



# 2018 Air Quality Annual Status Report (ASR)

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

June 2018

## South Lakeland District Council

Local Authority Officer	Rachel Shaw
Department	Environmental Protection
Address	South Lakeland District Council
Telephone	01539 733333
E-mail	r.shaw@southlakeland.gov.uk
Report Reference number	RAS/ASR/2018
Date	27 June 2018

## Executive Summary: Air Quality in Our Area

### Air Quality in South Lakeland

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>.

It is for this reason South Lakeland District Council are charged with the review and assessment of air quality at a local level.

We have monitored nitrogen dioxide (NO<sub>2</sub>) levels around the District since 1995. Previous assessments have shown that this is the only pollutant of concern in the district and that the principal source is road traffic.

An Air Quality Management Area (AQMA) was declared in 2001 when levels were found to be above the government's annual mean NO<sub>2</sub> objective on Lowther Street in Kendal. This was then extended in 2010 to cover other roads in the town centre, as shown on Defra's [UK Air website](#). Other areas of the district meet the objective and all areas meet the short-term 1-hour mean.

After the initial AQMA declaration we drew up an Air Quality Action Plan (AQAP). This was done in partnership with other parties who can influence air quality (such as Cumbria County Council, Planners and the Town Council) through the Kendal Traffic Pollution Working Group, to ensure measures were in place to bring levels of NO<sub>2</sub> down to below the objective. This Action Plan is reviewed regularly by the Working Group to ensure it is still effective and in 2016 we undertook a full review (see our [Air Quality Action Plan 2016](#)). It is updated annually to show progress and a summary can be found in section 2.2.

---

<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

The good news is that over the years we have been monitoring, levels of NO<sub>2</sub> have shown a downward trend. Of the 33 sites where we monitor, there is now only one location, on Lowther Street in Kendal (which is within the AQMA), which has yet to meet the objective. Even here levels have fallen dramatically over the years and it is now predicted that this site will comply with the annual mean objective by 2019.

## **Actions to Improve Air Quality**

Over the past year we, along with our partners, have continued to work on the actions in our Action Plan. This document reports on progress.

Projects in the Action Plan include:

- SCOOT in Kendal town centre
- Cycle parking provision, new cycle ways and cycling promotion activities
- Reduced price parking permits for cleaner vehicles
- Installation of electric vehicle charging points in public car parks
- Cleaner buses
- Work to reduce engine idling
- On street parking enforcement to reduce congestion





The Council didn't apply for a Clean Air Grant in 2017, but is considering projects to be included in the next round of funding.

Unfortunately, a bid in 2017 to secure funding to retrofit clean engine technology in buses using Kendal town centre was unsuccessful.

## **Conclusions and Priorities**

This report shows that all locations in the District comply with the Government's 1-hour mean NO<sub>2</sub> objective and all but one (Burgundy's on Lowther Street, within the existing AQMA) comply with the annual mean objective.

Since the declaration of the Air Quality Management Area in 2001, levels of NO<sub>2</sub> at Burgundy's have fallen by 39.6µg/m<sup>3</sup> through the combination of the measures in the Action Plan and higher emission standards of vehicles on the road.

The potential air quality impact of all proposed significant developments has been assessed and mitigation required as necessary. There have been no new developments which will have a significant impact on air quality and no new pollutant sources have been identified.

A review of monitoring locations took place at the start of 2018, as recommended in Defra's assessment of the 2017 ASR. Monitoring at 5 new locations in Kendal and 1 in Ulverston has now started (mainly in response to residents' concerns about queuing rush-hour traffic, but also at 2 schools for public reassurance) and 6 sites have been discontinued (due to consistently low results or no relevant exposure).

As only one site is currently failing the objective and levels are continuing to fall District-wide, we are planning to reduce the size of the AQMA to cover only Lowther Street.

However, we will wait for annual mean results for the new sites before making a final decision on reducing the size of the AQMA in early 2019.

Our priorities for 2018 are to:

- Work more closely with schools on air quality
- complete the package of sustainable transport measures identified in the Kendal Transport Improvement Study
- install a cycle hub in the town centre
- run a 'No Idling' campaign to coincide with Clean Air Day
- install a green living wall on Lowther Street
- publish, in conjunction with Directors of Public Health, a report on air quality and public health, following on from the first Lancashire and Cumbria Air Quality Summit

This will be a challenge given the pressures that Local Authorities are under from the Government to work differently and do more with less. Many organisations and individuals, including local residents, need to be involved, but we will work to ensure all parties are actively engaged, in particular through the Kendal Traffic Pollution Working Group, so we can ensure our Action Plan is effective. Balancing the economy and public health is key.

Our aim is a continuous improvement in air quality, even once the Government's Objective is met at all locations. It is anticipated that our monitoring regime will change over the coming years to look at levels at sensitive receptors more generally, for public reassurance, rather than concentrating on roadside hotspots. It is likely Government guidance on monitoring will change in the future too, following publication of their Air Quality Strategy in 2018.

## **Local Engagement and How to Get Involved**

We engage with parties who have an interest in and are able to influence air quality through the Kendal Traffic Pollution Working Group. Our website helps inform the public and any consultation (for example on revisions of the SLDC Air Quality Action Plan) is widely advertised to encourage public engagement.

There has been an increase in interest in air quality nationally recently, with more known about the health effects and several high profile, high pollution days reported in London. Defra's new Action Plan for air quality and subsequent court cases have also caused a lot of public and media interest, particularly given the Plan's reliance on new Clean Air Zones in cities. The 'diesel-gate' scandal has also raised the profile of air quality issues and health.

If you would like more information on air quality locally, or on how you can do your bit to help improve the air you breathe, visit the air quality pages on our [website](#).

There are lots of simple things you can do, for example:

- try to walk or cycle short journeys instead of jumping in the car. Remember air quality can actually be worse in the car than it is outside it
- catch the bus
- lift share to work, school, activities and clubs
- switch off your engine when stationary
- choose a low emission vehicle such as electric or hybrid (there are grants available)
- form a 'walking bus' for the journey to school

If you may be particularly affected by poor air quality (this includes young or older people and those with breathing difficulties) information on current pollution levels can be found on the [Defra Healthy Air website](#). This information helps you plan your day to avoid exposing yourself to higher levels of NO<sub>2</sub>. For example, on bad days stick to pedestrianised areas and don't use heavily congested streets, exercise in areas with lower pollution levels, switch off your engine while stationary and avoid driving in congested areas, as air quality inside cars can be worse than outside.

Please feel free to send us your thoughts on this document and our Action Plan using the contact details at the start of this report.



# Table of Contents

<b>Executive Summary: Air Quality in Our Area.....</b>	<b>1</b>
Air Quality in South Lakeland.....	1
Actions to Improve Air Quality.....	2
Conclusions and Priorities .....	3
Local Engagement and How to get Involved .....	4
<b>1 Local Air Quality Management.....</b>	<b>8</b>
<b>2 Actions to Improve Air Quality.....</b>	<b>9</b>
2.1 Air Quality Management Areas.....	9
2.2 Progress and Impact of Measures to address Air Quality in South Lakeland .....	11
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and/or Concentrations.....	24
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance.....</b>	<b>25</b>
3.1 Summary of Monitoring Undertaken .....	25
3.1.1 Automatic Monitoring Sites .....	25
3.1.2 Non-Automatic Monitoring Sites.....	25
3.2 Individual Pollutants .....	26
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	26
3.2.2 Other Pollutants .....	27
<b>Appendix A: Monitoring Results .....</b>	<b>28</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2017 .....</b>	<b>41</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC .....</b>	<b>44</b>
Screening of New and Modified Sources .....	44
Diffusion Tube Bias Adjustment Factors .....	44
Factor from Diffusion Tube Supplier .....	45
Factor from Local Co-location Studies .....	45
Discussion of Choice of Factor to Use .....	46
Diffusion Tube Distance Adjustment .....	46
Diffusion Tube Bias Annualisation.....	46
QA/QC of Automatic Monitoring.....	46
QA/QC of Diffusion Tube Monitoring.....	47
<b>Appendix D: Maps of Monitoring Locations and AQMAs .....</b>	<b>48</b>
<b>Appendix E: Summary of Air Quality Objectives in England.....</b>	<b>53</b>



<b>Glossary of Terms .....</b>	<b>54</b>
--------------------------------	-----------

<b>References .....</b>	<b>56</b>
-------------------------	-----------

## List of Tables

Table 2.1 – Declared Air Quality Management Areas.....	10
Table 2.2 – Progress on Measures to Improve Air Quality .....	15
Table A.1 – Details of Automatic Monitoring Sites .....	28
Table A.2 – Details of Non-Automatic Monitoring Sites .....	29
Table A.3 – Annual Mean NO <sub>2</sub> Monitoring Results .....	32
Table A.4 – 1-hr Mean NO <sub>2</sub> Monitoring Results .....	38
Table B.1 – NO <sub>2</sub> Monthly Diffusion Tube Results – 2017 .....	41
Table E1 – Air Quality Objectives in England .....	53

## List of Figures

Figure A.1 – Trends in Annual Mean NO <sub>2</sub> Concentrations – Diffusion Tubes – Kendal .....	36
Figure A.2 – Trends in Annual Mean NO <sub>2</sub> Concentrations – Diffusion Tubes – Outside Kendal .....	36
Figure A.3 – 1-hr Mean Results – Continuous Analyser .....	39
Figure A.4 – Trends in Mean NO <sub>2</sub> Concentrations – Continuous Analyser .....	40

## 1 Local Air Quality Management

This report provides an overview of air quality in South Lakeland 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 South Lakeland 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 (AQMA) 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.

A summary of AQMA declared by South Lakeland District Council can be found in Table 2.1. Further information related to declared or revoked AQMA, including maps of AQMA boundaries are available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=243](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=243) Alternatively, see Appendix D: Maps of Monitoring Locations and AQMA, which provides maps of air quality monitoring locations in relation to the AQMA.

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan		
						At Declaration	Now	Name	Date of Publication	Link
Kendal AQMA	Declared 05.05.2001, amended 23.11.10	NO <sub>2</sub> Annual Mean	Kendal	An area encompassing properties bordering Lowther Street in Kendal, later extended to also cover properties bordering Kirkland, Highgate, New Road, Blackhall Road, Stramongate, Kent Street, Beezon Road, Wildman Street and Longpool in Kendal.	NO	82.133 µg/m <sup>3</sup> *	42.5µg/m <sup>3</sup>	South Lakeland District Council Air Quality Action Plan	Nov-16	<a href="https://www.southlakeland.gov.uk/media/3644/sldc-air-quality-action-plan-2016.pdf">https://www.southlakeland.gov.uk/media/3644/sldc-air-quality-action-plan-2016.pdf</a>

\* NB Result was not bias adjusted in 2001

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

## 2.2 Progress and Impact of Measures to address Air Quality in South Lakeland

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

1. The pollution levels in the remaining hotspot in Lowther Street continue to fall. The only measured exceedance in Kendal is in this street, with a measured concentration of  $44\mu\text{g}/\text{m}^3$  recorded for 2016. The report states that the objective may be met here as early as 2018.

SLDC response: Noted

2. The current monitoring strategy should continue, with the option of relocating sites that are below  $30\mu\text{g}/\text{m}^3$  to areas that may be considered as higher exposure areas.

SLDC response: Several sites which have been below  $30\mu\text{g}/\text{m}^3$  for some years have been discontinued at the start of 2018. New sites have been started, both in areas of potential higher exposure and at 2 schools in Kendal for public reassurance monitoring.

3. With the expectation that the objective is likely to be met in the next few years, the future monitoring strategy should reflect the need to consider revocation, demonstrating that no other pollution hotspots remain.

SLDC response: Our revision of the monitoring strategy in 2018 aims to do this. A decision on the AQMA will be taken in 2019.

South Lakeland District Council has taken forward a number of direct measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the South Lakeland Air Quality Action Plan.

Key completed measures are:

- Alongside the improved cycle parking completed around Kendal, work has started on 2 new cycle ways into the town centre. These shared, off-road routes aim to encourage less confident cyclists, including students at the 2 secondary schools, to cycle in from the outskirts. Cumbria County Council's Cycling Strategy has been adopted.

- 7 new Euro 6 open top buses have been introduced in South Lakeland.
- An anti-idling campaign ran under the Go Easy banner, targeting buses, taxis and schools. Due to be repeated in 2018 to target motorists generally
- Inclusion of air quality in Cumbria's Joint Strategic Needs Assessment.

