



# 2016 Air Quality Annual Status Report (ASR)

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

October 2016 (Revised)

Local Authority Officer	Prepared by David Morgan for Andy Cole
Department	Environmental Health & Housing Services
Address	North Devon Council, Civic Centre, Barnstaple, Devon, EX31 1EA
Telephone	01271 388870
E-mail	andy.cole@northdevon.gov.uk
Report Reference number	
Date	October 2016
Revision History	<ol style="list-style-type: none"> <li>1. October 2016 - Final Report</li> <li>2. November 2017 – Revised Report (NO<sub>2</sub> diffusion tube data recalculated)</li> </ol>

## Executive Summary: Air Quality in Our Area

This report provides an overview of air quality in the North Devon Council area during 2015 and a summary of the actions the Council is taking to improve local air quality.

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>. North Devon Council takes its role in helping to reduce the impacts of air pollution very seriously and we are working closely with the public, local businesses and partner agencies to protect good air quality and to deliver improvements where they are needed.

### Air Quality in North Devon

The North Devon district occupies the northern most part of the county of Devon and borders the western edges of Somerset and the Bristol Channel, covering an area of approximately 1,085 square kilometres (419sq miles). The area is characterised by a rugged northern Bristol Channel coast, the sandy beaches of the West Coast, the estuarine and valley landscapes of the River Taw and the open moorland and farmland of the Exmoor fringes. The district includes approximately one-third of the area of Exmoor National Park.

The population of the area in 2011 was approximately 93,700 with around half of residents living in the four main settlements of Ilfracombe, Braunton, South Molton and Barnstaple. Barnstaple is the sub-regional centre for northern Devon. The remainder of the population lives in the open countryside or in one of the numerous villages and hamlets of the area.

