Annual Progress Report (APR)

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

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

September 2018

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Executive Summary: Air Quality in Our Area

Air Quality in Angus Council

Air quality monitoring data available for 2017 confirm that air quality across 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.

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. 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 proposed Angus Local Development Plan (LDP) and enhanced by the Active Travel strategy 2015/16. A number of schools in Angus have a Travel Plan in place or are currently undertaking travel plan activities.

Local Priorities and Challenges

Angus Council will:

- Continue to monitor NO_2 and PM_{10} concentrations during 2018 and will report on progress in 2019.
- 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 Smart Working programme

- 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 and cycling for short journeys all help to reduce emissions.

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

When you do travel by car, avoiding excessive acceleration and hard braking will also reduce the impact 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 Angus Council during 2017. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether 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

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 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1. All measures have now been successfully implemented, with exception of the North East Scotland Sustainable Energy Action Plan (SEAP), which 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 published and adopted 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' 'Angus on the Go' campaign	Promoting low emission transport; Public information; Promoting travel alternatives	Grant funding used to promote active and sustainable travel.	Angus Council	2015	2015-2016	• Promotional events to launch 'Angus on the Go' • Promotion of bus travel with on-bus adverts and display in shelters • Angus on the Go Leaflet for Brechin Community Campus showing bus routes, walking routes and cycling • Distribution of Leaflet door to door in Brechin together with bus timetables for the local services • Provision of cycle racks and cycle training in schools • Provision of active travel training in schools • Promotional events to promote public transport use and cycle provision on bus service X7 Aberdeen to Perth • Funding of the Cycle Hub (a social enterprise) for cycle training, refurbishment of bikes, and doctor bike sessions • Providing folders with public transport, liftshare, cycling and walking information for all the Angus Council hospitals	These measures have been implemented or are ongoing (e.g. the Cycle Hub)	Ongoing
							• Provision of electric vehicle charging station adjacent to A90 at Orchardbank, Forfar	Funding Secured from European Regional Development Fund	TBC

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Progress to Date	Completion Date
2	New bus services introduced	Transport planning and infrastructure	Grant funding used for active and sustainable travel to encourage model shift.	Angus Council	2014	January 2015	• New direct service introduced between Dundee – Forfar – Brechin – Stracathro Hospital and Edzell. • Marketing to promote the service • Quality contract with vehicles with Euro 5 or better engines scoring higher	Service commenced. Hybrid buses introduced	Jan 2015
3	Hybrid Buses	Transport planning and infrastructure	18 hybrid buses on the Arbroath to Dundee (Tayway corridor) Environmentally friendly vehicles on the X7 Aberdeen to Perth corridor	Stagecoach bus company partly funded by the Scottish Government Green Bus Fund	2014	2015	• For approximately 25% of the Stagecoach fleet in Angus and Dundee • Stagecoach fuel consumption was down (due to replacement of Euro 5 by Euro 6) • CO_2 reduction by 16% • Hydrocarbons have reduced by at least 72% • NO_X had reduced by 80 % • Particulates have reduced by 50% • Over 35% fuel burn emission reduction	Fully implemented. Services provided by Stagecoach	March 2015
4	Multi-operator smart ticketing scheme	Transport planning and infrastructure; Promoting travel alternatives; Vehicle fleet efficiency	Allow passengers to travel on different operators' services with the same ticket, to reduce travel costs.	Bus companies	2015	August 2016	• Implementing initially on a zone covering Monifieth, Monikie, Tealing, Muirhead and Liff • Extend the scheme in due course across Angus		August 2016 TBA
5	Smarter Choices Smarter Places' funding	Promoting low emission transport; Public information; Promoting Travel alternatives	Extended Grant funding to continue with work from 2015-2016	Angus Council	2016-2017	2016-2017	• Producing a leaflet of how to get to the new Forfar Community Campus (distributed door to door), carrying on with active travel training in schools in Forfar, Arbroath and Brechin predominantly	Fully implemented	March 2017

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Progress to Date	Completion Date
6	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	• 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 – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at http://www.gov.scot/Publications/2015/11/5671/17. Progress by 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 2017 (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 2017, and how local concentrations of the measured pollutants compare with the objectives. The locations of the current monitoring sites are shown below.

