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Fife Air Quality Annual Progress Report 2018

Fife Council

Report for Fife Council

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2018 Air Quality Annual Progress Report (APR) for
Fife Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

October 2018

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Executive summary

Air Quality in Fife

Air quality is generally good in most parts of Fife, but there are a few specific areas within town centres where hotspots of pollution have been identified and action is required. The main pollutants of concern in these hotspot areas are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}) from road vehicle emissions. This Annual Progress Report has been undertaken to fulfil Fife Council's duty to annually review and assess air quality. The report provides the latest monitoring results and discusses the implications for air quality management in the Fife area.

The Annual Progress Report utilises monitoring data collected throughout 2017. Fife Council carry out monitoring of NO₂ at four automatic stations in Cupar, Kirkcaldy, Dunfermline and Rosyth. Non-automatic monitoring of NO₂ was carried out using diffusion tubes at 62 sites (total of 81 tubes). During 2017 monitoring commenced at Hendry Road, Kirkcaldy and Links Crescent, St Andrews. These locations were identified as locations of concern, with vehicle movements of greater than 10,000 vehicles per day. Monitoring location Bonnygate, Cupar B6 moved location during 2017 due to numerous no returns, therefore results are reported as Bonnygate, Cupar B6i and Bonnygate, Cupar B6ii. All NO₂ concentrations measured during 2017 were below the annual mean objective of 40 µg m⁻³.

PM₁₀ and PM_{2.5} is measured at the four automatic sites within Fife at Cupar, Kirkcaldy, Dunfermline and Rosyth. During 2017 all concentrations were below the annual mean objective of 18 µg m⁻³ for PM₁₀ and 10 µg m⁻³ for PM_{2.5}.

The review of all available data relating to carbon monoxide (CO), sulphur dioxide (SO₂) and benzene monitoring during 2017 indicates that it is unlikely that any AQS objectives relating to these pollutants were exceeded during 2017.

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 AQMAs for NO₂ and PM₁₀ located within the Fife Council boundary, these are:

- Bonnygate, Cupar, declared in October 2008.
- Appin Crescent, Dunfermline, declared in November 2011 for NO₂ and August 2012 for PM₁₀.

The AQAP for the Bonnygate, Cupar AQMA was last updated in 2015 and has been successful in reducing both NO₂ and PM₁₀ concentrations within the Bonnygate area. During 2017 all annual mean concentrations were below the objective level of 40 µg m⁻³ for NO₂ and 18 µg m⁻³ for PM₁₀.

The AQAP for Appin Crescent, Dunfermline was last updated in 2015. The AQAP aims to reduce NO₂ and PM₁₀ concentrations within Appin Crescent. Initially an AQMA was declared in November 2011 for NO₂ only, however this was amended in August 2012 to include PM₁₀. During 2017 all annual mean concentrations were below the objective level of 40 µg m⁻³ for NO₂ and 18 µg m⁻³ for PM₁₀.

The Air Quality Strategy (AQS) for Fife 2015 – 2020 was developed from the guidance of the Scottish Government and aims not only to raise awareness of air quality issues but also to promote some of the existing best practice work that the Council has undertaken within existing AQMAs to other parts of Fife. It recognises that no one single authority or Council service can have all the solutions and consequently a collaborative approach with key partners and stakeholders is considered essential in order to bring about improvements in air quality. A Fife Air Quality Steering Group (Fife Council EPES, Assets, Transportation and Environment Services, Area Services, SEPA, NHS Fife and representatives of local communities) meets quarterly to ensure that the aims and objectives of Fife's Air Quality Strategy and Action Plans are being progressed. Progress in implementing the aims and objectives of Fife's air quality strategy has been acknowledged at the COSLA excellence awards in 2017 where Fife Council received a bronze award in the category of "Tackling Inequalities and Improving Health".

Fife Council has a duty to keep their action plans up to date (LAQM.PG(S) (16))¹. The obligation to keep air quality action plans up to date provides the opportunity for local authorities to periodically review the progress that has been made in implementing the air quality action plan, and assess the significance of improvements in air quality that have been observed since the adoption of the plan.

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

- Continue to monitor NO₂, PM₁₀ and PM_{2.5} concentrations throughout Fife.
- Produce an Annual Progress Report in 2019, reporting concentrations measured during 2018.
- Continue to implement the measures outlined in the action plans for Appin Crescent, Dunfermline and Bonnygate, Cupar.

Actions to Improve Air Quality

Measures outlined in the AQAPs for Bonnygate, Cupar and Appin Crescent, Dunfermline have been implemented throughout 2017. This includes the ongoing implementation of the Fife ECO Stars scheme which is a free, voluntary scheme that provides recognition, guidance and advice on operational best practice to operators of goods vehicles, buses and coaches, taxis and private hire vehicles. It is being rolled out in Fife to help fleet operators improve efficiency, reduce fuel consumption and reduce emissions - all helping to improve local air quality and at the same time, make cost savings. As of March 2018, there are 153 commercial fleet scheme members (6974 vehicles) and 25 taxi scheme members (132 vehicles). Notable achievements in 2017 include Fife Council being awarded a five-star operator rating from ECO Stars – the first council in Scotland to achieve such an honour. At the original grading, Fife Council achieved four stars. Since then, a number of initiatives have been put in place to increase the environmental credentials of the organisation which have resulted in this unprecedented rise to the full 5-star rating. Some of the changes include:

- A dedicated Fuel Champion – monitoring and reporting on fuel usage and spend.
- Extensive driver training and skills development.
- Replacement of older vehicles with efficient, cost-effective Euro6 diesel, electric or hydrogen engines.
- Support systems to inform drivers of potentially inefficient driving practices.



Three AQMesh units have been procured and installed in December 2017 to seek to further understand pollutant concentrations and trends in the Appin Crescent, Dunfermline AQMA (two x AQMesh units) and Bonnygate, Cupar AQMA (one x AQMesh unit). The two AQMesh units at Appin Crescent, Dunfermline are co-located with the Appin Crescent 5 and 6 diffusion tube sites (OS Grid Ref 309957

¹ [http://www.scottishairquality.co.uk/assets/documents/technical%20guidance/LAQM-PG\(S\)16-April-16.pdf](http://www.scottishairquality.co.uk/assets/documents/technical%20guidance/LAQM-PG(S)16-April-16.pdf)

687714 and 309904 687704 respectively) and the one AQMesh unit at Bonnygate Cupar is co-located with the Bonnygate B4 diffusion tube site (337467 714576). Analysis of the monitoring data from these units will be presented in the 2019 Annual Progress Report.

The Fife Regional Dispersion Model has also been updated to account for the latest emission factors. This also includes a GIS tracer study of the Fife Council fleet which, it is anticipated, will enable Fife Council to determine if fleet renewals of their own vehicles would yield tangible air quality benefits in their AQMAs and areas of concern (a useful piece of evidence for framing action plan interventions).

The Regional Dispersion Model uses the Ricardo modelling framework called RapidAir, which has been developed to provide graphical and numerical outputs which are comparable with other models used widely in the UK. The concentrations predicted from RapidAir were validated against roadside measurements made in Fife where emissions data was available. In addition, local validations were carried out for each of the main towns in Fife for NO₂ (Cupar, Dunfermline, Rosyth, Kirkcaldy and St Andrews) and the remaining tubes locations in combination.

The Cupar North Development Zone and Cupar Relief Road modelling assessment has been updated using the latest vehicle emission factors. The assessment provides an updated evidence base regarding how road traffic emissions from the phased rollout of the development may impact upon compliance with the Scottish air quality objectives in the Bonnygate Air Quality Management Area (AQMA) in future years. This aims to provide information that may aid the development of the Bonnygate AQMA air quality action plan; and how the air quality impact of the likely expansion of Cupar can be minimised within the AQMA.

Fife Council has also updated its air quality guidance note for developers to reflect latest policy and technical guidance and it is expected that this guidance note will facilitate dealing with planning applications with air quality issues. This guidance note is available at the dedicated Fife Council air quality web pages at www.fifedirect.org.uk/airquality

Local Priorities and Challenges

Fife Council has been awarded its grant funding from the Scottish Government for 2018 – 2019. The funding will be used to carry out the following air quality initiatives and studies, which aim to work towards the measures set out in the action plans for Cupar and Dunfermline:

Bonnygate Cupar:

Fife Council will continue to implement the measures set out in the Bonnygate AQAP during 2018. Fife Council's priorities within the designated AQMA over the forthcoming year include:

- Continue the implementation of Fife Council's travel plan including encouraging walking and cycling infrastructure and initiatives.
- Interrogation of monitoring data from the recently installed AQMesh unit in the Bonnygate to further understand pollutant concentrations and trends in the Bonnygate AQMA.
- Fife ECO Stars scheme will continue to operate and encourage and promote 'clean fleet operators'.

Appin Crescent, Dunfermline:

Fife Council will continue to implement the measures set out in the Appin Crescent AQAP during 2018. Fife Council's priorities within the designated AQMA over the forthcoming year include:

- Continue the implementation of Fife Council's travel plan including encouraging walking and cycling infrastructure and initiatives.
- Interrogation of monitoring data from the recently installed two AQMesh units in Appin Crescent to further understand pollutant concentrations and trends in the Appin Crescent AQMA.

-
- Fife ECO Stars scheme will continue to operate and encourage and promote 'clean fleet operators'.

How to Get Involved

Members of the public can find information related to air quality on the Fife Council website. Actions that members of the public can take to help reduce air pollution include:

- Car sharing
- Reducing car journeys, choose to walk, cycle or take the bus.
- Maintain and look after your vehicle properly.

Further information is available at the dedicated Fife Council air quality web pages at www.fifedirect.org.uk/airquality

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1 Local Air Quality Management

This report provides an overview of air quality in Fife during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by Fife Council to improve air quality and any progress that has been made. Table 1.1 summarises the Air Quality Objectives applicable to Scotland.

Table 1.1 Summary of Air Quality Objectives in Scotland

AQ Objective-Pollutant	Concentration	Measured as	Date to be achieved by
Nitrogen Dioxide (NO ₂)	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)	50 µg m ⁻³ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg m ⁻³	Annual mean	31.12.2010
Particulate Matter (PM _{2.5})	10 µg m ⁻³	Annual mean	31.12.2020
Sulphur Dioxide (SO ₂)	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
Benzene	3.25 µg m ⁻³	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg m ⁻³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg m ⁻³	Running 8-Hour mean	31.12.2003
Lead	0.25 µg m ⁻³	Annual Mean	31.12.2008

1.1 Summary of Previous Review and Assessment

1.1.1 Previous Review and Assessment Reports

As part of the Local Air Quality Regime, the following reports have been submitted by Fife Council:

Progress Report (2008)²
Detailed Assessment (2009) Appin Crescent, Dunfermline ³
Detailed Assessment (2009) Admiralty Road, Rosyth ⁴
Further Assessment (2010) Bonnygate, Cupar ⁵
Progress Report (2010) ⁶
2nd Detailed Assessment (2011) Appin Crescent, Dunfermline ⁷
Progress Report (2011)⁸
Further Assessment (2012) Appin Crescent Dunfermline⁹
Updating and Screening Assessment (2012)¹⁰
2nd Detailed Assessment for Admiralty Road, Rosyth, Fife (2012)¹¹
Detailed Assessment for St Clair Street, Kirkcaldy, Fife (2012)¹²
Fife Council, Bonnygate Air Quality Action Plan ¹³
Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline¹⁴
Progress Report (2013)¹⁵
Appin Crescent Traffic Management Options Appraisal: Scenario Modelling (Phase 2) ¹⁶
Cupar Streetscene Air Quality Modelling Assessment¹⁷
Progress Report (2014)¹⁸
Cupar North Development Zone and Relief Road: Air quality modelling assessment¹⁹
Appin Crescent Traffic Management Options Appraisal (Phase 3) AQ Impact Assessment²⁰
Fife Council Appin Crescent Updated Air Quality Action Plan (AQAP) 2015²¹

² Air Quality Review and Assessment Progress Report for Fife Council 2007/8. AEAT/ENV/R/2597 March 2008

³ Air Quality Detailed Assessment for Fife Council 2008: Appin Crescent, Dunfermline. AEAT/ENV/R/2705, January 2009

⁴ Air Quality Detailed Assessment for Fife Council 2008: Admiralty Road, Rosyth, AEAT/ENV/R/2761, April 2009

⁵ Air Quality Review and Assessment, Further Assessment, Bonnygate, Cupar 2010

⁶ 2010 Air Quality Progress Report for Fife Council, AEAT/ENV/R/2977, July 2010

⁷ Detailed Assessment of Air Quality: Appin Crescent, Dunfermline, AEA/ENV/R/3096 Issue 3, January 2011

⁸ Air Quality Review and Assessment Progress Report for Fife Council 2011. AEA/ENV/R/3179 Issue 2. May 2011

⁹ Air Quality Further Assessment (2012) Appin Crescent Dunfermline, AEA/R/ED56439. Issue 1, March 2012

¹⁰ 2012 Air Quality Updating and Screening Assessment for Fife Council, AEAT/ENV/R/3293, July 2012

¹¹ Air Quality Detailed Assessment for Admiralty Road, Rosyth, Fife, AEAT/ENV/R/3321, September 2012

¹² Detailed Assessment of Air Quality 2011 Saint Clair Street, Kirkcaldy, Fife, AEA/ENV/R/3332

¹³ Fife Council, Bonnygate Air Quality Action Plan, 2010, AEAT/ENV/R/ED05550006

¹⁴ Fife Council: Air Quality Action Plan for Appin Crescent, Dunfermline, Fife, ED56439- Issue Number 1

¹⁵ Air Quality Review and Assessment Progress Report for Fife Council 2011, Ricardo-AEA/R/3367/, Issue 2, July 2013

¹⁶ The Appin Crescent Traffic Management Options Appraisal: Scenario modelling assessment (Phase 2), Ricardo-AEA/R/ED56439013, Issue 3, Jan 2014

¹⁷ Cupar Streetscene Air quality modelling assessment, Ricardo-AEA/R/ED56439014, Issue 3, March 2014

¹⁸ Air Quality Review and Assessment Progress Report for Fife Council 2014, Ricardo-AEA/ENV/PR2014, May 2014

¹⁹ Cupar North Development Zone and Relief Road: Air Quality Modelling Assessment, Ricardo-AEA/R/ED56439015 Issue Number 2, February 2015

²⁰ Appin Crescent Traffic Management Options Appraisal (Phase 3) Air Quality Impact Assessment, ED56439019- Issue Number 1, February 2015

²¹ Fife Council Appin Crescent Updated AQAP, 2015, ED56439, Version 3, April 2015

Fife Council Bonnygate Updated Air Quality Action Plan (AQAP) 2015²²
Fife Council Air Quality USA Report 2015²³
Fife Council Annual Progress Report 2016²⁴
Cupar North Development Zone and Relief Road: Updated air quality impact assessment 2017²⁵
Dunfermline Northern Link Road: Updated air quality assessment²⁶
Fife Council Annual Progress Report 2017²⁷
Cupar North Development Zone and Relief Road: Updated air quality impact assessment 2018²⁸

Monitoring data for 2006 and 2007 (automatic and diffusion tubes) indicated that it was likely the NO₂ and PM₁₀ Air Quality Objectives would not be met in Bonnygate, Cupar. The 2007 Progress Report concluded that a Detailed Assessment should be carried out at this location. Additionally, the 2008 Progress Report concluded that a Detailed Assessment should be carried out for Appin Crescent, Dunfermline (NO₂) and Admiralty Road, Rosyth (PM₁₀).

The Detailed Assessment (2007/2008) for Bonnygate, Cupar considered NO₂ and PM₁₀. The report concluded that an AQMA should be declared for both NO₂ and PM₁₀. The Detailed Assessment (2008) for Appin Crescent, Dunfermline advised that increased monitoring of NO₂ should be carried out to enable improved characterisation of ambient NO₂ concentrations before any further decisions were made. The Detailed Assessment (2009) for Admiralty Road, Rosyth considered PM₁₀ 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 2.1). 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 Section 2.2.

The 2010 Progress Report concluded that for NO₂ and PM₁₀ monitoring, no further action was required over and above that already in progress by Fife Council. It was concluded that if NO₂ concentrations within the Appin Crescent area exceed the annual mean objective when 12 months of 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 NO₂ 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 NO₂ concentrations measured at Appin Crescent the Detailed Assessment recommended that automatic measurement of PM₁₀ should be carried out.

The 2011 Progress Report concluded that monitoring of NO₂ 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, NO₂ and PM₁₀ concentrations have increased since 2009 at Admiralty Road. Fife Council concluded that to further investigate NO₂ concentrations, diffusion tube monitoring should be increased incorporating more locations of relevant exposure to the general public. If measured concentrations of NO₂ exceed the annual mean objective after 12 months 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, Rosyth.

²² Fife Council Bonnygate Updated AQAP, 2015, ED56439, Version 2, April 2015

²³ Fife Council Air Quality USA Report, 2015, ED60521- Version 3, Issue 2, August 2015

²⁴ Fife Council Air Quality Annual Progress Report, ED60521-Version 5- June 2016

²⁵ Cupar North Development Zone and Relief Road: Updated air quality impact assessment, Ricardo-AEA, ED60521013 Issue Number 2, March 2017

²⁶ Dunfermline Northern Link Road: Updated air quality assessment, Ricardo-AEA, ED60521012, Issue 2, March 2017

²⁷ Fife Council Air Quality Annual Progress Report, ED10032-Issue 5- October 2017

²⁸ Cupar North Development Zone and Relief Road: Updated air quality impact assessment, Ricardo Energy & Environment, ED10032 Issue Number 1, April 2018

Local bias adjusted diffusion tube data at 3 locations within Fife exceeded the NO₂ annual mean objective of 40 µg m⁻³ in 2010. These locations were: Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy.

For 2010, all diffusion tubes sites (2, 3, 5 and 6) within Appin Crescent that exceeded 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 supported the conclusion made in the 2011 Detailed Assessment for Appin Crescent. It was 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 2.2 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 with a borderline concentration of 41 µg m⁻³. Data showed that NO₂ 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 NO₂ and PM₁₀ 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 NO₂ and PM₁₀) at St Clair Street to further investigate concentrations in this area, which commenced in February 2011.

PM₁₀ data collected for 2010 showed that both the Bonnygate and Admiralty Road sites exceeded the annual mean objective with concentrations of 19 µg m⁻³. Bonnygate, Cupar has been declared an AQMA for PM₁₀ since 2008 and an Action Plan has been adopted since 2010. Figure 2.1 shows the AQMA boundary encompassing Cupar Town Centre.

The Cupar 2011 monitoring data indicated an overall downward trend in NO₂ concentrations since the introduction of the traffic queue relocation system in the Bonnygate. PM₁₀ concentrations had also decreased relative to 2007 PM₁₀ levels and the exceedance was marginal.

The 2013 Progress Report concluded that Fife Council should maintain its current monitoring programme and confirmed that Fife Council was 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 NO₂ and PM₁₀ 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 NO₂ and PM₁₀ at locations of relevant exposure. Whilst outcomes of dispersion modelling of the proposed Appin Crescent bypass option reveal that this may reduce concentrations of NO₂ and PM₁₀ 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 Appin Crescent.

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 NO₂ and PM₁₀ 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 NO₂ and PM₁₀ 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 were implemented in 2014.

The 2014 Progress Report concluded that Fife Council should maintain its current monitoring programme and there was no requirement to declare any new AQMAs. It also identified the successful reduction of both NO₂ and PM₁₀ concentrations below the objectives within the Bonnygate AQMA. It concluded that the reductions were principally a result of traffic signalling and road layout improvements.

The Cupar North Development Zone and Relief Road: Air Quality Modelling Assessment 2015 aimed to quantify the potential air quality impact within the Bonnygate AQMA of future traffic associated with the Cupar North development zone. Future air quality impacts were assessed assuming that completion of different zones of the development are phased over time up to 2030, and that completion of the relief road may not occur until all of the residential and commercial developments are completed in 2030. This approach was used as projected vehicle pollutant emission rates and background concentrations are available until 2030 only. The report concluded that the results for each approach are very similar and indicate that there will be no exceedances of the NO₂ annual mean objective at the receptor locations in any of the future years assessed. However, when emissions from the additional traffic from the development rollout phases are included the results indicate that exceedances of the 18 µg m⁻³ Scottish PM₁₀ annual mean objective will occur at the same receptor locations where exceedances are predicted for the future baseline years. These receptor locations are at 1st floor height within the Bonnygate. When compared with the future 2030 baseline, small improvements in NO₂ and PM₁₀ concentrations are predicted with the completed development and the relief road in place in 2030. The report also recommends that when considering the cumulative impact of the development without the relief road in place, that air quality and potential mitigation measures to counteract the impact of the additional development traffic are considered in the planning process.

Appin Crescent Traffic Management Options Appraisal (Phase 3) Air Quality Impact Assessment (2015) investigated the potential impact of traffic management scenarios which aim to improve traffic flow through Appin Crescent and hence reduce vehicle emissions and improve local air quality. Using modelling software and monitoring data, the report explains the predicted outcomes of these scenarios in Appin Crescent, Dunfermline. The report concluded that Test Option 1 (Optimisation of Holyrood Place / Appin Crescent signals (also linked to Sinclair Gardens roundabout)) does not appear to provide any air quality benefits and may lead to an increase in annual mean NO₂ concentrations. Test Option 2 (Reconfigure Appin Crescent / Garvock Hill mini roundabout to signalised junction (right turn storage allowed but runs opposed)) and test option 3 (Removal of bus stops on Appin Crescent) will provide improvements in both NO₂ and PM₁₀ concentrations but neither of these options offer the opportunity to reduce concentrations of NO₂ and PM₁₀ on Appin Crescent to below the respective air quality objectives. Test Option 3 investigated the removal of the bus stops on Appin Crescent. The report suggests that a cost-benefit analysis of this option may be beneficial as it could be relatively inexpensive to implement and will provide improvements in NO₂ and PM₁₀ concentrations.

1.1.2 2016 Annual Progress Report

The 2016 Annual Progress Report (APR) utilised monitoring data collected throughout 2015. Fife Council carried out monitoring of NO₂ at four automatic stations in Cupar, Kirkcaldy, Dunfermline and Rosyth. Non-automatic monitoring of NO₂ was carried out using diffusion tubes at 48 sites in 2015. The concentrations measured in 2015, following bias adjustment, were compared against the Air Quality Strategy (AQS) annual mean objective of 40 µg m⁻³ for NO₂. Exceedances of the Annual mean objective were evident at the following sites:

- Appin Crescent (2), Dunfermline (40 µg m⁻³)
- Appin Crescent (6), (A), (B), (C), Dunfermline (43 µg m⁻³)

The marginal exceedances measured were within the current Appin Crescent, Dunfermline Air Quality Management Area (AQMA). The Air Quality Action Plan (AQAP) for Appin Crescent presents actions that will be implemented to address these exceedances.

The 2016 APR concluded there were no exceedances measured in the Cupar AQMA during 2016, indicating that the measures successfully implemented from the AQAP have had a positive effect.

1.1.3 2017 Annual Progress Report

The 2017 APR considered the available monitoring data measured during 2016. During 2016 Fife Council carried out monitoring of NO₂ at four automatic stations. Non-automatic, diffusion tube monitoring was undertaken at 59 locations within Fife. There were no exceedances of the AQS annual mean objectives from automatic monitoring locations. The new diffusion monitoring data highlighted exceedances of the AQS annual mean objective at two diffusion tube locations at:

- Bonnygate B4, Cupar (41 µg m⁻³)
- City Road 6, St Andrews (42 µg m⁻³)

The marginal exceedance measured within St Andrews is the result of new monitoring deployed within the town centre which commenced in 2016. This monitoring location was however some distance from the kerbside (just over 2m) and the nearest receptor. In accordance with TG.16, the result was therefore corrected for NO₂ drop off using the LAQM NO₂ fall off with distance calculator. This resulted in an annual mean concentration of 33 µg m⁻³ at the nearest receptor which is below the objective.

PM₁₀ and PM_{2.5} concentrations were measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2016 concentrations were below the PM₁₀ and PM_{2.5} annual mean objectives with no exceedances of the annual mean or daily mean objective at all sites.

The review of all available data relating to carbon monoxide (CO), sulphur dioxide (SO₂) and benzene monitoring during 2016 indicated that it is unlikely that any AQS objectives relating to these pollutants were exceeded during 2016. The review of all other local developments did not identify any locations where there may be a risk of the air quality objectives being exceeded and so no additional air quality assessment was recommended at this time. A review of industrial sources reported that Longannet Power Station ceased operation in March 2016.

1.1.4 Cupar North Development Zone and Relief Road: Updated Air Quality Assessment 2017

Fife Council commissioned Ricardo Energy & Environment to conduct an updated air quality modelling assessment using the latest available information on the development and vehicle emissions. An air quality assessment of the estimated future baseline air quality was undertaken. The baseline was then used to predict the impact of additional road traffic generated by the proposed Cupar North development and associated relief road.

Trip generation and distribution data from the transport assessment for the development was used to estimate future vehicle emissions and pollutant concentrations within the Bonnygate AQMA. Two future 'with development' traffic scenarios were assessed by comparison with future baseline conditions for both annual mean NO₂ and PM₁₀ concentrations.

Phase 1 2024 scenario results

The Phase 1 scenario modelled emissions from additional vehicles generated by the Cupar North development in 2024, just prior to the relief road becoming operational. No exceedances of the 40 µg m⁻³ NO₂ annual mean objective are predicted in 2024 using either of the emissions calculation methods. The maximum impact is classified as '**moderate**' and was predicted using emissions calculated with the CURED V2A²⁹ emission model. The predicted NO₂ annual mean at this location was 34.8 µg m⁻³, which is less than the 40 µg m⁻³ objective. The model results therefore indicated that the annual mean NO₂ concentrations are not predicted to be in excess of the annual mean objective in the Bonnygate AQMA in the future scenarios modelled.

Exceedances of the 18 µg m⁻³ Scottish objective were predicted in 2024 at three 1st floor height receptors where relevant human exposure may be present and at two ground level locations. The increase in annual mean PM₁₀ concentrations attributable to development traffic are classified as '**substantial**' at

²⁹ Air Quality Consultants (2016) Deriving Background Concentrations of NO_x and NO₂ for Use with 'CURED V2A' – August 2016

two of these receptors and 'moderate' at three. The points of maximum impact are located on the southern side of the narrow sections of the Bonnygate street canyon.

The model results indicated that additional emissions from vehicle trips generated by the Cupar North development will contribute to what could be considered a significant increase in annual mean PM₁₀ concentrations within the Bonnygate AQMA in 2024 prior to the relief road becoming operational.

Completed development 2030 scenario results

The completed development scenario assumed that the entire Cupar North mixed use development and the relief road is operational by 2030. Although there will be significantly more traffic generated by the completed development at that time, examination of the trip distribution data in the transport assessment indicates that through traffic will be reduced in Cupar town centre as a result of traffic using the relief road.

No exceedances of the 40 µg m⁻³ NO₂ annual mean objective are predicted in 2030. When using both methods of calculating future year NO_x emissions, the predicted impact of the completed development in 2030 is classified as either beneficial or negligible at all receptors.

Exceedances of the 18 µg m⁻³ Scottish PM₁₀ annual mean objective are predicted at the 1st floor height receptor Bonnygate 9 and at the diffusion tube Bonnygate B4 location. PM₁₀ concentrations either reduce or stay constant for the 'with full development' scenario in 2030. As expected, the model results indicated that the relief road is likely to have a beneficial effect on PM₁₀ concentrations within the Bonnygate AQMA.

The Fife Council AQ Steering Group is already considering the contents of this report in assisting in future strategic deliberations relating to the Cupar North Development Zone and Relief Road. This has included a submission to the Scottish Government for an AQMesh monitor to be installed on the Southern side of the narrow section of Bonnygate canyon for the purposes of monitoring PM₁₀ and PM_{2.5} as an automatic monitoring station and cabinet cannot be installed at the narrowest section of the street canyon due to access and health and safety reasons. The outputs of this monitoring are intended to further inform future modelling studies of the Cupar North Development Zone and associated Relief Road.

1.1.5 Dunfermline Northern Link Road Updated: Air Quality Assessment 2017

Fife Council commissioned Ricardo Energy & Environment to update the Dunfermline Northern Link Road Modelling study. A number of zones within Dunfermline have been allocated for residential and other urban land use developments. The additional vehicle trips generated by these developments are likely to have an impact on road traffic emissions within the Appin Crescent AQMA.

A measure that will likely help reduce traffic numbers and hence vehicle emissions in Appin Crescent is the construction of the proposed Northern Link Road which would initially link Pilmuir Street and Whitefield Road in the area of Dunfermline to the North of Appin Crescent. Completion of the Northern Link Road would link Pilmuir Street with the main road network at the east of Dunfermline. This would provide an alternative route for traffic that would otherwise use the Halbeath corridor and Appin Crescent to travel in and out of Dunfermline from the east.

This updated air quality assessment presents results calculated using the latest published vehicle emission functions (COPERT5), and also uses recent advances in dispersion modelling techniques.

The 2011 Dunfermline Strategic Land Allocation (SLA) Transport Assessment concluded that for effective operation of the road network, and in addition to a number of other upgrades to the road infrastructure, the link road will likely be required at some point between 2021 and 2029 depending on the rollout of residential and commercial developments in the SLA area.

The assessment compares the 'Future 2029 baseline' air quality with the 'Full SLA development in 2029' and the 'Full SLA with candidate sites included in 2029'. The scenario which includes the candidate sites assumes that the whole extent of the Northern Link Road is operational in 2029 whereas

the 'Full SLA Development Scenario' assumes that only the section of Northern Link Road between Pilmuir Street and Whitefield Road will be operational.

