



2018 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2018

Local Authority Officer	
Department	Environmental Protection
Address	Mansion House, Penrith, CA11 7YG
Telephone	
E-mail	pollution@eden.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Eden District Council

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

The Council has monitored air quality within the District since 1996 as part of its local air quality management duties. As the principal town within Eden, Penrith provides many of the key services, for example healthcare, schooling, employment and shops. Eden District Council monitors nitrogen dioxide levels using diffusion tubes across Penrith and also Eamont Bridge where historically monitored levels indicated breaches of the Air Quality Objective (AQO) for nitrogen dioxide.

Penrith town centre has become busier over the years with increased vehicle numbers accessing the amenities. Whilst there have been improvements to emissions from modern engines, the levels within the town centre are staying fairly static. This may be due to increased traffic numbers balancing out the improvements in emissions from vehicle engines. There are two specific areas within Penrith where Eden District Council continues to monitor, together with a stretch of the A6 through Eamont Bridge. (See Appendix D for a plan of the monitoring locations).

There was only one recorded failure of the annual mean AQO for nitrogen dioxide within the district in 2017. This was along Castlegate within the centre of Penrith.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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This street is one-way, narrow with a busy roundabout junction at the top end resulting in frequent standing traffic.

Victoria Road, a section of the A6 which is the main north south route through the town centre has several busy junctions along this section. There have now been no failures of the annual mean AQO recorded at any location along this section for the past 2 years.

Within Eamont Bridge, there have now been no breaches of the annual mean AQO recorded in the last four years. The Council is confident that levels of nitrogen dioxide are consistently staying below the annual mean AQO but will continue to monitor in 2018 albeit at a reduced number of locations.

The Council works with partner organisations Cumbria County Council, the Lake District National Park Authority, the Yorkshire Dales National Park Authority and the Environment Agency to ensure that this is achieved through the planning and permitting processes.

Actions to Improve Air Quality

Development within the district of Eden is managed by Eden District Council, the Lake District National Park Authority, the Yorkshire Dales National Park Authority and Cumbria County Council. Cumbria County Council is responsible for the management of the roads across Eden and all the local planning authorities are strongly committed to development where sustainable transport is a key consideration in the process. Eden District Council is the most sparsely populated of any district in England and as a consequence many people depend on car travel since public transport can be infrequent or non-existent in rural areas.

Eden District Council's Core Strategy Development Plan Document identifies that new development will be required to demonstrate that it protects air quality and does not result in environmentally unacceptable levels of traffic. It identifies that the Council will work with partner organisations to ensure that the environmental impact

of travel is reduced, to conserve energy and reduce air pollution by limiting the growth in traffic

Eden District Council Local Plan 2014 – 2032, Policy ENV7 – Air Pollution states that:

All major development proposals will be required to assess the likely impacts of the development on air quality and mitigate any negative impacts by:

1. Ensuring the development is located within easy reach of established public transport routes
2. Maximising provision for cycling and pedestrian facilities
3. Encouraging the use of cleaner transport fuels on site, through the inclusion of electric car charging points, and
4. Contributing towards the improvement of the highway network where the development is predicted to result in increased congestion on the highway network.

The Cumbria Local Transport Plan 2011 - 2026, produced by Cumbria County Council, identifies many measures aimed at improving ease of access to jobs, services and healthcare. The progress of this plan to date has seen:

- Introduction of Rural Wheels scheme - Transport for people in rural areas. Passengers sharing transport benefit from a reduced rate.
- Introduction of a Village Wheels Scheme - Timetabled service for communities to nearest town. Only available in Eden for Greystoke and Newbiggin.
- Introduction of a Community Wheels scheme - Demand responsive transport service for residents of Alston Moor Parish. One bus and service is for Alston, the other for Garrigill
- A66 Temple Sowerby by-pass
- Innovative rural traffic calming scheme in Clifton
- Environmental improvements in Appleby and Kirkby Stephen