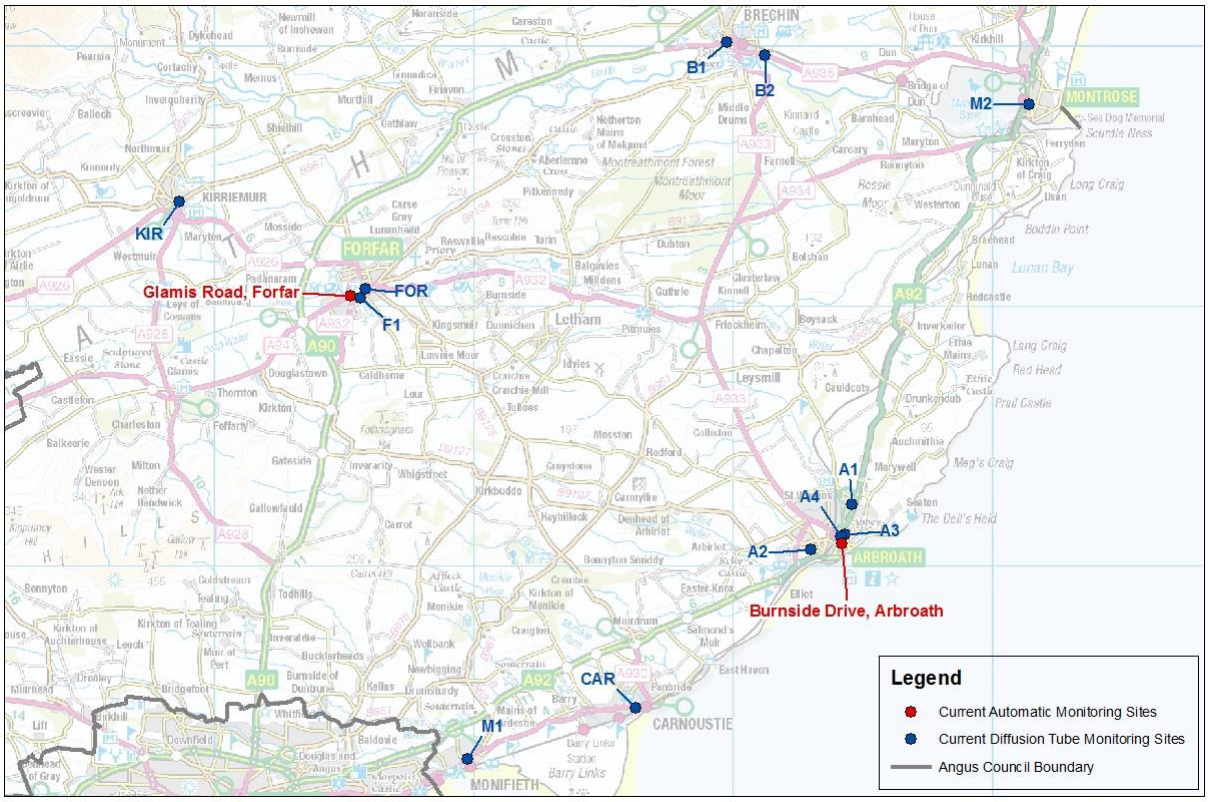

Figure 3.1 – Current air quality monitoring sites in Angus

3.1.1 Automatic Monitoring Sites

Angus Council undertook automatic (continuous) monitoring of PM_{10} at two sites during 2017. 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 NO_2 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 NO_2 at 12 sites during 2017. Table A.2 in Appendix A provides the details of the sites, whilst Appendix B provides the full 2017 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

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 7 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2017 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 2017; the highest concentration was 19.9µg/m^3 measured at monitoring site A3 located on Abbey Path, Arbroath. At most monitoring sites, concentrations have reduced overall since 2011. The main exceptions are the urban background monitoring sites (A1 and A2), and the roadside site at Abbey Path, Arbroath (A3), where concentrations have increased overall since 2011; concentrations, however, remain well below the annual mean objective.

