2014 Air Quality Progress Report for Fife Council

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

May 2014

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Fife Council

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Executive Summary

This Progress Report has considered the following new monitoring data for calendar year 2013. During 2013, Fife Council undertook ambient monitoring of NO_2 tubes at 48 locations within Fife. When assessing the 2013 annual mean nitrogen dioxide concentrations (bias adjusted) against the Air Quality Strategy (AQS) annual mean objective of 40 ug m^{-3}, a marginal exceedence is evident at the following diffusion tube monitoring site:

- Appin Crescent 6 (A, B & C), Dunfermline (41.4 µg m^{-3})

This marginal exceedence of the annual mean NO_2 objective was measured at one location within the Appin Crescent, Dunfermline Air Quality Management Area (AQMA). Fife Council's Air Quality Action Plan (AQAP) for Appin Crescent intends to address these exceedances through the implementation of appropriate measures.

PM_{10} concentrations are measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2013 concentrations were below the PM_{10} annual mean objective at all sites.

The review of all available data relating to carbon monoxide (CO), sulphur dioxide (SO_2) and benzene during 2013 indicates that it is unlikely that any AQS objectives relating to these pollutants were exceeded during 2013. In particular, the review of benzene data in the vicinity of Little Raith Wind Farm show that the running annual mean benzene concentrations measured at Cowdenbeath (LR01), Lochgelly (LR02) and Little Raith Farm (LR03) monitoring locations are below the AQS Objective of 3.25 µg m^{-3}. In addition, the operation of the Little Raith Wind Farm does not appear to have increased benzene concentrations at any of the three test locations.

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

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

There are currently two AQMA's for NO_2 and PM_{10} located within the Fife Council boundary:

- Bonnygate, Cupar, declared in October 2008
- Appin Crescent, Dunfermline, declared in November 2011 for NO_2 and November 2012 for PM_{10}.

The Air Quality Action Plan (AQAP) for the Bonnygate, Cupar AQMA is now well established and has been successful in reducing both NO_2 and PM_{10} concentrations within the Bonnygate. The reductions have principally been a result of the traffic signalling and road layout improvements carried out during 2009. No exceedances of NO_2 or PM_{10} AQS objectives were measured within the Bonnygate AQMA during 2013. Although, the PM_{10} annual mean concentration measured at the Bonnygate automatic monitoring site, 18 µg m^{-3}, was close to exceeding the objective.

The Air Quality Action Plan for Appin Crescent, Dunfermline was finalised in May 2013 and aims to reduce NO_2 and PM_{10} concentrations within Appin Crescent. Initially an AQMA was declared in October 2011 for NO_2 only, however this was amended in August 2012 to include PM_{10}. In 2013 only 1 diffusion tube location in Appin Crescent was found to be exceeding the annual mean objective, a decrease from the 3 diffusion tubes in 2012. There was also a decrease in annual mean NO_2 at the automatic monitoring site at Appin crescent from 30 µg m^{-3} to 25 µg m^{-3}.

These decreases coincide with revisions to the Appin Crescent traffic lane marking in March 2013. These revisions encourage traffic to use the middle lane more, thereby moving traffic away from the residential receptors on south side of Appin Crescent. A photograph of the traffic lane marking is provided in Appendix L.

PM_{10} concentrations have remained at the same level in 2013 as they were in 2012. Using the Bonnygate AQAP as a template, it is hoped that the Appin Crescent AQAP will achieve similar improvements in air quality.

Reports on both AQMA areas were carried out at the start of 2014. A brief description of these reports is as follows:

The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (2014) considered the possible effects that a change in traffic management will have on the NO_2 and PM_{10} concentrations in 2015. Using modelling software and monitoring data, the report explains the predicted outcomes of possible traffic management scenarios (including slip road options) in Appin Crescent, Dunfermline. The report concludes that none of the proposed traffic management scenarios made a significant difference to concentrations of NO_2 and PM_{10} at locations of relevant exposure. Whilst outcomes of dispersion modelling of the proposed Appin Crescent bypass option reveal that this may reduce concentrations of NO_2 and PM_{10} at Appin Crescent to below the relevant air quality objectives, it is still considered prudent to explore other traffic management measures that may deliver more cost effective and feasible solutions to addressing air quality issues in the Appin Crescent. In this regard, a review of traffic light signalling arrangements in the Appin Crescent area has recently been commissioned and the outcomes of this study will be reported in the next Annual Progress Report 2015.

The Cupar Streetscene Dispersion Modelling Report 2014 used atmospheric dispersion modelling to assess the potential air quality impacts that proposed traffic management changes in Cupar may have on the NO_2 and PM_{10} concentrations in 2017. The report concludes that both modelled Design Options 1 (includes introduction of mini-roundabouts at the East Bridge/St Catherine Street junction as well as the East Bridge/East Burnside junctions on the A91) and 2 (includes reconfiguration of the junctions at East Bridge/St Catherine Street and East Bridge/East Burnside junctions on the A91) will lead to a general reduction in NO_2 and PM_{10} emissions when compared to the 2017 baseline. Based on modelling predictions Option 1 provides greater air quality benefits than Option 2 for the Bonnygate AQMA. Both of these options are currently being implemented and anticipated to be completed this calendar year 2014.

Following the review of all available 2013 data it is recommended that Fife Council carry out the following actions:

1. Submit the next Air Quality Updating and Screening Assessment in May 2015.
2. Maintain the current monitoring programme.

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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 and Clackmannanshire Bridges or north east via the Tay Road Bridge, the exception being traffic headed north on the M90.

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

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (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[1] and Technical Guidance[2] 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

[1] 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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of 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 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2011
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2011
	18 µg/m^3	Annual mean	31.12.2011
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

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

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

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

[11] Air Quality Review and Assessment, Further Assessment, Bonnygate, Cupar 2010

[12] 2010 Air Quality Progress Report for Fife Council, AEAT/ENV/R/2977, July 2010

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

[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] 2012 Air Quality Updating and Screening Assessment for Fife Council, AEAT/ENV/R/3293, July 2012

[17] Air Quality Detailed Assessment for Admiralty Road, Rosyth, Fife, AEAT/ENV/R/3321, September 2012

- Fife Council, Bonnygate Air Quality Action Plan[19]
- Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline[20]
- Fife Council, Bonnygate Air Quality Action Plan[21]
- Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline[22]
- Progress Report[23] (2013)
- The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (Phase 2)[24]
- Cupar Streetscene Air Quality Modelling Assessment[25]

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

The 2003 USA 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 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 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 concluded that a Detailed Assessment should be carried out at this location. Additionally, the 2008 Progress Report concluded that a Detailed Assessment

[18] Detailed Assessment of Air Quality 2011 Saint Clair Street, Kirkcaldy, Fife, AEA/ENV/R/3332

[19] Fife Council, Bonnygate Air Quality Action Plan, 2010, AEAT/ENV/R/ED05550006

[20] Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline, Fife, ED56439- Issue Number 1

[21] Fife Council, Bonnygate Air Quality Action Plan, 2010, AEAT/ENV/R/ED05550006

[22] Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline, Fife, ED56439- Issue Number 1

[23] Air Quality Review and Assessment Progress Report for Fife Council 2011, Ricardo-AEA/R/3367/, Issue 2, July 2013

[24] The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (Phase 2), Ricardo-AEA/R/ED56439013, Issue 3, Jan 2014

[25] Cupar Streetscene Air quality modelling assessment, Ricardo-AEA/R/ED56439014, Issue 3, March 2014

should be carried out for Appin Crescent, Dunfermline (NO_2) and Admiralty Road, Rosyth (PM_{10}).

The Detailed Assessment (2007/2008) for Bonnygate, Cupar 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 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 considered PM_{10} concentrations in the area and concluded that no further action was required.

The Further Assessment (2010) for Bonnygate, Cupar concluded that the AQMA was still required and that its boundary was appropriate (see Figure 1.1). The source apportionment found that heavy and light goods vehicles contributed broadly similar oxides of nitrogen (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. Progress on measures contained within the Bonnygate, Cupar Air Quality Action Plan are reported in Appendix F.

The 2010 Progress report 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 that 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 40 µg m^{-3}. These locations were: Appin Crescent, Dunfermline; Admiralty Road, Rosyth; St Clair Street, Kirkcaldy.

For 2010, all diffusion tubes sites (2, 3, 5 and 6) within Appin Crescent exceeding the objective were located on the south side of Appin Crescent between Park Lane and Couston Street. Diffusion tubes within this area have consistently shown elevated concentrations contrary to those seen at the automatic monitoring site. Data from the 2011 Progress Report supports conclusion made in the 2011 Detailed Assessment for Appin Crescent. It is concluded that Fife Council should consider declaring an AQMA at Appin Crescent, encompassing as a minimum all residential properties which lie between Park Lane and Couston Street. It also concluded that Fife Council should consider declaring an area larger than that stated to account for any uncertainties in monitoring and modelling carried out. Figure 1.2 shows the AQMA boundary encompassing residential properties located on Appin Crescent, Dunfermline.

For 2010, 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 41 µg 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 40 µg 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 1.1 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 (19 µg m^{-3}) being a borderline exceedance of the objective.
- 2010 being the first year concentrations exceeded the objective in the area.
- Unusual weather conditions for the year may have contributed to the increase in concentrations.

Both Bonnygate and Admiralty Road sites did not exceed the 24 hour mean objective of 50 µg m^{-3}, with seven exceedances 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 exceedances of the NO_2 annual mean objective in Appin Crescent, Dunfermline. The spatial extent of the exceedances remains quite small and the current AQMA boundary is adequate for NO_2 (Figure 1.2). The assessment also indicated that there are exceedances 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 NO_x/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 NO_x than PM_{10}. Of the vehicle classes assessed, cars and HGVs are the most significant sources of vehicular NO_x, 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 Plan has been implemented for Appin Crescent, Dunfermline by Fife Council. The report on the finalised Appin Crescent Air Quality Action Plan was approved in May 2013. Progress on measures contained within the Appin Crescent, Dunfermline Air Quality Action Plan are reported in Appendix G.

The Updating and Screening Assessment (2012) concluded that no further action is required with respect to pollutants, Carbon Monoxide, Benzene, 1,3-Butadiene, Lead and Sulphur Dioxide. The assessment also indicated that the 2011 nitrogen dioxide (NO_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 exceedances of the annual mean objectives for both pollutants. PM_{10} concentrations at Admiralty Road, Rosyth have increased above the annual mean objective of 18 µg 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 Fife Cupar 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.

The annual mean NO_2 objective of 40 µg m^{-3} was exceeded at 6 diffusion tube sites located in three areas of Fife (Appin Crescent, Dunfermline, St Clair Street, Kirkcaldy and Bonnygate Cupar). All 6 diffusion tube sites are considered to be locations of relevant exposure. Both Appin Crescent and Bonnygate, Cupar are currently included within existing Air Quality Management Areas (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 Detailed Assessment of St Clair Street, Kirkcaldy (2012) was undertaken to investigate the potential scale and extent of exceedances of Air Quality Objectives in the study area.

This modelling study, which used the most recent traffic data, NO_2 measurements and meteorological data for the study area indicates that there are no exceedances of the NO_2 annual mean objective at locations with relevant exposure. The annual mean objective exceedances are occurring at ground level locations within the study area close to main junctions on St Clair Street where congestion is known to occur. These are not however locations of relevant exposure as the properties are used for commercial purposes. NO_2 concentrations in excess of the annual mean objective were not observed and are not occurring where ground level or first floor residential properties are present within the study area. In light of this Detailed Assessment of Air Quality, Fife Council is not required to declare an Air Quality Management Area at this time. It was recommended that Fife Council continue to monitor NO_2 and PM_{10} concentrations at this location and may wish to locate diffusion tube monitoring sites closer to the locations where ground floor residential properties are present on St Clair Street.

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

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

was therefore recommended that Fife Council change the drier unit to the FDMS analyser at Admiralty Road.

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

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

The 2013 Progress Report concluded that Fife Council should maintain its current monitoring programme and confirmed that Fife Council is not required to declare an AQMA at Admiralty Road, Rosyth at that time.

The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (2014) considered the possible effects that a change in traffic management will have on the NO_2 and PM_{10} concentrations in 2015. Using modelling software and monitoring data, the report explains the predicted outcomes of possible traffic management scenarios in Appin Crescent, Dunfermline. The report concludes that none of the proposed traffic management scenarios made a significant difference to concentrations of NO_2 and PM_{10} at locations of relevant exposure. Whilst outcomes of dispersion modelling of the proposed Appin Crescent bypass option reveal that this may reduce concentrations of NO_2 and PM_{10} on Appin Crescent to below the relevant air quality objectives, it is still considered prudent to explore other traffic management measures that may deliver more cost effective and feasible solutions to addressing air quality issues in the Appin Crescent. In this regard, a review of traffic light signalling arrangements in the Appin Crescent area has recently been commissioned and the outcomes of this study will be reported in the next Annual Progress Report 2015. The executive summary for this report can be found in Appendix I of this report.

The Cupar Streetscene Dispersion Modelling Report 2014 used atmospheric dispersion modelling to assess the potential air quality impacts that proposed traffic management changes in Cupar may have on the NO_2 and PM_{10} concentrations in 2017. The report concludes that both modeled Design Options 1 (includes introduction of mini-roundabouts at the East Bridge/St Catherine Street junction as well as the East Bridge/East Burnside junctions on the A91) and 2 (includes reconfiguration of the junctions at East Bridge/St Catherine Street and East Bridge/East Burnside junctions on the A91) will lead to a general reduction in NO_2 and PM_{10} emissions when compared to the 2017 baseline. Based on modelling predictions Option 1 provides greater air quality benefits than Option 2 for the Bonnygate AQMA. The road layout for Option 1 can be found in Appendix K. Both of these options are currently being implemented and anticipated to be completed this calendar year

2014. The executive summary from the Cupar Streetscene Dispersion Modelling Report can be found in Appendix J of this report.

Figure 1.1 Map of Bonnygate AQMA Boundary

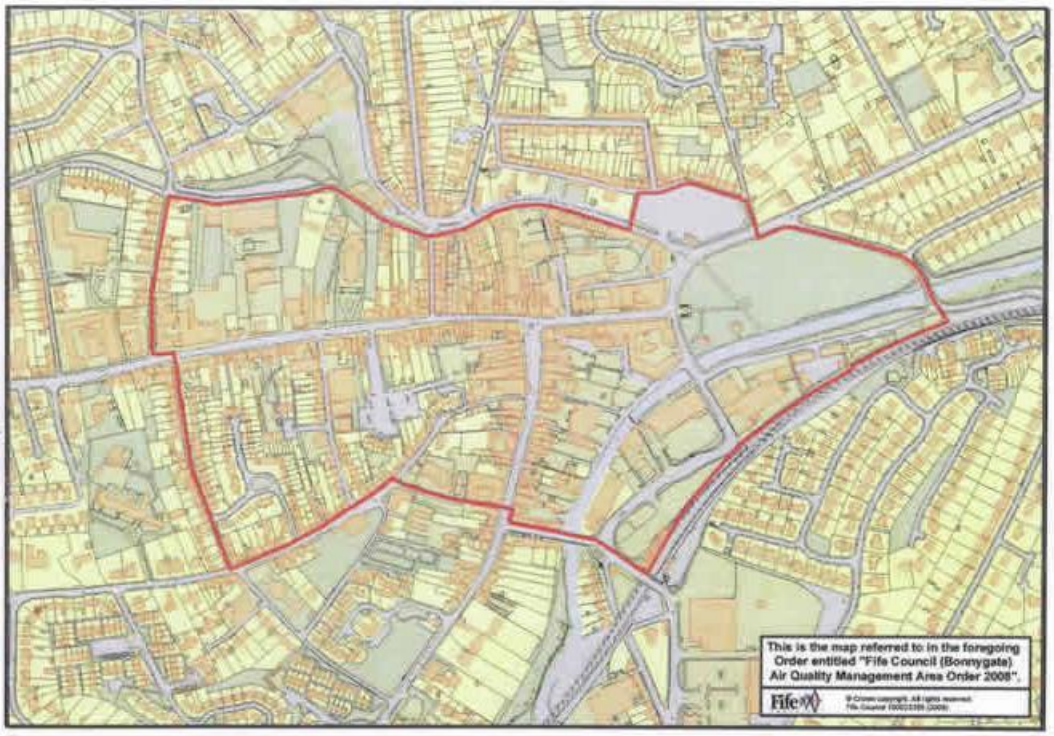
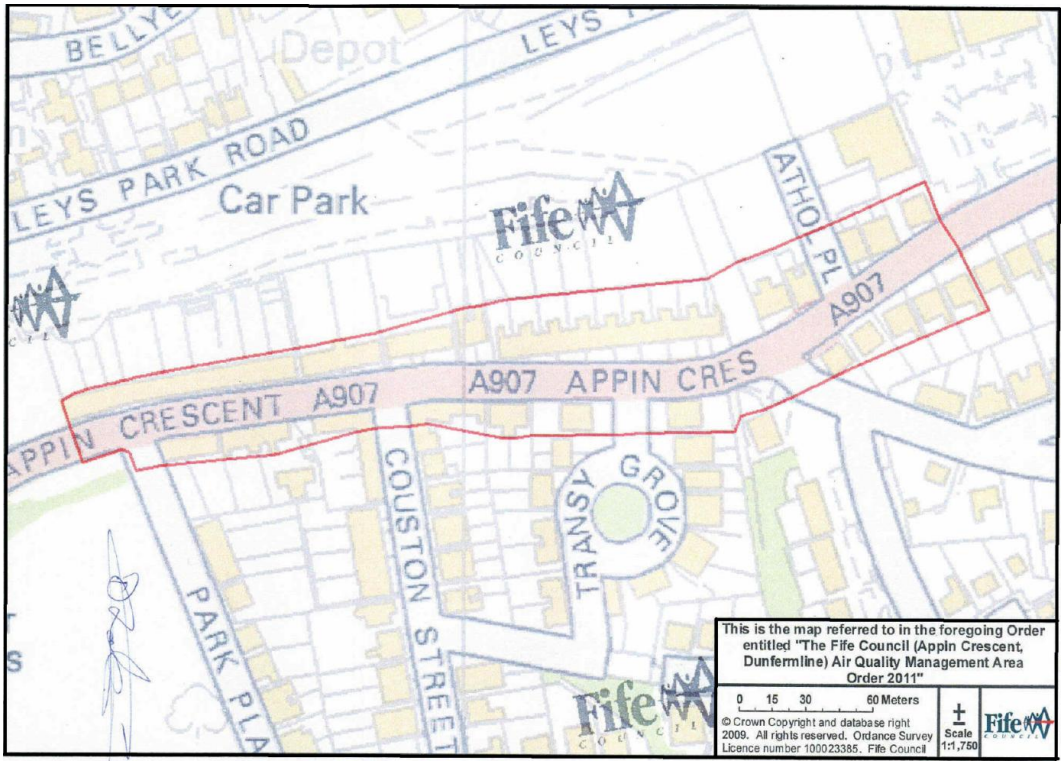


Figure 1.2 Map of Map of Appin Crescent AQMA Boundary



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 2013. NOx (oxides of nitrogen – precursor to NO) 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. Figures 2.1 – 2.4 show location maps of the automatic monitoring sites with surrounding NO_2 diffusion tube sites under operation during 2013. Table 2.1 gives further details about each site.

Automatic SO_2 data are available from Scottish Power Generation Ltd from a monitoring site close to Longannet Power Station and provided in their Annual Air Quality Impact Report[26]. 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.

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

A summary of the INEOS Grangemouth oil refinery in their Annual Community Air Monitoring Report[27] for 2013 is also provided in this Progress Report. The report assesses concentrations of 1,3 Butadiene, Benzene, Nitrogen Dioxide and Sulphur Dioxide.

[26] Review of Annual Air Quality Impacts around Longannet Power Station compared to Air Quality Strategy Objectives Calendar year 2013, Iberdrola, Engineering and Construction, March 2014

[27] Community Air Quality Monitoring Report, Ambient Atmospheric Survey in the Vicinity of Grangemouth – 2013, INEOS April 2014

Figure 2.1 Bonnygate, Cupar, Monitoring Locations

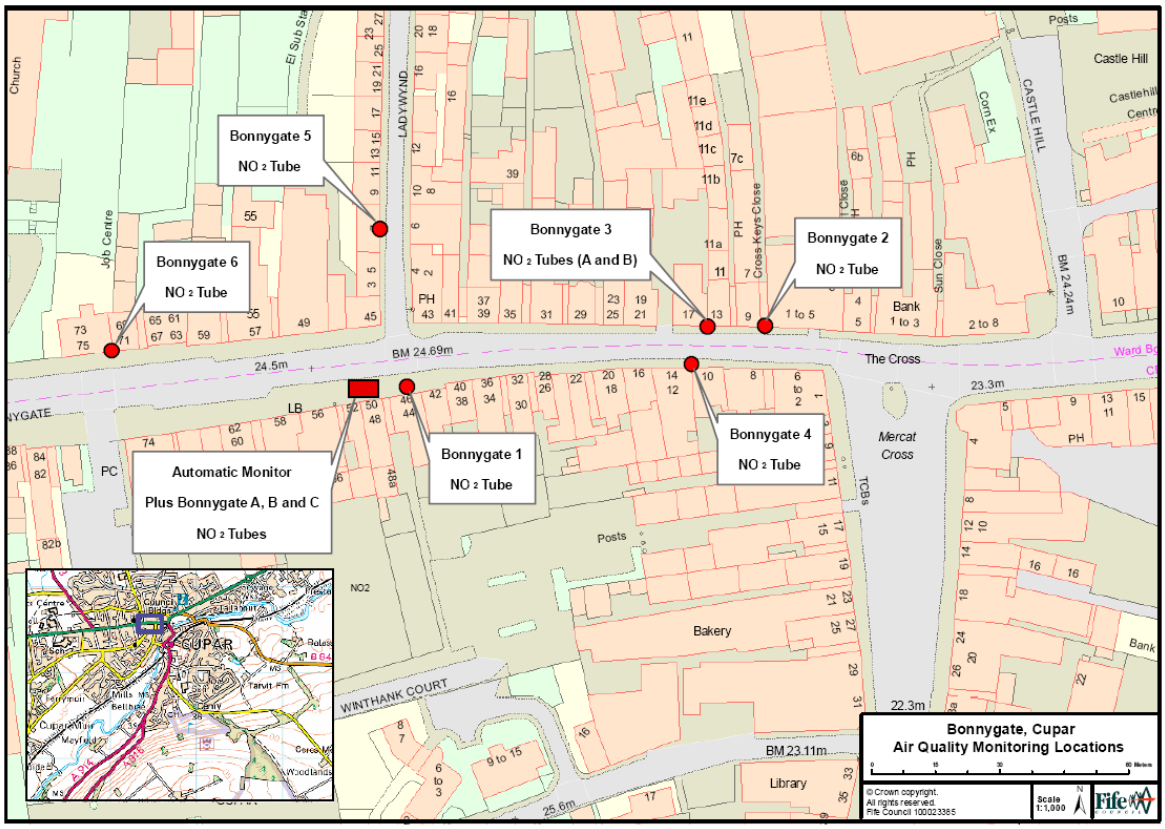


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Figure 2.2 Appin Crescent, Dunfermline, Monitoring Locations

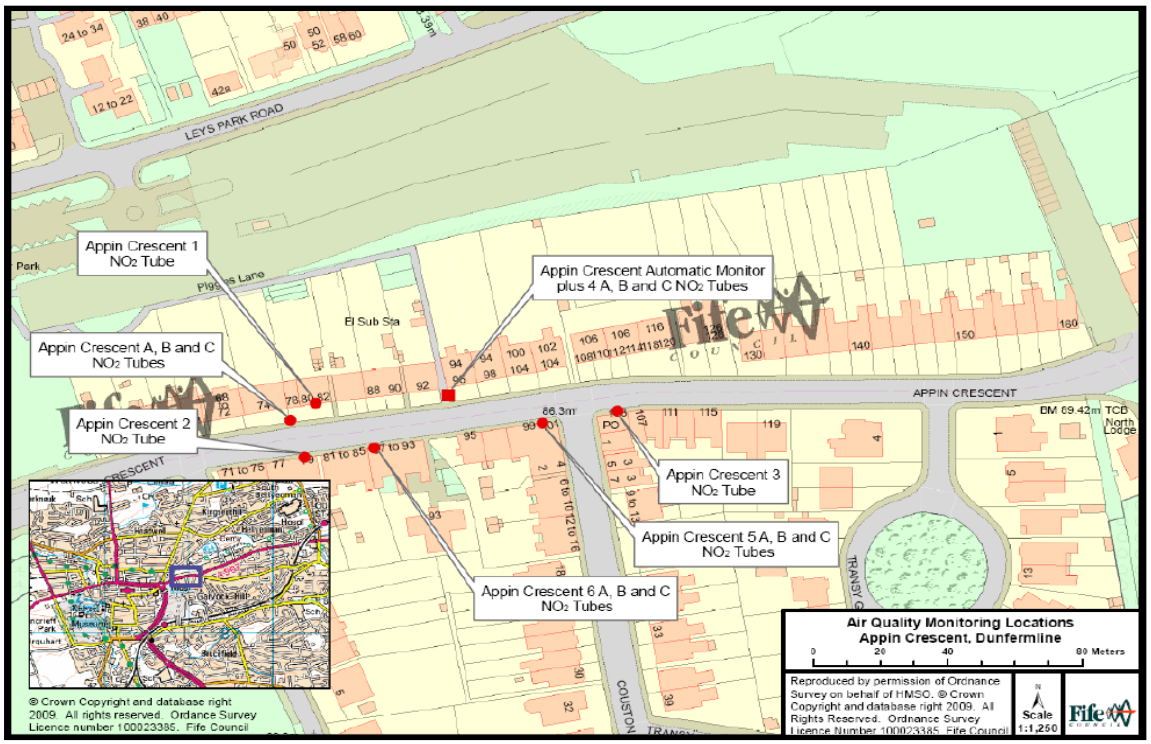

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Figure 2.3 Admiralty Road, Rosyth, Monitoring Locations

