Annual Progress Report (APR)

2022 Air Quality Annual Progress Report (APR) for Angus Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

July 2022

Information	**Angus Council**
Local Authority Officer	Iain Graham
Department	Housing, Regulatory, and Protective Services
Address	Angus House Orchardbank Business Park Forfar DD8 1AN
Telephone	01307 492026
E-mail	GrahamIH@angus.gov.uk
Report Reference Number	80557-SRL-RP-YQ-01-S2-P3
Date	July 2022

Executive Summary: Air Quality in Our Area

Air Quality in Angus

The 2021 air quality monitoring data 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.

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.

There are no significant air quality issues in Angus.

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), which is undergoing review. 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 administrative 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, and 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 by supporting the delivery of renewable energy and energy efficiencies. There is a duty under The Climate Change Act to deliver increased 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 the opportunity for mitigation of negative effects.

In the 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 2022 and will report on progress in 2023
- 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 the Transforming Angus Programme to consolidate estate, facilitate home working where possible, and reduce staff travel through the Smart Working programme; and
- Implement the current Angus Local Development Plan (2016), which sets out the strategies and policies to promote development that minimises adverse impacts on the environment.
- Begin monitoring and reporting on $PM_{2.5}$ concentrations at the Glamis Road, Forfar monitor as this monitor has the capability to do.

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.

Several online tools are available to help you plan your journey at www.travelinescotland.com.

Avoid excessive acceleration and hard braking when you do travel by car to 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

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Angus during 2021. 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 Concentration	Air Quality Objective Measured as	Date to be Achieved by
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen dioxide (NO_2)	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
Particulate Matter (PM_{10})	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2021
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO_2)	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO_2)	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

2 Actions to Improve Air Quality

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 currently does not have any AQMAs.

Cleaner Air for Scotland 2

Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2) is Scotland's second air quality strategy. CAFS2 sets out how the Scottish Government and its partner organisations propose to further reduce air pollution to protect human health and fulfil Scotland's legal responsibilities over the period 2021 – 2026. CAFS2 was published in July 2021 and replaces Cleaner Air for Scotland – The Road to a Healthier Future (CAFS), which was published in 2015. CAFS2 aims to achieve the ambitious vision for Scotland "to have the best air quality in Europe". A series of actions across a range of policy areas are outlined, a summary of which is available on the Scottish Government's website.

Progress by Angus Council against relevant actions for which local authorities are the lead delivery bodies within this strategy is demonstrated below.

2.1.1 Placemaking – Plans and Policies

Local authorities with support from the Scottish Government will assess how effectively air quality is embedded in plans, policies, City Deals and other initiatives, and more generally in cross departmental working, identifying and addressing evidence, skills, awareness, and operational gaps.

2.1.2 Transport – Low Emission Zones

Local authorities working with Transport Scotland and SEPA will look at opportunities to promote zero-carbon city centres within the existing LEZs structure.

Angus has no plans to introduce LEZs within its administrative area.

Progress and Impacts of Measures to address Air Quality in Angus

Angus Council has taken forward several measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress, or planned are set out in Table 2.1 – Progress on Measures to Improve Air Quality.

Angus Sustainable Energy Climate Action Plan (SECAP) was approved by Angus Council on 4th November 2021. The SECAP proposes climate change mitigation policies and actions to develop the low carbon economy in the region, encompassing mitigation strategies specific to Angus 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. However, many of the actions / projects are still to be completed.

Work is ongoing on a Net Zero action plan for the council's operations. It is hoped that a draft will be ready by the end of June 2022. The council needs to achieve Net Zero emissions by 2045, with an interim target of a 75% reduction by 2030. The action plan will contain projects that will have direct / indirect benefits to air quality. The action plan themes are:

- Waste, Recycling & Circular Economy
- Buildings, Energy & Infrastructure
- Transport & Travel
- Governance, Leadership & Procurement
- Land Use (carbon insetting / offsetting)

Angus Council has appointed design and consultancy firm Arcadis to take the Arbroath, A Place For Everyone project, aimed at improving access and promoting active travel, through design development, to completion in the next four years. In July 2019, the Scottish Government announced that funding under the Sustrans Places for Everyone programme had been awarded to Angus Council to develop the detailed design phase in conjunction with local community interests and Sustrans, and to support future development. The Arbroath project is among the most ambitious projects being funded by

the Places for Everyone programme, with Arbroath the first of Scotland's towns to receive the highest level of funding available through the scheme. The project will make areas within Arbroath more accessible for all by improving pedestrian, wheeling, and cycling provision, making better use of green spaces and developing path networks. Links from railways and bus stations to the town centre will be improved while the main dual carriageway that runs through Arbroath will be redesigned to better share the available road space.

