Cumberland Council (Carlisle Area) 2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: August 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Cumberland Council (Carlisle Area)

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

On 1st April 2023 Cumberland Council replaced Cumbria County Council and the three local authorities: Carlisle City Council, Allerdale Borough Council and Copeland Borough Council. For consistency with previous Annual Status Reports, the same monitoring network and Air Quality Management Areas, previously managed by Carlisle City Council, will be used in this assessment. For the purposes of this report the same area will now be known as Cumberland Council (Carlisle area).

Air quality has been monitored in Carlisle and the surrounding district as part of the local authority review and assessment process since 1996. In addition to nitrogen dioxide, other pollutants measured include particulate matter (in two size ranges; $PM_{2.5}$ and PM_{10}) and benzene (measured as part of Defra's Non-Automatic Hydrocarbon Network). However, as local authorities are no longer required to report benzene concentrations, we are not reporting these in this Annual Status Report.

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, January 2023

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

Following the impact of Covid-19 in 2020 which resulted in historical low NO_2 concentrations, annual average NO_2 concentrations increased on average by 3.5 µg m^{-3} in 2021. However, in 2022 NO_2 concentrations decreased on average by 1.9 µg m^{-3} compared to 2021. NO_2 concentrations remain below the 40 µg m^{-3} annual mean AQO within our AQMAs and all locations across Carlisle. The highest NO_2 concentration continues to be measured within Bridge Street AQMA (AQMA 4) but the concentration decreased from 36.3 µg m^{-3} in 2021 to 33.5 µg m^{-3} in 2022. This represents an 8 % decrease in NO_2 concentration.

The annual mean NO_2 concentration measured by the relocated automatic analyser at Morton Community Centre was 9.0 µg m^{-3} in 2022 and is considerably less than that measured previously at Paddy's Market, which over the previous five years ranged from a low of 19 µg m^{-3} in 2020 to a high of 26 µg m^{-3} in 2019. This probably reflects that the new location is to the southwest of the city centre where NOx emissions are less.

While the air quality measures that have been introduced, had tended to decrease NO_2 concentrations at all locations throughout Carlisle, the NO_2 concentrations measured before the pandemic suggested that the following AQMAs should remain:

- AQMA 1 (Brampton Road):
- AQMA 2 (Currock Street);
- AQMA 4 (Bridge Street);
- AQMA 5 (Dalston Road).

However, more recent monitoring, particularly since 2018, suggests that revocation could be considered at AQMA 1. Further monitoring is required before revocation could be considered at AQMA 2, AQMA 3 and AQMA 4.

AQMA 1[5] was significantly reduced in size; it no longer includes the area along the A7 from Hardwicke Circus to Junction 44 of the M6 instead it includes just an area extending for approximately 100 m from the Stanwix Bank junction (A7) along Brampton Road including properties 1 to 17 on Brampton Road. The order came into force on 25th July 2019.

5 https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/Air%20Quality%20Management%20Order%20No%201%20.pdf

The orders for revocation of AQMA 3[6] and AQMA 6[7] came into force on 3rd July 2019. Copies of the orders can be obtained from www.carlisle.gov.uk (see footnotes below).

They can be viewed on the Department for Environment, Food and Rural Affairs (Defra) website: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=48.

Improvements to the signalling on Castle Way and Bridge Street was implemented in August 2022. This change prevents vehicles, including HGV's and buses from leaving the Willowholme industrial estate and then being subsequently stopped at the pedestrian crossing on Bridge Street. The 2022 monitoring data shows significant improvement within AQMA 4, which will be demonstrated in this ASR.

A Defra funding bid was made to introduce wider improvements to traffic management and to reduce traffic derived emissions within the Bridge St AQMA and the wider area. This included continuous automatic NOx monitoring to determine signal sequences during busy periods. The application was rejected by Defra.

In 2022 the PM_{10} concentration at Morton Manor Community Centre was 14.3 µg m^{-3} which is slightly less than the concentrations measured previously at Paddy's Market; over the previous five years the concentration ranged from a low of 14.6 µg m^{-3} in 2017 to a high of 18.6 m^{-3} in 2019. While the nitrogen dioxide concentration was much lower at Morton Manor compared to Paddy's Market, the PM_{10} is relatively higher because the sources of PM_{10} are much more varied with a significant fraction arising from sources outside Carlisle.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

[6] https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AL517%20-%20Order%20Revoking%20Air%20Quality%20Management%20Order%20Area%20No%203.pdf

[7] https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AL517%20-%20Order%20Revoking%20Air%20Quality%20Management%20Order%20.pdf

The Environmental Improvement Plan[8] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[9] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Cumberland Council has taken forward a number of measures during the current reporting year of 2022 in pursuit of improving local air quality. Key local measures continue to support improvements in local air quality and the City Council continues to work on:

- Carlisle Southern Link Road: This will connect Junction 42 of the M6 with the A595 to the west. The route will include new junctions linking existing radial routes into Carlisle and the Garden Village. The 8km route will include bridges over two main railway lines and the Caldew and Petteril rivers, a network of footways and cycleway. This construction work is now underway.
- Bus infrastructure improvements: Ongoing improvements to bus services with new shelters and raised kerbs continues. In addition, plans for large new housing developments will include public transport provision.
- Potential opportunities to introduce new smart traffic signals, within the city centre. This could potentially be combined with continuous air quality monitoring, to reduce traffic derived emissions.
- Ongoing work to provide grant funding for home insulation and domestic renewable heating options.
- Ongoing schemes to introduce vehicle charging points on council owned land and as part of new private development, including charging provision in all new residential developments.

[8] Defra. Environmental Improvement Plan 2023, January 2023

[9] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Conclusions and Priorities

Nitrogen dioxide concentrations were generally lower in 2022 compared to 2021 thorough out Carlisle. There continues to be no exceedance of the annual objective concentration for NO_2 at locations relevant for human exposure anywhere in Cumberland Council (Carlisle area). It had been expected that NO_2 concentrations would return to pre Covid-19 concentrations within 2022 or 2023. But the observed concentrations for 2022 have decreased faster than expected but monitoring should continue to ensure that that the decrease is sustained.

As a result, it is too early to consider changing the AQMAs within Carlisle and monitoring should continue to ensure the ongoing measures in the AQAP are achieving success.

Cumberland Council's priorities for the coming year are:

- Drive forward on actions identified in the Action Plan.
- Continue to progress development of the Carlisle Southern Link Road
- Promote travel plans and introduction of green spaces for all new housing developments. Continue to work with businesses to promote more widespread use of alternative transport.
- Improve the vehicle charging infrastructure.
- Increase zero and near zero emission vehicle uptake as part of new residential development.

Local Engagement and How to get Involved

There are a number of ways in which the public can get involved with improving air quality:

- Taking part in Green Travel Plan arrangements with their employer.
- Joining local cycle groups and walk to school/work groups.
- The use of sustainable transport options including cycling, walking and the bus.
- Investigate how to improve the energy efficiency at home, including sustainable heating and improved home insulation. Contact Cumberland Council to find out what grants are currently available.
- Become involved other community groups such as the Waverley Viaduct Trust which is currently working to reopen the Waverley Viaduct Bridge. The Local

Enterprise Partnership (LEP) also works to secure government grant funding for local projects.

Cumberland Council's website can be used to view all previous air quality review and assessment reports as well as real time monitoring data and advice on how to reduce emissions to air.

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health department of Cumberland Council (Carlisle Area) with the support and agreement of the following officers and departments:

- Highways department
- Planning department

This ASR has been signed off by the Director of Public Health.

Colin Cox: 

If you have any comments on this ASR please send them to Environmental Health at:

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1 Local Air Quality Management

This report provides an overview of air quality in Cumberland Council (Carlisle Area), previously known as Carlisle City Council, during 2022. 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Cumberland Council (Carlisle Area) to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

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 should prepare an Air Quality Action Plan (AQAP) within 18 months. The AQAP should specify how air quality targets will be achieved and maintained and provide dates by which measures will be carried out.

A summary of AQMAs declared by Cumberland Council (Carlisle Area) can be found in Table 2-1. The table presents a description of the four AQMAs that are currently designated within Cumberland Council (Carlisle Area). Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA(s) and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean

Table 2-1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
AQMA 1	02/12/2005 Amended 25th July 2019	NO_2 Annual Mean	AQMA 1 Amended 25th July 2019 to include just 100 m Section along B6264 Brampton Road.	YES	45.3	26.9	10	Cumberland Council Air Quality Action Plan	https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AQAP_CCC_2021.pdf?ver=MTwIH1-2grJugOerj9V9rQ%3d%3d
AQMA 2	26/01/2007	NO_2 Annual Mean	AQMA 2 Currock Street and the properties immediately to the west of it, between the junction with James St/Water St and Crown St.	YES/NO	44.6	28.8	12	Cumberland Council Air Quality Action Plan	https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AQAP_CCC_2021.pdf?ver=MTwIH1-2grJugOerj9V9rQ%3d%3d
AQMA 3	01/08/2008 Revoked 3rd July 2019	NO_2 Annual Mean	AQMA 3 Wigton Road between Crummock Street and Caldewgate roundabout as well as properties on Caldcotes.	N/A	40	N/A	N/A	N/A	N/A
AQMA 4	01/08/2008	NO_2 Annual Mean	AQMA 4 North side of the A595 at Bridge Street, northbound from the junction with Shaddongate.	YES	43.9	33.5	3	Cumberland Council Air Quality Action Plan	https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AQAP_CCC_2021.pdf?ver=MTwIH1-2grJugOerj9V9rQ%3d%3d
AQMA 5	01/08/2008	NO_2 Annual Mean	AQMA 5 Junction of Dalston Road and Junction Street	YES/NO	48	29.3	7	Cumberland Council Air Quality Action Plan	https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AQAP_CCC_2021.pdf?ver=MTwIH1-2grJugOerj9V9rQ%3d%3d

AQMA 6	01/08/2008 Revoked 3rd July 2019	NO_2 Annual Mean	AQMA 6 London Road and properties on either side near the junction with Blake Street	N/A	43.3	N/A	N/A	N/A	N/A

☒ **Cumberland Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Cumberland Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Cumberland Council (Carlisle Area)

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

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports:

1. *The Council have detailed extensively its measures in place to improve air quality within the district. An updated AQAP is currently under review by the Steering Body, this is encouraging to see as the Council are continually reviewing their air quality strategies, and this can be considered a sign of good practice.*
2. *The Council have discussed NO_2 trends with respect to AQMAs and areas outside of the AQMA, which is welcomed as it allows the reader to understand trends within the area. The Council have also provided figures to depict the trends of NO_2 concentrations, which are grouped by location.*
3. *QA/QC procedures are appropriate and justified clearly, including calculation of the local bias adjustment for comparison with the national adjustment factor and justification of the factor used. This is welcomed and should be continued in the future.*
4. *The Council have provided clear maps of the monitoring sites within the area, which have been grouped by location. This is welcomed as it allows for easy identification of the monitoring locations.*
5. *The Council have made reference to the Public Health Outcome Framework relating to air quality and have provided the D01 indicator, with a comparison to the wider area and to the rest of England. The Council should in future get the 2023 ASR approved by the relevant Director of Public Health.*

Response: The 2023 report has been signed off by the Director of Public Health

6. *The formatting of the report could generally be improved, for example ensuring that there are no 'Error! Reference Source not found' within the report.*

Response: The 2023 ASR report has been formatted correctly.

