2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June, 2021

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Executive Summary: Air Quality in Our Area

Air Quality in the Eden area, as across the country, was significantly affected by the Covid-19 pandemic and in particular the lockdowns, furloughing and working from home that meant that our roads and urban areas produced significantly less pollution in 2020. It is hoped that some of the initiatives, such as home working, which were brought about over a very short timescale, will continue into the future and lead to more permanent improvements in air quality in our towns.

None of the Council's monitoring positions met or breached the objective level for Nitrogen dioxide in 2020.

Air Quality in Eden District

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 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

Nitrogen dioxide and particulates continue to be the main pollutants of concern in the Eden area, mainly from transport and industry and the burning of fossil fuels. Levels of measured pollutants in most of the measurement positions continue to fall year on year, with a significant decrease in 2020, due mainly to the lockdowns and the reduction of vehicles using the roads, and the increase in home working.

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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, July 2020

[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

The upper part of Castlegate is the road segment that has caused the Council the most concern in recent years. The levels of nitrogen dioxide measured for 2020 were well below the objective level, but it is likely that this is a reflection of the national picture of a reduction in road traffic during covid related lockdowns, rather than a permanent change. The Council has purchased, and installed (2021) two continuous monitoring instruments, which should provide useful information to allow us to delineate an Air Quality Management Area, if the levels of nitrogen dioxide are in excess of Objective Levels in the future.

In terms of new sources/receptors, the number of new dwellings being approved by the Council is something that the team continues to be aware of, and this year, Highways England announced the preferred route for the widening of the A66 from Bowes to Penrith (May 2020). Officers from the Environmental Protection Team will continue to be involved in this scheme, particularly where air quality impacts are concerned, not just adjacent to the new road, but also where increased traffic flows may have an air quality impact, particularly when this relates to housing.

In terms of planning applications in 2020 approval was given, following an air quality assessment, to a new crematorium near Temple Sowerby. Officers will be permitting the installation to ensure that it meets the highest standards applicable when it is ready to operate in 2021.

In matters of Air Quality, the Council continues to work with Cumbria County Council (Highways team, Planning, Public Health etc), the Environment Agency (Planning & Permitting, Waste Disposal etc), Lake District National Park and the Yorkshire Dales National Park (Planning), Highways England (now known as National Highways). Air Quality is also a key priority for the Council and is identified in its Health and Wellbeing Strategy.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out 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.

In terms of what Eden District Council can do to target sources of air pollution, responding to planning applications in terms of air quality continues to be a core action. Eden is covered by four planning authorities, Eden District Council (areas of the district not covered by National Parks), Cumbria County Council (waste and minerals planning), Lake District National Park and Yorkshire Dales National Park, so this continues to be a challenge. It is hard to identify what levels of pollution would be present without the input of the Environmental Protection Team, but air quality is a key planning consideration that officers continue to assess and comment upon. Similarly the impact of particularly polluting industrial activities is managed through the provision of an industrial permit issued by the Council or the Environment Agency. Air pollutants and the need to control them are an important part of the conditions that are put by the Council upon an environmental permit and monitored. Finally Air Quality has been identified and monitored by the Council in its Health and Wellbeing Forum with its partners.

Conclusions and Priorities

In 2020, no monitoring site in Eden breached the objective level. However, because the reduction in pollutant levels was replicated across the country as a result of Covid-19, and in particular, the lockdowns, we feel that it would be foolish to assume that the decrease in pollutant levels from 2020 are due to anything other than a highly unusual situation brought about by the global pandemic.

[5] Defra. Clean Air Strategy, 2019

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

Local Engagement and How to get Involved

Both the District and County Council have stated an ambition to get more people cycling and walking in Cumbria and that cycling and walking should be the natural choice for everyday short journeys. A Cycling and Walking Programme is being developed to include a Local Cycling and Walking Infrastructure Plan for Penrith, and is out for consultation with the public at the moment. Details can be found at https://www.cumbria.gov.uk/planning-environment/cyclingandwalking/. The intention is to provide safe, attractive and convenient cycling and walking routes that are inclusive of all ages and abilities, and meet the following design principles:

- Coherent – part of a wider strategic network that provides access to key destinations
- Direct – reaches the destination as directly as possible
- Safe – of a high quality and designed to standards that meet safety requirements
- Comfortable – accessible and attractive for all abilities
- Attractive – contributes to good urban design by integrating with and complementing the surroundings

The project sits under the Department of Transport's Cycling and Walking Investment Strategy 2017 and Gear Change (2020) vision for walking and cycling. This is supported by the new Design Guidance – Cycle Infrastructure Design (Local Transport Note 1/20 July 2020).

For members of the public wanting to take an active role in improving air quality within this district there are the following action groups:

- Cumbria Action for Sustainability (CAfS) promotes low carbon living, energy saving and reduced use of fossil fuels throughout Cumbria.
- Penrith Action for Community Transition (PACT) is a transition town group started in Cumbria during 2008, and is part of the growing transition network here in the UK and around the world, working to develop community-based responses to the challenges of peak oil, climate change and economic sustainability.
- Extinction Rebellion: is a global environmental movement with the stated aim of using non-violent civil disobedience to compel government action to avoid tipping points in the climate system, biodiversity loss, and the risk of social and ecological collapse. There are several XR (Extinction Rebellion) groups locally.

In 2019, both Cafs and PACT have worked with a number of villages in the district and have given presentations to Councillors at Full Council. Since then Cafs has been working with Eden District Council on the “Cold to Cosy Homes” project. The project provides contact with a qualified assessor to find out more about the home and the services that might be beneficial, advice and help with energy bills and switching tariff, professionally installed draught-proofing and referral to other support and advice agencies for other grants.

They’re also helping give energy efficiency advice to village halls and community venues across the district.

For business, Cafs provides information and suggestions on how to reach net zero carbon, which includes looking at energy consumption and business transport, both of which contribute to improving air quality locally. Eden District Council has also pulled together information and opportunities for small and medium-sized businesses to be part of the ‘Together for our Planet Business Climate Leaders’ campaign, https://www.eden.gov.uk/your-council/news/latest-media-releases/ ahead of COP26 Climate Conference in Glasgow in November 2021. Quite a few of the initiatives and projects available also contribute to improving air quality, as well as reducing carbon.

The Council also has a number of strategic priorities which are based on making its activities and its power to influence more sustainable. Typically these strategies are being driven by the Council’s declaration of a Climate Emergency in 2019 and a commitment to being carbon zero by 2030.

Finally the Council has applied to Government for Green Homes Grant Local Authority Delivery (LAD) Scheme funding. This will allow the Council to access funding from central government to install insulation and low carbon heating to homes in the district.