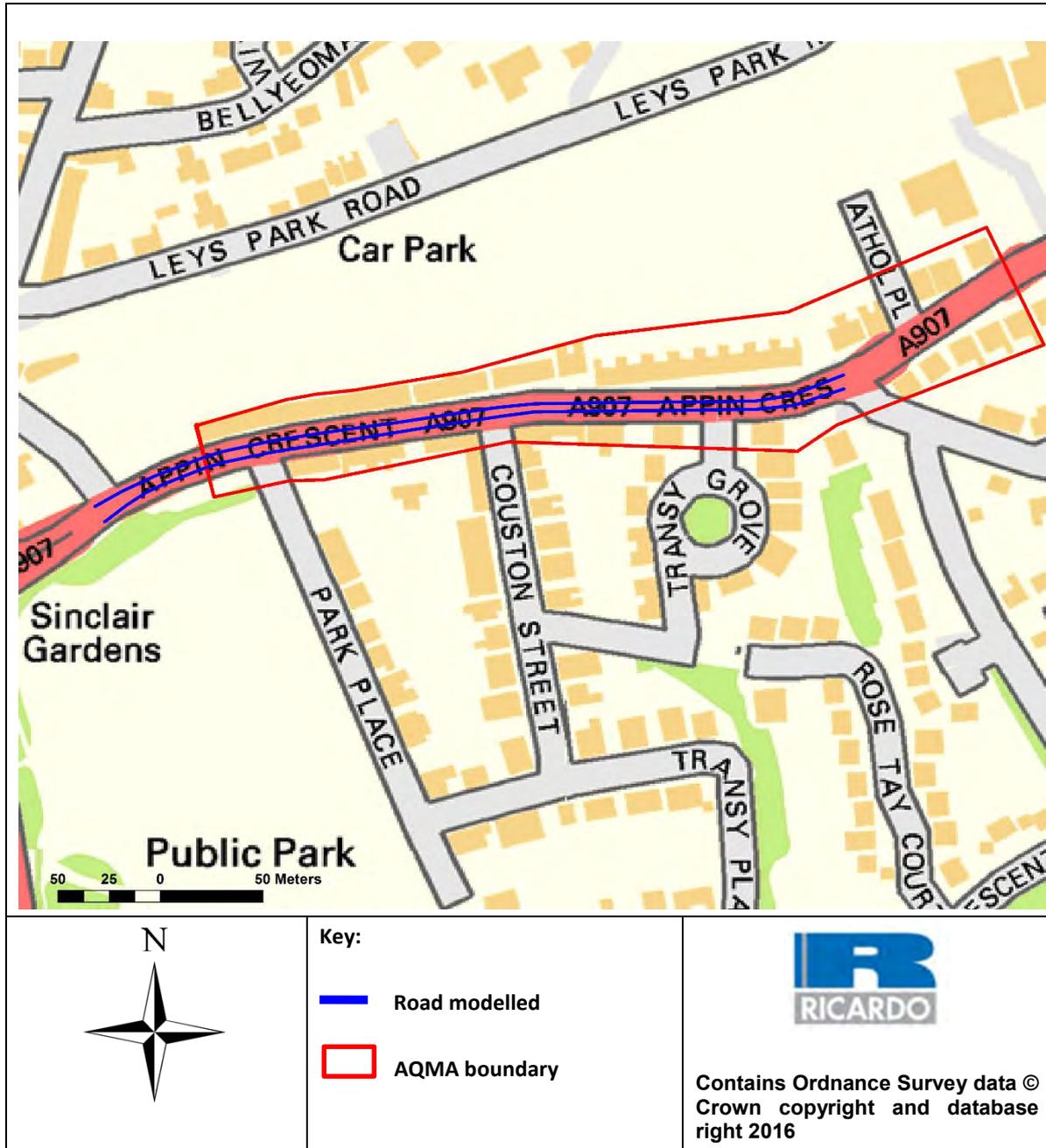
Comparison of the predicted pollutant concentrations for each scenario modelled indicate that:

- The NO₂ annual mean objective is not expected to be exceeded in 2029 for any of the scenarios modelled when using either the COPERT5 vehicle emission rates or the CURED V2A emissions calculator.
- NO₂ annual mean concentrations calculated using the COPERT5 vehicle emission rates are higher than those calculated using the CURED V2A method. At the receptors where the highest NO₂ concentrations are predicted in 2029, vehicle NO_x emissions calculated using COPERT5 produce annual mean concentrations up to 22% greater than when using CURED V2A.
- Annual mean PM₁₀ concentrations are predicted to be in excess of the 18 µg m⁻³ Scottish objective in 2029 at a number of receptor locations where relevant exposure is present.
- Slightly lower NO₂ and PM₁₀ annual mean concentrations are predicted for the 'Full SLA with candidate sites included in 2029' scenario; this is due to lower projected daily traffic flows as the Northern Link Road being fully operational was assumed in the traffic modelling for this test option. Even though additional traffic will be generated by the candidate sites, the completed Northern Link Road will provide an alternative route to Appin Crescent and the Halbeath corridor.

The model results, although based on fairly uncertain estimates of future traffic growth, indicate that the NO₂ annual mean objective may be achieved at Appin Crescent in 2020 or 2021. A map showing the extent of the study area is presented below in Figure 1.1. It should be noted that slight changes to the proposed route of the Northern Link route could occur prior to the delivery of the road, and changes will be reflected within future reports.

Given the above uncertainties in the modelling study, Fife Council has applied for Scottish Government Air Quality Grant funding for 2017-18 to include the introduction of two AQMesh monitoring pods for PM₁₀ and PM_{2.5} at the South side of Appin Crescent. This recent development in monitoring technology allows for monitoring at the South side of Appin Crescent as the narrow width of pavement at the South side does not allow for the installation of automatic continuous monitoring equipment and associated cabinet at this location.

Figure 1.1 Northern Link Road Modelling Study Area



1.1.6 Cupar North Development Zone and Relief Road: Updated Air Quality Assessment 2018

Ricardo Energy & Environment were commissioned by Fife Council to update the Cupar North Development Zone air quality impact assessment using updated NO_x and particulate vehicle emission factors. Since the 2017 report was prepared, updated (COPERT5) vehicle NO_x emission functions have been published. Ricardo Energy & Environment has also developed our own in-house emission calculator which uses a more detailed approach to calculating non-exhaust particulate emissions from vehicles than used in the previous assessments.

The assessment provided an updated evidence base regarding how road traffic emissions from the phased rollout of the development may impact upon compliance with the Scottish air quality objectives in the Bonnygate Air Quality Management Area (AQMA) in future years. This aims to provide information that may aid the development of the Bonnygate AQMA air quality action plan; and how the air quality impact of the likely expansion of Cupar can be minimised within the AQMA.

Trip generation and distribution data from the transport assessment for the development has been used to estimate future vehicle emissions and pollutant concentrations within the Bonnygate AQMA.

Two future 'with development' traffic scenarios have been assessed by comparison with future baseline conditions for both annual mean NO₂ and PM₁₀ concentrations:

- Phase 1 2024 when 600 residential units are in use just prior to opening of the relief road.
- Completed development 2030 when all residential and mixed used aspects of development are complete and the Cupar Relief road is operational.

Two methods of calculating NO_x emissions were used in the assessment. We have modelled using both the latest COPERT5 NO_x emission rates; and also using the light duty vehicle NO_x emissions rates adjusted using the latest CURED V3A method published by Air Quality Consultants™ (AQC) for predicting the current and future impact of road traffic emissions. When compared with the vehicle emission factors currently published by Defra, the AQC method provides a more precautionary approach to estimating NO_x emissions from light diesel vehicles in future years beyond 2020. This aims to provide a range of outcomes for each scenario assessed.

All annual mean PM₁₀ concentrations have been modelled using vehicle emission rates calculated using the COPERT5 emissions model for tailpipe emissions, and the EMEP tier 2 method of calculating the non-exhaust emissions - break wear, tyre wear and road abrasion. This method of calculating non-exhaust particulate emissions differs from Defra's standard emission factor toolkit in that the emission factors vary with speed. As exhaust PM emissions have reduced, the non-exhaust fraction of PM has increased in importance in explaining ambient concentrations of PM₁₀. Both in current and future years the non-exhaust fraction is the largest overall component and hence will not reduce by much over time, even when vehicles are significantly cleaner in terms of their NO_x emissions. This explains what could be perceived as a lack of sensitivity in the model predictions of PM₁₀ to modernisation of the road fleet. Hence it is possible (or even likely) that Local Authorities in Scotland will still note exceedances of the annual mean PM₁₀ standard due to the influence of non-exhaust PM emissions from road vehicles.

Phase 1 2024 scenario results

The Phase 1 scenario modelled emissions from additional vehicles generated by the Cupar North development in 2024, just prior to the relief road becoming operational. No exceedances of the 40 µg m⁻³ NO₂ annual mean objective are predicted in 2024 using either of the emissions calculation methods. The maximum impact is classified as '**slight**' and was predicted using emissions calculated with the CURED V3A emission model, the predicted NO₂ annual mean at this location was 30 µg m⁻³.

The model results therefore indicate that even when using what is currently considered a conservative approach to calculating NO_x emissions from vehicles in future years, annual mean NO₂ concentrations are not predicted to be in excess of the annual mean objective in the Bonnygate AQMA.

Exceedances of the 18 µg m⁻³ Scottish PM₁₀ annual mean objective are predicted in 2024 at three 1st floor height receptors where relevant human exposure may be present and at two ground level locations. The increase in annual mean PM₁₀ concentrations attributable to development traffic are

classified as **'substantial'** at five receptors locations and **'moderate'** at another two. The points of maximum impact are located on the southern side of the narrow sections of the Bonnygate street canyon.

The model results indicate that additional emissions from vehicle trips generated by the Cupar North development will contribute to what could be considered a significant increase in annual mean PM₁₀ concentrations within the Bonnygate AQMA in 2024, prior to the relief road becoming operational.

Completed development 2030 scenario results

The completed development scenario assumes that the entire Cupar North mixed use development and the relief road is operational by 2030. Although there will be significantly more traffic generated by the completed development at that time, examination of the trip distribution data in the transport assessment indicates that through traffic will be reduced in Cupar town centre as a result of traffic using the relief road.

No exceedances of the 40 µg m⁻³ NO₂ annual mean objective are predicted in 2030. When using both methods of calculating future year NO_x emissions, the predicted impact of the completed development in 2030 is classified as either beneficial or negligible at all receptors.

Exceedances of the 18 µg m⁻³ Scottish PM₁₀ annual mean objective are predicted at the 1st floor height receptors Bonnygate 7, 8 and 9 and at ground level diffusion tube locations Bonnygate 3 and Bonnygate B4. PM₁₀ concentrations either reduce or stay constant for the 'with full development' scenario in 2030. The model results indicate that the relief road will have a beneficial effect on PM₁₀ concentrations within the Bonnygate AQMA; the reduction will not however be sufficient to achieve compliance with the 18 µg m⁻³ Scottish PM₁₀ annual mean objective.

1.1.7 Bright Green Hydrogen / Levenmouth Community Energy Project

Hydrogen and fuel cell (HFC) technologies can provide services throughout Scotland's energy system and is becoming widely recognised as a key catalyst to decarbonising Scotland's energy production and use, with an emphasis on an integrated approach to **transport** as well as heat and power.

There are a number of reasons why Hydrogen and fuel cell (HFC) technologies will be a key component of the future transport fuel mix:

- **Air quality** - Hydrogen produces no air pollution when used in a fuel cell and can have very low emissions in a combustion engine.
- **Low carbon today and zero carbon in future** – Hydrogen is a zero carbon emission fuel at the point of use.
- **No fundamental changes in vehicle operation** – once a nationwide hydrogen station network is established, there would be no operational compromise compared with the vehicles customers are driving today, as they have equivalent ranges and refuelling times to conventional vehicles and so fit into the operational patterns.
- **A viable option for larger heavy vehicles** – there are very few options for either zero or ultra-low emission driving for larger vehicles where the relatively low energy density of batteries is prohibitive.
- **Environmental benefits** - Hydrogen and fuel cell vehicles would ensure transport exhaust emissions no longer contribute to poor air quality in cities and regions.
- **Economic benefits** - The automotive sector is a mainstay of UK manufacturing, along with battery vehicle technologies, HFC technologies have the potential to create or protect 1,000s of jobs in automotive manufacturing.
- **Security of energy supply** – Hydrogen can be generated from a range of indigenous energy sources. By deriving the primary energy for a hydrogen system in the UK, imports of foreign energy products are avoided.

One of Scotland's leading forces behind making this a reality is Fife through its pioneering **Levenmouth Community Energy Project**, a collaborative initiative which is being led by Bright Green Hydrogen and supported by a number of partners including Fife Council and Toshiba.

Part of this involves Levenmouth becoming home to one of Europe's largest fleet of hydrogen dual-fuel vehicles (17 vehicles), seven of which will be operated by Fife Council. The fleet includes 10 electric-powered Renault Kangoo vans with H₂ fuel cell range extender which will be 100% zero emissions if charged using the Hydrogen Office's 100% green electric vehicle charging station. The project also includes five Ford Transit vehicles that are converted to run on a diesel and hydrogen mixture as well as 2 Refuse Collection Vehicles (RCVs), which are believed to be a world-first of their kind.

The hydrogen range extender doubles the range of an electric van, allowing it to travel up to 200 miles before charging is required. The vans are to be leased out under the Levenmouth scheme to local organisations, allowing them to improve their green credentials by operating a vehicle that runs on green energy.

Following completion of the project and commissioning of the vehicle fleet and both refuelling stations at Methil and Bankhead, the Bright Green Hydrogen assets at Methil (hydrogen production, refuelling and 10 Kangoo vehicles) went into a standstill period as a decision was taken to set up a Special Purpose Vehicle for the Methil operation. The business case for the proposed new Special Purpose Vehicle is currently being approved by the Scottish Government. Following approval and conclusion of the business case, the assets become operational again and supply between the Methil and Bankhead stations will commence.

Further information available at: <https://www.investinfife.co.uk/content/levenmouth-community-energy/>



Hydrogen re-fuelling Station



Methil Office and Site

1.1.8 Fife Regional Dispersion Model 2018

1.1.8.1 Background

Fife Council commissioned Ricardo Energy and Environment to prepare a regional scale dispersion model to model emissions from road transport. Concentrations of NO₂, PM₁₀ and PM_{2.5} were modelled for 2016 at 3 m resolution over the whole of the council district using a novel modelling framework developed by Ricardo.

1.1.8.2 Modelling framework and methodology

The Ricardo modelling framework (RapidAir) which has been developed to provide graphical and numerical outputs which are comparable with other models used widely in the UK. The model approach is based on loose-coupling of three elements:

- Road traffic emissions model conducted using fleet specific COPERT5 algorithms to prepare grams/kilometre/second emission rates of NO_x.
- AERMOD dispersion model for development of “kernels” at resolutions ranging from 1 m to 81 m.
- The kernel based RapidAir model running in python to prepare dispersion fields of concentration for further analysis with a set of decision support tools coded by us in Python.

The system is built around the USEPA’s public source AERMOD model, which provides the dispersion functions that are applied to emissions in a GIS based modelling platform. RapidAir estimates emissions of airborne pollutants from road traffic by taking into consideration the characteristics and conditions of the roads as well as the fleet composition using emission factors and speed functions from the UK Emissions Factors Toolkit (v7.0); this is based on the COPERT5 emissions model. The emissions estimates were scaled to reflect changes associated with road gradients following Defra’s Technical Guidance.³⁰

RapidAir also has a built-in street canyon model which identifies street canyon locations using the average building height and road width on a street. The concentration, as a result of recirculation of pollution within the canyon, is determined using the AEOLIUS model³¹ and this concentration is added to those concentrations modelled by RapidAir to account for street canyon effects.

1.1.8.3 Model outputs

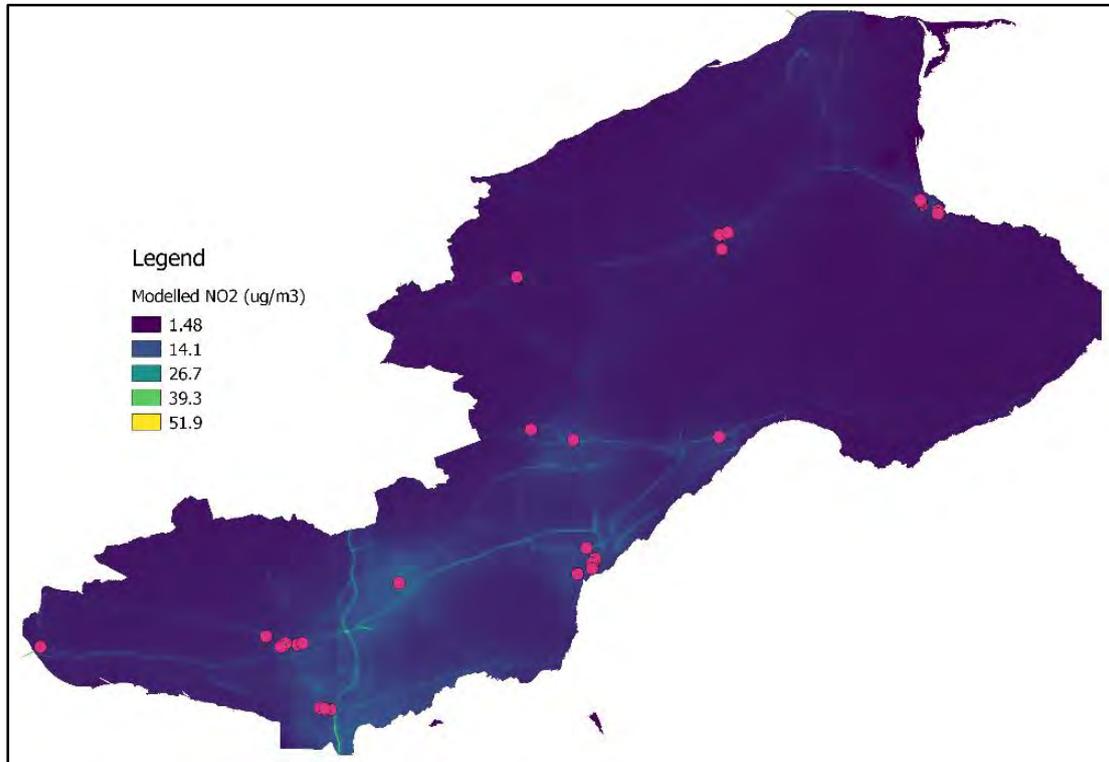
The concentrations predicted from RapidAir were validated against roadside measurements made in Fife where emissions data was available (n = 48 for NO₂, n = 4 for PM₁₀ and n = 3 for PM_{2.5}, where ‘n’ is the number of sites). In addition, local validations were carried out for each of the main towns in Fife

³⁰ Defra, “Local Air Quality Management Technical Guidance (TG16),” April 2016

³¹ Buckland, A.T., Middleton, D.R., 1999. Nomograms for calculating pollution within street canyons. Atmos. Environ. 33, 1017 - 1036

for NO₂ (Cupar, Dunfermline, Rosyth, Kirkcaldy and St Andrews) and the remaining tubes locations in combination.

Figure 1.2 RapidAir Modelled NO₂ Concentrations Fife (can reference to the Figure be provided within the text)



2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

A summary of AQMAs declared by Fife Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <http://www.scottishairquality.co.uk/laqm/aqma>. The boundaries of the AQMA's declared by Fife Council are shown in Figure 2.1 (Bonnygate, Cupar) and Figure 2.2 (Appin Crescent, Dunfermline).

A steering group including key representatives from relevant services of Fife Council was formed to develop the draft AQAPs 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 AQMAs. The steering group meet regularly to discuss the progress of the action plan measures outlined in the AQAP.

Figure 2.1 Bonnygate, Cupar AQMA Boundary

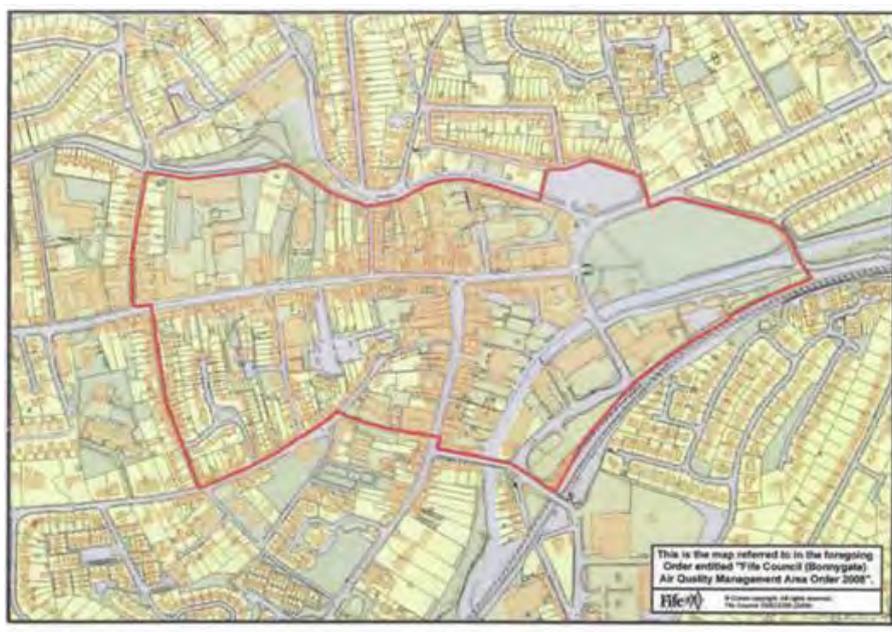
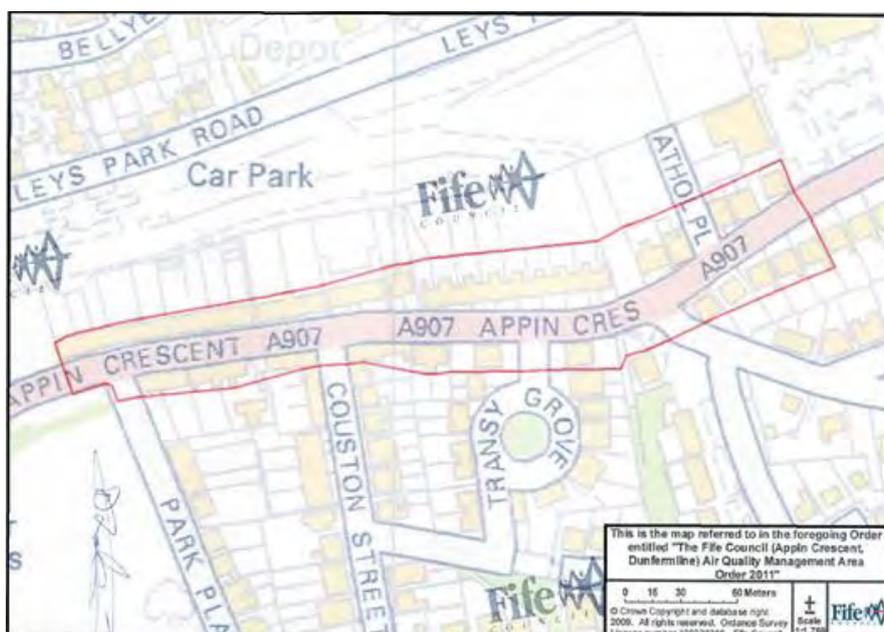


Figure 2.2 Appin Crescent, Dunfermline AQMA Boundary



2.1.1 Bonnygate, Cupar AQMA

The Bonnygate AQAP aims to work towards reducing transport emissions of NO_x and PM₁₀ in the AQMA by approximately 53% and 33% respectively; using a wide range of measures such as road and traffic signalling improvement combined with other measures, for example behaviour-change.

Fife Council has a statutory duty to review and update their Action Plans (LAQM.PG(16)). The Bonnygate, Cupar AQAP was reviewed and updated in 2015. The measures adopted in the latest AQAP and progress against them are outlined in Table 2.2.

NO₂ concentrations within Bonnygate Cupar remained consistent between 2013 and 2015, with a slight increase measured in 2016. Concentrations have decreased in 2017 at all tube locations within the Bonnygate AQMA. NO₂ concentrations at the automatic monitoring station remain well within the NO₂ annual mean objective. The initial drop in NO₂ concentrations between 2011 and 2012 are related to previous action plan measures implemented to alter the traffic signalling and pedestrian crossing within Bonnygate, Cupar. PM₁₀ concentrations have steadily declined between 2012 and 2017, with concentrations dropping below the AQS annual mean objective of 18 µg m⁻³. The automatic monitoring results for NO₂ and PM₁₀ are shown in Figure 2.3 and Figure 2.4 respectively.

Figure 2.3 NO₂ Automatic Monitoring Results 2012-2017-Bonnygate, Cupar

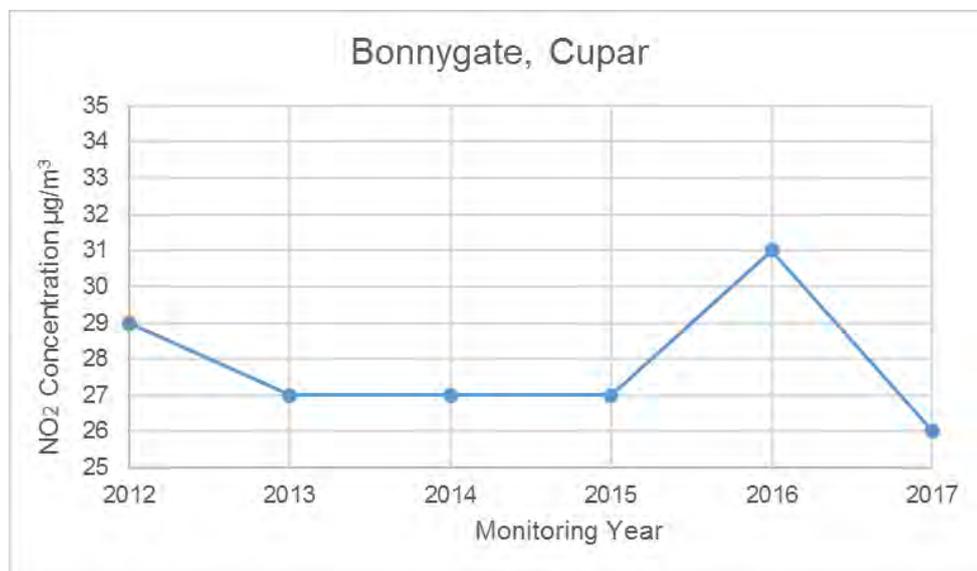
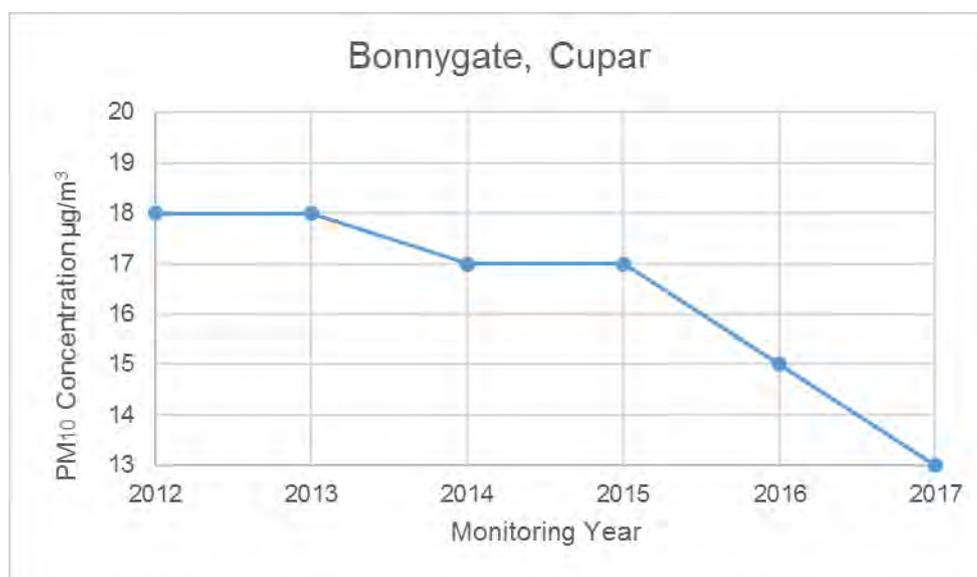


Figure 2.4 PM₁₀ Monitoring Results 2012-2017- Bonnygate, Cupar



2.1.2 Appin Crescent AQMA

The Appin Crescent AQAP aims to work towards reducing transport emissions of NO_x and PM₁₀ in the AQMA by approximately 18% and 40% respectively; and as with the Bonnygate AQAP will involve a combination of road layout and traffic signalling improvements combined with many other measures. As noted previously, Fife Council has a statutory duty to review and update their Action Plans. The Appin Crescent, Dunfermline AQAP was reviewed and updated in 2015. The measures adopted in the latest AQAP and progress against them are outlined in Table 2.3.

Over the past seven years NO₂ concentrations within Appin Crescent have decreased since 2011 as a result of the Action Plan measures being implemented. PM₁₀ concentrations remained consistent from 2011 to 2015, with annual mean concentrations ranging between 15 µg m⁻³ and 16 µg m⁻³. PM₁₀ concentrations have continued to decline since 2015, with an annual mean concentration of 10 µg m⁻³ in 2017. The automatic monitoring results for NO₂ and PM₁₀ are shown in Figure 2.5 and Figure 2.6 respectively.

