2017 Air Quality Annual Status Report (ASR)
Allerdale Borough Council

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

June 2017
<table>
<thead>
<tr>
<th>Local Authority Officer</th>
<th>Mr Richard Cain</th>
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<tbody>
<tr>
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<td>ASR2017</td>
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<td>June 2017</td>
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Executive Summary: Air Quality in Our Area

Air Quality in Allerdale

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion\(^3\).

Allerdale has relatively low levels of pollution due to the rural nature of the area and to date, no Air Quality Management Areas have been designated. Air quality in both urban and rural areas is constantly threatened by pollution from human activity.

The main pollutant of concern in the Allerdale area is Nitrogen Dioxide (NO\(_2\)). Nitrogen Dioxide pollution in Allerdale is predominantly associated with road traffic sources and other transport links.

In 2016 monitoring of Nitrogen Dioxide was carried out in Allerdale via diffusion tube monitoring sites. The sites are positioned at ten locations across Allerdale felt most affected by Road Traffic Pollution.

Other pollutants of concern include Sulphur Dioxide (SO\(_2\)) and Particulate Matter in the form of PM\(_{10}\) and PM\(_{2.5}\). Allerdale takes a proactive approach to tackling these pollutants via Smoke Control Areas, Planning requirements, Permitting Processes and general air pollution regulatory activities under the Clean Air Act.

Allerdale do not currently sample the boroughs air for SO\(_2\) and PM\(_{2.5}\), however studies are ongoing in relation to highlighting SO\(_2\) hotspots which may qualify for detailed assessment. Data for PM\(_{2.5}\) has been collated and modelled nationally and can be viewed on the Public Health Wider Determinants website. Allerdale is proud to have been stated as the borough with the lowest PM\(_{2.5}\) Human exposure rate in

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\(^1\) Environmental equity, air quality, socioeconomic status and respiratory health, 2010
\(^2\) Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
\(^3\) Defra. Abatement cost guidance for valuing changes in air quality, May 2013
the country. Further information regarding the above pollutants is explained further in later chapters of this report.

Due to the good quality of our air demonstrated by our monitoring and data gathered, there is no requirement for an air quality management area in Allerdale to date. Allerdale recognise the significance of maintaining good air quality for good health and will continue to pursue further improvements where possible.

We work with our partners in relation to local transport, highways, land use planning and public health in managing Air Quality

**Actions to Improve Air Quality**

A new transport hub at Workington Railway Station to encourage more sustainable travel was successfully opened in May 2017. The new transport hub, which was funded by Cumbria Local Enterprise Partnership, aims to encourage people to travel by train along the Cumbrian Coast, reduce traffic congestion and improve access to Workington rail station. Rail travel is known to be significantly less polluting in terms of emissions than car travel. The predicted reduction in congestion of road traffic will have positive effects in relation to the boroughs air quality.

Allerdale promote and encourage green travel, a review is ongoing in regards to transport impact with a review of green fleet vans to carry out Council Services. Allerdale also promote and encourage a home working policy, reducing the need for daily commute and cutting road/ rail travel related pollution.

An electric vehicle charging point has been installed at the Allerdale council offices in Workington after Cumbria County Council secured funding from the Governments Office of Low Emission Vehicles and a private investor.

Via the planning process Allerdale has been pro-active in ensuring the borough maintains its low levels of pollution. Air Quality assessments have been required for installation of potentially polluting industrial applications such as CHP and Energy production produced by combustion methods such as Gas turbine or Biomass boilers. Records have been maintained in relation to planning applications for domestic Bio-mass boilers.

Allerdale Borough Council continues with its duties to regulate and control in regards to emissions from all Part A2 and B Processes located within the local Authority area.
ensuring Best Available Techniques are adhered to and pollutant emissions are minimised.

Allerdale promote, support and influence plans and policies that may have a positive effect on the Allerdale air pollution levels.

**Conclusions and Priorities**

No exceedances of objectives were identified in this 2017 ASR. The general trend is that the Borough has very good Air Quality which has been highlighted by Public Health England as the best in relation to Human PM$_{2.5}$ exposure.

Given the above our priority is to maintain the good air quality within the Allerdale Borough. The main challenge for Allerdale is the potential impacts of proposed major developments individually and collectively on local air quality within our area. As discussed in the above section we have several National Significant Infrastructure Projects planned to include

- United Utilities West Cumbria Water Supplies Project,
- National Grid Northwest Coast Connections
- NuGen Moorside Nuclear Power Station. (Cross Boundary Effects)

Alongside detailed Air Quality Assessments being required from developers via the planning process. Further monitoring sites have also been identified by Allerdale specifically in relation to potential Road Improvement and increased Road Traffic / Rail Traffic associated with the transport links running through Allerdale.

**Local Engagement and How to get Involved**

The Cumbria Joint Strategic Needs Assessment (JSNA) for Environment and Sustainability is ongoing and is to be published this year ; this will include air quality in Cumbria. The JSNA is used by many agencies to help inform decision making around health and public health.

