# Annual Progress Report (APR)


2020 Air Quality Annual Progress Report (APR) for
Angus Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

June 2020

Customer:
Angus Council

Customer reference:
Local Air Quality Management

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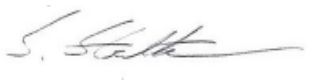

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# Executive Summary: Air Quality in Our Area

## Air Quality in Angus Council

Air quality monitoring data available for 2019 confirms that air quality across the administrative area of Angus remains good. Measured concentrations of nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$) are below the relevant objectives and continue to reduce at most monitoring locations.

Previous Review and Assessments have concluded that concentrations of carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide, $PM_{10}$ and $NO_2$ are compliant with the relevant objectives, and no Air Quality Management Areas (AQMAs) have been declared.

No new significant sources of pollutant emissions have been identified within the Angus Council area.

## Actions to Improve Air Quality

Angus Council has implemented numerous actions to improve air quality as detailed in the current Angus Local Development Plan (LDP). The policies in the LDP aim to improve air quality by facilitating sustainable development, reducing the need to travel and ensuring appropriate controls on development and apply to all types of development in the Angus Council area.

The LDP aims to reduce the need to travel by co-locating development and promoting local facilities in accessible locations such as town centres. The policies in the LDP promote accessible and sustainable development which includes access to a range of modes of transport. Development planning must include design principles which support well connected and resource efficient places, including the provision of active travel routes, green space and amenity considerations. There are also dedicated policies on maintaining and improving environmental quality, control of emissions and specifically considering impacts on air quality (DS2 Accessible development, DS3 Design Quality and Placemaking, and Policy DS4 Amenity)

The LDP also promotes non-vehicular travel through policies such as: Policy TC11 Park & Ride Facilities, Policy TC13 Digital Connectivity & Telecommunications Infrastructure.

Site briefs and the planning application process help deliver development that creates better places and includes working with Environmental Health colleagues to deliver quality development and the use of conditions and guidance to control emissions. Specific policies cover waste management and minerals - PV 17, PV 18 and PV 19.

Planning also has a role in meeting emissions targets through supporting the delivery of renewable energy and energy efficiencies. There is a duty under The Climate Change Act to deliver increasing energy efficiency measures and the reduction of energy use. (Primarily through the Building Standards process). Policies PV 9, PV 10 and PV 11 refer.

The Plan is also subject to Strategic Environmental Assessment. This process identifies where policies and proposals might impact on air quality and opportunity for mitigation of negative effects.

In future planning's contribution to a low carbon society will become increasingly important – as evidenced by the Clean Air for Scotland (CAFS) review (major developments should not result in increased emissions); Planning (Scotland) Act 2019 and the emerging National Planning Framework (NPF) 4. This will be reflected in our next local development plan – AngusPlan.

**Local Priorities and Challenges**

Angus Council will:

- Continue to monitor $NO_2$ and $PM_{10}$ concentrations during 2020 and will report on progress in 2021;
- Develop a Sustainable Energy Climate Action Plan (SECAP), and review policy landscape to align with this;
- Develop and deliver the Mercury Programme which will underpin all activity and aim to make Angus a low carbon, sustainable region;
- Implement a new Active Travel Plan & support Transforming Angus Programme to consolidate estate, facilitate home working where possible and reduce staff travel through the Smart Working programme; and

- Implement the Angus Local Development Plan (2016), which sets out the strategies and policies to promote development which minimises adverse impacts on the environment.

**How to Get Involved**

We can all help to maintain good air quality within Angus. Travel choices can have a significant impact on pollutant emissions. Reducing single occupancy car travel, using alternatives such as public transport, and walking or cycling for short journeys all help to reduce emissions.

A number of online tools are available to help you plan your journey available at www.travelinescotland.com.

When you do travel by car, avoiding excessive acceleration and hard braking will also reduce the pollution impacts of the journey.

If you would like further information on Air Quality within Angus, please visit our website, or contact us via ACCESSline (08452 777 778).

# Table of Contents

**Executive Summary: Air Quality in Our Area** ..... i

Air Quality in Angus Council ..... i

Actions to Improve Air Quality ..... i

Local Priorities and Challenges ..... ii

How to Get Involved ..... iii

**1. Local Air Quality Management** ..... 6

**2. Actions to Improve Air Quality** ..... 7

2.1 Air Quality Management Areas ..... 7

2.2 Cleaner Air for Scotland ..... 7

2.2.1 Transport – Avoiding travel – T1 ..... 7

2.2.2 Active travel – Deliverance of the Cycling Action Plan for Scotland vision, that by 2020, 10% of everyday journeys will be made by bike – T3 ..... 8

2.2.3 Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2 ..... 8

2.3 Progress and Impact of Measures to address Air Quality in Angus Council ..... 9

**3. Air Quality Monitoring Data and Comparison with Air Quality Objectives** ..... 12

3.1 Summary of Monitoring Undertaken ..... 12

3.1.1 Automatic Monitoring Sites ..... 12

3.1.2 Non-Automatic Monitoring Sites ..... 13

3.2 Individual pollutants ..... 13

3.2.1 Nitrogen Dioxide ($NO_2$) ..... 13

3.2.2 Particulate Matter ($PM_{10}$) ..... 13

3.2.3 Particulate Matter ($PM_{2.5}$) ..... 14

3.2.4 Sulphur Dioxide ($SO_2$) ..... 14

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene ..... 14

**4. New Local Developments** ..... 15

4.1 Road Traffic Sources ..... 15

4.2 Other Transport Sources ..... 15

4.3 Industrial Sources ..... 15

4.4 Commercial and Domestic Sources ..... 15

4.5 New Developments with Fugitive or Uncontrolled Sources ..... 16

**5. Planning Applications** ..... 17

5.1 Planning Applications Granted Approval ..... 17

**6. Conclusions and Proposed Actions** ..... 20

6.1 Conclusions from New Monitoring Data ..... 20

6.2 Conclusions relating to New Local Developments ..... 20
6.3 Proposed Actions ..... 20
**Appendix A: Monitoring Results ..... 22**
**Appendix B: Full Monthly Diffusion Tube Results for 2019 ..... 28**
**Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC ..... 29**
**Glossary of Terms ..... 30**
**References ..... 31**

