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2019 Air Quality Annual Progress Report (APR) for Clackmannanshire 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

This report provides an overview of air quality within Clackmannanshire Council during 2018. It provides a review of pollutant monitoring data and atmospheric emissions sources within Clackmannanshire and compares the available monitoring data to national air quality standards in accordance with the guidance in LAQM.TG (16) Technical Guidance.

Air Quality in Clackmannanshire Council

There are no Air Quality Management Areas in Clackmannanshire Council.

The Council continued to monitor emissions of NO_2, PM_{10} and $PM_{2.5}$ to determine if any air quality objectives were exceeded during 2018.

The Council maintained a network of six passive diffusion tubes to monitor ambient concentrations of NO_2 throughout 2018. All monitored concentrations were found to be below the air quality objectives.

Results for the annual mean concentration of NO_2 from the chemiluminescent monitor at the automatic monitoring station at King Street, have been in the range 22.6-29.3 µg/m^3 over the last five years.

Results from the AQ Mesh pod installed at Hallpark Road in Alloa, have shown an annual mean concentration of 43µg/m^3 for 2018. While the annual mean concentration of NO_2 is above the Air Quality Objective, when distance corrected for relevant exposure at the nearest residential property, the value is reduced to 37.5 µg/m^3.

Results from the FDMS monitor and those from the previous TEOM sampler have shown the annual mean concentration of particulate matter PM_{10} of 11 –17 µg/m^3 over the last five years with an overall downward trend.

Examination of the previous five years of data shows that there was no obvious trend in annual mean NO_2 concentrations across the diffusion tube network.

A review of planning applications submitted in 2018 showed there was one new development likely to result in the generation of significant new traffic on the local road network and hence have the potential to adversely impact on local air quality. A

detailed air quality impact assessment has been requested from the applicant but not yet received. The application is therefore awaiting decision.

Clackmannanshire Council Roads and Transportation confirmed there were no new roads constructed with the potential to result in an exceedance of the AQS objectives. Transport Planning officers have collated data from traffic count sites throughout the area in recent years which is detailed later in this report. Figures were also obtained for vehicular traffic from Transport Scotland for roads within Clackmannanshire in order to give an indication of the growth across the area.

Actions to Improve Air Quality

There are currently no Air Quality Management Areas (AQMAs) or action plans in the Clackmannanshire area, however the annual progress report summarises potential increases in emissions which may adversely affect air quality (like new roads or commercial developments). Where potential air pollution 'hotspots' are considered likely, monitoring will be considered for those areas.

The Council continues to:

- monitor the ambient concentration of $PM_{2.5}$, PM_{10} and NO_2 in the Alloa area, including additional monitoring at Hallpark Road;
- promote sustainable travel alternatives (walking, cycling, and car sharing) through the Local Active Travel Strategy, the promotion of cycle routes, and the introduction of travel plans and cycle/walk to work initiatives and investment in technology to allow video conferencing;
- reduce the number of vehicles in the Council fleet and replace older inefficient vehicles with low emissions alternatives when funding is available (expected 2018/2019);
- promote low emission transport (installation of electric charging points); and
- review and develop policies which impact on air quality.

Local Priorities and Challenges

The Council is committed to continuing the review and assessment of pollutants affecting the air quality in Clackmannanshire. The priority is to continue monitoring

concentrations of NO_2, $PM_{2.5}$ and PM_{10}, and widen the area of coverage of the monitoring network by utilising the AQ Mesh monitor.

Roads and Transportation will continue with plans for the promotion of low emission transport and sustainable travel alternatives as identified in the Local Transport Strategy. Continued consideration to be given to the 'Cleaner Air for Scotland Strategy' and the formation of an officer group to identify any required changes to policy and current working practices in relation to Air Quality across the Council.

How to Get Involved

Improving air quality in Clackmannanshire is not only the responsibility of the Council. There are many ways members of the public, local businesses, logistics companies and transport operators can get involved. Choosing to walk or cycle instead of using the car, car sharing, and buying 'hybrid' or lower emission vehicles will all play a part in reducing pollutant levels in the area. Careful consideration should also be given to the installation/use of biomass systems and domestic wood or multi-fuel stoves as they have the potential to contribute to increased concentrations of gases and particulate matter in the air. Further information on such appliances is available at http://www.clacksweb.org.uk/environment/woodburningstoves/.

The public can engage with the Council's efforts by logging onto the Clacksweb.org.uk website and searching for air quality. Monitoring results for the Clackmannanshire area can be viewed by visiting www.scottishairquality.co.uk and typing in your postcode. On this website, there is also the option to register for air quality alerts using the `Know and Respond' System.

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1. Local Air Quality Management

This report provides an overview of air quality in Clackmannanshire 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 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) is summarises the work being undertaken by Clackmannanshire Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

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

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

Clackmannanshire Council currently does not have any AQMAs. There are no recommendations in this year's report to declare any new AQMAs in the Council area.

2.2 Progress and Impact of Measures to address in Clackmannanshire Council

Clackmannanshire Council has taken forward a number of 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. Key completed measures are:

- Continuous $PM_{2.5}$ / PM_{10} analyser installation – installation at the end of 2017 of a continuous analyser for $PM_{2.5}$ / PM_{10} at King Street, Alloa. The first full year of data recorded by the new analyser is for 2018 and is included in this report.
- Walk Once a Week (WOW) – a programme introduced into schools in the local area to encourage walking into school at least once a week, instead of taking private transport. Pupils record their method of travel to school each week and are awarded a badge if they have walked to school at least once a week for a whole month.
- TripShare Clacks – Clackmannanshire Council continue to encourage staff to car share through their TripShare Clacks website. The council have reported that for 2018 there are 10 active car sharing teams.
- Upgrade of Cycle Paths – The council have completed the upgrade of 3 existing cycle paths in the local area.
- Electric Vehicle Charging Points – The council are planning for a further 11 electric vehicle charging points to be installed in the local area in 2018/2019.

