



# 2017 Air Quality Annual Status Report (ASR)

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

June 2017

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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<sup>1,2</sup>.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

Within Eden, the main air quality issue is from nitrogen dioxide levels associated with vehicle emissions within the town centre of Penrith. As a rural, sparsely populated area car ownership is high and regular public transport services are not commercially viable across much of the district.

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).

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<sup>1</sup> Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

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 were no failures of the annual mean AQO recorded at any location along this section in 2016.

Castlegate is the only location where a breach of the annual mean AQO for nitrogen dioxide was recorded within Eden. This street is one-way, narrow with a busy roundabout junction at the top end resulting in frequent standing traffic. However changes to activities at the monitoring location of the failure have identified potential errors with this reading and this tube location will be relocated.

Within Eamont Bridge, there have now been no breaches of the annual mean AQO recorded in the last three years. In 2016 the bridge was closed for three months following Storm Desmond which reduced the traffic passing through this location, however the Council is confident that levels of nitrogen dioxide are consistently staying below the annual mean AQO.

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

In September 2016 Cumbria County Council and the Lake District National Park Authority have submitted a partnership bid to the Access Fund for Sustainable Travel. If successful, the project aims to substantially increase the levels of cycling and walking in the county; and will work with business and schools to increase access by smarter travel modes.

## **Conclusions and Priorities**

### **Eamont Bridge**

Following exceedances of the AQO for NO<sub>2</sub> along the A6 in 2011 and 2012 identified from the diffusion tube monitoring, a detailed assessment was carried out by Bureau Veritas in 2013 on behalf of Eden District Council. This proposed the declaration of an AQMA and also recommended additional monitoring points to be installed along this stretch. The Council installed additional monitoring locations at relevant receptors and started the process of declaring an AQMA. Since 2012 however there have been no failures of the AQO detected. See Table A.3 for annual mean AQO monitoring results for the last five years.

The declaration of this AQMA was postponed until further data had been collected and analysed. Further assessment of counted traffic flows along this stretch of road have shown a reduction in vehicles of 15% from 2007 to 2011. Additionally the Bureau Veritas report modelled the number of HGVs to be 7.2% of all vehicles whereas the counted number in 2012 identified just 4.9% of all vehicles were HGVs. This may explain why the measured levels of NO<sub>2</sub> are significantly lower than the detailed assessment modelled and with reducing traffic numbers, the levels of NO<sub>2</sub> monitored are also reducing year on year. It is acknowledged that in 2016 this village was affected by Storm Desmond and the A6 bridge across the River Eamont was closed for 3 months whilst its structural stability was assessed.

Therefore it is proposed that at the end of 2017 monitoring is ceased along this stretch. This will allow another full year's data to be collected and providing that there is no failure of the AQO in 2017 give 5 years of compliance demonstrating a downward trend of NO<sub>2</sub> through Eamont Bridge.

## **Victoria Road**

In 2015 and 2016 there were no exceedances of the annual mean AQO for NO<sub>2</sub> in this location. Following a failure identified in 2012, this section of the A6 was also part of the Detailed Assessment undertaken in 2013 by Bureau Veritas. The assessment recommended additional monitoring points be installed and the declaration of an AQMA. The monitoring in 2013 recorded no failures. Additional monitoring points were installed in 2014 in line with the recommendations of the detailed assessment and 2 failures of the AQO were recorded. One of these failures (V5) was based on an annualised mean as only 7 months of data was captured (unauthorised tube removal). The other location (V7) recorded an abnormally high level of NO<sub>2</sub>, to which there was no attributable reason and if this months' figure was removed from the dataset then no exceedance would have been recorded on the bias adjusted annual mean. There has been no recorded exceedance of the annual mean AQO at any location along this stretch since. It is therefore proposed that monitoring is maintained and reviewed at the current locations for another 12 months.

## **Castlegate**

This stretch of road continues to record values close to or above the AQO. The monitoring point GAF05 was the only location to exceed the AQO in 2016. A survey of the road use has now identified that the road use in this location has altered. A large waste bin serving the nearby flats is now located immediately adjacent to the monitoring tube and cars of local residents have started to be parked on the pavement in closed proximity to the tube. This may well be skewing the data with short term point sources directly impacting on the monitoring tube results. This particular monitoring location is the furthest from the kerb at 2.5m of all the locations along Castlegate and would therefore expect to record a lower level of NO<sub>2</sub> than GAF04 which is just 1m from the kerbside and within a stretch of particular canyoning.

