



***North Devon Council
Annual Status Report 2018***

Bureau Veritas







June, 2018

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2018 Air Quality Annual Status Report (ASR)

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

June 2018

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Executive Summary: Air Quality in Our Area

Air Quality in North Devon

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

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

North Devon is predominantly rural in nature and is fortunate that air quality across the district is generally good. The main pollutant of local concern is nitrogen dioxide (NO₂), which within North Devon is primarily from vehicles using the road network. In addition to NO₂, particulate matter (PM₁₀ and PM_{2.5}) emissions are also produced from traffic sources.

Since 2000 there has been a council led NO₂ monitoring network running across the district using passive NO₂ diffusion tubes. In addition, there has been an Automatic Urban and Rural Network (AURN) monitor, measuring both PM₁₀ and PM_{2.5}, located within Barnstaple since 2013 .

Currently within North Devon there is one Air Quality Management Area (AQMA) situated within Braunton. The AQMA was declared in July 2011 following an exceedance of the annual mean NO₂ objective and subsequently an Air Quality Action Plan (AQAP) has been developed that describes specific measures that have been designed to reduce NO₂ concentrations within the AQMA.

In 2017 there were no exceedances of any air quality objectives at any monitoring location across North Devon. Since full monitoring of PM₁₀ and PM_{2.5} commenced at the Barnstaple AURN monitor in 2014 there have been no exceedances of the relevant air quality objectives at this location. Within the existing AQMA there have now been two consecutive years where the two NO₂ diffusion tubes have had annual

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

mean concentrations below the NO₂ annual mean objective. Site 12 has been within 10% of the annual mean objective for a number of the years, the diffusion tube is not located at relevant exposure therefore after distance correction the concentration is well below the annual objective. Upon the completion of the 2018 monitoring data the option to revoke the AQMA will be taken into account, this decision will be based upon the monitoring completed within the AQMA and also across the whole of Braunton.

Full details of the North Devon monitoring network, including monitoring concentrations for 2017 and for the past five years are included in Section 3, Appendix A and Appendix B.

Actions to Improve Air Quality

Due to being a rural district, the concentrations of air pollutants within North Devon, aside from within the Braunton AQMA have historically been low and in compliance with the air quality objectives. North Devon Council plays a major role in the protection and improvement of local air quality conditions across the district, a role that is wide ranging and includes involvement in the protection of green spaces, controlling the air quality impacts of development through the planning regime and working with partners such as Devon County Council on road projects to improve traffic flow and alleviate traffic congestion.

North Devon Council published an AQAP in 2016 and this document is the main driving force to improve local air quality within the existing Braunton AQMA and across the district. Throughout 2017, the measures outlined in the 2016 AQAP have progressed towards the goal of reducing pollutant concentrations within the district and towards the revocation of the Braunton AMQA.

The measures that are documented within the AQAP and Table 2.2 have been designed to reduce NO₂ concentrations within the Braunton AQMA. Where possible these have been developed throughout 2017, and this process will continue throughout 2018. The AQAP is designed as a live document so that the measures are able to be constantly updated, and also adapted if a certain measure cannot be completed or a new idea is developed or additional funding becomes available.

Monitoring of NO₂ is to continue within the Braunton AQMA and across the district so that concentration trends can continue to be identified and any decisions on the

possible revocation of the AQMA are based upon long term trends in NO₂ concentrations.

Conclusions and Priorities

Within 2017 there were no exceedances of any air quality objectives at any monitoring location across North Devon. There were two NO₂ sites that had annual mean concentrations within 10% of the 40µg/m³ objective value, with the majority of the diffusion tube sites reporting below 20µg/m³. In addition the 2017 PM₁₀ annual mean concentration recorded at the Barnstaple automatic monitoring station was 15.6µg/m³, far below the annual mean PM₁₀ objective of 40µg/m³.

Following completion of the 2018 ASR, it has been concluded that the current AQMA within Braunton should remain. NO₂ monitoring data for the past two years, (2016 and 2017) has shown there have been no exceedances of the NO₂ annual mean objective at the two diffusion tube locations within the AQMA. Site 12 has been within 10% of the annual mean objective for three out of the last five years (there was no data in 2014), but following distance correction to the nearest building façade for 2016 and 2017 data the concentrations are far below the annual mean objective . With the completion of 2018 monitoring, the decision of possibly revoking the AQMA can be discussed.

A number of the actions and measures that are outlined within the AQAP have been progressed during 2017, and these will continue to be progressed in 2018 with an overall aim of reducing the NO₂ concentrations within the AQMA further, and to a point where the AQMA can be revoked. The actions taken are also designed to reduce pollutant concentrations across the entire District, thus reducing any detrimental health effects of poor air quality.

Local Engagement and How to get Involved

At an individual level there are a number of ways the public are able to get involved and help improve air quality at a local level. Individual action makes an important contribution to improving air quality on a local scale and many of the actions that can be taken also have health benefits. Actions that can be taken at an individual level included the following:

Reducing Idling Engines

Running your engine unnecessarily while stationary:

- Pollutes your local environment and turning off and restarting an engine causes less pollution than keeping the engine running;
- Effects health for all – you could help to reduce heart disease, asthma and lung cancer associated with polluted air simply by turning off;
- Costs you money – it wastes fuel and money whilst increasing wear and tear on your engine and adding to repair bills. You could save £53 a year by not idling; and
- Is illegal – for unnecessarily leaving your car idling – you could be fined.

So what can you do:

- You can do your bit by switching off the engine if it looks like you could be waiting for more than a minute. Modern cars use virtually no extra fuel when they're re-started without pressing the accelerator so you won't waste lots of fuel switching the engine back on;
- Also avoid idling whilst waiting in car parks, petrol stations, layby's and set down and pick up points; and
- Be smart, stop/start.

Cutting down on these emissions can lead to better air quality and help reduce overall impacts on health. Switching the engine off while your vehicle is stationary reduces emissions and will have a positive environmental effect.

Reducing Personal Car Use

The following are suggested alternatives to private travel that would therefore contribute to improving the air quality within North Devon:

- Use of public transport – The use of the bus facilities, which in turn reduces pollutant concentration through the number of vehicles and reducing congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy;

- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and within schools; and
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

Further information on local air quality and useful links can be found on the North Devon Council website at <http://www.northdevon.gov.uk/environment/air-quality/>.

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1 Local Air Quality Management

This report provides an overview of air quality in North Devon 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 North Devon 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.

A summary of AQMAs declared by North Devon Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <https://www.northdevon.gov.uk/environment/air-quality/>.

Alternatively, see Figure D.3, which provides for a map of air quality monitoring locations within Braunton in relation to the declared 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 ⁽¹⁾	Name	Date of Publication	Link
North Devon AQMA No. 1	Declared 11 th July 2011	NO ₂ Annual Mean	Braunton	Area encompassing the B3231 in Braunton between the junction of the square in the middle of the village and the village green.	No	44.35µg/m ³	39.4µg/m ³	North Devon Council - Air Quality Action Plan	May 2016	https://www.northdevon.gov.uk/environment/air-quality/

☒ North Devon confirm the information on UK-Air regarding their AQMA is up to date

Notes:

(1) Annual mean concentration NO₂ concentration from diffusion tube Site 12 located at The Square, Braunton. This value has not been distance corrected in relation to relevant exposure.

2.2 Progress and Impact of Measures to address Air Quality in North Devon

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

"On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants, with the provisos listed in the commentary below.

The report is well structured, detailed, and provides the information specified in the Guidance.

- 1. The results of latest monitoring continue to support the conclusion that there are no exceedances of air quality objectives at the locations monitored.*
- 2. Our previous appraisal suggested that there may have been no exceedances since 2011. The Council were not in agreement with this conclusion. However our assessment was considered on the basis of exceedances at sites where there is relevant exposure. If the same distance corrections had been applied to previous results, it was assumed that similar reductions would apply to previous results.*
- 3. The District Council are monitoring with the use of passive diffusion tubes for nitrogen dioxide at 27 sites across the District, where Table A.1 suggests that all of the monitoring sites B1-B11 are within the AQMA.*
- 4. It appears that none of the monitoring points B1-B11 are located within the AQMA as shown below, suggesting all sites are outside of the current AQMA, with no monitoring taking place within the current AQMA.*
- 5. On this basis we recommend that the council should review the current monitoring strategy with respect to the boundary of the current AQMA. Routine monitoring should continue to verify the status of the AQMA from year to year.*
- 6. The status of many of the measures within the Action Plan is unclear. There are generally no implementation dates or expected dates for completion. Where measures are not currently funded or being considered for further funding, this should be made clear in the Action Plan table.*
- 7. Action Plan measures are expected to show dates for implementation and completion when measures are being progressed.*
- 8. The results continue to suggest there has not been an exceedance of the annual mean objective for nitrogen dioxide in Braunton since 2011. (This assumes*

previous results were not distance corrected). On this basis the Council should consider taking steps towards revoking this AQMA, once monitored pollution levels are consistently below 36ug/m³.”

In response to the appraisal comments received, North Devon provided the following responses to the appraisal team:

1. *No comment required.*
2. *The previous appraisal suggested there had been no exceedances since 2011.*
 - a. *This position was incorrect – as the report clearly identified exceedances at Sites 12 and 13 which are located within the AQMA.*
 - b. *It is right to say that the previously reported data were not distance corrected and confirmation has been received that Defra have accepted these reports. Advice received from the LAQM Helpdesk at the time of writing the 2017 ASR confirmed that distance based corrections should be applied from 2016 onwards – but that there was no need to distance correct retrospectively reported data. Any conclusions drawn therefore, must logically be based on data previously submitted and subsequently accepted by Defra.*
3. *On review of Table A.1 of the report, it is clear that there is a typing error, for which the Council apologises. The table has been amended to reflect the fact that 2 of the 27 monitoring locations – Sites 12 and 13 – are the only 2 which are located in the AQMA, this was amended in the revised submission.*
4. *Please refer to comments in Point 3.*
5. *In light of the comments to Point 3 above, there does not appear to be any need to review the current monitoring strategy in and around the AQMA – as I assume these comments are borne out of the confusion caused by the typing mistakes.*
6. *Clarity shall be provided in the future.*
7. *This shall be provided in the future where practicable.*
8. *Taking into consideration the comments for Point 2, again, the previous results were not distance corrected - in accordance with advice received from the LAQM Helpdesk.*

The above comments have been received by the appraisal team and the following comments have been received back:

- *With respect to point 2 it is accepted that site 12 and 13 have clearly had exceedances since 2011 and are within the AQMA.*
- *We agree that the distance corrections should only apply from 2016 onwards as previous reports have already been accepted and therefore conclusions should be drawn on the accepted and reported data.*
- *The Table A1 has been updated to reflect that Site 12 and Site 13 are located within the AQMA (not B12 and B13). It is advised that in future reports the map titled 'Diffusion Tube monitoring Locations- Braunton AQMA' sites is updated to include sites 12 and 13 as they are the only sites within the AQMA and that the AQMA boundary is included. The title of the map infers that sites B1 to B11 are within the Braunton AQMA, however now Table A1 has been updated it is clear this is not the case. It is useful to have the diffusion tube monitoring locations around the AQMA on the same map as those inside the AQMA and this is encouraged for future reports.*
- *It is agreed that at the present time there is sufficient monitoring in the AQMA and comments were borne out of the above confusion.*
- *Future clarity on implementation measures is welcomed.*
- *It is understood that you will continue to monitor and reassess the need for the AQMA based on future information.*

The confirmation on Point 2 advises that retrospective distance correction of previously submitted, and accepted data need not be completed. Therefore distance correction has been completed where prompted, and where relevant from the introduction of the Annual Status Report.