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	Control of new developments	Policy Guidance and development control	Continue to monitor concentrations of pollutants in the Council area	Development and Environment	Ongoing	Ongoing	Monitored emissions	N/A, no AQMAs	Satisfactory	Ongoing New developments will continue to be monitored and where necessary action will be taken	
2	Install a mobile emissions monitor at A908 Hallpark Road, Sauchie where it was identified that traffic levels had increased.	Transport planning and infrastructure	Monitoring of $PM_{2.5}$, PM_{10} and NO_x levels using this equipment.	Development and Environment	Funding has been awarded	Autumn 2017.	Comparison with AQOs	N/A, no AQMAs	Monitoring since June 2017	At least to end of 2019	Annual Mean NO_2 above AQO but distance corrected at nearest receptor is below AQO
3	Environmental Health work closely with other departments of the Council such as roads and transportation, fleet management, development planning, sustainability and planning policy	Policy guidance and development control	Advice set out in the Cleaner Air For Scotland strategy (CAFS)	Development and Environment	Ongoing	Ongoing	None	N/A, no AQMAs	Ongoing upgrades to low emissions vehicles when funding allows and retirement of older stock.	Ongoing	6 new EV vans introduced to remove older vehicles vans, investment in new sweeper fleet, gritters and tipping vehicles in 2018
4	Council provides 5 electric pool cars for use by staff and a further	Promoting low emission transport	Electric car charging points	Development and Environment	Complete	Complete	None	N/A, no AQMAs	Additional vehicles when funding allows	Ongoing	

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
5	Council provides 11 electric charging bays throughout Clackmannan-shire for use by the public.	Promoting low emission transport	Electric car charging points located at Kilncraigs, Greenside Street, Alloa, Dumyat Centre, Menstrie, Murray Square, Tillicoultry, Dollar Community Access Point Office, Dollar, Tron Court, Tullibody and soon Lower Coden Street, Alva	Development and Environment	Complete	Complete	None	N/A, no AQMAs	Complete	Complete for the moment but may increase if funding allows	A further 11 electric charging bays are scheduled to be installed 2018/2019
6	Promotion of walking and cycling. Part of this is the Smarter Choices, Smaller Places initiative which is promoted to the public and introduction of the Walk Once a Week (WOW) initiative into local schools	Alternative to Private vehicle use	Local Active Travel strategy	Development and Environment	Ongoing	Ongoing	None	N/A, no AQMAs	Ongoing	Ongoing	
7	Council utilises the ***TripShare Clacks*** website aimed at reducing congestion and pollution by encouraging staff to car share on journeys to and from work	Promoting travel alternatives	Car sharing	Development and Environment	Ongoing	Ongoing	No of shared journeys/ teams	N/A, no AQMAs	10 Active Car Sharing Teams	Ongoing	

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
8	3 Main cycle routes and paths have been upgraded/ maintained	Promoting travel alternatives		Development and Environment	Ongoing	Ongoing	None	N/A, no AQMAs	Ongoing	Ongoing	
9	Council has invested in technology in an effort to reduce car journeys for meetings	Promoting travel alternatives	Video and telephone conferencing	Information Technology	Ongoing	Ongoing	None	N/A, no AQMAs	Ongoing	Ongoing	
10	Cycle to work scheme for staff is promoted by the Council	Promoting travel alternatives	Cycle to work scheme	Development and Environment (Transportation)	Ongoing	Ongoing	None	N/A, no AQMAs	Ongoing	Ongoing	
11	Install a $PM_{2.5}$/PM_{10} continuous analyser at King Street, Alloa site	Policy Guidance and development control	To obtain data for this statutory pollutant with accredited equipment and analyser	Development and Environment	Complete	Complete	Monitored emissions	N/A, no AQMAs	Installed Dec 17	Ongoing	First full year of monitoring data included in this report

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 https://www.gov.scot/Publications/2015/11/5671/17. Progress by Clackmannanshire 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. Clackmannanshire Council has developed a revised Local Transport Strategy for up to 2019 which has not yet been formally adopted. In the interim period, the existing strategy for 2010-2014 will remain valid for use. Public transport plays an important part in the Council's transport strategy. The Public Transport Unit operates jointly with Stirling Council and will in the future work with Falkirk Council to undertake the assessment of need for public transport services and the provision of appropriate infrastructure. The Council continues to work with "SUSTRANS", "Cycling Scotland" and "Paths for All" to deliver and promote out Active Travel Network.

Clackmannanshire Council operates a trip-share scheme aimed at reducing congestion and pollution by encouraging staff to car share on journeys to and from work. Other initiatives include promotion of the Cycle to Work scheme. The Council web site (https://www.clacks.gov.uk/transport/travelplans/) provides a summary of existing Council Travel Plans and advice to existing businesses and new developments on measures for inclusion in travel plans aimed at reducing journeys by car.

2.3.2 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. Clackmannanshire Council has a Sustainability and Climate Change Strategy (https://www.clacks.gov.uk/document/2858.pdf) which includes replacing vehicles with the latest engine specifications and providing training to reduce fleet

vehicle fuel-use through fuel efficient driver training programmes. Additionally, lighting, heating and other electrical upgrades in council buildings are expected to have led to reduced energy consumption and therefore atmospheric emissions.

Clackmannanshire Council's annual statement report on climate change (https://www.clacks.gov.uk/document/5801.pdf) demonstrates that greenhouse gas emissions reduced from 9493 tCO_2e in 2015/16 to 8844 tCO_2e in 2016/17. The figures are not yet published for 2017/2018.

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

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives. The monitoring undertaken in 2018 was a continuation of the 2017 programme.

3.1 Summary of Monitoring Undertaken at Automatic Monitoring Sites

Clackmannanshire Council undertook automatic (continuous) monitoring at two sites during 2018. Table A.1 in Appendix A shows the details of the sites.

The accredited monitoring station is located on King Street, Alloa on the pavement outside a new residential development. It is a busy road with a pedestrian crossing, supermarket and housing nearby. The location is classified as a “roadside” site. A photograph of the unit is shown in Figure 3.1.

