AEA

2012 Air Quality Updating and Screening Assessment for

Fife Council

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

July 2012

Title	2011 Air Quality Progress Report for Fife Council
Customer	Fife Council
Customer reference	
Confidentiality, copyright and reproduction	This report is the Copyright of AEA Technology plc and has been prepared by AEA Technology plc under contract to Fife Council. The contents of this report may not be reproduced in whole or in part, nor passed to any organisation or person without the specific prior written permission of AEA Technology plc. AEA Technology plc accepts no liability whatsoever to any third party for any loss or damage arising from any interpretation or use of the information contained in this report, or reliance on any views expressed therein.
File Reference	ED56439
Reference number	AEAT/ENV/R/3293

AEA

Glengarnock Technology Centre

Caledonian Road

Glengarnock

Ayrshire

KA14 3DD

T: 0870 190 5301

F: 0870 190 5151

AEA is a business name of

AEA Technology plc

AEA is certificated to ISO9001

and ISO14001

Author	Name	Stephen Gray
Approved by	Name	Stuart Sneddon
	Signature	
	Date	09/07/12

Local Authority Officer	Douglas Mayne

Department	Fife Council
Address	Enterprise, Planning and Protective Services Kingdom House Kingdom Avenue Glenrothes Fife KY7 5LY
Telephone	08451 555555. Ext. 493619
e-mail	douglas.mayne@fife.gov.uk

Report Reference number	AEAT/ENV/R/3293
Date	09/07/12

Executive Summary

This Air Quality Updating and Screening Report has been prepared for Fife Council as part of the Local Air Quality Management (LAQM) system introduced in Part IV of the Environment Act 1995. The Local Air Quality Management Technical Guidance LAQM.TG (09) has been closely followed in the preparation of this report.

After completing the Fourth round of air quality review and assessments, Fife Council is now required to proceed to the Fifth round. The Fifth round will reassess sources of emissions to air to identify whether the situation has changed since the Fourth round, and if so, what impact this may have on predicted exceedences of the air quality objectives.

On the basis of this assessment, no further action is required with respect to pollutants:

- Carbon Monoxide;
- Benzene;
- 1,3-Butadiene;
- Lead;
- Sulphur Dioxide.

Analysis of the 2011 nitrogen dioxide (NO_2) and particulate matter (PM_{10}) monitoring data supports the requirement for Air Quality Management Areas in Bonnygate, Cupar and Appin Crescent, Dunfermline due to exceedences of the annual mean objectives for both pollutants. PM_{10} concentrations at Admiralty Road, Rosyth have increased above the annual mean objective of 18 $\mu g/m^3$ and it is therefore recommended that Fife Council carry out a further Detailed Assessment to assess PM_{10} concentrations in the area of Admiralty Road, Rosyth.

The annual mean NO_2 objective of 40$\mu g/m^3$ was exceeded at 6 diffusion tube sites located in three areas of Fife:

- Appin Crescent, Dunfermline
- St Clair Street , Kirkcaldy
- Bonnygate Cupar

All 6 sites are considered to be locations of relevant exposure. Both Appin Crescent and Bonnygate, Cupar are currently included within existing Air Quality Management Areas (AQMAs). St Clair Street, Kirkcaldy is not currently included within any existing AQMAs 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 Updating and Screening Assessment concluded that no further action is required for the following sources within Fife:-

- Busy Streets where people may spend 1-hour or More Close to Traffic;
- Roads with a high flow of buses and/or HGVs;
- Junctions;

- New roads constructed or proposed since the last round of review and assessment;
- Roads with significantly changed traffic flows and;
- Bus and coach stations;
- Airports;
- Railways (diesel and steam trains) and;
- Poultry Farms
- Ports (shipping).

2011 monitoring data indicate an overall downward trend in NO_2 concentrations since the introduction of the traffic queue relocation system in the Bonnygate. PM_{10} concentrations have also decreased relative to 2007 PM_{10} levels and the exceedance is currently marginal. Progress on measures contained in the Bonnygate Cupar Air Quality Action Plan are also reported (Appendix E).

Fife Council accepts these findings and will implement the recommendations.

Table of contents

Appendices

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 Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences 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.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	3.25 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 $\mu g/m^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, 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 (2003)
- Progress Report (2004)
- Progress Report (2005)
- Updating and Screening Assessment (2006)
- Detailed Assessment (2008) Appin Crescent, Dunfermline
- Detailed Assessment (2009) Admiralty Road, Rosyth
- Further Assessment (2010) Bonnygate, Cupar
- Progress Report (2010)
- Detailed Assessment (2010) Appin Crescent, Dunfermline
- Progress Report (2011)
- Further Assessment (2012) Appin Crescent Dunfermline

The second round of Review and Assessment reports (2003 Updating and Screening Assessment (USA)[3] and 2004 & 2005 Progress reports[4, 5]) concluded that the Air Quality Objectives for sulphur dioxide (SO_2), carbon monoxide (CO), 1,3-butadiene, benzene and lead are unlikely to be exceeded.

The 2003 USA[3] identified that high NO_2 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[5] recommended that automatic monitoring of NO_2 be undertaken at Admiralty Road, Rosyth and Bonnygate, Cupar. Additionally, it was recommended that automatic monitoring continue at North Approach Road, Kincardine. PM_{10} monitoring also commenced at Admiralty Road, Rosyth and Bonnygate, Cupar.

The 2006 USA[6] recommended that monitoring of NO_2 and PM_{10} continue at Bonnygate, Cupar and recommence at Admiralty Road, Rosyth to better assess concentrations of each pollutant.

Automatic monitoring of NO_2 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_2 have been realised at this location.

Monitoring data for 2006 and 2007 (automatic and diffusion tubes) indicated that it was likely the NO_2 and PM_{10} Air Quality Objectives would not be met in Bonnygate, Cupar. The 2007 Progress

Report[7] 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_2) and Admiralty Road, Rosyth (PM_{10}).

The Detailed Assessment (2007/2008) for Bonnygate, Cupar[11] considered NO_2 and PM_{10}. The report concluded that an AQMA should be declared for both NO_2 and PM_{10}.

The Detailed Assessment (2008) for Appin Crescent, Dunfermline[12] advised that increased monitoring of NO_2 should be carried out to enable improved characterisation of ambient NO_2 concentrations before any further decisions are made.

The Detailed Assessment (2009) for Admiralty Road, Rosyth[13] considered PM_{10} concentrations in the area and concluded that no further action was required.

The Further Assessment (2010) for Bonnygate, Cupar[14] 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 NO_x 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.[15]

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

The 2010 Progress report[10] concluded that for NO_2 and PM_{10} monitoring, no further action was required, over and above that already in progress by Fife Council. It was concluded that if NO_2 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_2 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_2 concentrations measured at Appin Crescent the Detailed Assessment recommended that automatic measurement of PM_{10} should be carried out.

The 2011 Progress Report concluded that monitoring of NO_2 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_2 concentrations have increased since 2009 in Admiralty Road along with PM_{10} concentrations. Fife Council concludes that to further investigate NO_2 concentrations within Admiralty Road diffusion tube monitoring should be increased, incorporating more locations of relevant exposure to the general public. If measured concentrations of NO_2 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_2 annual mean objective of 40μg/m^3. 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 are 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^3 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 40.5μg/m^3. Data shows that NO_2 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_2 and PM_{10} 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 40μg/m^3 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_x and PM_{10}) at St Clair Street to further investigate concentrations in this area, which commenced in February 2011. If measured concentrations of NO_2 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_{10} data collected for 2010 showed that both Bonnygate and the Admiralty Road sites exceeded the annual mean objective with concentrations of 19 μg/m^3. Bonnygate Cupar has been declared an AQMA for PM_{10} 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_{10} at Admiralty Road for another year before moving on to a Detailed Assessment. This conclusion was reached due to

- The annual concentration (19μg/m^3) being a borderline exceedence 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^3, with seven exceedences allowed per year.

Results for SO_2 monitoring in Fife in 2010 indicate that AQS objectives for SO_2 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_2.

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 exceedences of the NO_2 annual mean objective in Appin Crescent, Dunfermline. The spatial extent of the exceedences remains quite small and the current AQMA boundary is adequate for NO_2 (Figure 1.1). The assessment also indicated that there are exceedences of the Scottish annual mean PM_{10} 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_{10}, existing background concentrations are thought to be predominant in the overall concentrations at all locations in Appin Crescent. For NOx/NO_2 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 NOx than PM_{10}. Of the vehicle classes assessed, cars and HGVs are the most significant sources of vehicular NOx, whilst cars and LGVs have been identified as the most significant sources of vehicular PM_{10}. Buses are also an important source of both pollutants.

An Air Quality Action Planfor Appin Crescent, Dunfermline is currently being prepared by Fife Council with a view to undertaking an extensive public consultation exercise later this year.

Figure 1.1 Map of Appin Crescent AQMA Boundary

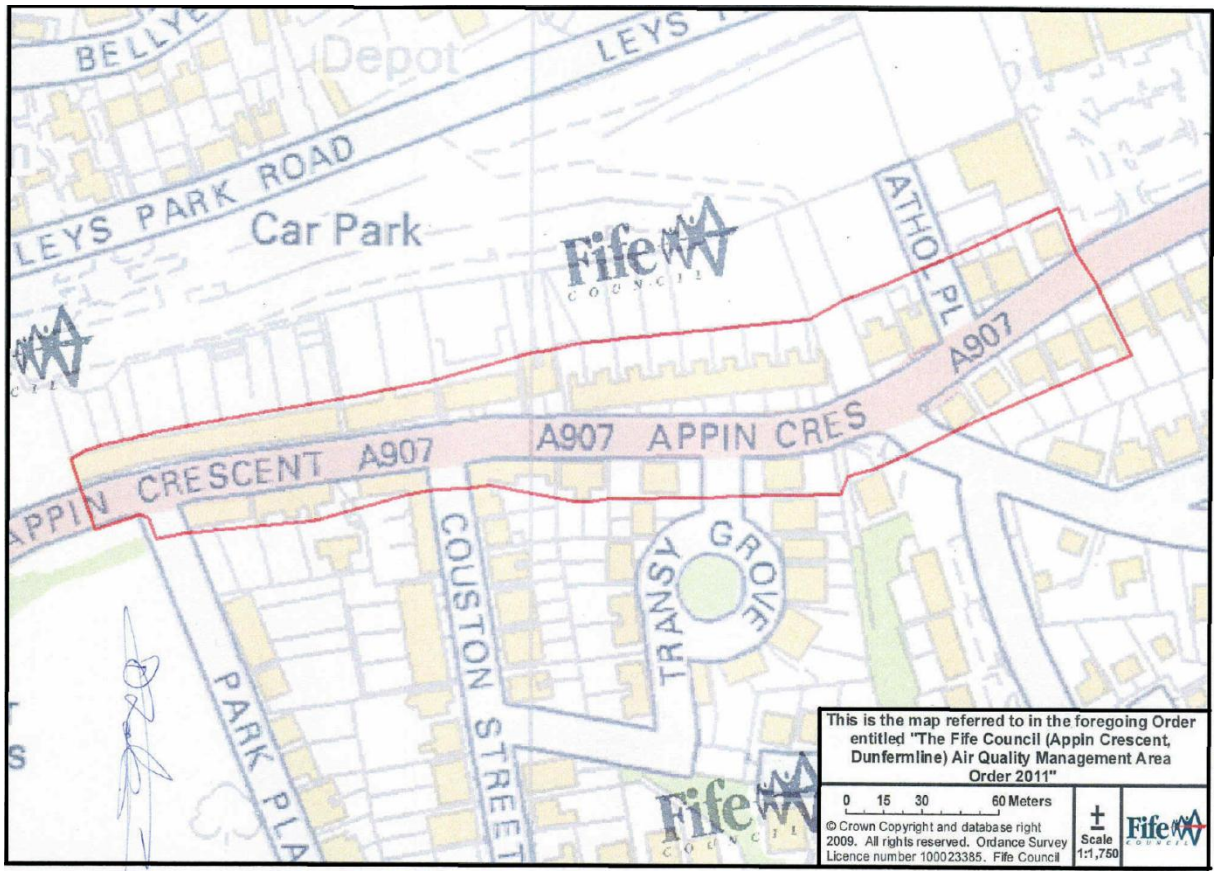
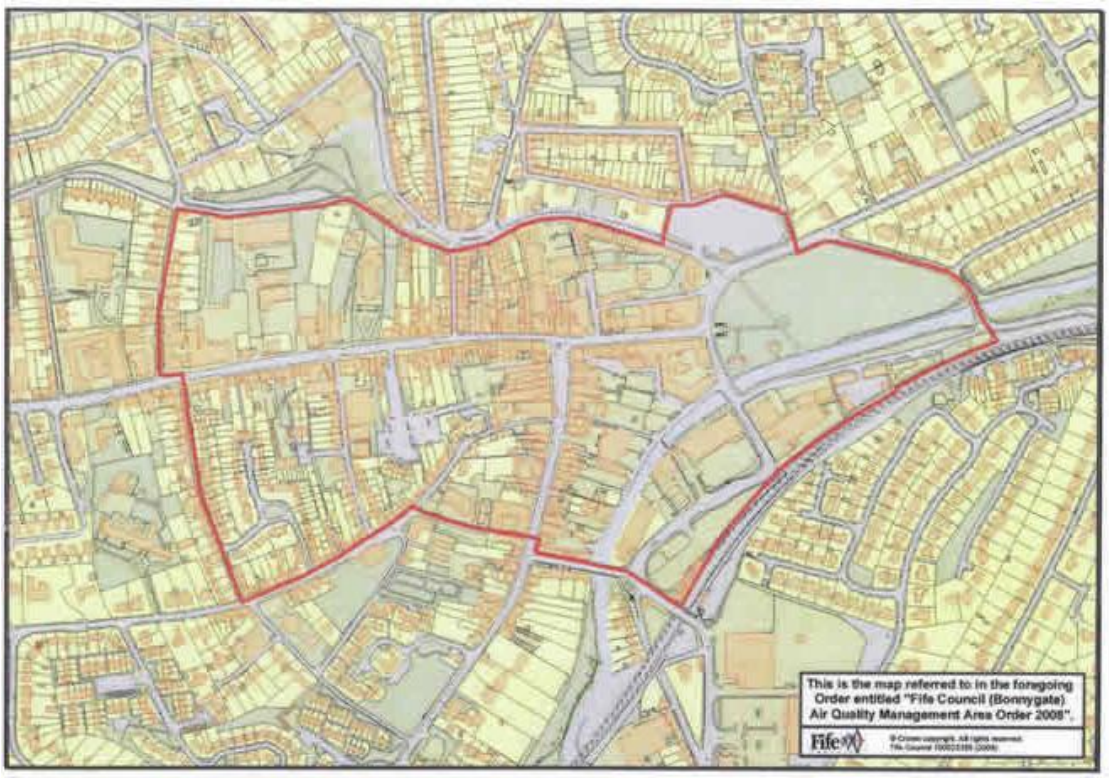


Figure 1.2 Map of Bonnygate AQMA Boundary



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 2011. NOx and PM_{10} concentrations are measured at each site. All automatic monitoring of PM_{10} 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..

Short-period CO monitoring has also been undertaken by Fife Council Transportation Department.

Automatic SO_2 data are also available from Scottish Power Generation Ltd from a monitoring site close to Longannet Power Station[17]. 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 for 2011 is also provided in this Updating and Screening assessment. The report assesses concentrations of 1,3 butadiene, benzene, nitrogen dioxide and sulphur dioxide.

New Automatic Monitoring

In 2011 Fife Council added to their automatic monitoring programme with the installation of a new site in St Clair Street, Kirkcaldy, monitoring NOx and PM_{10}, and with the extension of the monitoring site at Appin Crescent, Dunfermline, to include PM_{10}. Monitoring at Kirkcaldy and Dunfermline (PM_{10}) commenced February and March 2011 respectively.

Full details of these monitoring stations are provided in Appendix A and are summarised in Table 2.1. Maps of the locations can be seen in Figures 2.1, 2.2, 2.3 and 2.4.

Fife Council also undertook 6 months of monitoring of $PM_{2.5}$ between 6th September 2011 and 6th March 2012 at Admiralty Road/Kings Road Roundabout in Rosyth (see Figure 2.5)

QA/QC of the Automatic Monitoring Data

AEA undertook quality control of the automatic data for Fife Council monitoring sites during 2011. The QA/QC procedures follow the requirements of the Technical Guidance (09)[2] and are comparable to those used at UK the National Network (AURN) monitoring sites. This gives a high degree of confidence in the data obtained, both for reliable concentrations at the automatic sites and for bias correction data for the 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 both NOx and TEOM-FDMS analysers and any faults were identified thus minimising data loss.

Audits of the monitoring site 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 SO2 Automatic Monitoring site at Blair Mains. These procedures were also to a standard comparable to that used in the AURN.