Figure 2.5 NO₂ Automatic Monitoring Results 2012-2017- Appin Crescent, Dunfermline

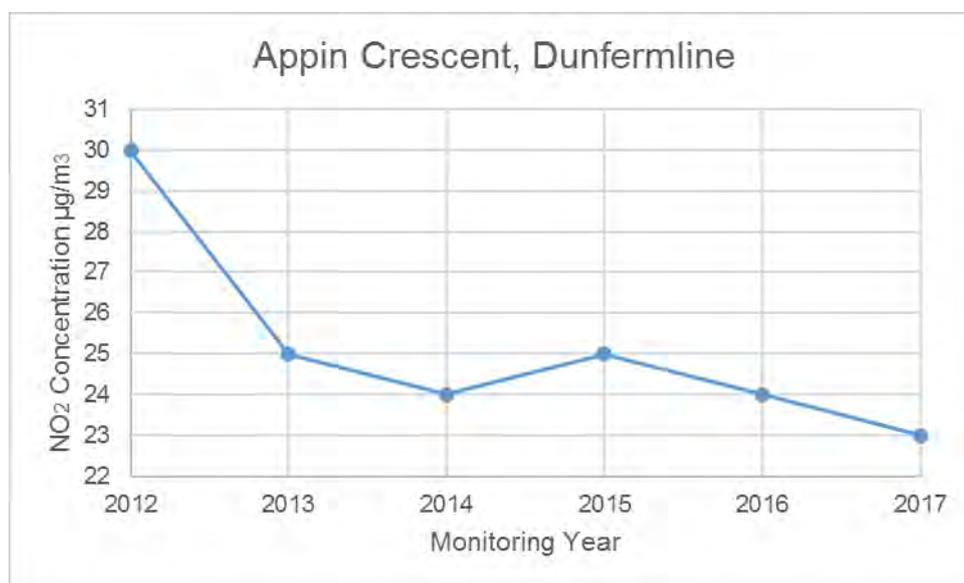


Figure 2.6 PM₁₀ Monitoring Results 2012-2017- Appin Crescent, Dunfermline

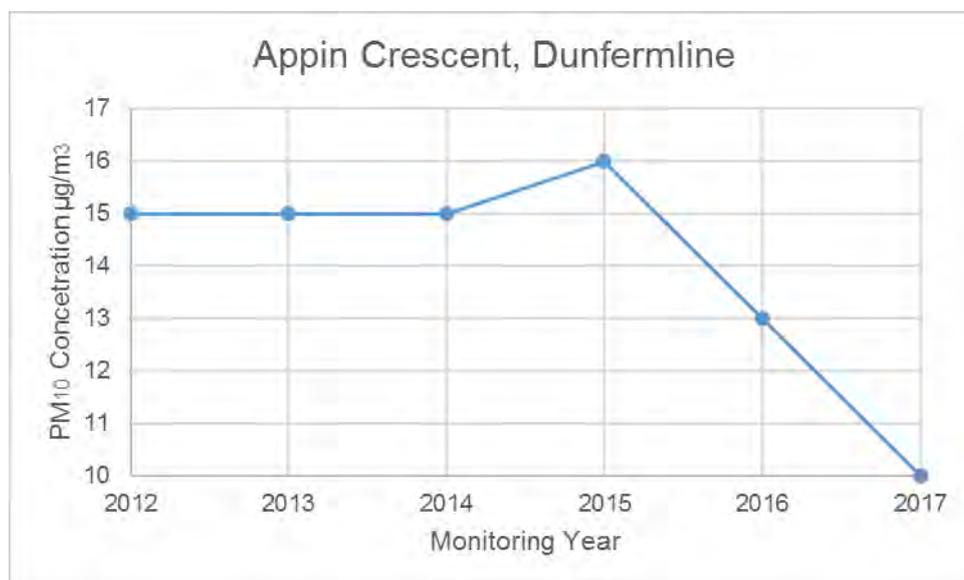


Table 2.1 Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City/Town	Description	Action Plan
Cupar, Bonnygate	NO ₂ annual mean PM ₁₀ annual mean	Cupar	An area comprising of Bonnygate (A91), Crossgate (A914) and St Catherine Street (A91). There are a number of residential properties within the area close to the road at 1 st floor height above commercial properties.	Bonnygate Cupar, AQAP can be accessed at: http://publications.fifedirect.org.uk/c64_FifeCouncilBonnygateAQAPUpdate20156.pdf
Appin Crescent, Dunfermline	NO ₂ annual mean PM ₁₀ annual mean	Dunfermline	An area comprising of Appin Crescent, Dunfermline. There are a number of residential properties within the area close to the road at both ground level and 1 st floor height.	Appin Crescent, AQAP can be accessed at: http://publications.fifedirect.org.uk/c64_FifeCouncilAppinCrescentAQAPUpdate20151.pdf

2.2 Progress and Impact of Action Plan Measures

In April 2015 a review and update of both the Appin Crescent and Bonnygate Air Quality Action Plans was completed by Fife Council. A brief summary of the additional measures incorporated into both action plans as a result of the AQAP review are provided in Table 2.2 and Table 2.3. Further details of the AQAP's and their progress are detailed in Table 2.6 and Table 2.7.

Table 2.2 New measures included within the Bonnygate Air Quality Action Plan (2015)

No.	Measure	Timescale
1	Fife ECO Stars	Short Term
2	Fife Council Air Quality Strategy 2015-2020	Short Term
3	Air Quality and Planning Toolkit	Short Term

Table 2.3 New measures included within the Appin Crescent Air Quality Action Plan (2015)

No.	Measure	Timescale
1	Fife ECO Stars	Short Term
2	Fife Council Air Quality Strategy 2015-2020	Short Term
3	Air Quality and Planning Toolkit	Short Term
4	Cost-Benefit-Analysis of options to improve air quality within Appin Crescent	Short Term
5	Proposed air dispersion modelling study of the potential Dunfermline Northern Link Road	Short Term

2.2.1 Fife ECO Stars Scheme

Fife's ECO Stars Fleet Recognition Scheme, providing free fuel efficiency advice to local fleet operators, has had another successful year. This builds on the foundations of the scheme, launched in October 2014, to increase the impact of good operational practice and cleaner vehicles to positively affect Fife's air quality. The scheme now has 157 member operators, each with regular vehicle movements in the Fife area, and covers more than 7000 vehicles.

ECO Stars is designed to provide ongoing advice to its members, not just a one-off assessment. A highlight of the last year has been the upgrade of Fife Council's own fleet to the maximum 5-star rating. This reflects excellent progress by the Council against earlier recommendations, with a number of positive actions being recorded. These include appointment of a dedicated Fuel Champion, extensive driver training and skills development; replacement of older vehicles with cleaner Euro 6 diesels, electric and hydrogen vehicles, as well as effective use of support systems to inform drivers of potentially inefficient driving practices.

Fife Council's parallel Taxi and Private Hire scheme has reached the milestone of its 25th member, Raith Taxis. This scheme carries a similar message of efficiency and cleaner vehicles, targeting taxi and private hire operators. An information session was held in Glenrothes in March 2018 to answer frequently asked questions on the use and suitability of electric vehicles in the taxi trade, in response to a significant level of interest during ECO Stars assessments. Some operators have added electric vehicles to their fleet as a result of ECO Stars recommendations, providing further evidence of the positive impact of the scheme. Further details and pictures from the January 2018 press release for the 25th member of Fife ECO Stars taxi scheme (Raith Taxis) are presented in Appendix E.

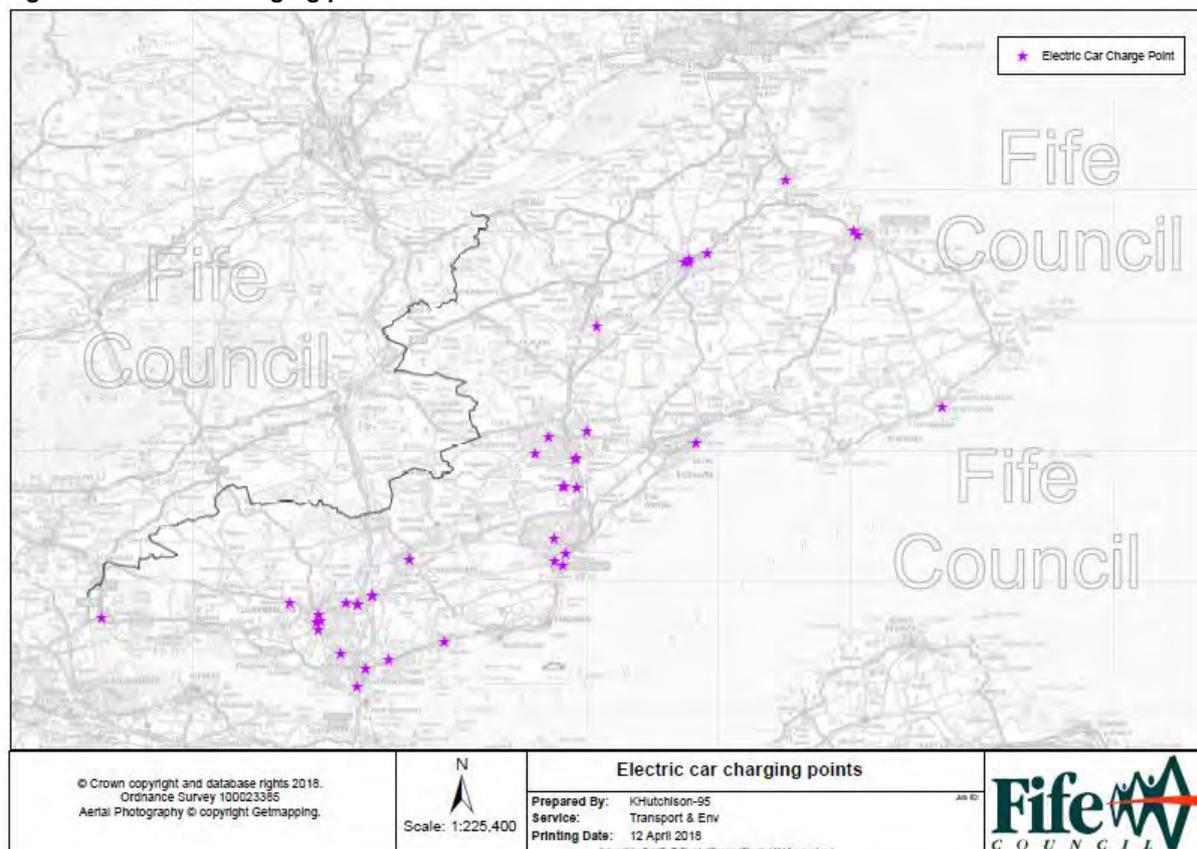


2.2.2 Electric Vehicles in Fife

Fife Council has made good progress towards increasing the number of electric vehicles and available charging points in Fife. This action has impacts on both the Bonnygate and Appin Crescent AQMAs and works towards reducing emissions from transport as detailed in the AQAP for each of the AQMAs. In 2017, the electric vehicle charge points had 141 charge point users in Cupar and 619 in Dunfermline. This was double the users in 2015 in Cupar and more than three times the users in Dunfermline since 2015. Across Fife as a whole there were 1223 users of electric charge points in 2017.

A map of the electric charging points installed throughout Fife is shown in Figure 2.7 below.

Figure 2.7 Electric charging points in Fife



2.2.3 Completed Measures

Fife Council has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.6 for Bonnygate, Cupar and Table 2.7 for Appin Crescent, Dunfermline. The tables summarise progress to date on each of the measures within the AQAP. More details on these measures can be found in the relevant AQAP and Fife Council's Air Quality Strategy 2015-2020.

Key completed measures include the installation of the traffic management system within Bonnygate, Cupar. The traffic management system included a new pedestrian crossing linked at St Catherine Street. The twin mini roundabout system has also been implemented at St Catherine Street/East Bridge to ease the flow of traffic through Cupar, reducing congestion.

Within the Appin Crescent AQMA, revised lane markings and signage were introduced in March 2013. These measures have resulted in a reduction in NO₂ concentrations on the south side of Appin Crescent. The AQAP outlines the consideration of a bypass and a feasibility study was commissioned to determine if this would be an option to reduce pollutant concentrations within Appin Crescent. The feasibility study suggested that the proposed bypass would achieve the reduction required in pollutant

concentrations to reach the Air Quality Strategy annual mean objectives. However, no funding is available for this option and Fife Council are considering alternative traffic management (including the outcomes of a recent cost benefit analysis of two traffic management options in 2016) that will result in similar reductions whilst being more cost effective and practicable.

As progress on the action plan measures for Cupar and Dunfermline continues to advance a number of measures have now been completed, these are summarised in Table 2.4. Similarly, as the action plan measures have been advanced, certain measures have been discounted from further consideration. Details on discounted measures are summarised in Table 2.5.

Table 2.4: Completed AQAP Measures

No.	Measure	Comments
Bonnygate, Cupar		
4	Implementation of new Urban Traffic Management and Control system and changes to pedestrian crossings	New pedestrian crossing linked to the traffic management system has been completed at St Catherine Street and twin mini roundabout scheme has been implemented at St Catherine Street/East Bridge.
Appin Crescent, Dunfermline		
2	Feasibility study	Feasibility studies (2015 and 2016) and a Cost Benefit Analysis report in 2016 have been produced and considered by the AQ Steering Group. It has been concluded from these studies that the options considered to date are not cost effective, feasible or not acceptable as defined in AQAP evaluation criteria. Focus is now on the delivery of the Northern Link Road to the North of Appin Crescent in terms of seeking air quality improvements in the Appin Crescent AQMA.
6	Traffic Management optimisation (dependent on feasibility study)	
15	Cost-benefit analysis of traffic management options to improve air quality within Appin Crescent.	

2.2.4 Discounted Measures

Table 2.5: Discounted AQAP Measures

No.	Measure	Justification
Bonnygate, Cupar		
8	AQMA Awareness Signs	Measure has been discounted based on the grounds of cost effectiveness, practicability feasibility and acceptability to members of the public.
Appin Crescent, Dunfermline		
12	Consideration of development of Appin Crescent bypass (Dependent upon feasibility study)	Based on the findings of the feasibility study, the Air Quality Steering Group considers that this option is not as cost effective, practicable and feasible relative to the introduction of the Northern Link Road in Dunfermline

Table 2.6 Progress on Measures to Improve Air Quality- Bonnygate Cupar

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
1	Improving links with Local Transport Strategy/ Area Transport Plan Implementation Phase: Ongoing	Policy guidance and development control	Measures to ensure the air quality in the AQMA is improved where possible and to avoid future problems are implemented via the Local Transport Strategy.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Reference to Bonnygate AQMA and measures included in Air Quality Action Plan. Integration of plan with Local Transport Strategy.	Low	Fife Council Air Quality Steering Group outputs continue to contribute to the development of Fife Council's Local Transport Strategy/Area Transport Plan and are to be integrated into future revisions of these strategies/plans.
2	Improving Air Quality Links with local Planning and Development Framework Implementation Phase: Ongoing	Policy guidance and development control	Local planning considerations aim to mitigate the cumulative negative air quality impacts of new development Consideration of air quality issues in LDP2.	Fife Council	Fife Council Air Quality Steering Group outputs are contributing to the development of Fife Council Local Transport Strategy/Area Transport Plan and are to be incorporated in future revisions of these strategies/plans.	Ensure that development proposals with the potential to exert an impact on the Bonnygate AQMA are assessed for air quality impacts and where necessary, appropriate mitigation measures considered.	Medium	Fife Council has produced a guidance leaflet to assist developers in considering and meeting the relevant air quality requirements as set out in environmental legislation. This leaflet has been designed to provide information regarding the way in which air quality issues are dealt with through the development management process. The guidance leaflet is available at www.fifedirect.org.uk/airquality The draft Low Carbon Fife Supplementary Guidance (SG) is expected to go to committee on 31st May 2018 before a period of public consultation. FIFEplan is now adopted (Sept 2017). Policy 10 does not support development which would lead to a breach in air quality standards or lead to a significant increase in concentrations of air pollution within an existing AQMA. The Low Carbon SG needs to be in place by Sept 2018 (one year after the adoption of FIFEplan). The GIS Modelling toolkit for Fife area/Regional Dispersion Model has been updated using latest emission factors (COPERT Version 5). In turn, this will provide Fife Council with more reliable data in support of tackling local air quality management issues, especially within their Local Air Quality Management Areas (AQMAs) and areas of concern. Submission of AQ grant application for 2018-2019 includes submissions for climate change related measures.
3	Integrate AQ with other Council Strategies Implementation Phase: Ongoing	Policy guidance and development control	Encourage opportunity for contributions towards improving local air quality and minimising negative impacts from existing and future Council strategies. Increase awareness of local air quality	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Continue and enhance joint working between Council Services and other Partnership Organisations to encourage potential air quality implications of existing and future Council strategies. Implementation of the relevant AQS objectives	Low	Fife Council's Land and Air Quality Team is working closely with the Council's Climate Change Team on the development of the Fife Sustainable Energy Climate Action Plan (SECAP) for the region to ensure air quality issues are considered. In addition, the Land and Air Quality Team assisted the Council's Climate Change Team in the development of a Local Energy Masterplan methodology for Burntisland. This provided a community level approach to energy planning. This approach will be considered as part of future actions in the Sustainable Energy Climate Action Plan. Promoting sustainable travel. Expanding EV charging network to help encourage / increase the number of EV drivers in the Fife Wide area. New EV charging provided by ScotRail Alliance at Cupar rail station.
4	Implementation of new Urban Traffic Management and Control system and changes to pedestrian crossings Implementation Phase: Completed	Policy guidance and development control	Improve efficiency of transit through Cupar Town Centre and reduce emissions from road traffic sources within the Bonnygate street canyon. Installation of traffic management system.	Fife Council	2009	Pollutant reduction in AQMA. AQ monitor will continue to confirm the effectiveness of the measures.	Decline in NO ₂ and PM ₁₀ concentrations within Bonnygate, monitoring to continue until trend has emerged. Pollutant concentrations can vary annually due to meteorological influences.	Completed

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
5	Travel Plans for Large Institutions and Businesses Implementation Phase: Ongoing	Promoting travel alternatives	To encourage a shift to more sustainable forms of travel, or reducing the need for travel.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Results of Council Travel surveys	Low	Transportation continuing to support schools in updating and developing School travel plans. Promoting sustainable travel to school, including initiatives as Bikeability and WOW (Walk Once a Week).
6	Promotion of Travel Choices Implementation Phase: Ongoing	Promoting travel alternatives	Discourage long stay commuter parking as part of the Fife Council's Parking Strategy. To increase awareness of travel choices and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	To improve integration between cycling, walking and public transport. To continue to liaise with Scottish Government in the production of KPIs for this action plan measure.	Low	Resubmitted grant application for further traffic counters in 2018-2019. Walk once a Week (WoW) is the Living Streets flagship scheme. It focuses on the journey to school and the encouragement to make the journey using active modes of travel. Each pupil logs their journey of how they got to school through the online Travel Tracker and if they reach the required number of active trips in a month they will receive a badge. Each month has a different badge which surrounds that month's theme. Fife Council has been delivering this in partnership with Living Streets Scotland. Although various factors need to be considered, on the whole the initiative seems to work with most schools now accustomed to using the system and all seeing modes of transport used moving in the right direction with active travel increasing and the number of pupils being driven all the way to school decreasing.
7	Target reduced localised emissions from freight. Implementation Phase: Ongoing	Freight and delivery management	Improve efficiency of transit through the AQMA and facilitate reduced emissions.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Pollution reduction in AQMA	Medium	Continue to engage with HDV Fleet operators through the ongoing roll out of the Fife ECO Stars scheme. Update of air quality impact assessment of Cupar North Development Zone and Relief Road using COPERT5 NOx vehicle emission rates and EMEP tier 2 PM10 non-exhaust emission rates to be produced in 2018-2019.
8	AQMA Awareness Signs Implementation Phase: N/A	Public information	To increase awareness of the Bonnygate AQMA and encourage behavioural change.	Fife Council	N/A	Authorisation, design, procurement and installation	Low	Measure has been discounted based on the grounds of cost effectiveness, practicability, feasibility and acceptability to members of the public.
9	Provision of Information relating to Air Quality Implementation Phase: Ongoing	Public information	To increase awareness of local air quality issues and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy	Production of booklet travel pack Publication of LAQM reports	Low	Fife Council has produced a guidance leaflet to assist developers in considering and meeting the relevant air quality requirements as set out in environmental legislation. This leaflet has been designed to provide information regarding the way in which air quality issues are dealt with through the development management process. The guidance leaflet is available at www.fifedirect.org.uk/airquality
10	Parking Management and Control Implementation Phase: Short – Medium Term	Traffic management	Reduce traffic by discouraging long stay parking and associated commuting movements. Minimise impacts of commercial deliveries on traffic movement.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Pollutant reduction in AQMA	Low	Continue to evaluate parking management within the Bonnygate AQMA.
11	Promotion of Cycling and Walking Implementation Phase: Ongoing	Promoting travel alternatives	To encourage a shift away from the use of private motor vehicles for travelling to more sustainable forms of transport, or	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy	Number/length of cycling and walking routes developed.	Low	Fife Council has been at the forefront of encouraging people to cycle for over 20 years. A network of over 350 miles of dedicated cycle ways, together with extensive 20 mph residential zones, has been developed and continuously improved to encourage people to cycle more. Comprehensive programme of promotional campaigns, route mapping, development and implementation of travel plans and cycle training for all ages and events, has contributed to year on year increases in cycle use in Fife.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
			reducing the need for travel.					<p>Increasing participation in all forms of cycling is a key task for Fife Council, building on the success it has achieved in recent years in tackling traffic congestion and pollution; reaping the economic benefits of cycle tourism and recreation; helping make the people of Fife healthier; and working towards the Scottish Government vision for 10% of all journeys by bike by 2020.</p> <p>Since the launch of Cycling Action Plan for Scotland (CAPS) in 2009, Fife has been working hard through multi-agency initiatives (e.g. TRY IT Cupar and Make Your Move Kirkcaldy) to increase numbers of cyclists and walkers.</p> <p>Fife Council aims to provide significant new and improved cycle routes and intensive cycle training for all ages in both areas, as well as free bike loan schemes and more cycle racks in a bid to get the whole community cycling.</p> <p>Fife Councils' Bikeability team are working with the Community Police to offer all P7s within the Bell Baxter Cluster (Cupar) the opportunity to take part in cycle training.</p>
12	Review and support proposed infrastructure changes that will contribute to delivering improvements in local air quality Implementation Phase: Long Term/Ongoing	Transport planning and infrastructure	Support Council proposals for infrastructure changes that will facilitate improvements in vehicle movements within Cupar.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy	Pollutant Reduction in AQMA	High	<p>Update of air quality impact assessment of Cupar North Development Zone and Relief Road using COPERT5 NOx vehicle emission rates and EMEP tier 2 PM₁₀ non-exhaust emission rates to be produced in 2018-2019.</p> <p>One AQMesh monitor for NO₂, PM₁₀ and PM_{2.5} installed on the Southern side of the narrow section of the Bonnygate canyon in December 2017. This monitor is to further understand pollutant concentrations in the Bonnygate AQMA and supplement future modelling studies.</p>
13	Target reductions in emissions from the Council fleet and contract vehicles (including driver training) Implementation Phase: Ongoing	Vehicle fleet efficiency	Target reduced emissions from Council fleet vehicles and Council contract fleet vehicles operating within the Cupar AQMA.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	<p>Fife Council tender specification outlines that all new vehicles must have the latest gas recyclable exhaust and catalyst systems fitted.</p> <p>Number of vehicles in fleet.</p> <p>Number of electric and hydrogen powered vehicles in fleet.</p>	Medium	<p>Fife Council now has 27 electric vehicles and eight plug-in hybrids. They also have two refuse vehicles and five vans that are dual-fuelled running on diesel and hydrogen. The charging network in Fife means you are never more than 10 miles from a charge point.</p> <p>Fife Council Fleet Operations joined the ECO stars scheme in October 2014 and have been continually improving by introducing low carbon vehicles to the fleet. Fife Council were recently awarded a 5-star rating. Advantages include reduction in air pollution (NO₂, PM₁₀ and PM_{2.5}), reduction in CO₂ emissions, meeting EU and LAQM targets, improved public health, economic efficiency and good communications with elected members.</p> <p>In addition, Fife Council's fleet reduced from 1922 items in January 2011 to 1437 items in January 2018. This represents a 25% decrease in fleet size. Annual diesel fuel consumption as of January 2018 is now under 4 million litres (3,826,135 litres). A reduction of 1,578 Tonnes of Carbon since 2012 and a 14% overall decrease in fuel usage since 2012.</p> <p>An emissions tracer study of Fife Council road fleet has also recently been commissioned. Within Fife Council there is interest in using GPS tracking data for the fleet to calculate emissions and for geolocation purposes. This would enable Fife Council to determine if fleet renewals of their own vehicles would yield tangible air quality benefits in their AQMAs and areas of concern (a useful piece of evidence for framing action plan interventions). Currently these vehicles are not treated as a discrete source group so the separate impact of them within AQMAs in Fife cannot be reliably established. Therefore, there is no way to know if measures to "clean" the Council fleet will have a tangible effect on local air quality. Answering this question would undoubtedly be useful to Fife Council by allowing them to focus their resources.</p>

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
								<p>Fife Council is also currently in the final stages of developing a Hydrogen Strategy for Fife. Initial recommendations for areas of future focus include:</p> <ul style="list-style-type: none"> • Deployment of hydrogen portable power devices to reduce diesel consumption. • Explore funding to begin a programme to convert remaining vehicle fleet to dual-fuelled RCVs and selected vans to generate significant localised demand. • Along with other neighbouring councils, explore the potential for new large scale electrolytic hydrogen production. • Work with local actors (e.g. Bright Green Hydrogen) and national technology providers to develop a centre of excellence for portable power based on hydrogen fuel cell products. • Prepare and pitch the region to take part in a 100% hydrogen gas grid trial. <p>In addition, the Council is currently a partner in the Fuel Cell and Hydrogen Joint Undertaking (FCHJU) Regions and Cities initiative. The key project which involves 60 regions across Europe, aims to help cities and regions to identify the most promising FC&H applications, evaluate the potential, and identify and maximise the use of different financing options.</p> <p>The initiative is currently developing roadmaps and concepts to prepare and implement FC&H deployment projects from 2018 onwards. Application areas include:</p> <ul style="list-style-type: none"> • Road transport: particularly urban and rural bus fleets, delivery vehicle fleets, and car club fleets • Passenger and vehicle ferries using hydrogen. • Commuter trains using hydrogen. • Stationary fuel cell applications, including combined heat and power (CHP) and back-up power systems • Power-to-Hydrogen applications for local fuel production, energy storage, and injection of hydrogen into the gas grid
14	Target reductions in emissions from buses Implementation Phase: Ongoing	Vehicle fleet efficiency	Target reduced emissions from buses operating within the Bonnygate AQMA.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Establish a bus quality partnership Increase in fleet using alternative fuels	Medium	<p>Continue to encourage bus operators to recognise the importance of air quality and climate change issues through the Fife ECO Stars scheme.</p>
15	Fife ECO Stars Implementation Phase: Ongoing	Vehicle fleet efficiency	Encourage operators of buses, coaches, HGVs and LDVs to sign up to voluntary scheme which encourages and promotes 'clean operators'	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Develop and promote Fife ECO Stars, a new green recognition scheme aiming to tackle air pollution from transport.	Medium	<p>As of March 2018 there are 153 HGV and Bus fleet members (6974 vehicles) and 25 taxi and private hire members (132 vehicles) already signed up to the scheme. Fife has one of the highest ECO Stars scheme recruitment rates in the UK.</p> <p>Recruitment initiatives in 2017-2018 include an information session for taxi operators on the electric vehicle options available.</p>
16	Air Quality and Planning Toolkit Implementation Phase: Short Term	Policy guidance and development control	Facilitate the consideration of the potential air quality impacts of developments across Fife, but notably near existing AQMAs	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Develop a GIS based dispersion modelling toolkit to assist planners and other local authority officers in the consideration of the air quality issues in the development management process.	Medium	<p>Phase 3 Study Completed.</p> <p>Regional Dispersion Model updated using COPERT5 emission factors.</p> <p>As a follow on task from the provision of the Regional RapidAir™ dispersion model, the regional model is to be enhanced to include validation in all Fife towns.</p>
17	Air Quality Strategy 2015-2020 Implementation Phase: Ongoing	Policy guidance and development control	Increase awareness of local air quality issues and promote good practice in reducing emissions of air quality pollutants.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Develop and adopt an Air Quality Strategy that aims to raise awareness of air quality issues and to promote some of the existing best practice work that the Council has undertaken within existing AQMAs to other parts of Fife.	High	<p>See measures 1-16. These are considered to be consistent with the aims/objectives of Scottish Government Cleaner Air Quality Strategy for Scotland 2015 including the List of Actions in Chapter 14 of this document.</p> <p>Progress in implementing Fife's Air Quality Strategy was recently recognised at the COSLA Excellence awards in 2017 where Fife Council obtained a Bronze Award in the category of "Tackling Inequalities and Improving Health".</p>

Table 2.7 Progress on measures to Improve Air Quality- Appin Crescent Dunfermline

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
1	Liaise with Scottish Government to encourage the consideration of national measures Implementation Phase: Ongoing	Policy guidance and development control	Increase focus on background concentrations of PM and encourage national action	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Maintain contact with the Scottish Government regarding the adoption of national air quality measures.	Low KPI's to be developed in liaison with Scottish Government	Fife Council continues to attend and contribute to air quality seminars, training events and pollution liaison group meetings where national air quality measures are discussed.
2	Feasibility study Implementation Phase: Completed	Transport planning and infrastructure	To adopt a strategic approach to air quality in Appin Crescent and undertake a detailed assessment of the feasibility and impacts of proposed infrastructure and traffic management measures.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Undertake a feasibility study to assess the potential impact of local infrastructure developments and traffic management optimisation on air quality in Appin Crescent.	Low to Medium	Completed.
3	Improving links with Local Transport Strategy/ Area Transport Plan Implementation Phase: Ongoing	Transport planning and infrastructure	Measures to ensure the current poor air quality in the AQMA is improved where possible and to avoid future problems are implemented via the Local Transport Strategy.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Reference to Appin Crescent AQMA and measures included in Air Quality Action Plan. Integration of plan with Local Transport Strategy.	Low	Fife Council Air Quality Steering Group outputs continue to contribute to the development of Fife Council's Local Transport Strategy/Area Transport Plan and are to be incorporated in future revisions of these strategies/plans.
4	Improving Air Quality links with Local Planning and Development Framework Implementation Phase: Ongoing	Policy guidance and development control	Local planning considerations aim to mitigate the cumulative negative air quality impacts of new development	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Integration of Appin Crescent AQAP with future versions of Local Plan. Maintain and make available - air quality guidance note for developers.	Medium	Fife Council has produced a guidance leaflet to assist developers in considering and meeting the relevant air quality requirements as set out in environmental legislation. This leaflet has been designed to provide information regarding the way in which air quality issues are dealt with through the development management process. The guidance leaflet is available at www.fifedirect.org.uk/airquality The draft Low Carbon Fife Supplementary Guidance (SG) is expected to go to committee on 31 st May 2018 before a period of public consultation. FIFEplan is now adopted (Sept 2017). Policy 10 does not support development which would lead to a breach in air quality standards or lead to a significant increase in concentrations of air pollution within an existing AQMA. The Low Carbon SG needs to be in place by Sept 2018 (one year after the adoption of FIFEplan). The GIS Modelling toolkit/Regional Dispersion Model for Fife area has been updated using latest emission factors (COPERT Version 5). In turn, this will provide Fife Council with more reliable data in support of tackling local air quality management issues, especially within their Local Air Quality Management Areas (AQMAs) and areas of concern.
5	Integrate AQ with other Council Strategies	Policy guidance and	Encourage opportunity for	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Maintain regular and ongoing communication between members of the Appin Crescent AQAP steering group.	Low	Submission of AQ grant application for 2018-2019 includes submissions for climate change related measures.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
	Implementation Phase: Ongoing	development control	contributions towards improving local air quality and minimising negative impacts from existing and future Council strategies.					Fife Council's Land and Air Quality Team is working closely with the Council's Climate Change Team on the development of the Fife Sustainable Energy Climate Action Plan (SECAP) for the region to ensure air quality issues are considered. In addition, the Land and Air Quality Team assisted the Council's Climate Change Team in the development of a Local Energy Masterplan methodology for Burntisland. This provided a community level approach to energy planning. This approach will be considered as part of future actions in the Sustainable Energy Climate Action Plan.
6	Traffic Management optimization (dependant on feasibility study) Implementation Phase: Completed	Traffic management	Increase awareness of local air quality. Reduce traffic queuing within the AQMA through the optimisation of the Traffic management system.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Optimisation of the traffic management system at Appin Crescent and the surrounding network. Progress of this action is dependent on the conclusions of the feasibility study.	High	The Council is also recognising the links between air quality and promoting sustainable travel. This includes expanding EV charging network to help encourage / increase the number of EV drivers in the Fife Wide area. There is also an increase in EVs within the Fife Council fleet (see Action Plan Measure 10). Completed.
7	Travel Plans for large Institutions and Businesses Implementation Phase: Ongoing	Transport planning and infrastructure	To encourage a shift to more sustainable forms of travel, or reducing the need for travel.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Continue the implementation of Fife Council's travel plan Undertake Council travel surveys	Low	Travel plans implemented and promoted in schools. Continue the implementation of Fife Council's travel plan.
8	Provision of Information and promotion of travel options Implementation Phase: Ongoing	Promoting travel alternatives	To increase awareness of travel choices and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	To improve integration between cycling, walking and public transport. Produce Travel Choices facility for Dunfermline. Undertaking Travel Marketing in Dunfermline.	Low	Resubmitted grant application for further traffic counters in 2018-19. Walk once a Week (WoW) is the Living Streets flagship scheme. It focuses on the journey to school and the encouragement to make the journey using active modes of travel. Each pupil logs their journey of how they got to school through the online Travel Tracker and if they reach the required number of active trips in a month they will receive a badge. Each month has a different badge which surrounds that month's theme. Fife Council has been delivering this in partnership with Living Streets Scotland. Although various factors need to be considered, on the whole the initiative seems to work with most schools now accustomed to using the system and all seeing modes of transport used moving in the right direction with active travel increasing and the number of pupils being driven all the way to school decreasing.
9	Provision of information relating to Air Quality Implementation Phase: Ongoing	Public information	To increase awareness of local air quality issues and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Continue to make information relating to local air quality management available through the Council website.	Low	Fife Council has produced a guidance leaflet to assist developers in considering and meeting the relevant air quality requirements as set out in environmental legislation. This leaflet has been designed to provide information regarding the way in which air quality issues are dealt with through the development management process. The guidance leaflet is available at www.fifedirect.org.uk/airquality
10	Target reductions in emissions from the Council fleet and contract vehicles (including driver training) Implementation Phase: Ongoing	Vehicle fleet efficiency	Target reduced emissions from Council fleet vehicles and Council contract fleet vehicles.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Monitor and assess viable options for alternative Fuels, technologies and fuel additives. Fife Council tender specification outlines that all new vehicles must meet Euro 6 Engine Emissions or an equivalent emission reduction system. Number of vehicles in Council fleet. Number of electric and hydrogen powered vehicles in Council fleet.	Medium	As of March 2018 Fife Council has 27 electric vehicles and eight plug-in hybrids. They also have two refuse vehicles and five vans that are dual-fuelled running on diesel and hydrogen. The charging network in Fife means you are never more than 10 miles from a charge point. Fife Council Fleet Operations joined the ECO Stars scheme in October 2014 and have been continually improving by introducing low carbon vehicles to the fleet. We were recently awarded a 5-star rating. Advantages include reduction in air pollution (NO ₂ , PM ₁₀ and PM _{2.5}), reduction in CO ₂ emissions, meeting EU and LAQM targets, improved public health, economic efficiency and good communications with elected members. In addition, Fife Council's fleet reduced from 1922 items in January 2011 to 1437 items in January 2018. This represents a 25% decrease in Fleet size. Annual diesel fuel consumption as of January 2018 is now under 4 million litres (3,826,135 litres). A reduction of 1,578 Tonnes of Carbon since 2012 and a 14% overall decrease in fuel usage since 2012. An emissions tracer study of Fife Council road fleet has also recently been commissioned. Within Fife Council there is interest in using GPS tracking data for the fleet to calculate emissions and for geolocation purposes. This would enable Fife Council to determine if fleet renewals of their own