Figure 3.1 – Automatic Monitoring Site - King Street, Alloa

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

The data capture at the site in 2018 was 96.9% for NO_2 and 99.8% for PM_{10} and $PM_{2.5}$. Routine calibrations are carried out by Clackmannanshire Council staff and biannual site audits are carried out by Ricardo AEA. The audit report is reproduced in Appendix A. The 2018 annual mean concentrations were 24 µg/m^3, 11µg/m^3 and 6µg/m^3 for NO_2, PM_{10} and $PM_{2.5}$ respectively. The measured values are significantly below the annual mean Scottish Air Quality Objectives for the respective pollutants (Table 1.1) and there are no predicted exceedances of any of the relevant short-term (1-hour or 24-hour objectives for any pollutant).

Additional automatic monitoring was undertaken on the A908 at Hallpark Road, using a lamppost-mounted AQ Mesh pod supplied by Air Monitors Ltd, as shown in Figure 3.2.

Figure 3.2 – AQ Mesh Unit on Location at Hallpark Road, Alloa

The AQ mesh pod is not a DEFRA accredited/quality assured method of monitoring, but it is able to provide the Council with continuously monitored data demonstrating the effects of diurnal traffic flows and periods of congestion on local air quality and has the benefit of including more pollutants than using a passive diffusion tube.

The AQ Mesh was installed on the A908, Hallpark Road, Alloa in June 2017, and the 6-month period mean concentrations for 2017 were reported in the 2018 Annual Progress Report. The first full year of data collected by the monitor for

2018 is presented in this report. The results show that the 2018 annual mean concentrations were 43 µg/m^3, 6.5µg/m^3 and 3.5µg/m^3 for NO_2, PM_{10} and $PM_{2.5}$ respectively.

While the annual mean concentration of NO_2 is above the AQO, when distance corrected for relevant exposure at the nearest residential properties, the value is reduced to 37.5 µg/m^3.

It is planned to locate a passive diffusion tube next to the nearest sensitive receptor to the AQ Mesh. Given that the annual mean concentration results for the diffusion tube at Norwood Avenue, which was chosen as it was a feeder road to the local primary school which has since been relocated to Redwell Primary School, have consistently been considerably lower than any of the other sites (10 - 15 ug/m^3 over the last 6 years) it is proposed that this DT will be relocated to Hallpark Road. If this indicates an exceedance of the AQO, then a full review will be carried out with a view to relocating the automatic monitoring station from King Street to Hallpark Road as the most cost effective solution of monitoring NO_2, PM_{10} and $PM_{2.5}$ at this location.

3.2 Summary of Monitoring Undertaken at Non-Automatic Monitoring Sites

Clackmannanshire Council undertook non- automatic (passive) monitoring of NO_2 at six sites during 2018. Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	King Street, Alloa	Roadside	288665	693072	NO2, PM10, PM2.5	N	NO2 Chemiluminescent; PM10 & PM2.5 FIDAS	1.22	2.45	2.3
AQ Mesh	Hallpark Road A908	Roadside	289371	693727	NO2, PM10, PM2.5	N	NO2 electrical sensors, PM10 and PM2.5 using optical spectrometry	1.34	2.38	2.68

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT1	Norwood Avenue, Alloa	Kerbside	287588	693546	NO2	N	2	1.7	N
DT2	Clackmannan Road, Alloa	Kerbside	289228	692943	NO2	N	2	2	N
DT3	Bus Station, Alloa	Kerbside	288818	692878	NO2	N	2	1.3	N
DT4	Shillinghill/Bridge Terrace, Alloa	Kerbside	288911	692940	NO2	N	2	1.4	N
DT5	King Street, Alloa	Kerbside	288665	693072	NO2	N	8	2.45	Y
DT6	Auld Brig Road, Alloa	Kerbside	288927	692878	NO2	N	3	1.8	N

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

(2) N/A if not applicable.

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. Trends in annual mean NO_2 concentrations are shown in Figure 3.3 below.

A map showing the locations of all the monitoring sites is provided in Figure 3.4.