Figure 2.1 Bonnygate, Cupar, Automatic Monitoring Location

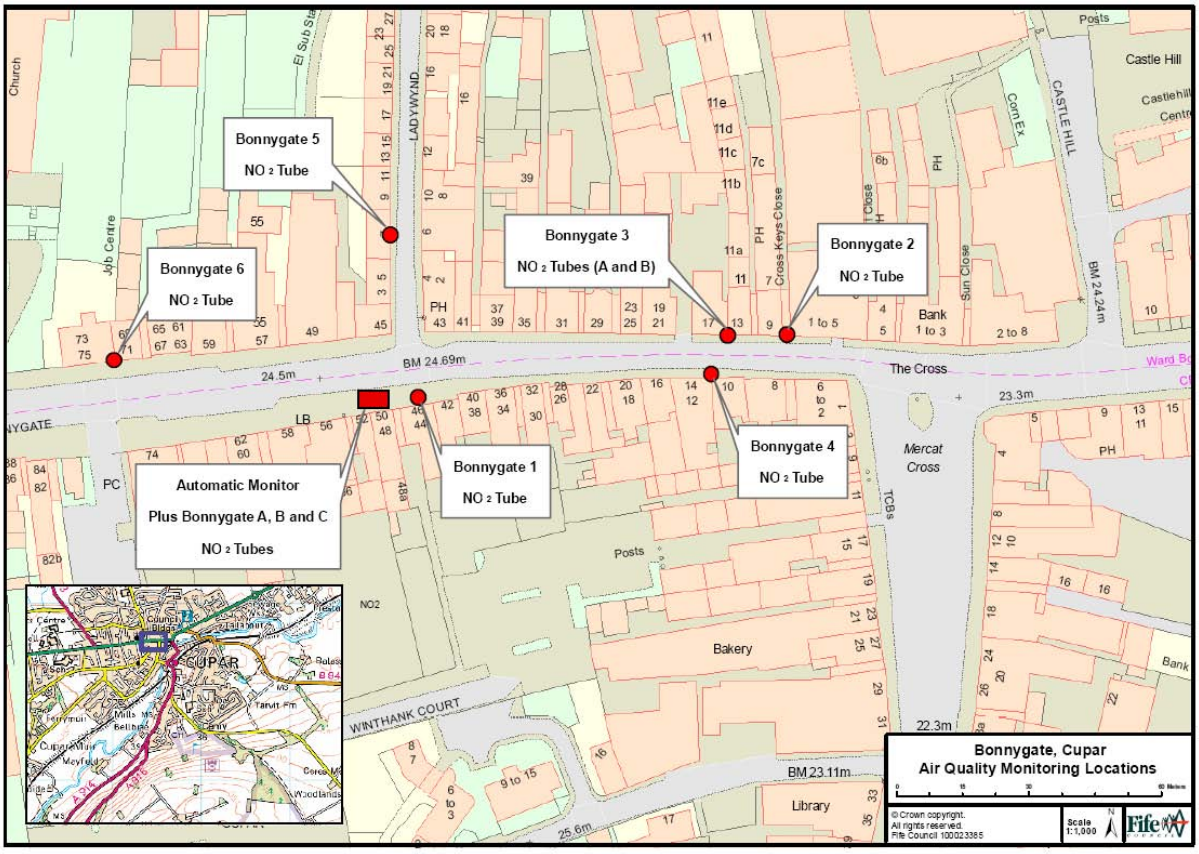


Figure 2.2: Appin Crescent, Dunfermline, Automatic Monitoring Location

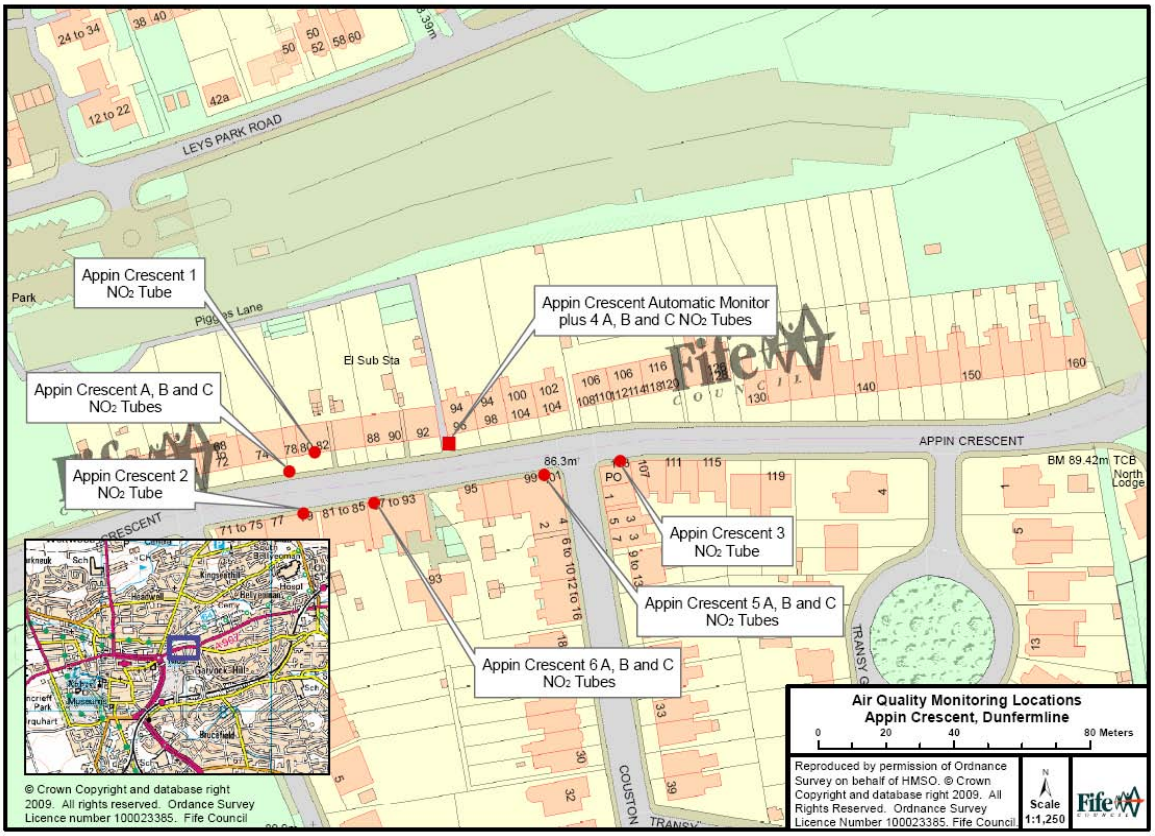


Figure 2.3: Admiralty Road, Rosyth, Automatic Monitoring Location

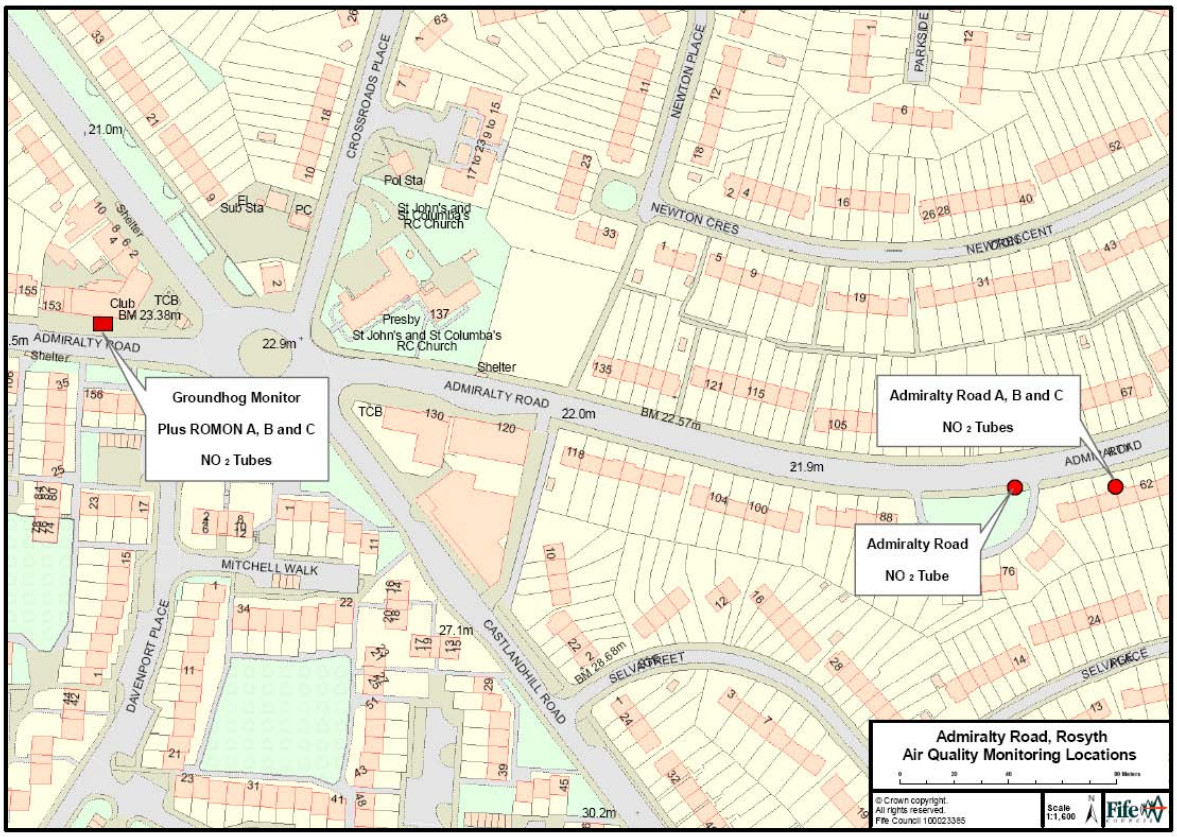


Figure 2.4: St Clair Street, Kirkcaldy, Automatic Monitoring Location

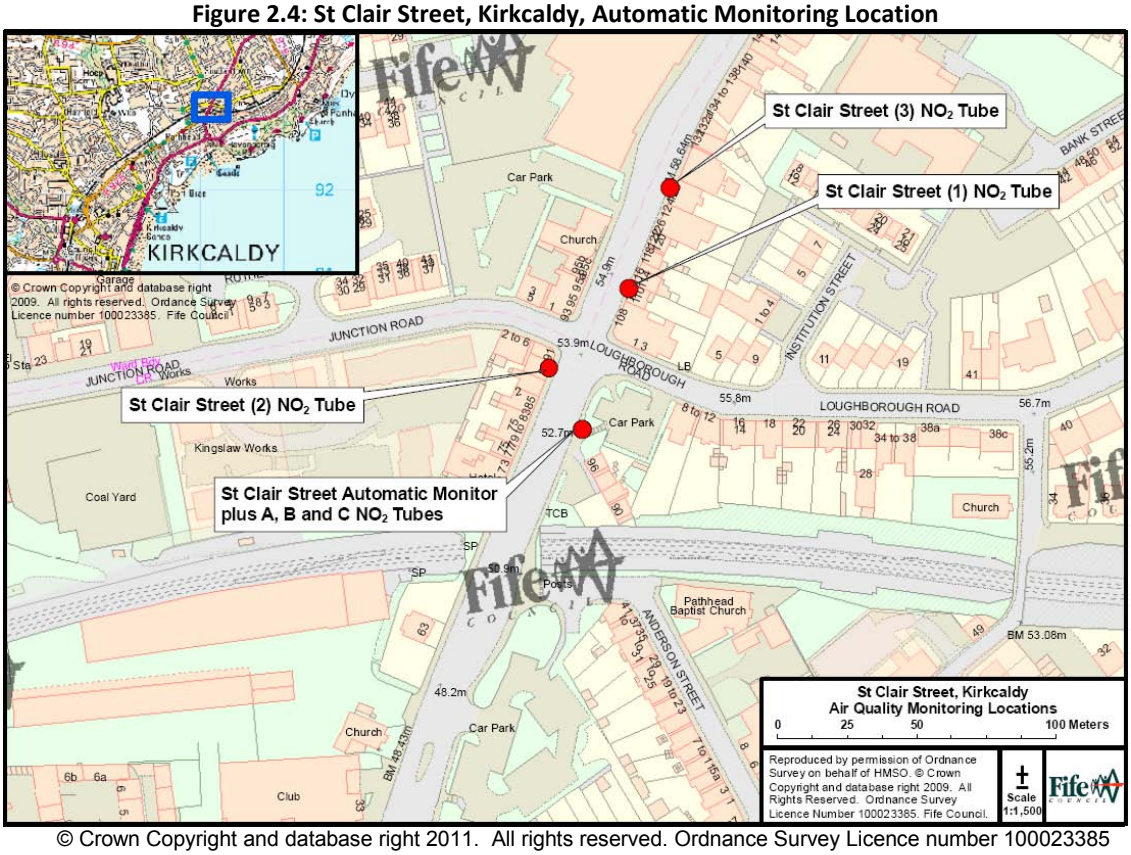


Figure 2.5: Admiralty Road/ Kings Road, Rosyth, Automatic Monitoring Location

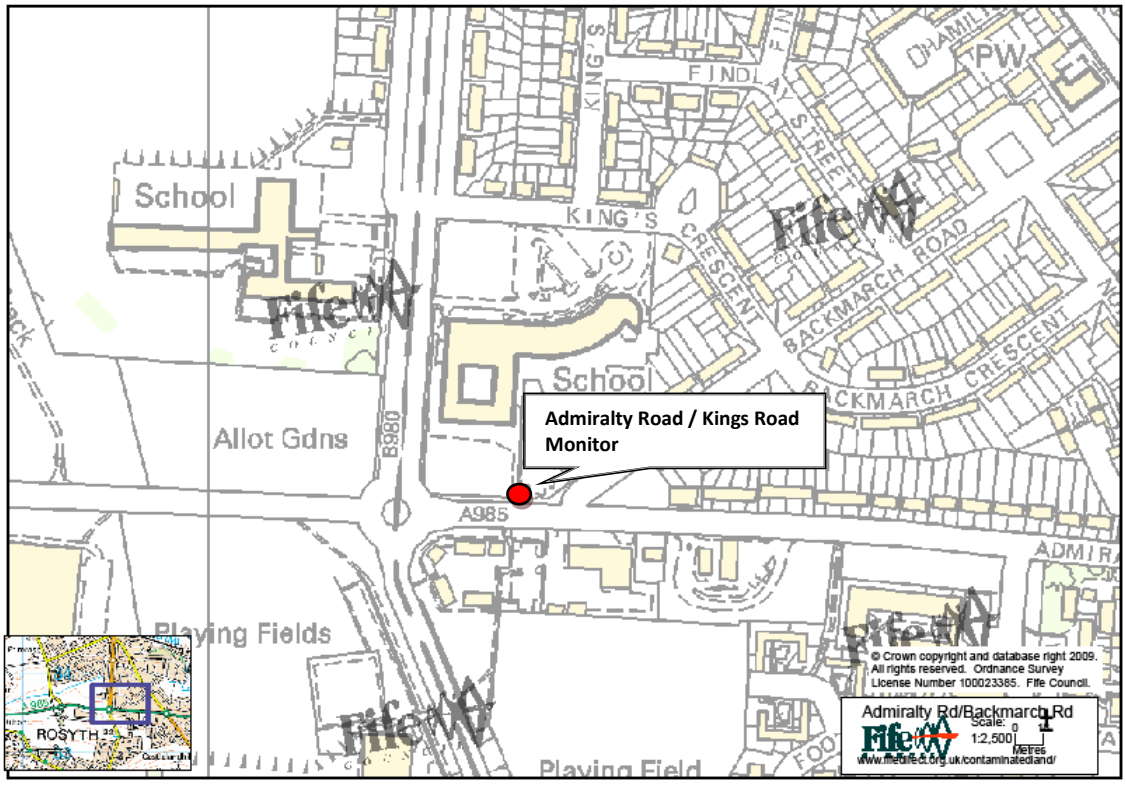


Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA ?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Bonnygate, Cupar	Kerbside	X337406	Y714574	NO_2, PM_{10}	NO_x Analyser, TEOM-FDMS	Y	N (5.0m)	< 0.5m	Y
Appin Crescent, Dunfermline	Roadside	X309926	Y687722	NO_2, (PM_{10} installed March 2011)	NO_x Analyser, TEOM-FDMS	Y	Y	4.0m	Y
Admiralty Road, Rosyth	Roadside	X311755	Y683503	$NO_{2,5}$ PM_{10}	NO_x Analyser, TEOM-FDMS	N	Y	6.0m	Y
St Clair Street, Kirkcaldy	Roadside	X329143	Y692986	NO_2, PM_{10}	NO_x Analyser, TEOM-FDMS	N	N(10.0m)	5.0m	Y

2.1.2 Non-Automatic Monitoring Sites

Fife Council operates an extensive NO_2 diffusion tube monitoring survey with monitoring sites in East, West and Central Fife. In total there are 72 NO_2 diffusion tubes located at 51 sites throughout the local area. Of these, nine sites are triplicate sites, with four of these triplicate sites being co-located with the automatic analysers.

Fife Council also undertook SO_2 diffusion tube monitoring with a triplicate tube site at Markinch, close to Tullis Russell Papermakers and the long running monitoring sites at High Valleyfield and Culross, both situated near Longannet Power Station. Details of all diffusion tube monitoring sites are provided in Table 2.3.

Although SO_2 diffusion tube data are not considered sufficiently accurate (and indeed cannot measure over the short term averaging periods that make up the objectives) for inclusion in the Review and Assessment process, they were included for completeness and to provide a broad indication of air quality. These monitoring sites were discontinued in May 2011.

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 100 square kilometres using 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. 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 on behalf of BP Exploration Operating Company Ltd in the vicinity of Hound Point, on the Forth coastline during 2011 (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_2 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_2 solution is also provided via this contract. This solution is run as an internal check for NO_2 tubes in the laboratory. The solution is tested after every 21 NO_2 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_2. 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.

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)[2], 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)[2]. The results are shown in Table 2.2 below. Calculations are shown in Appendix C.

Table 2.2 Bias correction factors for 2011 for NO_2 diffusion tubes in Fife

Source	Bias adjustment Factor 2011
Appin Crescent, Dunfermline	**0.83**
Bonnygate, Cupar	**0.73**
Admiralty Road, Rosyth	**0.92**
St Clair Street, Kirkcaldy	**0.81**
Regionally Derived (average of 4 local correction factors)	**0.82**
Nationally Derived	**0.78**

The average of the bias adjustment factors from Appin Crescent, Bonnygate Cupar, Admiralty Road and St Clair Street is **0.82**. The national derived Bias adjustment factor was calculated as **0.78**. This calculation was carried out using the most up to date National Bias Adjustment Factor Spreadsheet (version number 03/2012, shown in Appendix C).

For this report, 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 nationally derived bias adjustment factor of **0.78** will be used. For completeness and comparison of data, Fife Council have provided bias adjusted diffusion tube data using both local and national bias adjustment factors where appropriate.