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
11	Investigate the potential for establishing voluntary bus agreements Implementation Phase: Ongoing	Promoting travel alternatives	Target reduced emissions from buses operating within the Appin Crescent AQMA.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Liase with bus operators regarding emissions from the bus fleet and improvements to bus service infrastructure. Bus quality agreement similar to P&R at Ferrytoll, link to forth Road Bridge Replacement crossing.	Low	vehicles would yield tangible air quality benefits in their AQMAs and areas of concern (a useful piece of evidence for framing action plan interventions). Currently these vehicles are not treated as a discrete source group so the separate impact of them within AQMAs in Fife cannot be reliably established. Therefore, there is no way to know if measures to "clean" the Council fleet will have a tangible effect on local air quality. Answering this question would undoubtedly be useful to Fife Council by allowing them to focus their resources. Continue to encourage bus operators to recognise the importance of air quality and climate change issues through the Fife ECO Stars scheme and to explore the potential to set up voluntary bus agreements through interaction with local bus operators through the ongoing Fife ECO Stars recruitment process.
12	Consideration of development of Appin Crescent bypass (Dependent upon feasibility study) Implementation Phase: Completed	Transport planning and infrastructure	If determined to be feasible, the development of a bypass at Appin Crescent may be a potential option to facilitate a reduction the traffic volume passing through the AQMA and consequently, contribute to lower emissions.	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20.	Development of an Appin Crescent bypass.	High	Completed. Air Quality Steering Group considers that this option is not as cost effective or feasible relative to the introduction of the Northern Link Road in Dunfermline.
13	Fife ECO Stars Implementation Phase: Ongoing	Vehicle Fleet Efficiency in HGV and Taxi Fleets	Encouraging local fleet operators to introduce fleet management systems that improve air quality	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Number of ECO Stars members	Medium	As of March 2018 there are 153 HGV and Bus fleet members (6974 vehicles) and 25 taxi and private hire members (132 vehicles) already signed up to the scheme. Fife has one of the highest ECO Stars scheme recruitment rates in the UK. Recruitment initiatives in 2017-2018 include an information session for taxi operators on the electric vehicle options available.
14	Air Quality and Planning Toolkit Implementation Phase: Ongoing	Development Control	Ensure future development does not compromise achievement of statutory air quality objectives	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Develop a GIS based dispersion modelling toolkit to assist planners and other local authority officers in the consideration of the air quality issues in the development management process. CBA analysis	Medium	Phase 3 Study Completed. Regional Dispersion Model updated using COPERT5 emission factors. As a follow on task from the provision of the Regional RapidAir™ dispersion model, the regional model is to be enhanced to include validation in all Fife towns.
15	Cost-benefit analysis of traffic management options to improve air quality within Appin Crescent Implementation Phase: Completed	Traffic Management	Evaluation of short to medium term traffic management measures to improve air quality	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Outcomes of two traffic management options	Low to Medium	Completed
16	Air Dispersion modelling study of the potential Dunfermline Northern Link Road Implementation Phase: Ongoing (Initial	Traffic Management	Estimate the impact of the proposed northern link road and the proposed Dunfermline strategic land allocation (SLA) zones	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	Carry out Air Quality dispersion modelling to quantify the impacts of the proposed Northern Link.	High	Two AQMesh monitoring pods for NO ₂ , PM ₁₀ and PM _{2.5} installed at south side of Appin Crescent in December 2017. The data from these monitoring pods will be used to further understand pollutant concentrations in the Appin Crescent AQMA and supplement future modelling studies.

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date (February 2018)
17	<p>dispersion modelling report produced in 2016 and updated to reflect latest road vehicle emissions factors in 2017).</p> <p>Air Quality Strategy for Fife</p> <p>Implementation Phase: Ongoing</p>	Strategy	As outlined in the aims / objectives contained in the Air Quality Strategy Report 2015-2020	Fife Council	As outlined in the aims and objectives of Council's Air Quality Strategy 2015-20	<p>Pollutant reduction in AQMAs</p> <p>KPIs are currently being developed by the Scottish Government as outlined in the Cleaner Air Quality Strategy for Scotland and are anticipated to be finalised in the First Annual Progress Report for this Strategy. Following the introduction of these KPIs, Fife Council will incorporate these into the action planning process.</p>	High	<p>See measures 1-16. These are considered to be consistent with the aims/objectives of Scottish Government Cleaner Air Quality Strategy for Scotland 2015 including the List of Actions in Chapter 14 of this document.</p> <p>Progress in implementing Fife's Air Quality Strategy was recently recognised at the COSLA Excellence awards in 2017 where Fife Council obtained a Bronze Award in the category of "Tackling Inequalities and Improving Health".</p>

2.3 Cleaner Air for Scotland

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland’s legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at <http://www.gov.scot/Publications/2015/11/5671/17>. Progress by Fife Council against relevant actions within this strategy is demonstrated below.

2.3.1 Transport-Avoiding Travel-T1

“All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan.” (CAFS T1 2015)

Fife Council was the first Local Authority in Scotland to write a travel plan back in 1999 and to monitor how things are changing, an Employee Travel Survey is carried out every two years. The Fife Council Travel Plan³² promotes sustainable travel with a hierarchy of walking, cycling, public transport, car share, which is consistent with key aims and objectives of Fife Council’s Air Quality Strategy 2015-20, and the Appin Crescent (Dunfermline) and Bonnygate (Cupar) Air Quality Action Plans (updated 2015).

Fife Council have initiatives such as:

- TripshareFife.com - allowing you to find people travelling to similar locations to car share with: http://publications.fifedirect.org.uk/c64_LoveYourCar-Shareit.pdf
- Cycle to Work Scheme – providing you an opportunity to purchase a new bike and/or safety accessories and pay direct from your salary, saving money and spreading the cost.
- Working with Schools to assist them in producing school travel plans.

Fife Council also have initiatives such as:

- Bikeability – providing cycle training to primary school children P4 -7.
- WOW (Walk Once a Week).

The “Walk Once a Week” Campaign was launched in May 2017. This is a pilot scheme that is run in partnership with Living Streets. Since the start of the project the scheme has rapidly expanded in engagement levels and active travel mode share. Fife Council are currently working closely with 30 schools and over 8,000 pupils. To date each month in comparison with those in previous years (e.g. March 2016, March 2017) have seen an increase in active travel and engagement. The latest figures for May have seen a total of 78,715 trips logged and 88% were active. This in comparison to 60,948 journeys logged last May, the active journeys in this month have risen by 5%.

National Walk to School Week took place in May 2017 where the Walk of Fame was again in place to put the schools across Scotland up against each other and yet again we saw schools from Fife making it into the top ten 13 out of 15 days.



³² Fife Council Travel Plan- <https://www.fifedirect.org.uk/topics/index.cfm?fuseaction=service.display&p2sid=B8C89CE9-65BF-00F7-DD59C1DCB19187F5&themeid=568AF4CE-B036-4E67-93AB-36B1E13DFA11>

2.3.2 Climate Change-Effective co-ordination of climate change and air quality policies to deliver co-benefits-CC2

“Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered.” (CAFS CC2 2015)

On 27th October 2017, Fife Council approved becoming a signatory to the Covenant of Mayors in Climate Change and to reaffirming its commitment to Scotland’s Climate Change Declaration. Signatories to the global Covenant of Mayors initiative commit to producing a Sustainable Energy Climate Action Plan. Fife Council recognise climate and energy as defining challenges of our time. These challenges underpin many of the things the people of Fife take for granted in their everyday lives. Scotland as a whole is working to be climate friendly and climate ready and so is Fife. Almost everything in Fife is heavily reliant on our stable climate and our existing high carbon energy sources- such as energy, homes, offices, businesses, land use, schools and hospitals. Failure to cut emissions and adapt to climate change will impact on Fife’s services and our way of life.

The plan will set the direction and focus for climate change mitigation and adaptation activities across Fife. The plan sets out Fife’s aspirations to reduce carbon emissions across Fife to 2050, with detailed actions for a 56% reduction by 2020 and 66% by 2030 with key reviews at around every five years. The plan is an important part of the Council’s overall climate change strategy. Acting to transform the energy system and adapt to unavoidable climate change provides significant opportunity to be proactive, managing the cause of the problems rather than reacting to the energy insecurity and rising process, or not being ready for changes driven by climate change.

Reducing carbon emissions and adapting to climate change are also the key outputs of the Fife Partnership’s Climate Change Strategy³³. Fife Council’s Land and Air Quality Team is working closely with the Council’s Climate Change team on the development of the Fife Sustainable Energy Climate Action Plan (SECAP) for the region to ensure Air Quality considerations are considered.

In addition, the Land and Air Quality Team assisted the Council’s Climate Change Team in the development of a local Energy Masterplan for Burntisland³⁴. This provided a community level approach to energy planning. This approach will be considered as part of future actions in the Sustainable Energy Climate Action Plan.

2.3.3 NHS Boards and their Local Authority Partners will include reference to air quality and health in JHPP-H2

“NHS boards and their local authority partners will include reference to air quality and health in the next revision of their Joint Health Protection Plans, which should identify and address specific local priority issues.” (CAFS H2 2015)

Fife Council has in partnership with NHS Fife updated its Joint Health Protection Plan (JHPP) 2016-18 to include specific reference to local priority issues in particular the Bonnygate AQMA/AQAP and Appin Crescent AQMA/AQAP. Future versions of the JHPP will include specific reference to local priority issues and highlight the importance of a collaborative approach to tackling air quality issues.

2.3.4 Planning Authorities – Planning authorities to review the Local Development Plan-P2

“Expect planning authorities to review the Local Development Plan and revise at the next scheduled update to ensure policies are consistent with CAFS objectives and any local authority air quality action plans.” (CAFS P2 2015)

³³ Fife Environmental Partnership, Climate Change Strategy 2014-2020- Tackling Climate Change

³⁴ Burntisland Energy Master Plan, further information available at: <http://climatechange.fife.scot/burntisland-energy-master-plan/>

Fife Council adopted the Local Development Plan (FIFEplan) in September 2017. The plan includes text on Air Quality matters and includes a reference to supplementary guidance (Low Carbon SG) providing additional information on air quality assessments. The Low Carbon SG needs to be in place by September 2018.

2.3.5 Cycling Action Plan -T3

“We will work with partners to deliver our shared vision in the Cycling Action Plan for Scotland that by 2020, 10% of everyday journeys will be made by bike.” (CAFS T3 2015)

Fife has one of the UK's most comprehensive cycling networks. Over 350 miles of sign posted cycle network includes a variety of leisure and commuting routes. Terrain varies from off road disused railway tracks to routes in forests and from networks in towns and networks in quiet country lanes. In relation to the Appin Crescent Air Quality Action Plan (AQAP), new cycle routes have been developed to link the Public Park with Pittencrieff Park. The Lyne Burn Corridor project from Rex Park to Duloch has numerous purpose-built cycle routes connecting to two High Schools, Queen Margaret Station and the Queen Margaret Hospital.

Cycling is promoted through encouraging active schools. In schools across Fife the latest figures show that 4% of children travel to nursery and primary school by cycling. Cycling is further promoted within schools via the bikeability scheme. In 2017 there was an increase of 15% for pupils achieving Level 2:

- Level 1- 49 Schools delivering to 1062 pupils.
- Level 2- 49 schools delivering to 768 pupils.

2.3.6 Work with key partners to investigate the use of hydrogen as a transport fuel-T10

“Work with key partners to investigate the use of hydrogen as a transport fuel, as well as exploring wider environmental and economic opportunities of using hydrogen for energy applications – especially in promoting renewables, energy balancing and storage.” (CAFS T10 2015)

Green hydrogen power is becoming widely recognised as a key catalyst to driving forward transport and associated infrastructure for generations to come. One of Scotland's leading forces behind making this a reality is Fife through its pioneering Levenmouth Community Energy Project, a collaborative initiative which is led by Bright Green Hydrogen and supported by a number of partners including Fife Council and Toshiba. Part of this involves Levenmouth becoming home to one of Europe's largest fleet of hydrogen dual-fuel vehicles (17 vehicles), seven of which will be operated by Fife Council. The fleet includes 10 electric-powered Renault Kangoo vans with H₂ fuel cell range extender which will be 100% zero emissions if charged using the Hydrogen Office's 100% green electric vehicle charging station. The project also includes five Ford Transit vehicles that are converted to run on a diesel and hydrogen mixture as well as 2 Refuse Collection Vehicles (RCVs), which are believed to be a world-first of their kind.

The council is currently in the final stages of developing a Hydrogen Strategy for Fife. Initial recommendations for areas of future focus include:

- Deployment of hydrogen portable power devices to reduce diesel consumption.
- Explore funding to begin a programme to convert remaining vehicle fleet to dual-fuelled RCVs and selected vans to generate significant localised demand.
- Along with other neighbouring councils, explore the potential a new large scale electrolytic hydrogen production.
- Work with local actors (e.g. Bright Green Hydrogen) and national technology providers to develop a centre of excellence for portable power based on hydrogen fuel cell products
- Prepare and pitch the region to take part in a 100% hydrogen gas grid trial.

In addition, the Council is currently a partner in the Fuel Cell and Hydrogen Joint Undertaking (FCHJU) Regions and Cities initiative. The key project which involves 60 regions across Europe, aims to help

cities and regions to identify the most promising FC&H applications, evaluate the potential, and identify and maximise the use of different financing options.

The initiative is currently developing roadmaps and concepts to prepare and implement FC&H deployment projects from 2018 onwards. Application areas include:

- Road transport: particularly urban and rural bus fleets, delivery vehicle fleets, and car club fleets
- Passenger and vehicle ferries using hydrogen. Commuter trains using hydrogen.
- Stationary fuel cell applications, including combined heat and power (CHP) and back-up power systems
- Power-to-Hydrogen applications for local fuel production, energy storage, and injection of hydrogen into the gas grid

2.3.7 Freight Quality Partnerships-T12

“Encourage each local authority with an AQMA to create a Freight Quality Partnership (or utilise an existing RTP Freight Quality Partnership) and consider appropriate measures for local air quality improvement by 2017.” (CAFS T12 2015)

Fife Council continues to explore the potential to develop Freight Quality Partnerships through the ongoing implementation of the Fife ECO Stars scheme which includes the running of future workshops with key stakeholders.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out the monitoring that has taken place within Fife during 2017 and how local concentrations of the main air pollutants compare with the relevant objectives. Fife Council undertook automatic (continuous) monitoring at four sites during 2017, which measure NO₂, PM₁₀ and PM_{2.5} concentrations.

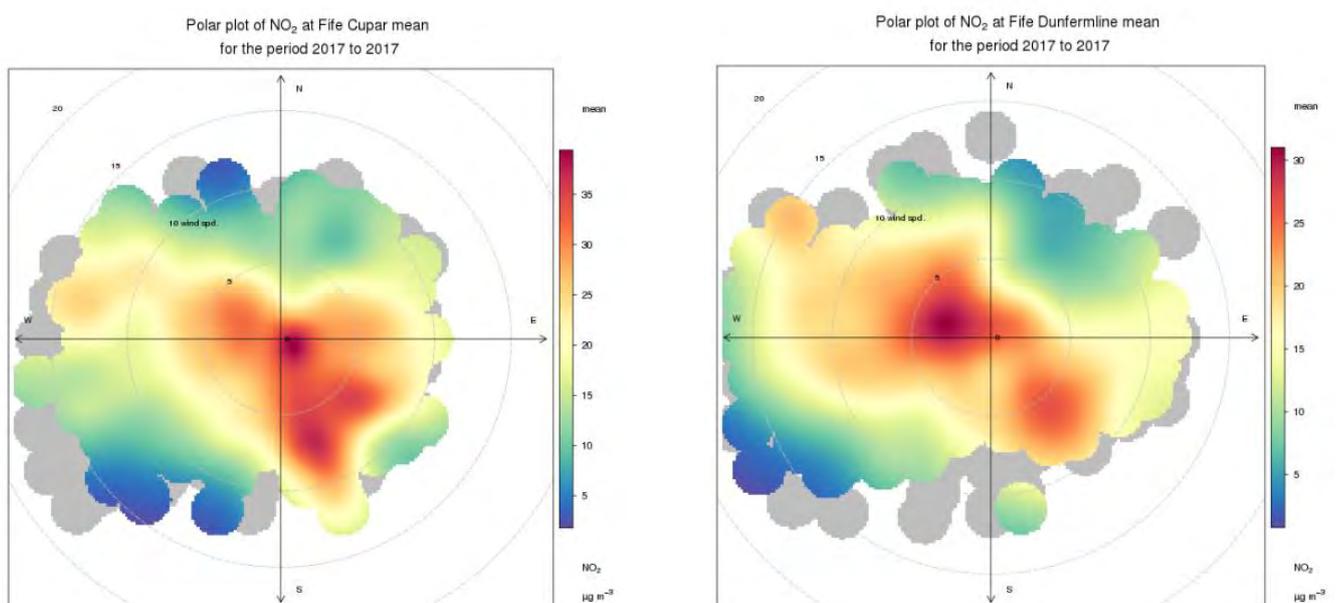
All PM₁₀ analysers were upgraded to FIDAS during 2016 and included monitoring of PM_{2.5}, PM₁ and TSP. FIDAS analysers have been assessed as equivalent to the EU reference method. Results for 2017 have been reported for PM₁₀ and PM_{2.5}. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at: <http://www.scottishairquality.co.uk/data/data-selector>

Maps showing the location of the monitoring sites in 2017 are provided in Figures 3.2-3.5. Further details on the QA/QC of the automatic monitoring sites are included in Appendix C. Automatic SO₂ was historically available from Scottish Power Generation Ltd. from a monitoring site close to Longannet Power Station, however Longannet Power Station ceased operation in March 2016.

Polar plots of NO₂ concentrations by wind speed and wind direction are shown in Figure 3.1 for Bonnygate, Cupar and Appin Crescent, Dunfermline where AQMAs have been declared. Polar plots are useful to show geographical representation of the relationship between pollutant concentrations and the meteorological conditions.

Polar plots for both locations indicate a 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. The plots show a broadly east-west signal which is consistent with parallel winds through the street canyon. It should also 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.

Figure 3.1 Polar plots of NO₂ concentrations by wind speed and direction



Short-period CO monitoring has also been undertaken by Fife Council's Transportation Department. Concentrations of 1,3 butadiene, benzene, nitrogen dioxide and sulphur dioxide measured in 2017 are summarised in the INEOS Grangemouth oil refinery Annual Community Air Monitoring Report³⁵.

3.1.2 Non-Automatic Monitoring Sites

Fife Council operates an extensive NO₂ diffusion tube monitoring survey with sites in East, West and Central Fife. In total there are 62 NO₂ diffusion tube monitoring sites throughout the Fife area. Of these, seven sites are triplicate sites, with four of these triplicate sites being co-located with the automatic analysers at Cupar, Kirkcaldy, Rosyth and Dunfermline.

Two additional diffusion tube sites commenced monitoring in 2017 at Hendry Road, Kirkcaldy and Links Crescent, St Andrews. Monitoring was undertaken as a result of local public concerns regarding air quality issues. Monitoring location Bonnygate, Cupar B6 moved location during 2017 due to numerous no returns, therefore results are reported as Bonnygate, Cupar B6i (Jan-April) and Bonnygate, Cupar B6ii (May-Dec). Table A.2 in Appendix A shows the details of these additional sites and the existing monitoring locations.

Maps showing the location of the monitoring sites are provided in Figures 3.2-3.7. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C. The additional monitoring undertaken in Kirkcaldy and St Andrews commenced during 2017 and therefore required to be annualised in accordance with TG.16, details are provided in Appendix D.

NPL on the behalf of BP Exploration North Sea Region, and subsequently INEOS FPS from 1st November 2017, monitored hydrocarbon levels on the Forth coastline during 2017 (06/01/2017-05/01/2018). Samples were collected over 2 week periods using passive samplers at 12 locations between the Forth Bridges and West Wemyss including four locations between Dalgety Bay and Burntisland. Samples were analysed for iso-butane, n-butane, iso-pentane, n-pentane, n-hexane, n-heptane, benzene, toluene, xylene and total hydrocarbons (C4-C10). These hydrocarbons are emitted from a variety of sources around the Forth including the operations at Hound Point Terminal but also traffic and other industrial sites such as the operations of ExxonMobil and Shell at Braefoot Bay and Mossmorran.

The results of this monitoring indicate that concentrations of benzene over the 12-month period were low (annual means range from 0.3-0.4 ppb) and well within the annual mean air quality standard of 5 µg m⁻³. Concentrations of other hydrocarbons were also low, but there are no air quality standards for these substances. The substance present in the greatest concentrations at most locations was n-butane for which annual mean concentrations ranged from 1.6 ppb to 7.4 ppb. Annual mean concentrations of other individual substances ranged from <0.3 ppb to 3.4 ppb. Annual mean concentrations of total hydrocarbons (C4 to C10) at different locations ranged from 8-22 ppb.

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 2017 indicate that concentrations of most of the monitored substances were very similar to 2016 at most locations.

³⁵ Community Air Quality Monitoring Report, Ambient Atmospheric Survey in the Vicinity of Grangemouth – 2017, INEOS April 2018

Figure 3.2 Monitoring Locations- Cupar AQMA

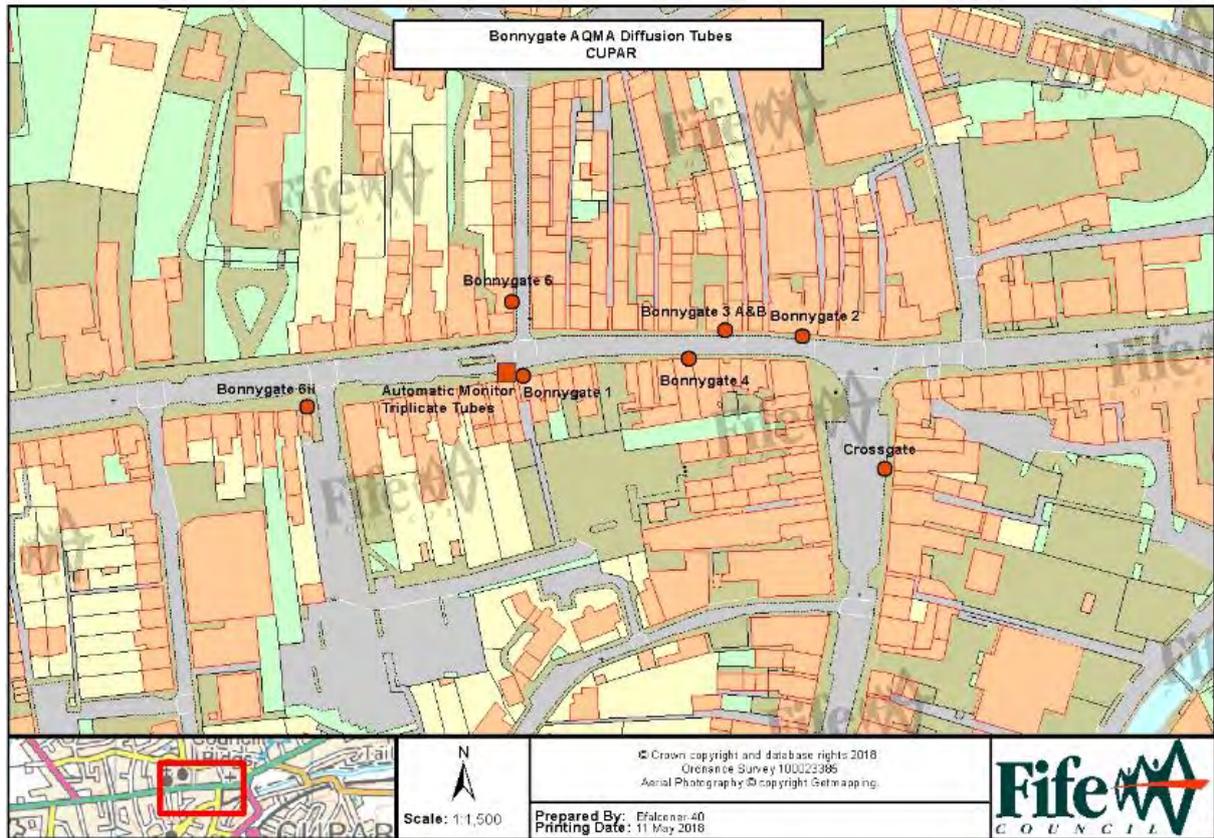


Figure 3.3 Monitoring Locations- Appin Crescent, Dunfermline AQMA

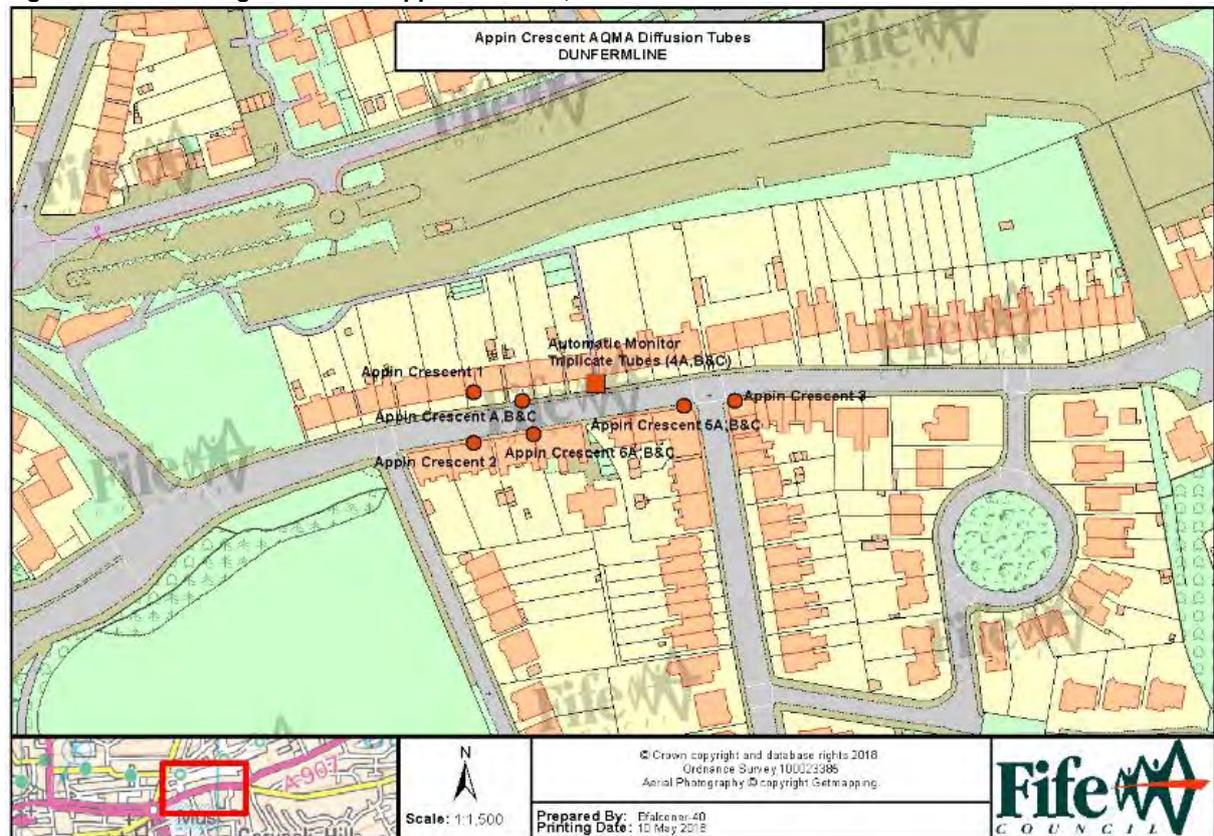
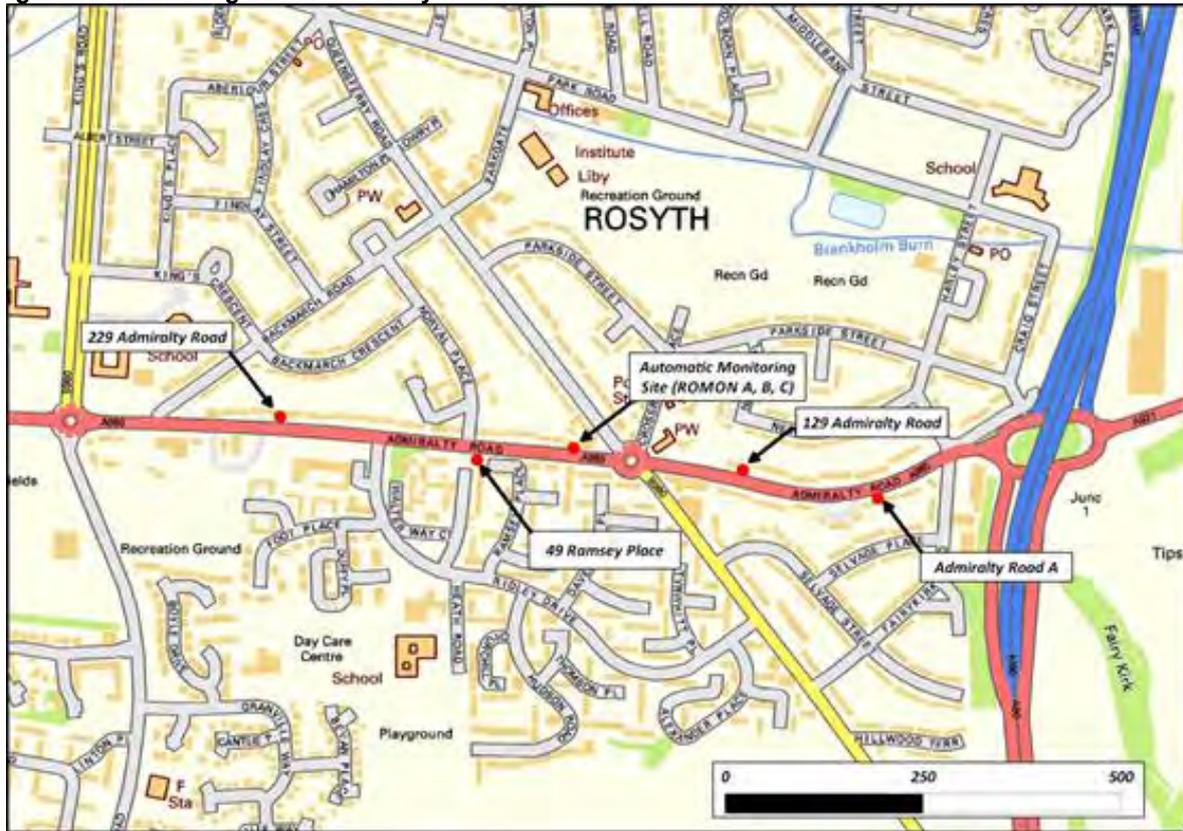


