Appin Crescent (Dunfermline)

Air Quality Action Plan

2021-2025

In fulfilment of Part IV of the

Environment Act 1995

Local Air Quality Management

Local Authority Officer	Kenny Bisset
Department	Land and Air Quality Team
Address	Protective Services Fife Council Fife House North Street Glenrothes Fife KY7 5LT
Telephone	03451 555555 Ext: 440461
E-mail	Kenny.Bisset@fife.gov.uk
Report Reference number	ED10032
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Executive Summary

This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management framework. It outlines the actions we will take to improve air quality in Appin Crescent (Dunfermline) between 2021-2025.

The key objective of this AQAP is to put in place plans of action that will sustain the decrease in PM_{10} concentrations so that they remain below the legal compliance.

This action plan differs from previous plans by the fact that it no longer directly considers Nitrogen Dioxide (NO_2). The NO_2 element of the Appin Crescent AQMA was successfully revoked in 2021 after data showing consistent levels below the AQS objective had been achieved. However, the links between emission sources of PM_{10} and NO_2 means that the pollutant will still be considered indirectly.

This action plan replaces the previous action plan which ran from 2015-2020. Fife Council have a duty to keep their action plans up to date. This review and update provides the opportunity to identify new or additional measures to assist Fife in achieving its goals of bringing air pollution below the air quality objectives and having the best air quality achievable in Fife.

A summary of new measures are provided in the table below.

Measure Number	Measure Description	Implementation Phase
13	Update Air Quality Strategy for Fife	2021
14	Promote the continued expansion of the Council's Electric Vehicle Fleet	2021 - 2025
15	Promote the continued Development of the Electric Vehicle Infrastructure	2021 - 2025
16	Promote sustainable travel initiatives	2021 - 2025
17	Promote domestic combustion best practice guidance	2021 - 2025
18	Develop alternative travel Infrastructure	2021 - 2025
19	Promote and organise Clean Air Day Events	2021 - 2025
20	Identify source apportionment to background PM	2021
21	Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA	2021
22	Identify most polluting vehicles within AQMA	2021

Responsibilities and Commitment

This AQAP was prepared by the Land and Air Quality Team of Fife Council with the support and agreement of the following officers and departments:

List officers/departments involved in the preparation of the AQAP

- Kenny Bisset, Protective Services, Fife Council (Chair)
- Jane Findlay, Transportation, Fife Council
- Marianne Bull, Transportation, Fife Council
- Tom Henderson, Transportation, Fife Council

Fife Council

- Shirley Melville, Communities, Fife Council
- Andrew Sim, Planning, Fife Council
- Blair Falconer, Protective Services, Fife Council
- Dr Josie Murray (CPHM), NHS Fife
- Tanith Allinson, Scottish Environment Protection Agency
- Jim Robb, Protective Services, Fife Council
- Eloise Griffin, Protective Services, Fife Council
- Donald Payne, Protective Services, Fife Council
- Dr Stuart Sneddon, Ricardo Energy & Environment
- Paul Wilkinson, TRL Ltd
- Representative from Central Dunfermline Community Council

This AQAP has been approved by Fife Council's Environment and Protective Services Sub-Committee on the 20th July 2021 after consultation with Air Quality Steering Group which includes key representatives from relevant services of Fife Council and community groups.

Details of high level Council members who have approved the AQAP are;

- Steve Grimmond, Chief Executive
- Keith Winter, Executive Director - Enterprise and Environment
- Michael Enston, Executive Director - Communities
- Eileen Rowand, Executive Director - Finance & Corporate Services
- Carrie Lindsay, Executive Director - Education & Children's Services

This AQAP will be subject to an annual review, appraisal of progress and reporting to the relevant Fife Council Committee. Progress each year will be reported via the Annual Progress Reports (APRs) produced by Fife Council, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP please send them to Land and Air Quality of Fife Council at:

Address Environmental Health (Public Protection), 3rd Floor , Fife House Main, North Street , Glenrothes KY7 5LT

Telephone 01592 583141

Email: Air.Quality@fife.gov.uk

Table of Contents

Executive Summary i

1 Introduction 1

2 Appin Crescent, Dunfermline AQMA Background 2

2.1 Revocation and Amendment of the AQAP 5

3 Summary of Current Air Quality in Appin Crescent, Dunfermline 6

3.1 Additional Monitoring 6

3.2 COVID-19 Lockdown Data Analysis 6

4 Fife Council's Air Quality Priorities 10

4.1 Public Health Context 10

4.2 Planning and Policy Context 10

4.3 Source Apportionment 13

4.3.1 Particulate Matter (PM_{10}) 13

4.3.2 Traffic Flows 15

4.4 Required Reduction in Emissions 17

4.5 Key Priorities 17

5 Development and Implementation of Fife Council AQAP 18

5.1 Consultation and Stakeholder Engagement 18

5.2 Steering Group 18

5.3 Action Plan Development Process 19

5.4 Proposed Measures Disregarded After Review 19

5.5 Approved New AQAP Measures 20

5.6 Funding Implementation of the Action Plan 20

6 AQAP Measures 21

6.1 Progression on the Implementation of AQAP measures 21

List of Tables

Table 2.1 New measures included within the Appin Crescent action plan (2015) 4
Table 2.2 Completed AQAP Measures 4
Table 2.3 Discounted AQAP Measure 5
Table 3.1 Fife Appin Crescent West AQ Mesh monitoring Statistics 1st January to 31st December 20208
Table 3.2 Fife Appin Crescent East AQ Mesh monitoring Statistics 1st January to 31st December 20208
Table 4.1 Reductions required in PM_{10} concentrations to achieve the annual mean objective**Error! Bookmark not defi**
Table 5.1 Consultation Undertaken 18
Table 5.2 Disregarded Measures 20
Table 5.3 Approved New Measures 20
Table 6.1 Appin Crescent AQAP measures 2021 -2025 22
Table 6.2 AQAP: List of Measures by EU category and classification 26

List of Figures

Figure 2-1 Appin Crescent, Dunfermline AQMA Boundary 2
Figure 2-2 Modelled Annual Mean NO_2 concentrations in the Appin Crescent AQMA (2011) 3
Figure 2-3 Modelled Annual Mean PM_{10} concentrations in the Appin Crescent AQMA (2011) 3
Figure 3-1 Appin Crescent, Dunfermline monitoring sites 7
Figure 3-2 PM_{10} Automatic Monitoring Results 2008 – 2020 7
Figure 3-3 Appin Crescent, Dunfermline AQMesh sensor locations 8
Figure 3-4: AQMesh Annual PM_{10} and $PM_{2.5}$ concentrations since monitoring began 9
Figure 3-5 Dunfermline automatic monitoring site PM_{10} concentrations during COVID-19 lockdown – Time Variance analysis 9
Figure 4-1 Receptor locations considered with the Source Apportionment 13
Figure 4-2 Sources of PM_{10} – Appin Crescent (2011) 14
Figure 4-3 Estimated percentage contributions to local concentrations of PM_{10} within Appin Crescent (2011) 14
Figure 4-4 Sources of PM_{10} – Appin Crescent (2016) 15
Figure 4-5 Working Week (5 day) Average Traffic Count 16
Figure 4-6 Full week (7 day) Average Traffic Count 16
Figure 4-7 Peak Morning and Afternoon Traffic Counts 16

Appendices

Appendix A: 2015 AQAP required reduction in emissions

Appendix B: Methodology Utilised to Assess Shortlisted Measures

Appendix C: Detailed Description of AQAP measures

1 Introduction

This report outlines the actions that Fife Council and its partners will deliver between 2021-2025 in order to sustain the current low concentrations and further reduce air pollution where required; thereby positively impacting on the health and quality of life of residents and visitors to the designated AQMA of Appin Crescent in Dunfermline.

This AQAP has been developed in recognition of the legal requirement on the local authority to work towards the AQS objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the LAQM statutory process. This AQAP follows the guidance set out in section 6 of the LAQM Policy Guidance PG(S) (16)[1].

The original Appin Crescent AQAP was adopted by Fife Council in 2013 and previously updated in 2015 in line with the Council's statutory duties.

This action plan differs from previous plans in that it no longer directly considers Nitrogen Dioxide (NO_2). The NO_2 element of the Appin Crescent Air Quality Management Area (AQMA) was successfully revoked in 2021 after data showing consistent levels below the Air Quality Strategy (AQS) objective had been achieved. However, the links between emission sources of PM_{10} and NO_2 means that the pollutant will still be considered indirectly.

The plan will be reviewed every five years at the latest and progress on measures set out within this plan will be reported on annually within Fife Council's air quality Annual Progress Report.

This AQAP has been developed from discussions within a steering group and on the basis of guidance from Fife Council's contracted consultants, Ricardo Energy and Environment. The draft plan was then subject to formal consultation and submitted to the following organisations and groups for comment:

- Fife Council
- Scottish Government
- Scottish Environment Protection Agency (SEPA)
- Statutory consultation, where the document will be made available to the general public and other stakeholders for scrutiny and general comment

The final version of the plan was submitted to the Scottish Government and SEPA for appraisal.

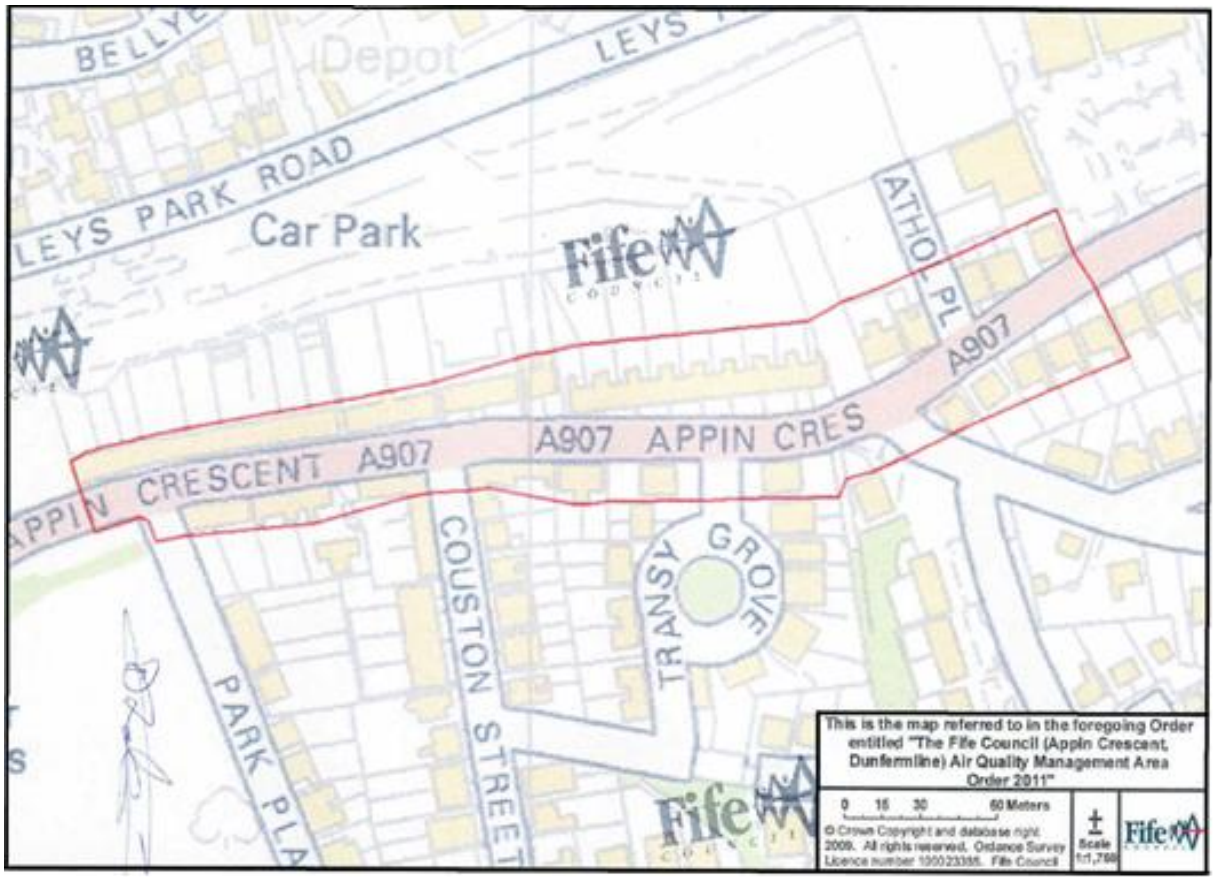
[1] http://www.scottishairquality.scot/assets/documents/technical%20guidance/LAQM-PG(S)16-April-16.pdf

2 Appin Crescent, Dunfermline AQMA Background

The Appin Crescent, Dunfermline AQMA came into force in November 2011 for NO_2 and August 2012 for PM_{10} after the Council completed its statutory LAQM obligations. For more detailed information on the LAQM process carried out see the latest Fife Council LAQM APR which can be found at the Fife Air Quality website pages[2] and Scottish Government Air Quality in Scotland website[3].

The designated AQMA incorporates Appin Crescent (A907), continuing into Halbeath Road and adjacent properties on the north side from and including 60 Appin Crescent to and including 14 Halbeath Road, and on the south side from and including 71 Appin Crescent to and including 7 Halbeath Road, Dunfermline. A map of the AQMA boundary is shown in Figure 2-1 below.

Figure 2-1 Appin Crescent, Dunfermline AQMA Boundary



The findings of a Further Assessment of Air Quality, and Appin Crescent Traffic Management Options Appraisal (2013) indicated that annual mean NO_2 concentrations in excess of the 40 μgm^{-3} objective were occurring at the residential properties and diffusion tubes located on the southern side of Appin Crescent (Figure 2-2). The modelling results also indicated that the Scottish PM_{10} annual mean objective of 18 μgm^{-3} was also likely being exceeded at these residential properties (see Figure 2-3). The A907 represents a major trunk road and runs from Dunfermline to the M90 and A92. It plays a strategic role in connecting Dunfermline to the rest of Fife.

[2] https://www.fife.gov.uk/kb/docs/articles/environment2/environmental-health/air-quality

[3] http://www.scottishairquality.scot/

Figure 2-2 Modelled Annual Mean NO_2 concentrations in the Appin Crescent AQMA (2011)

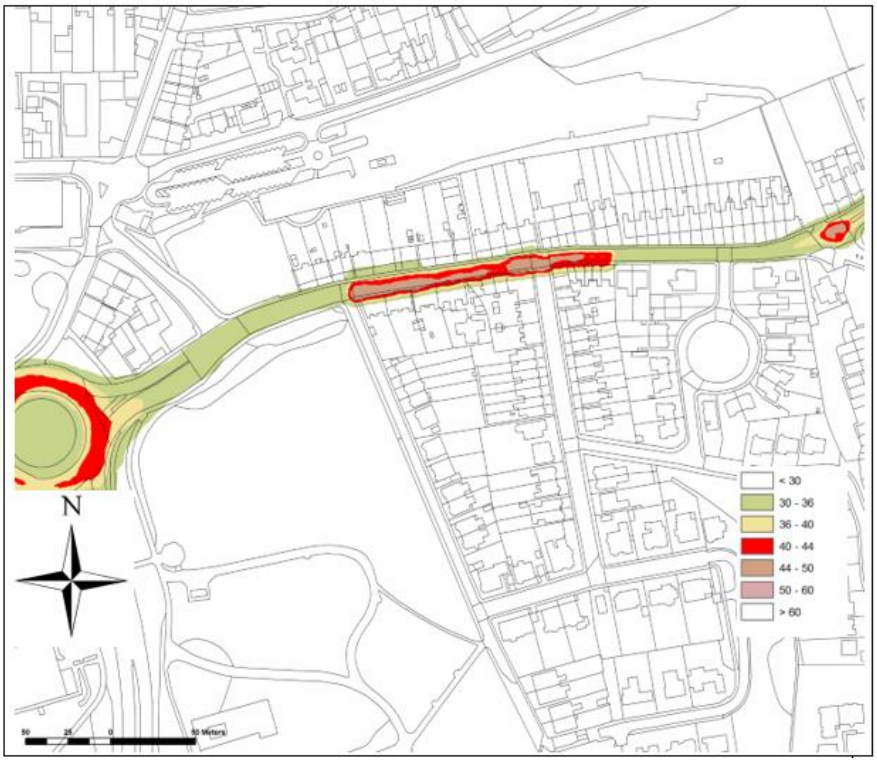
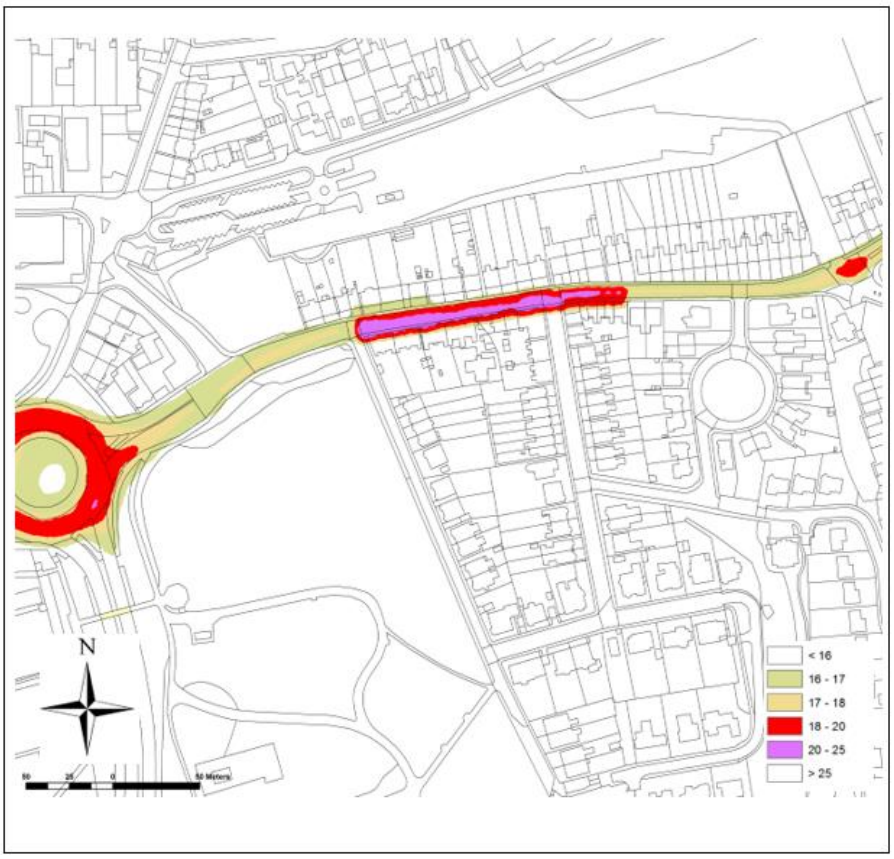


Figure 2-3 Modelled Annual Mean PM_{10} concentrations in the Appin Crescent AQMA (2011)



From consideration of source apportionment and scenario analyses carried out (see Section 4 of this report), it was recommended that an AQAP should include measures aimed at:

- Encouraging a reduction of the volume of traffic passing through Appin Crescent
- Minimising the impacts of traffic queuing within the AQMA
- Reducing the background concentration of PM_{10} through encouragement of efforts at the national level

A steering group including key representatives from relevant services of Fife Council was formed to develop the draft AQAP for Appin Crescent. The steering group considered the findings of the further assessment reports and the wide range of potential options for improving air quality within the AQMA.