3.2.2 Particulate Matter (PM_{10})

Table A.4 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 7 years with the air quality objective of 18µg/m^3. Table A.5 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 7 years with the air quality objective of 50µg/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 since monitoring commenced in 2013.

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 or significantly changed Industrial sources have been identified which may have a significant impact on local air quality.

4.4 Commercial and Domestic Sources

New commercial developments have been identified by Angus Council as having a potential effect on local air quality. Table 4.1 lists the potential sources of air pollutants, by location, with their dimensions and emission rates.

One of the five locations (Muirloch) is a single source and the simple assessment necessary is summarised in table 4.2.

Four of the five locations are associated with multiple sources, and therefore required a detailed assessment for cumulative impacts. Table 4.3 compares the predicted concentrations to Air Quality Strategy (AQS) objectives for these locations. Predicted concentrations at each location for PM_{10}, and NO_2 did not exceed air quality standards.

Table 4.1 – Commercial Sources

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
Biomass boiler Muirloch	1 biomass boiler	10	0.3	10.8	11.93	4.037	0.0017	0.0066
Biomass boiler Fraserfield[1]	2 biomass boilers	10	0.3	9	12	3.6	0.007	0.028
Biomass boilers Windyhills 7,8 and 9[1]	3 biomass boilers	8	0.5	10	13.99	4.31	0.004	0.034
Gas power generators 1-10 Station road Forfar[1]	10 gas engines	5.5	0.45	10	n/a	4.83	n/a	0.4728
Gas power generation Hatton farm[1]	2XBoilers	12.5	0.2	3.8	n/a	4.44	n/a	0.3021
	2X Flares		1.36	8			n/a	0.1314
	CHP		0.25	7			n/a	0.0022

[1]Cumulative impacts assessment required due to multiple sources, see Table 4.3

Table 4.2 –Target Emission Rates from Biomass Calculator

Source 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?
Muirloch	0.0081	No	0.0049	No	0.0843	No

Table 4.3 – Detailed Assessment for Cumulative Impacts

Source Location	PM_{10} Annual Mean ($\mu g/m^3$)			Nitrogen Dioxide Annual Mean ($\mu g/m^3$)			Nitrogen Dioxide Hourly Mean ($\mu g/m^3$)		
	PC[1]	PEC[2]	PEC > AQS	PC	PEC	PEC > AQS	PC	PEC	PEC > AQS
Fraserfield	0.9	12.9	No	1.3	4.9	No	12.2	18.4	No
Windyhills 7,8 and 9	2.41	16.28	No	11	15.03	No	24.9	32.96	No
Station road Forfar	n/a	n/a	n/a	3.74	8.57	No	117.9	122.7	No
AD Hatton farm	n/a	n/a	n/a	7.48	11.9	No	32.78	37.22	No

[1]Process Contribution (PC)
[2]Predicted Environmental Concentration (PEC) = background + PC

4.5 New Developments with Fugitive or Uncontrolled Sources

Angus Council confirm that no new Developments with Fugitive or Uncontrolled sources have been identified which may have a significant impact on local air quality.

5. Planning Applications

Angus Council has identified the following planning applications that could have an impact on air quality:

- Relocation and replacement of a biomass boiler in Windyhills Arbroath
- Construction of a Biomass fuelled grain dryer at Mains of Logie,
- Construction of a Biomass boiler at Glenskinno Montrose
- Construction of a Stone processing workshop at Pitairlie Quarry Monikie

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Concentrations of nitrogen dioxide measured at 12 monitoring sites across the Angus Council area were well below the annual mean objective in 2017. Concentrations have reduced at most monitoring sites in recent years.

