

Annual Progress Report (APR)



2019 Air Quality Annual Progress Report (APR) for
Angus Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

July 2019

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Executive Summary: Air Quality in Our Area

Air Quality in Angus

Air quality monitoring data available for 2018 confirm that air quality across the administrative area of Angus remains good. Measured concentrations of nitrogen dioxide (NO₂) and particulate matter (PM₁₀) 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, PM₁₀ and NO₂ 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 several actions in recent years which aimed to improve public transport, both in terms of reduced emissions and increased availability of services, and to reduce the number of journeys made by private car. A number of schools in Angus have a Travel Plan in place or are currently undertaking travel plan activities. Many of these actions are now fully implemented, for example: the promotion of “sustainable transport, supported by well-located and accessible development”. This policy, first incorporated in the TAYplan SDP, was incorporated into the Angus Local Development Plan (LDP) 2016 and enhanced by the Active Travel strategy 2015/16.

Policy DS4 in the Angus Local Development Plan (2016) makes specific reference that development proposals must have regard to environmental factors.

Policy DS4 Amenity states:

“All proposed development must have full regard to opportunities for maintaining and improving environmental quality. Development will not be permitted where there is an unacceptable adverse impact on the surrounding area or the environment or amenity of existing or future occupiers of adjoining or nearby properties.

Angus Council will consider the impacts of development on:

- *Air quality;*

Angus Council may support development which is considered to have an impact on such considerations, if the use of conditions or planning obligations will ensure that appropriate mitigation and / or compensatory measures are secured.”

Local Priorities and Challenges

Angus Council will:

- Continue to monitor NO₂ and PM₁₀ concentrations during 2019 and will report on progress in 2020;
- Work with other local authorities in the north-east to develop a Sustainable Energy Climate Action Plan (SECAP), and review policy landscape to align with this;
- Implement a new Active Travel Plan & support Transforming Angus Programme to consolidate estate, encourage home working 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).

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1. Local Air Quality Management

This report provides an overview of air quality in the administrative area of Angus Council during 2018. 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 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 towards meeting the air quality objectives in Scotland as listed in Table 1.1

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
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Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
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 Progress and Impact of Measures to address Air Quality in Angus Council

Angus Council has taken forward several measures during the current reporting year of 2018 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. The North East Scotland Sustainable Energy Action Plan (SEAP) is still in preparation. The local authorities of Aberdeenshire, Aberdeen City, Angus and Moray have developed a regional SEAP as well as individual SEAPs for each authority. This SEAP proposes climate change mitigation policies and actions to develop the low carbon economy in the region, encompassing mitigation strategies specific to each authority as well as regional mitigation activities. 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. This document will be adopted by the four local authorities in due course.

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	<ul style="list-style-type: none"> Promotion of bus travel with on-bus adverts and display in shelters Provision of cycle racks and cycle training in schools Provision of active travel training in schools Promoting sustainable travel choices to some of the main trip attractors in Angus 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. informing young people about travel alternatives Raising awareness and use of active and sustainable modes by residents, Liftshare system and count challenge introduction 	<p>These measures have been implemented or are ongoing (e.g. the Cycle Hub)</p> <p>Funding Secured from European Regional Development Fund</p>	<p>Ongoing</p> <p>TBC</p>

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Progress to Date	Completion Date
2	Switched on Towns and Cities feasibility bid	Transport planning and infrastructure	Feasibility study for in-depth support from the Scottish government for improving electric vehicle infrastructure in the town	Scottish Government/ Angus Council	2018	2018/2019	<ul style="list-style-type: none"> Winning the bid Feasibility of Angus towns to be electrified fully to receive vast infrastructure boost Number of electric cars in the town 	Feasibility study completed	2025
3	Cycling Walking Safer Streets Program	Transport planning and infrastructure; Promoting travel alternatives; Vehicle fleet efficiency	Grant funding used to promote active and sustainable travel	Angus Council	2018	2019	<ul style="list-style-type: none"> Upgrading of existing footpaths in Arbroath, Montrose, Ferryden and Carnoustie Construction of new footpaths in Forfar 	Upgraded foot paths at Keptie Pond; Arbroath; Lordburn Park, Forfar; and King George's Field. Upgraded cycle stands for schools	Ongoing TBC
4	Angus Council has signed up to North East Scotland Sustainable Energy Action Plan	Policy guidance and development control	North East Scotland Sustainable Energy Action Plan	North East Councils	2016-2030	Ongoing	<ul style="list-style-type: none"> Produce a strategic document which covers all areas of sustainable energy across business and commercial, domestic and transport including certain aspects of land use and fuel supply. 	Ongoing. A regional SEAP has been produced along with individual SEAPs for each authority	Ongoing