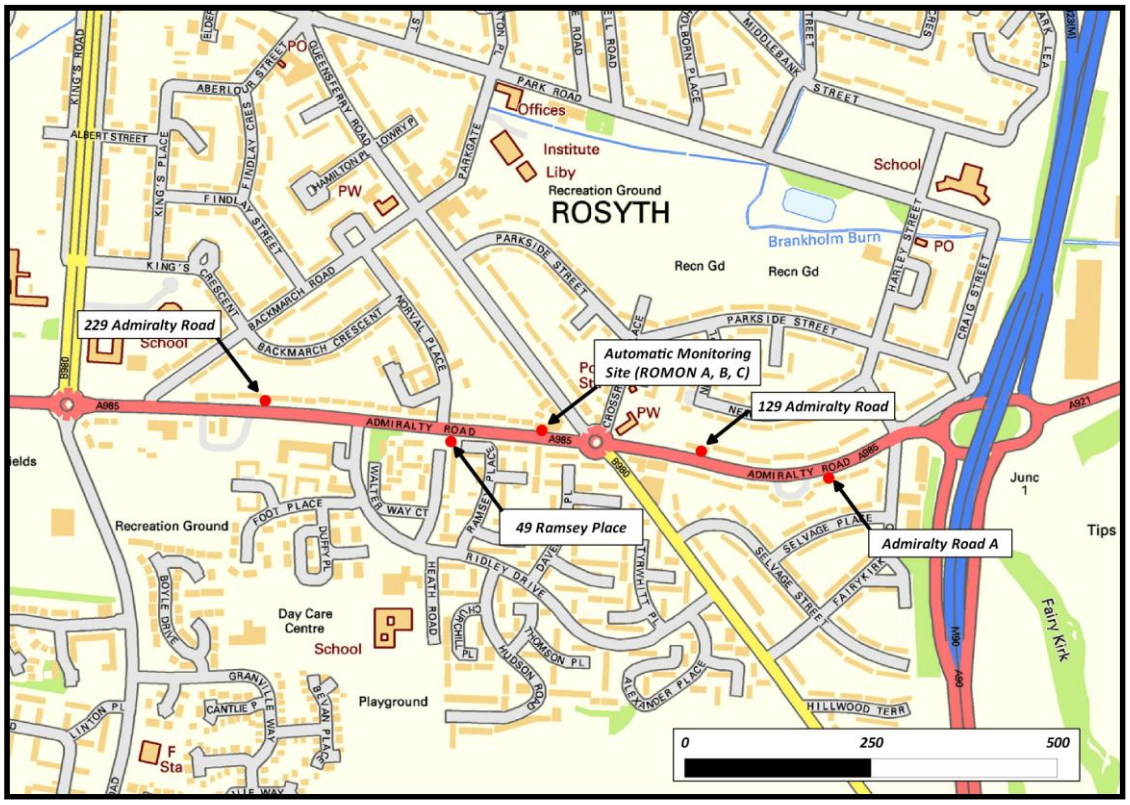

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Figure 2.4 St Clair Street Kirkcaldy, Monitoring Locations

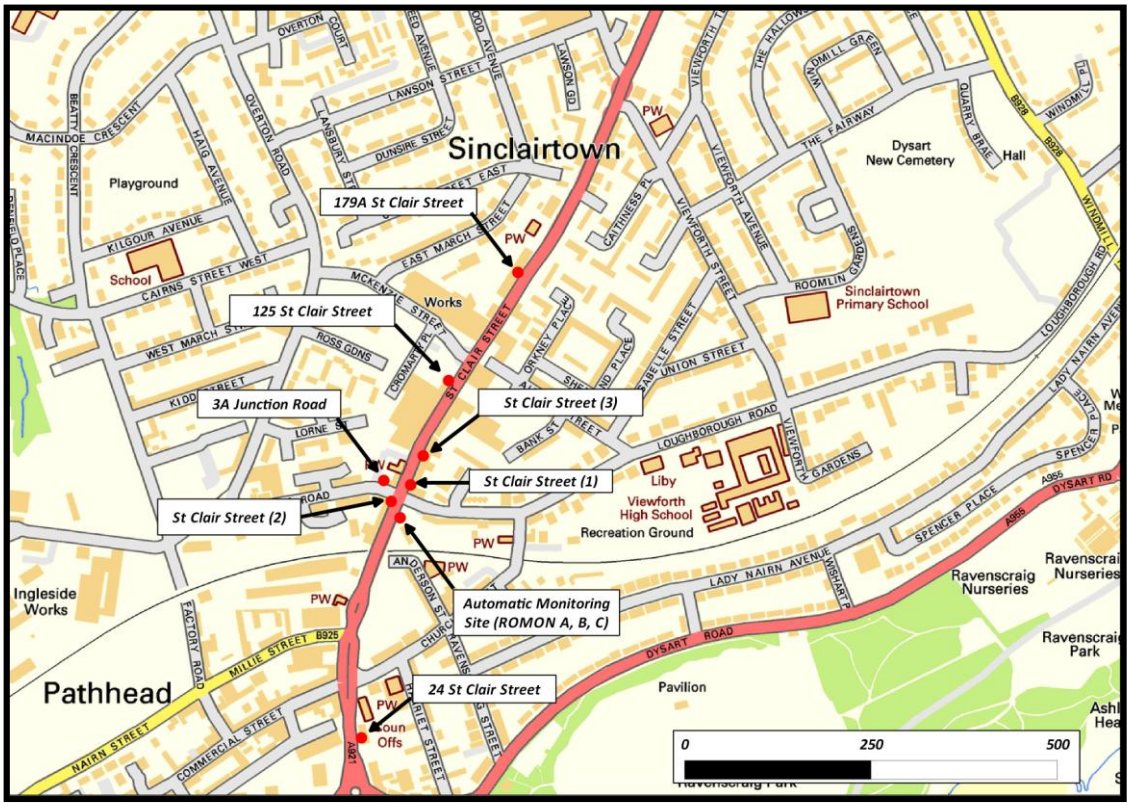

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Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Bonnygate, Cupar	Kerbside	337406	714574	**2.0**	NO_2, PM_{10}	Y	NO_x Analyser (Chemiluminescence), TEOM-FDMS	N (1.0m)	< 0.5m	Y
Appin Crescent, Dunfermline	Roadside	309926	687722	**2.0**	$NO_{2,,}$ PM_{10}	Y	NO_x Analyser (Chemiluminescence), TEOM-FDMS	Y (1.0m)	4.0m	N
Admiralty Road, Rosyth	Roadside	311755	683503	**2.0**	NO_2 PM_{10}	N	NO_x Analyser (Chemiluminescence), TEOM-FDMS	Y (1.5m)	6.0m	Y
St Clair Street, Kirkcaldy	Roadside	329143	692986	**2.0**	NO_2, PM_{10}	N	NO_x Analyser (Chemiluminescence), TEOM-FDMS	N (10.0m)	5.0m	N

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 48 NO_2 diffusion tube sites throughout the Fife area. Of these, eight sites are triplicate sites, with four of these triplicate sites being co-located with the automatic analysers.

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

Measurements of benzene and other hydrocarbon compounds are also undertaken by NPL[28] on behalf of BP Exploration Operating Company Ltd in the vicinity of Hound Point, on the Forth coastline during 2013 (31/12/2012-30/12/2013). 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.

[28] Extract from BP Production and Exploration, Houndpoint, 2012, NPL, April 2014

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); and several online tools are also available to assist with this process.

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

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

Table 2.2 Bias correction factors for 2013 for NO_2 diffusion tubes in Fife

Source	Bias adjustment Factor 2013
Appin Crescent, Dunfermline	0.76
Bonnygate, Cupar	0.71
Admiralty Road, Rosyth	0.88
St Clair Street, Kirkcaldy	0.81
Locally Derived (average of 4 local correction factors)	0.79
Nationally Derived (1 Study)	0.78
Locally Derived combined with Nationally Derived (5 Studies)	0.79

The average of the bias adjustment factors from Appin Crescent, Bonnygate Cupar, Admiralty Road and St Clair Street is **0.79**. The nationally derived bias adjustment factor was calculated as **0.78**; however, this has been calculated using only one study from the up-to-date National Bias Adjustment Factor Spreadsheet (version number 03/14, shown in Appendix B). A further bias adjustment factor has been calculated by combining both the locally and nationally derived factors using the method outlined in the National Bias Adjustment Factor Spreadsheet:

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

For this report and in line with the 2013 Progress 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 combined locally and nationally derived bias adjustment factor of **0.79** has been used. The diffusion tube monitoring locations are detailed in Table 2.3.

Table 2.3 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
West Area									
St Leonards Primary School, Dunfermline	R(F)	309770	686895	NO_2	N	N	Y	10.6	Y
Carnegie Drive (A,B,C), Dunfermline*	R(F)	309019	687632	NO_2^*	N	N	Y	2.3	Y
Rumblingwell, Dunfermline (5N)	R	307866	688231	NO_2	N	N	N (6.3)	1.7	Y
Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	309897	687713	NO_2	Y	N	N (5.1)	1.6	Y
Appin Crescent (1) Dunfermline	R(F)	309891	687716	NO_2	Y	N	Y	6.5	Y
Appin Crescent (2) Dunfermline	R(F)	309975	687716	NO_2	Y	N	Y	1.5	Y
Appin Crescent (3) Dunfermline	R(F)	309975	687716	NO_2	Y	N	Y	1.8	Y
Appin Crescent 4(A)(B)(C) Dunfermline*	R(F)	309926	687722	NO_2^*	Y	Y	Y	3.9	Y
Appin Crescent 5(A)(B)(C)*	R(F)	309974	687716	NO_2	Y	N	Y	1.5	Y
Appin Crescent 6(A)(B)(C)*	R(F)	309904	687704	NO_2	Y	N	Y	1.5	Y
High Street, Cowdenbeath	K	316523	691740	NO_2	N	N	N (3.5)	0.5	Y

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
North Approach Road (A, B) Kincardine	K	293182	687549	NO_2	N	N	N (11.0)	0.5	Y
Pittencrieff St, Dunfermline	R(F)	308743	687549	NO_2	N	N	Y	0.5	Y
11 Halbeath RD1, Dunfermline	R (F)	310245	687784	NO_3	N	N	Y	14	Y
57 Halbeath RD2, Dunfermline	R (F)	310488	6987873	NO_4	N	N	Y	6	Y
Admiralty Road A, Rosyth	R(F)	312140	683439	NO_2	N	N	Y	9	Y
Admiralty Road (A,B,C) ROMON*	R(F)	311755	683503	NO_2^*	N	Y	Y	6.5	Y
229 Admiralty Road, Rosyth	R (F)	311384	683543	NO_5	N	N	Y	11	Y
49 Ramsay Place, Rosyth	R (F)	311633	683688	NO_6	N	N	Y	14	Y
129 Admiralty Road, Rosyth	R (F)	311693	683477	NO_7	N	N	Y	12	Y
Central Area									
St Clair Street (1) , Kirkcaldy	R	329157	693030	NO_2	N	N	N (2)	1.3	Y
St Clair Street (2) , Kirkcaldy	R	329131	693008	NO_2	N	N	N (2)	1.8	Y
St Clair Street (3), Kirkcaldy	R(F)	329174	693069	NO_2	N	N	Y	2	Y

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
St Clair Street ROMON (A,B,C,)* Kirkacaldy	R	329143	692986	NO_3	N	Y	N(10.0m)	5	Y
Dunnikier Rd, Kirkcaldy	R(F)	328152	692350	NO_2	N	N	Y	3.4	Y
Victoria Rd, Kirkcaldy	R(F)	328152	692325	NO_2	N	N	Y	2.5	Y
Glenlyon Road, Levenmouth	K	337357	701318	NO_2	N	N	N (26.8)	1	Y
Leslie High St	R(F)	325111	701806	NO_2	N	N	Y	3	Y
Queensway, Glenrothes	K	327849	701114	NO_2	N	N	N (17.0)	1	Y
Adsa Roundabout, Kirkcaldy	K	328735	694053	NO_2	N	N	N (28.0)	1	Y
125 St Clair Street, Kirkcaldy	R(F)	329208	693170	NO_2	N	N	Y	1.5	Y
179A St Clair Street, Kirkaldy	R(F)	329301	693315	NO_2	N	N	Y	1.5	Y
3A Junction Road, Kirkcaldy	R(F)	329121	693036	NO_2	N	N	Y	1.5	Y
24 St Clair Street, Kirkcaldy	R(F)	329091	692691	NO_2	N	N	Y	1.5	Y
East Area									
City Road (1,2), St Andrews	R	350586	716580	NO_2	N	N	N (1.0)	1.5	Y
Bell Street (1,), St Andrews	R(F)	350708	716716	NO_2	N	N	Y	1.6	Y
Bell Street (2) St Andrews	R(F)	350716	716669	NO_2	N	N	Y	2.1	Y

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Crossgate, Cupar	K	337536	714537	NO_2	Y	N	N (3.0)	0.5	Y
South Road, Cupar	R	337513	713616	NO_2	N	N	N (17.0)	1.8	Y
Cupar Road, Auchtermuchty	R(F)	324186	711801	NO_2	N	N	Y	1.8	Y
Bonnygate, Cupar (1N), Bonnygate 1	R(F)	337409	714570	NO_2	Y	N	Y	5.3	Y
Bonnygate, Cupar, Bonnygate 2	R(F)	337493	714586	NO_2	Y	N	Y	1.7	Y
Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	337480	714586	NO_2	Y	N	Y	1.6	Y
Bonnygate, Cupar, Bonnygate B4	R(F)	337471	714575	NO_2	Y	N	Y	1.9	Y
Ladywynd, Cupar, Ladywynd B5	R(F)	337405	714596	NO_2	Y	N	Y	1	Y
Bonnygate West, Cupar, Bonnygate B6	R(F)	337342	714579	NO_2	Y	N	Y	3.2	Y
Bonnygate, Cupar, Monitor BA, BB, BC *	K	337406	714574	NO_2^*	Y	Y	N (4.8)	0.6	Y
4 East Road, Cupar	R(F)	337915	714721	NO_2	Y	N	Y	14	Y

** Triplicate sites*
K = Kerbside, 0-1m from the kerb of a busy road
R = Roadside, 1-5m from the kerb (up to 15m in some cases)
R (F) = façade of buildings on street
UB = Urban Background, >50m from any busy road

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

Table 2.4 shows 2013 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 exceedances 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 exceedances of the 1 hour NO_2 objective for any of the four automatic monitoring sites.

The polar plots of NO_2 concentrations by wind speed and wind direction are shown in Figure 2.5 for Appin Crescent, Dunfermline, and Bonnygate, Cupar where AQMA's have been declared. Polar plots are useful to gain a quick graphical representation of the relationship between pollutant concentrations and the meteorological conditions.

In the Appin Crescent, Dunfermline polar plot the relationship between concentration and wind speed/directions cannot be easily determined from the plot though there is some evidence of the influence of topography in the data. The plot shows a broadly east-west signal which is consistent with parallel winds through the street canyon. In general terms parallel winds of low speed will produce high concentrations in canyons and this is consistent with the plot shown. There is also evidence in the plot of perpendicular winds causing high concentrations, which is also common in street canyons- though complex three dimensional turbulence phenomena (including a turbulent contribution from road traffic) cannot be reliably determined in an Openair plot, the results should therefore be considered indicative. The only way to fully characterise turbulence conditions in the canyon would be through application of a 3D Computational Fluid Dynamics model.

In the polar plot for Bonnygate, Cupar there is a clearer relationship between concentrations and wind speed/direction. There is a clear signal arising when winds blow parallel to the street canyon to the east, which is as would be expected. It should be noted that the meteorological conditions in the Open Air tool on Scottish Government website are modelled, so there may be some bias in the data and subsequent analysis.

The trend of significantly lower concentrations seen at Bonnygate, Cupar, suggests that the traffic controlling measures introduced in mid-July 2009 is likely to be reducing levels of NO_2 in this area. These measures include a new Urban Traffic Management and Control System and changes to the pedestrian crossings.

The annual mean NO_2 concentrations from 2007-2013 are displayed in Figure 6.1 for Bonnygate, Cupar and Appin Crescent, Dunfermline. The graph demonstrates that NO_2

concentrations are declining in both AQMA's and provides evidence of the effectiveness of the action plans.

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 2013 %	Annual Mean Concentration µg m^{-3}				
					2009	2010	2011	2012	2013
Appin Crescent, Dunfermline*	Roadside	Y	98	93	30	29	30	30	25
Bonnygate, Cupar	Kerbside	Y	82	75	(33) 32**	32	30	29	27
Admiralty Road, Rosyth ***	Roadside	N	98	100	29	33	28	28	25
St Clair Street, Kirkcaldy	Roadside	N	95	99	N/A	N/A	19****	32	20

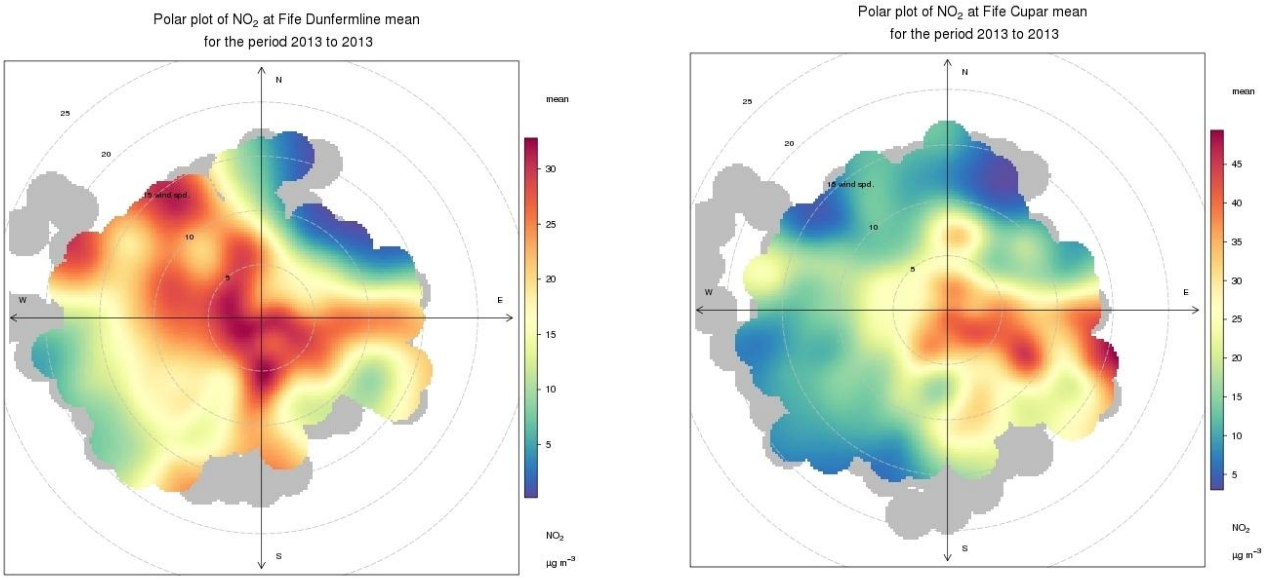
** Appin Crescent, Dunfermline started monitoring August 2007.*
*** Bonnygate, Cupar started monitoring December 2005. Bonnygate Cupar did not monitor between February and early July. Period Mean adjustment of 0.95 applied.*
**** Admiralty Road, Rosyth started monitoring March 2008.*
*****St Clair Street, 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 2013%	Number of Exceedances of hourly mean (200µg m^{-3}) *If the period of valid data is less than 90% of a full year, include the 99.8th percentile of hourly means in brackets.*				
				2009	2010	2011	2012	2013
Appin Crescent, Dunfermline *	Roadside	Y	93	0	0	0	0	0
Bonnygate, Cupar	Kerbside	Y	75	0 (170)**	0	0 (120)	0	0 (117)
Admiralty Road, Rosyth ***	Roadside	N	100	2	0	0	0	0
St Clair Street, Kirkcaldy	Roadside	N	99	N/A	N/A	0 (71)****	0	0

** Appin Crescent, Dunfermline started monitoring August 2007.*
*** Bonnygate, Cupar started monitoring December 2005. Bonnygate Cupar did not monitor between February and early July. Period Mean adjustment of 0.95 applied.*
**** Admiralty Road, Rosyth started monitoring March 2008.*
*****St Clair Street, Kirkcaldy started monitoring February 2011*

Figure 2.5 Polar plots of NO_2 concentrations by wind speed and wind direction



Diffusion Tube Monitoring Data

Table 2.6 gives the annual diffusion tube data for 2013. As discussed previously, the data have been bias corrected using local bias adjustment factors for diffusion tube sites located in Dunfermline (**0.76**), Rosyth (**0.88**), Cupar (**0.71**) and Kirkcaldy (**0.81**). For monitoring sites located in other areas, a combined national and local bias adjustment factor of **0.79** has been used**.**

All of the monthly diffusion tube results, and bias adjustments, are found within Appendix C of this report. Table 2.7 compares NO_2 diffusion data from 2009, 2010, 2011, 2012 and 2013. 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 2.6 and taking into consideration local, regional and national bias adjustments, only 1 location exceeded the NO_2 annual mean objective of 40 µg m^{-3}. This location was Appin Crescent 6 (A, B, C) in Dunfermline with a measured bias adjusted concentration of 40.4 µg m^{-3}. This shows a decrease when compared with the 46µg m^{-3} measured in 2012 (shown in Table 2.7). This site is located between Park Lane and Couston Street and is considered to be a location of relevant exposure to the general public. The majority of diffusion tube sites have seen a decrease in NO_2 concentrations when compared with data from previous years. In 2012 there were 5 diffusion tube sites (3 in Appin Crescent, Dunfermline and 2 in Kirkcaldy) which exceeded the annual mean objective, whereas only 1 site in Appin Crescent exceeded in 2013.

The decreases seen at Appin Crescent coincides with the revisions of traffic lane marking carried out in March 2013. These revisions encourage traffic to use the middle lane more, thereby moving traffic away from the residential receptors on the south side of Appin Crescent. A photograph of the traffic lane marking is provided in Appendix L.

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 (illustrated previously in Figure 1.2 of this report) was declared by Fife Council in 2011 as an AQMA for NO_2.

NO_2 monitoring data are presented for INEOS Grangemouth oil refinery as part of their annual monitoring report for 2013 report. Annual average concentrations for NO_2 are lower than the set air quality limit of 31 µg m^{-3} (16 ppb).

Table 2.6 Results of NO_2 Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg m^{-3})
NO_2 Diffusion Tubes West Area						
AQM3	St Leonards Primary School, Dunfermline	R(F)	N	N	100	14.1
C'GIE DR	Carnegie Drive (A,B,C), Dunfermline	R(F)	N	Triplicate	100	31.3
DRM5	Rumblingwell, Dunfermline (5N)	R	N	N	100	20.6
DRM9	Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	Y	Triplicate	100	30.5
APP CR1	Appin Crescent (1) Dunfermline	R(F)	Y	N	100	24.7
APP CR2	Appin Crescent (2) Dunfermline	R(F)	Y	N	100	38.8
APP CR3	Appin Crescent (3) Dunfermline	R(F)	Y	N	100	33.3
APP CR4	Appin Crescent 4(A)(B)(C) Dunfermline	R(F)	Y	Triplicate	100	25.1
APP CR5	Appin Crescent 5(A)(B)(C)	R(F)	Y	Triplicate and Co-located	100	36
APPCR6	Appin Crescent 6(A)(B)(C)	R(F)	Y	Triplicate	100	**40.4**
C'BEATH1	High Street, Cowdenbeath	K	N	N	100	21.1
K'DINE	North Approach Road (A, B) Kincardine	K	N	N	100	16.5
PITT ST	Pittencrieff St, Dunfermline	R(F)	N	N	100	18.4
HALBEATH RD1	11 Halbeath RD1, Dunfermline	R (F)	N	N	100	17.9
HALBEATH RD2	57 Halbeath RD2, Dunfermline	R (F)	N	N	100	17.5
ADM RO A	Admiralty Road A, Rosyth	R(F)	N	N	100	31.5
ROMON	Admiralty Road (A,B,C) ROMON	R(F)	N	Triplicate and Co-located	100	25.6
N/A	229 Admiralty Road, Rosyth	R (F)	N	N	100	22.4
N/A	49 Ramsay Place, Rosyth	R (F)	N	N	100	17.6

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg m^{-3})
N/A	129 Admiralty Road, Rosyth	R (F)	N	N	100	25.3
NO_2 Diffusion Tubes Central Area						
N/A	St Clair Street (1) , Kirkcaldy	R(F)	N	N	100	34.1
N/A	St Clair Street (2) , Kirkcaldy	R(F)	N	N	100	35.9
N/A	St Clair Street (3), Kirkcaldy	R(F)	N	N	100	30.4
N/A	St Clair Street ROMON (A,B,C,) Kirkacaldy	R	N	Triplicate and Co-located	100	19.6
N/A	Dunnikier Rd, Kirkcaldy	R(F)	N	N	100	27.3
N/A	Victoria Rd, Kirkcaldy	R(F)	N	N	100	28.5
N/A	Glenlyon Road, Levenmouth	K	N	N	100	24.2
N/A	Leslie High St	R(F)	N	N	100	21.2
N/A	Queensway, Glenrothes	K	N	N	100	20.1
N/A	Adsa Roundabout, Kirkcaldy	K	N	N	100	29.6
N/A	125 St Clair Street, Kirkcaldy	R(F)	N	N	100	20.6
N/A	179A St Clair Street, Kirkaldy	R(F)	N	N	100	26.7
N/A	3A Junction Road, Kirkcaldy	R(F)	N	N	100	27.1
N/A	24 St Clair Street, Kirkcaldy	R(F)	N	N	100	19.1
NO_2 Diffusion Tubes East Area						
N/A	City Road (1,2), St Andrews	R	N	N	100	27.0
N/A	Bell Street (1,), St Andrews	R(F)	N	N	100	35
N/A	Bell Street (2) St Andrews	R(F)	N	N	91.7	25.4
N/A	Crossgate, Cupar	K	Y	N	100	25.8
N/A	South Road, Cupar	R	N	N	100	12.4
N/A	Cupar Road, Auchtermuchty	R(F)	N	N	100	25.1
N/A	Bonnygate, Cupar (1N), Bonnygate 1	R(F)	Y	N	33.3	19.6*
N/A	Bonnygate, Cupar, Bonnygate 2	R(F)	Y	N	83.3	32.4

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg m^{-3})
N/A	Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	Y	N	95.8	31
N/A	Bonnygate, Cupar, Bonnygate B4	R(F)	Y	N	83.3	34.7
N/A	Ladywynd, Cupar, Ladywynd B5	R(F)	Y	N	100	18
N/A	Bonnygate West, Cupar, Bonnygate B6	R(F)	Y	N	100	19.2
N/A	Bonnygate, Cupar, Monitor BA, BB, BC	K	Y	Triplicate and Co-located	100	29.5
N/A	4 East Road, Cupar	R(F)	Y	N	100	14.8

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
** Data capture <75%*

Table 2.7 Results of NO_2 Diffusion Tubes (2009 to 2013)