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?
NO_2 Diffusion Tubes West Area								
St Leonards Primary School, Dunfermline	R(F)	X 309770	Y 686895	NO_2	N	Y	10.6	Y
Carnegie Drive (A,B,C), Dunfermline*	R(F)	X 309019	Y 687632	NO_2*	N	Y	2.3	Y
Rumblingwell, Dunfermline (5N)	R	X 307866	Y 688231	NO_2	N	N (6.3)	1.7	Y
Aytoun Grove, Dunfermline (6N)	UB	X 308328	Y 688426	NO_2	N	N (7.7)	6.1	N
Admiralty Road, Rosyth (AQM 5)	K	X 312103	Y 683439	NO_2	N	N (12.3)	0.5	Y
Admiralty Road (A,B,C), Rosyth*	R(F)	X 312140	Y 683439	NO_2*	N	Y	9	Y
Admiralty Road (A,B,C) ROMON*	R(F)	X 311755	Y 683503	NO_2*	N	Y	6.5	Y
Barrie Street, Dunfermline (8N)	UB	X 308379	Y 688249	NO_2	N	N (6.3)	0.5	N
Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	X 309897	Y 687713	NO_2	Y	N (5.1)	1.6	Y
Appin Crescent (1) Dunfermline	R(F)	X 309891	Y 687716	NO_2	Y	Y	6.5	Y
Appin Crescent (2) Dunfermline	R(F)	X 309975	Y 687716	NO_2	Y	Y	1.5	Y
Appin Crescent (3) Dunfermline	R(F)	X 309975	Y 687716	NO_2	Y	Y	1.8	Y

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 4(A)(B)(C) Dunfermline*	R(F)	X 309926	Y 687722	NO_2^*	Y	Y	3.9	Y
Appin Crescent 5(A)(B)(C)*	R(F)	X 309974	Y 687716	NO_2	Y	Y	1.5	Y
Appin Crescent 6(A)(B)(C)*	R(F)	X 309904	Y 687704	NO_2	Y	Y	1.5	Y
High Street, Cowdenbeath	K	X 316523	Y 691740	NO_2	N	N (3.5)	0.5	Y
North Approach Road (A, B) Kincardine	K	X 293182	Y 687549	NO_2	N	N (11.0)	0.5	Y
Pittencrieff St, Dunfermline	R(F)	X 308743	Y 687549	NO_2	N	Y	0.5	Y
11 Halbeath RD1, Dunfermline	R (F)	X 310245	Y 687784	NO_3	N	Y	14	Y
57 Halbeath RD2, Dunfermline	R (F)	X 310488	Y 6987873	NO_4	N	Y	6	Y
229 Admiralty Road, Rosyth	R (F)	X 311384	Y 683543	NO_5	N	Y	11	Y
43 Ramsay Place, Rosyth	R (F)	X 311633	Y 683543	NO_6	N	Y	14	Y
129 Admiralty Road, Rosyth	R (F)	X 311384	Y 683543	NO_7	N	Y	12	Y
NO_2 Diffusion Tubes Central Area								
St Clair Street (1), Kirkcaldy	R(F)	X 329105	Y 692992	NO_2	N	Y	1.3	Y
St Clair Street (2), Kirkcaldy	R(F)	X 329185	Y 693055	NO_2	N	Y	1.8	Y
St Clair Street (3), Kirkcaldy	R(F)	X 329173	Y 693069	NO_2	N	Y	2	Y
St Clair Street ROMON (A,B,C,)* Kirkacaldy	R	X329143	Y692986	NO_3	N	N(10.0m)	5	Y

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?
Wedderburn Road, Kirkcaldy	UB	X 325228	Y 693086	NO_2	N	N (8.6)	0.5	N
Lovat Road, Glenrothes	K	X 328600	Y 699470	NO_2	N	N (7.7)	0.5	Y
Dunnikier Rd, Kirkcaldy	R(F)	X 328152	Y 692350	NO_2	N	Y	3.4	Y
Victoria Rd, Kirkcaldy	R(F)	X 328152	Y 692325	NO_2	N	Y	2.5	Y
Glenlyon Road, Levenmouth	K	X 337357	Y 701318	NO_2	N	N (26.8)	1	Y
Leslie High St	R(F)	X 325111	Y 701806	NO_2	N	Y	3	Y
Queensway, Glenrothes	K	X 327849	Y 701114	NO_2	N	N (17.0)	1	Y
Adsa Roundabout, Kirkcaldy	K	X 328735	Y 694053	NO_2	N	N (28.0)	1	Y
NO_2 Diffusion Tubes East Area								
City Road (1,2), St Andrews	R	X 350586	Y 716580	NO_2	N	N (1.0)	1.5	Y
Bell Street (1,), St Andrews	R(F)	X 350708	Y 716716	NO_2	N	Y	1.6	Y
Bell Street (2) St Andrews	R(F)	X 350716	Y 716669	NO_2	N	Y	2.1	Y
Windsor Gdns, St Andrews (4N)	UB	X 349122	Y 715313	NO_2	N	N (15.6)	1.4	N
Crossgate, Cupar	K	X 337536	Y 714537	NO_2	Y	N (3.0)	0.5	Y
South Road, Cupar	R	X 337513	Y 713616	NO_2	N	N (17.0)	1.8	Y
Cupar Road, Auchtermuchty	R(F)	X 324186	Y 711801	NO_2	N	Y	1.8	Y
Millfield, Cupar (4N)	UB	X 336867	Y 713878	NO_2	N	N (17.0)	8	N
Bonnygate, Cupar (1N), Bonnygate 1	R(F)	X 337409	Y 714570	NO_2	Y	Y	5.3	Y

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, Bonnygate 2	R(F)	X 337493	Y 714586	NO_2	Y	Y	1.7	Y
Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	X 337480	Y 714586	NO_2	Y	Y	1.6	Y
Bonnygate, Cupar, Bonnygate B4	R(F)	X 337471	Y 714575	NO_2	Y	Y	1.9	Y
Ladywynd, Cupar, Ladywynd B5	R(F)	X 337405	Y 714596	NO_2	Y	Y	1	Y
Bonnygate West, Cupar, Bonnygate B6	R(F)	X 337342	Y 714579	NO_2	Y	Y	3.2	Y
Bonnygate, Cupar, Monitor BA, BB, BC *	K	X 337406	Y 714574	NO_2*	Y	N (4.8)	0.6	Y
4 East Road, Cupar	R(F)	X 337915	Y 714721	NO_2	Y	Y	14	Y
SO_2 Diffusion Tubes								
Main Street, Culross	UB	X 297860	Y 685299	SO2	N	N/A	N/A	N/A
Valleyfield, Dunfermline	UB	X 300920	Y 686848	SO2	N	N/A	N/A	N/A
Mount Frost Drive, Markinch (1,2,3)	UB	X 328627	Y 701992	SO2	N	N/A	N/A	N/A

** 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 AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 2.4 shows 2011 statistics for automatic NO_2 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 exceedences for the annual mean NO_2 objective.

Table 2.5 shows the results of automatic monitoring measured against the 1 hour NO_2 objective. There were no exceedences of the 1 hour NO_2 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_2. These measures include a new Urban Traffic Management and Control System and changes to the pedestrian crossings.

NO_2 monitoring data are presented for INEOS Grangemouth oil refinery as their annual monitoring report for 2011 report. Annual average concentrations of NO_2 are lower than the set air quality limit of 30.6 $\mu g/m^3$ (16ppb), with the exception of location CO19 (Grange Manor Hotel, Grangemouth), which show an annual average of 32.5 $\mu g/m^3$ (17ppb).

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 2011 %	Annual Mean Concentration μg/m³				
					2007	2008	2009	2010	2011
Appin Crescent, Dunfermline	Roadside	Y	94.5	94.5	31*	30	30	29	30
Bonnygate, Cupar	Kerbside	Y	88.7	88.7	**52**	**46**	(33) 32**	32	30
Admiralty Road, Rosyth	Roadside	N	98.9	98.9	N/A	26***	29	33	28
St Clair Street, Kirkcaldy	Roadside	N	88.9	88.9	N/A	N/A	N/A	N/A	19****

** 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 2011%	Number of Exceedences of hourly mean (200 μg/m³) *If the period of valid data is less than 90% of a full year, include the 99.8th percentile of hourly means in brackets.*				
				2007	2008	2009	2010	2011
Appin Crescent, Dunfermline	Roadside	Y	94.5	0*	0	0	0	0
Bonnygate, Cupar	Kerbside	Y	88.7	2	3	0 (170)**	0	0 (120)
Admiralty Road, Rosyth	Roadside	N	98.9	N/A	0***	2	0	0
St Clair Street, Kirkcaldy	Roadside	N	88.9	N/A	N/A	N/A	N/A	0 (71)****

** 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 2011. As shown in Table 2.2, the data has been bias corrected using locally calculated bias adjustment factors (Dunfermline **0.83**, Rosyth **0.92**, Cupar **0.73** , Kirkcaldy **0.81**). For comparison and completeness Fife Council has also corrected 2011 diffusion tube data using the nationally derived bias adjustment factor (**0.78**) and also a regional derived adjustment factor (**0.82**). This figure is given in brackets. All of the 2011 data with an asterisk * has been period mean adjusted by the factor of **1.21** to take account of missing data from January to September 2011. All of the 2011 data with a double asterisk ** has been period mean adjusted by the factor of **1.06** to take into account of missing data from January to April 2011 (calculations of these Period Mean adjustments can be found in Appendix C). There are no data for this period due to the sites being new locations started up during the course of 2011.

All of the monthly diffusion tube results are found within Appendix D of this report. Table 2.7 compares NO_2 diffusion data from 2007, 2008, 2009 and 2010. 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_2 annual mean objective of 40μg/m^3. These locations are:

- Appin Crescent 2, Dunfermline
- Appin Crescent 3, Dunfermline
- Appin Crescent 5 (A,B,C), Dunfermline
- Appin Crescent 6 (A,B,C), Dunfermline
- St Clair Street 1, Kirkcaldy
- Bonnygate 3(A,B), Cupar

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

The Bonnygate Cupar diffusion tube 3(A,B) exceeded the 40μg/m^3 objective when using the regional rather than local or national bias adjustment factor, which are below the objective. At 40.0μg/m^3 this exceedence is however borderline and Table 2.7 shows that concentrations in the Bonnygate area have decreased over 2009, 2010 and 2011. This is consistent with automatic monitoring concentrations. This 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 NO_2 and PM_{10}, and have 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.

Within Appin Crescent diffusion tubes sites 2, 3, 5 and 6 exceed the 40μg/m^3 objective. 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 NO_2.

As can be seen in Table 2.6, concentrations at St Clair Street, Kirkcaldy, diffusion tubes sites (1 and 2) have consistently measured concentrations around the 40μg/m^3 objective, with concentrations exceeding the objective in 2008, 2010. In 2010 concentrations exceeded the objective when corrected using the national derived bias adjustment factor. As a result of this Fife Council have installed an automatic monitoring station (monitoring NO_x and PM_{10}) at St Clair Street to further investigate concentrations in this area. Monitoring commenced in February 2011. St Clair Street 1 measured **42μg/m^3** in 2011, exceeding the annual mean objective. Whilst in 2011 St Clair Street 2 measured 36.2μg/m^3, measuring below the objective.

As summarised in the 2010 Progress Report, if St Clair Street continued to exceed the objective, then Fife Council should proceed with a Detailed Assessment for St Clair Street, Kirkcaldy. With St Clair Street 1 measuring above the objective for another year and this location being of relevant exposure and in accordance with the Technical Guidance LAQM. TG (09), Fife Council should proceed to a Detailed Assessment for NO_2 in the area of St Clair Street, Kirkcaldy.

Table 2.5 shows that the diffusion tube at Admiralty Road (AQM5) was close to exceeding the 40μg/m^3 objective (39.0μg/m^3) when corrected using the locally derived bias adjustment factor. This site is situated at a kerbside location that is not considered relevant exposure to the general public however is required as part of the National Monitoring Network.

Other triplicate diffusion tube sites in Admiralty Road, which are in locations of relevant exposure, show concentrations below the objective, concurring with those measured at the automatic monitoring site.

However, NO_2 concentrations have increased since 2009 in Admiralty Road along with PM_{10} concentrations. The reasons for this increase are not clear. As a result it is suggested in 2010 that Fife Council should increase their diffusion tube monitoring in Admiralty Road incorporating more locations of relevant exposure.

2011 results presented in Table 2.6 below are reported to three significant figures

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2011	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration
West Area								
DRM5	Rumblingwell, Dunfermline	N	R	N	83	_	N	26.6 (20.8)
DRM6	Aytoun Grove, Dunfermline	N	UB	N	83	_	N	13.2 (10.3)
DRM8	Barrie Street, Dunfermline	N	UB	N	75	_	N	13.4 (10.5)
DRM9A	Appin Crescent (A, B & C), Dunfermline	Y	R	Y	100	_	N	35.7 (33.5)
C'BEATH	High Street, Cowdenbeath	N	K	N	92	_	N	(22.2)
K'DINE1	N. Approach Rd. A/B, Kincardine	N	K	N	100	_	N	(18.8)
AQM3	St Leonards School, Dunfermline	N	R(F)	N	83	_	N	20.9 (19.6)
AQM5	Admiralty Road, Rosyth	N	K	N	75	_	N	39 (33.1)
C'GIE DR	Carnegie Drive (A, B & C), Dunfermline	N	R(F)	Y	97	_	N	37.5 (35.3)
ADM RO	Admiralty Road (A, B,C), Rosyth	N	R(F)	Y	75	_	N	36.4 (30.9)
ROMON	Admiralty Road, Rosyth ROMAN A,B,C	N	R(F)	Y	75	_	N	29.3 (24.8)
APP CR1	Appin Crescent 1 Dunfermline	Y	R(F)	N	100	_	N	29.3 (27.6)
APP CR2	Appin Crescent 2, Dunfermline	Y	R(F)	N	100	_	N	**46.3 (43.5)**
APP CR3	Appin Crescent 3, Dunfermline	Y	R(F)	N	100	_	N	**41.1** (38.6)
PITT ST	Pittencrieff St Dunfermline	N	R(F)	N	92	_	N	23.6 (22.2)

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2011	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration
APP CR4	Appin Crescent 4 (A, B,C), Dunfermline	Y	R(F)	Y	83	_	N	31.7 (29.8)
APP CR5	Appin Crescent 5 (A, B & C), Dunfermline	Y	R(F)	Y	100	_	N	**46.2 (43.4)**
APP CR6	Appin Crescent 6 (A, B & C), Dunfermline	Y	R(F)	Y	97	_	N	**55.8 (47.3)**
HALBEATH RD1	11 Halbeath RD1, Dunfermline	N	R (F)	N	67	y	N	21.5* (20.2*)
HALBEATH RD2	57 Halbeath RD2, Dunfermline	N	R (F)	N	67	y	N	26.2* (24.6*)
N/A	229 Admiralty Road, Rosyth	N	R (F)	N	33	y	N	25.9** (20.2**)
N/A	43 Ramsay Place, Rosyth	N	R (F)	N	33	y	N	17.8** (15.1**)
N/A	129 Admiralty Road, Rosyth	N	R (F)	N	33	y	N	27.7** (23.5**)
East Area								
N/A	Bonnygate 1, Cupar	Y	R(F)	N	100	_	N	28.3 (30.2)
N/A	Bonnygate 2, Cupar (11)	Y	R(F)	N	100	_	N	35.4 (37.8)
N/A	Bonnygate 3A,B Cupar (13A) (13B)	Y	R(F)	N	100	_	N	35.6 (38.9) **((40.0))**
N/A	Bonnygate B4 Cupar	Y	R(F)	N	100	_	N	31 (33.1)
N/A	City Road 1,2 St Andrews	N	R	N	100	_	N	(25.9)
N/A	Bell Street 1, St Andrews	N	R(F)	N	92	_	N	(36.4)
N/A	Bell Street 2, St Andrews	N	R(F)	N	100	_	N	(39.2)
N/A	Windsor Gds, St Andrews	N	UB	N	83	_	N	(6.0)
N/A	Cupar Road, Auchtermuchty	N	R(F)	N	100	_	N	(24.4)
N/A	Millfield, Cupar	N	UB	N	83	_	N	8.7 (9.3)
N/A	South Rd, Cupar	N	R	N	83	_	N	11.6 (12.4)

Site ID	Location	Within AQMA?	Site Type	Triplicate or Collocated Tube	Data Capture % 2011	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	Crossgate, Cupar	N	K	N	100	_	N	22.4 (23.9)
N/A	Ladywynd B5, Cupar	Y	R(F)	N	92	_	N	17.9 (19.2)
N/A	Bonnygate West B6, Cupar	Y	R(F)	N	100	_	N	18.5 (19.8)
N/A	Bonnygate Monitor B (ABC) Cupar	Y	K	Y	97	_	N	30.2 (32.3)
N/A	4 East Rd, Cupar	Y	R(F)	N	92	_	N	13.3 (14.2)
Central Area								
N/A	St Clair Street 1, Kirkcaldy	N	R(F)	N	100	_	N	**42 (40.4)**
N/A	St Clair Street 2, Kirkcaldy	N	R(F)	N	100	_	N	36.2 (34.8)
N/A	St Clair Street 3, Kirkcaldy	N	R(F)	N	100	_	N	32.4 (31.2)
N/A	St Clair Street ROMON A,B,C, Kirkacaldy	N	R	Y	75	_	N	19.2 (18.5)
N/A	Wedderburn Road, Kirkcaldy	N	UB	N	75	_	N	12 (11.5)
N/A	Lovat Rd, Glenrothes	N	K	N	83	_	N	(16.4)
N/A	Dunnikier Road, Kirkcaldy	N	R(F)	N	100	_	N	29.7 (28.6)
N/A	Victoria Road, Kirkcaldy	N	R(F)	N	100	_	N	31.9 (30.7)
N/A	Glenlyon, Leven	N	K	N	100	_	N	(26.9)
N/A	Leslie High Street, Leslie	N	R(F)	N	100	_	N	(22.1)
N/A	ASDA R/B, Kirkcaldy	N	K	N	92	_	N	(32.6)
N/A	Queensway, Glenrothes	N	K	N	100	_	N	(22.1)

** 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 forJanuary 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)

Table 2.7 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Location	Within AQMA?	Bias Adjust. Factor	Data Capture 2011 %	Annual mean concentrations (Objective 40 µg/m^3) Adjusted for bias				
					2007	2008	2009	2010	2011
West Area									
DRM5	Rumblingwell, Dunfermline	N	0.83	83	23	26	21	27.2 (26.8)	26.6 (20.8)
DRM6	Aytoun Grove, Dunfermline	N	0.83	83	13	15	13	13.8 (13.6)	13.2 (10.3)
DRM8	Barrie Street, Dunfermline	N	0.83	75	13	15	12	13.6 (13.5)	13.4 (10.5)
DRM9A	Appin Crescent (A, B & C), Dunfermline	Y	0.83	100	35	39	34	37.1 (36.6)	35.7 (33.5)
C'BEATH	High Street, Cowdenbeath	N	0.78	92	23	28	25	27.2	(22.2)
K'DINE1	N. Approach Rd. A/B, Kincardine	N	0.78	100	37	**40**	20	20.5	(18.8)
AQM3	St Leonards School, Dunfermline	N	0.83	83	19	22	20	22.5 (22.2)	20.9 (19.6)
AQM5	Admiralty Road, Rosyth	N	0.92	75	36	38	32	**41.0** (37.6)	39 (33.1)
C'GIE DR	Carnegie Drive (A, B & C), Dunfermline	N	0.83	97	31	38	35	37.8 (37.3)	37.5 (35.3)
ADM RO	Admiralty Road (A, B,C), Rosyth	N	0.92	75	33	33	31	36.9 (33.8)	36.4 (30.9)
ROMON	Admiralty Road, Rosyth ROMAN A,B,C	N	0.92	75	N/A	26	26	30.6 (28.1)	29.3 (24.8)
APP CR1	Appin Crescent 1 Dunfermline	Y	0.83	100	27	32	28	31.2 (30.8)	29.3 (27.6)
APP CR2	Appin Crescent 2, Dunfermline	Y	0.83	100	**40**	**49**	39	**45.6 (45.0)**	**46.3 (43.5)**
APP CR3	Appin Crescent 3, Dunfermline	Y	0.83	100	37	**40**	37	**44.4 (43.9)**	**41.1** (38.6)
PITT ST	Pittencrieff St Dunfermline	N	0.83	92	22	25	22	23.8 (23.5)	23.6 (22.2)
APP CR4	Appin Crescent 4 (A, B,C), Dunfermline	Y	0.83	83	30	34	30	32.6 (32.2)	31.7 (29.8)
APP CR5	Appin Crescent 5 (A, B & C), Dunfermline	Y	0.83	100	_	_	**42***	**44.0 (43.4)**	**46.2 (43.4)**
APP CR6	Appin Crescent 6 (A, B & C), Dunfermline	Y	0.83	97	_	_	**56***	**53.8 (53.2)**	**55.8 (47.3)**
HALBEATH RD1	11 Halbeath RD1, Dunfermline	N	0.83	67	_	_	_	_	21.5* (20.2*)
HALBEATH RD2	57 Halbeath RD2, Dunfermline	N	0.83	67	_	_	_	_	26.2* (24.6*)
N/A	229 Admiralty Road, Rosyth	N	0.92	33	_	_	_	_	25.9** (22.0**)