In terms of what individuals can do to help improve the air quality, we recommend the following:

- Turning off car engines,
- Car share once per week,
- Cycling / scooting,
- Servicing vehicles regularly,
- Home working,
- Using Public Transport,
- Use of Low / zero carbon vehicles,

- Renewable energy use at home,
- Use water-based or low solvent paints, glues, varnishes and wood preservatives, look for brands with a low VOC content.
- Make sure your home is well ventilated especially during DIY or cleaning.
- Have your central heating system checked and serviced regularly to avoid risking exposure to toxic carbon monoxide.
- Keep wood stoves and fireplaces well maintained. Ready to use wood bought from a Woodsure Certified Supplier (www.woodsure.co.ukv), will offer the following benefits:
    - Dry, Ready to Burn wood/logs & briquettes make any appliance more efficient.
    - Burning dry wood instead of wet wood is part of the solution to reducing the impact on our environment.
    - Burning wet wood increases emissions and has a greater impact on air quality.
    - Any appliance and chimney system will suffer from smoke produced from wet wood, which increases maintenance and repair requirements, making it harder for chimney sweeps to keep systems in safe, effective condition.
- Burning waste and treated wood (eg old furniture) can emit harmful fumes.
- Before organising days out, check the air pollution forecast (https://uk-air.defra.gov.uk/forecasting/vi).
- Purchase "Green Power" for the electricity in your home. (Contact your power supplier).
- Be energy efficient- make sure your house is well insulated and use energy efficient appliances (http://www.energysavingtrust.org.uk/home-energy-efficiencyvii).
- Use trigger sprays rather than aerosols.
- Don't light bonfires or barbecues when air pollution levels are high. Information on local pollution levels can be found at https://uk-air.defra.gov.uk/

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1. Local Air Quality Management

This report provides an overview of air quality in Eden during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Eden District Council 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 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Eden currently does not have any declared AQMAs. For reference, a map of Eden's monitoring locations is available in Appendix D

2.2 Progress and Impact of Measures to address Air Quality in Eden

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 trend graphs provide clear comparison with the air quality objective, it was especially helpful being divided by area.
2. The detailed maps clearly demonstrate the monitoring network.
3. Annualisation was required for 1 site (GAF05) where data capture was <75%. This was done using 4 roadside diffusion tubes. In future, it would be better if annualisation is done using data from continuous monitoring sites, in urban background locations.
4. Site P1 was distance corrected and calculations provided. However, Table A.2 states P1 is already located at 0m to relevant exposure and this should be updated. Also, the concentration before distance adjustment should be provided in Table A.3.
5. The report references the Public Health Outcomes Framework and this is encouraged to continue.
6. QA/QC information for the laboratory should be updated each year, the report still refers to 2018.
7. The report is a good reference for members of the Public to find out more on how to help improve air quality in their area.
8. Annual mean NO2 concentrations have been exceeded at Castlegate for a number of years now. It is appreciated the Council have purchased continuous monitoring devices for better understanding the concentrations in the area. The equipment

should be installed ASAP and the Council take the next steps towards declaring the AQMA.

Eden District Council has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table. These measures are included within Table, with the type of measure and the progress Eden District Council have made during the reporting year of 2020 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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	Traffic Management of new or improved roads (A66 road widening major planning project)	Traffic Management	Other	Ongoing	Ongoing	Highways England, Cumbria County Council, Eden District Council	Highways England, Cumbria County Council, Eden District Council	NO	Fully funded	Not known	Planning	Intention to minimise the adverse impacts of the road widening	NO2 levels not to exceed Objective Level	Planning phase for A66; Environmental Protection Team have fed in to preferred routing consultation on air quality and noise. Work on the DCO is now underway and Air Quality has been identified as a key issue	Lengthy Timescale
2	Input into Planning applications and Local Plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Ongoing	Ongoing	Eden District Council Environmental Protection Team, Eden District Council Planning Dept, Cumbria County Council Planning Dept, Yorkshire Dales NPA, Lake District NPA.	Eden District Council Environmental Protection Team, Eden District Council Planning Dept, Cumbria County Council Planning Dept, Yorkshire Dales NPA, Lake District NPA.	NO	Not Funded	£10k - 50k	Implementation		Early consultation with applicants. Improved links with all the planning depts.	Whilst Env Protection is consulted on some applications, we are aware that planning officers are not consulting the Team on everything. EP Team does feed back to planner when AQ is a potential issue	Dealing with four different planning depts. Issues with developers not doing any monitoring but relying on background emissions map and national guidance, which may/may not be relevant.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
3	Upgrade of passenger transport infrastructure to make it more convenient and widely accessible across the County. Arrangements for sustainable transport systems will be integrated into major new and proposed developments	Transport Planning and Infrastructure	Bus route improvements	Ongoing	Ongoing	Cumbria County Council	Cumbria County Council	NO	Partially Funded	£1 million - £10 million	Implementation	Reduced vehicle emissions	Improved bus service. Increased use of transport provided. Reduced NO2 along main routes	Ongoing improvements Plans for large new housing developments include public transport provision and/or sustainable transport options.	A significant of bus journeys in the District are made using vintage coaches dating from the 1940s and 1950s and one from 1991
4	Emissions from all Part A2 and B Processes located within the local authority area.	Environmental Permits	Other	1990	Ongoing	Eden District Council Environmental Protection Team	Eden District Council Environmental Protection Team	NO					Risk based inspections showing that emission limits are being met and efforts are being made to improve on national objectives	Continued inspection as per national guidance, assessment of monitoring, provision of advice, investigation of complaints and enforcement if necessary	Resources but activity is seen as key work of the EP Team
5	Education and Promotion of Air Quality	Public Information	Via the Internet and through leaflets	Ongoing	Ongoing	Eden District Council Environmental Protection Team	Eden District Council Environmental Protection Team	NO					Increased public awareness about issues of air quality and how to make personal choices to improve local air quality; use of enforcement action where necessary to deal with dark/black smoke, etc	Air quality info is available on the website already and real time monitoring data due soon. Monitoring data shows continued improvement in most areas. Eden District Council is actively supporting and promoting Clean Air Day. Provided Social Media posts for Clean Air Day 2020	Resourcing as above

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
6	Ensuring that Council Policies include measures to minimise activities that adversely affect air quality	Promoting Low Emission Plant	Other Policy	Ongoing	Ongoing	Eden District Council	Eden District Council	NO					Involvement of Environmental Protection Team in Council's work on its Environmental Policy, Climate Change, Vehicle Leasing and Procurement	Ongoing, but hope to report more in 2021 Report	Resourcing as above, plus potential for conflict of interest with other Council priorities
7	Working from home for council workers	Promoting Travel Alternatives	Workplace Travel Planning	2020	Ongoing	Eden District Council	Eden District Council	NO						Since March 23 2020 virtually all Council employees have been working from home. This is currently a temporary measure	With the opening up of communities it is likely that more staff will need to work in council buildings
8	Consideration of whether e-vehicles are suitable for Council's two fleet vans	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	Workplace Travel Planning	2021	Ongoing	Eden District Council	Eden District Council	No					Replacement of current diesel vehicles	Report has gone to Portfolio Holder and Sustainability Team	Size of district (800miles^2), scarcity of charging points, lack of suitable vehicles on the market currently

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), 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.

