Clackmannanshire Council

2025 Air Quality Annual Progress Report

June 2025

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Annual Progress Report (APR)

Clackmannanshire Council

2025 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 2025

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Executive Summary: Air Quality in Our Area

This report provides an overview of air quality within Clackmannanshire during 2024. This is done by reviewing the latest pollutant monitoring data for NO_2, PM_{10} 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 area of Clackmannanshire is dominated by large amounts of rural land, which gives rise to good levels of air quality. This is supported by the most recent monitoring data for 2024 which indicates NO_2, PM_{10} 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 sites, with the majority of monitoring sites recording a pollutant concentration in 2024 lower than that in the previous year of 2023. Therefore, this demonstrates the good air quality that Clackmannanshire continues to experience, and further improvements that are still being observed by reducing pollutant concentrations.

During 2024, Clackmannanshire Council continued to monitor concentrations of NO_2 through a network of six passive diffusion tubes and one continuous automatic analyser. The concentrations of PM_{10} and $PM_{2.5}$ were also concurrently measured by this automatic analyser during 2024. Across the entire diffusion tube network, all sites reported an NO_2 annual mean concentration below the air quality objective of 40 µg/m^3, with recorded concentrations in the range of 9.0 µg/m^3 – 11.3 µg/m^3. The maximum concentration is a decrease from the maximum NO_2 annual mean concentration recorded in the previous reporting year of 14.2 µg/m^3. At the automatic analyser, the NO_2 annual mean concentration in 2024 was 11.5 µg/m^3, which is a decrease from the 13.5 µg/m^3 recorded in the previous year. Therefore, the data from both the passive and continuous monitoring networks indicates an improvement in the concentration of NO_2 in Clackmannanshire during 2024. This is part of a wider trend of year-on-year improvements since 2021.

For PM_{10} and $PM_{2.5}$, in 2024 the annual mean objective of 18 µg/m^3 and limit of 10 µg/m^3, respectively, were not exceeded, with concentrations of 8.6 µg/m^3 (PM_{10}) and 6.4 µg/m^3 ($PM_{2.5}$) recorded by the automatic analyser. The PM_{10} daily objective of 50 µg/m^3 was also not exceeded, with a maximum daily concentration of 29.3 µg/m^3 recorded in 2024.

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 NO_2 via a passive diffusion tube network of six sites and automatically via a continuous analyser on King Street, Alloa. Concentrations on PM_{10} and $PM_{2.5}$ are also recorded at this automatic monitoring station. Clackmannanshire Council also continue to deploy an 'AQ Mesh Pod' which is a type of low-cost sensor that measures concentrations of NO_2, PM_{10} and $PM_{2.5}$. The 'AQ Mesh Pod' is used to identify potential 'hotspot' areas – during 2024, this was situated at 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 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 vehicles through the installation of EV charging points. Clackmannanshire Council 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 primary pollutants of concern (NO_2, PM_{10} 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 2025 this is to remain in the same place as during 2024 (Hallpark Road – A908).

With the Forth-ERA project continuing into 2025, Clackmannanshire Council are to monitor the result of air quality monitoring and use the data from the project, along with the data from Clackmannanshire Councill's monitoring networks, to plan locations for future monitoring sites. Clackmannanshire Council will consider applying for grant funding to support with additional monitoring equipment such as diffusion tubes to expand the current monitoring network of six sites.

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 'Clean Air for Scotland 2' strategy.

How to Get Involved

Improving air quality in Clackmannanshire requires a collective effort beyond those of Clackmannanshire 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 emissions vehicle all help in improving air quality 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 or particulate matter in the air. Further information on such appliances is available on Clackmannanshire Council's website for wood burning stoves.

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 dedicated website for Air Quality.

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1 Local Air Quality Management

This report provides an overview of air quality in Clackmannanshire during 2024. 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 2024 APR to declare a new AQMA.

2.2 Implementation of Air Quality Action Plan(s) and/or Measures to Address Air Quality

In order to ensure that local authorities implement the measures within an action plan by the timescales stated within that plan, the Scottish Government expects authorities to submit updates on progress through the APR process. Clackmannanshire Council has taken forward a number of measures within the action plan during the current reporting year of 2024 in pursuit of improving local air quality and meeting the air quality objectives within the shortest possible time. Details of all measures completed, in progress or planned are set out in Table 2.1.

Clackmannanshire Council are currently implementing the following measures to further improve air quality:

- **School Streets:** Clackmannanshire Council originally introduced a ‘School Street’ to meet Theme 3 (Parking, Roads and Transport) in the community plan. However, this initiative also had an inadvertent positive impact on air quality. Clackmannan Primary School is the location of the one ‘School Street’ that is currently in place within Clackmannanshire, with road closures in operative 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 evening pick-up reduces exposure to vehicle emissions during what would otherwise be a busy period of vehicle activity. Engagement in the 'Schools Streets' initiative demonstrates the commitment of Clackmannanshire Council to take action to further improve air quality.

- **School Travel Plans:** All schools within Clackmannanshire are required to produce a School Travel Plan to take into account all of the issues including safety and health relevant to journeys to and from the individual school. Clackmannanshire Council encourages safe and sustainable travel to and from school through the introduction of the 'Safer Routes to School Initiative'. This is aimed at encouraging pupils, parents and teachers to adopt healthier options for getting to and from school. Clackmannanshire Council promotes the opportunity to travel in a healthy and congestion free, non-polluting way. In order to facilitate this, Clackmannanshire Council have improved the condition of paths and introduced reduced speed limits on residential streets around schools to make cycling to school easier. All primary five pupils are provided with Bikeability Training, with funding available to schools for the supply of helmets and jackets to encourage cycling in bad weather. Primary schools within Clackmannanshire also participate in the 'Living Streets' initiative, where trackers monitor the mode of transport used by pupils to travel to school.
- **Cycling Routes:** There are a number of new and upgraded cycle routes such as the NC 76 National Cycle Network (NCN) Route, the NCN 767 from Alloa to Dollar, and the NCN 768 from Tullibody to Menstrie including the new off-road section between Menstrie and Alva. The Inner Forth Landscape Initiative has introduced a new bike bus service which is a free hop on – hop off transport service around the Forth Estuary. The route, between Alloa and the Forth Bridges, encourages cyclists to travel more sustainably within the Inner Forth. Walkers are welcome to use the service too. The first pilot season operated from April – October 2024 and will operate again in 2025 between the same months. Further information on the initiative is available on the Inner Forth Bike Bus Website.
- **Safer and 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 with local communities for cyclists to avoid the busier main roads. These streets are relatively light on vehicle traffic, benefit from 20 mph speed limits and may be traffic calmed. These streets are sign

posted and provide links to local off-road and national cycle network routes. Clackmannanshire Council have also introduced 'Walking, Cycling and Riding Friendly Roads' which are quiet rural roads where traffic speed and volumes are low. These roads have specifically designed speed limit signs and aim to remind drivers that they are likely to see walkers, cyclists and horse riders in these locations. There are signs at the entry points and smaller repeat signs throughout the limit area.

