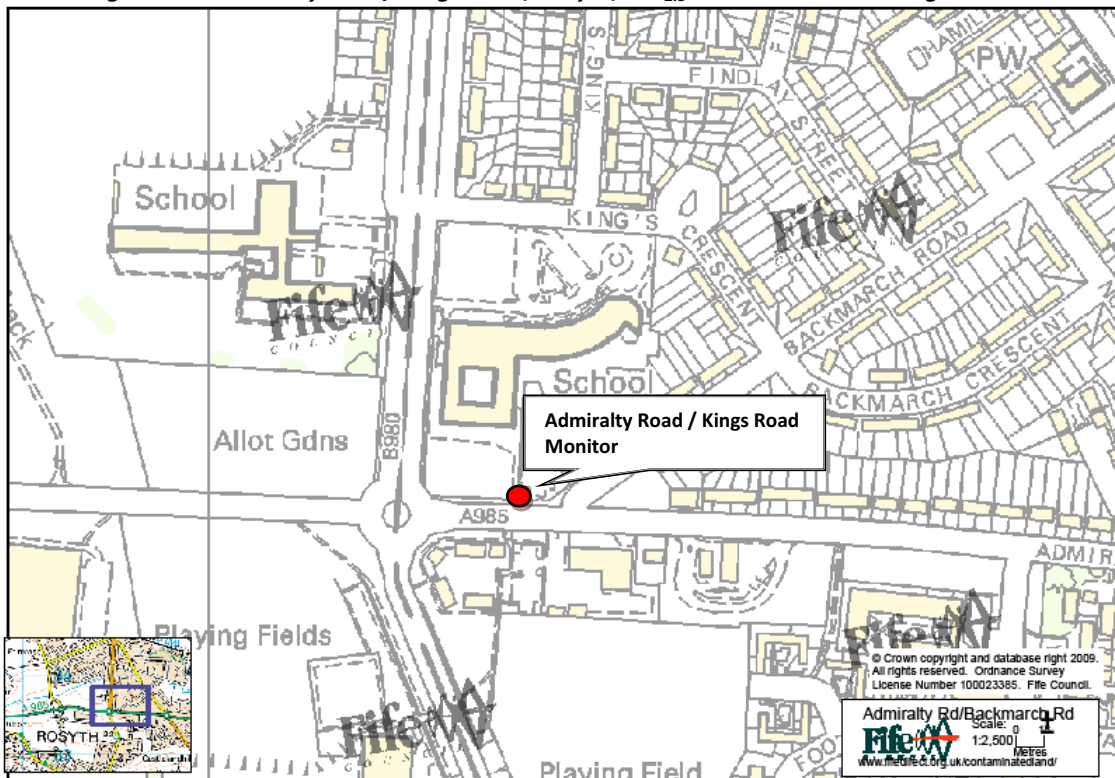
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Figure 2.2: Appin Crescent, Dunfermline, Monitoring Locations



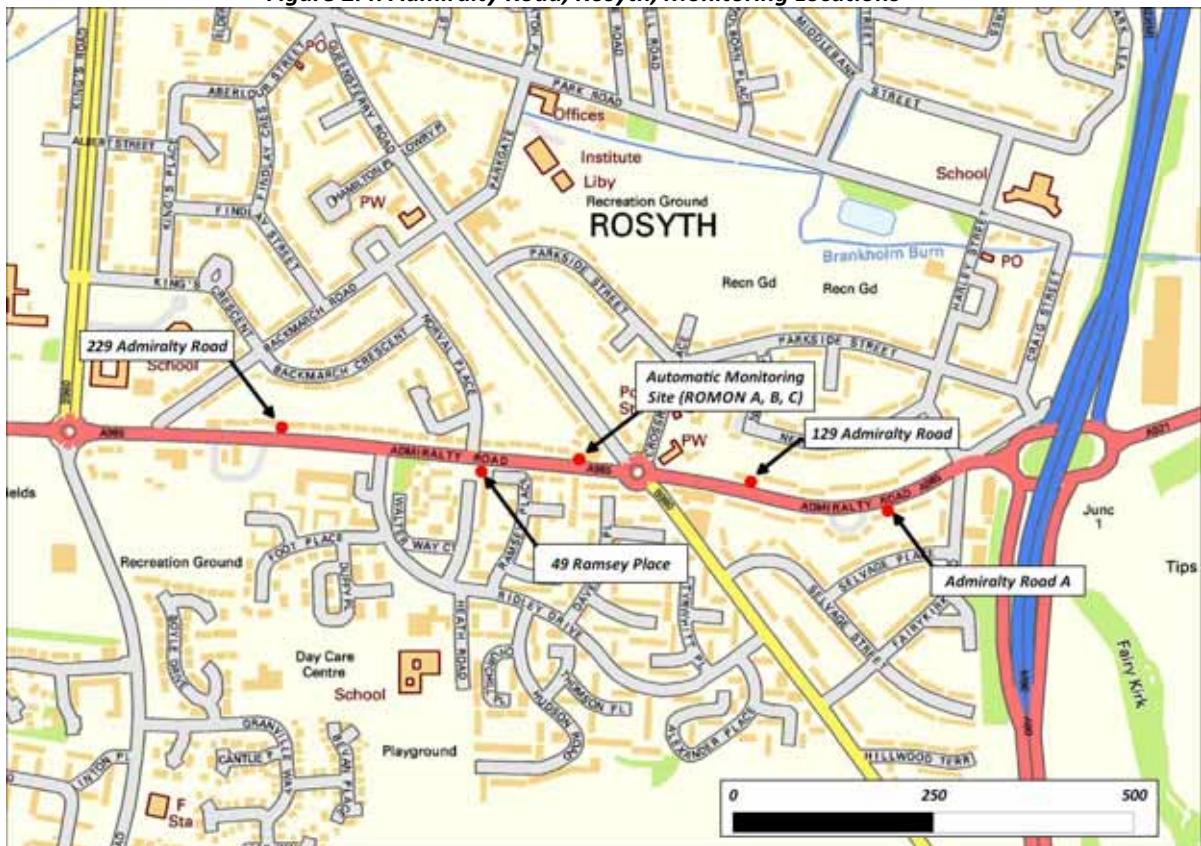
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Figure 2.3: Admiralty Road/ Kings Road, Rosyth, PM<sub>2.5</sub> Automatic Monitoring Location



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Figure 2.4: Admiralty Road, Rosyth, Monitoring Locations



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Figure 2.4: St Claire Street Kirkcaldy, Monitoring Locations



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## Fife Council

**Table 2.1 Details of Automatic Monitoring Sites**

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Bonnygate, Cupar	Kerbside	X337406	Y714574	2.0	NO <sub>2</sub> , PM <sub>10</sub>	Y	NO <sub>x</sub> Analyser, TEOM-FDMS	N (5.0m)	< 0.5m	Y
Appin Crescent, Dunfermline	Roadside	X309926	Y687722	2.0	NO <sub>2</sub> (PM <sub>10</sub> installed March 2011)	Y	NO <sub>x</sub> Analyser, TEOM-FDMS	Y	4.0m	N
Admiralty Road, Rosyth	Roadside	X311755	Y683503	2.0	NO <sub>2</sub> PM <sub>10</sub>	N	NO <sub>x</sub> Analyser, TEOM-FDMS	Y	6.0m	Y
St Clair Street, Kirkcaldy	Roadside	X329143	Y692986	2.0	NO <sub>2</sub> , PM <sub>10</sub>	N	NO <sub>x</sub> Analyser, TEOM-FDMS	N(10.0m)	5.0m	N

## 2.1.2 Non-Automatic Monitoring Sites

Fife Council operates an extensive NO<sub>2</sub> diffusion tube monitoring survey with monitoring sites in East, West and Central Fife. In total there are 51 NO<sub>2</sub> diffusion tube sites throughout the Fife area. Of these, eight sites are triplicate sites, with four of these triplicate sites being co-located with the automatic analysers.

Measurements of benzene and other hydrocarbon compounds are undertaken by INEOS laboratory Grangemouth. Environmental measurements are made around the petrochemicals sites based in Grangemouth to monitor the impact of industrial activities on local communities. Monitoring is carried out over an area of approximately 50 square kilometres using stainless steel sorbent passive diffusive tubes to determine and monitor Propane, n-Butane, Iso-Butane, n-Pentane, Hexane, Heptane, Octane, Nonane, Decane, Propylene, Benzene, Toluene, o-Xylene, m & p-Xylene, Styrene, 1,3 Butadiene and total C4 to C10 hydrocarbons. Glass Palmes tubes are used to determine and monitor nitrogen dioxide, sulphur dioxide and total inorganic chloride (acid gases).

Measurements of benzene and other hydrocarbon compounds are also undertaken by NPL<sup>23</sup> on behalf of BP Exploration Operating Company Ltd in the vicinity of Hound Point, on the Forth coastline during 2012 (12/01/2011-05/01/2012). Samples were collected over 2 week periods using passive samplers at 12 locations between the Forth Bridges and West Wemyss including 4 locations between Dalgety Bay and Burntisland. Samples were analysed for iso-butane, n-butane, iso-pentane, n-pentane, n-hexane, n-haptane, benzene, toluene, xylene and total hydrocarbons (C4-C19).

### Diffusion Tube QA/QC Process

Diffusion tubes used by Fife Council are supplied and analysed by Tayside Scientific Services (formerly Dundee City Council Scientific Services). The laboratory participates in three schemes which ensure that the NO<sub>2</sub> tube results meet acceptable standards.

1. The WASP scheme is run by the Health and Safety Laboratory. Each month one tube is sent for testing. Results are compared with other participating labs and feedback on performance provided.
2. Every three months three tubes and a blank (for analysis) are supplied for exposure at an intercomparison site operated as part of the Support to Local Authorities for Air Quality Management contract funded by the Scottish Government, Defra and the other Devolved Authorities. Again, results are compared with other participating labs and feedback on performance provided.
3. Each month a QC NO<sub>2</sub> solution is also provided via this contract. This solution is run as an internal check for NO<sub>2</sub> tubes in the laboratory. The solution is tested after every 21 NO<sub>2</sub> tube samples.

Tayside Scientific Services also use in-house quality assurance standards. The tube preparation method is 20%TEA in water.

### Bias Correction for Diffusion Tubes

Diffusion tube samplers are a simple and cost effective method of measuring NO<sub>2</sub>. However, they are classed as an indicative method and are known to have a systematic bias compared to more accurate results obtained from calibrated automatic analysers.

<sup>23</sup> Extract from BP Production and Exploration, Houndpoint, 2011, NPL, April 2012

The degree of systematic bias depends on the laboratory preparing and analysing the tubes, and also includes the methodology employed for that analysis. Therefore, it is necessary to determine a bias adjustment factor appropriate for the particular diffusion tubes used in Fife. The methodology for determining the appropriate bias adjustment factor is outlined in LAQM TG (09)<sup>2</sup>; and several online tools are also available to assist with this process.

The local bias factor is calculated using sites where a triplicate set of diffusion tubes are co-located with a chemiluminescence analyser. The national bias adjustment factor is derived using the national database co-location studies.

Fife Council has four co-location sites that can be used to calculate the local bias adjustment factor. The local bias adjustment factor for each individual location was calculated using the “LAQM Tool” described in section A1.191 of LAQM TG (09). The results are shown in Table 2.2 below. The calculation spreadsheets are shown in Appendix C.

**Table 2.2 Bias correction factors for 2012 for NO<sub>2</sub> diffusion tubes in Fife**

Source	Bias adjustment Factor 2012
Appin Crescent, Dunfermline	<b>0.79</b>
Bonnygate, Cupar	<b>0.76</b>
Admiralty Road, Rosyth	<b>0.88</b>
St Clair Street, Kirkcaldy	<b>0.90</b>
Locally Derived (average of 4 local correction factors)	<b>0.83</b>
Nationally Derived (1 Study)	<b>0.90</b>
Locally Derived combined with Nationally Derived (5 Studies)	<b>0.84</b>

The average of the bias adjustment factors from Appin Crescent, Bonnygate Cupar, Admiralty Road and St Clair Street is **0.83**. The nationally derived bias adjustment factor was calculated as **0.90**, however, this has been calculated using only one study from the up-to-date National Bias Adjustment Factor Spreadsheet (version number 03/2013, shown in Appendix C). A further bias adjustment factor has been calculated by combining both the locally and nationally derived factors using the method outlined in the National Bias Adjustment Factor Spreadsheet:

*“To obtain a new correction factor that includes your data, average the bias (B) values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g.  $-0.16 + 1.00 = 0.84$  in this example, then take the inverse to give the bias adjustment factor  $1/0.84 = 1.19$ . (This will not be exactly the same as the correction factor calculated using orthogonal regression as used in this spreadsheet, but will be reasonably close).”*

For this report and in line with the 2012 Updating and Screening Assessment, diffusion tube data have been bias adjusted using the respective locally derived bias adjustment factors. Where there is no local bias adjustment factor relevant to the location of the diffusion tube then the combined locally and nationally derived bias adjustment factor of **0.84** has been used. The diffusion tube monitoring locations are detailed in Table 2.3.



Fife Council

Table 2.3 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
<b>NO<sub>2</sub> Diffusion Tubes West Area</b>							
St Leonards Primary School, Dunfermline	R(F)	X 309770	NO <sub>2</sub>	N	Y	10.6	Y
Carnegie Drive (A,B,C), Dunfermline*	R(F)	X 309019	NO <sub>2</sub> *	N	Y	2.3	Y
Rumblingwell, Dunfermline (5N)	R	X 307866	NO <sub>2</sub>	N	N (6.3)	1.7	Y
Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	X 309897	NO <sub>2</sub>	Y	N (5.1)	1.6	Y
Appin Crescent (1) Dunfermline	R(F)	X 309891	NO <sub>2</sub>	Y	Y	6.5	Y
Appin Crescent (2) Dunfermline	R(F)	X 309975	NO <sub>2</sub>	Y	Y	1.5	Y
Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	X 309897	NO <sub>2</sub>	Y	N (5.1)	1.6	Y
Appin Crescent (1) Dunfermline	R(F)	X 309891	NO <sub>2</sub>	Y	Y	6.5	Y
Appin Crescent (2) Dunfermline	R(F)	X 309975	NO <sub>2</sub>	Y	Y	1.5	Y
Appin Crescent (3) Dunfermline	R(F)	X 309975	NO <sub>2</sub>	Y	Y	1.8	Y
Appin Crescent 4(A)(B)(C) Dunfermline*	R(F)	X 309926	NO <sub>2</sub> *	Y	Y	3.9	Y
Appin Crescent 5(A)(B)(C)*	R(F)	X 309974	NO <sub>2</sub>	Y	Y	1.5	Y

Fife Council

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Appin Crescent 6(A)(B)(C)*	R(F)	X 309904	NO <sub>2</sub>	Y	Y	1.5	Y
High Street, Cowdenbeath	K	X 316523	NO <sub>2</sub>	N	N (3.5)	0.5	Y
North Approach Road (A, B) Kincardine	K	X 293182	NO <sub>2</sub>	N	N (11.0)	0.5	Y
Pittencrieff St, Dunfermline	R(F)	X 308743	NO <sub>2</sub>	N	Y	0.5	Y
11 Halbeath RD1, Dunfermline	R(F)	X 310245	NO <sub>3</sub>	N	Y	14	Y
57 Halbeath RD2, Dunfermline	R(F)	X 310488	NO <sub>4</sub>	N	Y	6	Y
Admiralty Road A, Rosyth	R(F)	X 312140	NO <sub>2</sub> *	N	Y	9	Y
Admiralty Road (A,B,C) ROMON*	R(F)	X 311755	NO <sub>2</sub> *	N	Y	6.5	Y
229 Admiralty Road, Rosyth	R(F)	X 311384	NO <sub>5</sub>	N	Y	11	Y
49 Ramsay Place, Rosyth	R(F)	X 311633	NO <sub>6</sub>	N	Y	14	Y
129 Admiralty Road, Rosyth	R(F)	X 311693	NO <sub>7</sub>	N	Y	12	Y
<b>NO<sub>2</sub> Diffusion Tubes Central Area</b>							
St Clair Street (1), Kirkcaldy	R(F)	X 329157	NO <sub>2</sub>	N	N (2)	1.3	Y
St Clair Street (2), Kirkcaldy	R(F)	X 329131	NO <sub>2</sub>	N	N (2)	1.8	Y
St Clair Street (3), Kirkcaldy	R(F)	X 329174	NO <sub>2</sub>	N	Y	2	Y

Fife Council

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
St Clair Street ROMON (A,B,C)* Kirkcaldy	R	X329143	Y692986	NO <sub>3</sub>	N	N(10.0m)	5	Y
Dunnikier Rd, Kirkcaldy	R(F)	X 328152	Y 692350	NO <sub>2</sub>	N	Y	3.4	Y
Victoria Rd, Kirkcaldy	R(F)	X 328152	Y 692325	NO <sub>2</sub>	N	Y	2.5	Y
Glenlyon Road, Levenmouth	K	X 337357	Y 701318	NO <sub>2</sub>	N	N (26.8)	1	Y
Leslie High St	R(F)	X 325111	Y 701806	NO <sub>2</sub>	N	Y	3	Y
Queensway, Glenrothes	K	X 327849	Y 701114	NO <sub>2</sub>	N	N (17.0)	1	Y
Adsa Roundabout, Kirkcaldy	K	X 328735	Y 694053	NO <sub>2</sub>	N	N (28.0)	1	Y
125 St Clair Street, Kirkcaldy	R(F)	X 329208	Y693170	NO <sub>2</sub>	N	Y	1.5	Y
179A St Clair Street, Kirkcaldy	R(F)	X329301	693315	NO <sub>2</sub>	N	Y	1.5	Y
3A Junction Road, Kirkcaldy	R(F)	329121	693036	NO <sub>2</sub>	N	Y	1.5	Y
24 St Clair Street, Kirkcaldy	R(F)	329091	692691	NO <sub>2</sub>	N	Y	1.5	Y
<b>NO<sub>2</sub> Diffusion Tubes East Area</b>								
City Road (1,2), St Andrews	R	X 350586	Y 716580	NO <sub>2</sub>	N	N (1.0)	1.5	Y
Bell Street (1.), St Andrews	R(F)	X 350708	Y 716716	NO <sub>2</sub>	N	Y	1.6	Y
Bell Street (2) St Andrews	R(F)	X 350716	Y 716669	NO <sub>2</sub>	N	Y	2.1	Y
Crossgate, Cupar	K	X 337536	Y 714537	NO <sub>2</sub>	Y	N (3.0)	0.5	Y
South Road, Cupar	R	X 337513	Y 713616	NO <sub>2</sub>	N	N (17.0)	1.8	Y
Cupar Road, Auchtermuchty	R(F)	X 324186	Y 711801	NO <sub>2</sub>	N	Y	1.8	Y

Fife Council

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Bonnygate, Cupar (1N), Bonnygate 1	R(F)	X 337409	Y 714570	NO <sub>2</sub>	Y	Y	5.3	Y
Bonnygate, Cupar, Bonnygate 2	R(F)	X 337493	Y 714586	NO <sub>2</sub>	Y	Y	1.7	Y
Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	X 337480	Y 714586	NO <sub>2</sub>	Y	Y	1.6	Y
Bonnygate, Cupar, Bonnygate B4	R(F)	X 337471	Y 714575	NO <sub>2</sub>	Y	Y	1.9	Y
Ladywynd, Cupar, Ladywynd B5	R(F)	X 337405	Y 714596	NO <sub>2</sub>	Y	Y	1	Y
Bonnygate West, Cupar, Bonnygate B6	R(F)	X 337342	Y 714579	NO <sub>2</sub>	Y	Y	3.2	Y
Bonnygate, Cupar, Monitor BA, BB, BC *	K	X 337406	Y 714574	NO <sub>2</sub> *	Y	N (4.8)	0.6	Y
4 East Road, Cupar	R(F)	X 337915	Y 714721	NO <sub>2</sub>	Y	Y	14	Y

\* Triplicate sites

K = Kerbside, 0-1m from the kerb of a busy road

R = Roadside, 1-5m from the kerb (up to 15m in some cases)

R(F) = façade of buildings on street

UB = Urban Background, >50m from any busy road

## 2.2 Comparison of Monitoring Results with Air Quality Objectives

### 2.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table 2.4 shows 2012 statistics for automatic NO<sub>2</sub> measurements at the four locations in Fife. It shows that Appin Crescent, Dunfermline, Bonnygate, Cupar, Admiralty Road, Rosyth and St Clair Street, Kirkcaldy have no exceedances for the annual mean NO<sub>2</sub> objective.

Table 2.5 shows the results of automatic monitoring measured against the 1 hour NO<sub>2</sub> objective. There were no exceedances of the 1 hour NO<sub>2</sub> objective for any of the four automatic monitoring sites.

The trend of significantly lower concentrations seen at Bonnygate, Cupar, suggests that the traffic controlling measures introduced in mid-July 2009 may be reducing levels NO<sub>2</sub>. These measures include a new Urban Traffic Management and Control System and changes to the pedestrian crossings.

NO<sub>2</sub> monitoring data are presented for INEOS Grangemouth oil refinery as their annual monitoring report for 2012 report. Annual average concentrations of NO<sub>2</sub> are lower than the set air quality limit of 31 µg/m<sup>3</sup> (16 ppb).

## Fife Council

**Table 2.4 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for period of monitoring %	Valid Data Capture 2012 %	Annual Mean Concentration $\mu\text{g m}^{-3}$					
					2007	2008	2009	2010	2011	2012
Appin Crescent, Dunfermline	Roadside	Y	96	96	31*	30	30	29	30	30
Bonnygate, Cupar	Kerbside	Y	90	90	52	46	(33) 32**	32	30	29
Admiralty Road, Rosyth	Roadside	N	97	97	N/A	26***	29	33	28	28
St Clair Street, Kirkcaldy	Roadside	N	93	93	N/A	N/A	N/A	N/A	19****	32

\* Appin Crescent, Dunfermline started monitoring August 2007.

\*\* Bonnygate, Cupar started monitoring December 2005. Bonnygate Cupar did not monitor between February and early July. Period Mean adjustment of 0.95 applied.

\*\*\* Admiralty Road, Rosyth started monitoring March 2008.

\*\*\*\* St Clair Street, Kirkcaldy started monitoring February 2011

**Table 2.5 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture 2012%	Valid Data Capture 2012 %	Number of Exceedances of hourly mean ( $200 \mu\text{g m}^{-3}$ )					
					If the period of valid data is less than 90% of a full year, include the 99.8 <sup>th</sup> percentile of hourly means in brackets.					
					2007	2008	2009	2010	2011	2012
Appin Crescent, Dunfermline	Roadside	Y	96	96	0*	0	0	0	0	0
Bonnygate, Cupar	Kerbside	Y	90	90	2	3	0 (170)**	0	0 (120)	0
Admiralty Road, Rosyth	Roadside	N	97	97	N/A	0***	2	0	0	0
St Clair Street, Kirkcaldy	Roadside	N	93	93	N/A	N/A	N/A	N/A	0 (71)****	0

\* Appin Crescent, Dunfermline started monitoring August 2007.

\*\* Bonnygate, Cupar started monitoring December 2005. Bonnygate Cupar did not monitor between February and early July. Period Mean adjustment of 0.95 applied.

\*\*\* Admiralty Road, Rosyth started monitoring March 2008.

\*\*\*\* St Clair Street, Kirkcaldy started monitoring February 2011

## Diffusion Tube Monitoring Data

Table 2.6 gives the annual diffusion tube data for 2012. As discussed previously, the data have been bias corrected using local bias adjustment factors for diffusion tube sites located in Dunfermline (**0.79**), Rosyth (**0.88**), Cupar (**0.76**) and Kirkcaldy (**0.90**). For monitoring sites located in other areas, a combined national and local bias adjustment factor of **0.84** has been used.

All of the monthly diffusion tube results are found within Appendix D of this report. Table 2.7 compares NO<sub>2</sub> diffusion data from 2007, 2008, 2009, 2010, 2011 and 2012. Duplicate and triplicate site mean concentrations have been calculated using the methodology stated in Section 3.25 in the Technical Guidance (09).

As shown in Table 2.7 and taking into consideration local, regional and national bias adjustments, a total of 11 diffusion tubes at 6 locations exceeded the NO<sub>2</sub> annual mean objective of 40 µg m<sup>-3</sup>. These locations are:

- Appin Crescent 2, Dunfermline
- Appin Crescent 5 (A,B,C), Dunfermline
- Appin Crescent 6 (A,B,C), Dunfermline
- St Clair Street 1, Kirkcaldy
- St Clair Street 2, Kirkcaldy

All exceeding diffusion tube sites are considered to be locations of relevant exposure to the general public.

As can be seen in Table 2.7, concentrations at St Clair Street, Kirkcaldy, diffusion tubes sites (1 and 2) have consistently measured concentrations exceeding the 40 µg m<sup>-3</sup> annual mean objective, with concentrations exceeding the objective in 2008, 2010, 2011 and 2012. In 2010 concentrations exceeded the objective when corrected using the national derived bias adjustment factor. As a result of this, Fife Council installed an automatic monitoring station at St Clair Street in February 2011, monitoring both NO<sub>x</sub> and PM<sub>10</sub>, to further investigate concentrations in this area. St Clair Street 1 and 2 measured 45 µg m<sup>-3</sup> and 41 µg m<sup>-3</sup> in 2012 respectively, exceeding the annual mean objective.

The Detailed Assessment of St Clair Street, Kirkcaldy (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area. This modelling study, which used the most recent traffic data, NO<sub>2</sub> measurements and meteorological data for the study area indicates that there are no exceedances of the NO<sub>2</sub> annual mean objective at locations with relevant exposure. The annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. NO<sub>2</sub> concentrations in excess of the annual mean objective are not occurring and are not occurring where ground level or first floor residential properties are present within the study area.

In light of this Detailed Assessment of Air Quality, Fife Council is not required to declare an Air Quality Management Area at this time. It was recommended that Fife Council continue to monitor NO<sub>2</sub> and PM<sub>10</sub> concentrations at this location and may wish to locate diffusion tube monitoring sites closer to the locations where ground floor residential properties are present on St Clair Street. Fife Council took this into consideration and added 4 new site locations in 2012 in the study area (125 St Clair Street, 179A St Clair Street, 3A Junction Road and 24 St Clair Street). Monitoring at these locations only started in Late November 2012 and had only one month of monitoring in 2012 (16.7% data capture).