An active travel route between Newtyle and Dundee is being considered. Angus Council has appointed WSP (a transport consultancy) to look at options for a potential route. Active travel is any journey you take where you are physically moving to get about and can include walking, cycling (including using e-bikes and handcycles), travelling on a scooter, with the aid of a wheelchair, or powered mobility aid.

Angus Council ran a free bus travel scheme during the Easter holidays. The scheme included all Angus bus services and permitted any trip for free, including trips to Dundee. National funding given to Scottish local authorities to help alleviate the cost of living during the winter months was used by the council to fund the free travel. Although the scheme was to offer financial assistance, it was hoped there would be an environmental impact. Of the 300 people who responded to our survey, 140 reported that they would normally use their private car but instead used the bus. Furthermore, there was an average of 3217 trips per day, which is roughly a 20% increase from what was expected.

The FDMS analyser at Glamis Road, Forfar which had become economically unviable to repair was replaced with a FIDAS 200 analyser installed at the same location in June 2021. The replacement analyser was purchased using a 100% grant received from the Scottish Government.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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 • 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 • Raise awareness and use of active and sustainable modes by residents • Liftshare system and count challenge introduction • Holiday Hop scheme – reduced price bus tickets for children during school holidays in Summer, October, and Christmas. • Free bus travel scheme during the Easter Holidays	N/A	These measures have been implemented or are ongoing (e.g., the Cycle Hub) Funding Secured from European Regional Development Fund	Ongoing TBC	

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 Govern-ment / Angus Council	2018	2018 – 2019	• Winning the bid • Feasibility of Angus towns to be electrified fully to receive vast infrastructure boost • Number of electric cars in the town	N/A	Feasibility study completed	2025	
3	Cycling Walking Safer Streets Program	Transport planning and infrastructure Promoting travel alternative s; 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 • Construction of new footpaths in Forfar	N/A	Upgraded footpaths at Keptie Pond; Arbroath; Lordburn Park, Forfar; and King George's Field. Upgraded cycle stands for schools.	Ongoing TBC	
4	Angus Sustainable Energy & Climate Action Plan	Policy guidance and development control	Angus Sustainable Energy & Climate Action Plan	Angus Council	2018 - 21	2021 onwards	Produce a strategic document that covers all areas of sustainable energy across business and commercial, domestic, and transport including certain aspects of fuel supply. Sustainable land-use practices which aid in greenhouse gas emissions are also a focus.	N/A	Ongoing. SECAP is to be published in 2021.	Approved in Nov 21	

5	A Place for Everyone	Transport planning and infrastructure; Promoting travel alternatives; Traffic management	Grant funding used to promote active and sustainable travel	Scottish Govern -ment / Angus Council	2020 - 2022	2023 – 2025	• To plan, develop, and implement quality active travel infrastructure between Dundee Road and Guthrie Port in Arbroath	N/A	Design Development Completed	2025	
6	Active Travel	Transport planning and infrastructure Promoting travel alternatives	Feasibility study	Angus Council	2022	2022 onwards	• Identify and promote easier, safer, and more attractive routes to walk, wheel and cycle for everyday journeys between Newtyle and Dundee	N/A	Public Consultation phase	Ongoing	

Table 2.2 – Responses to DEFRA Comments on Angus Council APR (2021)