Eden District Council is taking the following measures to address $PM_{2.5}$:

Eden District Council is a signatory of the Cumbria Joint Public Health Strategy which is informed by the Public Health Outcomes Framework. Within this Strategy Air Quality is explicitly identified as an impactor on health and an Implementation Plan is currently being developed. As a mainly rural county, Cumbria is generally favoured with very good air quality: the proportion of mortality attributable to particulate matter air pollution for people over 30 years in Cumbria is 3.4%, lower than the national figure of 5.3% (Cumbria Observatory, 2019, https://www.cumbriaobservatory.org.uk/environment/). This is the most up to date local data that exists. For $PM_{2.5}$ in particular, there is no safe level and it has been estimated that in 2010 the deaths of 195 people in Cumbria may have been attributable to PM2.5.

Air pollution background maps are published by Defra which provide estimates of background concentrations for $PM_{2.5}$ within the district. Within Eden, 98% of the background levels published by Defra are below 8 μgm^{-3} which is less than half the annual mean objective of 20 μgm^{-3} which was be achieved by 2020.

The highest estimated backgrounds are rural locations affected by the major trunk roads, the M6 and the A66. Within Penrith the background levels are predicted to be below 9μgm^{-3}.

No monitoring of $PM_{2.5}$ was carried out within Eden since this is not currently required by Defra. The nearest National $PM_{2.5}$ monitoring site is in Carlisle, at an urban roadside location.

In recognition of the need for the Council to understand particulate levels locally and as part of its approach to reducing $PM_{2.5}$ levels once their distribution and level has been more fully understood, the Council has recently purchased continuous monitoring equipment which will be suitable for providing estimates of actual levels of $PM_{2.5}$. The two

pieces of equipment were due to be installed in March of 2020 but due to Covid-19 their installation date has been pushed back and will be carried out in June of 2021.

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

This section sets out the monitoring undertaken within 2020 by Eden District Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Eden District Council did not undertake any automatic (continuous) monitoring during 2019. 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. We do not have any local circumstances in Eden that mean that we need to report on these pollutants. National monitoring results are available at https://uk-air.defra.gov.uk/

3.1.2 Non-Automatic Monitoring Sites

Eden District Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 18 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites.

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 (eg 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 33%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Error! Reference source not found. and Table A.4 in Appendix A compare the ratified nd adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Please 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).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. The concentration data presented in Table B.1 includes distance corrected values, only where relevant.

The monitoring tubes within Eden District Council are supplied and analysed by Gradko. The tubes are prepared using a 50% TEA in acetone solution and typically exposed for a 4 week period. The 2020 results have been corrected for a bias using a factor of 0.82 which was determined following 14 studies undertaken by Gradko as part of the National Diffusion Tube Bias Adjustment Factor study.

All locations this year required annualisation due to COVID-19 lockdowns affecting the placement of tubes from April-July. Although we had hoped to start again in July, due to a change in working arrangments the tubes were mislaid in transit. All sites bar V1 only obtained 59.6%, with V1 obtaining 34.9%. As there were 4 month's worth of tubes that were missed, after removing this data, all sites bar V1 had 87.5% valid data captiure for monitoring period with V1 having 62.5%.

The annulisation was carried out using data from the four closest continous monitoring stations to Eden as required by the Techncial Guidance: Carlisle, Dumfries, Billingham and Hartlepool. Eskdalemuir is closer than the latter two and is representative of a rural site, however this site did not have enough data to use. This data gave an average annulisation factor of 0.8544 and that has been used on our data, even though it comes from very different locations and at considerable distance (up to 83 miles).

None of the monitoring locations required distance adjustments, all monitoring locations bar one have been chosen to be representative of a. relevant receptor, i.e at the façade of a residential property and therefore do not require any distance adjustments. The one location not located on a residential property concentration was under 36µg/m3 (per DEFRA guidance), so this didn't require any adjustment.

There were no exceedances of the air quailty objectives in Eden during 2020, all monitoring areas received their lowest results in the past 5 years. As tubes were not placed during the first lockdown we can't comment if this was due to a reduction in travel brought on from this. The raw data can be seen in Table B.1, the raw data from March had to be removed as the labortory stated 'Tubes were exposed for longer than the

recommended time. Results may be compromised.' Table B.1.1 shows the results if March had been included.

The area that received the highest concentration of 33 µg/m3 was C1 and second highest with 32µg/m3 was GAF04, both are located on Castlegate. These locations where also the highest concentrations last year, both have failed for the past 2 and 3 years respectively (Table A.4 or Figures in A.1). C30 and GAF05 are also located in Castlegate (see Locations in Appendice D) and both had results of 28 µg/m3. We know that Castlegate is at a point where the road is goes uphill, is narrowed and canyoned and frequently has queuing traffic. Due to the results of previous years and the concern about the impact of traffic on this road segment, the Council has purchased and installed continuous monitoring equipment to identify where exactly a potential AQMA should be located, as C30 hasn't exceeded the limit in the past 5 years and GAF05 hadn't exceeded in the past 3. Table B.1 shows results predominately in winter months which is when we would expect to see our higher readings.

Appendix A: Monitoring Results

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)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
V3	25b King Street	Roadside	351720	529966	NO2	N/A	0.0	2.0	No	2.5
V5	Front Victoria Rd / Langton Cott	Roadside	351713	529941	NO2	N/A	0.0	1.0	No	2.5
V7	Café 15	Roadside	351733	528918	NO2	N/A	0.0	2.5	No	2.5
B14	4 Brunswick Road	Roadside	351394	530344	NO2	N/A	0.0	2.0	No	2.5
EB15	Glendale	Roadside	352329	528475	NO2	N/A	0.0	1.0	No	2.5
EB18	Cherry Cottage	Roadside	352246	528667	NO2	N/A	0.0	2.5	No	2.5
SG27	8 Scotland Rd	Roadside	351171	530649	NO2	N/A	0.0	1.0	No	2.5
P1	No entry sign, Norfolk Road	Roadside	351144	530056	NO2	N/A	1.0	1.0	No	2.5
C30	40 Castlegate	Roadside	351333	530016	NO2	N/A	0.0	1.5	No	2.5
C31	3 Benson Row	Roadside	351741	530313	NO2	N/A	0.0	1.0	No	2.5
C32	Penrith Nursery	Roadside	351687	530387	NO2	N/A	0.0	2.5	No	2.5
uBi	13 Balmoral Close	Roadside	350860	529912	NO2	N/A	0.0	3.0	No	2.5
GAF04	NewVic	Roadside	351363	530046	NO2	N/A	0.0	1.0	No	2.5
GAF05	Station Hotel	Roadside	351302	520089	NO2	N/A	0.0	2.5	No	2.5
2018C1	Lower Castlegate	Roadside	351413	530069	NO2	N/A	0.0	1.0	No	2.5
GAF16	Landels Court corner	Roadside	351774	529838	NO2	N/A	0.0	2.0	No	2.5

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)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
V1	Roper Street	Roadside	351794	529870	NO2	N/A	0.0	1.0	No	2.5
GAF19	25 Victoria Road	Roadside	351774	529910	NO2	N/A	0.0	1.5	No	2.5

Notes:

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

(2) N/A if not applicable.