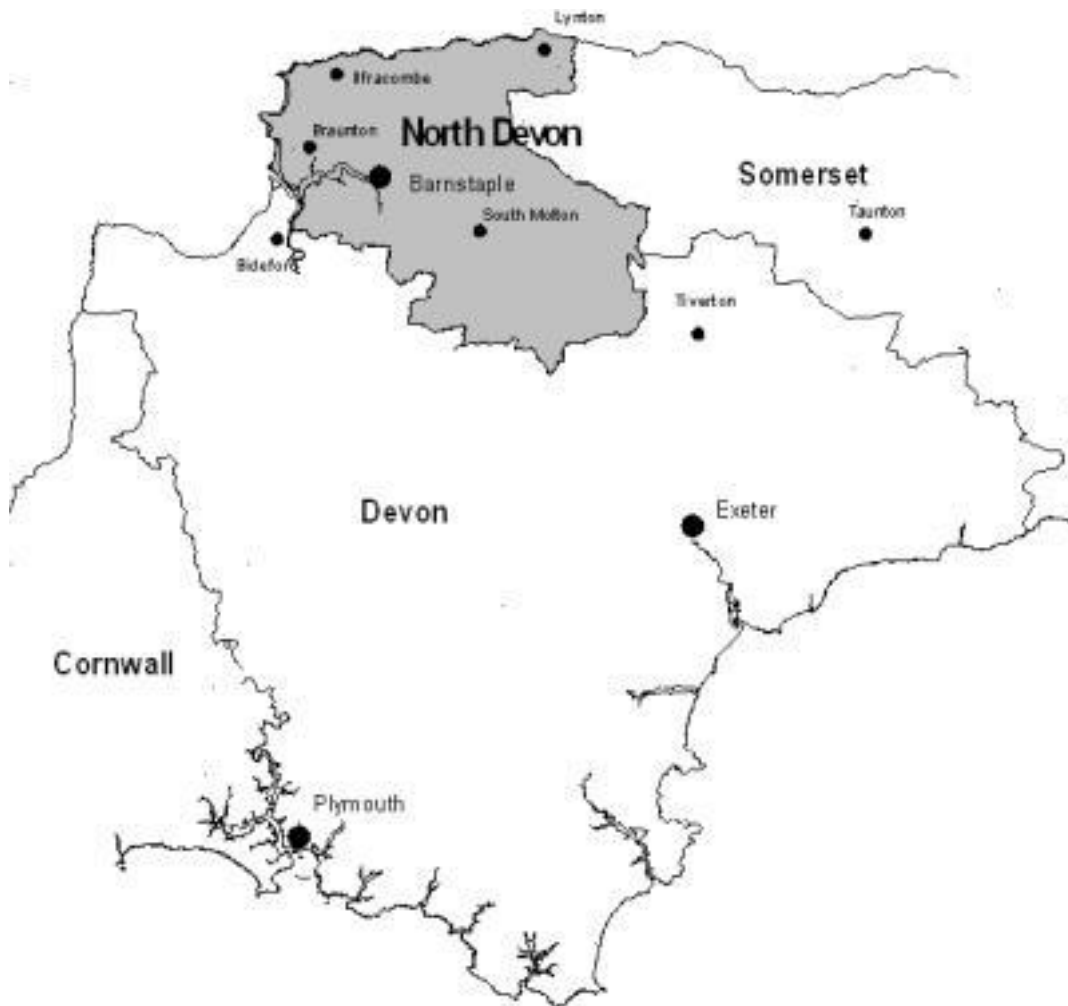
---

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

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

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

North Devon has an extensive rural road network and is connected to the rest of the region by the A39, A361 and A377 roads. There is also a regional rail connection between Barnstaple and Exeter, which runs along the valley of the River Taw.



**Figure 1:** Map showing North Devon Council area

Employment in the district is concentrated in the main settlements. There is a strong dependence on the service industry, especially tourism related in the summer and also in public administration, health and finance sectors. There is also a healthy industrial base in the area.

North Devon is fortunate in enjoying good local air quality generally. The main pollutant of local concern is nitrogen dioxide (NO<sub>2</sub>). This is a product of combustion and road traffic is the dominant source within the district. The Council has undertaken a routine monitoring programme for NO<sub>2</sub> since 2000 and currently monitors at 16 permanent locations and a further 11 temporary locations.

Monitored annual mean NO<sub>2</sub> levels at the 16 permanent sites typically show a gradual reduction over the past 5 years and the vast majority of sites are well below the national air quality “objective” standard of 40µg/m<sup>3</sup> (annual mean concentration).

In November 2017 the 2015 monitored annual mean NO<sub>2</sub> results were reassessed following queries over the length of time the diffusion tubes should be exposed for and the associated reliability of results obtained (details of this recalculation and an explanation of the reasons are included at Appendix C). The revised results are provided in at Appendix B Table B.1. The revised results show that during 2015 all sites complied with the annual mean standard except one site within the AQMA in Braunton, which slightly exceeded the standard (40.97µg/m<sup>3</sup>).

If measured levels exceed or appear likely to exceed an air quality objective level, local authorities must declare an “Air Quality Management Area” and develop measures to bring levels of the pollutant down. Following exceedance of the air quality objective annual mean level for NO<sub>2</sub> at a location in Braunton, an Air Quality Management Area was declared by North Devon Council on 11<sup>th</sup> July 2011. This area is referred to as “North Devon Council Air Quality Management Area No1” (AQMA#1). More information on AQMA#1 and actions being taken to further improve air quality in this location and elsewhere in the district are provided in this report.

Section 3 contains full details of the air quality monitoring undertaken during 2015.

## Actions to Improve Air Quality

North Devon Council plays a major role in protecting and improving local air quality, a role that is wide ranging and includes involvement in the protection of wildlife habitats and green spaces, controlling the air quality impacts of development through the planning regime, working with partners such as Devon County Council to improve road junctions and the non-car travel infrastructure of the district and more.

The Council's Environmental Health & Housing Services Department is the Lead service for Local Air Quality Management in North Devon as well as for the Local Air Pollution Control regime, which regulates prescribed industrial processes. It is also a Consultee to the Council and County Council Planning Departments in relation to the air quality impacts of development.