The Appin Crescent AQAP was finalised and implemented in May 2013. The AQAP aimed to work towards reducing transport emissions of NOx and PM_{10} in the AQMA by approximately 18% and 40% respectively.

The AQAP was last updated in 2015. Five further measures were included in the 2015 update. A summary of the new AQAP measures for Appin Crescent are shown in Table 2.1.

Table 2.1 New measures included within the Appin Crescent 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

* Short-term (1-2 years), Medium term (3-6 years), Long-term (>6 years)

A number of measures have been successfully undertaken by Fife Council since the AQAP inception. These are summarised in Table 2.2.

Table 2.2 Completed AQAP Measures

No.	Measure	Comments
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 acceptable as defined in AQAP evaluation criteria.
6	Traffic Management optimisation (dependent on feasibility study)	
15	Cost-benefit analysis of traffic management options to improve air quality within Appin Crescent.	

Ongoing measures have also been delivered through the past action plan and include:

- Improved Air Quality links with Local Planning and Development Framework through the introduction of the Low Carbon Fife Supplementary Guidance. The Guidance was adopted in

January 2019 and now forms a statutory part of the Fife development plan, incorporating air quality development guidelines.

- Integrated Air Quality with other Council Strategies with inclusion of climate change related measures as part of the AQ grant application for 2019-2020. Air Quality is also included in Fife Sustainable Energy Climate Action Plan. Alongside this Fife Council has committed to renewing its Carbon Management Plan.
- Targeted reductions in emissions from the Council fleet and contract vehicles.
    - By the spring of 2021 Fife Council had 52 full electric vehicles and 19 hybrid vehicles in service.
    - 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 currently have the highest rating of 5-stars. Advantages include: reduction in air pollution (NO_2, PM_{10}), reduction in CO_2 emissions, meeting EU and National LAQM targets, improved public health, economic efficiency and good communications with members. The size of the Fife Council fleet decreased slightly in 2019/20 and now stands at 1,518 (previously 1,544 in 2018/19). Total diesel use for 2019/20 was 3,695,177 litres (a reduction of 168,945 litres from 2018/19).

As the AQAP has developed through time, certain measures have been discounted from further consideration. Details on the discounted measure are summarised in Table 2.3.

Table 2.3 Discounted AQAP Measure

No.	Measure	Justification
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

2.1 Revocation and Amendment of the AQAP

After the completion and review of the LAQM APR 2020, Fife Council were advised by SEPA and the Scottish Government to seek the revocation of the Appin Crescent AQMA for both NO_2 and PM_{10}. As of 2021 the Appin Crescent AQMA was successfully revoked for pollutant NO_2. The Council declined to proceed in the revocation of the PM_{10} element of the AQMA due to ongoing Scottish government studies and associated uncertainties into the measurement techniques of particular matter in Scotland.

3 Summary of Current Air Quality in Appin Crescent, Dunfermline

Reference Equivalent Automatic Particulate Matter (PM_{10} and $PM_{2.5}$) Monitoring is carried out within the Appin Crescent AQMA at the Fife Dunfermline monitoring site as indicated by the green square in Figure 3-1.

For an in-depth look at the latest and historical air quality data from Appin Crescent please refer to the latest APR from Fife Council[4] or go to the Air Quality in Scotland Website http://www.scottishairquality.scot/latest/site-info?site_id=DUNF

The data from the Fife Council air quality network sites are Quality Controlled and Quality Assured following the requirements set out in the LAQM Technical Guidance (TG.16). This gives a high degree of confidence in the data obtained.

Figure 3-2 illustrates the annual mean concentrations of PM_{10} back to 2008 when monitoring of PM_{10} commenced. As can be seen the PM_{10} annual mean objective of 18µgm^{-3} has not been exceeded since 2010. PM_{10} concentrations have been well below the objective at Fife Dunfermline since 2016. However, this step change coincided with a change in monitoring technique which is currently under investigation by the Scottish Government. 2020 data should also be considered with caution due to the affect COVID-19 restrictions had on pollution levels. Once the investigative study has been completed Fife Council will undertake any required updates to this AQAP.

3.1 Additional Monitoring

Since 2018 additional Particulate Matter monitoring using AQMesh Sensors has been carried out in Appin Crescent to gain a better understanding of concentrations on the south side of the A907. The south side of the A907 is where historic modelling assessments identified as having the highest concentrations (see Figures 2-2 and 2-3 in Section 2). However due to the topography of the area, the Council were previously unable to monitor. Relatively new sensor technology now enables indicative high-resolution monitoring to take place. The latest sensor data provided in Table 3.1 and Table 3.2 show that concentrations measured by the AQMesh Sensors are below the annual mean objective. Annual mean concentrations of PM_{10} and $PM_{2.5}$ since monitoring began are provided in Figure 3-4. As can be seen, concentrations have yet to exceed the annual objectives for both PM_{10} and $PM_{2.5}$. For more in-depth analysis of the AQMesh PM_{10} data please refer to the latest Fife Council APR.

3.2 COVID-19 Lockdown Data Analysis

The 2020 lockdown restrictions arising from COVID-19 significantly reduced travel in the UK and brought improvements to local air quality. Vehicle traffic across the UK decreased by about 70% by mid-April according to Department for Transport data[5]. In Fife, analysis carried out showed significant reductions in NO_2 concentrations at all four automatic monitoring sites with the greatest reductions seen at Dunfermline with 60% reductions during April and May compared to the previous year[6].

Analysis of the COVID-19 data also noted a significant reduction in PM_{10} which indicated the possible contribution of PM_{10} from local vehicle sources and also potential future reductions within the Appin Crescent AQMA. It should be noted however there is higher level of uncertainty regarding this

[4] https://www.fife.gov.uk/__data/assets/pdf_file/0014/112154/Fife-Annual-Progress-Report-2020_Issue_1_140920_Amended.pdf

[5] https://www.gov.uk/government/publications/slides-and-datasets-to-accompany-coronavirus-press-conference-21-may-2020

[6] http://www.scottishairquality.scot/news/reports?view=technical&id=632

conclusion due to the multiple sources of Particulate Matter. The time variance analysis for Dunfermline can be seen in Figure 3-5.

Figure 3-1 Appin Crescent, Dunfermline monitoring sites

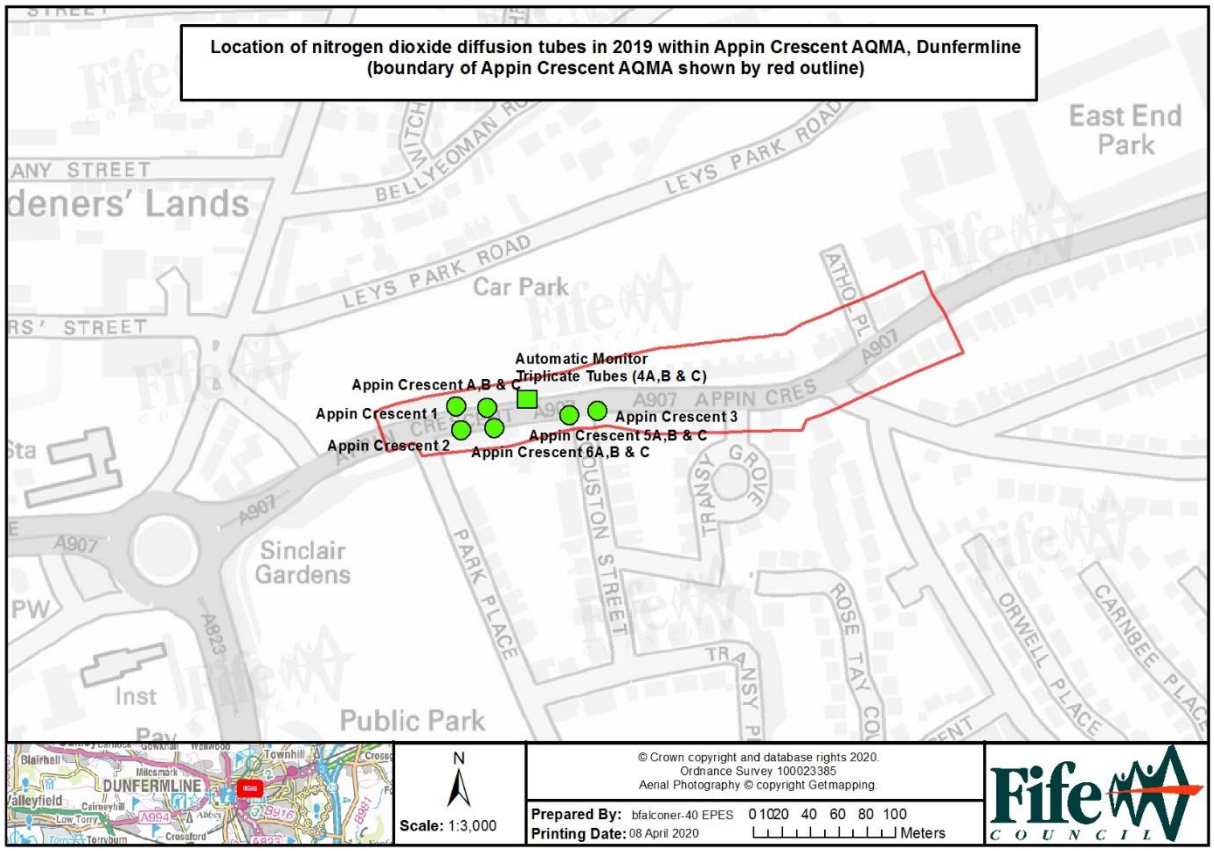


Figure 3-2 PM_{10} Automatic Monitoring Results 2008 – 2020

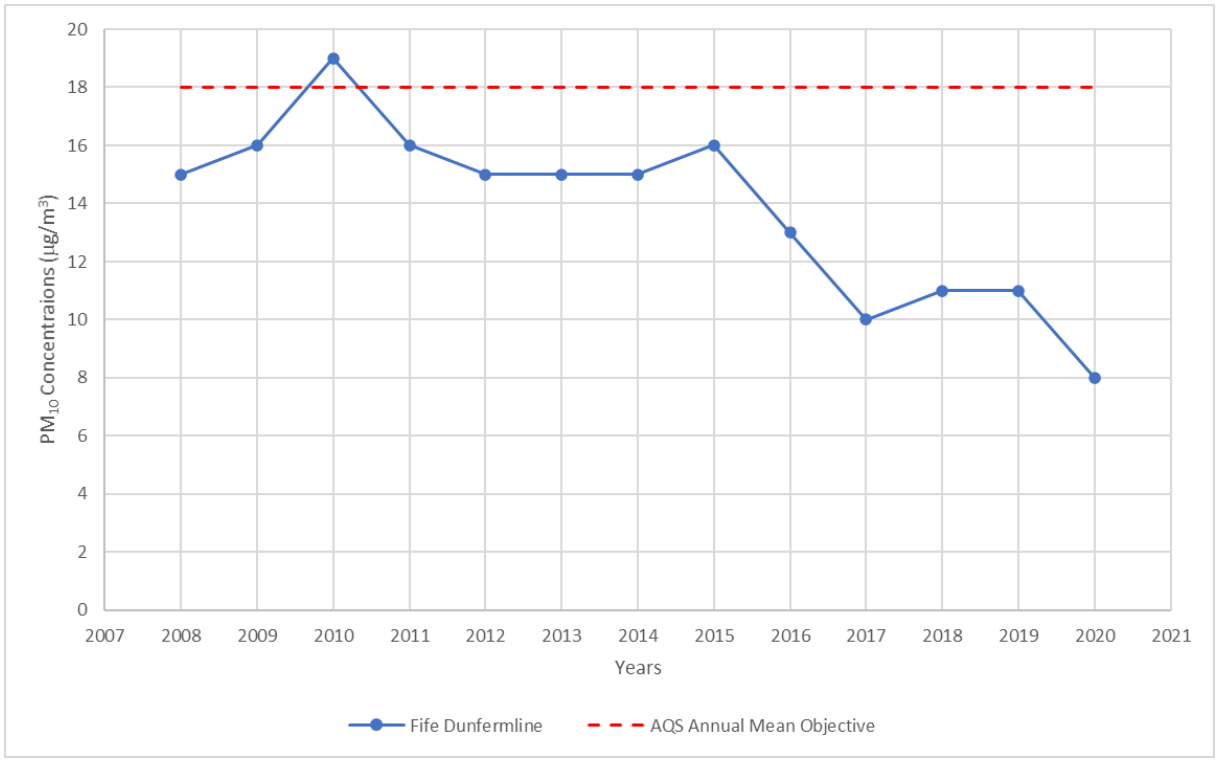


Figure 3-3 Appin Crescent, Dunfermline AQMesh sensor locations

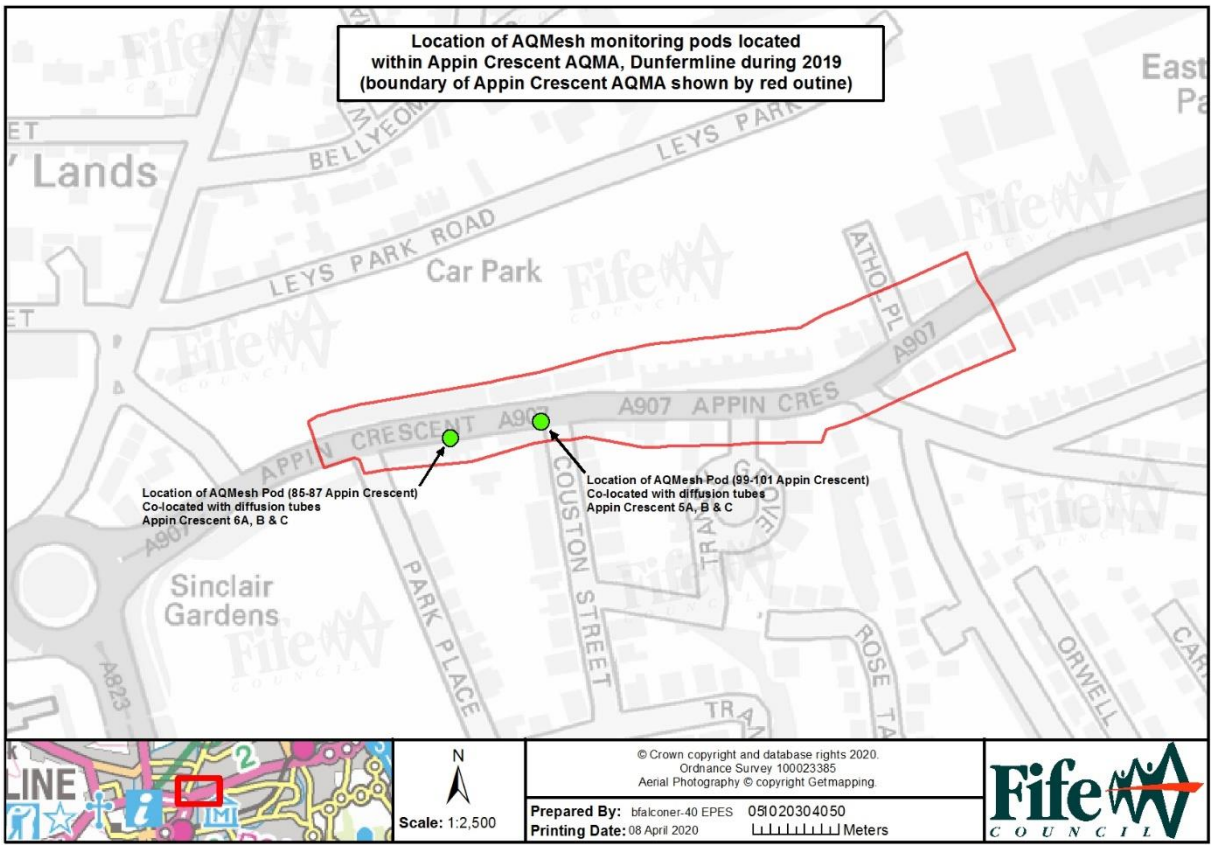


Table 3.1 Fife Appin Crescent West AQ Mesh monitoring Statistics 1st January to 31st December 2020

	V High (No. of Days)	High (No. of Days)	Mod (No. of Days)	Low (No. of Days)	Max. Hourly Conc.	Max. Daily Conc.	Max. Running 8 Hour Mean	Max. Running 24 Hour Mean	Period Mean Conc.	Annualised Mean Conc.	Period Data Capture (%)
PM10 (µg m^{-3})	0	0	1	305	155	56	107	63	7	n/a	83.7
PM2.5 (µg m^{-3})	0	0	0	306	88	32	58	36	5	n/a	83.7

Table 3.2 Fife Appin Crescent East AQ Mesh monitoring Statistics 1st January to 31st December 2020

	V High (No. of Days)	High (No. of Days)	Mod (No. of Days)	Low (No. of Days)	Max. Hourly Conc.	Max. Daily Conc.	Max. Running 8 Hour Mean	Max. Running 24 Hour Mean	Period Mean Conc.	Annualised Mean Conc.	Period Data Capture (%)
PM10 (µg m^{-3})	0	0	0	239	124	44	83	50	8	8	65.6
PM2.5 (µg m^{-3})	0	0	0	239	83	28	57	36	5	5	65.5

Figure 3-4: AQMesh Annual PM_{10} and $PM_{2.5}$ concentrations since monitoring began