There are a number of ways in which the public can get involved with maintaining / improving air quality such as considering alternative travel arrangements e.g. using public transport, car share schemes, using cycle networks, use of electric vehicles/cycles, walk/cycle to school/work groups.
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1 Local Air Quality Management

This report provides an overview of air quality in Allerdale Borough 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 Allerdale Borough Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.
2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

Allerdale Borough Council has not identified from monitoring throughout 2016 or previous years any exceedance of an air quality objective and therefore no AQMAs have been declared. For reference, a map of Allerdale Borough Councils monitoring locations is available in Appendix C.
2.2 Progress and Impact of Measures to address Air Quality in Allerdale

Defra’s appraisal of the 2016 ASR and Allerdale responsive actions

1. The council maintains an air quality monitoring network and should continue to ensure that they identify any new locations where air pollution may exceed the air quality objectives.

The Air Quality Monitoring network has been extended within Allerdale growing from six to ten sites with a number of location changes in areas to demonstrate worst case.

2. The USA 2015 identified a need for the council to produce a Detailed Assessment in respect of sulphur dioxide emissions from domestic solid fuel burning but there is no indication of the proposed methodology or time frame for this task. The authority is recommended to provide an update in respect of this matter in the next annual report.

Allerdale Borough Council has explored methodologies in relation to a detailed assessment. The Technical Guidance states that significant is defined as any area of about 500x500m with more than 50 houses burning coal/smokeless fuel as their primary source of heating.

Figures obtained by Allerdale’s most recent Housing Stock Condition survey has identified that the majority of Private stock households use grid gas however the dominant fuel used by dwellings off grid gas should be assumed to be oil closely followed by electricity.

See below table extract

Figure 2.1 Private Housing Fuel Source Allerdale

<table>
<thead>
<tr>
<th>Main Fuel</th>
<th>CO₂ (tonnes)</th>
<th>Dwellings</th>
<th>Average CO₂ per dwelling (kg per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains Gas</td>
<td>125,500</td>
<td>29,510</td>
<td>4,300</td>
</tr>
<tr>
<td>Oil</td>
<td>41,200</td>
<td>4,730</td>
<td>8,700</td>
</tr>
<tr>
<td>Solid Fuel (coal etc.)</td>
<td>10,900</td>
<td>1,310</td>
<td>8,300</td>
</tr>
<tr>
<td>Electricity</td>
<td>25,600</td>
<td>2,820</td>
<td>9,100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>203,200</strong></td>
<td><strong>38,370</strong></td>
<td><strong>5,300</strong></td>
</tr>
</tbody>
</table>
Going off the samples survey figures just 3.4% of properties within the Allerdale borough use solid fuel as a primary heat source (coal, smokeless or wood).

Figure 2.2 Fuel Use in Allerdale

If removing all mains gas properties (being 77% of the boroughs dwellings) from the figures. The above chart represents what could be assumed as the proportion split
for villages off mains gas. The actual solid fuel use (coal, smokeless and wood) equates to less than 17%. It should also be expected that a high proportion of the properties using solid fuel may be burning Wood rather than Coal or Smokeless Fuel. Allerdale expects this reduces the number of properties burning coal or smokeless fuel to be lower than 17%.

Villages outlined in the 2015 USA for further investigation were Anthorn and Ireby. Anthorn is a village containing less than a 100 dwellings and Ireby a village close to 200 dwellings. Given the Housing Stock Condition Survey findings it is not likely that there will be 50 houses burning coal / smokeless fuel as their primary source of heating within the given 500m x 500m area are as outlined in TG16.

Given the above findings it is felt unlikely that the TG16 criteria for detailed assessment will be met. Allerdale will however be carrying out further investigation similar to TG16 methodology to gather data from Registered Social Providers and Housing Associations within non mains gas areas to more accurately identify the number of coal burning properties within the suspect villages.

3. It is noted that the planned revisions to the monitoring network were implemented in 2016 and that data capture rates were improved from the previous year. This action is supported.

Due to the December 2015 severe flooding having disastrous effects on much of Allerdale, diffusion tube monitoring was suspended for the January period for all sites except DT7 Wigton.

However over the 11 months monitoring period for the other sites data capture rates have improved yet again from 2015, with 100% valid data collection being gained from 7 of the 10 sites. All sites were above the 75% annual data collection for 2016. No annualisation of data sets has been required.

4. The existing air quality measures adopted by the council and the local priorities and challenges identified within the Executive Summary are welcomed. The council are recommended to pursue the objectives identified and to continue to work collaboratively with the Highway Authority, Public Health and other key stakeholders.

For full update please refer to table 2.1
Highways
Traffic data and improvements from 2016 has been obtained from Cumbria County Council and the Highways Authority. There has been no improvement deemed as significant to warrant further assessment. On analysing data in relation to traffic movement further areas for NO₂ monitoring is being considered for 2018.

Allerdale Borough Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality.