## List of Tables

Table 1.1 – Summary of Air Quality Objectives in Scotland ..... 6
Table 2.1 – Progress on Measures to Improve Air Quality ..... 10

Table A.1 – Details of Automatic Monitoring Sites ..... 22
Table A.2 – Details of Non-Automatic Monitoring Sites ..... 22
Table A.3 – Annual Mean $NO_2$ Monitoring Results ..... 24
Table A.4 – Annual Mean $PM_{10}$ Monitoring Results ..... 26
Table A.5 – 24-Hour Mean $PM_{10}$ Monitoring Results ..... 26

Table B.1 – $NO_2$ Monthly Diffusion Tube Results for 2019 ..... 28

## List of Figures

Figure 3-1 Current air quality monitoring sites in Angus ..... 12
Figure A-1 Trend in Annual Mean $NO_2$ Concentrations ..... 25
Figure A-2 Trend in Annual Mean $PM_{10}$ Concentrations ..... 27

# 1. Local Air Quality Management

This report provides an overview of air quality in Angus Council during 2019. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

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

**Table 1.1 – Summary of Air Quality Objectives in Scotland**

| Pollutant | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Nitrogen dioxide ($NO_2$)** | 200 µg/m$^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 µg/m$^3$ | Annual mean | 31.12.2005 |
| **Particulate Matter ($PM_{10}$)** | 50 µg/m$^3$, not to be exceeded more than 7 times a year | 24-hour mean | 31.12.2010 |
| | 18 µg/m$^3$ | Annual mean | 31.12.2010 |
| **Particulate Matter ($PM_{2.5}$)** | 10 µg/m$^3$ | Annual mean | 31.12.2020 |
| **Sulphur dioxide ($SO_2$)** | 350 µg/m$^3$, not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 µg/m$^3$, not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 µg/m$^3$, not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |
| **Benzene** | 3.25 µg/m$^3$ | Running annual mean | 31.12.2010 |
| **1,3 Butadiene** | 2.25 µg/m$^3$ | Running annual mean | 31.12.2003 |
| **Carbon Monoxide** | 10.0 mg/m$^3$ | Running 8-Hour mean | 31.12.2003 |
| **Lead** | 0.25 µg/m$^3$ | Annual Mean | 31.12.2008 |

# 2. Actions to Improve Air Quality

## 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

Angus Council currently does not have any AQMAs.

## 2.2 Cleaner Air for Scotland

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

### 2.2.1 Transport – Avoiding travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Angus Council's Local Development Plan (LDP) has numerous policies to facilitate sustainable development, reduce the need to travel and ensure appropriate controls on development. The LDP aims to reduce the need to travel by co-locating development and promoting local facilities in accessible locations such as town centres.

The LDP includes policies which promote: accessible and sustainable development (access to a range of modes of transport); design principles supporting well connected and resource efficient places, including the provision of active travel routes, green space and amenity considerations; maintaining and improving environmental quality, control of emissions and specifically considering impacts on air quality (specific policies for reference are DS2 Accessible development, DS3 Design Quality and Placemaking, and DS4 Amenity).

The Plan also promotes non-vehicular travel through policies such as: Policy TC11 Park & Ride Facilities, Policy TC13 Digital Connectivity & Telecommunications Infrastructure.

### 2.2.2 Active travel – Deliverance of the Cycling Action Plan for Scotland vision, that by 2020, 10% of everyday journeys will be made by bike – T3

The Angus Active Travel Strategy (2016) details the actions that Angus Council will take to improve active travel networks, and infrastructure, as well as coordinate the actions and garner the support of a range of organisations. The aim is to promote walking and cycling in Angus as a means of sustainable transport, to improve public health and reduce traffic congestion. Examples of some of the implemented measures can be seen in Table 2.1.

The Accessible Development policy (DS2) will also require that any new development proposals must demonstrate, where appropriate, that they can provide and/or enhance safe and pleasant paths for walking and cycling which are suitable for use by all, and link existing and proposed path networks.

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

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy and Climate Action Plan to ensure that air quality considerations are covered. Angus Council published the Climate Change Strategy and Action Plan 2012 - 2016, which set out the strategies for adaptation to climate change and guidelines for sustainable development with respect to several environmental aspects, including air quality. Angus Council, in partnership with three other local authorities: Aberdeenshire, Aberdeen City and Moray, produced a regional North East Scotland Sustainable Energy Action Plan (NE SEAP). This scheme will be superseded by a Sustainable Energy and Climate Action Plan (SECAP) which is designed to cover all areas of sustainable energy across business and commercial, domestic and transport, including some aspects of land use and fuel supply. Implementation of the measures set out in the SECAP will result in the overall reduction in greenhouse gas emissions, and improvement of air quality, aligning with the aim of meeting emissions targets set for 2050.

## 2.3 Progress and Impact of Measures to address Air Quality in Angus Council

Angus Council has taken forward a number of measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. Angus Council has commissioned work to develop a Sustainable Energy and Climate Action Plan (SECAP) which will propose climate change mitigation policies and actions to develop the low carbon economy in the region. The potential effects each policy may have on energy and greenhouse gases are estimated and compared to relevant targets for reductions, whilst also considering the impacts on local air quality. Angus Council's aim is to complete this document by the end of 2020.

In addition, Angus Council are committed to delivering the Mercury Programme, the purpose of which is to increase productivity through Clean Growth, protecting places and creating places for future generations. The focus will be on projects in the Clean Growth, Agri-Tech and Low Carbon transport and housing sectors.