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
V3	351720	529966	Roadside	87.5	59.6	23.0	27.0	30.2	26.7	21.1
V5	351713	529941	Roadside	87.5	59.6	35.0	31.0	30.8	27.6	20.4
V7	351733	528918	Roadside	87.5	59.6	36.0	35.0	33.3	30.6	23.4
B14	351394	530344	Roadside	87.5	59.6	35.0	33.0	32.7	30.2	24.3
EB15	352329	528475	Roadside	87.5	59.6	32.0	32.0	31.6	27.1	20.8
EB18	352246	528667	Roadside	87.5	59.6	33.0	35.0	33.0	30.7	23.0
SG27	351171	530649	Roadside	87.5	59.6	33.0	30.0	30.0	27.1	20.8
P1	351144	530056	Roadside	87.5	59.6	-	-	23.4	19.0	15.9
C30	351333	530016	Roadside	87.5	59.6	37.0	31.0	30.1	28.5	21.8
C31	351741	530313	Roadside	87.5	59.6	32.0	29.0	29.1	25.9	19.3
C32	351687	530387	Roadside	87.5	59.6	36.0	33.0	32.8	30.0	21.8
uBi	350860	529912	Roadside	87.5	59.6	-	-	16.8	14.9	11.8
GAF04	351363	530046	Roadside	87.5	59.6	39.0	**47.0**	**48.7**	**43.2**	32.1
GAF05	351302	520089	Roadside	87.5	59.6	**53.0**	33.0	29.9	28.3	22.0
2018C1	351413	530069	Roadside	87.5	59.6	-	-	**48.1**	**42.4**	33.1
GAF16	351774	529838	Roadside	87.5	59.6	34.0	24.0	27.2	23.1	16.7
V1	351794	529870	Roadside	62.5	34.6	-	-	29.3	26.4	19.1
GAF19	351774	529910	Roadside	87.5	59.6	32.0	27.0	29.1	26.8	20.1

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16**

☒ **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 µg/m^3.

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

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

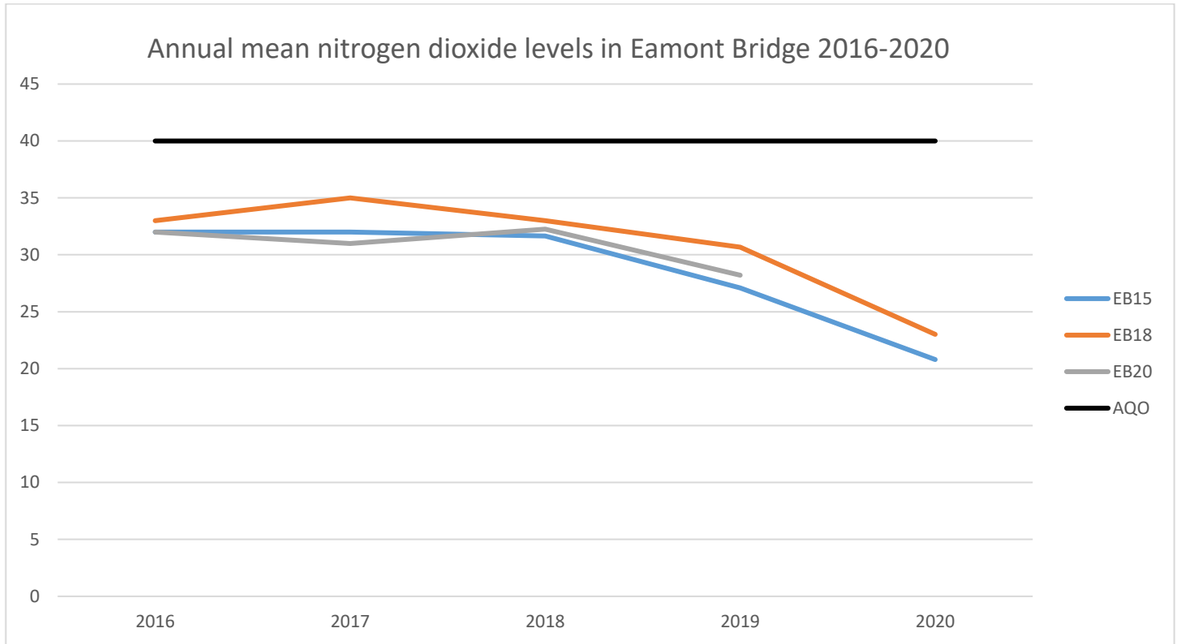
Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

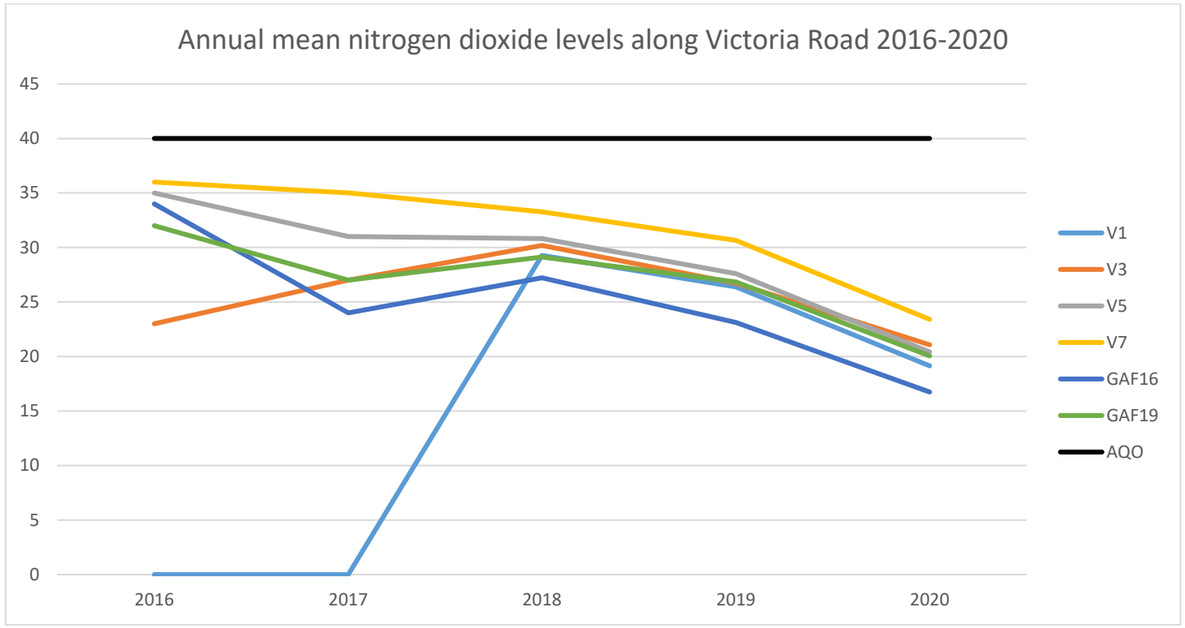
Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