- Surfaced walk and cycle route from Penrith to University campus at Newton Rigg

[Penrith Town Council](#), published their Council Plan for 2017-2022 in January 2017. This outlines the strategic plan for the town and includes several measures that will promote improvements in air quality:

- Provide inclusive walking and cycling opportunities in and around Penrith;
- Improve transport services through working with partners to secure improvements in public transport services, look for real alternatives to public transport, promote Car Club, community transport schemes and workable schemes for lift and car share;
- Lobbying for electric car charge points

Conclusions and Priorities

There have now been no exceedances of the AQO for NO₂ measured along the A6 within Eamont Bridge since 2012. The traffic data has been estimated to show an ongoing trend upwards in total traffic numbers (2% increase estimated in 2016). However this is still considerably lower than has been counted on this section of road in previous years. At the end of 2017, the number of monitoring tubes within Eamont Bridge was reduced to three locations in light of the monitoring results.

In 2017 there was again no exceedance of the AQO for NO₂ at any monitoring location along Victoria Road. At the end of 2017 in light of these results, a review of monitoring locations was undertaken and the total number has been reduced by two with one tube being relocated to the bottom of Roper Street.

In 2016 there was a breach of the AQO at the top of Castlegate although there were concerns regarding the accuracy of the data at this location. In 2017 there has again been a breach of the AQO at one location although this time it is further down the street but within the canyoned section.

A key priority moving forwards will be to establish an involvement with the Penrith Visionary Masterplan to ensure any potential impacts from the growth and expansion of Penrith are considered including the potential for any significant increase in traffic numbers within the sensitive areas of Penrith.

Local Engagement and How to get Involved

There has been an increasing media interest in air quality nationally as a wider understanding of the health effects from air quality has been publicised. In 2017 Defra published plans for reducing roadside nitrogen dioxide concentrations in the UK and set out the approach to meet the statutory limits for NO₂. Currently DEFRA are consulting on the draft Clean Air Strategy 2018 which sets out actions to improve air quality by reducing pollution from a wide range of sources.

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.

However there are also many simple measures that can be taken by individual members of the public to help improve air quality such as:

- Walking and cycling short journeys rather than taking the car;
- Using public transport wherever possible, the [Plan Your Journey](#) website has been established to assist with this;
- Electric bike hire is now available at several locations within Eden;
- Lift sharing to work and for the school run;

- Turning off the car engine when stationary;
- Choose a low emission vehicle such as an electric or hybrid car
- Start a 'walking bus' for the journey to school.

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1 Local Air Quality Management

This report provides an overview of air quality in Eden during 2017. 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 can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

Eden District Council currently does not have any AQMAs.

For reference, a map of Eden District Council's monitoring locations is available in Appendix D.

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

Defra's appraisal of last year's ASR concluded that the report was well structured, detailed and provided the information specified in the Guidance. The following comments were made:

1. One exceedance was recorded at the top of Castlegate of $53\mu\text{g}/\text{m}^3$. This is the second year at this location. It is reported that the road use has changed at this monitoring location and there are now cars parking beside the diffusion tube. The short term point sources may be directly impacting on the monitoring tube results and skewing the data.
2. It appears as though there three diffusion tubes located at the top end of Castlegate, but the road is particularly narrow lower down, with an incline. This road is clearly subject to canyoning, so we consider that the assessment of air quality should be extended lower down the street to include the narrow canyon, at locations where dwellings face the road.
3. It would be appropriate for the Council to consider reviewing the current monitoring strategy, to ensure that sites close to busy traffic with potential population exposure are adequately reviewed.
4. It would be very useful to plot trend graphs for the diffusion tube data as it makes it much easier to interpret the long term trend of the air quality.
5. The maps included in the report are very clear, and show the monitoring locations very effectively. This should be continued in all future reports.

Following receipt of DEFRA's comments, the locations of all the monitoring tubes have been reviewed and new monitoring locations identified:

- Within Eamont Bridge, monitoring location GAF02 has been removed. The monitoring has however continued along this stretch in order to maintain a watching brief where there is continued queuing traffic close to houses adjacent to the roadside.