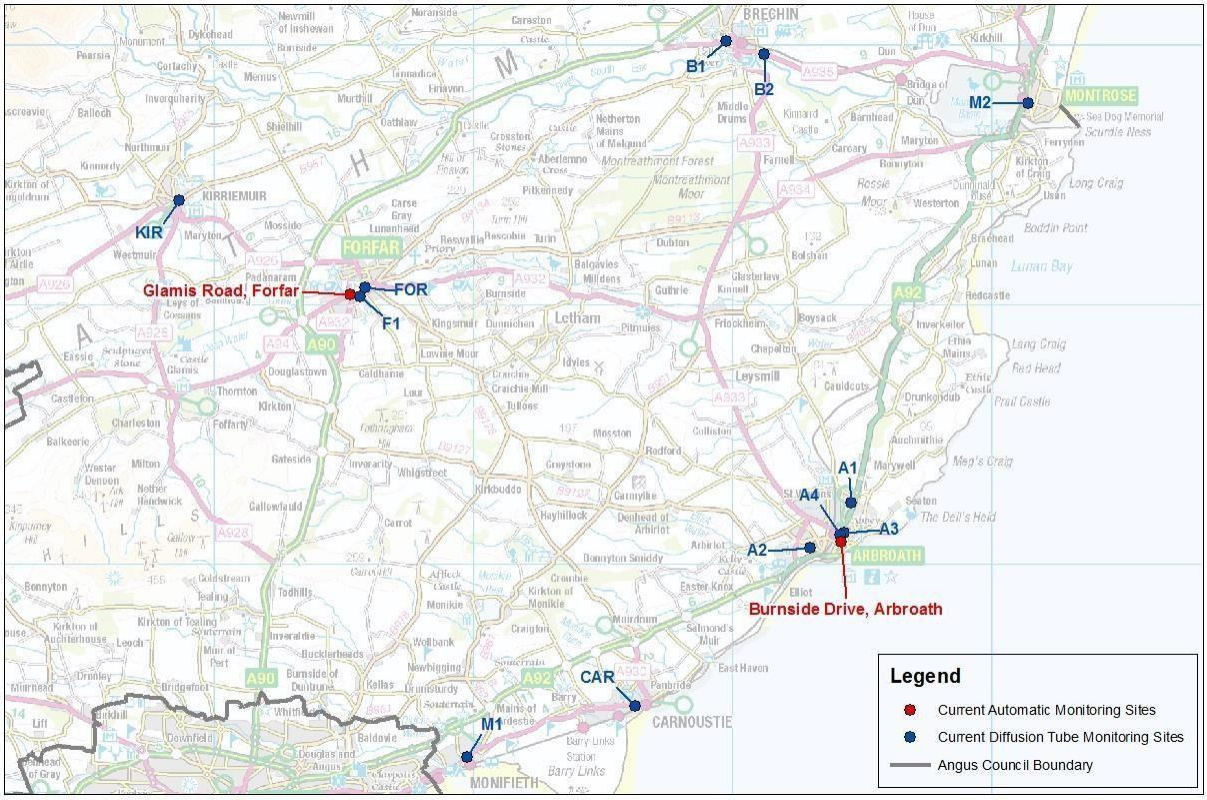
DEFRA Comments on Angus Council APR 2021	Response
The Council have provided an informative and concise report which contains the required content.	No response required.
Trends are presented and discussed and a robust comparison with air quality objectives is provided.	No response required.
The report confirms Angus Council continue to enjoy good air quality.	No response required.
The Council have outlined several measures to target air quality and has reported on their progress. This demonstrates the Council's commitment to improving and maintaining air quality.	No response required.
QA/QC procedures are largely robust. However, the Council did not annualise diffusion tube site KIR, stating it was not required for a data capture below 33%. This is not in accordance to LAQM.TG(16), which states diffusion tube data should be annualised if there is between three to nine months of data (ie 25-75%). KIR therefore should be annualised. The Council is advised to correct this, and complete annualisation for site KIR as per LAQM.TG(16), reporting the annualised result in Table A.3.	All data in this APR have been annualised where necessary in line with LAQM.TG16.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives

Summary of Monitoring Undertaken

This section sets out the monitoring that has taken place in 2021 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

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

Angus Council undertook automatic (continuous) monitoring at 2 sites during 2021. A gravimetric Partisol sampler is located at the Burnside Drive, 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 does not carry out automatic monitoring of NO_2. 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 11 sites during 2021. Table A.2 in Appendix A shows the details of the sites. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

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.