Figure 3.3 – Trends in Annual Mean Nitrogen Dioxide (NO_2) Concentrations

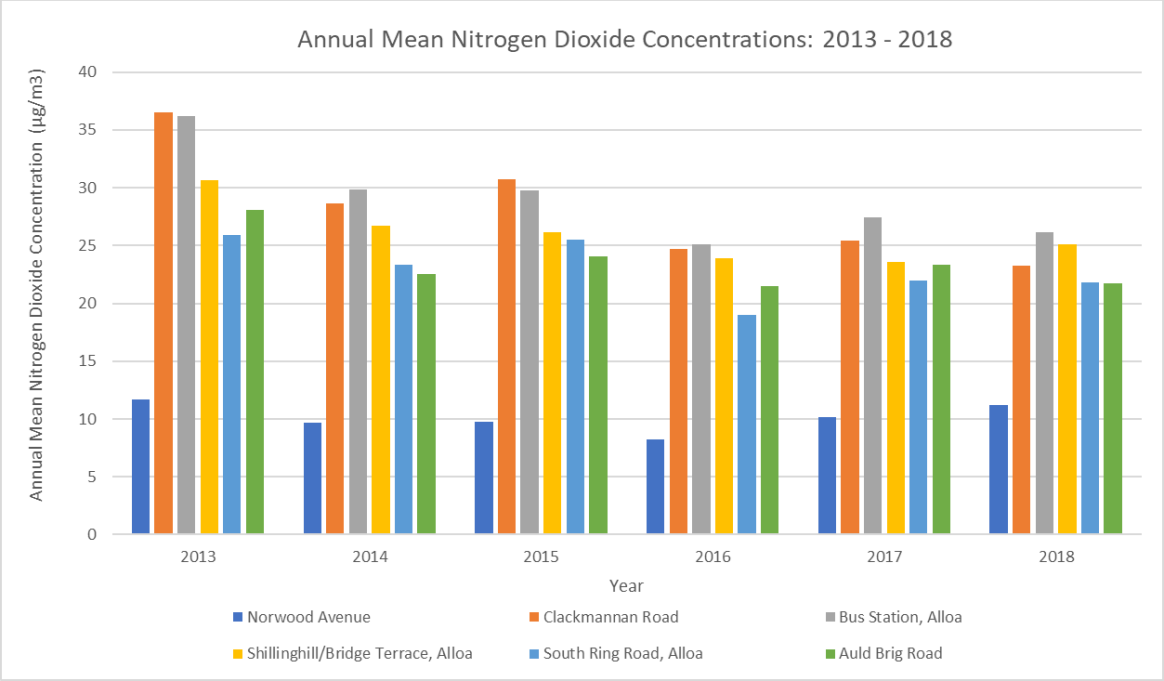
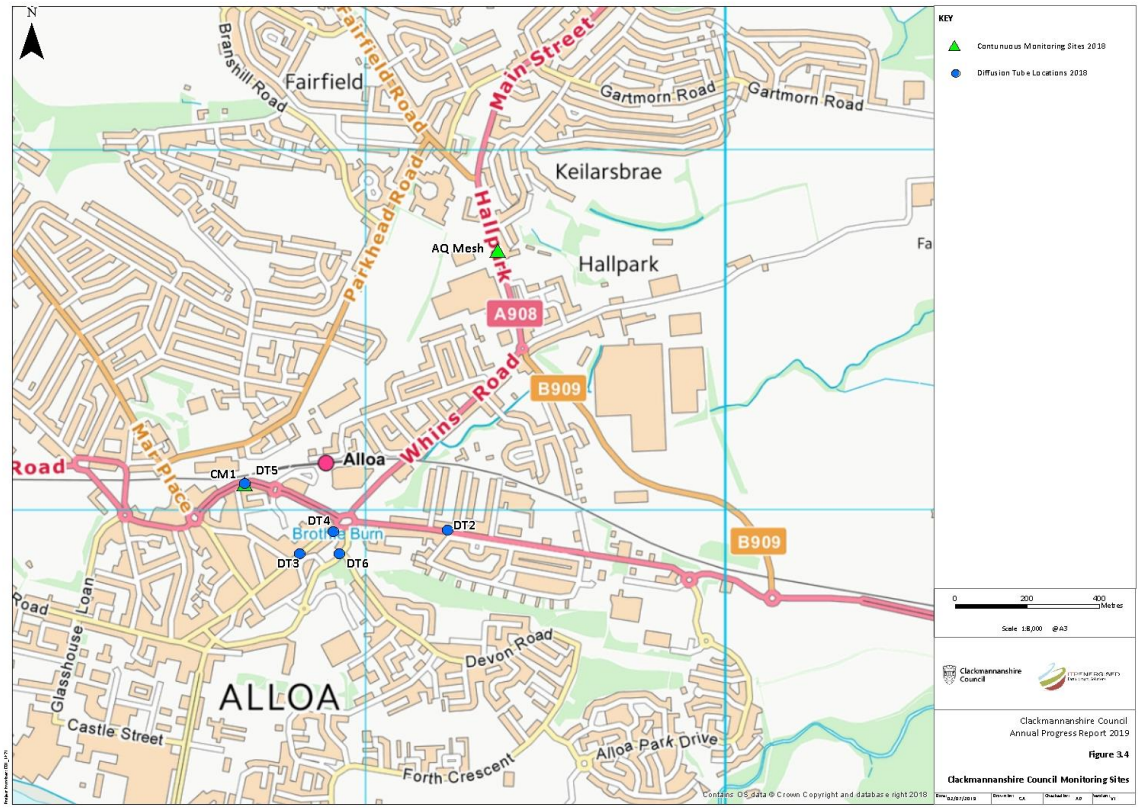


Figure 3.4 – Monitoring Locations



3.3 Individual pollutants

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

3.4.1 Nitrogen Dioxide (NO_2)

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)	NO2 Annual Mean Concentration (µg/m3) (3)				
					2014	2015	2016	2017	2018 (bias=0.92)
CM1	Roadside	Automatic	96.9	96.9	-	28	27.6 (29.3)(4)	22.6	24
AQ Mesh	Roadside	Automatic	100	100	-	-	-	37.3(5)	**43** (37.5)6
DT1	Kerbside	Diffusion Tube	100	100	9.7	9.7	8.2	10.3	11.3
DT2	Kerbside	Diffusion Tube	100	100	26.0	30.8	24.7	25.7	23.4
DT3	Kerbside	Diffusion Tube	100	100	29.8	29.8	25.1	27.7	26.3
DT4	Kerbside	Diffusion Tube	100	100	26.7	26.2	23.9	23.9	25.2
DT5	Kerbside	Diffusion Tube	100	100	23.4	25.5	19 (20)(4)	22.2 (23.2)(4)	21.9
DT6	Kerbside	Diffusion Tube	100	100	22.5	24.1	21.5	23.6	21.8

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.

(4) 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. Annualised data are presented in brackets.

(5) Period Mean for AQ Mesh

(6) Annual Mean for AQ Mesh – Distance Corrected in brackets for closest receptor location.

Table A.4 – 1-Hour Mean NO2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO2 1-Hour Means > 200µg/m3 (3)				
					2014	2015	2016	2017	2018
CM1	Roadside	Automatic	96.3	96.3	-	0 (90)	0 (96)	0 (87)	0
AQ Mesh	Roadside	Automatic	100	100				0 (117)	0

Notes: Exceedances of the NO2 1-hour mean objective (200µg/m3 not to be exceeded more than 18 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 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM10 Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM10 Annual Mean Concentration (µg/m3) (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	99.8	99.8	16	15	13	12	11
AQ Mesh	Roadside	100	100	-	-	-	9.2(3)	6.5

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.

Table A.6 – 24-Hour Mean PM10 Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM10 24-Hour Means > 50µg/m3 (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	99.8	99.8	0	2	3	0	0
AQ Mesh	Roadside	100	100	-	-	-	2	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.

Table A.7 – Annual Mean PM2.5 Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM2.5 Annual Mean Concentration (µg/m3) (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	99.8	99.8	**-**	**-**	**-**	**-**	6
AQ Mesh	Roadside	100	100	-	-	-	3.9	3.5

Notes: Exceedances of the PM10 annual mean objective of 10µg/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.

Table A.8 – Nitrogen Dioxide Drop-Off with Distance Calculator for AQ Mesh Annual Mean Concentration.