Site ID	Location	Within AQMA?	Bias Adjust. Factor	Data Capture 2011 %	Annual mean concentrations (Objective 40 µg/m^3) Adjusted for bias				
					2007	2008	2009	2010	2011
N/A	43 Ramsay Place, Rosyth	N	0.92	33	_	_	_	_	17.8** (15.1**)
N/A	129 Admiralty Road, Rosyth	N	0.92	33	_	_	_	_	27.7** (23.5**)
East Area									
N/A	Bonnygate 1, Cupar	Y	0.73	100	30	31	31	28.4 (31.2)	28.3 (30.2)
N/A	Bonnygate 2, Cupar (11)	Y	0.73	100	36	**45**	**42**	35.8 (39.3)	35.4 (37.8)
N/A	Bonnygate 3A,B Cupar (13A) (13B)	Y	0.73	100	**52**	**50**	**46**	36.9 **(40.5)**	35.6 (38.9) **((40.0))**
N/A	Bonnygate B4 Cupar	Y	0.73	100	**41**	38	32	31.4 (34.5)	31 (33.1)
N/A	City Road 1,2 St Andrews	N	0.78	100	24	30	29	33.1	(25.9)
N/A	Bell Street 1, St Andrews	N	0.78	92	29	32	33	36.8	(36.4)
N/A	Bell Street 2, St Andrews	N	0.78	100	26	32	29	30.7	(39.2)
N/A	Windsor Gds, St Andrews	N	0.78	83	6	7	7	6.5	(6.0)
N/A	Cupar Road, Auchtermuchty	N	0.78	100	27	31	30	29.2	(24.4)
N/A	Millfield, Cupar	N	0.73	83	9	10	11	11.7 (12.9)	8.7 (9.3)
N/A	South Rd, Cupar	N	0.73	83	14	16	21	17.5 (19.2)	11.6 (12.4)
N/A	Crossgate, Cupar	N	0.73	100	23	26	25	25.5 (28.0)	22.4 (23.9)
N/A	Ladywynd B5, Cupar	Y	0.73	92	19	22	21	19.4 (21.3)	17.9 (19.2)
N/A	Bonnygate West B6, Cupar	Y	0.73	100	30	26	25	22.5 (24.7)	18.5 (19.8)
N/A	Bonnygate Monitor B (ABC) Cupar	Y	0.73	97	34	39	33**	30.9 (33.9)	30.2 (32.3)
N/A	4 East Rd, Cupar	Y	0.73	92	15	17	16	14.4 (15.9)	13.3 (14.2)
Central Area									
N/A	St Clair Street 1, Kirkcaldy	N	0.81	100	34	**41**	38	**41.3**	**42 (40.4)**
N/A	St Clair Street 2, Kirkcaldy	N	0.81	100	34	**41**	39	**43.7**	36.2 (34.8)
N/A	St Clair Street 3, Kirkcaldy	N	0.81	100	31	35	33	36.5	32.4 (31.2)
N/A	St Clair Street ROMON A,B,C, Kirkacaldy	N	0.81	75	_	_	_	_	19.2 (18.5)
N/A	Wedderburn Road, Kirkcaldy	N	0.81	75	12	13	13	11.5	12 (11.5)

Site ID	Location	Within AQMA?	Bias Adjust. Factor	Data Capture 2011 %	Annual mean concentrations (Objective 40 µg/m^3) Adjusted for bias				
					2007	2008	2009	2010	2011
N/A	Lovat Rd, Glenrothes	N	0.78	83	18	19	18	18.7	(16.4)
N/A	Dunnikier Road, Kirkcaldy	N	0.81	100	29	33	30	32.5	29.7 (28.6)
N/A	Victoria Road, Kirkcaldy	N	0.81	100	30	36	34	34.6	31.9 (30.7)
N/A	Glenlyon, Leven	N	0.78	100	27	30	27	32.4	(26.9)
N/A	Leslie High Street, Leslie	N	0.78	100	20	24	24	25.1	(22.1)
N/A	ASDA R/B, Kirkcaldy	N	0.81	92	26	33	33	32.4	33.8 (32.6)
N/A	Queensway, Glenrothes	N	0.78	100	20	26	24	23.9	(22.1)

** 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 forJanuary 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)

2.2.2 PM_{10}

PM_{10} 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_{10} data against the annual mean air quality objectives set for Scotland (18 μg/m^3). Data collected for 2011 shows that both Bonnygate and the Admiralty Road sites exceeded the annual mean objective with concentrations of 19 μg/m^3 at Bonnygate and 20 μg/m^3 at Admiralty Road. Both Appin Crescent, Dunfermline (16.32 μg/m^3)and St Clair Street, Kirkcaldy (13 μg/m^3) were below the annual mean objective. The 24 hour mean objective of 50 μg/m^3 not to be exceeded more than 7 times in a year was not exceeded at any PM_{10} monitoring site.

As mentioned previously, Bonnygate Cupar has been designated an AQMA for PM_{10} 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 which may have distorted the annual mean for 2009. A period mean adjustment (1.04) was applied to compensate for the missing period in 2011. Data capture for PM_{10} in 2011 was 85.2%.

Admiralty Road has also exceeded the annual mean PM_{10} objective with a measured concentration of 20 μg/m^3. The reasons for this increase are unclear as there were no known activities around the area of Admiralty Road (i.e. a significant increase in traffic, long term road or construction works) which can explain it. This increase however does coincide with 2010 and an overall increase in NO_2 concentrations in the Admiralty Road area.

This is the second year Admiralty Road has exceeded the annual mean objective for PM_{10}. There has also been an increase in PM_{10} concentrations since the last Detailed Assessment carried out in 2009; measured PM_{10} concentrations in 2010 and 2011 have been above the maximum modelled PM_{10} annual average concentrations at a relevant receptor, which was predicted to be 16.9μgm^{-3} in 2010. With the monitoring site being in a location of relevant exposure and flats and houses being located across and along the street from the monitoring site, and in accordance with the Technical Guidance LAQM. TG (09)[2], it is recommended that Fife Council proceed to a Detail Assessment for PM_{10}. Background PM_{10} make a significant contribution to measured concentrations at Admiralty Road. Consequently, measured PM_{10} concentration; contributions from transboundary sources, and natural sources like sea salt and sand due to Admiralty Road's location near the coast, cannot be discounted from the PM_{10} levels.

This is the first year of PM_{10} data for Appin Crescent, Dunfermline. The site's data capture was 63.6%, the site started monitoring PM_{10} in March 2011 but data up to April was deleted during the ratification process. This may have distorted the annual mean for 2011. A period mean adjustment (1.02) was applied to compensate for the missing period in 2011. The period mean adjusted annual mean PM_{10} concentration at Appin Crescent, Dunfermline was below the annual mean PM_{10} objective with a measured concentration of 16 μg/m^3. However modelling undertaken as part of the Further Assessment of air quality in Appin Crescent indicated that the relevant PM_{10} objectives may be compromised and the Air Quality Management Area Order should be amended to include this pollutant.

This is also the first year of PM_{10} data for St Clair Street, Kirkcaldy. The site's data capture was 84.8% and the site started monitoring PM_{10} in February 2011. St Clair Street, Kirkcaldy was well below the annual mean PM_{10} objective with a measured concentration of 13 μg/m^3.

Table 2.8 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m^3				
						2007*[c]	2008*[c]	2009*[c]	2010*[c]	2011[c]
Bonnygate, Cupar	Kerbside	Y	85.2	85.2	Y	**23**	**19**	(16) 17*	**19**	**19**
Admiralty Road, Rosyth	Roadside	N	92.8	92.8	Y	N/A	15**	16	**19**	**20**
Appin Crescent, Dunfermline	Roadside	Y	63.6	63.6	Y	N/A	N/A	N/A	N/A	(16) 16***
St Clair Street, Kirkcaldy	Roadside	N	84.8	84.8	Y	N/A	N/A	N/A	N/A	13****

** 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 Brakets are Measurements without a period mean adjustment calculated

Table 2.9 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedences of 24-Hour Mean (50 µg/m^3) If *data capture < 90%, include the 98.08th percentile of daily means in brackets.*				
						2007	2008	2009	2010	2011
Bonnygate, Cupar	Kerbside	Y	85.2	85.2	Y	**5**	**1**	0 (41)*	**3 (44)**	0 (44)
Admiralty Road, Rosyth	Roadside	N	92.8	92.8	Y	N/A	0(39)**	2	**0**	3
Appin Crescent, Dunfermline	Roadside	Y	63.6	63.6	Y	N/A	N/A	N/A	N/A	0 (38)***
St Clair Street, Kirkcaldy	Roadside	N	84.8	84.8	Y	N/A	N/A	N/A	N/A	0 (33)****

** 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*

2.2.3 Sulphur Dioxide

Automatic Monitoring Data

SO_2 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 2011 Longannet operated with an average load factor of 46.1% (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 37.7kT of SO_2 during 2011 (45.2kT in 2010 / ~32.2kT in 2009). Emissions were well below the short-term authorisation limit for SO_2 of 2000 mg/m^3 at all times.

Results for 2011 for this site are provided along with 2006, 2007, 2008, 2009 and 2010 data in Table 2.10.

Table 2.10 Results Automatic SO_2 Monitoring for Blair Mains (µg/m^3): Comparison with Annual Mean Objective

Period	Data Capture (%)	Max 15 Minute Mean (µg/m^3)	Max 1 Hour Mean (µg/m^3)	Max 24 Hour Mean (µg/m^3)
AQS Objective	-	266 µg/m^3 (max. 35 exceedences)	350 µg/m^3 (max. 24 exceedences)	125 µg/m^3 (max. 3 exceedences)
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)

According to the Longannet Power Station Report[16], the measured concentrations at Blair Mains indicate that there were no exceedences of the 15-minute mean objective. Measured concentrations also indicated that there were no exceedences of the hourly or the daily SO_2 thresholds. Although maximum 24-hour mean data are not available, the 99.18th percentile daily value was 29.9µg/m^3 (compliance value 125µg/m^3) (19.7µg/m^3 in 2010), and the 99.73th percentile was 74.6µg/m^3 (compliance value 350µg/m^3) (62.7µg/m^3 in 2010). The annual mean for 2011 was 29.9µg/m^3.

The measurements therefore indicate that the area around Longannet Power Station was in compliance with all relevant SO_2 objectives during 2011.

Diffusion Tube Data:

Although SO_2 diffusion tube data are not considered sufficiently accurate for inclusion in the Review and Assessment process, the following are included for completeness and to provide a broad indication of air quality. Diffusion tubes were deployed by Fife Council at Culross, High Valleyfield and Markinch.

The Mount Frost, Markinch sites operated by Fife Council (Table 2.11) are close to the Tullis Russell paper mill and helped assess emissions from the coal fired plant at the mill.

The Air Quality Strategy includes an objective of 20µg/m^3 for the annual and winter mean SO_2 concentration, for protection of ecosystems, which is applicable only in rural areas. This may be

applicable to the shoreline site at Culross. There was not a full 12 months sampling period of SO_2 diffusion tubes. A winter average can be taken from the sampled data. The winter mean at all sites are well within the AQS objective.

Table 2.11 Fife Council SO_2 Diffusion Tubes (µg/m^3) – Annual Mean 2011

Period	Main St, Culross	Valleyfield, Dunfermline	Mount Frost Drive (1, 2 & 3)
2006	4	4	12
2007	3	4	11
2008	3	5	14
2009	3	5	11
2010	3.3	3.6	6.7
2011	2.9*	3*	9.5**

**sampling period of 2 months in January and February 2011 (17% data capture for 2011)*
*** sampling period of 5 months in January, February, March, April and May 2011(42% data capture for 2011)*

Additional SO_2 monitoring data are presented for INEOS Grangemouth oil refinery as their annual monitoring report for 2011. This report concludes that annual average concentrations of SO_2 are lower than the set air quality limit.

2.2.4 Benzene

Benzene monitoring data are presented for INEOS Grangemouth oil refinery as their annual monitoring report for 2011. Annual average concentrations of Benzene are below the Air Quality (Scotland) Regulations 2000 air quality objective of 1ppb, with the exception of location CO3(Kinneil Kerse – boundary of Kinneil Gas Plant) which measured an annual average concentration of 1.2ppb. This site is within the Grangemouth industrial vicinity. All monitoring sites within Fife Councils boundary meet the Air Quality Strategy Objective of 1ppb.

Benzene monitoring data are presented for BP production and exploration as their annual monitoring report for 2011.The results of this monitoring indicate that concentrations of benzene over the 12 month period were low (annual means range from 0.2-0.5 ppb) and well within the air quality standard.

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 2011. 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 2011. 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 2011, 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, 2011, 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 (2011) from the The Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group. 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.

$PM_{2.5}$

The average $PM_{2.5}$ concentration measured during the six month period of 6th September 2011 to 6th March 2012 was 10 µg m^{-3}. The estimated annual mean $PM_{2.5}$ concentration for the period 6th March 2011 to 6th March 2012 was also calculated to be 10 µg/m^{-3}, using an annualisation factor of 1.00. This annual mean concentration is lower than the Scottish annual mean objective of 12 µg/m^{-3}.

Table 2.12 Fife Council $PM_{2.5}$ Monitoring Results from of 6th September 2011 to 6th March 2012

POLLUTANT	$PM_{2.5}$
Maximum hourly mean	83 µg/m^3
Maximum running 24-hour mean	39 µg/m^3
Maximum daily mean	37 µg/m^3
Average	10 µg/m^3
Annualised Average	10 µg/m^3
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 2.13. The results have been converted from ppm into mass units at 20°C and 1 atmosphere.

Table 2.13 Fife Council CO Monitoring Results

Site Number/ Location	Monitoring Period	Max 8-Hour Concentration (mg/m^3)
Bothwell Gardens, Dunfermline	24/05/11 - 31/05/11	0.29
	07/10/11 - 13/10/11	0.39
Carnegie Drive/Pilmuir Street Dunfermline	13/04/11 - 19/04/11	0.9
	08/07/11 - 14/07/11	0.9
	18/10/11 - 24/10/11	0.75
Appin Crescent, Dunfermline	13/04/11 - 19/04/11	0.75
	29/10/11 - 04/11/11	0.51
Glenlyon Road/Windgates Road, Leven	11/05/11 - 17/05/11	0.26
Bonnygate, Cupar	11/05/11 - 17/05/11	0.64
Victoria Rd / Dunnikier Rd, Kirkcaldy	15/06/11 - 21/06/11	0.83
	22/09/11 - 28/09/11	0.8
St Clair Street, Kirkcaldy	15/06/11 - 21/06/11	0.33
	22/09/11 - 28/09/11	0.34
Admiralty Rd/Queensferry, Rosyth	24/06/11 - 30/06/11	0.31
	07/10/11 - 13/10/11	2.53
A909, Mossmorran	22/04/11 - 28/04/11	0.16
	11/11/11 to 17/11/11	0.23

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 10mg/m^3 for the running 8-hour mean concentration.

2.2.6 Summary of Compliance with AQS Objectives

Fife Council has examined the results from monitoring in the area in 2011. New monitoring data highlighted air quality issues for NO_2 at; Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road and St Clair Street, Kirkcaldy. Air Quality issues were also highlighted at Bonnygate Cupar and Admiralty Road for PM_{10}.

Bonnygate, Cupar and Appin Crescent, Dunfermline have already been declared AQMAs.

To further investigate elevated PM_{10} concentrations measured at Admiralty Road in Rosyth, Fife Council should undertake a Detailed Assessment as there has been an increase in measured PM_{10} concentrations since the Detailed Assessment in 2009.

Fife Council have installed an automatic monitoring station at St Clair Street, Kirkcaldy, (February 2011) measuring concentrations of NO_2 and through association PM_{10}. The first year measurements from the automatic monitor are below the air quality objectives. Although for the third year since 2008, diffusion tube location St Clair Street 1 has been above the objective. This location is of relevant exposure and so in accordance with the Technical Guidance LAQM. TG (09),Fife Council should proceed with a Detailed Assessment for St Clair Street, Kirkcaldy.

Fife Council has measured concentrations of NO_2 above the annual mean at a relevant location outside of a declared AQMA, and **will need to proceed to a Detailed Assessment for NO_2** , in the area of St Clair Street, Kirkcaldy.

Also, Fife Council measured concentrations of PM_{10} above the annual mean at a relevant location outside of a declared AQMA, and **will need to proceed to a Detailed Assessment for PM_{10}**, in the area of Admiralty Road, Rosyth.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Fife Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Fife Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

Fife Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Installation of pedestrian crossing signals, Cupar

Fife Council submitted a planning application [11/04030/FULL] for the Installation of pedestrian crossing signals including surface materials, lighting and tree planting on St Catherine Street, Cupar. As this development is located within the Bonnygate Cupar Air Quality Management Area, Fife Council consulted air quality consultants, AEA. After consultation Fife Council and AEA considered the development acceptable with regard to its Air Quality impact. As it would improve traffic flow through the designated area, is unlikely to cause any additional queuing or increased volume of

traffic flow through the Bonnygate and St Catherine Street and as such is unlikely to have a negative impact on local air quality.

Fife Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Fife Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Fife Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Details of the weekly movement of buses and coaches from Fife Council owned bus stations are given below: -

- Dunfermline Bus Station = 3877 departures per week
- Glenrothes Bus Station = 3749 departures per week
- Kirkcaldy Bus Station = 3648 departures per week
- Leven Bus Station = 2275 departures per week

Stagecoach, who own St Andrews Bus Station have 2145 departures per week.

All bus and coach stations within Fife fall below the threshold of 2,500 daily movements stated in the Technical Guidance (09) and therefore require no further action.

Halbeath, Dunfermline 'Park and Choose' Site

Fife Council submitted a planning application [11/01056/EIA] for the change of use of agricultural land to form a "Park and Choose" site, with an associated Hub building, car parking and landscaping. This application included an air quality impact assessment (WSP Consultants Environmental Statement 2011) which recommended NO2 diffusion tube monitoring to confirm air quality objectives will not be compromised. The "Park and Choose" site and associated bus routes are to be monitored using NO2 diffusion tubes at representative locations. This application has been approved and the Halbeath "Park and Choose" will be built by 2013 as part of the Forth Replacement Crossing development to help relieve traffic congestion. The site is situated along the A907 to the East of Appin Crescent, Dunfermline (part of the A907) which is an Air Quality Management Area (AQMA). The Park and Choose site and associated bus routes will be monitored to ensure these do not conflict with the development of an Air Quality Action Plan (AQAP) for the Appin Crescent.

Fife Council has assessed new/newly identified bus stations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

4 Other Transport Sources

4.1 Airports

Fife Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

Fife Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Fife Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

Rosyth International Container Handling Facility Port Babcock, Rosyth

The proposed development [10/01376/PAN] is for a container handling facility and associated infrastructure and storage in former RD57 site to the west of the main basin at Port Babcock, Rosyth.