## Table 2.1 – Progress on Measures to Improve Air Quality

| Measure No. | Measure | Category | Focus | Lead Authority | Planning Phase | Implementation Phase | Key Performance Indicator | Progress to Date | Completion Date |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Smarter Choices Smarter Places | Promoting low emission transport; Public information ; Promoting travel alternatives | Grant funding used to promote active and sustainable travel | Angus Council | 2018 | 2018 – 2019 | • Promotion of bus travel with on-bus adverts and display in shelters<br>• Provision of cycle racks and cycle training in schools<br>• Provision of active travel training in schools<br>• Promoting sustainable travel choices to some of the main trip attractors in Angus<br>• Angus Cycle Hub will roll out a new Rural Towns Active Travel Project and funding will continue to promote the Angus Get on the Go brand.<br>• Informing young people about travel alternatives<br>• Raising awareness and use of active and sustainable modes by residents<br>• Liftshare system and count challenge introduction<br>• Holiday Hop scheme – reduced price bus tickets for children during school holidays in Summer, October and Christmas | These measures have been implemented or are ongoing (e.g. the Cycle Hub)<br><br>Funding Secured from European Regional Development Fund | Ongoing<br><br>TBC |
| 2 | Switched on Towns and Cities feasibility bid | Transport planning and infrastructure | Feasibility study for in-depth support from the Scottish Government fir improving electric vehicle infrastructure in the town | Scottish Government / Angus Council | 2018 | 2018 – 2019 | • Winning the bid<br>• Feasibility of Angus towns to be electrified fully to receive vast infrastructure boost<br>• Number of electric cars in the town | Feasibility study completed | 2025 |

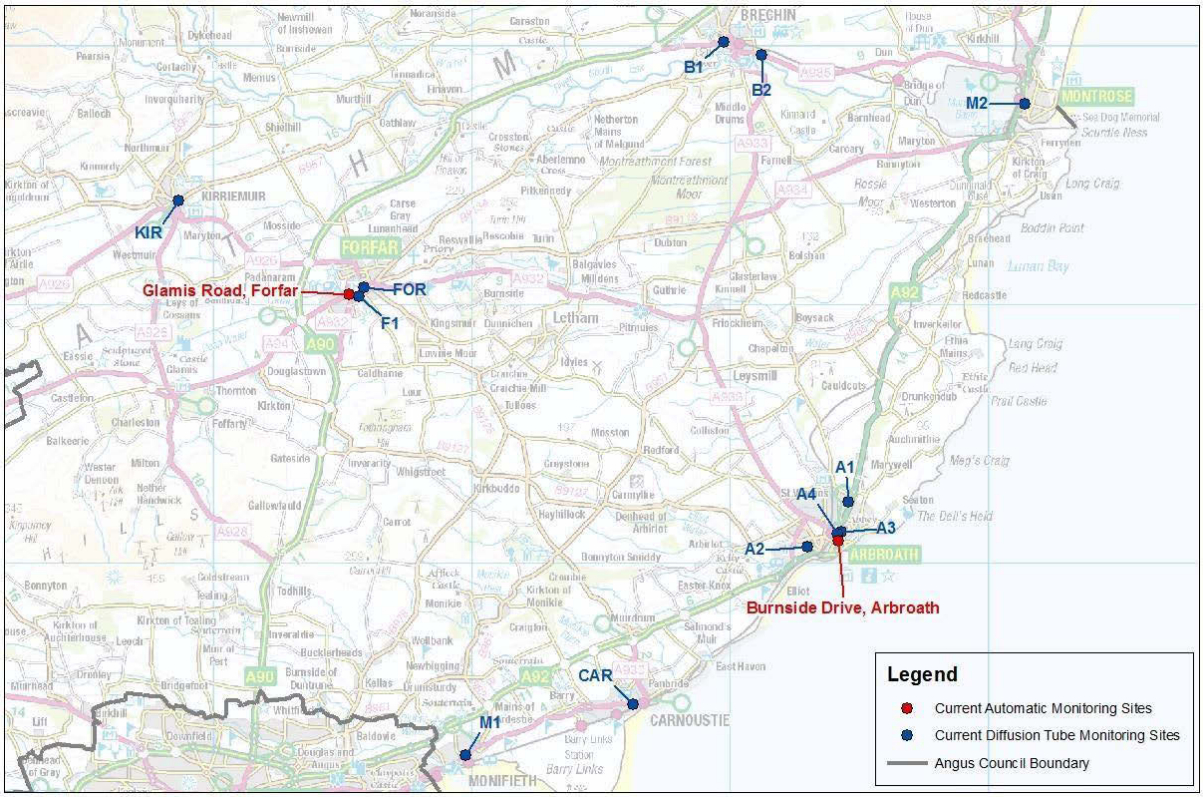
| Measure No. | Measure | Category | Focus | Lead Authority | Planning Phase | Implementation Phase | Key Performance Indicator | Progress to Date | Completion Date |
|---|---|---|---|---|---|---|---|---|---|
| 3 | Cycling Walking Safer Streets Program | Transport planning and infrastructure<br><br>Promoting travel alternatives; Vehicle fleet efficiency | Grant funding used to promote active and sustainable travel | Angus Council | 2018 | 2019 | • Upgrading of existing footpaths in Arbroath, Montrose, Ferryden and Carnoustie<br>• Construction of new footpaths in Forfar | Upgraded foot paths at Keptie Pond; Arbroath; Lordburn Park, Forfar; and King George's Field.<br><br>Upgraded cycle stands for schools | Ongoing<br><br>TBC |
| 4 | Sustainable Energy and Climate Action Plan | Policy guidance and development control | North East Sustainable Energy Climate Action Plan | Angus Council | 2016-2030 | 2020 | Produce a strategic document which covers all areas of sustainable energy and Climate Action Plan across business and commercial, domestic and transport including certain aspects of land use and fuel supply. | Recently Commissioned and due for completion and Implementation 2020. | Ongoing |

# 3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

## 3.1 Summary of Monitoring Undertaken

This section sets out the monitoring that has taken place in 2019, and how local concentrations of the measured pollutants compare with the objectives. The locations of the current monitoring sites are shown in Figure 3-1.

**Figure 3-1 Current air quality monitoring sites in Angus**






### 3.1.1 Automatic Monitoring Sites

Angus Council undertook continuous monitoring of $PM_{10}$ at two sites during 2019. A gravimetric Partisol sampler is located at the Burnside Drive, Arbroath site, whilst an automatic FDMS TEOM analyser is located at the Glamis Road, Forfar site. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk/. Angus Council do not carry out any automatic monitoring of $NO_2$ concentrations.

Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

### 3.1.2 Non-Automatic Monitoring Sites

Angus Council undertook non-automatic (passive) monitoring of $NO_2$ at 12 sites during 2019. Table A.2 in Appendix A shows the details of the sites, whilst Appendix B provides the full 2019 dataset of monthly mean values for each site.

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

## 3.2 Individual pollutants

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

### 3.2.1 Nitrogen Dioxide ($NO_2$)

Table A.3 in Appendix A compares the ratified and adjusted monitored $NO_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m$^3$.

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B.

Concentrations at all 12 sites were well below the annual mean objective in 2019; the highest annual mean concentration was 23.4 µg/m$^3$ measured at monitoring site A3 located on Abbey Path, Arbroath. The measured concentrations have not varied greatly over the past five years with the exception of the kerbside site at Abbey Path, Arbroath (A3), where concentrations have increased overall since 2015. All concentrations, however, remain well below the annual mean objective.

### 3.2.2 Particulate Matter ($PM_{10}$)

Table A.4 in Appendix A compares the monitored $PM_{10}$ annual mean concentrations for the past 5 years with the air quality objective of 18 µg/m$^3$. Table A.5 in Appendix A compares the monitored $PM_{10}$ daily mean concentrations for the past 5 years with the air quality objective of 50 µg/m$^3$, not to be exceeded more than 7 times per year.

The measured concentrations at both kerbside monitoring sites are well below the relevant objectives. Concentrations at the Burnside Drive, Arbroath monitoring site have reduced year-on-year over the past 5 years. At the Glamis Road, Forfar monitoring site, annual mean $PM_{10}$ concentrations increased by 2.8 µg/m$^3$ between 2017 and 2018. The concentration measured in 2019 was very similar to the 2018

concentration. This increase could be the result of a number of factors including variations in meteorological and traffic conditions in the local area.

### 3.2.3 Particulate Matter ($PM_{2.5}$)

Angus Council do not currently monitor $PM_{2.5}$ concentrations and have no plans to do so in the future.

### 3.2.4 Sulphur Dioxide ($SO_2$)

Angus Council do not currently monitor $SO_2$ concentrations and have no plans to do so in the future.

### 3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

Angus Council do not currently monitor Carbon Monoxide, Lead or 1,3-Butadiene concentrations and have no plans to do so in the future.

# 4. New Local Developments

## 4.1 Road Traffic Sources

Angus Council confirm that no new Road Traffic sources have been identified which may have a significant impact on local air quality.

## 4.2 Other Transport Sources

Angus Council confirm that no new Other Transport sources have been identified which may have a significant impact on local air quality.

## 4.3 Industrial Sources

Angus Council confirm that no new Industrial sources of the following nature have been identified which may have a significant impact on local air quality:

- **Industrial installations:** new or proposed installations for which an air quality assessment has been carried out.
- **Industrial installations:** existing installations where emissions have increased substantially or new relevant exposure has been introduced.
- Major fuel storage depots storing petrol.
- Petrol stations.
- Poultry farms.

Angus Council confirm that a new industrial source of the following nature has been identified and is dealt with under Section 5 Planning Applications:

- **Industrial installations:** new or significantly changed installations with no previous air quality assessment.

## 4.4 Commercial and Domestic Sources

Angus Council confirm that no new Commercial or Domestic sources of the following nature have been identified which may have a significant impact on local air quality:

- Areas where domestic solid fuel burning may be relevant.
- Combined Heat and Power (CHP) plant.

Angus Council confirm that new commercial or domestic sources of the following nature have been identified and are dealt with under Section 5 Planning Applications:

- Biomass combustion plant – individual installations.
- Areas where the combined impact of several biomass combustion sources may be relevant.

## 4.5 New Developments with Fugitive or Uncontrolled Sources

Angus Council confirm that no new sources of fugitive or uncontrolled particulate matter of the following nature have been identified which may have a significant impact on local air quality:

- Landfill sites.
- Quarries.
- Unmade haulage roads on industrial sites.
- Waste transfer stations, etc.
- Other potential sources of fugitive particulate matter emissions.

# 5. Planning Applications

## 5.1 Planning Applications Granted Approval

### 18/00565/FULL: Retrospective Change of Use of Buildings and Land to Use as part of Biomass Fuel Production Business at Dragonhall Farm, Padanaram, Forfar

This application sought retrospective permission for a woodchip biomass production industrial process including woodchip drying using two biomass boilers. This proposal has the potential to increase emissions of PM and $NO_2$. A screening assessment was undertaken and the results reproduced in the tables below. The types of boiler, the type of fuel and the height of the stacks have been controlled by planning conditions.

### 18/00764/FULL: Alterations and Extension to Existing District Heating Biomass Building at Piperdam Leisure Resort, Fowlis, Angus

This application included changing the biomass boiler to be used to service a number of chalets within the holiday resort. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

### 19/00020/FULL: Erection of a Shed to House Biomass Boiler on Land at Pearsie, Kirriemuir, Angus

This application included the provision of a 350 kW biomass boiler to provide heating to the main estate house and neighbouring cottages. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below.