- **Safer Footways for Pedestrians:** Clackmannanshire Council promotes walking as a means of simultaneously improving health and the environment. This is done by encouraging residents to report obstructions on pavements such as wheelie bins, parked vehicles and shop displays to ensure that walking routes remain accessible. As walking is a primary method of travel for many residents, Clackmannanshire Council will take the appropriate action where obstructions are not removed following a request to do so and will remove obstructions and recover costs from the offender.
- **'Wee Walk, Wee Cycle the Wee County':** The 'Wee Walk, Wee Cycle the Wee County' campaign aims to get more people walking and cycling for local journeys and for commuting, with a focus on promoting the local walking and cycling network. Clackmannanshire Council also promote a range of activities including family cycling and walking events and have installed new and improved signs.
- **Planning Developments:** The 'Roads, Traffic and Transportation' department of Clackmannanshire Council review planning developments and, where possible, request active travel plans for specific developments. This includes consideration of safer routes to schools, walking and cycling routes, recreational paths, and access to public transport.
- **Cycle to Work Scheme:** Clackmannanshire Council continue to participate in the 'Cycle to Work' scheme, where employers can lease a bike over 12 months. Although the employee pays a fee, the incentive is in the overall money saved in not paying income tax or national insurance on the amount by which the value of the gross salary is reduced.
- **Council Pool Bikes:** Clackmannanshire Council owns 11 bikes as an alternative mode of transport, which helps to reduce Clackmannanshire Council's environmental impact. These are promoted for use on short journeys of one to three miles (approximately 20 minutes). Clackmannanshire Council's offices are in Alloa, where most people live or in the surrounding small towns within one to three miles.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Expected / Actual Completion Year	Organisations Involved	Measure Status	Funding Status	Key Milestones	Progress	Barriers to Implementation
1	**Electrical Vehicle Charging Point**	Promoting Low Emission Transport	2024	Clackmannanshire Council	Ongoing	Fully Funded (Transport Scotland)	36 EV Charing Points Installed.	Construction of infrastructure underway in Sauchie, Fishcross and Alloa.	Funding
2	**School Streets**	Promoting Travel Alternatives	Ongoing	Clackmannanshire Council	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	Clackmannanshire Council	Ongoing	Not Funded	Air Quality included in Local Development Plan (LDP).	Any new development will be monitored and necessary action taken.	-
4	Cycle to Work Scheme	Promoting Travel Alternatives	Ongoing	Clackmannanshire Council	Ongoing	Fully Funded (Salary Sacrifice)	Number of members of the scheme.	23 members currently part of the 'Cycle to Work' scheme.	-
5	Cycling and Safer Streets	Promoting Travel Alternatives	Ongoing	Clackmannanshire Council	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	Clackmannanshire Council	Ongoing	Not Funded	Number of obstructions reported.	The 'Wee Walk, Wee Cycle the Wee County' campaign.	-
7	School Travel Plans	Promoting Travel Alternatives	Ongoing	Clackmannanshire Council	Ongoing	Not Funded	Number of schools with travel plans.	Increased awareness of air pollution.	-

2.3 Defra Appraisal of 2024 Annual Progress Report

Defra's appraisal of last year's (2024) annual progress report concluded:

1. **The report confirms Clackmannanshire Council continues to enjoy good air quality, with no exceedances of any relevant air quality objectives. Therefore, there is no requirement for any AQMAs or a formal AQAP.**
   - The 2024 data demonstrates compliance with the air quality objectives for NO_2, PM_{10} and $PM_{2.5}$, therefore there is no requirement to declare an AQMA or adopt a formal AQAP.
2. **Although there is no AQMA or formal AQAP, the Council outline seven measures designed to improve air quality within their jurisdiction. Progress has been outlined in 2023, with priorities for the upcoming year highlighted. This demonstrates the Council's proactive approach to monitoring air quality in their jurisdiction and is commended.**
   - Clackmannanshire Council continue to implement a range of measures during 2024 and are exploring a range of additional measures.
3. **QA/QC procedures applied to the monitoring data are robust, with sufficient discussion in Appendix A. A national bias adjustment factor has been suitably calculated and applied to the diffusion tube monitoring data.**
   - QA/QC procedures applied to the data from the diffusion tube network and the automatic analyser are outlined in Appendix C. Due to Clackmannanshire Council not undertaking a triplicate co-location study, the national bias adjustment factor has been applied to the 2024 diffusion tube data.
4. **Diffusion tubes were overexposed for January 2023, and thus data from this month has to be excluded form the annual mean calculations. This has not meant annualisation was required. However, the Council is reminded to follow the Defra diffusion tube calendar where possible.**
   - During 2024, no diffusion tube was overexposed beyond the recommended period. The diffusion tubes were also deployed in adherence with the Defra monitoring calendar, with all changeovers completed within the recommended two days of the specified date.
5. **The Council have included comments from last year's appraisal and responded to them. This is welcomed.**
   - The appraisal comments of the 2024 APR have been actioned in this report.

6. **There are instances of typographical errors within the report. Although it does not affects its readability, the Council should review the report for such errors and rectify prior to submission of reports in the future.**
   - The 2024 APR has been checked for typographical errors prior to publication.
7. **The report includes local engagement and serves as a good source of information for the general public.**
   - The 2024 APR outlines actions the public can take to help in Clackmannanshire Council's efforts to further reduce the level of pollution.
8. **A map of monitoring locations has been provided, including a smaller scale map which shows the entire Council boundary. This is welcomed.**
   - The location of the monitoring sites are presented on a large scale of Clackmannanshire Council's administrative boundary to demonstrate the geographical spread of the monitoring (i.e. areas that are currently monitored) and on a smaller scale to highlight the exact location of each monitoring site.

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 2024, that measured concentrations of NO_2, PM_{10} and $PM_{2.5}$. Table A.1 shows the details of the site, with maps showing the locations of the monitoring site provided in Appendix A. There was no change to the automatic monitoring network in 2024, from that of the previous year. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C. National monitoring results are available on the Scottish Government's Air Quality Data Website.

3.1.2 Non-Automatic Monitoring Sites

Clackmannanshire Council undertook non-automatic (passive) monitoring of NO_2 at six sites during 2024. This is the same number of sites as in the previous year, with no changes to the diffusion tube network reported in 2024 – all diffusion tubes were deployed in the same location in 2024 as in the previous reporting year. Table A.2 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

During 2024, Clackmannanshire Council continued to deploy an 'AQ Mesh Pod', that monitored concentrations of NO_2, PM_{10} and $PM_{2.5}$. This type of low-cost sensor is not to be relied upon for reporting compliance against the air quality objectives but can be utilised to identify trends. Therefore, the data from the 'AQ Mesh Pod' is not referenced throughout

this report and is instead presented in Appendix D. Information on low-cost sensors is provided by the LAQM FAQ 140.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

In 2024, the NO_2 annual mean objective was not exceeded at the automatic monitoring station on King Street, Alloa (CM1), as a NO_2 annual mean concentration of 11.5 µg/m^3 was recorded. The NO_2 annual mean concentration is a reduction of 2 µg/m^3 from that of the previous reporitng year, and continues the trend of a year-on-year decrease in the NO_2 annual mean concentration that has been observed from 2020 – 2024. This highlgihts the continual improvement in the concentration of NO_2 at this site in recent years.