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

- The last measures in the package of sustainable transport measures identified in the Kendal Transport Improvement Study, including the final cycle routes
- Installation of a public cycle hub in the town centre, linked to the Council's upgrading of staff facilities
- A 'No Idling' campaign, run to coincide with Clean Air Day, targeting motorists who leave their engines running while stationary. The event will be publicised and Officers will hand out leaflets explaining why engines should be switched off. This will be used to gauge the scale of the problem and guide future action
- Installation of a green, living wall on Lowther Street in Kendal
- Publication of the report "Air Quality and Public Health – Reducing Deaths and Ill Health Caused by Poor Air Quality in Lancashire and Cumbria", a collective report of the Lancashire and Cumbria Directors of Public Health, in conjunction with the Local Authorities, highlighting air quality issues across the region and following on from the Lancashire and Cumbria Air Quality Summit held in February 2018. The purpose of the report is to: improve awareness and engagement for action on air quality and understanding of everyone's role in tackling air pollution, building on existing plans and strategies; start a conversation about the ways in which we can work together and hold each other to account for action to improve air quality; and outline potential areas for further action to reduce population exposure to air pollution, as identified at the Summit
- Inclusion of air quality in Cumbria's Public Health Strategy.

South Lakeland District Council's priority for the coming year is to ensure these measures are completed.

The principal challenges and barriers to implementation that South Lakeland District Council anticipates facing are:

- Major funding will be required for major infrastructure projects (Kendal Master Plan and Kendal Strategic Infrastructure Study)
- A Clean Bus Fund bid was unsuccessful, with one reason given being that the air quality problem in Kendal is not big enough. This view is likely to mean other funding will not be easily accessible. In addition, there is a contradiction, because while national modelling shows the area is already in compliance (as stated in feedback from the grant application assessment), local monitoring shows there continues to be an exceedance on Lowther Street
- Financial pressures on businesses and bus operators may mean they are reluctant to alter routes or invest in cleaner vehicles
- Ensuring staff resources are available to drive measures forward
- Public resistance to changing their own travel habits.

Progress on some priorities identified in last year's report has been slower than expected:

- reducing the number of HGV's entering the AQMA and using Lowther Street – while some businesses responded proactively to the message, some local were resistant, believing it would impact financially and claiming the Council was working against business interests
- Kendal Master Plan and Kendal Strategic Infrastructure Study have been further delayed, with a knock-on effect on 20 MPH zone study
- completing the package of sustainable transport measures identified in the Kendal Transport Improvement Study – works were delayed due to a funding re-profiling
- final electric vehicle charging point not yet installed in Kendal, due to low usage of existing points – there is a reluctance to invest unless proof of demand is seen
- installing a cycle hub in the Westmorland Shopping Centre shopping centre – now looking at a more central location



- running a Go Easy 'travel to school' active travel and social media campaign – work stalled over the summer holidays in 2017
- installing a green living wall alongside the main road at Kendal Station – permission was not given by Network Rail (access to the wall for structural surveys required). A new location has had to be identified

However, South Lakeland District Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in the Kendal AQMA. Using Defra's future year projection calculation predicts that the failing site on Lowther Street will now comply in 2019.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Kendal Master Plan	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	South Lakeland District Council. Internal funding	2016	TBC	Master Plan in place; measures implemented	Improved traffic flow / reduction in traffic in AQMA will reduce emissions	Stakeholder meeting held May 2016. Engagement with consultants to ensure air quality taken into consideration. Master Plan preparation was paused pending completion of EA flood modelling work following Storm Desmond. This has since been completed, but the plan is now delayed pending the outcome of the strategic parking study and the County Council's transport study for Kendal. It is now anticipated that there will be consultation in autumn 2018 on the final draft, with final sign off back end of the year.	Report to be agreed end of 2018. Once Plan agreed, implementation could be 3-5 years	Flexible framework for future development and investment in Kendal including car parking, the road network and the public realm. Funding required to take agreed plan forward, not yet identified
2	Control of HGVs & on Lowther Street	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	South Lakeland District Council. Internal funding	2016	2016-2017	% HGV on Lowther Street	HGV's emit disproportionate levels of NO <sub>2</sub> . A reduction in numbers will reduce levels	Improved signage installed on by-pass in 2015 to direct vehicles to most appropriate north or south exit to Kendal and avoid AQMA. HGV survey undertaken August	2017	Reduction in number of HGV's using Lowther Street by re-routing to areas with lower NO <sub>2</sub> . Enforcement of 18T weight limit. Delivery plans for large businesses in town. Potential reduction in

## South Lakeland District Council

									2016 to identify vehicles >18T using Lowther Street. Letter sent to companies identified as using Lowther Street and main businesses in Kendal, reminding of the weight limit and asking for voluntary re-routing in the first instance. <b>HGVs on Lowther Street</b> March 2016 - 12.4% March 2017 - 11.5% March 2018 - 11.8%		weight limit. Has seen some resistance from businesses.
3	Reducing bus emissions and increasing usage	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	South Lakeland District Council. Internal funding	2016	2017	Number of buses using Kendal town centre and Lowther Street of Euro Std. 6	Older buses emit disproportionate levels of NO <sub>2</sub> . Cleaner buses will reduce levels	In July 2016 12 new Euro 6 double-deckers were introduced on the 555 Lancaster to Keswick route, which includes Lowther Street. In July 2017, 7 new Euro 6 Volvo B5 TL double deck (open top) vehicles added on the on 599 service. <b>In peak summer 2016, there were 87 bus movements on Lowther Street daily, 23 (26%) were Euro 6. This was unchanged in 2017.</b> Online customer bus tracker introduced 2016. 3 new passenger shelters installed in 2016 by Kendal BID. Clearer signage installed in 2015, linking Kendal town centre to entry points and transport links (ie railway and	Ongoing	Voluntary reduction of emissions and improvement in standard of buses using Kendal town centre. Encouraging bus use. Further bus replacements due summer 2018 (505, 508, 516 services). Funding is an issue. Clean Bus Fund bids in 2015 and 2017 failed as Kendal was not seen to have a big enough pollution problem.

## South Lakeland District Council

									bus station) to encourage more use of public transport. Operators have idling policies in place. Anti-idling campaign ran Spring 2017 targeting buses and taxis in Kendal.		
4	Implement ation of Kendal sustainabl e transport measures	Traffic Managem ent	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Cumbria County Council. Local Growth Fund	2014-2016	2016-2017	Number of schemes completed	Improved traffic flow / reduction in traffic in AQMA will reduce emissions	11 schemes out of 14 completed to date. Includes pedestrian improvements such as crossings and footpaths. Some works delayed due to flooding in December 2015. Phase one of the cycleway scheme (south Kendal) completed. Phase 2 currently underway. All schemes due to be completed in 2018/19 financial year.	2018/19	As identified in 'Kendal Transport Improvement Study'. 3 schemes removed in 2018 as undeliverable.
5	Car parking review (including Park and Walk / Park and Cycle)	Traffic Managem ent	Other	South Lakeland District Council. Internal funding	2016	2017	Town Centre AADT's; car park usage figures	Encouraging long term parking in town centre could reduce number of cold starts, reducing emissions. Car parks on outskirts of Kendal could reduce car journeys and emissions	Car park report for SLDC completed, options to be taken forward include: incentivise electric or ULEV, integrated traffic management and signage strategy, review of car park pricing strategy, usage and dwell time and increasing parking capacity out of town. Car Parking Survey ran in 2107 to get users opinions - still to go to Committee. New £1 early bird fee could increase long-term parking. Cars	2017	Plan to use Kendal Leisure Centre as park and walk / cycle shelved due to lack of funding as deemed "before it's time". Proving difficult as a Council to balance economy (bringing shoppers in by providing town centre parking) against the air quality benefits of keeping cars out of town. Prioritisation is a political issue. *NB reporting of figures revised in 2018 - multi-storey usage had been omitted

## South Lakeland District Council

									<p>prevented from parking on New Road common land in Kendal in early 2018 - impact on other car parks, traffic and air quality to be monitored.</p> <p>Lowther Street AADT:  March 2016 = 10,759;  March 2017 = 11,066;  March 2018 = 11,013.  Car park tickets sold in Kendal:  1 Jan – 31 Aug 2015 = 577,665;  1 Jan – 31 Aug 2016 = 534,629;  1 Jan - 31 Aug 2017 = 539,588</p>		
6	Kendal Strategic Transport Infrastructure Study	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Cumbria County Council. Funding from CCC, SLDC & KTC	2016	TBC	Strategic Study completed and measures delivered	Improved traffic flow / reduction in traffic in AQMA will reduce emissions	<p>First phase of work commissioned July 2016. Project Officer and Steering Groups appointed. Workshops undertaken with a wider technical group and political stakeholders 2016. Final stages of study currently being completed. Additional study work to pull together several previous pieces of work are now being progressed.</p>	Study to be completed 2017. Works TBC	This study considers longer term infrastructure requirements of Kendal, taking into account recent flooding events, air quality and proposed future development (including one way system, north / south travel and 'Northern Development Route'). Study is first step and significant additional work and funding will be required prior to any delivery.
7	Public electric vehicle charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission	South Lakeland District Council. OLEV funding	2010-2015	2016	Number of EV charging points installed Charging point usage	Electric vehicles have no NO <sub>2</sub> emissions	Further to those installed in Lakes by LDNPA, 8 points installed by SLDC to date (Ambleside, Ulverston, Kirkby	2016	Assessing Bushier Walk site prior to installation of further points at Blackhall Road. Some resistance as usage figures show

## South Lakeland District Council

			Vehicles, EV recharging, Gas fuel recharging						Lonsdale, Kendal). Funding available for one more site in Kendal. Currently 1 fast and 1 rapid charger. Rapid receives more use and an ongoing increase in use is seen. Average no. charges per day at Busher Walk in Kendal 2016 (July - Dec 2016) Fast = 0.17, Rapid = 0.4; 2017 Fast = 0.27, Rapid = 0.99. Pay-as-you-go hybrid Co-Wheels car club car now available at Oxenholme train station (part of Go Lakes Gateway project).		low usage to date and charging points involve loss of revenue for that parking space.
8	Reduced price parking / parking permits for cleaner vehicles	Traffic Management	Emission based parking or permit charges	South Lakeland District Council	2010	2011	No. of reduced price parking permits issued	Cleaner vehicles emit less NO <sub>2</sub>	Permits issued: 2011 = 1 2012 = 7 2013 = 11 2014 = 17 2015 = 25 2016 = 33 2017 = 50 Free parking for Go Lakes electric hire car fleet.	Implemented 2011. Ongoing	Discount on price of annual parking pass for Band A vehicles. Discount increased to £100 April 2017. Investigating options to expand scheme, although there are issues with DVLA and car manufacturer's data.
9	Enforcement of parking / loading restrictions	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	Cumbria County Council	2011	2011 onwards	Number of PCN's served	Reducing congestion improves traffic flow, reducing NO <sub>2</sub>	CCC enforcement team now up to full strength. PCN's issued: 2010 = 15 2011 = 273 2012 = 254 2013 = 61 2014 = 127 2015 = 121 2016 = 138 2017 = 582	Ongoing	Wildman Street and Highgate in particular are areas where illegal parking causes congestion

## South Lakeland District Council

10	Encouraging walking	Transport Planning and Infrastructure	Other	Kendal Town Council / Kendal Business Improvement District. Internal funding	2016-2017	2017	Number of cars using Park and Walk sites	Walking instead of driving reduces emissions	KTC produced and distributed a <a href="#">Walking Trails leaflet</a> for Kendal in January 2017- will encourage walking into town from residential areas. Investment in Canal Towpath Project will open up another safe, off-road walking route into town. SLDC liaising with CCC Public Health team to target travel to school. Kendal Bid project for Kendal Leisure Centre to become a Park and Walk / Cycle, including improved links to town centre, did not receive funding. No Park & Walk yet in operation, so no usage figures available.	2017	Further measures to enhance the walkability of the town to be worked up through the Kendal Town Centre Master Plan. Plan to use Kendal Leisure Centre as park and walk / cycle shelved due to lack of funding as deemed "before it's time".
11	Encouraging cycling, enhanced cycle routes and cycle parking in Kendal	Transport Planning and Infrastructure	Cycle network	Cumbria County Council. Local Growth Fund, Defra AQ grant, Health & Wellbeing Board funding	2014-2015	2016-2017	Length of cycleway; number of cycle stands installed; cycle counts	Cycling instead of driving reduces emissions	850m of cycleway installed in Phase 1 of Burton Rd Cycleway. Phase 2 (1.41km) has now started. Burton Road works currently underway to be completed mid- June 2018, Shap Road to follow. Lancaster Canal Partnership implementing the Kendal to Lancaster canal cycleway to encourage cycling from Natland to Kendal. Cycle parking now installed in most	2018/19	Cycle routes funded by Local Growth Fund. Funding was re-profiled to 2018/19 which has delayed implementation of the schemes. Cycle parking funded by Defra AQ Grant. Cycling Hub in Westmorland Shopping Centre delayed pending investigation of other options. Further measures to encourage cycling to be worked up through the Kendal Town Centre Master Plan.