7. *Clarification is required with the naming of AQMAs. Within the ASR report, AQMA 1 is mentioned however on the LAQM portal this AQMA is named AQMA 7*.

Response: This AQMA was never named as AQMA 7. The original name had been A7 AQMA as it included an area encompassing the A7 between Hardwicke Circus and J44 of the M6. In 2019 the

AQMA was amended and the part of the AQMA including the A7 was removed[10]. The AQMA was also renamed as AQMA 1 and now includes just a section of road along Brampton Road.

Cumberland Council (Carlisle Area) has taken forward a number of direct measures during the current reporting year of 2022 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2-2. Thirteen measures are included within Table 2-2, with the type of measure and the progress Cumberland Council (Carlisle Area) have made during the reporting year of 2022 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2-2.

More detail on these measures can be found in the respective Action Plans: 'Cumberland Council Air Quality Action Plan 2021 (Carlisle Area) (Revised October 2023)'. Key completed measures are:

- Improvements to the signalling on Castle Way and Bridge Street was implemented in August 2022. This change prevents vehicles, including HGV's and buses from leaving the Willowholme industrial estate and then being subsequently stopped at the pedestrian crossing on Bridge Street. This should reduce the number of standing starts at this incline in the road. The initial 2022 monitoring data shows significant improvement within AQMA 4.
- Construction work has started on the Carlisle Southern Link Road. This is expected to provide a major improvement on traffic volumes and congestion in the city centre.

Cumberland Council (Carlisle Area) does not expect any of our measures to be completed over the course of the next reporting year, as many of our measures are ongoing in nature, with no expected completion date. The Carlisle Southern Link Road is scheduled to open to the public in 2025.

Cumberland Council (Carlisle Area) 's priorities for the coming year are:

- Drive forward on actions identified in the Action Plan.
- Continue to progress development of the Carlisle Southern Link Road

[10] https://uk-air.defra.gov.uk/aqma/details?aqma_ref=405

- Promote travel plans and introduction of green spaces for all new housing developments. Continue to work with businesses to promote more widespread use of alternative transport.
- Improve the vehicle charging infrastructure.
- Increase zero and near zero emission vehicle uptake as part of new residential development.

Cumberland Council (Carlisle Area) worked to implement these measures in partnership with the following stakeholders during 2022:

- Highways department
- Planning department
- Green Spaces department

The principal challenges and barriers to implementation that Cumberland Council (Carlisle Area) anticipates facing are funding restrictions and staff resources to implement measures such as public awareness campaigns.

Progress on some measures has been slower than expected due to restrictions in available funding. Some measures such as the Carlisle Southern Link Road are dependent on external organisations and influences such as inflationary pressure and global events.

Cumberland Council (Carlisle Area) anticipates that the measures stated above and in Table 2-2 will achieve compliance in all our AQMA's.

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Table 2-2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Construction of the new Carlisle Southern Link Road (CSLR). This will extend the existing Carlisle Northern Development Route (CNDR). Monitor the air quality impacts of the CSLR and CNDR.	Traffic Management	Other	<2021	2025	Cumberland Council	Cumberland Council and Ministry of Housing, Communities and Local Government	No	Funding is in place	£150 million	Building work is underway	Potential for significant improvement in NO2 levels across the city centre.	Reduced NO2 levels at monitoring locations and within AQMA's.	The CNDR is operational. Monitoring at receptors on new road revealed consistently low NO2 levels. There is evidence of NO2 improvements and traffic reduction in the city centre. Several new cycle links from arterial roads are in place. Construction of the Carlisle Southern Link Road is underway. Environmental Health assisted in the consultation process. Delays were incurred due to rising costs and supply issues caused by global events. Expected to be open to the public in 2025.	The new Carlisle Southern Link Road is part of the wider Garden Village housing project, which is expected to deliver 10'000 new homes by 2030. The road would extend the existing CNDR. This would provide a complete bypass around the City Centre with both ends of the route connected to the M6 Motorway.
2	Effective traffic management measures will be implemented to improve traffic flow on the existing road network and in new developments.	Traffic Management	UTC, Congestion management, traffic reduction	2012	Ongoing.	Cumberland Council	Cumberland Council	No. 2022 funding bid failed	Ongoing.	Unknown	Ongoing	Modelling undertaken at AQMA 4 indicates that a 2.7% reduction in NOx would achieve compliance.	Reduced NO2 levels and standing traffic within AQMA's.	Traffic modelling has shown that emissions from diesel vehicles dominate emissions. Emissions factor toolkit has been used to show increased traffic speeds would reduce oxide of nitrogen emissions within Bridge Street AQMA. Work has been carried out to the traffic light sequence in this area to reduce standing start traffic. Early data indicates a significant improvement in NO2 levels within the AQMA.	Improvements to the signalling on Castle Way and Bridge Street was implemented in August 2022. Early monitoring data shows significant improvement in AQMA 4. A funding bid to make wider improvements to traffic management around Bridge St AQMA including automatic NOx measurements was rejected by Defra.
3	Environmental Health will work alongside the Planning Department to minimise the air quality impacts of new developments.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Effective links between EH and Planning. AQIA's submitted where necessary. Early consultation with applicants.	Environmental Health is consulted on all proposed developments which may impact on air quality. Responses are aimed at minimising AQ impacts, particularly within or close to our AQMA's. This includes large residential developments. Recommendations made for car charging points for all new residential properties.	Environmental Health comment on all potentially polluting developments. The outcome depends on Planning Department and current policy
4	Improvements to passenger transport infrastructure. Sustainable transport will be integrated into major new developments	Transport Planning and Infrastructure	Bus route improvements	2012	Ongoing	Cumberland Council and local public transport providers	Cumberland Council and local public transport providers	No	Ongoing.	Unknown	Ongoing.	Not calculated	Improved bus service. Increased use of transport provided. Reduced NO2 along main routes	Ongoing improvements to bus services with new shelters and raised kerbs. Plans for large new housing developments include public transport provision and/or sustainable transport options.	Success is dependent on public uptake of sustainable transport options. The council has no real control over the improvement of vehicle fleet.
5	Cycling and walking will be encouraged. Implement new and improved pedestrian and cycle links	Transport Planning and Infrastructure	Cycle network	2012	Ongoing	Cumberland Council	Cumberland Council with various funding bids.	No	Ongoing.	Unknown	Ongoing.	Not calculated	Completion of proposed works and ongoing improvement of the cycle and pedestrian route network.	The pedestrian crossing on Castle Way is complete. Pedestrian/cycle bridge connecting Currock and Denton Holme, over the railway line are complete. Ongoing applications for government funding for schemes that aim to improve the existing cycleways, creating new sections of cycle track and installing vehicle charging points. Extensive plans to increase the cycle path network are now in place.	Ongoing plans associated with improved pedestrian and cycle connections to the CNDR. Funding required to accelerate major improvements.
6	Travel plans will be required for all new developments that meet the criteria. Existing businesses will be encouraged to implement, monitor and review travel plans.	Promoting Travel Alternatives	Workplace Travel Planning	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Increased number of participant businesses and more widespread use of alternative transport.	All schools within the city now have travel plans. New developments likely to result in increased highway usage must submit a travel plan for approval when making an application.	Difficult to quantify the impact of Travel Plans.
7	The council will continue to provide comprehensive environmental control over emissions from all Part A2 and B Processes located within the local authority area.	Environmental Permits	Other measure through permit systems and economic instruments	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Risk based inspections showing that emission limits are being met and efforts are being made to improve on national objectives.	All processes which fall under part B & A2 processes are permitted by Cumberland Council. No recent enforcement action required in relation to emissions.	Any new applications are considered by Environmental Health as part of the planning consultation process and the environmental permitting procedures.
8	The council will continue to investigate complaints of black smoke and smoke nuisance as well as managing smokeless zones. Enforcement action will be taken as necessary.	Public Information	Other	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Reduction in the number of complaints from members of the public. Reduction in repeat offences.	There is information on website. Environmental Health provide advice and enforcement as required. Smoke complaints are responded to involving domestic fires, bonfires, trade waste, industrial and dark smoke. Advice leaflet sent out for all cases of domestic burning. Advice given to minimise potential for smoke issues and ensure compliance with smokeless zones.	The Air Quality Strategy set out a goal to cut public exposure to particulate matter pollution. The aim is to reduce by half the number of people in the United Kingdom exposed to the WHO guideline concentration of 10 µg m^{-3} by 2025. The measures set out here will contribute to this target.
9	Provision of home improvement grants and energy saving advice to the public.	Public Information	Other	2012	Ongoing	Cumberland Council	Cumberland Council with various funding bids.	No	Ongoing.	Unknown	Ongoing.	Not calculated	Number of properties taking up schemes, resulting in Improved energy efficiency of housing stock.	Cumberland Council (Carlisle Area) Home Improvement Agency is currently delivering Health through Warmth Scheme, supported by the Energy Companies Obligation. This includes boiler upgrades and home insulation. Safe and warm grants are provided by the council to deliver up to £7,500 to enable low-income homes to carry out minor repairs and energy efficiency	Cumberland Council (Carlisle Area) have now revised Housing Renewal Assistance Policy under the Regulatory Reform Order 2002. This covers all grants involving housing and energy efficiency measures.

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
														measures to their homes. Work has begun on enforcing the Minimum Energy Efficiency Standards, specifically aimed at private rented sector properties. New energy efficiency grants are now available up to £3000 through council grant scheme. Available schemes are regularly changing and evolving.	
10	Environmental Health will work alongside the Neighbourhoods and Green Spaces team to implement the effective use of trees and green areas to offset traffic derived emissions.	Public Information	Other	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Increase in trees and vegetation in visible locations. Increased public interest.	Cumberland Council continues to manage and maintain trees in parks and green spaces, including some additional planting, of mainly mixed broadleaf species, where necessary. Planting of green areas is an essential part of many new developments, including residential.	Limitations to planting options in busy urban areas. Parks and open spaces do not have significant air quality issues. Green Spaces continue to have a positive public impact.
11	Air Quality considerations to be included in all relevant council policies and strategies.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Increased awareness of air quality issues and consideration given by more council departments.	Included air quality links within most major relevant policies including Local Transport Plan (LTP 3) (2011-26) and The Carlisle District Local Plan (2015-30). New schemes being developed to deliver improved cycling routes and vehicle charging infrastructure.	Air Quality considerations are put forward during discussion and consultation stages of policy development.
12	Promotion of air quality and sustainable transport issues. Air quality information and monitoring data will be provided to the public.	Public Information	via the Internet	2012	Ongoing	Cumberland Council	Cumberland Council	No	Ongoing.	Unknown	Ongoing.	Not calculated	Increased public awareness and participation in improving air quality.	Air quality info and real time monitoring data is available on the website. Monitoring data shows continued improvement in most areas. Cumberland Council is actively supporting and promoting Clean Air Day, utilising social media and our website, as part of the Global Action Plan. Cumberland Council has ongoing projects to cut carbon emissions. These aim to raise ambition to tackle climate change and sharing learning and resources. The public can influence and drive climate action through citizens' juries and other projects, with community groups steering the programme.	Difficult to quantify improvements as a direct result of promotional work or providing monitoring data.
13	Installation of charging points and development of charging network	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2023	Ongoing	Cumberland Council	Cumberland Council with various funding bids.	No	Ongoing.	Unknown	Ongoing.	Not calculated	More charging points available	In 2023, Cumberland Council received notification that it had been successful with funding to install up to 900 charging points and develop its strategy[11].	Difficult to quantify improvements as a direct result of providing charging points. The aim is to assist with the transition to Electric Vehicles.