Table A.4 in Appendix A compares the adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg/m^3 at non-automatic monitoring sites.

In 2024, the NO_2 annual mean objective was not exceeded at any diffusion tube site, with a maximum concentration of 11.3 µg/m^3 (Site ID: DT3) recorded across the entire diffuison tube network. Relative to the previous reporting year, this is a decrease from the maximum NO_2 annual mean concentration of 14.2 µg/m^3 recorded at the same site in 2023. This trend of improving concentrations was observed at all six diffusion tube sites, and is part of a wider trend of a year-on-year decrease in the NO_2 annual mean concentration observed at all six sites since 2021. Therefore, and as demonstrated by the results from the autmomaitc monitoring station, the diffusion tube network also highlights the continual improvement in the concentration of NO_2 across Clackmannanshire.

For diffusion tubes, the full 2024 dataset of monthly values is provided in Appendix B.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200 µg/m^3, not to be exceeded more than 18 times per year.

In 2024, there were no exceedances of the NO_2 hourly mean objective of 200 µg/m^3, as the maximum hourly mean concentration was 88.4 µg/m^3 (29th July 2024, 11am). Additionally, as no single diffusion tube recorded an annual mean concentraiton greater than 60 µg/m$_3$, it can be inferred that the NO_2 hourly mean objective was also not exceeded at any site on the diffusion tube network across Clackmanannshire in 2024. This is in accordance with Section 7.97 of TG(22) which states:

"A study carried out on behalf of Defra and the Devloved Administrations identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60 µg/m^3*. Analaysis of the data in more recent yeard has shown local authorites should continue to use this assumption where NO_2 1-hour mean monitorng data are not avaiable (typically if monitoring using passive diffusion tubes)".*

As a result of both the automatic monitoring station and the passive diffusion tube network recording NO_2 concentrations below the annual and hourly objectives, no AQMA has needed to be declared for NO_2 within Clackmannanshire. It is therefore evident from the data that Clackmannanshire continues to enjoy good air quality in relation to NO_2.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 18 µg/m^3.

In 2024, the PM_{10} annual mean objective was not exceeded at the automatic monitoring station on King Street, Alloa (CM1), as a PM_{10} annual mean concentration of 8.6 µg/m^3 was recorded. The PM_{10} annual mean concentration is a reduction of 0.8 µg/m^3 from that of the previous reporting year (9.4 µg/m^3) and continues the trend of a year-on-year decrease in the annual mean concentration that has been observed from 2022 – 2024. This highlights the continual improvement in the PM_{10} concentration in recent years.

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

In 2024, there were no exceedances of the PM_{10} daily mean objective of 50 µg/m^3, as the maximum daily mean concentration was 29.3 µg/m^3 (17th May 2024). This is similar to the previous reporting year where no exceedances of the daily mean objective were also recordeed, with a maximum PM_{10} daily mean concentration of 31.7 µg/m^3 in 2023.

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 limit of 10 µg/m^3.

In 2024, the $PM_{2.5}$ annual mean limit was not exceeded at the automatic monitoring station on King Street, Alloa (CM1), as a $PM_{2.5}$ annual mean concentration of 6.4 µg/m^3 was recorded. This $PM_{2.5}$ annual mean concentration is an increase of 0.8 µg/m^3 from that of the previous reporting year (5.6 µg/m^3). However, the concentration is part of a long term trend that has been observed at the site of concentrations ranging between 5.0 µg/m^3 to 6.4 µg/m^3 between 2020 – 2024. This suggests that the increase in the reported concentration is not of concern, and the concentration remains below the annual limit.

4 New Local Developments

This section has been completed following consultation with other relevant services and departments within Clackmannanshire Council, including ‘Roads and 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 an increase in pollutant concentration and eventual exceedance of the air quality objectives. During 2024, it the department identified one new road serving the new residential development at Branshill, Sauchie which may have potential to impact air quality. The department are however not aware of any future plans for the development of a new major road.

Clackmannanshire Council have completed a trial on the use of Warm Mix Asphalt, which produces lower emissions from asphalt production than the conventional Hot Rolled Asphalt. This is achieved by producing asphalt at lower temperatures. The trial with the use of Warm Mix Asphalt is being monitored for durability. It has been found to a good material however it is reliant upon the production of large batches for its use to be cost-effective. This may be considered a disadvantage in reducing emissions to air. However, in 2024, Warm Mix Asphalt has been used in Alloa and Dollar. It has only been used during summer months and there are concerns it may not be suitable for use in winter months. Therefore, due to the expensive cost relative, its use is likely to be limited.

4.2 Other Transport Sources

During 2024, there has been no new or significant changed transport sources at:

- 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 15m; and
- Locations with a large number of movement of diesel locomotives and potential for long-term exposure within 30m.

4.3 Industrial Sources

During 2024, there were no new industrial sources installed within Clackmannanshire which may have a negative effect on local air quality. There were also no new proposed industrial sources approved for development during 2024.

4.4 Commercial and Domestic Sources

The ‘Environmental Health’ and ‘Planning’ departments of Clackmannanshire Council 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 2024, there were no new commercial emission sources introduced which may have a negative effect on local air quality.

New Build Heat Standard:

The new build heat standard (NBHS) that came into force on 1st April 2024 require all new buildings to install climate-friendly heating systems instead of oil and gas boilers. It came under review in 2024 following concerns from rural communities, which results in changes being made to the NBHS in November 2024. The amended standard came into force on 1st January 2025 and allows bioenergy heating systems like wood burner and peat-burning systems to:

- Be installed in all new homes and buildings, by putting temporary arrangements into law and expanding them to apply to all building; and
- Continue to be used in existing buildings being converted and captured by the NBHS.

The changes to the NBHS will also allow for any type of secondary heating in new buildings. It remains the case that fossil fuel gas and oil boilers cannot be used as a mains heating system in new-build homes and buildings.

Installation of Air Source Heat Pumps:

During 2024, Clackmannanshire Council have observed an increase in the number of planning applications that mention the installation of an air source heat pump.

Domestic Emission Sources:

During 2024, 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 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 2024, there have been no new or significant changed fugitive or uncontrolled sources at:

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

5 Planning Applications

The 'Development and Planning' department within Clackmannanshire Council was consulted to identify if there were any major planning applications during 2024 which may have the potential to negatively affect local air quality. The applications and outcomes are summarised in Table 5.1, with those requiring an air quality assessment outlined in red.