- The new transport hub, which was funded by Cumbria Local Enterprise Partnership, aims to encourage people to travel by train along the Cumbrian Coast, reduce traffic congestion and improve access to Workington rail station was completed in May 2017.

The hub was developed on the site of the former railway goods yard. Works on the project started with the demolition of disused buildings, a redundant rail platform and other minor structures, and earthworks to treat and remove contaminated material. Construction work then started on creating:

- A new 143-space car park
- New access road to A597
- Realignment of roads and footways
- New paving and road surface treatments
- Installation of street lighting, street furniture and bus shelter
- Provision of drop-off area, disabled parking and bike parking facilities
- Review and resite of NO₂ monitoring locations with an addition of four extra sites.

Allerdale expects the following measures to be completed over the course of the next reporting year:

- Maryport Transport Hub - Rail based park and ride, Construction of 78 space car park and 4 spaces for motorbikes.
• Review of traffic restrictions in Workington, Maryport and Keswick as part of the Cumbria Transport Plan Strategy 2011-2026

• Review Air Sampling Points for 2018- Allerdale NO₂ monitoring to be re-sited on assessment of results.

Allerdale priorities for the coming year are.

• Working with developers on National Significant Infrastructure projects ongoing within and around the borough.

• Allerdale BC Environmental Health to work with the Planning Authorities with regard to new developments considering air quality implications including major developments

• Further investigation to identify areas with domestic coal / smokeless fuel in relation to SO₂

• Allerdale BC Environmental Health will continue with its statutory duty in connection with Part A2 and B processes.

• Review grey fleet cars to carry out Allerdale Borough Council services.

• Review of green fleet vans to carry out Council Services

• Promote and encourage home working policy

The principal challenges and barriers to implementation that Allerdale anticipates facing are

• Making best use of the resources available including officer time and funding.

• Allerdale is a two tier Borough Council with Cumbria County Council, we will continue to work together to improve Air Quality.

Progress on the following measures has been slower than expected due to securing funding.

• Complete cycleway Allonby to Silloth – require match funding from DCLG.

Details of all measures completed, in progress or planned are set out in Table 2.1.
## Table 2.1 – Progress on Measures to Improve Air Quality

<table>
<thead>
<tr>
<th>Measure No.</th>
<th>Measure</th>
<th>EU Category</th>
<th>EU Classification</th>
<th>Organisations involved and Funding Source</th>
<th>Planning Phase</th>
<th>Implementation Phase</th>
<th>Key Performance Indicator</th>
<th>Reduction in Pollutant / Emission from Measure</th>
<th>Progress to Date</th>
<th>Estimated / Actual Completion Date</th>
<th>Comments / Barriers to implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Workington Transport Hub</td>
<td>Alternatives to private vehicle use</td>
<td>Rail based Park &amp; Ride</td>
<td>Cumbria County Council</td>
<td>2015</td>
<td>April 2016</td>
<td>Construction of 143 space car park</td>
<td>N/A</td>
<td>Completed</td>
<td>2016</td>
<td></td>
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<tr>
<td>2</td>
<td>Maryport Transport Hub</td>
<td>Alternatives to private vehicle use</td>
<td>Rail based Park &amp; Ride</td>
<td>Cumbria County Council</td>
<td>2015</td>
<td>2016</td>
<td>Construction of 78 space car park and 4 spaces for motorcycles</td>
<td>N/A</td>
<td>Implementation on-going</td>
<td>unknown</td>
<td></td>
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<td>3</td>
<td>Review Air Sampling Points for NO2</td>
<td>Policy Guidance And Development</td>
<td>Air Quality Planning and Policy Guidance</td>
<td>Allerdale Borough Council</td>
<td>2015</td>
<td>2016</td>
<td>Evidence based variation in sampling points</td>
<td>N/A</td>
<td>Completed for 2017 ongoing for 2018</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>National Significant Infra Structure Projects</td>
<td>Policy Guidance And Development</td>
<td>Air Quality Planning and Policy Guidance</td>
<td>County Council/ United Utilities/ NuGen/ National Grid</td>
<td>2015</td>
<td>Ongoing</td>
<td></td>
<td>N/A</td>
<td>Ongoing</td>
<td>Unknown</td>
<td>Funding issues for NuGen</td>
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<td>4</td>
<td>Review of traffic restrictions in Workington, Maryport and Keswick as part of the Cumbria Transport Plan Strategy 2011-2026</td>
<td>Traffic management</td>
<td></td>
<td>Cumbria County Council</td>
<td>2017</td>
<td>2017</td>
<td></td>
<td>N/A</td>
<td>Not yet implemented</td>
<td>2017</td>
<td></td>
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**Note:** For Measure 5, the key performance indicator refers to evidence based variation in sampling points. For Measure 4, the implementation phase is ongoing as of the reporting date.
<p>|   | Assessment for S02 in areas with domestic solid fuel | Policy Guidance And Development | Air Quality Planning and Policy Guidance | Allerdale Borough Council | 2017 | 2018 | Demonstrate compliance with Air Quality objective | N/A | Review of housing stock highlighted much fewer coal properties than expected. Survey work will be undertaken before a decision on detailed screening | 2018 | Resources |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Allerdale BC Environmental Health to work with the Planning Authorities with regard to new developments considering air quality implications | Policy Guidance And Development Control | Air Quality Planning and Policy Guidance | Allerdale Borough Council | Ongoing | Ongoing | Planning consultations made in accordance with consultation period | N/A | Environmental Health are consulted at pre-planning stage on all proposed developments which may impact on air quality | ongoing |
| 6 | Allerdale BC Environmental Health will continue with its statutory duty in connection with Part A2 and B processes. Environment Agency are responsible Part A1 | Environmental Permits | Other measure through permit systems and economic instruments | Allerdale Borough Council | Ongoing | Ongoing | Risk based inspections in accordance with Statutory Guidance | N/A | Allerdale Borough Council regulates permits for 27 part B &amp; 3 A2 processes. No enforcement action has required been during 2016 and no unexpected Air pollution incidents have been recorded. | ongoing |
| 7 | Complete cycleway Allonby to Silloth | Promoting Travel Alternatives | Promotion of cycling | Solway &amp; Silloth Coastal Community Team | 2015 | Ongoing | Promote easy walking and cycling | N/A | Working with DCLG on funding options | ongoing |
| 8 | Review grey fleet cars to carry out Council services | Alternatives to private vehicle use | Car Clubs | Allerdale Borough Council | Ongoing | To be agreed | Decrease the amount of travel undertaken in carrying out Council functions | N/A | Implementation ongoing | ongoing |</p>
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<tbody>
<tr>
<td>10</td>
<td>Review of green fleet vans to carry out Council Services</td>
<td>Promoting Low Emission Transport</td>
<td>Company Vehicle Procurement - Prioritising uptake of low emission vehicles</td>
<td>Allerdale Borough Council</td>
<td>Ongoing</td>
<td>To be agreed</td>
</tr>
<tr>
<td>11</td>
<td>Promote and encourage the Home Working Policy</td>
<td>Promoting Travel Alternatives</td>
<td>Encourage/Facilitate home-working</td>
<td>Allerdale Borough Council</td>
<td>Ongoing</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
2.3 PM$_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM$_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM$_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Wider Determinants of Health document 2017 published by Public Health England have stated in their statistics the annual concentration of human-made fine particulate (PM2.5) matter at an area level, adjusted to account for population exposure is the lowest in the country for the Allerdale Area.