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Enter data into the pink cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	2.7	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	5.7	metres
Step 3	**What is the local annual mean background NO2 concentration (in µg/m3)?**	13.9	µg/m3
Step 4	**What is your measured annual mean NO2 concentration (in µg/m3)?**	43	µg/m3
Result	**The predicted annual mean NO2 concentration (in µg/m3) at your receptor**	*37.5*	µg/m3

Toolkit downloaded from https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.
For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

There were no exceedances of the NO_2 annual mean objective in 2018.

Error! Reference source not found. in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There are no exceedances of the hourly mean objective recorded at either of the continuous monitoring sites.

There are no annual means of NO_2 greater than 60µg/m^3 at any diffusion tube sites which would indicate that an exceedance of the 1 hour mean objective is unlikely at these sites.

3.4.2 Particulate Matter (PM_{10})

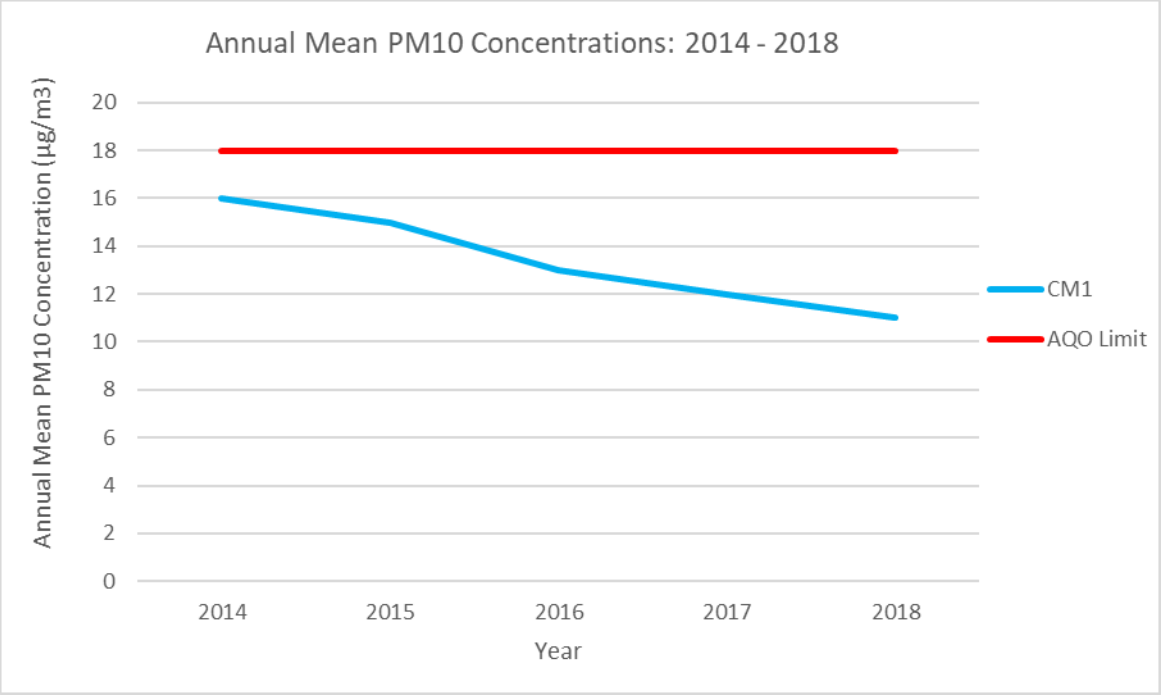
Error! Reference source not found. in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 18µg/m^3.

Figure 3.5 shows the trend in annual mean concentration of PM_{10} for the years 2014 – 2018, at the continuous automatic monitoring site located on King Street, Alloa (CM1). The Figure also displays the Air Quality Objective (AQO) limit of 18µg/m^3 for PM_{10}. The annual mean concentration lies between 16 µg/m^3 and 11µg/m^3 between the years 2014 – 2018.

2018 is the first year for which annual mean data are available, therefore there is no trend analysis for this site. The annual mean concentration of PM_{10} at the AQ Mesh site was significantly below the AQO at 6.5µg/m^3

There have been no exceedances of the annual mean objective for PM_{10} in 2018 at the automatic monitoring sites CM1 or AQ Mesh.

Figure 3.5: Trend in Annual Mean PM_{10} Concentration at King Street



Error! Reference source not found. in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 7 times per year.

There have been no exceedances of the daily mean objective for PM_{10} of 50µg/m^3 at the CM1 King Street or AQ Mesh sites.

No AQMA requires to be declared with regard to PM_{10} levels in Clackmannanshire.

3.4.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is monitored at both automatic monitoring sites (CM1 and AQ Mesh) within Clackmannanshire Council.

Clackmannanshire Council received funding from the Scottish Government to purchase and install a PM_{10} and $PM_{2.5}$ analyser at the King Street, Alloa site. Monitoring with the new analyser began in December 2017. Since the total annual data capture for 2017 by the analyser was very small, 2017 data was not reported in the last APR. The analyser has monitored PM_{10} and $PM_{2.5}$ concentrations for the whole of 2018, and the data is reported in this APR with good data capture.

Error! Reference source not found. in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years with the air quality objective of 10µg/m^3.

There were no exceedances of the annual mean objective for $PM_{2.5}$ at the CM1 King Street or AQ Mesh site.

No AQMA requires to be declared with regard to $PM_{2.5}$ levels in Clackmannanshire.

3.4.4 Sulphur Dioxide (SO_2)

Concentrations of SO2 are not monitored in the Clackmannanshire Council area and there are no immediate plans to do so.

No AQMA currently requires to be declared with regard to SO2 levels in Clackmannanshire.

3.4.5 Carbon Monoxide, Lead and 1,3-Butadiene

Concentrations of carbon monoxide, lead and 1,3-Butadiene are not monitored in the Clackmannanshire Council area and there are no immediate plans to do so.

No AQMA currently requires to be declared with regard to Carbon Monoxide, Lead and 1,3-Butadiene in Clackmannanshire.

4. New Local Developments

The following section has been completed based on consultation with other relevant Council services and departments including Roads & Transportation and Development Control.

4.1 Road Traffic Sources

The Transport Planning Department of Clackmannanshire Council was consulted in order to check if there were any new potential road traffic sources or significantly changed traffic sources within the Council area that could result in exceedances of air quality standards.