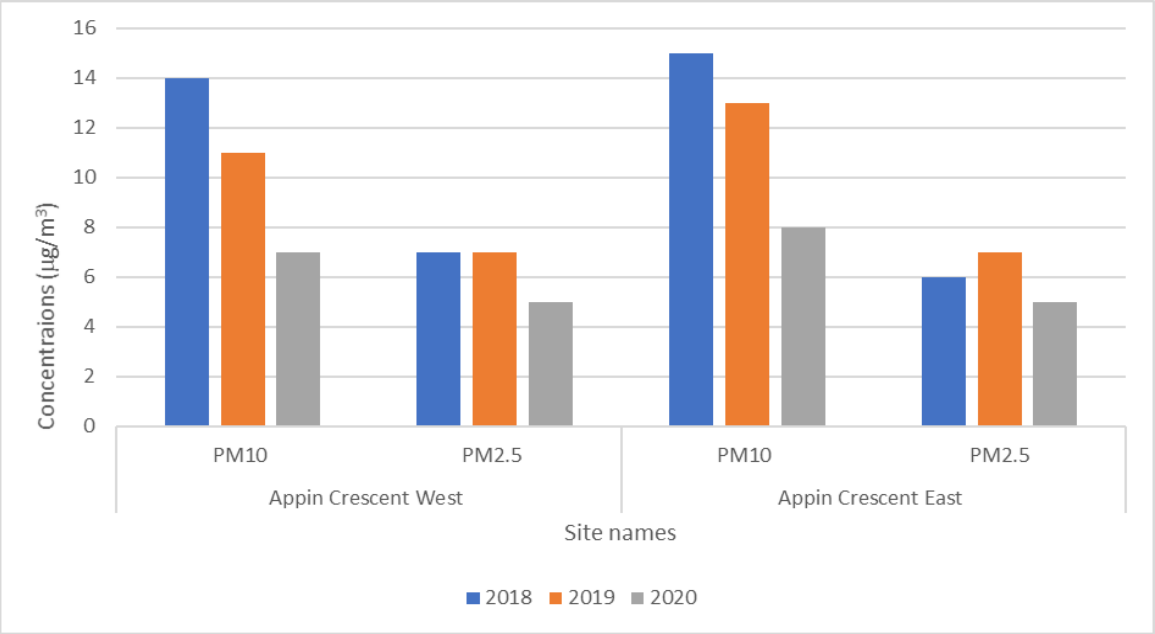
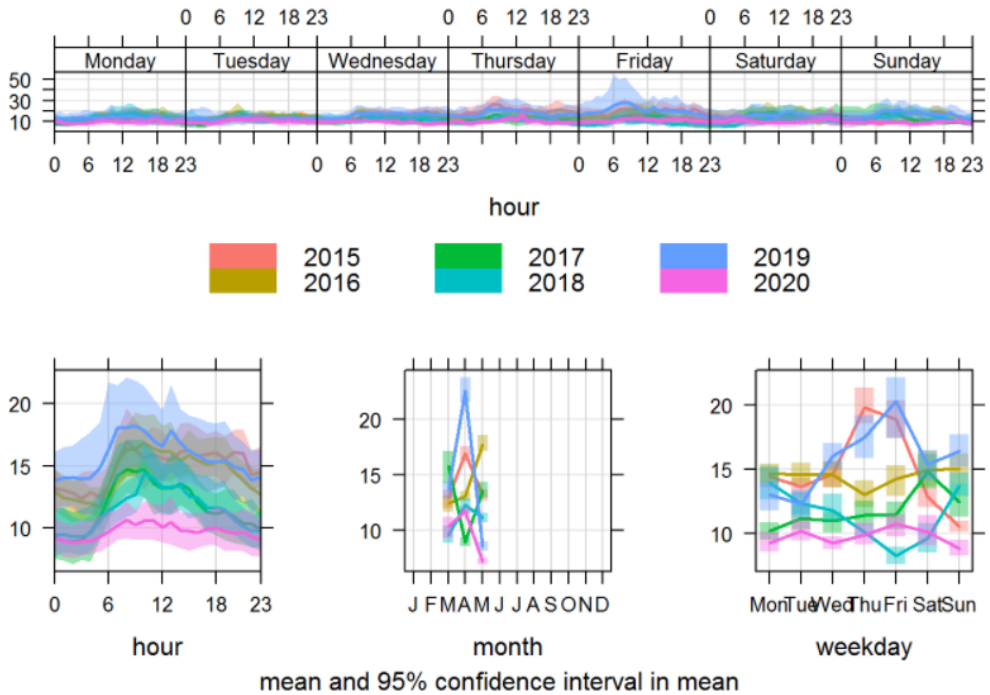


Figure 3-5 Dunfermline automatic monitoring site PM_{10} concentrations during COVID-19 lockdown – Time Variance analysis



	2015	2016	2017	2018	2019	2020
Fife Dunfermline	15	14	12	11	16	10
% drop in 2020 concentrations relative to comparison year (23 March - 26 May)	-33%	-29%	-17%	-9%	-38%	-

4 Fife Council's Air Quality Priorities

4.1 Public Health Context

The health of the residents and visitors to the Appin Crescent AQMA is the main priority for Fife Council AQAPs. There is a large body of evidence on the damage that poor air quality, even at low levels, can cause to human health. UK Government statistics estimated that air pollution in the UK reduced life expectancy of every person by an average of 7-8 months, with an associated cost of up to £20 billion each year[7].

Poor air quality has been associated with a range of harmful effects, including an increased incidence of cardiovascular disease and exacerbation of the symptoms of those with pre-existing heart and lung conditions such as asthma[8].

There is also growing evidence associating air pollution with other ailments such as dementia, diabetes and adverse pregnancy outcomes[9]. Even the low concentrations measured in most of Fife can be linked to poor health outcomes.

Though it is widely recognised that long term exposure of air pollution has the greatest public health effect, short-term 'high pollution' episodes can also have a profound impact especially on individuals with pre-existing heart and lung conditions such as asthma and potentially trigger increased hospital admissions.

Acute episodes can also contribute to the premature death of people who are more vulnerable to daily changes in ambient air pollutant levels, notably the elderly and those with pre-existing health conditions.

Significant evidence of the health impacts of long-term exposure to typical lower levels of ambient air pollution has also been documented in a large number of studies.

Within Fife, air pollution from transport has the greatest overall impact on health, and the main pollutants of concern Particulate Matter (PM_{10} and also $PM_{2.5}$) and Nitrogen Dioxide (NO_2). This was made evident by the data obtained from the 2020 COVID-19 lockdown. Reducing emissions from transport also provides the best way for the Council to further reduce pollution concentrations within the AQMA. The current unknown aspect of the source of the background Particulate Matter may present a future challenge.

4.2 Planning and Policy Context

Through co-ordinated working between other Council departments, Fife Council have in place a number of policy documents that will contribute towards the improvement in air quality within the Appin Crescent AQMA and the Fife region in general.

The most influential being the Air Quality Strategy for Fife 2021 – 2025 and the Clean Air For Scotland Strategy. The recently updated Fife Air Quality Strategy sets out the proposals for delivering further air quality improvements over the next five years and aligns with the 9 key areas of approach detailed in the latest Clean Air for Scotland Strategy. The 9 key areas and aims are:

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[7]Department for Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Volume 1. Accessed at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf

[8] Public Health England (2014), PHE-CRCE-010: Estimating local mortality burdens associated with particulate air pollution. Accessed at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332854/PHE_CRCE_010.pdf

[9] Scottish Government (2021), Cleaner Air For Scotland: the road to a healthier future, accessed at: https://www.gov.scot/publications/cleaner-air-scotland-road-healthier-future/

1. **Health** – Protect residents and visitors from the harmful effects of air pollution
2. **Integrated Policy** – Integrate air quality within Council plans and strategies
3. **Placemaking** – Meet the future environmental, economic, and social needs of its residents and maintain good air quality
4. **Data** – Provide high quality data that will accurately inform mitigation decision making
5. **Public Engagement and Behaviour Change** – Engage with people about how air pollution affects them and what they can do to make a difference
6. **Industrial** – Support the control and reduction of air pollution from industrial sources
7. **Non-Transport** – Control and reduce air pollution from non-transport sources
8. **Transport** – Maintain the reduction achieved in NO_2 and PM_{10} concentrations from road traffic
9. **Governance** – How co-ordinated working is facilitated between Council Services and external stakeholders to improve local air quality

Other notable documents that contribute include the following:

- **Climate Fife: Sustainable Energy and Climate Action Plan (2020-2030)** - includes actions such as:
  - Launch and begin implementing Fife Council Carbon Management Plan
  - Prepare for revision of the Local Development Plan by reviewing existing policies, develop Fife's climate risk and vulnerability evidence base and undertake a Low Carbon Place project
  - Prepare for the revision of the Local Transport Strategy and support sustainable transport projects through active travel, Fife Council's Carbon Management Plan, Leven Rail Link Blueprint and Levenmouth Connectivity project
- **FIFEplan Local Development Plan (2017)** – Fife Council adopted FIFEplan (Fife's Local Development Plan) on 21 September 2017. It now forms part of Fife's Development Plan replacing previous local plans for West Fife, Mid Fife and East Fife. The policies in the Plan and supplementary guidance are used to determine planning applications and give guidance to communities and investors on where development can and cannot take place, what type of development is allowed, how it should be laid out and designed and how environmental and cultural assets will be protected.
- **Fife Council Carbon Management Plan (2017-2050) –** The Carbon Management Plan defines how Fife Council proposes to act in the way best calculated to contribute to the delivery of the national Scottish carbon emission reduction targets. It translates national targets into annual targets for the Council's footprint and defines future emissions trajectories for the main carbon emitting activities, namely:
  - Building energy consumption
  - Fleet
  - Infrastructure energy consumption
  - Business travel
- **Local Transport Strategy For Fife (2006-2026) –** sets the 5-year (short term) programme, 10-year (medium term) plan and 20-year (longer term) vision and objectives for transport delivery in Fife and provides an overview of the region's Transportation and Environment Services, pertinent transport issues, visions and objectives together with a list of priorities, policies and projects for future transport provision in Fife.

- **Regional Transport Strategy (2008-2023) SEStran South East of Scotland Transport Partnership –** Fife Council is a member of the South East of Scotland Transport Partnership (SEStran). The SEStran Regional Transport Strategy was developed to compliment the objectives of the National Transport Plan and includes 17 sub-objectives that stem from the four high level objectives of: Economy, Accessibility, Environment and Safety and Health. The regional Strategy makes specific reference to the increasing importance of local air quality, its effects on human health and the role that transport plays in air quality issues in urban areas.

- **Fife Structure Plan (2006-2026)** – approved May 2009, sets out the development strategy and strategic land use policies and proposals. It establishes the context for local plans that translate these strategies and policies into site-specific guidance. Together, the Structure Plan and Local Plans form the Fife Development Plan. The principal aims of the plan are to support the growth of Fife's economy and population, whilst addressing the affordability and quality of housing, ensuring sustainable communities and safeguarding and improving Fife's environment.

- **Fife Council Carbon Emissions Reduction Plan (2009)** – Fife Council is committed to reduce its carbon emissions by 80% by 2050. The Carbon Emissions Reduction Plan (2009) was developed to provide managers within the Council with the tools to build carbon emission reductions into day-to-day service delivery and long-term planning. In addition to helping the Council meet its own carbon emission reduction targets, the Plan has been designed to support the achievement of the Scottish Government's national climate change targets.

- **Fife's first Climate Change Strategy 2014-2020 –** Fife's first Climate Change Strategy 2014-2020 identifies key areas that we need to address to meet the challenges and take advantage of opportunities associated with climate change.

- **Fife Community Plan (2011-2020) –** The aim of community planning is to strengthen Fife's future by bringing together Fife's public and voluntary organisations to work together with Fife's communities.

- **The National Transport Strategy** - The National Transport Strategy for Scotland was published in December 2006. The Strategy identified the need to provide an efficient, integrated and reliable transport network that successfully promotes economic growth, protection of the environment, health and social inclusion, and introduced three key strategic objectives:

    1. To reduce journey times between Scotland's towns/ cities and global markets, tackle congestion and provide access to key markets
    2. To reduce emissions to tackle climate change
    3. To improve the quality, accessibility, and affordability of transport, to give people the choice of public transport as an alternative to the car.

- **National Low Emission Framework (NLEF)** – Aims to improve local air quality in areas where air quality objectives are exceeded, or likely to be exceeded, primarily due to emissions from transport. NLEF helps to identify actions for local air quality within AQMAs. Fife Council carried out the Stage 1 screening appraisal and concluded that the proposed measures adopted so far were sufficient and there was no need to proceed to a Stage 2 assessment. Fife Council concluded that a Low Emission Zone was not required or a suitable option for improving air quality in the Appin Crescent AQMA after considering the following aspects:

    - Fife Council has achieved significant improvements in concentrations of NO_2 and PM_{10} within the Appin Crescent AQMA through the targeted implementation of its AQAP and seeks to bring about continued improvement in air quality through ongoing implementation of measures listed in the AQAP;
    - Monitored concentrations of both NO_2 and PM_{10} within the Appin Crescent AQMA now meet the air quality objectives;

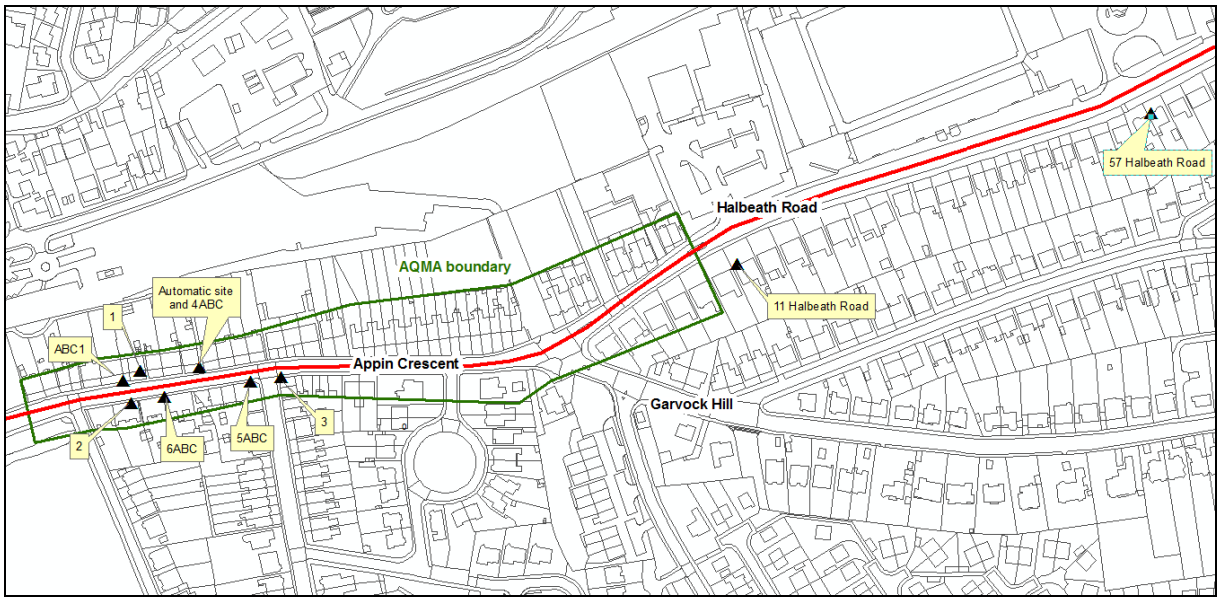
- The spatial nature of the historic exceedances of NO_2 and PM_{10} identified in Appin Crescent are restricted in nature;
- A significant reduction in vehicle traffic through the AQMA has been achieved; and
- Appin Crescent (A907) represents a key trunk road connecting Dunfermline to the M90 and the rest of Fife. Any vehicle restrictions enforced on this road could have significant impacts on public mobility, and/or result in the diversion of vehicles onto alternative, smaller residential roads.

4.3 Source Apportionment

The AQAP measures presented in this report are intended to be targeted towards the predominant sources of emissions within the Appin Crescent area. Through a proactive approach towards Local Air Quality Management (LAQM), Fife Council has undertaken considerable research to identify the prominent sources of pollution within Appin Crescent to enable these to be effectively targeted within the AQAP and the Council's Air Quality Strategy. A source apportionment exercise was carried out by Fife Council in 2011 and updated in 2016, to evaluate the contributions to levels of NO_2 and PM_{10} recorded.

The source apportionment exercise was undertaken using an air dispersion model which modelled the contribution of emissions of NO_x and PM_{10} from various sources at relevant exposure locations. The receptors of relevant exposure utilised within the study were correlated with the NO_2 diffusion tubes located within the study area. These receptor locations (1, 2, 3, ABC, 4ABC (and Automatic site), 5ABC, 6ABC, 11 Halbeath Road and 57 Halbeath Road are presented in Figure 4-1. These receptors were chosen as locations where the public are likely to be regularly present and exposed over the averaging period of the objectives.

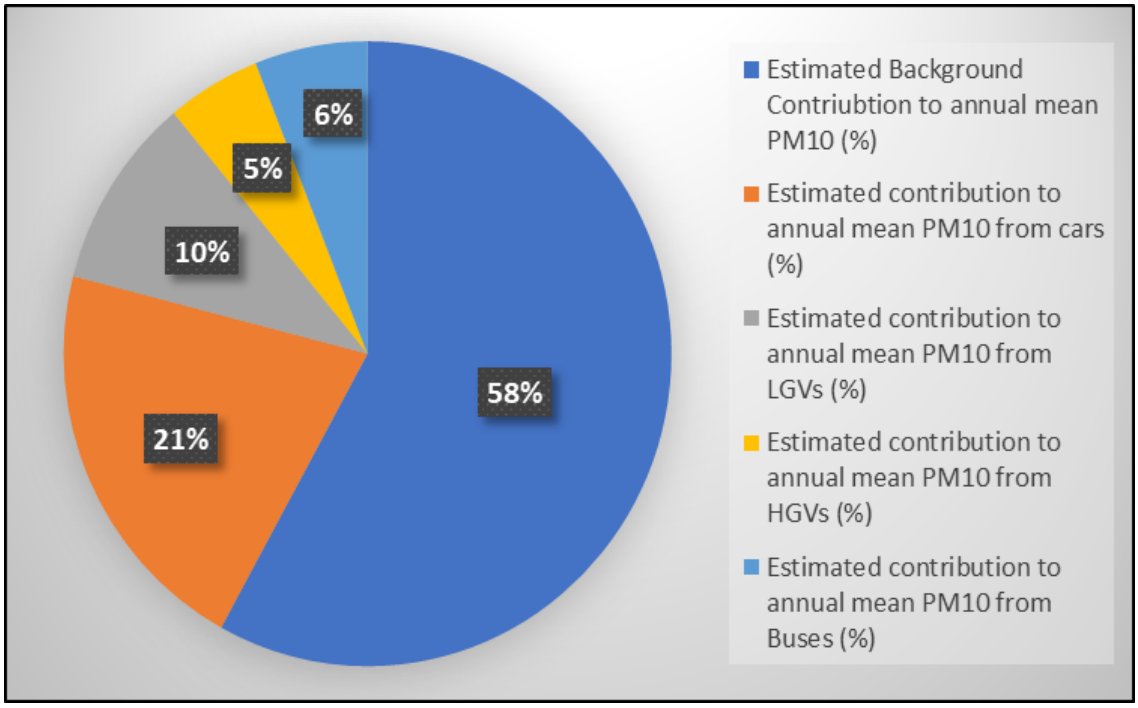
Figure 4-1 Receptor locations considered with the Source Apportionment



4.3.1 Particulate Matter (PM_{10})

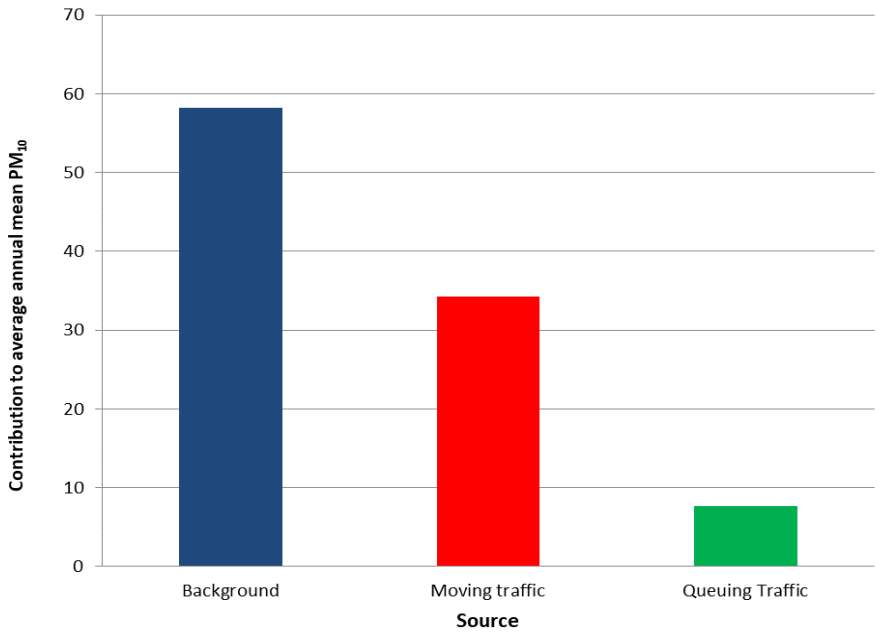
The findings of the source apportionment with regards PM_{10} are presented in Figure 4-2.