Within Appin Crescent, diffusion tube sites 2, 5 (A,B,C) and 6 (A,B,C) exceed the  $40 \mu\text{g m}^{-3}$  annual mean objective with measured bias adjusted concentrations of  $41 \mu\text{g m}^{-3}$ ,  $42 \mu\text{g m}^{-3}$  and  $46 \mu\text{g m}^{-3}$  respectively. An annual mean concentration of  $39 \mu\text{g m}^{-3}$  was measured at Appin Crescent 3. All 4 sites are located between Park Lane and Couston Street; diffusion tubes within this area have consistently shown elevated concentrations contrary to those seen at the automatic monitoring site.

The 2011 Detailed Assessment for Appin Crescent, Dunfermline, concluded that Fife Council should consider declaring an AQMA at Appin Crescent, Dunfermline encompassing as a minimum all residential properties which lie between Park Lane and Couston Street. The assessment also concluded that Fife Council should consider declaring an area larger than that stated to account for any uncertainties in monitoring and modelling carried out. This recommended area was declared by Fife Council in 2011 as an AQMA for  $\text{NO}_2$ .

Annual mean  $\text{NO}_2$  concentrations of  $36 \mu\text{g m}^{-3}$ ,  $37 \mu\text{g m}^{-3}$  and  $34 \mu\text{g m}^{-3}$  were measured at Bonnygate Cupar diffusion tube sites 2, 3(A,B) and B4, respectively. Table 2.7 shows that concentrations in the Bonnygate continue to be lower than pre-2010 concentrations. This decrease is consistent with automatic monitoring concentrations and is likely to be as a result of the traffic management measures introduced in mid-2009.

In 2008 Fife Council declared Bonnygate Cupar as an AQMA for  $\text{NO}_2$  and  $\text{PM}_{10}$  and has since adopted an Air Quality Action Plan to combat these issues. Progress to date with the measures in the plan is reported in Appendix E. There has been an encouraging trend in the monitoring results coinciding with the implementation of the Bonnygate Air Quality Action Plan.

Annual mean  $\text{NO}_2$  concentrations of  $39 \mu\text{g m}^{-3}$  and  $36 \mu\text{g m}^{-3}$  were measured at Bell St 1 and 2, St Andrews, respectively. Although these measured concentrations are below the AQS annual mean objective the data between 2007 and 2012 show a possible upward trend in annual mean  $\text{NO}_2$  concentrations.

Diffusion tube sites in Admiralty Road, Rosyth which are in locations of relevant exposure, show concentrations below the annual mean objective, concurring with those concentrations measured at the automatic monitoring site.



Fife Council

Table 2.6 Results of NO<sub>2</sub> Diffusion Tubes 2012

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2012	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration
<b>West Area</b>								
DRM5	Rumblingswell, Dunfermline	N	R	N	83.3	-	N	25
DRM9	Appin Crescent (A, B & C), Dunfermline*	Y	R	Y	91.7	-	N	34
C'BEATH	High Street, Cowdenbeath	N	K	N	91.7	-	N	24
K'DINE1	N. Approach Rd. A/B, Kincardine	N	K	N	91.7	-	N	19
AQM3	St Leonards School, Dunfermline	N	R(F)	N	91.7	-	N	17
C'GIE DR	Carnegie Drive (A, B & C), Dunfermline*	N	R(F)	Y	91.7	-	N	35
APP CR1	Appin Crescent 1, Dunfermline	Y	R(F)	N	91.7	-	N	27
APP CR2	Appin Crescent 2, Dunfermline	Y	R(F)	N	91.7	-	N	<b>41</b>
APP CR3	Appin Crescent 3, Dunfermline	Y	R(F)	N	91.7	-	N	39
PITT ST	Pittencrieff St, Dunfermline	N	R(F)	N	91.7	-	N	19
APP CR4	Appin Crescent 4 (A, B,C), Dunfermline	Y	R(F)	Y	91.7	-	N	28
APP CR5	Appin Crescent 5 (A, B & C), Dunfermline*	Y	R(F)	Y	91.7	-	N	<b>42</b>
APP CR6	Appin Crescent 6 (A, B & C), Dunfermline*	Y	R(F)	Y	91.7	-	N	<b>46</b>
HALBEATH RD1	11 Halbeath RD1, Dunfermline	N	R (F)	N	91.7	-	N	21
HALBEATH RD2	57 Halbeath RD2, Dunfermline	N	R (F)	N	91.7	-	N	20

## Fife Council

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2012	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration
ADM RO A	Admiralty Road A, Rosyth	N	R(F)	N	91.7	-	N	33
ROMON	Admiralty Road, Rosyth ROMON A,B,C	N	R(F)	Y	91.7	-	N	28
N/A	229 Admiralty Road, Rosyth	Y	R	N	91.7	-	N	24
N/A	49 Ramsay Place, Rosyth	Y	R	N	91.7	-	N	19
N/A	129 Admiralty Road, Rosyth	Y	R	N	91.7	-	N	27
<b>East Area</b>								
N/A	Bonnygate 1, Cupar	Y	R(F)	N	91.7	-	N	29
N/A	Bonnygate 2, Cupar (11)	Y	R(F)	N	91.7	-	N	36
N/A	Bonnygate 3A,B Cupar (13A) (13B)**	Y	R(F)	N	91.7	-	N	37
N/A	Bonnygate B4 Cupar	Y	R(F)	N	91.7	-	N	34
N/A	City Road 1,2 St Andrews***	N	R	N	91.7	-	N	30
N/A	Bell Street 1, St Andrews	N	R(F)	N	91.7	-	N	39
N/A	Bell Street 2, St Andrews	N	R(F)	N	83.3	-	N	36
N/A	Cupar Road, Auchtermuchty	N	R(F)	N	91.7	-	N	28
N/A	South Rd, Cupar	N	R	N	91.7	-	N	14
N/A	Crossgate, Cupar	N	K	N	91.7	-	N	24
N/A	Ladywynd B5, Cupar	Y	R(F)	N	91.7	-	N	18
N/A	Bonnygate West B6, Cupar	Y	R(F)	N	91.7	-	N	21
N/A	Bonnygate Monitor B (ABC) Cupar*	Y	K	Y	91.7	-	N	30

## Fife Council

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2012	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration
N/A	4 East Rd, Cupar	Y	R(F)	N	91.7	-	N	14
<b>Central Area</b>								
N/A	St Clair Street 1, Kirkcaldy	N	R(F)	N	83.3	-	N	45
N/A	St Clair Street 2, Kirkcaldy	N	R(F)	N	91.7	-	N	41
N/A	St Clair Street 3, Kirkcaldy	N	R(F)	N	91.7	-	N	34
N/A	St Clair Street ROMON A,B,C, Kirkcaldy*	N	R	Y	91.7	-	N	25
N/A	Dunnikier Road, Kirkcaldy	N	R(F)	N	91.7	-	N	32
N/A	Victoria Road, Kirkcaldy	N	R(F)	N	91.7	-	N	34
N/A	Glenlyon, Leven	N	K	N	91.7	-	N	28
N/A	Leslie High Street, Leslie	N	R(F)	N	91.7	-	N	25
N/A	ASDA R/B, Kirkcaldy	N	K	N	91.7	-	N	33
N/A	Queensway, Glenrothes	N	K	N	91.7	-	N	25
N/A	125 St Clair Street, Kirkcaldy	N	R(F)	N	16.7	N	N	N/A
N/A	179A St Clair Street, Kirkcaldy	N	R(F)	N	16.7	N	N	N/A
N/A	3A Junction Road, Kirkcaldy	N	R(F)	N	16.7	N	N	N/A
N/A	24 St Clair Street, Kirkcaldy	N	R(F)	N	16.7	N	N	N/A

\* Triplicate sites

\*\* Duplicate Sites

K = Kerbside, 0-1m from the kerb of a busy road

R = Roadside, 1-5m from the kerb (up to 15m in some cases)

R(F) = façade of buildings on street

UB = Urban Background, >50m from any busy road

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Table 2.7 Results of NO<sub>2</sub> Diffusion Tubes (2007 to 2012)

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )					
					2007	2008	2009	2010	2011	2012
<b>West Area</b>										
DRM5	Rumblingwell, Dunfermline	N	0.79	83	23	26	21	27 (27)	27 (21)	25
DRM9A	Appin Crescent (A, B & C), Dunfermline	Y	0.79	100	35	39	34	37 (37)	36 (34)	34
C'BEATH	High Street, Cowdenbeath	N	0.84	92	23	28	25	27	22	24
K'DINE1	N. Approach Rd. A/B, Kincardine	N	0.84	100	37	40	20	21	19	19
AQM3	St Leonards School, Dunfermline	N	0.79	83	19	22	20	23 (22)	21 (20)	17
C'GIE DR	Carnegie Drive (A, B & C), Dunfermline	N	0.79	97	31	38	35	38 (37)	38 (35)	35
APP CR1	Appin Crescent 1 Dunfermline	Y	0.79	100	27	32	28	31 (31)	29 (28)	27

**Fife Council**

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )					
					2007	2008	2009	2010	2011	2012
APP CR2	Appin Crescent 2, Dunfermline	Y	0.79	100	40	49	39	46 (45)	46 (44)	41
APP CR3	Appin Crescent 3, Dunfermline	Y	0.79	100	37	40	37	44 (44)	41 (39)	39
PITT ST	Pittencrieff St Dunfermline	N	0.79	92	22	25	22	24 (24)	24 (22)	19
APP CR4	Appin Crescent 4 (A, B,C), Dunfermline	Y	0.79	83	30	34	30	33 (32)	32 (30)	28
APP CR5	Appin Crescent 5 (A, B & C), Dunfermline	Y	0.79	100	-	-	42*	44 (43)	46 (43)	42
APP CR6	Appin Crescent 6 (A, B & C), Dunfermline	Y	0.79	97	-	-	56*	54 (53)	56 (47)	46
HALBEATH RD1	11 Halbeath RD1, Dunfermline	N	0.79	67	-	-	-	-	22* (20*)	21

## Fife Council

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )					
					2007	2008	2009	2010	2011	2012
HALBEATH RD2	57 Halbeath RD2, Dunfermline	N	0.79	67	-	-	-	-	26* (25*)	20
ADM RO A	Admiralty Road A, Rosyth	N	0.88	75	33	33	31	37 (34)	36 (31)	33
ROMON	Admiralty Road, Rosyth ROMAN A,B,C	N	0.88	75	N/A	26	26	31 (28)	29 (25)	28
N/A	229 Admiralty Road, Rosyth	N	0.88	33	-	-	-	-	24	24
N/A	49 Ramsay Place, Rosyth	N	0.88	33	-	-	-	-	17	19
N/A	129 Admiralty Road, Rosyth	N	0.88	33	-	-	-	-	26	27
<b>East Area</b>										
N/A	Bonnygate 1, Cupar	Y	0.76	100	30	31	31	28 (31)	28 (30)	29
N/A	Bonnygate 2, Cupar (11)	Y	0.76	100	36	45	42	36 (39)	35 (38)	36

**Fife Council**

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )					
					2007	2008	2009	2010	2011	2012
N/A	Bonnygate 3A,B Cupar (13A) (13B)	Y	0.76	100	52	50	46	37 (41)	36 (39) ((40))	37
N/A	Bonnygate B4 Cupar	Y	0.76	100	41	38	32	31 (35)	31 (33)	34
N/A	City Road 1,2 St Andrews	N	0.84	100	24	30	29	33	26	30
N/A	Bell Street 1, St Andrews	N	0.84	92	29	32	33	37	36	39
N/A	Bell Street 2, St Andrews	N	0.84	100	26	32	29	31	39	36
N/A	Cupar Road, Auchtermuchty	N	0.84	100	27	31	30	29	24	28
N/A	South Rd, Cupar	N	0.76	83	14	16	21	18 (19)	12 (12)	14
N/A	Crossgate, Cupar	N	0.76	100	23	26	25	26 (28)	22 (24)	24
N/A	Ladywynd B5, Cupar	Y	0.76	92	19	22	21	19 (21)	18 (19)	18
N/A	Bonnygate West B6, Cupar	Y	0.76	100	30	26	25	23 (25)	19 (20)	21
N/A	Bonnygate Monitor B (ABC) Cupar	Y	0.76	97	34	39	33**	31 (34)	30 (32)	30
N/A	4 East Rd, Cupar	Y	0.76	92	15	17	16	14 (16)	13 (14)	14

Fife Council

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )					
					2007	2008	2009	2010	2011	2012
Central Area										
N/A	St Clair Street 1, Kirkcaldy	N	0.90	100	34	41	38	41	42 (40)	45
N/A	St Clair Street 2, Kirkcaldy	N	0.90	100	34	41	39	44	36 (35)	41
N/A	St Clair Street 3, Kirkcaldy	N	0.90	100	31	35	33	37	32 (31)	34
N/A	St Clair Street ROMON A,B,C, Kirkcaldy	N	0.90	75	-	-	-	-	19 (19)	25
N/A	Dunnikier Road, Kirkcaldy	N	0.90	100	29	33	30	33	30 (29)	32
N/A	Victoria Road, Kirkcaldy	N	0.90	100	30	36	34	35	32 (31)	34
N/A	Glenlyon, Leven	N	0.84	100	27	30	27	32	27	28
N/A	Leslie High Street, Leslie	N	0.84	100	20	24	24	25	22	25
N/A	ASDA R/B, Kirkcaldy	N	0.90	92	26	33	33	32	34 (33)	33
N/A	Queensway, Glenrothes	N	0.84	100	20	26	24	24	22	25



## Fife Council

Site ID	Location	Within AQMA?	Bias Adjust. Factor (2012)	Data Capture 2011 %	Annual Mean Concentrations Adjusted for Bias (Objective 40 µg/m <sup>3</sup> )						
					2007	2008	2009	2010	2011	2012	
N/A	125 St Clair Street, Kirkcaldy	N	0.90	N/A	-	-	-	-	-	-	N/A
N/A	179A St Clair Street, Kirkcaldy	N	0.90	N/A	-	-	-	-	-	-	N/A
N/A	3A Junction Road, Kirkcaldy	N	0.90	N/A	-	-	-	-	-	-	N/A
N/A	24 St Clair Street, Kirkcaldy	N	0.90	N/A	-	-	-	-	-	-	N/A

\* 2011 data has been Period Mean Adjustment of 1.21 applied to non bias corrected data to compensate for January to September missing data

\*\* 2011 data has been Period Mean Adjustment of 1.06 applied to non bias corrected data to compensate for January to April missing data

2011 data has been adjusted using locally calculated bias adjustment factors (Dunfermline 0.83, Rosyth 0.92, Cupar 0.73, Kirkcaldy 0.81)

2011 data in brackets is adjusted using National Adjustment factor (0.78)

2011 data in double brackets is adjusted using Regional average calculated from locally calculated Bias Adjustment Factors (0.82)

\* 2010 data has been Period Mean Adjustment of 1.10 applied to non bias corrected data.

\*\* 2010 data has been Period Mean Adjustment of 0.95 applied to non bias corrected data.

2010 data has been Period Mean Adjusted by 1.08 to compensate for November and December missing data

2010 data in brackets is adjusted using nationally derived Bias Adjustment Factor (0.78)

### 2.2.1 Particulate Matter (PM<sub>10</sub>)

PM<sub>10</sub> concentrations are monitored at automatic monitoring sites in Bonnygate in Cupar, Admiralty Road in Rosyth, St Clair Street in Kirkcaldy and Appin Crescent in Dunfermline. Details of these sites are given in Table 2.1 and Appendix A. Table 2.8 compares PM<sub>10</sub> data against the annual mean air quality objectives set for Scotland (18 µg m<sup>-3</sup>). Data collected for 2012 shows that Bonnygate, Cupar site meets the annual mean objective with concentrations of 18 µg m<sup>-3</sup>. Annual means of 17 µg m<sup>-3</sup> at Admiralty Road, 15 µg m<sup>-3</sup> at Appin Crescent, Dunfermline and 11 µg m<sup>-3</sup> St Clair Street, Kirkcaldy were measured during 2012; all below the annual mean objective. Table 2.9 summarises the number of exceedances of the PM<sub>10</sub> daily-mean objective of 50 µg m<sup>-3</sup> between 2007 and 2012. As can be seen the daily-mean objective of 50 µg m<sup>-3</sup>, not to be exceeded more than 7 times in a year, was not exceeded at any PM<sub>10</sub> monitoring site.

As discussed previously, Bonnygate Cupar has been designated an AQMA for PM<sub>10</sub> and an Air Quality Action Plan has been adopted by Fife Council. Concentrations have stayed the same since 2008, however in 2009 there was no monitoring carried out between February and July due to building works being carried out close to the site. The data capture rate achieved for PM<sub>10</sub> during 2012 was 92%. The trend of significantly lower concentrations seen at Bonnygate, Cupar, indicates that the traffic controlling measures introduced in mid-July 2009 may be reducing NO<sub>2</sub> concentrations, and PM<sub>10</sub> concentrations are now only a borderline exceedance (18 µg m<sup>-3</sup>) in terms of annual mean objective. Further improvements in PM<sub>10</sub> concentrations are now achieving the annual mean air quality objectives for this pollutant.

The annual mean PM<sub>10</sub> concentration at Admiralty Road, Rosyth (17 µg m<sup>-3</sup>) is below the annual mean PM<sub>10</sub> objective. Fife Council undertook a Detailed Assessment (2012) following 2011's annual mean PM<sub>10</sub> exceedance. It was concluded that Fife Council should defer its decision as to whether or not to declare an AQMA at Admiralty Road Rosyth until at least six months monitoring data is available using a new FDMS drier in PM<sub>10</sub> monitoring equipment. This new FDMS drier was installed on the 26<sup>th</sup> September 2012 at Admiralty Road. Section 2.2.2 details the results of the PM<sub>10</sub> monitoring between 1<sup>st</sup> October 2012 and 31<sup>st</sup> March 2013.

The annual mean PM<sub>10</sub> concentration at Appin Crescent, Dunfermline (15 µg m<sup>-3</sup>) was below the annual mean PM<sub>10</sub> objective. The Appin Crescent, Dunfermline site's data capture was 93%, the site started monitoring PM<sub>10</sub> in March 2011 but data up to April was deleted during the ratification process. This may have distorted the annual mean for 2011. However modelling undertaken as part of the Further Assessment of air quality in Appin Crescent (2012) indicated that the relevant PM<sub>10</sub> objectives may be compromised and the Air Quality Management Area Order should be amended to include this pollutant. The Appin Crescent AQMA Declaration Order was amended to include PM<sub>10</sub> in November 2012.

This is also the first full year of PM<sub>10</sub> data for St Clair Street, Kirkcaldy. The site started monitoring PM<sub>10</sub> in February 2011. The sites Data Capture was 91% this year, with an annual mean concentration was well below the PM<sub>10</sub> objective with a measured concentration of 11 µg m<sup>-3</sup>.

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Table 2.8 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2012 (%)	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m <sup>3</sup>					
					2007	2008	2009	2010	2011	2012
Bonnygate, Cupar	Kerbside	Y	92	Y	23	19	(16) 17*	19	19	18
Admiralty Road, Rosyth	Roadside	N	98	Y	N/A	15**	16	19	20	17
Appin Crescent, Dunfermline	Roadside	Y	93	Y	N/A	N/A	N/A	N/A	(16) 16***	15
St Clair Street, Kirkcaldy	Roadside	N	91	Y	N/A	N/A	N/A	N/A	13****	11

\* Bonnygate Cupar did not monitor between February and early July. Period Mean Adjustment of 1.04 applied.

\*\* Admiralty Road started monitoring March 2008.

\*\*\* Appin Crescent, Dunfermline started monitoring PM10 March 2011, Period Mean Adjustment of 1.03 applied.

\*\*\*\* St Clair Street, Kirkcaldy started monitoring February 2011

Data in brackets are Measurements without a period mean adjustment calculated

Fife Council

Table 2.9 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedances of 24-Hour Mean (50 µg/m <sup>3</sup> ) <i>If data capture &lt; 90%, include the 98.08th percentile of daily means in brackets.</i>					
						2007	2008	2009	2010	2011	2012
Bonnygate, Cupar	Kerbside	Y	92	92	Y	5	1	0 (41)*	3 (44)	0 (44)	4
Admiralty Road, Rosyth	Roadside	N	98	98	Y	N/A	0(39)**	2	0	3	1
Appin Crescent, Dunfermline	Roadside	Y	93	93	Y	N/A	N/A	N/A	N/A	0 (38)***	4
St Clair Street, Kirkcaldy	Roadside	N	91	91	Y	N/A	N/A	N/A	N/A	0 (33)****	1

\* Bonnygate Cupar did not monitor between February and early July. Period Mean Adjustment of 1.04 applied.

\*\* Admiralty Road started monitoring March 2008.

\*\*\* Appin Crescent, Dunfermline started monitoring PM10 March 2011

\*\*\*\* St Clair Street Kirkcaldy started monitoring, February 2011

## 2.2.2 Fife Rosyth PM<sub>10</sub> – 01/04/2012 to 31/03/2013

As discussed above, a change in FDMS drier in September 2012 resulted in a drop in PM<sub>10</sub> concentrations measured at the Fife Rosyth automatic monitoring site. Table 2.10 summarises the PM<sub>10</sub> concentrations measured during the period 01/10/2012 to 31/03/2013. As can be seen the average PM<sub>10</sub> concentration measured during this period was 13 µg m<sup>-3</sup>; a drop of 4 µg m<sup>-3</sup> from the 2012 measured annual average. The 98.08<sup>th</sup> percentile of daily average PM<sub>10</sub> concentrations was calculated to be 47 µg m<sup>-3</sup>; indicating that the daily average objective of no more than 7 exceedances of 50 µg m<sup>-3</sup> was unlikely to have been breached.

Table 2.11 summarises the measured PM<sub>10</sub> concentrations during the period 01/04/2012 to 31/13/2013. In this case the measured annual mean PM<sub>10</sub> concentration was 15 µg m<sup>-3</sup>; well below the annual mean objective of 18 µg m<sup>-3</sup>. In addition, only 2 daily average PM<sub>10</sub> concentration of greater than 50 µg m<sup>-3</sup> were measured and so the daily mean objective is unlikely to have been breached also.

As a result of these latest data, it is concluded that Fife Council are not required to declare an Air Quality Management Area at Admiralty Road, Rosyth.

**Table 2.10 Results of Automatic PM<sub>10</sub> Monitoring – 01/10/2012 to 31/03/2013**

POLLUTANT	PM <sub>10</sub>
Maximum daily mean	54 µg m <sup>-3</sup>
98.08th percentile of daily means	47 µg m <sup>-3</sup>
Average	13 µg m <sup>-3</sup>
Data capture	96.8 %

**Table 2.11 Results of Automatic PM<sub>10</sub> Monitoring – 01/04/2012 to 31/03/2013**

POLLUTANT	PM <sub>10</sub>
Maximum daily mean	54 µg m <sup>-3</sup>
Average	15 µg m <sup>-3</sup>
Data capture	96.9 %

## 2.2.3 Sulphur Dioxide (SO<sub>2</sub>)

### Automatic Monitoring Data

SO<sub>2</sub> monitoring is undertaken on behalf of Longannet Power Station at Blair Mains, Fife (Grid Reference NS972864) to the north east of the power station. In 2012 Longannet operated with an average load factor of 47.9% (46.1% in 2011/ 49.6% in 2010 / 41% in 2009) and burned fuel with average sulphur content of approximately 0.5% (0.5% in 2009 and 2010). The station emitted 34.8 kT of SO<sub>2</sub> during 2012 (37.7kT in 2011/ 45.2kT in 2010 / ~32.2kT in 2009). Emissions were well below the short-term authorisation limit for SO<sub>2</sub> of 2000 mg/m<sup>3</sup> at all times.

Results for 2012 for this site are provided along with 2006 to 2011 data are summarised in Table 2.12.

**Table 2.12 Results Automatic SO<sub>2</sub> Monitoring for Blair Mains (µg m<sup>-3</sup>): Comparison with Annual Mean Objective**

Period	Data Capture (%)	Max 15 Minute Mean (µg m <sup>-3</sup> )	Max 1 Hour Mean (µg m <sup>-3</sup> )	Max 24 Hour Mean (µg m <sup>-3</sup> )
AQS Objective	-	266 µg m <sup>-3</sup> (max. 35 exceedances)	350 µg m <sup>-3</sup> (max. 24 exceedances)	125 µg m <sup>-3</sup> (max. 3 exceedances)
2006	N/A	166	88	N/A
2007	N/A	138	N/A	N/A
2008	N/A	423	N/A	N/A
2009	99.9	150 (0)	70 (0)	N/A (0)
2010	99.8	238.6 (0)	164.7 (0)	22.9 (0)
2011	96.6	247.6 (0)	152 (0)	37.5 (0)
2012	97.4	201.1 (0)	92.6 (0)	17.3 (0)

According to the Longannet Power Station Report, the measured concentrations at Blair Mains indicate that there were no exceedances of the 15-minute mean objective. Measured concentrations also indicated that there were no exceedances of the hourly or the daily SO<sub>2</sub> thresholds. Although maximum 24-hour mean data are not available, the 99.18th percentile daily value was 15.2 µg m<sup>-3</sup> (compliance value 125 µg m<sup>-3</sup>) (29.9 7 µg m<sup>-3</sup> in 2011 and 19.7 µg m<sup>-3</sup> in 2010), and the 99.73<sup>th</sup> percentile was 48.5 µg m<sup>-3</sup> (compliance value 350 µg m<sup>-3</sup>; 74.6 µg m<sup>-3</sup> in 2011 and 62.7 µg m<sup>-3</sup> in 2010). The period-mean for 2012 was 4.3 µg m<sup>-3</sup>.

The measurements therefore indicate that the area around Longannet Power Station was in compliance with all relevant SO<sub>2</sub> objectives during 2012.

### Diffusion Tube Data

Additional SO<sub>2</sub> monitoring data are presented for INEOS Grangemouth oil refinery as their annual monitoring report for 2012. This report concludes that annual average concentrations of SO<sub>2</sub> are lower than the set air quality limit.

### 2.2.4 Benzene

There are currently three benzene monitoring programmes carried out within the Fife Council boundary:

- Monitoring in the area of the Grangemouth oil refinery on behalf of INEOS,
- Monitoring along the Fife coastline on behalf of BP,
- Monitoring to assess the possible impacts of Little Raith Wind Farm.