[11] https://www.yourcumbria.org/News/2021/partnershipsuccessfulbidtodriveforwardevpoints.aspx

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Cumberland Council (Carlisle Area) is taking the following measures to address $PM_{2.5}$:

- Cumberland Council (Carlisle Area) had monitored $PM_{2.5}$ levels at Paddy's Market AQMS since 2009 as part of the AURN. This is a busy city centre junction between two AQMA's. The annual mean concentrations were consistently well below the objective at around 8-11 µg m^3 at this location. The monitoring equipment was relocated to Morton Manor Community Centre in 2021. $PM_{2.5}$ concentrations have remained within this range. There are ongoing efforts to reduce to reduce the $PM_{2.5}$ concentrations.
- The Environmental Health department will continue to work in partnership with the Highways department.
- Environmental Health will continue to work with the Planning Department with regard to new local developments with significant air quality implications and ensure that air quality implications and mitigation measures are taken into consideration in the planning process.
- We will continue to work alongside the Neighbourhoods and Green Spaces team to investigate and implement the effective use of trees and green areas to offset traffic derived emissions in existing AQMA's and in new development areas.
- The Council will also continue to provide comprehensive control over emissions from all Part A2 and B Processes located within the local authority area. We will work closely with the operators of these installations to continuously monitor and improve on their emissions to air as part of the permitting process.

Cumberland Council (Carlisle Area) has four designated smoke control areas. The locations of the smoke control areas within Carlisle are highlighted on our online mapping tool (http://maps.carlisle.gov.uk/MyCarlisle.aspx) or can be downloaded as a map

(http://www.carlisle.gov.uk/LinkClick.aspx?fileticket=9E67HYHexDw%3d&tabid=729&portalid=0&mid=2838).

The most recent available data from Public Health England's Public Health Outcomes Framework[12] show that the fraction of total mortality which is attributable to particulate air pollution within Cumberland Council (Carlisle Area) was 3.3 % in 2020 (the most recent data available; the Cumberland values for subsequent years were not available). This is below the average for both the North West region (5.3%) and England as a whole (5.5%).

[12] https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/ati/502/iid/93861/age/230/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/tre-do-0_car-ao-0_car-do-0. Data accessed 27th July 2023.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2022 by Cumberland Council (Carlisle Area) and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Cumberland Council (Carlisle Area) undertook automatic (continuous) monitoring at Morton Manor Community Centre[13] during 2022.

Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. Automatic monitoring results also available through the UK-Air website (https://uk-air.defra.gov.uk/data/data_selector)

A Map showing the location of the monitoring site is provided in Appendix D (Figure D.2. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Cumberland Council (Carlisle Area) undertook non- automatic (i.e. passive) monitoring of NO_2 at twenty eight sites during 2022. Table A.2 in Appendix A presents the details of the non-automatic sites.

[13] This site is known as Carlisle Morton A595 within Defra's compliance monitoring network. More information is available through UK_AIR website: Site Information for Carlisle Morton A595(UKA00932) - Defra, UK

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Automatic monitoring occurs only at Morton Manor Community Centre. Sampling at this site began in October 2021[14]. In 2022 in the annual average was 9.0 µg m^{-3}.

Elsewhere within CCC automatic monitoring of nitrogen dioxide concentrations began at Paddy's Market and Stanwix Bank in 2006 and 2007 and stopped at each site in 2021 and 2016, respectively. Figure 3-1 shows that the annual mean concentration has been below the annual mean objective since 2011.

[14] The annual mean concentration for 2021 at Morton Manor Community Centre was 11.4 µg m^{-3}. Because the data capture was 18.9 % and outside the permissible range for annualisation the annual concentration is only be considered an indicative measurement.

Figure 3-1 Automatic monitoring data (2006 – 2022)

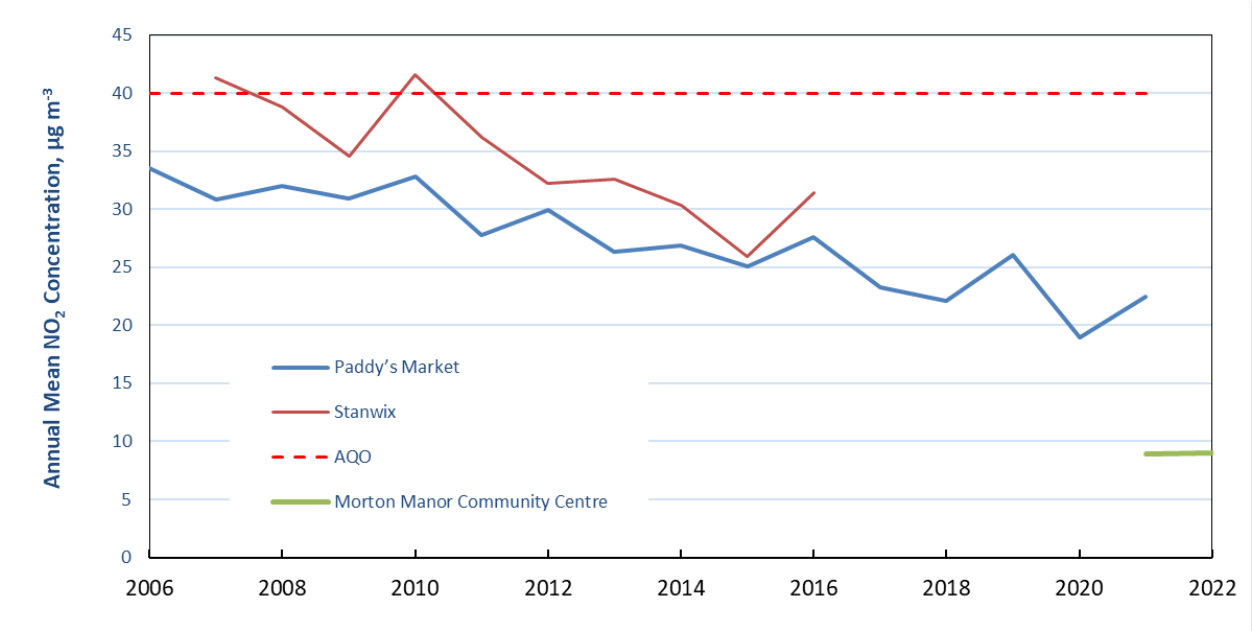


Table A.3 (automatic monitoring) and Table A.4 (diffusion tubes) in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40 µg m^{-3}. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

The annual mean concentrations are compared with the air quality objective of 40 µg m^{-3} in Figures A.1 to A.5. Generally, the NO_2 concentrations are less than those measured in 2021.

Figure A.1 shows the NO_2 concentration measured by the automatic monitor at Morton Manor Community Centre in 2022. The concentration 9.0 µg m^{-3} is considerably less than those measured at Paddy's Market which over the previous five years ranged from a low of 19 µg m^{-3} in 2020 to a high of 26 µg m^{-3} in 2019.

For sites situated along the A7 (see Figure A.2), the highest concentration (28.7 µg m^{-3}) was measured at Stanwix Bank (A10) which represented a decrease of 1.8 µg m^{-3} compared to what was measured in 2021.

For sites within AQMA 2 (Currock Street, B7) and AQMA 5 (Dalston Road, B4) NO_2 concentrations decreased by 3.6 µg m^{-3} and 1.6 µg m^{-3}, respectively compared to what was measured in 2021. Elsewhere in the city centre concentration decreased at all sites with the exception of Lowther Street for which concentration increased very slightly (Figure A.3)

For sites situated along the section of Wigton Road closer to the city centre, Bridge Street and London Road (see Figure A.4) the highest concentration (33.5 µg m^{-3}) continues to be measured in AQMA 4 Bridge Street (E8). At other sites in this part of the city concentrations decreased in 2022 compared to 2021. The largest decrease in concentration (4.9 µg m^{-3}) occurred at 24 London Road (F7). The new site at Morton Manor is measuring considerably less than the sites along Wigton Road and probably reflects the lower emissions in this part of the city.

The remaining sites along the Carlisle Northern Development Route and at a number of locations to the south of city centre and at the airport all measured concentrations considerably less than the annual objective concentration (see Figure A.5).

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for 2022 with the air quality objective of 200 µg m^{-3}, not to be exceeded more than 18 times per year. There were no exceedances.

Table 3-1 presents the annual mean concentrations measured at monitoring stations within the current AQMAs. Recommendations for retaining, amending or revoking the AQMA's are also presented in Table 3-1. In each case NO_2 concentrations decreased in 2022 compared to 2021. Monitoring should continue before decisions on amending or revocation can be made with confidence.

Table 3-1 Nitrogen dioxide concentrations measured by diffusion tube within each air quality management area

Site ID	Site Name		NO_2 Annual Mean Concentration ($\mu g/m^3$)								Recommendation
		AQMA	2015	2016	2017	2018	2019	2020	2021	2022	
A9	AQMA 1 BRAMPTON RD	1	35.9	37.4	35.5	32.4	32.7	23.0	26.9	26.1	No exceedances of annual objective within AQMA 1 since 2013. **Consider revocation if low concentrations remain.**
B7	AQMA 2 CURROCK ST	2	36.5	37.7	37.0	35.2	38.1	27.0	30.4	28.8	While no exceedances measured in last twelve years, concentrations before 2020 concentrations were sufficiently high to suggest there may be a risk of exceedance in future years ***Keep AQMA***
B4	AQMA 5 DALSTON RD	5	41.0	40.0	39.9	35.8	38.7	28.3	32.9	29.3	While no exceedances measured in last seven years, concentrations before 2020 concentrations were sufficiently high to suggest there may be a risk of exceedance in future years ***Keep AQMA***
E8	AQMA 4 BRIDGE ST	4	41.2	41.5	44.9	40.8	42.7	31.7	36.3	33.5	Expected exceedance did not occur in 2022, rather concentrations decreased. Monitoring to continue. ***Keep AQMA***

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 2022 with the air quality objective of 40 µg m^{-3}.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for 2022 with the air quality objective of 50 µg m^{-3}, not to be exceeded more than 35 times per year.

The automatic monitors within Carlisle were relocated from Paddy's Market to Morton Manor Community Centre during 2021. However, there was insufficient data capture at Morton Manor in 2021 to calculate a valid annual mean.

In 2022 the PM_{10} concentration was 14.3 µg m^{-3} which is slightly less than the concentrations measured previously at Paddy's Market; over the previous five years the concentration ranged from a low of 14.6 µg m^{-3} in 2017 to a high of 18.6 m^{-3} in 2019. While the nitrogen dioxide concentration was much lower at Morton Manor compared to Paddy's Market, the PM_{10} is relatively higher because the sources of PM_{10} are much more varied with a significant fraction arising from sources outside Carlisle.