North Devon 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 2016 North Devon AQAP that is available within the air quality section of North Devon Councils website, <http://www.northdevon.gov.uk/environment/air-quality/>.

Key completed measures are:

- A live exercise to be run from Spring 2018 that provides the local population and holiday makers with alternative travel options. Upon completion of the

exercise a review will take place and it will be decided how the measure can be built upon;

- Completion of the feasibility study to amend the South Street one way system. The measure has been discontinued due to Devon County Council (DCC) advising that the air quality benefit would not be significant; and
- Completion of the feasibility study for the possible implementation of a one way system through Braunton. The measure was discontinued due to predicted high costs, land ownership constraints and planning barriers.

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

- To review the current AQMA declaration based upon the NO₂ monitoring completed within the Braunton AQMA and the surrounding area. There have been two consecutive years where there have been no exceedances of the NO₂ annual mean objective within Braunton (without distance correction);
- AQAP Measure 12: Developing a supplementary planning document relating to air quality – A draft document has been circulated for review and possible comments, this will be implemented when any revisions required have been completed; and
- AQAP Measure 14: Installation of a “Park & Change” facility at Chivenor – Development is currently under construction and should be completed within 2018.

North Devon’s priorities for the coming year are:

- To complete the live exercise associated with Measure 13 and review the findings;
- Monitor initial usage at the Park & Change facility that should be completed within 2018;
- To continue to develop all other active measures with an emphasis on continued communication with local stakeholders and interested parties;

- Continue to monitor NO₂ concentrations throughout the district in order to assess concentration trends and work towards revocation of the Braunton AQMA;
- To continue to consult with Public Health England where possible in regards to developing a Health Needs Assessment for air quality.

North Devon anticipates that the measures stated above and in Table 2.2 will achieve compliance within the Braunton AQMA.

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	Upgrading of the traffic signals at "The Square" to "MOVA" (Microprocessor Optimised Vehicle Actuation)	Traffic Management	UTC, Congestion management, traffic reduction	NDC / DCC (Potential s106 funding)	Will be confirmed once funding secured	Estimated delivery time is 2 years once funded secured	Improved traffic flows / less congestion	Not known at this stage, once funding is secured an assessment can quantify this.	Informal discussions have taken place with Branton Parish Council to seek their opinions regarding implementation on this measure. Seeking funding.	Will be confirmed once funding secured	No S106 funds have been received to date. DCC to continue to seek relevant funding opportunities from new developments on the A361 corridor.
2	Consider amending the South Street one way system in relation to optimising traffic flow	Traffic Management	UTC, Congestion management, traffic reduction	NDC /DCC	Completed	N/A	Modelling results	N/A	Cancelled	N/A	Work undertaken identified a possible 5.23% reduction in annual average daily traffic movements on Caen Street. DCC advised that the AQ benefit would be very small.
3	Consider the implementation of a comprehensive one way system around the village and / or the	Traffic Management	UTC, Congestion management, traffic reduction	DCC	Completed	N/A	Reduced traffic volume on Caen Street	N/A	Feasibility report completed	N/A	Discontinued due to high costs predicted, land ownership and planning barriers.

	pedestrian isation of Caen Street										
4	Review all pedestrian movements around the village, to identify the optimal type and location of signals / crossings to maximise traffic flow. This review should include - but not be limited to - the consideration of amending signal / crossing timings, resiting / removal of the crossing outside The George Hotel, crossing patrol associated with Caen	Traffic Management	UTC, Congestion management, traffic reduction	DCC	DCC	Initial review completed	Can be looked into once full opinions from the local community have been sought	Improved traffic routing	0 - 1µg/m3	Potential measures have been identified to support this. These need to be formally discussed with local members, the parish council and Caen Primary School.	Can be looked into once full opinions from the local community have been sought

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	Primary School										
5	Improving parking management, including the prevention of parking associated with blocking bus stops	Traffic Management	Emission based parking or permit charges	NDC / DCC	Review undertaken and public consultation completed	Can be stated once initial review has been revisited	Number of parking spaces, movement of buses	Not known at this stage	Public consultation had not supported the parking management changes proposed. Further opinions from Braunton parish council are being sought.	To be confirmed once initial review has been revisited	Local member and parish council support would be required to revisit the initial review undertaken.
6	Installation of a delivery hub	Freight and Delivery Management	Freight Consolidation Centre	DCC	Initial investigation completed	Initial proposals not accepted	Routing of delivery vehicles	Unknown at this stage, can be assessed if the no loading restrictions are developed.	An investigation has been made into a possible hub to the rear of Caen Street. This was not feasible but alternatives could still be considered to support the no loading restrictions on Caen Street.	Initial proposals not accepted	Local member and parish council opinion is being sought regarding parking management issues.
7	Redirecting traffic along A399	Traffic Management	UTC, Congestion management, traffic reduction	DCC	Signage has been installed	Completed	Routing of vehicles	No significant change in NO2 concentration at diffusion tube monitoring sites 14 and 15.	Electronic signage has been installed to redirect traffic at peak flow times.	Completed	-
8	Off peak delivery times	Freight and Delivery Management	Quiet & out of hours delivery	DCC	Viability report to AQMA Steering Group	To be assessed once consultation has taken place	Number of delivery vehicles and the times they work within	0 - 1µg/m ³	Viability report completed	To be assessed once consultation has taken place	DCC to investigate viability in consultation with stakeholders prior to any implementation.

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9	Improving Public Transport	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	DCC	Options and viability report to Steering Group	To be assessed once consultation has taken place	Options and viability report to Steering Group	0 - 1µg/m ³	Options and viability report completed	To be assessed once consultation has taken place	DCC to investigate potential options with bus service providers.
10	Fleet partnerships - working with local companies to encourage lower emissions fleet vehicles	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	NDC / DCC	Initial review undertaken	Ongoing	Introduction in lower emission vehicles in fleet	0 - 1µg/m ³	DCC are in conversation with bus providers to ensure that buses passing through Branton are to be targeted for future fleet investment. Confirmed that there is the potential for two new buses to be provided.	Ongoing	Bus company representatives to be invited to future AQAP measure update meetings.
11	Implementing school / work travel plans	Promoting Travel Alternatives	School Travel Plans	NDC	Ongoing	Ongoing	Reduction of personal travel and uptake in more sustainable travel modes	Unknown at this stage, information on specific travel plans would need to be known first.	It has been confirmed that it would not be possible for the requirement of sustainable travel plans to be included in current/future planning policy.	Ongoing	Travel plans would still be sought from any developer submitting an application that was deemed applicable. DCC is currently approaching major employers in the region to support their employer travel plan activities.
12	Developing a supplementary planning document re air quality	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	NDC	Draft documents complete	To be reviewed before implementation	Document being adopted	Unknown at this stage, would be assessed based upon each development.	Draft documents have been completed and are to be circulated for review and possible comments.	Ongoing	Once draft has been revised potential public consultation will take place.

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13	Producing travel packs for holiday accommodation	Public Information	Via leaflets	NDC	Completed	Exercise to be run in Spring 2018	Number of participating companies, numbers of different travel options used	Can be calculated once the exercise has been reviewed.	An exercise is due to run in during Spring 2018 that provides local people and holiday makers with alternative travel options.	Ongoing	Exercise will be reviewed upon completion.
14	Installation of a "Park + Change" facility at Chivenor	Alternatives to private vehicle use	Bus based Park & Ride	NDC / DCC	Completed	Permission has been granted	Uptake of facility once completed		Awaiting completion of development	Expected 2018	Development currently under construction.

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.

As detailed in Table A.1, the Automatic Urban and Rural Network (AURN) automatic monitoring station Barnstaple 1 located on Eastern Avenue within Barnstaple monitors both PM₁₀ and PM_{2.5} using a Filter Dynamics Measurement System (FDMS). The annual mean PM_{2.5} concentration recorded for 2017 was 7.8µg/m³, the lowest annual mean concentration since monitoring began at the site. Since monitoring commenced at this location, all annual mean concentrations recorded have been well below the current 2020 target annual mean objective of 25µg/m³.

It should be noted that data capture was very low for 2017 due to technical issues with the FDMS monitors during warm temperature periods (42.8%), therefore the data was annualised in line with guidance provided in LAQM.TG(16). Full details of the annualisation process are provided in Appendix C.

The current Defra 2017 background maps⁴ for North Devon Council (2015 based) show that all background concentrations of PM_{2.5} are well below the 2020 annual mean objective for PM_{2.5}. The highest concentration is predicted to be 9.8µg/m³ within the 1 x 1km grid square with the centroid grid reference of 256500, 133500 that is set within Barnstaple.

The Public Health Outcomes Framework data tool⁵ compiled by Public Health England quantifies the mortality burden of PM_{2.5} within England on a county and local authority scale. Data for 2016 for England, the South West Region and for North Devon Council are presented in Table 2.3 below.

⁴ Defra Background Mapping data for local authorities (2015-based), available online at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>

⁵ Public Health Outcomes Framework, Public Health England data tool (2016 data), available online at <http://www.phoutcomes.info/public-health-outcomes-framework>

Table 2.3 – Adult Mortality Attributable to PM_{2.5} Pollution

Area	North Devon District	South West Region	England		
			Average	Highest	Lowest
% of Adult Mortality	3.5%	4.5%	5.3%	6.9%	2.6%

It can be seen from Table 2.3 that in 2016 the percentage of adult mortality attributable to PM_{2.5} pollution within North Devon was 1% lower than the average fraction for the South West Region, and 1.8% lower than the average fraction for England. When compared to 2015 % data; the South West Region has slightly increased (+0.2%) and North Devon has slightly decreased (-0.1%) between 2015 and 2016.