Site ID	Location	Site Type	Within AQMA?	Annual Mean Concentration (µg m^{-3})				
				2009	2010	2011	2012	2013
NO_2 Diffusion Tubes West Area								
AQM3	St Leonards Primary School, Dunfermline	R(F)	N	20	23 (22)	21 (20)	17	14
C'GIE DR	Carnegie Drive (A,B,C), Dunfermline*	R(F)	N	35	38 (37)	38 (35)	35	31
DRM5	Rumblingwell, Dunfermline (5N)	R	N	21	27 (27)	27 (21)	25	21
DRM9	Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	Y	34	37 (37)	36 (34)	34	31
APP CR1	Appin Crescent (1) Dunfermline	R(F)	Y	28	31 (31)	29 (28)	27	25
APP CR2	Appin Crescent (2) Dunfermline	R(F)	Y	39	**46 (45)**	**46 (44)**	**41**	39
APP CR3	Appin Crescent (3) Dunfermline	R(F)	Y	37	**44 (44)**	**41 (39)**	39	33
APP CR4	Appin Crescent 4(A)(B)(C) Dunfermline*	R(F)	Y	30	33 (32)	32 (30)	28	25
APP CR5	Appin Crescent 5(A)(B)(C)*	R(F)	Y	**42***	**44 (43)**	**46 (43)**	**42**	36
APPCR6	Appin Crescent 6(A)(B)(C)*	R(F)	Y	**56***	**54 (53)**	**56 (47)**	**46**	**40**
C'BEATH1	High Street, Cowdenbeath	K	N	25	27	22	24	21
K'DINE	North Approach Road (A, B) Kincardine	K	N	20	21	19	19	17
PITT ST	Pittencrieff St, Dunfermline	R(F)	N	22	24 (24)	24 (22)	19	18

Site ID	Location	Site Type	Within AQMA?	Annual Mean Concentration (µg m^{-3})				
				2009	2010	2011	2012	2013
HALBEATH RD1	11 Halbeath RD1, Dunfermline	R (F)	N	-	-	22* (20*)	21	18
HALBEATH RD2	57 Halbeath RD2, Dunfermline	R (F)	N	-	-	26* (25*)	20	18
ADM RO A	Admiralty Road A, Rosyth	R(F)	N	31	37 (34)	36 (31)	33	32
ROMON	Admiralty Road (A,B,C) ROMON*	R(F)	N	26	31 (28)	29 (25)	28	26
N/A	229 Admiralty Road, Rosyth	R (F)	N	-	-	24	24	22
N/A	49 Ramsay Place, Rosyth	R (F)	N	-	-	17	19	18
N/A	129 Admiralty Road, Rosyth	R (F)	N	-	-	27	27	25
NO_2 Diffusion Tubes Central Area								
N/A	St Clair Street (1) , Kirkcaldy	R(F)	N	38	**41**	**42 (40)**	**45**	34
N/A	St Clair Street (2) , Kirkcaldy	R(F)	N	39	**44**	36 (35)	**41**	36
N/A	St Clair Street (3), Kirkcaldy	R(F)	N	33	37	32 (31)	34	30
N/A	St Clair Street ROMON (A,B,C,)* Kirkacaldy	R	N	-	-	19 (19)	25	20
N/A	Dunnikier Rd, Kirkcaldy	R(F)	N	30	33	30 (29)	32	27
N/A	Victoria Rd, Kirkcaldy	R(F)	N	34	35	32 (31)	34	29
N/A	Glenlyon Road, Levenmouth	K	N	27	32	27	28	24
N/A	Leslie High St	R(F)	N	24	25	22	25	21
N/A	Queensway, Glenrothes	K	N	24	24	22	25	20

Site ID	Location	Site Type	Within AQMA?	Annual Mean Concentration (µg m^{-3})				
				2009	2010	2011	2012	2013
N/A	Adsa Roundabout, Kirkcaldy	K	N	33	32	34 (33)	33	30
N/A	125 St Clair Street, Kirkcaldy	R(F)	N	-	-	-	N/A	31
N/A	179A St Clair Street, Kirkaldy	R(F)	N	-	-	-	N/A	27
N/A	3A Junction Road, Kirkcaldy	R(F)	N	-	-	-	N/A	27
N/A	24 St Clair Street, Kirkcaldy	R(F)	N	-	-	-	N/A	19
NO_2 Diffusion Tubes East Area								
N/A	City Road (1,2), St Andrews	R	N	29	33	36	30	27
N/A	Bell Street (1,), St Andrews	R(F)	N	33	37	36	39	35
N/A	Bell Street (2) St Andrews	R(F)	N	29	31	39	36	25
N/A	Crossgate, Cupar	K	Y	25	26 (28)	22 (24)	24	26
N/A	South Road, Cupar	R	N	21	18 (19)	12 (12)	14	12
N/A	Cupar Road, Auchtermuchty	R(F)	N	30	29	24	28	25
N/A	Bonnygate, Cupar (1N), Bonnygate 1	R(F)	Y	31	28 (31)	28 (30)	29	22***
N/A	Bonnygate, Cupar, Bonnygate 2	R(F)	Y	**42**	36 (39)	35 (38)	36	32
N/A	Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	Y	**46**	37 (41)	36 (39) ((41))	37	31
N/A	Bonnygate, Cupar, Bonnygate B4	R(F)	Y	32	31 (35)	31 (33)	34	35

Site ID	Location	Site Type	Within AQMA?	Annual Mean Concentration (µg m^{-3})				
				2009	2010	2011	2012	2013
N/A	Ladywynd, Cupar, Ladywynd B5	R(F)	Y	21	19 (21)	18 (19)	18	18
N/A	Bonnygate West, Cupar, Bonnygate B6	R(F)	Y	25	23 (25)	19 (20)	21	19
N/A	Bonnygate, Cupar, Monitor BA, BB, BC *	K	Y	33**	31 (34)	30 (32)	30	30
N/A	4 East Road, Cupar	R(F)	Y	16	14 (16)	13 (14)	14	15

** 2011 data has been Period Mean Adjustment of 1.21 applied to non bias corrected data to compensate for January to September missing data*
*** 2011 data has been Period Mean Adjustment of 1.06 applied to non bias corrected data to compensate for January to April missing data*
2011 data has been adjusted using locally calculated bias adjustment factors (Dunfermline 0.83, Rosyth 0.92, Cupar 0.73 , Kirkcaldy 0.81)
2011 data in brackets is adjusted using National Adjustment factor (0.78)
2011 data in double brackets is adjusted using Regional average calculated from locally calculated Bias Adjustment Factors (0.82)
** 2010 data has been Period Mean Adjustment of 1.10 applied to non bias corrected data.*
*** 2010 data has been Period Mean Adjustment of 0.95 applied to non bias corrected data.*
2010 data has been Period Mean Adjusted by 1.08 to compensate for November and December missing data
2010 data in brackets is adjusted using nationally derived Bias Adjustment Factor (0.78)
**** Data capture <75%*

2.2.2 Particulate Matter (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 2013 shows that the Bonnygate, Cupar site meets the annual mean objective with concentrations of 18 µg m^{-3}. However it should be noted that there was only a 62.4% data capture at this site for 2013.This was due to technical problems with the PM_{10} monitoring equipment. This has been raised with the supplier of monitoring equipment in seeking to resolve these issues. Due to the low data capture, the annual mean concentration was adjusted using procedures stated in Box 3.2 of the Technical Guidance (09). The workings are given in Table B.1 in Appendix B of this report. The annual mean adjusted PM_{10} concentration for Bonnygate, Cupar was calculated to be 18 µg m^{-3}.

Annual mean concentrations of 14 µg m^{-3} at Admiralty Road, 15 µg m^{-3} at Appin Crescent, Dunfermline and 12 µg m^{-3} St Clair Street, Kirkcaldy were measured during 2013; both below the annual mean objective.

Table 2.9 summarises the number of exceedances of the PM_{10} daily-mean objective of 50 µg m^{-3} between 2009 and 2013. As can be seen the daily-mean objective of 50 µg m^{-3} (not to be exceeded more than 7 times in a year) was not exceeded at any of PM_{10} monitoring sites in Fife. Due to the low data capture at Bonnygate, Cupar (62.4%) the 98% percentile of the daily mean was calculated and was found to be 45µg m^{-3}.

As stated previously, Bonnygate Cupar has been designated an AQMA for PM_{10} and an Air Quality Action Plan has been adopted by Fife Council. Concentrations decreased significantly in 2012 (18 µg m^{-3}) and have stayed at the same in 2013 (18 µg m^{-3}).

Indications are that previous traffic management measures have helped to decrease the concentration of PM_{10} (and NO_2) since 2010 and it is hoped that future and ongoing action plan measures being carried out in Cupar will help reduce concentrations further.

The annual mean PM_{10} concentration at Admiralty Road, Rosyth (14 µg m^{-3}) is below the annual mean PM_{10} objective and is a decrease in the annual mean PM_{10} concentration from 2012 of 17 µg m^{-3}. The data capture rate achieved for PM_{10} during 2013 was 97%. It was concluded in the Detailed Assessment (2012) that Fife Council should defer its decision to declare an AQMA until at least 6 months of monitoring data was made available using a new FDMS drier. The new drier was installed in September 2012. Using mean data up to the 31st March 2013 (15 µg m^{-3}) the 2012 Progress Report concluded that Fife Council was not required to declare an Air Quality Management Area at Admiralty Road, Rosyth. The 2013 annual mean of 14 µg m^{-3} supports this conclusion.

The annual mean PM_{10} concentration at Appin Crescent, Dunfermline (15 µg m^{-3}) was below the annual mean PM_{10} objective and the same as what was measured in 2012. The Appin Crescent, Dunfermline site's data capture was 93%. The site started monitoring PM_{10} in

March 2011 but data up to April 2011 was deleted during the ratification process. This may have distorted the annual mean for 2011. However modelling undertaken as part of the Further Assessment of Air Quality in Appin Crescent (2012) indicated that the relevant PM_{10} objectives may be compromised and the Air Quality Management Area Order should be amended to include this pollutant. The Appin Crescent AQMA Declaration Order was amended to include PM_{10} in November 2012.

The annual mean PM_{10} concentration for St Clair Street, Kirkcaldy was well below the PM_{10} objective with a measured concentration of 12 µg m^{-3}. The data capture for 2013 at this site was 99.5%. As shown in Table 2.8 the PM_{10} concentrations at St Clair Street Kirkcaldy have been consistently well below the air quality objective.

Figure 6.2 shows the decline in PM10 concentrations at Bonnygate, Cupar and Appin Crescent, Dunfermline from 2007 to 2013 and highlights that action plans can be effective in reducing concentrations of pollutants in AQMA's.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
					2009	2010	2011	2012	2013
Bonnygate, Cupar	Kerbside	Y	62.4	Y	(16) 17*	**19**	**19**	18	(18) 18
Admiralty Road, Rosyth	Roadside	N	97.3	Y	16	**19**	**20**	17	14
Appin Crescent, Dunfermline	Roadside	Y	93.2	Y	N/A	N/A	(16) 16**	15	15
St Clair Street, Kirkcaldy	Roadside	N	99.5	Y	N/A	N/A	13***	11	12

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

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

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

Data in brackets are Measurements without a period mean adjustment calculated

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 2013 %	Valid Data Capture 2012 %	Confirm Gravimetric Equivalent (Y or N/A)	Number of Exceedances of 24-Hour Mean (50 µg/m^3) *If data capture < 90%, include the 98.08th percentile of daily means in brackets.*				
						2009	2010	2011	2012	2013
Bonnygate, Cupar	Kerbside	Y	62	92	Y	0 (41)*	3 (44)	0 (44)	4	4 (45)
Admiralty Road, Rosyth	Roadside	N	97	98	Y	2	0	3	1	2
Appin Crescent, Dunfermline	Roadside	Y	93	93	Y	N/A	N/A	0 (38)**	4	2
St Clair Street, Kirkcaldy	Roadside	N	100	91	Y	N/A	N/A	0 (33)***	1	1

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

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

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

2.2.3 Sulphur Dioxide (SO_2)

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 2013 Longannet operated with an average load factor of 49.9% (47.9% in 2012 / 46.1% in 2011/ 49.6% in 2010 / 41% in 2009). The station emitted 25.8 kT of SO_2 during 2013 (34.8kT in 2012 / 37.7kT in 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 2013 for this site are provided along with 2006 to 2012 data are summarised in Table 2.10.

Table 2.10 Results of Automatic Monitoring for SO_2: Comparison with Objectives

Period	Valid 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 exceedances)	350 µg m^{-3} (max. 24 exceedances)	125 µg m^{-3} (max. 3 exceedances)
2006	N/A	166	88	N/A
2007	N/A	138	N/A	N/A
2008	N/A	423	N/A	N/A
2009	99.9	150 (0)	70 (0)	N/A (0)
2010	99.8	238.6 (0)	164.7 (0)	22.9 (0)
2011	96.6	247.6 (0)	152 (0)	37.5 (0)
2012	97.4	201.1 (0)	92.6 (0)	17.3 (0)
2013	97.6	178.3 (0)	133.3 (0)	20.7 (0)

According to the Longannet Power Station Report, the measured concentrations at Blair Mains indicate that there were no exceedances of the 15-minute mean objective. Measured concentrations also indicated that there were no exceedances of the hourly or the daily SO_2 thresholds. Although maximum 24-hour mean data are not available, the 99.18th percentile daily value was 15.7 µg m^{-3} (compliance value 125 µg m^{-3}) (15.2 µg m^{-3} in 2012 and 29.9 µg m^{-3} in 2011), and the 99.73th percentile was 57.7 µg m^{-3} (compliance value 350 µg m^{-3}) (48.5 µg m^{-3} in 2012 and 74.6 µg m^{-3} in 2011). The period-mean for 2013 was 3.3 µg m^{-3}.

The measurements therefore indicate that the area around Longannet Power Station was in compliance with all relevant SO_2 objectives during 2013.

Diffusion Tube data

Additional SO_2 monitoring data are presented for INEOS oil refinery in their annual monitoring report for 2013. This report concludes that annual average concentrations of SO_2 are lower than the set air quality limit.

2.2.4 Benzene

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

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

INEOS Grangemouth Benzene Monitoring

Benzene monitoring is presented for INEOS Grangemouth oil refinery in their annual monitoring report for 2013. This report concludes that the annual average concentrations of Benzene are below the Air Quality (Scotland) Regulations 2000 air quality objective of 3.25 µg m^{-3} (1ppb).

BP Benzene Monitoring

Benzene monitoring data are presented in their annual monitoring report for 2013. The results of this monitoring indicate that concentrations of benzene over the 12 month period were low (annual means range from 0.65 – 1.3 µg m^{-3} (0.2 - 0.4 ppb) and are well within the air quality standard. BP have commissioned monitoring along the Fife coastline for many years and there has been an overall reduction in the levels of hydrocarbons, including benzene, present in air over the last decade. Concentrations at any one locality are highly dependent on the weather. The measurements made in 2013 indicate that concentrations of most of the monitored substances were similar to 2012 at most locations.

Little Raith Benzene monitoring

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

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

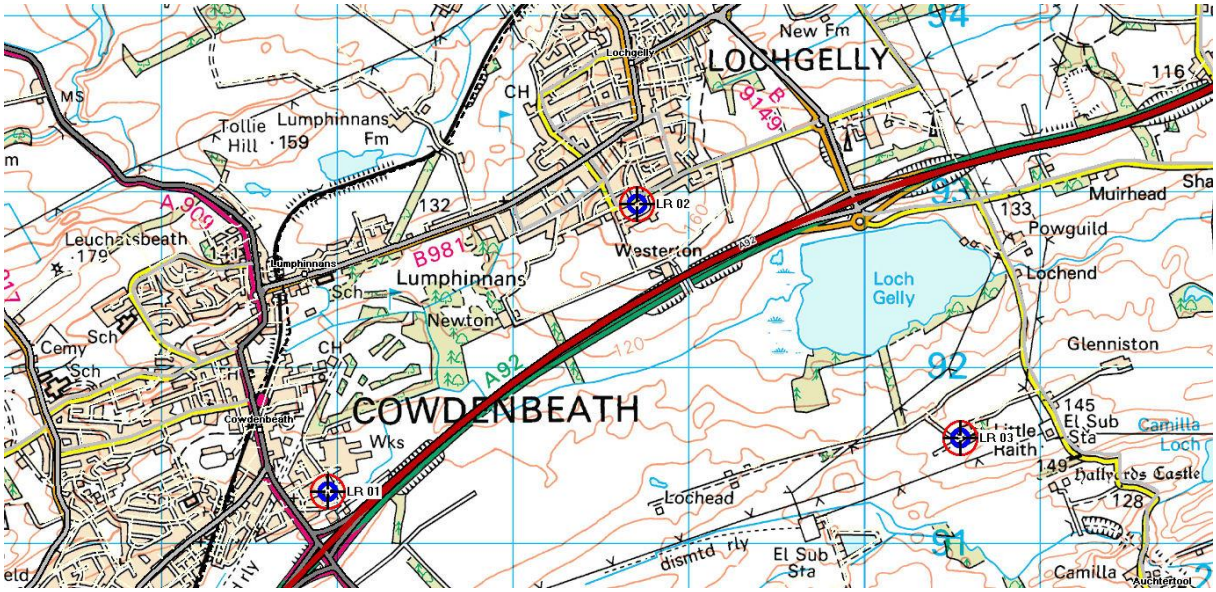


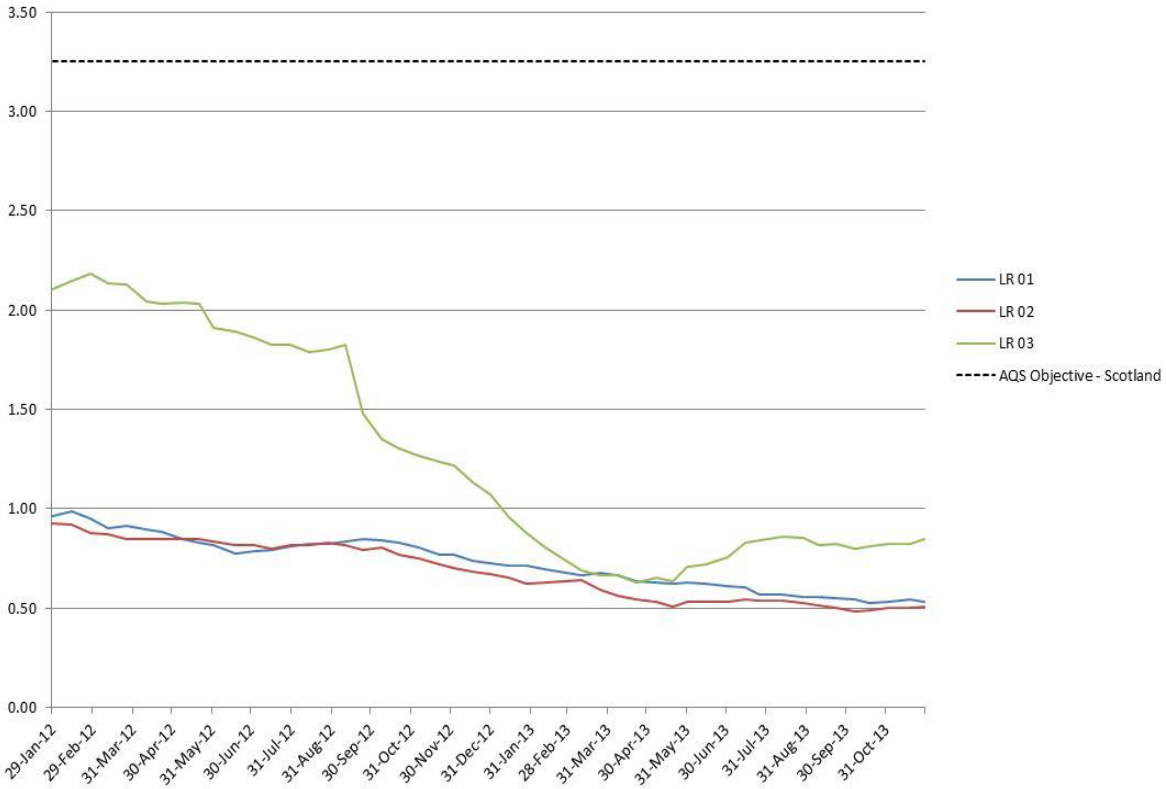
Table 2.11 summarises the running annual mean benzene concentrations for the period 29/01/2012 to 29/11/2013 and associated data capture rates. These results are also graphed in Figure 2.7. As can be seen, measured running annual mean benzene concentrations at all three monitoring locations have been below the AQS Objective of 3.25 µg m^{-3} throughout the monitoring programme; and data capture rates have remained at greater than or close to the 90% requirement. The maximum running annual mean concentration was measured at LR03 during 29/01/2012 to 28/01/2013 with a measured concentration of 0.88 µg m^{-3}. As illustrated in Figure 2.7, the benzene concentrations measured at LR01, LR02 and LR03 indicate a downward trend in benzene concentrations throughout the monitoring programme.

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

Table 2.11 Little Raith Running Annual Mean Benzene Concentrations – 29/01/2012 to 29/11/2013 (µg m^{-3})

Period		Running Annual Mean Benzene Concentrations (µg m^{-3})			Data Capture		
Start Date	Finish Date	LR 01	LR 02	LR 03	LR 01	LR 02	LR 03
29-Jan-12	28-Jan-13	0.66	0.63	0.88	100%	100%	100%
13-Feb-12	11-Feb-13	0.64	0.63	0.81	100%	100%	100%
27-Feb-12	25-Feb-11	0.63	0.65	0.73	100%	100%	100%
12-Mar-12	11-Mar-13	0.62	0.64	0.66	100%	100%	100%
26-Mar-12	25-Mar-13	0.63	0.59	0.64	100%	100%	100%
10-Apr-12	08-Apr-13	0.61	0.56	0.64	100%	100%	100%
22-Apr-12	22-Apr-13	0.59	0.55	0.61	100%	100%	100%
08-May-12	07-May-13	0.58	0.53	0.63	100%	100%	100%
21-May-12	20-May-13	0.58	0.51	0.61	100%	100%	100%
01-Jun-12	31-May-13	0.58	0.53	0.68	100%	100%	100%
18-Jun-12	14-Jun-13	0.57	0.53	0.69	100%	100%	100%
02-Jul-12	01-Jul-13	0.56	0.53	0.73	100%	100%	100%
16-Jul-12	15-Jul-13	0.56	0.54	0.80	100%	100%	100%
30-Jul-12	26-Jul-13	0.53	0.54	0.81	100%	100%	100%
13-Aug-12	12-Aug-13	0.53	0.54	0.83	100%	100%	100%
28-Aug-12	28-Aug-13	0.51	0.53	0.82	100%	100%	100%
10-Sep-12	09-Sep-13	0.53	0.51	0.78	100%	100%	100%
24-Sep-12	23-Sep-13	0.53	0.50	0.79	100%	100%	100%
08-Oct-12	07-Oct-13	0.52	0.49	0.77	100%	100%	100%
22-Oct-12	18-Oct-13	0.51	0.49	0.78	100%	100%	100%
06-Nov-12	01-Nov-13	0.51	0.50	0.79	100%	100%	100%
22-Nov-12	18-Nov-13	0.52	0.50	0.79	100%	100%	100%
03-Dec-12	29-Nov-13	0.51	0.51	0.81	100%	100%	100%

Figure 2.7 Graph of Little Raith Running Annual Mean Benzene Concentrations – 29/02/2012 to 29/11/2013 (µg m^{-3})



2.2.5 Other Pollutants Monitored

1,3- Butadiene

1,3 Butadiene monitoring data are presented for INEOS Grangemouth oil refinery and BP Production and Exploration as part of their 2013 annual reports. Annual average concentrations for 1,3 Butadiene are lower than the 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 measured at both the INEOS Grangemouth oil refinery and BP Production and Exploration as part of their annual reporting for 2013. Annual average concentrations are low, but there are no air quality standards for these substances.

The INEOS Grangemouth annual community air monitoring report for 2013, states that there were 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, 2013 states that concentrations of most of the monitored substances in 2013 were similar to 2012 at most locations. The report also adds that over the many years BP have commissioned monitoring along the Fife coastline; there has been an overall reduction in the levels of hydrocarbons, including benzene, present in air over the last decade.

The Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group 2012 Annual Report[29] (Aug 2013) states that emissions from regulated sources within the plants in 2012 remained within the limit values set by SEPA for the protection of public health and the environment. The report concluded that emissions from the Shell and ExxonMobil Plants at Mossmorran and Braefoot Bay continue to pose no significant risk to the health of members of the local community.

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 2.12. The results have been converted from ppm into mass units at 20°C and 1 atmosphere.

Table 2.12 Fife Council CO Monitoring Results for 2013

Site Number/ Location	Monitoring Period	Max 8-Hour Concentration (mg m^{-3})
Bothwell Gardens, Dunfermline	18/07/13 to 24/07/13	0.91
	10/10/13 to 16/10/13	2.15
Carnegie Drive/ Pilmuir Street Dunfermline	24/04/13 to 30/04/13	1.92
	24/10/13 to 30/10/13	1.02
Kirkcaldy, Victoria Rd/Dunnikier Rd	13/06/13 to 19/06/13	2.77
	18/09/13 to 24/09/13	1.94
	05/03/14 to 11/03/13	1.36
Glenlyon Road/Windgates Road, Leven	14/08/13 to 20/08/13	1.02
	10/02/14 to 16/02/14	0.91
Bonnygate, Cupar	14/08/13 to 20/08/13	0.88
Admiralty Rd/Queensferry, Rosyth	21/09/12 to 27/09/13	2.90
	07/03/14 to 13/03/14	0.61
A909, Mossmorran	04/05/13 to 10/05/13	0.20

Whilst none of these monitoring periods are sufficiently long to permit full assessment of CO concentrations over a full annual period, they all indicate that concentrations are likely to be below the Air Quality Strategy objective of 10 mg m^{-3} for the running 8 hour mean concentration.

[29] Mossmoran and Braefoot Bay Independant Air Quality Monitoring Review Group, 2012 Annual Report, August 2013

2.2.6 Summary of Compliance with AQS Objectives

New monitoring data highlighted air quality issues for NO_2 in Appin Crescent, Dunfermline at one diffusion tube location (Appin Crescent 6 (A, B, C)). Bonnygate, Cupar and Appin Crescent, Dunfermline have both already been declared AQMAs. Fife Council are currently in the process of implementing their Air Quality Action Plans for these areas.

All 2013 monitored PM_{10} at Bonnygate, Cupar and Appin Crescent, Dunfermline measured PM_{10} concentrations below the annual mean and daily mean objectives.

Fife Council has examined the results from monitoring in the Fife Council Area.

Concentrations within the Appin Crescent, Dunfermline AQMA still exceed or are close to the annual mean objectives for NO_2 at one location where relevant exposure exists and as a result the AQMA should remain. Concentrations within the Bonnygate Cupar AQMA still exceed or are close to the annual mean objectives for PM_{10} at one location where relevant exposure exists and as a result the AQMA should remain.

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

3 New Local Developments

3.1 Road Traffic Sources

No new road traffic sources have been identified within the Fife Council area since the last Progress Report.

3.2 Other Transport Sources

No other transport sources have been identified within the Fife Council area since the last Progress Report.