# 1 Local Air Quality Management

This report provides an overview of air quality in Eden District Council during 2016. 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.

## Local Engagement and How to get Involved

For members of the public wanting to take an active role in improving air quality within the 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.

## Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>1</b>
Air Quality in Eden District Council.....	1
Actions to Improve Air Quality.....	2
Conclusions and Priorities .....	4
Local Engagement and How to get Involved .....	6
<b>1 Local Air Quality Management</b> .....	<b>6</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>6</b>
2.1 Air Quality Management Areas.....	9
2.2 Progress and Impact of Measures to address Air Quality in Eden District Council .....	10
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations .....	11
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>12</b>
3.1 Summary of Monitoring Undertaken .....	12
3.1.1 Automatic Monitoring Sites.....	12
3.1.2 Non-Automatic Monitoring Sites .....	12
3.2 Individual Pollutants .....	12
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	13
<b>Appendix A: Monitoring Results</b> .....	<b>14</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2016</b> .....	<b>18</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>20</b>
<b>Appendix D: Map(s) of Monitoring Locations and AQMAs</b> .....	<b>22</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>23</b>
<b>Glossary of Terms</b> .....	<b>24</b>
<b>References</b> .....	<b>25</b>

### List of Figures

Figure C1: National Diffusion Tube Bias Adjustment Spreadsheet

## **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 has not yet been received following the agreed late submission of the 2016 ASR at the end of March 2016. The comments from the 2016 and 2017 ASRs will be incorporated in the 2018 report.

Eden District Council expects the following measures to be completed over the course of the next reporting year:

- Receipt of Defra's appraisal for the 2016 and 2017 ASR reports.
- Confirmation that the nitrogen dioxide levels within Eamont Bridge are consistently showing the levels identified from the diffusion tube monitoring are below the AQO for nitrogen dioxide;
- Ongoing diffusion tube monitoring of Castlegate to further understand the nitrogen dioxide levels;
- Ongoing diffusion tube monitoring of Victoria Road to confirm the reducing levels of nitrogen dioxide along this stretch of road.

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

Following the inspection of the proposed Eden Local Plan and recommendations from the Inspector, the Council is proposing modifications to the plan and has been further reviewing the proposed housing distribution. The proposal to reduce the number of key hubs from 28 to 12 focussing on the most sustainable locations may impact the density of development within Penrith. The potential effect of this on overall air quality within the town centre will need to be further considered, particularly if multiple smaller housing development sites are to be proposed.

## 2.3 PM<sub>2.5</sub> – 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<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> 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<sub>2.5</sub>:

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<sub>2.5</sub> is routinely carried out within Eden since this is not currently required by Defra. National PM<sub>2.5</sub> 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<sub>2.5</sub> within the district. Within Eden the background levels of PM<sub>2.5</sub> are all estimated to be below 11 µgm<sup>-3</sup> which around half the annual mean objective of 20 µgm<sup>-3</sup> 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<sup>-3</sup>.

## **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 NO<sub>2</sub> at 19 sites during 2016. 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 (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” 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 2016 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 (NO<sub>2</sub>)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

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 2016 results have been corrected for a bias using a factor of 1.03 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, ie at the façade of a residential property and therefore do not require any distance adjustments.

In 2016 the annual mean air quality objective of 40µg/m<sup>3</sup> was only exceeded at one location within Eden. GAF05 near the top of Castlegate recorded an annual mean of 53µg/m<sup>3</sup> for NO<sub>2</sub>. Consequently since there has been no annual mean greater than 60µg/m<sup>3</sup> there is no indication that the 1-hour mean objective has been exceeded at any site either.

## 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) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	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



Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
SG27	8 Scotland Rd	Roadside	351171	530649	NO2	NO	0	1	NO	2.5
SG29	Front - The Royal (Town Hall)	Roadside			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		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 NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
C30	Roadside	Diffusion Tube		92	-	35	37	38	37
GAF04	Roadside	Diffusion Tube		92	-	-	<b>48</b>	<b>50</b>	39
GAF05	Roadside	Diffusion Tube		75	-	-	33	<b>45</b>	<b>53</b>
V3	Roadside	Diffusion Tube		100	39	33	33	23	23
V5	Roadside	Diffusion Tube		92	38	32	<b>41</b>	38	35
V7	Roadside	Diffusion Tube		100	<b>48</b>	34	<b>51</b>	36	36
GAF15	Roadside	Diffusion Tube		100	-	-	32	32	27
GAF16	Roadside	Diffusion Tube		100	-	-	28	30	34
GAF17	Roadside	Diffusion Tube		100	-	-	35	29	34
GAF19	Roadside	Diffusion Tube		92	-	-	32	29	32
B14	Roadside	Diffusion Tube		100	38	32	33	31	35
SG27	Roadside	Diffusion Tube		92	37	31	32	31	33
SG29	Roadside	Diffusion Tube		100	-	28	31	30	31