Due to the health effects attributable to PM_{2.5} pollution through exposure, North Devon Council is continuing to take measures to reduce PM_{2.5} concentrations within the district, these include the following:

- Regular inspections of industrial processes permitted by North Devon Council where combustion and non-combustion processes could lead to anthropogenic emissions of PM_{2.5};
- Continuing the implementation works on the action plan measures listed within Table 2.2. Although the measures have been specifically designed to reduce NO₂ concentrations within the AQMA, a number of the initiatives are related to transport sources and therefore will typically have a positive effect on the reduction of PM_{2.5} as well; and
- To continue to consult with Public Health England in relation to the effects of PM_{2.5} upon the health of residents within North Devon.

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

3.1 Summary of Monitoring Undertaken

North Devon has operated an NO₂ diffusion tube monitoring programme since 2000. In 2017 the network consisted of 28 monitoring locations. In addition, there is an AURN automatic monitoring station located within Barnstaple.

3.1.1 Automatic Monitoring Sites

Automatic (continuous) monitoring was undertaken at one site during 2017. This is not a council operated site; it is part of the AURN and is run by the Environmental Agency. Table A.1 in Appendix A shows the details of this site.

National monitoring results are available through the Defra UK-AIR website at <https://uk-air.defra.gov.uk/networks/>.

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

3.1.2 Non-Automatic Monitoring Sites

North Devon Council undertook non- automatic (passive) monitoring of NO₂ at 28 sites during 2017. Two new monitoring sites were introduced in 2017 (Sites 17 and 18). Table A.2 in Appendix A shows the details of the sites.

Within Table A.2 there has been one change made within the details for the diffusion tubes since the 2017 ASR. The distance from monitoring site to relevant exposure has been amended from 1.8m that was stated within the 2017 ASR to 0m. The diffusion tube is located on a drainpipe at ground floor level on the façade of the London Inn public house on Caen Street within the Braunton AQMA. Relevant exposure for the annual mean objective is not at ground floor level as the property is a public house, relevant exposure (residential) is at first floor level at the London Inn and the adjacent property.

Currently there is no tool available that can predict change in NO₂ concentrations with height, the NO₂ Fall-Off with Distance Calculator is able to predict concentrations further from a road in the horizontal (a-axis) but not in the vertical (y-axis). The

location of the London Inn on Caen Street is not representative of a street canyon environment, therefore due to the additional mixing within the local atmosphere NO₂ concentrations will most likely decrease with height. Therefore amending the distance value to 0m serves as a worst case scenario as the concentration experienced at ground floor level will be higher than that at the first floor level.

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 (NO₂)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

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

Following the application of bias adjustment to the raw data, no sites exceeded the NO₂ annual mean objective in 2017. Two monitoring locations were within 10% of the annual mean objective (Site 12 and Site B5). As per LAQM.TG(16) guidance, distance correction was applied at these locations. At the two locations, the annual mean NO₂ concentrations calculated at the closest relevant receptors were predicted to be far below the annual mean objective.

There have not been any annual mean concentrations of NO₂ above the annual mean objective within the existing AQMA in North Devon since 2015, and anywhere outside of the existing AQMA for the 5-year monitoring period presented.

There were no sites where the NO₂ annual mean was greater than 60µg/m³, therefore in accordance with Defra LAQM.TG(16) there are no sites likely to be at risk of exceeding the 1-hour mean objective.

Trend graphs for all monitoring locations presenting up to 5 years of monitoring data are presented in Appendix A. The results presented have been annualised and bias adjusted where applicable, but these are not distance corrected for Site 12 and Site B5 as per Table A.3 and Table B.1

3.2.2 Particulate Matter (PM₁₀)

Table A.4 in Appendix A compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

Table A.5 in Appendix A compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 35 times per year.

There was not an exceedance of either the annual mean objective, or the 24-hour short term objective at the Barnstaple automatic monitoring station during 2017. Since monitoring commenced at this site in 2014 there have been no exceedances of either objective recorded at this location.

Data capture during 2017 was very low (40.1%) due to technical issues with the monitor during warmer periods of the year, this has meant that the monitoring data has been annualised in accordance with LAQM.TG(16). Full details on the annualisation process are presented in Appendix C.

Trend graphs for all monitoring locations presenting up to 5 years of monitoring data are presented in Appendix A. The results presented have been annualised where applicable.

3.2.3 Particulate Matter (PM_{2.5})

Table A.6 in Appendix A presents the ratified and adjusted monitored PM_{2.5} annual mean concentrations for the past 5 years.

The PM_{2.5} annual mean concentration recorded in 2017 at the Barnstaple monitoring site was 7.8µg/m³, this shows a reduction from the 2016 annual mean concentration of 10.7µg/m³ monitored in 2016. The concentration recorded in 2017 was the lowest recorded since the monitor commenced in 2013.

Data capture during 2017 was very low (43.8%) due to technical issues with the monitor during warmer periods of the year, this has meant that the monitoring data

has been annualised in accordance with LAQM.TG(16). Full details on the annualisation process are presented in Appendix C.

Trend graphs for all monitoring locations presenting up to 5 years of monitoring data are presented in Appendix A. The results presented have been annualised where applicable.

3.2.4 Sulphur Dioxide (SO₂)

North Devon Council does not carry out any routine monitoring of SO₂ within its area.

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)
Barnstaple 1	AURN – Barnstaple A39	Roadside	257048	132591	PM ₁₀ and PM _{2.5}	No	FDMS	20	3	3.3

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) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
Site 1	Pilton Causeway, Barnstaple	Kerbside	255774	133732	NO ₂	NO	7	1	NO	2.5
Site 2	Rolle Street 1, Barnstaple	Kerbside	255556	133583	NO ₂	NO	2	1.3	NO	2.5
Site 4	Lower Sticklepath Roundabout, Barnstaple	Kerbside	255651	132808	NO ₂	NO	34	2.8	NO	1.7
Site 5	Sticklepath School, Barnstaple	Kerbside	254197	132354	NO ₂	NO	2	2.2	NO	2.7
Site 6	Cedars Roundabout, Barnstaple	Roadside	253886	132394	NO ₂	NO	25	1.7	NO	2.5
Site 7	Newport Road, Barnstaple	Kerbside	256706	132253	NO ₂	NO	1.5	1.3	NO	2.7
Site 8	South Street, Newport,	Kerbside	256683	132130	NO ₂	NO	2	1.2	NO	2.5
Site 9	Castle Street, Barnstaple	Kerbside	255661	133179	NO ₂	NO	1	1.8	NO	2.4
Site 10	Alexandra Road, Barnstaple	Kerbside	256186	133164	NO ₂	NO	2.5	1.4	NO	2.7
Site 11	Belle Meadow Road, Barnstaple	Kerbside	255967	132985	NO ₂	NO	12	1.4	NO	2.5

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Site 12	The Square, Braunton	Kerbside	248789	136560	NO ₂	YES	3.3	1	NO	2.3
Site 13	The London Inn, Braunton	Kerbside	248732	136592	NO ₂	YES	0 ⁽³⁾	1.2	NO	2.4
Site 14	Church Street, Ilfracombe	Kerbside	251533	147330	NO ₂	NO	2	1.7	NO	2.5
Site 15	High Street, Ilfracombe	Kerbside	251971	147689	NO ₂	NO	1	1.6	NO	2.9
Site 16	Broad Street, South Molton	Kerbside	271423	125838	NO ₂	NO	8	2	NO	3
Site 17	Picston House, Bickington	Kerbside	253595	132433	NO ₂	NO	10	3.3	NO	2.9
Site 18	Bannages, Bickington	Kerbside	253053	132541	NO ₂	NO	7	0.6	NO	2.3
Site B1	Exeter Road 1, Braunton	Kerbside	249042	135903	NO ₂	NO	10	2.5	NO	2.7
Site B2	Exeter Road 2, Braunton	Kerbside	248969	136060	NO ₂	NO	6	2.7	NO	2.7
Site B3	Exeter Road 3, Braunton	Kerbside	248863	136403	NO ₂	NO	4	1.6	NO	2.4
Site B4	Exeter Road 4, Braunton	Kerbside	248766	136437	NO ₂	NO	6	2.5	NO	2.3
Site B5	Exeter Road 5, Braunton	Kerbside	248862	136372	NO ₂	NO	3.7	0.5	NO	2.5
Site B6	South Street 1, Braunton	Kerbside	248716	136067	NO ₂	NO	7	0	NO	3
Site B7	South Street 2, Braunton	Kerbside	248787	136498	NO ₂	NO	6	0	NO	2.7
Site B8	Chaloners Road, Braunton	Kerbside	248791	136621	NO ₂	NO	30	1.4	NO	2.4
Site B9	Caen Gardens, Braunton	Kerbside	248615	136596	NO ₂	NO	3.5	3.8	NO	2.7

Site B10	Saunton Road 1, Braunton	Kerbside	248417	136610	NO ₂	NO	3.4	1.5	NO	2.5
Site B11	Saunton Road 2, Braunton	Kerbside	248363	136630	NO ₂	NO	10	1.4	NO	3

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.

(3) Site 13 was previously listed as being 1.8m from relevant exposure. The diffusion tube is located on a drainpipe at ground floor level on the London Inn Pub, Caen Street and relevant exposure is at first floor level at The London Inn and the premises adjacent. Currently there is not a correction tool available to correct NO₂ concentrations in relation to changing height, the NO₂ Fall-Off with Distance Calculator is able to predict concentrations further from a road in the horizontal (a-axis) but not in the vertical (y-axis).