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

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 2017. 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 2017 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

Angus Council will continue monitoring nitrogen dioxide and PM_{10} concentrations.

An APR will be submitted in 2019 setting out 2018 monitoring data and details of any newly identified sources.

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
Chapelpark Primary School, Forfar(2)	*Roadside*	*345914*	*750612*	*PM_{10}*	*N*	*Gravimetric*	*0*	*5*	*1.5*
Chapelpark Primary School, Forfar(2)	*Roadside*	*345914*	*750613*	*PM_{10}*	*N*	*FDMS*	*0*	*6*	*1.5*
Peel Park Primary School, Glenisla(2)	*Rural Background*	*326515*	*754046*	*PM_{10}*	*N*	*Gravimetric*	*0*	*20*	*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) Monitoring ceased in 2012.

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

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?
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
F2(2)	*Dundee Loan, Forfar*	*Roadside*	*345342*	*750088*	*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) Monitoring ceased in 2012.

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 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)						
					2011	2012	2013	2014	2015	2016	2017
A1	Urban Background	Diffusion Tube	100	100	7.0	7.1	5.0	9.8	8.9	8.2	8.3
A2	Urban Background	Diffusion Tube	100	100	8.8	9.5	8.0	11.0	11.6	11.3	10.3
A3	Roadside	Diffusion Tube	100	100	17.7	15.6	15.0	18.5	19.6	20.1	19.9
A4	Roadside	Diffusion Tube	100	100	21.1	21.3	17.5	18.2	18.0	17.5	17.7
CAR	Kerbside	Diffusion Tube	100	100	20.3	20.1	16.8	22.9	15.6	15.1	14.4
M1	Kerbside	Diffusion Tube	100	100	23.4	23.3	19.4	17.4	14.6	15.9	13.9
M2	Kerbside	Diffusion Tube	92	92	23.8	26.1	21.7	21.0	20.1	19.3	18.2
B1	Kerbside	Diffusion Tube	92	92	14.8	16.8	14.0	15.0	13.5	14.2	12.3
B2	Industrial	Diffusion Tube	100	100	8.1	8.0	6.9	7.8	6.8	6.2	5.9
FOR	Kerbside	Diffusion Tube	100	100	17.0	17.0	15.8	16.1	16.3	16.8	14.9

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)						
					2011	2012	2013	2014	2015	2016	2017
KIR	Kerbside	Diffusion Tube	67	67	12.3	11.7	12.0	13.4	12.8	13.3	12.0
F1	Roadside	Diffusion Tube	100	100	-	23.0	21.0	21.3	21.3	21.2	18.2
F2	*Roadside*	*Diffusion Tube*	-	-	-	*21.1*	*18.2*	-	-	-	-

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.