The applicant has clarified issues in relation to modelling of air quality impacts and Fife Council's Environmental Strategy Team are satisfied with the comments provided. Fife Council will take into consideration theses air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

Fife Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

The following information from SEPA provides details of industrial installations in the past year:

Cameronbridge Distillery, Cameron Bridge Kirkcaldy
Cameronbridge Distillery (owned by Diageo), located at Cameron Bridge Kirkcaldy submitted a planning application in March 2008 for the Construction of a new Bio Energy Plant including towers, access roads, SUDS facility and other associated engineering works. Fife Council permitted this application with conditions. One of these conditions is that "the relevant air quality objectives as described in the Air Quality (Scotland) Regulations 2000 as amended, shall not be exceeded both at point source and at any receptor due to emissions from any of the plant or machinery on site at any time". This is due to be fully commissioned & operational by April/ May 2012.

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Fife Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Fife Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Fife Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.4 Changes to Regulated Industrial Processes

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

Part B Process - Scottish & Southern Energy's gas turbine at Westfield has been taken out of service.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

With Consultation from SEPA, Fife Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 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 exceedences of the PM_{10} 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 has approximately 432,000 laying hens housed in 6 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. Mill View Farm became fully operational during 2010.

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 exceedences 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. "*

With the above statement in mind and after further discussions with the Review and Assessment helpdesk, Fife Council will not move forward with their proposed detailed assessment until DEFRA releases their findings.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Dunfermline High School Biomass Boiler

St Leonards Place Dunfermline Fife KY11 3BQ [10/00399/FULL]

A biomass boiler of approximately 450 kW has been proposed as part of the heating system for the new Dunfermline High School, in conjunction with conventional natural gas boilers. An air quality assessment was carried out for this boiler in September 2010.

A boiler stack height of 13.88m was modelled to predict the short-term and annual mean ground level concentrations of NO_2 and PM_{10} particulate matter arising through the constant operation of the proposed boiler unit, using measured emission rates. In this pessimistic scenario (pessimistic since the boiler will likely be run for much less time than the whole year), the chosen stack height has been demonstrated to give adequate dispersion to meet Scotland's Air Quality Objectives for the protection of health from PM_{10} and NO_2 .

Auchmuty High School Biomass Boiler
Dovecot Road, Glenrothes, Fife (328320, 700970) [11/01188/FULL]

A biomass boiler of approximately 450kW has been proposed as part of the heating system for the school new Auchmuty School, in conjunction with conventional natural gas boilers. An air quality assessment was carried out for this boiler in April 2011.

A boiler stack height of 16.5m has been modelled to predict the short-term and annual mean ground level concentrations of nitrogen dioxide (NO_2) and PM_{10} particulate matter arising through the constant operation of the proposed boiler unit, using maximum allowable emission rates. In this pessimistic scenario (pessimistic since the boiler will likely be run for much less time than the whole year and the actual emission rates will be lower than modelled), the chosen stack height has been demonstrated to give adequate dispersion to meet Scotland's Air Quality Objectives for the protection of health from PM_{10} and NO_2 pollution.

Table 6.1: Auchmuty High School, Dovecot Road, Glenrothes, Fife

Height of Stack	16.5 m
Diameter of Stack	0.378 m
Dimensions of Buildings within 5 times the stack Height (above the ground)	13.5 m
Description of the combustion appliance	Giles HPK1-K/S (made by Giles Biomass Heating), Woodchip fired hot water boiler, 135-400KW boiler
Maximum emission rates(g/sec) for nitrogen dioxide and particulate matter (PM_{10})	Nitrogen Oxides (NOx) 0.025g/sec Particulate Matter 0.0075g/sec
Background Adjusted emission rates	Nitrogen Dioxide (NO_2) Annual Mean: 1.106 Nitrogen Dioxide (NO_2) 1-hour mean: 5.437 Particulate Matter 3.389
Effective Stack Height	5m

Pitreavie Call Centre Biomass boiler house, fuel store and flue

Castle Drive Dunfermline Fife KY11 8GH (56.048105,-3.423609) [11/03024/FULL]

A biomass boiler of approximately 560kW has been proposed as part of the heating system for the Pitreavie Call Centre. An air quality assessment was carried out for this boiler in June 2011.

A boiler stack height of 13.5m was modelled to predict the short-term and annual mean ground level concentrations of NO_2 and PM_{10} particulate matter arising through the constant operation of the proposed boiler unit, using measured emission rates. In this pessimistic scenario (pessimistic since the boiler will likely be run for much less time than the whole year), the chosen stack height has been demonstrated to give adequate dispersion to meet Scotland's Air Quality Objectives for the protection of health from PM_{10} and NO_2 .

Table 6.2: Pitreavie Call Centre Castle Drive, Dunfermline, Fife

Height of Stack	13m stack on 500mm Plinth = 13.5m
Diameter of Stack	350mm
Dimensions of Buildings within 5 times the stack Height (above the ground)	7.25m
Description of the combustion appliance	Compte-R Compact Evolution 560kW Boiler, Woodchip fired hot water boiler, boiler will run on virgin pulpwood
Maximum emission rates(g/sec) for nitrogen dioxide and particulate matter (PM_{10})	Nitrogen Oxides (NOx) 0.0800g/sec Particulate Matter 0.0611g/sec
Background Adjusted emission rates	Nitrogen Dioxide (NO2) Annual Mean: 4.198 Nitrogen Dioxide (NO2) 1-hour mean: 3.820 Particulate Matter 3.236
Effective Stack Height	10.4m

Fife Council has assessed the biomass combustion plants, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

Fife Council has assessed the potential cumulative impacts of biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment at this time

6.3 Domestic Solid-Fuel Burning

Fife Council do not currently have access to data on domestic solid fuel burning within Fife and are in the process of developing a system to collate this data.

Fife Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

6.4 Proposed Residential and Commercial installations

Redevelopment of Halbeath, Dunfermline

Shepherd Offshore submitted plans [11/04948/PPP] for the redevelopment of the long vacant former Hyundai/Motorola/Freescale facility and site in Halbeath Dunfermline. A Planning Application was lodged with Fife Council including a masterplan vision of the site. Shepherd Offshore's masterplan contains outline proposals for a mixed-use development of the site as set out in the public consultation with the local community. The site is approximately 150 acres, of which only 108 will be developed and 42 acres of new public open space will be created. The proposed mixed use development plans include class; 1 (retail), 4 (business), 5 (general industrial), 6 (warehousing and distribution), 7 (hotel), 9(residential) and 10 (educational) with on-site installation of renewable energy plant

This application is still in the consultation period and Fife Council's Environmental Strategy Team are unaware of any air quality assessment having been produced at present. Fife Council's Environmental Strategy Team has requested that standard air quality planning conditions be used for this development. Fife Council will take into consideration these air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

Tesco Store, Cupar

Tesco Stores Limited submitted a planning application [08/01079/EFULL] to demolish and redevelop their existing class 1 retail unit (situated at South Road, Cupar, Fife, KY155JE) along with a derelict engineering workshop/warehouse. The redevelopment includes an extended petrol station, car park, and new access and ancillary works. Details of this application can be found on the Fife Council Development Services Planning Applications website[20]. The proposed redevelopment is located at the south east edge of the Bonnygate AQMA in Cupar and may impact upon traffic flow, within the allocated area.

Fife Council will take into consideration these air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

Residential Development of 140 Dwellings Dovecot Field / Henderson Meadow, Leuchars
Bett Homes submitted a planning application [11/06066/ARC] for the approval of a residential development of 140 dwellings with associated engineering operations and landscape works at Dovecot Field / Henderson Meadow, Leuchars. This application is still in the consultation period and Fife Council's Environmental Strategy Team are unaware of any air quality assessment that includes an assessment of the potential impact on the local air quality having been produced at present. Fife Council will take into consideration theses air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

Erection of a Supermarket and Petrol station with service yard, Carnegie Drive, Dunfermline

Tesco Stores Limited submitted a planning application [04-202717-FULL] for the erection of a supermarket and petrol station with service yard, Carnegie Drive, Dunfermline. This application is still in the consultation period and Fife Council Environmental Startegy Team are currently awaiting provision of a suitable air quality impact assessment. Fife Council's Environmental Strategy Team has requested that standard air quality planning conditions be used for this development. Fife Council will take into consideration theses air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

7 Fugitive or Uncontrolled Sources

Erection of Concrete Batch Plant (Temporary 5 Years), Keith Road, Port of Rosyth

Forth Ports submitted a planning application [11/05156/FULL] in November 2011 for the erection of concrete batch plant (Temporary 5 Years). This development will need to hold or apply to hold a part B PPC permit which will regulated by SEPA. The applicant will need ensure that the operations on site do not prejudice the achievement of Scottish air quality objectives. Air Quality will continue to be monitored, fulfilling obligations for both PPC licence conditions (SEPA) and Planning Conditions.

Extraction of coal via surface mining methods, Standing Stane Road, Kirkcaldy

Hall Construction services Limited (Hall Construction) submitted a planning application [11/04265/EIA] to extract coal by surface mining methods and to remediate unstable land, areas of collery spoil and derelict land on a area known as Wellsgreen, near East Wemyss in Fife. An environmental statement was produced by consulting firm RPS. The environmental statement includes a qualitative assessment of potential Air Quality impacts on 8 local residential receptors from the development. We note that locations and assessment data appear to have been referenced to appropriate National Air Quality Standards and Objectives. The consultants concluded that 'No significant effect on air quality is predicted at any of the receptors assessed'. A qualitative risk assessment for dust emission from the proposed activities was undertaken for each stage of the proposed development. A source of dust from each of the operations was considered, together with suitable, practical, dust control measures. Material will be moved from the site by rail and that the number of HGV vehicle movements associated with the site will be reduced. RPS have recommended that air quality be monitored during the operational period, and the results passed to the planning authority for appropriate comment. Fife Council Environmental Strategy team are generally satisfied with the information provided by RPS within Chapter 8 'Air Quality' of the Environmental Statement. Air quality will continue to be monitored, fulfilling obligations for both PPC licence conditions (SEPA) and Planning Conditions.

Extension to Surface Mine and Rephasing of Restoration of 05/03715/WEIA, Inverkeithing Road, Crossgates, Fife

A planning application[10/02133/EIA] for the Extension to Surface Mine and rephasing of Restoration of [05/03715/WEIA] (Proposed Open Cast Coal Site, Muir Dean, Inverkeithing Road, Crossgates, Fife). An environmental statement was produced by consulting firm Entec. The environmental statement includes details on the monitoring methodology and mitigation measures, to ensure operations on site do not cause significant air quality impacts. It includes both short and long term monitoring of relevant receptors, assessing current and potential air quality impacts from the development. We note that that the locations and results of this monitoring have been referenced to appropriate National Air Quality Standards and Objectives. The consultants concluded that 'Whilst there is potential for a small decrease in local air quality due to the proposed development, it would only be of a short duration and should at no time result in air quality criteria levels being exceeded, as the site activity is unlikely to generate a significant quantity of PM_{10}. It is therefore concluded that there would be no significant change to the health risk as a result of the proposed development'. The proposals from the Annfield Extension would not lead to an increase in traffic levels over those related to the existing Muir Dean Surface Mine site operations. Fife Councils Environmental Strategy Team are generally satisfied with the information provided by Entec within Chapter 15 'Assessment

of the effects on Air Quality arising from the development' . Air quality will continue to be monitored, fulfilling obligations for both PPC licence conditions (SEPA) and Planning Conditions.

Extension To Existing Quarry North Of Ladybank Fife

Angle Park Sand and Gravel co. Ltd. submitted a planning application [11/04960/FULL] (Variation of planning permission 06/02170/EEIA) to allow for deepening of extractive works and extension of permitted area for extraction , located North Of Ladybank Fife. An environmental impact assessment was produced by consulting firm Dalgleish Associates Ltd. The consultants included an assessment of Air Quality with regard to emissions of PM_{10}'s from the site. The report includes details on the monitoring methodology and mitigation measures, to ensure operations on site do not cause significant air quality impacts. The consultant has referenced appropriate Air Quality Guidance and concludes that operations on site will not breach National Air Quality Regulations. It was concluded that there will be no increase in traffic movement, and therefore traffic related pollution as a result of any continued operations at the site. Air quality will continue to be monitored, fulfilling obligations for both PPC licence conditions (SEPA) and Planning Conditions.

Extension to hard rock quarry and amendment to restoration plan, Cruicks Quarry, Inerkeithing

Tarmac submitted a planning application [11/05080/EIA] for the extension to hard rock quarry by the deepening of quarry floor to allow for the continued extraction, processing and sale of quartz dolerite at Cruicks Quarry, Inverkeithing. Also the amendment to restoration plan (application 01/03014/WFULLas amended by application 09/00161/WFULL). An environmental statement was produced by consulting firm David Jarvis and Associates Ltd. It concluded that there is little risk of the Air Quality Standards being exceeded as a result of the proposals. Also the predicted volume of material to be transported by road will be no greater and indeed is likely to be less than that currently permitted and previously undertaken. Air quality will continue to be monitored, fulfilling obligations for both PPC licence conditions (SEPA) and Planning Conditions.

Scoping opinion for the Establishment of a Quarry, Kinloch Farm, Nr Collessie, Fife

Laird Aggregrates Ltd. submitted a scoping report [11/06198/SCO] for a proposed sand and gravel quarry at Kinloch Farm, Near Collessie, Fife. This application is still in the consultation period and Fife Council's Environmental Strategy Team are unaware of any environmental statement or air quality assessment having been produced at present. Fife Council's Environmental Strategy Team has requested that the environmental statement 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 and that the relevant air quality Technical Guidance should be consulted with regards to this assessment of air quality. Fife Council will take into consideration theses air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

With Consultation from SEPA, Fife Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

7.1 Other

Screening opinion for erection of 2 turbines Cowdenbeath. Fife: Land At To The West Of Chemical Works Mossmorran Fife (12/00669/SCR | EIA)

Fife Council as Planning Authority has adopted the opinion that the proposal will not require an EIA. Nevertheless, should an application be submitted for this proposal in the future, Fife Council will require a comprehensive visual impact assessment to form part of that submission alongside assessments in relation to: access, landscape impact, noise, aviation, and ecology/ornithology as set out in the request for a screening opinion. In addition to these, the proximity of the site to the Mossmorran chemical works means that a comprehensive air quality assessment should also form part of any future submission.

This application is still in the consultation period and Fife Council's Environmental Strategy Team are unaware of any air quality assessment having been produced at present. Fife Council will take into consideration these air quality issues during the consultation period of this application and will further assess the situation in the forthcoming 2013 Progress Report.

8 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 for the "TRY IT" campaign in Cupar (Appendix F) 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 G) and other new co- production models for health and well being ("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).

8.1 Air Quality Planning Policy

There has been no new Fife Council Policies/Plans since the last 2011 Progress Report (ie transport, climate change strategies etc.)

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Fife Council undertakes extensive automatic and diffusion tube air quality monitoring throughout its area. This monitoring is carried out to the high standard required for the review and assessment process.

Nitrogen Dioxide

Monitoring of NO_2 at the four automatic sites in Fife showed that concentrations at Appin Crescent in Dunfermline, Bonnygate in Cupar, St Clair Street in Kirkcaldy and Admiralty Road in Rosyth were below the annual mean objective. There were also no exceedences of the 1 hour NO_2 objective for any of the four automatic monitoring sites.

$N0_2$ concentrations measured by the automatic monitoring stations in the two AQMA's - Bonnygate, Cupar and Appin Crescent, Dunfermline - are both below the objective.

Bias adjusted diffusion tube data at 6 locations within Fife, exceeded the NO_2 annual mean objective of 40μg/m^3. These locations were:

- Appin Crescent 2, Dunfermline
- Appin Crescent 3, Dunfermline
- Appin Crescent 5 (A,B,C), Dunfermline
- Appin Crescent 6 (A,B,C), Dunfermline
- S t Clair Street 1, Kirkcaldy
- Bonnygate 3(A,B), Cupar

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

The Bonnygate Cupar diffusion tube 3(A,B) exceeded the 40 μg/m^3 objective when using the regional derived bias adjustment factor (0.83) rather than Local (0.73) or national bias (0.78) adjustment factor, which are below the objective. At 40.0 μg/m^3 this exceedence is borderline and Table 2.7 shows that concentrations in the Bonnygate area have decreased over 2009, 2010 and 2011 since being declared an AQMA in 2008. This is consistent with automatic monitoring concentrations and could be as a result of the traffic management measures introduced in mid 2009.

Within Appin Crescent, diffusion tubes sites 2, 3, 5 and 6 exceed the 40μg/m^3 objective. 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. A Detailed Assessment was carried out in 2011 for Appin Crescent and following that report this area was declared as an AQMA for NO_2 by Fife Council in 2011.

Concentrations at St Clair Street, Kirkcaldy, diffusion tubes sites (1 and 2) have consistently measured concentrations around the 40μg/m^3 objective, with concentrations exceeding the objective in 2008, 2010. In 2010 concentrations exceeded the objective when corrected using the National derived Bias Adjustment factor. St Clair Street 1 in 2011 measured 42μg/m^3, exceeding the objective. Whilst in 2011 St Clair Street 2 measured 36.2μg/m^3, measuring below the objective.

As concluded in the 2010 Progress Report, if St Clair Street continued to exceed the objective, then Fife Council should proceed with a Detailed Assessment for NO_2 in the area of St Clair Street. With St Clair Street 1 tube exceeding for another consecutive year it is therefore recommended, in accordance with the Technical Guidance LAQM. TG (09), that Fife Council should proceed to a Detailed Assessment for NO_2 in the area of St Clair Street, Kirkcaldy.

Diffusion tube (AQM5) at Admiralty Road, Rosyth was close to exceeding the 40μg/m^3 objective (39.0μg/m^3) when corrected using the locally derived bias adjustment factor. This site is situated at a kerbside location and has now been relocated to the façade of a nearby building in accordance with Technical Guidance LAQM. TG (09). Other triplicate diffusion tube sites in Admiralty Road, which are in locations of relevant exposure, show concentrations below the objective, concurring with those measured at the automatic monitoring site.

Nitrogen dioxide monitoring carried out by INEOS in the vicinity of the Grangemouth oil refinery continued to show low concentrations than set air quality limit of 30.6 μg/m^3 mirroring previous year's results. With the exception of location CO19 (Grange Manor Hotel, Grangemouth), which show the annual average of 32.5 μg/m^3.

Particulate Matter

PM10

PM_{10} concentrations are monitored at automatic sites in Bonnygate in Cupar, Admiralty Road in Rosyth, St Clair Street in Kirkcaldy and Appin Crescent in Dunfermline. Data collected for 2011 showed that both Bonnygate and the Admiralty Road sites exceeded the annual mean objective with concentrations of **19 μg/m^3** and **20 μg/m^3** respectively. Both Appin Crescent, Dunfermline (16.32 μg/m^3) and St Clair Street, Kirkcaldy (13 μg/m^3) were below the annual mean objective.

This is the second year Admiralty Road has exceeded the annual mean objective for PM_{10}. There has also been an increase in PM_{10} concentrations since the last Detailed Assessment carried out in 2009; measured PM_{10} concentrations in 2010 and 2011 have been above the maximum modelled PM_{10} annual average concentrations at a relevant receptor, which was predicted to be 16.9 μgm^{-3} in 2010. With the monitoring site being in a location of relevant exposure and flats and houses being located across and along the street from the monitoring site, and in accordance with the Technical Guidance LAQM. TG (09)[2], it is recommended that Fife Council proceed to a Detail Assessment for PM_{10}.

