



Clackmannanshire Council

Annual Progress Report 2024

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Annual Progress Report (APR)



Clackmannanshire Council



2024 Air Quality Annual Progress Report (APR) for Clackmannanshire Council

In fulfilment of Part IV of the Environment Act 1995, as amended by the Environment Act 2021

Local Air Quality Management

June 2024

Clackmannanshire Council

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Executive Summary: Air Quality in Our Area

This report provides an overview of air quality within Clackmannanshire during 2023. This is done by reviewing the latest pollutant monitoring data for NO₂, PM₁₀ and PM_{2.5} and comparing the results to the national air quality objectives in accordance with the guidance in LAQM TG(22).

Air Quality in Clackmannanshire

The air quality in Clackmannanshire is generally good owing to the large amounts of rural land that dominate the area. This is supported by the most recent monitoring data (2023) which indicated NO₂, PM₁₀ and PM_{2.5} concentrations below the relevant air quality objectives. Over the last five years, there have been no exceedances of any relevant air quality objective at any monitoring site, demonstrating the good air quality that Clackmannanshire has continued to experience.

During 2023, Clackmannanshire Council continued to monitor concentrations of NO₂ through a network of six passive diffusion tubes and one automatic analyser. The concentrations of PM₁₀ and PM_{2.5} were also measured by this automatic analyser during 2023.

Across the diffusion tube network, all sites reported an annual mean NO₂ concentration below the air quality objective of 40 µg/m³, with a maximum concentration in 2023 of 14.2 µg/m³. This maximum concentration is a decrease from the maximum concentration recorded in the previous reporting year (16.1 µg/m³), indicating a decrease in the concentration of NO₂. Across all six diffusion tube sites, the monitored NO₂ concentration in 2023 was lower than in 2022. At the automatic monitoring station, the NO₂ annual mean concentration in 2023 was 13.5 µg/m³, which is a reduction from that recorded in the previous reporting year (14.8 µg/m³). The NO₂ annual mean concentration at this automatic monitoring site has decreasing annually over the past 5-years.

For PM₁₀ and PM_{2.5}, the automatic monitoring site recorded an annual mean concentration of 9.4 µg/m³ and 5.6 µg/m³, respectively during 2023. The annual mean objectives were therefore not exceeded for both PM₁₀ and PM_{2.5}. The PM₁₀ daily objective (50 µg/m³) was also not exceeded, with a maximum 24-hour mean concentration recorded of 31.7 µg/m³.

Actions to Improve Air Quality

As Clackmannanshire Council have not declared an Air Quality Management Area due to concentrations being continually below the air quality objectives, there is no specific Air Quality Action Plan within Clackmannanshire. However, Clackmannanshire Council continue to take the following measures to ensure that air quality is further improved:

- Monitor concentrations of NO₂ via a passive diffusion tube network and automatically via a continuous analyser on King Street, Alloa. Concentrations of PM₁₀ and PM_{2.5} are also recorded by this automatic monitoring station. Clackmannanshire Council also continue to deploy an 'AQ Mesh Pod' which measures concentrations of NO₂, PM₁₀ and PM_{2.5}, which is used to identify any potential 'hotspot' areas. During 2023, this was situated on Hallpark Road (A908).
- Promote sustainable travel alternatives (i.e. walking and cycling) through the development of cycle routes, travel plans and cycle/walk to work initiatives. Clackmannanshire Council have also introduced a number of quiet/safer streets, to make sustainable forms of travel more desirable (i.e. cycling without the congestion of vehicles on the road).
- Decrease emissions from vehicles by reducing the number of polluting vehicles in Clackmannanshire Council's fleet and replacing older inefficient vehicles with low emission alternatives.
- Facilitate the update of low emission transport through the installation of EV charging points. At present, there are 36 EV charging points installed across Clackmannanshire and it is the aim to have at least one charging point in every community.
- Participate in initiatives that have a positive impact on air quality, such as School Streets, the 'Wee Walk, Wee Cycle the Wee County' campaign, and Clean Air Day.

Local Priorities and Challenges

A key priority for Clackmannanshire Council is to continue to review the latest monitoring data for the primary pollutants of concern (NO₂, PM₁₀ and PM_{2.5}), by maintaining both the passive and automatic monitoring networks. Clackmannanshire Council also have the ability to widen the area of coverage from year-to-year by utilising the portable 'AQ Mesh Pod' to identify any potential 'hotspot' areas; however, during 2024 this is to remain in the same place as during 2023 (Hallpark Road – A908).

Another key priority for Clackmannanshire Council is to continue with plans to promote low emission transport and sustainable travel alternatives, which are outlined throughout this report. Consideration is also to be given to the newly developed strategy 'Clean Air for Scotland 2', that replaces the old strategy that was established in 2015.

How to Get Involved

Improving air quality in Clackmannanshire requires a collective effort beyond those of the Council, including the involvement of local businesses, members of the public, logistics companies and transport operators. For example, choosing to walk or cycle instead of using the car, car sharing where possible and opting to buy a hybrid or lower emission vehicle will all play a part in reducing the pollution levels within Clackmannanshire.

It is also important that individuals make informed decisions about the installation and use of biomass boiler systems and domestic wood or multi-fire 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 on Clackmannanshire Council's website at: <https://www.clacks.gov.uk/environment/woodburningstoves/>.

There are multiple ways through which members of the public can actively engage with the topic of air quality within Clackmannanshire. For example, the public can engage with Clackmannanshire Council's efforts by visiting the Council's dedicated air quality website (<https://www.clacks.gov.uk/environment/airquality/>).

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1 Local Air Quality Management

This report provides an overview of air quality in Clackmannanshire during 2023. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), 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 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 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

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 publish and implement an Air Quality Action Plan (AQAP) within the shortest possible time and no later than 12 months of the date of AQMA Designation Order. The AQAP must set out measures the local authority intends to put in place in pursuit of the objectives within the shortest possible time. Measures should be provided with milestones and a final date for completion. The action plan itself should have a timescale for completion and for revocation of the AQMA. Where measures to reduce air pollution may require a longer timescale an action plan shall be reviewed and republished within five years of initial publication and then five-yearly thereafter.

Clackmannanshire Council currently does not have any AQMAs. Based on the monitoring data, there are also no recommendations in the 2023 APR to declare a new AQMA.

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

2.2.1 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.

[National Planning Framework 4 \(NPF4\)](#), the national spatial strategy for Scotland, makes reference to air quality in various policies, notably Policy 23 ('Health and Safety') and Annex D ('Six Qualities of Successful Places'). The next 'Local Development Plan' (LDP) to be adopted by Clackmannanshire Council will be developed so that these policies are incorporated to ensure that the NPF4 Outcome B ('Improving the Health and Wellbeing of People Living in Scotland') is achieved.

The land use planning system is an important tool to improve air quality in the longer term and ensure existing air quality does not deteriorate in the short term due to development protocols. [Clackmannanshire Council's LDP \(adopted August 2015\)](#) seeks to help Clackmannanshire to transition to a vibrant, low carbon economy whilst maintaining the delivery of a high quality of life. One of its strategic objectives is to deliver environmental sustainability, including by managing and reducing pollution to contribute to the improvement of air quality. LDP Policy EA11 ('Environmental Quality') requires developers to demonstrate how any potential environmental impacts, in particular air pollution, can be avoided or satisfactorily mitigated. The LDP position informs the Planning Service's negotiations with developers about applications for planning permission, including those for larger residential and commercial developments where the potential impact on air quality is likely to be more significant. This process includes consultation with the Environmental Health Service and the Scottish Environmental Protection Agency (SEPA) to help identify and address pollution issues. This ranges from site selection to help reduce the need to travel, ensuring the provision of infrastructure to encourage and support sustainable modes of transport, to requiring air quality impact assessments to be submitted (where appropriate).

Clackmannanshire Council have started the review of the existing LDP that was originally adopted in August 2015. As part of the review, Clackmannanshire Council are required to consider NPF4, which is the Scottish Government's strategy for Scotland's long term spatial development and includes national planning policies, as well as any 'Regional Spatial Strategy' for the area and any 'Local Plan Plans' which may have been prepared. The new LDP is due to be adopted in early 2027, with consultation with the relevant authorities starting in 2023 and continuing to progress throughout 2024.