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ^{(3) (4)}				
					2013	2014	2015	2016	2017
Site 1	Kerbside	Diffusion Tube	41.7	41.7	32.1	28.4	26.0	33.2	22.7
Site 2	Kerbside	Diffusion Tube	91.7	91.7	29.2	27.7	26.6	27.2	26.2
Site 4	Kerbside	Diffusion Tube	58.3	58.3	21.8	19.9	22.4	15.2	19.9
Site 5	Urban Background	Diffusion Tube	66.7	66.7	22.2	23.3	19.9	24.4	22.8
Site 6	Kerbside	Diffusion Tube	100	100	18.8	17.3	16.1	18.9	16.4
Site 7	Kerbside	Diffusion Tube	91.7	91.7	27.8	27.6	26.6	25.9	25.3
Site 8	Kerbside	Diffusion Tube	66.7	66.7	24.7	24.3	23.6	24.9	28.0
Site 9	Kerbside	Diffusion Tube	100	100	16.1	15.8	14.0	15.2	14.0
Site 10	Kerbside	Diffusion Tube	100	100	27.7	27.3	26.5	20.6	25.6
Site 11	Kerbside	Diffusion Tube	66.7	66.7	26.6	24.1	22.1	25.8	26.1
Site 12	Kerbside	Diffusion Tube	91.7	91.7	38.9	-	41.0	39.8 (29.4) ⁽⁵⁾	39.4 (29.2)
Site 13	Kerbside	Diffusion Tube	100	100	40.7	40.5	30.2	32.5	30.0
Site 14	Kerbside	Diffusion Tube	91.7	91.7	20.2	21.9	17.2	19.7	17.1
Site 15	Kerbside	Diffusion Tube	66.7	66.7	17.6	18.4	17.1	14.9	18.0
Site 16	Kerbside	Diffusion	100	25	24.5	22.4	20.2	21.0	21.1

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ^{(3) (4)}				
					2013	2014	2015	2016	2017
		Tube							
Site 17	Kerbside	Diffusion Tube	100	50	-	-	-	-	29.5
Site 18	Kerbside	Diffusion Tube	71.4	41.6	-	-	-	-	22.7
Site B1	Kerbside	Diffusion Tube	100	100	14.0	16.6	15.5	17.4	14.4
Site B2	Kerbside	Diffusion Tube	58.3	58.3	6.6	16.7	16.6	16.2	15.4
Site B3	Kerbside	Diffusion Tube	100	100	24.2	19.7	19.5	22.7	19.9
Site B4	Kerbside	Diffusion Tube	100	100	19.3	21.4	16.1	18.1	15.1
Site B5	Kerbside	Diffusion Tube	100	100	32.7	34.1	35.4	38.7 (34.0)	36.7 (32.2)
Site B6	Kerbside	Diffusion Tube	75	75	7.4	9.8	9.4	11.6	10.4
Site B7	Kerbside	Diffusion Tube	50	50	14.2	-	13.4	16.9	14.3
Site B8	Kerbside	Diffusion Tube	50	50	22.5	22.7	21.8	21.8	18.9
Site B9	Kerbside	Diffusion Tube	100	100	17.0	14.8	16.2	15.5	14.0
Site B10	Kerbside	Diffusion Tube	100	100	19.7	24.3	22.1	27.4	22.5
Site B11	Kerbside	Diffusion Tube	91.7	91.7	20.7	20.7	18.0	23.0	18.2

☒ Diffusion tube data has been bias corrected

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

Notes:

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

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

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

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

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

(4) As per LAQM.TG(16) guidance, distance correction has been applied to all concentrations to those within 10% of the objective, the distance corrected NO₂ annual means are shown in brackets.

(5) Distance from road correction has been amended from the value presented in the 2017 ASR.

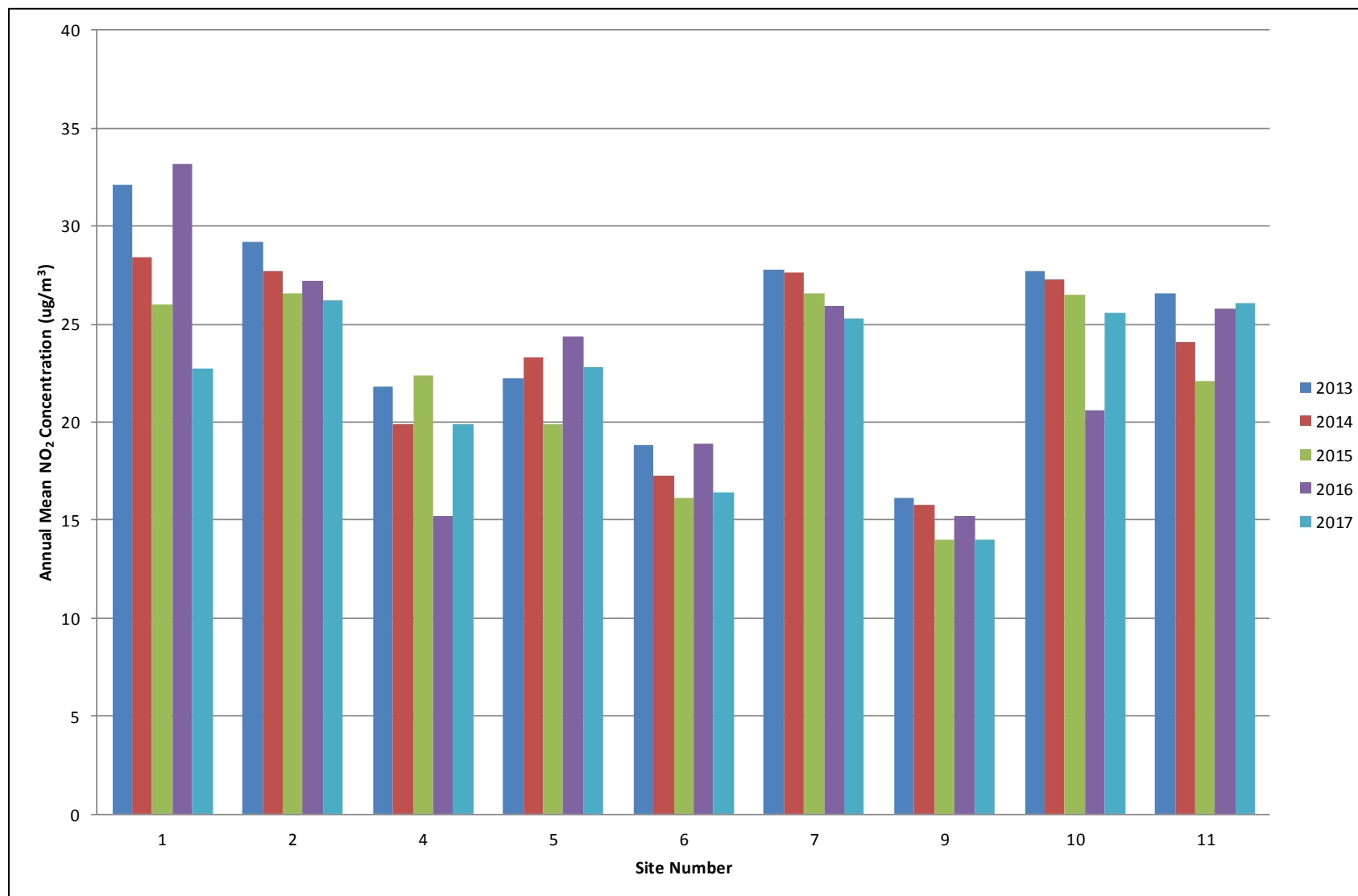
Figure A.1 – Trends in Annual Mean NO₂ Concentrations: Barnstaple

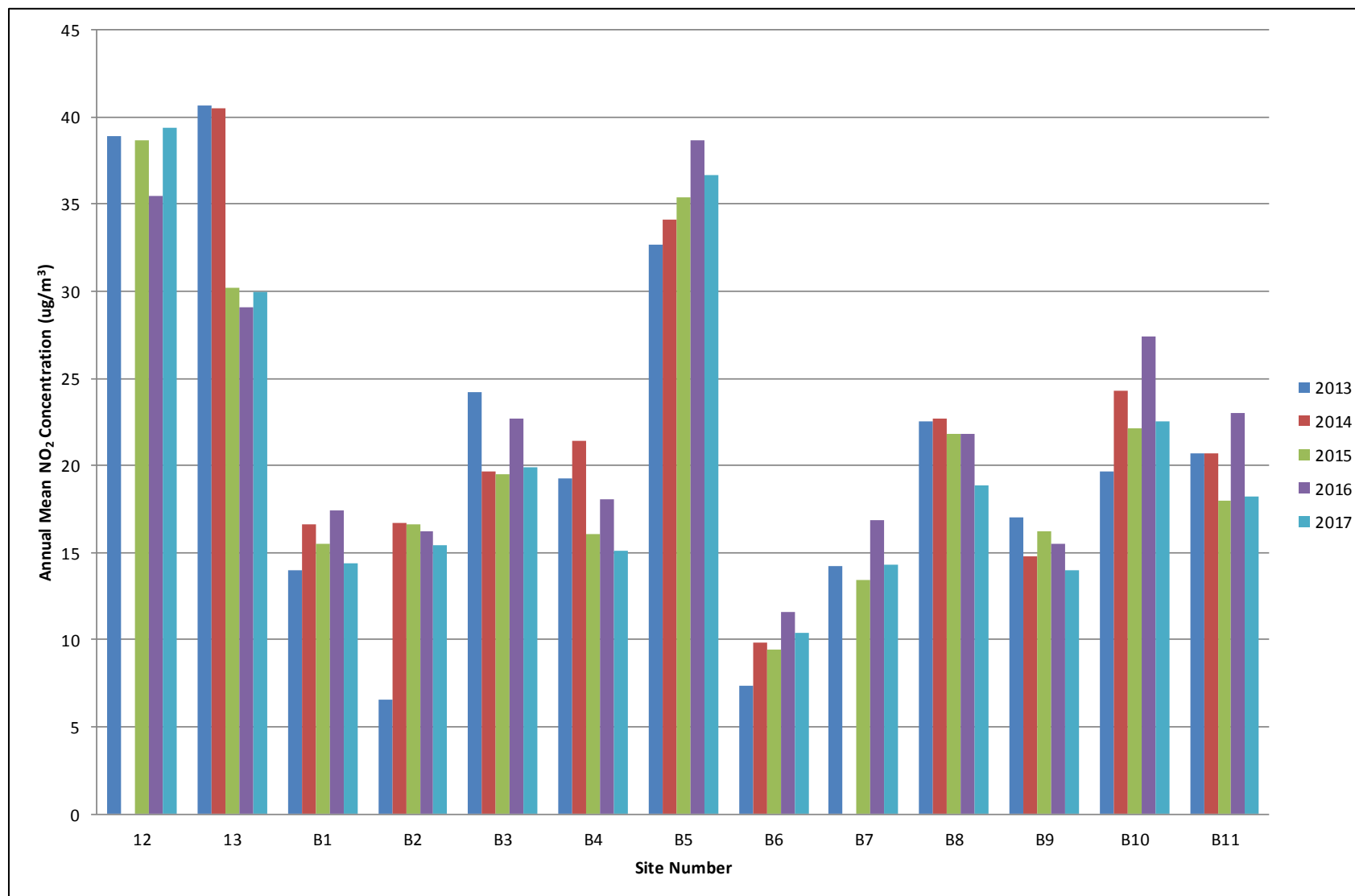
Figure A.2 – Trends in Annual Mean NO₂ Concentrations: Braunton