### 19/00138/FULL: Change of Use from Agricultural Use to Storage and Processing of Timber and Distribution of Firewood at East Mains of Keithock, Brechin, Angus

This application included the provision of a 370 kW biomass boiler to dry processed timber. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables

below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

**19/00405/FULL: Retrospective Planning Application for Installation of Biomass Boiler at Craignathro Farm, Forfar, Angus**

This application sought retrospective permission for a 500 kW biomass boiler used to dry grain and provide heating to a potato shed and the farmhouse. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

**19/00602/FULL: Installation of Biomass Boiler and Associated Flue At Govals Farm, Forfar, Angus**

This application sought retrospective permission for a 58.5 kW biomass boiler which had been installed to provide heating and hot water to the farmhouse, office and workshop. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

**19/00606/FULL: Installation of Woodchip Biomass Boiler System and Associated Components and Flue at Newmill of Balgavies Farm, Forfar, Angus**

This application sought permission for a 150 kW biomass boiler to be installed to provided space heating to a potato shed and heating and hot water to the farmhouse. As this proposal has the potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

**19/00744/FULL: Erection of a Replacement Biomass Production and Storage Building and Associated Works at Templeton Christmas Tree Farm, Strathmartine, Angus**

The above application included the provision of a 1 no. 990 kW and a 1 no. 750 kW biomass boilers in order to dry firewood processed on site. As this proposal has the

potential to increase emissions of PM and $NO_2$ a screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

## Data Used in Assessments

| Location | Source | Building Height (M) | Stack Diameter (M) | Stack Height (M) | Background Concentration (µg/m3) | | Emission Rates (g/s) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $PM_{10}$ | $NO_2$ | $PM_{10}$ | $NO_2$ |
| Dragonhall | Biomass Boiler 1 | 9.0 | 0.25 | 11 | 11.80 | 3.84 | 0.0255 | 0.0788 |
| Dragohall | Biomass Boiler 2 | 9.0 | 0.25 | 11 | 11.80 | 3.84 | 0.0166 | 0.0840 |
| Piperdam | Biomass Boiler | 6.7 | 0.35 | 8 | 10.71 | 4.17 | 0.0057 | 0.0121 |
| Pearsie | Biomass Boiler | 10.8 | 0.30 | 11.8 | 8.38 | 2.19 | 0.0019 | 0.021 |
| Keithock | Biomass Boiler | 7.0 | 0.27 | 8.0 | 11.3 | 2.96 | 0.0030 | 0.0047 |
| Craignathro | Biomass Boiler | 7.0 | 0.4 | 8.5 | 11.60 | 4.20 | 0.0090 | 0.0370 |
| Govals | Biomass Boiler | 5.5 | 0.15 | 6.2 | 11.73 | 2.98 | 0.0007 | 0.0050 |
| Newmill | Biomass Boiler | 8.2 | 0.3 | 8.8 | 11.77 | 4.08 | 0.0026 | 0.0099 |
| Templeton | Biomass Boiler 1 | 9.0 | 0.58 | 13.0 | 10.62 | 3.79 | 0.0037 | 0.0341 |
| Templeton | Biomass Boiler 2 | 9.0 | 0.46 | 13.0 | 10.62 | 3.79 | 0.0028 | 0.0259 |

## Target emission rates from biomass calculator

| Location | $PM_{10}$ Annual Mean | | Nitrogen Dioxide Annual Mean | | Nitrogen Dioxide Hourly Mean | |
|---|---|---|---|---|---|---|
| | Target Emission Rate (g/s) | Detailed Assessment Required? | Target Emission Rate (g/s) | Detailed Assessment Required? | Target Emission Rate (g/s) | Detailed Assessment Required? |
| Dragonhall | 0.0452 | NO | 0.2637 | NO | 0.3009 | NO |
| Piperdam | 0.0245 | NO | 0.1204 | NO | 0.1625 | NO |
| Pearsie | 0.0211 | NO | 0.0828 | NO | 0.1077 | NO |
| Keithock | 0.0147 | NO | 0.0811 | NO | 0.1068 | NO |
| Craignathro | 0.0228 | NO | 0.1307 | NO | 0.1761 | NO |
| Govals | 0.0092 | NO | 0.0545 | NO | 0.0759 | NO |
| Newmill | 0.0083 | NO | 0.0468 | NO | 0.0836 | NO |
| Templeton | 0.0748 | NO | 0.3668 | NO | 0.5324 | NO |

# 6. Conclusions and Proposed Actions

## 6.1 Conclusions from New Monitoring Data

Concentrations of $NO_2$ measured at 12 monitoring sites across the Angus Council area were well below the annual mean objective in 2019.

$PM_{10}$ concentrations measured at two kerbside/roadside monitoring sites were also below the relevant objectives.

The measured $NO_2$ concentrations have not varied greatly over the past five years with the exception of the Arbroath kerbside site (Abbey Path), where concentrations have been slightly higher in the last two years than in previous years. All concentrations, however, remain well below the annual mean objective.

Measured $PM_{10}$ concentrations were also slightly higher in the last two years than in previous years at the Forfar monitoring site (Glamis Road) but continued to fall at the monitoring site in Arbroath (Burnside Drive). Again, both sites measured concentrations well below the annual mean objective.

Considering the above, a detailed assessment is not required for either pollutant.

## 6.2 Conclusions relating to New Local Developments

New commercial sources of pollutant emissions were identified within the Angus Council area in 2019. The screening assessments for the eight new commercial sources found that the contributions from these new developments would not raise pollutant levels above the Air Quality Standards objectives and therefore, no further action is required.

In 2019 there have been no new road traffic, other transport, industrial, domestic or fugitive sources of emissions for which a detailed assessment is required.

## 6.3 Proposed Actions

It is acknowledged that the current monitoring sites have been maintained for a number of years, however, the Council is satisfied that the locations for $PM_{10}$ monitoring represent the worst case scenario as they consider the two busiest interchanges with relevant exposure.

With regards to the programme of $NO_2$ monitoring, the sites are constantly under review and it is anticipated that some locations may change this year to reflect new developments etc. Our future monitoring strategy will take into account the capability

of our equipment, increasing domestic scale combustion of solid fuels and the proposed Low Emissions Zone for Dundee City which could result in traffic displacement affecting Angus.

Angus Council will continue monitoring $NO_2$ and $PM_{10}$ concentrations.