- Along Victoria Road, one monitoring location GAF19 has been removed and location GAF17 has been relocated around the corner at the bottom of Roper Street. The Roper Street/ Victoria Road junction has been identified as operating at close to capacity for traffic and with the traffic lights there is frequent stationary traffic adjacent to properties.
- Along Castlegate, there has been an additional monitoring location established (2018C1) in the narrower canyoned section of the road.
- The results of the monitoring location SG29 were also reviewed and a decision taken that consistently low levels of NO2 meant that monitoring at this location could cease and the tube be relocated,
- A new monitoring location along Norfolk Road (2018P1) has been established. This road takes a lot of the lighter traffic for the industrial estates and at peak hours there is frequently stationary traffic queuing to the roundabout with Cromwell Road. There are several residential properties along this stretch that open directly onto the pavement and the opposite side of the road is adjacent to the main west coast rail line. This section is immediately prior to Penrith Station so there is the additional potential for trains to sit and idle here waiting to enter the station.
- There has also been a new location established (2018UB1) to monitor background nitrogen dioxide levels given the industrial processes on the industrial estates. This location was chosen since it is away from traffic and set down a quiet residential cul de sac.

The principal challenges and barriers to implementation that Eden District Council anticipates facing are resource constraints within a very small team.

At the end of 2017 the discussion of a Penrith Vision Masterplan to maximise opportunities for growth and development to 2050 within the district. Currently major new transport links together with business expansion and a possible new 5,000 – 8,000 new homes is being considered. Potential impacts on air quality will need to be

assessed and highlighted throughout and a member of the Environmental Protection team is now on the working group for this project.

All planning applications continue to be screened for possible impacts on air quality too and where appropriate air quality assessments are required as supporting information prior to the application being determined.

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}:

Liaison with the Director of Public Health at Cumbria County Council on how air quality can be prioritised within Eden to help reduce the health burden from air pollution. This will include working to include air pollution in Cumbria's Joint Strategic Needs Assessment through the Health and Wellbeing Board.

No monitoring of PM_{2.5} is routinely carried out within Eden since this is not currently required by Defra. National PM_{2.5} monitoring is carried out in Carlisle, within a neighbouring district. This is however classed as an urban roadside location.

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 is to 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 9 µgm⁻³.

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

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 does not undertake any automatic (continuous) monitoring. 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. 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 (passive) monitoring of NO₂ at 19 sites during 2017. Table A.1 in Appendix A shows the details of the 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 (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” and distance correction. Further details on adjustments are provided in Appendix C.

Eden District Council has selected monitoring sites which are at the façade of residential dwellings and therefore require no distance adjustment. In 2017 sufficient data was collected so no annualisation of results was required. The bias

adjustment calculation undertaken by Eden District Council is documented in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Table A.1

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 2017 results have been corrected for a bias using a factor of 0.97 which was determined following 16 studies undertaken by Gradko as part of the National Diffusion Tube Bias Adjustment Factor study. For all the monitoring locations there was more than 75% data capture for the year and consequently no annualisation of the data was required. All monitoring locations 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.

There has been just one exceedance this year along Castlegate (GAF04) at a level of 47µg/m³. This location is at a point where the road is narrowed and canyoned and frequently has queuing traffic. The additional monitoring point (2018C1) established in 2018 will assist with assessing the nitrogen dioxide levels along a greater stretch of Castlegate.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
C30	40 Castlegate	Roadside	351333	530016	NO2	NO	0	1.5	NO	2.5
GAF04	NewVic	Roadside	351363	530046	NO2	NO	0	1	NO	2.5
GAF05	Station Hotel	Roadside	351302	520089	NO2	NO	0	2.5	NO	2.5
V3	25b King Street	Roadside	351720	529966	NO2	NO	0	2	NO	2.5
V5	Front Victoria Rd / Langton Cott	Roadside	351713	529941	NO2	NO	0	1	NO	2.5
V7	Café 15	Roadside	351733	528918	NO2	NO	0	2.5	NO	2.5
GAF15	Abbey House, Victoria Road	Roadside	351804	529797	NO2	NO	0	2	NO	2.5
GAF16	Landels Court corner	Roadside	351774	529838	NO2	NO	0	2	NO	2.5
GAF17	Lamppost 36 Victoria Road	Roadside	351805	529855	NO2	NO	0	1	NO	2.5
GAF19	25 Victoria Road	Roadside	351774	529910	NO2	NO	0	1.5	NO	2.5