3.1.3 Nitrogen Dioxide (NO_2)

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

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B.

Concentrations at all 11 sites were well below the annual mean objective limit in 2021. The highest annual mean concentration was 18.9 µg/m^3 at monitoring site A3 located on Abbey Path, Arbroath; this is an increase from the concentration measured in 2020 of 15.6 µg/m^3. The annual mean NO_2 concentration at most of the locations has increased from 2020 to 2021; this is likely attributed to Covid-19 lockdown measures being slowly removed during 2021 and the effect this had on local traffic, and therefore emissions.

3.1.4 Particulate Matter (PM_{10})

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

The measures concentration at Burnside Drive, Arbroath continues to remain below the PM_{10} objective limits. The annual mean PM_{10} concentration has steadily decreased over the last 5 years. The decrease in 2021 could be attributed to the COVID-19 pandemic, as well as any other number of factors including variations in meteorological and general local traffic conditions.

There have been no exceedances of the 24-hour mean objective limit over the last 5 years.

3.1.5 Particulate Matter ($PM_{2.5}$)

Angus Council does not currently monitor $PM_{2.5}$ concentrations. Angus Council will report $PM_{2.5}$ concentrations at the Glamis Road, Forfar site from 2023.

3.1.6 Sulphur Dioxide (SO_2)

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

3.1.7 Carbon Monoxide, Lead, and 1,3-Butadiene

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

4 New Local Developments

Road Traffic Sources

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

Other Transport Sources

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

Industrial Sources

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

Commercial and Domestic Sources

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

New Developments with Fugitive or Uncontrolled Sources

Angus Council confirms 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.

5 Planning Applications

Planning Application 21/00550/FULL - Change of use of land and buildings to a biomass production operation including the formation of a district heating system and the installation of three boilers, flues, and associated works – retrospective.

The study assesses the potential air quality impacts of the existing and proposed biomass boiler installations at North Mains of Cononsyth Farm using atmospheric dispersion modelling. The assessment considers the impact of emissions from the proposed and existing boiler installations of NO_2, PM_{10}, and $PM_{2.5}$ and assesses them against the Air Quality Objectives.

The assessment concludes that:

- The predicted annual mean or relevant percentiles of short-term average concentrations at receptors are significantly less than each of the respective NO_2, PM_{10}, and $PM_{2.5}$ air quality objectives.
- The site is not forecast to result in the exceedance of any air quality standards or guidelines at relevant receptors.
- There are no significant impacts due to air pollution at any relevant exposure location.

6 Conclusions and Proposed Actions

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 limit in 2021. The majority of the monitoring locations experienced an increase in NO_2 concentration in 2021 from 2020, which is likely attributed to recovery from the Covid-19 pandemic and traffic flows returning to pre-pandemic levels. All concentrations at all monitoring sites remain well below the annual mean objective.

Measured PM_{10} concentrations were lower in 2021 than in 2020, continuing the downwards trend over the last 4 years, with the annual mean PM_{10} concentrations remaining below the annual mean objective limit. There were once again no days where PM_{10} exceeded 50µg/m^3 at the Burnside Drive monitor. There were 3 days where PM_{10} exceeded 50µg/m^3 at the Glamis Road monitor however, the only time this has happened over the last 5 years. Despite this, the 24-hour mean objective limit (50 µg/m^3 not to be exceeded more than seven times per year) has not been exceeded at either monitor.

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

Conclusions relating to New Local Developments

Angus Council is satisfied there have been no new local developments proposed or completed during 2021 that have the potential to introduce new exceedances of any relevant air quality objectives.

Proposed Actions

A review of the NO_2 diffusion tube locations will take place during the summer of 2022. It is anticipated that some of the locations will be changed to ensure that monitoring locations continue to represent relevant areas of interest.

Angus Council will report $PM_{2.5}$ concentrations at the Glamis Road, Forfar site from 2023.