3.3 Industrial Sources

Changes to Regulated Industrial Processes

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

Details of Part A or B processes changes:

- Tullis Russell's CHP (3 coal and 1 gas boilers) were taken out of service in August 2013. SEPA reports that this has meant a significant decrease in SOx and particulate emissions.
- Carr's Flour Mill, Kirkcaldy have built their replacement flour mill. This should give significant improvements with regards to particulates.
- Fife Council's Lochhead Landfill Site has a new composting and anaerobic digestion process.
- Devilla Quarry have had their permit updated which will allow them to use recovered fuel oil. Also, the limit of sulphur in the fuel has been increased from 0.1% to 1%.
- Nobles Letham Poultry Farms have partially surrendered 3 out of 5 farms, so only 2 are operational on the Letham permit

Part A or B processes that have ceased to operate:

- Nobles Lochty Burn Poultry Farm, ceased 2012
- Lamberts Garage at Leven, ceased in 2012
- Two Petrol Vapour Recovery's on Bridge St, Kirkcaldy, ceased 2013

- One of Thomas Muirs mobile plants, ceased 2013

Changes to Petrol Stations

Morrison's Supermarket has opened a new petrol station on Esplanade, Kirkcaldy

3.4 Commercial and Domestic Sources

Proposed Biomass Boiler

A biomass boiler is to be used to provide energy for a proposed secondary school in Levenmouth, Fife. The proposed biomass boiler will burn woodchips for fuel and have a maximum output of 360 kW. In March 2014, an impact assessment of the proposed boiler[30] was carried out by Ricardo-AEA on the potential impacts on the annual mean concentration for NO_2 and PM_{10}. The air quality impacts were calculated using Atmospheric Dispersion Modelling System (ADMS 5.0) a dispersion model developed by UK consultants CERC; in conjunction with 5 years of metrological data measured at Leuchars weather station.

Six stack heights were considered and their impacts on two areas; at the second floor level within the school complex and also at ground level within the school site and surrounding area, were modelled. A stack height of 15.1m, the current proposed stack height, was calculated to give the highest process contributions at both of these areas. However these impacts on the annual mean concentrations of NO_2 and PM_{10} were found to be negligible at modelled points.

It was concluded that it was unlikely that the AQS objective for NO_2 and PM_{10} would be breached as a result of the boiler emissions using the proposed stack height of 15.1m. The results from the report of the modelling exercise for NO_2 and PM_{10} are presented spatially for the proposed stack height of 15.1m above ground level in Figures H.1 and H.2 in Appendix H.

Fife Council Protective Services has been consulted on the contents of the 'Levenmouth Secondary School - Biomass plant air quality impact assessment (March 2014)' and found its contents to be satisfactory.

[30] Levenmouth Secondary School: Biomass Plant Air Quality Impact Assessment, Ricardo-AEA, March 2014

3.5 New Developments with Fugitive or Uncontrolled Sources

No new developments with fugitive or uncontrolled sources have been identified within the Fife Council area since the last Progress Report.

Fife Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Fife Council confirms that all the following have been considered:

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

4 Local / Regional Air Quality Strategy

Fife Environmental Partnership Climate Change Strategy 2014 – 2020

Fife is making sure it is ready to tackle the challenges posed by climate change. The Fife Environmental Partnership (FEP) launched the 'Climate Change Strategy 2014– 2020' in April 2014 (Appendix D).

The strategy aims to reduce carbon emissions and adapt to climate change in a variety of ways including:

- Using energy, waste and water more efficiently
- Getting more energy from low carbon supplies
- Encouraging more sustainable transport and travel

Fife Council is further promoting more sustainable transport and travel through current projects being carried out and the valuable information it provides on its council website.

Fife Council is encouraging the use of Electric Vehicles (EV) by promoting the many benefits of having an electric vehicle through their council website and also including electric vehicles in their fleet. Currently Fife Council and its Community Planning partners have 17 electric vehicles within their fleet and there are currently20 charging points which are available for the general public to use, at Long Stay Car Parks in Town Centres, and at Public Transport Interchanges such as Railway Stations, with 3 more proposed in the near future. This includes a charger location at Bonnygate Steet car park. Fife Council Protective Services recently presented work to date on air quality issues, including the introduction of electric vehicle to its fleet, at the Green Fleet Scotland event at Royal Highland Centre in Ingliston on 25th April 2014. Extract below:

Greening the Fleet (2)

Fife Council
Enterprise, Planning and Protective Services

- FC actively pursuing uptake of electric vehicles in its fleet
- Around 30 fleet vehicles replaced each year by the Council
- Anticipate third of the replacements will be electric
- FC has 17 electric vehicles (March 2014): 3 Peugeot iONs; 4 Nissan Leafs; 1 Mitsubishi iMiev; and 9 Renault Kangoo ZE Vans
- Chargers spread across 10 mile radius in Fife area
- 20 public charger locations – two in Bonnygate AQMA
- 4 Fife Council depot/office locations and 3 rapid chargers
- Also evaluating hybrid vehicle technologies

Fife Council explains that electric vehicles are significantly cheaper to run than conventional cars, even though they may cost more initially. The cost benefits are:

- No road tax
- You're also less affected by fluctuating fuel prices.
- Lower maintenance costs. The lack of complex parts (no gearboxes or engine) can make EVs cheaper to look after

The benefits to the environment of using an electric car are numerous. Electric Vehicles do not emit any pollutants at the point of use so can play an important role in tackling climate change and poor air quality in Fife particularly the Bonnygate and Appin Crescent AQMA's. Other forms of sustainable transport are also being invested in at locations in Cupar and Dunfermline. Development of the cycle network infrastructure is currently being made on the Linburn Corridor Cycle Way and Green space Project. This will create an east-west link from the town centre to Duloch Park, with other connections to residential areas.

Fife Council is also is also investing in the future use of cycle networks by carrying out cycle training across all schools. The Scottish Cycle Training Scheme (formerly known as cycling proficiency) has now been rebranded nationally as Bikeability Scotland by Cycling Scotland, details of which can be found in Appendix E. This will encourage children and young adults to travel to school by a sustainable means.

5 Planning Applications

A list is given below of the 2013 planning applications that are required to demonstrate that AQS objectives are unlikely to be exceeded as a result of the developments either through screening or more detailed dispersion modelling:

13/02638/FULL – Proposed erection of a biomass flue at 21 Session Street Pittenweem, Anstruther. Further information requested from applicant, which includes a suitable Air Quality impact assessment for the proposed flue and biomass boiler. In addition the applicant is also requested to submit a Biomass Boiler Information request form.

13/01210/FULL – Request for extending quarrying of hard rock, including ancillary crushing and recycling of rock, for a further 20 years at Belliston Quarry, Colinsburgh. Applicant is to ensure that emissions from the quarry and road traffic will not jeopardise the Scottish Air Quality objectives being met.

13/00189/FULL – Alteration of garage and house to install a biomass boiler. Applicant is requested to undertake a suitable Air Quality impact assessment and submit it for approval.

13/02655/FULL – Application to install a Biomass boiler in Denhead, St Andrews. The proposed biomass boiler will have a stack height of 4.8 metres and use wood pellets for fuel. This boiler is an exempt appliance in accordance with the Clean Air Act 1993.

13/02535/FULL – Installation of flue at Carslogie Farmhouse, Carslogie, Cupar Further information requested from applicant, which includes a suitable Air Quality impact assessment for the proposed flue and biomass boiler. In addition the applicant is also requested to submit a Biomass Boiler Information request form.

12/05072/SCO – Request for Scoping Opinion for proposed wind energy development for up to 12 No. wind turbines at Devilla Forest, Kincardine. Applicant advised to consult SEPA for their views on potential impacts. Also, applicant advised that the Development Management should be consulted if there are any issues which arise during the development work given that the former quarrying/ in filled ground activities associated with the site.

13/019891/ARC - Approval of Matters Specified by condition for erection of 54 dwelling houses with associated roads, footpaths and play areas at the Dunfermline East Expansion, Sandpiper Drive. The development is part of a larger development area. Given this, the development should not jeopardise the achievement of the Scottish statutory air quality objectives.

13-03414-FULL - Erection of golf course maintenance buildings including laundry, material storage, buggy store and biomass heating plant, formation of car park and access onto A915 and access route (pipeline) linking maintenance area to golf club building at land to north of Feddinch Mains, Feddinch, St Andrews, Fife. The proposed area in located adjacent to former railway land and therefore it is advised that Development Management are notified if there are any unexpected materials or conditions that are encountered during the

development work. Fife Council advises that a Biomass Boiler Information Request Form should be completed and submitted once the type of biomass boiler being used is confirmed.

13/01601/FULL - Installation of a prefabricated steel container containing two 198kw multi fuel boilers in Drumoig Hotel Golf Resort Forgan Drive, Drumoig, St Andrews. The applicant should provide suitable evidence that emissions from the above proposed development will not compromise the achievement of Scottish statutory air quality objectives.

13/03390/SCO - EIA Scoping opinion for extension to Little Raith Wind Farm, Gleniston, Auchtertool, Fife. The applicant is asked to provide a copy of the Fichtner Consulting Engineers Report.

13/01679/FULL - Planning Permission in Principle for Business Park (Classes 4, 5 and 6) including associated road infrastructure, open space and SUDS on land at Percival Road Buckhaven, Fife. Fife Council advises that a Site Specific Risk Assessment is required. Fife Council accepts the Air Quality Assessment findings in the planning statement provided.

13/00976/EIA - Application for extension to sand and gravel quarry including use of existing processing equipment, installation of mineral field conveyor and post extraction restoration of land at Melville Gates Quarry, Ladybank, Cupar. Fife Council confirms the information provided on Air Quality meets their requirements.

13/02583/EIA - Planning permission in principle for the erection of a Secondary school (class 10) with associated Facilities including access, par parking/bus stance, playing fields, re-grading of land and alterations to the path at Pipeland Farm, St Andrews. Fife Council notes that clarification should be provided by the applicant on the modelled NO_2 concentrations calculated in Section 12 of the applicants Environmental Statement. Fife Council asks that if the details of the proposed boiler differ from what has been proposed then the Air Quality Assessment should be revised and submitted. A Biomass Boiler Information Request should be completed and submitted to Fife Council once a full planning application is submitted

13/03276/NEA - Application under section 37 of the electricity act 1989 to upgrade existing transmission line including the erection of new terminal tower and 3 low level gantries, the installation of gas insulated substation, cable route and formation of vehicular access as part of east coast 400v reinforcement from Blairingone to Kincardine. The applicant is to submit the Environmental Management Plan to Fife Council that is outlined in their Environmental Statement. Information regarding the raised platform to be constructed for the new GIS (Gas Insulated Substation) should be submitted to Fife Council. This should include the necessary information with regards to the import/ export of material to/from the site.

13/01592/FULL - Erection of building to house, plus addition of three 199kw biomass boilers with associated plant and storage area in farmhouse at Peacehill Farm Peacehill Wormit Newport On Tay Fife DD6 8PJ. The applicant is required to submit a suitable interpretation of the Biomass Screening Tool Spreadsheet data and to confirm if there are buildings within 150 metre distance of the biomass boiler stack emissions.

12/04993/FULL – Application for installation of Biomass boiler on the Raith Estate, Kirkcaldy. A screening assessment submitted shows that there is no need to progress to a further detailed assessment.

13/01601/FULL - Screening for proposed re-development of site including erection of new retail unit, pub/restaurant and drive-thru restaurant, and associated improvements to access, car parking and landscaping (including demolition of existing buildings) | Fleming Building Donibristle Industrial Park Ridge Way Hillend Industrial Park Dalgety Bay Dunfermline Fife KY11 9HZ. The applicant is to submit a Transport and Accessibility Assessment and Geo-tech and Site Investigation Report. The Transport and Accessibility Assessment should include an appropriate contaminated land site specific risk assessment to ensure the site is suitable for the proposed end use in accordance with the provisions of PAN 33. The transport assessment include suitable consideration of air quality issues in ensuring road traffic emissions will not compromise the achievement of Scottish statutory air quality objectives.

13/00190/FULL - Erection of a Class 1 retail store with associated pedestrian/vehicular access, car park, servicing, landscaping and ancillary works at North End Park, High Street, Cowdenbeath, Fife. Applicant is to carry out a suitable air quality impact assessment.

13-03752-FULL - Erection of a Class 1 retail food store with ancillary works including car parking, access and landscaping at South Road, Cupar. Applicant is to submit a suitable air quality impact assessment as the proposed site is near the boundary if the existing Bonnygate Air Quality Management Area in Cupar.

WML-L-1113364 – Application for a waste management licence from Thomas Muir Ltd, which is an existing scrapyard at the Cromarty Campus, Rosyth.

13-00842/FULL – Construction of building to house biomass boiler and associated plant at Uthrogle Mills, Carslogie, Cupar. The Applicant is to submit the technical information on the intended boiler to be installed.

13-03683-EIA - Planning Permission in Principle for residential development, employment land, Neighborhood Centre, Primary School, open space areas including an urban park, path and cycle network and associated works on land to the west of Wellwood Mills, Wellwood, Fife. The Applicant is to provide an Air Quality Impact Assessment.

13-00164-FULL - Erection of building which will house biomass boiler (200kw) at West Park House, Walkerton Drive, Leslie, Glenrothes, Fife, KY6 3BT. The information submitted in relation to air quality screening assessment are noted and these appear to be generally satisfactory.

13-01853-SCR - Application under Section 42 for amendment of condition 1 (time period) to allow a further 3 years time period at Westfield OCCS Fife. The Environmental Strategy Team has no objections to this application, on the proviso that the air quality and contaminated land conditions contained in planning decision 07/00170/CEIA are complied with.

13-01179-FULL - Erection of wind turbine, 77m to blade tip, erection of 50m high temporary anemometer mast and ancillary works including substation building, site compound, internal access tracks and formation of vehicular access at Land at Kirkton Farm, Cullaloe. Fife Council has accepted the conclusions made in the Environmental Appraisal and have no further comment.

13-00689-SCO - Scoping opinion for proposed wind development (either single medium scale turbine to generate around 500kw, or 2 medium scale turbines to generate around 5mw) with anticipated blade tip height up to 99.5m (approximately 65m to hub height) at land at Camilla farm, Auchtertool, fife. Applicant is to provide suitable evidence that the Scottish statutory air quality objectives will not be exceeded at human receptors as a consequence of the proposed development.

13-02495-FULL - Application for installation of biomass boiler and flue at Wormiston House, Anstruther. The applicant is required to provide information that confirms the air quality objectives are not being exceeded at human receptors by the proposed biomass boiler installation.

13/03937/FULL – Erection of new secondary school (Class 10). Includes formation of car park, bus drop off area and new internal access roads, SUDS facilities, biomass boiler, boundary fencing; ground consolidation works and; the provision of 5 grass and 1 all weather sports pitches including demolition of existing high school. Fife council has been consulted on the contents of the '**Levenmouth Secondary School -** Biomass plant air quality impact assessment (March 2014)' and found its contents to be satisfactory.

6 Implementation of Action Plans

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

Fife Council declared an AQMA for Bonnygate, Cupar in October 2008 which came into force in December 2008. The findings of the Further Assessment indicate that road traffic is the principal source responsible for the local exceedances of NO_2 and makes a significant contribution to local PM_{10} concentrations. Background sources constitute the principal sources of PM_{10} within the Bonnygate AQMA, however, background sources are difficult to address at the local level.

Fife Council declared a second AQMA for Appin Crescent, Dunfermline amended for both NO_2 and PM_{10}, which came into force on September 2012. The findings of the Further Assessment indicate that road traffic is the principal source responsible for the local exceedances of NO_2. The source apportionment undertaken in the further assessment indicated that background sources constitute the principal sources of PM_{10} within the Appin Crescent AQMA although road traffic makes a significant contribution to local PM_{10} concentrations.

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

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

The assessments were then considered in total to place the options in a prioritised order.

These assessments then became the draft AQAPs for Bonnygate and Appin Crescent.

Fife Council adopted the finalised Air Quality Action Plan for Bonnygate in October 2010. The finalised Air Quality Action Plan for Appin Crescent was published in May 2013.

The Bonnygate AQAP aims to work towards reducing transport emissions of NO_x and PM_{10} in the AQMA by approximately 53% and 33% respectively; using a wide range of measures such as road and traffic signaling improvement combined with other measures, for example behavior-change. Provided in Appendix F of this Report is the Bonnygate, Cupar Air Quality Action Plan Progress Report – Summary Table for 2013. This table summarises Fife Council's progress to date in terms of implementing the finalised Action Plan for Bonnygate Cupar.

The Appin Crescent AQAP aims to work towards reducing transport emissions of NO_x and PM_{10} in the AQMA by approximately 18% and 40% respectively; and as with the Bonnygate AQAP a combination of road layout and traffic signaling improvement combined with many other measures. Provided in Appendix G of this Report is the Appin Crescent, Dunfermline Air Quality Action Plan Progress Report – Summary Table for 2013. This table summarises Fife Council's progress to date in terms of implementing the finalised Action Plan for Appin Crescent, Dunfermline.

The required improvements appear to be quite onerous, however, it should be noted that these represent the ambient concentrations required to meet the objectives, not the reduction in mass emissions. It is anticipated that a reduction of this scale will lead to the achievement of the annual mean NO_2 air quality standard (40 µg m^{-3}) and Scottish annual mean objective for PM_{10} (18 µg m^{-3}) within both AQMA's in future years. This has already been realised with a reduction in NO_2 and PM_{10} annual mean concentrations to below the annual mean objective at the Fife Cupar automatic monitoring site location; following improvements to the traffic signalling and road layout within the Bonnygate during 2009.

Figure 6.1 and 6.2 illustrate the decrease in NO_2 and PM_{10} concentrations between 2007 and 2013 at both the Fife Cupar and Dunfermline automatic monitoring site.

Figure 6.1 Annual Mean NO_2 Concentrations at Fife Cupar and Dunfermline – 2007 to 2013

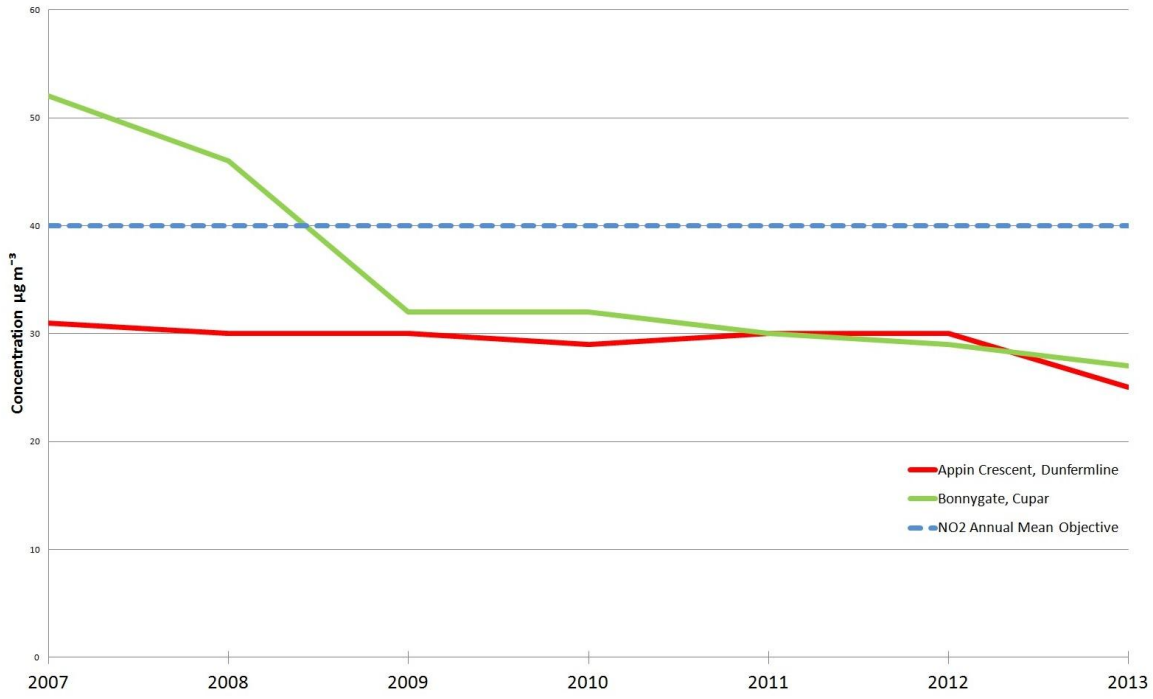
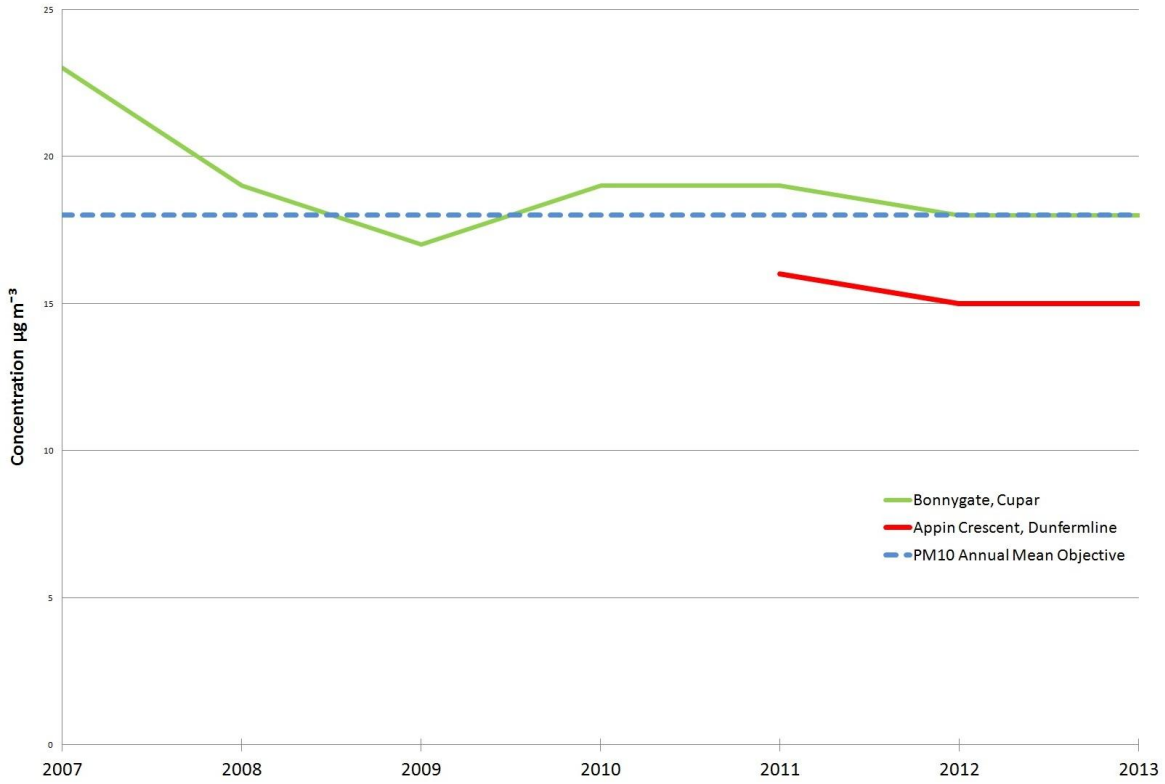


Figure 6.2 Annual Mean PM_{10} Concentrations at Fife Cupar and Dunfermline – 2007 to 2013



As part of the implementation of the Fife AQMA action plans, modelling studies on each of the Fife AQMA's were carried out for Fife Council. The Appin Crescent, Dunfermline study considered the modeled effect that traffic management options would have on NO_2 and PM_{10} concentrations in Appin Crescent in 2015. The modelling study on Bonnygate Cupar assessed the potential impacts that proposed traffic management changes would have on NO_2 and PM_{10} concentrations in 2017. Brief outlines of the content of these reports can be found below.

The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (2014) considered the possible effects that a change in traffic management will have on the NO_2 and PM_{10} concentrations in 2015. Using modelling software and monitoring data, the report explains the predicted outcomes of possible traffic management scenarios in Appin Crescent, Dunfermline. The report concludes that none of the proposed traffic management scenarios made a significant difference to concentrations of NO_2 and PM_{10} at locations of relevant exposure. Whilst outcomes of dispersion modelling of the proposed Appin Crescent bypass option reveal that this may reduce concentrations of NO_2 and PM_{10} on Appin Crescent to below the relevant air quality objectives, it is still considered prudent to explore other traffic management measures that may deliver more cost effective and feasible solutions to addressing air quality issues in the Appin Crescent. In this regard, a review of traffic light signalling arrangements in the Appin Crescent area has recently been commissioned and the outcomes of this study will be reported in the next Annual Progress Report 2015. The executive summary for this report can be found in Appendix I of this report.

The Cupar Streetscene Dispersion Modelling Report 2014 used atmospheric dispersion modelling to assess the potential air quality impacts that proposed traffic management changes in Cupar may have on the NO_2 and PM_{10} concentrations in 2017. The report concludes that both modeled Design Options 1 (includes introduction of mini-roundabouts at the East Bridge/St Catherine Street junction as well as the East Bridge/East Burnside junctions on the A91) and 2 (includes reconfiguration of the junctions at East Bridge/St Catherine Street and East Bridge/East Burnside junctions on the A91) will lead to a general reduction in NO_2 and PM_{10} emissions when compared to the 2017 baseline. Based on modelling predictions Option 1 provides greater air quality benefits than Option 2 for the Bonnygate AQMA.

The results indicate that for Option 1 there will be an overall reduction in predicted annual mean NO_2 concentrations when compared with the 2017 future baseline; with reductions of up to 4 $\mu g.m^{-3}$ being predicted at some of the specified ground level receptor locations. There are however some receptor locations where NO_2 concentrations are predicted to increase slightly by up to 1.2 $\mu g.m^{-3}$; these receptors are all located within the narrow canyon section of the Bonnygate immediately west of the junction with Crossgate at Mercat Cross. The predicted increase is insufficient to lead to any exceedances of the 40 $\mu g.m^{-3}$ NO2 annual mean objective. For PM_{10} the modelling results indicate that annual mean concentrations will reduce by up to 0.9 $\mu g.m^{-3}$ at some ground level locations but will increase by up to 0.2 $\mu g.m^{-3}$ at first floor height receptors within the Bonnygate canyon just west of Mercat Cross. These results indicate that the Option 1 will lead to an overall reduction in NOx and PM10 emissions, but not at all locations within the study area; and will actually increase PM10 concentrations slightly at the locations where exceedances of the 18 µg.m-3 objective are predicted to occur in 2017. The road layout for Option 1 can be found in Appendix K. Both of these options are currently being implemented and anticipated to be completed this calendar year 2014. The executive summary from the Cupar Streetscene Dispersion Modelling Report can be found in Appendix J of this report.

7 Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

Nitrogen Dioxide

This Progress Report considered the following new monitoring data for the 2013 calendar year. During 2013, Fife undertook ambient monitoring of NO_2 tubes at 48 locations within Fife. New monitoring data highlighted air quality issues at Appin Crescent, Dunfermline.