There was only 1 day when the short term AQO exceeded 50 µg m^{-3}. This is significantly less than the annual objective of 35 days.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for 2022. $PM_{2.5}$ is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator is based. Therefore, although not covered by the LAQM regulations, local authorities are encouraged to understand the $PM_{2.5}$ concentration within their council area. The annualised annual mean was 9.3 µg m^{-3} which is lower than the World Health Organisation guideline of 10 µg m^{-3}. Elsewhere, the background $PM_{2.5}$ maps for Carlisle for 2022 showed no exceedance of the guideline concentration.

Cumberland Council also acknowledges Defra's proposed Environmental Targets for $PM_{2.5}$.

- Annual mean concentration target – 10 µg m^{-3} to be achieved by 2040;

- Population Exposure Reduction Target – 35% reduction (on 2018 baseline) by 2040

The Government expects local authorities will need to take actions in support of the new targets.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
MMCC	Morton Manor	Roadside	338195	554990	NO_2, PM_{10} and $PM_{2.5}$	No	Chemiluminescence, BAM 1020 heated	6	8	2.37, 2.67, 2.77

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
A1	45 SCOTLAND RD	Roadside	339995	557188	NO_2	NO	4.5	1.5	NO	3.05
A10	STANWIX BANK	Roadside	340008	556842	NO_2	NO	1.5	1.5	NO	2.95
A12	STANWIX BANK CAR PARK	Roadside	339935	557125	NO_2	NO	0.0	3.0	NO	2.8
A5	37 KINGSTOWN RD	Roadside	339758	558059	NO_2	NO	0.0	4.0	NO	2.8
A7	282 KINGSTOWN RD	Roadside	339526	559285	NO_2	NO	7.5	4.0	NO	2.7
A9	BRAMPTON RD	Roadside	340028	556833	NO_2	Yes, AQMA 1	0.0	1.5	NO	2.75
B4	DALSTON RD	Roadside	339434	555638	NO_2	Yes, AQMA 5	0.0	3.5	NO	2.8
B7	12 CURROCK ST	Roadside	340205	555198	NO_2	Yes, AQMA 2	0.0	3.0	NO	3.05
C1	LOWTHER ST	Roadside	340216	556131	NO_2	NO	0.0	3.0	NO	2.85
C2	TOURIST INFO	Urban Centre	340069	555955	NO_2	NO	N/A	N/A	NO	2.7
C3	DEVONSHIRE ST	Roadside	340218	555768	NO_2	NO	0.0	3.0	NO	2.85
D12	POST OFFICE	Kerbside	340307	555718	NO_2	NO	N/A	5.0	NO	2.95

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
D7	282 WARWICK RD	Roadside	341593	555893	NO_2	NO	0.0	7.0	NO	2.8
E22	FINKLE ST	Roadside	339834	556137	NO_2	NO	0.0	12.0	NO	2.8
E12	3 WIGTON RD	Roadside	339225	555821	NO_2	NO	2.0	2.5	NO	2.95
E15	22 WIGTON RD	Roadside	339091	555736	NO_2	NO	0.0	4.5	NO	3.9
E16	JOVIAL SAILOR	Roadside	339141	555900	NO_2	NO	0.0	2.5	NO	2.7
E19	49 WIGTON RD	Roadside	338953	555610	NO_2	NO	0.0	2.5	NO	3.1
E6, E61, E62	Morton Manor Community Centre	Roadside	338195	554990	NO_2	NO	6.0	8.0	Yes	2.4
E8	BRIDGE ST	Roadside	339516	556024	NO_2	Yes, AQMA 4	0.0	4.0	NO	3.05
F10	155 BOTCHERGATE	Roadside	340600	555349	NO_2	NO	0.0	3.0	NO	2.7
F7	24 LONDON RD	Roadside	340708	555240	NO_2	NO	0.0	4.5	NO	2.7
F9	129 LONDON RD	Kerbside	341099	554931	NO_2	NO	0.0	0.5	NO	2.95
G4	THE HOBBIT	Rural	336905	554036	NO_2	NO	0.0	19.0	NO	2.85
H5	WIGTON RD	Roadside	337643	554100	NO_2	NO	0.0	1.5	NO	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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)
H6	PETER LANE	Roadside	337962	553220	NO_2	NO	0.0	4.0	NO	2.4
H7	DALSTON RD	Roadside	338282	553396	NO_2	NO	0.0	6.5	NO	2.4
H8	AIRPORT	Other	347874	561254	NO_2	NO	0.0	2.0	NO	2.4

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.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 2022 (%) (2)	2018	2019	2020	2021	2022
MMCC	338195	554990	Roadside	95.2	95.2					9.0

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

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

Notes:

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean objective of 40 µg m^{-3} are shown in **bold**.

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.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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 m^{-3})

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)	2018	2019	2020	2021	2022
A1	339995	557188	Roadside	89.7	89.7	30.1	31.7	23.3	25.5	23.6
A10	340008	556842	Roadside	99.4	99.4	37.6	36.7	24.9	30.5	28.7
A12	339935	557125	Roadside	99.4	99.4	28.2	28.7	20.8	24.3	22.3
A5	339758	558059	Roadside	99.4	99.4	29.2	31.5	21.4	25.2	23.8
A7	339526	559285	Roadside	99.4	99.4	21.2	20.7	14.1	17.1	15.5
A9	340028	556833	Roadside	99.4	99.4	32.4	32.7	23	26.9	26.1
B4	339434	555638	Roadside	99.4	99.4	35.8	38.7	28.3	32.9	29.3
B7	340205	555198	Roadside	99.4	99.4	35.2	38.1	27	30.4	28.8
C1	340216	556131	Roadside	83.8	83.8	27.4	27.6	19.7	22.1	22.1
C2	340069	555955	Urban Centre	89.7	89.7	20.2	17.8	11.5	13.2	13.0
C3	340218	555768	Roadside	89.7	89.7	24.4	27.5	18.6	22.8	20.8
D12	340307	555718	Kerbside	99.4	99.4	30.4	32.7	20.4	24.7	23.0
D7	341593	555893	Roadside	99.4	99.4	28	28.3	20.8	24.8	22.9
E22	339834	556137	Roadside	99.4	99.4	29.1	31.4	22	24.7	24.0
E12	339225	555821	Roadside	99.4	99.4	31.9	33.9	24.6	29.5	25.9
E15	339091	555736	Roadside	99.4	99.4	28.4	29.2	21.4	26.4	22.5
E16	339141	555900	Roadside	99.4	99.4	31.7	32	22.6	27.3	24.2
E19	338953	555610	Roadside	99.4	99.4	30.6	31.2	22.2	29.4	25.9
E6, E61, E62	338195	554990	Roadside	99.4	99.4				10.6	9.9
E8	339516	556024	Roadside	99.4	99.4	**40.8**	**42.7**	31.7	36.3	33.5
F10	340600	555349	Roadside	99.4	99.4	35.3	34.4	25.4	29.9	25.8
F7	340708	555240	Roadside	99.4	99.4	32.2	35.4	24.7	31	26.1
F9	341099	554931	Kerbside	99.4	99.4	30.3	31.4	23.6	28.9	27.1
G4	336905	554036	Rural	81.8	81.8	12.6	12.1	8	9.5	10.1
H5	337643	554100	Roadside	99.4	99.4	15.7	14.1	10.4	12	11.0
H6	337962	553220	Roadside	99.4	99.4	11.4	10.1	8.4	8.4	7.4
H7	338282	553396	Roadside	99.4	99.4	18.7	15.1	11.6	13.2	11.8
H8	347874	561254	Other	89.7	89.7	8.2	6.9	4.8	5.5	5.6

☒ **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:

The annual mean concentrations are presented as µgm^{-3}.

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.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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.1 - Trends in Annual Mean NO_2 Concentrations: Automatic monitoring at Morton Manor

Figure A.2 - Trends in Annual Mean NO_2 Concentrations: Along A7

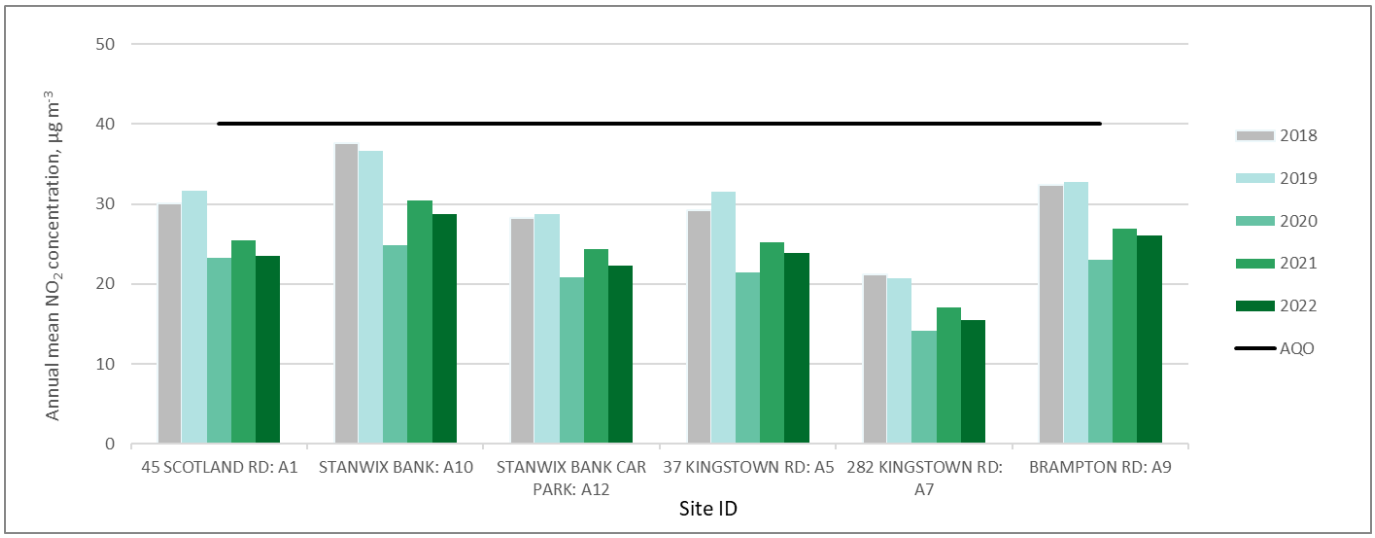


Figure A.3 - Trends in Annual Mean NO_2 Concentrations: for sites in city centre and within AQMA 2 and AQMA 5