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? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
-	Burnside Drive, Arbroath	Kerbside	364169	740861	PM_{10}	No	Gravimetric	4.0	1.0	1.5
AFR1	Glamis Road, Forfar	Roadside	345249	750386	PM_{10}	No	FDMS	20.0	6.0	1.5

Notes:

(1) 0m 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? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?	Tube Height (m)
A1	Ethie Terrace, Arbroath	Urban Background	364585	742349	NO_2	N	0.0	1.0	No	2.4
A2	Inchcape Road, Arbroath	Urban Background	362987	740642	NO_2	N	0.0	2.0	No	2.4
A3	Abbey Path, Arbroath	Kerbside	364299	741225	NO_2	N	1.5	1.0	No	2.4
A4	22 Lordburn, Arbroath	Kerbside	364158	741122	NO_2	N	3.0	1.0	No	2.4
B1	High St, Brechin	Kerbside	359727	760170	NO_2	N	2.0	1.0	No	2.4
B2	Sacone 1, Brechin	Industrial	361216	759644	NO_2	N	N/A	8.0	No	2.4
CAR	High St, Carnoustie	Roadside	356243	734526	NO_2	N	3.0	2.0	No	2.4
FOR	High St, Forfar	Kerbside	345825	750674	NO_2	N	3.0	1.0	No	2.4
F1	St James Road, Fordar	Roadside	345628	750307	NO_2	N	1.0	2.0	No	2.4
KIR	Manse Close, Kirriemuir	Roadside	338621	754032	NO_2	N	5.0	6.0	No	2.4
M1	High St, Monifieth	Roadside	349759	732549	NO_2	N	0.0	2.0	No	2.4

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?	Tube Height (m)
M2	High St, Montrose	Kerbside	371418	757767	NO_2	N	2.0	1.0	No	2.4

Notes:

(1) 0m 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 (µg/m^3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
A1	Urban Background	Diffusion Tube	100	59.6	8.3	8.1	8.0	7.1	5.1
A2	Urban Background	Diffusion Tube	100	59.6	10.3	12.2	11.1	8.3	8.0
A3	Kerbside	Diffusion Tube	100	59.6	19.9	23.4	23.4	15.6	18.9
A4	Kerbside	Diffusion Tube	100	59.6	17.7	16.6	17.9	14.0	12.9
B1	Kerbside	Diffusion Tube	100	35.0	12.3	12.6	12.6	7.8	8.2
B2	Industrial	Diffusion Tube	100	59.6	5.9	7.3	5.6	4.1	4.9
CAR	Roadside	Diffusion Tube	100	59.6	14.4	15.1	14.8	10.3	12.0
FOR	Kerbside	Diffusion Tube	100	59.6	14.9	15.2	14.7	10.0	10.1
F1	Roadside	Diffusion Tube	100	59.6	18.2	19.1	19.0	13.2	13.7
KIR	Roadside	Diffusion Tube	100	59.6	12.0	11.6	10.9	5.5	7.8
M1	Roadside	Diffusion Tube	100	59.6	13.9	13.2	13.9	10.0	10.2
M2	Kerbside	Diffusion Tube	100	59.6	18.2	19.2	18.1	13.1	14.8

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**.

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.

(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%).