“In 2015 the England average value was 8.3 µg/m3, and ranged from a low of 5.2 µg/m3 in Allerdale, up to 12.5 µg/m3 in the City of London”

Allerdale Borough Council is taking the following measures to address PM$_{2.5}$ in its locality.

- Allerdale Borough Council will continue with its duties to regulate and control in regards to emissions from all Part A2 and B Processes located within the local Authority area.
- Allerdale Borough Council will continue to work with NuGen, United Utilities and National Grid in regards to the planning and also implementation phase of the proposed and ongoing major developments.
- Allerdale Borough Council will continue to monitor Poultry Farms within the Borough via Environment Agency permitted links and the planning process. A review in the 2015 Updating and Screening Assessment demonstrated that there were no poultry farms meeting the specified criteria for detailed Assessment in Relation to PM$_{10}$. (Similar source to PM$_{2.5}$)
- Allerdale Borough Council continues to regulate and enforce Smoke Control Areas under the Clean Air Act see Annex E for defined mapped areas.
- Allerdale Borough Council will continue to regulate and monitor combustion plant emission sources such CHP plant, Biomass Boilers and Diesel STOR generator plants via the planning process.
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

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

Allerdale Borough Council undertook non-automatic (passive) monitoring of NO2 at ten sites during 2016. All monitoring locations use duplicate tubes to allowing precision of the tubes to be calculated from the duplicate exposure.

Allerdale removed Benzene monitoring from its Air Quality monitoring program in 2015. This was is in line with DEFRA guidance produced for local Authorities. Allerdale Borough Council demonstrated no exceedances from monitoring undertaken in years previous including 2015.

The 2016 annual monitoring results are well within the annual objectives for Nitrogen Dioxide (NO2). To date, there is no evidence that supports declaration of an air quality management area.

The 2015 Updating and Screening Assessment carried out a review of existing sampling locations. This was carried out in order to ensure that monitoring is carried out in areas where concentrations are expected to be highest and where the public (receptors) may be exposed over the averaging period of the objectives.

Sampling points had previously remained relatively unchanged for a period of 5 years despite no objectives ever being exceeded. Some sampling points had poor data capture due to interference with sampling apparatus. This led to a change in location and addition of four extra sampling points for 2016.

In line with the actions identified in the 2015 Updating and Screening Assessment and 2016 ASR the monitoring location sites for 2016 were sited as follows.