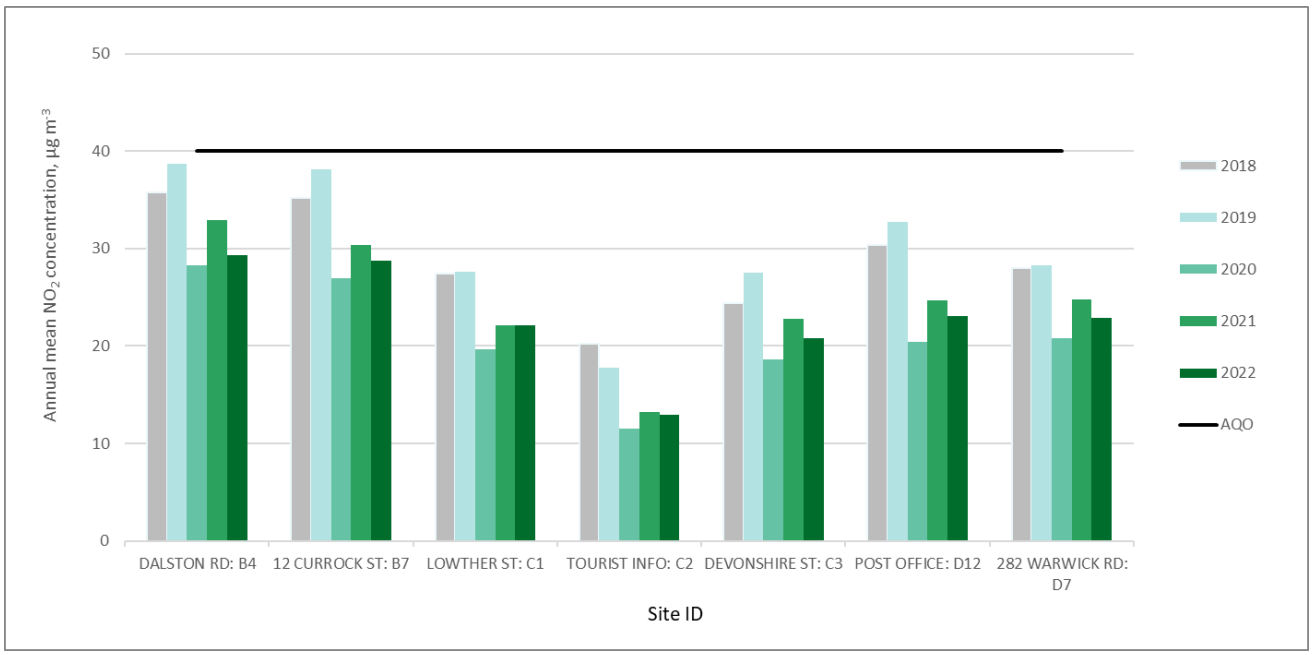


Figure A.4 - Trends in annual mean NO_2: along Wigton Road, Bridge Street and London Road

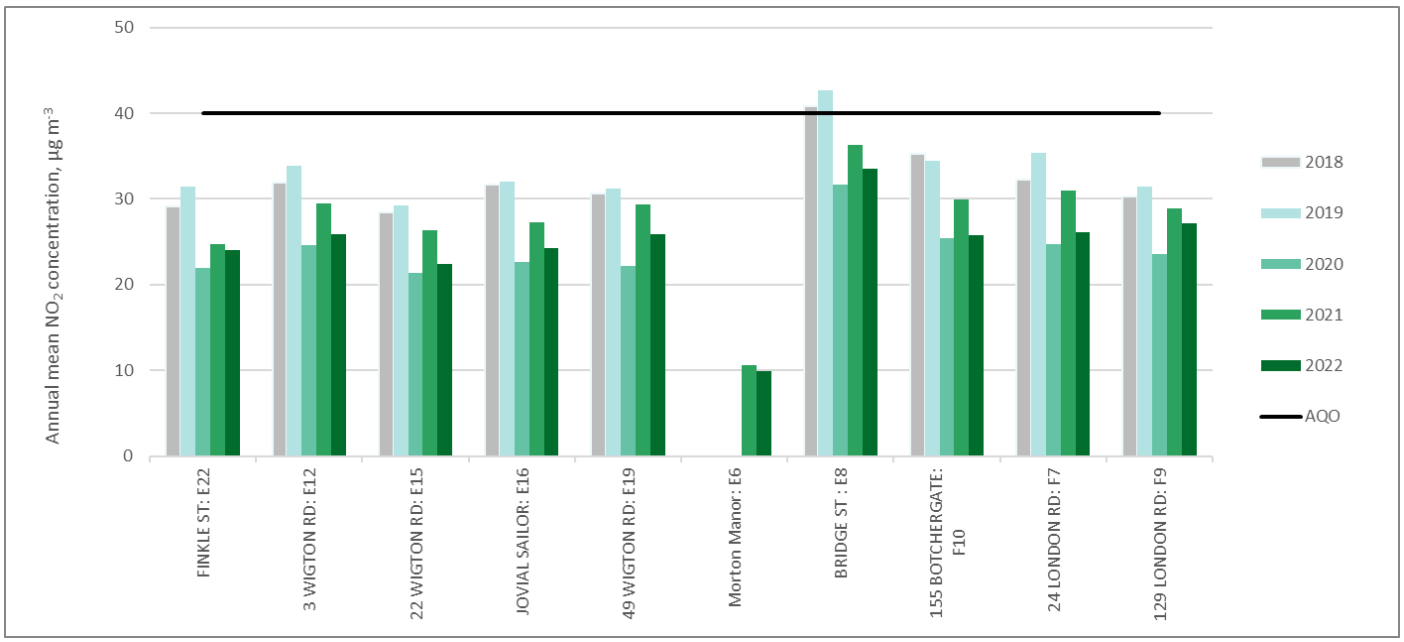


Figure A.5 - Trends in annual mean NO_2: Carlisle Northern Development Route and various other locations

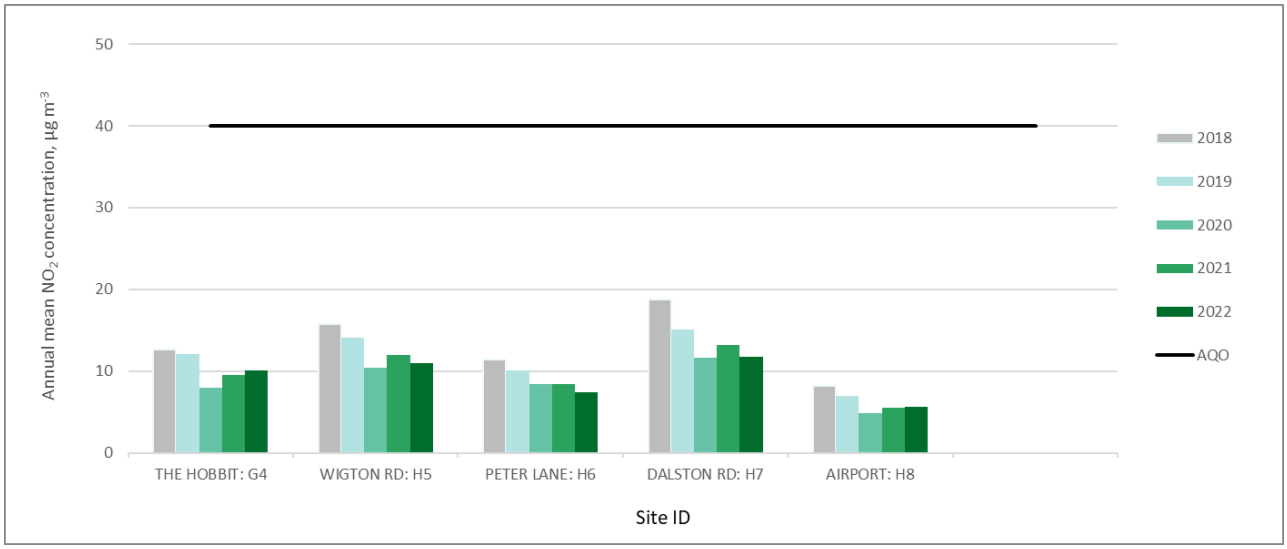


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200 µg m^{-3}

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
MMCC	338195	554990	Roadside	95.2	95.2					0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200 µg m^{-3} have been recorded.

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 2022 (%) (2)	2018	2019	2020	2021	2022
MMCC	338195	554990	Roadside	93.9	93.9					**14.3**

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

Notes:

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the PM_{10} annual mean objective of 40 µg m^{-3} are shown in **bold**.

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%).

Figure A.6 - Trends in Annual Mean PM_{10} Concentrations

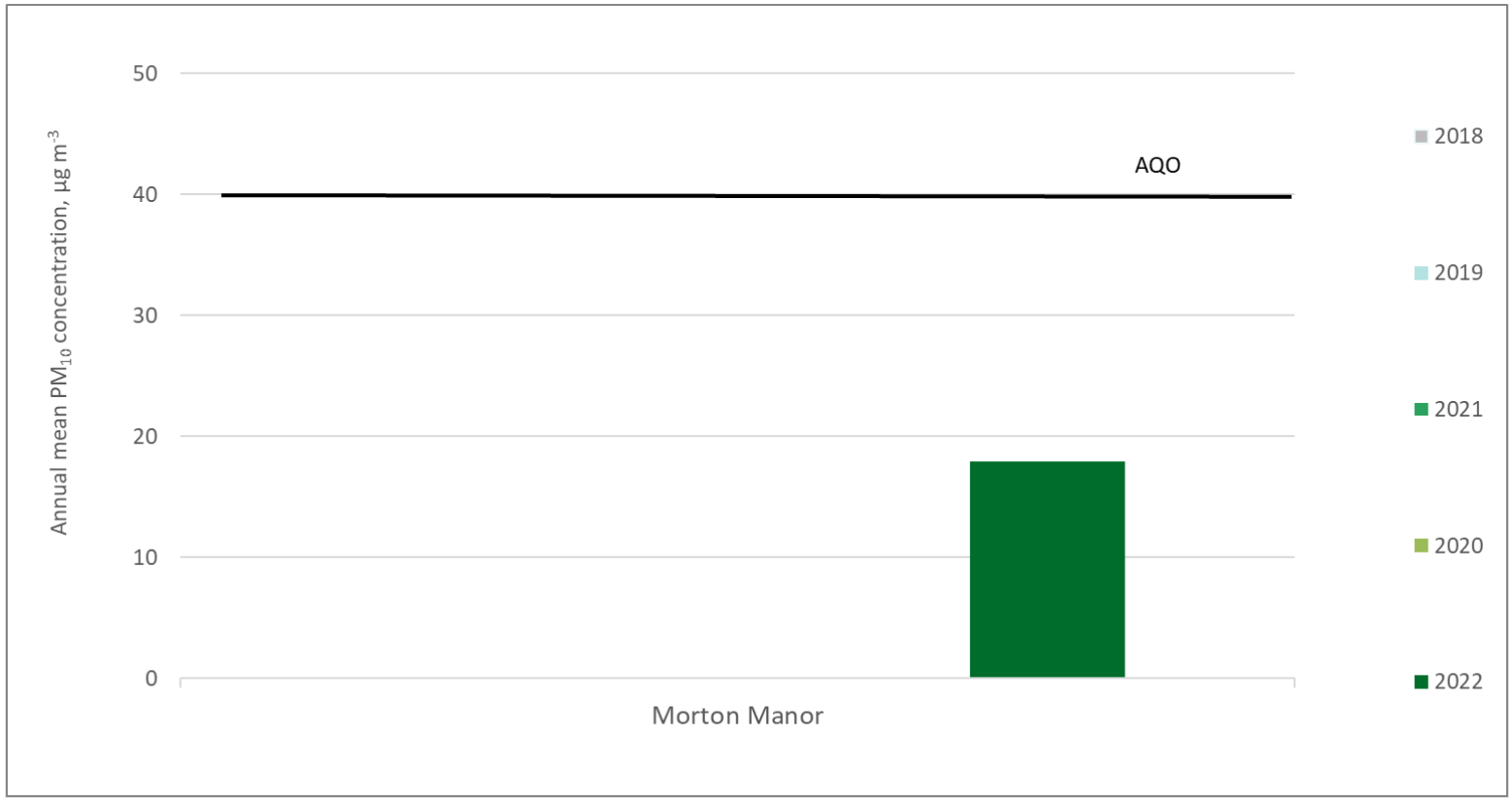


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50 µg m^{-3}

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
MMCC	338195	554990	Roadside	93.9	93.9					1