2.2.2 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.

Clackmannanshire Council have no LEZ established within the Local Authority area, and there are no current plans for a LEZ to be declared within Clackmannanshire. However, if the measured concentrations start to demonstrate an increase trend, or if there is an unacceptable rise in the number of exceedances of the permitted levels, then the possibility of a LEZ will be explored further by Clackmannanshire Council.

2.3 Implementation of Measures to Address Air Quality

Defra's appraisal of last year's ASR concluded:

1. The report confirms Clackmannanshire Council continues to enjoy good air quality, with no exceedances of the relevant air quality objectives. Therefore, there is no requirement for any AQMAs or a formal AQAP.
 - The 2023 monitoring data demonstrates concentrations to be below the air quality objectives for NO₂, PM₁₀ and PM_{2.5}. However, although no formal AQAP is required, Clackmannanshire Council continue to take measures to ensure that the current concentrations remain significantly below the air quality objectives.
2. Trends have been discussed with a robust comparison to air quality objectives. Graphs displaying monitoring data has been included which aids in interpretation. Concentrations generally show a decreasing or stable trend since 2018.
 - The 2023 annual mean concentrations for NO₂ are lower than in 2022 across all diffusion tube sites and at the automatic monitoring site. Concentrations of PM₁₀ and PM_{2.5} are also lower in 2023, demonstrating the continuing trend of decreasing pollutant concentrations within Clackmannanshire.
3. The Council have 6 measures designed to improve air quality, despite having no AQMA or formal AQAP. Progress has been made in 2022 with priorities for the upcoming year highlighted. The Council should continue their work on progressing these actions.
 - Additional measures have been added throughout the current reporting year to further reduce the concentration of pollutants across Clackmannanshire.
4. The Council have included comments from last year's appraisal and responded to them. This is welcomed.

- Appraisal comments of the 2022 APR have been addressed in this report.
5. QA/QC procedures applied to the monitoring data are robust, with sufficient discussion in the appendix. A national bias adjustment factor has been suitably calculated and applied to diffusion tube monitoring data.
 - Reasoning is provided in this report for the choice of bias adjustment factor, and explanations around using this factor in relation to adjustment factors used in previous reporting years.
 6. QA/QC information for the automatic monitor is limited in Appendix C, for example details on calibration and audit of the monitor is not provided.
 - Information on the frequency of calibrations, audits and services is provided in Appendix C of this report.
 7. Diffusion tubes were overexposed for December 2022, and thus data from this month had to be excluded. It is not this has not meant annualisation was required, but the Council is reminded to following the Defra Diffusion Tube calendar where possible.
 - With the exception of the January tubes (which were overexposed December tubes from 2022), the national calendar was followed in 2023 (± 2 days).
 8. A map of monitoring locations has been provided, which is welcomed. It appears all the Council's monitoring sites are within close proximity, within the main town of Alloa. It would be beneficial to also include a smaller scale map which shows the entire Council boundary for context.
 - A map showing the location of the monitoring stations in relation to the entire Council boundary has been included in Appendix A.
 9. The Council have summarised major planning applications submitted in 2022 which may have the potential for a negative impact on air quality. This is a useful summary; however it could be improved by providing more discussion on the air quality assessment conclusions and any decisions made as they relate to air quality. For example, there are a couple of applications which have been noted for dust generation, but is it not clear if this has been assessed or mitigated for.
 - The 2023 planning applications which have the potential to impact air quality are listed within this report, with reference made to the element of the application that is relevant with regards to air quality.

Clackmannanshire Council have taken forward a number of measures during the current reporting year of 2023 in pursuit of improving local air quality. These include:

- **School Streets:** Clackmannanshire Council continue to participate in initiatives which have a positive impact on air quality, such as the UK wide ‘School Streets’ scheme. The ‘School Streets’ within Clackmannanshire were originally developed to meet one of the main priorities identified in the Community Plan (Theme 3: Parking, Roads and Transport). However, this initiative had an inadvertent positive impact on air quality. The ‘School Street’ that is currently in place in Clackmannanshire is around Clackmannan Primary School, with temporary road closures in place from 8:30 – 9:10 am and 2:50 – 3:20 pm on Lochies Road, Castle Terrace, Garden Terrace and Bruce Street. Restricting vehicle access along these roads during the morning drop-off and afternoon pick-up is intended to reduce exposure to vehicle emissions during what would otherwise be a busy period of vehicle activity.
- **School Travel Plans:** All schools within Clackmannanshire are required to produce a ‘School Travel Plan’ to consider all of the issues including safety and health relevant to journeys to and from the school.
- **Cycling and Safer Streets:** Clackmannanshire Council continue to encourage and promote the opportunity to travel in a healthy, congestion free and non-polluting way. This is done by improving paths and reducing speed limits on residential streets around schools to make cycling to school easier and, more importantly, safer. A new cycle path has been developed between Menstrie and Alva. There are also a number of new and upgraded cycle routes such as the NCN 767 from Alloa to Tillicoultry and the NCN 768 from Tullibody to Menstrie. All Primary 5 pupils are provided with ‘Bikeability’ Training, with funding provided to schools to provide helmets and jackets to encourage cycling even in bad weather. Primary schools in Clackmannanshire also participate in the ‘Living Streets’ initiative where trackers monitor how pupils travel to school. Primarily school pupils digitally record their mode of transport to school upon arrival.
- **Safer / Quieter Streets:** Clackmannanshire Council have introduced a number of quiet streets that are walking and cycling friendly to encourage more sustainable travel behaviour. This initiative promotes links within local communities for cyclists to avoid the busier routes. These streets are relatively light on vehicle traffic, benefit from 20 mph speed limits and may be traffic calmed. These specific streets are sign posted and provide links to our local off road and national cycle network routes.
- **Safer Footways for Pedestrians:** Walking is a means of simultaneously improving the environment as well as an individual’s health. Clackmannanshire Council are therefore encouraging residents to report obstructions on pavements such as

wheelie bins, parked vehicles and shop displays to ensure there are no hindrances to people wishing to walk. As a primary method of travel for many residents, the Council will take actions where obstructions are not removed following a request to do so and will remove obstructions and recover costs from the offender. There is currently a 'Wee Walk, Wee Cycle the Wee County' campaign that aims to get more people walking and cycling for local journeys and for commuting. This campaign is focussed on promoting the Council's walking and cycling network. The Council are also promoting a range of activities including family cycling and walking events, and new and improve network sign posting to encourage more active travel.

- **Planning Developments:** The Roads, Traffic and Transportation Service review planning developments and, where possible, will promote and request active travel plans for such developments. This includes consideration of safer routes to schools, walking and cycling routes, recreational paths, and links to public transport.
- **Cycle to Work Scheme:** Clackmannanshire Council continue to participate in the 'Cycle to Work' scheme, where employees can lease a bike over 12 months. Although the employee pays a fee, the incentive of the scheme is that money will be saved overall by not paying income tax or national insurance on the amount by which their gross salary is reduced. The Council currently own 11 bikes as an alternative mode of transport, to help reduce the Council's environmental impact. These are promoted for use on short journeys of up to 3 miles (i.e. 20 minutes).
- **Electric Vehicles:** Clackmannanshire Council continue to promote the uptake of EVs by increasing the amount of EV charging points. There are currently 36 Council owned publicly available EV charging points within Clackmannanshire, with the aim to have at least one public charging point in every community. There is currently one EV charging point awaiting commissioning in Craigleith, Fishcross. One EV charging point has been transferred to private ownership by a public body.