DT1 Aspatria Sure Start Centre (Nursery School) (previously referred to in reports as S11/12. The diffusion tube monitoring site was relocated away from the facade of the building (receptor) to a Kerbside location 3 metres away. This move was unfortunately due to difficulties accessing the tubes in their previous location which was via a sash window.
**DT2 Cockermouth Main Street** This is a new location based on worst case scenario, located in the centre of Cockermouth as a Kerbside receptor next to the B5292 which is known to experience congestion and queueing of traffic at peak times as an access route for the town centre and Secondary School.

**DT3 Flimby School** This is a new Kerbside location on the A596 in very close proximity to Flimby Primary School 12m from nearest facade. Information received via Cumbria Highways has identified an AADT of 14042 on the A596 at Siddick which is 3 miles south of the Flimby monitoring site.

**DT4 Grasslot School Maryport** This is a new Kerbside location on the A596 in very close proximity to Grasslott Primary School (10m from façade).

**DT5 Keswick Co-Op** This is a new Roadside location on the A5271 in very close proximity to Bridgedale Guest House (permanent residential receptor also). Keswick is a very busy tourist town with larger volumes of traffic in holiday periods. Traffic has been noted to queue at the B5289 - A5272 intersection (mini roundabout) as the only exit entry to Borrowdale Valley and Derwent Water lake shore. The previous monitoring location at Keswick Town Hall was removed and swapped for the 2016 worst case site in closer proximity to relevant receptors.

**DT6 Maryport Curzon Street** This is a new Kerbside location on the A596 adjacent to a busy four way junction which demonstrates worst case. The façade of the nearest residential exposure is situated 5m back from the site. The previous Maryport Town Hall site has been removed in line with the recommendations of the 2015 USA report.

**DT7 Wigton King Street** The monitoring point on Wigton King Street had previously been damaged and removed by persons unknown on a number of occasions in recent years which has significantly affected the data capture. It has therefore been moved from the façade of the building to a nearby lamp post where security has been improved gaining 100% data capture for 2016.

**DT8 Workington Church Road** (Harrington) this is a new Kerbside location identified as a site for monitoring in the 2015 USA. Main Road, Harrington A597 has residential properties on both sides of the street and within 2m of the kerb. This section of road includes a pedestrian crossing causing vehicles to stop/start. We feel
this area may represent worst case, and may not have been considered during previous rounds of Review and Assessment.

**DT9 Workington Harrington Road** This is a new worst case Roadside site. It is positioned on traffic signage situated on the B5296 traffic light controlled Cross roads with Annie Pit Lane and Honister Drive. Although no data or traffic counts have been received for this location. It is known for stop start traffic due to the traffic light control. There are many residential receptors in close proximity to the Junction.

**DT10 Workington Vulcans Lane** This is a new site in close proximity to the previous S3/4 monitoring site. It has moved to a road side location on Vulcans Lane in closer proximity to residential receptors.

**Monitoring for 2017 and the future.**

The Moorside NuGen Nuclear Power Station may have a potential impact on pollution levels within the borough. Increase load on the transport networks within the borough has been identified and Improvement schemes to the road network has been put forward by the potential developers NuGen.

NuGen with consultation from Allerdale have carried out back ground monitoring of Nitrogen Dioxide at expected Road Improvement sites in Workington at kerb side locations on the A66 at Ramsay Brow and also Hall Brow. The Ramsay Brow Site initially indicated higher levels of NO₂ than expected. Due to these higher levels being recorded by NuGen it was felt that Allerdale should also carry out monitoring in this area independent of the Moorside Project. Diffusion Tubes are to be situated at the worst case closest receptor on Ramsay Brow being a residential property for 2017.

Further road links with increased usage predicted with the Moorside development include Lilyhall Industrial Estate. A monitoring site has been positioned at the nearest receptor to the carriage way being a residential property on Winscales Avenue.

The West Coast Main line is planned to be used via NuGen both in the construction phase for movement of aggregate and also operational phase as a staff transport link. Monitoring has been undertaken via Nugen to gather back ground data in the Harrington Area of Workington. Allerdale are exploring re-siting the current Wigton Tube **DT7** to a receptor who may be affected from any potential increased rail traffic. The close proximity in this area of the busy A596 link to Carlisle is also likely to be a contributor.
3.1.1 Automatic Monitoring Sites

Allerdale Borough Council has not undertaken automatic (continuous) monitoring during 2016. No automatic monitoring is planned at present for 2017.

3.1.2 Non-Automatic Monitoring Sites

Allerdale Borough Council undertook non-automatic (passive) monitoring of NO2 at 10 sites during 2016.

Table 2.1 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D.

Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

3.2.1 Nitrogen Dioxide (NO2)

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

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

It can be seen from Table A.2 that there is no exceedance of the lower annual 40µg/m3 objective at any of the ten monitoring sites. As sites are situated for worst case scenario in close proximity to the pollutant source (road traffic), it is assumed that pollutant concentrations at the closest receptor would be lower.

There are no annual means greater than 60µg/m3, demonstrating in line with TG16 that exceedance of the 1-hour mean 200 µg/m3 objective is very unlikely likely at any of the monitoring sites.