2.3 Cleaner Air for Scotland

Cleaner Air for Scotland (CAFS) – The Road to a Healthier Future 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/cleaner-air-scotland-road-healthier-future/pages/17/> . Progress by Angus Council against relevant actions within this strategy is demonstrated below.

2.3.1 Transport – Avoiding travel – T1

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Angus Council has produced the Angus Council Travel Plan 2018 (currently not publicly available) which is their corporate travel plan and covers both staff and business travel. A Liftshare system and Step Count Challenge is to be promoted for council staff as part of the Smarter Choices, Smarter Places campaign.

2.3.2 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.

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

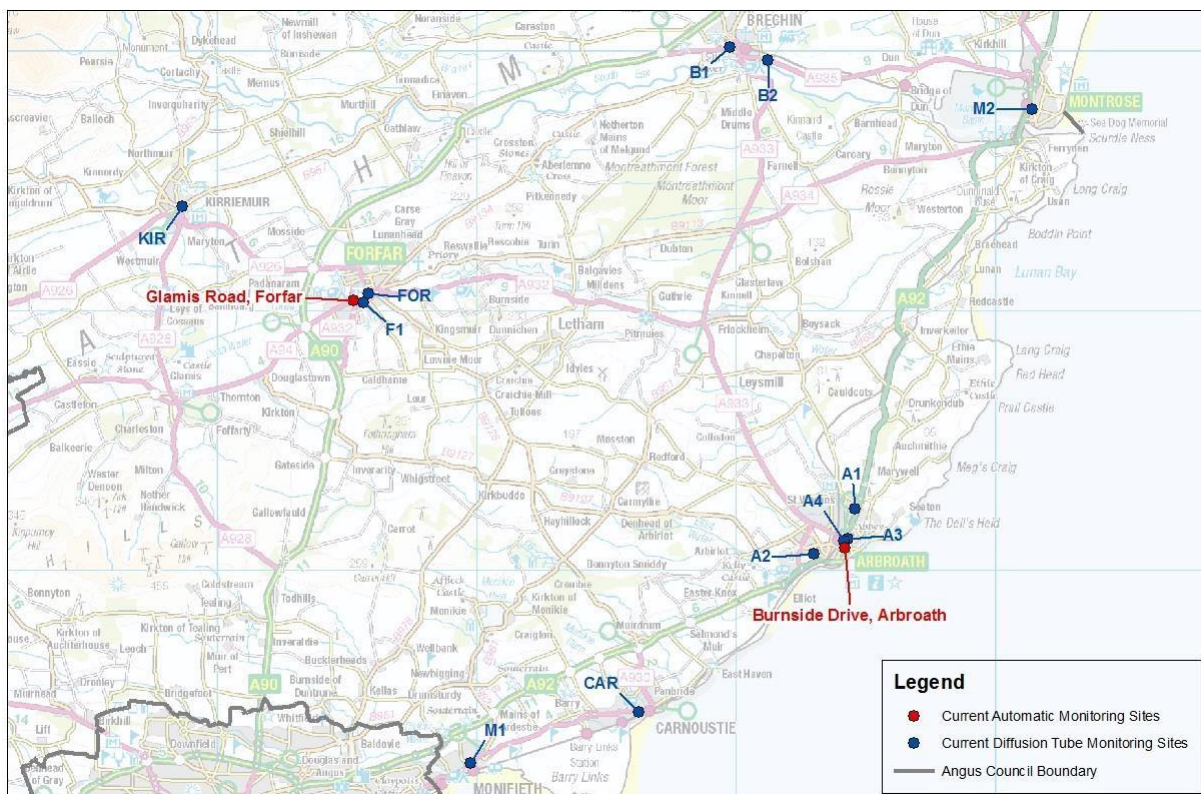
Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. Angus Council published the Climate Change Strategy and Action Plan 2012 - 2016, which set out the strategies for adaptation to climate change and guidelines for sustainable development with respect to several environmental aspects,