More details on these measures can be found in Table 2.1.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Expected/Actual Completion year	Measure Status	Funding Status	Key Milestones	Progress	Barriers to implementation
1	Electrical Vehicle Charing Points	Promoting Low Emission Transport	2024	Ongoing	Fully Funded (Transport Scotland)	36 EV charging points installed	Construction of infrastructure underway in Sauchie, Fishcross and Alloa.	Funding
2	School Streets	Promoting Travel Alternatives	Ongoing	Ongoing	Not Funded	School Street in place around Clackmannan Primary School	School Street effective from 8:30 – 9:10 am / 2:50 – 3:20 pm.	-
3	Control of New Builds	Policy Guidance and Development Control	Ongoing	Ongoing	Not Funded	Air Quality included in LDP	Any new development will be monitored and necessary action taken.	-
4	Cycle to Work Scheme	Promoting Travel Alternatives	Ongoing	Ongoing	Fully Funded (Salary Sacrifice)	Number of member of the scheme.	23 members of the 'Cycle to Work' scheme.	-
5	Cycling and Safer Streets	Promoting Travel Alternatives	Ongoing	Ongoing	Not Funded	Number of pupils cycling to school.	New cycle path developed between Menstrie and Alva.	-
6	Safer Footways for Pedestrians	Promoting Travel Alternatives	Ongoing	Ongoing	Not Funded	Number of obstructions reported.	The 'Wee Walk, Wee Cycle the Wee County' campaign.	-
7	School Travel Plans	Promoting Travel Alternatives	Ongoing	Ongoing	Not Funded	Number of schools with travel plans.	Increased awareness of air pollution.	-

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

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

3.1.1 Automatic Monitoring Sites

Clackmannanshire Council undertook automatic (continuous) monitoring at one site during 2023, to measure NO₂, PM₁₀ and PM_{2.5}. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at <https://www.scottishairquality.scot/>. Maps showing the location of the monitoring sites are provided in Appendix A. 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

Clackmannanshire Council undertook non-automatic (passive) monitoring of NO₂ at six sites during 2023. This is the same number of sites as in the previous reporting year, with no changes to the diffusion tube network (i.e. positioning of tubes) reported in 2023. It should however be noted that the January diffusion tube data has been omitted from the annual data analysis in 2023 as the diffusion tubes were overexposed. Table A.2 in Appendix A shows the details of the sites. Maps showing the location of the monitoring sites are provided in Appendix A. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.1.3 Other Monitoring Activities

Clackmannanshire Council also continued to deploy an 'AQ Mesh Pod' during 2023, to monitor concentrations of NO₂, PM₁₀ and PM_{2.5}. This type of low-cost sensor should not be relied upon for reporting compliance against the air quality objectives. As such, the data from the 'AQ Mesh Pod' is not referenced throughout this report and is instead presented

in Appendix D. Further information on low-cost sensors is available on the LAQM website via FAQ 140 (<https://laqm.defra.gov.uk/faqs/faq140/>).

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in Appendix A compares the ratified monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40 µg/m³ at automatic monitoring sites.

In 2023, the automatic monitoring station on King Street, Alloa (CM1) recorded an NO₂ annual mean concentration of 13.5 µg/m³. This is a reduction from that recorded in the previous reporting year (14.8 µg/m³) and is part of a wider trend of decreasing NO₂ concentrations. For example, the NO₂ annual mean concentration reported at this monitoring station has continued to show year-on-year decreases throughout 2019 – 2023.

Table A.4 in Appendix A compares the adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40 µg/m³ at non-automatic monitoring sites.

In 2023, there were no exceedances of the NO₂ annual mean objective, with the maximum reported concentration being 14.2 µg/m³ (Site ID: DT3). This is a different site to where the maximum concentration was recorded in the previous reporting year (Site ID: DT4), but is still situated along the same one-way road (Shillinghill). The maximum concentration in 2022 was 16.1 µg/m³, indicating a decrease in NO₂ concentrations. Indeed, across the diffusion tube network, the concentration in 2023 was lower than in 2022 at all six sites, demonstrating the continuing improvement in air quality across Clackmannanshire.

For diffusion tubes, the full 2023 dataset of monthly values is provided in Appendix B.

Table A.5 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past five years with the air quality objective of 200 µg/m³, not to be exceeded more than 18 times per year.

In 2023, there was only one occasion where the NO₂ hourly mean concentration was above 200 µg/m³, with a concentration of 411.6 µg/m³ reported on the 27th December, at 17:00. There was no known cause for this, however there were no reported incidents that may have contributed to this raised concentration. However, this is below the 18 times that is permissible under the objective. As no single diffusion tube recorded an annual mean NO₂ concentration greater than 60 µg/m³, in line with the guidance in TG(22), it can be assumed that the NO₂ hourly objective is unlikely to have been exceeded at any diffusion tube site across Clackmannanshire in 2023.

As a result of both the automatic monitoring station and the passive diffusion tube network recording NO₂ concentrations below the annual and hourly objectives, no AQMA has been declared for NO₂ within Clackmannanshire.

3.2.2 Particulate Matter (PM₁₀)

Table A.6 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past five years with the air quality objective of 18 µg/m³.

In 2023, the PM₁₀ annual mean objective was not exceeded at the automatic monitoring station (CM1), with a concentration of 9.4 µg/m³ being recorded. In comparison to the previous reporting year, this is a decrease of 1.8 µg/m³ from 11.2 µg/m³ in 2022.

Table A.7 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past five years with the air quality objective of 50 µg/m³, not to be exceeded more than seven times per year.

In 2023, the PM₁₀ daily mean objective of 50 µg/m³ was not exceeded on any occasion, with the maximum 24-hour mean concentration recorded of 31.7 µg/m³. This was recorded on the 14th February 2023.

As a result of the automatic monitoring station recording PM₁₀ concentrations below the annual and daily objectives, no AQMA has been declared for PM₁₀ in Clackmannanshire.

3.2.3 Particulate Matter (PM_{2.5})

Table A.8 in Appendix A compares the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past five years with the air quality objective of 10 µg/m³.

In 2023, the PM_{2.5} annual mean objective was not exceeded at the automatic monitoring station (CM1), with a concentration of 5.6 µg/m³ being recorded. In comparison to the previous reporting year, this is a slight decrease from the 6.4 µg/m³ recorded in 2022. However, across the last five years (2019 – 2023), this concentration is part of a wider trend of annual concentrations being relatively stable at approximately 5 – 6 µg/m³.

4 New Local Developments

This section has been completed based on consultation with other relevant services and departments within Clackmannanshire Council, including 'Roads & Transportation' and 'Development Control'.

4.1 Road Traffic Sources

Consultation with the 'Transport Planning Department' of Clackmannanshire Council was undertaken to confirm if there were any new sources or significantly changed traffic sources within the area that could result in a likely exceedance of the air quality objectives. It was however confirmed that in 2023 no new roads were either introduced or significantly modified within Clackmannanshire which would have an impact on air quality.

In order to reduce emissions from road transport, Clackmannanshire Council continue to be committed to expanding the network of EV charging points. Currently, there are 36 Council owned publicly available EV charging points within Clackmannanshire, with the aim to have at least one public charging point in every community.

Clackmannanshire Council's vehicle fleet is comprised of 28 EVs, of which 22 are small vans and six are cars. In 2023, Clackmannanshire Council planned to replace further vehicles to expand the amount of EVs in the fleet. However, due to capital budget cuts for 2023, amendments had to be made to the planned vehicle replacements. In total, 12 vehicles were replaced and were procured with the higher euro emissions standards.

Clackmannanshire Council also introduced a tariff for the use of EV charging infrastructure on 1st July 2023. This tariff allows Clackmannanshire Council to cover the operating costs of the network, and allows residents with no on-street charging to get a 10% discount. The introduction of EV vehicles into the Council's fleet and the expansion of EV charging points demonstrates the continued commitment to reducing emissions from road traffic sources.

4.2 Other Transport Sources

During 2023, there has been no new or significantly changed transport sources within the following categories:

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

4.3 Industrial Sources

During 2023, there were no new industrial sources (either proposed or installed) within Clackmannanshire which may have a negative effect on local air quality.

4.4 Commercial and Domestic Sources

Clackmannanshire Council's Environmental Health and Planning Departments were consulted on any new commercial and domestic emission sources within the area which may have a negative effect on local air quality.