Table 5.1 – 2024 Planning Applications with an Air Quality Interest

Date	Planning Application	Development Information	Air Quality Interest?	Air Quality Assessment Required?	Decision
15/12/23	23/00276/FULL	Alterations, Extension, installation, formation Glassworks building including louvres, external plant including silos etc to accommodate replacement furnaces	Yes	Yes	Approved
22/01/24	24/00023/FULL	Installation Of Wood Burning Stove And External Flue On Eastern Gable Of House	Yes	No	Approved
24/01/24	24/00026/FULL	Erection of 10 houses with ASHPs (at rear)	Yes	-	Approved
05/02/24	24/00031/MSC	Residential Development 51 houses (Phase 1B)	Yes	Yes Submitted but requires review due to new ZDEH	Approved
09/02/24	24/00032/FULL	Extension & Alteration to Aldi store including EV charging points, ASHPs & HRS	Yes	No	Approved
05/04/24	24/00073/FULL	Variation of PP 22/00012/FULL	No	-	Approved

03/05/24	24/00104/FULL	Installation of recreational hut	Yes	3/5/24	24/00104/FULL
07/05/24	24/00108/FULL	Alterations, Conversion, Extension to House (includes wood burning stove)	Yes	No	Approved
24/06/24	24/00146/PAN	Residential Dev , major development	Yes	Yes	Response to Notice Issued
09/07/24	24/00157/FULL	Erection of 37 houses, Branshill	Yes	Yes	Approved
10/07/24	24/00158/PPP	COU to residential Dev 4 houses	Yes	No	Refused
15/07/24	24/00149/FULL	Erection of a Well-Being Hub (Class 11) Including Swimming Pool, Sports Hall and External Sports and Play Facilities and Erection Of Additional Support Needs School with External Play Areas (Class 10), with Electricity Sub-station, Landscaping , Drainage, Access and Parking and Sustainable Urban Drainage	Yes Transport Ass, Environmental Report, ASHPs x 9 External condensers x 12 AHUs x 8 MVHRs x 24	Yes	Approved
16/07/24	24/00160/FULL	Conversion & Extension to outbuilding for form house	Yes,	16/7/24	24/00160/FULL
15/08/24	24/00176/ FULL	Internal alterations including WBS, Burnbrae, Dollar	Yes	No	Approved
17/09/24	24/00197/FULL	Alterations to house, new ASHP, Devonside	Yes	No	Approved

17/10/24	24/00216/MSC	Dev 74 Houses, Branshill Sauchie	Yes	Yes	Awaiting Decision
08/11/24	24/00229/FULL	Demo of House & Erection of 2 storey house with WBS & ASHPS	Yes	No	Approved
13/11/24	24/00232/FULL	Installation of Wood Burning Stove at 12 Campbell Street, Dollar	Yes	No	Approved
13/11/24	24/00233/FULL	Internal Alterations West Wood , Forestmill includes WBS	Yes	No	Approved
20/11/24	24/00237/FULL	Installation of Air Source Heat Pump at The Hive, Dollar	2 x ASHP	No	Approved
02/12/24	24/00246/full	Demolition of Nursery to form Residential care Home.	2 x ASHPs	No	Approved

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

In 2024, Clackmannanshire Council undertook monitoring of NO_2, PM_{10} and $PM_{2.5}$ at locations detailed in the report. The concentrations of NO_2 were monitored passively via a diffusion tube network of six sites and continuously via an automatic analyser at one site. The concentrations of PM_{10} and $PM_{2.5}$ were also concurrently monitored by this automatic analyser. During 2024, there was no changes to either the number or location of sites on both the passive and continuous monitoring networks. The 2024 annual mean concentrations reported by the monitoring networks are reported below:

- NO_2 (Automatic) = 11.5 µg/m^3.
- NO_2 (Passive) = 11.3 µg/m^3 (Maximum Concentration).
- PM_{10} (Automatic) = 8.6 µg/m^3.
- $PM_{2.5}$ (Automatic) = 6.4 µg/m^3.

The data from both the passive diffusion tube and the continuous monitoring networks indicates that the concentration of all measured pollutants is compliant with the air quality objectives. This is a year-on-year trend that has been observed in Clackmannanshire which has resulted in no AQMA needing to be declared for any pollutant. Therefore, the latest reported monitoring data demonstrates that Clackmannanshire continues to enjoy good air quality, and that there are no new areas of concern identified during 2024.

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 outlined.

6.3 Proposed Actions

Despite recent monitoring data showing compliance with the air quality objectives for all pollutants, Clackmannanshire Council are committed to continue to take action to further improve air quality. This is to be primarily achieved by implementing the measures outlined in Table 2.1 and raising awareness of air quality issues to the public through initiatives such as ‘Clean Air Day’.

The main actions that Clackmannanshire Council intend to implement are centred around encouraging alternate modes of transport. For example, increasing the uptake of EVs, developing safer routes to encourage walking and cycling, and engaging with 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 by ensuring that residents’ exposure to air pollution continues to reduce.

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	-	NO_2 – Chemiluminescent PM_{10} / $PM_{2.5}$ – Fidas	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 – Air Quality Monitoring Sites (Clackmannanshire Overview)