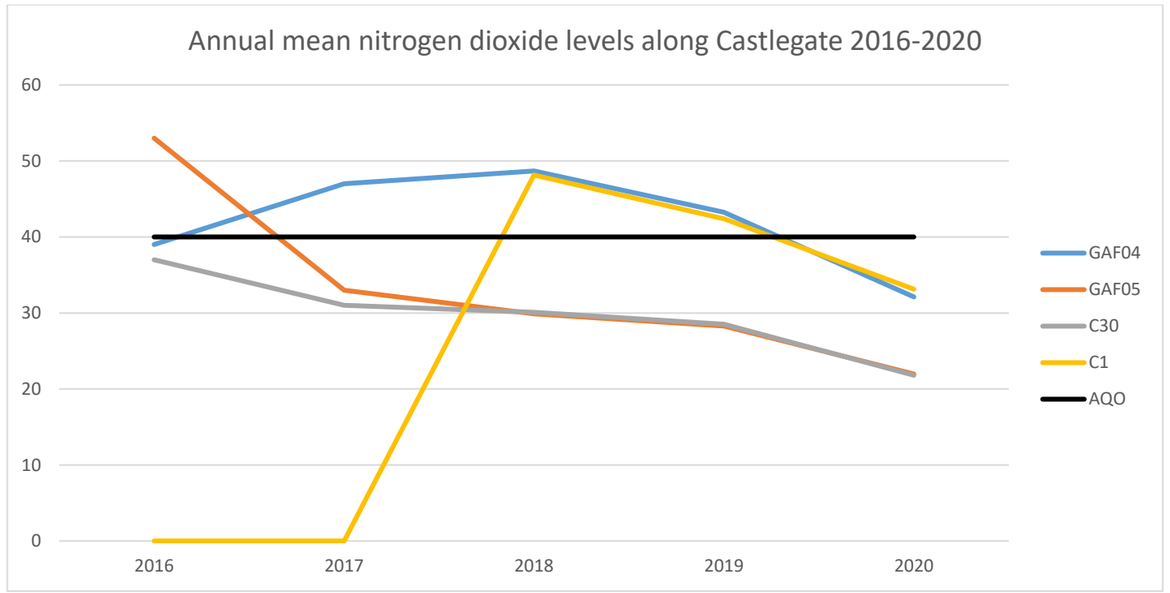
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

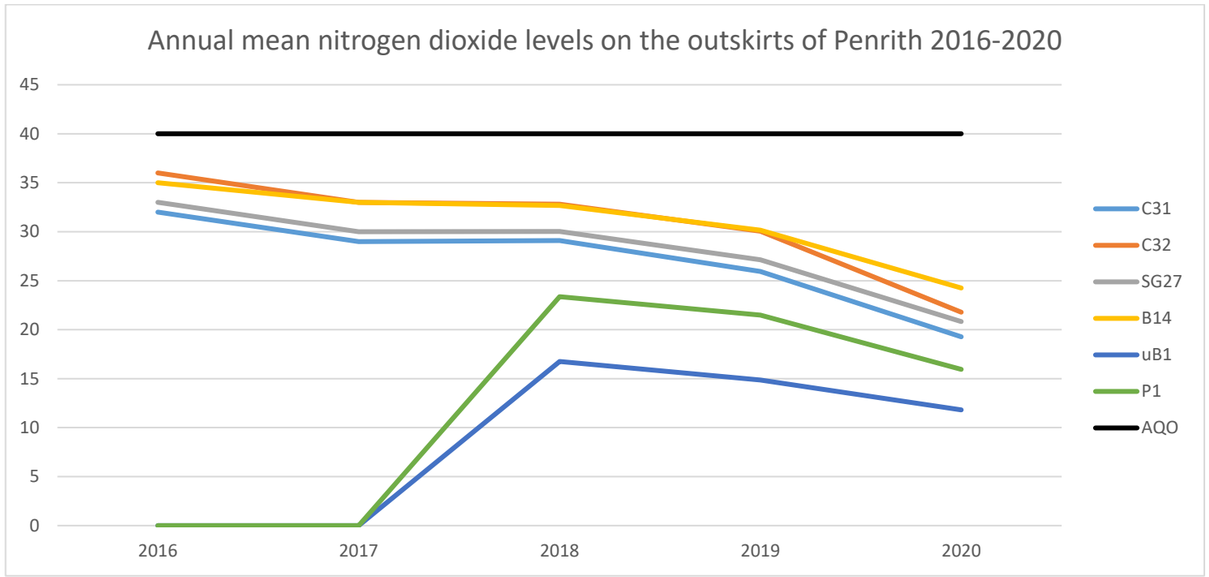
(2) Data capture for the full calendar year (eg if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations




Annual mean nitrogen dioxide levels along Victoria Road 2016-2020
45
40
35
30
25
20
15
10
5
0
2016
2017
2018
2019
2020
V1
V3
V5
V7
GAF16
GAF19
AQO


Annual mean nitrogen dioxide levels along Castlegate 2016-2020
60
50
40
30
20
10
0
2016
2017
2018
2019
2020
GAF04
GAF05
C30
C1
AQO



Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (x.x)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
V3	351720	529966	33.3	30.5						24.0	28.8	31.9	30.9	31.8	30.1	21.1	-	
V5	351713	529941	32.9	26.3						24.6	28.5	30.9	32.4	29.2	29.2	20.4	-	
V7	351733	528918	45.9	36.7						24.2	30.5	33.2	35.0	31.3	33.4	23.4	-	
B14	351394	530344	40.5	34.0						28.5	32.7	37.9	34.1	35.2	34.6	24.3	-	
EB15	352329	528475	34.4	27.4						29.5	30.6	31.9	29.0	25.6	29.7	20.8	-	
EB18	352246	528667	39.3	34.1						34.6	33.9	29.6	27.1	31.9	32.8	23.0	-	
SG27	351171	530649	33.2	24.9						24.8	30.3	30.5	30.2	34.2	29.7	20.8	-	
P1	351144	530056	24.5	23.2						20.3	19.3	20.8	25.6	25.9	22.7	15.9	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (x.x)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
C30	351333	530016	33.1	32.5						25.9	31.3	34.8	29.5	31.3	31.1	21.8	-	
C31	351741	530313	33.4	26.9						21.8	24.0	28.3	30.8	28.3	27.5	19.3	-	
C32	351687	530387	33.7	34.5						27.9	25.7	31.7	33.2	31.5	31.1	21.8	-	
uBi	350860	529912	22.4	18.6						9.4	13.9	16.2	20.3	18.7	16.9	11.8	-	
GAF04	351363	530046	48.6	47.1						45.9	45.7	47.1	45.3	41.8	45.8	32.1	-	
GAF05	351302	520089	34.9	33.0						25.1	30.3	33.5	32.9	30.8	31.4	22.0	-	
2018 C1	351413	530069	49.0	47.9						50.9	46.7	45.7	48.3	42.9	47.3	33.1	-	
GAF16	351774	529838	28.8	24.1						18.6	23.1	24.5	23.9	25.3	23.9	16.7	-	
V1	351794	529870	-	-						20.8	25.4	-	32.0	29.9	26.8	19.1	-	
GAF19	351774	529910	35.3	28.3						22.9	28.2	30.1	30.8	26.4	28.6	20.1	-	

☒ **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 >33% in line with LAQM.TG16.**

☒ **National bias adjustment factor used**

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

Notes:

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

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

See Appendix C for details on bias adjustment and annualisation.

Table B.1.1 – NO_2 2020 Diffusion Tube Results (µg/m^3) including March data

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Time Weighted Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
V3	351720	529966	33.3	30.5	16.6					24.0	28.8	31.9	30.9	31.8	28.5	20.2	-
V5	351713	529941	32.9	26.3	16.7					24.6	28.5	30.9	32.4	29.2	27.7	19.6	-
V7	351733	528918	45.9	36.7	14.3					24.2	30.5	33.2	35.0	31.3	31.2	22.1	-
B14	351394	530344	40.5	34.0	18.9					28.5	32.7	37.9	34.1	35.2	32.8	23.2	-
EB15	352329	528475	34.4	27.4	17.2					29.5	30.6	31.9	29.0	25.6	28.3	20.0	-
EB18	352246	528667	39.3	34.1	18.4					34.6	33.9	29.6	27.1	31.9	31.2	22.0	-
SG27	351171	530649	33.2	24.9	16.6					24.8	30.3	30.5	30.2	34.2	28.2	20.0	-
P1	351144	530056	24.5	23.2	13.7					20.3	19.3	20.8	25.6	25.9	21.7	15.3	-
C30	351333	530016	33.1	32.5	17.8					25.9	31.3	34.8	29.5	31.3	29.6	20.9	-
C31	351741	530313	33.4	26.9	15.6					21.8	24.0	28.3	30.8	28.3	26.1	18.5	-
C32	351687	530387	33.7	34.5	17.7					27.9	25.7	31.7	33.2	31.5	29.6	20.9	-
uBi	350860	529912	22.4	18.6	10.0					9.4	13.9	16.2	20.3	18.7	16.1	11.4	-
GAF04	351363	530046	48.6	47.1	27.5					45.9	45.7	47.1	45.3	41.8	43.7	30.9	-
GAF05	351302	520089	34.9	33.0	15.1					25.1	30.3	33.5	32.9	30.8	29.5	20.9	-
2018C1	351413	530069	49.0	47.9	30.6					50.9	46.7	45.7	48.3	42.9	45.4	32.1	-
GAF16	351774	529838	28.8	24.1	13.0					18.6	23.1	24.5	23.9	25.3	22.7	16.0	-
V1	351794	529870	-	-	14.5					20.8	25.4	-	32.0	29.9	24.6	17.7	-
GAF19	351774	529910	35.3	28.3	16.1					22.9	28.2	30.1	30.8	26.4	27.2	19.2	-

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

New or Changed Sources Identified Within Eden During 2020

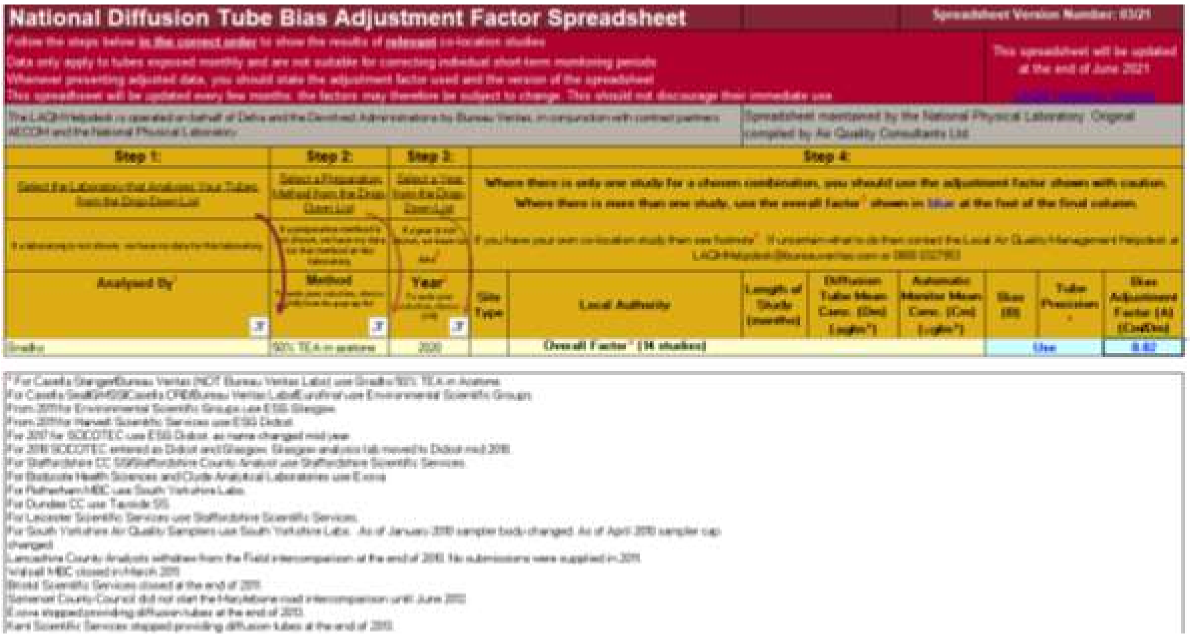
Eden District Council has not identified any new sources relating to air quality within the reporting year of 2020.

Additional Air Quality Works Undertaken by Eden During 2020

Eden District Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

The monitoring tubes within Eden District Council are supplied and analysed by Gradko. The tubes are prepared using a 50% TEA in acetone solution and typically exposed for a 4 week period. The 2020 results have been corrected for bias using a factor of 0.82 which was determined following 14 studies undertaken by Gradko as part of the National Diffusion Tube Bias Adjustment Factor study.