B14	4 Brunswick Road	Roadside	351394	530344	NO2	NO	0	2	NO	2.5
SG27	8 Scotland Rd	Roadside	351171	530649	NO2	NO	0	1	NO	2.5
SG29	Front - The Royal (Town Hall)	Roadside	351405	530426	NO2	NO	0	1	NO	2.5
31	3 Benson Row	Roadside	351741	530313	NO2	NO	0	1	NO	2.5
32	Penrith Nursery	Roadside	351687	530387	NO2	NO	0	2.5	NO	2.5
GAF02	4 Old Post Row, Eamont Bridge	Roadside	352272	528642	NO2	NO	0	1	NO	2.5
EB15	Glendale	Roadside	352329	528475	NO2	NO	0	1	NO	2.5
EB18	Cherry Cottage	Roadside	352246	528667	NO2	NO	0	2.5	NO	2.5
EB20	2 Kemplay Rd	Roadside	352207	528827	NO2	NO	0	4	NO	2.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
C30	Roadside	Diffusion Tube		92	35	37	38	37	31
GAF04	Roadside	Diffusion Tube		75	-	48	50	39	47
GAF05	Roadside	Diffusion Tube		83	-	33	45	53	33
V3	Roadside	Diffusion Tube		83	33	33	23	23	27
V5	Roadside	Diffusion Tube		100	32	41	38	35	31
V7	Roadside	Diffusion Tube		100	34	51	36	36	35
GAF15	Roadside	Diffusion Tube		92	-	32	32	27	31
GAF16	Roadside	Diffusion Tube		100	-	28	30	34	24
GAF17	Roadside	Diffusion Tube		83	-	35	29	34	31
GAF19	Roadside	Diffusion Tube		92	-	32	29	32	27
B14	Roadside	Diffusion Tube		100	32	33	31	35	33
SG27	Roadside	Diffusion Tube		92	31	32	31	33	30
SG29	Roadside	Diffusion Tube		100	28	31	30	31	29
31	Roadside	Diffusion Tube		83	33	39	34	32	29

32	Roadside	Diffusion Tube		100	28	-	33	36	33
GAF02	Roadside	Diffusion Tube		100	-	36	30	29	28
EB15	Roadside	Diffusion Tube		83	32	35	32	32	32
EB18	Roadside	Diffusion Tube		100	35	38	35	33	35
EB20	Roadside	Diffusion Tube		100	31	34	30	32	31