# Appendix A: Monitoring Results

## Table A.1 – Details of Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Monitoring Technique | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Inlet Height (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| AFR1 | Burnside Drive, Arbroath | Kerbside | 364169 | 740861 | $PM_{10}$ | N | Gravimetric | 4 | 1 | 1.5 |
| - | Glamis Road, Forfar | Roadside | 345249 | 750386 | $PM_{10}$ | N | FDMS | 20 | 6 | 1.5 |

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

## Table A.2 – Details of Non-Automatic Monitoring Sites

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube co-located with a Continuous Analyser? |
|---|---|---|---|---|---|---|---|---|---|
| A1 | Ethie Terrace, Arbroath | Urban Background | 364585 | 742349 | $NO_2$ | N | 0 | 1 | N |
| A2 | Inchcape Road, Arbroath | Urban Background | 362987 | 740642 | $NO_2$ | N | 0 | 2 | N |
| A3 | Abbey Path, | Kerbside | 364299 | 741225 | $NO_2$ | N | 1.5 | <1 | N |

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) (1) | Distance to kerb of nearest road (m) (2) | Tube co-located with a Continuous Analyser? |
|---|---|---|---|---|---|---|---|---|---|
| | Arbroath | | | | | | | | |
| A4 | 22 Lordburn, Arbroath | Kerbside | 364158 | 741122 | $NO_2$ | N | 3 | <1 | N |
| CAR | High St, Carnoustie | Roadside | 356243 | 734526 | $NO_2$ | N | 3 | 2 | N |
| M1 | High St, Monifieth | Roadside | 349759 | 732549 | $NO_2$ | N | 0 | 2 | N |
| M2 | High St, Montrose | Kerbside | 371418 | 757767 | $NO_2$ | N | 2 | 1 | N |
| B1 | High St, Brechin | Kerbside | 359727 | 760170 | $NO_2$ | N | 2 | 1 | N |
| B2 | Sacone 1, Brechin | Industrial | 361216 | 759644 | $NO_2$ | N | NA | 8 | N |
| FOR | High St, Forfar | Kerbside | 345825 | 750674 | $NO_2$ | N | 3 | <1 | N |
| KIR | Manse Close, Kirriemuir | Roadside | 338621 | 754032 | $NO_2$ | N | 5 | 6 | N |
| F1 | St James Road, Forfar | Roadside | 345628 | 750307 | $NO_2$ | N | <1 | 2 | N |

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

**Table A.3 – Annual Mean $NO_2$ Monitoring Results**

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $NO_2$ Annual Mean Concentration (µg/m$^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| A1 | Urban Background | Diffusion Tube | 100 | 100 | 8.9 | 8.2 | 8.3 | 8.1 | 8.0 |
| A2 | Urban Background | Diffusion Tube | 100 | 100 | 11.6 | 11.3 | 10.3 | 12.2 | 11.1 |
| A3 | Kerbside | Diffusion Tube | 100 | 100 | 19.6 | 20.1 | 19.9 | 23.4 | 23.4 |
| A4 | Kerbside | Diffusion Tube | 100 | 100 | 18.0 | 17.5 | 17.7 | 16.6 | 17.9 |
| CAR | Roadside | Diffusion Tube | 91.7 | 91.7 | 15.6 | 15.1 | 14.4 | 15.1 | 14.8 |
| M1 | Roadside | Diffusion Tube | 100 | 100 | 14.6 | 15.9 | 13.9 | 13.2 | 13.9 |
| M2 | Kerbside | Diffusion Tube | 100 | 100 | 20.1 | 19.3 | 18.2 | 19.2 | 18.1 |
| B1 | Kerbside | Diffusion Tube | 100 | 100 | 13.5 | 14.2 | 12.3 | 12.6 | 12.6 |
| B2 | Industrial | Diffusion Tube | 100 | 100 | 6.8 | 6.2 | 5.9 | 7.3 | 5.6 |
| FOR | Kerbside | Diffusion Tube | 100 | 100 | 16.3 | 16.8 | 14.9 | 15.2 | 14.7 |
| KIR | Roadside | Diffusion Tube | 100 | 100 | 12.8 | 13.3 | 12.0 | 11.6 | 10.9 |
| F1 | Roadside | Diffusion Tube | 100 | 100 | 21.3 | 21.2 | 18.2 | 19.1 | 19.0 |

Notes: Exceedances of the $NO_2$ annual mean objective of 40µg/m$^3$ are shown in **bold**.

$NO_2$ annual means exceeding 60µg/m$^3$, indicating a potential exceedance of the $NO_2$ 1-hour mean objective are shown in **bold and underlined.**