Figure 4-2 Sources of PM_{10} – Appin Crescent (2011)



The 2011 results indicated that background concentrations constitute the most significant source of ambient concentrations of PM_{10} within the Appin Crescent AQMA, being estimated to contribute between 53 and 71% of ambient concentrations at various points within the AQMA. Emissions from local road traffic are estimated to contribute the remaining 29-47%, with the majority of these local traffic emissions being attributed to moving traffic as illustrated in Figure 4-3. However, queuing traffic was found to make a significant contribution to local PM_{10} concentrations at the western periphery of the AQMA.

Figure 4-3 Estimated percentage contributions to local concentrations of PM_{10} within Appin Crescent (2011)



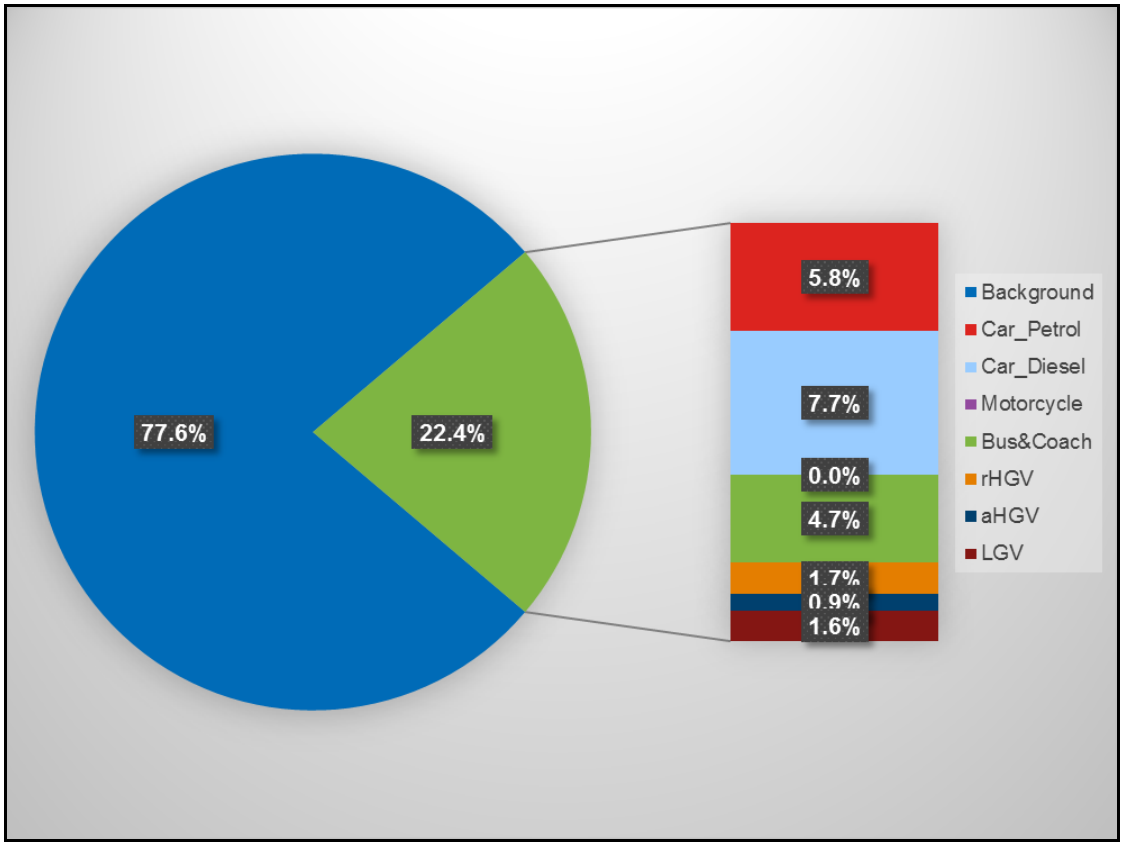
The high percentage contribution of PM_{10} from background sources was recognised as a challenge, as it is difficult to implement measures at a local level that will result in a significant reduction in background concentrations. Common sources of background PM_{10} include industrial, road transport

(outside the AQMA), and domestic/commercial combustion sources (heating). Natural sources and particulates produced through atmospheric reactions can also contribute significantly.

Evaluation of the estimated contribution from different vehicle types to ambient annual mean PM_{10} concentrations indicated that cars represented the most significant road transport source of PM_{10} within the Appin Crescent AQMA, being estimated to contribute 21% to annual mean concentrations on average, with light good vehicles estimated to contribute a further 10%. Buses were estimated to contribute a further 6% to local concentrations, and HGVs 5%. The findings indicated that whilst background concentrations represent the principal source of elevated PM_{10} concentrations within Appin Crescent, road transport (in particular cars) also make a significant contribution to local concentrations and were thus targeted under actions included within the Council's AQAP.

A summary of the findings of the 2016 source apportionment data is presented in Figure 4-4. The findings of this source apportionment generally agreed with findings of the original Further Assessment but provide more detail on the sources. The increase in background indicates that abatement measures previously implemented have resulted in a decrease in emissions from local transport sources.

Figure 4-4 Sources of PM_{10} – Appin Crescent (2016)



4.3.2 Traffic Flows

Traffic count data recorded at Appin Crescent shows a decline in traffic over the past 10 years. Between 2009 and 2019, total traffic flow (Eastbound and Westbound) has reduced by up to 10% for both the working week (Figure 4-5) and full week (Figure 4-6) averages. The morning and afternoon peak traffic flows have also reduced on average by 4% and 8-11%, respectively (Figure 4-7).

The implementation of traffic management measures in 2009 and other measures adopted by Fife Council (as detailed within the AQAP) have led to an improvement in traffic flow within the AQMA.

Figure 4-5 Working Week (5 day) Average Traffic Count

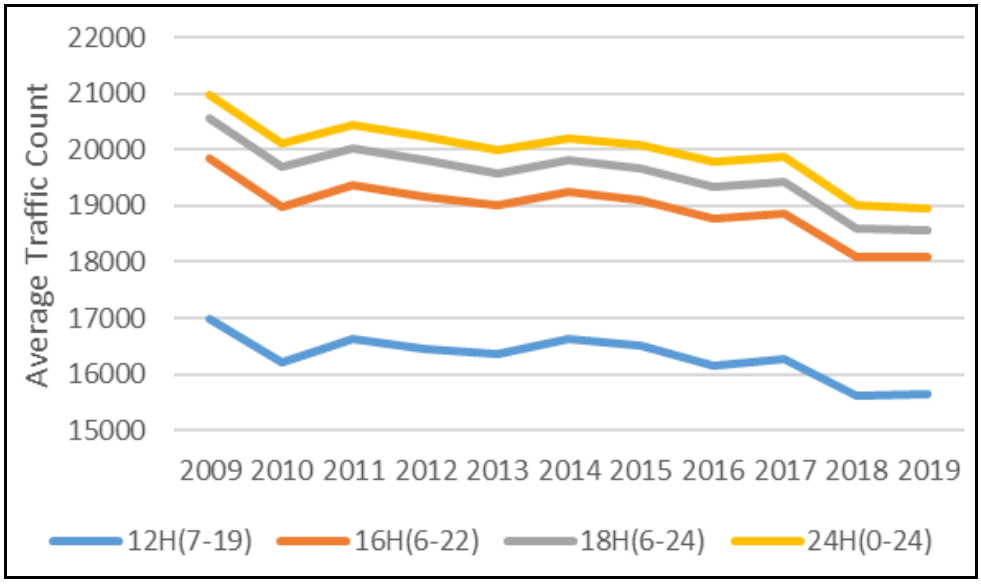


Figure 4-6 Full week (7 day) Average Traffic Count

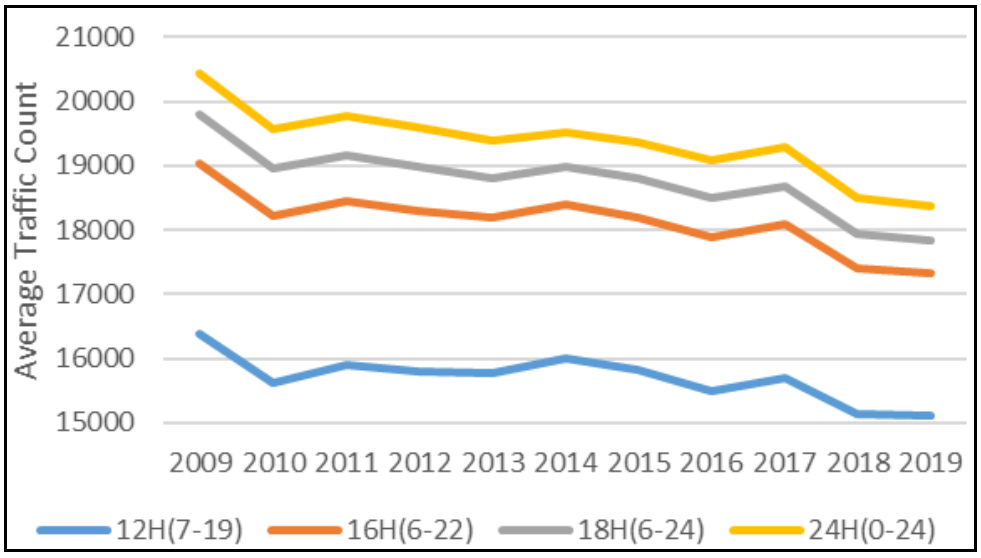
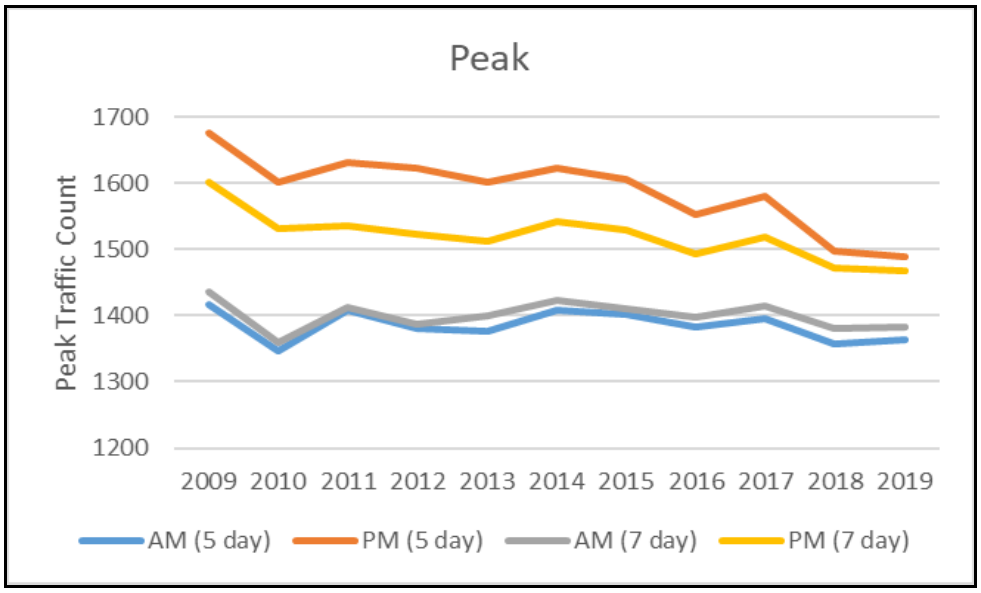


Figure 4-7 Peak Morning and Afternoon Traffic Counts



4.4 Required Reduction in Emissions

LAQM.TG16 states that the further assessment must show that a local authority has calculated the reduction in emissions required to achieve the objectives of concern, as this will enable the authority to consider whether the measures proposed to achieve these reductions are proportionate and cost effective.

Required reduction in emissions calculations carried out for the 2015 AQAP calculated that a 40% reduction in road PM_{10} concentrations was required in order for the objective to be attained at all locations within the AQMA. The data for this is provided in Appendix A of this report. Scenarios assessed to achieve this reduction are also provided in Appendix A.

As stated in Section 2, all measured concentrations of PM_{10} (and NO_2) within Appin Crescent have been well below the Air Quality Strategy objectives for a number of years. Additional high resolution AQMesh Sensor monitoring (at location Appin Crescent 5ABC and 6ABC) carried out since 2018 has also indicated that concentrations are below the AQS objectives. This indicates that there are no calculated reductions in emissions required. However, as previously discussed, the results from ongoing Scottish Government investigations into PM_{10} monitoring techniques in Scotland may affect the current concentrations measured in Appin Crescent. Once the information from this study is made available, Fife Council will amend the AQAP accordingly.

4.5 Key Priorities

After consultation of the information made available the key priorities of this AQAP were deemed to be;

- To sustain or achieve additional reductions in PM_{10} concentrations focussing on background and the major transport sources
- The development and implementation of the Fife Air Quality Strategy that aligns with the National approach in tackling PM_{10} emissions
- To educate the public on low emission practises or alternatives
- Consideration of the air quality issues within the AQMA in future developments
- Seek revocation of the PM_{10} AQMAs following the outcome of the Scottish Government Study

5 Development and Implementation of Fife Council AQAP

This section provides information on the development of the Appin Crescent AQAP 2021 – 2025. The development and implementation follows procedures used in previous iterations of the AQAP and also the latest guidance.

5.1 Consultation and Stakeholder Engagement

Schedule 11 of the Environment Act 1995 requires local authorities to consult the bodies listed in Table 5.1 following the preparation or revision of their AQAP. Due to the location, size and current situation within the Appin Crescent AQMA, Fife Council did not deem it necessary to consult all Consultees in the update of the AQAP.

Table 5.1 Consultation Undertaken

Yes/No	Consultee	Comments
No	Secretary of State	Not applicable
Yes	Scottish Government	Approval has been granted
Yes	SEPA	Approval has been granted
No	Highways Authority	Not applicable due to location and size of AQMA and the measures proposed
No	All neighbouring local authorities	Not applicable due to location and size of AQMA and the measures proposed
Yes	Other public authorities as appropriate, such as Public Health officials	Approval has been granted
Yes	Bodies representing local business interests and other organisations as appropriate	Approval has been granted

5.2 Steering Group

The development of the action plan began with an inception meeting, which was attended by a number of Local authority officers, forming the Air Quality Steering Group. These officers have been consulted and provided input into the development of the AQAP. In this way the action plan has been influenced by their local knowledge and area of responsibility.

The steering group comprises:

- Kenny Bisset, Protective Services, Fife Council (Chair)
- Jane Findlay, Transportation, Fife Council
- Marianne Bull, Transportation, Fife Council
- Tom Henderson, Transportation, Fife Council
- Shirley Melville, Communities, Fife Council
- Andrew Sim, Planning, Fife Council

Fife Council

- Blair Falconer, Protective Services, Fife Council
- Dr Josie Murray (CPHM), NHS Fife
- Tanith Allinson, Scottish Environment Protection Agency
- Jim Robb, Protective Services, Fife Council
- Eloise Griffin, Protective Services, Fife Council
- Donald Payne, Protective Services, Fife Council
- Dr Stuart Sneddon, Ricardo Energy & Environment
- Paul Wilkinson TRL Ltd
- Representative from Central Dunfermline Community Council

The steering group was formed to provide an appropriate forum for developing the AQAP. The composition of the group was carefully considered to include representatives from relevant Local Authority Services with an interest in air quality and who may have an influence on the measures being considered. Following the development of the previous AQAP, representatives of the Central Dunfermline Community Council joined the steering group and helped further progress the development of the plan.

5.3 Action Plan Development Process

During the development of the AQAP, the steering group considered a full range of relevant options aimed at reducing ambient PM_{10} concentrations within the Appin Crescent AQMA. The AQAP drafting process comprised of a gradual refinement of the range of potential options under consideration, to enable the focus to be centred on measures that directly addressed the key priorities identified but were also feasible and cost-effective compared to other potential options.

Information on the assessment and prioritisation of measures, including their perceived cost-effectiveness and wider impacts, together with the methodology utilised to undertake the assessment are provided in Appendix B.

During the development process, the Steering group met on a number of occasions. The main content of these meetings and discussions included the following:

- Review the requirements of the Action Planning process.
- Review of air quality management options to consider as potential measures within the updated AQAP.

In turn, the steering group completed the following actions:

1. Initial consideration of all possible options for reducing ambient concentrations of PM_{10} within the Appin Crescent AQMA.
2. Identification of measures that were not feasible, sufficiently focussed, or which were considered disproportionate to the prevailing situation.
3. More detailed consideration and assessment of short-listed options aimed at reducing emissions.
4. Agreement of measures for updated AQAP.

5.4 Proposed Measures Disregarded After Review

A list of measures were presented to the steering group for review in line the with LAQM Policy Guidance (PG16). After review, a number of measures were disregarded as they were found to be

unfeasible with regards the current situation within the Appin Crescent AQMA. These are listed in Table 5.2.

Table 5.2 Disregarded Measures

Disregarded Measures
Survey domestic biomass installations within or near AQMA and determine contribution
Promote initiatives to help members of the public to take action to reduce air pollution
Work with Schools to raise awareness of Air Pollution and promote Active travel

5.5 Approved New AQAP Measures

After completion of the relevant review processes stated above, a suite of new measures were approved for inclusion within the updated AQAP. Table 5.3 provides a list of these new measures.

Table 5.3 Approved New Measures

Measure Number	Measure Description
13	Update Air Quality Strategy for Fife
14	Promote the continued expansion of the Council's Electric Vehicle Fleet
15	Promote the continued development of the Electric Vehicle Infrastructure
16	Promote sustainable travel initiatives
17	Promote domestic combustion best practice guidance
18	Develop alternative travel Infrastructure
19	Promote and organise Clean Air Day Events
20	Identify source apportionment to background PM
21	Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA
22	Identify most polluting vehicles within AQMA

5.6 Funding Implementation of the Action Plan

The capacity to successfully implement an Air Quality Action Plan is heavily dependent upon obtaining adequate funding and resources to deliver the proposed measures. Many of the measures included within the plan are already supported through existing strategies but may require some additional funding to facilitate modification in line with the requirements of this AQAP. For other measures, other sources of funding will require securing before the measures are progressed. Other potential sources of funding include:

- Scottish Government Air Quality Funding.
- Developer contributions.