### INEOS Benzene Monitoring

Benzene monitoring data are presented for INEOS Grangemouth oil refinery in their annual monitoring report for 2012. Annual average concentrations of Benzene are below the Air Quality (Scotland) Regulations 2000 air quality objective of 1 ppb ( $3.25 \mu\text{g m}^{-3}$ ), with the exception of location 1 (Kinneil Kerse near boundary fence of Kinneil Gas Plant ) and location 5 (Technical Building Gate 4 ), which measured an annual average concentration of 1.3 ppb ( $4.23 \mu\text{g m}^{-3}$ ). These sites are within the Grangemouth industrial vicinity. All monitoring sites within Fife Councils boundary met the Air Quality Strategy Objective of 1 ppb.

### BP Benzene Monitoring

Benzene monitoring data are presented for BP Production and Exploration in their annual monitoring report for 2012. The results of this monitoring indicate that concentrations of benzene over the 12 month period were low; annual means range from 0.2-0.3 ppb ( $0.65 - 0.98 \mu\text{g m}^{-3}$ ) and are well within the air quality standard. BP have commissioned monitoring along the Fife coastline for many years and there has been an overall reduction in the levels of hydrocarbons, including benzene, present in air over the last decade. The measurements made in 2012 indicate that concentrations of most of the monitored substances were similar or slightly lower than during 2011 at most locations.

### Little Raith Benzene Monitoring

The purpose of the Little Raith monitoring programme is to evaluate the possible air quality impacts following the development of the Little Raith Wind Farm. The wind farm began generating on the 19/09/2012 and became fully operational by mid-November 2012. The monitoring programme started in January 2011 and consists of 3 diffusion tube sites located at Cowdenbeath (LR01), Lochgelly (LR02) and Little Raith Farm (LR03); shown in Figure 2.6.

**Figure 2.6 Benzene Diffusion Tube Monitoring Locations – Little Raith Monitoring Programme**



Table 2.13 summarises the running annual mean benzene concentrations for the period 31/01/2011 to 11/03/2013 and associated data capture rates. These results are also graphed in Figure 2.7. As can be seen, measured running annual mean benzene concentrations at all three monitoring locations have been below the AQS Objective of  $3.25 \mu\text{g m}^{-3}$  throughout the monitoring programme; and data capture rates have remained at greater than or close to the 90% requirement. The

maximum running annual mean concentration was measured at LR03 during 28/02/2011 to 27/02/2012 with a measured concentration of  $2.18 \mu\text{g m}^{-3}$ . The benzene concentrations measured at LR01 and LR02 indicate slight downward trend in benzene concentrations throughout the monitoring programme. In contrast, running annual average benzene concentrations measured at LR03 are greater than 200% of concentrations measured at the LR01 and LR02 during the period 31/01/2011 to 10/09/12. From 27/09/2012 to 11/03/2013 running annual average benzene concentrations at LR03 have decreased to similar levels to that measured at LR01 and LR02.

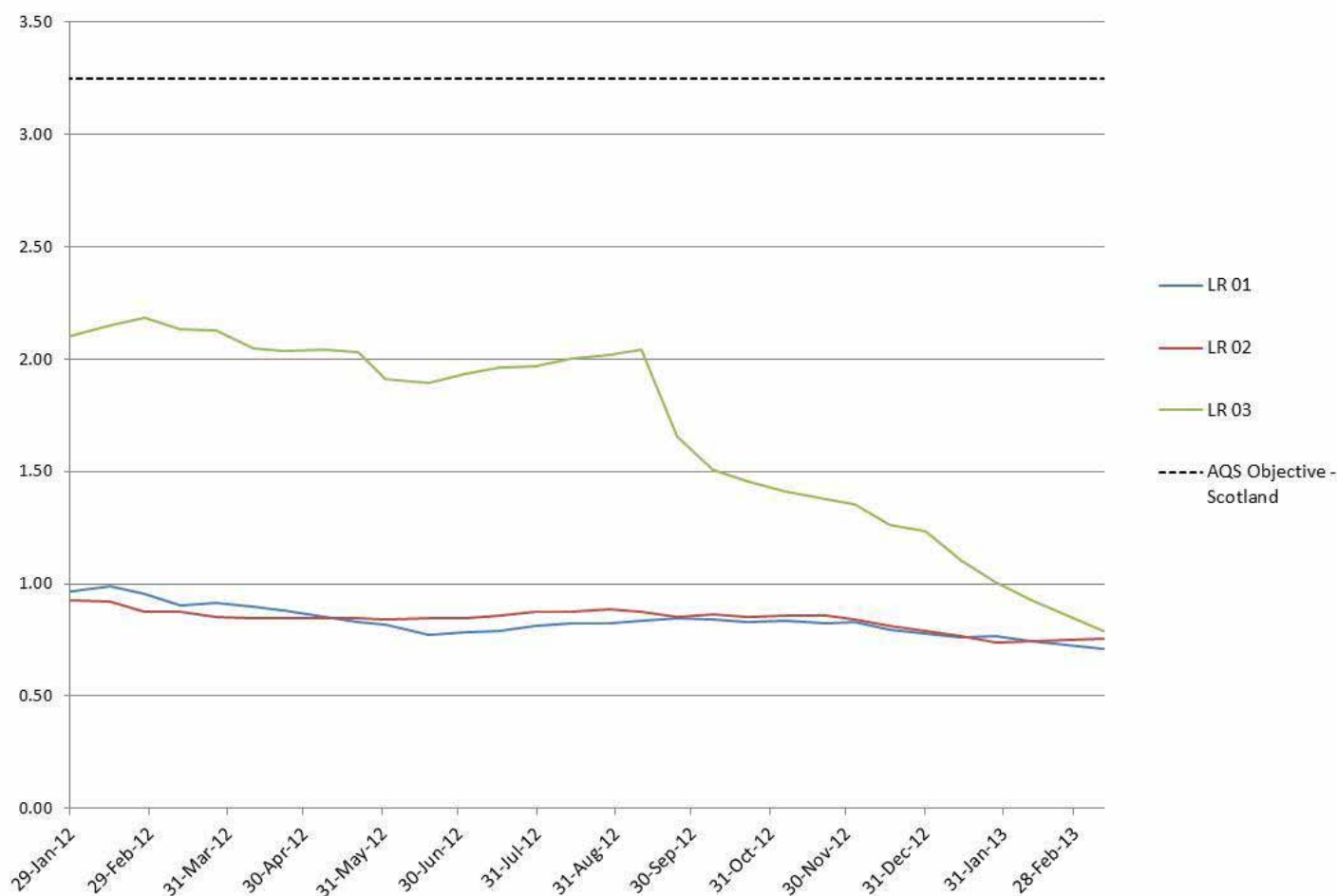
Therefore, the review of these data show that the running annual mean benzene concentrations measured at Cowdenbeath (LR01), Lochgelly (LR02) and Little Raith Farm (LR03) monitoring locations are below the AQS Objective of  $3.25 \mu\text{g m}^{-3}$ . In addition, these data also indicate that benzene concentrations have not increased as a result of the commissioning of Little Raith Wind Farm.

**Table 2.13 Little Raith Running Annual Mean Benzene Concentrations – 31/01/2011 to 11/03/2013 ( $\mu\text{g m}^{-3}$ )**

Period		Running Annual Mean Benzene Concentrations ( $\mu\text{g m}^{-3}$ )			Data Capture		
Start Date	Finish Date	LR 01	LR 02	LR 03	LR 01	LR 02	LR 03
31-Jan-11	29-Jan-12	0.96	0.93	2.11	92%	92%	100%
14-Feb-11	13-Feb-12	0.99	0.92	2.15	96%	92%	100%
28-Feb-11	27-Feb-12	0.95	0.88	2.18	96%	92%	100%
14-Mar-11	12-Mar-12	0.90	0.87	2.13	96%	92%	100%
28-Mar-11	26-Mar-12	0.92	0.85	2.13	96%	92%	100%
10-Apr-11	10-Apr-12	0.90	0.85	2.05	96%	92%	100%
26-Apr-11	22-Apr-12	0.88	0.85	2.04	96%	92%	100%
09-May-11	08-May-12	0.85	0.85	2.04	96%	92%	100%
23-May-11	21-May-12	0.83	0.85	2.03	96%	96%	100%
05-Jun-11	01-Jun-12	0.82	0.84	1.91	96%	96%	100%
20-Jun-11	18-Jun-12	0.77	0.85	1.89	96%	96%	100%
04-Jul-11	02-Jul-12	0.78	0.84	1.93	96%	96%	100%
18-Jul-11	16-Jul-12	0.79	0.86	1.96	96%	96%	100%
31-Jul-11	30-Jul-12	0.81	0.88	1.97	96%	96%	100%
15-Aug-11	13-Aug-12	0.82	0.87	2.00	92%	96%	100%
30-Aug-11	28-Aug-12	0.82	0.89	2.02	92%	96%	100%
19-Sep-11	10-Sep-12	0.84	0.87	2.04	88%	96%	100%
27-Sep-11	24-Sep-12	0.85	0.85	1.65	88%	96%	100%
10-Oct-11	08-Oct-12	0.84	0.86	1.50	88%	96%	100%
24-Oct-11	22-Oct-12	0.83	0.85	1.45	88%	96%	100%
07-Nov-11	06-Nov-12	0.83	0.86	1.41	88%	96%	100%
21-Nov-11	22-Nov-12	0.83	0.86	1.38	88%	96%	100%
05-Dec-11	03-Dec-12	0.83	0.84	1.35	88%	96%	100%
20-Dec-11	17-Dec-12	0.80	0.81	1.26	88%	96%	100%
04-Jan-12	31-Dec-12	0.78	0.79	1.24	92%	100%	100%
16-Jan-12	14-Jan-13	0.76	0.77	1.10	92%	100%	100%
29-Jan-12	28-Jan-13	0.76	0.74	1.01	92%	100%	100%
13-Feb-12	11-Feb-13	0.75	0.74	0.92	92%	100%	100%
27-Feb-12	25-Feb-11	0.74	0.77	0.84	92%	100%	100%
12-Mar-12	11-Mar-13	0.71	0.76	0.79	92%	100%	96%



**Figure 2.7 Graph of Little Raith Running Annual Mean Benzene Concentrations – 31/01/2011 to 11/03/2013 ( $\mu\text{g m}^{-3}$ )**



## 2.2.5 Other Pollutants Monitored

### 1,3- Butadiene

1,3 Butadiene monitoring data are presented for INEOS Grangemouth oil refinery and for BP Production and Exploration as their annual monitoring report for 2012. Annual average concentrations of 1,3-Butadiene at all monitoring locations are lower than set air quality limit.

### Other Hydrocarbons

Monitored concentrations of Propane, n-Butane, Iso-Butane, n-Pentane, Hexane, Heptane, Octane, Nonane, Decane, Propylene, Toluene, o-Xylene, m & p-Xylene, Styrene and total C4 to C10 hydrocarbons are presented for INEOS Grangemouth oil refinery and for BP Production and Exploration as their annual monitoring report for 2012. Annual average concentrations of hydrocarbon monitored at all monitoring locations indicate that annual concentrations are low, but there are no air quality standards for these substances.

The INEOS Grangemouth annual community air monitoring report for 2012, states that there are no significant changes in the annual average concentrations for all hydrocarbon components across all locations, when compared with historical data.

The Annual air quality report for BP Production and Exploration, Houndpoint, 2012, states that concentrations of most of the monitored substances in 2011 were similar or slightly lower than during 2010 at most locations. The report also adds that over the many years that BP have commissioned monitoring along the Fife coastline that there has been an overall reduction in the levels of hydrocarbons, including benzene, present in air over the last decade.

The Annual Report for 2011 from the Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group<sup>24</sup> states that emissions from regulated sources within the plants in 2011 remained well within the limit values set by SEPA for the protection of public health and the environment. This report also concludes that the work undertaken in 2011 demonstrates that emissions from Mossmorran and Braefoot Bay continue to pose no significant risk to the health of members of the local community.

### PM<sub>2.5</sub>

A monitoring study of PM<sub>2.5</sub> was carried out at Admiralty Road, Rosyth (OS Grid: 311200, 683548 (see Fig 2.5) during the period of 6th September 2011 to 6th March 2012. Table 2.14 summarises the PM<sub>2.5</sub> concentrations measured during this study. As can be seen the average PM<sub>2.5</sub> concentration measured during the six month was 10 µg m<sup>-3</sup>. The estimated annual mean PM<sub>2.5</sub> concentration for the period 6<sup>th</sup> March 2011 to 6<sup>th</sup> March 2012 was also calculated to be 10 µg/m<sup>3</sup>, which used a calculated annualisation factor of 1.00. This annual mean concentration is lower than the Scottish annual mean objective of 12 µg/m<sup>3</sup>.

**Table 2.14 Fife Council PM<sub>2.5</sub> Monitoring Results from of 6<sup>th</sup> September 2011 to 6<sup>th</sup> March 2012**

POLLUTANT	PM <sub>2.5</sub>
Maximum hourly mean	83 µg m <sup>-3</sup>
Maximum daily mean	37 µg m <sup>-3</sup>
Average	10 µg m <sup>-3</sup>
Annualised Average	10 µg m <sup>-3</sup>
Data capture for 6 month sampling period	92.3 %

### Carbon Monoxide

As in previous years, short periods of CO monitoring have been undertaken by Fife Council Transportation Services at a number of roadside locations. Measurements were undertaken with Marksmann 660 street monitors. The results are summarised in Table 2.15. The results have been converted from ppm into mass units at 20°C and 1 atmosphere.

**Table 2.15 Fife Council CO Monitoring Results**

Site Number/ Location	Monitoring Period	Max 8-Hour Concentration (mg m <sup>-3</sup> )
Bothwell Gardens, Dunfermline	13/04/12 - 19/04/12	0.25
	13/07/12 - 19/07/12	0.93
	22/10/12 - 28/10/12	0.75
Carnegie Drive/Pilmuir Street Dunfermline	13/07/12 - 19/07/12	0.9
	22/10/12 - 28/10/12	0.9
Appin Crescent, Dunfermline	13/04/12 - 19/04/12	0.89
	13/07/12 - 19/07/12	0.96
	22/10/12 - 28/11/12	0.29

<sup>24</sup> MOSSMORRAN & BRAEFOOT BAY INDEPENDENT AIR QUALITY MONITORING REVIEW GROUP, 2009 Annual Report, Environment Enterprise and Transportation Committee, March 2013

Site Number/ Location	Monitoring Period	Max 8-Hour Concentration (mg m <sup>-3</sup> )
Glenlyon Road/Windgates Road, Leven	11/05/1 - 16/05/12	0.30
	15/08/12 – 21/08/12	0.76
	13/02/13 – 19/02/13	0.36
Bonnygate, Cupar	10/05/12 - 16/05/12	3.30
	15/08/12 – 21/08/12	0.78
	13/02/13 – 19/02/13	1.86
St Clair Street, Kirkcaldy	20/06/12 - 26/06/11	0.41
	18/09/12 - 24/09/12	0.83
	07/03/13 – 13/03/13	0.20
Admiralty Rd/Queensferry, Rosyth	20/06/12 - 26/06/11	1.95
	20/09/12 - 26/10/12	0.96
	09/03/13 – 15/03/13	1.09
A909, Mossmorran	19/04/12 - 25/04/12	2.56
	26/07/12 to 01/08/12	2.20
	08/08/12 – 14/10/12	0.31

Whilst none of these monitoring periods are sufficiently long to permit a full assessment of CO concentrations over a full annual period, they all indicate that all concentrations are likely to be below the AQS objective of 10 mg m<sup>-3</sup> for the running 8-hour mean concentration.

## 2.2.6 Summary of Compliance with AQS Objectives

New monitoring data highlighted air quality issues for NO<sub>2</sub> at; Bonnygate, Cupar; Appin Crescent, Dunfermline and St Clair Street, Kirkcaldy. Bonnygate, Cupar and Appin Crescent, Dunfermline have already been declared AQMAs. Fife Council have installed an automatic monitoring station at St Clair Street, Kirkcaldy (February 2011) measuring concentrations of NO<sub>2</sub> and through association PM<sub>10</sub>. The first full years' of measurements from the automatic monitor are below the air quality objectives. Although for the fifth year since 2008, diffusion tube location St Clair Street 1 has measured NO<sub>2</sub> concentrations above the annual mean objective.

The Detailed Assessment of St Clair Street, Kirkcaldy (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area. This modelling study, found that the annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. NO<sub>2</sub> concentrations in excess of the annual mean objective are not occurring and are not occurring where ground level or first floor residential properties are present within the study area.

In light of this Detailed Assessment of air quality, Fife Council is not required to declare an Air Quality Management Area at this time. It was recommended that Fife Council continue to monitor NO<sub>2</sub> and PM<sub>10</sub> concentrations at this location and may wish to locate diffusion tube monitoring sites closer to the locations where ground floor residential properties are present on St Clair Street. Fife Council took this into consideration and added 4 new site locations in 2012 in the study area (125 St Clair Street, 179A St Clair Street, 3A Junction Road and 24 St Clair Street). Although monitoring at these locations only started in Late November 2012 and had only one month of monitoring in 2012 (16.7% data capture).

All 2012 monitored PM<sub>10</sub> at Bonnygate, Cupar; Appin Crescent, Dunfermline and St Clair Street, Kirkcaldy measured PM<sub>10</sub> concentrations below the annual mean and daily mean objectives. Fife Council undertook a Detailed Assessment (2012) to assess PM<sub>10</sub> concentrations in the Admiralty Road, Rosyth area following 2011's annual mean PM<sub>10</sub> exceedance. It was concluded that Fife Council should defer its decision as to whether or not to declare an AQMA at Admiralty Road Rosyth, until at least six months monitoring data is available using a new FDMS drier installed in the PM<sub>10</sub> monitoring equipment. This new FDMS drier was installed on the 26<sup>th</sup> September 2012. The measured average PM<sub>10</sub> concentration for the period 01/10/2012 to 31/03/2013 was 13 µg m<sup>-3</sup> and therefore it has been concluded that Fife Council is not required to declare an AQMA in the area of Admiralty Road, Rosyth.

Fife Council has examined the results from monitoring in the council area. Concentrations within the two AQMAs (Bonnygate and Appin Crescent) still exceed or are close to the annual mean objective for NO<sub>2</sub> and PM<sub>10</sub> at various locations where relevant exposure exists. As a result, the AQMAs should remain.

Concentrations of all AQS pollutants outside of the AQMAs are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

## 3 New Local Developments

### 3.1 Road Traffic Sources

No new road traffic sources have been identified within the Fife Council area since the last Updating and Screening assessment.

### 3.2 Other Transport Sources

No new road traffic sources have been identified within the Fife Council area since the last Updating and Screening assessment.

### 3.3 Industrial Sources

#### Changes to Regulated Industrial Processes

The following information from SEPA provides details of industrial processes that have surrendered their PPC licence or have ceased to operate in the past year:

#### Details of Part A or B processes changes:

- Tullis Russell, Markinch are burning significantly less coal, all coal burning is due to cease in June 2013.
- ABAGri in Cuparmuir have changed from using LPG to natural gas in their boiler; this is a small boiler with insignificant increase in emissions.
- Raytheon , Glenrothes have introduced a new ion implantation process including one new stack, but with an insignificant increase in emissions.
- Diageo's bio-energy plant, Cameronbridge Fife; there were multiple delays in commissioning during 2012 and the plant is still not fully operational.

#### Part A or B processes that have ceased to operate:

- Lamberts Garage at Leven, ceased in 2012
- Fife Cleaners, Kirkcaldy High Street, ceased in 2012
- Two of Skene's mobile plant, ceased in 2012

### 3.4 Commercial and Domestic Sources

No new commercial or domestic sources have been identified within the Fife Council area since the last Updating and Screening assessment.

### 3.5 New Developments with Fugitive or Uncontrolled Sources

#### Poultry Farms

Based on experience from studies carried out by the Environment Agency, the Department for Environment Northern Ireland and a number of local authorities, poultry farming facilities have the potential to cause localised exceedances of the PM<sub>10</sub> objectives. Fife Council has identified one farm (Mill View Farm formerly Diddlum Farm) which meets the specified criteria stated within Technical Guidance (09).

Mill View Farm, Strathore Road, Thornton (326876, 697373) is owned by Deans Food Limited (PPC/A/1008780) and became fully operational during 2010. The farm houses approximately 492,800 laying hens housed in 4 naturally ventilated (supplemented by a mechanical system) poultry sheds. Previous Air Quality Review and Assessment reports (USA 2009 and Progress Report 2010) concluded that due to the number of hens and distance to the nearest relevant exposure a Detailed Assessment should be carried out for this site when the farm is fully operational, with a hen population of over 400,000. However, these conclusions were made the following statement was issued by DEFRA (March 2010) in relation to Poultry Farms:

*“Detailed Assessments of Poultry Farms:*

*A number of local authorities have now completed their Updating and Screening Assessments and have identified poultry farms that meet the criteria (as set out in the Technical Guidance (LAQM.TG(09)) that would require proceeding to a Detailed Assessment. It is recognised that the screening criteria in TG(09) have been based on limited data, and it was stated that further information would be provided as and when new information became available. To assist this process, three local authorities in England have been awarded Air Quality Grant funding in order to carry out studies at the poultry farms they have identified, in order to assess both the local risk of exceedances of the air quality objectives, and to provide additional information to verify, or amend if necessary, the current screening criteria.*

***Until this assessment work is completed, there is no requirement for local authorities to move forward to a Detailed Assessment at this time. Where local circumstances (such as a history of nuisance complaints related to the farm in question) suggest that it would be preferable to proceed to a Detailed Assessment as soon as possible, authorities are advised to contact the Review and Assessment Helpdesk in order to ensure that any work carried out is in line with best practice. “***

The above assessment has now been completed (Appendix F) and as a result, the following screening assessment has been carried out to assess the potential air quality impacts of Mill View Farm.

The following equation was derived from the study:

$$MD = (-0.000161 \cdot \ln(d) + 0.000793) \times b$$

Where MD is the maximum daily increment to PM<sub>10</sub> concentration in  $\mu\text{g m}^{-3}$ , b is the number of birds and d is the distance to the nearest receptor in metres.

In order to calculate the 98<sup>th</sup> percentile of MD, the following relationship is used:

$$98^{\text{th}}\text{ile} = (0.83 \times \text{MD}) + (2 \times \text{Bkg})$$

Where Bkg is the PM<sub>10</sub> annual mean background concentration, which in this case was taken from the 2012 Scotland background maps for grid square (326500, 697500). In this case the PM<sub>10</sub> background concentration was found to be **13.8 µg m<sup>-3</sup>**.

Figure 3.1 shows three residential receptors; numbered 1 to 3 and located within between 90 m and 150 m of the four poultry sheds within Mill View Farm. The four sheds housing up to 492,800 hens (123,200 hens in each shed) are lettered w to z.

**Figure 3.1 Relevant Receptors - Mill View Poultry Farm 2012**

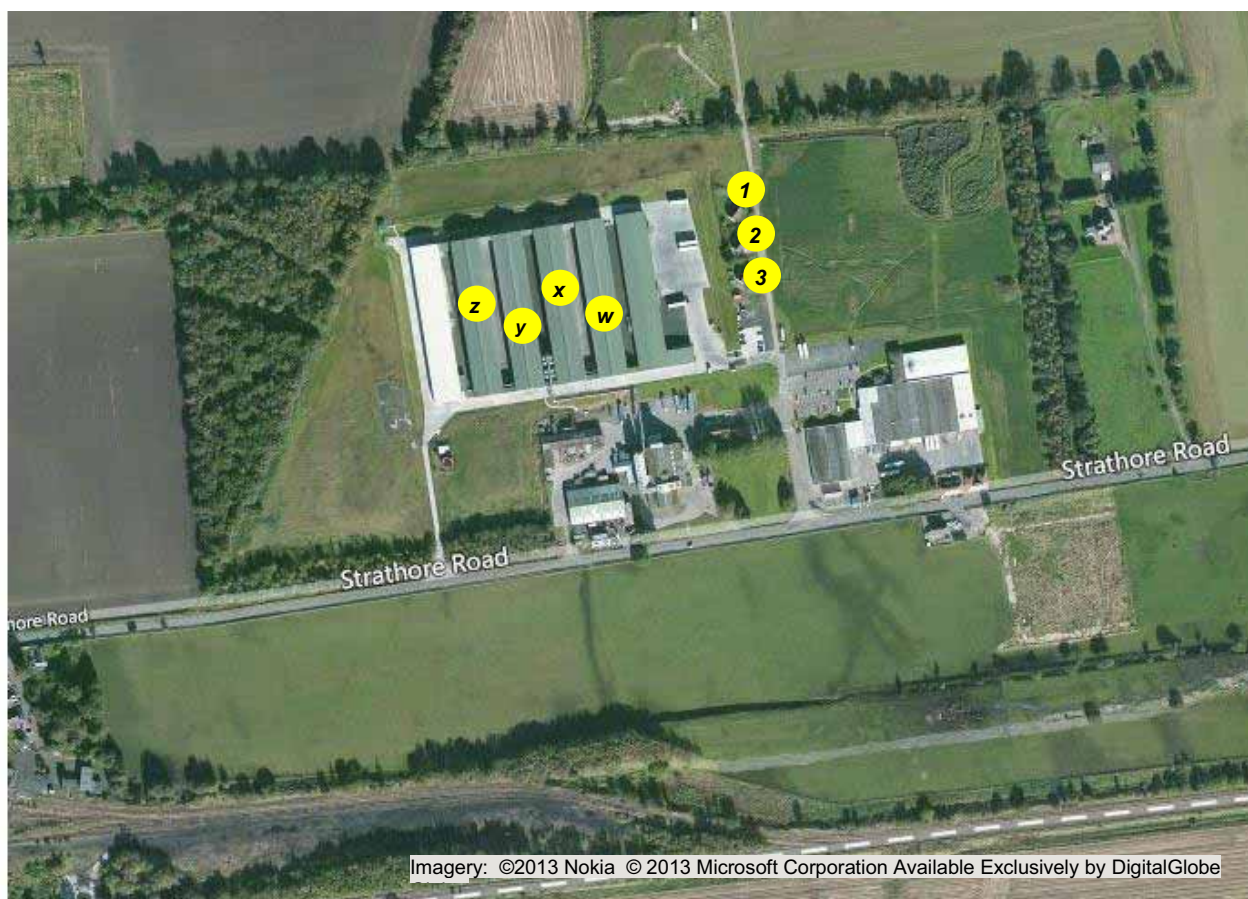


Table 3.1 summarises the distances from the relevant receptors to each of the four sheds and the corresponding maximum daily increment to PM<sub>10</sub> concentrations from each shed. As can be seen, using this screening method, it is unlikely that there will be a contribution to daily mean PM<sub>10</sub> concentrations at the 3 receptors due to emissions from shed z.