☒ Diffusion tube data has been bias corrected

☐ Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

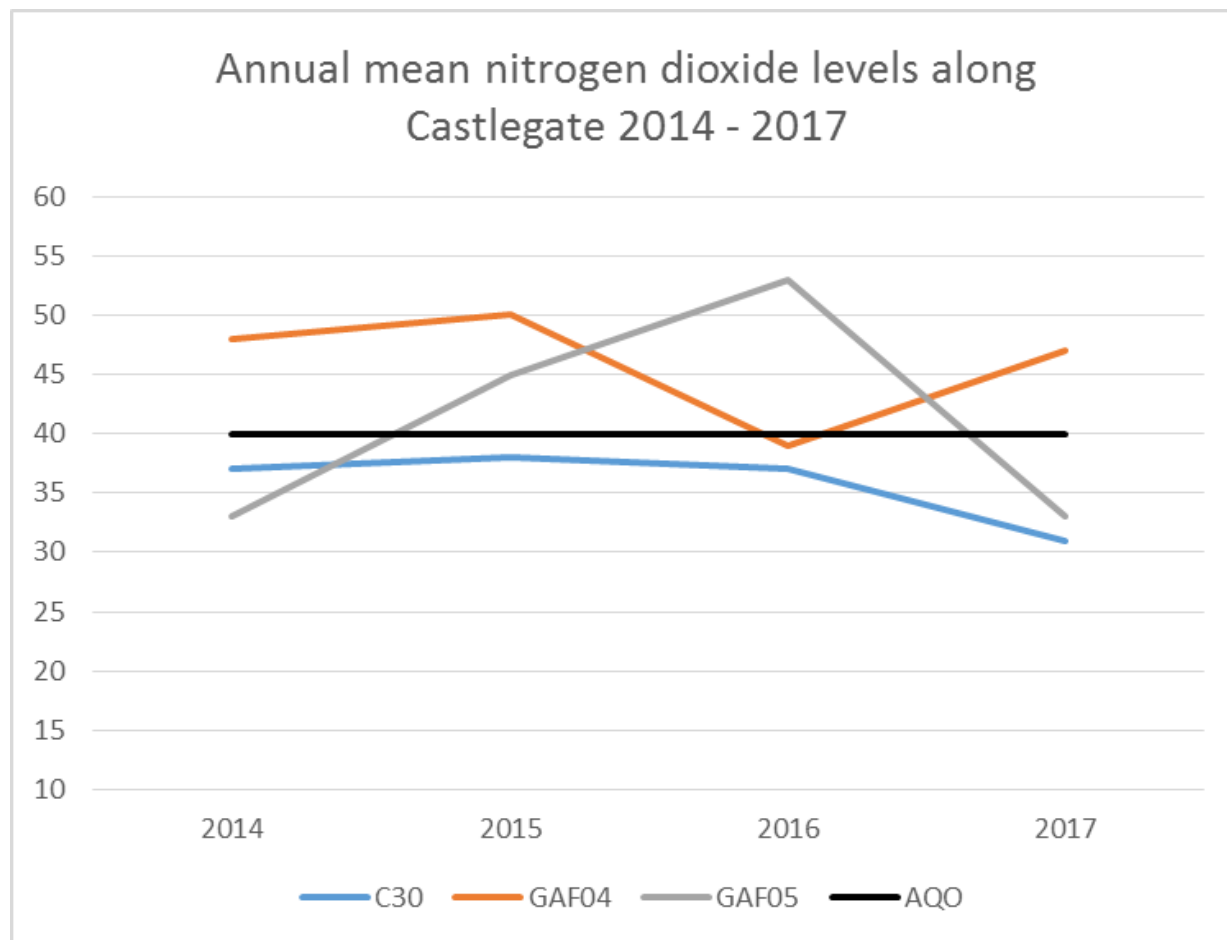
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