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

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

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

**Figure A-1 Trend in Annual Mean $NO_2$ Concentrations**

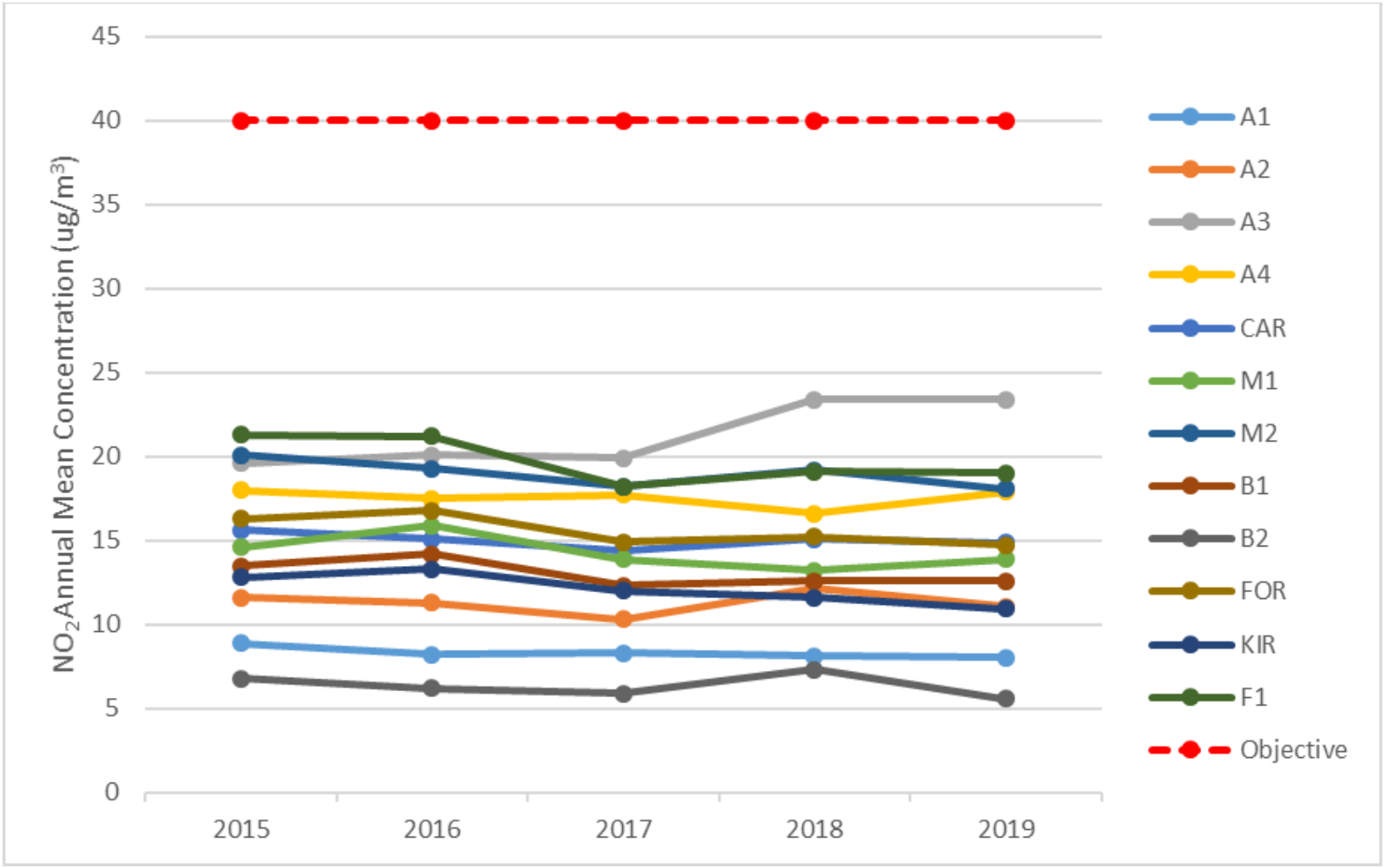


**Table A.4 – Annual Mean $PM_{10}$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $PM_{10}$ Annual Mean Concentration ($\mu g/m^3$) (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| Burnside Drive, Arbroath | Kerbside | 76% | 76% | 14.3 | 13.0 | 12.9 | 12.0 | 11.8 |
| Glamis Road, Forfar | Roadside | 89% | 89% | 10.2 | 10.5 | 9.9 | 12.7 | 12.7 |

Notes: Exceedances of the $PM_{10}$ annual mean objective of $18\mu g/m^3$ are shown in **bold.**

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

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

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

**Table A.5 – 24-Hour Mean $PM_{10}$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2019 (%) (2) | $PM_{10}$ 24-Hour Means > $50\mu g/m^3$ (3) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2015 | 2016 | 2017 | 2018 | 2019 |
| Burnside Drive, Arbroath | Kerbside | 76% | 76% | 0 (31.6) | 1 (34.9) | 0 (23.5) | 0 (23.9) | 0 (27.6) |
| Glamis Road, Forfar | Roadside | 89% | 89% | - | 1 (32.0) | 0 | 0 (39.5) | 0 |

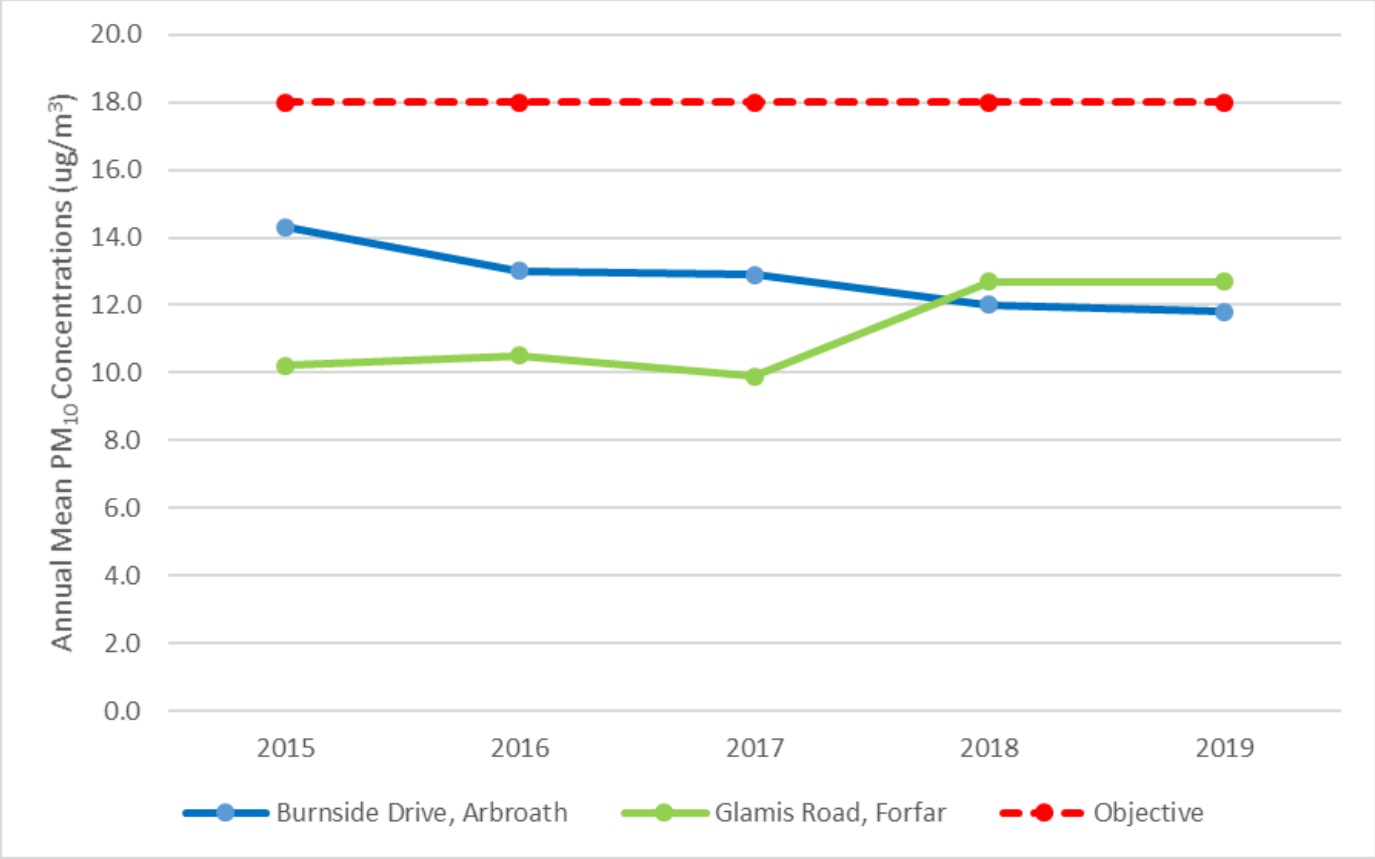
Notes: Exceedances of the $PM_{10}$ 24-hour mean objective ($50\mu g/m^3$ not to be exceeded more than 7 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 98.1st percentile of 24-hour means is provided in brackets.