including air quality. This scheme has now been replaced with the North East Scotland Sustainable Energy Action Plan (NE SEAP). Angus Council, in partnership with three other local authorities: Aberdeenshire, Aberdeen City and Moray, have produced a regional SEAP 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 SEAP 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.

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 2018, and how local concentrations of the measured pollutants compare with the objectives. The locations of the current monitoring sites are shown below.



Contains Ordnance Survey data © Crown copyright and database 2018.

Figure 3.1 – Current air quality monitoring sites in Angus

3.1.1 Automatic Monitoring Sites

Angus Council undertook automatic (continuous) monitoring of PM₁₀ at two sites during 2018. A gravimetric Partisol sampler is located at the Burnside Drive, Arbroath site, whilst an FDMS TEOM analyser is located at the Glamis Road, Forfar site. Table A.1 in Appendix A describes the details of these sites. National monitoring results (for the FDMS) are available at <http://www.scottishairquality.co.uk/>. Angus Council do not carry out any automatic monitoring of NO₂ concentrations.

Further details of the Quality Assurance/Quality Control (QA/QC) and how the data have been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Angus Council undertook non-automatic (passive) monitoring of NO₂ at 12 sites during 2018. Table A.2 in Appendix A provides the details of the sites, whilst Appendix B provides the full 2018 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 (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B table B.1.

Concentrations at all 12 sites were well below the annual mean objective in 2018; the highest concentration was 23.4 µg/m³ measured at monitoring site A3 located on Abbey Path, Arbroath. At most monitoring sites, concentrations have reduced overall since 2014. The exceptions are the Inchape Road, Arbroath urban background monitoring site (A2), and the roadside site at Abbey Path, Arbroath (A3), where concentrations have increased overall since 2014; concentrations, however, remain well below the annual mean objective.

3.2.2 Particulate Matter (PM₁₀)

Table A.4 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 18µg/m³.

Table A.5 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean

concentrations for the past 5 years with the air quality objective of $50\mu\text{g}/\text{m}^3$, 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. It is not possible to identify a trend in results for the Glamis Road, Forfar monitoring site over the 4 years that the site has been operational. However, when compared to 2017 annual mean PM_{10} concentrations, an increase of $2.8\mu\text{g}/\text{m}^3$ is evident in 2018 at Glamis Road, Forfar. This increase could be the result of a number of factors including variations in meteorological and traffic conditions in the local area. Trends in concentrations at this site will be reviewed in the APR for 2020, when further monitoring data is available.

3.2.3 Particulate Matter ($\text{PM}_{2.5}$)

Angus Council do not currently monitor $\text{PM}_{2.5}$ 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;

- **Industrial installations:** existing installations where emissions have increased substantially or new relevant exposure has been introduced.
- **Industrial installations:** new or significantly changed installations with no previous air quality assessment.
- 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 proposed installations for which an air quality assessment has been carried out.

4.4 Commercial and Domestic Sources

Angus Council confirm that no new commercial or domestic sources of the following nature have been identified;

- Biomass combustion plant – individual installations.
- 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;

- 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;

- Landfill sites.
- Unmade haulage roads on industrial sites.
- Waste transfer stations, etc.