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50 µg m^{-3} have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50 µg m^{-3} not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

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

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

Figure A. 7 – Trends in Number of 24-Hour Mean PM_{10} Results > 50 µg m^{-3}

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 2022 (%) (2)	2018	2019	2020	2021	2022
MMCC	338195	554990	Roadside	97	97					9.3

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

Notes:

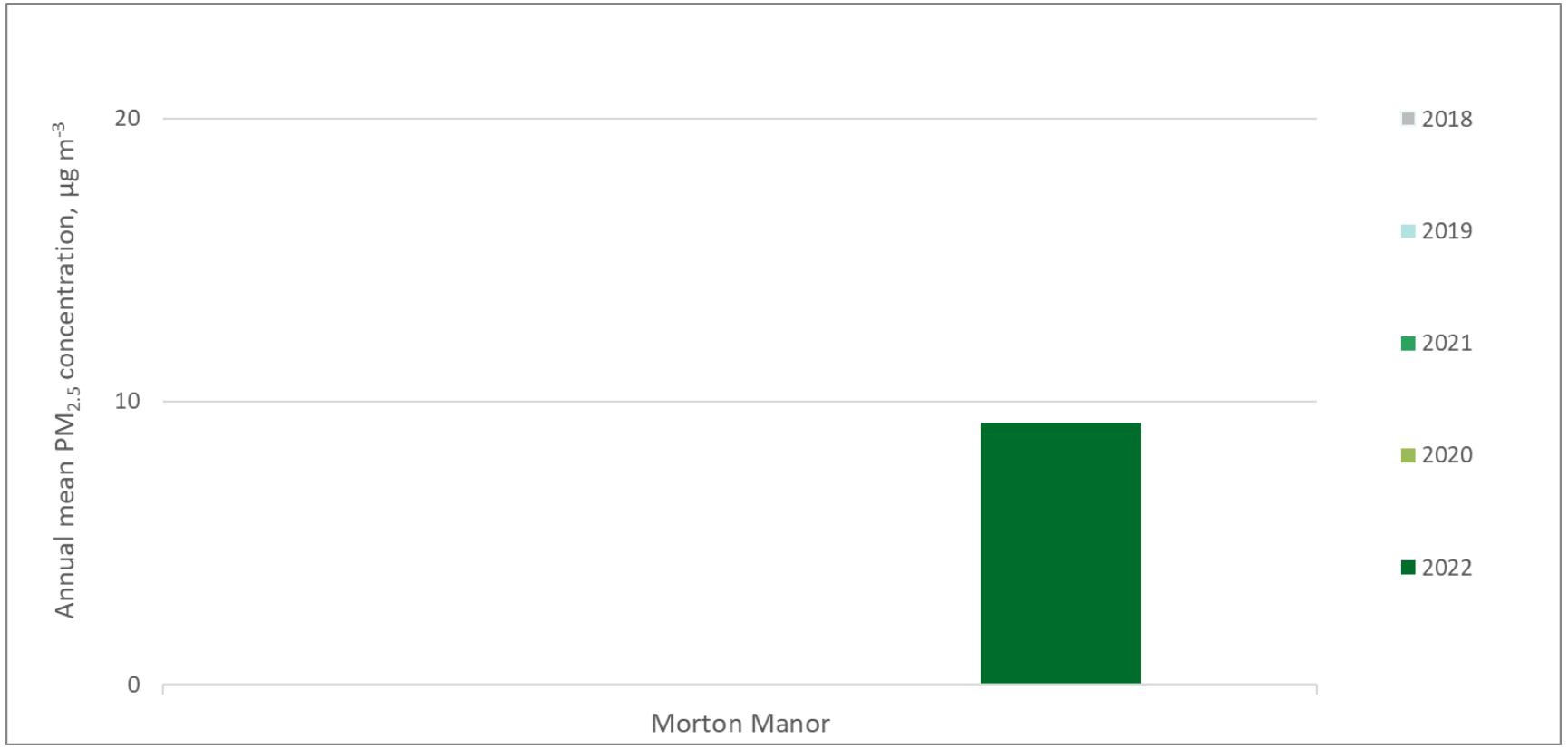
The annual mean concentrations are presented as µg m^{-3}.

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%).

Figure A.8 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2022

Table B.1 – NO_2 2022 Diffusion Tube Results (µg m^{-3})

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 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
A1	339995	557188	37.2	32.8	32.9	23.4	21.6	24.8	24.8	25.5	27.5	30.3	36.3		28.4	23.6	-	
A10	340008	556842	34.3	23.5	44.3	33.9	28.4	20.0	28.9	35.0	33.3	34.6	45.4	50.3	34.6	28.7	-	
A12	339935	557125	30.5	23.0	30.9	26.0	20.0	22.4	24.1	27.0	29.7	24.6	32.6	33.4	26.9	22.3	-	
A5	339758	558059	36.9	25.6	31.4	24.7	22.6	26.0	26.7	26.5	27.9	29.5	34.0	35.6	28.7	23.8	-	
A7	339526	559285	26.8	16.8	21.4	15.4	14.2	16.6	16.7	16.6	19.0	18.1	21.3	24.3	18.7	15.5	-	
A9	340028	556833	44.7	31.4	30.1	30.0	24.8	29.8	30.1	30.6	39.0	26.2	31.0	35.7	31.4	26.1	-	
B4	339434	555638	41.2	30.0	39.1	32.3	30.8	32.3	32.9	34.7	36.1	32.9	37.9	45.3	35.3	29.3	-	
B7	340205	555198	44.6	31.9	26.8	33.6	27.1	27.5	30.8	35.5	36.8	35.7	44.4	43.9	34.7	28.8	-	
C1	340216	556131	29.9			26.0	21.7	20.6	20.4	23.6	26.6	28.2	35.4	34.5	26.7	22.1	-	
C2	340069	555955	19.3	14.6	18.1	15.0	9.6	12.2	10.0	12.2	13.9		20.9	26.2	15.6	13.0	-	
C3	340218	555768	30.7	20.7	33.4	27.2	20.2	18.3	20.7	24.5	26.0		25.2	30.0	25.1	20.8	-	
D12	340307	555718	38.1	26.9	30.3	20.1	22.4	23.9	22.6	23.5	26.4	28.5	34.7	38.7	27.8	23.0	-	
D7	341593	555893	40.5	26.6	31.4	24.5	23.2	27.7	25.2	23.7	27.0	28.5	27.9	29.5	27.6	22.9	-	
E22	339834	556137	36.7	26.0	37.7	24.9	21.8	23.4	22.8	26.7	28.0	29.9	35.3	36.6	28.9	24.0	-	
E12	339225	555821	34.1	24.7	34.1	28.8	25.9	26.6	28.9	32.4	35.5	31.7	34.8	37.9	31.2	25.9	-	
E15	339091	555736	36.7	22.4	29.9	26.0	23.4	20.4	22.6	23.9	26.8	26.8	30.6	36.4	27.1	22.5	-	
E16	339141	555900	32.2	21.9	34.5	30.6	22.7	21.2	24.3	29.6	33.5	27.7	33.6	38.3	29.2	24.2	-	
E19	338953	555610	34.4	23.7	38.5	31.5	21.4	22.5	23.8	28.6	32.3	33.8	41.7	41.8	31.2	25.9	-	

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 0.83	Annual Mean: Distance Corrected to Nearest Exposure	Comment
E6	338195	554990	15.5	8.8		10.2	8.2	7.6	8.8	10.2	12.3	11.0	14.2	20.3	-	-	-	Triplicate Site with E6, E61 and E62 - Annual data provided for E62 only
E61	338195	554990	13.7	8.8	15.4	10.6	8.2	7.8	8.9	10.8	11.8	11.2	14.9	21.9	-	-	-	Triplicate Site with E6, E61 and E62 - Annual data provided for E62 only
E62	338195	554990	15.6	10.5	14.6	10.2	7.5	8.0	9.0	10.8	11.3	10.2	15.1	21.8	12.0	9.9	-	Triplicate Site with E6, E61 and E62 - Annual data provided for E62 only
E8	339516	556024	50.1	34.0	43.3	37.8	35.4	34.3	37.4	41.5	41.5	42.6	41.9	46.8	40.4	33.5	-	
F10	340600	555349	41.7	26.7	36.5	30.4	25.1	25.4	26.8	31.2	35.6	29.7	32.4	34.6	31.0	25.8	-	
F7	340708	555240	34.4	22.0	36.1	31.7	27.4	30.5	30.7	30.7	32.7	29.9	35.3	36.9	31.5	26.1	-	
F9	341099	554931	37.0	25.8	38.8	34.0	26.3	25.4	30.2	35.4	39.5	29.9	30.4	40.5	32.7	27.1	-	
G4	336905	554036	14.4	8.8	13.8		14.5	7.6	8.1		10.6	11.2	13.0	17.8	12.1	10.1	-	
H5	337643	554100	20.0	11.4	17.6	13.5	8.5	8.2	8.6	10.3	11.0	11.3	15.5	23.5	13.2	11.0	-	
H6	337962	553220	6.8	4.4	14.9	11.1	6.3	5.4	7.5	9.3	10.4	7.6	8.5	13.4	8.9	7.4	-	
H7	338282	553396	15.1	9.3	20.3	15.8	11.1	9.7	8.7	13.3	14.1	14.0	15.1	21.8	14.2	11.8	-	
H8	347874	561254	7.9	4.8	8.0	5.3		9.8	4.7	5.8	5.6	5.7	6.9	10.0	6.8	5.6	-	

☒ **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.**

☒ **Cumberland Council confirm that all 2022 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 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**.

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 Cumberland Council (Carlisle Area) During 2022

Cumberland Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Cumberland Council (Carlisle Area) During 2022

Cumberland Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

This section provides detail relating to the following aspects of non-automatic monitoring using diffusion tubes:

Diffusion Tube Supplier

Cumberland Council diffusion tubes are supplied and analysed by Gradko International using 20% TEA in water.

Gradko participate in the AIR-PT analysis scheme[15]. This is an independent analytical proficiency-testing scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR NO_2 PT scheme. For those reporting periods in 2022 for which Gradko reported results all were re considered satisfactory (based on z-scores less than or equal to 2).

15 https://laqm.defra.gov.uk/documents/LAQM%20NO2%20Performance%20data_Up%20to%20March%202021_v2.pdf

The laboratory performance for Gradko is summarised below:

AIR PT Round	AIR PT AR042	AIR PT AR043	AIR PT AR045	AIR PT AR046
Round conducted in the period	January – February 2021	May – June 2021	July – August 2021	September – October 2021
Gradko International	100%	100%	100%	100%

Diffusion Tube Calendar

The diffusion tube calendar used by Cumberland Council is provided below.