When assessing the annual mean nitrogen dioxide concentrations (bias adjusted) against the AQS annual mean objective of 40 ug m^{-3}, exceedances are evident at the following diffusion tube monitoring site:

- Appin Crescent 6 (A,B,C), Dunfermline (40.4 ug m^{-3})

This exceedance of the annual mean NO_2 objective was measured at one location within Appin Crescent, Dunfermline, which has been declared an Air Quality Management Area (AQMA). Fife Council's Air Quality Action Plan (AQAP) for Appin Crescent intends to addresses these exceedances through the implementation of appropriate measures.

Particulate Matter

PM_{10} concentrations are measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2013 concentrations were below the PM_{10} annual mean objective with no exceedances of the daily mean objective at all sites.

Sulphur Dioxide

The 2013 results for SO_2 monitoring in Fife 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 2013 confirms the conclusion of previous reports that a Detailed Assessment is not required for SO_2.

Carbon Monoxide

Short-term monitoring undertaken by Fife Council's Transportation Services department during 2013 indicates that the AQS objective for CO is unlikely to have been exceeded during 2013. There are no new industrial processes, roads or other developments that require detailed assessment with respect to this pollutant. Hence, new information in 2013 confirms the conclusion of previous reports that a Detailed Assessment is not required for CO.

1,3 Butadiene and Benzene

Benzene and 1,3 Butadiene monitoring carried out in the area of the Grangemouth refinery show that it is unlikely that the Air Quality Strategy objective for these pollutants have been exceeded within the Fife Council boundary.

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

7.2 Conclusions relating to New Local Developments

Fife Council have not identified any New Local Developments where there may be a risk of the air quality objectives being exceeded and so no additional air quality assessment is recommended at this time.

7.3 Conclusions relating to Air Quality Action Plans

There are currently two Air Quality Management Areas (AQMA) for NO_2 and PM_{10} located within the Fife Council boundary:

- Bonnygate, Cupar, declared in October 2008
- Appin Crescent, Dunfermline, declared for NO_2 in November 2011 and for PM_{10} in November 2012

The Air Quality Action Plan (AQAP) for the Bonnygate, Cupar AQMA is now well established and has been successful in reducing both NO_2 and PM_{10} concentrations within the Bonnygate. The reductions have principally been a result of the traffic signalling and road layout improvements carried out during 2009. No exceedances of NO_2 or PM_{10} AQS objectives were measured within the Bonnygate AQMA during 2013. Although, the PM_{10} annual mean concentration measured at the Bonnygate automatic monitoring site, 18 µg m^{-3}, was close to exceeding the objective.

The Air Quality Action Plan for Appin Crescent, Dunfermline was finalised in May 2013 and aims to reduce NO_2 and PM_{10} concentrations within Appin Crescent. Initially an AQMA was declared in October 2011 for NO_2 only, however this was amended in August 2012 to include PM_{10}. No exceedances of NO_2 or PM_{10} AQS objectives were measured within the Appin Crescent AQMA during 2013. Since 2011 the NO_2 concentrations measured at the Appin Crescent air quality monitoring station have decreased to 25 µg m^{-3} in 2013. PM_{10}

concentrations have remained at the same level in 2013 as they were in 2012. Using the Bonnygate AQAP as a template, it is hoped that the Appin Crescent AQAP will achieve similar improvements in air quality.

7.4 Proposed Actions

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

1. Submit the next Air Quality Progress Report in May 2015.

2. Maintain the current monitoring programme.

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

Appendices

Appendix A: Automatic Monitoring Sites

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

Appendix C: NO2 Diffusion Tube Data

Appendix D: Fife Environmental Partnership Climate Change Strategy 2014 – 2020

Appendix E: Bikeability Scotland

Appendix F: Bonnygate Air Quality Action Plan Progress Report – Summary Table

Appendix G: Appin Crescent Air Quality Action Plan Progress Report – Summary Table

Appendix H: Levenmouth Secondary School : Biomass Plant Air Quality Impact Assessment

Appendix I: Appin Crescent Traffic Management Options Appraisal (Phase 2): Scenario Modelling Assessment – Executive Summary

Appendix J: Cupar Streetscene: Air Quality Modelling Assessment – Executive Summary

Appendix K: Cupar Streetscene: Air Quality Modelling Assessment – Road Scheme Layout (Appendix 3)

Appendix L: Appin Crescent Traffic Lane Revision – Road Markings

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

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 – Thermo 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

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

Station Name:	St 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: Quality Assurance / Quality Control (QA/QC) Data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes may systematically under or over-read NO2 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.

The diffusion tubes deployed by Fife Council are supplied and analysed by Tayside Scientific Services using a preparation mixture of 20% triethanolamine (TEA) in water. The bias adjustment factor of 0.78 reported in the national diffusion tube bias adjustment factor spreadsheet (version 03/14), conducted using diffusion tubes prepared and analysed by Tayside Scientific Services during 2013, has been used to adjust the diffusion tube results.

The National Spreadsheet of Bias Adjustment Factors (version 03/14) is shown below in Figure B.1 and Figures C2 – C5 show the locally derived adjustment factors.

Period Mean Monitoring Adjustment

Period mean adjustment factors were applied to the TEOM FDMS PM_{10} automatic analyser in Bonnygate, Cupar. Data was deleted between June – August 2013 and so a short to long term data adjustment was required. Table B.1 shows the calculated adjustment factor which will give the estimate of the annual mean for 2013.

Table B.1 Short-Term to Long-Term Monitoring Data Adjustment

Monitoring Site	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$)	Ratio
Alloa	15.91	16.22	0.981
Perth Muirton	9.91	10.13	0.978
Average (Ra)			0.980
Monitoring Site	**Annual Mean ($\mu g/m^3$)**	**Annual Adjusted Mean ($\mu g/m^3$)**	
Cupar	18.22	17.85	

Figure B.1 Bias adjustment factor used for 2013 diffusion tube results

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/14

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 spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2014

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.

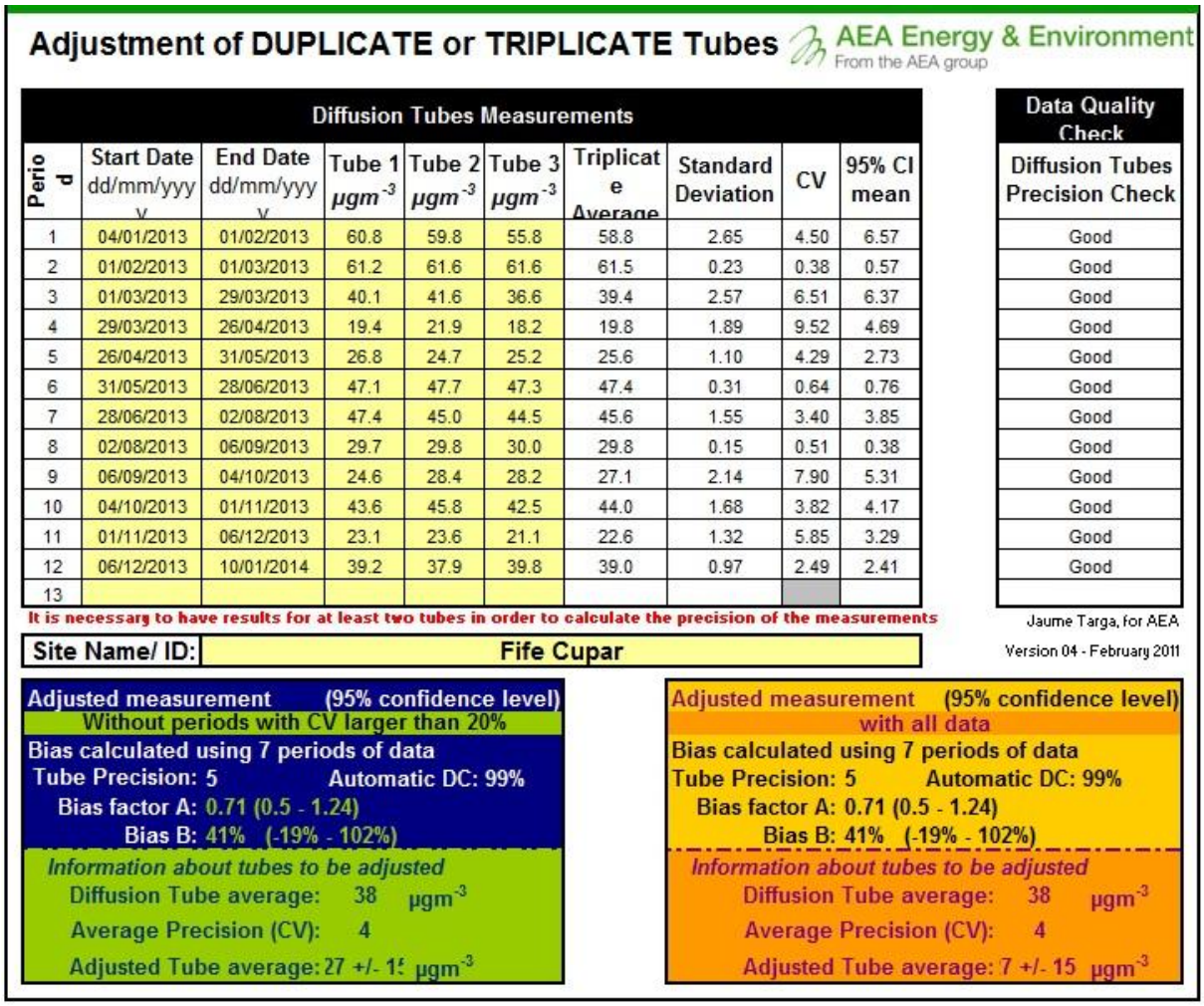
Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the	Select a Year from the Drop-Down	**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 a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	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 make your selection, choose (All) from the pop-up list	Year[5] To make 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[6]	Bias Adjustment Factor (A) (Cm/Dm)
Tayside Scientific Services	20% TEA in Water	2013	KS	Marylebone Road Intercomparison	12	103	81	27.6%	G	**0.78**
Tayside Scientific Services	20% TEA in water	2013		**Overall Factor[3] (1 study)**				**Use**		**0.78**

Factor from Local Co-location Studies

Figure B.2 Locally Derived Bias Adjustment Factor – Cupar



Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	01/02/2013	60.8	59.8	55.8	58.8	2.65	4.50	6.57
2	01/02/2013	01/03/2013	61.2	61.6	61.6	61.5	0.23	0.38	0.57
3	01/03/2013	29/03/2013	40.1	41.6	36.6	39.4	2.57	6.51	6.37
4	29/03/2013	26/04/2013	19.4	21.9	18.2	19.8	1.89	9.52	4.69
5	26/04/2013	31/05/2013	26.8	24.7	25.2	25.6	1.10	4.29	2.73
6	31/05/2013	28/06/2013	47.1	47.7	47.3	47.4	0.31	0.64	0.76
7	28/06/2013	02/08/2013	47.4	45.0	44.5	45.6	1.55	3.40	3.85
8	02/08/2013	06/09/2013	29.7	29.8	30.0	29.8	0.15	0.51	0.38
9	06/09/2013	04/10/2013	24.6	28.4	28.2	27.1	2.14	7.90	5.31
10	04/10/2013	01/11/2013	43.6	45.8	42.5	44.0	1.68	3.82	4.17
11	01/11/2013	06/12/2013	23.1	23.6	21.1	22.6	1.32	5.85	3.29
12	06/12/2013	10/01/2014	39.2	37.9	39.8	39.0	0.97	2.49	2.41
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:	Fife Cupar

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 7 periods of data
Tube Precision: 5 Automatic DC: 99%
Bias factor A: 0.71 (0.5 - 1.24)
Bias B: 41% (-19% - 102%)

Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 27 +/- 1[illegible] μgm^{-3}

Adjusted measurement (95% confidence level) with all data

Bias calculated using 7 periods of data
Tube Precision: 5 Automatic DC: 99%
Bias factor A: 0.71 (0.5 - 1.24)
Bias B: 41% (-19% - 102%)

Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 7 +/- 15 μgm^{-3}

Figure B.3 Locally Derived Bias Adjustment Factor - Dunfermline

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	08/01/2013	31/01/2013	39.2	42.3	41.2	40.9	1.57	3.84	3.90
2		26/02/2013	44.2	42.1	42.3	42.9	1.16	2.70	2.88
3	26/02/2013	26/03/2013	39.7	37.2	37.4	38.1	1.39	3.65	3.45
4	26/03/2013	23/04/2013	28.8	24.7	31.0	28.2	3.20	11.35	7.94
5	23/04/2013	28/05/2013	27.3	25.8	26.6	26.6	0.75	2.83	1.86
6	28/05/2013	25/06/2013	26.1	24.4	25.4	25.3	0.85	3.38	2.12
7	25/06/2013	30/07/2013	27.4	28.5	28.7	28.2	0.70	2.48	1.74
8	30/07/2013	28/08/2013	28.1	26.9	29.7	28.2	1.40	4.98	3.49
9	28/08/2013	02/10/2013	26.0	28.7	28.8	27.8	1.59	5.71	3.95
10	02/10/2013	30/10/2013	32.9	26.3	33.4	30.9	3.96	12.84	9.84
11	30/10/2013	03/12/2013	49.9	47.2	49.2	48.8	1.40	2.87	3.48
12	03/12/2013	08/01/2014	31.8	29.2	32.8	31.3	1.86	5.94	4.62
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID:

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 98%
Bias factor A: 0.76 (0.72 - 0.82)
Bias B: 31% (22% - 40%)

Information about tubes to be adjusted
Diffusion Tube average: 33 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 25 +/- 2 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 98%
Bias factor A: 0.76 (0.72 - 0.82)
Bias B: 31% (22% - 40%)

Information about tubes to be adjusted
Diffusion Tube average: 33 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 25 +/- 2 μgm^{-3}

Figure B.4 Locally Derived Bias Adjustment Factor - Kirkcaldy

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	04/01/2013	28/01/2013	30.7	33.6	28.6	31.0	2.51	8.11	6.24
2	28/01/2013	01/03/2013	34.7	35.0	34.6	34.8	0.21	0.60	0.52
3	01/03/2013	25/03/2013	23.9	24.9	24.3	24.4	0.50	2.07	1.25
4	25/03/2013	24/04/2013	15.5	18.5	18.4	17.5	1.70	9.76	4.23
5	24/04/2013	27/05/2013	20.2	17.8	19.6	19.2	1.25	6.51	3.10
6	27/05/2013	24/06/2013	17.9	17.3	16.0	17.1	0.97	5.69	2.41
7	24/06/2013	29/07/2013	18.1	17.8	18.2	18.0	0.21	1.15	0.52
8	29/07/2013	27/08/2013	19.6	21.0	20.7	20.4	0.74	3.61	1.83
9	27/08/2013	03/09/2013	20.6	20.6	21.3	20.8	0.40	1.94	1.00
10	30/09/2013	29/10/2013	23.4	25.7	25.4	24.8	1.25	5.03	3.11
11	29/10/2013	21/12/2013	39.6	38.6	39.0	39.1	0.50	1.29	1.25
12	02/12/2013	06/01/2014	24.2	23.2	20.8	22.7	1.75	7.69	4.34
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: Fife Kirkcaldy

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 12 periods of data
Tube Precision: 4 Automatic DC: 98%
Bias factor A: 0.81 (0.75 - 0.89)
Bias B: 23% (13% - 34%)

Information about tubes to be adjusted
Diffusion Tube average: 24 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 20 +/- 2 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 12 periods of data
Tube Precision: 4 Automatic DC: 98%
Bias factor A: 0.81 (0.75 - 0.89)
Bias B: 23% (13% - 34%)

Information about tubes to be adjusted
Diffusion Tube average: 24 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 20 +/- 2 μgm^{-3}

Figure B.5 Locally Derived Bias Adjustment Factor - Rosyth

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	08/01/2013	31/01/2013	41.7	40.4	40.8	41.0	0.67	1.63	1.65
2	31/01/2013	26/02/2013	37.5	40.8	42.9	40.4	2.72	6.74	6.76
3	26/02/2013	26/03/2013	36.9	35.6	35.5	36.0	0.78	2.17	1.94
4	26/03/2013	23/04/2013	24.5	24.1	24.6	24.4	0.26	1.08	0.66
5	23/04/2013	28/05/2013	22.4	19.7	20.6	20.9	1.37	6.58	3.42
6	28/05/2013	25/06/2013	22.5	26.0	21.8	23.4	2.25	9.60	5.59
7	25/06/2013	30/07/2013	25.4	24.6	23.1	24.4	1.17	4.79	2.90
8	30/07/2013	28/08/2013	26.9	25.9	25.1	26.0	0.90	3.47	2.24
9	28/08/2013	02/10/2013	26.4	21.1	27.0	24.8	3.25	13.08	8.07
10	02/10/2013	30/10/2013	27.9	28.2	28.7	28.3	0.40	1.43	1.00
11	30/10/2013	03/12/2013	36.6	40.9	40.4	39.3	2.35	5.98	5.84
12	03/12/2013	08/01/2014	18.8	21.1	22.3	20.7	1.78	8.58	4.42
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: Fife Rosyth

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 12 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.88 (0.82 - 0.94)
Bias B: 14% (6% - 22%)

Information about tubes to be adjusted
Diffusion Tube average: 29 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 26 +/- 2 μgm^{-3}

Adjusted measurement (95% confidence level) with all data

Bias calculated using 12 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.88 (0.82 - 0.94)
Bias B: 14% (6% - 22%)

Information about tubes to be adjusted
Diffusion Tube average: 29 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 26 +/- 2 μgm^{-3}

Discussion of Choice of Factor to Use

QA/QC of Automatic Monitoring

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

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

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

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

The final stage of the QA/QC process was to ratify the data. During ratification, all calibration, audit and service data are collated and the data are appropriately scaled. Any suspect data identified are deleted therefore ensuring that the data are of a high quality.
Casella Measurement carried out QA/QC procedures at the SO2 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 NO2 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 NO2 solution is also provided via this contract. This solution is run as an internal check for NO2 tubes in the laboratory. The solution is tested after every 21 NO2 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 Data

DUNFERMLINE AND ROSYTH NO_2 TUBE CONCENTRATION RESULTS - 2013

NO_2 µgm3 -1

SITE CODE	DRM5	DRM9A	DRM9B	DRM9C	C'BEATH	K'DINE1	K'DINE2	AQM3	C'GIE DR.A	C'GIE DR.B	C'GIE DR.C
LOCATION	Rumblinquell	Appin Crescent A	Appin Crescent B	Appin Crescent C	High Street	N. Approach Rd. A	N. Approach Rd. B	St Leonards Pri Sch	Carnegie Drive A	Carnegie Drive B	Carnegie Drive C
	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Cowdenbeath	Kincardine	Kincardine	Dunfermline	Dunfermline	Dunfermline	Dunfermline
TUBE NUMBER	D1	D4A	D4B	D4C	D5	D6	D7	D9	D16A	D16B	D16C
08/01/12 - 31/01/13	34.7	53.9	49.2	52.6	36	28.7	28.3	26.7	56.7	57.2	61.3
31/01/13 - 26/02/13	34.8	52.6	57.2	48.9	38.8	27.9	30.8	27.2	53.1	43.4	53
26/02/13 - 26/03/13	29.2	45.4	46	46.1	34.7	24	24.1	24.5	47.2	47.8	44.2
26/03/13 - 23/04/13	21.1	33.9	35.5	32.2	26.9	15.3	13.6	15.9	40.9	36.6	38
23/04/13 - 28/05/13	23.1	31.5	33	30.5	19.1	15.1	15.9	14.4	32.9	36.3	33.7
28/05/13 - 25/06/13	22.5	31.1	34.2	30.2	23.5	15.2	15.2	14.5	37.4	37.8	33.4
25/06/13 - 30/07/13	21.5	36	34.1	32.9	20.9	15.8	16.4	15.6	37.3	35.5	38.4
30/07/13 - 28/08/13	24.3	36.6	31.9	37.4	13.8	16.9	16.9	13.8	36.4	37.1	37.6
28/08/13 - 02/10/13	23.2	36	32.7	34.6	24.8	17.9	17.7	15.1	31.2	34.2	32
2/10/13-30/10/13	25.7	39	31.4	39.9	30.5	21.8	20.8	19.3	42.7	42.5	40.7
30/10/13-3/12/13	39.2	58.6	55	54.7	33.9	30.6	32.1	25.3	41.4	42.8	40.3
3/12/13-8/1/14	26.2	39.4	39.2	32	17.9	19.7	21.4	10.3	**38.3**	**42.4**	40
RUNNING MEAN	**27.1**	**41.2**	**40.0**	**39.3**	**26.7**	**20.7**	**21.1**	**18.6**	**41.3**	**41.1**	**41.1**
RUNNING MEAN			**40.2**							**41.2**	
Bias Factor	**0.76**	**0.76**	**0.76**	**0.76**	**0.79**	**0.79**	**0.79**	**0.76**	**0.76**	**0.76**	**0.76**
Number of Months with Data	12	12	12	12	12	12	12	12	12	12	12
Data Capture (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Average per site	27.1		40.2		26.7	20.7	21.1	18.6		41.2	
						20.92					
Adjusted data	20.6		30.5		21.1	16.5		14.1		31.3	

NO_2 µgm3 -1

SITE CODE	ADM RO.A	APP CR1	APP CR2	APP CR3	PITT ST	APP CR4A	APP CR4B	APP CR4C	APP CR5A	APP CR5B	APP CR5C
LOCATION	Admiralty Road A	Appin Crescent 1	Appin Crescent 2	Appin Crescent 3	Pittencrieff Street	Appin Crescent 4A	Appin Crescent 4B	Appin Crescent 4C	Appin Crescent 5A	Appin Crescent 5B	Appin Crescent 5C
	Rosyth	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline	Dunfermline
TUBE NUMBER	D17	D18	D19	D20	D21	D22A	D22B	D22C	D24A	D24B	D24C
08/01/12 - 31/01/13	48.8	42.3	65.3	57.8	32.7	39.2	42.3	41.2	60.5	58.9	56.4
31/01/13 - 26/02/13	50.4	43.1	60	54.1	32.3	44.2	42.1	42.3	57.1	59.7	57.8
26/02/13 - 26/03/13	44.4	39	54.3	46.9	33.7	39.7	37.2	37.4	50	49.6	50.8
26/03/13 - 23/04/13	30.8	26.6	44.7	42	24.1	28.8	24.7	31	40.9	37.1	37.2
23/04/13 - 28/05/13	26.5	26.2	43.4	37.2	20.6	27.3	25.8	26.6	40	42.3	41.1
28/05/13 - 25/06/13	30.3	23.7	37.2	35.9	20.3	26.1	24.4	25.4	37.3	38.3	37.8
25/06/13 - 30/07/13	28.3	29.1	45.7	37.6	7.2	27.4	28.5	28.7	44.1	42.8	41.8
30/07/13 - 28/08/13	31.6	29.1	47.4	36.5	20.2	28.1	26.9	29.7	41	41.4	45
28/08/13 - 02/10/13	28.2	25.1	38.6	37.3	21.4	26	28.7	28.8	22.4	41.2	43.1
2/10/13-30/10/13	38.8	33.3	53.9	43.4	25.7	32.9	26.3	33.4	43.5	46.5	49.4
30/10/13-3/12/13	43.5	45.5	69.8	54.4	29.6	49.9	47.2	49.2	68.9	65.6	65.4
3/12/13-8/1/14	28.5	27.4	53.1	43.2	22.5	**31.8**	**29.2**	32.8	**54**	**44.3**	51.6
RUNNING MEAN	**35.8**	**32.5**	**51.1**	**43.9**	**24.2**	**33.5**	**31.9**	**33.9**	**46.6**	**47.3**	**48.1**
RUNNING MEAN							**33.1**			**47.4**	
Bias Factor	**0.88**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**
Number of Months with Data	12	12	12	12	12	**12**	**12**	**12**	**12**	**12**	**12**
Data Capture (%)	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Annual Average per site	35.8	32.5	51.1	43.9	24.2		**33.1**			**47.4**	
Adjusted data	31.5	24.7	38.8	33.3	18.4		25.1			36.0	

NO_2 µgm^{-3}	TUBE LOCATION										
ON/OFF DATE	BONNYGATE 1, CUPAR	BONNYGATE 2, CUPAR(11)	BONNYGATE 3A, CUPAR(13A)	BONNYGATE 3B, CUPAR (13B)	BONNYGATE B4 CUPAR	CITY RD 1, ST ANDREWS	CITY RD 2, ST ANDREWS	BELL ST 1, ST ANDREWS	BELL ST 2, ST ANDREWS	WINDSOR GDNS, ST ANDREWS	Cupar Travel
04/01/13 - 01/02/13	N/A	58.6	63.5	N/A	63.5	48.7	45.3	68.6	42.8		
01/02/13 - 01/03/13	N/A	65.6	71.6	73.3	69.8	53.2	56.5	67.3	52.4		
01/03/13 - 29/03/13	N/A	40.7	40.8	46.6	47.1	44.5	37.9	47.9	28.8		
29/03/13 - 26/04/13	N/A	25.1	17.7	23.9	N/A	17.3	14.8	33.7	25.0		
26/04/13 - 31/0513	N/A	31.2	27.1	25.2	43.5	24.8	28.0	33.3	27.6		
31/05/13 - 28/06/13	N/A	55.5	53.3	63.3	59.0	41.2	39.2	55.3	N/A		
28/06/13 - 02/08/13	N/A	56.7	47.5	63.2	57.3	42.1	41.6	49.7	38.1		
02/08/13 - 06/09/13	27.1	37.8	32.4	37.7	36.8	22.9	22.9	27.1	21.0		
06/09/13 - 04/10/13	23.4	37.0	30.4	51.0	36.5	31.3	31.2	33.1	22.1		
04/10/13 - 01/11/13	N/A	N/A	42.7	60.4	48.7	31.4	30.6	49.3	35.0		
01/11/13 - 06/12/13	21.8	N/A	26.3	29.9	27.0	18.1	16.6	29.6	20.7		
06/12/13 - 10/01/14	38.3	47.8	35.2	37.4	N/A	39.2	41.1	37.1	39.6		
RUNNING MEAN	**27.7**	**45.6**	**40.7**	**46.5**	**48.9**	**34.6**	**33.8**	**44.3**	**32.1**	**#DIV/0!**	**####**
Number of Months with Data Capture	**4**	**10**	**12**	**11**	**10**	**12**	**12**	**12**	**11**		
Data Capture (%)	**33.3%**	**83.3%**	**100.0%**	**91.7%**	**83.3%**	**100.0%**	**100.0%**	**100.0%**	**91.7%**		
Annual Average	**27.7**	**45.6**	**40.7**	**46.5**	**48.9**	**34.6**	**33.8**	**44.3**	**32.1**		
Annual Average			**43.6**				**34.2**				
Bias Factor	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**	**0.79**	**0.79**	**0.79**	**0.79**		
Adjusted Value	**19.6**	**32.4**	**31.0**		**34.7**	**27.0**		**35.0**	**25.4**		

	TUBE LOCATION									
ON/OFF DATE	CUPAR RD,	MILLFIELD, CUPAR	SOUTH RD, CUPAR	CROSSGATE, CUPAR	LADYWYND B5, CUPAR	BONNYGATE WEST B6	MONITOR BA CUPAR	MONITOR BB CUPAR	MONITOR BC CUPAR	4 EAST ROAD
04/01/13 - 01/02/13	47.5		27.3	46.8	40.9	35.7	60.8	59.8	55.8	27.7
01/02/13 - 01/03/13	46.4		26.0	53.6	38.9	39.2	61.2	61.6	61.6	27.4
01/03/13 - 29/03/13	21.7		10.9	39.5	22.2	27.0	40.1	41.6	36.6	11.0
29/03/13 - 26/04/13	11.1		10.4	13.7	10.7	11.4	19.4	21.9	18.2	10.1
26/04/13 - 31/0513	19.2		10.3	20.9	12.1	17.2	26.8	24.7	25.2	9.8
31/05/13 - 28/06/13	36.1		14.7	34.2	24.3	29.9	47.1	47.7	47.3	16.1
28/06/13 - 02/08/13	38.90		16.80	31.80	23.80	29.60	47.40	45.00	44.50	17.40
02/08/13 - 06/09/13	N/A		12.4	20.6	15.5	20.1	29.7	29.8	30.0	12.6
06/09/13 - 04/10/13	20.8		10.5	21.1	16.4	20.5	24.6	28.4	28.2	11.2
04/10/13 - 01/11/13	35.7		22.2	N/A	29.8	26.9	43.6	45.8	42.5	24.3
01/11/13 - 06/12/13	20.0		13.9	N/A	14.8	15.0	23.1	23.6	21.1	15.1
06/12/13 - 10/01/14	23.4		18.7	48.5	31.9	27.2	39.2	37.9	39.8	24.2
RUNNING MEAN	**29.2**		**16.2**	**33.1**	**23.4**	**25.0**	**38.6**	**39.0**	**37.6**	**17.2**
Number of Months with Data Capture	**11**	**0**	**12**	**10**	**12**	**12**	**12**	**12**	**12**	**12**
Data Capture (%)	**100.0%**	**#DIV/0!**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Annual Average	**31.8**	**#DIV/0!**	**17.5**	**36.4**	**25.4**	**27.1**	**41.8**	**42.2**	**40.7**	**18.7**
								41.6		
Bias Factor	**0.79**	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**	**0.79**
Adjusted Value	25.13	#DIV/0!	12.44	25.83	18.03	19.21		29.52		14.76

CENTRAL FIFE NO_2 TUBE CONCENTRATION RESULTS - 2013

NO_2 µg/m3

See Key for details.