Trend in Annual Mean Nitrogen Dioxide Concentrations

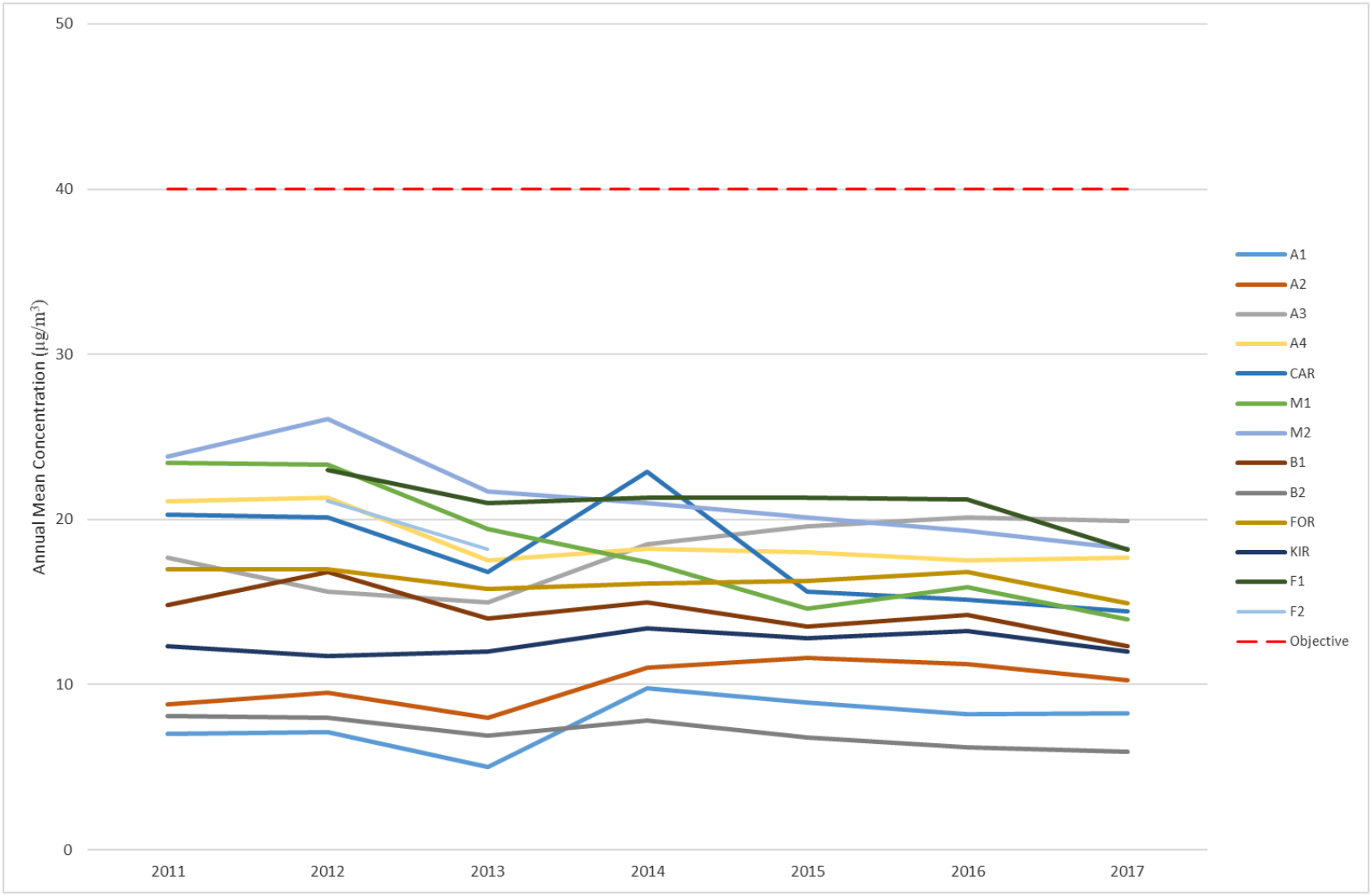

Table A.4 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)						
				2011	2012	2013	2014	2015	2016	2017
Burnside Drive, Arbroath	Kerbside	83	83	-	-	16.5	15.6	14.3	13.0	12.9
Glamis Road, Forfar	Kerbside	47	47	-	-	-	-	10.2	10.5	9.9
Chapelpark Primary School, Forfar	*Roadside*	-	-	*18*	*17*	-	-	-	-	-
Chapelpark Primary School, Forfar	*Roadside*	-	-	*17.2*	*14.5*	-	-	-	-	-
Peel Park Primary School, Glenisla	*Rural Background*	-	-	*8.9*	*6.6*	-	-	-	-	-

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.