Bonnygate Cupar has been declared an AQMA for PM_{10} since 2008 and an Action Plan has been adopted since 2010.

The 24 hour mean objective of 50 μg/m^3 not to be exceeded more than 7 times per year was not exceeded at any site.

PM2.5

Short-term monitoring undertaken by the Fife Council for $PM_{2.5}$ at Admiralty Road, Rosyth indicates that the annual mean concentration is lower than the Scottish annual mean objective of 12 μg/m^{-3}. There are no new industrial processes, roads or other developments that require detailed assessment with respect to this pollutant.

Sulphur Dioxide

Results for SO_2 monitoring in Fife in 2011 indicate that AQS objectives for SO_2 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 2011 confirms the conclusion of previous reports that a Detailed Assessment is not required for SO_2.

Carbon Monoxide

Short-term monitoring undertaken by the Fife Council Transportation Department in 2011 indicates that the Air Quality Strategy Objective for CO are likely to be met. There are no new industrial processes, roads or other developments that require detailed assessment with respect to this pollutant. Hence, new information in 2011 confirms the conclusion of previous reports that a Detailed Assessment is not required for CO.

Benzene

Results of the ongoing air quality monitoring study for Ineos and BP Exploration indicate that ambient concentrations of benzene in Fife during 2011 met the Air Quality Strategy Objective of 1ppb. There are no new industrial processes, roads, petrol stations or other developments that require detailed assessment for this pollutant. Hence, new information in 2011 confirms the conclusion of previous reports that a Detailed Assessment is not required for benzene.

1,3 Butadiene

Results of ongoing air quality monitoring study for INEOS and BP Exploration also indicate that ambient concentrations of 1,3-butadiene in Fife during 2011 met the Air Quality Strategy Objective. There are no new industrial processes, roads, or other developments that require detailed assessment for this pollutant. Hence, new information in 2011 confirms the conclusion of previous reports that a Detailed Assessment is not required for 1,3-butadiene.

Other Hydrocarbons

Results of ongoing air quality monitoring study for INEOS and BP Exploration also indicate that ambient concentrations of hydrocarbons (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) in Fife during 2011 are low, but there are no air quality standards for these substances.

9.2 Conclusions from Assessment of Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Busy Streets where people may spend 1-hour or more close to traffic;
- Roads with a high flow of buses and/or HGVs;
- Junctions;
- New Roads constructed or proposed since the last round of review and assessment;
- Roads with significantly changed traffic flows and;
- Bus and coach stations.

9.2.1 Other Transport Sources

There is no requirement to proceed to a Detailed Assessment for the following sources

- Airports;
- Railways (diesel and steam trains) and;
- Ports (shipping).

9.2.2 Industrial Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Industrial installations;
- New or significantly changed installations with no previous air quality assessment;
- Major fuel (petrol) storage depots and;
- Petrol stations
- Poultry Farms

9.2.3 Commercial and Domestic Sources

There is no requirement to proceed to a Detailed Assessment for the following sources:

- Biomass combustion- Individual installations
- Biomass combustion- Combined Impacts
- Domestic Solid Fuel Burning
- Proposed Residual and Commercial Installations

9.2.4 Fugitive and Uncontrolled Sources

There is no requirement to proceed to a Detailed Assessment for any fugitive sources.

9.3 Proposed Actions

Fife Council has identified the need for two Detailed Assessment to be carried out for pollutants nitrogen dioxide and particulate matter at the following location:-

- **Admiralty Road, Rosyth–PM_{10};**
- **St Clair Street, Kirkcaldy– NO_2**

The Detailed Assessment should be completed within 12 months of the date they are initiated however, in some locations a minimum of 6 months monitoring data will be required before a the Detailed Assessment can be prepared. The next step of Fife Council in the air quality review and assessment process will be the 2013 Progress Report, to be finished for the end of April 2013.

Progress on measures contained in the Bonnygate Cupar Air Quality Action Plan are reported in Appendix E. The Bonnygate Air Quality Core Steering Group continues to meet on a quarterly basis to ensure action plan measures are suitably progressed.

Fife Council accepts these conclusions and will implement the recommendations.

10 References

1. 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

2. 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

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

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

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

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

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

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

9. 2009 Air Quality Updating and Screening Assessment for Fife Council AEAT/ENV/R/2803

10. Air Quality Review and Assessment Progress Report for Fife Council 2010. AEAT/ENV/R/2977

11. Air Quality Detailed Assessment For Fife Council 2008: Bonnygate, Cupar. AEAT/ENV/R/2615, May 2008

12. Air Quality Detailed Assessment For Fife Council 2008: Appin Crescent, Dunfermline. AEAT/ENV/R/2705, January 2009

13. Air Quality Detailed Assessment For Fife Council 2008: Admiralty Road, Rosyth, AEAT/ENV/R/2761, April 2009

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

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

16. Air Quality Review and Assessment, Further Assessment

17. Fife Councils, Bonnygate Air Quality Action Plan, 2010, AEAT/ENV/R/ED05550006

18. Review of Annual Air Quality Impacts around Longannet Power Station – Calendar year 2011, Iberdrola, Engineering & Construction, March 2011

19. Air Quality Review and Assessment Help desk: http://www.uwe.ac.uk/aqm/review/index.html
20. Fife Council Website: http://www.fife.gov.uk
21. SEPA Website: www.sepa.org.uk
22. UK Air Quality Archive: http://www.airquality.co.uk/archive/laqm/tools.php
23. Fife Council Website: http://www.fifedirect.org.uk/airquality
24. Air Quality Assessment of a Biomass Boiler at Dunfermline High School 6AEAA01L, Jacobs, September 2010
25. Proposed Biomass Boiler Air Quality Assessment at Auchmuty High School, Glenrothes 6AEAA02A, Jacobs, April 2011
26. REPORT FOR CLEARPOWER LTD ON PROPOSED BIOMASS BOILER INSTALLATION AT BSKYB (DUNFERMLINE) KY11 8GH, Poujoulat UK, June 2011
27. Annual Community Air Quality Monitoring Report 2011, INEOS, Feb 2012
28. Annual report on air quality for BP Production and Exploration, Houndpoint, 2011, NPL, May 2012
29. MOSSMORRAN & BRAEFOOT BAY INDEPENDENT AIR QUALITY MONITORING REVIEW GROUP, 2009 Annual Report, Environment Enterprise and Transportation Committee, August 2010
30. A stronger Future for Life "Single Outcome Agreement between Fife Partnership and Scottish Government 2009-2012, Fife Council, Version1.1 (02/04/09), www.fifedirect.org.uk
31. Fife Councils Plan 2007 – 2011, Fife Council, November 2007, www.fifedirect.org.uk
32. Fife Council State of the Environment Report 2007, www.fifedirect.org.uk
33. Fife Structure Plan 2006 – 2026, Fife Council, May 2009, www.fifedirect.org.uk
34. National Transport Strategy for Scotland 2006, December 2006, www.scotland.gov.uk/Publications/2006/12/04104414/11
35. South East of Scotland Transport (SEStran) Partnership Regional Transport Strategy 2008 – 2023, SEStran, 2008, www.sestran.gov.uk/publications
36. Fife Council Local Transport Strategy 2006, Fife Council, Oct 2006, www.fifedirect.org.uk
37. Annual Report of the Chief Medical Officer 2010. "Health in Scotalnd 2010. Assets for Health" (Scottish Government 2011)
38. Fife's Health and Wellbeing Plan 2011 -14. Fife Health and Wellbeing Alliance (2011)
39. A Scientific and psychosocial environmental investigation tool: the Meeting, Understanding, Surveillance, Toxically, Evaluation and Reporting (MUSTER) model. Jackie Hyland, Peter Donnelly. Post Graduate Medical Journal (March 2011)
40. 2011 Annual Report; Mossmaron & Braefoot bay Independent Air Quality Monitoring Review Group.

Appendices

Appendix A Automatic Monitoring Sites

Appendix B QA/ QC Data

Appendix C Diffusion Tube Bias Calculations and Period Mean Adjustments

Appendix D Diffusion Tube Data

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

Appendix F Fife Council "TRY IT" Initiative Report 2011Appendix G Asset Based Approach to Local Air Quality Management

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

Appendix I 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_x, NO NO_2, PM_{10} (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_2 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_{10} (TEOM) NOx, NO, NO_2
Instrument manufacturer:	FDMS NOx – 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_2 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_{10} (FDMS) NOx, NO, NO_2
Instrument manufacturer:	FDMS– R and P NOx – 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_2 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_{10} (FDMS) NOx, NO, NO_2
Instrument manufacturer:	FDMS– R and P NOx – 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_2 tubes installed

Appendix B – QA/ QC Data

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 NO_x analyser;
- 6-monthly audits and servicing of the monitoring site;
- Data ratification.

Calibrations of the NO_x 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 NO_x 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_2 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_2 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_2 solution is also provided via this contract. This solution is run as an internal check for NO_2 tubes in the laboratory. The solution is tested after every 21 NO_2 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 Calculations and Period Mean Adjustments

Diffusion Tube Bias Adjustment Factors

Diffusion tubes may systematically under or over-read NO_2 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. Figures C1 to C4 show the locally derived adjustment factors with the national adjustment factor shown in Figure C6.

Factors from Local Co-location and National Studies

Figure C1 Local Bias Adjustment Factor from Appin Crescent, Dunfermline.

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011	42.1	43.1	45.6	44	1.8	4	4.5	47	99.7	Good	Good
2	02/02/2011	02/03/2011	51.2	52.4	54.2	53	1.5	3	3.8	41	81.6	Good	Good
3	02/03/2011	30/03/2011								35	97.9		Good
4	30/03/2011	27/04/2011	44.3	38.1	43.1	42	3.3	8	8.2	31	96.1	Good	Good
5	27/04/2011	01/06/2011								23	99.9		Good
6	01/06/2011	29/06/2011	33.0	35.6	32.0	34	1.9	6	4.6	22	99.6	Good	Good
7	29/06/2011	05/08/2011	30.0	27.9	41.4	33	7.3	22	18.0	20	99.9	Poor Precision	Good
8	05/08/2011	02/09/2011	35.5	36.3	37.2	36	0.9	2	2.1	23	92.3	Good	Good
9	02/09/2011	30/09/2011	34.1	31.9	35.1	34	1.6	5	4.1	26	59.6	Good	or Data Capture
10	30/09/2011	04/11/2011	30.1	29.7	32.7	31	1.6	5	4.0	25	99.9	Good	Good
11	04/11/2011	30/11/2011	43.6	43.0	41.0	43	1.4	3	3.4	38	99.8	Good	Good
12	30/11/2011	06/01/2012	34.1	35.2	32.7	34	1.3	4	3.1	36	98.8	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

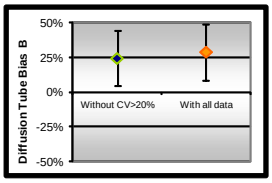
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Fife Dunfermline (Appin Cresent)

Precision: 9 out of 10 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 8 periods of data	
Bias factor A	0.83 (0.71 - 1)
Bias B	20% (0% - 40%)
Diffusion Tubes Mean:	39 µgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	96%
Adjusted Tubes Mean:	33 (28 - 39) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.7 - 0.97)
Bias B	23% (3% - 43%)
Diffusion Tubes Mean:	39 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	31 µgm^{-3}
Data Capture for periods used:	96%
Adjusted Tubes Mean:	31 (27 - 38) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C2. Local Bias Adjustment Factor from Admiralty Road, Rosyth

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011	42.7	45.5	40.3	43	2.6	6	6.5	43	99.7	Good	Good
2	02/02/2011	02/03/2011	46.7	44.5	43.8	45	1.5	3	3.8	39	99.6	Good	Good
3	02/03/2011	30/03/2011	34.9	32.5	36.6	35	2.1	6	5.1	32	99.9	Good	Good
4	30/03/2011	27/04/2011	28.8	34.9	29.0	31	3.5	11	8.6	28	90	Good	Good
5	27/04/2011	01/06/2011	18.9	18.8	19.6	19	0.4	2	1.1	20	99.6	Good	Good
6	01/06/2011	29/06/2011	31.1	31.9	31.7	32	0.4	1	1.0	27	99.6	Good	Good
7	29/06/2011	05/08/2011	27.0	28.4	29.1	28	1.1	4	2.7	26	99.7	Good	Good
8	05/08/2011	02/09/2011								24	98.7		Good
9	02/09/2011	30/09/2011	30.3	29.0	34.3	31	2.8	9	6.9	23	99.6	Good	Good
10	30/09/2011	04/11/2011								27	99.6		Good
11	04/11/2011	30/11/2011								31	99.5		Good
12	30/11/2011	06/01/2012	21.9	23.9	22.9	23	1.0	4	2.5	25	99	Good	Good
13													

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

Overall survey --> Good precision | Good Overall DC

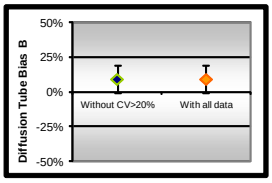
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Fife Rosyth (Admiralty Road)

Precision 9 out of 9 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 9 periods of data
Bias factor A 0.92 (0.84 - 1.01)
Bias B 9% (-1% - 19%)
Diffusion Tubes Mean: 32 µgm^{-3}
Mean CV (**Precision**): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 9 periods of data
Bias factor A 0.92 (0.84 - 1.01)
Bias B 9% (-1% - 19%)
Diffusion Tubes Mean: 32 µgm^{-3}
Mean CV (**Precision**): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 29 (27 - 32) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C3. Local Bias Adjustment from Bonnygate, Cupar

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011	52.3	54.4	54.6	54	1.3	2	3.2	45	52.3	Good	or Data Captu
2	02/02/2011	02/03/2011	49.0	53.8	54.5	52	3.0	6	7.4	41	99.9	Good	Good
3	02/03/2011	30/03/2011	45.6	46.9	46.6	46	0.7	1	1.7	34	99	Good	Good
4	30/03/2011	27/04/2011	35.9		41.6	39	4.0	10	36.2	28	99.3	Good	Good
5	27/04/2011	01/06/2011	33.4	33.0	35.1	34	1.1	3	2.8	24	99.5	Good	Good
6	01/06/2011	30/06/2011	36.6	39.5	39.5	39	1.7	4	4.2	24	98.7	Good	Good
7	30/06/2011	04/08/2011	40.0	40.0	40.8	40	0.5	1	1.1	24	99.3	Good	Good
8	04/08/2011	01/09/2011	36.2	38.1	37.7	37	1.0	3	2.5	20	36.8	Good	or Data Captu
9	01/09/2011	29/09/2011	34.5	36.7	37.2	36	1.4	4	3.6	25	67.9	Good	or Data Captu
10	29/09/2011	03/11/2011	43.1	44.0	44.7	44	0.8	2	2.0	28	99.5	Good	Good
11	03/11/2011	02/12/2011	44.4	46.0	46.4	46	1.1	2	2.6	37	99.6	Good	Good
12	02/12/2011	05/01/2012	27.3	30.7	29.5	29	1.7	6	4.3	31	99.6	Good	Good
13													

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

Overall survey --> Good precision | Poor Overall DC

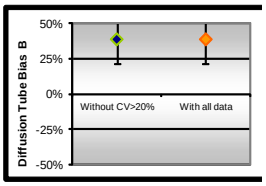
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Fife Cupar (Bonnygate)

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 9 periods of data
Bias factor A 0.73 (0.65 - 0.84)
Bias B 36% (19% - 53%)
Diffusion Tubes Mean: 41 µgm^{-3}
Mean CV (**Precision**): 4
Automatic Mean: 30 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 30 (27 - 34) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 9 periods of data
Bias factor A 0.73 (0.65 - 0.84)
Bias B 36% (19% - 53%)
Diffusion Tubes Mean: 41 µgm^{-3}
Mean CV (**Precision**): 4
Automatic Mean: 30 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 30 (27 - 34) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C4. Local Bias Adjustment from St Clair Street, Kirkcaldy

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	05/01/2011	02/02/2011									0		or Data Captu
2	02/02/2011	01/03/2011								29	73.2		or Data Captu
3	01/03/2011	28/03/2011								27	99.4		Good
4	28/03/2011	25/04/2011	26.4	26.0	24.3	26	1.1	4	2.8	22	99.6	Good	Good
5	25/04/2011	30/05/2011	19.2	18.7	18.0	19	0.6	3	1.5	17	99.9	Good	Good
6	30/05/2011	28/06/2011	22.0	24.0	21.5	23	1.3	6	3.3	20	99.6	Good	Good
7	28/06/2011	02/08/2011	22.0	21.5	21.2	22	0.4	2	1.0	19	99.6	Good	Good
8	02/08/2011	29/08/2011	20.6	20.7	21.0	21	0.2	1	0.5	19	99.5	Good	Good
9	29/08/2011	26/09/2011	23.5	21.7	21.7	22	1.0	5	2.6	19	99.6	Good	Good
10	26/09/2011	01/11/2011	25.9	26.1	21.3	24	2.7	11	6.7	17	99.7	Good	Good
11	01/11/2011	01/12/2011	29.7	31.9	31.8	31	1.2	4	3.1	17	99.4	Good	Good
12	01/12/2011	05/01/2012	24.0	27.5	26.7	26	1.8	7	4.6	23	99.8	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

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

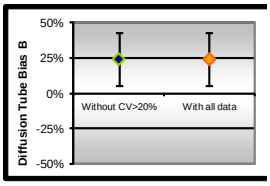
Site Name/ ID:	Fife Kirkcaldy (St Clair Street)

Precision	9 out of 9 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.71 - 0.96)
Bias B	23% (4% - 42%)
Diffusion Tubes Mean:	24 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	19 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	19 (17 - 23) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.71 - 0.96)
Bias B	23% (4% - 42%)
Diffusion Tubes Mean:	24 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	19 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	19 (17 - 23) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C5. National Bias Adjustment Factor

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/12

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

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 September 2012

LAQM Helpdesk Website

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.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

Step 4: 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[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Tayside Scientific Services	20% TEA in water	2011	K	Marylebone Road Intercomparison	12	127	100	27.6%	P	0.78
Tayside Scientific Services	20% TEA in water	2011	UB	Dundee City Council	9	16	10	54.3%	G	0.65
Tayside Scientific Services	20% TEA in water	2011	R	Dundee City Council	12	46	36	28.2%	G	0.78
Tayside Scientific Services	20% TEA in water	2011	R	Dundee City Council	9	46	36	29.8%	P	0.77
Tayside Scientific Services	20% TEA in water	2011	K	Fife Council	9	41	30	36.1%	G	0.73
Tayside Scientific Services	20% TEA in water	2011	R	Fife Council	9	39	31	23.1%	G	0.81
Tayside Scientific Services	20% TEA in water	2011	R	Fife Council	9	24	19	23.1%	G	0.81
Tayside Scientific Services	20% TEA in water	2011	R	Fife Council	9	32	29	8.9%	P	0.92
Tayside Scientific Services	20% TEA in water	2011		Overall Factor[3] (8 studies)				Use		0.78

Period Mean Adjustment

The Period Mean adjustment was carried out in accordance with Box 3.2: Estimation of annual mean concentrations from short-term monitoring data, from Technical Guidance LAQM.TG(09). The following sites were used to calculate the period mean adjustment factor as they were the best suited Urban background sites available, as stated in Technical Guidance LAQM.TG(09).