Trends

Previous years of monitoring 2012-2015 USA and 2016 ASR

All Bias Adjusted annualised results were well below the 40µg/m3 annual mean Nitrogen Dioxide (NO2) objective. Generally, across locations a decrease in NO2 concentrations had been found in 2015, apart from a small increase in Keswick and Cockermouth. However, the 2015 annual results for Keswick and Cockermouth were
lower than previous years 2012 and 2013. The NO₂ concentration between the monitored years 2012 - 2014 displays a slight decrease across all six monitoring sites.

It was concluded that the analysed monitoring results over the past four years show no sign of the 40μg/m3 annual mean Nitrogen Dioxide (NO2) objective being exceeded.

**Current Trend 2016**

Due to the low concentrations found at the previous sites and other factors identified in the 2015 USA multiple location changes were made to monitoring.

Due to the multiple changes of monitoring sites carried out in 2016 it is difficult to give a definitive trend as to whether Nitrogen Dioxide levels in the Allerdale Borough have improved or deteriorated. However it is clear that levels are still relatively low and well within objectives.

The two sites most representative to previous sites are DT7 Wigton and also DT1 Aspatria. Both Monitoring sites have been moved a few metres closer to the pollutant source (Highway) to demonstrate worst case scenario. Please see trends from 2012 – 2016 for these two sites in Figure A1.1

It can be seen that there has been a reduction each year for DT7 Wigton. The 2016 monitoring shows a slight increase for DT1 Aspatria on last year, however the annual concentration is still lower than all other previous years of monitoring to 2012.

The results plotted in Figure A1.2 demonstrate that the levels of Nitrogen Dioxide within the Borough are low given their worst case positioning and concentrations well below the 40μg/m³ NO₂ Annual Mean Objective.

Figure A1.3 Show’s the plotted monthly results for all diffusion tube sites throughout 2016. The results for each site demonstrate good correlation displaying uniform peaks/drops corresponding to the seasons and meteorological conditions as expected. With higher concentrations noted in the colder winter months and lower concentrations in the summer months.

There has been no exceedance of the Air Quality Objectives despite the monitoring sites being situated at worst case exposure. On discussion with LAQM helpdesk it was advised that there is no need to demonstrate modelling of pollutant dispersal.
and distance correction to the nearest receptor. This is due to the results being well below the national objectives.
## Appendix A: Monitoring Results

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

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Name</th>
<th>Site Type</th>
<th>X OS Grid Ref</th>
<th>Y OS Grid Ref</th>
<th>Pollutants Monitored</th>
<th>In AQMA?</th>
<th>Distance to Relevant Exposure (m) (1)</th>
<th>Distance to kerb of nearest road (m) (2)</th>
<th>Tube collocated with a Continuous Analyser?</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT1</td>
<td>Aspatria</td>
<td>Kerbside</td>
<td>314377</td>
<td>541789</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>2</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT2</td>
<td>Cockermouth Main Street</td>
<td>Kerbside</td>
<td>311874</td>
<td>530674</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>24</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT3</td>
<td>Flimby School</td>
<td>Kerbside</td>
<td>302284</td>
<td>534144</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>12</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT4</td>
<td>Grasslott School Maryport</td>
<td>Kerbside</td>
<td>303418</td>
<td>535825</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>10</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT5</td>
<td>Keswick CO-OP</td>
<td>Roadside</td>
<td>326419</td>
<td>523602</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>4</td>
<td>1.5</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT6</td>
<td>Maryport Curzon Street</td>
<td>Kerbside</td>
<td>303778</td>
<td>536534</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>5</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT7</td>
<td>Wigton King Street</td>
<td>Kerbside</td>
<td>325508</td>
<td>548419</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>2</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT8</td>
<td>Workington Church Road</td>
<td>Kerbside</td>
<td>299256</td>
<td>525634</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>3</td>
<td>1</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT9</td>
<td>Workington Harrington Road</td>
<td>Roadside</td>
<td>299633</td>
<td>527882</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>16</td>
<td>2</td>
<td>NO</td>
<td>2.5</td>
</tr>
<tr>
<td>DT10</td>
<td>Workington Vulcans Lane</td>
<td>Roadside</td>
<td>300115</td>
<td>528660</td>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NO</td>
<td>6</td>
<td>2.5</td>
<td>NO</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**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\textsubscript{2} Monitoring Results

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Type</th>
<th>Monitoring Type</th>
<th>Valid Data Capture for Monitoring Period (%)(^{(1)})</th>
<th>Valid Data Capture 2016 (%)(^{(2)})</th>
<th>NO\textsubscript{2} Annual Mean Concentration (µg/m\textsuperscript{3})(^{(3)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT1</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td>20.5</td>
</tr>
<tr>
<td>DT2</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>DT3</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>DT4</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>DT5</td>
<td>Roadside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>DT6</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>DT7</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>100</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>DT8</td>
<td>Kerbside</td>
<td>Diffusion Tube</td>
<td>91</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>DT9</td>
<td>Roadside</td>
<td>Diffusion Tube</td>
<td>91</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>DT10</td>
<td>Roadside</td>
<td>Diffusion Tube</td>
<td>82</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