Combining the maximum daily increments to PM<sub>10</sub> concentrations from each shed gives a total PM<sub>10</sub> increment of 14.1 µg m<sup>-3</sup>. The calculated 98<sup>th</sup> percentile of maximum daily mean concentrations is therefore **39.2 µg m<sup>-3</sup>**. As a result, it is unlikely that the daily mean PM<sub>10</sub> objective of no more than 7 exceedances of 50 µg m<sup>-3</sup> in a year will be exceeded at any receptor due to emissions from the four

poultry sheds at Mill View Farm. It is also concluded that Fife Council are not required to proceed to a Detailed Assessment.

**Table 3.1 Receptors Within 150 m of a Poultry Shed and Potential PM<sub>10</sub> Exceedances**

Receptors	d - Distance to Poultry Shed (m)	b - No of Hens in Shed	MD - Maximum Daily Increment to PM <sub>10</sub> Concentrations ( $\mu\text{g m}^{-3}$ )	98 <sup>th</sup> %ile of Maximum Daily Mean PM <sub>10</sub> Concentrations ( $\mu\text{g m}^{-3}$ )
1, 2, 3	90 (w)	123,200	8.4	34.5
1, 2, 3	110 (x)	123,200	4.5	31.2
1, 2, 3	130 (y)	123,200	1.1	28.5
1, 2, 3	150 (z)	123,200	0.0	n/a
<b>Combined Daily Increment to PM<sub>10</sub> Concentrations:</b>			<b>14.1</b>	<b>39.2</b>

Fife 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.

Fife 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

### Fife's Air Quality Strategy - Health Protection and Improvement

The role of Fife Council in protecting human health through implementation of the local air quality management regime is described in the latest version of the NHS Fife and Fife Council Joint Health Protection Plan 2011 - 2014.

Fife Council is also keen to further understand and improve the positive health and wellbeing outcomes that may be realised through implementation of measures designed to improve air quality at a local level.

The concept of the local authority as a health improvement organisation is not a new one - there has been recognition both by COSLA and the Scottish Government that Local Authorities have a key role to play in the development and delivery of health improvement to and with communities (COSLA 2005).

Further exploration of these above themes, in the context of Fife's Air Quality Strategy, are currently being undertaken through the "TRY IT" campaign in Cupar (Appendix G) and Fife's Health and Wellbeing Plan 2011 -14 (Appendix H). This will include reference to "asset based approaches" to health improvement as described in the latest annual report by the Chief Medical Officer for Scotland (Appendix I) and other new co- production models for health and wellbeing ("Building new approaches to delivery to achieve better health outcomes at the local level" Final Report of a National Colloquim, December 2011").

Asset based studies already undertaken in Fife in other sectors (e.g. Fife Local Food System) will be considered in evaluating the effectiveness of different community engagement methods within the context of the LAQM process. Other relevant national guidance - including NHS National Institute for Health and Clinical Excellence (NICE) "Community engagement to improve health" (2008) and Glasgow Centre for Population Health (GCPH) "Asset based approaches for health improvement: redressing the balance" (2011) reports - will also be referred to as part of seeking to further involve local communities in air quality issues.

Such steps are considered consistent with recommendations contained in the recent Christie Commission Report on the Future Delivery of Public Services in Scotland (2012) - in particular that "public services are built around people and communities, their needs, aspirations, capacities and skills, and work to build up their autonomy and resilience" (Christie, 2011).

Fife Council has also presented their action planning work on the Bonnygate and Appin Crescent to the Faculty Of Public Health Medicine Annual Scottish Conference in November 2013, the Scottish Government Annual Air Quality Seminar (March 2013) and the Scottish Transport Emission Partnership Workshop meeting (February 2013)

## 5 Planning Applications

A list is given below of 2012 planning applications that are required to demonstrate that AQS objectives are unlikely to be exceeded as a result of the developments, either through screening or more detailed dispersion modelling:

**12/00313/FULL** - Carr's Flour Mills, Robert Hutchinson Ltd. East Bridge, Kirkcaldy, FIFE, KY1 2SR - erection of a flour mill and associated infrastructure buildings, silos and loading facilities. Robert Hutchinson Ltd are re-building the flour mill on adjacent site. This is a like for like process with newer technologies involved which should slightly reduce particulate emissions. SEPA do not anticipate any potential deleterious impact on local air quality. There is not a requirement for a more detailed air quality assessment to be submitted.

**12/00981/FULL** - Warehouse development and ancillary development, access road and landscaping at Begg Farm, Kirkcaldy, Fife, KY2 6QP.

**12/04322/FULL** - Erection of biomass fuel pellet production building. Land to West of Whitworth Road, Glenrothes, Fife. Clarification is sought from the applicant on the following points:

- The number and classification of vehicle movements associated with the facility during operation?
- Whether the facility will have its own biomass unit for the drying of pellets, and/or the heating of the facility? If this is the case; please provide details and a specification for the selected unit.

**12/01074/FULL** - Refurbishment and upgrading of building and site. Layout for modern multi-function depot facility Including continued/new class 2, class 4, class 5 and Class 6 uses, access, parking, landscaping, material. Storage and other associated uses at Fife Council, Bankhead Central, Bankhead Park, Glenrothes, Fife, KY7 6GH.

**12/01225/SCR** - Screening opinion for erection of medium scale wind turbine (height to blade tip 98 metres) on Land at Kirkton Farm by Cowdenbeath - Land at Kirkton Farm, Cullaloe, Fife.

**12/02965/SCR** - Request for screening opinion for erection of 2 wind turbines at the Former Auchtertool Landfill Site.

**12/02159/CLP** - Certificate of Lawfulness (proposed) for installation of biomass boiler and ancillary flue at Carslogie Farmhouse, Cupar, Fife, KY15 4NG. Fife Council are currently awaiting confirmation of the PM<sub>10</sub> and NO<sub>x</sub> emission rates from the developer in order to be able to carry a screening assessment of potential air quality impacts in the area surrounding the farm.

**12/04137/PPP** - Planning permission in principle for erection of residential development with associated landscaping, access roads and infrastructure - North Fod Site, Pittsburgh Road, Halbeath Fife.

**12/00659/SCR** - Request for Screening Opinion Fife Energy Park High Street Methil Fife. The applicant should provide suitable site specific air quality risk assessments as part of the screening process for the above proposed development.

**12/00669/SCR** - EIA screening opinion for erection of 2 turbines, land to the West of chemical works Mossmorran, Fife. The applicant should provide a suitable air quality impact assessment for the above proposed development which provides adequate evidence that Scottish statutory air quality objectives will not be compromised. This should include demonstrating that the proposed development will not affect the dispersal patterns of nearby industrial emissions in such a manner that achievement of Scottish statutory air quality objectives are put at risk.

**12/01673/FULL** - Erection of 203 dwelling houses and 22 flatted dwellings with associated domestic garages, access road, car parking and landscaping at land to north of Ostlers Way, Kirkcaldy, Fife. Air Quality Impact Assessment has been carried out and concludes that the proposed development is unlikely to significantly affect local air quality and that no further information is required.

**12/02741/SCR** - Pre-app enquiry for quarrying operations, Belliston Quarry, Gibliston, Colinsburgh, Leven, Fife, KY9 1JS.

**12/02903/NEA** - Application under Section 36 of the Electricity Act 1989 for erection of biomass renewable energy plant (65MW), Auchmuty And Rothes Mills Glenrothes Fife KY7 6PB. It is noted that Npower Renewables commissioned an independent assessment of the air quality impact in the vicinity of the biomass CHP plant at Tullis Russell in October 2011, and that this study concluded that emissions from the plant are not predicted to result in atmospheric conditions that exceed health based ambient standards or guidelines, and that emissions from the plant are therefore not expected to result in any human health effects. It is also noted that all the emissions to air will be continuously monitored to ensure that they meet the emission limits imposed by SEPA in the PPC permit for the site.

**12/03070/MCA**. Removal of Condition 17 of application Ref: 95/0432/IDO to allow additional mineral extraction, Orrock Quarry Kirkcaldy Fife KY2 5XD.

**12/03102/NEA** - Application under Section 36 of the Electricity Act 1989 and under Part 4 Section 20 of the Marine (Scotland) Act 2010 for the erection and operating of an offshore wind farm, Near Na Gaoithe Offshore Wind Farm, Fife.

**12/03455/SCR** - Screening request for development of business park, Former Diosynth Complex, Muiredge Industrial Estate, Buckhaven, Fife.

**12/04853/FULL** - Erection of crematorium, 100 Acre Wood, Brewsterwells Cottages, Lathockar, St Andrews, Fife.

**12/04876/PAN** - Proposal of Application Notice for redevelopment of vacant site. Redevelopment Site, Bruce Street, Dunfermline, Fife.

**12/03202/SCR** - Screening opinion for single wind turbine (99.5m to tip of blade, 500+kW) on land at Camilla Farm, north of Auchtertool, KY2 5XG.

**12/03747/SCR** - screening request for erection of single 99.5m (to blade tip) 500kW wind turbine at land to south of Glenniston Farm, Auchtertool, Fife, KY2 5XG.

**12/03846/FULL** - Construction of malt distillery and associated maturation warehouses with associated parking and landscaping on land to east of Osprey Road, Glenrothes, Fife.

**12/00034/SCO** - Request for scoping opinion for extension to coal extraction area at proposed Open Cast Coal Site at Muir Dean. It is noted that the proposed scheme may have the potential to

influence the local air quality. The Environmental Statement (ES) should clearly demonstrate that the statutory air quality objectives will not be exceeded and detail any proposed mitigation measures which may be required in this regard. The relevant air quality technical guidance should be consulted with regards to this assessment of air quality.

**12/00343/SCR** - EIA Screening request for warehouse and ancillary development at Begg Farm, Kirkcaldy. It was noted that a Transport Statement has been undertaken, however it is unknown if this includes an assessment of the potential impact that the proposed development may have on the local air quality.

**12/00314/EIA** - Extraction and processing of sand from woodland and reinstatement of land to woodland and loch at Kirkton Wood, Tentsmuir, Tayport.

**12/01300/PPP** - Planning Permission in Principle for residential, mixed use development (Class 4 Business, Class 5 General Industry and Class 6 Storage and Distribution) and ancillary uses (small-scale food and non-food retail (Class 1), crèche (Class 10 Non-Residential Institution) and Class 3 restaurant with ancillary takeaway, incorporating road works, associated infrastructure and landscaping at Westwood Park, Glover Road, Glenrothes. All comments and conclusions noted by ECOM Environmental in their Air Quality Assessment (dated October 2012) would appear to be generally satisfactory. In particular, it is noted that various mitigation measures are recommended for during the construction phase of the proposed development.

**10/01774/EIA** - Planning permission in principle for mixed use development comprising residential, commercial and business uses, retail, leisure and community facilities, education provision, landscaping and open space and associated roads/infrastructure at Land at Kingslaw, Randolph Road, Kirkcaldy. The information submitted in relation to the air quality impact assessment undertaken would appear to be generally satisfactory.

**12/01771/FULL** - Erection of Food Store (Class 1), Petrol Filling Station with Car Wash and ATM, Car Parking, Access, Landscaping and Associated Works (Demolish Existing Retail Unit) at 439 Esplanade, Kirkcaldy KY1 1SL.

**12/02108/EIA** - Amendment to Approved Extraction Area for the Winning and Working of Coal and Relocation of Site Infrastructure at Proposed Open Cast Coal Site at Muir Dean. The Environmental Strategy Team is generally satisfied with the information provided within Section 14 Air Quality of the Environmental Statement (ES), dated May 2012.

**12/02791/SCR** - Request for screening opinion for residential development at Land at Spencerfield, The Avenue, Inverkeithing.

**12/02692/FULL** - Erection of two wind turbines 126.5 metres to tip height with associated sub-station and control building, new access to public road, connecting access tracks, and associated hardstanding and infrastructure at Land to the West of Chemical Works, Mossmorran.

## 6 Implementation of Action Plans

Where an authority identifies that a given air quality objective is likely to be exceeded at a relevant location, it is obliged to declare an Air Quality Management Area (AQMA) and undertake a Further Assessment of existing and likely future air quality. The Authority must then develop an Air Quality Action Plan (AQAP), setting out the local actions that will be implemented to improve air quality and work towards meeting the objectives.

Fife Council declared an AQMA for Bonnygate, Cupar in October 2008 which came into force in December 2008. The findings of the Further Assessment indicate that road traffic is the principal source responsible for the local exceedances of NO<sub>2</sub> and makes a significant contribution to local PM<sub>10</sub> concentrations. Background sources constitute the principal sources of PM<sub>10</sub> within the Bonnygate AQMA, however, background sources are difficult to address at the local level.

Fife Council declared a second AQMA for Appin Crescent, Dunfermline amended for both NO<sub>2</sub> and PM<sub>10</sub>, which came into force on September 2012. The findings of the Further Assessment indicate that road traffic is the principal source responsible for the local exceedances of NO<sub>2</sub>. The source apportionment undertaken in the further assessment indicated that background sources constitute the principal sources of PM<sub>10</sub> within the Appin Crescent AQMA although road traffic makes a significant contribution to local PM<sub>10</sub> concentrations.

A steering group including key representatives from relevant services of Fife Council was formed to develop the draft AQAP's for both Bonnygate and Appin Crescent. The steering group considered the findings of the Further Assessments and the wide range of potential options for improving air quality within the AQMA's. Subsequently the steering group undertook an assessment of each of these options. The options were assessed against the following criteria:

- How much support was there initially within the steering group for the option?
- Potential air quality impact;
- Potential costs;
- Overall cost-effectiveness;
- Potential co-environmental benefits, risk factors, social impacts and economic impact;
- Feasibility and Acceptability.

The assessments were then considered in total to place the options in a prioritised order. This then became the draft AQAP.

Fife Council adopted the finalised Air Quality Action Plan for Bonnygate in October 2010 following approval by the relevant Fife Council Committee. The Appin Crescent Draft AQAP<sup>44</sup> was submitted for consultation during the period of 1<sup>st</sup> October to the 23<sup>rd</sup> November 2012.

The North East Fife Area Committee meets on a quarterly basis to discuss the latest progress made in implementing measures contained within the Bonnygate AQAP. The latest AQAP Progress Report<sup>25</sup> was published in January 2013 and concluded that:

- Fife Council will continue to progress the air quality action plan measures contained in the Bonnygate AQAP.

<sup>25</sup> Bonnygate Cupar - Air Quality Action Plan Progress Report 2012, 23<sup>rd</sup> January 2013

- Fife Council will continue to provide annual reports on air quality for the Bonnygate AQMA and progress made in implementing action plan measures contained in the Bonnygate AQAP.

The Bonnygate AQAP aims to work towards reducing transport emissions of NO<sub>x</sub> and PM<sub>10</sub> in the AQMA by approximately 53% and 33% respectively; using wide range of measures such as road and traffic signaling improvement combined with other measures, for example behaviour-change. The Draft Appin Crescent AQAP aims to work towards reducing transport emissions of NO<sub>x</sub> and PM<sub>10</sub> in the AQMA by approximately 18% and 40% respectively; and as with the Bonnygate AQAP a combination of road layout and traffic signaling improvement combined with many other measures. The required improvements appear to be quite onerous, however, it should be noted that these represent the ambient concentrations required to meet the objectives, not the reduction in mass emissions. It is anticipated that a reduction of this scale will lead to the achievement of the annual mean NO<sub>2</sub> air quality standard (40 µg m<sup>-3</sup>) and Scottish annual mean objective for PM<sub>10</sub> (18 µg m<sup>-3</sup>) within both AQMA's in future years. This has already been demonstrated with a reduction in NO<sub>2</sub> and PM<sub>10</sub> annual mean concentrations to below the annual mean objective at the Fife Cupar automatic monitoring site location; following improvements to the traffic signaling and road layout within the Bonnygate during 2009. Figures 6.1 and 6.2 show the decrease in NO<sub>2</sub> and PM<sub>10</sub> concentrations between December 2005 and December 2012 at the Fife Cupar automatic monitoring site.

**Figure 6.1 Annual Mean NO<sub>2</sub> Concentrations at Fife Cupar – 2007 to 2012**

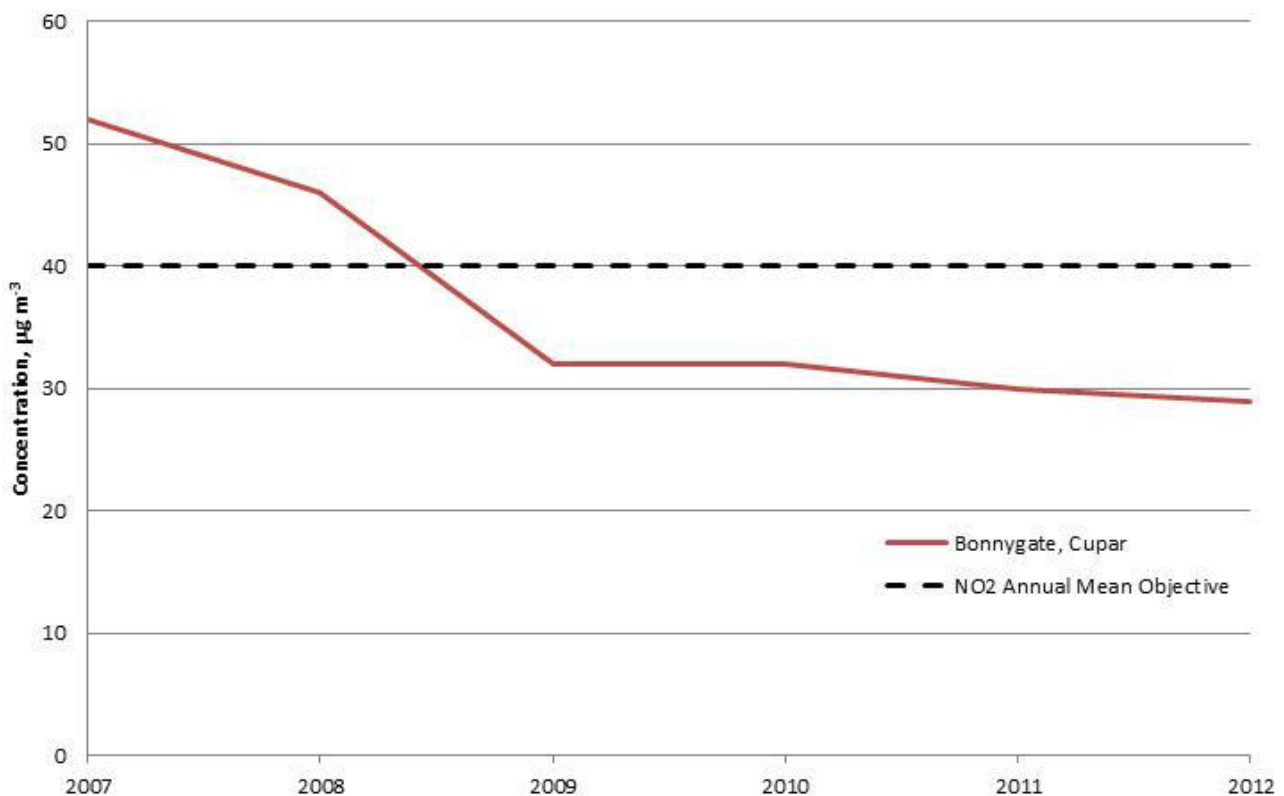
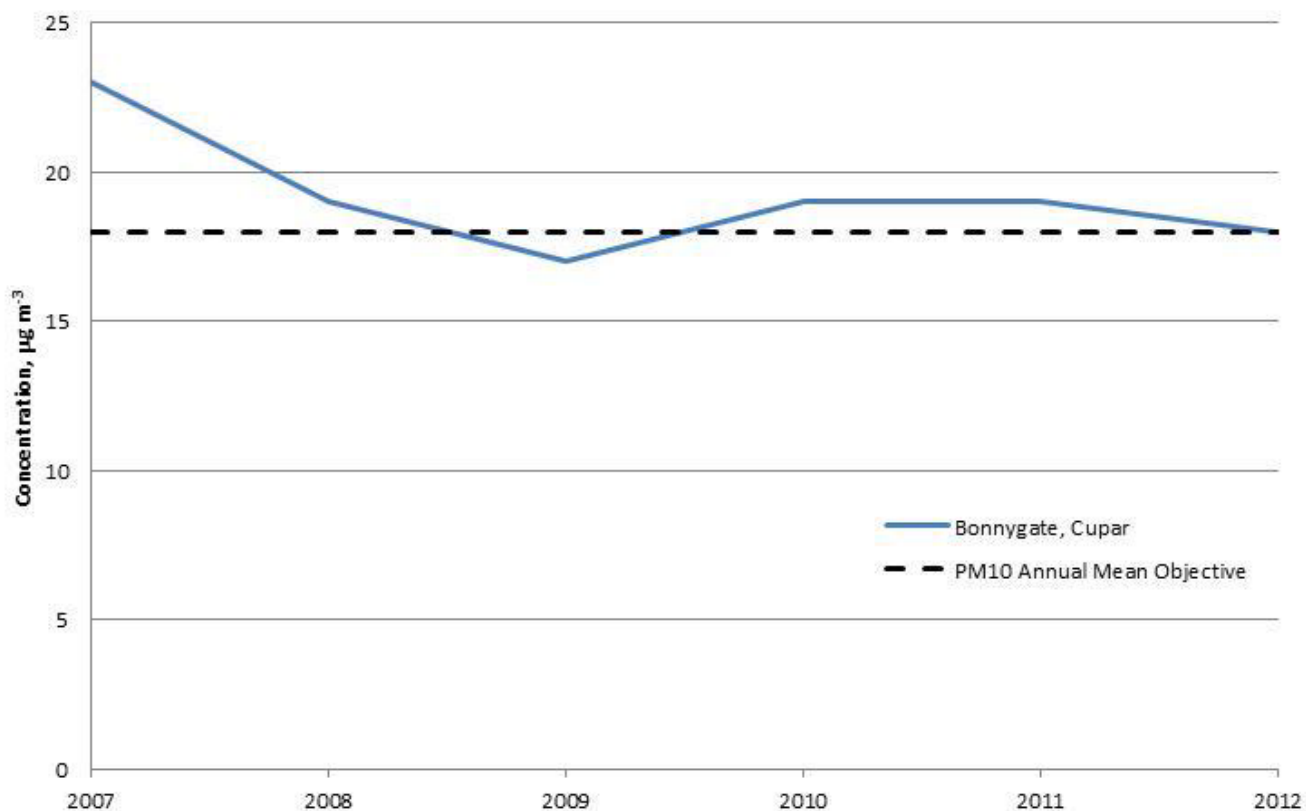


Figure 6.2 Annual Mean PM<sub>10</sub> Concentrations at Fife Cupar – 2007 to 2012



Provided in Appendix E of this Report is the Bonnygate Air Quality Action Plan Progress Report – Summary Table for 2012. This table summarises Fife Council’s progress to date in terms of implementing the finalised Action Plan for Bonnygate Cupar. As the Appin Crescent AQAP is in Draft the first Progress Report will be submitted with the 2014 Air Quality Progress Report.

## 7 Conclusions and Proposed Actions

### 7.1 Conclusions from New Monitoring Data

#### Nitrogen Dioxide

This Progress Report considered the following new monitoring data for calendar year 2012. During 2012, Fife Council undertook ambient monitoring of NO<sub>2</sub> tubes at 51 locations within Fife. New monitoring data highlighted air quality issues for NO<sub>2</sub> at Appin Crescent, Dunfermline and St Clair Street, Kirkcaldy.

When assessing the 2012 annual mean nitrogen dioxide concentrations (bias adjusted) against the AQS annual mean objective of 40 µg m<sup>-3</sup>, exceedances are evident at the following diffusion tube monitoring sites:

- Appin Crescent 2, Dunfermline (41 µg m<sup>-3</sup>)
- Appin Crescent 5 (A, B & C), Dunfermline (42 µg m<sup>-3</sup>)
- Appin Crescent 6 (A, B & C), Dunfermline (46 µg m<sup>-3</sup>)
- St Clair Street 1, Kirkcaldy (45 µg m<sup>-3</sup>)
- St Clair Street 2, Kirkcaldy (44 µg m<sup>-3</sup>)

Exceedances of the annual mean NO<sub>2</sub> objective were measured at three locations within Appin Crescent, Dunfermline, which has been declared an Air Quality Management Area (AQMA). Fife Council's Air Quality Action Plan (AQAP) for Appin Crescent intends to address these exceedances through the implementation of appropriate measures.

For the fifth year since 2008, diffusion tube location St Clair Street 1 and 2 has measured NO<sub>2</sub> concentrations above the annual mean objective. The Detailed Assessment of St Clair Street, Kirkcaldy (2012) found that the annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. Fife Council is not required to declare an Air Quality Management Area at this time. It was recommended that Fife Council continue to monitor NO<sub>2</sub> and PM<sub>10</sub> concentrations at this location and may wish to locate diffusion tube monitoring sites closer to the locations where ground floor residential properties are present on St Clair Street. Fife Council took this into consideration and added 4 new site locations in 2012 in the study area (125 St Clair Street, 179A St Clair Street, 3A Junction Road and 24 St Clair Street). Monitoring at these locations only started in Late November 2012 and had only one month of monitoring in 2012 (16.7% data capture).

Annual mean NO<sub>2</sub> concentrations of 39 µg m<sup>-3</sup> and 36 µg m<sup>-3</sup> were measured at Bell St 1 and 2, St Andrews, respectively. Although these measured concentrations are below the AQS annual mean objective the data between 2007 and 2012 show a possible upward trend in annual mean NO<sub>2</sub> concentrations.



## Particulate Matter

PM<sub>10</sub> concentrations are measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2012 concentrations were below the PM<sub>10</sub> annual mean objective with no exceedances of the daily mean objective at all sites.

It was concluded that Fife Council should defer its decision as to whether or not to declare an AQMA at Admiralty Road Rosyth, until at least six months monitoring data is available using a new FDMS drier in PM<sub>10</sub> monitoring equipment. This new FDMS drier was installed on the 26<sup>th</sup> September 2012 at Admiralty Road. The latest PM<sub>10</sub> data for the periods 01/10/2012 to 31/03/2013 and 01/04/2012 to 31/03/2013 show measured average PM<sub>10</sub> concentrations of 13 µg m<sup>-3</sup> and 15 µg m<sup>-3</sup> respectively; with no exceedances of the daily mean objective. As a result, Fife Council is not required to declare an AQMA at Admiralty Road, Rosyth.