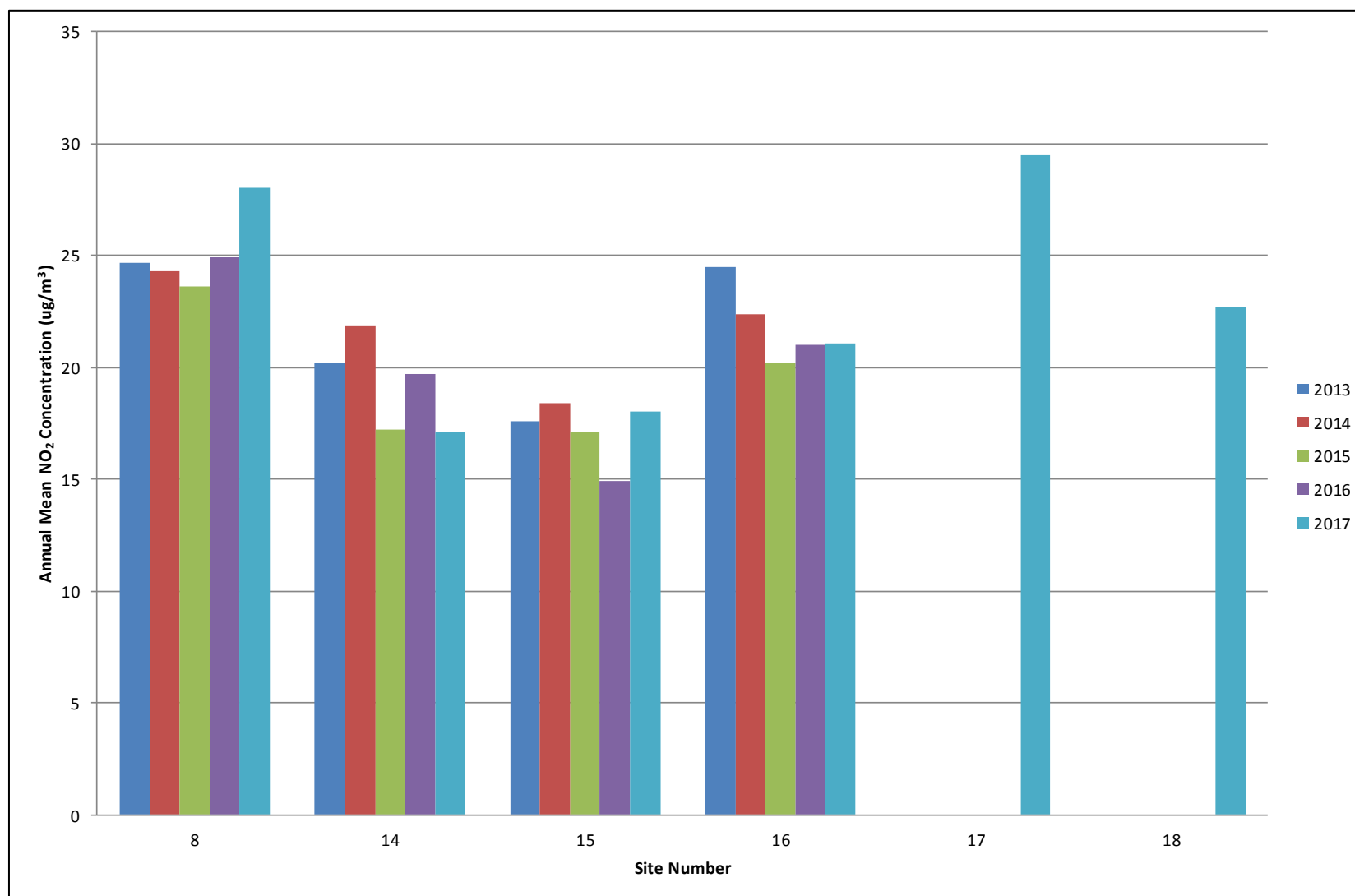
Figure A.3 – Trends in Annual Mean NO₂ Concentrations: Newport, Ifracombe, South Moulton and Bickington

Table A.4 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
Barnstaple 1	Roadside	40.1	40.1 ⁽⁴⁾	-	16.0	17.7	16.9	15.6

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

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ 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) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.
- (4) Data capture is low for 2017 due to ongoing issues experienced at the monitoring station during period of warm temperatures.

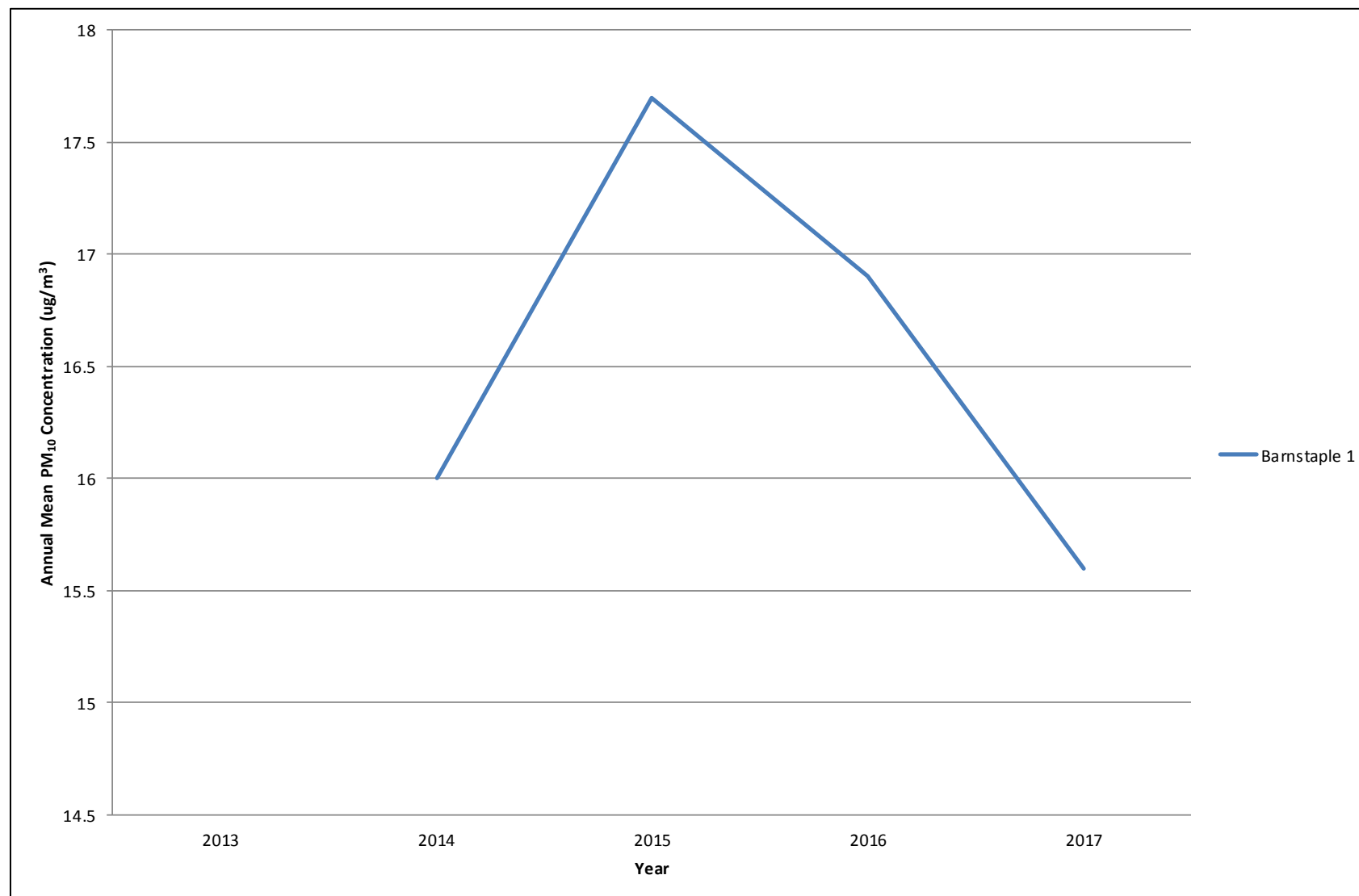
Figure A.4 – Trends in Annual Mean PM₁₀ Concentrations: Barnstaple 1

Table A.5 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
				2013	2014	2015	2016	2017
Barnstaple 1	Roadside	40.1	40.1 ⁽⁴⁾	-	2	4 (27.7)	0	0 (28.5)

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 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 90.4th percentile of 24-hour means is provided in brackets.
- (4) Data capture is low for 2017 due to ongoing issue experienced at the monitoring station during period of warm temperatures.

Figure A.5 – Trends in Number of 24-Hour Mean PM₁₀ Results >50µg/m³: Barnstaple 1