Commercial Emission Sources:

During 2023, there were no new commercial emission sources introduced which may have a negative effect on local air quality within Clackmannanshire.

The new built heat standard which came into force on the 1st April 2024 applies to new buildings and limited conversions applying for a building warrant from 1st April 2024. Any development which has approved planning permission from 2023 but not a building warrant before 1st April 2024 will have to comply with the new standard and change planned heating systems to comply with the new standard. Any impacts of this new standard on future planning applications will be considered in future reports. These buildings will not be allowed to use direct emission (or polluting) heating systems such as oil and gas boilers and wood burning stoves. As with any legislation, there are however exemptions. Instead, in general they will need to use climate-friendly alternatives like heat pumps and heat networks (also referred to as clean heating systems). This standard only applies to systems used for heating and cooling and does not apply to industrial process heat. The new standard is currently under review in particular following concerns from rural communities but remains in force currently. It has been observed that there was an

increase during 2023 in the number of planning applications mentioning installation of air source heat pumps.

Domestic Emission Sources:

During 2023, there were no new areas of development with significant amounts of solid fuel burning. However, Clackmannanshire Council do continue to receive intermittent complaints relating to smoke from domestic wood burning stoves, garden bonfires and fire pits. Each complaint is logged, and a reminder is provided to residents of alternative ways to dispose their garden waste. With regard to wood burning stoves, all residents are reminded to ensure they use the appropriate fuel for the wood burning stove.

4.5 New Developments with Fugitive or Uncontrolled Sources

During 2023, there have been no new or significantly changed fugitive or uncontrolled sources at any of the following locations:

- Landfill sites;
- Quarries;
- Unmade haulage roads on industrial sites;
- Waste transfer stations; and
- Other potential sources or fugitive particulate matter emissions.

5 Planning Applications

The 'Development and Planning' department within Clackmannanshire Council was consulted to identify if there was any major planning applications during 2023 which may have the potential to negatively affect local air quality. The applications and outcomes are summarised in Table 5.1.

Table 5.1 – Planning Applications with an Air Quality Interest

Date	Planning Application	Development Information	Air Quality Interest?	Air Quality Assessment Required?	Decision
9 th January 2023	23/00003/FULL	Alterations, formations of doors/windows and installation of a wood burning stove.	Yes (Wood burning stove)	No	Unknown
20 th January 2023	23/00011/FULL	Erection of No.1 house.	Yes (Wood burning stove, ASHP).	No	Approved
27 th February 2023	23/00040/FULL	Erection of building including heat pump, cycle shelter and photovoltaic panels.	Yes (Heat pump, photovoltaic panels)	No	Approved
18 th April 2023	23/00079/FULL	Installation of kiosk and 2 EV charging points.	Yes (EV charging points)	No	Approved
21 st April 2023	23/00058/FULL	Conversion of garage to form room and installation of wood burning stove.	Yes	No	Approved
5 th May 2023	23/00090/FULL	Demolition of house and erection of No.1 house.	Yes (Air source heat pump to be installed)	No	Approved
22 nd May 2023	23/00100/PAN	Erection of 15 wind turbines.	Yes	No	Unknown
19 th June 2023	23/00128/FULL	Alterations and extensions to rear of house including stove.	Yes	No	Approved

4 th July 2023	23/00154/FULL	Change of use of land within site to uses comprising classes 4, 5 and 6 and recycling of construction waste to create aggregates (sui generis), (part retrospective).	Yes	Yes	Approved
11 th July 2023	23/00160/PAN	Installation of 25 MW battery storage facility.	Yes	No	Unknown
25 th August 2023	23/00182/MSC	Residential development of 157 houses with associated infrastructure (Phase 1) land at Branshill, Branshill Road, Sauchie, Clackmannanshire	Yes	Yes	Approved
16 th August 2023	23/00190/FULL	Installation of replacement windows and wood burning stove.	Yes	No	Approved
22 nd August 2023	23/00196/FULL	Demolition of existing house, erection of No.1 house, including installation of flue.	Yes	No	Awaiting Decision
15 th September 2023	23/00209/FULL	Alterations and extension of house with installation of flue.	Yes	No	Approved
5 th October 2023	23/00219/MSC	Approval of matters in relation to 10/00153/PPP.	Yes	Yes	Approved
16 th October 2023	23/00229/FULL	Alterations and extension to house.	Yes (Air source to heat pump to be installed).	No	Approved
19 th October 2023	23/00234/FULL	Alterations and conversion of No.2 semi-detached houses to form No.1 house (including stove).	Yes	No	Approved
23 rd November 2023	23/00256/FULL	The demolition of existing garage and single storey extension (includes stove).	Yes	No	Approved

27 th November 2023	23/00258/FULL	Installation of flue and multi-fuel stove.	Yes	No	Approved
14 th December 2023	23/00274/FULL	Erection of 8 bungalows	Yes (Each house heated by air source heat pump).	No	Approved
15 th December 2023	23/00274/FULL	Alterations and extension to glassworks building including hoist enclosure to accommodate replacement furnaces (partly retrospective).	Yes	Yes	Awaiting Decision

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

In 2023, Clackmannanshire Council undertook monitoring of NO₂, PM₁₀ and PM_{2.5} at locations detailed in the report. The concentrations of NO₂ were monitored passively monitored at six diffusion tube sites and one automatic continuous analyser. The concentration of PM₁₀ and PM_{2.5} was also concurrently measured at this automatic monitoring site. The 2023 annual mean concentrations are reported below:

- NO₂: 13.5 µg/m³ (Automatic).
- NO₂: 14.2 µg/m³ (Passive – Maximum).
- PM₁₀: 9.4 µg/m³ (Automatic).
- PM_{2.5}: 5.6 µg/m³ (Automatic).

The data from both the diffusion tube network and the automatic monitoring station indicates that the concentration of all measured pollutants complies with the air quality objectives. This is a continuing year-on-year trend observed within Clackmannanshire and, as a result, there is no AQMA declared for any pollutant. Therefore, the latest monitoring data demonstrates that Clackmannanshire continues to enjoy good air quality, and that there is no requirement for any additional monitoring to be undertaken.

6.2 Conclusions Relating to New Local Developments

This assessment has been conducted in accordance with LAQM TG(22). Updated information has been obtained on road, rail, industrial, domestic, and fugitive emission sources and compared to the criteria and conditions described in the guidance.

Any new or proposed development which may have a negative effect on local air quality is presented in Table 5.1. Actions as to whether an air quality assessment was required or requested is also shown.

6.3 Proposed Actions

Clackmannanshire Council are committed to continue to take action to further improve air quality. This is primarily done by progressing the measures outlined in Table 2.1, whilst raising awareness of air quality issues to be public (i.e. through Clean Air Day etc).

The main actions that Clackmannanshire intend to take to improve air quality are centred around encouraging alternate modes of transport. For example, increasing the uptake of EVs, encouraging walking and cycling via developing safer routes and encouraging schools to produce travel plans that facilitate sustainable modes of transport. Therefore, although Clackmannanshire continues to enjoy good air quality, there are a range of measures that are continuing to be progressed to ensure that pollution levels remain low. This has a positive benefit on the health of those living within Clackmannanshire, ensuring that residents' exposure to air pollution continues to decrease.

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)
CM1	King Street, Alloa	Roadside	288665	693072	NO ₂ PM ₁₀ PM _{2.5}	No	Chemiluminescent (NO ₂) Fidas (PM ₁₀ / PM _{2.5})	1.2	2.5	2.3

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)
DT2	Clackmannan Road, Alloa	Kerbside	289228	692943	NO ₂	No	2.0	2.0	No	3.3
DT3	Bus Station, Alloa	Kerbside	288818	692878	NO ₂	No	2.0	1.3	No	3.5
DT4	Shillinghill/Bridge Terrace, Alloa	Kerbside	288911	692940	NO ₂	No	2.0	1.4	No	3.1
DT5	King Street, Alloa	Kerbside	288665	693072	NO ₂	No	8.0	2.5	Yes	2.9
DT6	Auld Brig Road, Alloa	Kerbside	288927	692878	NO ₂	No	3.0	1.8	No	3.3
DT7	Pearson View, Sauchie	Kerbside	289371	693727	NO ₂	No	0.0	2.4	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.