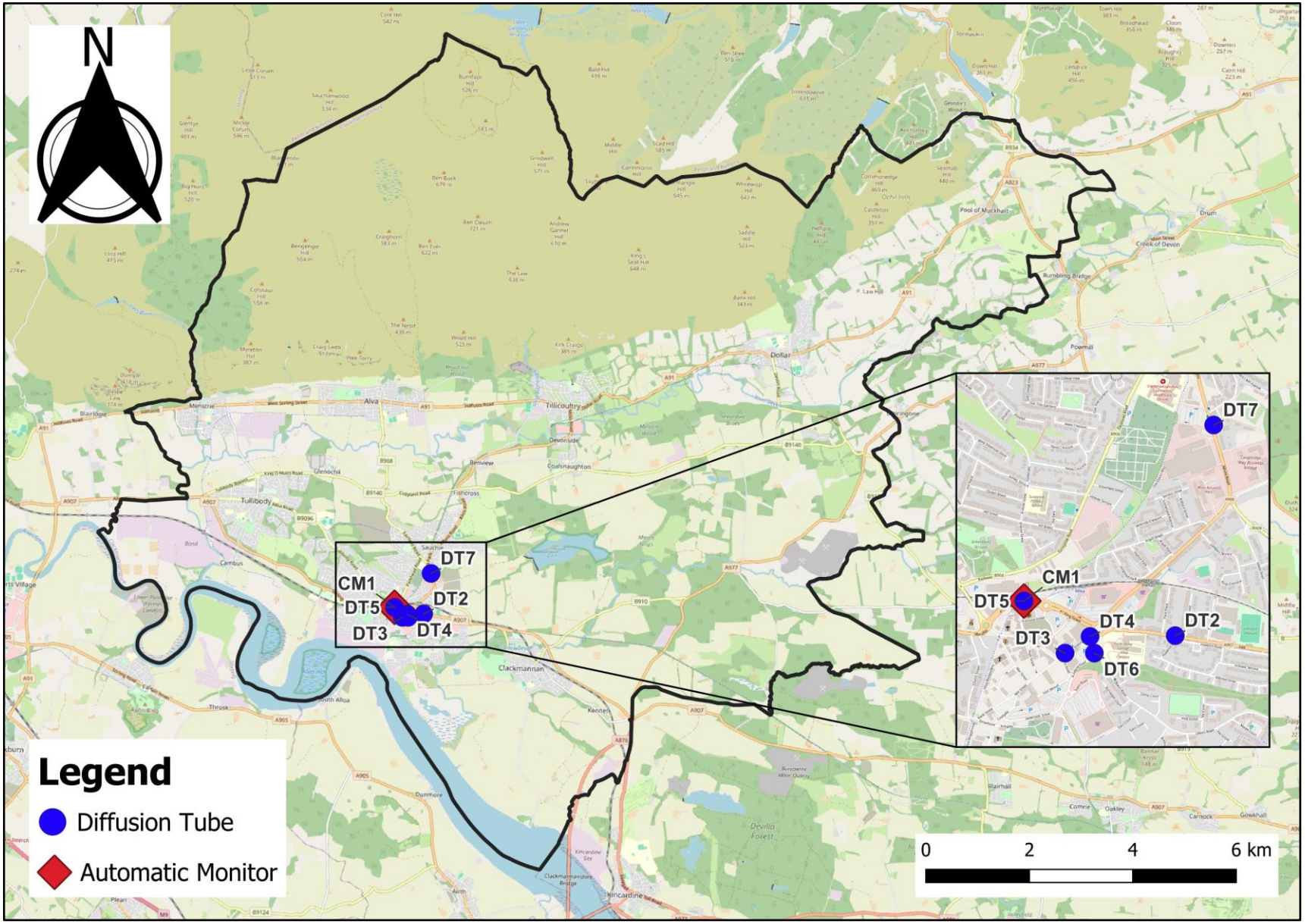


Figure A.2 – Air Quality Monitoring Sites (Alloa / Sauchie)

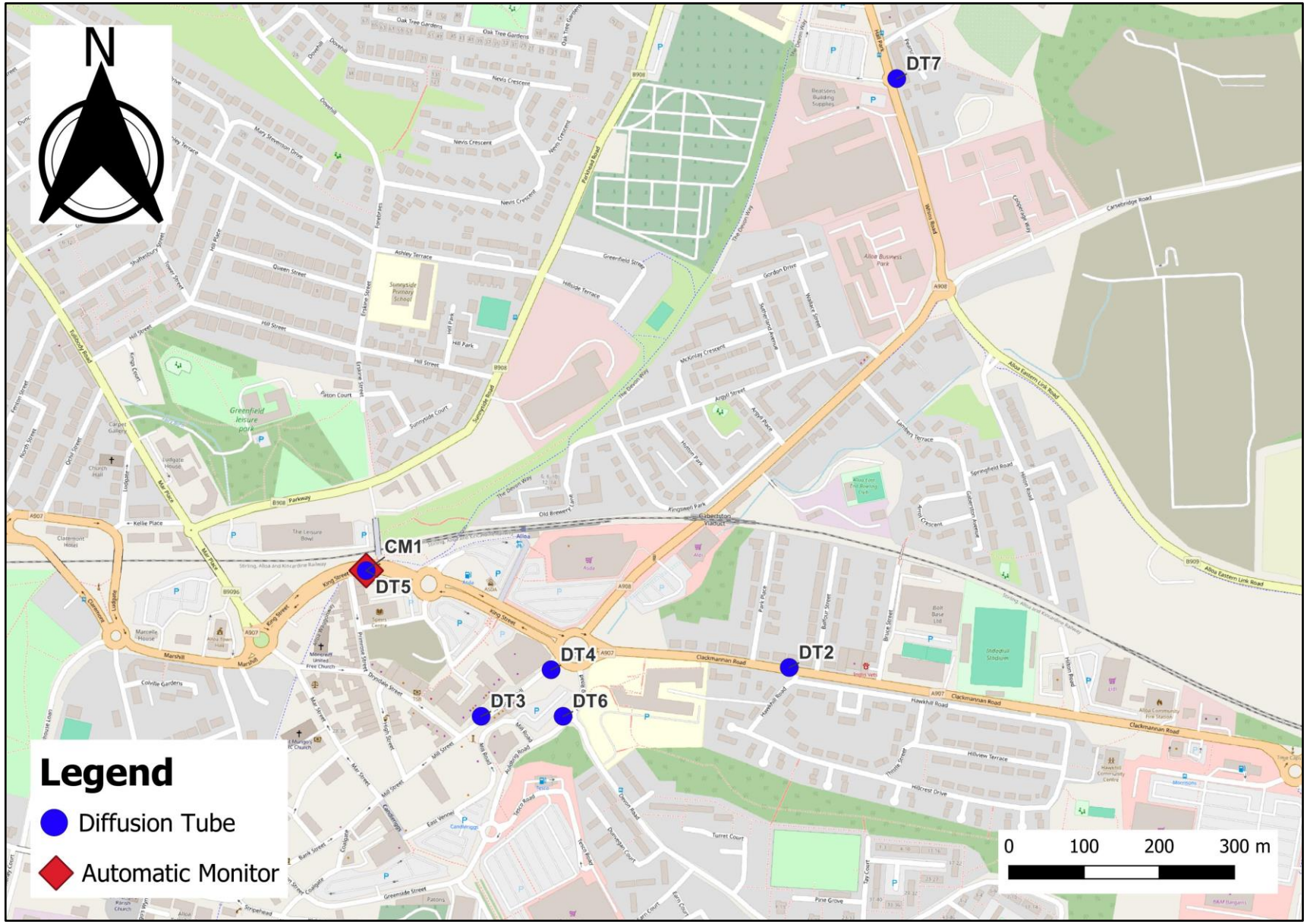


Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	288665	693072	Roadside	98.3	98.3	19.0	17.7	14.8	13.5	11.5

Notes:

Exceedances of the NO_2 annual mean objective of 40 µg/m^3 are shown in bold.

NO_2 annual means exceeding 60 µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.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 NO_2 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 2024 (%) (2)	2020	2021	2022	2023	2024
DT2	289228	692943	Kerbside	100.0	100.0	16.1	18.4	15.7	11.8	10.5
DT3	288818	692878	Kerbside	100.0	100.0	15.6	17.7	15.6	14.2	11.3
DT4	288911	692940	Kerbside	100.0	100.0	15.2	18.6	16.1	13.4	11.0
DT5	288665	693072	Kerbside	100.0	100.0	13.0	15.8	12.9	11.1	9.0
DT6	288927	692878	Kerbside	100.0	100.0	13.0	16.2	14.2	11.6	9.5
DT7	289371	693727	Kerbside	100.0	100.0	11.8	14.5	12.0	10.2	9.1

☒ **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 NO_2 annual mean objective of 40 µg/m³ are shown in bold.