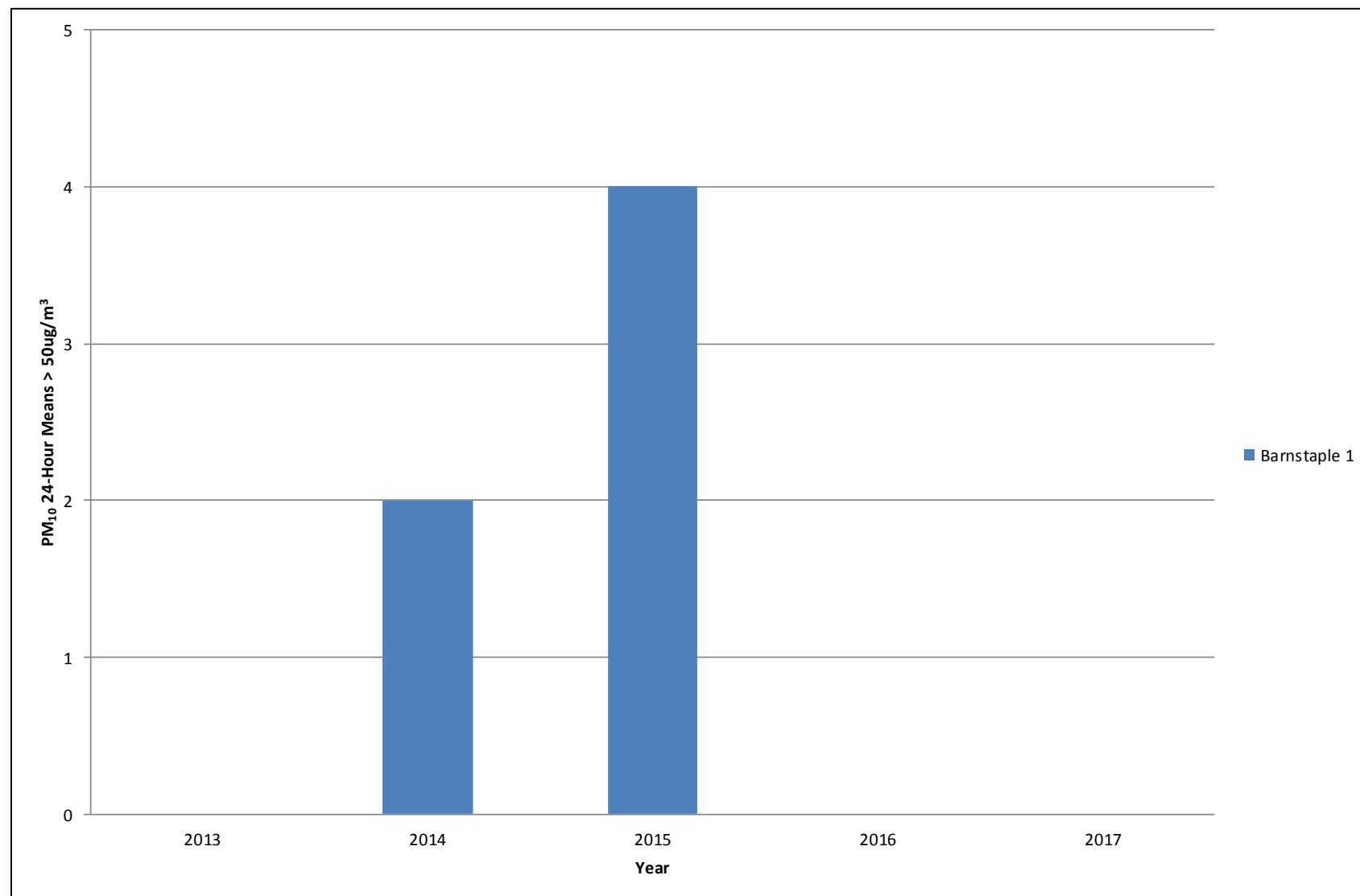


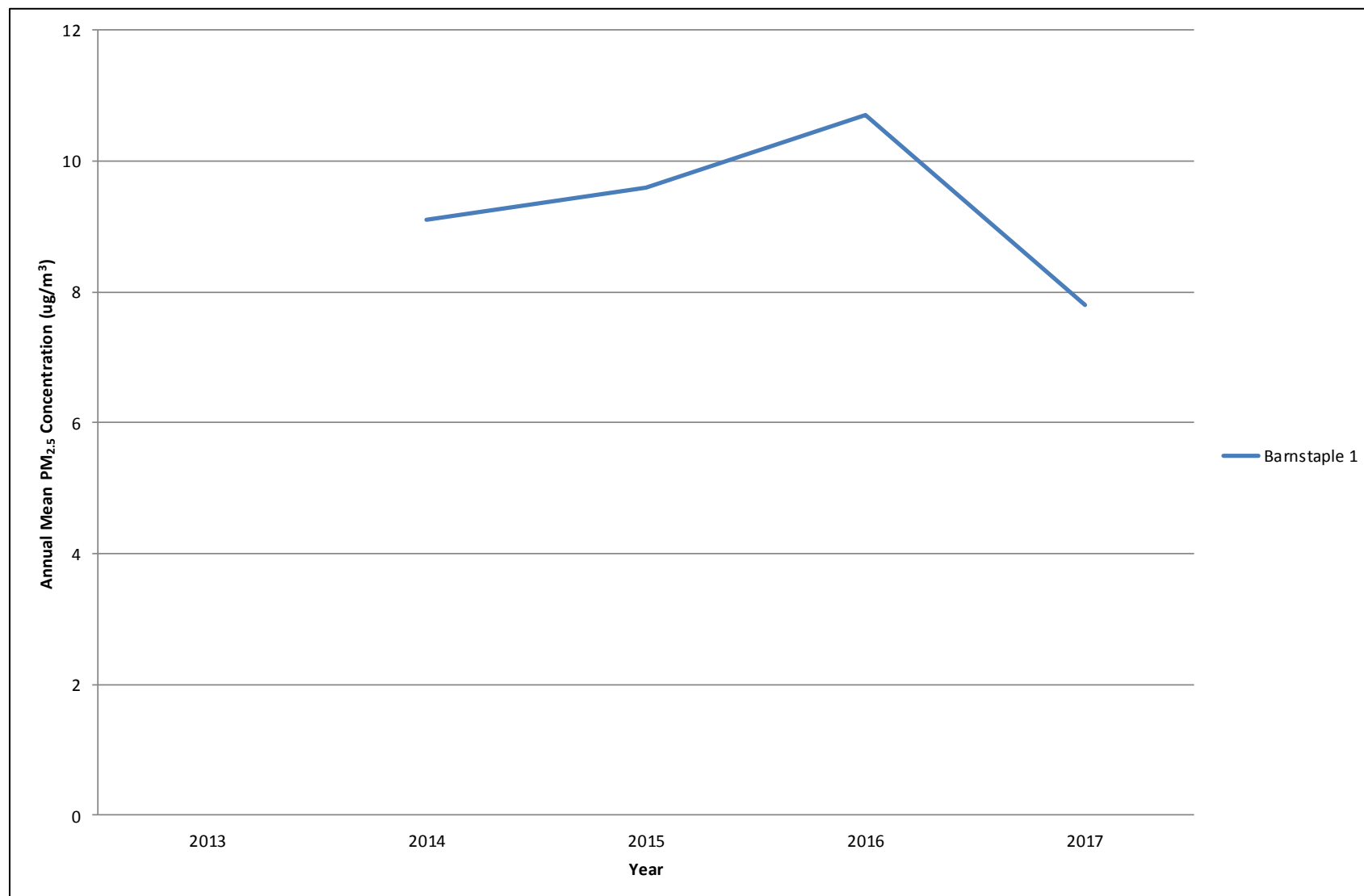
Table A.6 – PM_{2.5} Annual Mean Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2017 (%) ⁽²⁾	PM _{2.5} Annual Mean Concentration (µg/m ³) ⁽³⁾				
				2013	2014	2015	2016	2017
Barnstaple 1	Roadside	43.8	43.8	-	9.1	9.6	10.7	7.8

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

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) All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.
- (4) Data capture is low for 2017 due to ongoing issue experienced at the monitoring station during period of warm temperatures.

Figure A.6 – Trends in Annual Mean PM_{2.5} Concentrations: Barnstaple 1

Appendix B: Full Monthly Diffusion Tube Results for 2017

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

Site ID	NO ₂ Mean Concentrations (µg/m ³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.89) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Site 1	-	-	-	-	-	29.28	-	22.19	15.85	-	29.23	23.08	25.5	22.7	-
Site 2	38.37	28.25	-	34.47	20.55	28.23	22.42	25.62	25.32	31.72	42.25	27.21	29.5	26.2	-
Site 4	31.16	23.75	24.98	23.34	18.42	21.84	20.44	-	-	-	-	-	22.3	19.9	-
Site 5	-	24.44	-	-	22.27	22.62	18.91	20.15	20.95	25.55	22.63	-	25.6	22.8	-
Site 6	26.43	22.39	21.48	15.32	15.83	18.78	14.98	15.33	15.86	19.88	16.91	18.55	18.5	16.4	-
Site 7	36.21	29.00	31.78	27.79	22.31	30.39	23.01	23.77	24.79	26.76	37.17	0.37	28.5	25.3	-
Site 8	-	-	-	-	20.77	28.76	22.49	24.62	25.50	26.55	33.35	32.01	31.5	28.0	-
Site 9	23.71	16.48	16.71	13.64	12.09	13.68	11.68	12.91	14.15	16.49	20.44	16.74	15.7	14.0	-
Site 10	35.69	28.22	31.12	27.56	21.46	26.45	23.01	23.99	23.25	33.78	38.96	31.58	28.8	25.6	-
Site 11	-	-	-	-	19.26	27.99	21.98	23.10	20.27	23.65	34.61	28.19	29.3	26.1	-
Site 12	43.04	39.47	39.34	42.72	34.06	51.12	38.31	38.26	40.93	42.63	-	77.11	44.3	39.4	29.2
Site 13	45.36	31.93	18.60	32.12	30.27	46.96	31.64	38.19	33.56	37.14	30.62	28.03	33.7	30.0	-
Site 14	23.74	18.07	21.27	19.89	16.27	26.12	15.86	17.68	16.44	19.33	16.32	-	19.2	17.1	-
Site 15	20.34	21.21	22.61	20.20	16.68	20.86	20.17	20.84	-	-	-	-	20.2	18.0	-
Site 16	40.56	28.19	32.61	-	-	-	-	-	-	-	-	-	23.8	21.1	-
Site B1	24.01	14.33	15.29	20.70	14.88	17.04	12.49	12.61	12.43	16.56	20.17	13.98	16.2	14.4	-

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Site B2	23.03	19.65	18.94	20.98	-	20.17	-	13.92	-	20.56	-	-	17.4	15.4	-
Site B3	27.37	18.57	19.10	29.65	17.55	25.06	8.46	22.35	22.37	24.01	32.08	22.17	22.4	19.9	-
Site B4	21.55	14.93	14.65	20.29	14.95	19.48	12.89	15.54	15.24	18.27	20.78	15.10	17.0	15.1	-
Site B5	43.00	34.62	37.07	50.34	31.00	53.66	39.74	45.31	39.31	41.62	47.93	30.98	41.2	36.7	32.2
Site B6	-	14.65	13.54	9.54	-	10.67	8.49	8.95	8.44	-	-	11.03	11.7	10.4	-
Site B7	19.74	21.05	24.50	14.86	-	14.78	12.10	-	-	-	-	-	16.0	14.3	-
Site B8	28.61	24.59	22.93	25.13	-	23.90	-	21.53	-	-	-	-	21.2	18.9	-
Site B9	20.99	15.29	15.06	14.15	12.59	16.09	13.42	14.74	12.41	15.27	26.16	12.65	15.7	14.0	-
Site B10	34.12	20.75	23.38	29.09	21.21	34.57	24.77	28.47	22.67	21.14	20.23	22.31	25.2	22.5	-
Site B11	26.61	23.87	19.62	19.97	16.22	23.71	18.15	20.43	16.04	26.87	13.49	-	20.5	18.2	-

☐ Local bias adjustment factor used

☒ National bias adjustment factor used

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

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

Notes:

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

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

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

(2) As per LAQM.TG(16) guidance, distance correction has been applied to all concentrations to those within 10% of the objective.

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

Sources of Pollution

North Devon have not identified any potential **new sources** within the district as described in Chapter 7, Section 1 of Defra LAQM.TG(16).

Diffusion Tube Bias Adjustment Factor

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

With regard to the application of a bias adjustment factor for diffusion tubes, Defra LAQM.TG(16) and the LAQM Helpdesk recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

North Devon Council does not operate any continuous NO₂ monitoring stations within the District and therefore a co-location study is not available to derive a local bias factor, thus the national bias adjustment factor spreadsheet⁶ has been used.

Diffusion tubes for North Devon Council are supplied and analysed by Gradko International Ltd. The tubes were prepared using the 20% TEA in water preparation method. The national bias adjustment factor for Gradko 20% TEA in water is 0.89 for the year 2017 (based on 34 studies) as derived from the national bias adjustment factor spreadsheet.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes for the year 2017 were supplied and analysed by Gradko International Ltd, the tubes were prepared using the 20% TEA in water preparation

⁶ National Diffusion Tube Bias Adjustment Factor Spreadsheet version 03/18 available at <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

method. All results have been bias adjusted and annualised where required before being presented in Table A.3.