The tube precision for 11 out of the 14 studies was listed as ‘Good’ for Gradko laboratory on the DEFRA website, with 1 being ‘Poor’ and 2 where “single tube”, therefore not applicable.

Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (ugm-3)	Automatic Monitor Mean Conc. (Cm) (ugm-3)	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	50% TEA in acetone	2020	UC	Falkirk Council	10	33	26	24.9%	G	0.80
Gradko	50% TEA in acetone	2020	UB	Falkirk Council	11	16	12	33.6%	G	0.75
Gradko	50% TEA in acetone	2020	UB	Middlesbrough	10	17	12	44.3%	G	0.69
Gradko	50% TEA in acetone	2020	R	Royal Borough of Windsor and Maidenhead	12	29	26	12.3%	G	0.90
Gradko	50% TEA in acetone	2020	R	Royal Borough of Windsor and Maidenhead	12	24	22	11.7%	G	0.90
Gradko	50% TEA in acetone	2020	SU	Redcar & Cleveland Borough Council	11	16	13	23.4%	P	0.81
Gradko	50% TEA in acetone	2020	R	Needham	10	29	24	19.2%	G	0.85
Gradko	50% TEA in acetone	2020	R	Sandwell MBC	12	34	27	26.9%	G	0.79
Gradko	50% TEA in acetone	2020	R	Sandwell MBC	9	14	11	23.0%	G	0.81
Gradko	50% TEA in acetone	2020	R	Sandwell MBC	11	25	23	9.4%	G	0.91
Gradko	50% TEA in acetone	2020	UB	Sandwell Metropolitan Borough Council	11	21	19	9.4%	G	0.91
Gradko	50% TEA in acetone	2020	KS	Haverstone Road Intercomparison	12	57	43	33.0%	G	0.75
Gradko	50% TEA in acetone	2020	R	London Borough of Richmond upon Thames	12	22	20	9.4%	G	0.91
Gradko	50% TEA in acetone	2020	R	London Borough of Richmond upon Thames	9	19	16	20.3%	G	0.83
Gradko	50% TEA in acetone	2020		Overall Factor [1] (14 studies)					Use	0.82

The labortaory has also taken part in the AIR proficiency scheme

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR0030, 31, 33, 34, 36. 37, 39 and 40

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

AIR PT Round	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034	AIR PT AR036	AIR PT AR037	AIR PT AR039	AIR PT AR040
Round conducted in the period	January – February 2019	April – May 2019	July – August 2019	September – November 2019	January – February 2020	May – June 2020	July – August 2020	September – October 2020
Aberdeen Scientific Services	75 %	100 %	100 %	100 %	100 %	NR [4]	NR [4]	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [4]	NR [4]	NR [3]
Edinburgh Scientific Services	100 %	NR [2]	100 %	25 %	50 %	NR [4]	NR [4]	100 %
SOCOTEC	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	NR [4]	NR [4]	100 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [4]	NR [4]	NR [3]
Glasgow Scientific Services	100 %	100 %	100 %	50 %	100 %	NR [4]	NR [4]	100 %
Gradko International	75 %	100 %	100 %	100 %	75 %	NR [4]	NR [4]	75 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [4]	NR [4]	NR [3]
Kirklees MBC	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [4]	NR [4]	NR [3]
Lambeth Scientific Services	50 %	100 %	50 %	100 %	100 %	NR [4]	NR [4]	100 %
Milton Keynes Council	100 %	100 %	50 %	100 %	100 %	NR [4]	NR [4]	25 %
Northampton Borough Council	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [4]	NR [4]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [4]	NR [4]	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	75 %	100 %	NR [4]	NR [4]	100 %
Staffordshire County Council	100 %	75 %	75 %	75 %	100 %	NR [4]	NR [4]	50 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [4]	NR [4]	100 %
West Yorkshire Analytical Services	100 %	100 %	100 %	50 %	100 %	NR [4]	NR [4]	NR [2]

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR, No results reported.
[3] Cardiff Scientific Services, Exova (formerly Clyde Analytical), Kent Scientific Services, Kirklees MBC and Northampton Borough Council; no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.
[4] Round was cancelled due to pandemic.

NO2 PT Summary – AIR PT Rounds AR030, 31, 33, 34, 36, 37, 38 and 40 Page 5 of 5

As can been seen on the table above Gradko scored 75% Jan-Feb2020 and Sep-Oct2020. May-Aug 2020 no results were reported.

Due to the unusual circumstance that occurred in 2020 with COVID19 there were months that air tubes could not be collected and put out. Tube were put out as normal in March but then not removed until the end of June. However due to a change in working locations July’s tubes were not received and so could not be put out. This led to all of Eden’s tube sites needing to be annualised.

Diffusion Tube Annualisation

All 18 sites required annualisation; this was calculated using DEFRA Diffusion processing tool and is illustrated in Table C.2. The four closest continuous monitoring locations to Eden with enough data were chosen, but unfortunately they cover a wide geographical area over the north of England and include Scotland, and a variety of mainly urban sites.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 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.TG16 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.

Eden District Council have applied a national bias adjustment factor of 0.82 to the 2020 monitoring data. A summary of bias adjustment factors used by Eden over the past five years is presented in Table C.1 filled using the National Diffusion Tube Bias Adjustment Factor Spreadsheet (See below)

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	National	03/21	0.82
2019	National	09/20	0.89
2018	National	06/19	0.89
2017	National	09/18	0.96
2016	National	06/17	1.01

NO_2 Fall-off with Distance from the Road

No diffusion tube NO_2 monitoring locations within Eden required distance correction during 2020. All monitoring locations bar one have been chosen to be representative of a. relevant receptor, i.e at the façade of a residential property and therefore do not require any distance adjustments. The one location not located on a residential property concentration was under 36µg/m3 (per DEFRA guidance).