In the network of 41 counters operated by the Council in partnership with neighbouring local authorities, data for 2018 were only available for 12 sites. Of these data, 4 could be compared to 2017 values; 2 showed an increase in vehicle movements, and 2 showed a decrease, all changes being less than 10%.

Traffic count figures for 2017 – 2018 are summarised in Table 4.1.

Table 4.1Summary of Traffic Survey Data: 2017 – 2018

Link	Description	Speed limit (mph)	Annual Average Daily Traffic (vehicles per day)		
			2017	2018	% change 2017-2018
00000049	A977 Gartlove (loop)	60	7706	-	
00000287	A907 Blackgrange (loop)	60	21169	-	
00000288	A907 Cambus (loop)	40	-	-	
00000289	A907 Redwell Primary School	20/30	8602	-	
00000292	A907 Ring Road Westbound (loop)	30	11203	-	
00000295	A907 Clackmannan Bypass (loop)	60	-	-	
00000299	A908 Hallpark Road	30	18684	-	
00000300	A908 Fishcross Primary School (loop)	30	-	-	
00000301	A908 Blackfaulds (loop)	40	9213	-	
00000302	A908 Alexandra Street, Devonside (loop)	30	-	-	
00000309	A91 Menstrie Mains (loop)	60	7975	-	
00000311	A91 between Menstrie & Alva (loop)	60	8127	-	
00000314	A91 West of Lower Mill Street, Tillicoultry (loop)	30	6207	-	
00000317	A91 Taits Tomb (loop)	60	5489	-	
00000321	A91 Muckhart (loop)	60	3372	-	
00000501	A977 Blairingone (loop)	60	6232	-	
00000581	B908 Fairfield (loop)	30	7393	-	
00000586	B909 Hilton Road (loop)	40	12002	-	
00000589	B9096 Tullibody Sign (loop)	30	9477	-	
00000590	B9096 Tullibody Road (loop)	30	11902	-	

Link	Description	Speed limit (mph)	Annual Average Daily Traffic (vehicles per day)		
			2017	2018	% change 2017-2018
00000625	B9140 Tullibody Bypass (loop)	60	8357	-	
00000626	B9140 Muirside (loop)	60	9848	-	
00000634	B9140 Sheardale (loop)	60	1870	-	
00001292	A907 Ring Road Eastbound (loop)	30	9790	-	
00005891	B9096 Tullibody Road, Alloa @ Gavins Road	30	-	9079	
58800001	B9096 Alloa Road, Tullibody @ No. 33	30	8890	8565	-3.8%
L1044	Carsebridge Road, Alloa @ No. 8	30	-	730	
75400001	Port Street, Clackmannan @ No. 11	20	1255	1191	-5.4%
10460000	North Street, Clackmannan opp No. 3	20	311	341	8.8%
76600000	Main Street, Clackmannan @ No. 32	20	1130	-	
93500000	South Pilmuir Street,Clackmannan opp No. 29	20	940	948	0.8%
L982	Lochies Road, Clackmannan opp No.26	20	-	-	
L868	Castle Street, Clackmannan @ No.36	20	-	-	
31000001	A91 Main Street, Menstrie @ Petrol Station	30	-	7289	
7660001	Cattlemarket, Clackmannan @ No.34	20	-	1052	
95200000	Beauclerc Street, Alva opp. No.24	20	-	481	
L871	Claremont, Alloa @ No.20	20	-	-	
L302	Alexandria Street, Devonside	30	-	-	
L1048	Birch Grove, Menstrie btw No.5/7	20	-	339	
30300000	Moss Road, Tillicoultry opp No 6/8	30	-	7163	
76700000	Alloa Road, Clackmannan @ No.62 (during bypass closure w/b, 20mph limit in place	20	-	10093	

On consideration of the information relating to traffic count data and from discussions with the roads and transportation department at the Council, it can be confirmed that:

- There are no new narrow congested streets with residential properties close to the kerb;
- There are no new busy streets where people may spend one hour or more close to traffic;
- There are no new roads with a high flow of buses and/or HGV's;
- There are no new junctions;
- There are no new roads constructed or proposed;
- There are no new roads with significantly changed traffic flows.
- There are no new bus or coach stations.

4.2 Other Transport Sources

Clackmannanshire Council can confirm that there are none of the following new or significantly changed transport sources:

- airports;
- locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m;
- locations with a large number of movements of diesel locomotives and potential long-term exposure within 30m; and
- ports for shipping.

There is one train station within the Clackmannanshire Council area at Alloa which has been assessed in previous rounds of Review and Assessment for the potential impact from stationary trains. The electrification of the Stirling/Alloa/Dunblane lines was completed in 2018 and there is no longer any diesel freight utilising this route.

No further assessment of rail emissions was therefore undertaken.

4.3 Industrial Sources

The Scottish Environment Protection Agency, (SEPA) was contacted to obtain up-to-date information on regulated industrial processes within the Clackmannanshire

Council area. They were unaware of any applications or plans for new or increased sources of atmospheric emissions in the Council area.

4.4 Commercial and Domestic Sources

There are no new commercial energy centre installations or Combined Heat and Power (CHP) plants.

Previous reports concluded that there were no areas of domestic solid fuel burning with a density greater than 100 houses within a 500 x 500m area. There have been no new areas of development with significant solid fuel burning and it is therefore not necessary to undertake any further assessment.

The Council has received some complaints regarding smoke from small, domestic wood burning stoves which are investigated on a case-by-case basis. Such installations do not always require planning permission and it is therefore difficult to track their numbers within the Council area. However, it is the intention of Clackmannanshire Council to log all complaints as they become aware of them to monitor density.

New planning applications for combustion sources, including biomass boilers are considered in Section 5.

4.5 New Developments with Fugitive or Uncontrolled Sources

Clackmannanshire Council confirms that there are none of the following new or significantly changed fugitive or uncontrolled sources:

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

5. Planning Applications

The Development Quality section of the Council was consulted with regard to major planning applications during 2018 which might affect air quality.

The applications and outcomes are summarised in Table 5.1.