Figure A.1 – Location of Air Quality Monitoring Sites (Alloa)

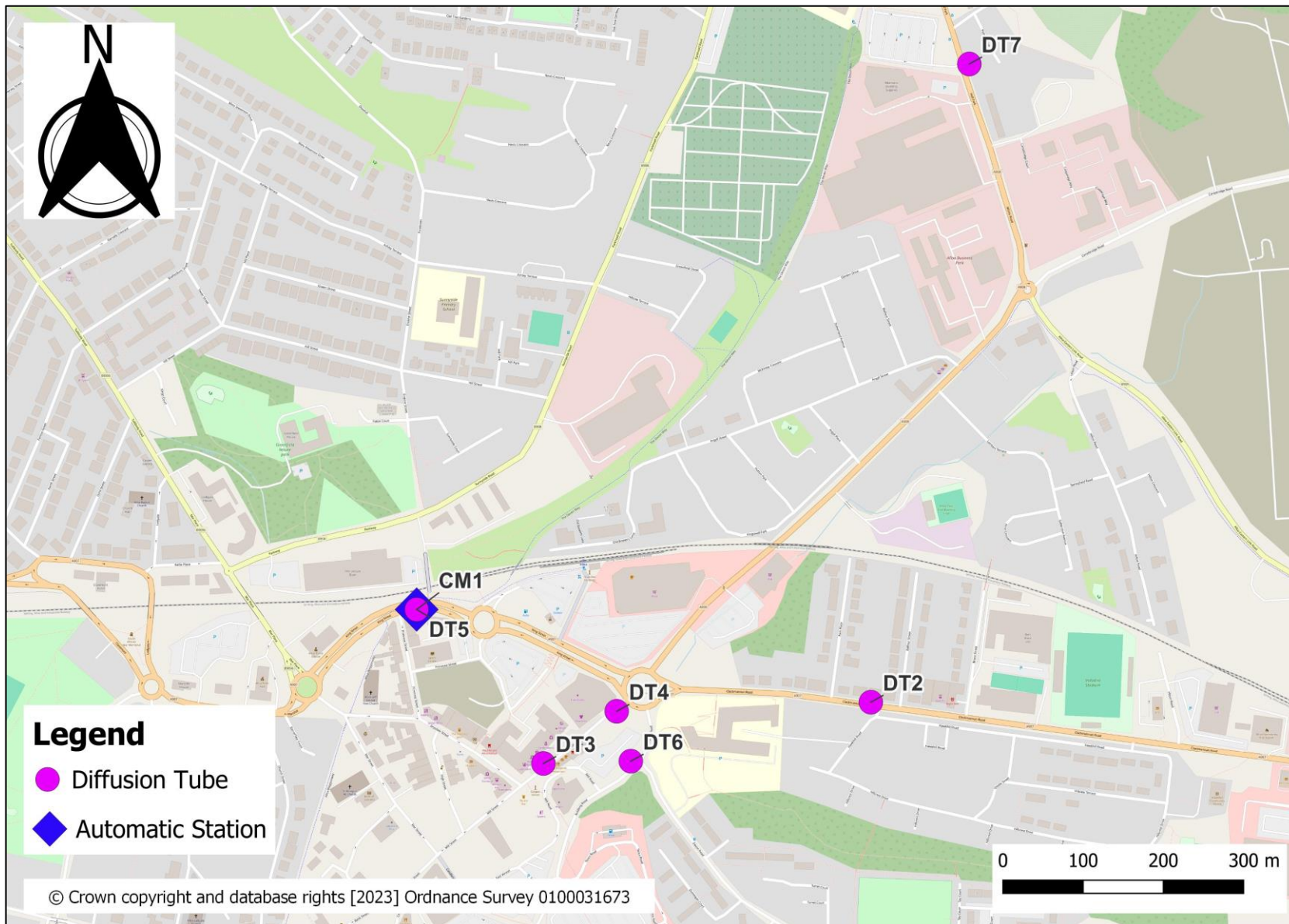


Figure A.2 – Location of Air Quality Monitoring Sites (Across Local Authority)

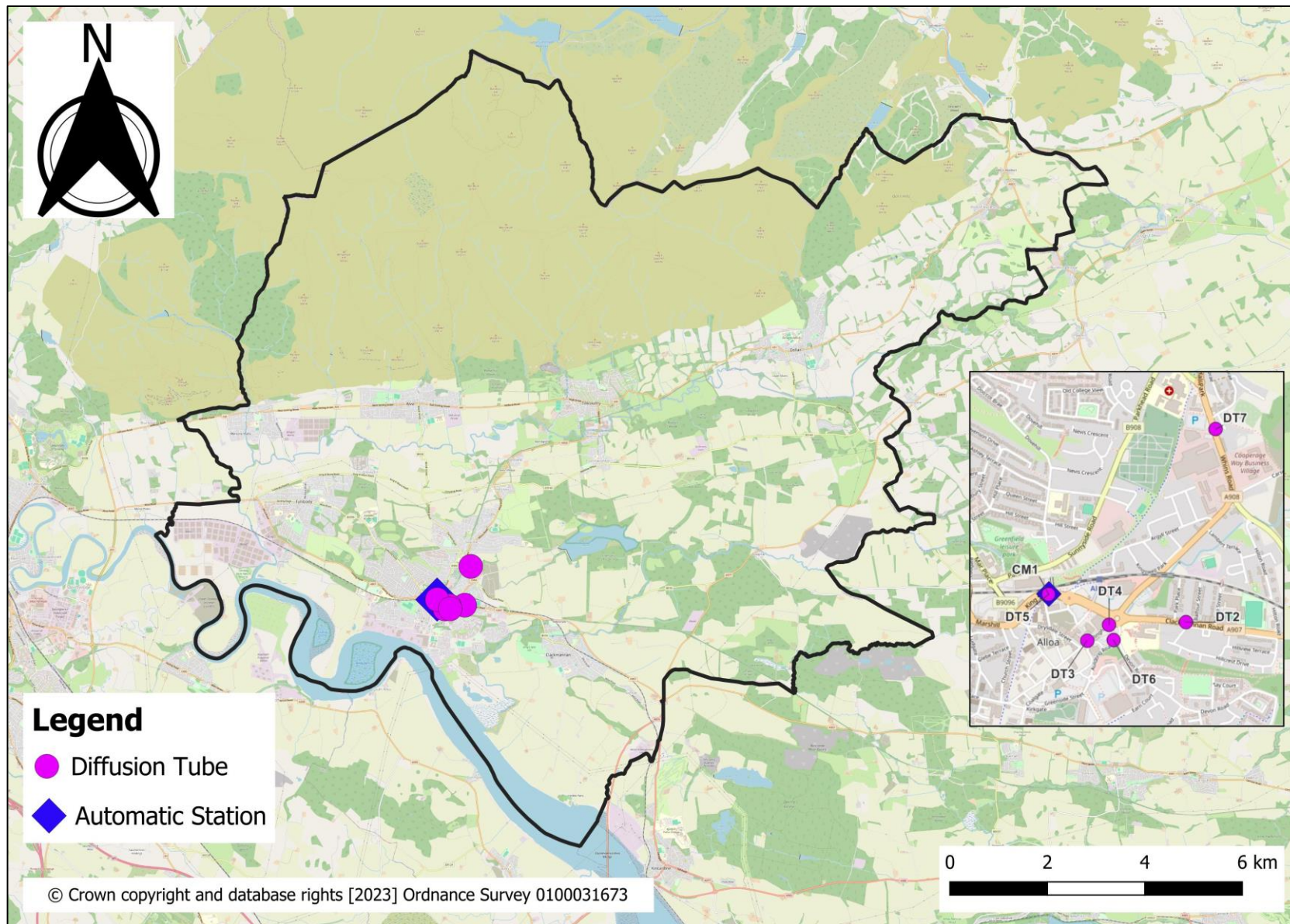


Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	Roadside	Automatic	98.5	98.5	22.0	19.0	17.7	14.8	13.5

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**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG22 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%).