The availability of such funding from the sources stated is likely to determine the future progress of the Action Plan.

6 AQAP Measures

Table 6.1 provides the full list of the agreed measures that make up the Appin Crescent AQAP 2021 - 2025. It also contains:

- a list of the actions that form part of the plan
- the responsible individual and departments/organisations who will deliver this action
- estimated cost of implementing each action (overall cost and cost to the local authority)
- expected benefit in terms of pollutant emission and/or concentration reduction
- the timescale for implementation
- how progress will be monitored

Table 6.2 provides the EU Category and Classification of each measure in line with the National Air Quality Plan. Table 6.2 also splits each measure into categories “Strategic” and “Specific” as done in previous AQAPs. Definitions of each category are provided below.

1. **Strategic** – aimed at integrating air quality into all relevant areas of decision making within Fife Council.
2. **Specific** – aimed at reducing traffic within the Appin Crescent AQMA, reducing emissions from principal sources, promoting greater awareness of local air quality, and encouraging more sustainable travel choices within Fife in general.

Detailed information on each measure and reasons why they were considered applicable for this AQAP is provided in Appendix C.

6.1 Progression on the Implementation of AQAP measures

Future APRs will provide annual updates on the implementation of the AQAP measures. These reports can be found on the Fife Air Quality website[10] and also the Scottish Government Air Quality in Scotland website[11].

In addition, regular Air Quality Steering Group meeting will be carried out throughout the year to review progression and also identify the requirement to make amendments to the current plan.

[10] https://www.fife.gov.uk/kb/docs/articles/environment2/environmental-health/air-quality

[11] http://www.scottishairquality.scot/

Table 6.1 Appin Crescent AQAP measures 2021 -2025

Meas No.	Measure	Focus	Lead Authority	Planning Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion date	Comments
1	Liaise with Scottish Government to encourage the consideration of national measures Implementation Phase: 2021 -2025	Increase focus on background concentrations of PM and encourage national action	Fife Council	On-going	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.	2025	
2	Improving links with Local Transport Strategy/ Area Transport Plan Implementation Phase: 2021 -2025	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	On-going	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. Fife Council will seek to incorporate specific air quality measures in future versions of its Local Transport Strategy/Area Transport Plan	2025	
3	Improving Air Quality links with Local Planning and Development Framework Implementation Phase: 2021 -2025	Local planning considerations aim to mitigate the cumulative negative air quality impacts of new development	Fife Council	On-going	Integration of Appin Crescent AQAP with future versions of Local Plan. Maintain and make available - air quality guidance notes for developers.	Medium	The Low Carbon Fife Supplementary Guidance was adopted in January 2019 and now forms a statutory part of the Local Development Plan (FIFEplan). This guidance incorporates the Fife Council Air Quality Developers Guide. Initial stages of reviewing the Local Development Plan (FIFEplan) are due to begin towards the end of 2020. In conjunction with this the Fife Council Air Quality Developers Guide has been amended as is the Fife Council Air Quality Strategy (to cover 2021 to 2025).	2025	
4	Integrate Air Quality with other Council Strategies Implementation Phase: 2021 -2025	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	On-going	Maintain regular and ongoing communication between members of the Appin Crescent AQAP steering group.	Low	Submission of AQ grant application for 2020-2021 includes submissions for climate change related measures. On February 6th 2020 Fife Council's Environment and Protective Services Committee approved the Sustainable Energy Climate Action Plan - Climate Fife. https://climatechange.fife.scot Climate Fife includes a practical action plan for mitigation activities and a Risk and Vulnerability Assessment to outline the challenge for adaption action. Climate Fife is a Fife wide plan. Reducing carbon emission and adapting to unavoidable climate change are also therefore priorities for the Fife Partnership. A review is underway to bring forward more action on the climate emergency into the Plan for Fife - the Local Outcome Improvement Plan. Air Quality and linked low carbon emissions actions are covered under the Sustainable Transport theme in the Climate Fife Action Plan. Additionally, Fife Council is to brought a revised Carbon Management Plan to committee in April 2020 Fife Councils Land & Air Quality Team continues to work closely with the Council's Climate Change team to ensure air quality is considered	2025	To invite one of the Council's Climate Change Team to attend Fife Core Air Quality Steering Group meetings in the future.
5	Travel Plans for large Institutions and Businesses Implementation Phase: 2021 -2025	To encourage a shift to more sustainable forms of travel or reducing the need for travel.	Fife Council	On-going	Continue the implementation of Fife Council's travel plan Undertake Council travel surveys	Low	Transportation department continuing to support schools in updating and developing School specific travel plans. Continue to actively promote sustainable travel to school, including initiatives such as Bikeability and WOW (Walk Once a Week). Continue the implementation of Fife Council's Travel Plan.	2025	
6	Provision of Information and promotion of travel options Implementation Phase: 2021	To increase awareness of travel choices and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	Annually	To improve integration between cycling, walking and public transport. Produce Travel Choices facility for Dunfermline.	Low	Grant application for 2020-21 includes 9 new traffic counters with 9 obtained in 2019-20 through grant funding also. These traffic counters will aid in tracking changes in vehicle use.	2025	

	-2025				Undertaking Travel Marketing in Dunfermline.		Adopted FIFEplan policy 11 requires new development to encourage and facilitate the use of sustainable transport appropriate to the development, promoting in the following order of priority: walking, cycling, public transport, cars. Initial stages of reviewing the Local Development Plan (FIFEplan) are due to begin towards the end of 2020. Continue to actively promote sustainable travel to school, including initiatives such as Bikeability and WOW (Walk Once a Week).		
7	Provision of information relating to Air Quality Implementation Phase: 2021 -2025	To increase awareness of local air quality issues and encourage changes in behaviour that will contribute to improving local air quality.	Fife Council	On-going	Continue to make information relating to local air quality management available through the Council website and Scottish Government “Air Quality in Scotland” Website.	Low	This information is covered by the Low Carbon Fife Supplementary Guidance which was adopted in January 2019 and now forms a statutory part of the Local Development Plan (FIFEplan). This guidance incorporates the Fife Council Air Quality Developers Guide. Initial stages of reviewing the Local Development Plan (FIFEplan) are due to begin towards the end of 2020. In conjunction with this the Fife Council Air Quality Developers Guide is in the process of being amended as is the Fife Council Air Quality Strategy (to cover 2021 to 2025).	2025	
8	Target reductions in emissions from the Council fleet and contract vehicles (including driver training) Implementation Phase: 2021 -2025	Target reduced emissions from Council fleet vehicles and Council contract fleet vehicles.	Fife Council	Annually	Monitor and assess viable options for alternative fuels, technologies, and fuel additives. Fife Council tender specification outlines that all new vehicles must have exhaust trap and filtration systems. Number of vehicles in Council fleet Number of electric and hydrogen powered vehicles in Council fleet Annual reduction in Fuel usage	Medium	By spring 2021 Fife Council had 52 full electric vehicles and 19 hybrid vehicles in service (either leased or purchased). The size of the Fife Council fleet decreased slightly in 2019/20 and now stands at 1,518. Total diesel use for 2019/20 was 3,695,177litres (a reduction of 168,945 litres from the 2018/19). This can be associated with the increased use of electric and hybrid vehicles and a eduction in the number of larger sized Fleet items.	2025	
9	Investigate the potential for establishing voluntary bus agreement Implementation Phase: 2021 -2025	Target reduced emissions from buses operating within the Appin Crescent AQMA.	Fife Council	2021	Identify most polluting operators within AQMA Liaise with bus operators regarding emissions from the bus fleet and improvements to bus service infrastructure.	Medium	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. As of May 2021 there are 59 bus operators within the ECO Stars scheme covering 1336 vehicles.	2025	
10	Fife ECO Stars Implementation Phase: 2021 -2025	Encouraging more local fleet operators to introduce fleet management systems that improve air quality	Fife Council	On-going	Number of ECO Stars members	Medium	As of May 2021 the Fife Commercial Membership grew to 254 members covering 9,127 vehicles operating in Fife & beyond. As of May 2021 the Taxi & Private Hire Membership has increased to 141 members operating 575 vehicles. The requirement for all Fife Council school and social work contract operators to become members of ECO Stars has resulted in the significant increase.	2025	
11	Maintenance and utilisation of Air Quality and Planning Toolkit Implementation Phase: 2021 -2025	Ensure future development does not compromise achievement of statutory air quality objectives through use of toolkit to assess planning Development.	Fife Council	Annually	Is the Toolkit being utilised by council departments to consider Air Quality issue in Planning developments. Is the Toolkit up to date with latest data.	low	The Regional RapidAir^{TM} Dispersion Model was updated in 2018 with local validations carried out for each of the main towns in Fife for NO_2 (Cupar, Dunfermline, Rosyth, Kirkcaldy and St Andrews). This allows the Council to consider air quality issues in the development management process.	2025	
12	Proposed Air Dispersion modelling study of the potential Dunfermline Northern Link Road Implementation Phase: 2021 - 2025	Estimate the impact of the proposed northern link road and the proposed Dunfermline strategic land allocation (SLA) zones.	Fife Council	On-going	Carry out any future Air Quality dispersion modelling to quantify the impacts of proposed Northern Link or alternatives to the Northern link Road.	Medium	Initial dispersion modelling report produced in 2016 and updated to reflect latest road vehicle emissions factors in 2017. Regional Model was developed in 2016 and updated in 2018 to provide a resource to better assess development impact on air quality. Additional sensor monitoring has been carried out since 2018 in areas of concern in the AQMA. This data will be input into future modelling studies.	2025	

13	Update Air Quality Strategy for Fife Implementation Phase: 2021	Update Strategy so that it meets the current needs of Fife with regards Air Quality and aligns with the Clean air for Scotland Strategy 2.	Fife Council	To be completed and issued in 2021	Aligning the Strategy with CAFS whilst meeting the specific needs of Fife. Following the latest guidelines with regards the development of Air Quality Strategy and that meets the approval of the Council committee	medium	Process of Updating Started in 2020 with final approval and publication to be carried out in early 2021.	2021	
14	Promote the continued expansion of the Councils Electric Vehicle Fleet Implementation Phase: 2021 – 2025	cross department initiative to promote the continued expansion of the council Vehicle Fleet	Fife Council	On-going	The Number of electric Vehicle in the Council Fleet	Medium	By spring 2021 Fife Council had 52 full electric vehicles and 19 hybrid vehicles in service (either leased or purchased). The number of electric and hybrid vehicles being added to the Fleet continues to increase every year with new vehicles identified and brought in on trial	2025	
15	Promote the continued Development of the Electric Vehicle Infrastructure Implementation Phase: 2021 – 2025	Work with Roads and planning department to further develop EV infrastructure, focusing on the addition of charging points.	Fife Council	On-going	Number of EV Charging points. Number of times EV Charging points are used. Number of EV registrar in Fife.	Low	As of spring 2021 there are 54 Charging points in Fife In 2020 EV Charging points in Dunfermline wereused by 1,432 public users (up from 1,120 public users in 2019)	2025	
16	Promote Sustainable travel initiatives Implementation Phase: 2021 – 2025	Focus on promotional material in schools and businesses. Identify initiatives to work in tandem with ECO Stars that focus on alternative travel options. Provision of guidance and information.	Fife Council	On-going	Creation of promotional material. Promotion of Air Quality related events. Identification of new Initiatives. Incorporation of new Initiatives.	Low	Fife Council have been providing information and promotional material for a number of years via initiatives carried out such as Fife ECO Stars and Clean air Day and via the Fife Council website https://www.fife.gov.uk/kb/docs/articles/environment2/environmental-health/air-quality	2025	
17	Promote domestic combustion best practice guidance Implementation Phase: 2021 – 2025	Managing the PM concentration contribution from the increase number of small-scale domestic biomass burners	Fife Council	2021	Identification of best practise guidance. Creation of promotional material. Distribution of promotional material.	Low	New Concept	2025	
18	Develop alternative travel Infrastructure Implementation Phase: 2021 – 2025	Continued enhancement and management of cycle routes and walking paths and infrastructure in Fife. Making it easier to commute using these alternatives	Fife Council	On-going	Development projects carried out on Fife cycle and walking paths. Events carried out or promoted by Fife Council.	Low	Fife Council maintains one of the UKs comprehensive cycle network with 350 miles of signed cycle routes. Fife Council has promoted/developed numerous initiatives such as WOW and Bikeability. The Fife Travel Plan has been set up since 1999 and continually enhance and developed. Partnerships have been developed such as with Living Streets Scotland.	2025	
19	Promote and organise Clean Air Day Events Implementation Phase: 2021 – 2025	On schools events packages Citizen Science Projects	Fife Council	Annually	CAD Events carried out or promoted by Fife Council	Low	Fife Council have carried out events at a number of primary Schools for the 2020 Clean Air Day	2025	
20	Identify source apportionment to background PM. Implementation Phase: 2021 – 2025	The Main source of PM for the Appin Crescent is background. It would help identify exactly what contributes to this to help identify possible mitigation measures	Fife Council	2021 - concept	Source apportionment study for background PM	Medium	New Concept	2025	
21	Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA. Implementation Phase: 2021 – 2025	Use sensor technology to monitor PM at locations in the AQMA where previously it was not possible and where modelling has indicated higher levels. This will inform movement to revoke PM10 AQMA.	Fife Council	On-going	Quality controlled Data from AQMesh sensor units for use in LAQM reporting	Medium	Monitoring underway since 2018 Data processed and managed following guidance to ensure data quality	2025	
22	Identify most polluting vehicles within AQMA.	Specific persistent polluters to help inform policy and provide evidence to help encourage change. Focusing on business	Fife Council	2021	Emissions study to identify specific polluters	Medium	New Concept	2025	

	Implementation Phase: 2021 – 2025	rather than individuals			Utilisation of data to inform				

Table 6.2 AQAP: List of Measures by EU category and classification

Key Priority	Measure	EU Measure Category	EU Measure Classification
Strategic	Liaise with Scottish Government to encourage the consideration of national measures	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality
Strategic	Improving Air Quality links with Local Planning and Development Framework	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Strategic	Integrate Air Quality with other Council Strategies	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Specific	Maintenance and utilisation of Air Quality and Planning Toolkit	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Strategic	Promote domestic combustion best practice guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Strategic	Improving links with Local Transport Strategy/ Area Transport Plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Strategic	Travel Plans for large Institutions and Businesses	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Strategic	Update Air Quality Strategy for Fife	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance
Specific	Investigate the potential for establishing voluntary bus agreements	Promoting Low Emission Transport	Company Vehicle Procurement -Prioritising uptake of low emission vehicles
Specific	Promote the continued expansion of the councils Electric Vehicle Fleet	Promoting Low Emission Transport	Public Vehicle Procurement -Prioritising uptake of low emission vehicles
Specific	Promote the continued Development of the Electric Vehicle Infrastructure	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging
Strategic	Provision of Information and promotion of travel options	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure
Strategic	Promote Sustainable travel Initiatives	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure
Strategic	Provision of information relating to Air Quality	Public Information	Via other mechanisms
Strategic	Promote and organise Annual Clean Air Day Events	Public Information	Via other mechanisms
Specific	Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA	Traffic Management	Other
Specific	Proposed Air Dispersion modelling study of the potential Dunfermline Northern Link Road	Traffic Management	Testing Vehicle Emissions
Strategic	Develop alternative sustainable travel Infrastructure	Transport Planning and Infrastructure	Bus route improvements/Cycle Network
Specific	Identify source apportionment to background PM	Vehicle Fleet Efficiency	Testing Vehicle Emissions
Specific	Identify most polluting vehicles within AQMA	Vehicle Fleet Efficiency	Testing Vehicle Emissions
Specific	Target reductions in emissions from the Council fleet and contract vehicles (including driver training)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes
Specific	Fife ECO Stars	Vehicle Fleet Efficiency	Driver training and ECO driving aids

Appendices

Appendix A: 2015 AQAP required reduction in emissions

Appendix B: Methodology Utilised to Assess Shortlisted Measures

Appendix C: Detailed Description of AQAP measures

A 2015 AQAP required reduction in emissions

Required reductions in emissions calculations carried out for the 2015 AQAP are provided in table A.1.

Table A.3 Reductions required in PM10 concentrations to achieve the annual mean objective

Location	Current Road-[PM_{10}] ($\mu g\ m^{-3}$)	Required Road-[PM_{10}] ($\mu g\ m^{-3}$)	Road-[PM_{10}] Reduction required (%)
Auto analyser + 4ABC	6.8	7.1	0.0
Appin Crescent ABC	7.3	7.1	2.8
Appin Cr 1	4.4	7.1	0.0
Appin Cr 2	8.9	7.1	25.4
Appin Cr 3	9.4	7.1	32.4
Appin Cr 5ABC	9.6	7.1	35.2
Appin Cr 6ABC	9.9	7.1	**39.4**
11 Halbeath Rd	2.4	7.1	0.0
57 Halbeath Rd	2.5	7.1	0.0

A.1 Scenario Analysis

In addition to modelling baseline concentrations of NO_2 and PM_{10} for the Appin Crescent AQMA for the base year, the 2011 further assessment modelled the potential impact of five potential scenarios (measures) to ascertain their potential impact on local concentrations of NOx/ NO_2 and PM_{10} and in terms of compliance with the relevant objectives. The scenarios assessed were:

1. 5% reduction in traffic volume
2. 10% reduction in traffic volume
3. 20% reduction in traffic volume
4. 25% reduction in queuing traffic
5. 50% reduction in queuing traffic

These scenarios were modelled to inform future management decisions, but do not speculate on how the necessary reductions may be achieved. The scenarios were selected to obtain an indication of what impact various changes in traffic volume and queuing could have on concentrations of NO_2 and PM_{10} within Appin Crescent. For both scenario classes (1) traffic volume and (2) queuing traffic, a range of reductions were assessed to inform the Action Plan. The lower reductions were included to assess the impact of what were considered to be more realistic changes in both parameters, 5% reduction in traffic volume and 25% reduction in queuing. It was considered that these reductions could feasibly be implemented with the appropriate consideration and therefore could be used to give an indication of what could feasibly be achieved by measures that could bring about such changes. Scenarios requiring larger reductions in traffic volume and queuing were also modelled to reinforce the impact of both these parameters on air quality within Appin Crescent, and the impact such large yet unlikely changes could have on local air quality.

A summary of these scenario analyses is presented below together with anticipated impacts on concentrations of NO_x and PM_{10} at relevant receptors.

A.2 Scenarios 1-3: 5, 10 and 20% reductions in traffic flow

This scenario involves reducing the volume of vehicles on the Appin Crescent as well as Halbeath Road. To model this, a new set of emissions factors were derived for all modelled roads using the Emissions Factor Toolkit[12] (EfT) with the reduced flow of traffic. Table A.1 and Table A.2 show the results of the analysis.