## South Lakeland District Council

									SLDC car parks. 46 Defra-funded cycle stands now installed in Kendal, with net increase of 25 stands, alongside 20 bike boxes installed by Kendal BID. Electric Bike Network have 2 hire locations and 3 charging locations in Kendal. 1619 cyclists in Kendal in October 2015 traffic count (8.8% growth on previous year). 2016 = 1715 (5.8% growth). 2017 = no figures available		No cycle count in 21017 due to CCC funding cuts.
12	Reducing taxi emissions	Promoting Low Emission Transport	Taxi Licensing conditions	South Lakeland District Council	2014	2015	Policy in place. % of licensed taxis of Euro Standard 6	Cleaner vehicles emit less NO <sub>2</sub>	Taxi Licensing Policy with measures to increase cleaner vehicles in fleet adopted January 2016. Anti-idling campaign ran Spring 2017 targeting buses and taxis in Kendal.	Policy in place January 2016	Policy in place. Reporting system to differentiate between vehicle class currently being developed. Currently record CO <sub>2</sub> emissions as detailed on V5 document.
13	Go Easy campaign & SLDC Active Travel	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	South Lakeland District Council. Internal funding / historic Defra AQ Grant	2016	2016	Number of active travel projects completed.	Behaviour change to reduce car use, reducing emissions	See previous reports for history of Go Easy. Lack of funding has meant campaign has been in hiatus. To be progressed through SLDC's Active Travel program and Green Team. Website will be used to promote active travel, health and air pollution issues more generally across the District. An Active Travel Action Plan has been approved by Cabinet.	Ongoing	Progress restricted as Project Officer not appointed. Now taken on by Health and Wellbeing Officer

## South Lakeland District Council

									Currently 39 actions on the list, 4 completed.		
14	Planning policy prioritises air quality (Local Plan Policy)	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	South Lakeland District Council	2015	2016	CIL liabilities, CIL receipts, CIL spending decisions. Adoption of new policies	New development is air quality neutral and gives rise to no increase in NO <sub>2</sub>	<p>Air quality considerations included in planning policy. Submission of DPD Feb 2018. Development Management Policies being updated. Policies will encourage active travel and control pollution to minimise the impact of development on air quality. Development Briefs for specific development sites in Kendal have similar requirements. CIL adopted 1 June 2015. First CIL payments likely to be made in mid-2017. Potential for CIL monies to be spent on projects that support improvement of air quality in Kendal.</p>	CIL ongoing; DM Policies adoption expected by Autumn 2018	<p>Development above thresholds in SLDC Guidance for Developers must be air quality neutral, ie. have positive or no negative impact on air quality. All developments predicting negative impact on air quality, even negligible, are required to agree mitigation, although developers are resistant to this.</p>
15	20 mile per hour zones in Kendal	Traffic Management	Reduction of speed limits, 20mph zones	Kendal Town Council. Internal funding	2017	Unknown	Number of 20mph zones	Consistent, smooth driving at lower speeds can reduce emissions	Study to be commissioned by KTC into potential for 20mph zones, but on hold pending outcome of Kendal Integrated Transport and Masterplan studies. Funding moved to 2018/19	Unknown	<p>Evidence that measures such as speed bumps can cause increased vehicle emissions, but a consistent lower speed can reduce emissions. Must ensure chosen speed restrictions do not impede smooth flow of traffic. Dependant on CCC support for recommendations</p>

## South Lakeland District Council

16	Enhanced green infrastructure	Other	Other	South Lakeland District Council / Kendal Town Council. Internal funding / Locally Important Projects Grant	2016	2018	Number of projects completed	Some evidence that certain plants can remove pollutants from the air	<p>Study showed trial green wall at Blackhall Road not feasible due to building structure. KTC identified a wall adjacent to Kendal Station and standing traffic on Longpool (on the boundary of the AQMA) and have obtained funding for a green wall to be delivered in 2017/18. However, permission for this wall was not secured from Network Rail. Funding rolled over to 2018/19. Now looking at a section of SLDC building on Lowther Street. SLDC &amp; KTC working in partnership on parks and public areas of green space. Making use of the list of species most efficient at removing pollutants. Encouraging planting of 'correct' species through planning process.</p>	First wall to be delivered in 2018/19 financial year	Any work is subject to permission from owner of wall and structural constraints. Funding other projects is an issue.
----	-------------------------------	-------	-------	--	------	------	------------------------------	--	--	--	--

## 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.

In South Lakeland in 2010 it is estimated there were 44 adult deaths attributable to PM<sub>2.5</sub><sup>4</sup>. Public health indicator 3.01 reports the fraction of mortality attributable to particulate air pollution. In South Lakeland in 2016 this was 3.4%<sup>5</sup>, lower than the regional and English values.

To address PM<sub>2.5</sub>, South Lakeland District Council is working with the Director of Public Health at Cumbria County Council on how air quality can be prioritised in South Lakeland to help reduce the health burden from air pollution.

This includes including air pollution in Cumbria's Joint Strategic Needs Assessment through the Health and Wellbeing Board, as well as in the Cumbria Public Health Strategy, encouraging closer working and communicating health messages to the public. Work is ongoing with the Directors of Public Health in Cumbria and Lancashire on a joint report, "Air Quality and Public Health – Reducing Deaths and Ill Health Caused by Poor Air Quality in Lancashire and Cumbria", following the Air Quality Summit held in early 2018.

Measures in the AQAP (Table 2.2) aim to both reduce the public's exposure to PM<sub>2.5</sub> and reduce other polluting emissions.

Although no national network monitoring of PM<sub>2.5</sub> takes place in South Lakeland, a portable monitor (AQ Mesh) has been purchased by the Council which allows monitoring in response to complaints and of hotspots. Short-term monitoring at residential properties in Kendal and alongside the continuous analyser on Lowther Street has not indicated any problems to date.

---

<sup>4</sup> Estimating Local Mortality Burdens Associated with Particulate Air Pollution – Public Health England 2014

<sup>5</sup> Public Health Outcomes Framework – Public Health England

## **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.

South Lakeland District Council undertook automatic (continuous) monitoring at 1 site during 2017. Table A.1 in Appendix A shows the details of the site. National monitoring results are available at <https://uk-air.defra.gov.uk/data/>

A map showing the location of the monitoring site is provided in Appendix D. Further details on how the monitor is calibrated and how the data has been adjusted are included in Appendix C.

#### **3.1.2 Non-Automatic Monitoring Sites**

South Lakeland District Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 33 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

A review of monitoring locations took place at the start of 2018, as recommended in Defra's assessment of the 2017 ASR. As a consequence, monitoring at 6 new locations in Kendal has now started, some in areas of congestion, some at the request of local residents and some for reassurance monitoring. These are: Canal Street, Ulverston; Windermere Road, Kendal; Milnthorpe Road, Kendal; Mintsfeet / Shap Road, Kendal; Stramongate Primary and Kirkbie Kendal Secondary, both in Kendal. 6 sites have been discontinued due to consistently low results or no relevant exposure: Parkside Road, Levens Close, Highgate, Sandylands Road and Glebe Road, Kendal and Brewery Street, Ulverston. Both Sandylands Road and Glebe Road were new sites in 2017, located just outside the AQMA and chosen to check the AQMA didn't need to be extended. Both sites showed adjusted annual mean results less than 20µg/m<sup>3</sup>.

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.

### 3.2.1 Nitrogen Dioxide (NO<sub>2</sub>)

Table A.3 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 the continuous monitor this is calculated using a full calendar year of 1-hour means. As the analyser reads in parts per billion (ppb) this is converted to micrograms per meter cubed (µg/m<sup>3</sup>) for reporting. The figure is validated by the third party. Diffusion tube annual means are calculated using monitored monthly values.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

Monitoring shows that, after bias adjustment and distance correction (for those sites which are not representative of public exposure), the improvement year on year in air quality across South Lakeland continues, with results at the majority of sites falling between 2016 and 2017. However, there was a slight increase in levels seen at 7 sites, both in Kendal and Ulverston.

With the exception of 1, all sites continued to meet the annual mean objective in 2017. Site N25 (Burgundy's on Lowther Street, where there is relevant exposure on the first floor) saw a result of 42.54µg/m<sup>3</sup>, just above the 40µg/m<sup>3</sup> objective. This site is already within the AQMA and is now predicted (using Defra's future year calculator) to meet the objective by 2019.

There was 1 site within 10% of the objective in 2017 (31 Lowther Street), compared to 2 in 2016. Again this is within the AQMA and there is relevant exposure.

The Council have adopted a voluntary target of 30µg/m<sup>3</sup>, to ensure an ongoing reduction in NO<sub>2</sub>, even when the Government objective has been met. This was being met at 26 of the 33 sites in 2017 (no change from 2016).

## **South Lakeland District Council**

There were no exceedences of the hourly mean objective at the Lowther Street continuous analyser in 2017 (worst case monitoring location) and no sites at which annual means were greater than  $60\mu\text{g}/\text{m}^3$  (which would indicate an exceedance of the 1-hour mean objective is likely at these sites).

Given the results in 2017, the Council do not at this time propose to amend the AQMA. This will be re-assessed when results of the new and existing monitoring sites are known for 2018, to be reported in the ASR in 2019. We are aiming to reduce the size of the AQMA at that time. However, work will continue to ensure ongoing improvement in air quality across the District.

### **3.2.2 Other Pollutants**

No other pollutants are routinely monitored by South Lakeland District Council.



## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
A1	Lowther Street	Kerbside	351610	492650	NO NOx NO2	Yes	Chemiluminescence	0	0.83	3

**Notes:**

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	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)
N1	Stricklandgate, Kendal	Roadside	351500	492710	NO <sub>2</sub>	No	2.03	6.5	No	2.65
N2	Finkle Street, Kendal	Urban Centre	351550	49270	NO <sub>2</sub>	No	1.67	0	No	2.64
N3	Levens Close, Kendal	Urban Background	351860	491290	NO <sub>2</sub>	No	3.3	1.18	No	2.5
N4	St Thomas' School, Kendal	Urban Background	351100	493720	NO <sub>2</sub>	No	6.42	2.9	No	2.62
N6	Cavendish St, Ulverston	Kerbside	328550	478190	NO <sub>2</sub>	No	2	0.2	No	2.47
N7	Millans Park, Ambleside	Roadside	337560	504460	NO <sub>2</sub>	No	12	1.53	No	2.72
N8	Crescent Rd, Windermere	Kerbside	341290	498430	NO <sub>2</sub>	No	1.74	0.68	No	2.56
N9	1 Lowther St, Kendal	Kerbside	351490	492610	NO <sub>2</sub>	Yes	0	0.85	No	2.93
N11, N13, N14	24 Lowther St, Kendal	Kerbside	351605	492640	NO <sub>2</sub>	Yes	0	0.83	Yes	3
N12	35 Highgate, Kendal	Roadside	351490	492600	NO <sub>2</sub>	Yes	0	6	No	3.15
N16	Aynam Road, Kendal	Roadside	351710	491940	NO <sub>2</sub>	No	3.1	1.63	No	2.63
N17	Kirkland, Kendal	Roadside	351570	492410	NO <sub>2</sub>	Yes	0.5	4.1	No	2.58
N18	Cooks Corner, Bowness	Roadside	340340	497010	NO <sub>2</sub>	No	0	1.92	No	2.53
N19	Beezon Road, Kendal	Kerbside	351897	493022	NO <sub>2</sub>	Yes	3.2	0.5	No	2.64

# South Lakeland District Council

N20	29 Wildman Street, Kendal	Roadside	351970	493070	NO <sub>2</sub>	Yes	0.53	1.5	No	2.54
N21	Blackhall Rd, Kendal	Roadside	351680	492840	NO <sub>2</sub>	Yes	0	2.3	No	2.4
N22	Parkside Rd, Kendal	Roadside	351772	491843	NO <sub>2</sub>	No	6.43	4.77	No	2.6
N23	99 Highgate, Kendal	Kerbside	351484	492434	NO <sub>2</sub>	Yes	1.8	0.8	No	3.1
N24	147 Highgate, Kendal	Roadside	351499	492314	NO <sub>2</sub>	Yes	0	2.7	No	2.55
N25	Burgundy's Kendal	Kerbside	351557	492624	NO <sub>2</sub>	Yes	0	0.85	No	2.6
N26	31 Lowther St, Kendal	Kerbside	351619	492637	NO <sub>2</sub>	Yes	0	0.8	No	2.37
N27	Kent Street, Kendal	Roadside	351674	492695	NO <sub>2</sub>	Yes	5.1	2.6	No	2.4
N31	42 Stramongate, Kendal	Roadside	351712	492832	NO <sub>2</sub>	Yes	0.55	2.8	No	2.4
N33	Sandes Ave, Kendal	Roadside	351597	493052	NO <sub>2</sub>	Yes	0.72	2.65	No	2.5
N36	11 Longpool, Kendal	Kerbside	352016	493142	NO <sub>2</sub>	Yes	3.3	0.6	No	2.45
N37	9 Wildman St, Kendal	Roadside	351934	493043	NO <sub>2</sub>	Yes	0	1.5	No	2.5
N38	Windermere Rd, Kendal	Roadside	351499	493022	NO <sub>2</sub>	Yes	12	1.45	No	2.45
N40	Appleby Rd, Kendal	Roadside	352075	493264	NO <sub>2</sub>	No	7.34	1.3	No	2.35
N41	County Road, Ulverston	Roadside	328698	478158	NO <sub>2</sub>	No	5.75	2.2	No	2.6
N42	Brewery St, Ulverston	Roadside	328828	478350	NO <sub>2</sub>	No	22.6	1.05	No	2.55
N43	Casson St, Ulverston	Urban Background	329049	478471	NO <sub>2</sub>	No	0.3	1.12	No	2.5
N44	Sandylands Road, Kendal	Roadside	352138	493280	NO <sub>2</sub>	NO	1.15	1.5	NO	2.47