ON/OFF DATE	ST CLAIR ST KIRKCALDY	ST CLAIR ST 2 KIRKCALDY	ST CLAIR ST 3 Kirkcaldy	125 ST CLAIR ST	9A ST CLAIR ST	A JUNCTION RD	DUNNIKIER RD KIRKCALDY	t Clair St Roman	t Clair St Roman	t Clair St Roman C
04/01/13 - 28/01/13	49.6	49.8	43.1	43.2	41.7	41.6	42.0	30.7	33.6	28.6
28/01/13 - 01/03/13	50.1	54.8	46.7	48.5	43.6	41.9	39.1	34.7	35.0	34.6
1/3/13-25/3/13	50.6	41.0	42.2	34.4	33.2	39.0	37.9	23.9	24.9	24.3
25/03/13 - 24/04/13	45.4	33.0	35.2	25.9	21.6	31.8	33.2	15.5	18.5	18.4
24/4/13-27/5/13	33.4	40.4	31.0	33.7	25.5	27.4	29.0	20.2	17.8	19.6
27/05/13 - 24/06/13	42.8	37.6	37.9	29.0	24.4	27.8	32.4	17.9	17.3	16.0
24/6/13-29/7/13	38.0	34.8	32.0	30.3	24.8	28.8	29.8	18.1	17.8	18.2
29/7/13-27/8/13	37.1	44.7	34.7	36.0	30.6	30.4	31.1	19.6	21.0	20.7
27/8/13-30/9/13	36.8	41.1	34.2	37.5	31.4	29.0	29.2	20.6	20.6	21.3
30/9/13-29/10/13	46.2	45.1	41.5	36.8	33.0	35.7	36.8	23.4	25.7	25.4
29/10/13-2/12/13	43.6	63.6	39.4	58.7	53.0	39.8	38.2	39.6	38.6	39.0
2/12/13-6/1/14	31.1	46.2	32.4	39.7	32.6	28.4	25.1	24.2	23.2	20.8
RUNNING MEAN	**42.1**	**44.3**	**37.5**	**37.8**	**33.0**	**33.5**	**33.7**	**24.0**	**24.5**	**23.9**
Number of Months with Data Capture	12	12	12	12	12	12	12	12	12	12
Data Capture (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Average	42.1	44.3	37.5	37.8	33.0	33.5	33.7	24.0	24.5	23.9
									24.1	
Bias Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adjusted Values	34.1	35.9	30.4	30.6	26.7	27.1	27.3		19.6	

ON/OFF DATE	VICTORIA RD KIRKCALDY	GLENLYON LEVEN	LESLIE HIGH ST LESLIE	ASDA R/B KIRKCALDY	QUEENSWAY GLENROTHES	24 ST CLAIR ST	KIRKCALDY Travel Bank 1	KIRKCALDY Travel Bank 2
04/01/13 - 28/01/13	42.5	35.2	36.8	44.5	35.5	29.7	0.3	0.2
28/01/13 - 01/03/13	45.7	38.8	34.2	45.0	35.2	33.5	0.3	0.3
1/3/13-25/3/13	42.0	30.0	33.1	37.7	32.3	23.1		
25/03/13 - 24/04/13	31.8	26.2	25.5	35.7	25.0	16.0	-	-
24/4/13-27/5/13	25.2	22.9	21.8	30.6	19.2	18.7	0.3	0.2
27/05/13 - 24/06/13	35.8	23.8	23.2	30.8	22.2	19.1	-	-
24/6/13-29/7/13	31.3	30.0	22.3	26.8	15.9	18.9		
29/7/13-27/8/13	33.5	29.4	22.1	32.3	20.1	22.1	0.2	0.4
27/8/13-30/9/13	29.1	29.5	24.1	35.3	20.9	21.3		
30/9/13-29/10/13	35.2	30.9	27.2	42.6	28.0	22.5		
29/10/13-2/12/13	42.4	44.7	29.0	43.0	29.3	35.8		
2/12/13-6/1/14	27.6	25.5	21.0	34.2	21.4	22.0	0.2	0.3
RUNNING MEAN	**35.2**	**30.6**	**26.7**	**36.5**	**25.4**	**23.6**	**0.3**	**0.3**
Number of Months with Data Capture	12	12	12	12	12	12	5	5
Data Capture (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	41.7%	41.7%
Annual Average	35.2	30.6	26.7	36.5	25.4	23.6	0.3	0.3
Bias Factor	0.81	0.79	0.79	0.81	0.79	0.81		
Adjusted Values	28.5	24.2	21.1	29.6	20.1	19.1		

Appendix D: Fife Environmental Partnership Climate Change Strategy 2014 - 2020

Fife Environmental Partnership

Climate Change Strategy 2014 - 2020

Tackling Climate Change

Fife Environmental Partnership Strategy
Climate Change Strategy 2014 - 2020

Introduction

Climate Change is going to have a dramatic impact on our future.

The effects of a changing climate are already beginning to be seen in Fife, with increasingly frequent severe weather events requiring responses from the Council, the emergency services and our Community Planning Partners.

These events are having increased consequences for both the human and natural environments. Action needs to be taken to help us adapt to the impacts of climate change.

Fife's first Climate Change Strategy 2014-2020 identifies key areas that we need to address to meet the challenges and take advantage of opportunities associated with climate change. It sets out six outcomes that we will work towards over the next six years.

Contents

Foreword

Fife Environmental Partnership Chair
Katherine Leys, Operations Manager, Scottish Natural Heritage

Fife Partnership is committed to making Fife a great place to live, work and visit.

One of the biggest challenges it has to deal with in order to deliver this commitment is the impact of climate change. This could affect our communities for generations. We need to act now to reduce the contribution that Fife makes to greenhouse gasses and to adapt to the impacts that climate change brings.

As outlined in Fife's Community Plan 2011 to 2020 *"The challenge of reducing our production of carbon dioxide and other greenhouse gases[1] will require changes to the way we work and live, improvements in technology, and the generation, use and export of renewable energy."*

Reducing our contribution to climate change isn't just about challenges. There are opportunities to become national and international leaders in the development of renewable technology and generation of renewable energy, and in developing an education and training sector that provides the knowledge and skills that the transition to a low carbon economy requires. There are opportunities to make our communities more resilient, and to reduce the waste of resources without compromising our quality of life.

This strategy aims to achieve 6 medium term outcomes:

Reducing Carbon Emissions

- More efficient use of resources (energy, waste and water)
- More energy is from low carbon supplies
- Encourage more sustainable transport and travel including reducing the need to travel
- Ecosystems are used sustainably and strengthened

Adapting to Climate Change

- Places are adapting to cope with Climate Change (including land use, coastlines, buildings and infrastructure)
- People are adapting to cope with Climate Change

Fife Environmental Partnership is committed to working together to deliver this strategy. We would also encourage businesses, community groups and individuals to do what they can to adopt the **key commitments** in this strategy and work together to contribute to a Low Carbon Future for Fife.

[1] 'Carbon dioxide equivalent' (CO_2e) is the technical term for carbon dioxide plus the other greenhouse gases. Throughout this document we will use the term 'carbon' to cover these gases. (Appendix 1, Glossary)

1.1 What is Climate Change?

Climate change is evidenced by increases in global average air and ocean temperatures, widespread melting of snow and ice and a rising global average sea level. Most of the increase in global average temperatures since the mid 20th century is extremely likely to be due to the observed increase in greenhouse gas concentrations from human influence, which have increased by 70% between 1970 and 2004.

The increasing likelihood and severity of extreme weather events are expected to have adverse effects on natural and human systems. In responding to climate change, we will need to take into account measures both for adaptation (how to live with change) and mitigation (to minimise further impacts).

Climate change will affect all aspects of life, increasing risks to food security, water availability, infrastructure and human health. If emissions are reduced early and rapidly, the extent of climate change will be mitigated. If greenhouse gas emissions continue unabated, the implications grow more severe, posing even greater risk to life on Earth. In view of the threat and risks of inaction, it is essential that public bodies put climate change strategies in place and act sustainably to address climate change in Scotland.

1.2 Introduction

This document sets out a number of key elements that the Fife Partnership has identified as contributing to or influencing human made climate change. It commits Fife's community planning partners to meeting a number of targets that aim to reduce our impact on climate change, and sets out the principles that will be adopted in pursuit of the targets. The next stage will be the development of detailed strategies and plans that will enable the community planning partners to turn the aspirations of this document into reality.

1.3 Strategic Context

A whole raft of EU, UK and Scottish legislation and guidance has been produced in recent years. The Climate Change (Scotland) Act 2009 is arguably the key piece of climate change legislation relating to Fife and the Fife Partnership. It sets mandatory targets to reduce Scottish greenhouse gas emissions by 42% by 2020 and by 80% by 2050. It also requires Scottish Ministers to lay before Parliament, and subsequently report on, programmes for climate change adaptation.

1.4 Public Duties

Of particular relevance to most partner organisations in Fife is the guidance on the duties placed on all public bodies under the Climate Change (Scotland) Act published on 4th February 2011. In exercising their functions, all public bodies must act:

- in the way best calculated to contribute to the delivery of the Act's (national) emissions targets;
- in the way best calculated to deliver any statutory adaptation programme; and
- in a way that it considers the most sustainable.

1.5 Community Plan & Single Outcome Agreement

Fife's Community Plan 2011-2020 is the overarching strategic plan for Fife and provides a framework for every other strategy and plan produced by partner organisations within the Fife Partnership. The Fife Partnership recognises the importance of tackling climate change as one of three high

level outcomes identified in Fife's Community Plan 2011-2020, recently approved by Fife Partnership Board.

The Fife Partnership 2009-2012 Single Outcome Agreement (SOA) 'A Stronger Future for Fife' identifies areas for action to deliver a better quality of life for the people of Fife. The SOA sets out how the Fife Partnership will work towards improving outcomes for the local people in a way that reflects local circumstances and priorities, within the context of the Government's 15 National Outcomes. Action on climate change mitigation is an integral part of the Fife SOA, including action in relation to National Outcome 14: reducing the local and global environmental impact of our consumption and production.

This Climate Change Strategy comprises the Fife Partnership's response to the national and Fife-wide priority of tackling climate change and should be taken account of in all future planning and policy work undertaken by Fife's partners, including in the evolution of the partner strategies listed in Appendix 2. Taking cognisance of the two long term outcomes identified within the Community Plan 2011-2020:

- Reducing carbon emissions
- Adapting to climate change

Preparing for the impact of climate change will require investment in adaptation on the part of businesses, organisations and households, so that they can cope with the climate as it changes, and so that they may even be able to take advantage of new opportunities.

Partners and partnerships will have to work more closely together to achieve these outcomes - showing strong commitment and leadership. They will have to recognise and support the assets and aspirations of individuals and communities, while being open to doing things differently.

The following five sustainability principles, will underpin Fife Environmental Partnership's work.

Education and awareness

Work to raise awareness of environmental issues and promote education through conceptual, technical and social learning.

Community engagement

Encourage communities to have aspirations and vision and support them to achieve these. This will be done in ways that promote community resilience by offering targeted support, access to information and resources.

Promoting sustainable behaviours

Promote sustainable behaviours in its own work and in communities by publicising best practice and leading by example, providing appropriate infrastructure, through regulation and by using incentives, campaigns and supportive community engagement.

Reducing Environmental Inequalities

Aim to identify those individuals and communities that experience environmental inequalities and take positive action to reduce these for current and future generations.

Enforcement

Where appropriate take enforcement action in line with existing legislation where other interventions have not resolved a problem

Reducing Carbon Emissions (Long Term Outcome)

Through key partner consultation, Fife Environmental Partnership has developed six medium term outcomes which we aim to achieve over the next seven years, working closely with communities, organisations and other partnership groups.

1. More efficient use of resources (energy, waste and water)

We will –

- Take a partnership approach to providing clear resource efficiency messages;
- Work with housing providers and householders to improve energy and water efficiency in new and existing buildings
- Develop a joint asset management strategy
- Work with businesses to promote the use of energy audits
- Work with local organisations to promote opportunities to encourage reuse
- Identify opportunities to look for potential sources of waste that can be used as a resource

2. More energy is from low carbon supplies

We will -

- Investigate opportunities for partnership working to deliver renewable energy
- Develop a heat map to identify opportunities for district heat in Fife
- Explore feasibility of alternative sources of renewable energy generation
- Identify potential sites for on shore wind developments
- Support the transition to a low carbon economy
- Identify opportunities for the creation of green jobs

3. Encourage more sustainable transport and travel

We will –

- Work with SEStran Freight Quality Partnership in support of the Scottish Freight Action Plan (Sustainable Freight Transport System)
- Encourage improvements to the public transport network
- Further develop the core path network
- Encourage use of low carbon and electric vehicles
- Establish a network of electric charging points across Fife
- Support projects to encourage walking and cycling as a mode of transport
- Promote sustainable travel choices in local areas

4. Ecosystems are used sustainably and strengthened

We will –

- Ensure coastal ecosystems are protected and enhanced, and that their potential benefits are fully considered in regard to Climate Change Adaptation
- Ensure the provision of new woodlands are included in Development Plans
- Contribute to the development of the River Basin Management Planning as part of the Water Framework Directive
- Establish a 'stalled spaces' project on derelict land
- Creation of ponds and wetlands with local community groups
- Make use of the integrated Habitat Network tool to identify priority areas
- Support communities to manage habitats

Adapting to cope with Climate Change (Long Term Outcome)

5. Places are adapting to cope with climate change (including land use, coastlines, buildings and infrastructure)

We will –

- Create or enhance natural wetlands, flood attenuation areas, and other similar measures to assist in reducing flooding and to deal with surface water run off from new and existing developments
- Actively seek funding for the promotion of flood protection and coastal erosion studies and projects based on the priorities set out in the Local Flood Risk Management Plans and the Fife Shoreline Management Plan
- Encourage partners to sign up to the implementation of Fife's Shoreline Management Plan and work together to implement its policies
- Encourage trees in urban areas
- Adapt grounds maintenance regimes in regard to drainage and appropriate species planting
- Ensure sustainability building regulations are applied when building in high risk areas
- Ongoing review of land use allocations in the Local Plans / Local Development Plan in regard to potential climate change effects

6. People are adapting to cope with Climate Change

We will –

- Develop local, targeted campaigns to raise awareness of the potential impacts of climate change and the responsibilities of communities and individuals
- Work with vulnerable communities to provide guidance in regard to adapting to specific climate change issues
- Promote the use of small scale, low cost, and sustainable measures where appropriate

Measuring Our Progress

In order to measure progress in achieving Fife Environmental Partnership outcomes and in particular Fife Partnership's commitment to tackling climate change we will use a range of indicators:

National Outcome	Local Outcome	Indicator	Baseline	Target
14. We reduce the local and global environmental impact of our consumption and production.	Reducing carbon emissions (by reducing energy use, more sustainable transport and less waste)	CO2 emissions for Fife (000 tonnes)	3,658 (2008)	Reduce to 2,117 by 2020 (to reflect government target of 42% reduction from 2005 by 2020)
Adapting to climate change	Self assessment of preparedness for climate change	No self-assessment undertaken (2011)	Level 4 by 2013	

Outcome measures are listed below. These will be monitored on an ongoing basis and inform six monthly reports to the Fife Partnership Executive Group on the delivery of Fife's Community Plan and Single Outcome Agreement.

More detailed indicators, including baselines and targets, will be included in a partnership performance framework for monitoring and progress reporting by the outcome groups.

Medium Term Outcome 1 - More efficient use of resources (energy, waste and water)	
Indicator	**Source**
Fife Carbon Footprint – Industrial and Commercial (inc public sector)	Department of Energy and Climate Change (DECC)
Fife Carbon Footprint - Domestic	DECC
Carbon Footprint – Infrastructure (street lighting)	Fife Council
% of household waste recycled/composted	Scottish Environment Protection Agency (SEPA)

Medium Term Outcome 2 - More energy is from low carbon supplies	
Indicator	**Source**
Large scale renewable energy in operation in Fife	Fife Council
% of renewable electricity generated in Fife	Fife Council

Medium Term Outcome 3 - Encourage more sustainable transport and travel	
Indicator	**Source**
Fife Carbon Footprint – Road Transport	DECC
% of pupils walking/cycling to school	Fife Council
Increase cycle use on key monitored routes	Fife Council

Medium Term Outcome 4 - Ecosystems are used sustainably and strengthened	
Indicator	**Source**
Fife Carbon Footprint – Land Use, Land Use Change, Forestry	DECC
Woodland cover as a % of land area	Forestry Commission

Medium Term Outcome 5 - Places are adapting to cope with CC (including land use, coastlines, buildings and infrastructure)	
Indicator	**Source**
Number of wetlands, flood attenuation areas, or similar measures created or enhanced	Fife Council
Number of properties in Potentially Vulnerable Areas with reduced flood risk	Fife Council
Progress with studies and works identified within the Shoreline Management Plan action plan	Fife Council
Progress on actions identified within the Local Flood Risk Management Plans in accordance with timelines set out	Fife Council

Medium Term Outcome 6 - People are adapting to cope with Climate Change	
Indicator	**Source**
Number of specific community engagements on climate change adaptation	Fife Council / SEPA / Scottish Flood Forum
Number of small scale, low cost, and sustainable measures implemented	Fife Council / Scottish Flood Forum

Appendix 1: Glossary

Word/ Phrase	Definition
Adaptation	In terms of climate change, is the action to plan, prepare and respond to the potential impacts of weather.
Carbon	Universal shorthand for Carbon Dioxide, or Carbon Dioxide equivalent greenhouse gases.
Carbon Dioxide (CO_2)	Carbon dioxide is the most common greenhouse gas contributing to human made climate change.
Carbon dioxide equivalent (CO_2e)	In addition to Carbon Dioxide there are several other greenhouse gases. Because it is necessary to reduce all greenhouse gas emissions these are referred to collectively as Carbon Dioxide equivalent gases.
Carbon emissions	Release of CO_2e into the atmosphere.
Carbon Footprint	A measure of the carbon emissions produced as a result of an organisation's or service's activities.
Carbon neutral	When, through a transparent process of measuring emissions, reducing those emissions and offsetting any unavoidable emissions, net calculated emissions equal zero. (DECC)
Carbon offsetting	Offsetting aims to make it possible to compensate for unavoidable emissions by helping to fund projects that deliver equivalent emissions savings elsewhere.
Climate change	Cumulative changes in the Earth's temperature and weather due to increased levels of greenhouse gases as a consequence of human activity.
Climate Change (Scotland) Act 2009	Legislation introduced by the Scottish Government to set a mandatory target of cutting carbon emissions by 42% by 2020 and 80% by 2050.
Climate Change Act 2008	Legislation passed by the UK Government in late 2008 to set a mandatory target of cutting carbon emissions by 80% by 2050.
DECC	The Department for Energy and Climate Change (www.decc.gov.uk) may take up some of DEFRA's responsibilities in future.
DEFRA	The Department for the Environment, Food and Rural Affairs provide the carbon emissions conversion factors used for calculating the carbon footprint.
Ecosystem	A system that includes all living organisms in an area as well as its physical environment functioning together as a unit.
Greenhouse Gases	Gases that enhance the greenhouse effect and hence climate change. The issue of concern is greenhouse gases emitted over and above natural levels as a consequence of human activity such as through burning fossil fuels. Greenhouse gases in general are often referred to as "Carbon Dioxide equivalent" in terms of their potential climate change impact.
Mitigation	The attempt to lessen future climate change and its social, economic and environmental consequences by reducing the greenhouse gas emissions we make.

Word/ Phrase	Definition
Scotland's Climate Change Declaration	A commitment made by all Scotland's 32 local authorities to mitigate their impact on climate change through reducing greenhouse gas emissions and to adapt to climate change impacts.

Appendix 2
Associated Plans & Strategies

The Fife Environmental Partnership Strategy focuses on joint outcomes where one or more partner is involved in their delivery. The strategy does not cover in detail the work that various partners carry out on an individual basis. The following list provides links to other related strategies and plans that contribute to the delivery of wider environmental outcomes:

- Fife Community Plan 2011 -2020
- Fife Council Plan 2017
- Fife Health & Wellbeing Plan 2011-2014
- Fife's Greenspace Strategy 2010 – 2015
- 2011 Fife Shoreline Management Plan
- Fife Local Biodiversity Action Plan

Community Plan Outcome 2011-2020

- Sustaining and improving the environment

Long Term Outcomes

- Reducing carbon emissions
- Adapting to climate change

Medium Term Outcomes

- More efficient use of resources (energy, waste and water)
- More energy is from low carbon supplies
- Carbon emissions from travel and transport have reduced
- Ecosystems are used sustainably and strengthened
- Places are adapted to cope with climate change (including land use coastlines, buildings and infrastructure)
- People are adapting to cope with Climate Change


Fife Environmental Partnership Strategy
Climate Change Strategy 2014 - 2020

Appendix E: Bikeability Scotland

The Scottish Cycling Training Scheme (formerly known as cycling proficiency) has now been rebranded nationally as Bikeability Scotland by Cycling Scotland. This new programme is being delivered in Fife Council.

Bikeability Scotland has three levels which help pupils to improve their cycling knowledge and ability:

- **Level 1** teaches children the basic skills of riding a bike, such as balance, control and making turns and takes place in the playground. It is recommended that pupils in Primary 5 should have this training but as it is playground based Fife is encouraging this training to take place from primary 1. Giving pupils the skills and knowledge from an early age.
- **Level 2** teaches children how to ride a bike safely on the road and navigate basic junctions. It is usually delivered to children in Primary 6 and takes place in the playground and on quiet roads. Level 2 is very similar to the old cycling proficiency training.
- **Level 3** teaches children how to navigate more complex junctions and plan journeys effectively. It is aimed at Primary 7 and secondary school pupils and supports them to make independent journeys and plan the quietest and safest route available. Level 3 training is delivered on road, on a route that has been risk assessed by a qualified cycle trainer.