Figure 3.4 Monitoring Locations- Rosyth



Contains Ordnance Survey data © Crown copyright and database right 2011

Figure 3.5 Monitoring Locations – Kirkcaldy



Contains Ordnance Survey data © Crown copyright and database right 2011

Figure 3.6 St Andrews Monitoring Locations

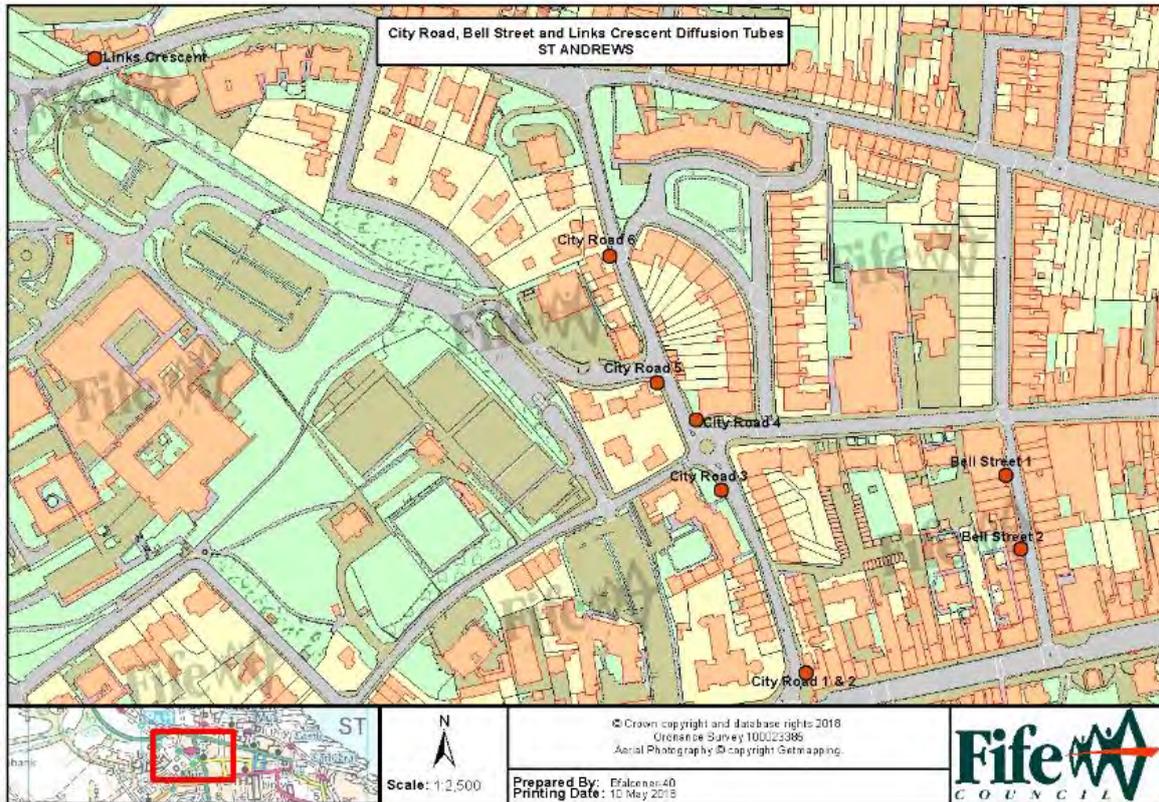
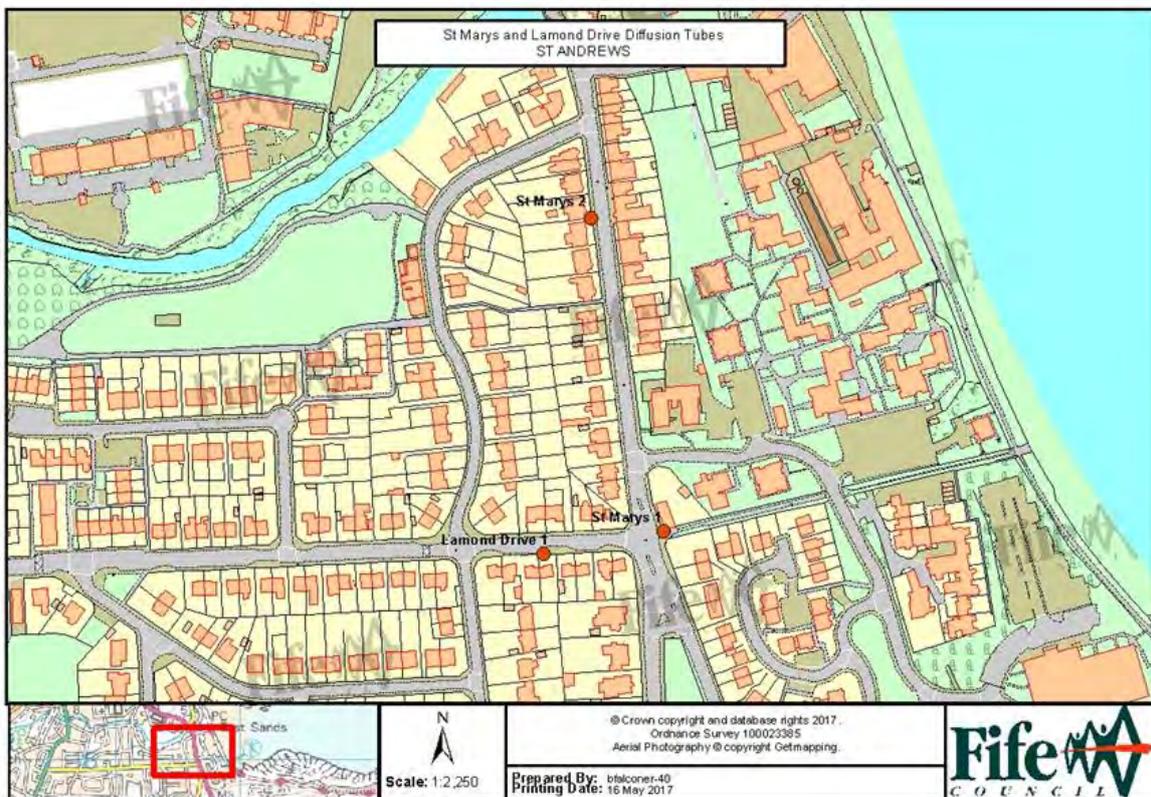


Figure 3.7: St Andrews St Marys and Lamond Drive Monitoring Locations



3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Automatic Monitoring Data

Appendix A presents the monitoring results for 2017. The automatic sites at Cupar, Kirkcaldy, Rosyth and Dunfermline did not record any exceedances of the AQS NO₂ annual mean (Table A.3) or 1-hour mean objectives (Table A.5) during 2017.

The trend of decreasing concentrations seen at Appin Crescent, Dunfermline suggests that the action plan measures introduced have had a positive impact. During 2017 concentrations decreased in Cupar with all monitoring locations measuring annual mean concentrations below the AQS annual mean objective of 40 µg m⁻³. The automatic monitoring site at Bonnygate, Cupar, measured an annual mean concentration of 26 µg m⁻³ during 2017. In Appin Crescent, Dunfermline, the automatic monitoring site measured an annual mean concentration of 23 µg m⁻³ during 2017.

The annual mean NO₂ concentrations from 2012-2017 are displayed in Figure 2.3 for Bonnygate, Cupar and Figure 2.5 for Appin Crescent, Dunfermline (provided in Section 2.1 of this report). The graph demonstrates that NO₂ concentrations are generally declining in both AQMAs, with concentrations declining further in 2017.

Overall concentrations have continued to decline within the designated AQMAs in Dunfermline and Cupar as a result of AQAP measures being implemented.

Three AQMesh units have been procured and installed in December 2017 to seek to further understand pollutant concentrations and trends in the Appin Crescent, Dunfermline AQMA (two x AQMesh units) and Bonnygate, Cupar AQMA (one x AQMesh unit). The two AQMesh units at Appin Crescent, Dunfermline are co-located with the Appin Crescent 5 and 6 diffusion tube sites (OS Grid Ref 309957 687714 and 309904 687704 respectively) and the one AQMesh unit at Bonnygate Cupar is co-located with the Bonnygate B4 diffusion tube site (OS Grid Ref 337467 714576). Analysis of the monitoring data from these units will be presented in the 2019 Annual Progress Report.

Diffusion Tube Monitoring Data

The annual diffusion tube data is presented in Appendix A, Table A.4. The Data has been bias corrected using a combined bias adjustment factor of 0.73, combining both the national adjustment factor of 0.72 and the average of the local adjustment factors (0.73). The following local bias adjustments were calculated - further details are provided in Appendix C:

- Kirkcaldy = 0.73
- Cupar = 0.73
- Rosyth = 0.74
- Dunfermline = 0.73

The combined factor of the local and national bias adjustment of 0.73 was applied to all diffusion tubes for consistency. The local BIAS calculations are outlined in the data QA/QC in Appendix C. The full 2017 dataset of monthly mean values is provided in Appendix B.

Details of the diffusion tube bias adjustment are found within Appendix C of this report. Diffusion tube results from 2012 to 2017 are presented in Appendix A, Table A.4. The 2017 diffusion tube results indicate that there were no exceedances of the AQS annual mean objective at all monitoring locations, including locations within Dunfermline and Cupar which had previously exceeded are now marginally below 40 µg m⁻³. The highest annual mean concentration measured in Appin Crescent, Dunfermline during 2017 was 37 µg m⁻³ at Appin Crescent 6(A, B, C). The highest annual mean concentration measured in Bonnygate, Cupar during 2017 was 33 µg m⁻³ at Bonnygate B4.

During 2017 Bonnygate, Cupar B6 moved location to the other side of the A91 due to numerous no returns. Therefore, results have been reported as Bonnygate B6i between January and April 2017 and B6ii between May and December 2017. Due to very low data capture (17%) at Bonnygate B6i, no annual mean has been reported - this monitoring location has now ceased monitoring. The annual mean concentration for 2017 at Bonnygate B6ii has been annualised in accordance with TG.16, further details are provided in Appendix D.

Monitoring commenced at Hendry Road, Kirkcaldy in May 2017 and at Links Crescent, St Andrews in October 2017. Therefore, annual mean concentrations have been annualised in accordance with TG.16, further details are provided in Appendix D.

3.2.2 Particulate Matter (PM₁₀)

Table A.6 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations between 2012 and 2017 with the air quality objective of 18 µg m⁻³. Table A.7, Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations between 2012 and 2017 with the air quality objective of 50 µg m⁻³, not to be exceeded more than 7 times per year. The 2017 monitoring results indicate that 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 the PM₁₀ monitoring sites in Fife.

PM₁₀ 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 A.1, Appendix A.

Data collected for 2017 shows that all the Fife monitoring sites meet the annual mean objective with concentrations lower than 18 µg m⁻³.

- Admiralty Road, Rosyth - 11 µg m⁻³
- Appin Crescent in Dunfermline - 10 µg m⁻³
- Bonnygate, Cupar - 13 µg m⁻³
- St Clair Street, Kirkcaldy - 9 µg m⁻³

PM₁₀ concentrations within the Bonnygate, Cupar AQMA for PM₁₀ have steadily decreased from 19 µg m⁻³ in 2011 to 13 µg m⁻³ in 2017. It is believed that the decrease in PM₁₀ is a result of the implemented measures for traffic management outlined in the AQAP. It is hoped that future and ongoing action plan measures being carried out in Cupar will help reduce concentrations further.

The 2017 annual mean PM₁₀ concentration at Admiralty Road, Rosyth (11 µg m⁻³) was below the annual mean PM₁₀ objective. Appendix A, Figure A.2 shows the change in PM₁₀ concentrations at Bonnygate, Cupar and Appin Crescent, Dunfermline from 2012 to 2017 and highlights that action plans can be effective in reducing concentrations of pollutants in AQMA's.

The 2017 annual mean PM₁₀ concentration at Appin Crescent, Dunfermline (10 µg m⁻³) was below the AQS annual mean PM₁₀ objective. The Further Assessment of Air Quality in Appin Crescent (2012) indicated that the relevant PM₁₀ 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 PM₁₀ in November 2012. The monitored PM₁₀ concentrations have now been consistently below the annual mean objective for multiple years.

The annual mean PM₁₀ concentration for St Clair Street, Kirkcaldy in 2017 continued to be below the PM₁₀ annual mean objective with a measured concentration of 9 µg m⁻³. As shown in Figure A.2, Appendix A, the PM₁₀ concentrations at St Clair Street Kirkcaldy have been consistently well below the air quality objective.

3.2.3 Particulate Matter (PM_{2.5})

During 2017, PM_{2.5} was measured at four automatic monitoring sites in Bonnygate in Cupar, Admiralty Road in Rosyth, St Clair Street in Kirkcaldy and Appin Crescent in Dunfermline. 2017 is the first year where PM_{2.5} concentrations have been reported for Cupar. Last year's concentrations were reported for Kirkcaldy and Dunfermline; however, these concentrations were annualised in accordance with TG.16 as monitoring commenced during 2016. Measured 2017 concentrations were below the PM_{2.5} annual mean objective at all sites. Details of these sites and concentrations measured are presented in Appendix A.

3.2.4 Sulphur Dioxide (SO₂)

Fife Council does not undertake any SO₂ monitoring.

3.2.4.1 SO₂ Automatic Monitoring

SO₂ monitoring was previously undertaken on behalf of Longannet Power Station at Blair Mains, Fife (Grid Reference NS972864) to the north east of the power station. Operations at Longannet ceased in March 2016. SO₂ concentrations until 2015 are reported within the 2017 Fife Council Annual Progress Report³⁶.

3.2.5 Benzene

There are currently two 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.

INEOS Grangemouth Benzene Monitoring

Benzene monitoring is presented for INEOS Grangemouth oil refinery in their annual monitoring report for 2017³⁷. 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

NPL on the behalf of BP Exploration North Sea Region, and subsequently INEOS FPS from 1st November 2017, monitored hydrocarbon levels on the Forth coastline during 2017 (06/01/2017-05/01/2018). Samples were collected over 2 week periods using passive samplers at 12 locations between the Forth Bridges and West Wemyss including four locations between Dalgety Bay and Burntisland. Samples were analysed for iso-butane, n-butane, iso-pentane, n-pentane, n-hexane, n-heptane, benzene, toluene, xylene and total hydrocarbons (C4-C10). These hydrocarbons are emitted from a variety of sources around the Forth including the operations at Hound Point Terminal but also traffic and other industrial sites such as the operations of ExxonMobil and Shell at Braefoot Bay and Mossmorran.

The results of this monitoring indicate that concentrations of benzene over the 12-month period were low (annual means range from 0.3-0.4 ppb) and well within the air quality standard of 1 ppb as an annual mean. Concentrations of other hydrocarbons were also low, but there are no air quality standards for these substances. The substance present in the greatest concentrations at most locations was n-butane for which annual mean concentrations ranged from 1.6 ppb to 7.4 ppb. Annual mean concentrations of other individual substances ranged from <0.3 ppb to 3.4 ppb. Annual mean concentrations of total hydrocarbons (C4 to C10) at different locations ranged from 8-22 ppb.

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

³⁶ Fife Council Annual Progress Report, 2017, available at: http://www.scottishairquality.co.uk/assets/documents//Fife_Annual_Progress_Report_2017_FINAL.pdf

³⁷ Community Air Quality Monitoring Report, Ambient Atmospheric Survey in the Vicinity of Grangemouth – 2017, INEOS April 2018

2017 indicate that concentrations of most of the monitored substances were very similar to 2016 at most locations.

3.2.6 Carbon Monoxide, Lead and 1,3-Butadiene

As in previous years, short periods of CO monitoring have been undertaken by Fife Council's Transportation Services at a number of roadside locations. Measurements were undertaken with Marksman 660 street monitors. The results are summarised in Table 3.1. It has been requested that Transportation add the following streets in St Andrews to CO monitoring survey for 2018:

- St Andrews, Bell Street
- St Andrews, St Marys Street
- St Andrews, Lamond Drive

Whilst none of these monitoring periods are sufficiently long to permit full assessment of CO concentrations over a full annual period for 2017, they all indicate that concentrations are likely to be below the AQS objective of 10 mg m⁻³ for the running 8-hour mean concentration.

Table 3.1 CO Monitoring Fife Transportation Services

Site Number/Location	Monitoring Period	Max 8-Hour Concentration (ppm)
Dunfermline, Bothwell Gardens (Site 3)	25/04/17-01/05/17	1.83
	13/07/17-19/07/17	0.51
	12/10/17-18/10/17	2.23
Dunfermline, Carnegie Drive/Pilmuir Street (Site 13)	25/04/17-01/05/17	0.53
	13/07/17-19/07/17	0.50
	12/10/17-18/10/17	0.46
Dunfermline, Appin Crescent (Site 35)	25/04/17-01/05/17	1.70
	13/07/17-19/07/17	0.89
	12/10/17-18/10/17	0.16
Leven, Glenlyon Road/ Windygates Road (Site 7)	18/05/17-24/05/17	1.7
	16/08/17-22/08/17	1.95
	13/02/18-19/02/18	0.35
Cupar, Bonnygate (Site 34)	18/05/17-24/05/17	0.61
	16/08/17-22/08/17	1.64
	13/02/18-19/02/18	0.73
Kirkcaldy, Dunnikier Road/Victoria Road (Site 16)	15/06/17-21/06/17	0.56
	15/09/17-21/09/17	0.29
	14/03/18-20/03/18	0.61
Kirkcaldy, St Clair Street/Junction Road (Site 36)	15/06/17-21/06/17	0.24
	15/09/17-21/09/17	0.59
	14/03/18-20/03/18	0.20
Rosyth, Admiralty Road/ Queensferry Road (Site 24)	15/06/17-21/06/17	0.90
	16/09/17-22/09/17	1.69
	14/03/18-20/03/18	0.56
A909 Mossmorran (Site 37)	04/04/17-10/04/17	0.19
	25/07/17-31/07/17	0.11
	21/10/17-27/10/17	0.53

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 by INEOS Grangemouth as part of their annual reporting for 2017³⁸. Annual average concentrations are lower than the set air quality limit for these substances. The INEOS Grangemouth annual community air monitoring report for 2017 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 draft Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group (referred to from now on as the Review Group) 2017 Annual Report³⁹ states that the work undertaken by the Review Group in 2017 demonstrates 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. In the areas around Mossmorran and Braefoot Bay, the 2010 air quality objective for benzene is being readily satisfied.

A number of complaints were received regarding the flaring incident at the Mossmorran plant in June 2017. These were reported to the relevant Council Committee.

In brief, an extended period of flaring from the Mossmorran plant occurred in June 2017. SEPA were immediately notified at the time of the incident, which has been fully investigated. Final Warning Letters were served on both Shell and ExxonMobil by SEPA in April 2018 relating to the unplanned flaring incidents. This was the result of SEPA's investigation that identified that both Shell and ExxonMobil had breached a condition of their PPC permit relating to smoke from flaring, as a result of lack of available steam. In addition, ExxonMobil failed to implement Best Available Technique (BAT) with respect to management and maintenance which could have reduced the emissions from the installation.

Further to the final warning letters, on 8 June 2018, SEPA and the Health and Safety Executive announced a joint investigation into ExxonMobil Chemical Ltd and Shell UK Limited.

A meeting of the Review Group to consider the June flaring incident was held on 25 July 2017. It was agreed at this meeting that the Review Group would assess options for improving communications with local communities in order to address any concerns relating to local air quality issues. The Review Group also agreed to liaise with the Mossmorran Community and Safety Committee to determine how other environmental issues may be examined further.

Details of the subsequent October 2017, March 2018 and May 2018 flaring incidents and monitoring data remain under investigation to avoid prejudice to future enforcement action.

The Review Group has participated in a series of meetings (12 January, 20 April, 8 June 2018 and 31 August 2018) organised by Lesley Laird, Member of Parliament for Kirkcaldy and Cowdenbeath and Professor Wilson Sibbett (Chair of the Review Group). These meetings, which have also included representatives from community councils, ExxonMobil, Shell, Mossmorran Community and Safety Committee, SEPA, Fife Council and HSE, have sought to identify community concerns about the plants' activities and flaring events. Focussed discussions have taken place to identify solutions that will improve the communication of information to relevant communities.

The Review Group considers these meetings to be a valuable initiative and will continue to participate and contribute to relevant follow-up action within their remit.

The Review Group are already actively taking action in response to matters discussed at the above meetings, e.g. the inclusion of the 'Recent activities and updates' sections of the 2017 technical report and the production of a non-technical summary to accompany the report. The Review Group has had initial correspondence with NHS Fife with a view to holding a meeting to discuss any relevant community-related health concerns (within the Reviews Group's remit) where appropriate strategies might be required to address these issues.

³⁸ Community Air Quality Monitoring Report, Ambient Atmospheric Survey in the Vicinity of Grangemouth – 2017, INEOS April 2018

³⁹ Draft Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group 2017 Annual Report

3.2.7 Summary of Compliance with AQS Objectives

New monitoring data measured in 2017 identified no exceedances of the AQS annual mean objective for NO₂ at any of the automatic or non-automatic monitoring locations in Fife. The highest annual mean concentration measured in Appin Crescent, Dunfermline during 2017 was 37 µg m⁻³ at Appin Crescent 6(A, B, C). The highest annual mean concentration measured in Bonnygate, Cupar during 2017 was 33 µg m⁻³ at Bonnygate B4.

All the automatic monitoring sites in Fife measured PM₁₀ concentrations below the annual and daily mean objectives during 2017. Bonnygate, Cupar and Appin Crescent, Dunfermline have both already been declared AQMA for NO₂ and PM₁₀. PM₁₀ concentrations within these locations have remained below the annual mean objective consistently since 2014.

Fife Council has examined the results from monitoring in the Fife Council Area. Concentrations within the Appin Crescent, Dunfermline AQMA and Bonnygate Cupar AQMA are within the air quality objectives. There was a marginal exceedance of NO₂ within the Bonnygate Cupar AQMA reported in last year's APR. This location is sensitive to meteorological influences within the canyon environment, therefore annual variations in concentrations occur. As a result, the existing AQMA should remain.

In light of the 2017 monitoring results, Fife Council should continue to monitor at locations throughout Fife. Following a review of concentrations Fife Council intend to amend non-automatic monitoring locations as appropriate. The monitoring data for 2018 will be reported in the next Annual Progress Report which will evaluate the most recent monitoring data.

4 New Local Developments

4.1 Road Traffic Sources

The Forth Replacement Crossing (FRC) opened on 30th August 2017. Several new and upgraded roads connect the bridge into the existing road network with around four kilometres (2.5 miles) of new roads constructed. These new roads join the M9 and M90 motorways together for the first time, with the Queensferry Crossing being built to motorway standard in order to carry the M90 across the Forth. The M90 motorway terminates at Admiralty Junction, around 3 kilometres (1.9 miles) north of the current Forth Road Bridge, with the road continuing as all-purpose dual carriageway across the existing bridge and joining the M9 via the M9 Spur. Admiralty Junction, the present Junction 1 of the M90 motorway is unaltered, with the exception of a bus lane added on the southbound carriageway. The junction was renumbered to Junction 1C of the M90. Ferrytoll Junction has been redesigned to give access to the new crossing and to maintain public transport access to the Forth Road Bridge.

The design of the new junction required the realignment of the B981 road to North Queensferry. Ferrytoll Junction is numbered Junction 1B of the M90. Air quality impacts of this development were previously considered during the relevant consultation stages and the findings of modelling studies accepted. That is: *“the predicted impacts on local air quality as a result of the proposed scheme are generally very small, therefore no mitigation measures are proposed with respect to operational traffic.”* DMRB Stage 3 Environmental Statement (Jacobs Arup 2009).

4.1.1 Forth Replacement Crossing

During the construction of the Forth Replacement Crossing and associated road network, air quality monitoring has been undertaken by the Forth Crossing Bridge Constructors (FCBC)⁴⁰. Air quality has been monitored using automatic light scatter dust meters and Frisbee gauge dust deposition monitoring. Three automatic light scatter meters were installed at various sensitive locations to measure real time particulate matter (PM₁₀) concentrations and the Total Suspended Particle (TSP) concentrations. Three Frisbee gauges were present at sensitive locations across the site to measure dust deposition rates.

The Queensferry Crossing opened to traffic on 30th August 2017, as a result, the number of monitoring sites have been reduced. The previous monitoring location at Whinny Hill, which was the only monitoring location within the Fife local authority area, is no longer active. Results for the Whinny Hill site between January 2017 and October 2017 (when monitoring ceased) indicated that PM₁₀ results above the action level were monitored for a few short periods between January and March 2017.

During 2017 there were exceedances measured at multiple sites including Linn Mill, Scotstoun, Clufflat Brae, Inchgarvie and Queensferry Road External TEOM. All the Forth Replacement Crossing air quality monitoring reports are publically available at the project website:

www.transport.gov.scot/road/forth-replacement-crossing/frc-air-quality-documents

4.2 Other Transport Sources

Edinburgh Airport Limited (Edinburgh Airport) is proposing to upgrade its aircraft arrival and departure flight paths and apply new methods of operation as part of its overall Airspace Change Programme (ACP) 2016-2018. Fife Council has provided comments on this consultation in terms of ensuring that these proposals will not compromise the achievement of statutory air quality objectives in its area.

4.3 Industrial Sources

Fife Council confirms that there are no new industrial sources that have not been adequately considered in previous rounds of Review and Assessment.

⁴⁰ Forth Replacement Crossing: Air Quality Monitoring Report December 2017, Forth Crossing Bridge Constructors, available at: <https://www.transport.gov.scot/projects/forth-replacement-crossing/document-library/frc-air-quality-documents/>

4.4 Poultry Farms

Fife Council confirms that there are no new poultry farms that have not been adequately considered in previous rounds of Review and Assessment.

SEPA has recently issued two new permits in Fife (Garpit PPC/A/1157119 and Elmbank PPC/A/1157580) but these only have 48,420 places each which is well below Fife Council's and TG.16 screening threshold.

4.5 Commercial and Domestic Sources

Fife Council confirms there is no requirement to proceed to a Detailed Assessment for the following sources:

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

4.6 New Developments with Fugitive or Uncontrolled Sources

SEPA have advised that the following amendments to Part A and Part B processes have been made during 2017:

- PPC/B/1004481, ESA McIntosh (Havelock), Kirkcaldy: has now changed from using heavy fuel oil to diesel gas oil
- PPC/E/30184 (Part B – sawmill) and PPC/A/1132894 (Part A timber treatment) Donaldson Timber, Leven: Changed from wood burner to heat their plant to oil or gas

During 2017, the following processes ceased operation:

- PPC/E/0020013 Tullis Russell Papermakers, Glenrothes - NOT SURRENDERED
- PPC/A/1000040 Raytheon Semiconductor plant, Glenrothes (remainder of site still operational but not Part A or Part B Processes) - NOT SURRENDERED
- PPC/A/1016554 Saline Farms (Saline and Dinmoss), Dunfermline (Intensive Agriculture) -NOT SURRENDERED
- PPC/B/1098984 Morrison Construction Rosyth
- PPC/B/1004513 Earlseat OCCS, Standing Stane Road, Kirkcaldy
- PPC/B/1009243 Westfield Link OCCS Kinglassie Cardenden Fife
- PPC/B/1117994 Muir Dean Surface Mine, Crossgates
- PPC/E/0030081 Skene Group Ltd, mobile plant
- PPC/E/0030174 St Ninians Opencast Coal Site, Kelty, Fife

4.6.1 Valleyfield Ash Lagoons 2017

In April 2017, Fife Council received a number of complaints from the public regarding dusts from the Scottish Power Ash Lagoons at Low Valleyfield affecting nearby communities. SEPA as regulator of this facility issued Scottish Power with enforcement notices to suppress the dust. Air quality monitoring (Osiris particle monitors) for particulate matter (PM₁₀) was also carried out by SEPA at sites in nearby Culross and Valleyfield. On average, levels of PM₁₀ remained below the daily Air Quality Standard (Scotland), which is set to protect human health.