Trend in Annual Mean PM10 Concentrations

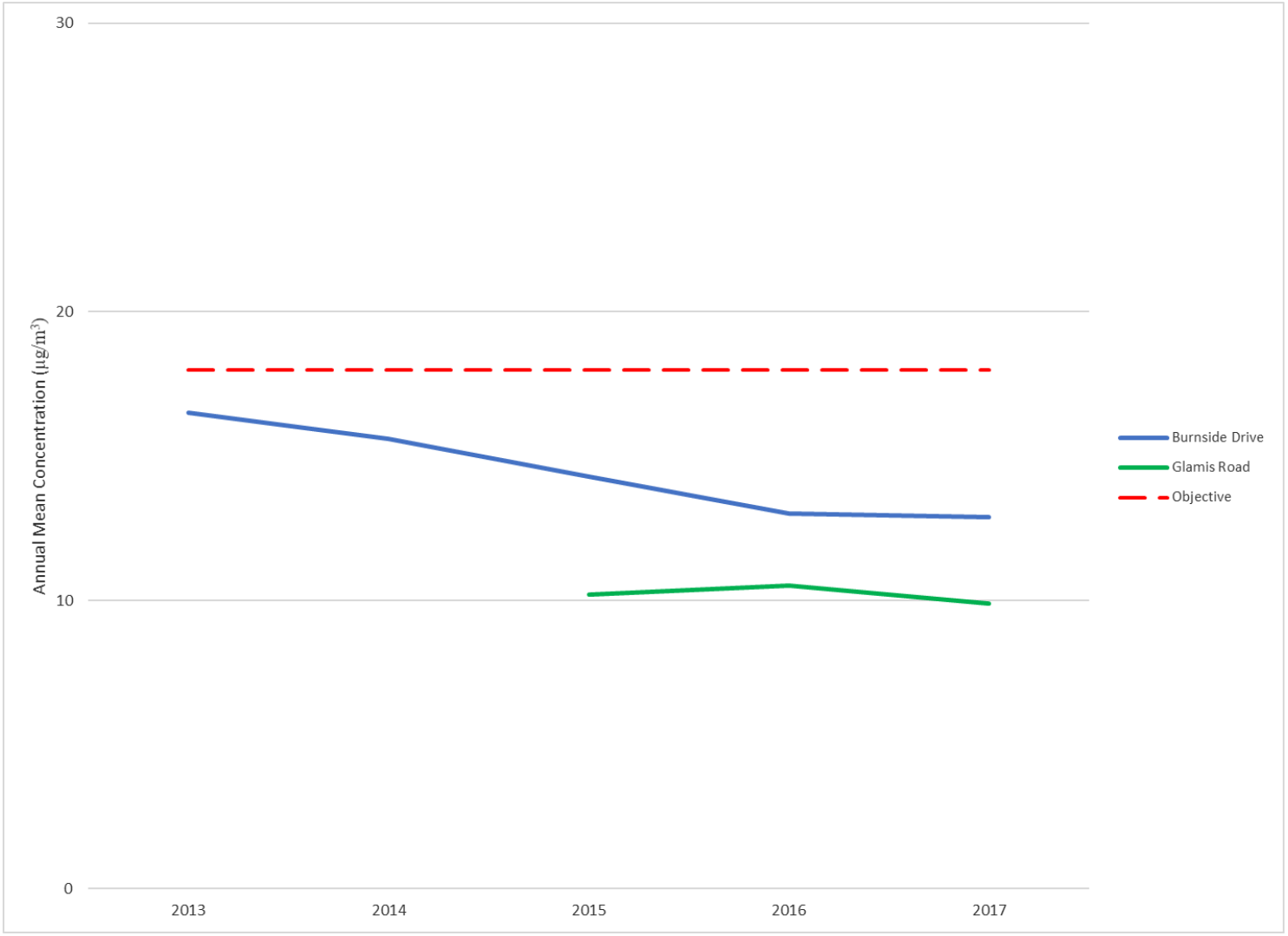

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)						
				2011	2012	2013	2014	2015	2016	2017
Burnside Drive, Arbroath	Kerbside	83	83	-	-	5 (52.8)	0 (31.6)	1 (34.9)	0 (23.5)	0 (23.9)
Glamis Road, Forfar	Kerbside	47	47	-	-	-	-	1 (32.0)	0	1 (39.5)
Chapelpark Primary School, Forfar	*Roadside*	-	-	*0*	*2*	-	-	-	-	-
Chapelpark Primary School, Forfar	*Roadside*	-	-	*2*	*1 (38.4)*	-	-	-	-	-
Peel Park Primary School, Glenisla	*Rural Background*	-	-	*1*	*0 (19.0)*	-	-	-	-	-