Appendix F: Bonnygate Air Quality Action Plan Progress Report – Summary Table

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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)	Original: 2009-2010; Amended: 2014	Benefit to local air quality - enables the consideration of Air Quality issues in the Bonnygate into Local Transport Planning considerations.	Fife Council have submitted an application for Scottish Government Grant 2014-2015 to produce an Air Quality Strategy for Fife. This is to include updates to Appin Crescent and Bonnygate AQAPs and exploration of low emissions strategic approach.	The proposed Air Quality Strategy is to include integration with Local Transport Strategy and Area Transport Plan	Not possible to assign a quantitative indicator. These are strategic options which will be reported in future versions of LTS and proposed Fife Council Air Quality Strategy and relevant commentary will be provided on specific air quality provisions in such documentation.	Proposed Air Quality Strategy for Fife.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
1		Options that will be implemented via the Area Transport Plan (ATP)	Fife Council TES and EPPS	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.	Cycle Path completed in 2014	Scottish Government grant funding for 2013/14 received for completion of cycle path.	Actions to be detailed in LTS and ATP.	Proposed Air Quality Strategy for Fife.
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	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.	Air Quality Management Guidance Note on Fife Direct website and reference to Bonnygate AQMA in existing Local Plan . Discussions with Development Management colleagues to include air quality considerations within the proposed FIFEplan framework	Fife Council is to explore potential to produce supplementary planning guidance for air quality issues within the proposed FIFEplan framework	Inclusion of reference to Bonnygate AQAP within Local Development Plan 2011.	Proposed Air Quality Strategy for Fife to include improving links with Local Planning and Development Framework

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	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.	Air Quality Development Management Guidance Note 2011 published on Fife Direct website. Development Management staff provided with model planning condition for air quality issues.	Positive feedback already received by developers on the user friendly content of Air Quality Development Management Leaflet.	Publication of Developers Guidance Note on Fife Direct.	EPPS to continue providing comment on air quality issues on planning applications. This includes routine screening of weekly planning application lists.
2		(c) Developers guidance note. EPPS teams to continue to liaise to ensure continued understanding and correct interpretation of Developer's Guidance note – linked to Action (e)	Fife Council EPPS	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	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.	EPPS to continue providing comment on air quality issues on planning applications. This includes routine screening of weekly planning application lists.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	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.	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 seminars by EPPS and also presentations to colleagues in Development Management	EPPS to continue providing comment on air quality issues on planning applications. This includes routine screening of weekly planning application lists.
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	Original: 2010; Amended: 2011	This measure will raise awareness of local air quality issues within the Development Services team and facilitate their consideration when applications for new developments are being appraised.	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.	Ongoing presentations and meetings with Development Management colleagues to reinforce importance of tackling air quality issues.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
3	Encourage Integration AQ with other Council strategies	Implementation of AQAP	Fife Council and community planning partners	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.	Air Quality steering group meeting held. Members include individuals from different departments who pool information and proposed plans.	Sustainable transport themes are included in the Councils Climate Strategy 2014 - 2020. 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 of the air quality action planning process Protective Services attended one day training in asset based approaches run by Fife's Health and wellbeing Alliance on 28^{tth} March 2013. Outcomes from this event to be incorporated into action	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.	AQ strategy for Fife grant application to be submitted for 2014/2015 which will include integration of AQ issues with other Fife Council issues.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
							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	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.	This project is not considered feasible in the context of the current south road configuration.	Proposed re-routing of traffic has raised concerns regarding health and safety issues including overhead lines. Therefore this option is currently not considered as being viable.	Assess the possibility of moving all freight to the South Road. Assess the feasibility of encouraging freight operators to use the South Road.	No new proposals/objectives identified as making a significant contribution at this stage for this particular action plan measure. It is proposed to remove this measure in updating the set of Bonnygate Air Quality action plan measures in 2014-2015

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	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.			Continue to attend the SEStran Freight Quality Partnership and contribute to Air Quality Group within the partnership	Advice from the Scottish Transport Emission Partnership (STEP) to be sought in seeking to look at such issues. To consider these issues also in production of Air Quality strategy for Fife
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	Original: 2010-2011; Amended: 2011 onwards.	Local freight partnerships offer the potential to reduce local emissions from freight activities and thus contribute to improving air quality. The potential impact of this measure is dependent on its successful adoption and implementation.			Discuss with local operators vehicle emissions and routing policies.	Advice from the Scottish Transport Emission Partnership (STEP) to be sought in seeking to look at such issues To consider these issues also in production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	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.	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO_2 and PM_{10} within the Bonnygate for 2013. However, due to the potential variation in air pollutant concentrations and effects of factors such as weather conditions, it is recommended that these potential impacts are treated with caution until a distinct trend can be identified.	Completed	Air quality monitoring at the Bonnygate will continue to confirm the effectiveness of these measures.
5		(b) Implementation of new UTMC in Cupar town centre with synchronised fixed time signals.	Fife Council Transportation and Environmental Services	2009-2011	New UTMC will aim to maximise the efficiency of traffic flow through the town centre and minimise unnecessary traffic queuing within the Bonnygate. This measure aims to	Measure complete	The introduction of these measures has coincided with a decline in concentrations of NO_2 and PM_{10} within the Bonnygate in	Completed	Air quality monitoring at the Bonnygate will continue to confirm the effectiveness of these measures.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
					reduce emissions from stationary vehicles within the AQMA.		2013. 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.		
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	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.			Discourage long stay commuter parking as part of Fife Council's Parking Strategy.	To be reviewed as part of proposed production of Air Quality strategy for Fife.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
6		(b) Length of stay restrictions and parking controls in town centre should be monitored and reviewed annually.	Fife Council – Transportation and Environmental Services	2009-2015	Regular reviews of parking restrictions/ controls can help to encourage the use of public transport when travelling to Cupar.			On-going monitoring	To be reviewed as part of proposed production of Air Quality strategy for Fife
6		(c) Continued enforcement of loading restrictions within AQMA.	Fife Council – Transportation and Environmental Services and Fife Constabulary	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.			Police enforce traffic road orders	To be reviewed as part of proposed production of Air Quality strategy for Fife
6		(d) Assess the need for on street parking charges to manage the demand for parking.	Fife Council – Transportation and Environmental Services	2010-2011	The management of parking availability should function to encourage the use of public transport instead of private vehicles when travelling to Cupar.			Carry out assessment. The Council has received parking control grant funding from the Scottish Government.	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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 and Protective Services)	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.	Fife Council have submitted a Scottish Government air quality grant application for undertaking dispersion modelling of proposed Cupar Relief Road for 2014-15.	Preliminary dispersion modelling to be undertaken on assessing potential air quality impacts of proposed Cupar Relief Road on Bonnygate AQMA	This scheme would be developer funded and therefore could only be implemented through the Development Plan process.	Fife Council have submitted a Scottish Government air quality grant application for undertaking dispersion modelling of proposed Cupar Relief Road for 2014-15.
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	Fife Council – Transportation and Environmental Services and EPPS (Development Management and Protective Services)	2009-2013	The successful implementation of this measure should contribute to more efficient vehicle movements and enhanced pedestrian accessibility, and should thus contribute to improving local air quality within Cupar by helping to reduce emissions from road transport. This	Cupar Streetscape Improvements have received appropriate funding and are in the process of being implemented. Updates will be provided in future Air Quality	Impacts on air quality of these Streetscape improvements have been assessed by dispersion modelling exercise in 2014 and are considered unlikely to have any deleterious effects on air quality.	Feasibility and design to implement proposals.	Ongoing monitoring to assess air quality following the introduction of these traffic management measures

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
		pedestrian accessibility within Cupar Town centre.			measure has been designed but implementation is dependent upon capital funding.	Progress Reports.			
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	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).	Reviewed and discussed other local authorities approaches to establishing Bus Quality Partnerships.		Establish a Bus Quality Partnership	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
8		(b) Encourage bus operators to improve emission performance of their fleet.	Fife Council - Transportation and Environmental Services	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).			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.	To be reviewed as part of proposed production of Air Quality strategy for Fife
9	Continue to target reduction in emissions from Council Fleet and contract vehicles	(a) Continue procurement of low emission vehicles.	Fife Council – Fleet Operations and Procurement and Supplies	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.	2012 – 2014 fleet / plant replacement plan now in place with 3 new vans in service which the manufacturer states will provide a possible 10% fuel reduction	Fife council had reduced its fleet to 1705 in December 2013, from 1922 in 2011. All Council fleet Vehicles fitted with ERG systems to reduce NOx emissions. Fife Council is also running low sulphur vehicles within its fleet which continue to be monitored and assessed	Fife Council tender specification insists all new vehicles must have exhaust trap and particulate filtration systems	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
							Use of vehicle tracking systems which reduces idling.		
9		(b) Monitor and assess alternative fuels, technologies and fuel additives.	Fife Council – Fleet Operations and Procurement and Supplies	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.	17 fully electric vehicles in the Fife Council fleet to date.	7% bio-diesel from renewable sources is added to the councils fuel stocks.	Increase in fleet using alternative fuels	To be reviewed as part of proposed production of Air Quality strategy for Fife
9		(c) SAFED training.	Fife Council – Fleet Operations and Procurement and Supplies	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.	CPC (Certificate of Professional Competence) for HGV drivers (almost 300 Council staff as of March 2014), along with driver training for all other smaller type vehicles,		Driver certification CPC (Certificate of Professional Competence)	

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
						are now running alongside.			
9		(d) Assess potential for emissions standards for fleet contracts.	Fife Council – Fleet Operations and Procurement and Supplies	2009-2015	By ensuring that contractor fleets have newer vehicles, Fife Council are encouraging the use of lower emitting vehicles under its contracts.	2012 – 2014 fleet / plant replacement plan now in place with specific vehicles being targeted for renewal by smaller more appropriate sized vehicles.	Fleet operations now insist that any heavy goods vehicles supplied must be fitted with an exhaust trap and particulate filtration system. Some retro fitting of exhaust emissions systems have been fitted to the existing Fife Council fleet with more planned in future.	Fife Council tender specification insists all new vehicles must have exhaust trap and particulate filtration systems.	To be reviewed as part of proposed production of Air Quality strategy for Fife
10	AQMA Awareness Signs	To design and erect AQMA signs at various locations within Cupar Town Centre.	Fife Council – Transportation and Environmental Services	2010-2011				Authorisation, design, procurement and installation.	To be removed from list of measures as part of update of Bonnygate Air Quality Action Plan in 2014-2015

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
11	Travel plans for large organisations and businesses	(a) Continue the implementation of Fife Council's Travel Plan.	Fife Council – Transportation and Environmental Services	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.	Looking at best means to interrogate existing records for number of Travel Plans submitted to Council.		Results of Council travel surveys	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
11		(b) Continue to support the implementation of School Travel Plans.	Fife Council – Transportation and Environmental Services	2009-2015				Travel plans implemented and promoted in all schools	To be reviewed as part of proposed production of Air Quality strategy for Fife
11		(c) Work with local businesses/organisations to encourage the development and implementation of travel plans.	Fife Council – Transportation and Environmental Services	2009-2015				Number of large businesses approached regarding the development of travel plans.	To be reviewed as part of proposed production of Air Quality strategy for Fife
12	Promotion of Cycling and Walking	(a) Development of walking and cycling routes within Cupar.	Fife Council – Transportation and Environmental Services	2009-2015	The provision of an area wide map for cycling and walking should encourage the cycling and walking in preference to the car for some users. This measure therefore offers the potential to help reduce emissions from private vehicles.	A feasibility study was carried out on creating a cycle route from Cupar to Guardsbridge along the A91. However due to the complexity of multiple land owners this will not go ahead in the short term.		Number/ length of cycling and walking routes developed.	Additional cycle parking to be added in Cupar

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
12		(b) Signage and Interpretation.	Fife Council – Transportation and Environmental Services	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.			Installation of Signage	To be reviewed as part of proposed production of Air Quality strategy for Fife
12		(c) Provision of Cycle Parking throughout the town centre; at workplaces and at Transport interchange points.	Fife Council – Transportation and Environmental Services	2009-2015	The provision of more cycle parking facilities should encourage the use of bicycles in preference to the use of private motor vehicles.			Installation of cycle parking points.	Cycle parking is being placed in Cupar as part of the Town Centre Traffic Scheme.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
12		(d) A programme of led Cycle Rides will be set up in Cupar to encourage people to cycle as part of their daily routine.	Fife Council – Transportation and Environmental Services	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.			Number of led cycle rides.	To be reviewed as part of proposed production of Air Quality strategy for Fife
13	Promoting Travel Choices	(a) Production of a Travel Choices map of Cupar	Fife Council – Transportation and Environmental Services	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.			Creation and publication of map.	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	2010-2015	Fife Council has undertaken an extensive marketing exercise to raise awareness about the Bonnygate AQAP including 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.			Undertake marketing	To be reviewed as part of proposed production of Air Quality strategy for Fife
13		(c) Production of a community booklet.	Fife Council – Transportation and Environmental Services	2010-2015				Production of booklet.	To be reviewed as part of proposed production of Air Quality strategy for Fife
13		(d) Production of a residential travel pack.	Fife Council – Transportation and Environmental Services	2010-2015	This measure aims to provide guidance on travel options to local residents and thus encourage the use of sustainable forms of transport.			Production of travel pack.	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
13		(e) Undertaking individualised Travel Marketing at households throughout Cupar.	Fife Council – Transportation and Environmental Services	2010-2015	This measure aims to provide guidance on travel options to local residents and thus encourage the use of sustainable forms of transport.			Undertaking visits with households.	To be reviewed as part of proposed production of Air Quality strategy for Fife
13		(f) Undertaking individualised Travel Marketing at businesses throughout Cupar.	Fife Council – Transportation and Environmental Services	2010-2015	This measure aims to provide guidance on travel options to local businesses and thus encourage the use of sustainable forms of transport.			Undertaking visits to businesses throughout Cupar to discuss Travel.	To be reviewed as part of proposed production of Air Quality strategy for Fife
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	2010-2015				Obtain internal and developer agreement to progress the car club's approach by Transport Planning and Development Management	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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	2010-2015				Travel packs to be distributed to 'new build' homes	To be reviewed as part of proposed production of Air Quality strategy for Fife
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	2010-2015	This measure aims to make Council 'pool cars' available for members of the public to hire in the evenings and weekends. This measure provides an alternative to private vehicle ownership and encourages the use of sustainable forms of transport by users at other times.			Establish Car Club.	To be reviewed as part of proposed production of Air Quality strategy for Fife
13		(j) Continue to provide information about public transport services through the Council website.	Fife Council – Transportation and Environmental Services	2009-2015	This measure aims to increase awareness of public transport options in Fife and therefore encourage their use in preference to private motor vehicles.			Regular updates of public transport information on Council website	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
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 Protective Services	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.	The Fife Council Air Quality website has been redesigned and now includes updated information on both road traffic pollution and other potential sources of air pollutants e.g. biomass boilers. In addition relevant Council committee reports continue to be produced on an annual basis	In addition relevant Council committee reports on air quality issues continue to be produced on an annual basis	Publication of new LAQM reports and details relating to the Bonnygate AQMA/ AQAP on the Fife direct.	An under spend in a Scottish Government grant funding for 2013/14 for completion of cycle path is being used to fund mobile monitoring in Bonnygate the outcomes which are likely to raise awareness of importance of air quality issues.
14		(b) Undertake a publicity campaign to raise awareness of the Bonnygate AQMA.	Fife Council – Transportation and Environmental Services and Protective Services	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	The "TRY IT" campaign (www.fifedirect.org.uk/tryit) has been particularly successful in	Sustainable Cupar's energy group is in the early stages of developing a plan to buy a London cab or similar	Publication of materials, events held, website statistics.	Fife Council will continue to incorporate the most recent developments in our understanding of air quality issues within the context of

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
					work with other associated activities in the plan to encourage activities that will contribute to improving local air quality in the Bonnygate AQMA.	raising awareness of local air quality issues of both the Bonnygate AQMA and air quality issues in general. .	vehicle, and convert it so it can run on used fat from local takeaway restaurants. The group has already received backing for its project from the Green Insurance company which has awarded it a 'Green Grant' of £1600 to get the idea off the ground. Presentations provided to FPH, NHS and GreenFleet Scotland events in 2013-2014 in raising awareness of air quality issues.		public communication media mechanisms.

Appendix G: Appin Crescent Air Quality Action Plan Progress Report – Summary Table

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
1	Liaise with the Scottish Government regarding the consideration of national measures to reduce background concentrations of PM	Contact the Scottish Government lead regarding the consideration of national measures to reduce PM	Fife Council – Protective services	2012	Possible future reduction in background concentrations of PM			Meeting / consultation with Scottish Government	The Scottish Government has contracted Transport Research Laboratories to consider the effectiveness of the current Action plan measures. An under spend in a Scottish Government grant funding for 2013/14 for completion of cycle path is being used to fund mobile monitoring in Appin Crescent.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
2	Feasibility study	a) Undertake a feasibility study to assess the potential impact of local infrastructure developments and traffic management optimisation on air quality in Appin Crescent. 1) Appin Crescent bypass 2)Traffic management optimisations 3) Halbeath Park and Ride 4) The Northern Link Road	Fife Council – Transportation and Environmental Services and Protective Services	2012 onwards		Feasibility studies have been carried out on four local infrastructure developments and traffic management optimisation traffic options. Further feasibility studies are to be undertaken to look at traffic signalling in Appin Crescent area..		Feasibility study reports (2014 onwards)	A grant application for a review of traffic signalling arrangements in Appin Crescent has been submitted to the Scottish Government
2		b) Publish findings of study and undertake consultation with relevant organisations regarding future progress	Fife Council – Transportation and Environmental Services and Environmental Strategy	2012 - 2015		The Appin Crescent bypass is included in the Dunfermline and West Fife Local Plan and has been		Findings of feasibility studies in 2014 have been discussed by Air Quality Steering Group and it has been agreed –subject to	A grant application for a review of traffic signalling arrangements in Appin Crescent has been submitted to the Scottish Government

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
						promoted by a number of local organisations and individuals as a potential solution to the air quality issues identified. The diversion is planned to the north of Appin Crescent at Leys Road, Dunfermline. The feasibility study carried out shows that the proposed by pass appears to offer the achievement of the AQ objectives, however there is no funding available at the moment		provision of Scottish Government air quality grant – that traffic signalling arrangements in the Appin Crescent area be reviewed in terms of improving traffic flow and easing congestion.	.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
3	Improving links with Local Transport Strategy	a) Reference to Appin Crescent AQMA and measures included in Air Quality Action Plan. Integration of plan with LTS.	Fife Council – Enterprise, Planning and Protective Services	2012-2013	Benefit to local air quality - enables the consideration of Air Quality issues in the Appin Crescent into Local Transport Planning considerations.	Meeting arranged with Transportation and Fleet Services to discuss integration of different strategies within the overall AQ Strategy for Fife grant application		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.	To be reviewed as part of proposed production of Air Quality strategy for Fife
3		b) Develop action plan options that will be implemented via the local transport strategy.	Fife Council – Enterprise, Planning and Protective Services	2012-2015	Provision of a large scale project to develop a cycle network in Dunfermline should encourage cycling and contribute to reducing car usage and associated emissions.			Actions to be detailed in LTS and ATP.	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
4	Improving Air Quality links with Local Planning and Development Framework	a) Integration of Appin Crescent AQAP with future versions of Local Plan.	Fife Council – Enterprise, Planning and Protective Services	2012-2015		Meeting held with Council's Sustainabilty Team to discuss integration with Climate Change Strategy (Appendix D)		No quantitative indicator	AQ strategy for Fife grant application to be submitted for 2014/2015 which will include integration of AQ issues with other Fife Council issues.
4		b) Ensure that development proposals with the potential to exert an impact on the Appin Crescent AQMA are assessed for air quality impacts and where necessary, appropriate mitigation measures adopted.	Fife Council – Enterprise, Planning and Protective Services	2011-2015	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.	Air Quality Development Management Guidance Note 2011 published on Fife Direct website. Development Management staff provided with model planning condition for air quality issues. Ongoing discussion with Development Management colleagues on		No quantitative indicator	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
						FIFEplan.			
4		c) Continue to promote sustainable developments	Fife Council EPPS	2011-2015	Incorporation of sustainable technologies and methods in new developments should help minimise the potential air quality impacts of new developments. 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	Air Quality Development Management Guidance Note (2011) published on Fife Direct website		Publication of promotional materials	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
4		d)Maintain and make available - air quality guidance note for developers.	Fife Council EPPS	2011-2015	The incorporation of sustainable technologies and methods in new developments should help to minimise the potential air quality impacts of new developments by increasing developer awareness of air quality issues			Publication of relevant promotional material	To be reviewed as part of proposed production of Air Quality strategy for Fife
5	Encourage Integration of AQ with other Council strategies	a) Enhance joint working between Council Services to encourage consideration of potential air quality implications	Fife Council and community planning partners	2012-2015	This will encourage contributions towards improving local air quality and minimising negative impacts from existing and future council strategies, which will possibly lead to the achievement of AQ Objectives	Air Quality steering group meeting held. Members include individuals from different departments who pool information and proposed plans.	Fife Council's Single Outcome Agreement (SOA) with the Scottish Government outlines the aim of providing better water, air and land quality under the banner of Sustaining and Improving Our Environment	Evidence of Joint working	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
5		b) Maintain regular and ongoing communication between members of the Appin Crescent AQAP steering group.	Fife Council and community planning partners	2012-2015		Air Quality steering group meetings continue to be held.		Regular steering group meetings and minutes	To be reviewed as part of proposed production of Air Quality strategy for Fife
6	Consideration of development of Appin Crescent bypass (dependent upon feasibility study)	Development of an Appin Crescent bypass .	Fife Council	-	This is dependent on the conclusions within the feasibility study and related factors	The feasibility study suggests that the proposed bypass appears to offer the achievement of Air Quality objectives however there is no funding in the short term.		Progress of this action is dependent on the conclusions of the feasibility study and related factors	To consider other traffic management options that may realise similar air quality improvements but may be more cost effective and practicable.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
7	Optimisation of the traffic management system	Optimisation of the traffic management system at Appin Crescent and the surrounding network.	Fife Council		This is dependent on the conclusions within the feasibility study and related factors	The feasibility study suggests that the proposed bypass appears to offer the achievement of Air Quality objectives however there is no funding in the short term.	As part of the grant submission a bid will be made for assessing traffic signalling arrangements at Garvock Hill roundabout.	Progress of this action is dependent on the conclusions of the feasibility study and related factors	To be reviewed as part of proposed production of Air Quality strategy for Fife
8	Investigate the potential for establishing voluntary bus agreements	a) Liaise with local bus operators to establish the potential for developing local bus quality agreements.	Fife Council (Transportation and Environmental Services)	2013-2015	Increased Operator awareness of air quality issues.			Bus quality agreement. Similar to P&R at Ferrytoll 2016/2017 link to Forth Replacement Crossing	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
		b) Liaise with bus operators regarding emissions from the bus fleet and improvements to bus service infrastructure.	Fife Council (Transportation and Environmental Services)	2012-2015	Increased Operator awareness of air quality issues.			Existing arrangements with Operators	To be reviewed as part of proposed production of Air Quality strategy for Fife
9	Continue to target reductions in emissions from the Council fleet and contract vehicles.	a) Continue periodic procurement of low emission vehicles;	Fife Council (Fleet Services/ Procurement and Supplies)	2012-2015	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 Appin Crescent. This is dependent upon verified emission factors, continued maintenance of the vehicles and no increase in activity within the Appin Crescent area.	2012 – 2014 fleet / plant replacement plan now in place with 3 new vans in service which the manufacturer states will provide a possible 10% fuel reduction	Fife Council had reduced its fleet to 1705 in December 2013, from 1922 in 2011. Fife Council is also running low sulphur vehicles within its fleet which continue to be monitored and assessed	Fife Council tender specification insists all new vehicles must have exhaust trap and particulate filtration systems	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
9		b) Monitor and assess viable options for alternative fuels, technologies and fuel additives;	Fife Council (Fleet Services/ Procurement and Supplies)	2012-2015	The replacement of fleet car(s) with electric alternatives should make a small contribution to reducing emissions of air quality pollutants in the Appin Crescent. This is dependent upon the electric vehicle replacing an existing vehicle and not an addition to the existing fleet	17 fully electric vehicles in the Fife Council fleet to date.	7% bio-diesel from renewable sources is added to the councils fuel stocks.	Increase in fleet using alternative fuels	To be reviewed as part of proposed production of Air Quality strategy for Fife
9		c) Undertake periodic training for vocational fleet drivers including Safe and Fuel Efficient Driving (SAFED);	Fife Council (Fleet Services/ Procurement and Supplies)	2012-2015	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.	CPC (Certificate of Professional Competence) for HGV drivers, along with driver training for all other smaller type vehicles, are now running alongside.	Almost 300 Council staff have CPC	Driver certification CPC (Certificate of Professional Competence)	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
9		d) Assess potential for emissions standards for fleet contracts.	Fife Council (Fleet Services/ Procurement and Supplies)	2012-2015	By ensuring that contractor fleets have newer vehicles, Fife Council are encouraging the use of lower emitting vehicles under its contracts.	2012 – 2014 fleet / plant replacement plan now in place with specific vehicles being targeted for renewal by smaller more appropriate sized vehicles.	Fleet Operations now insist that any heavy goods vehicles supplied must be fitted with an exhaust trap and particulate filtration system. Some retro fitting of exhaust emissions systems have been fitted to the existing Fife Council fleet with more planned in future.	Around 30 fleet vehicles replaced each year by the Council Anticipate third of the replacements will be electric	To be reviewed as part of proposed production of Air Quality strategy for Fife
10	Provision of Information and Promotion of Travel options	a) Produce Travel Choices facility for Dunfermline.	Fife Council (EPPS)) and SEStran	2013-2015	Increased awareness of travel choices will encourage a change in behaviour that will contribute to improving local air quality.			Creation and publication of map	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
10		b) Undertaking Travel Marketing in Dunfermline.	Fife Council (EPPS)) and SEStran	2013-2015				Undertake marketing	To be reviewed as part of proposed production of Air Quality strategy for Fife
10		c) Undertake a publicity exercise to raise awareness of the Appin Crescent AQMA and encourage people to use sustainable forms of transport wherever possible.	Fife Council (Environmental Strategy and Transportation and Environmental Services) and SEStran	2013-2015	Raised awareness of the Appin Crescent AQMA will encourage people to use sustainable forms of transport which will in turn lead to improvements in air quality	In Dunfermline there will be various promotions and marketing activities carried out to encourage more people to uses bikes for short journeys.		Undertake Marketing	To be reviewed as part of proposed production of Air Quality strategy for Fife
10		d) Maintain and promote the use of Tripshare Fife, car-sharing initiative.	Fife Council (EPPS and) and SEStran	2013-2015	Encouraging individuals to car share will reduce the number of vehicles on the road at peak times and can contribute to air quality objectives being met			Increased take up of car share journeys	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
10		e) Continue to provide information about public transport services through the Council website.	Fife Council (EPPS and Transportation and Environmental Services) and SEStran	2013-2015	Providing information to the public through the council website allows individuals to make informed choices with regards to their travel and can contribute to air quality objectives being met			Continue updates on the council website	To be reviewed as part of proposed production of Air Quality strategy for Fife
10		f) Ensure cycle networks and facilities are provided, as a matter of course, within existing and new networks and developments.	Fife Council (EPPS and Transportation and Environmental Services) and SEStran	2012 – 2014	By providing facilities individuals are more likely to use sustainable means of transport, thus this can contribute to Air quality objectives being met	Work is currently being carried out on the Linburn corridor cycleway and Greenspace project.		Signage. Number/ length of cycling and walking routes established	Large scale development to the cycle network in Dunfermline is planned for 2014 – 2016.