Table 5.1 – Details of Planning Applications Requiring Air Quality Assessments or Screening Assessments by Clackmannanshire Council

Name of Establishment	Data Submitted by Applicant	Assessment	Outcome
18/00283/PPP Mixed Use Development Comprising Residential, Employment, Commercial and Community Uses, Sports Hall, Sports Pitches And Running Track, Including Associated Landscaping And Supporting Infrastructure On Agricultural Land And Playing Fields | Land South Of Dollar Dollar Clackmannanshire	Application Validated 18th December 2018 – Awaiting Decision	AQ Assessment Requested – There are 70+ objections to the proposals and increased congestion envisaged due to 300+ homes and new school. The Roads & Transportation Department have raised concerns about the assumptions made in the Transport Assessment and SEPA have raised concerns about flood risk.	Not yet received

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

During 2018, Clackmannanshire Council undertook monitoring of NO_2, PM_{10} and $PM_{2.5}$ concentrations at locations detailed in the report. The results indicate that concentrations complied with the air quality objectives.

There are no existing AQMAs within the Council area and based on the monitoring data obtained during 2018, it is concluded that no AQMAs are required to be declared.

6.2 Conclusions relating to New Local Developments

This assessment has been conducted in accordance with the TG(16) Technical Guidance. Updated information has been obtained on road, rail, industrial, domestic and fugitive emission sources and compared to criteria and conditions described in the Guidance.

It was concluded that there are no new local developments that require further assessment.

6.3 Proposed Actions

Clackmannanshire Council will continue monitoring air quality at the current locations and progressing the Actions to Improve Air Quality as outlined in Table 2.2.

Due to the elevated annual mean concentration of NO_2 monitored by the AQ Mesh at Hallpark Road, it is the intention to continue monitoring at this site throughout 2019/2020. It is planned to locate a passive diffusion tube next to the nearest sensitive receptor to the AQ Mesh. Given that the annual mean concentration results for the diffusion tube at Norwood Avenue, which was chosen as it was a feeder road to the local primary school which has since been relocated to Redwell Primary School, have consistently been considerably lower than any of the other sites (10 - 15 ug/m^3 over the last 6 years) it is proposed that this DT will be relocated to Hallpark Road. If this indicates an exceedance of the AQO, then a full review will be carried out with a view to relocating the automatic monitoring station

from King Street to Hallpark Road as the most cost effective solution of monitoring air quality at this location.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	King Street, Alloa	Roadside	288665	693072	NO_2, PM_{10}, $PM_{2.5}$	N	NO_2 Chemiluminescent; PM_{10} & $PM_{2.5}$ FIDAS	1.22	2.45	2.3
AQ Mesh	Hallpark Road A908	Roadside	289371	693727	NO_2, PM_{10}, $PM_{2.5}$	N	NO_2 electrical sensors, PM_{10} and $PM_{2.5}$ using optical spectrometry	1.34	2.38	2.68

(3) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(4) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT1	Norwood Avenue, Alloa	Kerbside	287588	693546	NO_2	N	2	1.7	N
DT2	Clackmannan Road, Alloa	Kerbside	289228	692943	NO_2	N	2	2	N
DT3	Bus Station, Alloa	Kerbside	288818	692878	NO_2	N	2	1.3	N
DT4	Shillinghill/Bridge Terrace, Alloa	Kerbside	288911	692940	NO_2	N	2	1.4	N
DT5	King Street, Alloa	Kerbside	288665	693072	NO_2	N	8	2.45	Y
DT6	Auld Brig Road, Alloa	Kerbside	288927	692878	NO_2	N	3	1.8	N

(3) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(4) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2014	2015	2016	2017	2018 (bias=0.92)
CM1	Roadside	Automatic	96.9	96.9	-	28	27.6 (29.3)(4)	22.6	24
AQ Mesh	Roadside	Automatic	100	100	-	-	-	37.3(5)	**43** (37.5)6
DT1	Kerbside	Diffusion Tube	100	100	9.7	9.7	8.2	10.3	11.3
DT2	Kerbside	Diffusion Tube	100	100	26.0	30.8	24.7	25.7	23.4
DT3	Kerbside	Diffusion Tube	100	100	29.8	29.8	25.1	27.7	26.3
DT4	Kerbside	Diffusion Tube	100	100	26.7	26.2	23.9	23.9	25.2
DT5	Kerbside	Diffusion Tube	100	100	23.4	25.5	19 (20)(4)	22.2 (23.2)(4)	21.9
DT6	Kerbside	Diffusion Tube	100	100	22.5	24.1	21.5	23.6	21.8

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.**

(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.

(4) 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. Annualised data are presented in brackets.

(5) Period Mean for AQ Mesh

(6) Annual Mean for AQ Mesh – Distance Corrected in brackets for closest receptor location.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
CM1	Roadside	Automatic	96.3	96.3	-	0 (90)	0 (96)	0 (87)	0
AQ Mesh	Roadside	Automatic	100	100				0 (117)	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 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 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM_{10} 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
CM1	Roadside	99.8	99.8	16	15	13	12	11
AQ Mesh	Roadside	100	100	-	-	-	9.2(3)	6.5

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

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

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

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

Table A.6 – 24-Hour Mean PM_{10} 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)				
				2014	2015	2016	2017	2018
CM1	Roadside	99.8	99.8	0	2	3	0	0
AQ Mesh	Roadside	100	100	-	-	-	2	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.

Table A.7 – Annual Mean $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	99.8	99.8	**-**	**-**	**-**	**-**	6
AQ Mesh	Roadside	100	100	-	-	-	3.9	3.5

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

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

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

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

Table A.8 – Nitrogen Dioxide Drop-Off with Distance Calculator for AQ Mesh Annual Mean Concentration.