- **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:**
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.1.1 – Trends in Annual Mean NO$_2$ Concentrations ($\mu$g/m$^3$) Aspatria and Wigton (2012 – 2016)
Figure A.1.2 – Bias adjusted Annual Mean NO2 Concentrations (µg/m³) all sites 2016

(Annual Mean Objective limit is 40 µg/m³)
Figure A.1.3 – Unadjusted Monthly Data NO$_2$ Diffusion Tube Concentrations ($\mu$g/m$^3$) All Sites 2016
Figure A.2.4 – Previous trends in Annual Mean NO₂ Concentrations (µg/m³) (2012 – 2015)
## Appendix B: Full Monthly Diffusion Tube Results for 2016

### Table B.1 – NO$_2$ Monthly Diffusion Tube Results - 2016

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT1</td>
<td>33.4</td>
<td>30.0</td>
<td>23.2</td>
<td>21.0</td>
<td>19.2</td>
<td>20.1</td>
<td>20.0</td>
<td>23.5</td>
<td>24.6</td>
<td>34.2</td>
<td>29.4</td>
<td>25.3</td>
<td>19.502</td>
</tr>
<tr>
<td>DT2</td>
<td>34.2</td>
<td>27.9</td>
<td>25.1</td>
<td>23.4</td>
<td>19.9</td>
<td>23.4</td>
<td>22.6</td>
<td>26.6</td>
<td>28.6</td>
<td>37.6</td>
<td>33.7</td>
<td>27.5</td>
<td>21.2</td>
</tr>
<tr>
<td>DT3</td>
<td>24</td>
<td>22.9</td>
<td>21.6</td>
<td>17</td>
<td>19.1</td>
<td>16.4</td>
<td>16.9</td>
<td>18.7</td>
<td>21.4</td>
<td>25.1</td>
<td>28.2</td>
<td>21.0</td>
<td>16.2</td>
</tr>
<tr>
<td>DT4</td>
<td>30</td>
<td>26.6</td>
<td>24.4</td>
<td>19</td>
<td>21.8</td>
<td>16.1</td>
<td>17.3</td>
<td>21.2</td>
<td>30.1</td>
<td>34.4</td>
<td>31.2</td>
<td>24.7</td>
<td>19.0</td>
</tr>
<tr>
<td>DT5</td>
<td>44.7</td>
<td>39.8</td>
<td>41.4</td>
<td>36</td>
<td>30.8</td>
<td>31.8</td>
<td>37.8</td>
<td>36.6</td>
<td>32.3</td>
<td>44.9</td>
<td>38.6</td>
<td>37.7</td>
<td>29.0</td>
</tr>
<tr>
<td>DT6</td>
<td>36.7</td>
<td>37.8</td>
<td>36.2</td>
<td>29.7</td>
<td>27.4</td>
<td>31</td>
<td>30.8</td>
<td>31.2</td>
<td>32.9</td>
<td>44.9</td>
<td>38.8</td>
<td>34.3</td>
<td>26.4</td>
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<tr>
<td>DT7</td>
<td>38.7</td>
<td>38</td>
<td>35.4</td>
<td>31.4</td>
<td>32.2</td>
<td>30.9</td>
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<td>45.4</td>
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<td>32.8</td>
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<td>DT8</td>
<td>27.9</td>
<td>29.6</td>
<td>18.4</td>
<td>21.9</td>
<td>13.7</td>
<td>17</td>
<td>19</td>
<td>30.9</td>
<td>36.2</td>
<td>30.3</td>
<td>24.5</td>
<td>18.9</td>
<td></td>
</tr>
<tr>
<td>DT9</td>
<td>30.9</td>
<td>27.5</td>
<td>25.1</td>
<td>22.5</td>
<td>19.9</td>
<td>19.1</td>
<td>18.8</td>
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<td>29</td>
<td>32.7</td>
<td>24.8</td>
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<td>DT10</td>
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<td>24.1</td>
<td>20.5</td>
<td>16.4</td>
<td>8.7</td>
<td>10.7</td>
<td>26.6</td>
<td>31.9</td>
<td>24.9</td>
<td>20.8</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Notes:**
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

Diffusion Tube Bias Adjustment Factors
Diffusion tubes may systematically under or over-read nitrogen dioxide concentrations when compared to a chemiluminescence analyser. This is known as ‘bias’ and can be corrected for to improve the accuracy of the diffusion tube results, using a suitable bias-adjustment factor. This factor can be determined from a local study that has co-located diffusion tubes with a chemiluminescence analyser. The Defra Local Air Quality Management Helpdesk has collated a database of bias adjustment factors determined from Local Authority co-location studies throughout the UK. Using orthogonal recession, combined bias adjustment factors have been calculated for each laboratory, year and preparation method combination for which data is available. Table C.1 shows the bias adjustment factors used in the assessment, taken from the March (Version 3/17) of the Diffusion Tube Bias Adjustment Spreadsheet.