Angus Council confirm that new sources of fugitive or uncontrolled particulate matter of the following nature have been identified and are dealt with under Section 5 Planning Applications;

- Quarries.
- Other potential sources of fugitive particulate matter emissions

5. Planning Applications

5.1 Planning Applications Granted Approval

- **17/00917/Full: Planning application for new stone processing building, Denfind Monikie**

This application was for a new stone processing building, forming part of an existing hard rock quarry with an existing stone workshop. The proposal has the potential to increase fugitive emissions of PM.

The application was supported by an air quality assessment carried out in line with the IAQM guidance on quarry developments by Dustscan dated March 2018. No justifiable complaints have been received about existing operations and no emissions witnessed by EHO staff. The proposal is considered unlikely to result in a significant increase in levels of PM₁₀. A dust management plan including nuisance dust monitoring has been required by condition.

- **18/00271/Full: Planning application for replacement and relocation of an existing biomass boiler, Windyhills Farm Auchmithie Arbroath.**

This application was for the replacement of an existing BSB boiler with a new 2MW SASP Biomass boiler. The proposal has the potential to increase emissions of PM and NO₂. The application was supported by an air quality assessment including dispersion modelling due to the potential cumulative impact from other similar boilers (previous annual reports refer). The assessment was carried out by WSP and dated May 2018. Based on emissions data alone the proposed boiler was clearly cleaner in terms of likely PM₁₀ emissions, however, a lower discharge stack was also proposed.

The assessment concluded that under worst case conditions the boiler replacement would have a negligible effect on PM and NO₂ levels. See the results reproduced in the tables below. The type of boiler, the location of the boiler, the type of fuel and the height of the stack have been controlled by planning conditions.

- **19/00226/Full Planning application for biomass production including chipping and drying of biomass, East Newton Farm Arbroath**

This application was for a woodchip biomass production industrial process including woodchip drying using a biomass boiler. This proposal has the potential to increase emissions of PM and NO₂. A screening assessment was undertaken and the results reproduced in the tables below. The type of boiler, the location of the 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/m ³)		Emission Rates (g/s)	
					PM ₁₀	NO ₂	PM ₁₀	NO ₂
East Newton	Biomass Boiler	6.5	0.5	10	13.98	4.06	0.0036	0.034
Windyhills ¹	Biomass Boiler	6.5	0.46	12	12.11	4.37	0.031	0.094

(1)Detailed assessment carried out in order to compare emissions with existing boiler and take account of cumulative impact.

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?
East Newton	0.0399	NO	0.3094	NO	0.4515	NO

Detailed assessment including cumulative impacts

Source Location	PM ₁₀ Annual Mean (µg/m ³)			Nitrogen Dioxide Annual Mean (µg/m ³)			Nitrogen Dioxide Hourly Mean (µg/m ³)		
	PC	PEC	PEC > AQS	PC	PEC	PEC > AQS	PC	PEC	PEC > AQS
Windyhills	0.7	12.81	NO	1.46	5.83	NO	3.76	12.5	NO

PC= process contribution PEC= predicted environmental concentration=background +PC

5.2 Planning Applications Pending etc.

- **18/00368/Full: Planning application for biomass production including chipping and drying of biomass, Glenskenno Farm Hillside Montrose**

This application is for a woodchip biomass production industrial process including woodchip drying using 7 biomass boilers. This proposal has the potential to increase emissions of PM and NO₂. An air quality impact assessment has been requested. Due to the number of boilers and the flues being below the height of the adjoining building the assessment should include dispersion modelling.

- **19/00138/Full Planning application for biomass production including chipping and drying of biomass, East Mains of Keithock Brechin**

This application is for a woodchip biomass production industrial process including woodchip drying using a biomass boiler. This proposal has the potential to increase emissions of PM and NO₂. An air quality impact assessment has been requested.

- **19/00083/FULM Planning application for extension to sand and gravel quarry, Hatton Quarry Froikhiem**

This application has the potential to increase PM levels. An air quality assessment has been included in the EIA. The application is under consideration.

- **19/00091/FULM Planning application for extension to sand and gravel quarry, Auchterforfar Forfar**

This application has the potential to increase PM levels. An air quality assessment has been included in the EIA. The application is under consideration.