## Sulphur Dioxide

Results for SO<sub>2</sub> monitoring in Fife in 2012 indicate that AQS objectives for SO<sub>2</sub> are unlikely to be exceeded. There are no new industrial processes, road or other developments that require detailed assessment with respect to this pollutant. Hence, new information in 2012 confirms the conclusion of previous reports that a Detailed Assessment is not required for SO<sub>2</sub>.

## Carbon Monoxide

Short-term monitoring undertaken by Fife Council's Transportation Services department during 2012 indicates that the AQS objective for CO is unlikely to have been exceeded during 2012. There are no new industrial processes, roads or other developments that require detailed assessment with respect to this pollutant. Hence, new information in 2012 confirms the conclusion of previous reports that a Detailed Assessment is not required for CO.

## 1,3 Butadiene and Benzene

Benzene and 1.3-butadiene monitoring carried out in the area of the Grangemouth refinery show that it is unlikely that the AQS objectives for these pollutants have been exceeded within the Fife Council Boundary.

The review of benzene data in the vicinity of Little Raith Wind Farm show that the running annual mean benzene concentrations measured at Cowdenbeath (LR01), Lochgelly (LR02) and Little Raith Farm (LR03) monitoring locations are below the AQS Objective of 3.25 µg m<sup>-3</sup>. In addition, these data also indicate that benzene concentrations have not increased as a result of the commissioning of Little Raith Wind Farm.

## 7.2 Conclusions relating to New Local Developments

Fife Council has identified one poultry farm (Mill View Farm formerly Diddlum Farm) which meets the specified criteria stated within Technical Guidance (09). Mill View Farm consists of 4 sheds housing up to 492,800 hens and located between 90 m and 150 m from 3 residential receptors. The 98<sup>th</sup> percentile of maximum daily mean PM<sub>10</sub> concentrations was calculated to be **39.2 µg m<sup>-3</sup>**. As a result, it is unlikely that the daily mean PM<sub>10</sub> objective of no more than 7 exceedances of 50 µg m<sup>-3</sup> in a year will

be exceeded at any receptor due to emissions from the four poultry sheds at Mill View Farm. It is therefore also concluded that Fife Council are not required to proceed to a Detailed Assessment.

The review of all other local developments has not identified any locations where there may be a risk of the air quality objectives being exceeded and so no additional air quality assessment is recommended at this time.

### 7.3 Conclusions relating to Air Quality Action Plans

There are currently two Air Quality Management Areas (AQMA) for NO<sub>2</sub> and PM<sub>10</sub> located within the Fife Council boundary:

- Bonnygate, Cupar, declared in October 2008
- Appin Crescent, Dunfermline, declared for NO<sub>2</sub> in November 2011 and for PM<sub>10</sub> in November 2012

The Air Quality Action Plan (AQAP) for the Bonnygate, Cupar AQMA is now well established and has been successful in reducing both NO<sub>2</sub> and PM<sub>10</sub> concentrations within the Bonnygate; principally as a result of the traffic signalling and road layout improvements carried out during 2009. No exceedances of NO<sub>2</sub> or PM<sub>10</sub> AQS objectives were measured within the Bonnygate AQMA during 2012. Although, the PM<sub>10</sub> annual mean concentration measured at the Bonnygate automatic monitoring site was 18 µg m<sup>-3</sup> and so is still close to exceeding the objective.

The Draft AQAP for Appin Crescent, Dunfermline was submitted for consultation between October and November 2012 and the finalised AQAP will now be submitted for approval to City of Dunfermline Area Committee meeting on 8<sup>th</sup> May 2013. Using the Bonnygate AQAP as a template, it is hoped that the Appin Crescent AQAP will achieve similar improvements in air quality.

### 7.4 Proposed Actions

Following the review of all available data it is recommended that Fife Council carry out the following actions:

1. Submit the next Air Quality Progress Report in May 2014.
2. Include the Air Quality Action Plan Progress Reports for both the Appin Crescent and Bonnygate Air Quality Management Areas within the 2014 Air Quality Progress Report.
3. Maintain the current monitoring programme.

Fife Council agrees with the content of this report and will implement these recommendations.

## Appendices

Appendix A	Automatic Monitoring Sites
Appendix B	QA/ QC Data
Appendix C	Diffusion Tube Bias Adjustment Factor Calculations
Appendix D	NO <sub>2</sub> Diffusion Tube Data
Appendix E	Bonnygate Air Quality Action Plan Progress Report – Summary Table
Appendix F	Poultry Farm Screening Tool
Appendix G	Fife Council “TRY IT” Initiative Update Report 2012
Appendix H	Fife’s Health and Wellbeing Plan 2011 -2014
Appendix I	Asset Based Approach to Local Air Quality Management
Appendix J	Fife Council Air Quality Development Guidelines Leaflet

## Appendix A: Automatic Monitoring Sites

### Appin Crescent, Dunfermline



Station Name:	Appin Crescent, Dunfermline
Site Owner/operator:	Fife Council
Easting:	309926
Northing:	687722
Distance to kerb and road name/number	3m + (A907)
Zone/agglomeration:	
Site Classification:	Roadside
Manifold type and height:	Single Teflon tube, inlet height 1.7m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by AEA with Air Liquide gas cylinder
Pollutants measured on site:	NO <sub>x</sub> , NO, NO <sub>2</sub> , PM <sub>10</sub> (since March 2011)
Instrument manufacturer:	Monitor Europe ME 9841 B
Calibration procedure and frequency:	3-weekly manual calibration and autocalibration every 3 days.
Site service arrangements:	6-monthly service by air monitors
Co-located passive sampler	Triplicate NO <sub>2</sub> tubes installed

## Bonnygate Cupar, Fife



Station Name:	Bonnygate, Cupar
Site Owner/operator:	Fife Council
Easting:	337406
Northing:	714574
Altitude:	
Zone/agglomeration:	
Site Classification:	Kerbside (<1m from Kerb)
Distance to kerb and road name/number	0.5m to Bonnygate (A91)
Distance to nearest junction and joining road name/number	Opposite the junction with Ladywynd
Start date of monitoring	19 December 2005
Manifold type and height:	Single Teflon tube, Inlet height 1.7m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by AEA with Air Liquide gas cylinder
Pollutants measured on site:	PM <sub>10</sub> (TEOM) NO <sub>x</sub> , NO, NO <sub>2</sub>
Instrument manufacturer:	FDMS NO <sub>x</sub> – Teco i-series
Calibration procedure and frequency:	2-weekly manual calibration
Site service arrangements:	6-monthly service by Air Monitors
Co-located passive sampler	Triplicate NO <sub>2</sub> tubes installed

## Admiralty Road, Rosyth



Station Name:	Admiralty Road, Rosyth
Site Owner/operator:	Fife Council
Easting:	311755
Northing:	683503
Altitude:	
Zone/agglomeration:	
Site Classification:	Roadside
Distance to kerb and road name/number	6m (A985(T))
Start date of monitoring	March 2008
Manifold type and height:	Single Teflon tube, Inlet height 2m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by AEA with Air Liquide gas cylinder
Pollutants measured on site:	PM <sub>10</sub> (FDMS) NO <sub>x</sub> , NO, NO <sub>2</sub>
Instrument manufacturer:	FDMS– R and P NO <sub>x</sub> – Thermo 42i
Calibration procedure and frequency:	3-weekly manual calibration and autocalibration every 3 days.
Site service arrangements:	6-monthly service by air monitors
Co-located passive sampler	Triplicate NO <sub>2</sub> tubes installed

## St Clair Street, Kirkcaldy



Station Name:	Saint Clair Street , Kirkcaldy
Site Owner/operator:	Fife Council
Easting:	329143
Northing:	692986
Altitude:	
Zone/agglomeration:	
Site Classification:	Roadside
Distance to kerb and road name/number	4.8m, Saint Clair Street/A921
Start date of monitoring	February 2011
Manifold type and height:	Single Teflon tube, Inlet height 2.5m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by AEA with Air Liquide gas cylinder
Pollutants measured on site:	PM <sub>10</sub> (FDMS) NO <sub>x</sub> , NO, NO <sub>2</sub>
Instrument manufacturer:	FDMS– R and P NO <sub>x</sub> – Thermo 42i
Calibration procedure and frequency:	3-weekly manual calibration and autocalibration every 3 days.
Site service arrangements:	6-monthly service by air monitors
Co-located passive sampler	Triplicate NO <sub>2</sub> tubes installed

## Appendix B: QA/QC of automatic monitoring

The QA/QC procedures follow the requirements of the Technical Guidance (09) and are equivalent to those used at UK level for the National Network (AURN) monitoring sites. This gives a high degree of confidence in the data obtained, both for measured concentrations at the automatic sites and for establishing robust bias correction factors for diffusion tubes.

In order to satisfy the requirement outlined in the Technical Guidance (09), the following QA/QC procedures were implemented:

- 3-weekly calibrations of the NOx analyser;
- 6-monthly audits and servicing of the monitoring site;
- Data ratification.

Calibrations of the NOx analyser were carried out using certified compressed gas standards (ISO17025). This ensured that the calibration gas was traceable to national and international standards. In addition to the calibration, sample filters were changed for NOx and TEOM analysers and any faults were identified thus minimising data loss.

Audits of the monitoring sites consisted of a number of performance checks to identify any faults with the equipment. The calibration cylinder was also checked against another gas standard in order to confirm the gas concentration. Any identified faults were forwarded on to the service unit for repair.

The final stage of the QA/QC process was to ratify the data. During ratification, all calibration, audit and service data are collated and the data are appropriately scaled. Any suspect data identified are deleted therefore ensuring that the data are of a high quality.

Casella Measurement carried out QA/QC procedures at the SO<sub>2</sub> automatic monitoring site at Blair Mains. These procedures were also to a standard equivalent to the AURN.

### QA/QC of diffusion tube monitoring

Diffusion tubes used by Fife Council are supplied and analysed by Tayside Scientific Services (formerly Dundee City Council Scientific Services). The laboratory participates in three schemes which ensure that the NO<sub>2</sub> tube results meet acceptable standards.

1. The WASP scheme is run by the Health and Safety Laboratory. Each month one tube is sent for testing. Results are compared with other participating labs and feedback on performance provided.
2. Every three months three tubes and a blank (for analysis) are supplied for exposure at an intercomparison site operated as part of the Support to Local Authorities for Air Quality Management contract funded by the Scottish Government, Defra and the other Devolved Authorities. Again, results are compared with other participating labs and feedback on performance provided.



3. Each month a QC NO<sub>2</sub> solution is also provided via this contract. This solution is run as an internal check for NO<sub>2</sub> tubes in the laboratory. The solution is tested after every 21 NO<sub>2</sub> tube samples.

Tayside Scientific Services also use in-house quality assurance standards. The tube preparation method is 20%TEA in water.

## Appendix C – Diffusion Tube Bias Factor Adjustment Calculations

Diffusion tubes may systematically under or over-read NO<sub>2</sub> concentrations when compared to the reference chemiluminescence analyser. This is described as bias and can be corrected for to improve the accuracy of the diffusion tube results, using a suitable bias adjustment factor.

Fife Council's diffusion tubes are prepared and analysed by Tayside Scientific Services. The tubes are prepared by applying solution of 20% TEA in water to the metal grid within the tube end cap. The tubes are then assembled. Tubes are prepared monthly prior to dispatch. Figure 1 shows the national adjustment factor shown and Figures C2 to C5 show the locally derived adjustment factors.

Figure C1 National Diffusion Tube Bias Adjustment Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet		Spreadsheet Version Number: 03/13	
Follow the steps below in the correct order to show the results of relevant co-location studies		This spreadsheet will be updated at the end of June 2013	
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods		This spreadsheet will be updated at the end of June 2013	
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet		This spreadsheet will be updated at the end of June 2013	
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.		This spreadsheet will be updated at the end of June 2013	
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.		This spreadsheet will be updated at the end of June 2013	
Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.		This spreadsheet will be updated at the end of June 2013	
Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor <sup>3</sup> shown in blue at the foot of the final column.
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data	If you have your own co-location study then see footnote <sup>1</sup> . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953
Analysed By <sup>1</sup>	Method	Year <sup>2</sup>	Local Authority
	To undo your selection, choose (All) from the pop-up list	To undo your selection, choose (All)	Maylebone Road Intercomparison
Tayside Scientific Services	20% TEA in Water	2012	KS
Tayside Scientific Services	20% TEA in Water	2012	Overall Factor <sup>3</sup> (1 study)
			Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )
			Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )
			Length of Study (months)
			Bias (B)
			Tube Precision
			Bias Adjustment Factor (A) (Cm/Dm)
			0.90
			Use

Figure C2 Locally Derived Bias Adjustment Factor - Rosyth

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean
1	05/01/2012	03/02/2012	37.5	36.9	39.9	38.1	1.59	4.17	3.94
2	03/02/2012	02/03/2012	36.7	37.0	37.2	37.0	0.25	0.68	0.63
3	02/03/2012	30/03/2012	27.4	28.0	29.4	28.3	1.03	3.63	2.55
4	30/03/2012	27/04/2012	27.9	34.1	32.6	31.5	3.23	10.26	8.04
5	27/04/2012	01/06/2012	23.1	20.0	23.5	22.2	1.92	8.63	4.76
6	01/06/2012	28/06/2012	25.1	25.9	24.3	25.1	0.80	3.19	1.99
7	28/06/2012	03/08/2012	N/A	N/A	N/A				
8	03/08/2012	31/08/2012	32.2	31.6	30.0	31.3	1.14	3.64	2.83
9	31/08/2012	28/09/2012	22.4	25.1	24.3	23.9	1.39	5.79	3.45
10	28/09/2012	02/11/2012	37.1	37.7	35.8	36.9	0.97	2.63	2.41
11	02/11/2012	28/11/2012	39.8	35.9	36.7	37.5	2.06	5.50	5.12
12	28/11/2012	04/01/2013	39.2	39.1	38.3	38.9	0.49	1.27	1.23
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Site Name/ ID:

Jaume Targa, for AEA

Version 04 - February 2011

**Adjusted measurement (95% confidence level)**  
**Without periods with CV larger than 20%**  
 Bias calculated using 11 periods of data  
 Tube Precision: 4      Automatic DC: 100%  
 Bias factor A: 0.88 (0.76 - 1.04)  
 Bias B: 14% (-4% - 32%)

---

*Information about tubes to be adjusted*  
 Diffusion Tube average: 32  $\mu\text{gm}^{-3}$   
 Average Precision (CV): 4  
 Adjusted Tube average: 28 +/- 8  $\mu\text{gm}^{-3}$

**Adjusted measurement (95% confidence level)**  
**with all data**  
 Bias calculated using 11 periods of data  
 Tube Precision: 4      Automatic DC: 100%  
 Bias factor A: 0.88 (0.76 - 1.04)  
 Bias B: 14% (-4% - 32%)

---

*Information about tubes to be adjusted*  
 Diffusion Tube average: 32  $\mu\text{gm}^{-3}$   
 Average Precision (CV): 4  
 Adjusted Tube average: 28 +/- 8  $\mu\text{gm}^{-3}$

Figure C3 Locally Derived Bias Adjustment Factor - Kirkcaldy

**Adjustment of DUPLICATE or TRIPLICATE Tubes**  From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	05/01/2012	31/01/2012	37.8	39.7	39.7	39.1	1.10	2.81	2.73	Good
2	31/01/2012	27/02/2012	36.6	35.9	36.6	36.4	0.40	1.11	1.00	Good
3	27/02/2012	26/03/2012	29.3	30.8	26.2	28.8	2.35	8.15	5.83	Good
4	26/03/2012	26/04/2012	24.0	20.4	27.0	23.8	3.30	13.88	8.21	Good
5	26/04/2012	28/05/2012	18.2	19.1	19.2	18.8	0.55	2.92	1.37	Good
6	28/05/2012	25/06/2012	15.0	15.0	13.7	14.6	0.75	5.15	1.86	Good
7	26/06/2012	29/06/2012	-	-	-	-	-	-	-	-
8	30/07/2012	27/08/2012	20.7	18.6	20.6	20.0	1.18	5.93	2.94	Good
9	27/08/2012	24/09/2012	21.3	23.3	20.0	21.5	1.66	7.72	4.13	Good
10	24/09/2012	01/11/2012	29.6	26.8	29.3	28.6	1.54	5.38	3.82	Good
11	01/11/2012	26/11/2012	35.8	34.8	30.7	33.8	2.70	8.00	6.71	Good
12	26/11/2012	04/01/2013	34.7	33.9	34.7	34.4	0.46	1.34	1.15	Good
13										

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

Site Name/ ID:

Jaume Targa, for AEA

Version 04 - February 2011

**Adjusted measurement (95% confidence level)**  
**Without periods with CV larger than 20%**  
 Bias calculated using 10 periods of data  
 Tube Precision: 6      Automatic DC: 98%  
 Bias factor A: 0.9 (0.8 - 1.02)  
 Bias B: 12% (-2% - 25%)

---

*Information about tubes to be adjusted*  
 Diffusion Tube average: 27  $\mu\text{gm}^{-3}$   
 Average Precision (CV): 6  
 Adjusted Tube average: 25 +/- 3  $\mu\text{gm}^{-3}$

**Adjusted measurement (95% confidence level)**  
**with all data**  
 Bias calculated using 10 periods of data  
 Tube Precision: 6      Automatic DC: 98%  
 Bias factor A: 0.9 (0.8 - 1.02)  
 Bias B: 12% (-2% - 25%)

---

*Information about tubes to be adjusted*  
 Diffusion Tube average: 27  $\mu\text{gm}^{-3}$   
 Average Precision (CV): 6  
 Adjusted Tube average: 25 +/- 3  $\mu\text{gm}^{-3}$

Figure C4 Locally Derived Bias Adjustment Factor - Dunfermline

**Adjustment of DUPLICATE or TRIPLICATE Tubes**  From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	05/01/2012	03/02/2012	46.0	47.3	51.0	48.1	2.59	5.39	6.44	Good
2	03/02/2012	02/03/2012	46.8	43.6	44.8	45.1	1.62	3.59	4.02	Good
3	02/03/2012	30/03/2012	40.9	39.9	44.0	41.6	2.14	5.14	5.31	Good
4	30/03/2012	27/04/2012	33.4	32.6	31.0	32.3	1.22	3.78	3.04	Good
5	27/04/2012	01/06/2012	27.6	27.9	27.1	27.5	0.40	1.47	1.00	Good
6	01/06/2012	28/06/2012	26.7	27.0	25.0	26.2	1.08	4.11	2.68	Good
7	28/06/2012	03/08/2012	N/A	N/A	N/A					
8	03/08/2012	31/08/2012	27.2	27.4	28.2	27.6	0.53	1.92	1.31	Good
9	31/08/2012	28/09/2012	27.4	25.3	27.1	26.6	1.14	4.27	2.82	Good
10	28/09/2012	02/11/2012	35.4	35.5	35.0	35.3	0.26	0.75	0.66	Good
11	02/11/2012	28/11/2012	39.9	33.7	34.1	35.9	3.47	9.67	8.62	Good
12	28/11/2012	04/01/2013	38.3	42.9	41.3	40.8	2.34	5.72	5.80	Good
13										

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

Site Name/ ID:

Jaume Targa, for AEA

Version 04 - February 2011

<p><b>Adjusted measurement (95% confidence level)</b>                  Without periods with CV larger than 20%</p> <p>Bias calculated using 11 periods of data                  Tube Precision: 4      Automatic DC: 100%                  Bias factor A: 0.79 (0.69 - 0.93)                  Bias B: 26% (7% - 45%)</p> <p><i>Information about tubes to be adjusted</i>                  Diffusion Tube average: 35 <math>\mu\text{gm}^{-3}</math>                  Average Precision (CV): 4                  Adjusted Tube average: 28 +/- 8 <math>\mu\text{gm}^{-3}</math></p>
---

<p><b>Adjusted measurement (95% confidence level)</b>                  with all data</p> <p>Bias calculated using 11 periods of data                  Tube Precision: 4      Automatic DC: 100%                  Bias factor A: 0.79 (0.69 - 0.93)                  Bias B: 26% (7% - 45%)</p> <p><i>Information about tubes to be adjusted</i>                  Diffusion Tube average: 35 <math>\mu\text{gm}^{-3}</math>                  Average Precision (CV): 4                  Adjusted Tube average: 28 +/- 8 <math>\mu\text{gm}^{-3}</math></p>
---

Figure C5 Locally Derived Bias Adjustment Factor - Cupar

**Adjustment of DUPLICATE or TRIPLICATE Tubes**  **AEA Energy & Environment**  
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	05/01/2012	03/02/2012	61.8	61.5	59.2	60.8	1.42	2.34	3.53	Good
2	03/02/2012	02/03/2012	34.5	31.9	38.3	34.9	3.22	9.22	8.00	Good
3	02/03/2012	30/03/2012	44.6	42.0	47.1	44.6	2.55	5.72	6.33	Good
4	30/03/2012	27/04/2012	22.3	19.3	25.5	22.4	3.10	13.86	7.70	Good
5	27/04/2012	01/06/2012	46.7	48.4	45.1	46.7	1.65	3.53	4.10	Good
6	01/06/2012	28/06/2012	33.5	33.8	28.4	31.9	3.03	9.51	7.54	Good
7	28/06/2012	03/08/2012	N/A	N/A	N/A					
8	03/08/2012	31/08/2012	38.6	39.1	40.7	39.5	1.10	2.78	2.73	Good
9	31/08/2012	28/09/2012	32.4	33.5	33.8	33.2	0.74	2.22	1.83	Good
10	28/09/2012	02/11/2012	43.5	44.2	44.3	44.0	0.44	0.99	1.08	Good
11	02/11/2012	28/11/2012	45.4	45.9	45.9	45.7	0.29	0.63	0.72	Good
12	28/11/2012	04/01/2013	37.1	32.7	33.9	34.6	2.27	6.58	5.65	Good
13										

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

**Site Name/ ID:**

Jaume Targa, for AEA

Version 04 - February 2011

<b>Adjusted measurement (95% confidence level)</b> <b>Without periods with CV larger than 20%</b> Bias calculated using 9 periods of data Tube Precision: 5      Automatic DC: 98% Bias factor A: <b>0.76 (0.63 - 0.94)</b> Bias B: <b>32% (6% - 58%)</b> <hr style="border-top: 1px dashed white;"/> <b>Information about tubes to be adjusted</b> Diffusion Tube average: 40 $\mu\text{gm}^{-3}$ Average Precision (CV): 5 Adjusted Tube average: 30 +/- 6 $\mu\text{gm}^{-3}$
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<b>Adjusted measurement (95% confidence level)</b> <b>with all data</b> Bias calculated using 9 periods of data Tube Precision: 5      Automatic DC: 98% Bias factor A: <b>0.76 (0.63 - 0.94)</b> Bias B: <b>32% (6% - 58%)</b> <hr style="border-top: 1px dashed white;"/> <b>Information about tubes to be adjusted</b> Diffusion Tube average: 40 $\mu\text{gm}^{-3}$ Average Precision (CV): 5 Adjusted Tube average: 30 +/- 6 $\mu\text{gm}^{-3}$
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Appendix D: NO<sub>2</sub> Diffusion Tube Data

ON/OFF DATE	TUBE LOCATION												
	BONNY GATE 1, CUPAR (11)	BONNY GATE 3A, CUPAR (13A)	BONNY GATE 3B, CUPAR (13B)	BONNY GATE 4, CUPAR (13C)	BONNY GATE 5, CUPAR (13D)	BONNY GATE 6, CUPAR (13E)	BONNY GATE 7, CUPAR (13F)	BONNY GATE 8, CUPAR (13G)	BONNY GATE 9, CUPAR (13H)	BONNY GATE 10, CUPAR (13I)	BONNY GATE 11, CUPAR (13J)	BONNY GATE 12, CUPAR (13K)	
<b>RUNNING MEAN</b>	60.3	65.6	64.6	67.3	63.0	50.5	47.1	79.9	64.5				
05/01/12 - 03/02/12	32.4	43.5	39.4	39.1	0.4	27.9	28.9	52.7	48.9				
03/02/12 - 02/03/12	44.4	61.7	60.3	62.6	88.5	41.3	38.2	63.7	50.4				
02/03/12 - 30/03/12	21.4	32.4	39.3	N/A	30.4	30.8	30.4	21.2	30.8				
27/04/12 - 1/06/12	38.3	61.4	52.0	56.7	58.2	46.2	46.2	45.3	44.4				
01/06/12 - 28/06/12	27.8	39.3	41.3	N/A	37.9	34.2	33.5	27.2	25.2				
28/06/12 - 03/08/12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
03/08/12 - 31/08/12	36.2	40.1	38.5	41.2	44.4	36.7	34.6	37.0	31.4				
31/08/12 - 28/09/12	31.2	39.6	38.2	37.5	38.7	25.0	24.4	41.1	33.9				
28/09/12 - 02/11/12	40.4	52.0	46.3	51.7	51.4	41.2	39.2	55.5	45.7				
02/11/12 - 28/11/12	41.0	52.0	52.7	56.5	47.9	36.0	27.7	59.6	47.3				
28/11/12 - 04/01/13	46.0	38.3	47.0	37.0	36.7	30.3	28.8	32.2	N/A				
<b>RUNNING MEAN</b>	<b>38.1</b>	<b>47.8</b>	<b>47.2</b>	<b>49.8</b>	<b>45.2</b>	<b>36.4</b>	<b>34.5</b>	<b>46.9</b>	<b>42.3</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>
				<b>48.5</b>			<b>35.4</b>						
ON/OFF DATE	TUBE LOCATION												
	MILLIE RD, CUPAR	SOUTH RD, CUPAR	CROSS GATE, CUPAR	LADYBYNDY, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR	BONNYGATE WEST, CUPAR
<b>RUNNING MEAN</b>													
05/01/12 - 03/02/12	51.1	35.0	50.2	45.5	40.1	61.8	61.5	59.2	35.5				
03/02/12 - 02/03/12	32.9	18.9	24.8	23.2	23.5	34.5	31.9	38.3	18.3				
02/03/12 - 30/03/12	40.1	26.7	27.6	23.1	33.6	44.6	42.0	47.1	19.0				
30/03/12 - 27/04/12	22.8	9.6	28.1	11.7	22.1	22.3	19.3	25.5	9.3				
27/04/12 - 1/06/12	30.4	11.8	46.9	20.5	32.9	46.7	48.4	45.1	14.1				
01/06/12 - 28/06/12	20.4	8.7	29.3	N/A	24.0	33.5	33.8	28.4	9.6				
28/06/12 - 03/08/12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
03/08/12 - 31/08/12	29.9	4.7	25.5	N/A	23.3	38.6	39.1	40.7	14.1				
31/08/12 - 28/09/12	29.0	14.0	19.8	14.0	21.0	32.4	33.5	33.8	16.3				
28/09/12 - 02/11/12	38.5	23.9	31.9	27.2	29.9	43.5	44.2	44.3	22.0				
02/11/12 - 28/11/12	41.0	28.5	34.7	30.4	32.0	45.4	45.9	45.9	29.3				
28/11/12 - 04/01/13	24.7	19.8	27.2	21.5	23.4	37.1	32.7	33.9	19.2				
<b>RUNNING MEAN</b>	<b>32.8</b>	<b>#DIV/0!</b>	<b>18.3</b>	<b>31.5</b>	<b>24.1</b>	<b>27.8</b>	<b>40.0</b>	<b>39.3</b>	<b>40.2</b>	<b>18.8</b>			
								<b>39.8</b>					