Table A.2 NO_2 concentrations at receptors for the 'do-nothing' and Scenarios 1-3

Location	Modelled NO_2 *do-nothing* (μgm^{-3})	Modelled NO_2 *5% reduction* (μgm^{-3})	Modelled NO_2 *10% reduction* (μgm^{-3})	Modelled NO_2 *20% reduction* (μgm^{-3})
Auto analyser and 4ABC	33.9	32.9	32.0	29.9
Appin Crescent ABC	35.1	34.0	33.2	31.1
Appin Crescent 1	27.4	26.7	26.1	24.6
Appin Crescent 2	41.8	40.5	39.4	36.8
Appin Crescent 3	42.4	41.2	39.9	35.9
Appin Crescent 5ABC	42.7	41.5	40.3	36.0
Appin Crescent 6ABC	44.0	42.7	41.5	38.8
11 Halbeath Rd	20.6	20.2	19.8	19.1
57 Halbeath Rd	21.1	20.7	20.3	19.6

Table A.3 PM_{10} concentrations at receptors for the 'do-nothing' and Scenarios 1-3

Location	Modelled NO_2 *do-nothing* (μgm^{-3})	Modelled NO_2 *5% reduction* (μgm^{-3})	Modelled NO_2 *10% reduction* (μgm^{-3})	Modelled NO_2 *20% reduction* (μgm^{-3})
Auto analyser and 4ABC	17.7	17.4	17.1	16.3
Appin Crescent ABC	18.2	17.9	17.5	16.4
Appin Crescent 1	15.3	15.1	14.9	14.3
Appin Crescent 2	19.8	19.6	18.8	18.0
Appin Crescent 3	20.3	19.9	19.5	18.5
Appin Crescent 5ABC	20.5	20.0	19.6	18.6
Appin Crescent 6ABC	20.8	20.3	19.9	18.7

[12] Emissions Factor Toolkit for Vehicle Emissions: http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html#eft

11 Halbeath Rd	13.3	13.2	13.1	12.8
57 Halbeath Rd	13.4	13.2	13.2	12.9

A.3 Scenarios 4 and 5: reduction in traffic queuing emissions: 25 and 50%

This scenario involves reducing the assumed queuing emissions in the baseline model by 25% and 50%. The same methodology as used for scenarios 1-3 was used, but this time reducing the number of queuing vehicles in the EfT to generate new emissions factors for input to the model. Table A.3 and Table A.4 show the results of the analysis.

Table A.4 NO_2 concentrations at receptors for the 'do-nothing' and Scenarios 4 and 5

Location	Modelled NO_2 *do-nothing* (μgm^{-3})	Modelled NO_2 *15% reduction* (μgm^{-3})	Modelled NO_2 *50% reduction* (μgm^{-3})
Auto analyser and 4ABC	33.9	33.0	32.2
Appin Crescent ABC	35.1	33.9	32.7
Appin Crescent 1	27.4	26.5	25.5
Appin Crescent 2	**41.8**	39.5	37.2
Appin Crescent 3	**42.4**	**41.1**	39.9
Appin Crescent 5ABC	**42.7**	**41.5**	**40.3**
Appin Crescent 6ABC	**44.0**	**41.9**	39.8
11 Halbeath Rd	20.6	20.2	19.9
57 Halbeath Rd	21.1	20.8	20.4

Table A.5 PM_{10} concentrations at receptors for the 'do-nothing' and Scenarios 4 and 5

Location	Modelled NO_2 *do-nothing* (μgm^{-3})	Modelled NO_2 *15% reduction* (μgm^{-3})	Modelled NO_2 *50% reduction* (μgm^{-3})
Auto analyser and 4ABC	17.7	17.5	17.4
Appin Crescent ABC	**18.2**	17.9	17.6
Appin Crescent 1	15.3	15.1	14.9
Appin Crescent 2	**19.8**	**19.2**	**18.6**
Appin Crescent 3	**20.3**	**20.0**	**19.6**
Appin Crescent 5ABC	**20.5**	**20.2**	**19.9**
Appin Crescent 6ABC	**20.8**	**20.2**	**19.7**

11 Halbeath Rd	13.3	13.3	13.2
57 Halbeath Rd	13.4	13.4	13.3

As anticipated, the queue reduction scenarios above improve the likelihood of compliance with the NO_2 and PM_{10} annual mean objectives in Appin Crescent. Both queue reduction scenarios reduce NO_2 and PM_{10} concentrations, but even for the more realistic scenario exceedances of the objective are still predicted.

The built up urban topography that prevails at the worst case locations in Appin Crescent mean that whilst there are meaningful traffic volumes along quite narrow road links, exceedances of the NO_2 and PM_{10} objectives could exist until improvements in fleet emissions are observed (for instance by gradually improving Euro standards). That said, Action Planning interventions that reduce flows and/or queuing could reduce the magnitude of the exceedances predicted in this study.

A.4 Conclusions and recommendations from the further assessment

The findings of the further assessment confirmed that there are continued current exceedances of the NO_2 annual mean objective in Appin Crescent, Dunfermline. The spatial extent of the exceedances remains quite small and the current AQMA boundary is adequate for NO_2. The assessment also indicated that there are exceedances of the Scottish annual mean PM_{10} objective within the Appin Crescent AQMA and as this pollutant is not currently included in the AQMA order for the location, it is recommended that the order is amended accordingly.

The results of the source apportionment indicate that for PM_{10} existing background concentrations are thought to be predominant in the overall concentrations at all locations in Appin Crescent. For NOx/NO_2 the contribution from road traffic is dominant overall.

The contribution from moving and queuing vehicles was tested. The contribution from moving traffic is thought to predominate between the two, although emissions from queuing vehicles are also important, though perhaps more so for NOx than PM_{10}. Of the vehicle classes tested cars and HGVs are the most significant sources of vehicular NOx, whilst cars and LGVs have been identified as the most significant sources of vehicular PM_{10}. Buses are also an important source of both pollutants.

The study investigated the potential impact of several mitigation scenarios tested to provide insight into what influence they would likely have on ambient air quality and the likelihood of compliance with the NO_2 and PM_{10} annual mean objectives in Appin Crescent. The scenarios modelled assessed percentage reductions in traffic volumes passing through Appin Crescent and also reductions in traffic queuing. All scenarios tested were, as expected, found to reduce NO_2 and PM_{10} concentrations. However, each of the more realistic scenarios when considered in isolation was still found to have exceedances of the respective objectives.

From consideration of the source apportionment and scenario analyses, it is recommended that the Action Plan should include measures aimed at:

- Encouraging a reduction of the volume of traffic passing through Appin Crescent;
- Minimising the impacts of traffic queuing within the AQMA;
- Reducing the background concentration of PM10 through encouragement of efforts at the national level.

B Methodology Utilised to Assess Shortlisted Measures

In accordance with the government guidance, the measures short-listed for inclusion within the Action Plan have been assessed against a wide range of criteria in order to assess their suitability for inclusion within the plan and enable suitable measures to be prioritised. The criteria against which options were assessed were:

- Potential air quality impact;
- Implementation costs;
- Cost-effectiveness;
- Potential co-environmental benefits, risk factors, social impacts and economic impacts;
- Feasibility and Acceptability.

The following paragraphs outline how the assessment has been undertaken.

B.1 Potential Air Quality Impact

This is a key assessment in that the AQAP must focus on prioritising options that improve air quality most effectively. The assessment is complex in that the detailed assessment of any given option could normally be subject to a study of its own requiring significant resources.

A semi-quantitative assessment relying on a level of judgement has been adopted. The method used is outlined below:

1 The description of the option and the proposed change to be brought about by the option is used alongside the source apportionment analysis (section) to define what proportion of road transport emissions would potentially be affected by the option.

2 A view is then expressed on how much of the traffic would actually be changed by the option.

3 The proportion of emissions potentially affected by the option and the view on how far they could be changed by the option are combined to express a view on how much transport emissions may be reduced in the AQMA due to the option.

4 A view is then expressed on how significant this change in emissions would be in terms of making progress towards the air quality standard in the AQMA.

For the purpose of the AQ assessment the result of the realistic intervention has been assessed as having a potentially:

- **Zero** local AQ benefit if the realistic intervention is 0% or worse;
- **Small** local AQ benefit if the realistic intervention is 1%;
- **Medium** local AQ benefit if the realistic intervention is 2-5%;
- **Large** local AQ benefit if the realistic intervention is >5%.

B.2 Implementation Costs

The potential implementation costs of each option are assessed as follows:

- **Cost neutral** (measure already implemented through existing plans/ programmes)

- **Low** costs (up to £20k annually e.g. for small surveys or campaigns or other options using current resources)
- **Medium** costs (up to £60k annually e.g. for a full time officer and resources)
- **High** costs (up to £200k annually e.g. for small traffic management schemes)
- **Very high** costs (above £200k annually e.g. for new infrastructure)

The assessed costs attempt to include the costs to vehicle operators as well as to Fife Council. These cost bandings may be subject to revision depending on comments received from those consulted.

B.3 Cost-Effectiveness

The effectiveness of each measure in improving air quality is compared to the implementation costs in the following matrix:

Table B.1 Implementation costs matrix

AQ benefit / Cost	Score	Zero	Small	Medium	Large
Score		0	1	2	3
Neutral	5	0	5	10	15
Low	4	0	4	8	12
Medium	3	0	3	6	9
High	2	0	2	4	6
Very High	1	0	1	2	3

In Table B.1 the assessed implementation costs and potential air quality impacts have been given a weighted score. The product of the weighted scores for each option is calculated. The results can be interpreted as follows:

- If the product is **high** (10 or more) then the measure is more cost-effective (significant impacts for the cost involved) and perhaps favourably cost-effective;
- If the product is **medium** (between 5-9) then the measure is in the **medium** range of cost-effectiveness;
- If the product is **low** (4 or less) then the measure is less cost-effective (small impacts for the cost involved) and perhaps unacceptably poor in cost-effectiveness terms.

This method only estimates the *relative* cost-effectiveness of options rather than their *absolute* values. The method is useful during discussions of the relative priority of different options. The final cost-effectiveness value is sensitive to changes in the assumptions of how effective a measure might be in reducing emissions and how costly it is.

B.4 Potential Co-environmental Benefits

In this assessment other environmental benefits are highlighted.

- Greenhouse gases: The likely effect on greenhouse gas emissions is assessed as being an overall reduction or a local reduction perhaps with emissions being relocated elsewhere.
- Noise.

Without detailed information on the true impacts of the options these assessments rely on judgement.

B.5 Potential Risk Factors

In this assessment risk factors are highlighted. These may be looked at more closely within a Strategic Environmental Assessment of any measure implemented. At this stage it is simply highlighted whether or not it is likely that the measure would:

- Relocate emissions and hence lead to worsening air quality elsewhere;
- Require a change in land use;
- Place limits on pace of development, or increase costs of development significantly.

Without detailed information on the true impacts of the measures, these assessments rely on judgement.

B.6 Potential Social Impacts

Potential social impacts are highlighted. These may need to be examined more closely when developing the options further. At this stage it is simply highlighted whether or not it is likely that the option would potentially:

- Provide health benefits in terms of lower exposure to pollutants or increased mobility;
- Increase road safety;
- Improve accessibility.

Without detailed information on the true impacts of the options these assessments rely on judgement.

B.7 Potential Economic Impacts

Potential economic impacts are highlighted. These may need to be examined more closely when developing the options further. At this stage it is simply highlighted whether or not it is likely that the option would potentially:

- Influence sustainable development or accessibility in Dunfermline;
- Reduce or increase overall travel time;
- Place additional requirements on operators.

B.8 Feasibility and Acceptability

Each option has been assessed for its feasibility against three simple criteria. These are whether the authority has:

- The executive powers under existing legislation to implement and enforce a measure. Alternatively, whether the authority has an existing mechanism to influence other agencies to implement a measure;

- Secured funding for the measure or a straightforward route for securing funding;
- Characterised the potential positive and negative impacts of the measure with sufficient evidence or confidence to make a decision to implement the measure.

Table B.2 below sets out the criteria adopted for defining the option as being feasible over the short, medium or long term, or as being unfeasible. Each option is assessed against each criterion. The final feasibility timeframe is defined according to which of the three assessments results in the longest of the four possible terms (short, medium, long or unfeasible). For example, an option for which powers are clear and for which impacts are well characterised but for which funding will be difficult to obtain would be assessed as feasible over the long term.

Table B.2 Assessment of the Feasibility of Measures

Feasible in the:	Authority has the powers	Funding secured	Potential positive and negative impacts are well characterised
Short term (1-2 years)	Yes, clearly defined and already exercised	Yes potentially straightforward	Yes
Medium term (3-6 years)	Yes but novel or with an element of uncertainty	Yes with forward planning	Not without further study
Long term (>6 years)	Highly uncertain	No or extremely difficult	Not without further study
Unfeasible	No	Will never attract funding	Hard to characterise and with high risks

In relation to the acceptability, a preliminary judgement is expressed on how acceptable each option might be to stakeholders according to the following criteria:

- The option is considered potentially acceptable if: the option is unlikely to compel people to change behaviour or increase their costs significantly or at least some level of behaviour change or personal costs are required but the scheme is overall consistent with community policies;
- The option is considered potentially unacceptable if: unacceptably intrusive changes in behaviour or large personal costs would be incurred.

Final judgements on acceptability will necessarily rest with the elected Council members.

A summary of the results of the assessment is presented in Table B.3 below.

Table B.3 Summary Assessment of Proposed Measures

Measure Title	Potential Air Quality Impact	Estimated Costs	Cost Effectiveness	Potential Co-environmental Impacts	Risk Factors	Potential Social Impacts	Potential Economic Impacts	Lead Authority	Feasibility/ Acceptability
Liaise with Scottish Government to encourage the consideration of national measures				GHG – positive Other AQ pollutants - positive	None identified	Health benefits	Potential costs to operators of prominent sources	Fife Council	Short-term/ Acceptable
Improving links with Local Transport Strategy/ Area Transport Plan				GHG - positive Other AQ pollutants – positive	Care to avoid relocating pollution	Improved accessibility	May influence development and associated aims.	Fife Council Transportation and Environment Services and Environmental Services	Short-term/ Acceptable
Improving Air Quality links with Local Planning and Development Framework				GHG - positive Other AQ pollutants – positive	Care to avoid relocating pollution	Health benefits	May influence development and associated aims.	Fife Council Economy, Planning and Employability Services	Medium-term/ Acceptable
Integrate AQ with other Council strategies				GHG - positive. Other AQ pollutants – positive	None identified	Health benefits	May influence development and associated aims	Fife Council Economy, Planning and Employability Services	Medium-term/ Acceptable
Travel Plans for Large Institutions and Businesses	M	M*	Medium	GHG - positive Other AQ pollutants – positive	Noise - positive	Health benefits	Potential financial benefits to employees	Fife Council Transportation and Environment Services and Economy, Planning and Employability Services	Short-term/ Acceptable

Measure Title	Potential Air Quality Impact	Estimated Costs	Cost Effectiveness	Potential Co-environmental Impacts	Risk Factors	Potential Social Impacts	Potential Economic Impacts	Lead Authority	Feasibility/ Acceptability
Provision of Information and Promotion of Travel options	M	M*	Medium	GHG - positive Other AQ pollutants – positive Noise - positive	Potential road safety issues (cycling and walking)	None Identified	Potential benefits	Fife Council Transportation and Environment Services and Economy, Planning and Employability Services	Short- Medium-term/ Acceptable
Provision of Information relating to Air Quality	S	L*	Medium	GHG - positive Other AQ pollutants – positive Noise - positive	None identified	Health benefits	None identified	Fife Council Protective Services	Short-term/ Acceptable
Target reductions in emissions from the Council fleet and contract vehicles (including driver training).	S	H*	Low	GHG- positive Other AQ pollutants – positive Noise - positive	None identified	Health benefits	Neutral	Fife Council Finance and Procurement Services	Short-Medium term/ Acceptable
Investigate the potential for establishing voluntary bus agreements	S	M-H	Low	GHG- positive Other AQ pollutants – positive	Care to avoid relocating pollution	Health benefits	Potential impact on Operators	Fife Council Transportation and Environment Services and Economy, Planning and Employability Services	Medium-term/ Acceptable
Fife ECO Stars	M	L	Medium	GHG – positive Other AQ pollutants – positive	None identified	Health benefits	Potential impact on Operators	Fife Council	Short-term/ Acceptable

Measure Title	Potential Air Quality Impact	Estimated Costs	Cost Effectiveness	Potential Co-environmental Impacts	Risk Factors	Potential Social Impacts	Potential Economic Impacts	Lead Authority	Feasibility/ Acceptability
Maintenance and utilisation of Air Quality and Planning Toolkit	M	L	Medium	GHG - positive Other AQ pollutants – positive	None identified	Health benefits	None identified	Fife Council	Long-term/ Acceptable
Proposed Air Dispersion modelling study of the potential Dunfermline Northern Link Road	M	L	Medium	Other AQ pollutants – positive	None identified	Health benefits	Potential impact on Operators	Fife Council	Medium-term/ Acceptable
Update Air Quality Strategy	M	L	Medium	Other AQ pollutants – positive	None identified	Health benefits	None identified	Fife Council	Short-term/ Acceptable
Promote the continued expansion of the councils Electric Vehicle Fleet	M	M	Medium	GHG – positive Other AQ pollutants – positive	None identified	Health benefits	Potential Impact on Council	Fife Council	Medium-term/ Acceptable
Promote the continued Development of the Electric Vehicle Infrastructure	M	M	Medium	GHG – positive Other AQ pollutants – positive	None identified	Health benefits	Potential benefits	Fife Council	Medium-term/ Acceptable
Promote Sustainable travel initiatives	M	L	Medium	GHG – positive Other AQ pollutants – positive	None identified	Health benefits	Potential benefits	Fife Council	Medium-term/ Acceptable
Promote domestic combustion best	S	L	Medium	GHG – positive Other AQ	None identified	Health benefits	Potential impact/benefits	Fife Council	Medium-term/ Acceptable

Measure Title	Potential Air Quality Impact	Estimated Costs	Cost Effectiveness	Potential Co-environmental Impacts	Risk Factors	Potential Social Impacts	Potential Economic Impacts	Lead Authority	Feasibility/ Acceptability
practice guidance				pollutants – positive			to residents		
Develop alternative travel infrastructure	M	M	Medium	GHG – positive Other AQ pollutants – positive	Increased Cycling incidents	Health benefits	None identified	Fife Council	Medium-term/ Acceptable
Promote and organise Clean Air Day Events	M	L	Medium	Other AQ pollutants – positive	Safety of Participants in events	Health benefits	Potential benefits	Fife Council	Short-term/ Acceptable
Identify source apportionment to background PM	M	L	Medium	Other AQ pollutants – positive	None identified	Health benefits	None identified	Fife Council	Short-Medium term/ Acceptable
Utilise sensor technology to gain a better understanding of PM concentrations within the AQMA	M	L	Medium	Other AQ pollutants – positive	Local site operator risks	Health benefits	Potential benefits	Fife Council	Short-Medium term/ Acceptable
Identify most polluting vehicles within AQMA	M	L	Medium	GHG – positive Other AQ pollutants – positive	Potential road safety issues	Health benefits	None identified	Fife Council	Short-Medium term/ Acceptable
Survey domestic biomass installations within or near AQMA and determine contribution	S	M	Low	GHG – positive Other AQ pollutants – positive	Risk to surveyors caring out survey	Health benefits	None identified	Fife Council	Unfeasible

Fife Council

Measure Title	Potential Air Quality Impact	Estimated Costs	Cost Effectiveness	Potential Co-environmental Impacts	Risk Factors	Potential Social Impacts	Potential Economic Impacts	Lead Authority	Feasibility/ Acceptability
Promote initiatives to help members of the public to take action to reduce air pollution	M	L	Medium	Other AQ pollutants – positive	None identified	Access to information	None identified	Fife Council	Unfeasible, covered elsewhere
Work with Schools to raise awareness of Air Pollution and promote Active travel	S	L	Low	Other AQ pollutants – positive	None identified	Access to information	None identified	Fife Council	Unfeasible, covered elsewhere

*Partly or wholly implemented through existing finance stream

C Detailed Description of AQAP measures

Each of the chosen measures to be included within the updated draft plan are discussed in more detail below. Information includes; a summary of potential sub-measures, the relevant authorities responsible for implementation, and the powers available to implement the given measures.