Following the declaration of an Air Quality Management Area in Braunton mentioned above, the Council initiated a programme of additional NO<sub>2</sub> monitoring in order to better understand the nature and extent of air quality impacts in this location. The Council also created a Technical Working Group (TWG) to coordinate and oversee a programme of improvements and develop a detailed Air Quality Action Plan (AQAP). The TWG has evaluated a range of potential measures for improving air quality and, following consultation with the public and other stakeholders, produced a package of improvement measures as the basis of an effective Action Plan.

The above work continued during 2015 and, in May 2016, an Air Quality Action Plan (AQAP 2016) was published. The AQAP 2016 is available on the Council's Air Quality website at: <http://www.northdevon.gov.uk/environment/air-quality/>

The specific measures set out in the Action Plan will be progressed as a priority for the Council moving forward. Progress on these actions, as well as associated NO<sub>2</sub> monitoring results, will be reported every year in future Annual Status Reports.

## **Local Priorities and Challenges**

The main priorities for addressing and improving air quality within North Devon are:

- Implementation of the measures set out in the Air Quality Action Plan 2016 with a view to achieving reductions in measured NO<sub>2</sub> concentrations within the AQMA and achieving the air quality objective
- Analysis of measured NO<sub>2</sub> concentrations within the AQMA area to help assess the benefits of implementing specific Action Plan measures
- Continuing to monitor NO<sub>2</sub> concentrations at existing long-term locations and to supplement these with additional sites should new pollution hotspots be identified

- Working within the Planning regime to ensure that the air quality objectives are achieved and to deliver air quality improvements from development within the district where possible
- Developing a new role in relation to assessing and reducing exposure to PM<sub>2.5</sub> in North Devon, in accordance with national health priorities

## How to Get Involved

Residents, local businesses and visitors to North Devon can make their own important contributions to improving air quality. In addition, some of the changes that help to reduce air pollution also have proven mental and physical health benefits too,

Here are some examples of possible changes that can make a real difference:

- Make more short trips and journeys on foot or by bike instead of by car
- Find someone to try car sharing with such as a work colleague or other parents on the school run
- For longer journeys switch from using a car to public transport

And if you have to use your car.....

- Make sure your tyre pressures are correct (low tyre pressure increases fuel use, fuel costs and emissions).
- Think about whether you need to use the air conditioning. Using it increases fuel consumption by up to 20%
- Using a roof rack on your car can also increase fuel consumption by 20%. Bicycles are better attached to the back of the car.

Opt for local produce!

- Transporting food and other goods a long way creates more air pollution than transporting them short distances. Buying local also helps our local economy!

Other ideas worth considering might include:

- Purchasing a low-emission electric and/or hybrid vehicle, with government funding and grants available.
- Upgrading boilers to newest and most efficient gas condensing boilers with lowest NO<sub>x</sub> (and carbon) emissions.

- Improving building insulation to reduce use of boilers etc.

Further information on local air quality and a link to Defra's Local Air Quality Management website can be found online at:

[www.northdevon.gov.uk/environment/air-quality/](http://www.northdevon.gov.uk/environment/air-quality/)



# Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>i</b>
Air Quality in North Devon .....	i
Actions to Improve Air Quality .....	iii
Local Priorities and Challenges.....	iv
How to Get Involved.....	v
<b>1 Local Air Quality Management</b> .....	<b>1</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>2</b>
2.1 Air Quality Management Areas.....	2
2.2 Progress and Impact of Measures to address Air Quality in North Devon.....	2
2.3 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and or Concentrations.....	8
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>10</b>
3.1 Summary of Monitoring Undertaken .....	10
3.1.1 Automatic Monitoring Sites .....	10
3.1.2 Non-Automatic Monitoring Sites.....	100
3.2 Individual Pollutants .....	10
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	10
3.2.2 Particulate Matter (PM <sub>10</sub> ).....	11
3.2.3 Particulate Matter (PM <sub>2.5</sub> ).....	11
3.2.4 Sulphur Dioxide (SO <sub>2</sub> ).....	11
<b>Appendix A: Monitoring Results</b> .....	<b>12</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2015</b> .....	<b>19</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>22</b>
<b>Appendix D: Map(s) of Monitoring Locations</b> .....	<b>24</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>2626</b>
<b>Glossary of Terms</b> .....	<b>27</b>
<b>References</b> .....	<b>28</b>