In December 2017, Scottish Power Generation (SPG) submitted a Proposal of Application Notice (17/03865/PAN Proposal of application notice for capping and engineering works (Valleyfield Ash Lagoons Main Street Low Valleyfield Dunfermline Fife KY12 8TY) to Fife Council. The ash lagoons are

the subject of a Pollution Prevention and Control (PPC) permit for which SEPA requires the implementation of an aftercare and restoration plan now that operations at the power station have ceased. The future planning application to which this PAN relates will seek planning permission for the final capping and engineering works which form part of the Aftercare and Restoration Plan. SPG is currently engaged in an ongoing dialogue with SEPA in respect of the detail of the Aftercare and Restoration Plan and the consultation exercise also includes public exhibitions of these proposals.

5 Planning Applications

5.1 Applications

The following planning applications were commented on by the Land & Air Quality Team during 2017:

January 2017

16/04155/EIA (our ref PC150473.C3) Application for Planning Permission in Principle for a residential led mixed-use development comprising a minimum of 2,150 residential units, employment/commercial land, landscape framework (landscaping, parks, green space), community facilities, healthcare, local retail, new primary school(s), roads and drainage infrastructure and associated development at Broomhall Site at Land Adjacent to Pitreavie Business Park, Grange Road, Dunfermline. [Advised that Air Quality Consultants Ltd.'s air quality impact assessment, discussed in Chapter 10 Air Quality of Ironside Farrar's Environmental Statement \(December 2016\), was being reviewed by our contracted air quality consultants. Comments were to follow under separate cover.](#)

16/03491/FULL (our ref PC150434.C4) Erection of 134 residential units including SUDS, open space, access and associated services at Land to North of 25 Dalbeath Gardens, Hill of Beath. [Team awaiting submission of an appropriate air quality impact assessment. AQ condition recommended.](#)

18/00001/FULL (our ref PC170322C1) Installation of flue pipe for wood burning stove | 8 Hillview Court Halbeath Dunfermline Fife. [The applicant was asked to provide information on the boiler design and operation, management and maintenance arrangements, stack or flue height, fuel and building details including a site plan showing the location of the boiler room, fuel storage area, boiler exhaust stack, nearest openable windows and any fan assisted intake air vents.](#)

15/03458/EIA (our ref PC130456C11) Installation of district heating pipeline works Curtis Fine Papers Ltd. Main Street Guardbridge St Andrews. [General advice was given on air quality.](#)

February 2017

17/00219/FULL (our ref PC150189.C3) Erection of biomass building and water storage tank (demolition of existing garages) (part retrospective), Falkland House School, West Port, Falkland. [Team had no further comment to make with the proviso that the proposed plant, maintenance and servicing did not alter from those detailed in 15/02449/FULL. Any changes to be reported in an updated Biomass Information Request Form.](#)

16/04155/EIA (our ref PC150473.C3A) Application for Planning Permission in Principle for a residential led mixed-use development comprising a minimum of 2,150 residential units, employment / commercial land, landscape framework (landscaping, parks, green space), community facilities, healthcare, local retail, new primary school(s), roads and drainage infrastructure and associated development at Broomhall Site at Land Adjacent to Pitreavie Business Park, Grange Road, Dunfermline. [Additional clarification / information required. AQ condition recommended.](#)

16/03491/FULL (our ref PC150434.C5) Erection of 134 residential units including SUDS, open space, access and associated services at Land to North of 25 Dalbeath Gardens, Hill of Beath. [Conclusions made appeared generally satisfactory, however additional information in relation to dusts and road traffic emissions during construction requested. AQ condition recommended.](#)

18/00264/PREAPP (our ref PC170351.C1) Pre-application for proposed residential development at Balcomie Caravan Park Crail. [The team is awaiting an Air Quality Impact Assessment.](#)

17/03651/FULL (our ref PC170065.C3) Erection of 78 affordable dwellings at Land To East Of Cullen Drive Glenrothes. [It was noted in the Air Quality Assessment that a dust management plan was recommended.](#)

March 2017

17/00536/FULL (our ref PC130469.C3) Planning permission for the erection of 55 houses, proposed site layout for up to a further 113 houses, provision of employment land (Class 4 Business), together with access, infrastructure, drainage, sustainable urban drainage systems, landscaping and open space at Gilliesfaulds Farm, Carslogie, Cupar. Given the site's proximity to the Bonnygate AQMA, and the potential for additional road traffic generated by the proposed development to impact upon the AQMA, it was advised that an air quality screening assessment be undertaken. AQ condition recommended.

16/03491/FULL (our ref PC150434.C7) Erection of 134 residential units including SUDS, open space, access and associated services at Land to North of 25 Dalbeath Gardens, Hill of Beath. AQ information submitted satisfactory therefore no further comment to make.

April 2017

17/01039/PREAPP (our ref PC170020.C1) Pre-application for installation of district heating underground pipe network at Glenrothes District Heating Scheme, Church Street, Glenrothes. It was noted that the proposed scheme would use the current RWE Markinch biomass plant. Confirmation requested that the plant had capacity to provide for the proposed scheme and that any changes as a result of the proposal would not compromise AQ objectives.

17/00246/PREAPP (our ref PC170007.C1) Pre-application for residential development on land at Seggie Farm, Guardbridge. Given the scale of the proposed development an Air Quality Impact Assessment will be required in terms of any future planning applications.

17/00253/PREAPP (our ref PC170008.C1) Pre-application for proposed mixed use development at land to west of Andrew Melville Hall, North Haugh, St Andrews, Fife. Given the scale of the proposed development an Air Quality Impact Assessment will be required in terms of any future planning applications.

17/00923/PREAPP (our ref PC170011.C1) Pre-application for mixed use development at Thistle Industrial Estate, Cowdenbeath. Given the scale of the proposed development an Air Quality Impact Assessment will be required in terms of any future planning applications.

May 2017

16/03718/FULL Use of Land to form local authority depot including access and parking, vehicle wash, truck stop and storage at Land at Crossgates Road, Halbeath, Dunfermline AND 16/03601/FULL Form local authority depot and offices at Alteration to factory building to form a local authority depot with associated offices, external storage area and SUDS at Regency House, Crossgates Road, Halbeath, Dunfermline (our ref PC160332.C6). Given the scale and nature of the development it was advised that a screening exercise be undertaken. Advised that potential impacts on the Appin Crescent AQMA were to be considered. AQ condition recommended.

17/01184/FULL (our ref PC170057.C1) Alterations including installation of doors, windows, roof lights and flue and single storey extension to rear of 33 Hepburn Gardens, St Andrews. Applicant to provide details of the boiler for which the flue was required. If a biomass boiler, then the Biomass Boiler Information Request Form to be completed.

17/01382/PREAPP (our ref PC009028.C2) Pre-application for residential development, 4M Plant, Den Road, Kirkcaldy. Given the potential scale of the development it was advised that a screening exercise be undertaken.

16/03718/FULL Use of Land to form local authority depot including access and parking, vehicle wash, truck stop and storage at Land at Crossgates Road, Halbeath, Dunfermline AND 16/03601/FULL Form local authority depot and offices at alteration to factory building to form a local authority depot with associated offices, external storage area and SUDS at Regency House, Crossgates Road, Halbeath, Dunfermline (our ref PC160332.C7). [Noted that an initial screening exercise is to be undertaken. AQ condition recommended.](#)

17/01340/SCO (our ref PC170008.C2) EIA Scoping request for proposed mixed use development comprising residential, University, business, employment, hotel, care home, retail, education, community facilities, open spaces, road and associated infrastructure at land to west of Andrew Melville Hall, North Haugh, St Andrews, Fife. [Report specified that an Air Quality Impact Assessment will be undertaken and included within the associated environmental statement.](#)

17/01410/PREAPP (our ref PC170008.C3) Pre-application for proposed erection of a secondary school (Class 10) with associated facilities, including access, car parking/bus stance and playing fields/all-weather pitches at land to west of Andrew Melville Hall, North Haugh, St Andrews, Fife. [Given the scale of the proposed development an Air Quality Impact Assessment will be required in terms of any future planning applications.](#)

June 2017

13/03937/FULL (our ref PC130370.C5) Erection of new secondary school (Class 10); 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 five grass and one all-weather sports pitches including demolition of existing school. [Supporting information identified in terms of the installed stack height – no further comment to make.](#)

15/00937/FULL (our ref PC140579.C13) Erection of 101 affordable residential units with associated parking, drainage infrastructure, landscaping and roadworks at Kirkland Works Steelworks Brae Methil Leven Fife. [The Air Quality Assessment appeared to be generally satisfactory.](#)

15/04064/FULL (our ref PC150417.C4) Erection of 23 affordable residential units with associated parking, landscaping and infrastructure At Kirkland Works Methil Brae Methil Fife. [The Air Quality Assessment appeared to be generally satisfactory.](#)

17/01686/EIA (our ref PC170104.C1) Residential development approximately 340 residential units at Wester Whitefield Farm to East of Whitefield Road. [It was noted that the developer proposes to introduce mitigation such as part of an alternative route for traffic \(Northern Link Road\) and electric vehicle charging points.](#)

July 2017

17/01927/SCO (our ref PC140478.C6) Scoping request for proposed tourist, commercial, leisure development including 82 lodges, bar/restaurant, visitor centre, retail, access, road and drainage infrastructure at North Bank Farm, Lathockar, St Andrews, Fife. [EIA Scoping Report was submitted and advised that an assessment of local air quality would be undertaken and consultation would take place with Fife Council. Proposed methodology for the air quality assessment considered to be satisfactory.](#)

17/01688/FULL(our ref PC170107.C1) Erection of 140 affordable dwellings East Of B920 At Kirkland Farm Ballingry. [The proposed development comprises more than 50 houses. It was advised that a suitable air quality impact assessment should be undertaken considering both construction and future proposed use of the site.](#)

16/00557/FULL (our ref PC150286.C5) Construction of 114 residential units on Land To The South Of Mayfield Unit. [The submitted information appeared to be generally satisfactory.](#)

17/01870/PPP (our ref PC170108.C1) Approximately 125 residential units at Hillside School Aberdour.

Given the nature and scale of the proposed development, it was advised that a suitable air quality impact assessment should be undertaken considering both construction and future uses of the site.

August 2017

17/02280/PREAPP (our ref PC170166.C1) Pre-application for erection of new buildings and conversion, part demolition, extension and refurbishment of existing building to form residential units with associated infrastructure, parking, landscaping and alteration to existing road access at Pilmuir Works, Pilmuir Street, Dunfermline, KY12 0QA. Advised that depending on the scale of the proposed development, an AQ assessment may be required and that the proximity of the site to the Appin Crescent AQMA should be noted.

17/02562/PREAPP (our ref PC170167.C1) Pre-application for residential development (circa 200 units), access roads, SUDS, landscaping and other associated infrastructure at Land to the West of Crossford, Cairneyhill Road, Crossford. Given the scale of the proposed development it was advised that an air quality assessment be undertaken.

September 2017

17/02752/FULL (our ref PC170020.C2) Installation of district heating underground pipe network and associated infrastructure at Glenrothes District Heating Scheme, Church Street. Although not covered by this application it was noted that the biomass CHP plant has the thermal capacity for the proposed scheme. Concluded that as there will be no increase in the fuel input to the biomass CHP plant it is expected that there will be no change to flue emissions. Air quality impacts related to the back-up mains gas fired boilers to be assessed as part of the energy centre planning application.

17/02515/FULL (our ref PC170191.C1) Alterations to dwelling house including formation of recessed balcony, installation of flue and roof light at Bosuns Cottage, 11 East Shore, St Monans, Anstruther. Applicant to provide details of the boiler for which the flue was required. If a biomass boiler, then the Biomass Boiler Information Request Form to be completed.

17/00536/FULL Gilliefaulds Farm, Carslogie, Cupar (our ref PC130469.C6). Consultant advised to undertake a screening assessment to determine if a more detailed assessment is required. Advised that the assessment should take account of the Bonnygate AQMA. General info on guidance provided.

17/02663/PREAPP (our ref PC170197.C1) Pre-application for major development, comprising residential led mixed-use development, including employment/business use (including retail), care home, industrial and energy use, distillery, data centre, open space, parkland and associated development at Rothes Mill, Glenrothes, KY7 6PB. Given the nature and scale of the proposed development, it was advised that a suitable air quality assessment will be required.

17/02887/PREAPP (our ref PC150028.C5) Pre-application for proposed land raising through landfilling with non-hazardous commercial and industrial waste and potentially stable non-reactive hazardous waste if appropriate, creation of fully lined landfill with appropriate leachate and gas collection systems, potential re-profiling of former landfill site to ensure site stability, landscaping and ancillary works at Old Landfill Site, Balbie Farm, Orrock, Auchtertool. Given the potential for increased road traffic emissions and dust generation associated with the proposed development, it was advised that an air quality assessment be undertaken.

17/02645/SCO (our ref PC170187.C1) Scoping request for proposed construction of 18-hole golf course and associated works at Dumbarnie Link, Drumeldrie, Fife. Scoping Report advised that the assessment of air quality would be scoped out of the EIA given the predicted limited impact of the proposed development on local air quality.

17/02103/PPP (our ref PC170174C1) Erection of 48 flats and 26 townhouses Junction Of Hendry Road and Hayfield Place, Kirkcaldy. Given the nature and scale of the proposed development, it was advised that a suitable air quality impact assessment should be undertaken considering the effect on future air

quality of both construction phase and future uses of the site taking into account the possible cumulative effect of other proposed developments in the immediate area where relevant.

17/02913/PREAPP (our ref PC170213C1) Pre-application for erection of 35 affordable housing North of Carnock Road, Dunfermline. Given the nature and scale of the proposed development and its proximity to an existing air quality management area, it was advised that a suitable air quality impact assessment should be undertaken considering the effect on future air quality of both construction and future uses of the site and taking into account the possible cumulative effect of other proposed developments in the immediate area.

October 2017

16/04155/EIA (our ref PC150473.C4) Application for Planning Permission in Principle for residential led mixed-use development comprising a minimum of 2,150 residential units, employment/commercial land, landscape framework (landscaping, parks, green space), community facilities, healthcare, local retail, new primary school(s), roads and drainage infrastructure and associated development at Broomhall Site at Land Adjacent to Pitreavie Business Park, Grange Road, Dunfermline. [Updated assessment to be submitted for review.](#)

17/02960/FULL (our ref PC170233.C1) Installation of electricity generation plant (19.9MW) and associated infrastructure at Land to North of Railway, Clockluine Road, Hillend, Fife. [Additional information / clarification required regarding submitted AQ assessment.](#)

17/03270/FULL (our ref PC170020.C4) Erection of Energy Centre at Site of former Tullis Russell paper mill, south of the existing Markinch Power Station and north of Glenrothes town centre. [Additional information / clarification required regarding submitted AQ assessment. AQ conditions recommended.](#)

17/01711/PAN (our ref PC170030.C3) Proposal of Application Notice for student accommodation development, associated landscaping, parking, ancillary facilities and development at Albany Park, St Mary Street, St Andrews, Fife. [Assessment Methodology for Air Quality Assessment considered to be satisfactory.](#)

17/02905/PREAPP (our ref PC170205.C1) Pre-application for erection of 57 affordable East of Braigh Gardens, Dunfermline. Given the nature and scale of the proposed development and its proximity to an existing Air Quality Management Area, a suitable air quality impact assessment was recommended considering the effect on future air quality of both construction and future uses of the site and taking into account the possible cumulative effect of other proposed developments in the area.

17/02912/PREAPP (our ref PC170212.C1) Pre-application for erection of 73 affordable East of Pitdinnie Road Cairney Hill. Given the nature and scale of the proposed development, it was advised that a suitable air quality impact assessment should be undertaken considering the effect on future air quality of both construction and future uses of the site and taking into account the possible cumulative effect of other proposed developments in the area.

17/02915/PREAPP (our ref PC170204.C1) Pre-application for erection of 128 affordable houses North of Kent Street Dunfermline. Given the nature and scale of the proposed development and its proximity to an existing Air Quality Management Area it was advised that a suitable air quality impact assessment should be undertaken. This must consider the effect on future air quality of both construction and of future uses of the site (road traffic) and take into account the cumulative effect of other proposed developments in the area.

17/02910/PREAPP (our ref PC170210.C1) Pre-application for erection of 55 affordable houses North of Manse Road Crossgates. Given the nature and scale of the proposed development, it is advised that a suitable air quality impact assessment should be undertaken considering the effect on future air quality of both construction and future uses of the site and taking into account the possible cumulative effect of other proposed developments in the area.

17/00103/PPP (our ref PC160384C1) Planning permission in principle for residential development north of the former Wellwood Primary. It was noted that although a one percent increase in NO₂, PM₁₀ and PM_{2.5} was modelled at some receptors—and although the PM_{2.5} concentrations at Appin Crescent are modelled to exceed objectives without the development traffic—the impact of the development on local air quality is considered to be negligible.

November 2017

17/03292/FULL (our ref PC170166.C4) Erection of new buildings and conversion, part demolition and refurbishment of existing buildings to form residential units and ancillary commercial floor space (Classes 1, 2, sui generis take away and sui generis licensed premises and Class 10) with associated infrastructure, parking, landscaping and access at Pilmuir Works, Pilmuir Street, Dunfermline. AQ assessment to be submitted for review. AQ condition recommended.

17/03293/LBC (our ref PC170166.C5) Partial demolition of buildings, Extension and internal and external alterations to existing buildings to form residential units and ancillary commercial units at Pilmuir Works, Pilmuir Street, Dunfermline. AQ assessment to be submitted for review.

17/03270/FULL (our ref PC170020.C5) Erection of Energy Centre at Former Tullis Russell Mill, Glenrothes. Additional detail on proposed boiler units requested.

17/03270/FULL (our ref PC170020.C6) Erection of Energy Centre at Former Tullis Russell Mill, Glenrothes. AQ information submitted satisfactory, no further comment to make. Advised that any changes to boiler specification, supporting infrastructure or maintenance / servicing will require the assessment to be revised.

17/03420/PREAPP (our ref PC170096.C2) Pre-application for proposed residential development of 30 No. dwellings at Grieve Street, Dunfermline, Fife Council. Advised that existing conditions (including Condition 6 – Air Quality Assessment) be retained from previous application (17/01575/FULL).

17/03471/PPP (our ref PC1701670.C2) Residential development, access roads, SUDS, landscaping, and other associated infrastructure at Land to the West of Crossford, Cairneyhill Road, Crossford, Fife. Given the scale of the proposed development an Air Quality Impact Assessment will be required in terms of any future planning applications.

17/01410/PREAPP (our ref PC170008.C3) Pre-application for proposed erection of a secondary school (Class 10) with associated facilities, including access, car parking/bus stance and playing fields/all-weather pitches at land to west of Andrew Melville Hall, North Haugh, St Andrews, Fife. Advice provided on the proposed methodology for the associated Air Quality Impact Assessment.

17/03377/FULL (our ref PC150463.C6) The installation and operation of up to ten gas engines with a generating capacity of 19.96MWe and ancillary development on land at the former Westfield Opencast Coal Site, near Kinglassie, Fife. Submitted Air Quality Assessment considered to be satisfactory.

17/03095/EIA (our ref PC140478.C8) Tourist, commercial and leisure development including lodges (82 units), restaurant, reception, retail, access road and drainage infrastructure at North Bank Farm, Lathockar, St Andrews, Fife. Air Quality Assessment within EIA considered to be satisfactory.

17/01677/EIA (our ref PC150341.C4) Pre application for proposed residential development at Land At Halbeath North Of Fife Circle Rail Line. It was noted that the developer proposes to introduce mitigation such as an alternative route for traffic (Northern Link Road) and electric vehicle charging points.

December 2017

17/03241/LBC (our ref PC170166.C6) Partial demolition and associated works at Pilmuir Works, Pilmuir Street, Dunfermline. Noted that an AQ assessment is to be submitted and that the demolition works map impact upon local AQ. AQ condition recommended.

17/02960/FULL (our ref PC170233.C2) Installation of electricity generation plan (19.9MW) and associated infrastructure at Land to North of Railway, Clockluine Road, Hillend. Additional AQ information appeared generally satisfactory. LAQT advised that SEPA's AQ specialist be consulted regarding their requirements for the facility.

17/03487/FULL (our ref PC170291.C1) External alterations including erection of biomass boiler and flue (in retrospect) at 11 Inzievar Courtyard, Inzievar, Oakley. Applicant to provide details of the biomass boiler by completing the Biomass Boiler Information Request Form.

17/02515/FULL (our ref PC170191.C1) Alterations to dwelling house including formation of recessed balcony, installation of flue and roof light at Bosuns Cottage, 11 East Shore, St Monans, Anstruther. Confirmed that the development involves a wood burning stove not a biomass boiler. No need for the Biomass Boiler Information Request Form to be completed.

17/03291/ARC (our ref PC120264.C5) Approval of matters specified by condition on 13/03683/EIA in relation to the mineral stabilisation for phase 1 extension are at Land to West of Wellwood Mills, Wellwood. Review of information submitted for 13/03683/EIA and associated applications noted that requested additional AQ information is yet to be provided. Advised that the AQ assessment should be updated where required and submitted for review. AQ condition recommended.

17/03956/SCO (our ref PC170197.C5) EIA Scoping request for residential led mixed-use development at Former Tullis Russell Mill, Glenrothes. Noted that the EIA report will include chapters covering AQ. The scoping report was noted to include details of proposed methodology and a number of points were brought to the attention of the applicant.

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring data

Nitrogen Dioxide

The 2018 APR has considered the available monitoring data measured during 2017. During 2017 non-automatic, diffusion tube monitoring was undertaken at 62 locations within Fife. There were no exceedances of the NO₂ annual mean objective at any automatic or non-automatic monitoring location during 2017. The highest annual mean concentration measured in Appin Crescent, Dunfermline during 2017 was 37 µg m⁻³ at Appin Crescent 6(A, B, C). The highest annual mean concentration measured in Bonnygate, Cupar during 2017 was 33 µg m⁻³ at Bonnygate B4.

During 2017 Bonnygate, Cupar B6 moved location to the other side of the A91 due to numerous no returns. Therefore, results have been reported as Bonnygate B6i between January and April 2017 and B6ii between May and December 2017. Due to very low data capture (17%) at Bonnygate B6i no annual mean has been reported, this monitoring location has now ceased monitoring. The annual mean concentration for 2017 at Bonnygate B6ii has been annualised in accordance with TG.16, further details are provided in Appendix D.

Monitoring commenced at Hendry Road, Kirkcaldy in May 2017 and at Links Crescent, St Andrews in October 2017. Therefore, annual mean concentrations have been annualised in accordance with TG.16, further details are provided in Appendix D.

The additional monitoring which commenced in 2016 within St Andrews town centre were all below the annual mean objective of 40 µg m⁻³ during 2017. The highest concentration measured during 2017 within St Andrews town centre was 31 µg m⁻³. Table A.2 in Appendix A shows the details of these monitoring locations.

Three AQMesh units have been procured and installed in December 2017 to seek to further understand pollutant concentrations and trends in the Appin Crescent, Dunfermline AQMA (2 x AQMesh units) and Bonnygate, Cupar AQMA (1 x AQMesh unit). The two AQMesh units at Appin Crescent, Dunfermline are co-located with the Appin Crescent 5 and 6 diffusion tube sites (OS Grid Ref 309957 687714 and 309904 687704 respectively) and the one AQMesh unit at Bonnygate, Cupar is co-located with the Bonnygate B4 diffusion tube site (OS Grid Ref 337467 714576). Analysis of the monitoring data from these units will be presented in the 2019 Annual Progress Report.

Particulate Matter

PM₁₀ concentrations are measured at four locations in Fife at Bonnygate, Cupar; Appin Crescent, Dunfermline; Admiralty Road, Rosyth and St Clair Street, Kirkcaldy. Measured 2017 concentrations were below the PM₁₀ annual mean objective with no exceedances of the annual mean or daily mean objective at all sites.

During 2017 PM_{2.5} was measured at four automatic monitoring sites in Bonnygate in Cupar, Admiralty Road in Rosyth, St Clair Street in Kirkcaldy and Appin Crescent in Dunfermline. 2017 is the first year where PM_{2.5} concentrations have been reported for Cupar. Last year's concentrations were reported for Kirkcaldy and Dunfermline; however, these concentrations were annualised in accordance with TG.16 as monitoring commenced during 2016. Measured 2017 concentrations were below the PM_{2.5} annual mean objective at all sites.

Sulphur Dioxide

No SO₂ concentrations were measured in Fife during 2017. Historical SO₂ monitoring data from the Longannet power station site is available in last year's APR report for Fife Council.

Carbon Monoxide

Short-term monitoring undertaken by Fife Council's Transportation Services department during 2017 indicates that the AQS objective for CO is unlikely to have been exceeded during 2017.

1,3 Butadiene and Benzene

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

A summary of the monitoring data from BP Production and Exploration, Houndpoint, and subsequently INEOS FPS from 1st November 2017 states that concentrations of most of the monitored substances in 2017 were lower than 2016 at most locations.

The draftt Mossmorran & Braefoot Bay Independent Air Quality Monitoring Review Group (referred to from now on as the Review Group) 2017 Annual Report states that the work undertaken by the Review Group in 2017 demonstrates 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. In the areas around Mossmorran and Braefoot Bay, the 2010 air quality objective for benzene is being readily satisfied.

As previously reported to the relevant Council Committee, a number of complaints were received regarding the flaring incident at the Mossmorran plant in June 2017, these are outlined in Section 3.2.6 above.

6.2 Conclusions Relating to New Developments

Fife Council have not identified any New Local Developments out with the applications previously considered and assessed by Fife Council where there may be a risk of the air quality objectives being exceeded. Therefore, no additional air quality assessment is recommended at this time.

6.3 Proposed Actions

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

1. Continue the additional monitoring for NO₂ which commenced in 2016 within St Andrews Town Centre to ensure ongoing compliance with Air Quality Objectives. Consider relocating or extending monitoring within St Andrews to locations where relevant exposure is present.
2. Submit the next Air Quality Progress Report in June 2019.
3. Maintain the current monitoring programme.
4. Continue to implement the measures outlined in the action plans for Appin Crescent, Dunfermline and Bonnygate, Cupar.

Fife Council confirms it will undertake these recommended actions.