**Figure A-2 Trend in Annual Mean $PM_{10}$ Concentrations**



# Appendix B: Full Monthly Diffusion Tube Results for 2019

## Table B.1 – $NO_2$ Monthly Diffusion Tube Results for 2019

| Site ID | $NO_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean | |
| | | | | | | | | | | | | | Raw Data | Bias Adjusted (1) |
| A1 | 16.6 | 18.1 | 7.6 | 9.2 | 5.8 | 5.9 | 7.2 | 6.6 | 7.4 | 8.2 | 10.2 | 25.3 | 10.0 | 8.0 |
| A2 | 23.2 | 20.7 | 10.6 | 12 | 9.4 | 8.8 | 10.3 | 10.2 | 10.9 | 14.5 | 19.1 | 34.8 | 13.8 | 11.1 |
| A3 | 41.4 | 43.4 | 25.8 | 24.4 | 22.8 | 23.3 | 23 | 25.7 | 22.8 | 31.4 | 28.6 | 63.6 | 29.2 | 23.4 |
| A4 | 36.4 | 30.3 | 22.1 | 16.6 | 15.5 | 16 | 15.3 | 19.1 | 16.6 | 25.3 | 25.6 | 56.1 | 22.4 | 17.9 |
| CAR | 29.9 | 24.2 | 17 | 16.8 | 13.4 | 13.6 | 13.5 | 14.1 | 0 | 17.7 | 31.3 | 45.5 | 18.6 | 14.8 |
| M1 | 30.1 | 21.6 | 13.5 | 15.2 | 14.1 | 11.4 | 11.3 | 11.6 | 13.5 | 18.4 | 23.4 | 47.3 | 17.3 | 13.9 |
| M2 | 32 | 30.6 | 21.2 | 15.9 | 17.8 | 17.3 | 19.2 | 20.9 | 17 | 23.1 | 24.8 | 48.6 | 22.6 | 18.1 |
| B1 | 24.3 | 18.1 | 12 | 19.2 | 13.9 | 12.2 | 11.3 | 9.7 | 12.6 | 18.8 | 25.4 | 36.5 | 15.7 | 12.6 |
| B2 | 14.7 | 9.1 | 3.7 | 7 | 5.2 | 3.8 | 4 | 3.9 | 5.8 | 8.8 | 13.4 | 19.5 | 7.0 | 5.6 |
| FOR | 36.8 | 27.5 | 15.2 | 15.4 | 11.9 | 11.5 | 11.5 | 11.8 | 13.8 | 22.4 | 29.1 | 45.3 | 18.4 | 14.7 |
| KIR | 26.1 | 16.9 | 12.7 | 10.3 | 8.8 | 8.2 | 8.2 | 9.7 | 10.6 | 15.4 | 19.2 | 38.9 | 13.7 | 10.9 |
| F1 | 42.3 | 31.4 | 21.8 | 17.5 | 17 | 16.2 | 17.4 | 16.5 | 17.9 | 28.5 | 32.6 | 60.3 | 23.8 | 19.0 |

(1) See Appendix C for details on bias adjustment

# Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

## Diffusion Tube QA/QC

Angus Council deploy diffusion tubes prepared and analysed by Tayside Scientific Services (TSS; 20% TEA in water method). Tubes are changed monthly.

## Bias Adjustment Factors from Local Co-location Studies

Angus Council do not operate a chemiluminescent analyser, and therefore no co-location study is carried out. It is therefore not possible to calculate a local bias adjustment factor.

## National Bias Adjustment Factor

The national bias adjustment factor for TSS in 2019 is 0.80 (taken from spreadsheet 03/20, based on 1 study; available at: https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html). This factor has been applied to all 2019 diffusion tube data.

## Automatic Monitoring QA/QC

The Partisol is a gravimetric reference equivalent PM10 analyser. It contains 16 filters which are exposed for 24 hours and allowing for 2 weeks' continuous operation (usually with two blanks). The filters are supplied by the equipment manufacturer and conditioned and weighed before and after the sampling period by Tayside Scientific Services using in-house. The samplers are serviced annually by Air Monitors Ltd.

Data from the FDMS analyser is collected via automatic telemetry by Ricardo Energy & Environment. The analyser is serviced on a bi-annual basis and audited every six months. All data are ratified on a 3-monthly basis using procedures comparable to those used for national network monitoring data. Data are available on the Scottish air quality website (www.scottishairquality.co.uk).

## Glossary of Terms

| Abbreviation | Description |
|---|---|
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values' |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives |
| APR | Air quality Annual Progress Report |
| AURN | Automatic Urban and Rural Network (UK air quality monitoring network) |
| Defra | Department for Environment, Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England |
| FDMS | Filter Dynamics Measurement System |
| LAQM | Local Air Quality Management |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| $PM_{10}$ | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| $PM_{2.5}$ | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| QA/QC | Quality Assurance and Quality Control |
| $SO_2$ | Sulphur Dioxide |
| TEOM | Tapered Element Oscillating Microbalance |

## References

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