Enter data into the pink cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	2.7	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	5.7	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	13.9	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	43	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	*37.5*	µg/m^3

Toolkit downloaded from https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2018

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)
DT1	18.6	15.2	15.2	10.8	10.1	2.0	8.6	6.6	6.1	6.1	30.7	17.1	12.26	11.3
DT2	39.0	35.4	29.1	21.8	24.3	10.3	17.2	19.0	15.3	17.1	37.0	39.3	25.40	23.4
DT3	43.8	36.6	34.9	31.6	22.5	6.4	24.3	22.9	21.7	24.2	38.6	35.0	28.54	26.3
DT4	43.0	26.9	30.0	27.0	23.5	13.5	19.9	21.4	21.1	25.0	39.0	38.2	27.38	25.2
DT5	34.9	28.4	29.6	23.2	7.2	16.1	19.6	17.4	13.5	22.3	40.7	32.6	23.79	21.89
DT6	32.1	30.4	28.3	23.0	17.9	7.3	16.5	13.4	24.8	18.6	41.8	30.2	23.69	21.8

(1) See Appendix C for details on bias adjustment

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

Factor from local Co-location Studies

There is no co-location study within Clackmannanshire Council.

Diffusion Tube Bias Adjustment Figures

The National bias adjustment factor spreadsheet 03/19 V2 was used to derive the national bias adjustment factor for diffusion tubes analysed by Glasgow Scientific Services during 2018. Using all sites, the factor was found to be 0.86. Using only those with Good Precision, the factor was 0.92. The factor of 0.92 was used in this assessment. See Figure C.1 below.

Figure C.1 Glasgow Scientific Services – National average bias adjustment factor 2018

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/19

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2019

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Glasgow Scientific Services	20% TEA in water	2018	R	East Dunbartonshire Council	9	21	16	26.5%	G	**0.79**
Glasgow Scientific Services	20% TEA in water	2018	R	East Dunbartonshire Council	10	28	27	3.3%	G	**0.97**
Glasgow Scientific Services	20% TEA in water	2018	R	East Dunbartonshire Council	12	31	28	12.9%	P	**0.89**
Glasgow Scientific Services	20% TEA in water	2018	KS	Marylebone Road Intercomparison	12	86	85	1.3%	G	**0.99**
Glasgow Scientific Services	20% TEA in water	2018	KS	Glasgow City Council	12	64	59	7.3%	P	**0.93**
Glasgow Scientific Services	20% TEA in water	2018	R	Glasgow City Council	11	44	34	30.4%	P	**0.77**
Glasgow Scientific Services	20% TEA in water	2018	R	Glasgow City Council	12	32	29	9.8%	P	**0.91**
Glasgow Scientific Services	20% TEA in water	2018	R	Glasgow City Council	10	36	30	20.0%	P	**0.83**
Glasgow Scientific Services	20% TEA in water	2018	UB	Glasgow City Council	11	33	25	31.8%	P	**0.76**
Glasgow Scientific Services	20% TEA in water	2018		**Overall Factor[3] (9 studies)**				**Use**		**0.86**

QA/QC Automatic Monitoring Data

Automatic monitoring of NO_x, PM_{10} and $PM_{2.5}$ is completed within Clackmannanshire Council using Chemiluminescence (NO_x), FDMS (PM_{10}) and FIDAS (PM_{10} and $PM_{2.5}$) analysers. All data is available in real-time, and following data dissemination is ratified by Ricardo Energy and Environment to AURN standards.

The certificates of ratified data are included in Figure C.2.

Figure C.2 Ratified Data from Ricardo Energy and Environment for King Street Alloa

Air Pollution Report

1st January to 31st December 2018

Air Quality in Scotland

Alloa A907 (Site ID: ALO2)

These data have been fully ratified

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

Pollutant	NO µg/m³	NO_2 µg/m³	NO_x as NO_2 µg/m³	PM_{10} µg/m³	$PM_{2.5}$ µg/m³
Number Days Low	-	355	-	365	365
Number Days Moderate	-	0	-	0	0
Number Days High	-	0	-	0	0
Number Days Very High	-	0	-	0	0
Max Daily Mean	92	54	188	37	22
Annual Max	354	100	633	162	64
Annual Mean	17	24	49	11	6
98th Percentile of daily mean	-	-	-	26	-
90th Percentile of daily mean	-	-	-	19	-
99.8th Percentile of hourly mean	-	85	-	-	-
98th Percentile of hourly mean	92	64	200	33	22
95th Percentile of hourly mean	57	55	143	27	16
50th Percentile of hourly mean	9	20	34	9	5
% Annual data capture	**96.93%**	**96.86%**	**96.86%**	**99.81%**	**99.81%**

Instruments: PM_{10}: FIDAS

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO_X mass units are NO_X as NO_2 µg m-3

Note: For a strict comparison against the objectives there must be a data capture of 85% or greater throughout the calendar year.

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Pollutant	Air Quality Standards (Scotland) Regulations 2010	Exceedances	Days
PM10 particulate matter (Hourly measured)	daily mean > 50 microgrammes per metre cubed	0	0
PM10 particulate matter (Hourly measured)	Annual mean > 18 microgrammes per metre cubed	0	-
PM2.5 particulate matter (Hourly measured)	Annual mean > 12 microgrammes per metre cubed	0	-
Nitrogen dioxide	Hourly Mean > 200 microgrammes per metre cubed	0	0
Nitrogen dioxide	Annual Mean > 40 microgrammes per metre cubed	0	-

QA/QC of Diffusion Tube Data

The diffusion tubes for the year 2018 were supplied and analysed by GSS, the tubes were prepared using the 20% TEA in water preparation method. All results have been bias adjusted and annualised (where required). GSS is a UKAS accredited laboratory and participates in the AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre.

The latest AIR-PT results were as follows:

- AIR-PT AR023 (September to October 2018) – 100%
- AIR-PT AR024 (January to February 2018) – 100%
- AIR-PT AR025 (April to May 2018) – 100%
- AIR-PT AR027 (July to August 2018) – 50%
- AIR-PT AR028 (September to October 2018) – 100%
- AIR-PT AR030 (January to February 2019) – 100%

Over a rolling five round AIR-PT window, it is expected that 95% of laboratory results should be ≤+2. If this percentage is substantially lower than 95% for a particular

laboratory, within this five round window, then one can conclude that the laboratory in question may have sources of error within their analytical procedure.

For the latest five round window 92% of GSS results were ≤+2 therefore the diffusion tube performance over this period has been assessed satisfactory.

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

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6. 2014 Air Quality Progress Report for Clackmannanshire Council, TSI Scotland Limited, TSI/CLA.005-04-01, April 2014
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