NO_2 annual means exceeding 60 µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(22) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(4) 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 NO_2 Monitoring Results (2020 – 2024)

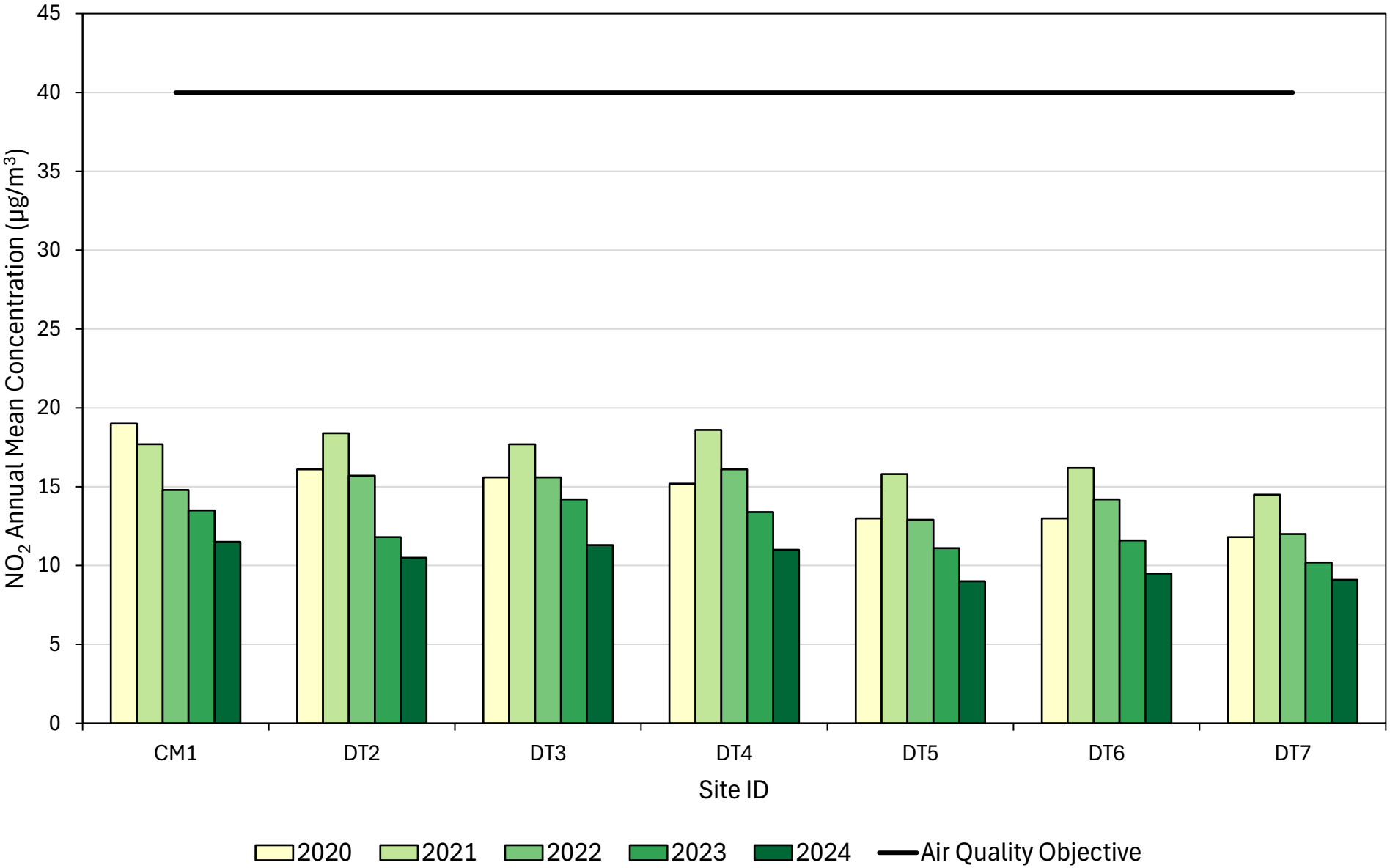


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	288665	693072	Roadside	98.3	98.3	0	0 (61.2)	0	1	0

Notes:

Exceedances of the NO_2 1-hour mean objective (200 µg/m^3 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 PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	288665	693072	Roadside	98.2	98.2	9.0	10.7	11.2	9.4	8.6

Notes:

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

All means have been "annualised" as per LAQM.TG(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 PM_{10} Monitoring Results (2020 – 2024)