## List of Tables

Table 2.1: Declared Air Quality Management Areas.....	2
Table 2.2: Progress on Measures to Improve Air Quality .....	5
Table 2.3: Fraction of mortality attributable to particulate air pollution (PM <sub>2.5</sub> ).....	8

**List of Figures**

Figure 1: Map of North Devon Council area .....ii

# 1 Local Air Quality Management

This report provides an overview of air quality in North Devon Council's area during 2015. 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 Council to improve air quality and any progress that has been made.

There is a new requirement for local authorities to work towards reducing levels of PM<sub>2.5</sub> (fine particulates). This report sets out what North Devon Council will do in relation to PM<sub>2.5</sub> in section 2.3 below.

Local authorities in England no longer have to report on 1,3-Butadiene, Benzene, Carbon Monoxide and Lead. There are no significant concerns regarding these pollutants in North Devon.

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) setting out measures it intends to put in place in pursuit of the objectives.

Details of the AQMA declared by North Devon Council can be found in

Table 2.1. Further information related to the AQMA, including maps of AQMA

boundaries are available online at: [www.northdevon.gov.uk/environment/air-quality/](http://www.northdevon.gov.uk/environment/air-quality/)

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

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
AQMA #1	NO <sub>2</sub> annual mean	Braunton	Braunton B3231 from “The Square” junction to the “Village Green”.	Air Quality Action Plan 2016 <a href="http://www.northdevon.gov.uk/environment/air-quality/">North Devon air quality webpage</a>

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

North Devon Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of specific measures that have been completed, are in progress or planned are set out in Table 2.2. More detail on measures associated with the AQMA can be found in the 2016 Action Plan, which is available at: [www.northdevon.gov.uk/environment/air-quality/](http://www.northdevon.gov.uk/environment/air-quality/)

Key completed actions in 2015 are:

- A package of measures for improving air quality in the Braunton AQMA was finalised and associated consultation results were submitted in 2015
- A total of 332 planning applications have been considered during 2015 for environmental impacts including air quality and, where appropriate, mitigation has been agreed or secured through the imposition of planning conditions

North Devon Council expects the following key measure to be completed over the course of the next reporting year (2016):

- Preparation and publication of an Air Quality Action Plan (AQAP) setting out a package of measures designed to address the AQMA in Braunton
- Begin progressing measures identified within the AQAP 2016

The above measure represents a key step in enabling the Council to identify and begin implementing a package of specific measures needed to effectively reduce air pollution in the AQMA to acceptable levels.

North Devon Council's priorities for the coming year are:

- Progressing the measures set out in the Air Quality Action Plan 2016 with a view to achieving reductions in measured NO<sub>2</sub> concentrations within the AQMA and achieving the NO<sub>2</sub> air quality objective
- Analysis of measured NO<sub>2</sub> concentrations within the AQMA area to help assess the benefits of implementing specific Action Plan measures
- Continuing to monitor NO<sub>2</sub> concentrations at existing long-term locations and to supplement these with additional sites should new pollution hotspots be identified
- Continuing to work within the Planning regime to ensure that the air quality objectives are achieved and to secure air quality benefits from development within the district

- Develop a clear role in relation to assessing and reducing exposure to PM<sub>2.5</sub> in North Devon, in accordance with national health priorities