# Fife Council

## TUBE LOCATION

ON/OFF DATE	ST CLAIR ST 1		ST CLAIR ST 2		ST CLAIR ST 3		125 ST CLAIR ST		179A ST CLAIR ST		3A JUNCTION RD		DUNNIKER RD		ST CLAIR ST Roman A		ST CLAIR ST Roman B		ST CLAIR ST Roman C	
	KIRKCALDY	KIRKCALDY	KIRKCALDY	KIRKCALDY	Kirkcaldy	Kirkcaldy	KIRKCALDY	KIRKCALDY	179A ST CLAIR ST	3A JUNCTION RD	DUNNIKER RD	KIRKCALDY	ST CLAIR ST Roman A	ST CLAIR ST Roman B	ST CLAIR ST Roman C					
05/01/12 - 31/01/12	56.3	47.1	43.0	-	-	-	-	-	-	-	38.7	37.8	39.7	39.7	39.7					
31/01/12 - 27/02/12	65.3	46.2	40.5	-	-	-	-	-	-	-	46.1	36.6	35.9	36.6	36.6					
27/02/12 - 26/03/12	54.8	45.4	39.3	-	-	-	-	-	-	-	34.9	29.3	30.8	30.8	26.2					
26/03/12 - 26/04/12	46.7	42.8	36.3	-	-	-	-	-	-	-	35.6	24.0	20.4	27.0	27.0					
25/04/12 - 28/05/12	35.5	47.5	36.5	-	-	-	-	-	-	-	28.7	18.2	19.1	19.2	19.2					
28/05/12 - 25/06/12	-	46.4	33.1	-	-	-	-	-	-	-	32.3	15.0	15.0	13.7	13.7					
26/06/12 - 29/07/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
30/07/12 - 27/08/12	38.2	46.9	39.5	-	-	-	-	-	-	-	33.4	20.7	18.6	20.6	20.6					
27/08/12 - 24/09/12	43.4	32.7	28.0	-	-	-	-	-	-	-	25.9	21.3	23.3	20.0	20.0					
24/09/12 - 01/11/12	55.2	45.2	37.8	-	-	-	-	-	-	-	33.5	29.6	26.8	29.3	29.3					
01/11/12 - 26/11/12	63.5	44.8	41.0	-	-	-	-	-	-	-	42.1	35.8	34.8	30.7	30.7					
26/11/12 - 04/01/13	37.2	53.3	39.7	46.6	41.7	41.7	38.0	41.6	41.6	41.7	34.2	34.7	33.9	34.7	34.7					
04/01/13 - 28/01/13	49.6	49.8	43.1	43.2	41.7	41.7	41.6	41.6	41.6	41.7	42.0	30.7	33.6	28.6	28.6					
<b>RUNNING MEAN</b>	<b>49.6</b>	<b>45.7</b>	<b>38.2</b>	<b>46.6</b>	<b>41.7</b>	<b>41.7</b>	<b>38.0</b>	<b>41.7</b>	<b>41.7</b>	<b>39.8</b>	<b>35.6</b>	<b>27.8</b>	<b>27.7</b>	<b>27.2</b>	<b>27.2</b>					
<b>RUNNING MEAN</b>	<b>49.6</b>	<b>45.7</b>	<b>38.2</b>	<b>44.9</b>	<b>41.7</b>	<b>41.7</b>	<b>39.8</b>	<b>41.7</b>	<b>41.7</b>	<b>39.8</b>	<b>35.6</b>	<b>27.8</b>	<b>27.7</b>	<b>27.2</b>	<b>27.2</b>					

TUBE LOCATION		TUBE LOCATION		TUBE LOCATION		TUBE LOCATION	
VICTORIA RD	GLENLYON	LESLIE HIGH ST	ASDA R/B	QUEENSWAY	24 ST CLAIR ST	KIRKCALDY	KIRKCALDY
KIRKCALDY	LEVEN	LESLIE	KIRKCALDY	GLENROTHES	Travel Bank 1	Travel Bank 2	Travel Bank 2
05/01/12 - 31/01/12	40.4	39.5	42.4	39.0	-	-	-
31/01/12 - 27/02/12	37.8	29.5	35.9	35.4	-	-	-
27/02/12 - 26/03/12	32.6	32.0	41.2	28.1	-	-	-
26/03/12 - 26/04/12	36.7	32.3	36.9	24.2	-	-	-
25/04/12 - 28/05/12	22.4	20.2	27.8	26.1	-	-	0.6
28/05/12 - 25/06/12	24.8	25.0	32.3	22.3	-	-	-
26/06/12 - 29/07/12	-	-	-	-	-	-	-
30/07/12 - 27/08/12	30.1	24.4	39.1	23.7	-	-	-
27/08/12 - 24/09/12	27.3	23.5	30.9	20.8	-	-	<0.1
24/09/12 - 01/11/12	35.0	27.7	29.0	31.1	-	-	-
01/11/12 - 26/11/12	40.9	39.6	43.1	33.4	-	-	-
26/11/12 - 04/01/13	38.1	36.9	39.3	32.2	30.6	0.2	0.2
04/01/13 - 28/01/13	42.5	35.2	44.5	35.5	29.7	0.2	0.2
<b>RUNNING MEAN</b>	<b>37.2</b>	<b>33.5</b>	<b>36.9</b>	<b>29.3</b>	<b>30.6</b>	<b>0.0</b>	<b>0.6</b>
<b>RUNNING MEAN</b>	<b>37.2</b>	<b>33.5</b>	<b>36.9</b>	<b>29.3</b>	<b>30.2</b>	<b>0.3</b>	<b>0.3</b>

# Fife Council

SITE CODE	DRM5 Rumblingwell Dunfermline	DRM9A Appin Crescent A Dunfermline	DRM9B Appin Crescent B Dunfermline	DRM9C Appin Crescent C Dunfermline	C'BEATH High Street Cowdenbeath	K'DINE1 N Approach Rd. A Kincardine	K'DINE2 N Approach Rd. B Kincardine	AQM3 St Leonards Pri Sch Dunfermline	
06/01/2012 - 01/02/2012	D1 41.7	D4A 60.6	D4B 60.4	D4C 51.4	D5 34.3	D6 32.2	D7 32.4	D9 31.4	
01/02/2012 - 28/02/2012	42.7	57.6	57.6	50	28.3	28.7	29.6	27.1	
28/02/2012 - 27/03/2012	33.4	53.6	50.6	46.8	25	23.6	24.3	24.5	
27/03/2012 - 24/04/2012	26.9	42.3	42.9	39.5	30.7	19.3	18.5	21.1	
24/04/2012 - 30/05/2012	N/A	42.5	30.4	31.4	24	13.8	13.6	14.1	
30/05/2012 - 28/06/2012	20.4	29.5	33.1	32.8	28	13.3	13.2	13.7	
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
01/08/2012 - 28/08/2012	27.2	34.6	35	35.3	28.5	18.5	17.8	19.1	
28/08/2012 - 26/09/2012	22.7	31.9	31.9	35.3	19.8	15.7	16.3	15.3	
26/09/2012 - 30/10/2012	26.3	43	42.6	49	30	24.6	24.2	22.4	
30/10/2012 - 27/11/2012	34.2	52	48	38.8	28.4	29	28.2	23.1	
27/11/2012 - 08/01/2013	35.8	51	49.1	50.4	32.9	30.9	28.6	24.9	
<b>RUNNING MEAN</b>	<b>31.1</b>	<b>44.2</b>	<b>43.9</b>	<b>41.9</b>	<b>28.2</b>	<b>22.8</b>	<b>22.4</b>	<b>21.5</b>	
SITE CODE	C'GIE DR.A Carnegie Drive A Dunfermline	C'GIE DR.B Carnegie Drive B Dunfermline	C'GIE DR.C Carnegie Drive C Dunfermline	ADM ROA Admiralty Road A Rosyth	ADM ROA Admiralty Road A Rosyth	APP CR1 Appin Crescent 1 Dunfermline	APP CR2 Appin Crescent 2 Dunfermline	APP CR3 Appin Crescent 3 Dunfermline	PITT ST Pittencrief Street Dunfermline
06/01/2012 - 01/02/2012	D16A 46.3	D16B 52.6	D16C 52	D17 45.5	D18 46.2	D19 66.1	D20 56.5	D21 56.5	D21 8.2
01/02/2012 - 28/02/2012	44.7	51	50.5	45.7	43.5	65.4	58.7	29.3	29.3
28/02/2012 - 27/03/2012	40.5	49.7	49.6	38.5	N/A	56.6	76	29.3	29.3
27/03/2012 - 24/04/2012	42.6	39.7	42.8	38.7	33.4	48.3	40.9	27.6	27.6
24/04/2012 - 30/05/2012	41.5	41.8	40.8	30.7	20.9	38.8	36.8	20.4	20.4
30/05/2012 - 28/06/2012	43.3	41.1	41.8	28.1	26.3	32.1	39.6	19.7	19.7
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
01/08/2012 - 28/08/2012	46.3	44.1	48.3	33.9	24	53.3	40.8	23.2	23.2
28/08/2012 - 26/09/2012	31.3	30.9	32.7	29	27.7	44	36	20.4	20.4
26/09/2012 - 30/10/2012	40	39.1	42.1	41.1	36.2	44.6	46.8	25.8	25.8
30/10/2012 - 27/11/2012	56.3	48.1	53.9	43.3	43	62.1	53.6	33.5	33.5
27/11/2012 - 08/01/2013	<b>46.2</b>	<b>44.7</b>	<b>44</b>	<b>41.1</b>	<b>42.8</b>	<b>59.8</b>	<b>53.9</b>	<b>29.9</b>	<b>29.9</b>
<b>RUNNING MEAN</b>	<b>43.5</b>	<b>43.8</b>	<b>45.3</b>	<b>37.8</b>	<b>34.4</b>	<b>52.0</b>	<b>49.1</b>	<b>24.3</b>	<b>24.3</b>
SITE CODE	APP CR4A Appin Crescent 4A Dunfermline	APP CR4B Appin Crescent 4B Dunfermline	APP CR4C Appin Crescent 4C Dunfermline	APP CR5A Appin Crescent 5A Dunfermline	APP CR5B Appin Crescent 5B Dunfermline	APP CR5C Appin Crescent 5C Dunfermline			
06/01/2012 - 01/02/2012	D22A 46	D22B 47.3	D22C 51	D24A 74.9	D24B 73	D24C 73.4			
01/02/2012 - 28/02/2012	46.8	43.6	44.8	73.5	63.1	60.6			
28/02/2012 - 27/03/2012	40.9	39.9	44	50.9	61.9	64.7			
27/03/2012 - 24/04/2012	33.4	32.6	31	45.7	47.4	46.2			
24/04/2012 - 30/05/2012	27.6	27.9	27.1	39	34.5	34.2			
30/05/2012 - 28/06/2012	26.7	27	25	36	37.5	37.1			
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	N/A			
01/08/2012 - 28/08/2012	27.2	27.4	28.2	40.7	43	42.9			
28/08/2012 - 26/09/2012	27.4	25.3	27.1	44.3	45.6	43.6			
26/09/2012 - 30/10/2012	35.4	35.5	35	54.5	54.8	55.5			
30/10/2012 - 27/11/2012	39.9	33.7	34.1	62.4	67.6	64			
27/11/2012 - 08/01/2013	<b>38.3</b>	<b>42.9</b>	<b>41.3</b>	<b>58</b>	<b>59.1</b>	<b>61.3</b>			
<b>RUNNING MEAN</b>	<b>35.4</b>	<b>34.8</b>	<b>35.3</b>	<b>52.7</b>	<b>53.4</b>	<b>53.0</b>			
SITE CODE	ROMON A Admiralty Road Rosyth	ROMON B Admiralty Road Rosyth	ROMON C Admiralty Road Rosyth	APP CR6A Appin Crescent 6A Dunfermline	APP CR6B Appin Crescent 6B Dunfermline	APP CR6C Appin Crescent 6C Dunfermline			
06/01/2012 - 01/02/2012	D23A 37.5	D23B 36.9	D23C 39.9	D25A 77	D25B 75.4	D25C 75.1			
01/02/2012 - 28/02/2012	36.7	37	37.2	65.8	73	68.7			
28/02/2012 - 27/03/2012	27.4	26	29.4	55.6	71.1	60.3			
27/03/2012 - 24/04/2012	27.9	34.1	32.6	51.1	48.5	47.8			
24/04/2012 - 30/05/2012	25.1	20	23.5	40.4	35.6	43.2			
30/05/2012 - 28/06/2012	25.1	25.9	24.3	46.7	38.9	44.9			
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	N/A			
01/08/2012 - 28/08/2012	32.2	31.6	30	53.4	59.6	55.1			

## Fife Council

SITE CODE	ROMON A	ROMON B	ROMON C	APP CR6A	APP CR6B	APP CR6C
LOCATION	Admiralty Road Rosyth	Admiralty Road Rosyth	Admiralty Road Rosyth	Appin Crescent 6A Dunfermline	Appin Crescent 6B Dunfermline	Appin Crescent 6C Dunfermline
TUBE NUMBER	D23A	D23B	D23C	D25A	D25B	D25C
06/01/2012 - 01/02/2012	37.5	36.9	39.9	77	75.4	75.1
01/02/2012 - 28/02/2012	36.7	37	37.2	65.8	73	68.7
28/02/2012 - 27/03/2012	27.4	28	29.4	55.6	71.1	60.3
27/03/2012 - 24/04/2012	27.9	34.1	32.6	51.1	48.5	47.8
24/04/2012 - 30/05/2012	23.1	20	23.5	40.4	35.6	43.2
30/05/2012 - 28/06/2012	25.1	25.9	24.3	46.7	38.9	44.9
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	N/A
01/08/2012 - 28/08/2012	32.2	31.6	30	53.4	59.6	55.1
28/08/2012 - 26/09/2012	22.4	25.1	24.3	50.2	43	44.4
26/09/2012 - 30/10/2012	37.1	37.7	35.8	53.3	59	52.7
30/10/2012 - 27/11/2012	39.8	35.9	36.7	69	73	72.4
27/11/2012 - 08/01/2013	<b>39.2</b>	<b>39.1</b>	<b>38.3</b>	<b>63.8</b>	<b>69.5</b>	<b>61.9</b>
<b>RUNNING MEAN</b>	<b>31.7</b>	<b>31.9</b>	<b>32.0</b>	<b>56.9</b>	<b>58.8</b>	<b>57.0</b>
SITE CODE	HALBEATH RD1	HALBEATH RD2				
LOCATION	11 Halbeath Road Dunfermline	57 Halbeath Road Dunfermline	229 Admiralty Road Rosyth	49 Ramsay Place Rosyth	129 Admiralty Road Rosyth	
TUBE NUMBER	D26	D27	D28	D29	D30	
06/01/2012 - 01/02/2012	33.4	38.1	35	27	37.9	
01/02/2012 - 28/02/2012	35.8	35.8	35.7	24.8	36.9	
28/02/2012 - 27/03/2012	32	28.3	30	18.7	29.4	
27/03/2012 - 24/04/2012	23.5	23.8	26.2	22.3	34.8	
24/04/2012 - 30/05/2012	16.8	13.7	18.1	12.8	20.9	
30/05/2012 - 28/06/2012	14.8	15.6	18.6	17.5	22.9	
28/06/2012 - 01/08/2012	N/A	N/A	N/A	N/A	N/A	
01/08/2012 - 28/08/2012	19.6	19.5	22.8	19.4	27.9	
28/08/2012 - 26/09/2012	20.3	20.2	20.6	14.2	23.3	
26/09/2012 - 30/10/2012	26.3	26.2	31.3	24.7	32.5	
30/10/2012 - 27/11/2012	31.9	32.3	33	23.8	36.2	
27/11/2012 - 08/01/2013	<b>31.4</b>	<b>28.4</b>	<b>32.8</b>	<b>26.5</b>	<b>37.8</b>	
<b>RUNNING MEAN</b>	<b>26.0</b>	<b>25.6</b>	<b>27.6</b>	<b>21.1</b>	<b>31.0</b>	

Fife Council

Appendix E- Bonnygate Air Quality Action Plan Progress Report – Summary Table

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
1	Improving links with Local Transport Strategy/ Area Transport Plan	Reference to Bonnygate AQMA and measures included in Air Quality Action Plan. Integration of plan.	Fife Council Transportation and Environmental Services (TES) and Enterprise, Planning and Protective Services (EPPS)	Jane Findlay and Kenny Bisset	Original: 2009-2010; Amended: 2011	Benefit to local air quality - enables the consideration of Air Quality issues in the Bonnygate into Local Transport Planning considerations. <b>Potential effect of measure to date: Small</b>		Draft of Revised Fife LTS available in summer 2011 Currently being reviewed.	Not possible to assign a quantitative indicator. These are strategic options which will be reported in future versions of LTS and relevant commentary will be provided on specific air quality provisions in such documentation.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
1		Options that will be implemented via the Area Transport Plan (ATP)	Fife Council TES and EPPS	Jane Findlay and Kenny Bisset	Originally: 2010; Amended: 2011 - 12	Provision of a cycle-way from the town centre to the trading estate should encourage walking and cycling and contribute to reducing car usage and associated emissions. <b>Potential effect of measure to date: Small</b>		Received Scottish Government grant funding for 2013/14 for completion of cycle path.	Actions to be detailed in LTS and ATP.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
2	Improving Air Quality links with Local Planning and Development Framework	(a) Integrate AQ Action Plan with Local Plan - liaise with Development Management staff re: inclusion of specific reference within Local Plan policies to Air Quality issues and legislative requirements.	Fife Council EPPS	Tara Cowley and Kenny Bisset	Original: 2010-2011; Amended: 2010-2012	The Strategic Development Plan for the TAYplan region will be a significant plan guiding development in the area up to 2032. This Plan has considered air quality issues associated with future development in the North East Fife area and makes specific reference to Cupar Relief Road and reducing air pollution. The inclusion of the AQAP within Local Plan documents will encourage the	Air Quality Management Guidance Note on Fife Direct website and reference to Bonnygate AQMA in existing Local Plan .	Feasibility of supplementary planning guidance on air quality issues has been fully explored and it is the opinion of the Bonnygate Air Quality Core Steering Group that existing arrangements in the Local Plan and Air Quality Management Guidance note are sufficient in addressing this	Inclusion of reference to Bonnygate AQAP within Local Development Plan 2011.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
						consideration of Local Air Quality Issues within future planning considerations. <b>Potential effect of measure to date: Low</b>		particular action plan measure.		
2		(b) Ensure development proposals in AQMA are assessed for AQ impacts - Development Management staff to consider Air Quality issues and consult Developer's Guidance note when determining applications within AQMA.	Fife Council EPPS	Tara Cowley and Kenny Bisset	2010-2015	The guidance note will increase awareness and consideration of potential air quality impacts of new developments and thus help to prevent deteriorations in local air quality. <b>Potential effect of measure to date: Low</b>	Air Quality Development Management Guidance Note 2011 published on Fife Direct website. Development Management staff provided with model planning condition for air quality issues.	Positive feedback already received by developers on the user friendly content of Air Quality Development Management Leaflet.	Publication of Developers Guidance Note on Fife Direct.	EPPS to continue providing comment on air quality issues on planning applications. This includes routine screening of weekly planning application lists.  A modelling exercise, funded by the Scottish Government, was carried out in October 2012 to assess the potential impacts of development in the Bonnygate 'gap site'. The assessment concluded that development of the gap site was unlikely to compromise AQ in the canyon to a significant degree.

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
2		(c) Developers guidance note. EPPS teams to continue to liaise to ensure continued understanding and correct interpretation of Developer's Guidance note – linked to Action (e)	Fife Council EPPS	Tara Cowley and Kenny Bisset	2010	The guidance note will increase awareness and consideration of potential air quality impacts of new developments and thus help to prevent deteriorations in local air quality. <b>Potential effect of measure to date: Low</b>	Air Quality Development Management Guidance Note (2011) published on Fife Direct website (Please see Appendix I)	Positive feedback already received by developers on the user friendly content of Air Quality Development Management Leaflet.	Publication of relevant promotional materials. Identification of relevant points of contact within associated Council Services.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
2		(d) Promote sustainable developments to minimise AQ impacts - Local Plan policy requires all new developments to incorporate sustainable technology and/or methods.	Fife Council EPPS	Tara Cowley and Kenny Bisset	2010-2015	The incorporation of sustainable technologies and methods in new developments should help to minimise the potential air quality impacts of new developments. This measure may require additional consideration of the impacts of biomass boilers in new developments. <b>Potential effect of measure to date: None</b>	Sustainability Checklist Supplementary Planning and Customer Guidance produced in 2010.	Progression has been made for the communication and training of staff and elected members on the Sustainability Checklist and this will continue through organised future workshops including House Builders Forum.	Provision of in-house seminar by EPPS	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
2		(e) Internal seminar on AQ – EPPS to co-ordinate internal seminar aimed at Development Management Staff dealing directly with applications or new proposals in Local Plans.	Fife Council EPPS	Tara Cowley and Kenny Bisset	Original: 2010; Amended: 2011	This measure will raise awareness of local air quality issues within the Development Services team and facilitate their consideration when applications for new developments are being appraised. <b>Potential effect of measure to date: None</b>	Internal Seminar on Air Quality and Development Management issues held on 28th September 2011 at Glen Pavillion Buildings in Dunfermline.	Seminar event proved very popular and has raised knowledge of air quality issues in Development Management Staff as evidenced through outputs realised in the planning consultation process.	Completion of internal seminar.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
3	Encourage Integration AQ with other Council strategies	Implementation of AQAP	Fife Council and community planning partners	Kenny Bisset	2010-2015	The integration of Air Quality with other Council strategies will facilitate joined-up thinking and the consideration of possible air quality impacts from the implementation of different strategies. <b>Potential effect of measure to date: Small</b>	Meeting held with Council's Sustainability Team to discuss integration with Climate Change Strategy.	Existing arrangements detailed within the Councils Carbon Emissions Reduction Plan and Energy Efficiency Schemes are considered sufficient at this juncture in terms of providing adequate evidence of consideration of greenhouse gases in the context of the Bonnygate AQMA. Consideration will also be given to "asset based" approaches" as	Comparison with AQ Objectives. Please refer to recent monitoring data for Cupar town centre reported in Section(s) of this report. Due to the variability of air quality monitoring data, and the seasonal influences of numerous factors (e.g. prevailing weather), it is recommended that this data is treated with caution until a definitive trend in	Further consideration of latest climate change indicators will be undertaken as these are developed.



## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
								<p>described in the latest Annual Report by the CMO for Scotland (2010) within the context of the air quality action planning process Protective Services attended one day training in asset based approaches run by Fife's Health and wellbeing Alliance on 28<sup>th</sup> March 2013. outcomes from this event to be incorporated into action planning process.</p> <p>Potential links with the "TRY IT" initiative and Fife's Health and Wellbeing Plan (2011 -14) are also to be explored. TRY IT workshop event to be held on May 2013.</p>	concentrations can be identified.	

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
4	Target reduced local emissions from freight operations	(a) Undertake a study to assess the feasibility e.g. encouraging freight operators to utilise the South Road(A914) approach to the town in preference to the Bonnygate(A91)	Fife Council Transportation and Environmental Services	Jane Findlay	Original: 2010-2011; Amended: 2011 onwards.	This measure was assessed in the further assessment and offers the potential of reducing freight associated emissions in the Bonnygate - and associated reductions in air quality pollutant concentrations. The extent of the effect would be dependent upon the proportion of freight that was redirected. <b>Potential effect of measure to date: None</b>	This project is not considered feasible in the context of the current south road configuration.	Proposed re-routing of traffic has raised concerns regarding health and safety issues including overhead lines. Therefore this option is currently not considered as being viable.	Assess the possibility of moving all freight to the South Road. Assess the feasibility of encouraging freight operators to use the South Road.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
4		(b) Continue to meet with stakeholders through the SEStran Freight Quality Partnership to identify key needs, issues and areas for progress.	Fife Council Transportation and Environmental Services	Jane Findlay	2009-2015	By attending and providing input to SEStran, Fife Council are able to influence actions of the partnership that will potentially help to reduce the impact of road freight on air quality in Cupar and Fife in general. <b>Potential effect of measure to date: None</b>			Continue to attend the SEStran Freight Quality Partnership and contribute to Air Quality Group within the partnership	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
4		(c) Assess potential for the development of local freight quality partnership aimed at reducing emissions within AQMA and wider area.	Fife Council Transportation and Environmental Services	Jane Findlay	Original: 2010-2011; Amended: 2011 onwards.	Local freight partnerships offer the potential to reduce local emissions from freight activities and thus contribute to improving air quality. The potential impact of this measure is dependent on its successful adoption and implementation. <b>Potential effect of measure to date: None</b>			Discuss with local operators vehicle emissions and routing policies.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
5	Implementation of new Urban Traffic Management and Control System and changes to pedestrian crossings	(a) Installation of new pedestrian crossings in Bonnygate linked to new traffic management system.	Fife Council Transportation and Environmental Services	Jane Findlay	2009	The UTMC and changes to pedestrian crossings have been successfully implemented. These measures combined with 5(b) have helped to reduce traffic queuing in the Bonnygate street canyon, and thus help to reduce localised concentrations of air quality pollutants. <b>Potential effect of measure to date: Medium/Large</b>	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO <sub>2</sub> and PM <sub>10</sub> within the Bonnygate. However, due to the potential variation in air pollutant concentrations and effects of factors such as weather conditions, it is recommended that these potential impacts are treated with caution until a distinct trend can be identified.	Completed	Air quality monitoring at the Bonnygate will continue to confirm the effectiveness of these measures.