- **19/00257/PREAPP Pre Planning advice sought for development of a new crematorium.**

This application has the potential to increase PM and NO₂ levels. The developer has been advised that an air quality assessment would be required.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Concentrations of NO₂ measured at 12 monitoring sites across the Angus Council area were well below the annual mean objective in 2018.

PM₁₀ concentrations measured at two kerbside/roadside monitoring sites were also below the relevant objectives.

Concentrations have generally reduced at most monitoring sites since 2014. However, when compared with 2017, annual mean NO₂ concentrations increased slightly in 2018 at eight of the twelve monitoring sites and annual mean PM₁₀ concentrations increased at the Glamis Road monitoring site in Forfar. These fluctuations could be the result of a number of factors including variations in meteorological or traffic conditions in the local area. Despite the increases evident in 2018, concentrations at all monitoring sites remain below national objectives with the highest annual mean NO₂ concentration (23.4µg/m³) being measured at site A3 at Abbey Path, Arbroath and the highest annual mean PM₁₀ concentration (12.7µg/m³) being measured at Glamis Road, Forfar.

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 County Council area in 2018. One location did not require a detailed assessment. The detailed cumulative impacts assessment for the other four locations found that the contributions from these new developments did not raise pollutant levels above the Air Quality Standards objectives and therefore, no further action is required.

In 2018 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 PM₁₀ monitoring represent the worst case scenario as they consider the two busiest interchanges with relevant exposure. With regards to our programme of NO₂ monitoring, our sites are constantly under review and it is anticipated that some locations will change this year to reflect new developments etc. Our future monitoring strategy will need to 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 nitrogen dioxide and PM₁₀ concentrations.

An APR will be submitted in 2020 setting out 2019 monitoring data and details of any newly identified sources.

References

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Angus Council, 2016. An Active Travel Strategy For Angus. Available at:

https://www.angus.gov.uk/sites/angus-cms/files/2017-07/401_AppA.pdf

Angus Council Local Development Plan. Available at:

<http://www.angus.gov.uk/sites/angus-cms/files/Angus%20local%20development%20plan%20adopted%20September%202016.pdf>

TAYplan Strategic Development Plan 2016-36. Available at: https://www.tayplan-sdpa.gov.uk/strategic_development_plan

Appendix A: Monitoring Results

Table A.2 – Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m)	Inlet Height (m)
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 of the monitoring sites are at a location of exposure (e.g. installed on the façade of a residential property).

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)	Tube collocated 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, Arbroath	Roadside	364299	741225	NO ₂	N	1.5	<1	N
A4	22 Lordburn, Arbroath	Roadside	364158	741122	NO ₂	N	3	<1	N
CAR	High St, Carnoustie	Kerbside	356243	734526	NO ₂	N	3	2	N
M1	High St, Monifieth	Kerbside	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	Kerbside	338621	754032	NO ₂	N	5	6	N
F1	St James Road, Forfar	Roadside	345628	750307	NO ₂	N	<1	2	N

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

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
A1	Urban Background	Diffusion Tube	100	100	9.8	8.9	8.2	8.3	8.1
A2	Urban Background	Diffusion Tube	100	91.7	11.0	11.6	11.3	10.3	12.2
A3	Roadside	Diffusion Tube	100	91.7	18.5	19.6	20.1	19.9	23.4
A4	Roadside	Diffusion Tube	100	100	18.2	18.0	17.5	17.7	16.6
CAR	Kerbside	Diffusion Tube	100	100	22.9	15.6	15.1	14.4	15.1
M1	Kerbside	Diffusion Tube	91.7	91.7	17.4	14.6	15.9	13.9	13.2
M2	Kerbside	Diffusion Tube	100	100	21.0	20.1	19.3	18.2	19.2
B1	Kerbside	Diffusion Tube	100	100	15.0	13.5	14.2	12.3	12.6
B2	Industrial	Diffusion Tube	100	100	7.8	6.8	6.2	5.9	7.3
FOR	Kerbside	Diffusion Tube	100	100	16.1	16.3	16.8	14.9	15.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
KIR	Kerbside	Diffusion Tube	83.3	83.3	13.4	12.8	13.3	12.0	11.6
F1	Roadside	Diffusion Tube	100	100	21.3	21.3	21.2	18.2	19.1