Table A.4 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2022 (%) ⁽²⁾	2019	2020	2021	2022	2023
DT2	289228	692943	Kerbside	92.3	92.3	21.7	16.1	18.4	15.7	11.8
DT3	288818	692878	Kerbside	92.3	92.3	25.2	15.6	17.7	15.6	14.2
DT4	288911	692940	Kerbside	92.3	92.3	22.5	15.2	18.6	16.1	13.4
DT5	288665	693072	Kerbside	92.3	92.3	18.3	13.0	15.8	12.9	11.1
DT6	288927	692878	Kerbside	84.4	84.4	16.8	13.0	16.2	14.2	11.6
DT7	289371	693727	Kerbside	83.0	83.0	20.6	11.8	14.5	12.0	10.2

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

Diffusion tube data has been bias adjusted.

Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.

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**.

Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per LAQM.TG(22) 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.3 – Annual Mean NO₂ Monitoring Results (2019 – 2023)

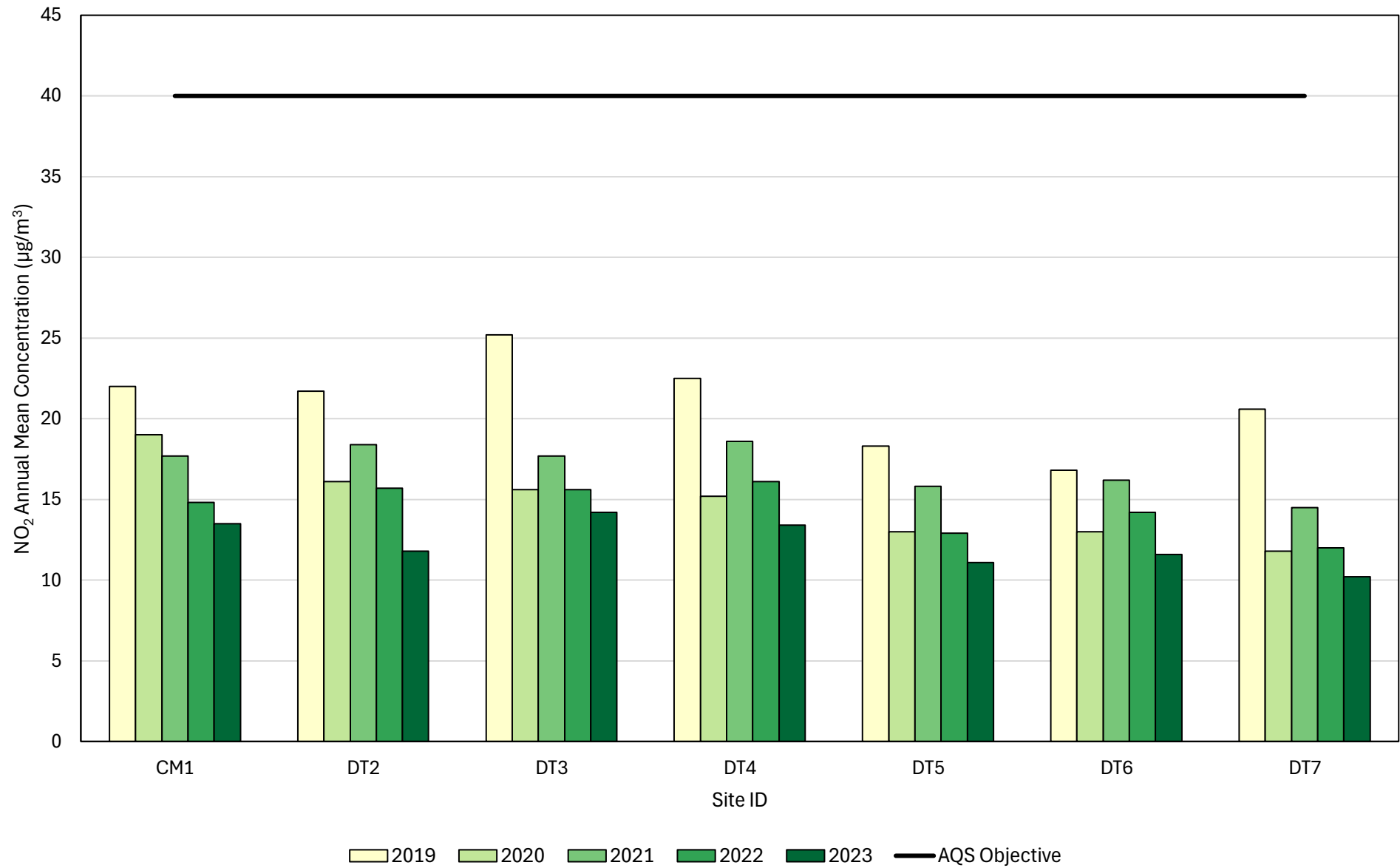


Table A.5 – 1-Hour Mean NO₂ Monitoring Results, 1-Hour Means > 200µg/m³

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	Roadside	Automatic	98.5	98.5	0	0	0 (61.2)	0	1

Notes:

Exceedances of the NO₂ 1-hour mean objective (200 µg/m³ not to be exceeded more than 18 times/year) are shown in bold.

If the period of valid data is less than 85%, the 99.8th percentile of 1-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%).

Table A.6 – Annual Mean PM₁₀ Monitoring Results (µg/m³)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	Roadside	98.5	98.5	11.0	9.0	10.7	11.2	9.4

Notes:

Exceedances of the PM₁₀ annual mean objective of 18 µg/m³ are shown in bold.

All means have been “annualised” as per LAQM.TG(22), 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.4 – Annual Mean PM₁₀ Monitoring Results (2019 – 2023)