Month	Tube On	Tube Off
Jan	13/01/2022	02/02/2022
Feb	02/02/2022	01/03/2022
Mar	01/03/2022	30/03/2022
Apr	30/03/2022	04/05/2022
May	04/05/2022	08/06/2022
Jun	08/06/2022	06/07/2022
Jul	06/07/2022	03/08/2022
Aug	03/08/2022	31/08/2022
Sep	31/08/2022	28/09/2022
Oct	28/09/2022	02/11/2022
Nov	02/11/2022	30/11/2022
Dec	30/11/2022	04/01/2023

This did not deviate significantly from the 2022 Diffusion Tube Monitoring Calendar[16]- except for the last sampling period for which the sampling period was more than 6 six weeks.

Diffusion Tube Annualisation

As the data capture was better than 75 % at all sites annualisation was not required.

[16] NO2 Diffusion Tube Monitoring Calendar | LAQM (defra.gov.uk)

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG22 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Cumberland Council (Carlisle Area) have applied a national bias adjustment factor of 0.83 to the 2022 monitoring data. A summary of bias adjustment factors used by Cumberland Council (Carlisle Area) over the past five years is presented in Table C-1 .

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Table C-1 Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.83
2021	National	06/22	0.84
2020	National	06/21	0.81
2019	National	03/20	0.93
2018	National	03/19	0.93

Table C-2 Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1
Periods used to calculate bias	12
Bias Factor A	
Bias Factor B	
Diffusion Tube Mean (µg m^{-3})	12.0
Mean CV (Precision)	4.4
Automatic Mean (µg m^{-3})	9.0
Data Capture	
Adjusted Tube Mean (µgm^{-3})	

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/23

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 2023
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: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

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

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

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

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

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

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

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

Analysed By[1]	Method	Year[2]	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[4]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2022	R	Blackburn With Darwen Bc	12	26	19	35.0%	G	**0.74**
Gradko	20% TEA in water	2022	R	Gedling Borough Council	12	31	26	19.9%	G	**0.83**
Gradko	20% TEA in water	2022	R	Ards And North Down Borough Council	12	33	22	49.4%	G	**0.67**
Gradko	20% TEA in water	2022	R	Bath & North East Somerset	12	30	25	19.0%	G	**0.84**
Gradko	20% TEA in water	2022	R	Birmingham City Council	11	32	24	36.8%	G	**0.73**
Gradko	20% TEA in water	2022	UB	East Devon District Council	12	8	7	23.6%	G	**0.81**
Gradko	20% TEA in water	2022	R	Gateshead Council	11	23	20	14.2%	G	**0.88**
Gradko	20% TEA in water	2022	R	Gateshead Council	12	23	21	12.7%	G	**0.89**
Gradko	20% TEA in water	2022	R	Gateshead Council	12	25	23	10.1%	G	**0.91**
Gradko	20% TEA in water	2022	R	Gateshead Council	11	30	23	29.0%	G	**0.77**
Gradko	20% TEA in water	2022	R	Gateshead Council	9	31	36	-14.0%	G	**1.16**
Gradko	20% TEA in Water	2022	R	Lisburn & Castlereagh City Council	12	24	19	23.7%	G	**0.81**
Gradko	20% TEA in Water	2022	R	Monmouthshire County Council	12	35	28	23.8%	G	**0.81**
Gradko	20% TEA in water	2022	KS	Marylebone Road Intercomparison	12	52	42	22.8%	G	**0.81**
Gradko	20% TEA in Water	2022	UB	Plymouth City Council	12	18	18	3.2%	G	**0.97**
Gradko	20% TEA in water	2022	UC	Belfast City Council	12	26	20	30.7%	G	**0.76**
Gradko	20% TEA in water	2022	R	Belfast City Council	12	47	36	28.1%	G	**0.78**
Gradko	20% TEA in water	2022	R	Belfast City Council	12	25	22	14.0%	G	**0.88**
Gradko	20% TEA in water	2022	R	Belfast City Council	12	36	28	29.0%	G	**0.78**
Gradko	20% TEA in water	2022	R	Brighton & Hove City Council	10	37	23	62.8%	G	**0.61**
Gradko	20% TEA in water	2022	UB	Hertsmere Borough Council	12	16	15	7.1%	G	**0.93**
Gradko	20% TEA in water	2022	R	Southampton City Council	12	36	28	30.6%	G	**0.77**
Gradko	20% TEA in water	2022	UC	Southampton City Council	12	28	24	15.4%	G	**0.87**
Gradko	20% TEA in water	2022	R	Southampton City Council	12	34	31	8.4%	G	**0.92**
Gradko	20% TEA in water	2022	R	Worcestershire	11	13	12	4.2%	G	**0.96**
Gradko	20% TEA in water	2022	R	Lancaster City Council	13	34	27	25.8%	G	**0.79**
Gradko	20% TEA in water	2022	R	Lancaster City Council	12	28	24	15.2%	G	**0.87**
Gradko	20% TEA in water	2022		**Overall Factor[3] (27 studies)**				**Use**		**0.83**

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with

distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

QA/QC of Automatic Monitoring

Ricardo provides data management and local site operator (LSO) duties for the automatic monitoring sites within Carlisle. The instrumentation is calibrated every two weeks and a full site service is carried out every six months. The QA/QC is accredited to ISO 17025. All data are ratified to all LAQM reporting requirements. Measurement data are available through UKAIR.

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

PM_{10} and $PM_{2.5}$ are measured using BAM 1020 heated instrument. For the PM_{10} instrument a slope correction factor of 0.9662 is applied. No slope correction is required for the $PM_{2.5}$.

Automatic Monitoring Annualisation

As data capture was greater than 85 % annualisation was not required.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations required distance correction during 2022.

Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Location of diffusion tubes within Cumberland Council (Carlisle Area)

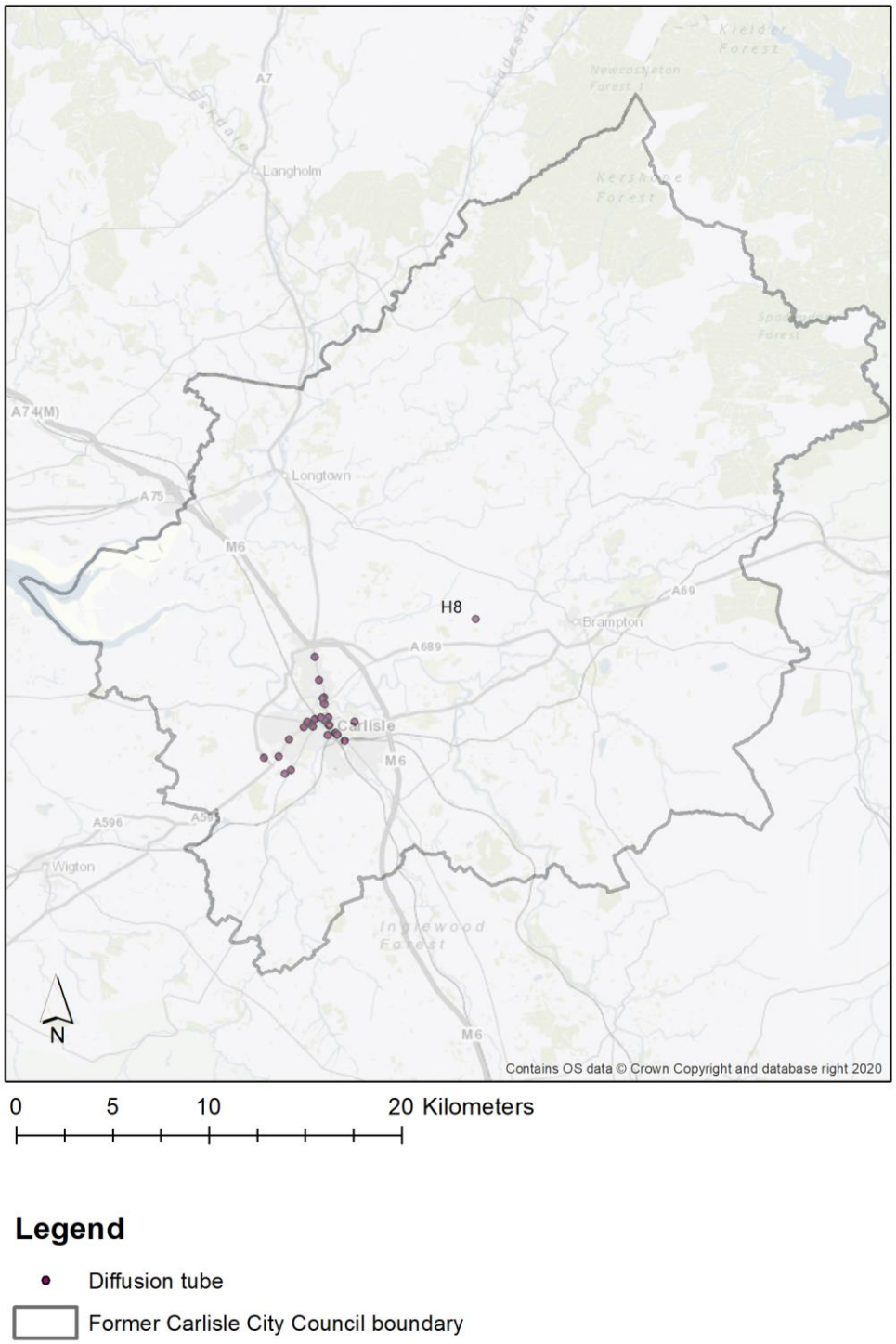


Figure D.2 – Location of diffusion tubes within Cumberland Council (Carlisle Area) (with Site IDs)