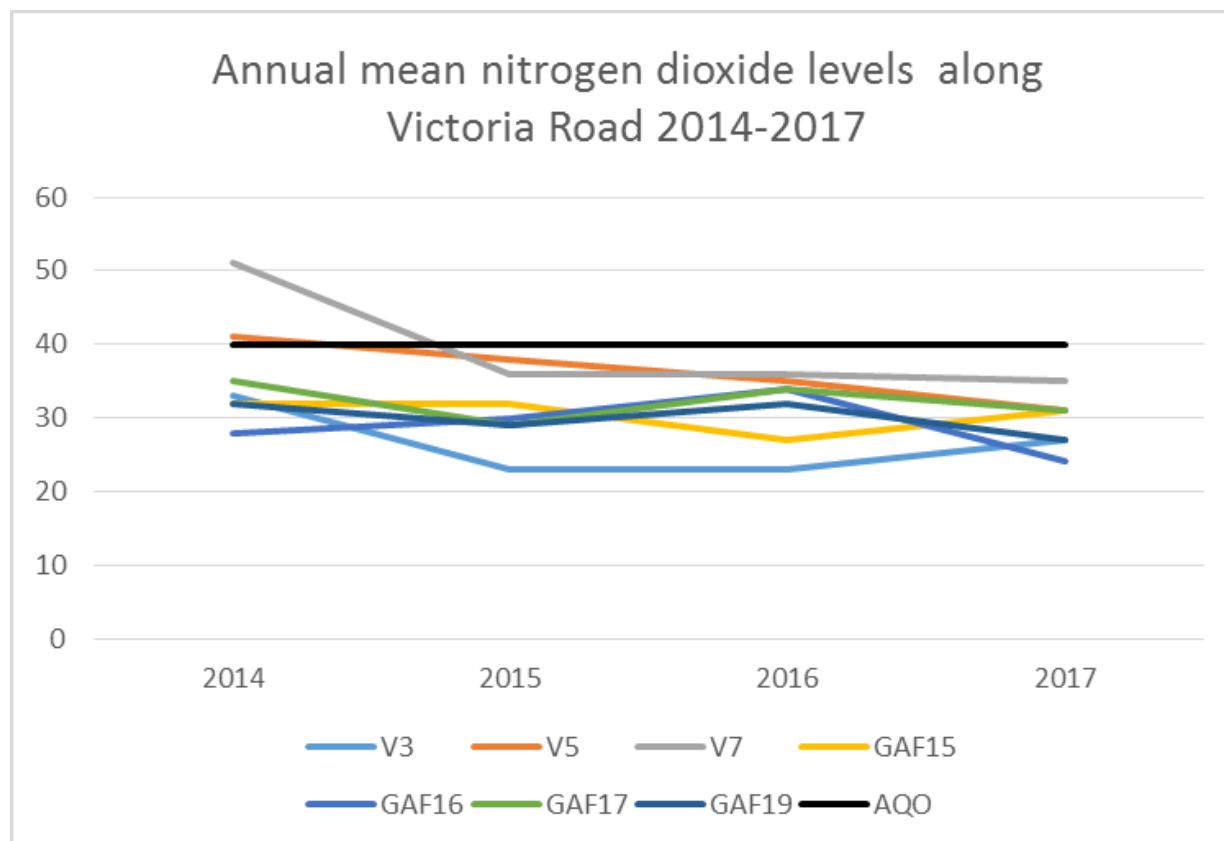
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

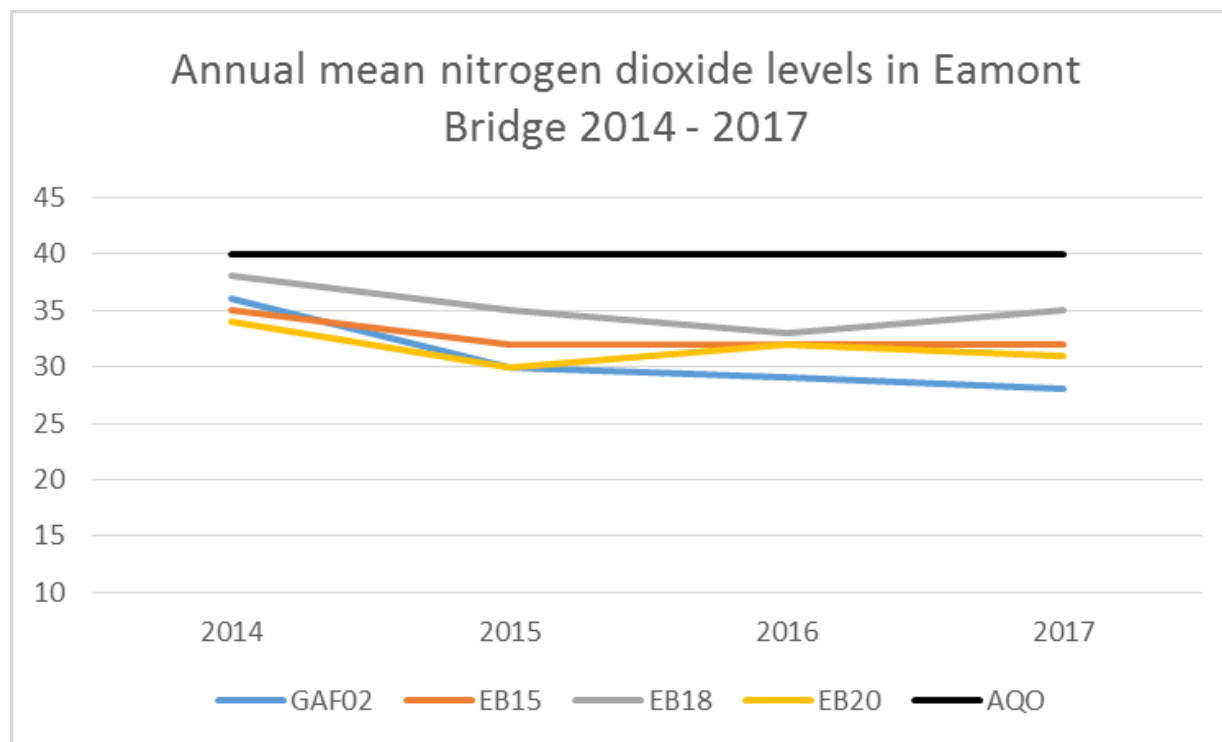
(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