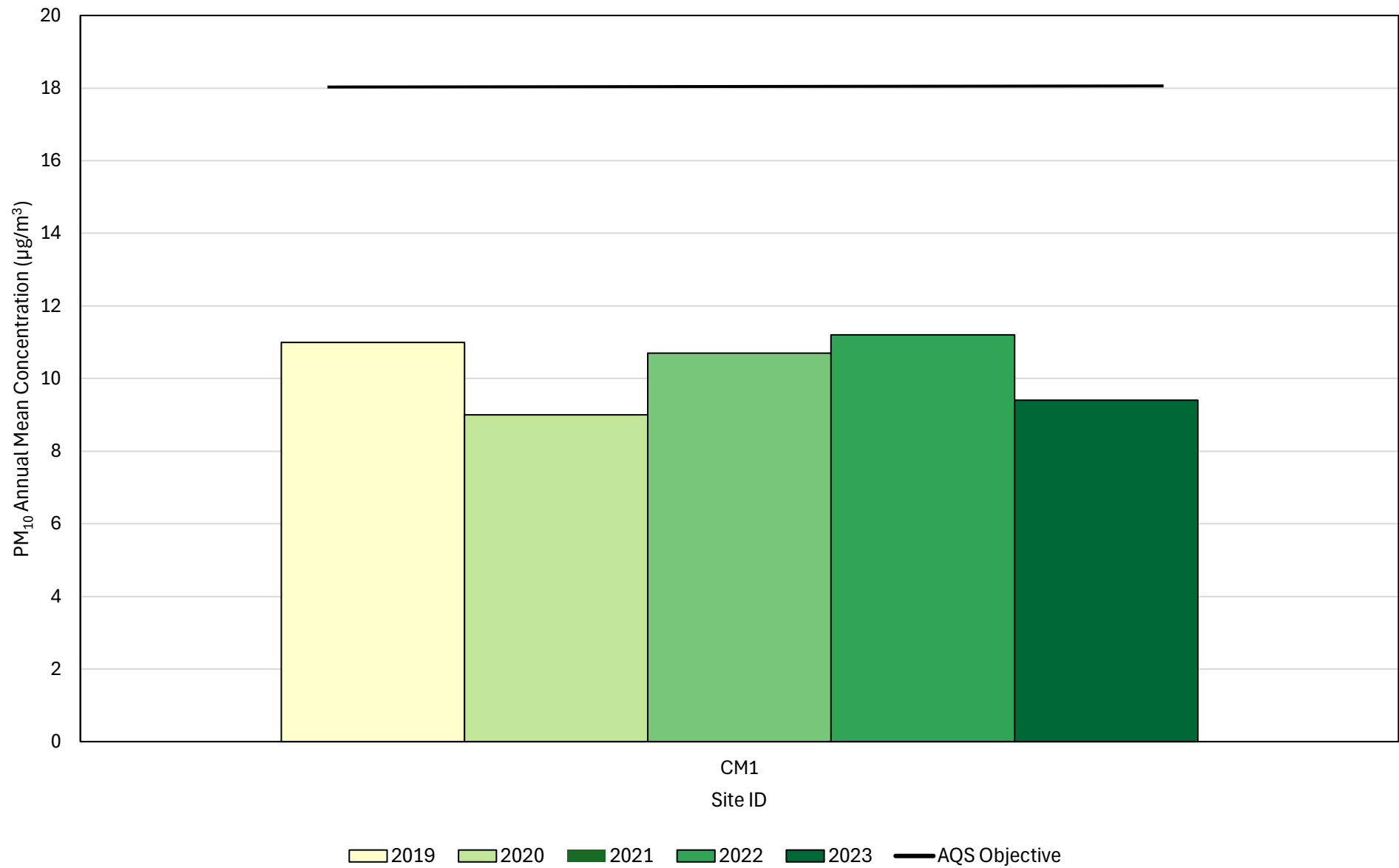


Table A.7 – 24-Hour Mean PM₁₀ Monitoring Results, 24-Hour Means > 50µg/m³

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	Roadside	98.5	98.5	1	0	3	2	0

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50 µg/m³ 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%).

Table A.8 – Annual Mean PM_{2.5} Monitoring Results (µg/m³)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2023 (%) ⁽²⁾	2019	2020	2021	2022	2023
CM1	Roadside	98.5	98.5	6.0	5.0	5.6	6.4	5.6

Notes:

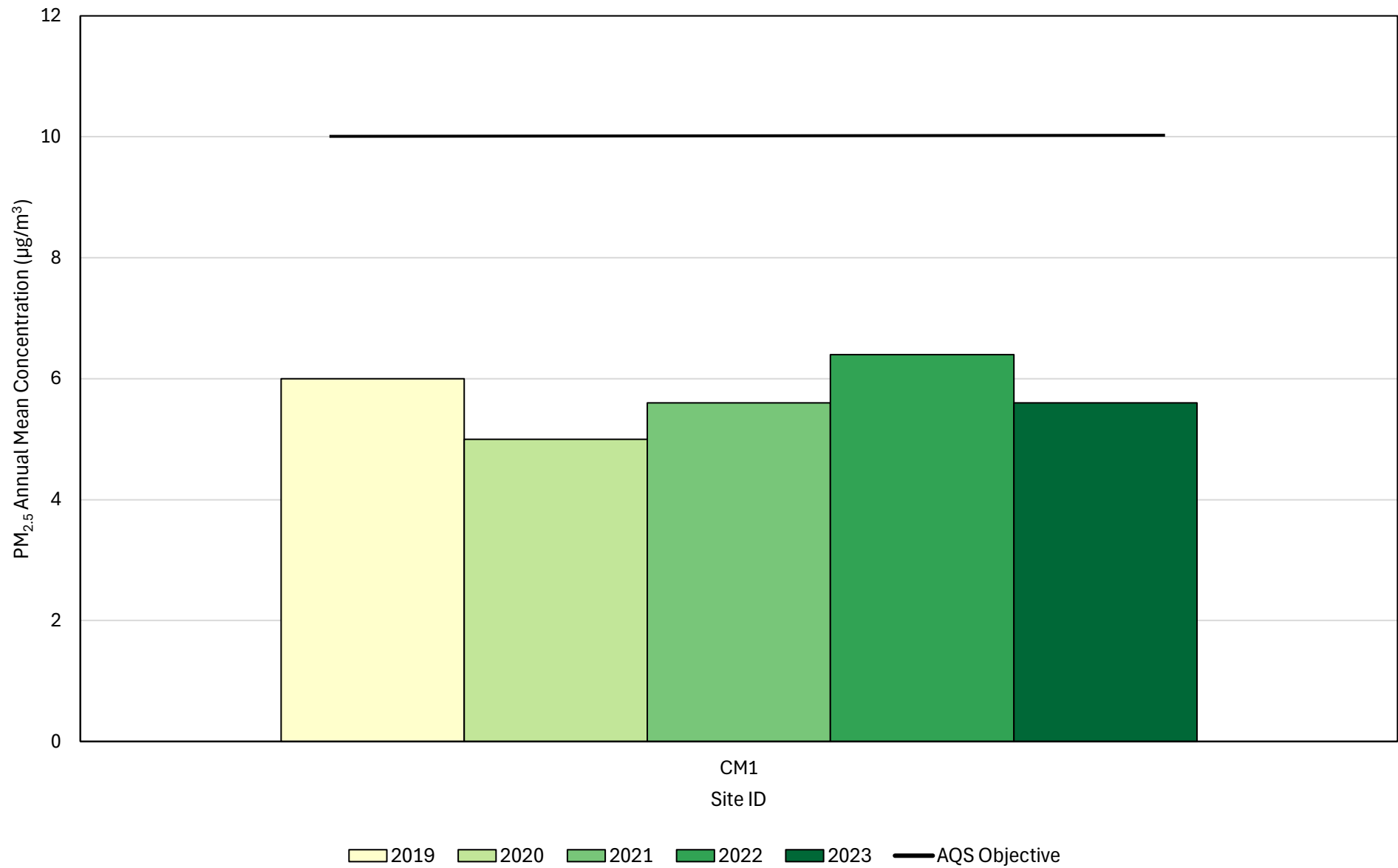
Exceedances of the PM_{2.5} annual mean objective of 10 µg/m³ are shown in bold.

All means have been “annualised” as per LAQM.TG(22), 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.5 – Annual Mean PM_{2.5} Monitoring Results (2019 – 2023)



Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO₂ 2023 Monthly Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan ⁽¹⁾	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.74)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT2	289228	692943	31.4	19.9	23.5	10.0	10.3	12.4	12.4	11.6	17.8	14.8	21.4	20.2	16.0	11.8	-	January data removed due to over exposure.
DT3	288818	692878	27.6	29.3	23.8	14.3	10.9	16.6	14.3	15.8	15.5	18.5	24.8	26.2	19.2	14.2	-	January data removed due to over exposure.
DT4	288911	692940	20.3	28.9	21.8	13.1	12.5	18.0	16.5	15.0	23.6	12.0	19.4	18.9	18.2	13.4	-	January data removed due to over exposure.
DT5	288665	693072	23.5	18.8	21.6	8.2	13.3	16.4	8.7	12.5	10.1	18.7	19.1	14.6	15.0	11.1	-	January data removed due to over exposure.
DT6	288927	692878	15.8	23.2	20.7	7.9	9.2	13.1	11.7	10.8	11.4	-	23.9	23.0	15.7	11.6	-	January data removed due to over exposure.
DT7	289371	693727	12.6	22.5	17.3	10.5	9.3	15.3	11.4	12.8	13.8	15.9	-	8.2	13.8	10.2	-	January data removed due to over exposure.

All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

Local bias adjustment factor used.

National bias adjustment factor used.

Where applicable, data has been distance corrected for relevant exposure in the final column.

Clackmannanshire Council confirm that all 2023 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

Notes:

Exceedances of the NO₂ annual mean objective of 40 µg/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**.

See Appendix C for details on bias adjustment and annualisation.

⁽¹⁾ January results excluded from annual mean concentration due to being overexposed beyond the recommended period.