C.1 Liaise with the Scottish Government to encourage the consideration and adoption of new measures that aim to reduce background concentrations of PM_{10} and $PM_{2.5}$

The source apportionment study undertaken as part of the further assessment identified that background sources make a significant contribution to local concentrations of PM_{10}. Background sources of particulate matter include a wide range of natural and man-made processes including industry, residential and commercial combustion and transport sources. However, local authorities have very limited opportunities to address background concentrations of pollutants and instead must rely on regional and national measures to address these and contribute to improving local concentrations.

Fife Council has been proactive in reviewing local concentrations of particulate matter (PM) including $PM_{2.5}$ and propose to liaise with the Scottish Government regarding the consideration and adoption of new measures that will contribute to reducing background concentrations of PM and other pollutants.

Measure	Title
1	Liaise with the Scottish Government regarding the consideration of national measures to reduce background concentrations of PM
Definition	Key Intervention
a. Maintain contact with the Scottish Government regarding the adoption of national air quality measures.	Increase focus on background concentrations of PM and encourage national action.
Responsible authority and other partners	Powers to be used
Fife Council – Transportation and Protective Services	Voluntary

C.2 Improving links with the Local Transport Strategy/Area Transport Plan

Road transport has been identified as the principal source of NO_x and a significant source of PM_{10} in the Appin Crescent AQMA. Consequently, Fife Council's Local Transport Strategy and the developing Dunfermline and West Fife Local Plan constitute key mechanisms for delivering initiatives aimed at improving local air quality.

Measure	Title
2	Improving links with Local Transport Strategy/ Area Transport Plan
Definition	Key Intervention
Future versions of LTS to be revised to include: a. Reference to Appin Crescent AQMA and	Measures to ensure the current poor air quality in the AQMA is improved where

measures included in Air Quality Action Plan. Integration of plan with LTS. b. Develop Action Plan options that will be implemented via the local transport strategy.	possible and to avoid future problems are implemented via the Local Transport Strategy.
Responsible authority and other partners	Powers to be used
Fife Council – Transportation	Voluntary

C.3 Improving air quality links with Local Planning and Development Framework

Development Planning and Control play an important role in minimising the potential detrimental impacts that new developments may have on local air quality. This Strategic measure is intended to minimise the potential impact of future developments on local air quality across Fife. As a strategic measure it has a broader remit that is not specific to Dunfermline but Fife generally. Whilst Air Quality is already considered by Fife Council during the development planning process, the declaration of the new AQMA in Dunfermline presents the opportunity to refocus on the potential impacts of developments on local air quality during construction and operational phases. Whilst it is important that all large-scale developments are considered in terms of their potential impact on local air quality, it is particularly important that proposed developments that may exert an impact on the Appin Crescent AQMA should be subject to particular consideration in terms of their potential impact on local air quality, and that all practicable mitigation measures are implemented.

This measure also includes the maintenance and continued provision of Fife Council's Air Quality guidance note for developers that was originally prepared to support the Bonnygate Air Quality Action Plan for Cupar[13]. This document outlines the potential requirement to undertake an Air Quality Impact Assessment for certain developments and the required content of such assessments. The guidance note should enable a consistent approach to air quality impact assessment to be adopted in the Council and minimise the potential effects of future development on air quality across Fife.

Measure	Title	
3	Improving Air Quality links with Local Planning and Development Framework	
Definition		Key Intervention
a. Integration of Appin Crescent AQAP with future versions of Local Plan. b. Ensure that development proposals with the potential to exert an impact on the Appin Crescent AQMA are assessed for air quality impacts and where necessary, appropriate mitigation measures adopted. c. Continue to promote sustainable developments by using the planning process to maximise commitment from developers to minimise air quality impacts. d. Maintain and make available - air quality guidance note for developers.		Local planning considerations aim to mitigate the cumulative negative air quality impacts of new development

[13] Fife Council (2009). Bonnygate Air Quality Action Plan.

Responsible authority and other partners	Powers to be used
Fife Council – Transportation	Voluntary

C.4 Encourage Integration of Air Quality with other Council Strategies

Fife Council recognised the benefit of increasing the general awareness of air quality issues throughout the Council and the need to integrate air quality considerations within existing and future Council plans and strategies. Fife Council's Single Outcome Agreement (SOA) with the Scottish Government outlines the aim of providing better water, air and land quality under the banner of Sustaining and Improving Our Environment. In the future, the Appin Crescent AQAP should represent a key tool for helping to deliver on the SOA targets and indicators.

Measure	Title	
4	Encourage Integration of Air Quality within other Council strategies	
Definition		Key Intervention
a. Continue and enhance joint working between Council Services to encourage potential air quality implications of existing and future Council strategies. b. Maintain regular and ongoing communication between members of the Appin Crescent AQAP steering group.		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.
Responsible authority and other partners		Powers to be used
Fife Council and community planning partners		Statutory and Voluntary

C.5 Travel Plans for large Institutions and Businesses

Travel plans aim to address the negative impacts of car travel, notably single occupancy vehicles, by encouraging car sharing, or a shift to more sustainable forms of transport, such as walking, cycling and public transport; or reducing the need for travel. Such plans typically recognise that one solution is unlikely to be suitable for everyone and thus focus on encouraging the consideration of alternative forms of travel through the provision of incentives such as improved cycle facilities, flexible working arrangements and discounted public transport.

Travel plans have been widely adopted across the UK and have been shown to be cost-effective at reducing car usage in numerous situations. As a result, the adoption of Travel Plans is now widely promoted by the UK Government[14]. Fife Council have been proactive in the development of Travel Plans, through the development of the 'Way Ahead to Work' Council Travel Plan, and by providing guidance and support to schools, businesses and organisations in relation to the design and implementation of successful Travel Plans. A summary of some of the activities undertaken by Fife Council in relation to travel plans is presented below.

[14] Good Practice Guidelines. Delivering Travel Plans through the planning Process. DfT (2009)

School Travel Plans

School Travel Plans represent a commitment from schools to develop a package of measures aimed at encouraging healthier, safer and more environmentally friendly methods of travelling to and from school by parents, pupils and staff.

Fife Council already employs School Travel Plan Co-ordinators to assist teachers, pupils and parents in the development and implementation of Travel Plans, together with promoting health and environmental benefits of alternative travel choices. The Travel Co-ordinators provide guidance, and where appropriate, help establish a link between schools and other stakeholders. The Plans incorporate established programmes such as 'Safer Routes to School' and 'Active School Travel' but also aim to initiate a change in transport culture through education and encouraging change through initiatives like walking buses. Fife Council produced Primary and Secondary School Travel Plan resource packs which were distributed to all schools in Fife. Also a wide variety of publications aimed at encouraging the establishment of School Travel Plans have been made available through the Council website at www.fifedirect.org.uk/schooltravelplans.

Fife Council Travel Plan

In order to encourage a reduction in car dependency for commuting to and from work and whilst at work, Fife Council has developed a Council Travel Plan 'Way Ahead to Work' (2000). The Plan was based on a Council Travel Survey undertaken in 1999 and identified the following Objectives:

- A reduction in the number of single occupancy car journeys to work;
- An increase in the use of more sustainable forms of travel to work, and,
- A reduction in the amount of travel undertaken at work.

In order to achieve this, the plan outlined numerous actions covering walking and cycling, public transport, car use and reducing the need to travel. This overall plan has been supplemented by the development framework travel plans for several towns in Fife including Dunfermline. The travel plan includes a number of measures which are of interest to the development of this Action Plan, including:

- Fife Council Private Car Share Group;
- The development and implementation of Car Park Management Guidelines;
- The support and promotion of cycling and walking;
- Promotion of public transport;
- Reducing the need of staff to travel (e.g. flexible working).

Fife Council's travel plan is widening staff travel options.

Encouraging External Organisations to Develop Travel Plans

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

Measure	Title	
5	Travel Plans for large Institutions and Businesses	
Definition		Key Intervention
To encourage and assist large organisations to develop and implement travel plans, including: a) Continue the implementation of Fife Council's travel plan; b) Continue to support the implementation of School travel		To encourage a shift to more sustainable forms of travel or reducing the need for travel.

plans; c) Work with local businesses/ organisations to encourage the development and implementation of travel plans.	
Responsible authority and other partners	Powers to be used
Fife Council	Voluntary

C.6 Provision of Information and promotion of travel options

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

Public Transport Information

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

Promoting Cycling and Walking

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

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

Measure	Title
6	Provision of Information and promotion of travel options

Definition	Key Intervention
To increase awareness of travel choice options and promote cycling/ walking, Fife Council propose to: a. Produce Travel Choices facility for Dunfermline. b. Undertaking Travel Marketing in Dunfermline. c. Undertake a publicity exercise to raise awareness of the Appin Crescent AQMA and encourage people to use sustainable forms of transport wherever possible. d. Maintain and promote the use of Tripshare Fife, car-sharing initiative.	To increase awareness of travel choices and encourage changes in behaviour that will contribute to improving local air quality.

e. Continue to provide information about public transport services through the Council website. f. Ensure cycle networks and facilities are provided, as a matter of course, within existing and new networks and developments. g. To improve integration between cycling, walking and public transport. h. Increase cycling trips to employment, education and leisure facilities. i. Improve pedestrian facilities such as new footpaths and crossings.	
Responsible authority and other partners	Powers to be used
Fife Council - Transportation	Voluntary

C.7 Provision of information relating to Air Quality

Fife Council operates an extensive air quality monitoring network, with data from these sites made available to the public through the Air Quality in Scotland website. In addition, the most recent air quality management reports prepared by the Council are available through the Council website.

In addition, in order to continue to raise the profile of Air Quality Management across Fife, and in particular the Appin Crescent AQMA, Fife Council propose to undertake a public awareness exercise aimed at improving awareness of local air quality issues and encouraging members of the public to participate in improving local air quality.

Measure	Title
7	Provision of information relating to Air Quality

Definition	Key Intervention
To increase awareness of local air quality issues and public transport information. a) Continue to make information relating to local air quality management available through the Council website. Undertake a publicity campaign to raise awareness of the Appin Crescent AQMA.	To increase awareness of local air quality issues and encourage changes in behaviour that will contribute to improving local air quality.
Responsible authority and other partners	Powers to be used
Fife Council – Protective Services and Transportation	Part IV of the Environment Act 1995 and Voluntary

C.8 Target reductions in emissions from the Council fleet and contract vehicles (including driver training)

Fife Council considers that it should lead by example and target reductions in emissions from their transport fleet activities as much as practicable. The Council has implemented numerous policies and programmes aimed at improving the energy efficiency of the Council fleet. These are divided into four categories:

Procurement of Lower Emission Vehicles

Fife Council undertakes an evaluation process, taking into consideration fuel consumption figures and CO_2 emissions when procuring new vehicles for the Council fleet. Wherever practicable, Fife Council's Fleet Operations aim to procure vehicles meeting the new emission limits established in the EU Directives. As a result of this replacement policy, during 2009 the Council procured seventeen refuse collection vehicles meeting the new Euro V standard, and before the end of 2011, all heavy goods vehicles operating within Fife Council's fleet should comply with Euro IV or V emission standards. Fife Council is also actively pursuing the uptake of electric vehicles and hybrid vehicles within the Council fleet. The Council has 18 electric vehicles operating within the fleet as of March 2015 with funding to procure a further 4 electric vehicles and 3 hybrid vehicles during 2015/ 2016.

Fuel Monitoring Management

Fife Council's Fleet Services provide data relating to fuel consumption to all Services within Fife Council, enabling each service to monitor targeted reductions in fuel usage and emissions. In order to refine this process, the Council has also implemented a vehicle telemetry system on some of its fleet vehicles. The system collects data on speed, odometer readings and fuel consumption from each vehicle and sends the data to a central server for collation. The introduction of this system should enable the Council to identify efficiencies in fuel and fleet management that will contribute to reduced emissions from the fleet across Fife.

Alternative Fuelled Vehicles

There are a number of alternative fuels and technologies available that offer the potential to lower emissions of air pollutants, including CO_2, from road transport sources. Fife Council operates a policy of assessing and where appropriate, incorporating new alternative fuelled vehicles within its fleet.

In line with the requirements of the Renewable Transport Fuel Obligation[15], as of October 2008, all diesel utilised by Fife Council contains up to 7% bio diesel. Whilst bio-diesel is currently seen as the best alternative fuel approach, Fleet Operations will continue to evaluate the use of other alternative fuels such as hybrid vehicles and electric vehicles. In addition, Fleet Services are undertaking trials of numerous electric powered cars and vans to test the effectiveness and reliability of these vehicles during operation. The Council are to improve electric vehicle charging infrastructure via the Plugged in Places project.

Safe and Fuel Efficient Driving Training

Fife Council trains and re-trains drivers to ensure that they drive in a more efficient way in a process linked to the introduction of the Driver CPC (Certificate of Professional Competence). Fife Council's Fleet Services have received accreditation through the Joint Approvals Unit for Periodic Training (JAUPT), to undertake in-house training for the new Driver CPC.

The Vehicle Drivers (Certificates of Professional Competence) Regulations 2007 requires the continuous training of vocational bus, coach and lorry drivers with part of the syllabus covering Safe and Fuel Efficient Driving (SAFED). The Council have approximately 400 members of staff who require to undertake and complete the training. However, Fleet Services are in discussions with other services within the Council regarding the advantages of fuel-efficient driver training and exploring the potential for extending training to other services. As of 2014, almost 300 Council staff have Certificates of Professional Competence.

Measure	Title
8	Target reductions in emissions from the Council fleet and contract vehicles (including driver training)

[15] Renewable Transport Fuel Obligation. The UK has since set a target of 5% of road fuel sold to come from biofuels by 2010

Definition	Key Intervention
Continue to target reductions in emissions from the Council fleet and contract vehicles through: a. Continue periodic procurement of low emission vehicles; b. Monitor and assess viable options for alternative fuels, technologies and fuel additives; c. Undertake periodic training for vocational fleet drivers including Safe and Fuel Efficient Driving (SAFED); d. Assess potential for emissions standards for fleet contracts.	Target reduced emissions from Council fleet vehicles and Council contract fleet vehicles.
Responsible authority and other partners	Powers to be used
Fife Council (Fleet Services/ Procurement and Supplies)	Voluntary and Certificate of Professional Competence

C.9 Investigate the potential for developing local bus agreements and the use of lower emission vehicles

Buses and coaches constitute an essential component of public transport in Fife, representing an important alternative to cars. Consequently, the encouragement of the development of public transport options forms an important part of many of Fife Council's policies. Bus services represent a valuable and viable alternative to the use of private cars and the contribution of local services across Fife are considered an essential component of the Council's promotion of sustainable alternatives to private transport. However, in some circumstance's buses can also make a significant contribution to emissions of NO_x and PM_{10}, and consequently it is important to assess what can be done to reduce emissions from fleet vehicles where possible.

Voluntary Bus Quality Partnerships are informal agreements between relevant bus operators and local authorities that are not enshrined in legislation. Such partnerships are usually formed between one or more Local authority and bus operator(s) but may also include large organisations or institutions (e.g. businesses). In these partnerships each party makes a commitment to improvements that will result in enhancements to bus services in a given area through measures such as improved infrastructure or better vehicles. Numerous authorities in Scotland have already developed voluntary agreements with bus operators.

Since 2000, Fife Council has operated a voluntary agreement with Stagecoach in Fife at the Ferrytoll Park & Ride. Fife Council recognizes the potential benefits of developing voluntary bus agreements across Fife, including Dunfermline and Cupar and proposes to liaise with bus operators to investigate the future potential for reducing emissions from the bus fleet where this is feasible. The Council also proposes to liaise with local operators regarding improvements to bus facilities to encourage members of the public to use public transport as an alternative to private vehicles. In 2014 Fife launched the Fife ECO Stars programme which constitutes a communication channel with goods vehicles and bus operators. The programme promotes a partnership approach to LAQM and will contribute to reducing emissions of air pollutants and CO_2 emissions from road traffic sources whilst improving economic efficiency.

Measure	Title	
9	Investigate the potential for establishing voluntary bus agreements	
Definition		Key Intervention
a. Liaise with local bus operators to establish the potential for developing local bus quality		Target reduced emissions from buses operating within the Appin Crescent

agreements. b. Liaise with bus operators regarding emissions from the bus fleet and improvements to bus service infrastructure.	AQMA.
Responsible authority and other partners	Powers to be used
Fife Council - Transportation	Voluntary

C.10 Fife ECO Stars

Fife's ECO Stars Fleet Recognition scheme has completed its 6th year, the scheme strikes a balance between recruitment of new operator members and ongoing support of the existing membership, providing advice on good operational performance and clean vehicles. This year has seen an increase in the number of operators considering ULEV.

As of May 2021 the scheme has grown to 254 fleet operator members, who operate 9,127vehicles in and around Fife.

Recruitment of new members continues to reflect the full spectrum of fleets operating in Fife, with van fleets such as MGB Services and McLays in addition to hauliers operating heavy goods vehicles, such as Seacliff Haulage. We have seen an increase in bus and coach operators from other LA areas joining as they are regularly travelling in, around and through Fife. The scheme is also of interest to national operators, with Scottish Fire and Rescue joining this year.

Ongoing support of the membership can result in star rating upgrades where good practice has been implemented, having a positive effect on air quality in Fife. One example is local company Growforth, who have upgraded their fleet and invested in driver training following recommendations made after their initial ECO Stars assessment, resulting in a 3 to 4 star upgrade.

The parallel ECO Stars Taxi and Private Hire scheme has significantly increased the number of operators to 141 members, covering 575 vehicles. The increase of membership as a requirement for social work contracts had a positive impact on recruitment efforts.

ECO Stars continues to be supported by the Scottish Government as part of its clean air strategy, and TRL also keep the scheme profile high by attending local forums such as the SESTran Logistics and Freight Forum.