Appendices

Appendix A: Monitoring Results

Appendix B: Full Monthly Diffusion Tube Results for 2017

Appendix C: Data QA/QC

Appendix D: Annualisation of Data

Appendix E: ECO Stars Scheme

Appendix F: Technical Specification of Automatic Monitoring Equipment

Appendix A – Monitoring Results

Table A. 1 - Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Inlet Height (m)
Bonnygate, Cupar	Kerbside	337403	714571	NO ₂ , PM ₁₀ , PM _{2.5}	Y	NO _x Analyser (Chemiluminescence), TEOM-FDMS (until December 2016), FIDAS since December 2016)	N (1m)	<0.5m	1.9m
Appin Crescent, Dunfermline	Roadside	309926	687722	NO ₂ , PM ₁₀ , PM _{2.5}	Y	NO _x Analyser (Chemiluminescence), TEOM-FDMS (until September 2016), FIDAS since September 2016)	Y (1m)	4m	2m
Admiralty Road, Rosyth	Roadside	311755	683503	NO ₂ , PM ₁₀ , PM _{2.5}	N	NO _x Analyser (Chemiluminescence), TEOM-FDMS (until July 2015), FIDAS (since July 2015)	Y (1.5m)	6m	2.1m
St Clair Street, Kirkcaldy	Roadside	329143	692986	NO ₂ , PM ₁₀ , PM _{2.5}	N	NO _x Analyser (Chemiluminescence), TEOM-FDMS (until April 2016), FIDAS since April 2016)	N (10m)	5m	2m

Table A. 2 - Details of Non-Automatic Monitoring

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?
West Area								
St Leonards Primary School, Dunfermline	R(F)	309787	686549	NO ₂	N	Y	10.6	N
Carnegie Drive (A,B,C), Dunfermline*	R(F)	309023	687632	NO ₂	N	Y	2.3	N
Rumblingwell, Dunfermline (5N)	R	307898	688224	NO ₂	N	N (6.3)	1.7	N
Appin Crescent (A)(B)(C), Dunfermline (9N)*	R	309900	687716	NO ₂	Y	N (5.1)	1.6	N
Appin Crescent (1) Dunfermline	R(F)	309888	687719	NO ₂	Y	Y	6.5	N
Appin Crescent (2) Dunfermline	R(F)	309883	687701	NO ₂	Y	Y	1.5	N
Appin Crescent (3) Dunfermline	R(F)	309975	687716	NO ₂	Y	Y	1.8	N
Appin Crescent 4(A)(B)(C) Dunfermline*	R(F)	309926	687722	NO ₂	Y	Y	3.9	Y
Appin Crescent 5(A)(B)(C)*	R(F)	309957	687714	NO ₂	Y	Y	1.5	N
Appin Crescent 6(A)(B)(C)*	R(F)	309904	687704	NO ₂	Y	Y	1.5	N
High Street, Cowdenbeath	K	316527	691742	NO ₂	N	N (3.5)	0.5	N

North Approach Road (A, B) Kincardine	K	293182	687527	NO ₂	N	N (11.0)	0.5	N
11 Halbeath RD1, Dunfermline	R (F)	310245	687784	NO ₂	N	Y	14	N
57 Halbeath RD2, Dunfermline	R (F)	310488	687873	NO ₂	N	Y	6	N
Admiralty Road A, Rosyth	R(F)	312069	683431	NO ₂	N	Y	9	N
Admiralty Road (A,B,C) ROMON*	R(F)	311755	683503	NO ₂	N	Y	6.5	Y
229 Admiralty Road, Rosyth	R (F)	311384	683543	NO ₂	N	Y	11	N
49 Ramsay Place, Rosyth	R (F)	311633	683488	NO ₂	N	Y	14	N
129 Admiralty Road, Rosyth	R (F)	311960	683477	NO ₂	N	Y	12	N
Pilmuir Road, Dunfermline	R	309143	687774	NO ₂	N	Y	2	N
Mill Street, Dunfermline	R	308888	687968	NO ₂	N	Y	2	N
42 Chalmers Street, Dunfermline- to replace Pittencrieff Street	R	308808	687555	NO ₂	N	Y	1.8	N
Central Area								
St Clair Street (1), Kirkcaldy	R	329157	693030	NO ₂	N	N (2)	1.3	N
St Clair Street (2), Kirkcaldy	R	329131	693008	NO ₂	N	N (2)	1.8	N
St Clair Street (3), Kirkcaldy	R(F)	329174	693069	NO ₂	N	Y	2	N

St Clair Street ROMON (A,B,C,)* Kirkcaldy	R	329143	692986	NO ₂	N	N(10.0m)	5	Y
Dunnikier Rd, Kirkcaldy	R(F)	328152	692352	NO ₂	N	Y	3.4	N
Victoria Rd, Kirkcaldy	R(F)	328144	692315	NO ₂	N	Y	2.5	N
Glenlyon Road, Levenmouth	K	337357	701318	NO ₂	N	N (26.8)	1	N
Leslie High St	R(F)	325111	701806	NO ₂	N	Y	3	N
Queensway, Glenrothes	K	327849	701114	NO ₂	N	N (17.0)	1	N
Adsa Roundabout, Kirkcaldy	K	328742	694045	NO ₂	N	N (28.0)	1	N
125 St Clair Street, Kirkcaldy	R(F)	329208	693163	NO ₂	N	Y	1.5	N
179A St Clair Street, Kirkcaldy	R(F)	329310	693326	NO ₂	N	Y	1.5	N
3A Junction Road, Kirkcaldy	R(F)	329123	693029	NO ₂	N	Y	1.5	N
24 St Clair Street, Kirkcaldy	R(F)	329091	692682	NO ₂	N	Y	1.5	N
Hendry Road Kirkcaldy	R	327437	692270	NO ₂	N	N (16)	1.7	N
				East Area				
City Road (1,2), St Andrews	R	350590	716570	NO ₂	N	N (1.0)	1.5	Y
Bell Street (1,.) St Andrews	R(F)	350712	716691	NO ₂	N	Y	1.6	N
Bell Street (2) St Andrews	R(F)	350721	716646	NO ₂	N	Y	2.1	N

Crossgate, Cupar	K	337536	714537	NO ₂	Y	N (3.0)	0.5	N
South Road, Cupar	R	337513	713616	NO ₂	N	N (17.0)	1.8	N
Cupar Road, Auchtermuchty	R(F)	324186	711800	NO ₂	N	Y	1.8	N
Bonnygate, Cupar (1N), Bonnygate 1	R(F)	337409	714570	NO ₂	Y	Y	5.3	N
Bonnygate, Cupar, Bonnygate 2	R(F)	337507	714584	NO ₂	Y	Y	1.7	N
Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	337480	714586	NO ₂	Y	Y	1.6	Y
Bonnygate, Cupar, Bonnygate B4	R(F)	337467	714576	NO ₂	Y	Y	1.9	N
Ladywynd, Cupar, Ladywynd B5	R(F)	337405	714596	NO ₂	Y	Y	1	N
Bonnygate West, Cupar, Bonnygate B6i	R(F)	337342	714579	NO ₂	Y	Y	3.2	N
Bonnygate, Cupar, Bonnygate B6ii	R	337333	714559	NO ₂	Y	N (4)	3	N
Bonnygate, Cupar, Monitor BA, BB, BC *	K	337403	714571	NO ₂	Y	N (4.8)	0.6	Y
4 East Road, Cupar	R(F)	337915	714721	NO ₂	Y	Y	14	N
City Rd. (3), St Andrews	R	350538	716682	NO ₂	N	N (14m)	1.5	N
City Rd. (4) St Andrews	R	350523	716725	NO ₂	N	N (26m)	2.2	N
City Rd. (5) St Andrews	R	350499	716748	NO ₂	N	N (5m)	1.9	N
City Rd. (6) St Andrews	R	350470	716826	NO ₂	N	N (5m)	2.2	N
St Marys St. (1) St Andrews	R	351667	715969	NO ₂	N	Y	3.5	N

St Mary's St. (2) St Andrews	R	351627	716143	NO ₂	N	N (4m)	1.8	N
Lamond Dr. (1) St Andrews	R	351601	715956	NO ₂	N	N (7m)	1.8	N
8 Balgarvie Rd, Cupar	R(F)	336669	714719	NO ₂	N	Y	10	N
The Orchard, Balgarvie Rd, Cupar	R	336826	714506	NO ₂	N	N (18m)	2	N
Links Crescent, St Andrews	R(F)	350156	716947	NO ₂	N	Y	3	N

Y= if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

*Triplicate sites

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

R =Roadside, 1-5m from the kerb. R (F) = Façade of buildings on street

UB = Urban background, >50m from any busy road.

Table A. 3- Annual Mean NO₂ Monitoring Results (µg m⁻³)

Site Name	Site Type	Valid Data Capture 2017 (%) ⁽²⁾	2012	2013	2014	2015	2016	2017
Appin Crescent, Dunfermline	Roadside	99	30	25	24	25	24	23
Bonnygate, Cupar	Kerbside	99	29	27	27	27	31	26
Admiralty Road, Rosyth	Roadside	99	28	25	25	23	25	22
St Clair Street, Kirkcaldy	Roadside	98	32	20	18	18	17	18

Notes: Exceedances of the NO₂ annual mean objective of 40 µg m⁻³ are shown in bold.

NO₂ annual means exceeding 60 µg m⁻³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in bold and underlined.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

NO₂ Annual Mean concentrations are presented in Figure A.1. Over the past five years NO₂ concentrations have declined and have generally stabilised between 2015 and 2017. In 2017 there was a decline in concentrations at all sites with the exception of Kirkcaldy, which increased from 17 µg m⁻³ to 18 µg m⁻³.

Figure A. 1 NO₂ annual mean 2012-2017 (µg m⁻³)

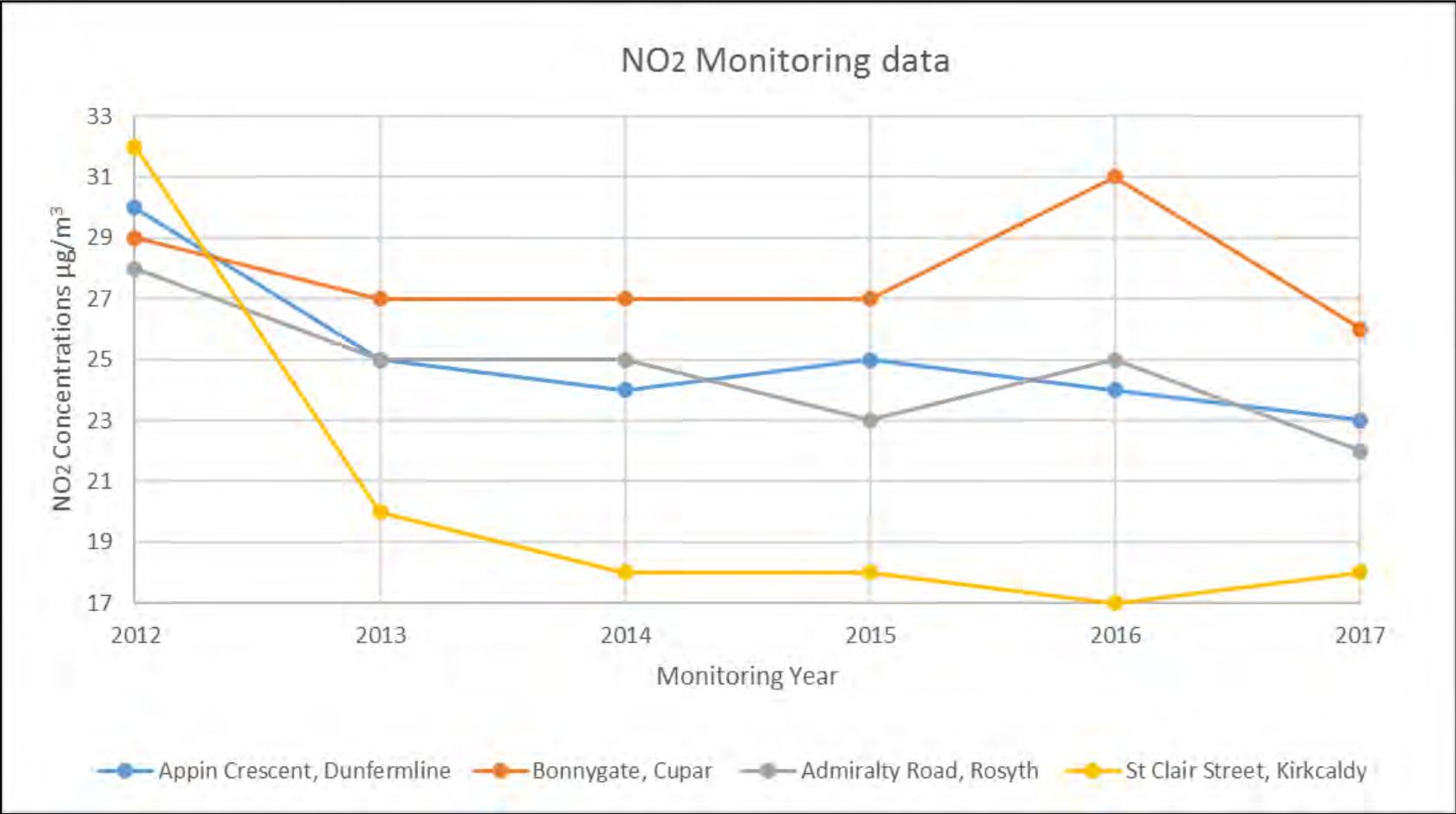


Table A. 4 - Annual mean NO₂ Monitoring Results- Non-Automatic sites ($\mu\text{g m}^{-3}$)

Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	2012	2013	2014	2015	2016	2017 BIAS Adjustment Factor (0.73)
Diffusion Tubes- West Area									
St Leonards Primary School, Dunfermline	R(F)	N/A	100	17	14	14	14	15	13
Carnegie Drive (A,B,C), Dunfermline	R(F)	N/A	83	35	31	32	30	30	26
Rumblingwell, Dunfermline (5N)	R	N/A	100	25	21	21	22	22	22
Appin Crescent (A)(B)(C), Dunfermline (9N)	R	N/A	100	34	31	31	32	31	29
Appin Crescent (1) Dunfermline	R(F)	N/A	100	27	25	26	27	25	25
Appin Crescent (2) Dunfermline	R(F)	N/A	100	41	39	39	40	38	34
Appin Crescent (3) Dunfermline	R(F)	N/A	100	39	33	33	35	32	29
Appin Crescent 4(A)(B)(C) Dunfermline	R(F)	N/A	100	28	25	25	25	24	23
Appin Crescent 5(A)(B)(C)	R(F)	N/A	100	42	36	36	39	35	35

Appin Crescent 6(A)(B)(C)	R(F)	N/A	100	46	40	40	43	39	37
High Street, Cowdenbeath	K	N/A	83	24	21	22	19	21	18
North Approach Road (A, B) Kincardine	K	N/A	100	19	17	16	16	16	16
Pittencrieff St, Dunfermline	R(F)	-	-	19	18	26	20	-	-
11 Halbeath RD1, Dunfermline	R (F)	N/A	100	21	18	17	18	17	16
57 Halbeath RD2, Dunfermline	R (F)	N/A	92	20	18	17	18	18	16
Admiralty Road A, Rosyth	R(F)	N/A	100	33	32	31	28	29	26
Admiralty Road (A,B,C) ROMON	R(F)	N/A	100	28	26	25	23	25	22
229 Admiralty Road, Rosyth	R (F)	N/A	100	24	22	22^	20	21	19
49 Ramsay Place, Rosyth	R (F)	N/A	100	19	18	17	14.6	16	14
129 Admiralty Road, Rosyth	R (F)	N/A	100	27	25	24	22	24	21
Pilmuir Road, Dunfermline	R	N/A	100	N/A	N/A	N/A	24	26	23
Mill Street, Dunfermline	R	N/A	100	N/A	N/A	N/A	28	30	30
42 Chalmers Street	R	N/A	100	N/A	N/A	N/A	N/A	21	19

Diffusion Tubes – Central Area									
St Clair Street (1), Kirkcaldy	R(F)	N/A	58	45	34	35	31	32	33*
St Clair Street (2), Kirkcaldy	R(F)	N/A	100	41	36	36	37	37	34
St Clair Street (3), Kirkcaldy	R(F)	N/A	100	34	30	31	27	28	25
St Clair Street ROMON (A,B,C,)Kirkcaldy	R	N/A	100	25	20	18	19	20	19
Dunnikier Rd, Kirkcaldy	R(F)	N/A	100	32	27	27	25	26	21
Victoria Rd, Kirkcaldy	R(F)	N/A	75	34	29	29	26	25	23
Glenlyon Road, Levenmouth	K	N/A	100	28	24	26	25	26	24
Leslie High St	R(F)	N/A	100	25	21	20	19	20	17
Queensway, Glenrothes	K	N/A	92	25	20	20	18	20	17
Adsa Roundabout, Kirkcaldy	K	N/A	100	33	30	28	26	28	24
125 St Clair Street, Kirkcaldy	R(F)	N/A	100	-	31	31	32	32	29
179A St Clair Street, Kirkcaldy	R(F)	N/A	100	-	27	26	27	28	26
3A Junction Road, Kirkcaldy	R(F)	N/A	100	-	27	27	26	27	22
24 St Clair Street, Kirkcaldy	R(F)	N/A	83	-	19	20	20	20	19
Hendry Road Kirkcaldy	R	100	67	-	-	-	-	-	26*

Diffusion Tubes - East Area									
City Road (1,2), St Andrews	R	N/A	92	30	27	25	23	24	20
Bell Street (1,), St Andrews	R(F)	N/A	92	39	35	32	32	30	27
Bell Street (2) St Andrews	R(F)	N/A	100	36	25	28	21 ^{^^}	26	24
Crossgate, Cupar	K	N/A	83	24	26	21	21	20	18
South Road, Cupar	R	N/A	100	14	12	11	12	12	10
Cupar Road, Auchtermuchty	R(F)	N/A	100	28	25	22	22	25	21
Bonnygate, Cupar (1N), Bonnygate 1	R(F)	N/A	100	29	22	26	27	25	24
Bonnygate, Cupar, Bonnygate 2	R(F)	N/A	100	36	32	26	29	32	28
Bonnygate, Cupar, Bonnygate 3 (A, B)	R(F)	N/A	100	37	31	34	39	37	31
Bonnygate, Cupar, Bonnygate B4	R(F)	N/A	92	34	35	32	36	41	33
Ladywynd, Cupar, Ladywynd B5	R(F)	N/A	100	18	18	16	16	15	14
Bonnygate West, Cupar, Bonnygate B6i	R(F)	50	17	21	19	19	18	18	#Not reported due to low DC
Bonnygate West, Cupar, Bonnygate B6ii	R(F)	100	67	-	-	-	-	-	20*

Bonnygate, Cupar, Monitor BA, BB, BC	K	N/A	100	30	30	28	27	27	26
4 East Road, Cupar	R(F)	N/A	100	14	15	13	12	12	12
City Rd. (3), St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	25	22
City Rd. (4) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	23 ^{^^}	18
City Rd. (5) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	29 ^{^^}	23
City Rd. (6) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	42^{^^} ((33))	31
St Marys St. (1) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	19 ^{^^}	14
St Mary's St. (2) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	15 ^{^^}	12
Lamond Dr. (1) St Andrews	R	N/A	100	N/A	N/A	N/A	N/A	13 ^{^^}	9
8 Balgarvie Rd, Cupar	R(F)	N/A	100	N/A	N/A	N/A	N/A	#Not reported due to low DC	8
The Orchard, Balgarvie Rd, Cupar	R	N/A	100	N/A	N/A	N/A	N/A	#Not reported due to low DC	13
Links Crescent, St Andrews	R(F)	100	25	-	-	-	-	-	19*

Notes: Exceedances of the NO₂ annual mean objective of 40 µg m⁻³ are shown in **bold**. NO₂ annual means exceeding 60µg m⁻³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C

^ Data annualised (R_a of 0.986 applied to Bias corrected data) to compensate for May to December missing data

^^ 2015 data annualised, adjustment factor of 0.99 to calculate annual mean from period mean concentrations as described in TG(16)

^^^ Data Annualised as described in TG.16. Full details in 2017 APR report.

(()) Data distance corrected to nearest receptor, using LAQM NO₂ fall off calculator

*Annualised in accordance with TG.16. Full details in Appendix C.

Table A. 5 - 1-Hour Mean NO₂ Monitoring Results (NO₂ 1-Hour Means > 200 µg m⁻³)

Site Name	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	2012 ⁽³⁾	2013 ⁽³⁾	2014 ⁽³⁾	2015 ⁽³⁾	2016 ⁽³⁾	2017 ⁽³⁾
Appin Crescent, Dunfermline	Automatic	n/a	99	0	0	0	0	0	0
Bonnygate, Cupar	Automatic	n/a	99	0	0 (117)	0 (115)	0	0	0
Admiralty Road, Rosyth	Automatic	n/a	99	0	0	0 (105)	0	0	0
St Clair Street, Kirkcaldy	Automatic	n/a	98	0	0	0	0	0	0

Notes: Exceedances of the NO₂ 1-hour mean objective (200 µg m⁻³ not to be exceeded more than 18 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A. 6- Annual Mean PM₁₀ Monitoring Results ($\mu\text{g m}^{-3}$)

Site Name	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	2012 ⁽³⁾	2013 ⁽³⁾	2014 ⁽³⁾	2015 ⁽³⁾	2016 ⁽³⁾	2017 ⁽³⁾
Appin Crescent, Dunfermline	n/a	100	15	15	15	16	13	10
Bonnygate, Cupar	n/a	91	18	(18) 18	17	17	15	13
Admiralty Road, Rosyth	n/a	95	17	14	15	14	10	11
St Clair Street, Kirkcaldy	n/a	100	11	12	11	13	10	9

Notes: Exceedances of the PM₁₀ annual mean objective of 18 $\mu\text{g m}^{-3}$ are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been “annualised” as per LAQM.TG(16), where valid data capture for the full calendar year is less than 75%. See Appendix C for details.

() Data in brackets are Measurements without a period mean adjustment calculated

PM₁₀ Annual Mean concentrations are presented in Figure A.2. Over the past five years PM₁₀ concentrations have declined. The decline in concentrations coincide with implementation of certain AQAP measures.

Figure A. 2 PM₁₀ Annual Mean Concentrations 2012-2017 (µg m⁻³)

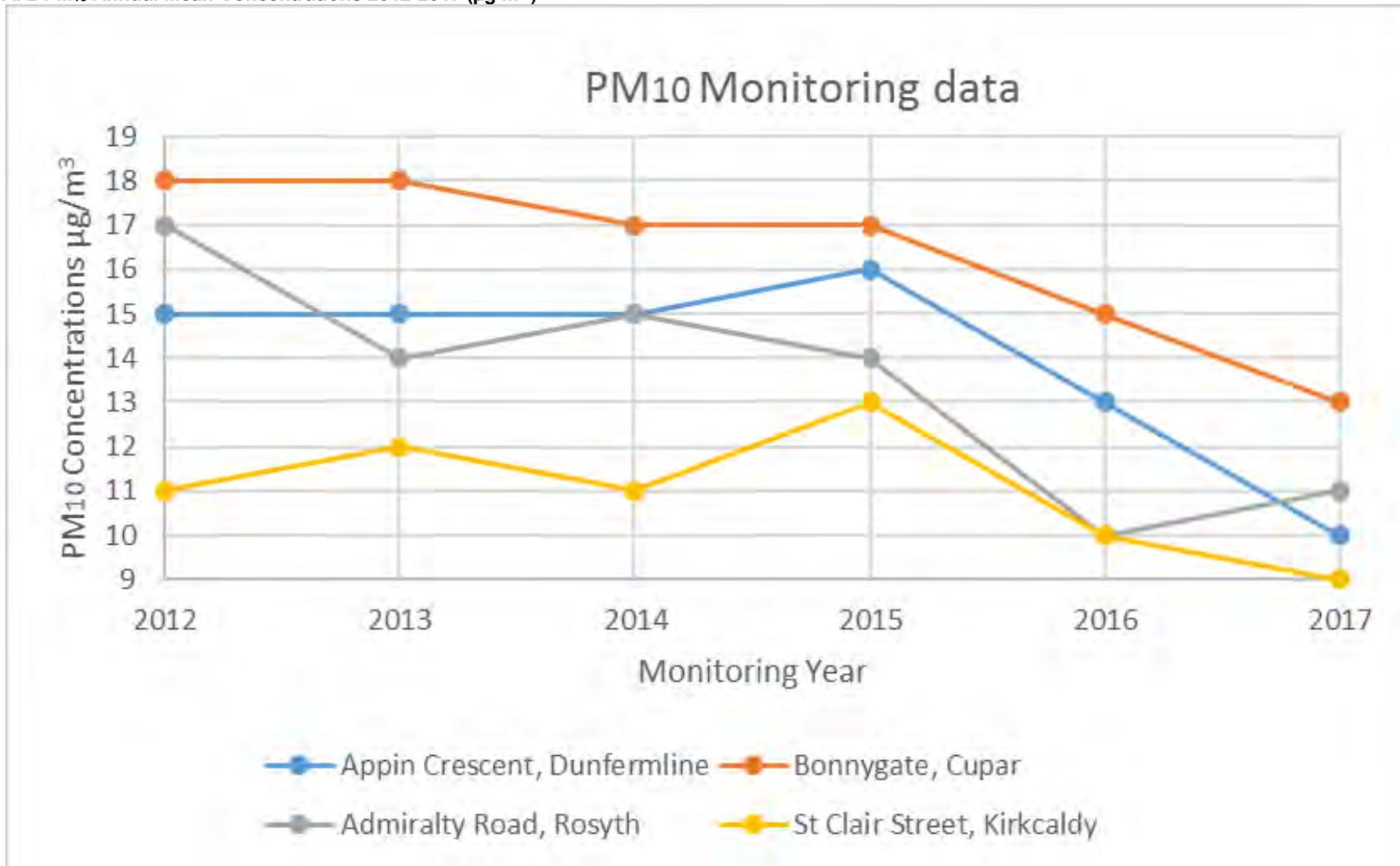


Table A. 7- 24- Hour Mean PM₁₀ Monitoring Results (PM₁₀ 24-Hour Means > 50 µg m⁻³)

Site Name	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	2012 ⁽³⁾	2013 ⁽³⁾	2014 ⁽³⁾	2015 ⁽³⁾	2016 ⁽³⁾	2017 ⁽³⁾
Appin Crescent, Dunfermline	n/a	100	4	2	0	2 (25)	1	0
Bonnygate, Cupar	n/a	91	4	4 (45)	0 (39)	2 (27)	0	1
Admiralty Road, Rosyth	n/a	95	1	2	0 (37)	3 (24)	1	1
St Clair Street, Kirkcaldy	n/a	100	1	1	1 (25)	2	0	0

Notes: Exceedances of the PM₁₀ 24-hour mean objective (50 µg m⁻³ not to be exceeded more than 7 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 90%, the 98.1th percentile of 24-hour means is provided in brackets.

Table A. 8- Annual Mean PM_{2.5} Monitoring Results ($\mu\text{g m}^{-3}$)

Site Name	Valid Data Capture 2017 (%) ⁽²⁾	2012 ⁽³⁾	2013 ⁽³⁾	2014 ⁽³⁾	2015 ⁽³⁾	2016 ⁽³⁾	2017 ⁽³⁾
Appin Crescent, Dunfermline	100	-	-	-	-	6 ^{^^^}	6
Bonnygate, Cupar	91	-	-	-	-	-	6
Admiralty Road, Rosyth	95	-	-	-	7 ^{^^}	6	6
St Clair St, Kirkcaldy	100	-	-	-	-	5.1 ^{^^^}	5

Notes:

- (1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) All means have been “annualised” as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix D for details.
- ^{^^} Data annualised as detailed in 2016 Annual Progress Report
- ^{^^^} Data annualised as outlined in 2017 Annual Progress Report

Appendix B - Full Monthly Diffusion Tube Results for 2017

Table B. 1- NO₂ Monthly Diffusion Tube Results for 2017 (µg m⁻³)

Site Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean Raw	Annual Mean Bias Adjusted ⁽¹⁾
Diffusion Tubes-West Area														
St Leonards Primary School, Dunfermline	27.2	21.8	22.2	14.1	13.6	12.9	12.2	14.7	18.1	16.5	25.3	24.2	18.6	13.5
Carnegie Drive (A), Dunfermline	43.6	43.8	42.8	24.9	35.9	30.4	29.8	-	34.2	32.6	36.9	35.9		
Carnegie Drive (B), Dunfermline	42.8	45.8	41	26.6	37.7	29.3	31.3	-	38.1	35.4	38.1	35.3	35.9	26.1
Carnegie Drive (C), Dunfermline	41.7	43	-	27	37.3	30.2	30.5	-	38.8	34.6	37.6	36.1		
Rumblingwell, Dunfermline (5N)	39.2	36.1	32.9	24.7	24.9	22.8	20.7	27	31.9	28.1	41.4	40.4	30.8	22.4
Appin Crescent (A), Dunfermline (9N)	54	48.9	50.1	34.9	32	33.2	25.2	31.5	38.5	40.5	59.4	55.7		
Appin Crescent (B), Dunfermline (9N)	53.6	48.7	44	38.3	30.2	32.2	28.6	34.3	38.7	38.8	59.1	54.3	40.5	29.4
Appin Crescent (C), Dunfermline (9N)	50	42.4	43.8	29	26.7	27.9	29.2	34.9	33.4	35.2	47.6	52.9		
Appin Crescent (1) Dunfermline	44.9	37.4	37.4	29.4	24	39.6	23	28.5	31.3	28.6	43.8	45	34.4	25.0
Appin Crescent (2) Dunfermline	54.7	57.3	57.3	30.9	41.7	31.8	35.5	42.8	48.5	45.8	64	52.5	46.9	34.1
Appin Crescent (3) Dunfermline	50.2	49.1	49.1	33	34	22.6	21.7	37.2	40.4	36.5	54.5	51.7	40.0	29.1
Appin Crescent 4(A) Dunfermline	44	36.6	38.4	24.7	21.7	23	20.4	25.1	30.2	30.3	45.8	43.2		
Appin Crescent 4(B) Dunfermline	41.9	36.3	39.6	28.2	23.3	23	20.5	24.9	30.2	30.4	43.7	43	31.9	23.1
Appin Crescent 4(C) Dunfermline	41.5	37.6	37.2	25.6	21.8	23.6	20.9	25.7	28.1	29.3	42.2	44.8		
Appin Crescent 5(A)	61.3	53.5	54.1	47.4	34.6	38.2	32.9	43.4	43.6	45.3	65	63	48.5	35.2
Appin Crescent 5 (B)	61.5	53.9	55.3	39.7	37.3	38	34.1	44.3	43.2	44.7	62.7	63.8		
Appin Crescent 5(C)	61.5	53.9	56.7	46.2	35.8	38.4	33.3	44.5	44.7	42.4	64.3	62.6		
Appin Crescent 6(A)	63	63.4	57.5	40.5	43.6	41.9	38.3	47.2	51.3	51.2	63.7	52.1		37.1

Appin Crescent 6(B)	60.9	57.8	59	45	44	42.7	39.2	48.9	53.2	51.2	68.3	65.8	51.1	
Appin Crescent 6(C)	54.9	57.8	58.6	44.5	42.1	39.2	36.4	46.2	46.4	44.4	60.1	58.6		
High Street, Cowdenbeath	30.6	-	29.9	13.9	20.9	19.1	18.1	17.7	26	<0.5	43.5	25	24.5	17.8
North Approach Road (A) Kincardine	33.8	23	24.8	15.6	15.6	14	13.2	16.2	18.9	18.9	36.3	34.9	21.8	15.8
North Approach Road (B) Kincardine	31.1	24	25.2	14.8	15.6	12.1	12	15.5	19.2	19.7	36.3	32.5		
11 Halbeath RD1, Dunfermline	30.6	24.4	27.9	15.8	15.3	15.4	14.6	17.9	20.4	19.4	29.1	29.5	21.7	15.8
57 Halbeath RD2, Dunfermline	32.8	26.5	27.5	-	15.5	15.2	14.3	17.4	19.4	19.9	28.4	31.5	22.6	16.4
Admiralty Road A, Rosyth	49.6	45.2	44.2	31.8	28.7	25.2	27.7	29.2	33.6	30.1	43.8	40.8	35.8	26.0
Admiralty Road (A) ROMON	37.4	34.5	37.2	24.2	25.9	23.8	21.1	23.4	31.1	27.5	38.1	39		
Admiralty Road (B) ROMON	39.8	37.2	36.5	21.8	25.6	23.2	20	22.6	30.4	24.5	35.5	37.4	30.0	21.8
Admiralty Road (C) ROMON	38.5	35.3	35.3	25.4	26.1	22.6	21.6	23.4	31.1	25.5	37.3	38.6		
229 Admiralty Road, Rosyth	35.7	29.5	31.9	22.7	19	18.5	16.7	19.4	25.1	22.2	33	36.3	25.8	18.8
49 Ramsay Place, Rosyth	28.1	23.4	23.6	11.5	16.4	13.7	13.6	14.5	17.9	15.7	23.1	23.8	18.8	13.6
129 Admiralty Road, Rosyth	37.2	35.3	34.5	25.1	23.9	23.8	20.9	23.8	28.1	23.9	31.8	36.3	28.7	20.9
Pilmuir Road, Dunfermline	41.3	35.5	37	24.9	25.3	26.5	20.7	27	31.7	26.4	40.2	42.8	31.6	23.0
Mill Street, Dunfermline	47	45.8	44.2	32.8	31.5	30.4	28.4	37.2	42.3	38.4	59.7	54.3	41.0	29.8
42 Chalmers St	34.3	29.1	30.9	18.9	22.5	21.3	20.4	21.3	24.7	24.7	32.7	34.9	26.3	19.1
Diffusion Tubes- Central Area														
St Clair Street (1), Kirkcaldy	-	43.6	46.8	30.4	44	30.4	31.6	-	-	33.5	-	-	37.2	*
St Clair Street (2), Kirkcaldy	57.5	49.3	55.5	50.3	37.9	39.3	24.5	44.7	45.1	44.3	60.4	59.8	47.4	34.4
St Clair Street (3), Kirkcaldy	40.6	42.2	42.1	26.5	38.6	29.9	29.1	29.1	33.2	31.4	32.2	34.2	34.1	24.8
St Clair Street ROMON (A)Kirkcaldy	35.5	28.5	28.5	22.6	17.7	18.8	15.9	21.5	23.2	22	33.3	37.2	25.4	18.5
St Clair Street ROMON (B) Kirkcaldy	37.2	30.5	27.9	22.4	18.2	19.2	15.9	21.3	23.4	22.7	34.3	35.3		