N45	Glebe Road, Kendal	Roadside	351591	491762	NO <sub>2</sub>	NO	0.17	1.62	NO	2.45
-----	-----------------------	----------	--------	--------	-----------------	----	------	------	----	------

**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.3 – 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 2017 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2013	2014	2015	2016	2017
A1 Lowther Street, Kendal	Roadside	Automatic monitor	N/A	100	33.47	31.53	32.58	30.36	27.42
N1 Stricklandgate Kendal	Roadside	Diffusion tube	N/A	100	22.52	21.97	20.42	19.32	19.93
N2 Finkle Street, Kendal	Urban centre	Diffusion tube	N/A	100	16.49	15.84	14.19	15.00	13.01
N3 Levens Close, Kendal	Urban Background	Diffusion tube	N/A	92	11.47	11.91	10.6	11.35	9.33
N4 St Thomas School, Kendal	Urban Background	Diffusion tube	N/A	100	10.17	10.55	8.72	9.10	9.04
N6 Cavendish Street, Ulverston	Kerbside	Diffusion tube	N/A	100	20.20	22.89	19.09	20.67	17.96
N7 Millans Park, Ambleside	Roadside	Diffusion tube	N/A	100	20.57	21.85	21.28	18.66	17.26
N8 Crescent Road, Windermere	Kerbside	Diffusion tube	N/A	100	23.44	23.41	22.59	22.98	20.33
N9 Top Lowther Street, Kendal	Roadside	Diffusion tube	N/A	100	37.46	39.63	34.91	32.60	30.27
N11 N13 N14 Middle Lowther St, Kendal	Kerbside	Triplicate diffusion tube	N/A	100	33.65	33.35	32.74	30.23	29.86

## South Lakeland District Council

N12 35 Highgate, Kendal	Kerbside	Diffusion tube	N/A	92	28.56	28.70	25.17	24.27	22.77
N16 Aynam Road, Kendal	Roadside	Diffusion tube	N/A	100	22.01	22.82	22.63	21.08	19.74
N17 Kirkland, Kendal	Kerbside	Diffusion tube	N/A	100	29.69	30.67	28.84	27.04	26.06
N18 Cooks Corner, Bowness	Roadside	Diffusion tube	N/A	100	29.15	31.41	30.44	29.42	27.29
N19 Beeson Road, Kendal	Kerbside	Diffusion tube	N/A	100	33.20	32.31	31.90	32.10	29.7
N20 29 Wildman St, Kendal	Roadside	Diffusion tube	N/A	100	38.84	36.6	29.79	38.33	30.55
N21 Blackhall Road, Kendal	Roadside	Diffusion tube	N/A	100	29.43	31.01	32.47	29.13	31.94
N22 Parkside Road, Kendal	Roadside	Diffusion tube	N/A	100	21.46	21.60	19.31	21.53	19.82
N23 99 Highgate, Kendal	Kerbside	Diffusion tube	N/A	100	<b>40.13</b>	38.50	34.70	35.13	32.45
N24 147 Highgate, Kendal	Roadside	Diffusion tube	N/A	100	29.31	28.07	26.74	27.61	24.02
N25 Burgundy's, Kendal	Kerbside	Diffusion tube	N/A	100	<b>50.06</b>	<b>49.46</b>	<b>46.52</b>	<b>44.45</b>	<b>42.54</b>
N26 31 Lowther Street, Kendal	Kerbside	Diffusion tube	N/A	100	<b>40.79</b>	38.68	38.52	35.98	36.44
N27 Kent Street, Kendal	Roadside	Diffusion tube	N/A	92	32.24	31.30	30.74	32.17	29.34
N31 42 Stramongate, Kendal	Roadside	Diffusion tube	N/A	100	31.37	32.14	29.26	29.61	27.63

## South Lakeland District Council

N33 Sandes Avenue, Kendal	Roadside	Diffusion tube	N/A	100	35.71	35.40	34.74	32.95	26.48
N36 11 Longpool, Kendal	Kerbside	Diffusion tube	N/A	100	33.29	35.10	29.33	28.53	25.15
N37 9 Wildman Street, Kendal	Roadside	Diffusion tube	N/A	100	39.81	37.36	35.35	33.81	31.39
N38 Windermere Road, Kendal	Roadside	Diffusion tube	N/A	100	36.39	37.40	33.57	34.95	27.50
N40 Appleby Road, Kendal	Roadside	Diffusion tube	N/A	92	25.49	25.21	24.60	23.80	22.80
N41 County Road, Ulverston	Roadside	Diffusion tube	N/A	100	32.22	32.94	30.34	30.19	26.56
N42 Brewery Street, Ulverston	Roadside	Diffusion tube	N/A	92	-	10.08	15.74	20.87	23.64
N43 Casson Street, Ulverston	Urban Background	Diffusion tube	N/A	92	-	17.29	11.1	10.33	11.92
N44 Sandylands Road, Kendal	Roadside	Diffusion Tube		83	-				19.90
N45 Glebe Road, Kendal	Roadside	Diffusion Tube		83	-				17.31

☒ Diffusion tube data has been bias corrected

☒ 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) 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 NO<sub>2</sub> Concentrations – Diffusion Tubes - Kendal

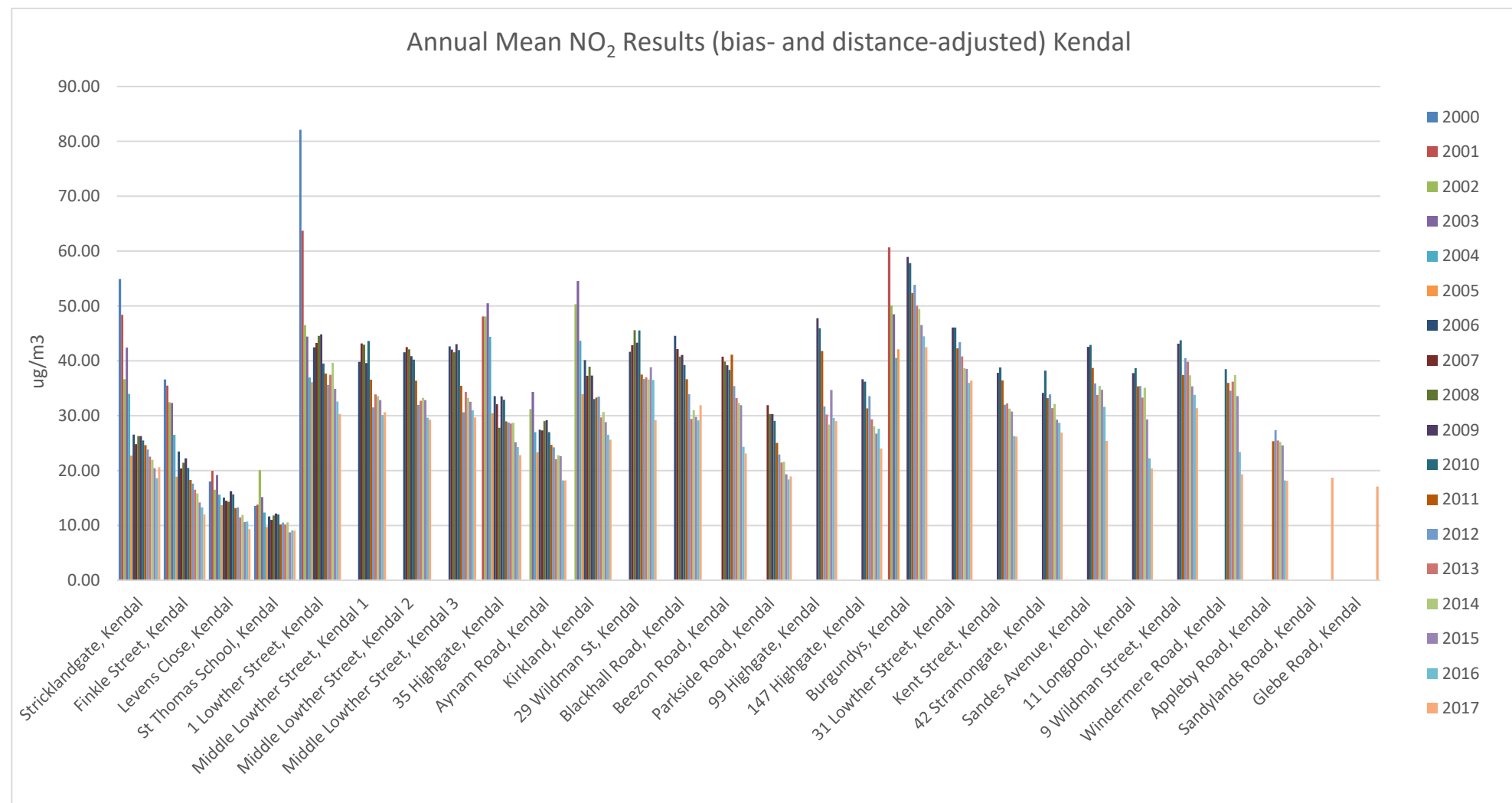


Figure A.2 – Trends in Annual Mean NO<sub>2</sub> Concentrations – Diffusion Tubes – Outside Kendal

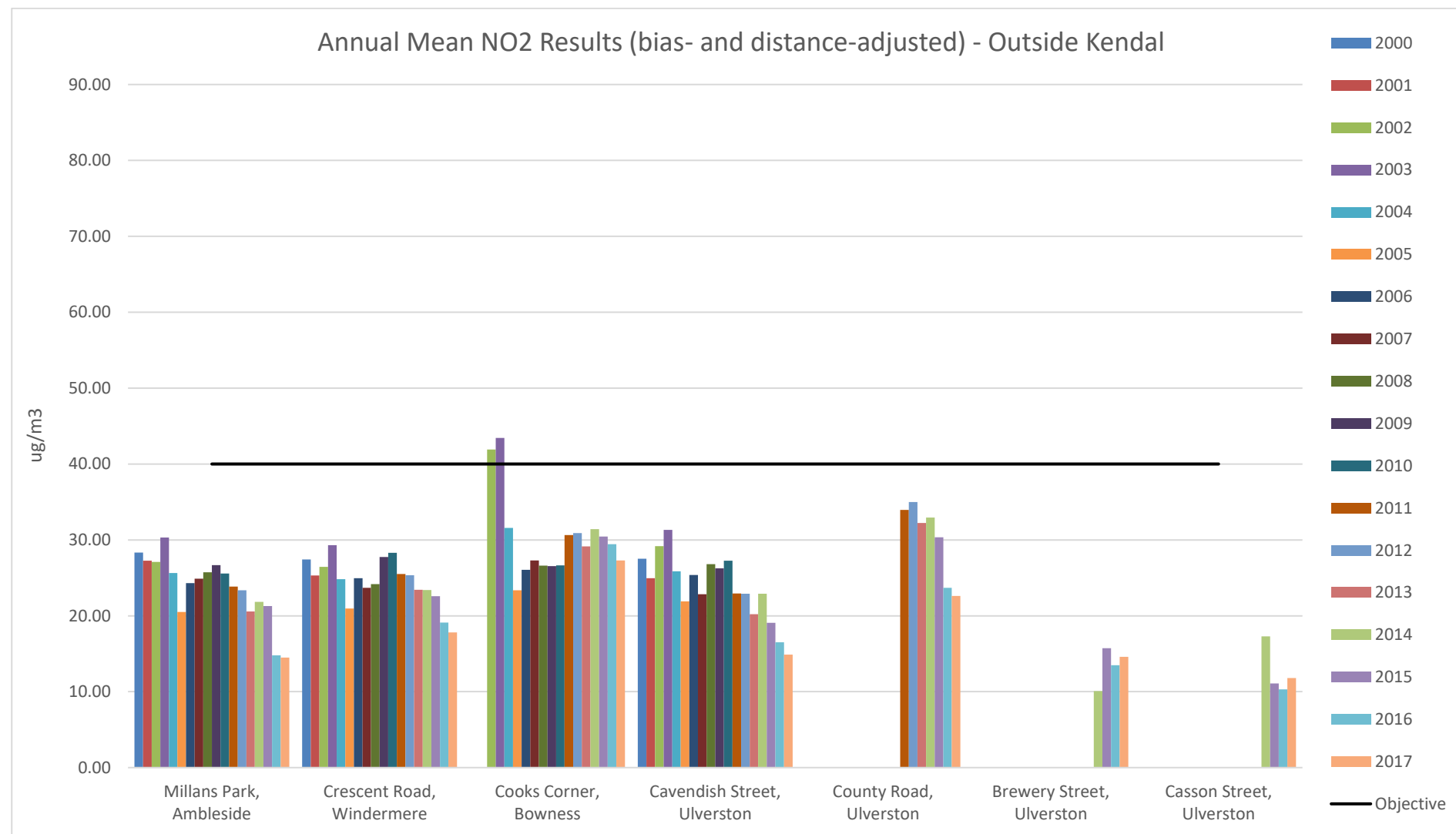


Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2017 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2013	2014	2015	2016	2017
A1	Roadside	Automatic monitor	N/A	95.8	0 (113.28)	0 (104.2)	0	0	0