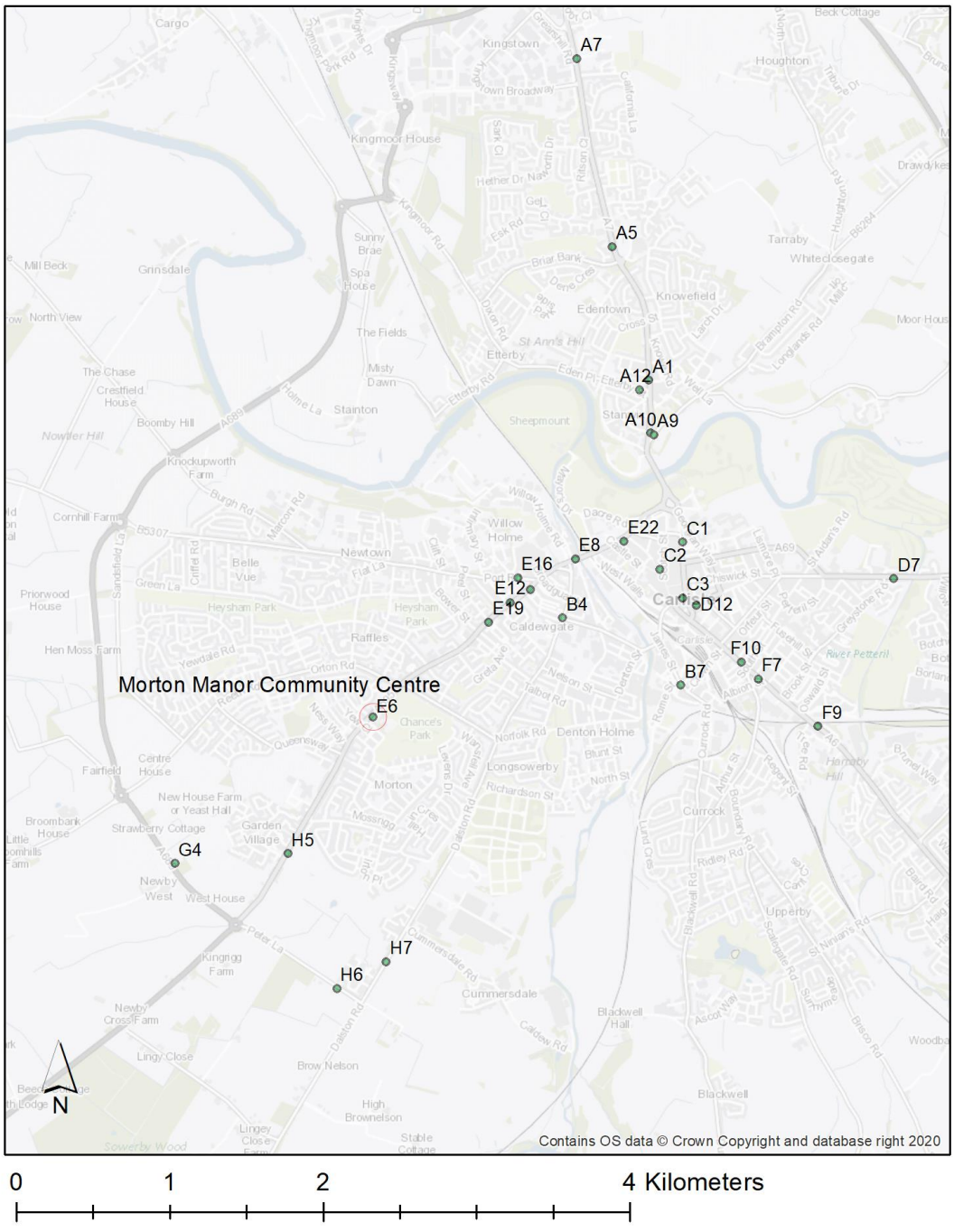


Figure D.3 – Location of air quality management areas and diffusion tubes

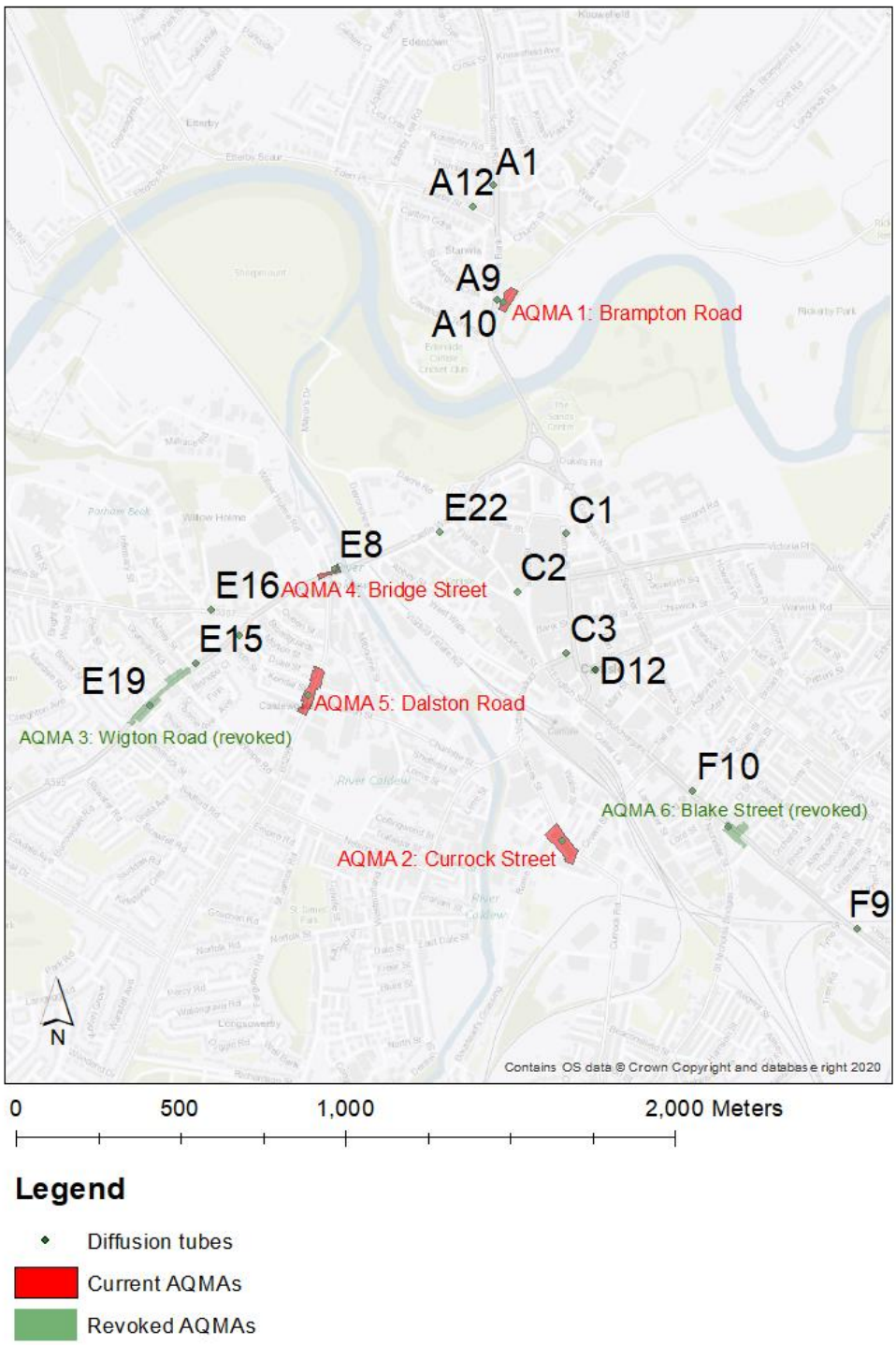
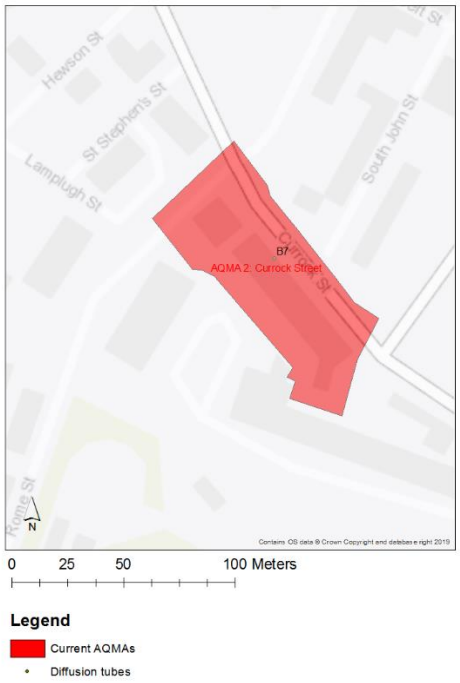


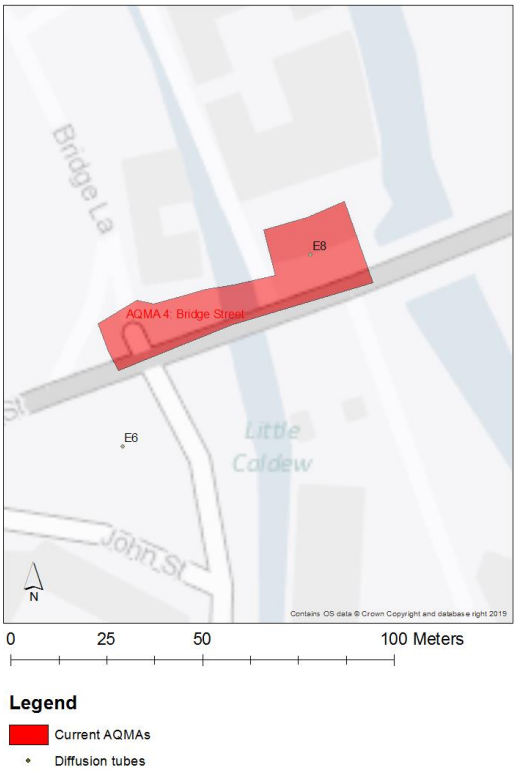
Figure D.4 - Location of air quality management areas (zoomed in)

AQMA 1: Brampton Road

AQMA 2: Currock Street



AQMA 4: Bridge Street



AQMA 5: Dalston Road

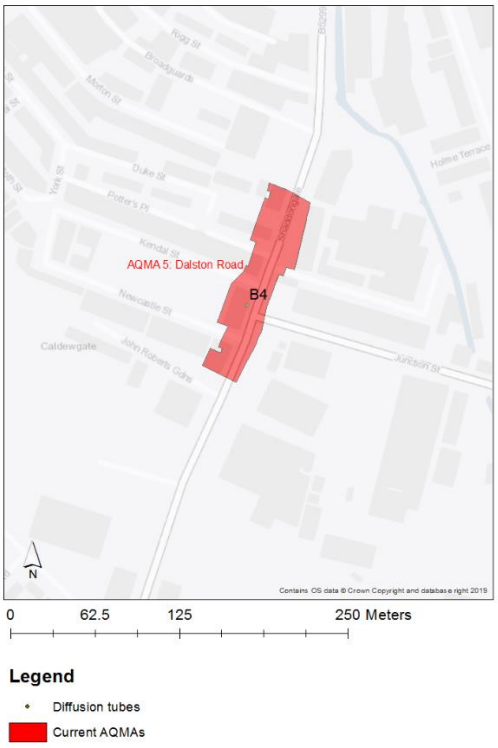


Figure D.5 – Location of diffusion tubes in outlying areas

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[17]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200 µg m^{-3} not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40 µg m^{-3}	Annual mean
Particulate Matter (PM_{10})	50 µg m^{-3}, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40 µg m^{-3}	Annual mean
Sulphur Dioxide (SO_2)	350 µg m^{-3}, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125 µg m^{-3}, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266 µg m^{-3}, not to be exceeded more than 35 times a year	15-minute mean

[17] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority 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
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
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 or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Defra. Air quality appraisal: damage cost guidance, July 2020
- Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018
- https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/Air%20Quality%20Management%20Order%20No%201%20.pdf
- https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AL517%20%20Order%20Revoking%20Air%20Quality%20Management%20Order%20Area%20No%203.pdf
- https://www.carlisle.gov.uk/Portals/0/Documents/Residents/Environment/AL517%20-%20Order%20Revoking%20Air%20Quality%20Management%20Order%20.pdf
- DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018
- https://uk-air.defra.gov.uk/data/laqm-background-home
- Diffusion tube data processing tool laqm (defra.gov.uk)