Table C.1 Bias Adjustment Factors

<table>
<thead>
<tr>
<th>Year</th>
<th>Bias Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Discussion of Choice of Factor to Use
As there is no co-location study the national nitrogen dioxide bias adjustment factor was used, as described above.

QA/QC of Diffusion Tube Monitoring

The laboratory supplying and analysing the diffusion tubes is Environmental Scientifcals Group (ESG). ESG currently holds the highest rank of a “Satisfactory” laboratory.

The nitrogen dioxide tubes are prepared by spiking acetone: triethanolamine (50:50) onto the grids prior to the tubes being assembled. They are desorbed with distilled water and the extract analysed using a segmented flow auto analyser with ultraviolet detection. The results are initially calculated assuming an ambient temperature of 11°C and are adjusted to 20°C to allow for direct comparison with the air quality objectives.
**Precision and Accuracy**
Allerdale Borough Council monitoring site use two tubes referred to as duplicates. Tube precision is separated into two categories good or poor. Tubes are considered to have good precision where the coefficient of variation (CV) is less than 20% and the average CV of all monitoring periods is less than 10%. Tubes are considered to have poor precision where the CV of four or more periods is greater than 20% and/or the average CV is greater than 10%. All of the 10 Diffusion tube study periods had a CV of below 20% (good precision).

**Diffusion Tube Exposure Method**
Diffusion tubes are installed and changed on a monthly basis in line with the DEFRA exposure calendar. Allerdale store and handle the tubes in accordance with RIAMS produced document “Nitrogen Dioxide Diffusion Tube Monitoring” and TG16 Guidance.
Appendix D: Maps of Monitoring Locations

Figure D.1. Aspatria Children’s Centre Monitoring Site (NO$_2$) DT1

Figure D.2. Cockermouth Main Street Monitoring Site (NO$_2$) DT2
Figure D.3. Flimby Primary School Flimby Monitoring Site (NO\(_2\)) DT3

Figure D.4. Grasslot Primary School, Maryport, Monitoring Site (NO\(_2\)) DT4
Figure D.5. Keswick Co-Op, Keswick, Monitoring Site (NO₂) DT5

Figure D.6. Curzon Street, Maryport, Monitoring Site (NO₂) DT6
Figure D.7. King Street, Wigton, Monitoring Site (NO$_2$) DT7

Figure D.8. Church Road, Workington, Monitoring Site (NO$_2$) DT8
Figure D.9. Harrington Road, Workington, Monitoring Site (NO₂) DT9

Figure D.10. Vulcans Lane, Workington, Monitoring Site (NO₂) DT10
Appendix E: Map of Allerdale Smoke Control Areas
Appendix F: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Air Quality Objective[^4]</th>
<th>Concentration</th>
<th>Measured as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>200 µg/m³ not to be exceeded more than 18 times a year</td>
<td>1-hour mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 µg/m³</td>
<td>Annual mean</td>
<td></td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>50 µg/m³, not to be exceeded more than 35 times a year</td>
<td>24-hour mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 µg/m³</td>
<td>Annual mean</td>
<td></td>
</tr>
<tr>
<td>Sulphur Dioxide (SO₂)</td>
<td>350 µg/m³, not to be exceeded more than 24 times a year</td>
<td>1-hour mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125 µg/m³, not to be exceeded more than 3 times a year</td>
<td>24-hour mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>266 µg/m³, not to be exceeded more than 35 times a year</td>
<td>15-minute mean</td>
<td></td>
</tr>
</tbody>
</table>

[^4]: The units are in microgrammes of pollutant per cubic metre of air (µg/m³).
## Glossary of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQAP</td>
<td>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’</td>
</tr>
<tr>
<td>AQMA</td>
<td>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</td>
</tr>
<tr>
<td>ASR</td>
<td>Air quality Annual Status Report</td>
</tr>
<tr>
<td>Defra</td>
<td>Department for Environment, Food and Rural Affairs</td>
</tr>
<tr>
<td>DMRB</td>
<td>Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>LAQM</td>
<td>Local Air Quality Management</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen Dioxide</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Nitrogen Oxides</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less</td>
</tr>
<tr>
<td>PM₂·₅</td>
<td>Airborne particulate matter with an aerodynamic diameter of 2.5µm or less</td>
</tr>
<tr>
<td>QA/QC</td>
<td>Quality Assurance and Quality Control</td>
</tr>
<tr>
<td>SO₂</td>
<td>Sulphur Dioxide</td>
</tr>
</tbody>
</table>
References

- Allerdale Borough Council Updating and Screening Assessment 2012
- Allerdale Borough Council Updating and Screening Assessment 2015
- Allerdale Borough Council Updating and Screening Assessment 2015
- Allerdale Borough Council Air Quality Annual Status Report 2016
- Allerdale Borough Council Stock Condition Survey 2016