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
5		(b) Implementation of new UTMC in Cupar town centre with synchronised fixed time signals.	Fife Council Transportation and Environmental Services	Jane Findlay	2009-2011	New UTMC will aim to maximise the efficiency of traffic flow through the town centre and minimise unnecessary traffic queuing within the Bonnygate. This measure aims to reduce emissions from stationary vehicles within the AQMA. <b>Potential effect of measure to date: Medium/Large</b>	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO <sub>2</sub> and PM <sub>10</sub> within the Bonnygate. However, due to the potential variation in air pollutant concentrations and effects of factors such as weather conditions, it is recommended that these potential impacts are treated with caution until a distinct trend can be identified.	Completed	Air quality monitoring at the Bonnygate will continue to confirm the effectiveness of these measures.
6	Parking Management and Control	(a) Support the objectives of Fife Council's Parking Strategy to discourage long stay commuter parking.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	The inclusion of measures to discourage long stay commuter parking could contribute to reducing traffic volume in Cupar and associated emissions by encouraging the use of public transport. <b>Potential effect of measure to date: Small</b>			Discourage long stay commuter parking as part of Fife Council's Parking Strategy.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
6		(b) Length of stay restrictions and parking controls in town centre should be monitored and reviewed annually.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	Regular reviews of parking restrictions/ controls can help to encourage the use of public transport when travelling to Cupar. <b>Potential effect of measure to date: Small</b>			On-going monitoring	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measures
6		(c) Continued enforcement of loading restrictions within AQMA.	Fife Council – Transportation and Environmental Services and Fife Constabulary	Jane Findlay	2009-2015	Inappropriate loading/unloading activities can result in bottle-necks within the Bonnygate and Crossgate - which can result in additional traffic queuing and increases in emissions. The enforcement of loading restrictions should minimise the potential for such events. <b>Potential effect of measure to date: Small</b>			Police enforce traffic road orders	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
6		(d) Assess the need for on street parking charges to manage the demand for parking.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2011	The management of parking availability should function to encourage the use of public transport instead of private vehicles when travelling to Cupar. <b>Potential effect of measure to date: Small</b>			Carry out assessment.  The Council has received parking control grant funding from the Scottish Government.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
7	Review and support proposed infrastructure changes that will contribute to delivering improvements in local air quality	(a) Review and support the proposed delivery of a new relief road which would come forward as part of a new strategic land allocation to the north of Cupar (Structure Plan).	Fife Council – Transportation and Environmental Services and EPPS (Development Management)	Jane Findlay and Tara Cowley	2012-2015	Adoption of this measure ensures that Fife Council will review any proposed infrastructure changes for their potential impact on local air quality. Where such proposals will contribute to improving local air quality and have neutral/ positive effects on other (socio-economic and environmental) factors, these proposals will be supported. <b>Potential effect of measure to date: None</b>			This scheme would be developer funded and therefore could only be implemented through the Development Plan process.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
7		(b) Review and support the proposed Cupar, St Catherine Street and The Cross, Traffic and Streetscape Improvements that will contribute to more efficient vehicle movements and enhanced pedestrian accessibility within Cupar Town centre.	Fife Council – Transportation and Environmental Services and EPPS (Development Management)	Jane Findlay	2009-2013	The successful implementation of this measure should contribute to more efficient vehicle movements and enhanced pedestrian accessibility, and should thus contribute to improving local air quality within Cupar by helping to reduce emissions from road transport. This measure has been designed but implementation is dependent upon capital funding. <b>Potential effect of measure to date: None</b>	Cupar Streetscape Improvements have received appropriate funding and are in the process of being implemented. Updates will be provided in future Air Quality Progress Reports.	Impacts on air quality of these Streetscape improvements have been assessed and are considered unlikely to have any deleterious effects on air quality.	Feasibility and design to implement proposals.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure.
8	Target reduction in emissions from buses	(a) Liaise with local bus operators to establish the potential for developing a local bus quality partnership.	Fife Council - Transportation and Environmental Services	Jane Findlay	2010-2015	The development of a local bus partnership would aim to promote environmental improvement (among other issues), with reductions in emissions (GHG and AQ) from the current fleet being a key objective. If successfully implemented this action should contribute to improving air quality within the Bonnygate and Cupar in general (dependent upon activity			Establish a Bus Quality Partnership	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
8		(b) Encourage bus operators to improve emission performance of their fleet.	Fife Council - Transportation and Environmental Services	Jane Findlay	2010-2015	It is anticipated that gradual improvements to the bus fleet that cover the Bonnygate should contribute to potential reductions in emissions of air quality pollutants (dependent upon activity data and maintenance of vehicles). <b>Potential effect of measure to date: Small</b>	data, verified emission factors and maintenance of the fleet vehicles). <b>Potential effect of measure to date: None</b>		New buses and technologies being developed all the time. Local bus fleets, both council and commercial have made significant investment in the fleet to the latest engine standards.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure



## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
9	Continue to target reduction in emissions from Council Fleet and contract vehicles	(a) Continue procurement of low emission vehicles.	Fife Council – Fleet Operations and Procurement and Supplies	Tom Henderson/ Robin O'Connell	2009-2015	Improvements in fleet demonstrate that Fife Council is leading by example. Improvements in fleet should make a small contribution to reducing emissions of CO <sub>2</sub> and Air Quality Pollutants within the Bonnygate. This is dependent upon verified emission factors, continued maintenance of the vehicles and no increase in activity within Bonnygate area. <b>Potential effect of measure to date: Small</b>	2012 – 2014 fleet / plant replacement plan now in place with specific vehicles being targeted for renewal by fully electric vehicles.	One of Fleet Operations major customers (Building Operations) have now introduced a fleet reduction plan (see strategy attached)  Additionally, Environmental Services have now reduced their own fleet of refuse vehicles by 20, however, this will be double shifted.	Number of low emissions vehicles in fleet  18 by June 2012. (achieved)	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
9		(b) Monitor and assess alternative fuels, technologies and fuel additives.	Fife Council – Fleet Operations and Procurement and Supplies	Tom Henderson/ Robin O'Connell	2009-2015	The replacement of fleet car(s) with electric alternatives should make a small contribution to reducing emissions of air quality pollutants in the Bonnygate. This is dependent upon the electric vehicle replacing an existing vehicle and not an addition to the existing fleet. <b>Potential effect of measure to date: None</b>	18 fully electric vehicles now ordered and will be introduced by June 2012.	Additional funding of £50,000 has now been secured for fleet which will be used to purchase additional electric vehicles along with the charging infrastructures needed.	Increase in fleet using alternative fuels	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
9		(c) SAFED training.	Fife Council – Fleet Operations and Procurement and Supplies	Tom Henderso n/Robin O'Connell	2009-2015	It is hoped that driver training will facilitate more fuel efficient driving practices, a reduction in fuel consumption, associated emissions and concentrations of air quality pollutants. <b>Potential effect of measure to date: Small</b>	CPC (Certificate of Professional Competence) for HGV drivers, along with driver training for all other smaller type vehicles, are now running alongside.		Driver certification CPC (Certificate of Professional Competence)	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
9		(d) Assess potential for emissions standards for fleet contracts.	Fife Council – Fleet Operations and Procurement and Supplies	Tom Henderso n/Robin O'Connell	2009-2015	By ensuring that contractor fleets have newer vehicles, Fife Council are encouraging the use of lower emitting vehicles under its contracts. <b>Potential effect of measure to date: Small</b>	2012 – 2014 fleet / plant replacement plan now in place with specific vehicles being targeted for renewal by smaller more appropriate sized vehicles.		Number of Vehicles	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
10	AQMA Awareness Signs	To design and erect AQMA signs at various locations within Cupar Town Centre.	Fife Council – Transportation Services	Jane Findlay	2010-2011	<b>Measure Rejected - No impact on Air Quality.</b>			Authorisation, design, procurement and installation.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
11	Travel plans for large organisations and businesses	(a) Continue the implementation of Fife Council's Travel Plan.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	Travel plans include a package of measures to encourage relevant individuals (staff, pupils, students etc) to use alternatives modes of transport rather than single occupancy cars. Measures may include improved cycling facilities, provision of information, car sharing schemes and improved public transport provisions. If implemented effectively, travel plans can help to reduce traffic congestion and also traffic volumes generally. Consequently, travel plans can have a positive impact on the			Results of Council travel surveys	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

### Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
11		(b) Continue to support the implementation of School Travel Plans.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	users, but also the environment - such as reducing CO <sub>2</sub> and air quality emissions through reduced fuel consumption. <b>Potential effect of measure to date: Small</b>			Travel plans implemented and promoted in schools	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
11		(c) Work with local businesses/organisations to encourage the development and implementation of travel plans.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015				Number of large businesses approached regarding the development of travel plans.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
12	Promotion of Cycling and Walking	(a) Development of walking and cycling routes within Cupar.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	The provision of an area wide map for cycling and walking should encourage the cycling and walking in preference to the car for some users. This measure therefore offers the potential to help reduce emissions from private vehicles. <b>Potential effect of measure to date: None</b>			Number/ length of cycling and walking routes developed.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
12		(b) Signage and Interpretation.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	The provision of adequate signage can encourage cycling and walking in preference to private cars. Consequently, this measure could contribute to reducing road traffic emissions and help contribute to local improvements in air quality. <b>Potential effect of measure to date: None</b>			Installation of Signage	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
12		(c) Provision of Cycle Parking throughout the town centre, at workplaces and at Transport interchange points.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	The provision of more cycle parking facilities should encourage the use of bicycles in preference to the use of private motor vehicles. <b>Potential effect of measure to date: Small</b>			Installation of cycle parking points.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
12		(d) A programme of led Cycle Rides will be set up in Cupar to encourage people to cycle as part of their daily routine.	Fife Council – Transportation and Environmental Services	Jane Findlay	Original: 2010-2015; Amended: 2011-2015	This measure aims to encourage people to cycle and may result in some existing car users to cycle instead of drive for some journeys. <b>Potential effect of measure to date: None</b>			Number of led cycle rides.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
13	Promoting Travel Choices	(a) Production of a Travel Choices map of Cupar	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	The provision of a travel choices map for Cupar aims to encourage the use of sustainable forms of transport in preference to private motor vehicles. This measure therefore offers the potential of reducing future emissions from road transport. <b>Potential effect of measure to date: None</b>			Creation and publication of map.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
13		(b) A Mass Marketing Campaign for Cupar to raise awareness about the project and encourage people to take sustainable modes of travel.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	Fife Council has undertaken an extensive marketing exercise to raise awareness about the Bonnygate AQAP including vi the "TRY IT" campaign. This has included press releases, a stall at the Farmer's market, and close working with NHS Fife, Community Groups and Schools within Cupar. <b>Potential effect of measure to date: Very Low</b>			Undertake marketing	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
13		(c) Production of a community booklet.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	<b>Potential effect of measure to date: None</b>			Production of booklet.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure



## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
13		(d) Production of a residential travel pack.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	This measure aims to provide guidance on travel options to local residents and thus encourage the use of sustainable forms of transport. <b>Potential effect of measure to date: Small</b>			Production of travel pack.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
13		(e) Undertaking individualised Travel Marketing at households throughout Cupar.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	This measure aims to provide guidance on travel options to local residents and thus encourage the use of sustainable forms of transport. <b>Potential effect of measure to date: Small</b>			Undertaking visits with households.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
13		(f) Undertaking individualised Travel Marketing at businesses throughout Cupar.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	This measure aims to provide guidance on travel options to local businesses and thus encourage the use of sustainable forms of transport. <b>Potential effect of measure to date: None</b>			Undertaking visits to businesses throughout Cupar to discuss Travel.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
13		(g) New housing developments in Cupar to be designed with the Scottish Government's travel hierarchy in mind and new residential developments set up Car Clubs for use by residents.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015				Obtain internal and developer agreement to progress the car club's approach by Transport Planning and Development Management	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
13		(h) Residential Travel Packs, to be issued to all 'new built' homes identified in the local plan through the planning process.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015				Travel packs to be distributed to 'new build' homes	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
13		(i) Setting up a car club so that Fife Council pool cars are able to be used by the community for hire at evenings and weekends.	Fife Council – Transportation and Environmental Services	Jane Findlay	2010-2015	This measure aims to make Council 'pool cars' available for members of the public to hire in the evenings and weekends. This measure provides an alternative to private vehicle ownership and encourages the use of sustainable forms of transport by users at other times. <b>Potential effect of measure to date: None</b>			Establish Car Club.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
13		(j) Continue to provide information about public transport services through the Council website.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015	This measure aims to increase awareness of public transport options in Fife and therefore encourage their use in preference to private motor vehicles. <b>Potential effect of measure to date: Small</b>			Regular updates of public transport information on Council website	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure
14	Provision of information relating to Air Quality and Travel options	(a) Continue to make information relating to local air quality management available through Council website	Fife Council – Transportation and Environmental Services and EPPS (Environmental Strategy)	Jane Findlay and Kenny Bisset	2009-2015	The provision of LAQM reports provides a valuable source of information to the local public and increases awareness of local air quality issues. <b>Potential effect of measure to date: Small</b>	The Fife Council Air Quality website has been redesigned and this now includes updated information on both road traffic pollution and other potential sources of air pollutants e.g. biomass boilers. In addition relevant Council committee reports continue to be produced on an annual basis	In addition relevant Council committee reports on air quality issues continue to be produced on an annual basis	Publication of new LAQM reports and details relating to the Bonnygate AQMA/ AQAP on the Fife direct.	Fife Council continues to work more closely with NHS Fife in seeking to both increase understanding of air quality issues and promoting healthier travel options. This includes consideration of the MUSTER model of risk communication and the asset based approach advocated in the recent Chief Medical Officer report of 2011.  Other means of engaging with the local community are also being discussed with a view to involving these

## Fife Council

Item	Action	Sub-action	Lead Authority	Lead Officer(s)	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2013-2014
14		(b) Undertake a publicity campaign to raise awareness of the Bonnygate AQMA.	Fife Council – Transportation and Environmental Services and EPPS (Environmental Strategy)	Jane Findlay and Kenny Bisset	2010-2011	The publicity campaign will raise awareness of Local Air Quality issues in general and of the Bonnygate AQMA in particular. The measure intends to work with other associated activities in the plan to encourage activities that will contribute to improving local air quality in the Bonnygate AQMA. <b>Potential effect of measure to date: Small</b>	The "TRY IT" campaign ( <a href="http://www.fifedirect.org.uk/tryit">www.fifedirect.org.uk/tryit</a> ) has been particularly successful in raising awareness of local air quality issues of both the Bonnygate AQMA and air quality issues in general. The latest report (2011) on this initiative is provided in Appendix F.	Sustainable Cupar's energy group is in the early stages of developing a plan to buy a London cab or similar vehicle, and convert it so it can run on used fat from local takeaway restaurants. The group has already received backing for its project from the Green Insurance company which has awarded it a 'Green Grant' of £1600 to get the idea off the ground.	Publication of materials, events held, website statistics.	Fife Council will continue to incorporate the most recent developments in our understanding of air quality issues within the context of public communication media mechanisms.
										parties more in the air quality action planning process. The Bonnygate and Appin Crescent Air Quality Steering Group has been formed to promote sharing of ideas between these two groups and membership extended to representatives of public and business communities.

## Appendix F: Poultry Farm Screening Tool

**Do poultry farms which meet the criteria identified in LAQM.TG(09) require a Detailed Assessment to be undertaken? Is there any guidance on how to proceed?**

Date 27/11/2012

A number of local authorities have completed their Updating and Screening Assessments, and have identified poultry farms which meet the screening criteria (as set out in the Technical Guidance (LAQM.TG(09))), such that they would require proceeding to a Detailed Assessment for PM<sub>10</sub>. The Detailed Assessments which have been carried out to date have been based on ambient PM<sub>10</sub> measurements near the poultry units, which can be both time-consuming (requiring many months of monitoring to capture stocking/breeding cycles and representative weather conditions) and relatively expensive.

The screening criteria to determine the need for a Detailed Assessment provided in LAQM.TG(09) is:

1. *Identify any farms housing in excess of 400,000 birds if mechanically ventilated, 200,000 birds if naturally ventilated or 100,000 birds for any turkey unit.*
2. *Establish whether there is relevant exposure within 100 m of the poultry units. Relevant exposure will include residential properties that form part of the farm itself.*

A study was carried out to review the suitability of the screening criteria, and to develop a desk-top assessment method that could be used by local authorities to further screen and assess the impact of particulate matter emissions from poultry farms, and in this manner make a more informed judgement on the need to undertake a Detailed Assessment and/or ambient monitoring. The Study Report is available here. [LINK](#)

Whilst the screening criteria in LAQM.TG(09) are still valid as a quick, first-level screening tool, the criteria may be overly conservative, i.e. the LAQM.TG(09) criteria may suggest the need to proceed to a Detailed Assessment when in fact, breaches of the air quality objectives for PM<sub>10</sub> are unlikely. Therefore, an updated screening method, based on an empirical relationship established from monitoring at several poultry farms, is now provided. This empirical equation calculates the 90<sup>th</sup> (or 98<sup>th</sup> for Scotland) percentile of daily mean PM<sub>10</sub> concentrations, based on the number of birds, distance to relevant receptor, and the local background PM<sub>10</sub> concentration.

A local authority should proceed to a Detailed Assessment only if this empirical equation indicates a breach of the relevant air quality strategy short-term objective. Local authorities are advised to seek further advice from the LAQM Support Helpdesk before proceeding to a Detailed Assessment.

The relationship has been developed to enable local authorities to carry out a more refined screening assessment based upon information about number of birds, distance to receptor and background concentrations. The method and a summary of the findings of the report are set out below. Worked examples of the updated screening method are also provided.

### **Empirical Monitoring Data**

Ambient PM<sub>10</sub> concentrations measured near a number of poultry farms were reviewed in detail, to identify the increment to PM<sub>10</sub> concentrations contributed by the farm. The daily increment was found to vary with the stage in the production cycle, with lowest emissions at the beginning when the birds are small, and the highest emissions at the end when the birds are largest and being removed from the farm. The data that were suitable for inclusion in this analysis were from mechanically ventilated farms (which are the most common type); vents were either roof or side-wall mounted. Naturally ventilated farms do not appear to have dissimilar results, although the data available were limited to only one study.

A relationship was found for broiler farms, between the maximum daily mean PM<sub>10</sub> concentrations (MD, in µg/m<sup>3</sup>), number of birds (b) and distance (d in metres). The relationship is shown below (Equation 1). The value MD is an estimate of the maximum (i.e. 100<sup>th</sup> percentile) daily increment that is expected to occur when the relevant receptor is downwind of the farm, and emissions are at their highest:

$$\text{Equation 1:} \quad \text{MD} = (-0.000161 \ln(d) + 0.000793) \times b$$

For turkey and goose farms, the number of birds (b) should be increased by a factor of 1.5 to allow for their larger size.

Local annual mean background concentrations should be obtained for the local area that represents the (typically) rural nature of the site. This could be from either a local rural monitoring site or from mapped background concentrations

The equation above estimates the maximum daily increment to PM<sub>10</sub> concentrations, i.e. the 100<sup>th</sup> percentile source contribution. However, the Air Quality Strategy objectives for daily mean PM<sub>10</sub> concentrations are equivalent to the 90<sup>th</sup> percentile of daily mean values in (England, Wales and Northern Ireland), and 98<sup>th</sup> percentile of daily mean values (in Scotland). These percentiles should be calculated by multiplying MD derived from Equation 1 above, by the appropriate factor, which has been derived from the poultry farm monitoring studies by inspecting the daily mean PM<sub>10</sub> increments over extended periods and deriving the ratio of high percentiles to the 100% percentile source contribution.

For England, Wales and Northern Ireland:

Equation 2: 90<sup>th</sup> percentile of daily mean PM<sub>10</sub> increment ( $\mu\text{g}/\text{m}^3$ ) = MD \* 0.62

For England, Wales and Northern Ireland, the 90<sup>th</sup> percentile daily PM<sub>10</sub> increment estimated using the formula above should be added to the annual mean background concentration.

For Scotland:

Equation 3: 98<sup>th</sup> percentile of daily mean PM<sub>10</sub> concentration increment ( $\mu\text{g}/\text{m}^3$ ) = MD \* 0.83

For Scotland, the 98<sup>th</sup> percentile of daily PM<sub>10</sub> increment estimated using the formula above should be added to twice the annual mean background concentration.

The resulting concentration (background + farm contribution) can be compared against the benchmark of 50  $\mu\text{g}/\text{m}^3$ , in order to determine if there is a risk of exceeding the daily mean AQS objective, and therefore if there is the need to proceed to a Detailed Assessment.

### **Worked Examples**

#### Example 1

A broiler farm in England (either mechanically or naturally ventilated) has 90,000 birds. The closest relevant receptor is 30 m away. The annual mean PM<sub>10</sub> background concentration is 24  $\mu\text{g}/\text{m}^3$ .

The maximum daily increment to PM<sub>10</sub> concentrations from the farm using Equation 1 is:



$$MD = (-0.000161 \ln(30) + 0.000793) \times 90000 = 22.1 \mu\text{g}/\text{m}^3.$$

The 90<sup>th</sup> percentile increment is determined used Equation 2:

$$90^{\text{th}} \text{ percentile of daily mean PM}_{10} \text{ increment } (\mu\text{g}/\text{m}^3) = 22.1 \times 0.62 = 13.7 \mu\text{g}/\text{m}^3.$$

The total 90<sup>th</sup> percentile daily mean concentration (source contribution + background) is therefore:

$$\text{Total } 90^{\text{th}} \text{ percentile daily mean concentration} = 24 + 13.7 = 38 \mu\text{g}/\text{m}^3$$

The total 90<sup>th</sup> percentile daily mean concentration is within the objective of 50  $\mu\text{g}/\text{m}^3$ . Hence, for this hypothetical case, a Detailed Assessment would not be required.

### Example 2

A broiler farm in Scotland (either mechanically or naturally ventilated) has 327,000 birds. The closest relevant receptor is 60 m away. The annual mean PM<sub>10</sub> background concentration is 10.9  $\mu\text{g}/\text{m}^3$ .

The maximum daily increment to PM<sub>10</sub> concentrations from the farm using Equation 1 is:

$$MD = (-0.000161 \ln 60 + 0.000793) \times 327,000 = 43.8 \mu\text{g}/\text{m}^3.$$

The 98<sup>th</sup> percentile increment is determined used Equation 3:

$$98^{\text{th}} \text{ percentile of daily mean PM}_{10} \text{ increment } (\mu\text{g}/\text{m}^3) = 0.83 \times 43.8 = 36 \mu\text{g}/\text{m}^3.$$

The total 98<sup>th</sup> percentile daily mean concentration (source contribution + twice background) is therefore:

$$\text{Total } 98^{\text{th}} \text{ percentile daily mean concentration} = 36 + 21.8 = 58 \mu\text{g}/\text{m}^3$$

The total 98<sup>th</sup> percentile daily mean concentration breaches the objective of 50  $\mu\text{g}/\text{m}^3$ . Hence, for this hypothetical case, a Detailed Assessment would be required.

### **When is monitoring required?**

If the AQS short-term objective is predicted to be exceeded using this approach, then monitoring may be required at the farm. Monitoring is recommended rather than modelling,

due to the uncertainty in emission factors, the large number of variables that affect the emission rates and the uncertainty in quantifying ventilation rates. In addition, due to the limited monitoring data available near poultry farms, it is unlikely that the model results could be verified.

If there is only one relevant property near the farm that is at risk of exceeding the AQS objective, monitoring should be carried out at that location. If there are several properties, monitoring should be carried out at the property that is expected to experience the worst impact. Guidance is given in LAQM. TG(09) as to suitable monitoring methods.

Local authorities are advised to seek further advice from the LAQM Support Helpdesk before proceeding to a Detailed Assessment. Where a site is regulated by the EA/SEPA/NIEA, it is also recommended that further advice from EA/SEPA/NIEA is sought as appropriate (see below).

### **EA/SEPA/NIEA Regulation**

Poultry farms with a capacity of over 40,000 birds require a permit from the Environment Agency (EA), Scottish Environmental Protection Agency (SEPA) or Northern Ireland Environment Agency (NIEA) under the Environmental Permitting Regulations or Pollution Prevention and Control (Scotland) Regulations 2000 as amended. Permitted installations have to demonstrate that they are using Best Available Techniques (BAT). The European BAT Reference document (BREF) is currently being reviewed, and a draft is due in early 2013; this sector guidance will set out BAT for the industry. Existing operators of permitted installations will need to comply with BAT within 4 years of issue of the BREF. Some farms will already be achieving it.

Local authorities should always ensure that their local EA/SEPA/NIEA officer is aware that the farm has been identified in their USA as a potential issue, and enquire as to the BAT status of the farm. The screening method makes no assumptions on the BAT status of the poultry farm, as it is based on empirical monitoring data from a range of poultry farms with different controls on particulate emissions.

### **Emission Factors and Dispersion Modelling**

If a dispersion modelling study is to be carried out, appropriate emission factors would be required as inputs to the model. The review concludes that quantifying the PM<sub>10</sub> emissions from a poultry farm is not yet possible with the required degree of accuracy. Dispersion modelling predictions are useful for investigating the relative impacts of different farms, or poultry sheds with different options for mitigation, or for identifying the location of maximum

impact; however, unless the modelling results can be verified by monitoring, the absolute values of predicted PM<sub>10</sub> ambient concentrations generally lack the accuracy necessary for predicting breaches of the AQS objectives, and therefore would be unsuitable for the purposes for declaring an AQMA.

A wide variation was found in the published emission rates for poultry farms, as the emissions depend upon a number of factors including:

- the number, size and type of birds,
- the type and rate of ventilation and location of inlets and outlets,
- type of feeding system, floor, bedding and manure system,
- cleaning practices, and
- secondary sources due to farmers' activities.

The number, type, size and physical density of birds was found to be important in determining emissions, as was the activity of the birds which is governed by species, circadian rhythms, age and housing.

Poultry houses must be ventilated to remove waste gases and to ensure fresh air for the birds, as well as to control internal temperatures. This can be achieved in a variety of ways, and each method affects dispersion in a different way. Ventilation can be provided by powered or natural systems. Fans can be placed in the roof or the sidewalls of buildings, mostly extracting from buildings but occasionally designed to blow into buildings under pressure.

Materials used inside the building also affect emissions. Emissions can be increased if the feed is dusty, as with some non-pelleted feeds for laying hens. Broiler feed is less dusty as it is moulded into pellets that contains a higher level of fat. When the food is provided by a screw auger system or automatic feeder, emissions are higher than when it is administered by hand. Bedding can increase emissions compared to cages with wire floors.