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

Site ID	Annualisation Factor Carlisle	Annualisation Factor Dumfries	Annualisation Factor Billingham	Annualisation Factor Hartlepool	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
V3	0.9030	0.8242	0.8806	0.8098	0.8544	30.1	25.7	
V5	0.9030	0.8242	0.8806	0.8098	0.8544	29.2	24.9	
V7	0.9030	0.8242	0.8806	0.8098	0.8544	33.4	28.5	
B14	0.9030	0.8242	0.8806	0.8098	0.8544	34.6	29.6	
EB15	0.9030	0.8242	0.8806	0.8098	0.8544	29.7	25.4	
EB18	0.9030	0.8242	0.8806	0.8098	0.8544	32.8	28.1	
SG27	0.9030	0.8242	0.8806	0.8098	0.8544	29.7	25.4	
P1	0.9030	0.8242	0.8806	0.8098	0.8544	22.7	19.4	
C30	0.9030	0.8242	0.8806	0.8098	0.8544	31.1	26.6	
C31	0.9030	0.8242	0.8806	0.8098	0.8544	27.5	23.5	
C32	0.9030	0.8242	0.8806	0.8098	0.8544	31.1	26.6	
uBi	0.9030	0.8242	0.8806	0.8098	0.8544	16.9	14.4	

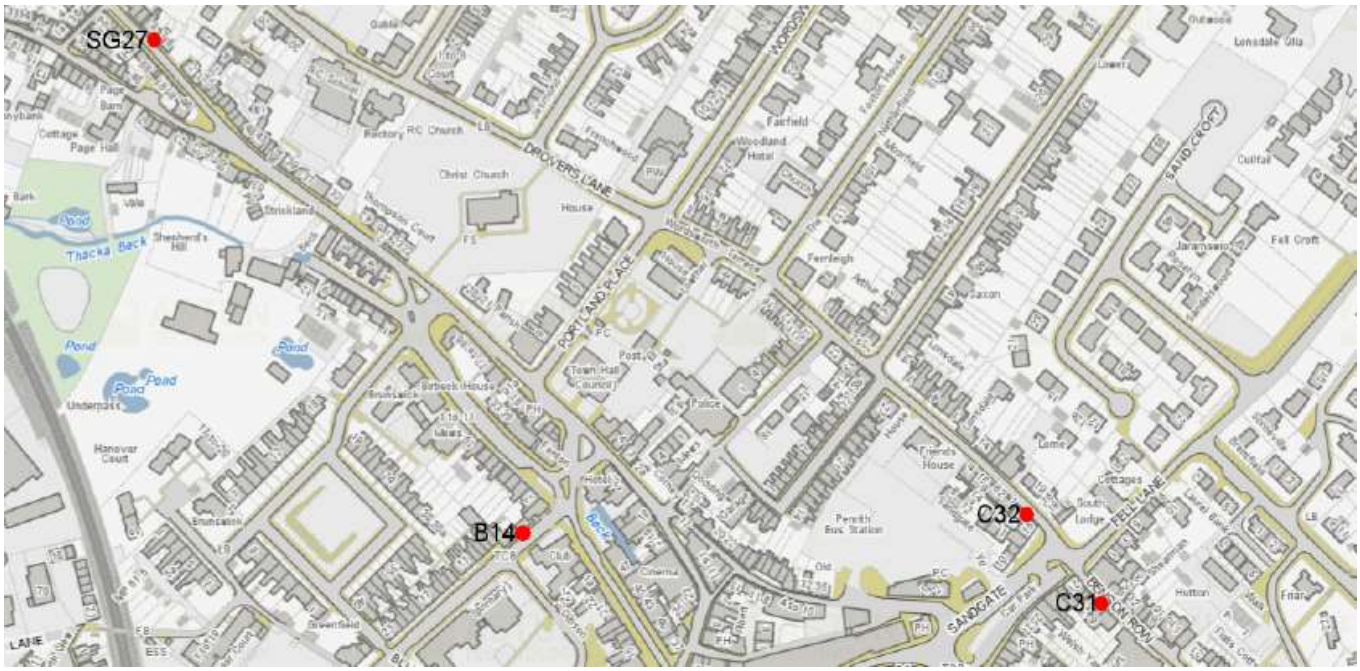
Site ID	Annualisation Factor Carlisle	Annualisation Factor Dumfries	Annualisation Factor Billingham	Annualisation Factor Hartlepool	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
GAF04	0.9030	0.8242	0.8806	0.8098	0.8544	45.8	39.2	
GAF05	0.9030	0.8242	0.8806	0.8098	0.8544	31.4	26.8	
2018 C1	0.9030	0.8242	0.8806	0.8098	0.8544	47.3	40.4	
GAF16	0.9030	0.8242	0.8806	0.8098	0.8544	23.9	20.4	
V1	0.9014	0.9071	0.8835	0.7856	0.8694	26.8	23.3	
GAF19	0.9030	0.8242	0.8806	0.8098	0.8544	28.6	24.5	

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

Figure D.1 – Map of Non-Automatic Monitoring Site

Map D1 Monitoring locations east of Castlegate, along Castlegate and Victoria Road

Map D2 Monitoring locations in the northern outskirts of Penrith



Map D3 Monitoring locations within Eamont Bridge, EB20 was removed but kept on the map as its present in figures

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

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

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

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data[8] suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[9] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual

[8] Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

[9] Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within Eden District

Due to COVID-19 and as a result of the lockdowns officers were unable to change and collect tubes from March 2020 until June 2020. The results collected from tubes that had been exposed for several months could not be regarded as reliable as it's likely the tubes were saturated, so were removed from the report. This meant the maximum readings for each site was only 8 months. As a result of home working and the Council buildings being closed, July's tubes were also mislaid in transit, so could not be put out.

Permission from the County Council took much longer than anticipated and the new automatic monitoring devices were not installed on Castlegate until 2021.

Opportunities Presented by COVID-19 upon LAQM within Eden District

A positive outcome of Covid-19 was an increase in the opportunity to work from home for many businesses across Eden, allowing for a decrease in work related travel. It is hoped this is something that can continue.

Challenges and Constraints Imposed by COVID-19 upon LAQM within Eden District

- The installation of our automated air monitors was postponed as we were unable to go into our offices to collect the equipment after they arrived in March 2019. Due to other impacts of COVID getting them installed was postponed in 2020 due to staff in both the district and Cumbria County Council having to prioritise other work ie track and trace. **High Impact.**
- As with previous years, a national bias adjustment factor has been utilised to adjust the diffusion tube results for 2020. Within 2019 there were 25 co-location studies that were utilised to calculate the bias factor for the laboratory and preparation method used. For 2020, this number has reduced to only three studies. There is therefore the potential for there to be a greater degree of

uncertainty associated with the resultant annual mean NO_2 concentrations in 2020 than in previous years. **High Impact.**

- During 2020, access to all of diffusion tube monitoring sites was restricted due to their locations on residential buildings. Therefore, it was not possible to maintain diffusion tube exposure periods for April to June in line with the national monitoring calendar for a number of sites. This has affected data capture within 2020, resulting in monitoring sites having to be annualised. **Medium Impact.**
- Environmental Health staff, as well as undertaking their usual duties during the pandemic were also involved in the government's Track and Trace programme. As trained officers in disease investigation, they were part of a Cumbria-wide system to identify and manage local outbreaks and to identify and speak to those individuals who hadn't been contacted by the national system. This work continues and still puts a strain on officers and the work of the team.

The impacts as presented above are aligned with the criteria as defined in Table F 1, with professional judgement considered as part of their application.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (eg 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

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 Highways England
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.TG16. April 2021. 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.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.