Gradko is a UKAS accredited laboratory and participates in the new AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO₂ tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO₂ concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. In the latest available AIR-PT results, AIR-PT AR 0018 (January to February 2017), AIR-PT AR019 (April to May 2017), AIR-PT AR021 (July to August 2017) and AIR-PT AR022 (September to October 2017). Gradko has scored 100% on all results. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$.

Thirty two out of the thirty four local authority co-location studies in 2017 were rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

Short-term to Long-term Data Adjustment

In regards to the 2017 diffusion tube data set, annualisation was required at thirteen diffusion tube locations and for the Barnstaple automatic monitoring data (both PM₁₀ and PM_{2.5} data) due to data capture being below 75%. Annualisation has been completed in line with Box 7.9 and Box 7.10 within LAQM.TG(16) and full working details are presented in Table C.2 (NO₂), Table C.3 (PM₁₀) and Table C.4 (PM_{2.5}).

In completing the annualisation process, data has been taken from a number of automatic monitoring sites that are part of the AURN. In line with LAQM.TG(16) the monitoring sites that have been used lie within a radius of approximately 50 miles of the sites to be annualised.

All monitoring stations that were used are background monitoring stations and as such are not influenced by local sources of air pollution such as road traffic emissions at roadside monitoring sites. The monitoring sites that were used are listed in Table C.1.

Table C.1 – AURN Monitoring Stations Used for Annualisation

Pollutant	Background AURN Sites used for Annualisation
NO₂	<ul style="list-style-type: none"> • Yarner Wood – Rural Background • Charlton Mackerill – Rural Background • Honiton – Urban Background • Plymouth Centre – Urban Background
PM₁₀	<ul style="list-style-type: none"> • Narbeth – Rural Background • Bristol St Pauls – Urban Background • Cardiff Centre – Urban Background • Plymouth Centre – Urban Background
PM_{2.5}	<ul style="list-style-type: none"> • Bristol St Pauls – Urban Background • Cardiff Centre – Urban Background • Plymouth Centre – Urban Background

Distance from Road Correction

In line with LAQM.TG(16) distance correction has been applied to NO₂ monitoring sites that have recorded an annual mean concentration above the annual mean objective, or within 10% of the annual mean objective. There were two sites within North Devon's NO₂ monitoring network that were within 10% of the NO₂ annual mean objective in 2017; Site 12 and Site B5.

The NO₂ Fall-Off with Distance Calculator (v4.2)⁷ has been used to derive the NO₂ concentration at a location of relevant exposure; the results of the calculations are presented in Table C.5.

⁷ NO₂ Fall-Off with Distance Calculator (Version 4.2), available online at <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

Table C.2 – Diffusion Tube Short Term to Long Term Monitoring Data Adjustment (2017)

Site ID	Unadjusted Diffusion Tube Mean ($\mu\text{g}/\text{m}^3$)	Annualisation Factor Yarner Wood	Annualisation Factor Charlton Mackerill	Annualisation Factor Honiton	Annualisation Factor Plymouth Centre	Average Annualisation Factor	Annualised & Bias Adjusted (0.89) Concentration ($\mu\text{g}/\text{m}^3$)
Site 1	23.93	-	1.191	0.979	1.032	1.067	22.7
Site 4	23.42	0.848	0.92	1.041	1.004	0.953	19.9
Site 5	22.19	1.167	1.192	1.148	1.106	1.153	22.8
Site 8	26.76	1.271	1.222	1.128	1.087	1.177	28.0
Site 11	24.88	1.271	1.222	1.128	1.087	1.177	26.1
Site 15	20.36	0.858	0.983	1.082	1.039	0.991	18.0
Site 16	33.79	0.625	0.619	0.747	0.822	0.703	21.1
Site 17	27.78	1.453	1.201	1.043	1.071	1.192	29.5
Site 18	18.18	1.456	1.257	1.106	1.113	1.233	20.0
Site B2	19.61	0.798	0.865	0.937	0.941	0.885	15.4
Site B6	10.66	1.111	1.207	1.155	1.127	1.150	10.4
Site B7	17.84	0.816	0.847	0.959	0.973	0.899	14.3
Site B8	24.45	0.749	0.85	0.927	0.945	0.868	18.9

Table C.3 – PM₁₀ Short Term to Long Term Monitoring Data Adjustment (2017)

Site ID	Unadjusted Diffusion Tube Mean (µg/m ³)	Annualisation Factor Narbeth	Annualisation Factor Bristol St Pauls	Annualisation Factor Cardiff Centre	Annualisation Factor Plymouth Centre	Average Annualisation Factor	Annualised Concentration (µg/m ³)
Barnstaple 1	16.79	0.977	0.879	0.928	0.930	0.928	15.6

Table C.4 – PM_{2.5} Short Term to Long Term Monitoring Data Adjustment (2017)

Site ID	Unadjusted Diffusion Tube Mean (µg/m ³)	Annualisation Factor Bristol St Pauls	Annualisation Factor Cardiff Centre	Annualisation Factor Plymouth Centre	Average Annualisation Factor	Annualised Concentration (µg/m ³)
Barnstaple 1	9.15	0.829	0.865	0.861	0.852	7.8

Table C.5 – NO₂ Fall-Off with Distance Calculations

Site ID	Distance (m)		NO ₂ Annual Mean Concentration (µg/m ³)		
	Monitoring Site to Kerb	Receptor to Kerb	Background ⁽¹⁾	Monitoring at Site	Predicted at Receptor
Site 12	1.0	2.0	4.7	39.4	29.2
Site B5	1.0	4.3	4.7	36.7	32.2

Notes:

(1) Background NO₂ concentrations have been taken from the 2017 Defra Background Maps for North Devon.