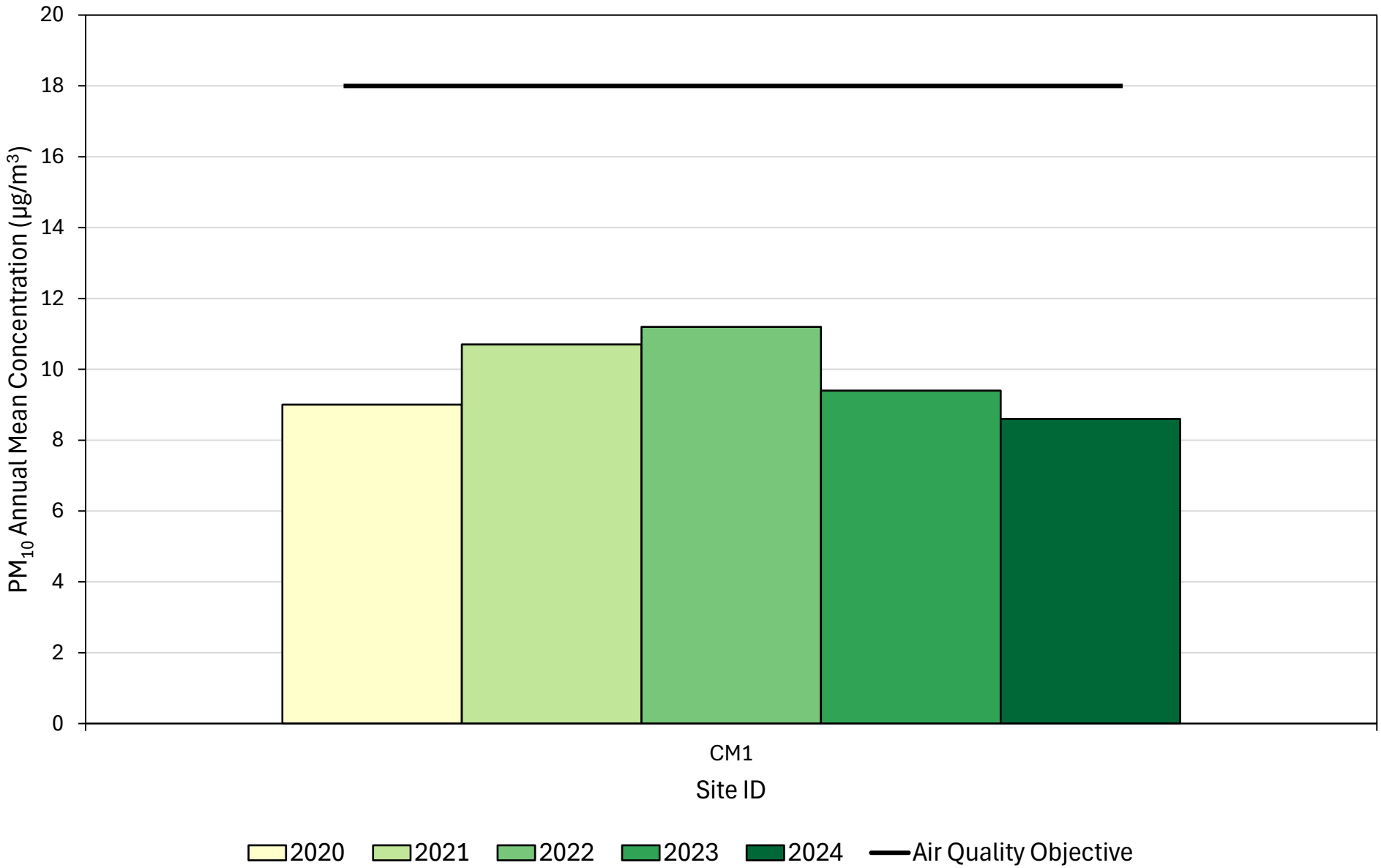


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50 µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	288665	693072	Roadside	98.2	98.2	0	3	2	0	0

Notes:

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

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

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

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

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2024 (%) (2)	2020	2021	2022	2023	2024
CM1	288665	693072	Roadside	98.2	98.2	5.0	5.6	6.4	5.6	6.4

Notes:

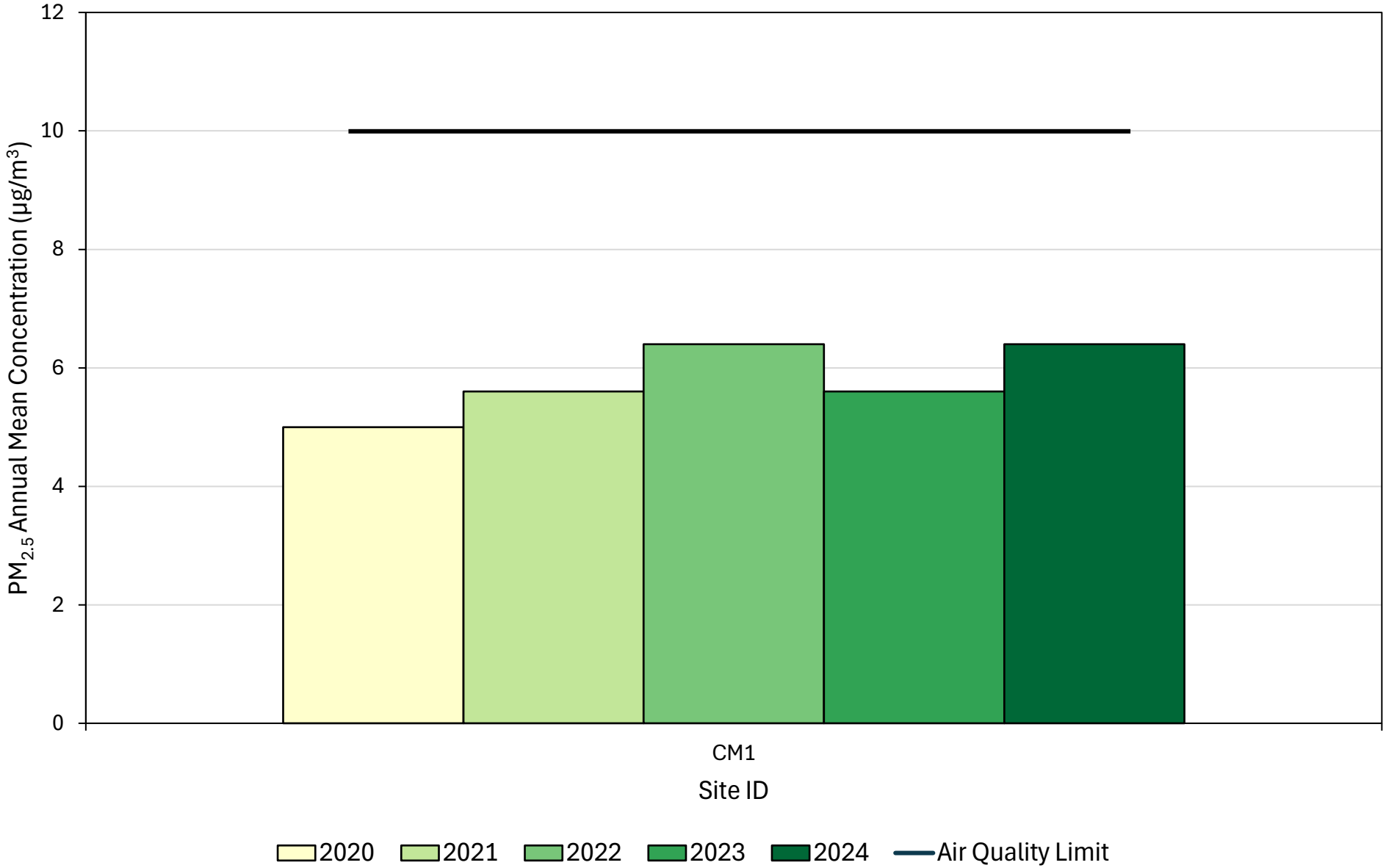
Exceedances of the $PM_{2.5}$ annual mean objective of 10 µg/m^3 are shown in bold.

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 (2020 – 2024)



Appendix B: Full Monthly Diffusion Tube Results for 2024

Table B.1 – NO_2 2024 Monthly Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.82)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT2	289228	692943	15.1	9.2	9.3	5.8	8.8	8.4	13.4	9.5	14.8	18.3	25.1	16.5	12.9	10.5	-	-
DT3	288818	692878	15.6	11.1	13.5	7.9	5.0	13.9	18.2	9.9	17.7	20.6	22.9	9.3	13.8	11.3	-	-
DT4	288911	692940	12.3	11.4	19.0	6.4	8.2	8.1	15.4	10.2	16.5	17.3	22.9	13.9	13.5	11.0	-	-
DT5	288665	693072	11.6	9.3	10.8	6.1	7.7	7.1	14.8	7.2	14.9	16.6	16.3	9.6	11.0	9.0	-	-
DT6	288927	692878	9.7	11.4	11.7	7.9	7.5	8.7	11.6	7.0	14.7	16.8	20.0	12.3	11.6	9.5	-	-
DT7	289371	693727	11.4	8.6	9.5	5.5	6.8	5.7	9.5	8.1	16.3	18.3	16.5	17.3	11.1	9.1	-	-

☒ **All erroneous data has been removed from the NO_2 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 2024 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40 µg/m³ are shown in **bold**.