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

New or Changed Sources Identified Within Clackmannanshire During 2023

Clackmannanshire Council have identified a substantial variation application by Walsh Brothers Industrial Services Limited at 15 – 17 Castle Street, Alloa. This is for PPC(A) – mix disposal and recovery of hazardous or non-hazardous waste section 5.3 and 5.4, as well as PPC(a) other waste storage and treatment sites.

Additional Air Quality Works Undertaken by Clackmannanshire Council During 2023

Clackmannanshire Council have not completed any additional air quality works within the reporting year of 2023. However, the Council have become stakeholders in a new project that is being undertaken by the University of Stirling, which will progress through 2024.

The University of Stirling are leading a project termed the Forth Environmental Resilience Array (Forth-ERA), which is a digital observatory of the Firth of Forth's entire water catchment, providing "real-time" environmental data and analytics. Clackmannanshire Council along with Stirling Council are stakeholders in the Forth-ERA Air Quality Project. The project expands over both Council areas and includes air quality monitoring using AQ Mesh monitors and PurpleAirs at over 40 locations including industrial, residential, educational, recreational and public buildings. The project will also allow the public to add their own experiences of air quality onto an online platform. Currently, the project is in its early stages of development and will predominantly progress throughout 2024.

QA/QC of Diffusion Tube Monitoring

During 2023, the diffusion tubes deployed by Clackmannanshire Council were supplied and analysed by Glasgow Scientific Services (GSS) and were prepared using the 20% TEA in water preparation method. All results have been bias adjusted and annualised (where required). GSS are a UKAS accredited laboratory that participate in the AIR-PT scheme for NO₂ diffusion tube analysis and the Annual Field Inter-Comparison Exercise.

These provide strict performance criteria for participating laboratories to meet, thereby ensuring the reported NO₂ concentrations are of a high calibre. In the most recent round of AIR-PT results (AR058, July – August 2023 and AR059, September – October 2023), GSS were awarded a score of 100% on both occasions. This therefore indicates that all results were deemed to be satisfactory, based on a z-score of less than ± 2 , highlighting a good performance of GSS during 2023. As a result of this score, there is a high degree of confidence in the diffusion tube results presented within this report.

With the exception of January, all diffusion tubes were changed in accordance with the national calendar (± 2 days), ensuring that they had a suitable exposure period – i.e. diffusion tubes were not underexposed or overexposed. The diffusion tubes that were deployed in December 2022 were not removed at the end of the month, and were kept in position until the February changeover. Therefore, as the diffusion tubes were exposed for approximately 8 weeks the data has been excluded from the annual mean analysis as the diffusion tubes were overexposed. This is because Section 7.199 of TG(22) states:

“If diffusion tubes are left out for significantly longer or shorter periods than the four and five weeks recommended, then data may not be reliable as the diffusion rate may not have been accurately defined”.

However, for completeness, these results are presented in Appendix B. They are however only for illustrative purposes and have not been included in the annual mean calculation.

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Clackmannanshire recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

Clackmannanshire Council have applied a national bias adjustment factor of 0.74 to the 2023 monitoring data. A summary of bias adjustment factors used by Clackmannanshire Council over the past five years is presented in Table C.1.

The national bias adjustment spreadsheet (version 03/24) was used to derive the national bias adjustment factor for diffusion tubes analysed by GSS during 2023. The national bias

adjustment factor for GSS was 0.74. However, as shown in Figure C.1, this was only based on one study (Marylebone Road Intercomparison).

National Diffusion Tube Bias Adjustment Factor Spreadsheet					Spreadsheet Version Number: 03/24					
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								This spreadsheet will be updated at the end of June 2024		
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet								LAQM Helpdesk Website		
This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.										
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:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	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 shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data.	If you have your own co-location study then see footnote 1. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953						
Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Glasgow Scientific Services	20% TEA in water	2023	KS	Marylebone Road intercomparison	10	50	37	34.8%	G	0.74
Glasgow Scientific Services	20% TEA in water	2023		Overall Factor¹ (1 study)						Use 0.74

Figure C.1 – 2023 National Bias Adjustment Factor for Glasgow Scientific Services

Whilst it is acknowledged that this bias adjustment factor (0.74) is slightly lower than that used across the last five years, Clackmannanshire Council do not operate a co-location study so a local bias adjustment factor could not instead be determined. It is however important to note that the diffusion tube concentrations were significantly below the AQS objective of 40 µg/m³ prior to bias adjustment. Therefore, there is no concern that applying this slightly lower bias adjustment factor is reducing concentrations below any objectives.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.74
2022	National	03/23	0.86 ⁽¹⁾
2021	National	03/22	0.89 ⁽¹⁾
2020	National	03/21	0.89 ⁽¹⁾
2019	National	03/20	0.82 ⁽¹⁾

(1) Adjustment factor derived using co-location studies of good precision only.

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within Clackmannanshire required distance correction during 2023.

QA/QC of Automatic Monitoring

Automatic monitoring of NO₂, PM₁₀ and PM_{2.5} is completed within Clackmannanshire using Chemiluminescence (NO₂) and Fidas (PM₁₀ and PM_{2.5}) analysers. These automatic analysers are calibrated on a monthly basis by Clackmannanshire Council, with the results of the calibration sent to Ricardo (on behalf of the Scottish Government). The site is serviced every six months by the equipment support unit (Acoem), which usually occurs in May/June and November/December. The audits also occur in June and December, and are completed by Riccardo. Clackmannanshire Council (as the local site operator) also visit the site after any reports of bad weather or roadworks to check the site is still operating as expected. The data is ratified by Acoem and is available at the following website: <https://www.scottishairquality.scot/latest/site-info/ALO2>.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The PM₁₀ and PM_{2.5} data was corrected in accordance with the guidance note issued by the Scottish Government in relation to the monitoring of particulate matter (PM) data. For PM data measured via a Fidas 200 instrument, the ratified PM₁₀ annual mean value was divided by 0.909 whilst the annual mean PM_{2.5} value was multiplied by 1.06. Further information on the adjustments applied to the PM data obtained from the automatic monitoring station on King Street, Alloa (CM1) is available at the following webpage: <https://www.scottishairquality.scot/technical-reports/local-authority-guidance-note-laqm-reporting-scottish-pm-data>.

Automatic Monitoring Annualisation

All automatic monitoring locations within Clackmannanshire recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO₂ Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within Clackmannanshire required distance correction during 2023.

Appendix D: Supplementary Data ('AQ Mesh Pod')

		Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	2019	2020	2021	2022	2023
NO ₂	Annual Mean (µg/m ³)	89.0	89.0	15.2	14.6	17.9	15.6	15.7
	1-hr Means > 200 µg/m ³			0 (91.1)	0	0	0	0
PM ₁₀	Annual Mean (µg/m ³)	89.6	89.6	4.8	3.9	3.7	3.7	2.8
	24-hr Means > 50 µg/m ³			0	0	0	0	0
PM _{2.5}	Annual Mean (µg/m ³)	89.6	89.6	2.8	2.0	2.1	2.0	1.7

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
DT	Diffusion Tube
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

References

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- (2) Clackmannanshire Council – Wood Burning Stoves. Available at:
<https://www.clacks.gov.uk/environment/woodburningstoves/>.
- (3) Clackmannanshire Council – Local Air Quality Management. Available at:
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- (4) Department for Environment, Food and Rural Affairs (DEFRA) – Local Air Quality Management Technical Guidance 22 (LAQM TG22). 2022. Available at:
https://www.scottishairquality.scot/sites/default/files/publications/2023-04/LAQM-TG22-August-22-v1.0_0.pdf
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<https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/07/cleaner-air-scotland-2-towards-better-place-everyone/documents/cleaner-air-scotland-2-towards-better-place-everyone/cleaner-air-scotland-2-towards-better-place-everyone/govscot%3Adocument/cleaner-air-scotland-2-towards-better-place-everyone.pdf>
- (6) Scottish Government – National Planning Framework 4 (NPF4). 2023. Available at:
<https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2023/02/national-planning-framework-4/documents/national-planning-framework-4-revised-draft/national-planning-framework-4-revised-draft/govscot%3Adocument/national-planning-framework-4.pdf>