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

Trend in Annual Mean Nitrogen Dioxide Concentrations

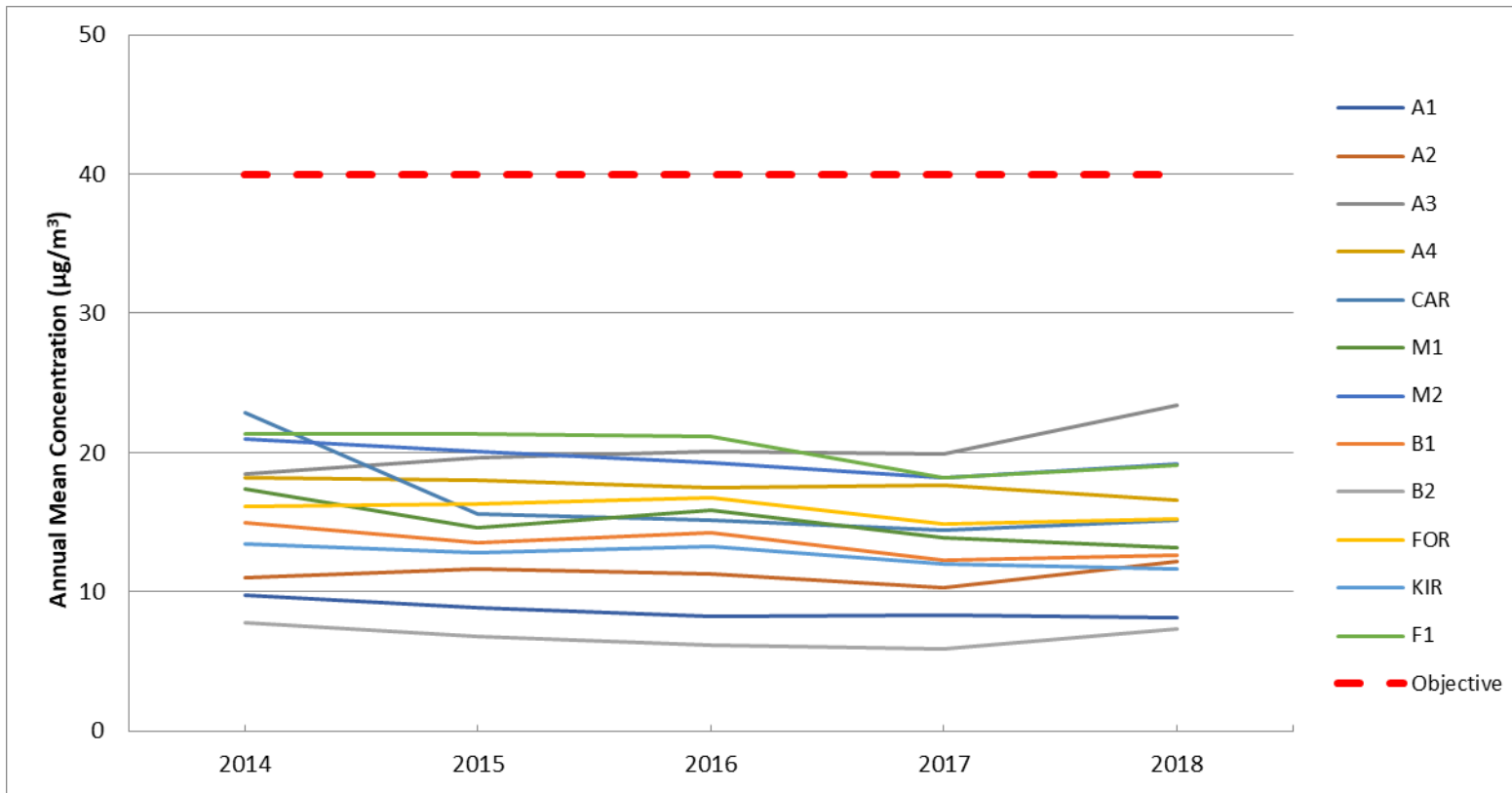


Table A.4 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2014	2015	2016	2017	2018
Burnside Drive, Arbroath	Kerbside	96	96	15.6	14.3	13.0	12.9	12.0
Glamis Road, Forfar	Kerbside	95	95	-	10.2	10.5	9.9	12.7

Notes: Exceedances of the PM₁₀ annual mean objective of 18µg/m³ 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.