Appendix D: Maps of Monitoring Locations and Current AQMA

Figure D.1 – Automatic Monitoring Site: Barnstaple

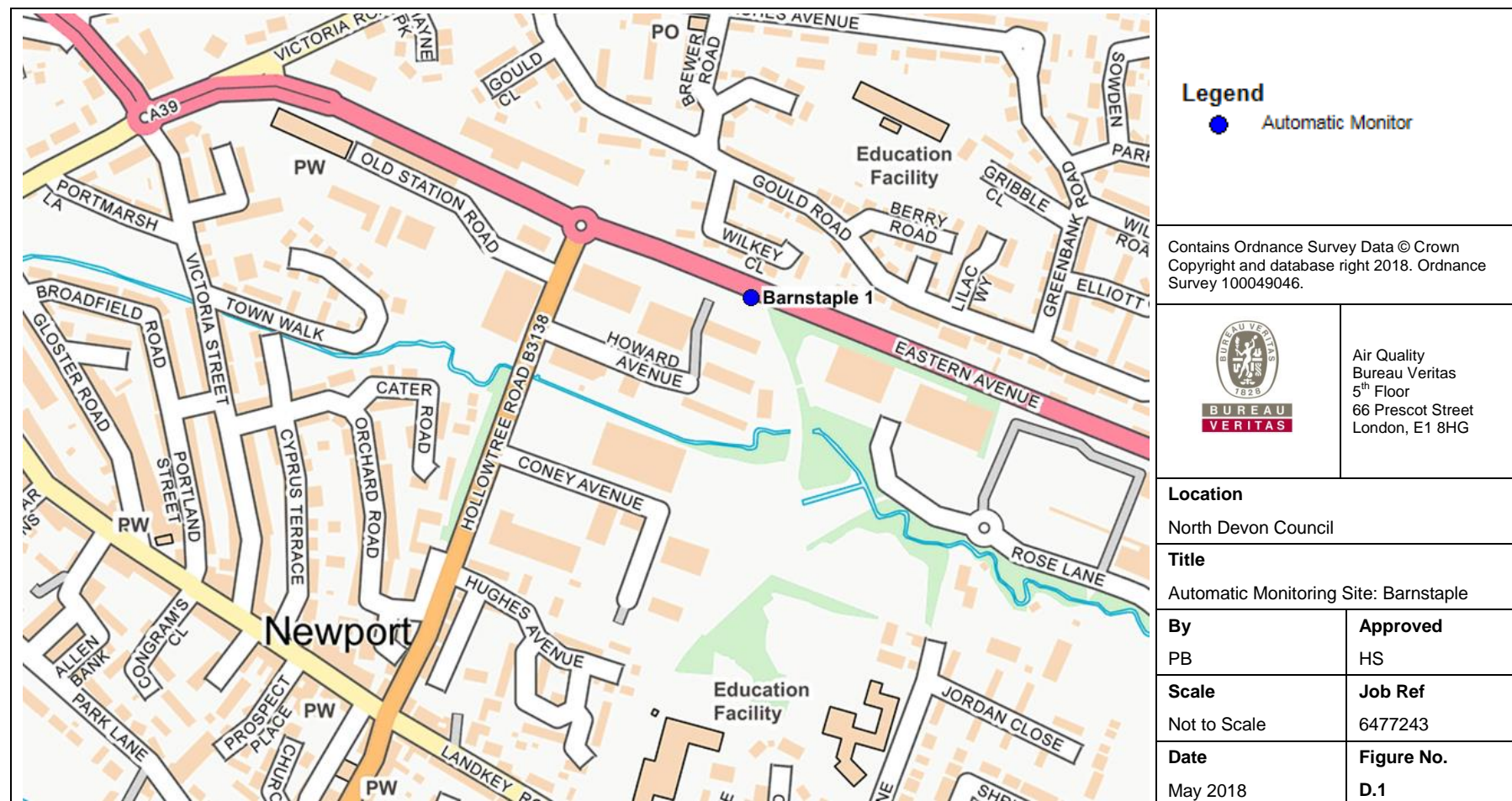


Figure D.2 – Diffusion Tube Monitoring Locations: Barnstaple

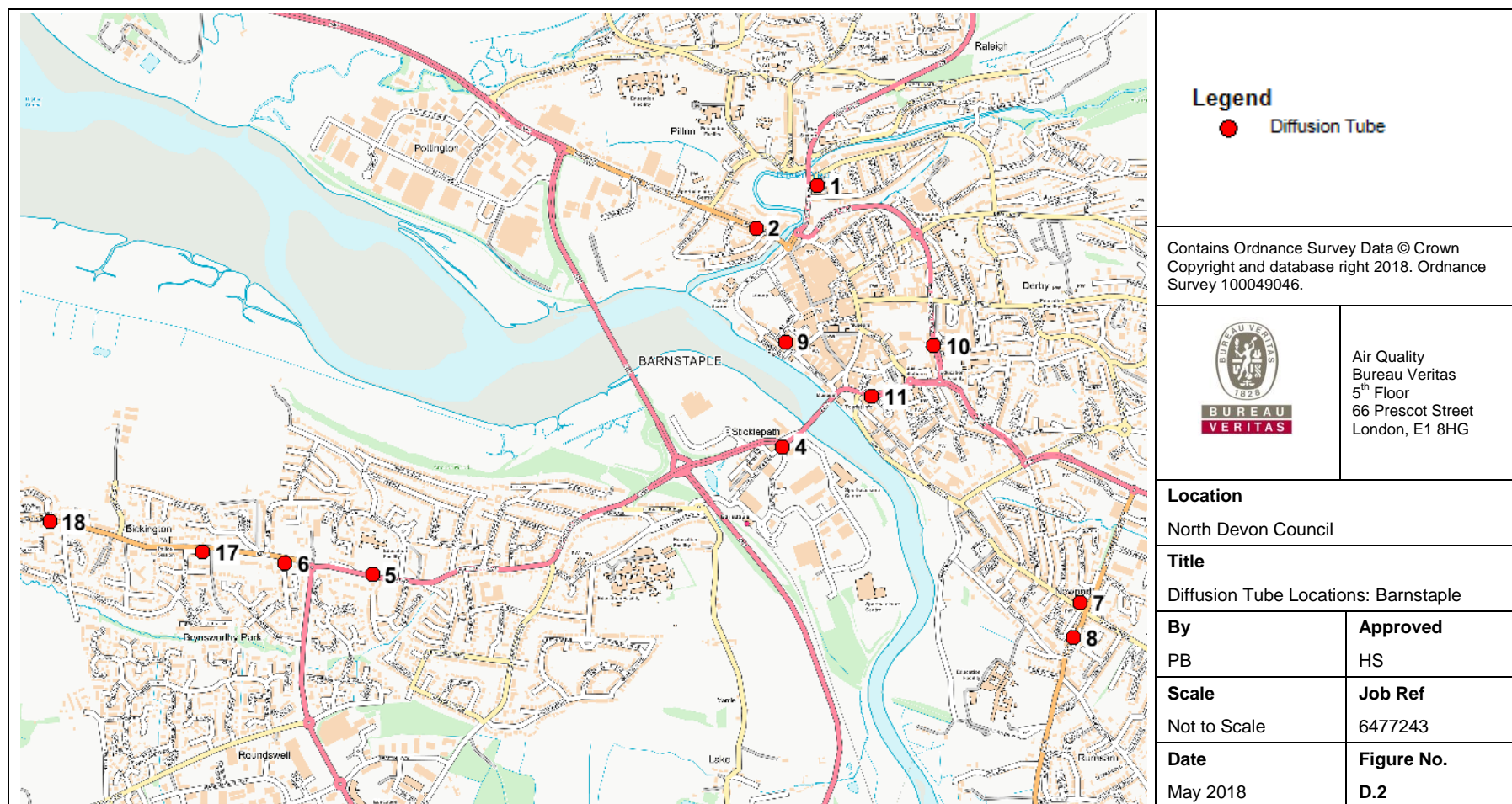


Figure D.3 – Diffusion Tube Monitoring Locations: Braunton



Figure D.4 – Diffusion Tube Monitoring Locations: Ilfracombe

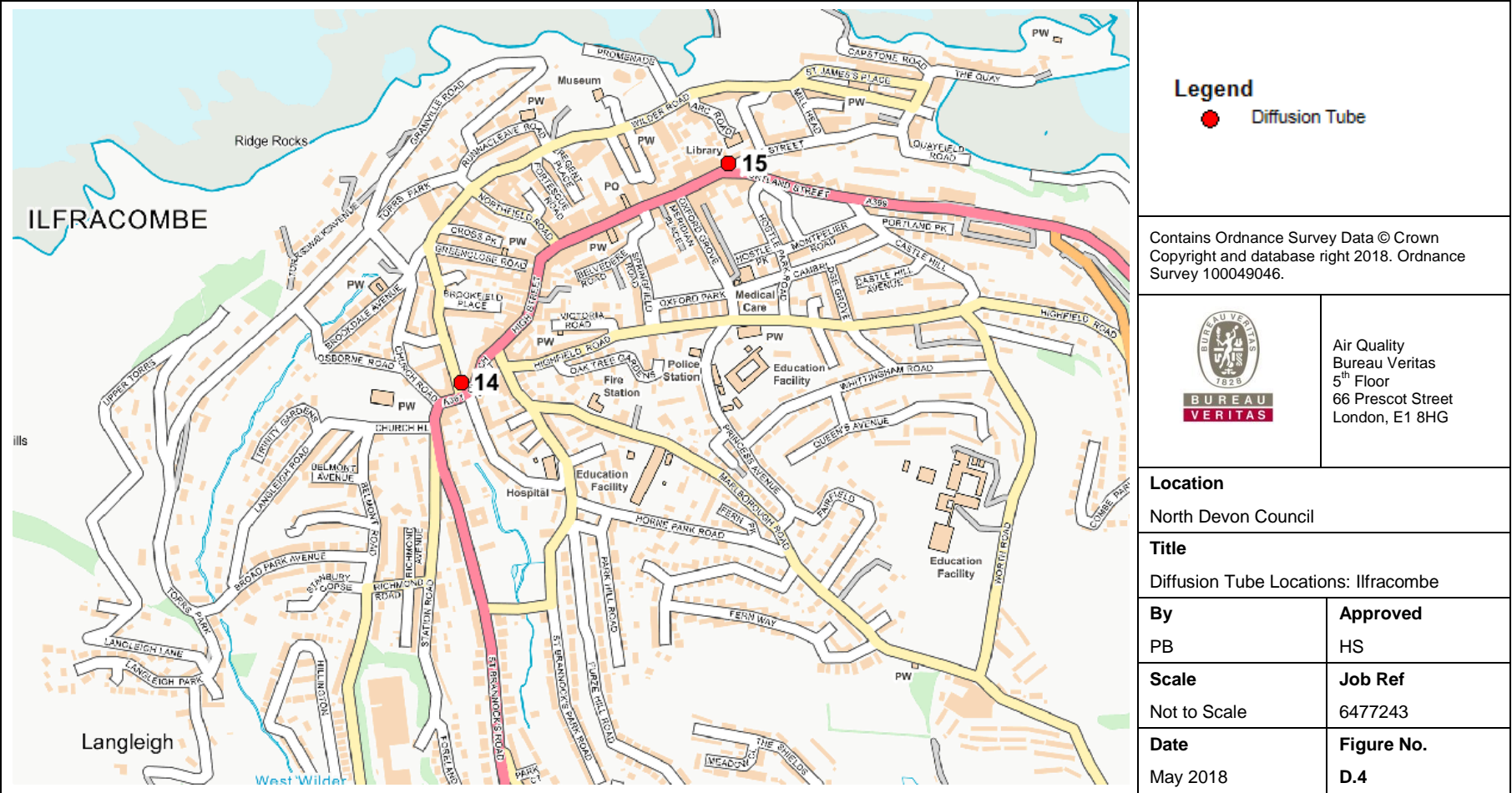
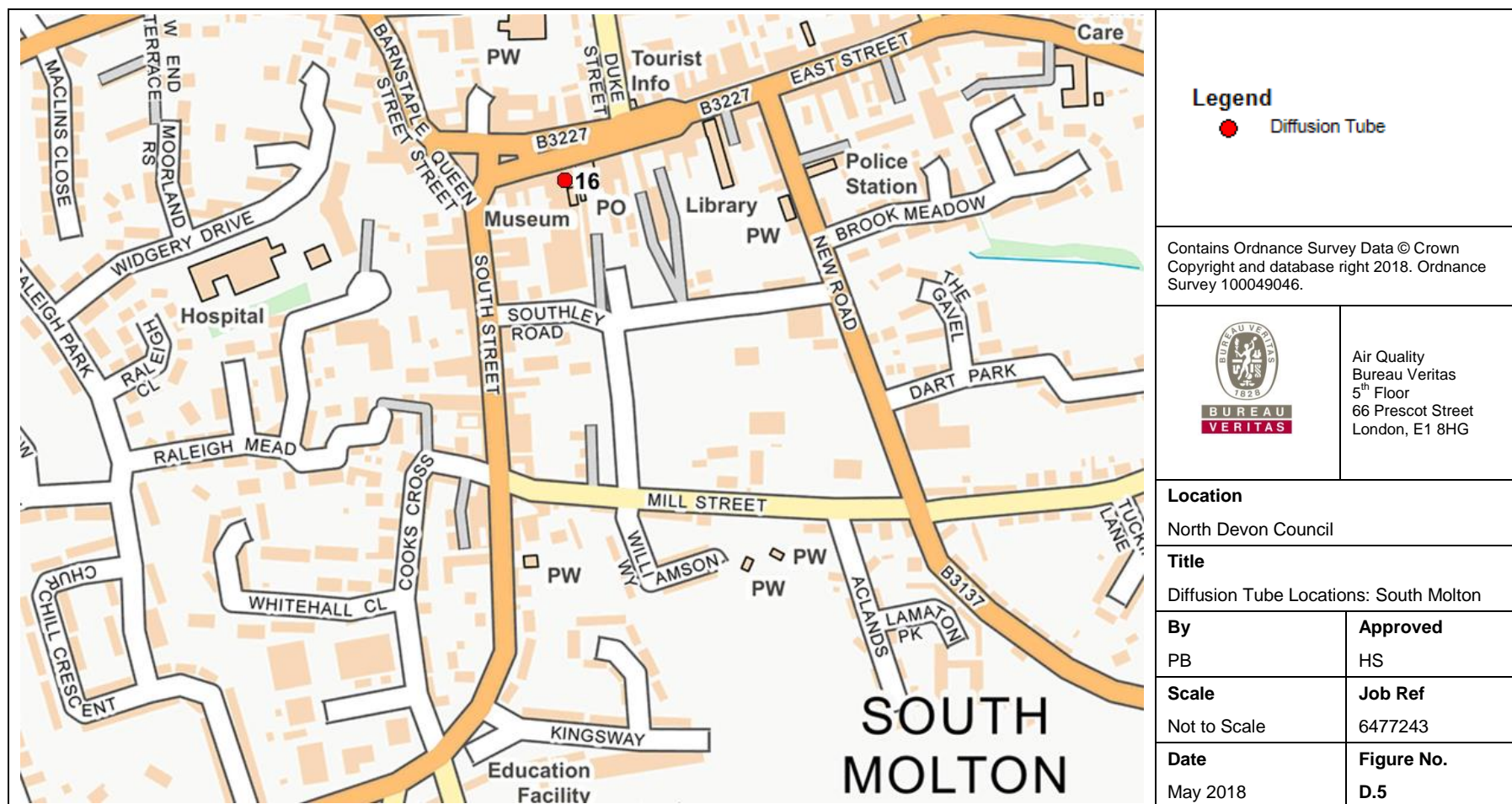


Figure D.5 – Diffusion Tube Monitoring Location: South Molton



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). February 2018. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- North Devon Council Air Quality Action Plan, May 2016.
- North Devon Council 2017 Annual Status Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/18 published in March 2018.