This FAQ updates and extends the guidance provided previously in LAQM.TG(09), in that an estimate can now be made of the farm's contribution to local short-term PM<sub>10</sub> concentrations at the relevant receptor location. If that indicates that the short-term AQS objective could be exceeded, only then should a Detailed Assessment (based on monitoring) be considered. Previously, monitoring and modelling were recommended for all poultry farms which met the LAQM.TG(09) screening criteria. Local authorities are advised to seek further advice from the LAQM Support Helpdesk before proceeding to a Detailed Assessment.

## Appendix G: Fife Council “TRY IT” Initiative Report 2

### Improving Air Quality in Cupar

In October 2008 the A91 (Bonnygate), in Cupar Town Centre, was declared an Air Quality Management Area (AQMA). This was a result of elevated concentrations of Nitrogen Dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>10</sub>) being built up within a 'street canyon' environment. Road traffic was found to be the principal reason for this pollution.

An action plan was developed throughout 2009/10, (recognised by DEFRA as best practice) with an overall aim of working towards reducing NO<sub>2</sub> and PM<sub>10</sub> in the AQMA by approximately 53% and 33% respectively.

It is anticipated that by undertaking the following sustainable transport measures collectively, it will lead to the achievement of the annual mean NO<sub>2</sub> air quality standard (40 µg m<sup>-3</sup>) and for PM<sub>10</sub> (18 µg m<sup>-3</sup>).

### CycleStart



A lack of confidence or cycling skills can be one of the biggest barriers in the take up of cycling have developed CycleStart to establish volunteer-led cycle rides in communities.

CycleStart volunteers now lead weekly rides in Cupar, Dunfermline, Kirkcaldy and Falkland.

Following a survey that found 60% of trips in Cupar were 'local trips' a range of initiatives were designed that would encourage residents to change their travel habits

The brand 'TRY IT' .....A *Breath of Fresh Air for Cupar* was developed.



Projects that have made up 'TRY IT' include:

- Cupar Town and Countryside Maps
- Cupar Community Guide
- Cupar Shop Loyalty Scheme
- Promotion of Business Travel Choices
- Cupar Car Club
- Art in the Windows – photography competition
- TRY IT in Duffus park event

### Cupar Town and Countryside Maps and Treasure Trail.

Cupar Town (not printed) and Countryside Maps (printed) were developed to encourage people to get out and about by bike and on foot in their local area.



A Countryside map of Cupar was produced in partnership with Sustainable Cupar, to encourage the local community to walk, cycle and experience the countryside around Cupar.

The walking and cycling routes on the map were all recommended walkers and cyclist in Cupar, to encourage others to walk and cycle.

The reverse of the map had more information about the interesting locations identified and information about local wildlife etc. To accompany the maps 1000 walking and cycling treasure trails were produced.

The treasure trails had different themes (who done it and a treasure hunt) and were over 2 and 5 miles. The idea behind the treasure trails was that they would encourage people to get out and about in Cupar. The company engaged to do the work has the rights to develop the maps under the Treasure Trails brand for the East of Scotland. Normally Treasure Trail maps sell for £5.99 each but an agreement was reached with the Company whereby the 1000 of the maps would be sold to customers for £1 each and given free to shop owners throughout Cupar with profits going to the shops. The countryside map, which is free and distributed to schools, and libraries has an advertisement for the Cupar Treasure Trail maps.

14 Shops have stocked the map and Treasure Trails and many of the shops have contacted the Travel Plan team for more copies because they have sold out.

A Cupar Community Guide was designed and distributed to encourage people to rediscover what they have locally. It contains all of the goods and services within Cupar Town Centre and was distributed to over 130 householders.



Fife Council developed the 'Try It' A Breath of Fresh Air for Cupar, campaign.



A TRY IT shop loyalty scheme was developed and promoted in the run up to Christmas 2011. Over 70 businesses took part in offering loyalty stickers to participants who made a purchase locally.

Over 4000 householders were sent loyalty cards and the scheme was very well received with prizes of 10 £100 vouchers for local shops being offered through the scheme.



Cupar 'TRY IT' Loyalty Card and stickers.

#### Travel choices and business

Fife Council continues to encourage and assist all institutions/organisations within Cupar to develop and implement travel plans by:

- Continuing implementation of Fife Council's travel plan.
- Continuing implementation of School Travel Plans.
- Encouraging businesses to develop Travel Plans and promote sustainable travel choices.



Cupar schools are showing an encouraging move towards sustainable travel (see table below).

	2008	2009	2010	2011
Walk	28	26	30	26
Cycle	1	1	0	1
Park and Walk	3	3	3	2
Car	15	14	12	13
Bus	52	55	54	55
Taxi	1	1	1	2

### Cupar Car Club

The creation of a Cupar Car Club was designed to offer a valuable alternative to the private car, as well as decoupling car use from car ownership which is shown to reduce car use despite membership of a car club. The project was to provide local businesses and the residents of Cupar with an additional sustainable travel mode. It will also set an exemplary example and a platform for other councils and rural communities to follow.

The car club was to operate using four Fife Council pool car fleet. A tender for delivery of the online operating system was to go out in March 2012.

A public consultation giving information about and establishing interest in a car club for cupar had a return of seven people, four of whom were interested in the development of a car club. Work on developing a Car Club for Cupar was

not taken any further and instead a request was granted to divert funding into other projects.

### Personalised Travel Planning

A Personalised Travel Planning project was undertaken. Over 4600 households in Cupar were offered travel advice by trained travel advisors.

*“Personal Travel Planning (PTP) is a well-established method that encourages people to make more sustainable travel choices. It seeks to overcome the habitual use of the car, enabling more journeys to be made on foot, bike, bus, train or in shared cars. This is achieved through the provision of information, incentives and motivation directly to individuals to help them voluntarily make more informed travel choices.*

*PTP forms an important part of UK national and local transport policy, contributing to the suite of tools promoted under the general heading of Smarter Choices.” Making Personal Travel Planning Work: Practitioners’ Guide November 2008*

Over 300 households participated in the project with over 1142 resources sent out including The Town maps, Cupar Community booklet, pedometers and a ‘Getting around Fife’ maps.



Promotional Material  
Postcards



Postcards were put through each door within two weeks of the planned visit by a travel advisor, they promoted the project and prepared people to expect Travel Advisors 'door knocking'. If the Travel Adviser found no-one home a 'sorry we missed you' postcard was posted through the door.

Waterproof Jacket



Promotional Material  
Household Engagement Form



Uniforms were designed for Travel advisors to wear when out and about talking to the public

### Christmas light switch on

In November 2011 the Travel Plan team attended the annual Cupar Christmas lights switch on to introduce the second phase of the Try It project. Around 400 people attended the event. Throughout the evening the team





distributed hand warmers and engaged with the community to talk about the project to make them aware of the Try it project.

Information had been posted prior to the event to every household in Cupar to introduce the first initiative being rolled out to the community through the TRY IT initiative. This gave the Travel Plan team the perfect opportunity to build interest for the initiative among the community and gauge how interested they were by the initiative.

The majority of residents that came along to the event were already aware of the loyalty card, having received it in the post. Those who had not received theirs were keen to hear about it and said they were looking forward to it arriving and would use it. Most welcomed a conversation about the project.

We found that some individuals had travelled from other towns to watch the light switch on. They were all enthusiastic about the project but as they were not residents, they did not receive information about the initiative. Most still wanted to take part and we noted down their details.

The overall evening was a complete success and the community were motivated to take part in the first initiative since the Individualised Travel Marketing exercise.

### Loyalty Card Scheme

The Loyalty card scheme was launched on 1st December 2011 and ran for 24 days until Christmas Eve.

All local businesses were contacted by the Travel Plan team to participate in the scheme. 72 local shops and businesses agreed and signed up to support the initiative. Posters were placed throughout the town and in all participating business windows.

Cupar householders received one loyalty card in the post and could pick up additional cards in one of the participating shops or offices, where non-residents who work in the town could also pick up a loyalty card.

Their loyalty card could not go through the postal system without an envelope because of the hot dot gumming involved in keeping the card attached to the information which went out with the loyalty card.

Envelope loyalty card arrived in.



Information that went out with the loyalty card



The community were encouraged to walk and cycle into town and use the amenities available instead of making longer trips to larger towns and supermarkets. Every time they made a purchase from one of the 72 participating businesses they would be given one sticker to add to their loyalty card. Each card had space for 20 stickers. Once a card was full the community were asked to hand it in at one of the participating businesses and collect a new card to start using.

Participants were encouraged to return to the shops in the town to give in their full cards. Those who hadn't managed to fill cards were also encouraged to return them to a participating

shop in the town, where they would be returned to Transportation Services and entered into a separate draw for smaller prizes.

The objective was to encourage people to visit shops in the town and then return by Christmas Eve to deposit their loyalty cards.

All completed cards were returned to the Travel Plan team after the Christmas break. Around 300 loyalty cards were returned. 10 lucky winners were then selected at random, each winning £100 of vouchers for their chosen businesses in Cupar.

The initiative was received well with all positive feedback from both the community and local businesses and all were in agreement that the initiative should return. Anecdotally businesses stated that they felt more people were in the town and many people were talking about the loyalty card. Feedback from the community was that there was a buzz within the town that had not been there for some time.

The project received some negative feedback because we would not publish a list of participating shops. We did this because non-participating shops would hopefully be continually asked if they were participating and in the end participating making any published list invalid. We didn't feel that it was right to create a platform whereby Fife Council was promoting a select number of organisations. If the project was to operate again we would not publish a list of participating organisations.

This idea worked because a number of organisations joined once the scheme had started. Some members of the Community reported that not publishing the list caused

embarrassment where people didn't feel they wanted to ask if an organisation was participating and receive a negative response.

Feedback from the press was that there was not enough made of the people who got prizes. This is a fair comment, many of the participants didn't want their picture taken but we could have made much more of the story, getting press coverage into January and early February. Unfortunately, by this point the team was busy putting together the next TRY IT initiative.

The loyalty card



### Business Step Challenge

All businesses in Cupar were contacted to take part in a walking and cycling challenge. Over a four week period employees from local businesses would record their steps or miles cycled on either a pedometer or cycle computer provided by the Travel Plan team. Businesses were also provided with record booklets for staff to mark down what they achieved each day.

The challenge was to encourage more employees to either walk or cycle to work and in their leisure time. Initially businesses were enthused by the challenge and signed up

(approx. 20 businesses) however after the four week period only 14 individual record booklets were returned from only two businesses.

We initially thought that we could run two business step/pedal challenges, one in the autumn at the beginning of the project and one at the end, in the Spring, to enable us to gather evidence that the project had been successful and more staff from local businesses were choosing more active ways to get to and from work and within their leisure time. Feedback from the individuals involved indicated that participants lost momentum after two weeks. We decided that the same people would not be enthused to take part in the project once more, in Spring after not completing the first one and felt that it would be better to focus on community initiatives that anyone could be involved in as they proved more successful.

### Art in the windows

Art in the Windows was a project developed to encourage children to take and promote physical activity and feel good about getting out and about. It was also designed to inspire children and leave them with skills that they could develop further later in life, possibly into a career. The objective was to teach children photography skills that they would then use to take pictures of and inspired by physical activity. The children were encouraged to go out and about with family members in their spare time to take pictures. They were asked to take pictures within their local community that would inspire

residents to be more active within their local area.

Around 90 pupils from the four primary, secondary and special needs schools in Cupar took part in the Art in the Window photography initiative. Each school selected pupils with, either an interest in photography, or an interest in being active to participate in the initiative.

We tendered for the services of a professional photographer who would be involved in teaching children photography skills. The photographer and a member of the Travel Plan team visited each school over a 6 week period to work with children in developing their skills. Each school was provided with digital cameras for the children to use and explore camera settings and how to get the best from each photo opportunity. The children were able to take the cameras home and were given a memory stick each to use for their own photos.

Each week, within school time, they were taken to areas within the local community of Cupar for photo opportunities that they felt people could relate to and would encourage them to be more active. These areas included the town centre, local parks and walking routes.

After the 6 week period each child downloaded all their images onto a CD and the professional Photographer and member of the Travel Planning team selected each child's best photograph. The best images were then sent to the local newspaper where the editor selected the best image from each of the four schools.

The four winning photographs were then placed in local shops in the town centre for all to see. Parents/carers and friends and family of the

participating pupils were encouraged to walk/cycle into the town to try and spot the winning images. School and members of the community were also encouraged, through press releases in the local papers, to spot the images around the Town. They were not told where the photos would be, the aim of this part of the project was to encourage people into Cupar, walking and cycling and find places, goods and services they didn't know about, or had forgotten about.

After the winning images were in the chosen shop windows for a week all 90 children's best photographs were displayed at a photograph exhibition held in the Corn Exchange. The whole community were invited to come along to see the work the children had achieved and be inspired by their work to get out and be more active. Over 200 people managed to come along to the event which was open from 2 pm until 7.30 pm to allow parents and members of the public to attend.



Advertisement for the exhibition



Promoting the exhibition.



One of the lucky winners at the event with his picture

Anecdotal evidence gathered at the event showed the project was a great success and people were very impressed by the skills the children had gained and the artistic photos they had taken, that did indeed inspire and encourage people to get out and about.

Feedback from Head Teachers was that they felt that this would be something they would love to be involved in again and they really valued the opportunity to take part.



### Community Event

After a year of engaging with the local community and businesses in Cupar the Travel Plan team organised a walking and cycling event for the whole community. The event was held in Duffus park, Cupar and was attended by over 500 people.

The event was publicised through local newspapers, posters in shop windows, schools and local community centres.

Throughout the day there were cycle stunt shows, bike try outs, healthy eating stalls and a balloon modeller among other activities. Everyone who attended the event was also given an active travel goody bag filled with walking and cycling goodies that would encourage them to travel active and make it easier for them to do so.

### Aftercare

75 Householders were interested in taking part in 'aftercare' phonecalls. 'Aftercare' was to be undertaken in spring 2012 to establish how the household found use of the resources and if there is anything else that would encourage them to travel sustainably.

Aftercare was undertaken later than planned due to staffing shortages and started in Summer – Autumn 2012.

75 householders had given contact details to receive a follow up 'after care' telephone call.


Of the seventy five, twenty two of them were valid entries. An entry was considered invalid if there was no phone number or if the phone number went through to a wrong number, some phone numbers were dead and some went through to a shop.

46% (6 people) of respondents found the advice or resources offered useful. Through the phonecalls 32% of respondents (7 people) said they didn't receive the resources they had requested. These were promptly sent out. 18% (4 people) used the aftercare call to ask for additional resources.

Respondents were also asked about other elements of the Try IT project

#### Loyalty Card Scheme

8% of respondents (1) had taken part in the loyalty card scheme. Though 31% (4 people)



talked about the scheme positively and said they would use the scheme if it was to launch again.

#### Community Guide

46% (6 respondents) had used the community guide and 31% (4 respondents) found something in the guide that they were unaware of. 38% (5 respondents) would find an updated version of the guide useful and 31% (4) wanted to be sent another copy.

#### Art in the Windows Photography competition.

38% (5) were aware of the art in the windows project and none of the respondents knew any children taking part in the Photography competition and only 15% (2) saw photos around the town or at the exhibition itself.

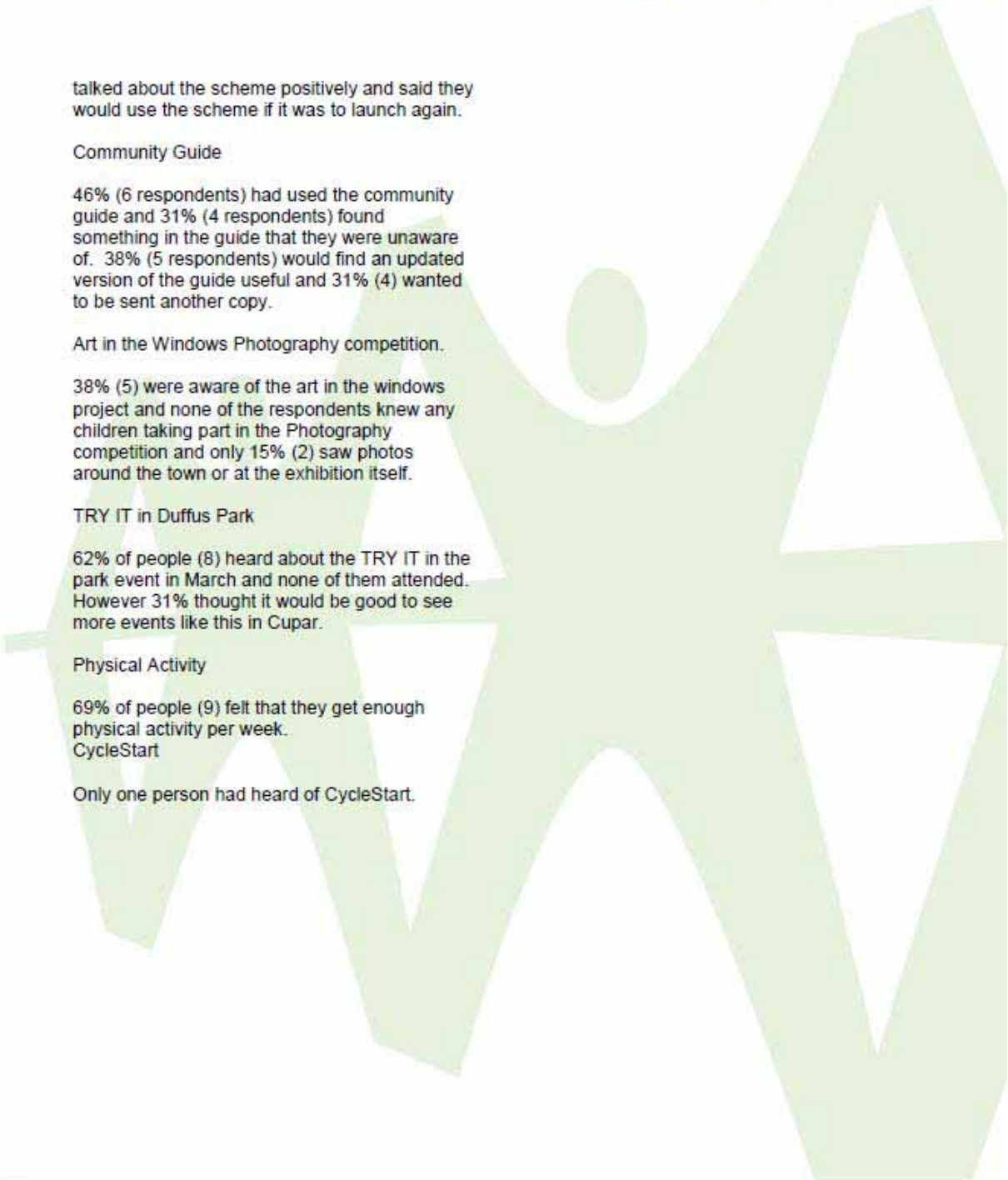
#### TRY IT in Duffus Park

62% of people (8) heard about the TRY IT in the park event in March and none of them attended. However 31% thought it would be good to see more events like this in Cupar.

#### Physical Activity

69% of people (9) felt that they get enough physical activity per week.  
CycleStart

Only one person had heard of CycleStart.



## Appendix H: Fife's Health and Wellbeing Plan 2011 - 2014

The Bonnygate Air Quality Core Steering Group is currently exploring potential links with action plan measures (in particular the "TRY IT" campaign) and Fife's Health and Wellbeing Plan outcomes.

The following potential links have been identified in 9 of the 10 outcomes of Fife's Health and Wellbeing Plan and are to be the subject of further discussion with the Fife Health and Wellbeing Alliance in terms of their inclusion in future versions of this plan..

Fife Health and Wellbeing Outcomes:

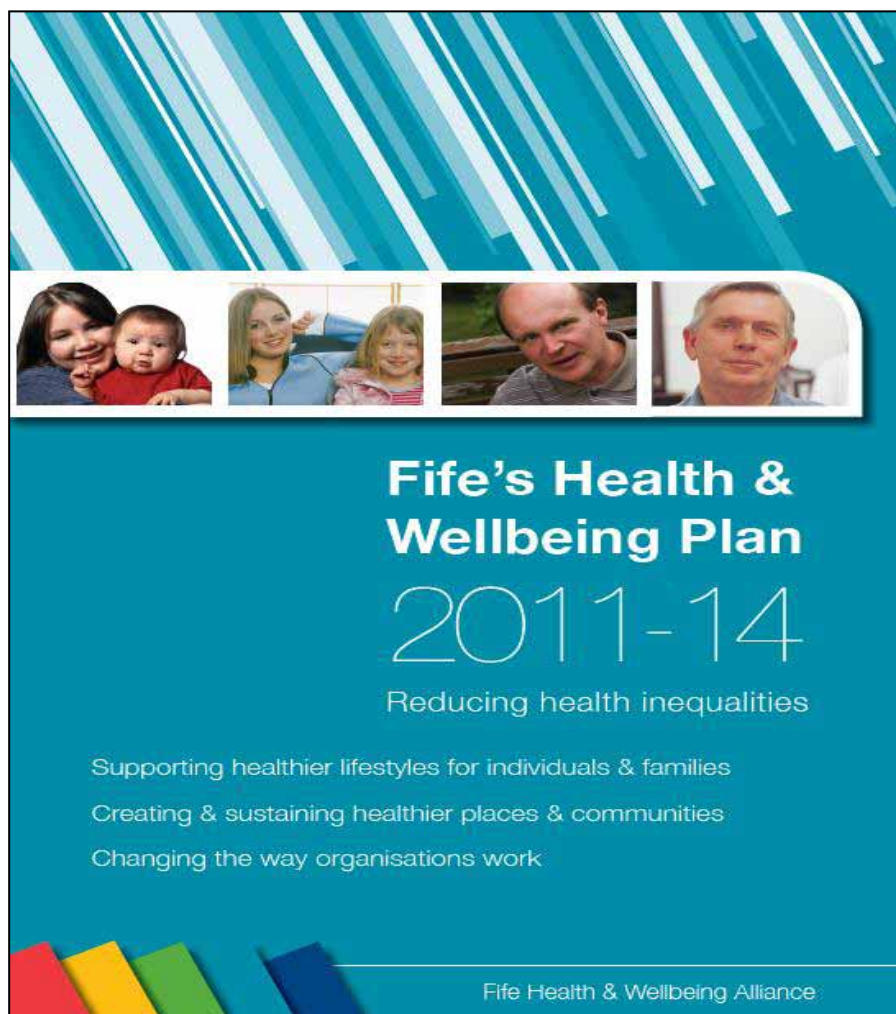
1. People have opportunities and effective support to access and sustain education, training and employment - **access to education, training and employment links to Cyclestart and TRY IT initiatives.**
2. People have increased skills, knowledge and opportunities to manage and improve their financial situation - **empowerment about their own travel choices and realising they have cheaper travel choices through TRY IT and Cyclestart**
3. Vulnerable pregnant women, children, young people and families have reduced risk of poor health outcomes – **links to TRY IT and Cyclestart campaigns.**
4. People have the personal skills, strengths, knowledge and opportunity to improve their health and wellbeing – **links to TRY IT and Cyclestart campaigns**
5. Older people have increased opportunities and support to improve their health and wellbeing and to engage in their local communities – **links to TRY IT and Cyclestart campaigns**
6. Communities develop and lead local health and wellbeing initiatives which create supportive social networks and increase participation in community activity – **links to TRY IT and Cyclestart campaigns**
7. Communities develop and use safe outdoor and community spaces in ways that enhance their health and wellbeing - **provision of routes and promotion of outdoor spaces and places makes them more popular which in turn makes them safer – "natural surveillance"**
8. Services and support are delivered in flexible ways which meet the health and wellbeing needs of different communities, neighbourhoods and equality groups - **links to TRY IT and Cyclestart campaigns**
9. Workforces have increased confidence and competence to improve health and wellbeing and tackle health inequalities -**work on business travel plans to date**



From the above preliminary appraisal the following health indicators used to measure these outcomes have been identified:

- Percentage of teenage girls taking part in physical activity (**Outcome 3**)
- Percentage of young people taking part in physical activity; Percentage of adult population taking 30 minutes of moderate physical activity on at least 5 days per week and; Percentage of adults 75+ taking 30 minutes exercise (**Outcome 5**)
- Percentage of adults aged 75+ taking 30 minutes exercise (**Outcome 6**)

The above preliminary findings are to be discussed further with relevant representatives of the Fife Health and Wellbeing Alliance in terms of evaluating potential health related benefits associated with the air quality action planning process for the Bonnygate AQMA.



## Appendix I: Asset Based Approach to Local Air Quality Management

Asset based approaches value the capacity, skills and knowledge and connections in individuals and communities. A "health asset" is any factor or resource which enhances the ability of individuals, communities and populations to maintain and sustain health and well-being.

Asset approaches recognise that individuals and communities are part of the solution, work with people rather than viewing them as passive recipients of services, and empower people to control their future.

Asset based approaches and ways of thinking have been highlighted in the 2010 Annual Report of the Chief Medical Officer for Scotland (Scottish Government 2011) - in particular the need to involve people more in shaping and running public services in the future - a theme which has also been reinforced in the findings of the Christie Commission Report on the Future Delivery of Public Services in Scotland (2011).

Asset based approaches rely on "**embedded engagement**" with communities - which it is believed are consistent with key themes contained in official guidance for local authorities on how best to consult with communities on air quality issues – including the production of air quality action plans ("Steps to Better Practice - Guidance for Local Authorities on LAQM consultation" - UWE 2006).

Fife Council has already undertaken a consultation exercise on the Bonnygate Air Cupar Quality Action Plan in 2010 which it is believed has adopted methods consistent with an asset based approach - including public surveys and workshops for public and business communities.

This has also resulted in actions such as the "TRY IT" initiative which aims to encourage more sustainable modes of travel (walking and cycling) than the car.

Other means of improving community engagement will also be considered - including the MUSTER method (Hyland and Donnelly 2011) which seeks to understand public concerns within the personal, environmental and social setting.

Fife Council therefore intends to use such proven communication methods - considered consistent with asset based approaches - in the context of its LAQM duties - including in the production and implementation of the Appin Crescent Dunfermline Air Quality Action Plan. Fife Council will continue to work with NHS Fife in considering the latest developments in this field – in particular in empowering communities through their involvement in the field of local air quality management



## Appendix J: Fife Council Air Quality Development Guidelines Leaflet



### Fife Air Quality Development Guidelines