NO_2 annual means exceeding 60 µg/m³, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Clackmannanshire During 2024

Clackmannanshire Council has not identified any new sources relating to air quality within the reporting year of 2024.

Additional Air Quality Works Undertaken by Clackmannanshire Council During 2024

Clackmannanshire Council finalised the development of the New Climate Change Strategy in 2024, and launched the public consultation on 20th September 2024. The strategy sets out a framework for achieving net zero greenhouse gas emissions for Clackmannanshire Council's own operations by 2040 and for the rest of Clackmannanshire by at least 2045. There are six themes in the strategy, which are expected to have an additional co-benefit of improving air quality. For example, Theme 2 ('Low Carbon Transport') suggests that:

"Given Clackmannanshire Council's role as an employer of over 2,050 staff and as a local authority responsible for planning and transportation services to the public, it has huge scope to reduce emissions while improving air quality".

Additionally, Clackmannanshire Council are stakeholders in a new project that is being undertaken by the University of Striling, which continued to progress during 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 area and includes air quality monitoring using AQ Mesh monitoring and PurpleAirs at over 40 locations including industrial, residential and public buildings. The project also allows members of the public living and working within both Clackmannanshire and Stirling to share their air pollution 'story' on an online dashboard by sharing their experiences with and perceptions of air pollution across the area. This also allows for the identification of any potential hotspot areas, based on peoples' perceptions.

QA/QC of Diffusion Tube Monitoring

During 2024, the diffusion tubes deployed by Clackmannanshire Council were supplied and analysed by Glasgow Scientific Services (GSS) and were prepared using the 20% Triethanolamine (TEA) in water preparation method. GSS are a UKAS accredited laboratory that participate in the AIR-PT scheme for NO_2 diffusion tube analysis and the Annual Field Intercomparison Exercise. These provide strict criteria relating to performance that participating laboratories must meet, ensuring that the reported NO_2 concentrations are of a high calibre. For all AIR-PT rounds for diffusion rubes analysed during 2024, GSS received a score of 75% (AR062) and 100% for the remaining rounds (AR063, AR065 and AR066) – the percentage score reflects the reflects the results deemed satisfactory based on the z-score ± 2. Additionally, the precision of the NO_2 diffusion tubes (20% TEA in Water) supplied by GSS was classified as 'good' for the single observation in 2024. This reflects the laboratory's performance and consistency in preparing and analysing the diffusion tubes, as well as the subsequent handling of the tubes in the field. Tubes are considered to have 'good' precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more monitoring periods during the year is less than 20%. Further information on the precision results is available on the LAQM Website. As a result of these results, there is a high degree of confidence in the data of the diffusion tube results that is presented in this report.

During 2024, the diffusion tube monitoring was completed in adherence with the Defra monitoring calendar, with all changeovers completed within the recommended two days of the specified date.

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 0.82 to the 2024 monitoring data. The national bias adjustment factor spreadsheet (version 04/25) was used to derive the national bias adjustment factors for diffusion tubes analysed by GSS during 2024. However, as shown in Figure C.1, this was based only on one study.

Figure C.1 – National Bias Adjustment Factor Spreadsheet (04/25)

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 04/25

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 2025

LAQM Helpdesk Website

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[3] 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[2]	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@bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[5]	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	2024	KS	Marylebone Road Intercomparison	11	43	36	21.2%	G	0.82
Glasgow Scientific Services	20% TEA in water	2024		Overall Factor[3] (1 study)				Use		0.82

A summary of bias adjustment factors used by Clackmannanshire Council over the past five years is presented in Table C.1. Whilst it is evident that the bias adjustment factor is likely to vary year-on-year due to the national factor being derived from one study only (Marylebone Road Intercomparison), Clackmannanshire Council do not undertake any triplicate co-location monitoring so are not able to calculate a local bias adjustment factor.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2024	National	04/25	0.82
2023	National	03/24	0.86 (1)
2022	National	03/23	0.89(1)
2021	National	03/22	0.89(1)
2020	National	03/21	0.82 (1)

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

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Clackmannanshire required distance correction during 2024.

QA/QC of Automatic Monitoring

During 2024, automatic monitoring of NO_2 and PM_{10} / $PM_{2.5}$ was completed within Clackmannanshire using a Chemiluminescence and Fidas analyser, respectively. These automatic analysers are calibrated by Clackmannanshire Council on a monthly basis, with the calibration results sent to Ricardo (on behalf of the Scottish Government). Each of the analysers are calibrated 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 Ricardo. Clackmannanshire Council (as the local site operator) visit the site after any reports of bad weather or roadworks to check the site is operating as expecting. The data is ratified by Acoem and is available at the following Scottish Government Website.

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

The PM_{10} and $PM_{2.5}$ data has been adjusted in accordance with the guidance note issued by the Scottish Government in relation to the monitoring of particulate matter (PM) data. For PM data measures via a Fidas 200 instrument, the ratified PM_{10} 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 in the issued Guidance Note.

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.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Clackmannanshire required distance correction during 2024.

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

		Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	2020	2021	2022	2023	2024
NO_2	Annual Mean (µg/m^3)	99.5	99.5	14.6	17.9	15.6	15.7	25.9
	1-hr Means > 200 µg/m^3			0	0	0	0	0
PM_{10}	Annual Mean (µg/m^3)	100	100	3.9	3.7	3.7	2.8	2.1
	24-hr Means > 50 µg/m^3			0	0	0	0	0
$PM_{2.5}$	Annual Mean (µg/m^3)	100	100	2.0	2.1	2.0	1.7	1.5

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	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

(1) Clackmannanshire Council – Local Development Plan. 2015. Avaiable at: https://www.clacks.gov.uk/document/6862.pdf

(2) Clackmannanshire Council – Wood Burning Stoves. Avaiable at: https://www.clacks.gov.uk/environment/woodburningstoves/

(3) Clackmannanshire Council – Local Air Quality Management. Avaiable at: https://www.clacks.gov.uk/environment/airquality/

(4) Department for Environment, Food and Rural Affairs (Defra) – Local Air Quality Management Technical Guidance 22 (LAQM TG.22). 2022. Avaiable at: https://www.scottishairquality.scot/sites/default/files/publications/2023-04/LAQM-TG22-August-22-v1.0_0.pdf

(5) Climate Forth – Inner Forth Bike Bus. 2025. Available at: https://www.innerforthlandscape.co.uk/climate-forth/inner-forth-bike-bus