**Notes:**

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

(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) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

Figure A.3 – 1-hour Mean Results – Continuous Analyser

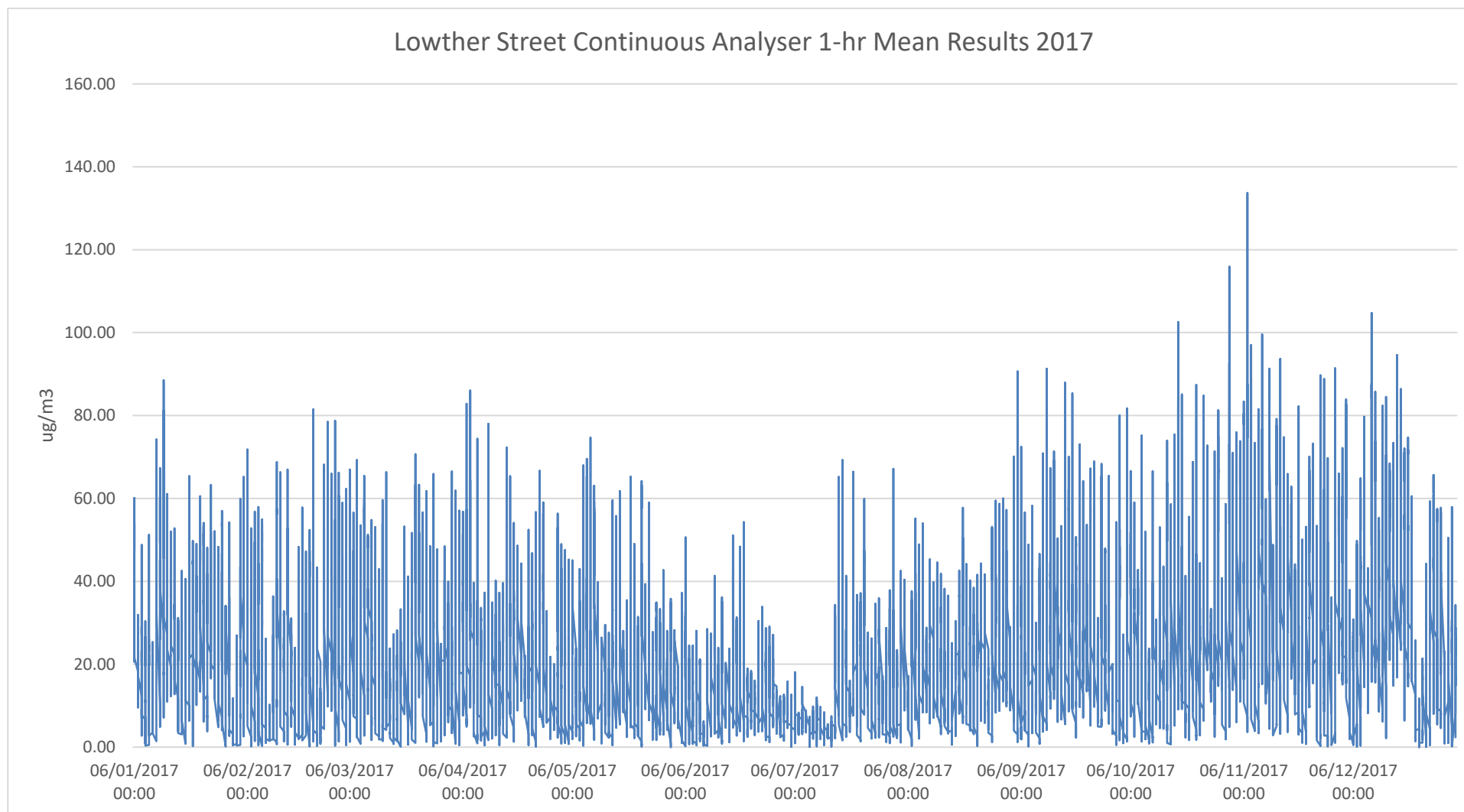
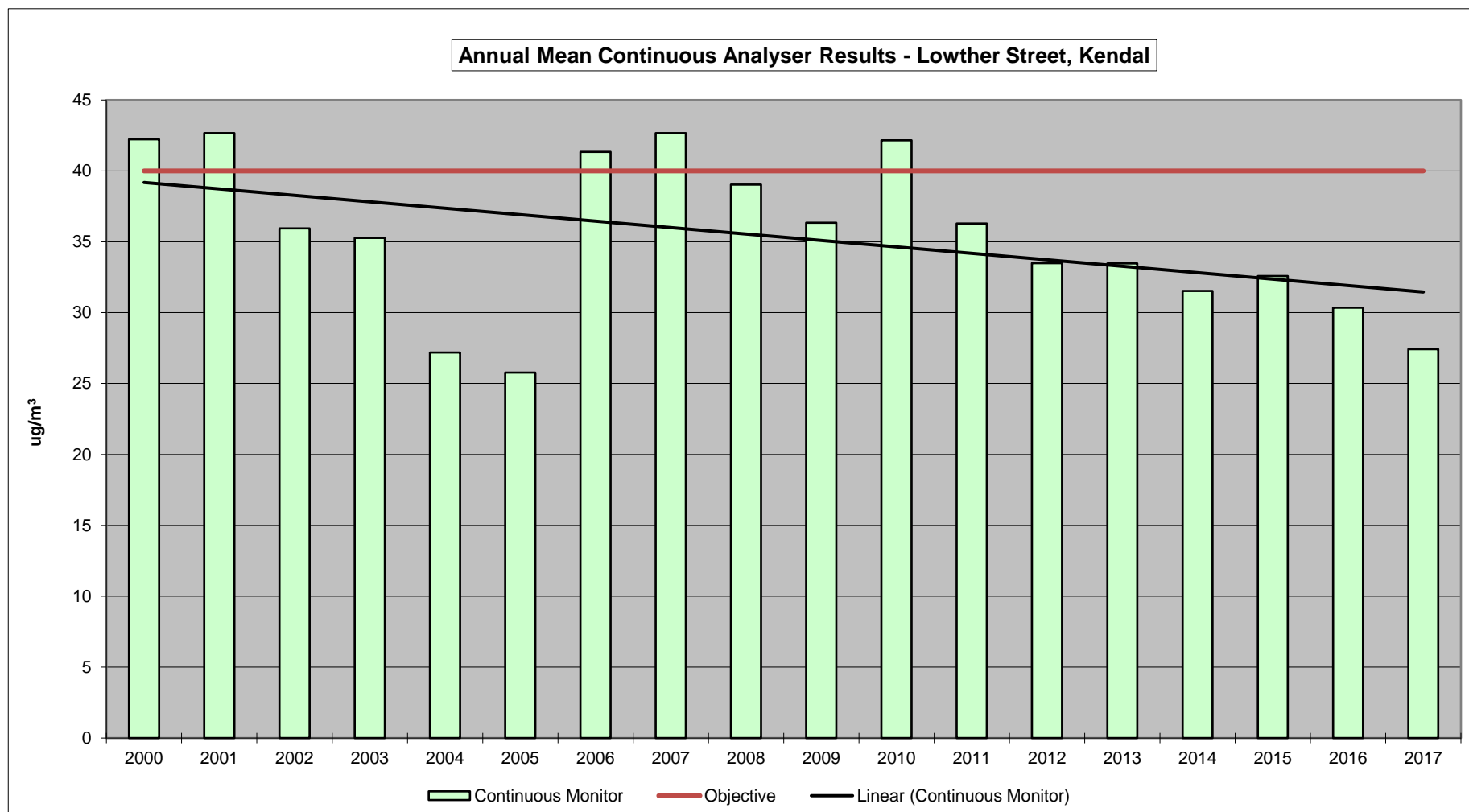


Figure A.4 – Trends in Mean NO<sub>2</sub> Concentrations – Continuous Analyser



## Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2017

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.71) and Annualised <sup>(1)</sup>	Distance Corrected to Nearest Exposure <sup>(2)</sup>
N1	47.8	32.4	27.9	27.3	19.6	19.0	16.1	21.6	26.0	29.2	34.6	35.3	28.1	19.93	19.1
N2	38.5	21.3	18.6	14.6	13.7	10.7	10.7	13.8	18.6	18.4	18.2	22.8	18.3	13.0	12.0
N3		12.90	15.50	10.60	9.00	7.30	7.50	10.90	13.90	13.20	20.30	23.40	13.14	9.3	9.3
N4	29	17	10.9	8.7	7.3	6.7	6.5	8.5	11.7	11	16.2	19.2	12.7	9.0	9.7
N6	43.5	32.5	29	20.7	22.1	17.6	17.9	20.2	26.1	21.9	27.2	24.9	25.3	18.0	14.9
N7	34.4	25.8	22.4	27.1	18	19.1	17	21.9	23	24.7	28.2	30.1	24.3	17.3	14.5
N8	37.5	30	29.8	29.2	25.5	25.4	21.4	26.8	28.6	26.8	30	32.6	28.6	20.3	17.8
N9	61.5	44.2	46.9	43.1	38.8	39	30.8	35.4	42.2	41.6	45.5	42.7	<b>42.6</b>	30.3	30.3
N11	67	37.4	42.2	53.5	35	29.7	29.1	32.7	40.7	39.4	54.6	55	<b>43.0</b>	30.6	30.6
N12	51.5	33.9		29.4	28.3	20.4	22.7	24.5	33.1	29.1	40.3	39.6	32.1	22.8	22.8
N13	55.9	35.1	43.3	45.2	35.2	33.8	30.9	31.4	39.7	36.5	64.9	43.4	<b>41.3</b>	29.3	29.3
N14	73.6	39.1	44.1	43.2	35.9	31.4	29.3	33.4	41.6	36	53.5	41.1	<b>41.9</b>	29.7	29.7
N16	45.9	28.9	27.1	25.1	20.9	20.6	17.4	22.1	28.7	25.6	37.6	33.7	27.8	19.7	18.2
N17	51.6	35	36.8	41.7	26.9	31.7	25.7	30.7	34.3	39.9	46.2	39.9	36.7	26.1	25.6
N18	50.4	39.2	33.1	47.4	31.8	36	31.8	41.6	35.2	40.2	38.5	36	38.4	27.3	27.3