Trend plots for the last four years of data for the three key areas monitored have been produced below. On each chart the black line represents the AQO for nitrogen dioxide of 40µg/m³.







Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2017

Site ID	NO ₂ Mean Concentrations (µg/m³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	Bias Adjusted (0.97) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
													Raw Data		
C30	38.8	34.7	30.6	21.4	25.5	27.6		29.1	29.8	35.0	45.3	39.2	32.5	31.5	0
GAF04	66.7	66.8		32.6	27.6		39.0		42.6	49.5	57.5	55.4	48.6	47.2	0.0
GAF05	37.69	37.45	38.71	39.26		23.94	29.76	26.91		33.37	38.22	36.94	34.2	33.2	0.0
V3	31.63	30.44	23.61		18.45	17.26		27.59	24.98	30.72	37.76	36.84	27.9	27.1	0.0
V5	47.2	38.44	31.61	20.69	27.8	27.78	24.48	31.45	27.7	32.25	38.8	38.07	32.2	31.2	0.0
V7	69.14	35.7	33.82	24.66	29.57	28.02	30.4	38.1	31.86	33.01	43.46	39.54	36.4	35.3	0.0
GAF15	34.39	34.5	34.48	24.36	27.71	26.69		31.72	27.952	33.45	41.13	37.26	32.1	31.2	0.0
GAF16	32.42	28.61	26.55	17.36	18.1	20.97	20.44	23.95	21.79	25.9	27.66	30.49	24.5	23.8	0.0
GAF17	42.55	39.51	31.79	24.32	26.43	24.64		25.12	24.22		43.53	34.47	31.7	30.7	0.0
GAF19	30.42	30.62	29.78	25.62	22.94	24.67	19.8	24.32	24.24		33.21	35.83	27.4	26.6	0.0
B14	40.76	37.96	38.63	26.93	30.03	28.61	27.19	35.48	33.46	26.79	44.33	41.85	34.3	33.3	0.0
SG27	44.38	36.27	28.1	23.24	24.88	24.32		27.13	28.85	30.11	36.45	40.33	31.3	30.3	0.0

SG29	35.93	34.31	32.99	20.46	23.76	23.66	23.8	29.91	26.85	29.39	40.17	35.61	29.7	28.8	0.0
31	36.93	38	31.57	22.01	27.01	24.85	22.83	24.41	30.29			37.17	29.5	28.6	0.0
32	40.37	39.74	36.18	24.13	31.11	31.35	27.59	31.01	35.4	36.5	41.63	39.15	34.5	33.5	0.0
GAF02	38.34	34.22	29.67	23.52	24.49	24.89	24.47	25.85	26.39	29.21	35.18	34.16	29.2	28.3	0.0
EB15		35.42	39.52	25.14		31.07	28.66	34.8	29.89	26.34	35.36	38.6	32.5	31.5	0.0
EB18	40.36	40.2	31.44	32.36	28.91	32.73	32.26	37.92	34.32	34.34	43.57	38.48	35.6	34.5	0.0