Figure A-2. Trend in Annual Mean NO_2 Concentrations

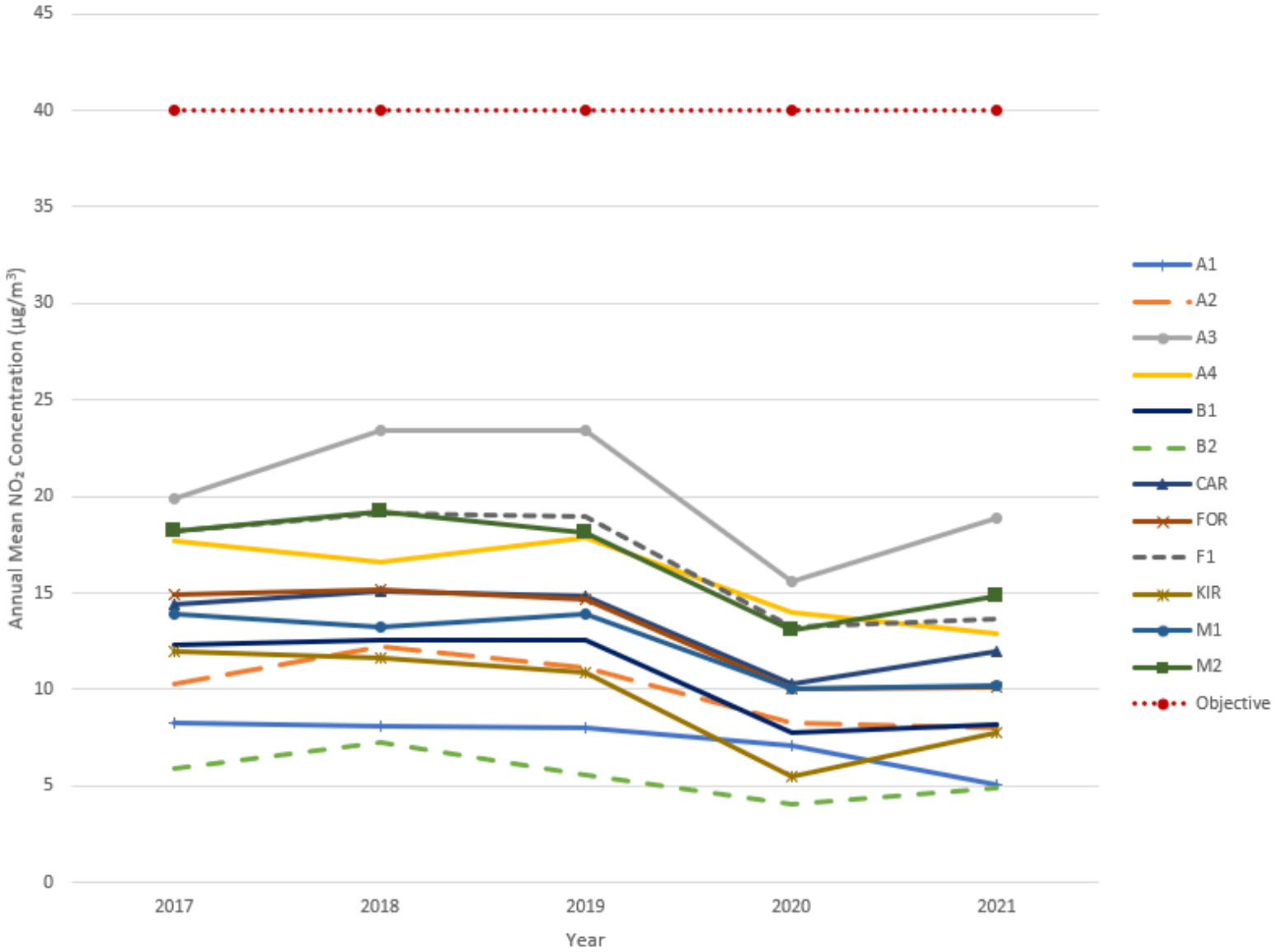


Table A.4 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
-	Kerbside	100	34.3	12.9	12.0	11.8	11.4	10.9
AFR1	Roadside	99.7	56.3	9.9	12.7	12.7	10.0	9.1

Notes:

Exceedances of the PM_{10} annual mean objective of 18 µg/m^3 are shown in bold.

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.

(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%).

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
-	Kerbside	100	34.3	0 (23.5)	0 (23.9)	0 (27.6)	0 (27.0)	0 (27.9)
AFR1	Roadside	99.7	56.3	0	0 (39.5)	0	0 (23.5)	3 (23.7)

Notes:

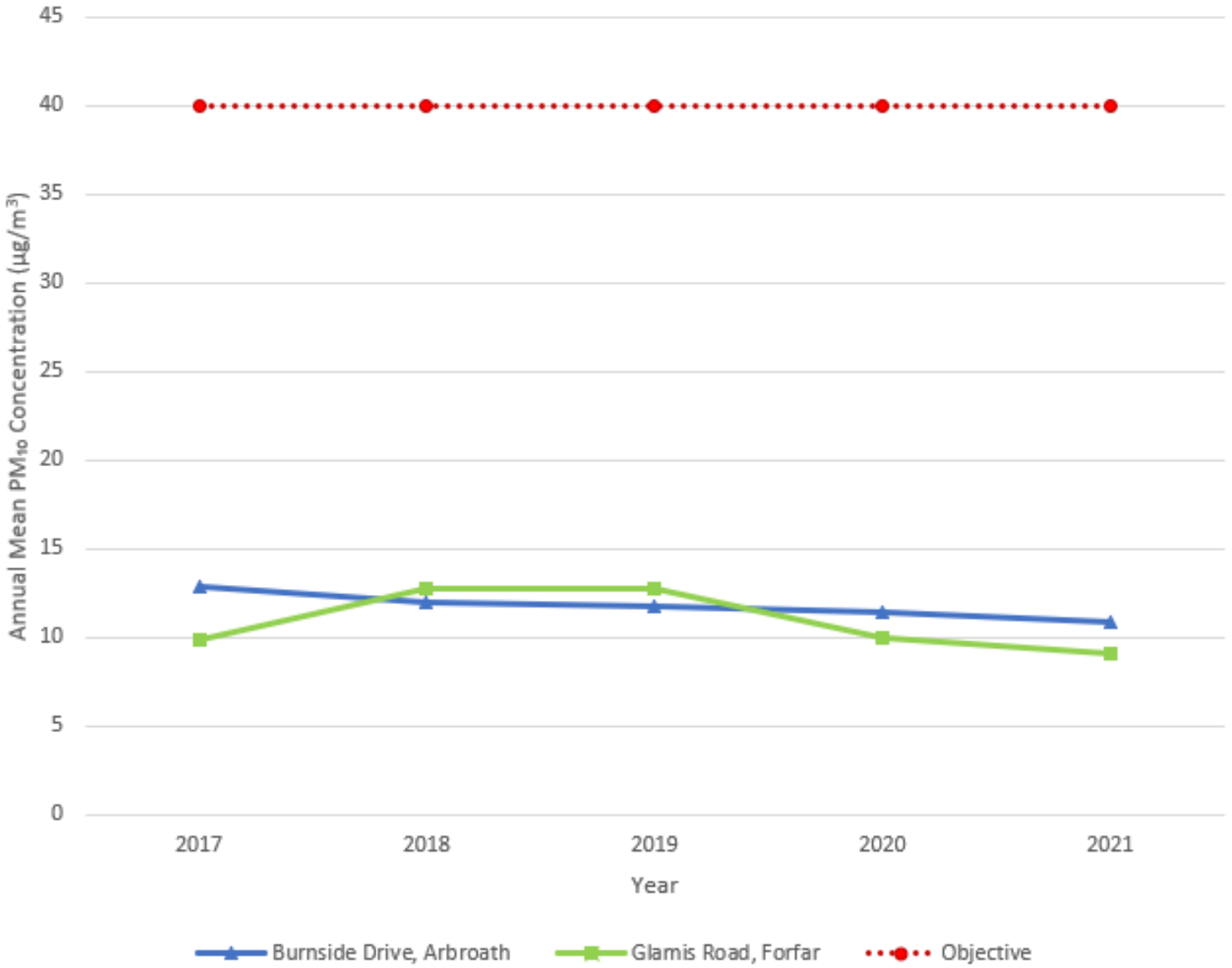
Exceedances of the PM_{10} 24-hour mean objective (50 µg/m^3 not to be exceeded more than seven times/year) are shown in bold.

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

(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%).

Figure A-3. Trend in Annual Mean PM_{10} Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Monthly Diffusion Tube Results ($\mu g/m^3$)