## South Lakeland District Council

N19	58.5	42.2	46.2	36.8	31.8	29.4	28.1	30.7	42.2	40.8	67.7	47.5	<b>41.8</b>	29.7	23.1
N20	78	55	53.4	53.1	42.7	46.4	38	36	45.2	53.3	62.7	48.2	<b>51.0</b>	36.2	29.2
N21	60.9	45.6	39.5	51.8	34.7	44	34.1	38.2	55	47	53.1	36	<b>45.0</b>	31.9	31.9
N22	45.9	30.7	28.9	23.4	19.7	18.8	11.2	20.3	29.2	26.7	36.4	43.7	27.9	19.8	18.9
N23	68.8	47.3	43.7	35.9	40.4	33.5	32.9	31.8	49.7	51.2	58.6	54.6	<b>45.7</b>	32.5	29.0
N24	51.7	36.7	35.4	32.5	31.7	21.7	25.4	25.4	31.1	30.3	41.9	42.1	33.8	24.0	24.0
N25	83.8	61.4	60.1	67.6	54.5	46	47.4	51.1	63.8	55.2	65.1	62.9	<b>59.9</b>	<b>42.5</b>	<b>42.5</b>
N26	77.4	48.7	52.7	58.2	41.4	42.9	38.3	43.2	49.2	50.6	59.4	53.8	<b>51.3</b>	36.4	36.4
N27	67	41.5	36.6	36.4	38.6	32.9	30.2	33.6	41.9		62.6	33.3	<b>41.3</b>	29.3	26.2
N31	61.2	42.9	35.6	40.7	33.3	25.3	27.7	29.7	37.2	37.8	50.6	45	38.9	27.6	26.9
N33	53.7	41.1	30.4	42.8	35.1	26.1	27.6	30.3	39.1	34.4	45.4	41.6	37.3	26.5	25.4
N36	50.8	33.5	29	38.3	37.6	28	27.2	28.4	34.9	35.3	43.4	38.6	35.4	25.2	20.4
N37	59.3	49.7	44.3	46.4	38.9	39.3	34.3	34.9	40.6	42.2	52.9	47.7	<b>44.2</b>	31.4	31.4
N38	50.7	42.4	34.7	40.9	37.1	26.2	30.5	28.7	37.5	35.9	51.9	48.2	38.7	27.5	19.3
N40	51.3	30.3	29.2	34		25.2	21.4	24.6	30.7	33.2	38.7	34.6	32.1	22.8	18.1
N41	61.2	45.7	35	31.6	23.4	32	27.7	32.5	36.8	37.4	42.9	42.7	37.4	26.6	22.6
N42	48.5	36.3	25.6	46.9	37.1		22.2	21.4	31.1	28.3	35.1	33.8	33.3	23.6	14.6
N43	31.7	17.3	12.5	27.5		10.2	8.6	11.9	14.5	14.7	15.9	19.9	16.8	11.9	11.8
N44			36	12.4	11.4	26.8	20.9	27.6	31.5	37.1	42.9	33.7	28.0	19.9	18.7
N45			27.9	21.7	23.8	19.4	17.2	17.7	27.5	26.5	31.4	30.7	24.4	17.3	17.1

☐ 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 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

### Screening of New and Modified Sources

It is now recognised that Local Authorities will have assessed all known sources in their District through previous rounds of review and assessment. Any new or modified sources will be assessed for their impact on air quality through the planning application process.

South Lakeland District Council Environmental Protection Group is consulted on all applications which may impact on air quality and requires that all development is air quality neutral. This means developments are not affected by poor air quality and they either improve, or have no negative impact on air quality themselves.

Any new or modified source identified will be assessed using the tools in [LAQM \(TG16\)](#) (updated in February 2018). Sources which will be assessed include new developments which lead to an increase in traffic (including the proportion of HGV's), biomass boilers and Combined Heat and Power (CHP) plant, new industrial sites or changes to existing industrial sources, new or altered roads or junctions, bus stations, airports and railways and any uncontrolled or fugitive sources (such as construction sites).

South Lakeland District Council will continue to review developments to ensure sources are assessed if they meet the criteria in TG16.

Work is currently underway to strengthen local planning policy when looking at requirements for air quality.

### Diffusion Tube Bias Adjustment Factors

Diffusion tubes may systematically under- or over-read NO<sub>2</sub> concentrations when compared to the reference automatic monitor. This is described as 'bias' and can be corrected using a bias adjustment factor to improve the accuracy of the diffusion tube results. This is calculated using the results of 3 diffusion tubes co-located alongside an automatic monitor, all sampling the same air. The annual average result for the monitor is divided by the annual average of the 3 diffusion tubes results to give the bias

factor. This factor is then applied to all the diffusion tube results for that year. A bias factor can vary from year to year due to variables such as the weather at the site or changes in laboratory procedures.

Even after bias adjustment a diffusion tube may have an uncertainty of +/-20%, compared to 10-15% for automatic monitors.

### Factor from Diffusion Tube Supplier

South Lakeland District Council's diffusion tubes are supplied and analysed by Environmental Scientifics Group (ESG) using 20% triethylamine (TEA) in water.

A national bias adjustment factor is calculated using results from all Authorities supplied by ESG who also use 20% TEA in water and who upload their results to the collation website (<http://laqm.Defra.gov.uk/bias-adjustment-factors/national-bias.html>). The March 2018 version was used for the 2017 calculation. The results from 2 Authorities (including South Lakeland) were included in this calculation.

Year	ESG Bias
2015	0.81
2016	0.75
2017	0.71

### Factor from Local Co-location Studies

The local bias adjustment factor was calculated using triplicate tubes (N11, N13 & N14) located alongside the automatic monitor (A1) on Lowther Street in Kendal.

Year	Automatic Monitor Annual Mean	Diffusion Tube Annual Mean of 3 Tubes	Bias
2015	32.58	32.5843.08	0.76
2016	30.36	40.85	0.74
2017	27.42	42.05	0.65

### **Discussion of Choice of Factor to Use**

Only one other Local Authority was included in the national tube supplier inter-comparison this year, making it potentially less meaningful. Also, it is recognised that local results are more representative of local circumstances. However, the locally derived figure was unusually low in 2017 and its use would reduce diffusion tube results hugely.

It has therefore been decided that the national factor of 0.71, which is more similar to previous years factors, will be used to bias adjust the 2017 data, to give worst case results.

### **Diffusion Tube Distance Adjustment**

Some passive monitoring locations are not representative of relevant exposure (due to a lack of secure mounting locations at the property facade). In these cases results are adjusted for distance to the nearest relevant receptor (residential property) using Defra's NO<sub>2</sub> fall-off with distance calculator. Table B1 shows which sites these are.

### **Diffusion Tube Bias Annualisation**

No annualisation of diffusion tube results has been necessary as more than 9 months data was available for each site in 2017.

### **QA/QC of Automatic Monitoring**

South Lakeland District Council has, since 1999, used a US-EPA, TÜV and Netcen-accredited Horiba APN 360 ambient air quality analyser. This is situated in the basement of the Council Offices on Lowther Street, within the AQMA. The analyser self-calibrates and is also calibrated and the results checked weekly by the Local Authority, with a 6-monthly service and calibration visit by the supplier. The calibration factor is automatically applied to the raw data. Access is available to an engineer at short notice if required.

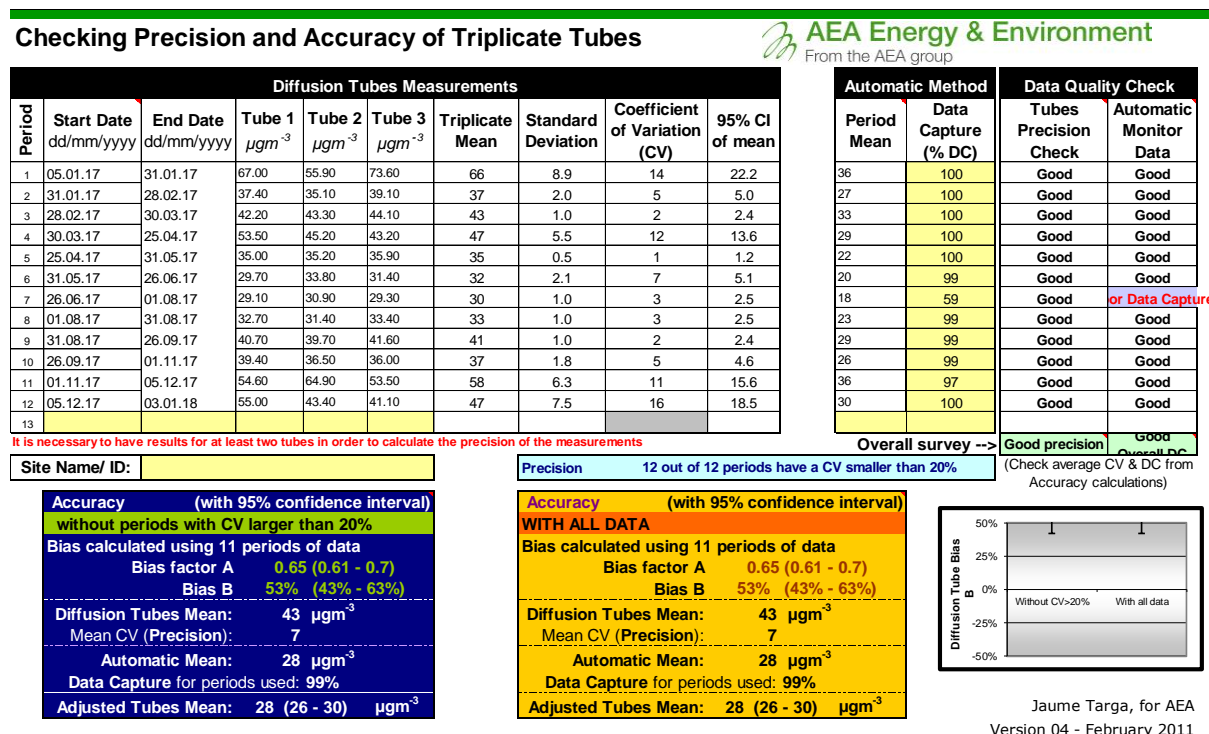
Data is validated and ratified to the LAQM (TG16) standards using the AURN methodology by a third party (Air Quality Data Management) prior to publishing. As part of this contract, all data, diagnostics and any alarms are downloaded automatically at least twice a day, seven days a week. Performance is checked daily looking for the first sign of a fault.

## QA/QC of Diffusion Tube Monitoring

ESG, who supply and analyse the Council's diffusion tubes, state that they are classed as a 'satisfactory' laboratory in the AIR NO<sub>2</sub> PT proficiency testing scheme (the highest ranking) and lab precision results were classed as Good in 2017. Their test method for NO<sub>2</sub> tubes meets the guidelines in Defra's guidance for diffusion tube monitoring.

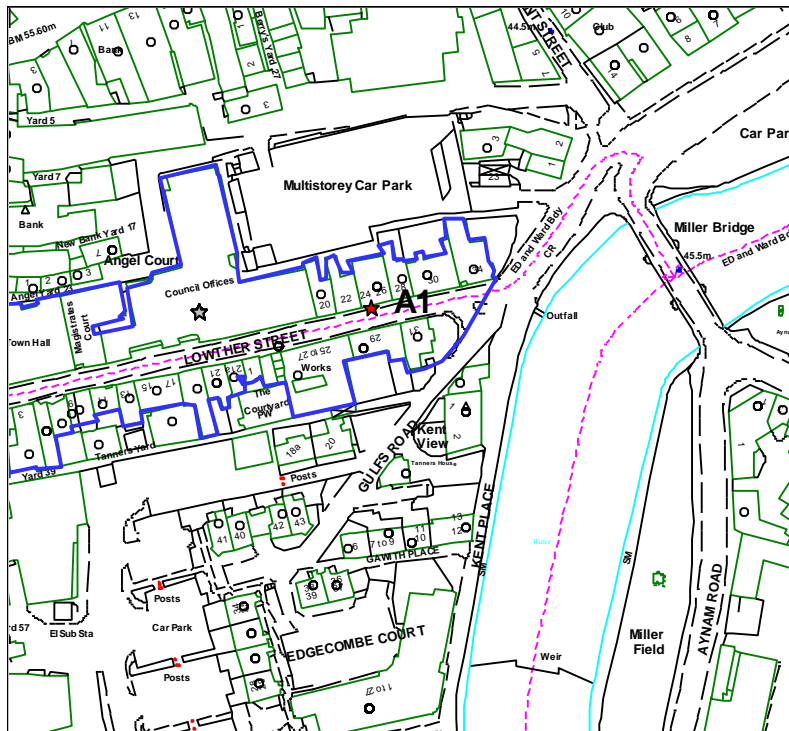
Diffusion tubes are installed and changed each month by the Council according to the Council's document "Procedure for Air Quality Monitoring" and in accordance with Defra's documents "Diffusion Tubes for Ambient Monitoring: Practical Guidance" and TG(16). Spurious or unusual diffusion tube results are removed from the data set.

The precision and accuracy of all results can be checked using the tool available on Defra's website. This shows good precision and good overall data capture in 2017.