Measure	Title	
10	Fife ECO Stars	
Definition		Key Intervention
Number of ECO Stars members including: a. Commercial membership – 8,200 vehicles b. Taxi and private hire membership – 365 vehicles		Encouraging more local fleet operators to introduce fleet management systems that improve air quality
Responsible authority and other partners		Powers to be used
Fife Council – Protective Services		Voluntary

C.11 Maintenance and utilisation of Air Quality and Planning Toolkit

In 2016 Fife Council commissioned the development of a regional dispersion model to obtain fast accurate data with regards predicting pollution concentration at sensitive receptors. This information

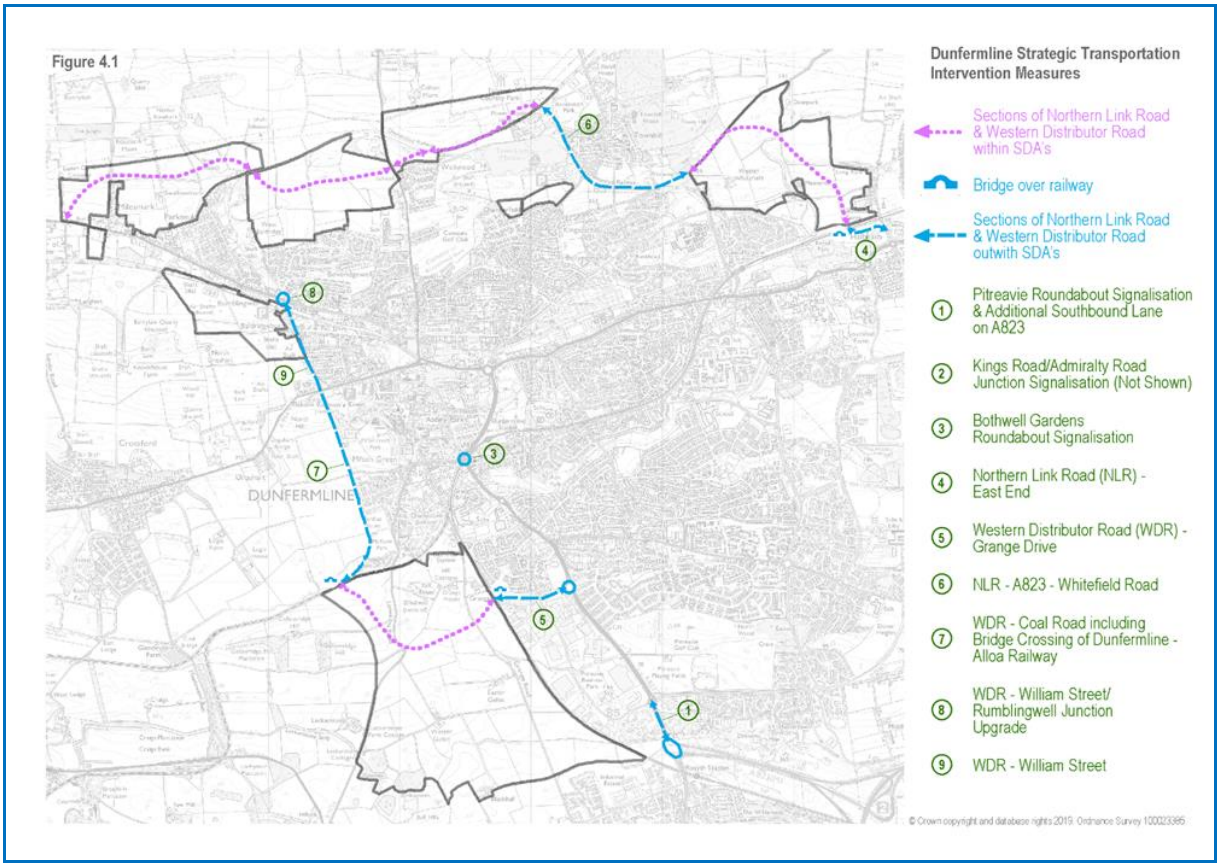
would then be used to determine the affect future developments would have on air quality in Fife. This tool, which uses Ricardo's RapidAir™ modelling platform was updated in 2018 with the latest available emissions data. Fife Council plan is to maintain this tool and also to have it utilised more by all relevant departments within the Council.

Measure	Title	
11	Maintenance and utilisation of Air Quality and Planning Toolkit	
Definition		Key Intervention
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.		Ensure future development does not compromise achievement of statutory air quality objectives through use of toolkit to assess planning Development.
Responsible authority and other partners		Powers to be used
Fife Council		Part IV of the Environment Act 1995

C.12 Proposed Air Dispersion modelling study of the potential Dunfermline Northern Link Road

Fife Council have carried out numerous dispersion modelling studying which examine the potential affect the proposed Dunfermline Northern Link Road (NLR) will have on the Appin Crescent AQMA. Figure C.1 provides a map of the proposed NLR. In future if there are proposed significant changes to the NLR, Fife Council will seek to assess the impact it will have on air quality using the relevant dispersion modelling studies.

Figure C.1 Proposed Dunfermline Northern Link Road



Measure	Title	
12	Proposed Air Dispersion modelling study of the potential Dunfermline Northern Link Road	
Definition		Key Intervention
Carry out any future Air Quality dispersion modelling to quantify the impacts of proposed Northern Link or alternatives to the Northern link Road.		Estimate the impact of the proposed northern link road and the proposed Dunfermline strategic land allocation (SLA) zones.
Responsible authority and other partners		Powers to be used
Fife Council		Part IV of the Environment Act 1995

C.13 Update Air Quality Strategy for Fife

The Air Quality Strategy for Fife 2021-2025 will provide a framework which sets out how Fife Council will work with other organisations within Fife to build on the achievements already seen in reducing air pollution. This will be achieved through the promotion of best practice, use of the best available technology, awareness raising and encouraging behavioural change.

The Air Quality Strategy is set out to clearly communicate the reasons and ideas behind the strategic outcomes it is intended to achieve. The strategy is set around 9 key areas of approach and aligns with CAFS. The updated Air Quality Strategy will go through the relevant approvals process before publishing.

Measure	Title	
13	Update Air Quality Strategy for Fife	
Definition		Key Intervention
Aligning the Strategy with CAFS whilst meeting the specific needs of Fife. Following the latest guidelines with regards the development of Air Quality Strategy and the meets the approval of the committee		Update Strategy so that it meets the current needs of Fife with regards Air Quality and aligns with the Clean Air for Scotland Strategy 2.
Responsible authority and other partners		Powers to be used
Fife Council		Part IV of the Environment Act 1995

C.14 Promote the continued Development of the Electric Vehicle Infrastructure

The continued development of the Fife electric vehicle infrastructure will encourage the vehicle fleet in Fife to change from combustion vehicles to electric vehicles. This change will help reduce air pollution emissions within the Appin Crescent AQMA. Fife Council is currently running a project called eFife (https://www.fife.gov.uk/kb/road,-travel-and-parking/electric-vehicle-network) which supports Fifes electric vehicle network – from the vehicles and charging points to promoting the benefits of electric vehicles along with grants available to help buy one. Currently there are 54public EV charging points across Fife. These are mainly at long stay car parks in town centres, and at public transport interchanges such as railway stations and park & rides. The plan going forward is to continue to expand the number of EV charging points.

Measure	Title
14	Promote the continued Development of the Electric Vehicle Infrastructure

Definition	Key Intervention
a. Number of EV Charging points. b. Number of times EV Charging points are used. c. Number of EV registrar in Fife.	Work with Roads and planning department to further develop EV infrastructure, focusing on the addition of charging points
Responsible authority and other partners	Powers to be used
Fife Council	Voluntary

C.15 Promote Sustainable travel initiatives

The Fife Council Travel Plan promotes sustainable travel with a hierarchy of walking, cycling, public transport and car share which is consistent with the key aims and objectives of Fife Council's Air Quality Strategy and the Appin Crescent (Dunfermline) and Bonnygate (Cupar) Air Quality Action Plans (updated 2015).

Fife Council have several initiatives in place, which include:

- TripshareFife.com - allowing you to find people travelling to similar locations to car share with: https://liftshare.com/uk/community/fifetripshare
- Cycle to Work Scheme – providing you an opportunity to purchase a new bike and/or safety accessory and pay direct from your salary, saving money and spreading the cost.
- Working with Schools to assist them in producing school travel plans.
- WOW (Walk Once a Week)
- Bikeability – providing cycle training to primary school children P4 -7

The "Walk Once a Week" Campaign has continued over 2019 (and into 2020) and is now in its fifth year. WOW is a partnership between Fife Council and Living Streets Scotland that continues to progress the active travel agenda in Fife Primary schools and increase the uptake of active travel. Levels of active travel remain well above average amongst the WOW schools in Fife with 85% of pupils (as of March 2020) utilising active travel measures to get to school (through walking, park & stride or using a bike or scooter). This compares with a 70% average across all other Fife schools.

Throughout the academic year, the Living Streets' Walk of Fame competition encourages schools across Scotland to join in and track as many active journeys as they can via the WOW Travel Tracker. The Walk of Fame is a fun and engaging way for schools to reach even higher levels of active travel and demonstrate how much they have embedded WOW as they try and get into the national top ten of the most active schools.

During the October 2019 Scotland Walk of Fame for International Walk to School Month Fife Council schools features regularly in the top 10 results with Auchtertool Primary winning prizes in the second week of the competition (for schools under 250 pupils). Other schools to feature in the top ten in this category included Milesmark Primary (Dunfermline) and St Agatha's Primary (Leven). Fife schools also featured in the top ten for schools in the over 250 pupils category in the form of Capshard Primary (Kirkcaldy) and Commercial Primary (Dunfermline).

Throughout December Fife schools also featured well in the Festive Walk of Fame with several making it into the top ten. On day 2 of the challenge Auchtertool Primary was first, Milesmark Primary (Dunfermline) second and Crossgates Primary third in the up to 250 pupils category. In the over 250

pupils category Commercial Primary (Dunfermline) was first and Capshard Primary (Kirkcaldy) was fourth.

In March 2020 the Scotland Walk of Fame for World Book Day took place and Fife schools featured in the top 10 every day of the week. On World Book Day (5th March) Milesmark Primary (Dunfermline) finished first in the under 250 pupils category and won the prize of a set of books for the school library.

Measure	Title	
15	Promote Sustainable travel initiatives	
Definition		Key Intervention
a. Creation of promotional material. b. Promotion of Air Quality related events. c. Identification of new Initiatives. d. Incorporation of new Initiatives.		Focus on promotional material in schools and businesses. Identify initiatives to work in tandem with ECO Stars that focus on alternative travel options. Provision of guidance and information.
Responsible authority and other partners		Powers to be used
Fife Council		Voluntary

C.16 Promote domestic combustion best practice guidance

The Cleaner Air For Scotland strategy identified a gap in emissions from the non-transport sector, including emissions from domestic (household) combustion and agriculture, as well as nitrogen deposition. An increased focus on this area has the potential to achieve greater air quality improvements than currently possible.

Domestic combustion refers to household wood burners or biomass burners which have been growing in popularity in Fife towns and urban areas in recent years as a secondary heat source. Burning solid fuel is a source of particulate matter, specifically fine particulate matter (PM2.5), as well as nitrogen dioxide and sulphur dioxide. There is a lot of variability in the quantity and type of emissions from burning wood, which makes it difficult to legislate. Variable factors include:

- the type of appliance used,
- the dryness and treatment of the wood burnt,
- the sulphur content of the fuel,
- the maintenance of the appliance, and
- the type of chimney.

Local authorities have a certain amount of control over the environmental performance standards for domestic fires, stoves and fuels, however these powers do not capture every source, especially outdoor small-scale wood burners. Unless located in an AQMA, household wood burners do not require planning permission and it can therefore be difficult for local authorities to calculate the number and location of appliances in their areas. It is important to be able to evaluate the number of appliances in a relatively small urban area because it is generally the cumulative effect which contributes to overall emissions.

There is an increasing focus on fine particulate matter pollution and control over the use of woodburning fires is likely to be of increasing importance to tackling air pollution. Currently, Fife Council's Public Protection team assesses applications for the use of domestic combustion and if these are near to, or within, an AQMA then these are also passed to the Land & Air Quality team for comment.

Fife Council

Fife Council believe that the one of the best and efficient ways of tackling this issue is to focus on raising awareness, both in terms of operation of appliances and the choice of fuel. At a UK-level, Burnright[16] is an educational campaign which provides a range of materials and resources for stove users. Within Scotland, Home Energy Scotland[17] provides advice and support to households considering low-carbon heating for their homes. Fife will also focus on implementing and promoting the EU led "Ecodesign[18]" programme which looks to lower emissions and improve efficiency in wood burners.

Measure	Title
16	Promote domestic combustion best practice guidance
Definition	Key Intervention
a. Identification of best practise guidance. b. Creation of promotional material. c. Distribution of promotional material.	Managing the PM concentration contribution from the increase number of small-scale domestic biomass burners
Responsible authority and other partners	Powers to be used
Fife Council	Voluntary

C.17 Develop alternative travel Infrastructure

Encouraging residents and visitors to use alternative travel whilst travelling within Fife and especially in and around AQMAs will help reduce vehicle numbers, congestion and in turn vehicle emissions. To achieve this behavioural change the alternative travel infrastructure (i.e. walkways and cycle paths) must be suitable for people to use. Fife Council maintains one of the UKs comprehensive cycle network with 350 miles of signed cycle routes. Fife Council plan to continue this maintenance and seek further ways to enhance what already exists, especially around AQMAs. Fife Council have also promoted/developed numerous initiatives such as WOW and Bikeability which encourage people to use alternative travel. Fife Council was the first Local Authority in Scotland to write a Travel Plan back in 1999. This is reviewed every two years using an Employee Travel Survey, to monitor how things are changing. The Fife Council Travel Plan promotes sustainable travel with a hierarchy of walking, cycling, public transport and car share. Partnerships have also been developed such as with Living Streets Scotland.

Measure	Title
17	Develop alternative travel Infrastructure
Definition	Key Intervention
a. Development projects carried out on Fife cycle and walking paths. b. Events carried out or promoted by Fife Council.	Continued enhancement and management of cycle routes and walking paths and infrastructure in Fife. Making it easier to commute using these alternatives
Responsible authority and other partners	Powers to be used

[16] https://burnright.co.uk/

[17] https://energysavingtrust.org.uk/scotland/home-energy-scotland

[18] https://op.europa.eu/en/publication-detail/-/publication/c6ccf626-2f6d-11e5-9f85-01aa75ed71a1/language-en

Fife Council	Voluntary

C.18 Promote and organise Clean Air Day Events

Public engagement helps to increase awareness of air quality issues and encourage changes in behaviour that will contribute to improving local air quality. Public engagement forms a huge part of the work that any Local Authority carries out, more so now as interest in improving air quality continues to increase.

Communicating complex scientific data to the public is challenging and works best when it is related to the real world. For this reason, communication of air quality issues to the public usually focus on the health and environmental impacts, rather than concentrations or emissions.

For engagement to work well, it must be supported by a range of agencies including national and local government, public health agencies, public transport providers, businesses, and schools. There must also be an element of evaluation and feedback so that organisers can identify how effective the engagement is.

It is also important to support citizen-led events and activities. This active involvement can be used to raise awareness and encourage behaviour change.

In recent years Clean Air Day (CAD) has become a successful platform in raising awareness within Scotland. Fife have successfully delivered initiatives and events around CAD focussing specifically on Schools. Fife plan to continue to provide annual CAD events focussing on schools and areas in and around AQMAs. Events will include citizen science projects, educational seminars and awareness raising campaigns.

Measure	Title	
18	Promote and organise Clean Air Day Events	
Definition		Key Intervention
Clean Air Day Events carried out or promoted by Fife Council		On schools events packages Citizen Science Projects
Responsible authority and other partners		Powers to be used
Fife Council		

C.19 Identify source apportionment to background PM

Source Apportionment studies carried out at Appin Crescent AQMA identified that the vast majority of Particulate Matter (PM_{10}) was from background sources (see figure 4.4). Fife Council would like to gain a better understanding of what the sources are within this background element to better inform the development of abatement measures and policies to further reduce PM_{10} concentration within the AQMAs and the rest of Fife.

Fife Council, over the past 10 years, have successfully reduced PM_{10} concentrations within the AQMA through the implementation of abatement measures that focused on local transport sources. We will continue to implement existing and new local source abatement measures however believe that the identification of what contributes to the background source could provide further opportunities for

reductions. Fife will identify a number of options available to tackle this issue and seek funding from the Scottish Government to carry it out.

Measure	Title	
19	Identify source apportionment to background PM	
Definition		Key Intervention
Source apportionment study for background PM		The main source of PM for the Appin Crescent is background. It would help identify exactly what contributes to this to help identify possible mitigation measures
Responsible authority and other partners		Powers to be used
Fife Council		

C.20 Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA

Air quality monitoring technology is now available that will enable Fife to carry out monitoring of particulate matter and NO_2 at high resolution on the south side of Appin Crescent where previous we were unable to do so. The south side of the A907 is where historic modelling assessments identified as having the highest concentrations (see Figure 2-3 in section 2). Gaining a better understanding on PM concentrations will help inform future abatement measures and also the movement to revoke the PM_{10} AQMA.

Measure	Title	
20	Utilise Sensor technology to gain a better understanding of PM concentrations within the AQMA	
Definition		Key Intervention
Quality controlled Data from AQMesh sensor units for use in LAQM reporting		Use sensor technology to monitor PM at locations in the AQMA where previously it was not possible and where modelling has indicated higher levels. This will inform movement to revoke PM10 AQMA
Responsible authority and other partners		Powers to be used
Fife Council		

C.21 Identify most polluting vehicles within AQMA

Previously carried out source apportionment studies (see section 4) have identified that 22.4% of PM_{10} emissions come from vehicles within the AQMA. Fife propose using real world emissions monitoring technology to identify if there are persistent polluters and then use this information as evidence to encourage change. The focus would be on business vehicles (i.e. buses HGV LGV etc) rather than individual private car owners. Once identified the Council will contact the persistent polluter and identify where alternative actions can be taken (i.e. the use of new less pollution emitting vehicles when traveling through the AQMA). Fife will identify a number of options available to tackle this issue and seek funding from Scottish Government to carry it out.

Fife Council

Measure	Title
21	Identify most polluting vehicles within AQMA

Definition	Key Intervention
Emissions study to identify specific polluters Utilisation of data to inform	Identify specific persistent polluters to help inform policy and provide evidence to help encourage change. Focusing on business rather than individuals
Responsible authority and other partners	Powers to be used
Fife Council	

D Glossary of Terms

Please add a description of any abbreviation included in the AQAP – An example is provided below.

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority 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
AQS	Air Quality Strategy
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
…	…

The Gemini Building
Fermi Avenue
Harwell
Didcot
Oxfordshire
OX11 0QR
United Kingdom
t: +44 (0)1235 753000
e: enquiry@ricardo.com

ee.ricardo.com