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Bias Adjusted (1)
A1						3.7	4.5	0.5	6.5	10.1	8.1	9.6	6.4	5.5
A2						6.1	7.5	7.0	10.9	13.2	10.3	12.7	9.9	8.5
A3						15.7	16.9	19.3	26.2	32.3	27.2	23.0	23.1	19.8
A4						9.0	10.4	11.3	15.4	22.7	21.8	18.8	15.9	13.6
B1									0.5	14.8	12.2	16.5	11.8	9.4
B2						2.1	3.2	4.0	11.0	7.5	5.4	8.2	6.0	5.1
CAR						9.3	11.1	11.3	11.9	20.4	18.0	19.8	14.9	12.8
FOR						7.0	7.5	8.1	11.7	18.5	14.8	17.9	12.6	10.8
F1						10.7	11.8	13.2	17.1	23.1	18.4	21.6	16.9	14.5
KIR						5.0	0.5	6.6	9.3	16.5	12.5	15.5	9.7	8.3
M1						6.9	8.6	9.8	13.5	16.3	13.4	18.3	12.7	10.9
M2						14.3	11.9	12.5	17.7	27.5	17.8	23.7	18.5	15.8

Notes:

(1) See Appendix C for details on bias adjustment

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

New or Changed Sources Identified Within Angus During 2022

Angus Council has not identified any new sources relating to air quality within the reporting year of 2021.

Additional Air Quality Works Undertaken by Angus During 2022

Angus Council has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

Angus Council deploy diffusion tubes prepared and analysed by Tayside Scientific Services (TSS; 20% TEA in water method). Tubes are changed monthly. Monitoring when performed has been completed in adherence with the 2021 Diffusion Tube Monitoring Calendar. Divergences from the calendar are attributed to the COVID-19 pandemic.

Diffusion Tube Annualisation

All 2021 monitoring data required annualisation. The calculation method undertaken is provided in Table C.2.

Diffusion Tube Bias Adjustment Factors

Angus Council has applied a national bias adjustment factor of 0.77 to the 2021 monitoring data. A summary of bias adjustment factors used by Angus Council over the past five years is presented in Table C.1. The bias adjustment factor is based on one study and has been applied to all 2021 diffusion tube data.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22	0.77
2020	National	03/21	0.80
2019	National	03/20	0.80
2018	National	03/19	0.72
2017	National	03/18	0.82

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Angus required distance correction during 2021.

QA/QC of Automatic Monitoring

The Partisol is a gravimetric reference equivalent PM_{10} analyser. It contains 16 filters that are exposed for 24 hours and allow 2 weeks of 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 methodologies. The samplers are serviced annually by Air Monitors Ltd.

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10} monitor(s) utilised within Angus do not require the application of a correction factor.

Automatic Monitoring Annualisation

The Burnside Drive, Arbroath monitor within Angus recorded data capture of less than 75% and greater than 33%, therefore annualization of monitoring data was required for this location.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Angus required distance correction during 2021.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor Glasgow Townhead	Annualisation Factor Edinburgh St Leonards	Annualisation Factor Auchencorth Moss	Annualisation Factor Bush Estate	Annualisation Factor Fort William	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
Burnside Drive, Arbroath	1.0018	1.0165	0.9271	-	-	0.9818	11.1	10.9	PM_{10}
Glamis Road Forfar	1.0417	1.0367	0.9944	-	-	1.0242	8.9	9.1	PM_{10}
A1	1.0619	-	-	1.1658	0.9891	1.0722	6.1	6.6	NO_2
A2	1.0619	-	-	1.1658	0.9891	1.0722	9.7	10.4	NO_2
A3	1.0619	-	-	1.1658	0.9891	1.0722	22.9	24.6	NO_2
A4	1.0619	-	-	1.1658	0.9891	1.0722	15.6	16.8	NO_2
B1	0.8694	-	-	1.2079	0.8254	0.9676	11.0	10.6	NO_2
B2	1.0619	-	-	1.1658	0.9891	1.0722	5.9	6.3	NO_2
CAR	1.0619	-	-	1.1658	0.9891	1.0722	14.5	15.6	NO_2
FOR	1.0619	-	-	1.1658	0.9891	1.0722	12.2	13.1	NO_2
F1	1.0619	-	-	1.1658	0.9891	1.0722	16.6	17.8	NO_2
KIR	1.0619	-	-	1.1658	0.9891	1.0722	9.4	10.1	NO_2
M1	1.0619	-	-	1.1658	0.9891	1.0722	12.4	13.3	NO_2
M2	1.0619	-	-	1.1658	0.9891	1.0722	17.9	19.2	NO_2

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