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2016 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2012	2013	2014	2015	2016
31	Roadside	Diffusion Tube		100	37	33	39	34	32
32	Roadside	Diffusion Tube		100	42	28	-	33	36
GAF02	Roadside	Diffusion Tube		92	-	-	36	30	29
EB15	Roadside	Diffusion Tube		100	37	32	35	32	32
EB18	Roadside	Diffusion Tube		92	42	35	38	35	33
EB20	Roadside	Diffusion Tube		100	38	31	34	30	32

- Diffusion tube data has been bias corrected
- Annualisation has been conducted where data capture is <75%
- If applicable, all data has been distance corrected for relevant exposure

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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.

## Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2016

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (1.01) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
C30	43.8	41.7	38.2	33.3	39.8	33.1	29.0		28.0	25.7	46.7	35.1	35.8	36.2	0
GAF04	34.6	35.0	27.7	30.6	26.4	27.3	27.1	26.4	38.1		68.4	76.2	38.0	38.4	0.0
GAF05	49.2	70.5	45.4	51.3	61.9	54.8				42.3	47.7	36.5	51.1	<b>51.6</b>	0.0
V3	26.9	26.99	20.91	19.52	19.39	19.22	16.94	16	19.7	23.77	37.22	26.4	22.7	23.0	0.0
V5	36.11	37.57	31.92	23.07		32.84	28.28	26.3	30.06	38.77	46.35	39.5	33.7	34.0	0.0
V7	39.12	39.03	30.82	26.28	28.38	34.68	30.84	28.4	37.34	40.45	46.77	33.2	34.6	35.0	0.0
GAF15	29.42	29.07	24.44	18.99	20.72	20.97	21.16	26.46	26.63	28.58	39.53	33.8	26.7	26.9	0.0
GAF16	34.14	35.59	32.08	29.61	27.16	25.41	27.91	21.59	24.99	28.25	37.64	31.8	29.7	30.0	0.0
GAF17	35.22	39.61	28.09	30.75	36.83	29.68	24.13	24.67	28.58	38.12	43.35	35.4	32.9	33.2	0.0
GAF19	33.72	39.93	24.8	27.25	33.09		21.32	22.46	26.53	35.63	45.98	32	31.2	31.5	0.0
B14	37.09	37.86	35.95	36.16	35.23	32.38	25.81	22.06	21	39.33	49.28	36.9	34.1	34.4	0.0
SG27	32.58	39.16	31.45	33.35	34.09	28.3	20.22	20.95	30.17		52.89	34.5	32.5	32.8	0.0
SG29	34.08	32.1	31.61	25.55	26.79	24.5	24.18	21.38	28.17	29	45.24	34.5	29.8	30.1	0.0
31	31.84	33.26	25.84	28.77	26.6	26.03	23.91	26.14	30.5	39.39	46.03	38.7	31.4	31.7	0.0
32	36.69	38.01	28.93	32.1	29.74	31.54	29.52	32.34	34.53	43.91	43.13	36.8	34.8	35.1	0.0

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (1.01) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
GAF02	11.28	15.27	22.88		36.59	32.87	25.24	28.52	27.06	40.64	42	31.4	28.5	28.8	0.0
EB15	16.05	18.83	25.53	30.01	30.19	37.93	30.78	29.97	30.29	37.65	48.91	35.2	30.9	31.3	0.0
EB18	13.27		28.23	38.89	30.39	31.34	34.69	32.34	33.21	35.46	41.62	32.7	32.0	32.3	0.0
EB20	13.29	17.85	23.96	35	41.21	35.66	22.83	27.35	29.97	41.06	48.97	30.9	30.7	31.0	0.0

- Local bias adjustment factor used  
 National bias adjustment factor used  
 Annualisation has been conducted where data capture is <75%

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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

There have been no significant changes to industrial sources in 2016. Eden District Council is however still waiting for clarification on details regarding two Environment Agency permitted poultry farms within the district.