Trend in Annual Mean PM₁₀ Concentrations

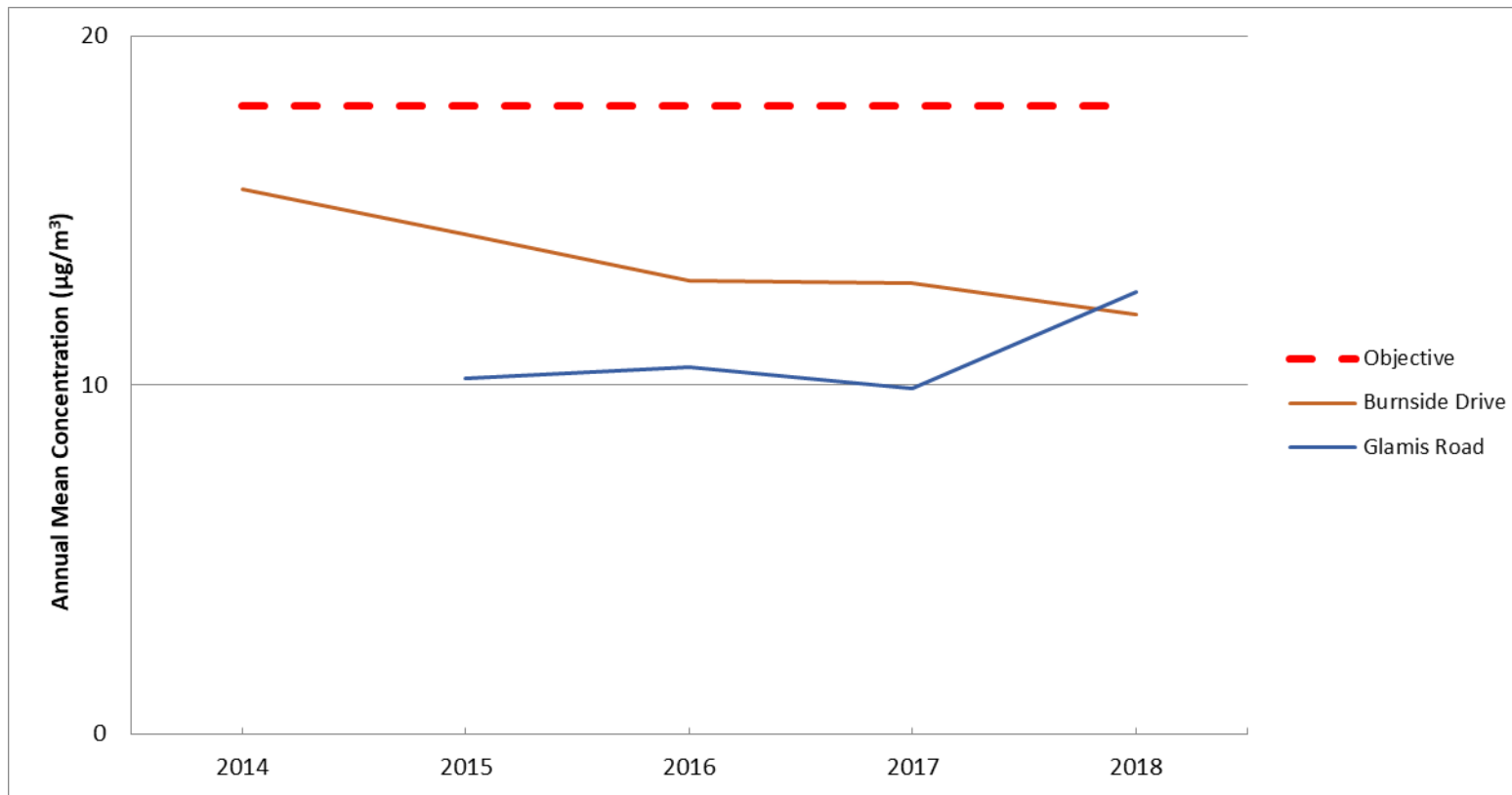


Table A.5 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾					
				2013	2014	2015	2016	2017	2018
Burnside Drive, Arbroath	Kerbside	96	96	5 (52.8)	0 (31.6)	1 (34.9)	0 (23.5)	0 (23.9)	0
Glamis Road, Forfar	Kerbside	95	95	-	-	1 (32.0)	0	0 (39.5)	0

Notes: Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ 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.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results for 2018

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted ⁽¹⁾
	A1	17	13.1	9.8	9.7	6.5	6.6	6.1	7.9	6.7	10.3	11.1		

A2	-	36.4	13.6	12.3	12.3	8.9	8.9	9.9	11.5	10.3	19.6	19.3	15.2	12.2
A3	-	65.7	23.3	27.1	25.3	20.8	23.4	20.2	22	31	30.4	33.1	29.3	23.4
A4	33	26.4	17.9	20.9	19	15.1	15.7	21.6	20.1	7.3	21.3	30	20.7	16.6
CAR	26.9	25.3	19.9	15.2	15.8	13.6	17.8	12.3	13.7	19.1	22.6	24.5	18.9	15.1
M1	-	23	13.8	18.4	14	10.6	10.3	13.3	10.8	20.1	20.1	27.2	16.5	13.2
M2	35.6	26.3	21.5	23.1	23.6	15.7	22.4	20	21.8	24.3	25	28.5	24	19.2
B1	19.6	20.5	6.6	19.9	18.2	12	10.7	10.6	9.2	16.6	24.7	20.8	15.8	12.6
B2	13.6	9.3	19.7	6.2	8.8	5.9	5.6	5.2	4.4	8.9	11.2	11.3	9.2	7.3
FOR	32.2	23.3	17.9	17.8	14.9	12.7	12.7	13.7	15.3	19.5	24.2	23.9	19	15.2
KIR	23.8	20.7	13	11.7	10.8	8.4	6	10.8	-	18	< 0.5	22.1	14.5	11.6
F1	33.7	31.9	22.4	20.9	20	15.1	14.5	16.7	21.2	28.2	28.4	33.9	23.9	19.1

(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 colocation 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 2018 is 0.80 (taken from spreadsheet 03/18, based on 5 studies; available at: <http://laqm.defra.gov.uk/bias-adjustmentfactors/national-bias.html>). This factor has been applied to all 2018 diffusion tube data.

Air Proficiency Testing

Tayside Scientific Services take part in the UKAS accredited proficiency testing scheme Air PT, operated by LGC and the Health and Safety Laboratory (HSL).

Available data for TSS in 2018 are provided below:

Air PT Round	AR024	AR025	AR026	AR027
Period	Jan – Feb 2018	April – May 2018	July – Aug 2018	Sept – Oct 2018
Satisfactory Results (%)	100	NR	100	NR

NR – no results reported

During 2018, 100% of samples submitted were determined to have been satisfactory.

Automatic Monitoring QA/QC

Angus Council change the Partisol filter cassettes fortnightly. The samplers are serviced bi-annually by Air Monitors Ltd.

Data from the FDMS analyser is collected via automatic telemetry by Ricardo Energy & Environment. The analyser is serviced on an annual basis and audited every six months. All data are ratified on a 6-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