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
10		f) To improve integration between cycling, walking and public transport.	Fife Council (EPPS and Transportation and Environmental Services) and SEStran	2012-2014	Improved integration will improve journey times and promote sustainable transport options. This will lead to fewer journeys being made by car at peak times and contribute to the AQ objectives being met			Signage	To be reviewed as part of proposed production of Air Quality strategy for Fife
10		g) Increase cycling trips to employment, education and leisure facilities.	Fife Council (Environmental Strategy and Transportation and Environmental Services) and SEStran	2012-2015	Increased use of planned cycling network will lead to fewer journeys being made by car at peak times and contribute to the AQ objectives being met	In 2014, it is planned that there will be cycling training rolled out across schools in Dunfermline. Adult cycling initiatives will also be set up.			To be reviewed as part of proposed production of Air Quality strategy for Fife

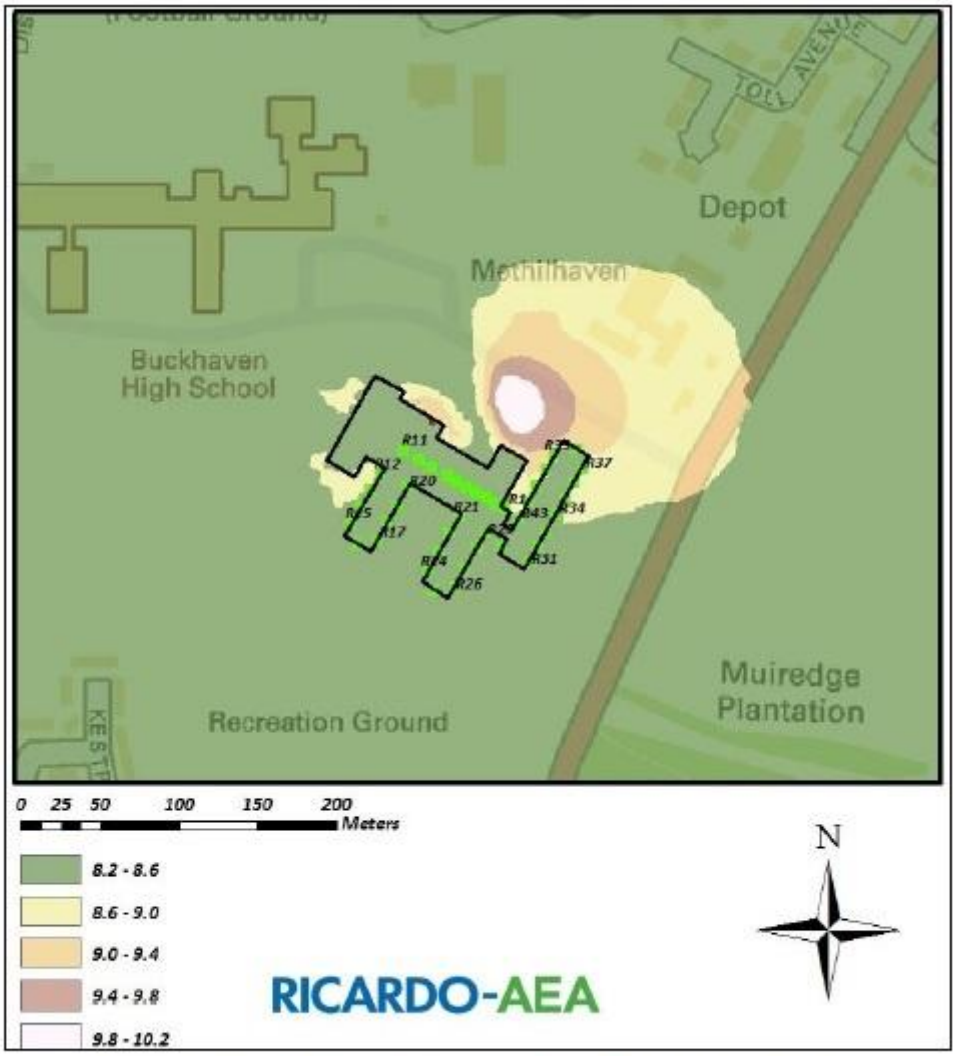
Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
10		h) Improve pedestrian facilities such as new footpaths and crossings.	Fife Council (Environmental Strategy and Transportation and Environmental Services) and SEStran	2013-2015	Increased use of pedestrian facilities will lead to fewer journeys being made by car at peak times and contribute to the AQ objectives being met				To be reviewed as part of proposed production of Air Quality strategy for Fife
11	Provision of Information and raising awareness of Air Quality issues	a) Continue to make information relating to local air quality management available through the Council website.	Fife Council (Environmental Strategy and Transportation and Environmental Services)	2011-2015	Access to information about Air Quality Issues will improve public understanding, therefore promoting use of sustainable transport and contribute to the AQ objectives being met.	Presentations to NHS, FPH and Green FleetScotland and STEP.		Publication of LAQM reports	To be reviewed as part of proposed production of Air Quality strategy for Fife
11		b) Undertake a publicity campaign to raise awareness of the Appin Crescent AQMA	Fife Council (Environmental Strategy and Transportation and Environmental Services)	2012-2013	Access to information about Air Quality Issues will improve public understanding, therefore promoting use of sustainable transport and contribute to the AQ objectives being met.	Presentations to NHS, FPH and Green FleetScotland and STEP		Publication of materials, events held and website statistics	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
12	Travel Plans for Large Institutions and Businesses	a) Continue the implementation of Fife Council's travel plan;	Fife Council	2012-2015	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.	Latest developments discussed at quarterly Air Quality Steering Group meetings.		Council travel surveys	To be reviewed as part of proposed production of Air Quality strategy for Fife

Item	Action	Sub-action	Lead Authority	Timescale	Effect on Air Quality	Progress with measure (against indicators where possible)	Comments	Indicators listed in AQAP	New Proposals/ Objectives for 2014-2015
12		b) Continue to support the implementation of School travel plans;	Fife Council	2012-2015		Latest developments discussed at quarterly Air Quality Steering Group meetings		Implemented and promoted in schools	To be reviewed as part of proposed production of Air Quality strategy for Fife
12		c) Work with local businesses/ organisations to encourage the development and implementation of travel plans.	Fife Council	2012-2015				Number of large businesses approached to develop travel plans.	To be reviewed as part of proposed production of Air Quality strategy for Fife

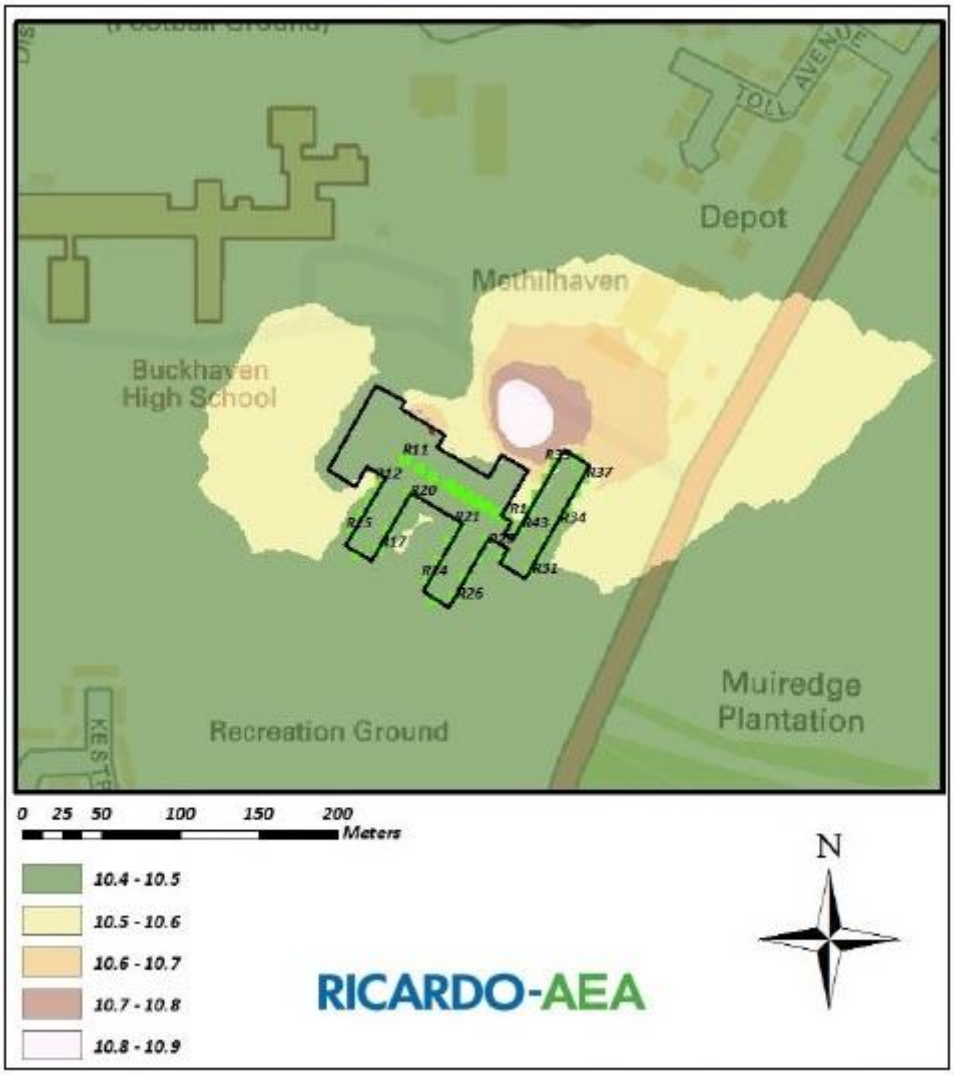
Appendix H: Levenmouth Secondary School: Biomass Plant Air Quality Impact Assessment

Figure H.1 Modelled NO_2 Annual Mean Concentrations ($\mu g\ m^{-3}$)



Contains Ordnance Survey data © Crown Copyright and database right 2011

Figure H.2 Modelled PM_{10} Annual Mean Concentrations ($\mu g\ m^{-3}$)



Appendix I: Appin Crescent Traffic Management Options Appraisal (Phase 2): Scenario modelling assessment – Executive Summary

In October 2011 Fife Council declared an Air Quality Management Area (AQMA) at Appin Crescent in Dunfermline. A draft Action Plan setting out the measures Fife Council intends to take to achieve compliance with the air quality objectives within the area covered by the AQMA has been prepared. One element of the action plan is to consider a number of traffic management scenarios to help reduce vehicle emissions and ambient NO_2 and PM_{10} concentrations.

This report describes Phase 2 of the traffic management options feasibility study and aims to quantify the potential impact of six traffic management scenarios on NO_2 and PM_{10} concentrations within the Appin Crescent AQMA when compared with the 2015 future baseline.

Six traffic management scenarios have been modelled to predict their potential impact on air quality within the Appin Crescent AQMA when compared with the 2015 future baseline. Four of the scenarios use traffic flow and speed data from a S-PARAMICS traffic micro-simulation model conducted by SIAS Ltd (appointed by Fife Council). The outputs of the traffic model were then used by Ricardo-AEA to model the impact of each scenario on air quality within the AQMA. The air quality assessment has been conducted using atmospheric dispersion modelling of road traffic emissions. Throughout the study, Ricardo-AEA have worked in consultation with the traffic modellers to ensure that our understanding of the traffic micro-simulation model outputs are correct.

A summary of the findings of each scenario assessed is as follows:

- Atmospheric dispersion modelling of road traffic emissions verified using 2011 NO_2 and PM_{10} annual measurements indicates that the annual mean objectives for both pollutants are currently being exceeded at many locations where relevant human exposure exists within Appin Crescent. This broadly agrees with the conclusions of the Further Assessment for the Appin Crescent AQMA conducted previously using 2011 monitoring and traffic datasets. This assessment however differs from the Further Assessment as traffic micro-simulation model outputs have been used to calculate vehicle emission rates. Comparison of the modelled NO_2 concentrations with local measurements has shown that the model is in fairly good agreement with the measurements; this indicates that the modelling approach used is estimating vehicle emissions reasonably well. The worst case locations for both NO_2 and PM_{10} concentrations are at the facades of the residential properties close to the roadside on the south side of Appin Crescent

- Modelling of projected road traffic NOx and PM_{10} emissions with estimated future background concentrations in 2015 and modelled changes to traffic flows, indicates that for a business as usual scenario there will be little change in predicted annual mean NO_2 concentrations when compared with the 2011 baseline; with reductions of less than 0.5 $\mu g.m^{-3}$ being predicted at the receptor locations on Appin Crescent. The projected reductions in NO_2 concentrations are insufficient to achieve compliance with the annual mean objective. A slight increase in NO_2 concentrations is observed at some of the receptor locations in Appin Crescent, this is due to a combination of the average number of vehicles increasing and the average vehicle speeds decreasing at these road sections. Similarly for PM_{10} in 2015 the annual mean concentrations are predicted to increase at most of the receptors at Appin Crescent

- Three design options relating to potential changes to how traffic flows are managed when approaching the Appin Crescent/St Margaret's Drive roundabout from the east have been assessed as follows:

    - Design Option 3: A dedicated left hand slip lane from Appin Crescent to St Margaret's Drive with a physically segregated left turn lane with give way on exit.
    - Design Option 5: An additional entry lane to roundabout from Appin Crescent.
    - Design Option 6: A dedicated slip road from Appin Crescent to St Margaret's Drive with staggered crossing so that the slip road crossings can work independently of the existing roundabout lights.

- The results indicate that for Design Option 3 there will be a small change in predicted annual mean NO_2 concentrations when compared with the 2015 future baseline; with reductions of up to 0.4 $\mu g.m^{-3}$ being predicted at some receptor locations on Appin Crescent. However, at the locations where annual mean concentrations in excess of the 40 $\mu g.m^{-3}$ objective are occurring both decreases and increases of 0.1 $\mu g.m^{-3}$ are predicted at the different receptors indicating that there is not much of an overall change in

emissions occurring at these locations. For PM_{10} the predicted reduction in annual mean concentration is very small with reductions of up to 0.3 $\mu g.m^{-3}$ predicted at receptor locations on Appin Crescent.

- The results indicate that for Design Option 5 there will be an increase in predicted annual mean NO_2 concentrations when compared with the 2015 future baseline; with increases of up to 0.5 $\mu g.m^{-3}$ being predicted at some receptor locations on Appin Crescent. Similarly for PM_{10} the predicted change in annual mean concentration is very small with either no change or reduction and increases of up to 0.1 $\mu g.m^{-3}$ predicted.

- For Design Option 6 the results indicate that there will be an increase in predicted annual mean NO_2 concentrations when compared with the 2015 future baseline; with increases of up to 0.7 $\mu g.m^{-3}$ being predicted at the receptor locations on Appin Crescent. For PM_{10} the predicted reduction in annual mean concentration is very small with either no change or reductions and increases of up to 0.1 $\mu g.m^{-3}$ predicted

- A basic analysis of the traffic micro-simulation model outputs (as provided by traffic modellers SIAS) has been conducted for two westbound road sections where the maximum NO_2 and PM_{10} concentrations are predicted on the south side of Appin Crescent. For each option modelled, the main variable which is changing is the average speed of the traffic and how this is affected by queuing during congested period. NOx and PM_{10} emissions tend to increase as average vehicles speed decreases; it is therefore useful to provide a comparison of the average speeds predicted by the micro-simulation model for each scenario. We have consulted with the traffic modellers to ensure our interpretation of their data is correct.

  A comparison of the average hourly speeds during peak traffic hours at both road sections analysed indicates that during the morning (AM) peak only Option 3 increases averages speeds and therefore reduces emissions when compared with the 2015 future baseline scenario; with Options 5 & 6 having lower hourly average speeds than the 2015 baseline.
  In the evening (PM) peak however, Option 3 reduces average speed when compared with the 2015 baseline which has the highest predicted hourly average speed of all three options.
  Comparison of the maximum vehicle queue lengths in each hour during the peak periods also indicate that Option 3 is the most beneficial in reducing queue lengths at that location on Appin Crescent during the morning peak but is not as beneficial in the evening when the 2015 future baseline has the shortest maximum queue lengths.

- The potential air quality impact of bypassing traffic flows away from Appin crescent has been assessed. The scenario is based on our own broad assumptions regarding traffic displacement and uses a hypothetical road layout for the bypass; this scenario has not been modelled using microsimulation. This is intended to provide an indication of the air quality benefits that could be achieved by this option; further air quality assessment will likely be required should this option get to a detailed design stage. Three sub-scenarios have been modelled to include consideration of bypassing one-way eastbound and westbound flows and all traffic.

  As we would expect, the results indicate that bypassing all traffic (bar local access) from Appin Crescent would achieve compliance with both the NO_2 and PM_{10} annual mean objective at all locations in 2015. When only westbound traffic is diverted, compliance with both the NO_2 and PM_{10} annual mean objective would be achieved at all of the receptor locations modelled except at the Diffusion Tube 5ABC site. When only eastbound traffic is diverted, smaller reductions in both NO_2 and PM_{10} annual mean concentrations are predicted indicating that diverting eastbound traffic only would be insufficient to achieve compliance with the air quality objectives at all locations. The results of these scenarios should be interpreted with some caution given that they are largely based on broad assumptions.
- The potential impact of the planned Crossgates Park & Choose facility on air quality within the Appin Crescent AQMA has been assessed. The scenario assumes that annual average daily traffic flow (AADT) for both eastbound westbound journeys through the study area will reduce by 300 vehicles per day. The results indicate that a reduction in daily traffic of 300 vehicles in both directions may reduce annual mean NO_2 concentrations by up to 0.7 $\mu g.m^{-3}$; and annual mean PM_{10} concentrations by up to 0.2 $\mu g.m^{-3}$; at the locations on Appin Crescent where exceedances of each objective are currently occurring. The results of this scenario should be interpreted with care given it is based on assumed flow reductions. It would not appear that the concentration reductions associated with this scheme would be sufficient to remove exceedances of air quality objectives on Appin Crescent.

Broadly speaking, none of the modelled traffic management scenarios offer the opportunity to reduce concentrations of NO_2 and PM_{10} on Appin Crescent to below the relevant air quality objectives. The slip road and additional entry lane to the roundabout options investigated appear to provide greater benefits to traffic flows approaching from the north heading south and little benefit to the traffic travelling westbound; this will provide air quality benefit's at locations very close to the roundabout but not at Appin Crescent where the highest pollutant concentrations are occurring at locations of relevant human exposure.

The main issues at Appin Crescent are the emissions associated with high baseline traffic flows and low average vehicle speeds during peak periods, which is further compounded by poor pollutant dispersion where the facades of residential properties are located very close to the roadside. None of the traffic management interventions modelled address these factors sufficiently to bring concentrations below the respective objectives. Only the bypass scenario offers a solution, which is unsurprising given that the emissions are taken out of the street canyon and hence can disperse much more easily. If considered appropriate by Fife Council; it may be beneficial to investigate alternative traffic management measures that could help reduce vehicle emissions within Appin Crescent.

Appendix J: Cupar Streetscene: Air Quality Modelling Assessment – Executive Summary

Fife Council declared an Air Quality Management Area (AQMA) in the Bonnygate area of Cupar in 2008. This was required as annual mean nitrogen dioxide (NO_2) and fine particulate (PM_{10}) concentrations in excess of the Scottish air quality objective were known to be occurring at locations where local residents may be exposed. Road traffic emissions are the main source of these pollutants within the AQMA.

Options testing via traffic micro-simulation modelling has been conducted to investigate the potential for improving the efficiency of traffic movements through Cupar town Centre via implementation of significant junction improvements (includes two roundabouts), reduction of traffic congestion (includes reconfiguration of traffic signals) and changes to the junction layout at Mercat Cross.

Fife Council has subsequently commissioned Ricardo-AEA to conduct an atmospheric dispersion modelling assessment to quantify the potential air quality impacts of the proposed traffic management measures. This report describes the atmospheric dispersion modelling study and aims to quantify the potential impact of two traffic management scenarios on NO_2 and PM_{10} concentrations within the Bonnygate AQMA when compared with the 2017 future baseline.

Two traffic management scenarios have been modelled to predict their potential impact on air quality within the Bonnygate AQMA when compared with the 2017 future baseline. A 2012 baseline scenario was modelled initially to allow the model to be refined and verified using the latest available NO_2 and PM_{10} measurements.

The scenarios modelled use traffic flow and speed data from a S-PARAMICS traffic micro-simulation model provided by SIAS Ltd (appointed by Fife Council). The outputs of the traffic model were then used by Ricardo-AEA to model the impact of each scenario on air quality within the AQMA. The air quality assessment has been conducted using atmospheric dispersion modelling of road traffic emissions. Throughout the study, Ricardo-AEA has worked in consultation with the traffic modellers to ensure that our understanding of the traffic micro-simulation model outputs is correct.

A summary of the findings of each scenario assessed is as follows:

- The 2012 baseline model outputs indicated that no annual mean NO_2 concentrations in excess of the 40 $\mu g.m^{-3}$ objective are occurring at any of the specified receptor locations within the study area. There are some locations where annual mean PM_{10} concentrations in excess of the 18 $\mu g.m^{-3}$ Scottish objective are predicted at first floor height and at some of the ground level receptors where diffusion tube sites are located; these ground level locations are not however locations where relevant exposure exists. The first floor height receptors where annual mean PM_{10} concentrations in excess of 18 $\mu g.m^{-3}$ are predicted are all located within the narrow canyon section of the Bonngyate that is immediately west of the junction with Crossgate.

- The 2017 future baseline (with no traffic management measures implemented) scenario results indicate that in 2017 there will be a fairly significant reduction in predicted annual mean NO_2 concentrations when compared with the 2012 baseline; with reductions of up to 8.5 $\mu g.m^{-3}$ being predicted at some of the specified receptor locations.

Annual mean PM_{10} concentrations are also predicted to reduce in 2017 when compared with the 2012 baseline; with reductions of up to 1.6 $\mu g.m^{-3}$ predicted at some ground floor locations. The reductions are not significant enough to achieve compliance with the 18 $\mu g.m^{-3}$ Scottish objective at all first floor height receptors.

- For 'Option 1' which relates to the introduction of mini-roundabouts at the East Bridge/St Catherine Street junction as well as the East Bridge/East Burnside junctions on the A91; the model results indicate that there will be an overall reduction in predicted annual mean NO_2 concentrations when compared with the 2017 future baseline; with reductions of up to 4 $\mu g.m^{-3}$ being predicted at some of the specified ground level receptor locations. NO_2 concentrations are also predicted to increase slightly (by up to 1.6 $\mu g.m^{-3}$), but not sufficiently to exceed the 40 $\mu g.m^{-3}$ objective at some locations within the narrow canyon section immediately west of Mercat Cross.

For PM_{10} the model results indicate that annual mean concentrations will reduce by up to 1.1 $\mu g.m^{-3}$ at some ground level locations but will increase by up to 0.3 $\mu g.m^{-3}$ at first floor height receptors within the Bonnygate canyon just west of Mercat Cross.

- For 'Option 2' which relates to reconfiguration of the junctions at East Bridge/St Catherine Street and East Bridge/East Burnside junctions on the A91, to include fixed cycle time pedestrian crossings on

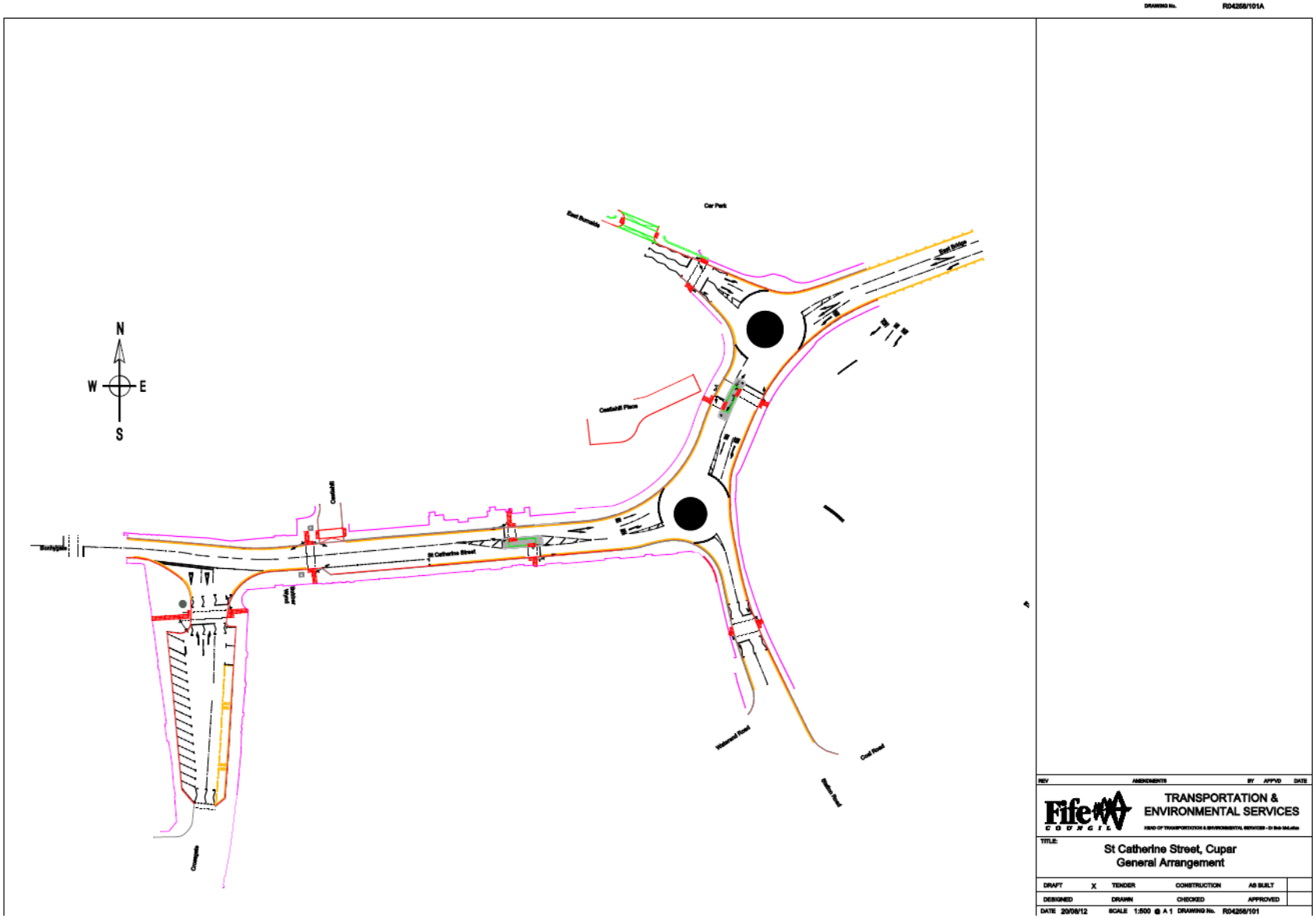
each arm. And also includes the Bonnygate/Crossgates junction (Mercat Cross) becoming a give way junction also with fixed cycle time pedestrian crossings.

The model results indicate that there will be an overall reduction in predicted annual mean NO_2 concentrations when compared with the 2017 future baseline. The overall reduction in predicted concentrations across the study area is not as great as predicted for Option 1. Although reductions of up to 4.4 $\mu g.m^{-3}$ are predicted at some of the ground level receptor locations, an increase in annual mean NO_2 concentrations of up to 2.7 $\mu g.m^{-3}$ is predicted at some first floor height receptors. The increase is insufficient to lead to any exceedances of the 40 $\mu g.m^{-3}$ objective.
For Option 2 the model results indicate that annual mean PM_{10} concentrations will reduce by up to 0.9 $\mu g.m^{-3}$ at some ground level locations but will increase by up to 0.3 $\mu g.m^{-3}$ at first floor height receptors within the Bonnygate canyon just west of Mercat Cross.

The results of the dispersion modelling study indicate that both Design Options 1 and 2 will lead to a general reduction in NOx and PM_{10} emissions when compared to the 2017 baseline. The predicted reductions in NO_2 and PM_{10} for Options 1 and 2 are also in addition to those predicted for the baseline 2017 scenario based on our current understanding of emissions from the typical Scottish vehicle fleet mix in 2017. Based on the model predictions Option 1 provides a greater air quality benefits than Option 2 for the Bonnygate AQMA.

At the time of writing this report, Option 1 is currently being implemented in Cupar and is planned for completion in June 2014.

Appendix K: Cupar Streetscene: Air Quality Modelling Assessment – Road Scheme Layout (Appendix 3)



Appendix L: Appin Crescent Traffic Lane Revision – Road Markings