See the period mean adjustment figures below.

Figure C6. Period Mean Adjustment Factor

NO_2 diffusion tube

	Annual Mean 2011 (Am)	Period Mean 1 2011 (Pm)	Ratio (Am/Pm)	Period Mean 2 2011 (Pm)	Ratio (Am/Pm)
Bush Estate	6	5	1.20	6	1.00
Edinburgh St Leonards	25	21	1.19	21	1.19
Grangemouth AURN	15	12	1.25	15	1.00
		Average (R_a)	**1.21**	**Average (R_a)**	**1.08**

PM_{10}

Auchencorth Moss	7	7	1.00
Edinburgh St Leonards	15	155	1
Grangemouth AURN	14	13	1.08
		Average (R_a)	**1.03**

$PM_{2.5}$

Auchencorth Moss	4	4	1.00
Edinburgh St Leonards	12	12	1.00
Grangemouth AURN	11	11	1.00
		Average (R_a)	**1.00**

Appendix D Diffusion Tube Data

	TUBE LOCATION							
	ST CLAIR ST 1	ST CLAIR ST 2	ST CLAIR ST 3	WEDDERBURN RD	LOVAT RD	DUNNIKIER RD	St Clair St Roman A	St Clair St Roman B
ON/OFF DATE	KIRKCALDY	KIRKCALDY	Kirkcaldy	KIRKCALDY	GLENROTHES	KIRKCALDY		
05/01/11 - 02/02/11	71.8	51.6	44.3	22.5	31.8	41.7	-	-
02/02/11 - 01/03/11	64.3	58.2	55.4	23.5	31.1	47.2	-	-
01/03/11 - 28/03/11	61.9	57.9	45.7	20.1	27.3	43.7	-	-
28/03/11 - 25/04/11	52.2	42.5	38.3	13.2	20.9	39.1	26.4	26.0
25/04/11 - 30/05/11	41.7	37.6	34.6	10.3	14.5	30.2	19.2	18.7
30/05/11 - 28/06/11	47.2	45.3	38.4	11.9	16.0	35.9	22.0	24.0
28/06/11 - 02/08/11	42.2	51.0	42.8	8.9	17.3	37.2	22.0	21.5
02/08/11 - 29/08/11	43.5	41.3	37.6	10.3	16.5	33.6	20.6	20.7
29/08/11 - 26/09/11	47.3	34.1	32.1	-	15.2	30.8	23.5	21.7
26/09/11 - 01/11/11	48.6	37.8	37.7	12.3	19.6	34.4	25.9	26.1
01/11/11 - 01/12/11	54.0	48.0	47.4	-	-	41.1	29.7	31.9
01/12/11 - 05/01/11	47.3	30.6	26.0			25.8	24.0	27.5
RUNNING MEAN	**51.8**	**44.7**	**40.0**	**14.8**	**21.0**	**36.7**	**23.7**	**24.2**

	TUBE LOCATION							
	VICTORIA RD	GLENLYON	LESLIE HIGH ST	ASDA R/B	QUEENSWAY	KIRKCALDY	KIRKCALDY	St Clair St Roman C
ON/OFF DATE	KIRKCALDY	LEVEN	LESLIE	KIRKCALDY	GLENROTHES	Travel Bank	Travel Bank	
05/01/11 - 02/02/11	51.6	48.3	39.6	50.3	43.2	-	-	-
02/02/11 - 01/03/11	47.4	46.1	36.4	52.3	36.7	0.2	<0.01	-
01/03/11 - 28/03/11	45.4	41.6	34.9	47.2	33.4	-	-	-
28/03/11 - 25/04/11	40.3	32.6	29.4	43.0	25.7	-	-	24.3
25/04/11 - 30/05/11	32.8	29.3	22.4	30.0	22.5	0.4	0.5	18.0
30/05/11 - 28/06/11	38.1	32.1	27.1	39.1	26.5	-	-	21.5
28/06/11 - 02/08/11	39.3	31.4	26.6	37.5	26.3	-	-	21.2
02/0/11 - 29/08/11	35.4	31.6	24.4	35.8	25.4	-	-	21.0
29/08/11 - 26/09/11	31.2	30.5	19.2	36.0	20.9	-	-	21.7
26/09/11 - 01/11/11	35.9	33.3	24.4	40.1	24.3	-	-	21.3
01/11/11 - 01/12/11	45.7	36.9	31.1	47.8	32.2	-	-	31.8
01/12/11 - 05/01/11	29.6	19.4	24.0		23.3			26.7
RUNNING MEAN	**39.4**	**34.4**	**28.3**	**41.7**	**28.4**	**0.3**	**0.5**	**23.1**

	TUBE LOCATION										
ON/OFF DATE	BONNYGATE 1, CUPAR	BONNYGATE 2, CUPAR(	BONNYGATE 3A, CUPAR(1	BONNYGATE 3B, CUPAR	BONNYGATE B4 CUPAR	CITY RD 1, ST ANDREWS	CITY RD 2, ST ANDREWS	BELL ST 1, ST ANDREW	BELL ST 2, ST ANDREW	WINDSOR GDNS, ST	Cupar Travel
RUNNING MEAN											
05/01/11 - 02/02/11	51.6	62.0	67.0	61.1	59.0	32.7	33.7	53.3	41.7	12.4	-
02/02/11 - 02/03/11	50.6	56.7	58.2	62.3	54.7	46.0	41.0	51.9	45.4	12.8	-
02/03/11 - 30/03/11	45.0	54.7	51.1	58.7	52.9	36.7	39.4	50.5	42.5	8.6	-
30/03/11 - 27/04/11	37.3	50.7	47.4	48.2	43.4	32.7	34.4	45.4	43.1	7.4	-
27/04/11 - 01/06/11	32.8	38.2	38.1	35.5	34.4	24.7	27.7	-	31.6	5.0	0.1
01/06/11 - 30/06/11	36.1	45.8	41.8	49.9	39.1	36.1	32.8	42.1	30.9	5.3	-
30/06/11 - 04/08/11	36.8	46.8	52.1	54.3	36.2	43.9	43.9	41.3	29.5	5.1	-
04/08/11 - 01/09/11	31.6	48.0	47.6	50.0	39.8	34.3	34.7	38.4	32.7	5.2	-
01/09/11 - 29/09/11	33.5	44.1	39.1	41.9	29.9	28.2	27.6	42.5	34.8	6.5	-
29/09/11 - 03/11/11	41.7	48.8	49.6	53.1	44.3	39.7	38.4	48.7	41.4	8.9	-
03/11/11 - 02/12/11	39.0	49.2	48.2	50.1	45.6	39.3	26.5	62.8	46.8	-	-
02/12/11 - 05/01/12	28.8	36.5	32.2	33.0	30.1	19.2	17.6	37.1	29.4		
RUNNING MEAN	**38.7**	**48.5**	**47.7**	**49.8**	**42.5**	**34.5**	**33.1**	**46.7**	**37.5**	**7.7**	**0.1**

	TUBE LOCATION										
ON/OFF DATE	CUPAR RD, A'MUCH	MILLFIELD, CUPAR	SOUTH RD, CUPAR	CROSS GATE, CUPAR	LADYWYND B5, CUPAR	BONNYGATE WEST B6 CUPAR	NITOR BA CUP	TOR BB C	TOR BC C	EAST ROA	
RUNNING MEAN											
05/01/11 - 02/02/11	40.4	22.3	-	38.7	36.6	34.2	52.3	54.4	54.6	30.5	
02/02/11 - 02/03/11	43.7	19.9	0.2	37.4	35.1	34.6	49.0	53.8	54.5	25.9	
02/03/11 - 30/03/11	43.2	13.1	23.2	36.0	24.1	30.2	45.6	46.9	46.6	21.2	
30/03/11 - 27/04/11	0.1	10.0	17.1	30.7	21.1	22.5	35.9	<0.1	41.6	15.0	
27/04/11 - 01/06/11	26.7	7.7	12.1	26.8	17.6	19.8	33.4	33.0	35.1	11.2	
01/06/11 - 30/06/11	31.2	7.6	14.4	29.2	20.3	22.5	36.6	39.5	39.5	-	
30/06/11 - 04/08/11	30.9	7.8	13.9	31.9	21.0	24.2	40.0	40.0	40.8	11.2	
04/08/11 - 01/09/11	32.6	8.4	16.0	27.4	18.8	25.1	36.2	38.1	37.7	14.4	
01/09/11 - 29/09/11	34.4	9.2	18.8	19.6	19.5	20.2	34.5	36.7	37.2	14.9	
29/09/11 - 03/11/11	31.5	12.7	21.7	34.7	26.1	28.1	43.1	44.0	44.7	21.3	
03/11/11 - 02/12/11	35.9	-	21.3	32.3	30.0	29.8	44.4	46.0	46.4	17.1	
02/12/11 - 05/01/12	25.5		15.9	23.4		12.7	27.3	30.7	29.5	18.0	
RUNNING MEAN	**31.3**	**11.9**	**15.9**	**30.7**	**24.6**	**25.3**	**39.9**	**42.1**	**42.4**	**18.2**	

SITE CODE	DRM5	DRM6	DRM8	DRM9A	DRM9B	DRM9C
LOCATION	Rumblingwell	Aytoun Grove	Barrie Street	Appin Crescent A	Appin Crescent B	Appin Crescent C
	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline
5/01/11 - 2/02/11	39.8	25.5	22.6	50.3	51.3	28.7
2/02/11 - 2/03/11	45.5	29.2	26.3	59.5	69	63.6
2/03/11 - 30/03/11	19.9	16.8	24.1	59.3	49.5	50.8
30/03/11 - 27/04/11	29.8	13.1	14	51.6	47.2	50.9
27/04/11 - 01/06/11	20.9	10.3	8.5	35.4	29.3	30.1
01/06/11 - 29/06/11	28.3	12.2	N/A	40.2	38.8	N/A
29/06/11 - 05/08/11	28.1	12.2	12	38.7	33.9	35.1
05/08/11 - 02/09/11	N/A	14.1	12.8	46.5	49.6	39.9
02/09/11 - 30/09/11	N/A	12.4	12.5	42.1	13.7	15.2
30/09/11 - 04/11/11	46	13.5	12.9	36.3	39.9	32.9
04/11/11 - 30/11/11	34.1	N/A Discontinued	N/A Discontinued	52.1	52.9	45.5
30/11/11 - 06/01/12	28.4	N/A Discontinued	N/A Discontinued	46	45.7	36.2
RUNNING MEAN	**32.1**	**15.9**	**16.2**	**46.5**	**43.4**	**39.0**

SITE CODE	C'BEATH	K'DINE1	K'DINE2	AQM3	AQM5
LOCATION	High Street	N. Approach Rd. A	N. Approach Rd. B	St Leonards Pri Sch	Admiralty Road
	Cowdenbeath	Kincardine	Kincardine	Dunfermline	Rosyth
5/01/11 - 2/02/11	18.8	30.8	35.5	28.7	52.8
2/02/11 - 2/03/11	44.4	37.4	35	37.1	61.9
2/03/11 - 30/03/11	38.7	32.2	30.9	27.9	51.3
30/03/11 - 27/04/11	N/A	23.2	22.4	24.7	37.7
27/04/11 - 01/06/11	43.4	12.7	13.2	15.5	26.8
01/06/11 - 29/06/11	18.2	19.1	18.7	14.2	44.3
29/06/11 - 05/08/11	30.5	16.5	15.8	21.1	0.5*
05/08/11 - 02/09/11	25.8	24.1	24	0.4*	87.1*
02/09/11 - 30/09/11	22.8	20.2	19.3	N/A	N/A
30/09/11 - 04/11/11	20.5	20.6	22.3	37.2	N/A
04/11/11 - 30/11/11	30.6	27.5	28.6	25.9	33.4
30/11/11 - 06/01/12	19.8	24.8	23.1	19.2	30.9
RUNNING MEAN	**28.5**	**24.1**	**24.1**	**25.2**	**42.4**

SITE CODE	C'GIE DR.A	C'GIE DR.B	C'GIE DR.C	ADM RO.A	ADM RO.B	ADM RO.C
LOCATION	Carnegie Drive A	Carnegie Drive B	Carnegie Drive C	Admiralty Road A	Admiralty Road B	Admiralty Road C
	Dunfermline	Dunfermline	Dunfermline	Rosyth	Rosyth	Rosyth
5/01/11 - 2/02/11	48.9	49.1	45.6	43.6	46.1	48.1
2/02/11 - 2/03/11	60.6	59	57.3	51.5	55.5	52.6
2/03/11 - 30/03/11	48.3	45.3	45.9	40.1	60.8	47.8
30/03/11 - 27/04/11	44	35.7	45.6	42.3	39.8	41.1
27/04/11 - 01/06/11	28.9	29.9	N/A	24.1	23.1	N/A
01/06/11 - 29/06/11	43.3	44.5	44.2	39	38	39.2
29/06/11 - 05/08/11	48.7	47.5	50.5	27.9	33	30.6
05/08/11 - 02/09/11	43.3	45.1	41.3	32.6	28.6	34.2
02/09/11 - 30/09/11	45.8	43.5	42.8	36.2	N/A Discontinued	N/A Discontinued
30/09/11 - 04/11/11	40.2	42.4	40	30.3	N/A Discontinued	N/A Discontinued
04/11/11 - 30/11/11	54.7	54.1	57.3	44.9	N/A Discontinued	N/A Discontinued
30/11/11 - 06/01/12	**36.2**	**33.5**	37.8	21.7	N/A Discontinued	N/A Discontinued
RUNNING MEAN	**45.2**	**44.1**	**46.2**	**36.2**	**40.6**	**41.9**

SITE CODE	ROMON A	ROMON B	ROMON C	APP CR1	APP CR2	APP CR3	PITT ST
LOCATION	Admiralty Road	Admiralty Road	Admiralty Road	Appin Crescent 1	Appin Crescent 2	Appin Crescent 3	Pittencrieff Street
	Rosyth	Rosyth	Rosyth	Dunfermline	Dunfermline	Dunfermline	Dunfermline
5/01/11 - 2/02/11	42.7	45.5	40.3	46.1	58.7	53.6	N/A
2/02/11 - 2/03/11	46.7	44.5	43.8	50.1	85.8	69.3	40.7
2/03/11 - 30/03/11	34.9	32.5	36.6	44.4	56.6	56.8	40.3
30/03/11 - 27/04/11	28.8	34.9	29	38.4	59.2	52.5	30
27/04/11 - 01/06/11	18.9	18.8	19.6	24.2	39.9	31.6	18.9
01/06/11 - 29/06/11	31.1	31.9	31.7	32.6	52.5	45.7	23.5
29/06/11 - 05/08/11	27	28.4	29.1	36.1	50.2	44	25.6
05/08/11 - 02/09/11	3.1*	3.4*	2.8*	28.9	55.3	45	23
02/09/11 - 30/09/11	30.3	29	34.3	31.9	52.7	52.9	26.3
30/09/11 - 04/11/11	N/A	N/A	N/A	20.5	42.9	41.4	24
04/11/11 - 30/11/11	N/A	N/A	N/A	39.9	69.8	58.5	36.4
30/11/11 - 06/01/12	**21.9**	**23.9**	22.9	30.9	46.1	43.1	23.8
RUNNING MEAN	**31.4**	**32.2**	**31.9**	**35.3**	**55.8**	**49.5**	**28.4**

SITE CODE	APP CR4A	APP CR4B	APP CR4C	APP CR5A	APP CR5B	APP CR5C
LOCATION	Appin Crescent 4A	Appin Crescent 4B	Appin Crescent 4C	Appin Crescent 5A	Appin Crescent 5B	Appin Crescent 5C
	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline
5/01/11 - 2/02/11	42.1	43.1	45.6	59.1	68.7	62.7
2/02/11 - 2/03/11	51.2	52.4	54.2	75.7	71.6	64.5
2/03/11 - 30/03/11	N/A	N/A	N/A	64.9	68	61.9
30/03/11 - 27/04/11	44.3	38.1	43.1	58.1	66.5	58.8
27/04/11 - 01/06/11	N/A	N/A	N/A	45.7	47.7	43.4
01/06/11 - 29/06/11	33	35.6	32	50.9	50.1	82.6
29/06/11 - 05/08/11	30	27.9	41.4	39.4	35.9	39.5
05/08/11 - 02/09/11	35.5	36.3	37.2	52.6	55.2	55.1
02/09/11 - 30/09/11	34.1	31.9	35.1	46.5	39.9	49.5
30/09/11 - 04/11/11	30.1	29.7	32.7	44.2	40.3	45.9
04/11/11 - 30/11/11	43.6	43	41	66.7	61.8	65
30/11/11 - 06/01/12	**34.1**	**35.2**	32.7	**54.7**	**56.1**	52.6
RUNNING MEAN	**37.8**	**37.3**	**39.5**	**54.9**	**55.2**	**56.8**

SITE CODE	APP CR6A	APP CR6B	APP CR6C	HALBEATH RD1	HALBEATH RD2			
LOCATION	Appin Crescent 6A	Appin Crescent 6B	Appin Crescent 6C	11 Halbeath Road	57 Halbeath Road	229 Admiralty Road	49 Ramsay Place	129 Admiralty Road
	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Rosyth	Rosyth	Rosyth
5/01/11 - 2/02/11	65.8	66.5	65.9					
2/02/11 - 2/03/11	76.3	83.4	N/A					
2/03/11 - 30/03/11	73.6	70.7	67.1					
30/03/11 - 27/04/11	65	68.8	67.3					
27/04/11 - 01/06/11	45.7	47.7	43.4	17.2	18.1			
01/06/11 - 29/06/11	83.7	61	52.5	21.7	53.1			
29/06/11 - 05/08/11	46.6	53.8	53.2	18.5	15.9			
05/08/11 - 02/09/11	54.1	58.7	52.4	23.8	23.5			
02/09/11 - 30/09/11	60.1	53.2	60.2	21.7	20.8	26.7	19.4	29.1
30/09/11 - 04/11/11	58.3	54.1	49.8	20.4	20.3	24.5	12.8	24.4
04/11/11 - 30/11/11	68.1	72.3	71.3	21.8	31.7	33.4	25.7	35.6
30/11/11 - 06/01/12	**51.3**	**54.6**	51	**25.8**	25.2	21.7	**15**	24.6
RUNNING MEAN	**62.4**	**62.1**	**57.6**	**21.4**	**26.1**	**26.6**	**18.2**	**28.4**

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 2011-2012
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. **Potential effect of measure to date: Small**		Draft of Revised Fife LTS available in summer 2011	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 significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: Small**			Actions to be Detailed in LTS and ATP.	No new proposals/objectives identified as making significant contributio 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 consideration of Local Air Quality Issues within future planning considerations. **Potential effect of measure to date: Low**	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 particular action plan measure.	Inclusion of reference to Bonnygate AQAP within Local Development Plan 2011.	No new proposals/objectives identified as making significant contributio at this stage for this 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. **Potential effect of measure to date: Low**	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 o air quality issues on planning applications This includes routine screening of weekly planning application lists. The Council plan to undertake a modellin exercise to assess the potential impacts of development in the Bonnygate 'gap site'. The assessment has received Scottish government grand funding to look at impacts of range of development scenari for demolished buildings in the Bonnygate.