☐ Local bias adjustment factor used

☒ National bias adjustment factor used

☐ Annualisation has been conducted where data capture is <75%

☒ Where applicable, data has been distance corrected for relevant exposure

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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

Sources

Omega Proteins was granted planning approval in 2017 for a new thermal oxidiser. This industry is now permitted as an A1 process by the Environment Agency. There have also been two peak power generation plants approved in this locality of Penrith within 2017. In light of this, the two industrial estates, the M6 and the prevailing wind a new monitoring tube location to verify background nitrogen dioxide levels has been established for 2018.

A housing development for 110 houses on the outskirts of the east of Penrith was approved.

Choice of NO₂ Bias Adjustment Factor

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 2017 results have been corrected for bias using a factor of 0.97 which was determined following 22 studies undertaken by Gradko as part of the National Diffusion Tube Bias Adjustment Factor study.

QA/QC of diffusion tube monitoring

The tube precision for 20 out of the 22 studies is listed as 'Good' for the Gradko laboratory on the [Defra website](#).

The laboratory has also taken part in the [AIR proficiency scheme](#)

Table 1: Laboratory summary performance for AIR NO₂ PT rounds AR013, 15, 16, 18, 19, 21, 22 and 24

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO₂ PT rounds and the percentage (%) of results submitted which were subsequently determined to be satisfactory based upon a z-score of $\leq \pm 2$ as defined above.

AIR PT Round	AIR PT AR013	AIR PT AR015	AIR PT AR016	AIR PT AR018	AIR PT AR019	AIR PT AR021	AIR PT AR022	AIR PT AR024
Round conducted in the period	April – May 2016	July – August 2016	September – October 2016	January – February 2017	April – May 2017	July – August 2017	September – October 2017	January – February 2018
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	75 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	0 %	100 %	100 %	50 %	0 %	100 %	100 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	100 %	100 %	75 %	100 %	NR [2]	NR [2]	100 %	NR [2]
Milton Keynes Council	100 %	100 %	75 %	100 %	75 %	0 %	75 %	100 %
Northampton Borough Council	100 %	NR [2]	75 %	0 %	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
South Yorkshire Air Quality Samplers	100 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	75 %	100 %	NR [2]	100 %	100 %	100 %	100 %	50 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	100 %	NR [2]	50 %	100 %	100 %	100 %	100 %	50 %

[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each AIR PT round.

[2] NR No results reported

[3] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO₂ diffusion tube monitoring and therefore did not submit results.

As can be seen from the table above Gradko have consistently scored 100%.

For all monitoring locations within Eden. There was more than 75% data capture for the year and consequently no annualisation of the data was required. All monitoring locations have been chosen to be representative of a relevant receptor (residential property) and have been located on the facade of the building and therefore do not require any distance adjustments.

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

Map D1 Monitoring locations along Castlegate and Victoria Road



Map D2 Monitoring locations for other locations within Penrith



Map D3 Monitoring locations within Eamont Bridge



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁴	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	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
	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
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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	Air quality 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 (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

References

Eden District Council Core Strategy [Development Plan Document](#)

Eden Local Plan [\(Proposed Submission Version\) 2014 – 2032](#)

Lake District National Park Authority - [Lake District National Park Authority Core Strategy](#)

Cumbria County Council - [Moving Cumbria Forward, Cumbria Transport Plan Strategy 2011-2026](#)

[Penrith Town Council Plan 2017 – 2022](#)

[Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance, 2008](#)

Local Air Quality Management Technical Guidance [TG16](#)