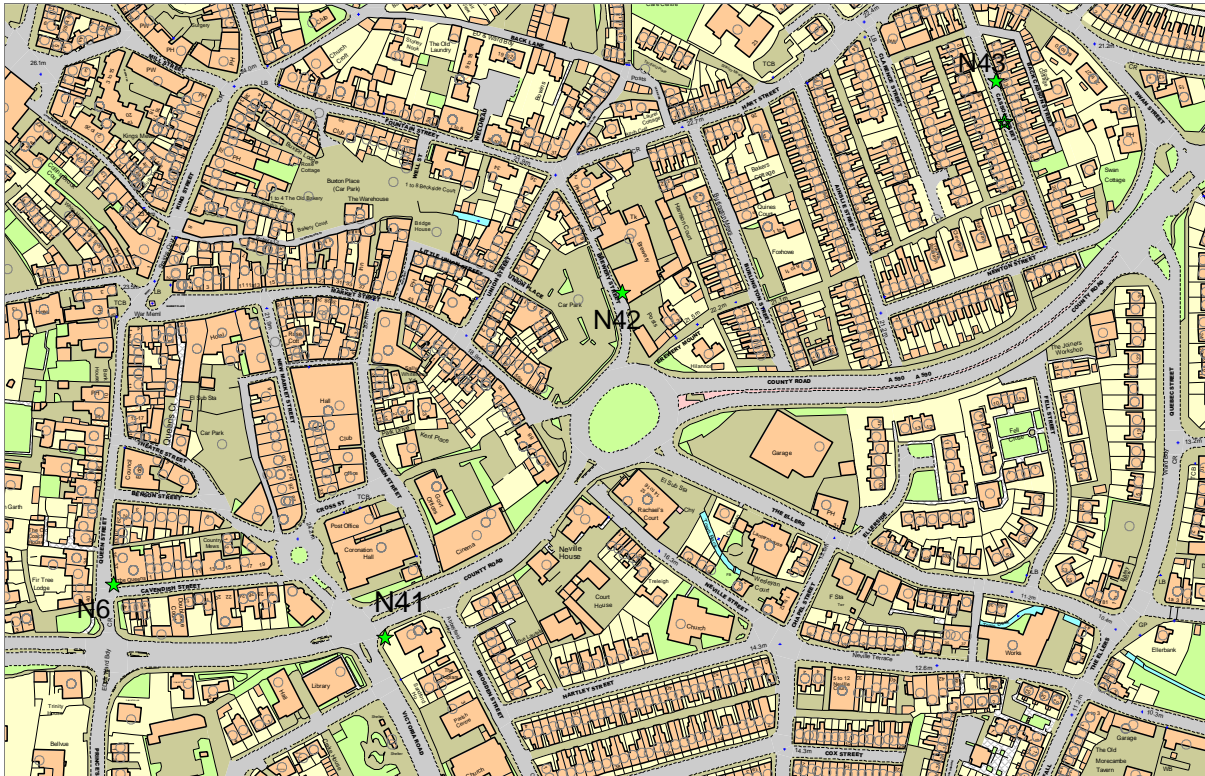
## Appendix D: Maps of Monitoring Locations and AQMAs