In respect of development proposals, additional housing (47 units) has been proposed to the north of Penrith. The development is below the threshold of 50 units at which point an air quality report is required.

### Choice of NO<sub>2</sub> 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 2016 results have been corrected for a bias using a factor of 1.01 which was determined following 18 studies undertaken by Gradko as part of the National Diffusion Tube Bias Adjustment Factor study.

Figure C1 shows the results for Gradko from the National diffusion tube bias adjustment factor spreadsheet. The tube precision for 17 out of the 18 studies is listed as 'Good' for the Gradko laboratory.

Figure C1: National Diffusion Tube Bias Adjustment Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet										Spreadsheet Version Number: 16/17	
Follow the steps below in the correct order to show the results of relevant calibration studies.										This spreadsheet will be updated at the end of September 2017	
Data only apply to tubes exposed monthly and are not suitable for collecting individual short-term monitoring periods.											
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet.											
This spreadsheet will be updated every few months. Its factors may therefore be subject to change. This should not discourage their immediate use.											
The LAQM Handbook is approved on behalf of Defra and the Devolved Administrations by Defra, in conjunction with contract partners: AQCDH and the National Physical Laboratory.										Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.	
Step 1:		Step 2:		Step 3:		Step 4:					
Select the Laboratory that produced your Tubes. See the Data Download List.		Select a Diffusion Tube from the Data Download List.		Select a Tube from the Data Download List.		Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor shown in blue at the foot of the final column.					
Enter the Laboratory name in the column to the left.		Enter the Diffusion Tube name in the column to the left.		Enter the Tube ID in the column to the left.		If you have a tube that has failed (check 'Yes' on 'Tube ID'), it is possible that it is not the correct tube. Contact the Local Air Quality Management Helpline or LAQM Helpdesk for further advice. See the LAQM Handbook for more information.					
Analyzed by	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Am) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Co/Dm)	
Gradio	SDS TEA in ambient	2016	FI	LE Neighbors	12	36	44	-0.02	0	1.22	
Gradio	SDS TEA in ambient	2016	LAB	London Borough of Croydon	12	42	43	-1.2%	0	1.01	
Gradio	SDS TEA in ambient	2016	FI	London Borough of Richmond upon Thames	12	36	36	2.4%	0	0.96	
Gradio	SDS TEA in ambient	2016	FI	London Borough of Richmond upon Thames	11	24	25	-7.6%	0	1.08	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	11	31	45	13.2%	0	0.88	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	12	20	21	-5.0%	0	1.06	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	11	45	45	0.0%	0	0.99	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	12	59	67	13.6%	0	0.88	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	5	40	41	-1.6%	0	1.03	
Gradio	SDS TEA in ambient	2016	FI	Royal Borough of Greenwich	12	41	39	5.1%	1	0.92	
Gradio	SDS TEA in ambient	2016	FI	West Berkshire Council	12	39	42	-6.9%	0	1.10	
Gradio	SDS TEA in ambient	2016	FI	East Hampshire District Council	12	21	21	-6.2%	0	1.07	
Gradio	SDS TEA in ambient	2016	FI	City of London	12	39	42	-6.6%	0	1.09	
Gradio	SDS TEA in ambient	2016	FI	City of London	12	53	50	4.7%	0	1.01	
Gradio	SDS TEA in ambient	2016	LAB	Middlesbrough	12	17	8	-7.6%	0	1.09	
Gradio	SDS TEA in ambient	2016	F.S	Marblestone Road Intercomparison	11	90	70	2.3%	0	0.96	
Gradio	SDS TEA in ambient	2016	SIJ	Redcar and Cleveland Borough Council	6	11	11	12.0%	0	0.89	
Gradio	SDS TEA in ambient	2016	FI	London Borough of Croydon	11	53	47	9.1%	0	0.88	
Gradio	SDS TEA in ambient	2016		<b>Overall Factor (W studies)</b>					<b>Use</b>	<b>1.01</b>	

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, ie at the façade of a relevant receptor (residential property) and therefore do not require any distance adjustments.

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



Diffusion tube monitoring locations within Penrith



Diffusion tube 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 <sup>4</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>4</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## 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
AQO	Air Quality Objective
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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
...	...

## References

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

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

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

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

A partnership bid to the [Access fund for Sustainable Travel](#) from Cumbria County Council and the Lake District National Park Authority