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/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.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2017

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	17.0	14.0	14.3	6.7	9.5	7.9	7.4	8.8	10.5	11.8	14.9	14.9	11.5	8.3
A2	21.0	16.2	14.5	10.1	11.3	10.7	9.7	12.5	13.1	15.6	18.2	18.4	14.3	10.3
A3	32.1	30.8	30.5	25.8	21.8	22.2	20.0	25.0	25.0	26.8	33.5	38.2	27.6	19.9
A4	29.5	25.6	27.9	21.2	16.6	18.2	16.1	21.3	22.6	24.1	34.1	37.2	24.5	17.7
CAR	29.3	21.3	23.2	16.0	15.6	13.9	13.3	15.0	17.9	18.0	27.7	29.5	20.1	14.4
M1	24.8	23.0	22.4	14.7	14.8	20.2	11.7	13.3	17.0	14.5	26.5	29.5	19.4	13.9
M2	31.5	29.1	30.1	20.6	-	13.1	17.4	24.0	24.8	25.4	32.6	29.5	25.3	18.2
B1	21.8	22.4	21.6	12.7	-	13.9	11.2	12.3	16.4	14.5	20.3	21.4	17.1	12.3
B2	13.1	10.9	8.9	5.2	6.9	5.0	4.8	5.1	9.4	8.3	9.8	11.7	8.3	5.9

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)
FOR	30.7	26.3	24.2	16.2	15.3	13.9	11.5	15.6	18.3	19.0	28.7	28.9	20.7	14.9
KIR	21.4	20.9	-	15.1	12.0	11.7	9.0	11.3	-	-	-	23.0	15.6	11.2
F1	32.9	32.8	27.3	23.4	18.5	8.5	15.1	22.0	24.2	26.2	33.3	38.4	25.2	18.2

(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 2017 is 0.72 (taken from spreadsheet 03/18, based on 5 studies; available at: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html). This factor has been applied to all 2017 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 2017 are provided below:

Air PT Round	AR018	AR019	AR021	AR022
Period	Jan – Feb 2017	April – May 2017	July – Aug 2017	Sept – Oct 2017
Satisfactory Results (%)	100	NR	100	NR

NR – no results reported

During 2017, 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).

Short-term to Long-term Data Adjustment (Annualisation)

Data capture at the Forfar FDMS analyser was low in 2017, and below the minimum requirement (of 75%). The data have therefore been adjusted to an annual mean, based on the ratio of concentrations during the short-term monitoring period to those over the 2017 calendar year. This has utilised data from three urban background monitoring sites whose data are available from the Scottish air quality website (www.scottishairquality.co.uk) where long-term PM_{10} data are available.

1 Jan – 24 May, 1 Oct – 20 Nov 2017

Site	2017 Annual Mean	Period Mean	Ratio
Aberdeen Errol Place	11.5	13.8	0.829
Falkirk Grangemouth	11.5	13.0	0.886
Glasgow Townhead	13.4	15.7	0.855
		Average	0.857

Data capture at the Manse Close diffusion tube (KIR) was low in 2017, at just 67%. The data have therefore been adjusted to an annual mean, based on the ratio of concentrations during the short-term monitoring period to those over the 2017 calendar year. This has utilised data from three urban background monitoring sites whose data are available from the Scottish air quality website (www.scottishairquality.co.uk) where long-term NO_2 data are available.

5 Jan – 1 Mar 2017, 30 Mar – 30 Aug 2017, 6 Dec 2017 – 4 Jan 2018

Site	2017 Annual Mean	Period Mean	Ratio
Aberdeen Errol Place	22.1	21.0	1.049
Falkirk Grangemouth	16.6	15.4	1.082
Glasgow Townhead	25.1	23.2	1.082
		Average	1.071

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