### Automatic monitor A1

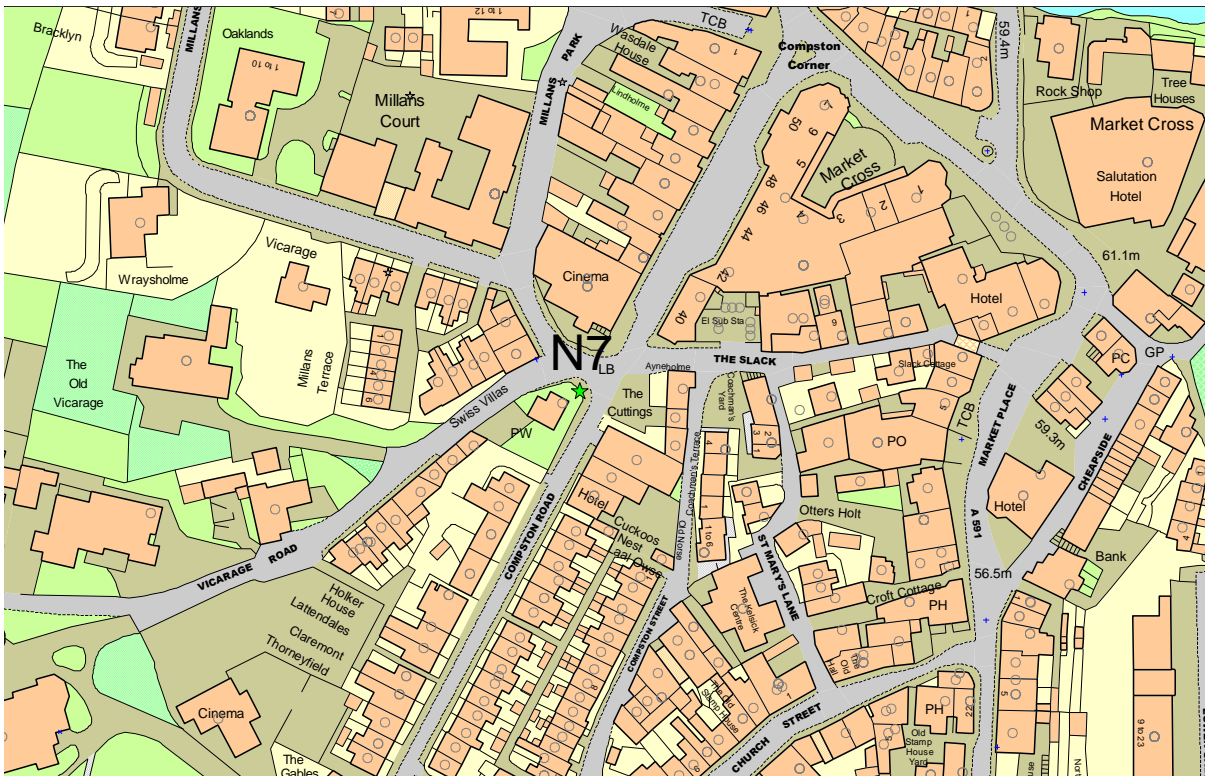




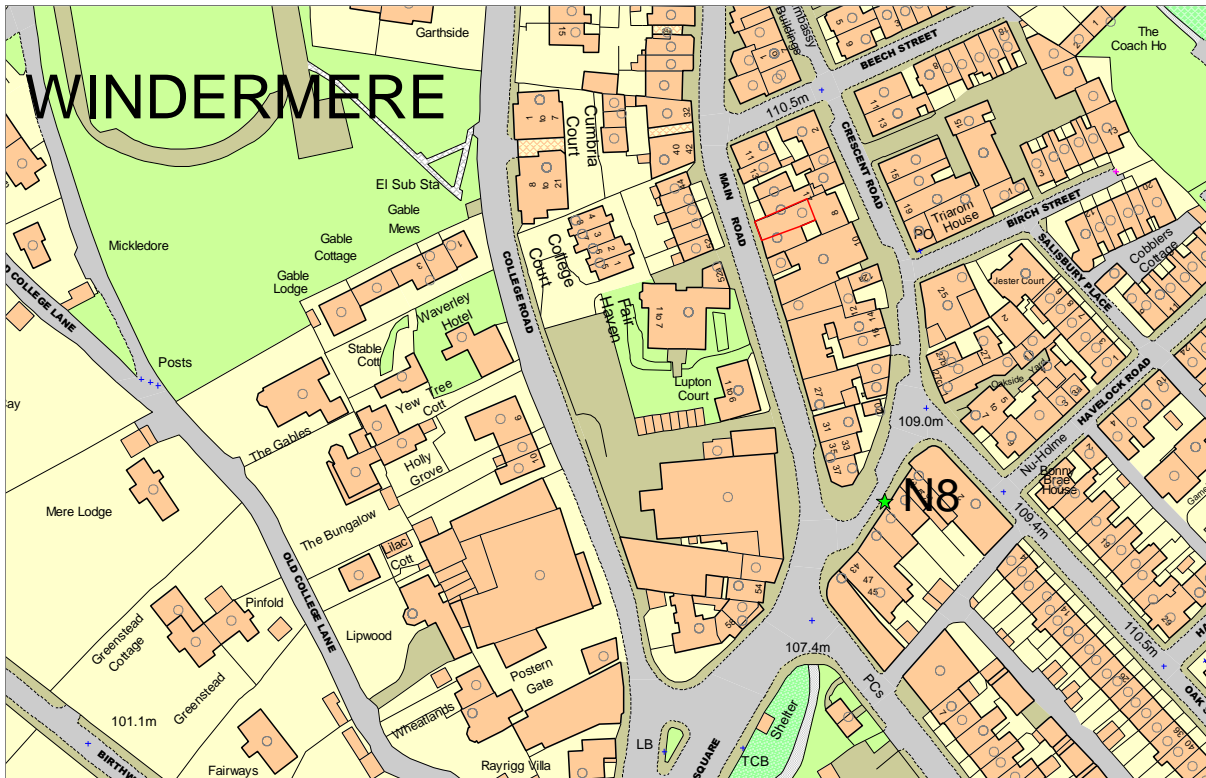
## Ulverston



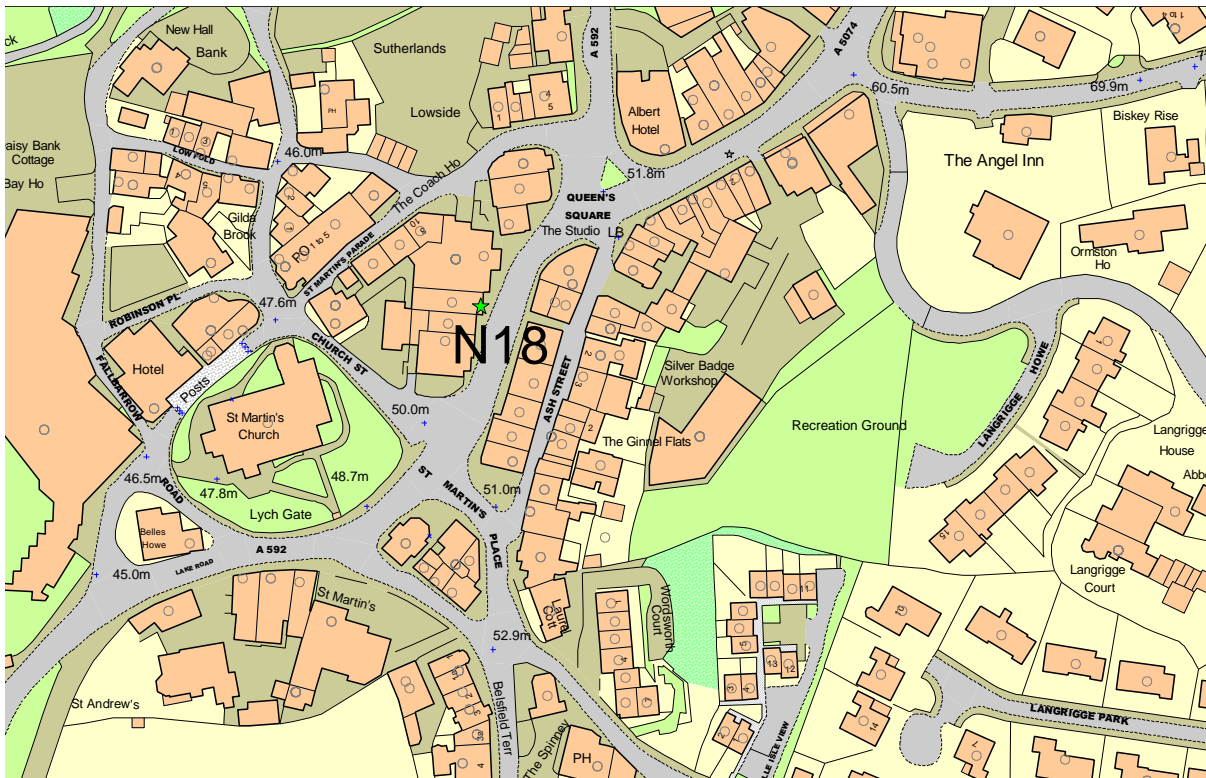
## Ambleside



Windermere

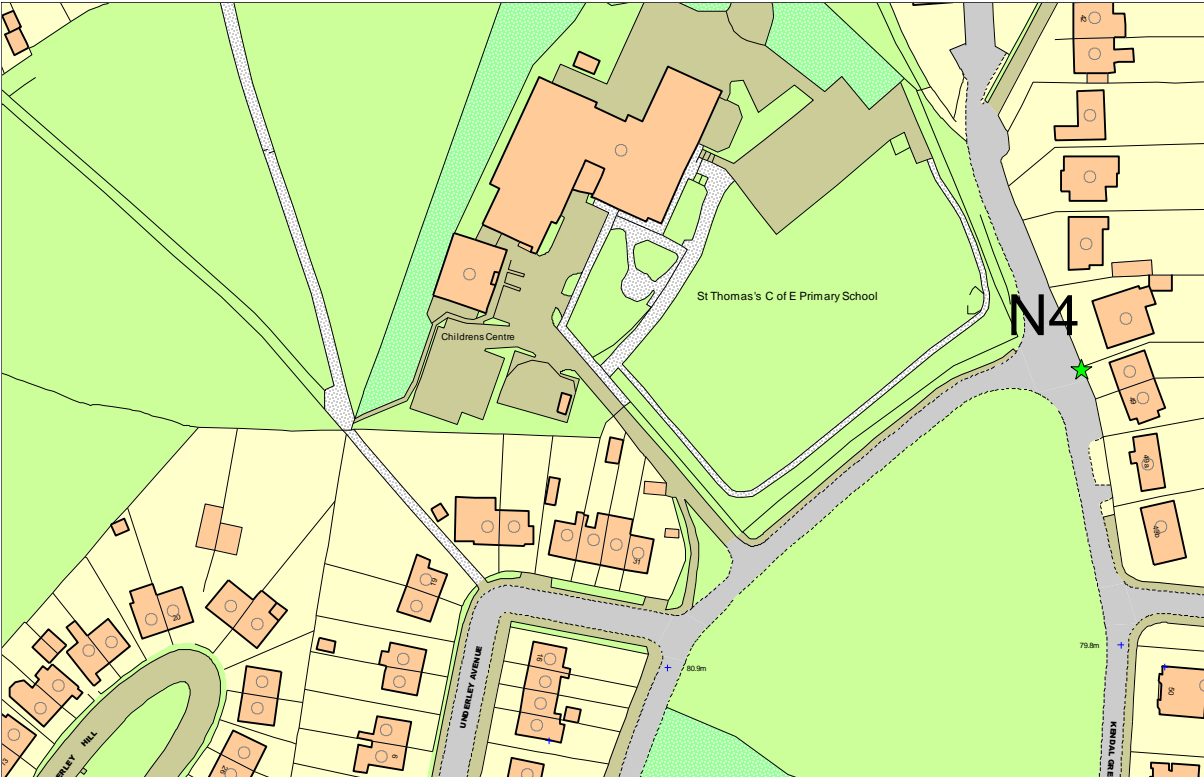


Bowness

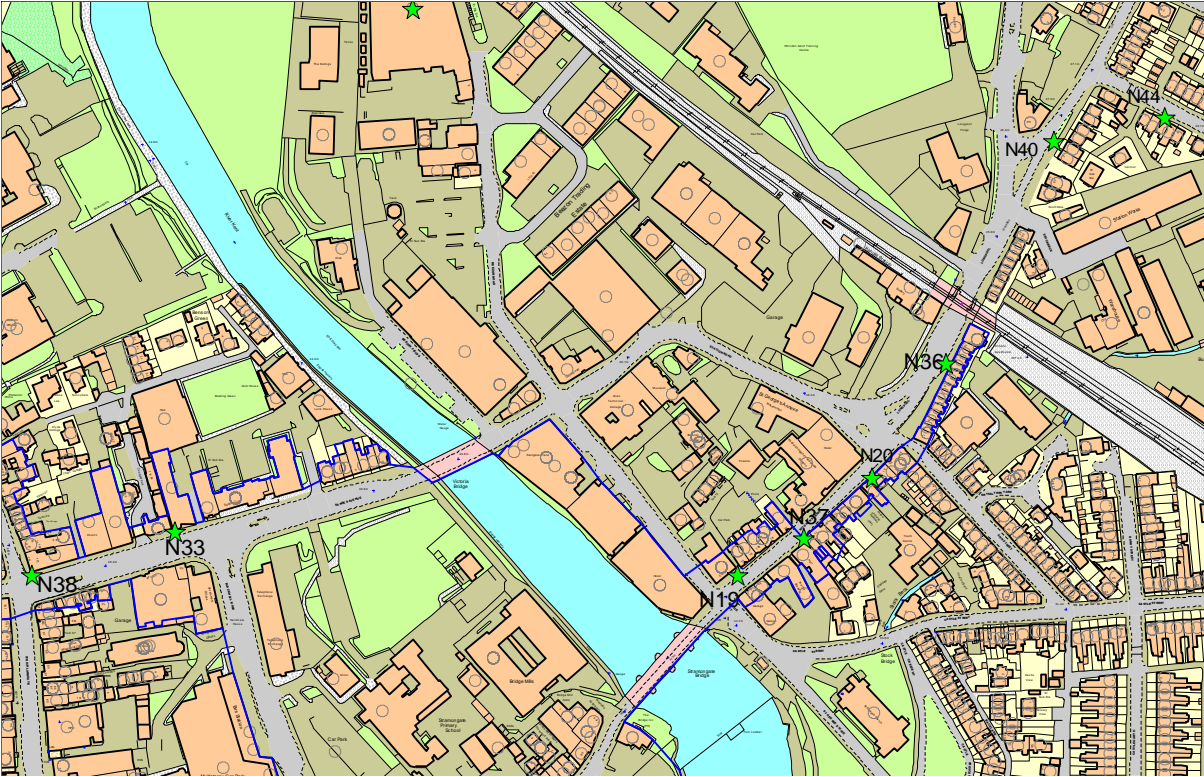




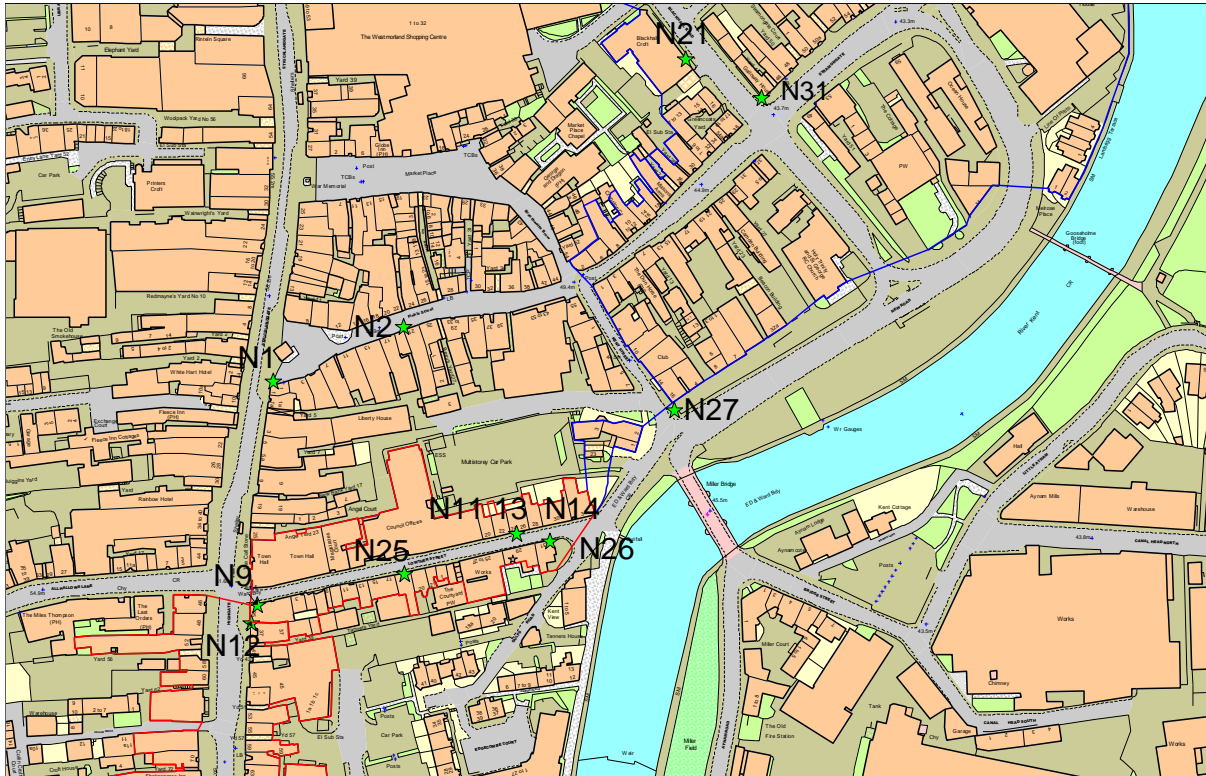
Kendal North



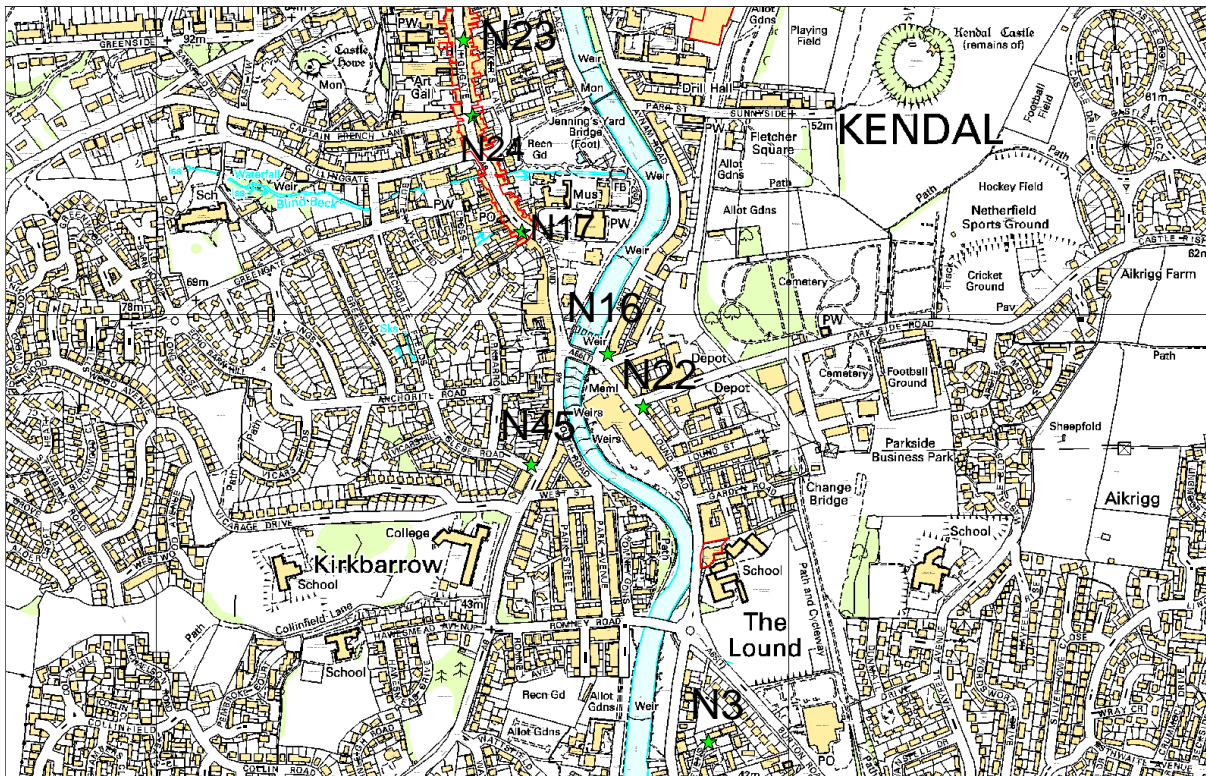
Kendal Central 1



## Kendal Central 2



## Kendal South



## 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
AADT	Annual Average Daily Traffic
AQ	Air quality
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
BID	Business Improvement District
CCC	Cumbria County Council
CHP	Combined heat and power
CIL	Community Infrastructure Levy
CO <sub>2</sub>	Carbon Dioxide
Defra	Department for Environment, Food and Rural Affairs
ESG	Environmental Scientifics Group
EU	European Union
EV	Electric vehicle
HGV	Heavy Goods Vehicle
KTC	Kendal Town Council
LAQM	Local Air Quality Management
LDNPA	Lake District National Park Authority
MPH	Miles per hour
NO <sub>2</sub>	Nitrogen Dioxide



NO <sub>x</sub>	Nitrogen Oxides
OLEV	Office for Low Emission Vehicles
PCN	Parking Contravention Notice
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
ppb	Parts per billion
QA/QC	Quality Assurance and Quality Control
SLDC	South Lakeland District Council
SCOOT	Split Cycle Offset Optimisation Technique
TEA	Triethylamine
ULEV	Ultra-low emission vehicle
µg/m <sup>3</sup>	Microgrammes per cubic meter
µm	Micrometres

## References

South Lakeland District Council Annual Status Report 2107

South Lakeland District Council Air Quality Action Plan 2016

South Lakeland District Council Procedure for Air Quality Monitoring, 2015

Diffusion Tubes for Ambient Monitoring: Practical Guidance, 2008 (AEA Energy & Environment)

Environmental equity, air quality, socioeconomic status and respiratory health, 2010 (Wheeler BW, Ben-Shlomo Y)

AEA Technology. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

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

Public Health England. Estimating Local Mortality Burdens Associated with Particulate Air Pollution, 2014

Public Health Outcomes Framework – Public Health England (updated quarterly)

Defra. LAQM TG16, February 2018