St Clair Street ROMON (C) Kirkcaldy	37	29.1	29.2	22	17.9	18.6	16.1	18.7	22.2	22.3	35	34.1		
Dunnikier Rd, Kirkcaldy	35.5	32.9	36.2	23	30	26	22.5	25.4	30.2	27.6	33.8	30.9	29.5	21.4
Victoria Rd, Kirkcaldy	40.6	30.9	33	26.7	32.7	26	24.3	28.3	-	-	-	42.4	31.7	23.0
Glenlyon Road, Levenmouth	41.9	35.3	31.5	20.5	31.4	28.2	27	31.2	35.5	31.7	42.8	36.9	32.8	23.8
Leslie High St	31.3	29.9	28.7	20.3	22	16.9	16.4	19.1	22.2	19.5	28.6	28.1	23.6	17.1
Queensway, Glenrothes	31.1	27.1	25.3	18.9	23	18.8	18.4	18.5	-	19.9	30.2	30.6	23.8	17.3
Asda Roundabout, Kirkcaldy	39.2	36.8	39.2	23.8	34.8	28.7	27.9	30.8	31	33.3	39.4	35.4	33.4	24.2
125 St Clair Street, Kirkcaldy	48.7	45	40.9	39.6	30.2	31.8	28.7	38.4	34.5	35.6	54.8	53	40.1	29.1
179A St Clair Street, Kirkcaldy	47.9	38	39.4	33	26.6	27.6	25.2	32	35.9	29.1	47.1	47.9	35.8	26.0
3A Junction Road, Kirkcaldy	36.6	36.3	35.1	25.2	34.1	26.4	23.7	26.1	32.4	26.8	32.5	34.9	30.8	22.4
24 St Clair Street, Kirkcaldy	32.8	-	26.6	20.1	20.8	-	17.7	22	24.8	23	31.8	36.1	25.6	18.6
Hendry Road Kirkcaldy	-	-	-	-	28.1	29.9	25.9	31.2	33.4	31	39.7	38	32.2	26.4*
Diffusion Tube – East Area														
City Road (1), St Andrews	29.8	37.5	31.5	24.6	30.2	20.1	24.6	21.3	30.1	24.5	28.6	25	27.7	20.1
City Road (2), St Andrews	31.4	37.3	32.8	24.6	32.2	24	24.3	23.6	-	22.8	29.2	27.5		
Bell Street (1,), St Andrews	48.8	47.2	45.5	36.5	-	30.4	26.5	27.3	32.7	33.2	43.9	40	37.5	27.2
Bell Street (2) St Andrews	39.6	43.3	41.9	33.9	31.4	26.1	22	24.8	29.9	30.4	44.2	37.2	33.7	24.5
Crossgate, Cupar	28.3	31.8	27.4	19.1	25.6	18.1	19	-	19.6	-	26.3	27.4	24.3	17.6
South Road, Cupar	24.1	19.3	17.9	10.7	9.4	9	8.3	9.2	11.7	10.8	21.4	20.3	14.3	10.4
Cupar Road, Auchtermuchty	38.9	31.6	34.7	25.4	21.7	24.2	21.5	27.1	27.1	26.6	36.2	31.1	28.8	20.9
Bonnygate, Cupar (1N), Bonnygate 1	39.3	36.3	39.2	27.3	30.2	24.4	25.2	29.8	35.1	32.7	38.8	38.3	33.05	24.0
Bonnygate, Cupar, Bonnygate 2	49.3	41.4	44.3	36.7	35.9	32.4	29.8	34.3	35.9	35.8	46.8	46.3	39.1	28.4
Bonnygate, Cupar, Bonnygate 3 (A)	49.3	49.4	47.7	39.4	42.7	39.4	34.2	38.8	41.6	34.6	47.4	46.9	42.2	30.7
Bonnygate, Cupar, Bonnygate 3 (B)	46.6	44.5	47.4	35.3	41.9	34.5	32.9	36.1	42.6	36.6	55.4	48.7		

Bonnygate, Cupar, Bonnygate B4	63.4	-	53.6	39.8	40.9	39.8	36.1	43.3	45	40.7	51.4	46.8	45.5	33.1
Ladywynd, Cupar, Ladywynd B5	27.2	25.2	22.6	15.4	14.8	13.5	13.1	15.8	18.8	17.4	25.6	24.8	19.5	14.2
Bonnygate West, Cupar, Bonnygate B6i	28.5	26.5	-	-	Monitoring ceased								# DC too low to report	
Bonnygate West, Cupar, Bonnygate B6ii	-	-	-	-	22.7	21.3	17.6	21.7	24.4	24.8	35.7	30.6	24.9	20.5*
Bonnygate, Cupar, Monitor BA	44	40.6	43	30.6	33.2	30.4	28.7	32.2	38	33	41.6	40.7		
Bonnygate, Cupar, Monitor BB	44.6	44.5	44	30.2	33.3	29.3	27.1	31.6	35.5	33.2	43.3	39.6	36.4	26.4
Bonnygate, Cupar, Monitor BC	44.9	44.1	38.7	31.6	34.3	29.3	28.7	31	36.1	33	43.2	42.3		
4 East Road, Cupar	24.3	18.1	19.2	12.1	11.2	10.5	9.7	12.1	14.3	15.1	24.5	25.2	16.4	11.9
City Rd. (3), St Andrews	36	34.5	34	31	28.4	25.2	21.4	27.3	30.9	30.4	38	28.9	30.5	22.2
City Rd. (4) St Andrews	28.5	28.5	35.7	18.3	25.6	20.3	19.8	22.2	26	22.8	24.9	20.2	24.4	17.7
City Rd. (5) St Andrews	38.4	40	32.8	29.5	29.7	27.3	25.4	29.1	33.5	27.6	34.5	31.2	31.6	22.9
City Rd. (6) St Andrews	51.7	43.9	46.4	42.5	37.3	36.7	33.7	40	41.8	37.8	46.7	45.5	42.0	30.5
St Marys St. (1) St Andrews	27.4	20.9	21.1	17.6	13.8	15.2	5.9	16.4	19	20.4	26.1	22.5	18.9	13.7
St Mary's St. (2) St Andrews	23.2	18.7	17.9	14.6	13.3	12.7	10.9	15.4	17.4	17.7	22.6	19.2	17.0	12.3
Lamond Dr. (1) St Andrews	16.6	15.2	13.4	10.7	10.7	9.4	8.3	10.1	13.9	12.6	15.1	15.3	12.6	9.2
8 Balgarvie Rd, Cupar	17.7	14.4	12.8	6.8	7.2	6.8	6.1	7.4	9.5	9.8	15	14.3	10.7	7.7
The Orchard, Balgarvie Rd, Cupar	26.1	24.8	20.6	13.5	14.4	13.1	11.3	14.4	16	16.9	24	23.6	18.2	13.2
Links Crescent St Andrews	-	-	-	-	-	-	-	-	-	28.4	30.6	28.6	29.2	18.7*

(1) See Appendix C for details on bias adjustment

(2) Exceedances of the NO₂ annual mean objective of 40 µg m⁻³ are shown in bold.

(3) () Data distance corrected to nearest receptor, using LAQM NO₂ fall off calculator- Only conducted if exceedance.

(4) * 2017 data annualised, from period mean concentrations as described in TG(16)

(5) High Street, Cowdenbeath October tube result <0.5 -removed from results.

Appendix C - Data QA/QC

Diffusion Tube Bias Adjustment Factors

Diffusion tubes may over or under predict NO₂ concentrations when compared to the reference method chemiluminescent analyser. This difference in measurement is described as bias. Accuracy in results can be adjusted in order to account for this. Results are adjusted using a calculated 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 0.72 was reported in the national diffusion tube bias adjustment factor spreadsheet (version 03/18) shown below, using diffusion tubes prepared and analysed by Tayside Scientific Services during 2017.

Figures C2 – C5 show the locally derived adjustment factors. Overall the locally derived adjustment factor was 0.73, with a combined factor of 0.73 using both local and national adjustment. The combined adjustment factor of 0.73 has been used to bias correct the diffusion tube results within this report.

Figure C. 1 National BIAS Adjustment

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 03/18				
Follow the steps below in the correct order to show the results of relevant co-location studies						This spreadsheet will be updated at the end of June 2018 LAQM Helpdesk Website				
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods						Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet				
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.						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 Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data.	If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953						
Analysed By	Method	Year	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	Bias Adjustment Factor (A) (Cm/Dm)
Tayside Scientific Services	20% TEA in water	2017	R	Fife Council	12	30	22	36.9%	G	0.73
Tayside Scientific Services	20% TEA in water	2017	R	Fife Council	12	25	18	41.9%	G	0.70
Tayside Scientific Services	20% TEA in water	2017	R	Fife Council	12	32	22	45.6%	G	0.69
Tayside Scientific Services	20% TEA in water	2017	KS	Fife Council	12	36	26	38.8%	G	0.72
Tayside Scientific Services	20% TEA in water	2017	KS	Marylebone Road Intercomparison	12	103	79	31.2%	G	0.76
Tayside Scientific Services	20% TEA in water	2017	Overall Factor (5 studies)						Use	0.72

Figure C. 2 Local Bias adjustment spreadsheet- Cupar

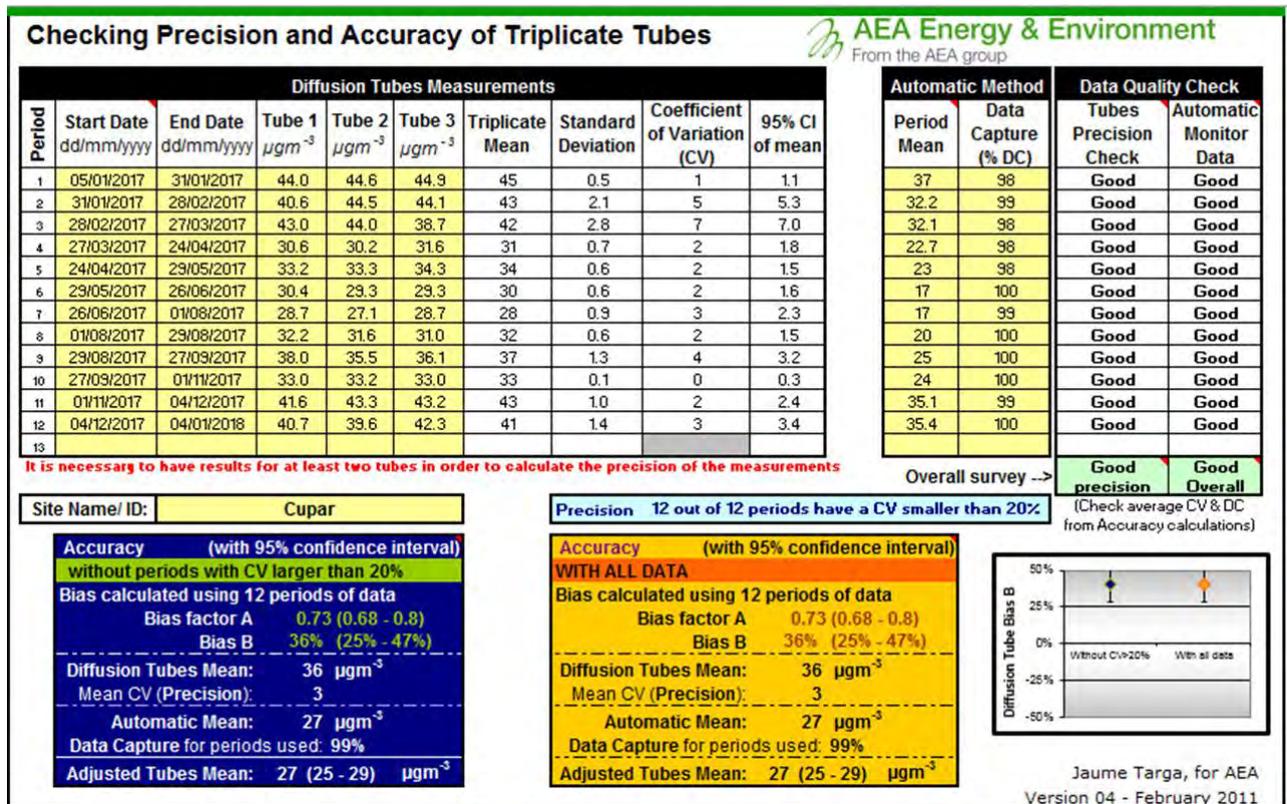


Figure C. 3 Local Bias Adjustment Factor spreadsheet- Dunfermline

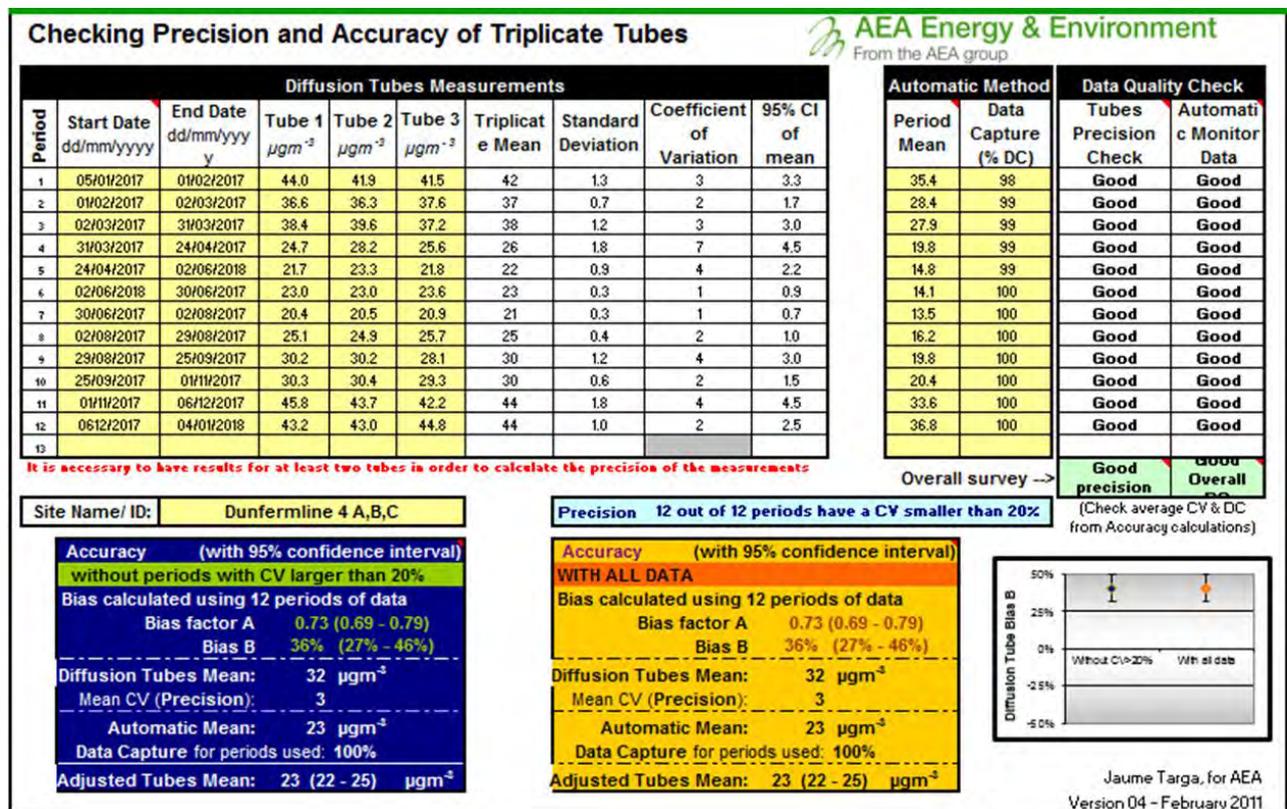


Figure C. 4 Local Bias Adjustment Factor spreadsheet- Kirkcaldy

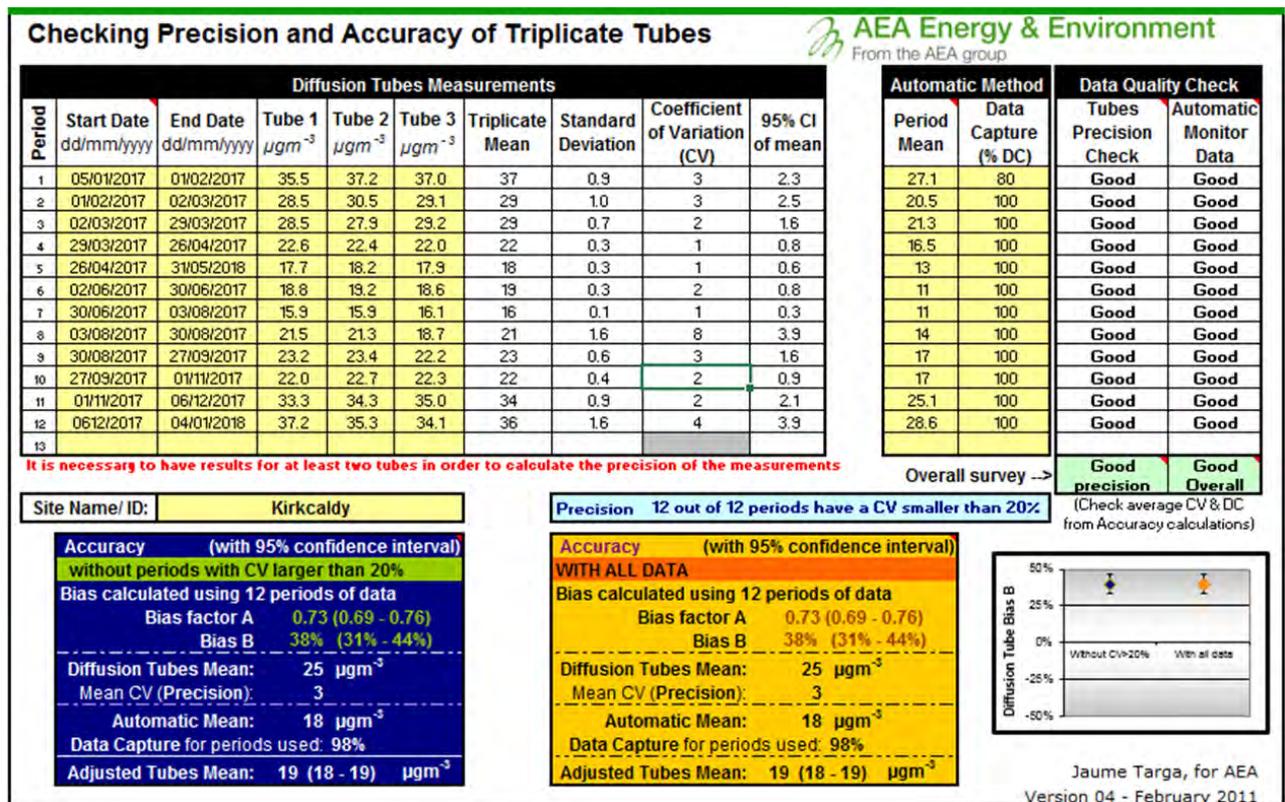
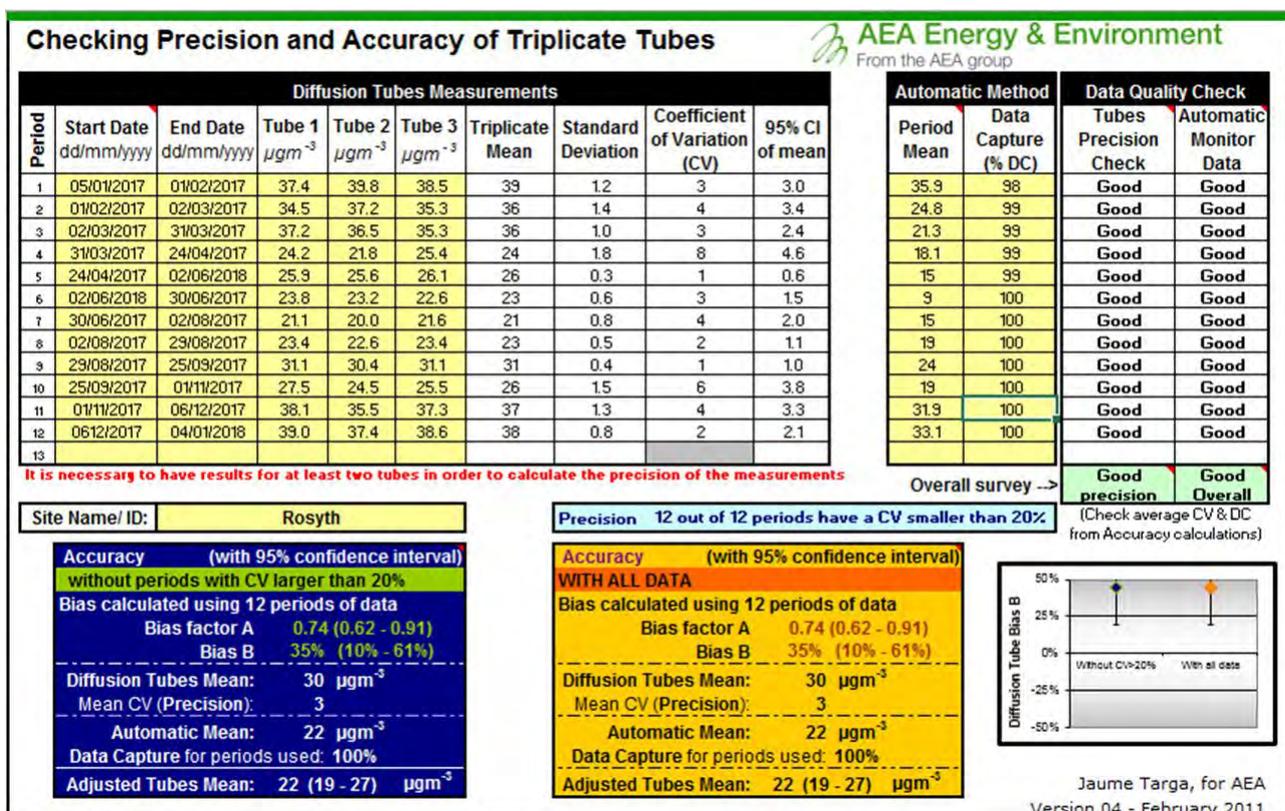


Figure C. 5 Local Bias Adjustment Factor Spreadsheet – Rosyth



QA/QC of Automatic Monitoring

The QA/QC procedures follow the requirements of the Technical Guidance (TG.16) 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 (TG.16), the following QA/QC procedures were implemented:

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

Calibrations of the NO_x analyser were carried out using certified compressed gas standards (ISO17025). This ensured that the calibration gas was traceable to national and international standards. FIDAS diagnostics were recorded and cal dust performed.

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 during the audit 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 scaled appropriately. Any suspect data identified are deleted therefore ensuring that the data are of a high quality.

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 tube preparation method is 20% TEA in water. The laboratory participates in the centralised QA/QC services provided by Defra and the devolved administrations. These services comprise of:

- Promotion of the independent AIR-PT scheme, operated by LGC Standards and supported by the Health and Safety Laboratory, with yearly assessment against agreed performance criteria. AIR-PT combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL Workplace Analysis Scheme for Proficiency (WASP) PT scheme.
- Provision of quality control standard solutions, free of charge to laboratories that prepare and analyse NO₂ diffusion tubes used by Local Authorities for LAQM purposes.

Bias Correction for Diffusion Tubes

Diffusion tube samplers are a simple and cost effective method of measuring NO₂. 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 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 have been 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 LAQM TG (16). The results are shown in Table C.1 below. The average of the bias adjustment factors is 0.73. The nationally derived bias adjustment factor was calculated as 0.72; using National Bias Adjustment Factor Spreadsheet (version number 03/18). A further bias adjustment factor has been calculated by combining both the locally and nationally derived factors.

For this report, in order to keep results comparable, the combined bias correction factor has been applied to all diffusion tubes. TG16 outlines that a combined approach should be used when:

Where the survey consists of tubes exposed over a range of settings, which differ from the co-location site, e.g. the co-location site is in a very exposed setting and the tubes being assessed are on building façade in a canyon-like street. As Cupar is situated in a street canyon the combined local and national bias adjusted factors have been applied across the entire dataset.

Table C. 1 Local BIAS adjustment factors

Source	Bias Adjustment Factors 2017
Appin Crescent, Dunfermline	0.73
Bonnygate, Cupar	0.73
Admiralty Road, Rosyth	0.74
St Clair Street, Kirkcaldy	0.73
Nationally Derived	0.72
Combined Bias factor (national and local)	0.73

Appendix D- Annualisation of Data

Data capture for the following sites was less than 75%, therefore the data was annualised in accordance with TG(16) as per Box 7.9.

- St Clair Street 1 Kirkcaldy-58%. Periods of valid data= 01/02/17-31/05/17, 02/06/17-03/08/17 and 27/9/17-1/11/17.
- Hendry Road Kirkcaldy-67%. Periods of valid data= 26/04/17-31/05/17 and 02/06/17-04/01/18.
- Links Crescent-25%. Periods of valid data= 27/09/17- 04/01/18.
- Bonnygate West B6ii- 67%. Periods of valid data= 24/04/17- 04/01/18.

Table D. 1 Annualisation of NO₂ Diffusion Tubes

Automatic Site	Automatic Site Annual mean 2017 (Am)	Automatic Site Period Mean 2017 (Pm) (St Clair Street 1)	Automatic Site Period Mean 2017 (Pm) (Hendry Road)	Automatic Site Period Mean 2017 (Pm) (Links Crescent)	Automatic Site Period Mean 2017 (Pm) (Bonnygate B6ii)
Bush Estate	5	4.2	4.1	4.8	4.1
Edinburgh St Leonards	20	16.1	18.4	25.0	18.3
Dundee Mains Loan	12	10.0	11.1	14.9	11.0
Average Ratio (Am/Pm)- St Clair Street 1				1.21	
Average Ratio (Am/Pm)- Hendry Road				1.13	
Average Ratio (Am/Pm)- Links Crescent				0.88	
Average Ratio (Am/Pm)- Bonnygate B6ii				1.13	
St Clair Street 1- Annual Mean ($\mu\text{g m}^{-3}$)				44.8	
St Clair Street 1- Annual Mean ($\mu\text{g m}^{-3}$) – BIAS Adjusted				32.5	
Hendry Road - Annual Mean ($\mu\text{g m}^{-3}$)				36.3	
Hendry Road - Annual Mean ($\mu\text{g m}^{-3}$) – BIAS Adjusted				26.4	
Links Crescent - Annual Mean ($\mu\text{g m}^{-3}$)				25.7	
Links Crescent - Annual Mean ($\mu\text{g m}^{-3}$) – BIAS Adjusted				18.7	
Bonnygate B6ii - Annual Mean ($\mu\text{g m}^{-3}$)				28.2	
Bonnygate B6ii - Annual Mean ($\mu\text{g m}^{-3}$) – BIAS Adjusted				20.5	

Appendix E- Fife ECO Stars Scheme

Fife ECO Stars for taxis and private hire vehicles has welcomed its 25th member – Kirkcaldy firm, Raith Taxis Ltd.

ECO Stars is a free scheme that provides tools and support for taxi and private hire operators to reduce costs and their environmental impact. Each scheme member gets a 1-5 Star rating based on an assessment of how 'clean' their vehicle fleet is and the best practice they demonstrate. Cllr Ross Vettrano, convener for environment, protective services and community safety committee said: *"Fife Council is delighted to welcome Raith Taxis as the 25th member of our ECO Stars Scheme for taxis and private hire vehicles. The ECO Stars scheme encourages operators to run their vehicles in the most efficient way. This reduces carbon emissions as well as the company's running costs, so everyone's a winner"*.

So far 25 operators, running over 130 vehicles have joined the scheme, showing they're committed to reducing air pollution in Fife. Ian Duncan, Raith Taxis Ltd said: *"We went for the ECO Stars Scheme because it's a great way of showing our customers that we are committed to being an eco-friendly and ethical supplier. The ECO Stars process helped us to identify ways in which we could improve further, and we are currently investigating several ways to reduce our emissions and measure our progress."* The scheme is managed by Transport Research Laboratory on behalf of Fife Council. Mark Cavers, ECO Stars said: *"We are delighted to see the scheme grow and welcome its 25th member. Fife Council have consistently adopted a pro-active approach towards reducing transport emissions and improving air quality in the local area. There are real benefits to joining the scheme, not only in terms of cost and fuel savings but to the environment."*



Appendix F Technical Specification of Automatic Monitoring Equipment

Appin Crescent Dunfermline



Station Name:	Appin Crescent, Dunfermline
Easting:	309926
Northing:	687722
Distance to kerb and road name/number	3m + (A907)
Site Classification:	Roadside
Manifold type and height:	Single Teflon tube, inlet height 2m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by Ricardo with Air Liquide gas cylinder
Pollutants measured on site:	PM ₁₀ , PM _{2.5} , PM ₁ , TSP, NO _x , NO, NO ₂
Instrument manufacturer:	FIDAS 200
Calibration procedure and frequency:	Thermo i-series 2 weekly manual calibrations
Site service arrangements:	6-monthly service by air monitors
Co-located passive sampler	Triplicate NO ₂ tubes installed

Bonnygate Cupar



Station Name:	Bonnygate, Cupar
Easting:	337403
Northing:	714571
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 1.9m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by Ricardo with Air Liquide gas cylinder
Pollutants measured on site:	PM ₁₀ , PM _{2.5} , PM ₁ , TSP, NO _x , NO, NO ₂
Instrument manufacturer:	FIDAS 200 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

Admiralty Road, Rosyth

Station Name:	Admiralty Road, Rosyth
Easting:	311755
Northing:	683503
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 2.1m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by Ricardo with Air Liquide gas cylinder
Pollutants measured on site:	PM ₁₀ , PM _{2.5} , PM ₁ , TSP, NO _x , NO, NO ₂
Instrument manufacturer:	FIDAS 200 NO _x – Thermo 42i
Calibration procedure and frequency:	2-weekly manual calibrations.
Site service arrangements:	6-monthly service by air monitors
Co-located passive sampler	Triplicate NO ₂ tubes installed

St Clair Street, Kirkcaldy

Station Name:	St Clair Street, Kirkcaldy
Easting:	329143
Northing:	692986
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 2m
Network affiliation:	Scottish Air Quality Database
Quality control procedures:	UKAS calibration by Ricardo with Air Liquide gas cylinder
Pollutants measured on site:	PM ₁₀ , PM _{2.5} , PM ₁ , TSP, NO _x , NO, NO ₂
Instrument manufacturer:	FIDAS 200 NO _x – Thermo 42i
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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AQS	Air Quality Strategy
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
CO	Carbon Monoxide
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10 µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5 µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide



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