2		(c) Developers guidance note. EPPS teams to continue to liase 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. **Potential effect of measure to date: Low**	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 significant contributio 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. **Potential effect of measure to date: None**	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 significant contributio at this stage for this particular action plan measure

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 measures 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. **Potential effect of measure to date: None**	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 significant contributio 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. **Potential effect of measure to date: Small**	Meeting held with Council's Sustainabilty 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 described in the latest Annual Report by the CMO for Scotland (2010) within the context	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 concentrations can be identified.	Further consideration of latest climate chan indicators will be undertaken as these are developed.

								of the air quality action planning process Potential links with the "TRY IT" initiative and Fife's Health and Wellbeing Plan (2011 -14) are also to be explored		
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. **Potential effect of measure to date: None**	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 t use the South Road.	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: None**			Continue to attend the SEStran Freight Quality Partnership and contribute to Air Quality Group within the partnership	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure
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 it's successful adoption and implementation. **Potential effect of measure to date: None**			Discuss with local operators vehicle emissions and routing policies.	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: Medium/Large**	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO_2 and PM_{10} 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 t effectiveness of these measures.
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 uneccessary traffic queuing within the Bonnygate. This measure aims to reduce emissions from stationary vehicles within the AQMA. **Potential effect of measure to date: Medium/Large**	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO_2 and PM_{10} 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	Completed	Air quality monitoring at the Bonnygate will continue to confirm t effectiveness of these measures.

								with caution until a distinct trend can be identified.		
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. **Potential effect of measure to date: Small**			Discourage long stay commuter parking as part of Fife Council's Parking Strategy.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measu

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. **Potential effect of measure to date: Small**			On-going monitoring	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: Small**			Police enforce traffic road orders	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: Small**			Carry out assessment. The Council has received parking control grant funding from the Scottish Government.	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: None**			This scheme would be developer funded and therefore could only be implemented through the Development Plan process.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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	2009-2012	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 implmentation is dependent upon capital funding. **Potential effect of measure to date: None**	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 significant contributio 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 data, verified emission factors and maintenance of the fleet vehicles). **Potential effect of measure to date: None**			Establish a Bus Quality Partnership	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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). **Potential effect of measure to date: Small**			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 significant contributio at this stage for this particular action plan measure
9	Continue to target reduction in emissions from Council Fleet and contract vehicles	(a) Continue procurement of low emission vehicles.	Fife Council – Fleet Services 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_2 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. **Potential effect of measure to date: Small**	2012 – 2014 fleet / plant replacement plan now in place with specific vehicles being targeted for renewal by fully electric vehicles.		Number of low emissions vehicles in fleet 18 by June 2012.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

9		(b) Monitor and assess alternative fuels, technologies and fuel additives.	Fife Council – Fleet Services 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. **Potential effect of measure to date: None**	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 significant contributio at this stage for this particular action plan measure
9		(c) SAFED training.	Fife Council – Fleet Services and Procurement and Supplies	Tom Henderson/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. **Potential effect of measure to date: Small**	CPC (Certificate of Professional Competence) for HGV drivers, along with driver training for all other smaller type vehicles, are now running along side.		Driver certification CPC (Certificate of Professional Competence)	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

9		(d) Assess potential for emissions standards for fleet contracts.	Fife Council – Fleet Services and Procurement and Supplies	Tom Henderson/Robin O'Connell	2009-2015	By ensuring that contractor fleets have newer vehicles, Fife Council are encouraging the use of lower emitting vehicles under it's contracts. **Potential effect of measure to date: Small**	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 significant contributio at this stage for this particular action plan measure
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	**Measure Rejected - No impact on Air Quality.**			Authorisation, design, procurement and installation.	No new proposals/objectives identified as making significant contributio 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 users, but also the environment - such as reducing CO_2 and air quality emissions through reduced fuel consumption. **Potential effect of measure to date: Small**			Results of Council travel surveys	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure
11		(b) Continue to support the implementation of School Travel Plans.	Fife Council – Transportation and Environmental Services	Jane Findlay	2009-2015				Travel plans implemented and promoted in schools	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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 significant contributio 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 a 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. **Potential effect of measure to date: None**			Number/ length of cycling and walking routes developed.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: None**			Installation of Signage	No new proposals/objectives identified as making significant contributio 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 motorvehicles. **Potential effect of measure to date: Small**			Installation of cycle parking points.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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 Environmntal 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. **Potential effect of measure to date: None**			Number of led cycle rides.	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: None**			Creation and publication of map.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: Very Low**			Undertake marketing	No new proposals/objectives identified as making significant contributio 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	**Potential effect of measure to date: None**			Production of booklet.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: Small**			Production of travel pack.	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: Small**			Undertaking visits with households.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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. **Potential effect of measure to date: None**			Undertaking visits to businesses throughout Cupar to discuss Travel.	No new proposals/objectives identified as making significant contributio 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 significant contributio at this stage for this particular action plan measure

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 significant contributio 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 encourage the use of sustainable forms of transport by users at other times. **Potential effect of measure to date: None**			Establish Car Club.	No new proposals/objectives identified as making significant contributio at this stage for this particular action plan measure

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 therfore encourage their use in preference to private motor vehicles. **Potential effect of measure to date: Small**			Regular updates of public transport information on Council website	No new proposals/objectives identified as making significant contributio 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. **Potential effect of measure to date: Small**	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 reoports continue to be produced on an annual basis	In addition relevant Council committee reoports 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 Fifedirect.	Fife Council continues to work more closely with NHS Fife in seeking to both increase understandi of air quality issues a promoting healthier travel options. This includes consideratio of the MUSTER mode of risk communicatio and the asset based approach ch advocate in the recent Cheief Medical Officer repor of 2011.

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. **Potential effect of measure to date: Small**	The "TRY IT" campaign (www.fifedirect.org.uk/tryit) 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 takeway 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 incorpora the most recent developments in our understanding of air quality issues within the context of public communication medi mechanisms.

Appendix F- Fife Council "TRY IT" Initiative Report 2

TRY IT Cupar

Report

October 2011

Background

Cupar Town Centre was declared an Air Quality Management Area (AQMA) which came into force in December 2008 as a result of elevated concentrations of nitrogen dioxide and PM10.

Fife Council – Bonnygate Air Quality Action Plan, Cupar Sept 2010

TRY IT Cupar – householder engagement February - April 2011

A Personalised Travel Planning (PTP) project was undertaken in the town of Cupar from February to April 2011. This involved 5 trained travel advisors going door to door to just over 4,500 households. These travel advisors were employed by Fife Council through the Future Jobs Fund in order to carry out the piece of work and to give them work experience that they could use to secure them a future job.

Households were made aware of the PTP project through press releases and posters up in local shops, the library and local council office. Approximately 7 days before an advisor visited a household a postcard would be posted to them. This postcard included information about the project and gave them an opportunity to request not to be visited.

If, when the advisor visited the household, they were out they would be left a "missed you" card. This ideally would have been left after 3 attempts, however due to time constraints it was left after the first.

During the engagement the travel advisor would have a conversation with the household to identify how they travelled and their thoughts on sustainable and active travel. Once this relationship had been built through the conversation then the advisor would decide upon which resources would be best suited to encourage more sustainable behaviour and offer these to the householder.

Advisors were also able to offer incentives for householders such as a Stagecoach Megarider 7-day ticket to allow them to try out a mode of transport that they may not have experienced for a number of years. Other incentives included a pedometer and a cycle computer to record steps and miles cycled respectively. These would then be used in conjunction with the 5*30 challenge diary where participants would record their activities over 4 weeks.

Aftercare will be carried out one year after the door knocking took place in order to identify any changes in travel behaviour. There are 70 names to contact on the aftercare list.

There was no pilot group or control group selected for the project and therefore the 2004 Travel Survey figures should be used as the robust data to base results from.

The most popular resource requested was the Cupar Community Guide with over 100 being sent out. The resource requested least was the Cycling to Work book with less than 5 being requested.

In total over 1,700 resources were sent out.

From those that gave a response to "how do you normally get to work" 43% said that they normally drove and 40% walked. 14% said they took the bus to work normally.

In total over 4,500 households were knocked with approximately 350 being engaged with at the door. There were around 2,600 households recorded as being "No Contacts" meaning there was no one in to take part in the engagement.

Encouraging External Organisations to Develop Travel Plans

Fife Council provides guidance and support to local businesses and organisations in the design of successful Travel Plans.

Measure	Title
11	Travel Plans for Large Institutions and Businesses
Definition	Key Intervention
To encourage and assist large organisations to develop and implement travel plans, including: a. Continue the implementation of Fife Council's travel plan; b. Continue to support the implementation of School travel plans; c. Work with local businesses/ organisations to encourage the development and implementation of travel plans.	To encourage a shift to more sustainable forms of travel, or reducing the need for travel.
Responsible authority and other partners	Powers to be used
Fife Council	Voluntary

Promotion of Cycling and Walking

Promoting cycling and walking represents a key objective of Fife Council's Local Transport Strategy and also constitutes important aspects of the Fife Access Strategy. Fife Council aims to encourage members of the public to consider walking or cycling instead of using their car, and as a consequence, promote healthy lifestyle choices and environmental improvement by reducing the number of cars on the road.

Fife's vision is to develop cycling into a realistic choice as a method of transport and Fife as a cycle friendly leisure location. As part of this, the Local Transport Strategy (LTS) includes numerous short term objectives aimed at achieving this goal. In addition, the Council has developed a Cycling Strategy (2008-2013) to supporting the objectives of the Access Strategy and Local Transport Strategy (2006-2026). Fife attracted Millennium Funding to put in place over 300 miles of off and on road cycle network. In order to promote cycling, Fife Council has produced a series of maps to help cyclists navigate the 24 circular routes and five town networks. Each map shows colour-coded routes and gives route advice and recommends things to look out for and attractions to visit along the way.

Measure	Title
12	Promotion of Cycling and Walking
Definition	Key Intervention
To encourage members of the community to adopt cycling and walking as alternatives to using private vehicles. a. Ensure cycle networks and facilities are provided, as a matter of course, within existing and new networks and developments. b. To improve integration between cycling, walking and public transport. c. Increase cycling trips to employment, education and leisure facilities. d. Improve pedestrian facilities such as new footpaths and crossings.	To encourage a shift away from the use of private motor vehicles for travelling to more sustainable forms of transport, or reducing the need for travel.
Responsible authority and other partners	Powers to be used
Fife Council (Transportation Services) and SEStran	Statutory

Provision of Information relating to Air Quality and Travel options

Fife Council aims to provide information and undertake marketing initiatives targeting increasing the Public's awareness of air pollution issues in Fife and to encourage members of the public to participate in improving the situation. This measure is intrinsically linked to the promotion of cycling and walking and the development of travel plans but focuses on the provision of information relating to air quality within Fife and public transport.

Public Transport Information

Public Transport is a key priority for Fife Council and our Transportation Services work closely with the commercial operators of taxis, buses and trains. In order to encourage members of the public to utilise public transport instead of private vehicles, Fife Council provides information on public transport services operating within Fife through the Council website, and links to external organisations such as Traveline Scotland. The Council in partnership with Traveline also operates a mobile phone texting service for information on bus times for any bus stop (charged service). Fife Council is looking to enhance the promotion of travel choices and have identified numerous potential approaches.

Measure	Title
13	Promoting Travel Choices

Definition	Key Intervention
To increase awareness of travel choice options, Fife Council propose to: a. Produce a Travel Choices map of Cupar. b. A Mass Marketing Campaign for Cupar to raise awareness about the project and encourage people to take sustainable modes of travel. c. Production of a community booklet. d. Production of a residential travel pack. e. Undertaking individualised Travel Marketing at households throughout Cupar. f. Undertaking individualised Travel Marketing at businesses throughout Cupar. 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. h. Residential Travel Packs, to be issued to all 'new built' homes identified in the local plan through the planning process. 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. j. Continue to provide information about public transport services through the Council website.	To increase awareness of travel choices and encourage changes in behaviour that will contribute to improving local air quality.
Responsible authority and other partners	**Powers to be used**
Fife Council (Environmental Services and Transportation Services)	Voluntary

TRY IT Cupar (EE&T Sept 2011 submission)

Introduction of "TRY IT Cupar" scheme in 2010. This scheme is about engaging with residents and local community groups to make Cupar a more sustainable community, increasing the use of public transport and encouraging people to cycle and walk when possible. A doorstep engagement was carried out at the beginning of 2011 and this will be followed up by aftercare telephone calls in September 2011. The data collected from the doorstep engagements is currently being cleansed and analysed in the run up to these aftercare calls.

383 Cupar residents answered their doors to the Personalised Travel Planning engagement. 352 residents participated and only 31 chose not to take part when engaged at the door.

The most popular resource requested by residents was the Cupar Community Guide which was developed as part of the Try It project in order to encourage residents to source goods locally, cutting down the need to travel.

Another resource which has been of interest to residents is the Cupar walking and cycling maps that are being developed as part of the project. These are to be finalised, printed and distributed during 2011/2012 to those that showed an interest in receiving them as well as to other popular outlets in the town.

Appendix G – 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 H – Fife's Health and Wellbeing Plan 2011 - 2014

The Bonnygate Air Quality Core Steering Group are 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"**

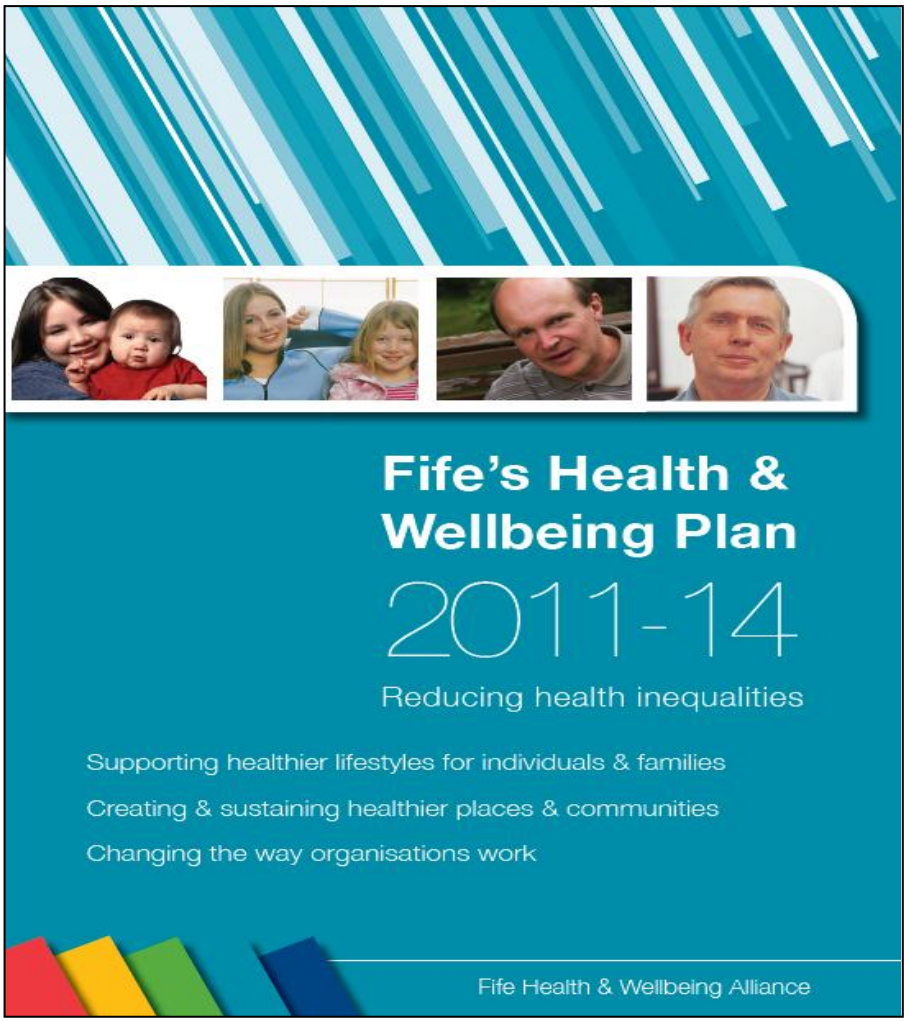
8. Services and support are delivered in flexible ways which meet the health and wellbeing needs of different communities, neighbourhoods and equality groups - **links to TRY IT and Cyclestart campaigns**

9. Workforces have increased confidence and competence to improve health and wellbeing and tackle health inequalities -**work on business travel plans to date**

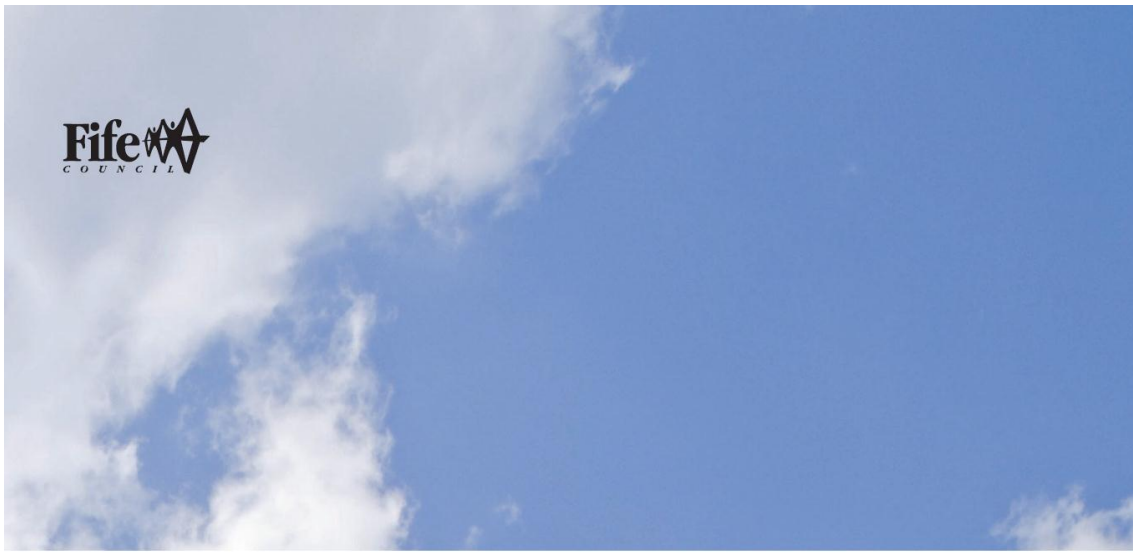
From the above preliminary appraisal the following health indicators used to measure these outcomes have been identified:

- 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 Fife Council Air Quality Development Guidelines Leaflet



Fife Air Quality Development Guidelines