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category / Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Upgrading of the traffic signals at “The Square” to “MOVA” (Microprocessor Optimised Vehicle Actuation)	Traffic Management / UTC	NDC / (DCC)	June 2017 / See comments	Does AQ Model indicate positive benefit?	See comments	0%	See comments	AQ Modelling may indicate no significant benefit and removal of this measure from AQA Plan
2	Consider amending the South Street one way system in relation to optimising traffic flow	Traffic Management / congestion management	NDC / (DCC)	June 2017 / See comments	Does AQ Model indicate positive benefit?	See comments	0%	See comments	AQ Modelling may indicate no significant benefit and removal of this measure from AQA Plan
3	Consider the implementation of a comprehensive one way system around the village and / or the pedestrianisation of Caen Street	Traffic Management / congestion management	DCC	n/a / March 2017	Submission of report to NDC	n/a	0%	March 2017	DCC to undertake feasibility study and produce options report
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 Primary School	Traffic Management / congestion management	DCC	Underway / March 2017	Submission of report to NDC	n/a	Review underway	March 2017	DCC to undertake review and produce options report. Implementation of options is subject to funding being secured.

Measure No.	Measure	EU Category / Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
5	Improving parking management, including the prevention of parking associated with blocking bus stops	Traffic Management/ Parking enforcement	NDC/ DCC	n/a / underway	Monitoring parking compliance	Not specified	underway	ongoing	Results of compliance monitoring to be reported in next ASR
6	Installation of a delivery hub	Freight & Delivery Management/ Freight Consolidation Centre	NDC/ DCC	March 2017 / See comments	Monitoring parking compliance	Not specified	Some options already investigated	See comments	Implementation depends on stakeholder engagement
7	Redirecting traffic along A399	Traffic management/ other	DCC	March 2017 / See comments	Viability report to AQMA Steering Group	Not specified	0%	See comments	DCC traffic monitoring system requires recommissioning – DCC to investigate viability.
8	Off peak delivery times	Freight & Delivery Management/ out of hours delivery	DCC	June 2017 / See comments	Viability report to AQMA Steering Group	Not specified	0%	See comments	DCC to investigate viability in consultation with stakeholders prior to implementation
9	Improving Public Transport	Transport Planning & Infrastructure/ Public transport improvements	DCC	June 2017 / See comments	Options and viability report to Steering Group	Not specified	0%	See comments	DCC investigating options with bus companies



Measure No.	Measure	EU Category / Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
10	Fleet partnerships – working with local companies to encourage lower emissions fleet vehicles	Vehicle Fleet Efficiency / Fleet efficiency	NDC / DCC	Underway	Monitoring fleet emissions data	Not specified	underway	ongoing	Eco-Stars membership scheme has been implemented across North Devon Public health grant funding in place.
11	Implementing school / work travel plans	Promoting travel alternatives/ School & Work travel plans	DCC	underway / June 2017	School travel indicators & surveys	Not specified	Engaging with stakeholders	June 2017	DCC resource in place
12	Developing a supplementary planning document re air quality	Policy Guidance & Development Control/ AQ Planning Guidance	NDC	Underway / June 2017	Number of AQ assessments on planning applications	n/a	0%	June 2017	
13	Producing travel packs for holiday accommodation	Public Information / Via leaflets etc	NDC / DCC	n/a / March 2017	Number of participating Companies	n/a	0%	March 2017	Some DCC resource already in place
14	Installation of a “Park + Change” facility at Chivenor	Alternatives to Private vehicle use/ bus based park & ride	NDC / DCC	Underway / To be confirmed	Numbers of tickets sold	Not specified	1 <sup>st</sup> Phase of development underway	TBC	Resources secured and development proceeding
15	Establish and develop NDC’s role in relation to assessing and reducing exposure to PM <sub>2.5</sub> in North Devon	Other	NDC	March 2017 / Ongoing	New role to be set out in next ASR	n/a	Review underway	Set out clarified role in next ASR	Use of Public Health Toolkit being investigated.

## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and or Concentrations

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

Public Health England has created an online data tool known as The Public Health Outcomes Framework, which is intended to help focus public health action on increasing healthy life expectancy and reducing differences in life expectancy between communities. The tool uses indicators to assess improvements and includes indicator 3.01:

*“Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution (measured as fine particulate matter, PM<sub>2.5</sub>)*

This indicator can be used to compare the situation regarding PM<sub>2.5</sub> within North Devon with other areas and with England as a whole. This comparison is shown in Table 2.1 below:

**Table 2.3: Adult mortality attributable to particulate air pollution (PM<sub>2.5</sub>)**

AREA	North Devon District	South West Region	England Highest	England Lowest
Percentage of adult Mortality	3.7%	4.5%	7.9%	3.5%

Source: Public Health England - <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data> (2013 data)

It can be seen from the above comparison that North Devon has amongst the lowest fractions of mortality attributable to PM<sub>2.5</sub>. While this is to be welcomed, it is also clear that exposure to this harmful pollutant does occur and so further reductions would have health benefits.

In addition to the air quality improvement measures mentioned elsewhere in this report, North Devon Council will take the following specific measures to address PM<sub>2.5</sub> over the next reporting year:

- Prior to publication of the 2017 Annual Status Report, the Council will review available data on PM<sub>2.5</sub> with a view to developing a better understanding of the main sources of the pollutant within North Devon. This information will help the Council to target its efforts where they can be most effective in reducing relevant emissions and exposures within the district.

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

### **3.1 Summary of Monitoring Undertaken**

The Council has undertaken a routine monitoring programme for NO<sub>2</sub> since 2000 and currently monitors at 16 permanent locations and a further 11 temporary locations.

#### **3.1.1 Automatic Monitoring Sites**

There are no automatic monitoring sites in North Devon.

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

North Devon Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 27 sites during 2015. Table A.1 in Appendix A shows the details of the sites.

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

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

### **3.2 Individual Pollutants**

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

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

In November 2017 the 2015 monitored annual mean NO<sub>2</sub> results were reassessed following queries over the length of time the diffusion tubes should be exposed for and the associated reliability of results obtained. NO<sub>2</sub> diffusion tube result data from tubes exposed for more than 35 days has now been removed in this revised report because the level of confidence in results from tubes exposed for more than 35 days is reduced. This is based on advice obtained from the tube analysis laboratory (Gradko) and subsequent discussion with Defra’s LAQM Helpdesk.

The revised results are provided in Tables A.2 and B.1 below.

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

The full revised 2015 dataset of monthly mean values is provided in Appendix B.

Monitored annual mean NO<sub>2</sub> levels at the Council's 16 permanent sites typically show a gradual reduction over the past 5 years and the vast majority of results are well below the national air quality objective annual mean standard of 40µg/m<sup>3</sup>.

The revised results show that during 2015 all sites complied with the annual mean standard except one site within the AQMA in Braunton which slightly exceeded the standard (40.97µg/m<sup>3</sup> ).

In relation to the designated AQMA, it is considered too early to say whether the trend of improving results can be relied on to continue. The Council will therefore continue to prioritise and progress measures set out in the Air Quality Action Plan 2016. This situation will be reviewed each year as part of the Annual Status Reporting process.

### **3.2.2 Particulate Matter (PM<sub>10</sub>)**

The Council does not carry out any routine monitoring of PM<sub>10</sub> in its area.

### **3.2.3 Particulate Matter (PM<sub>2.5</sub>)**

The Council does not carry out any routine monitoring of PM<sub>2.5</sub> in its area.

### **3.2.4 Sulphur Dioxide (SO<sub>2</sub>)**

The Council does not carry out any routine monitoring of SO<sub>2</sub> in its area.

## Appendix A: Monitoring Results

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
site 1	Pilton Causeway, Barnstaple	Kerbside	SS 55756	BNG 33720	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 2	Rolle Street 1, Barnstaple	Kerbside	SS 55533	BNG 33615	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 3	Rolle Street 2, Barnstaple	Kerbside	SS 55421	BNG 33652	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 4	Lower Sticklepath Roundabout, Barnstaple	Kerbside	SS 55658	BNG 32828	NO <sub>2</sub>	N	Y (10m)	0.5m	N	3m
site 5	Sticklepath School, Barnstaple	Urban Backgrnd	SS 54230	BNG 32526	NO <sub>2</sub>	N	Y (1m)	N/A	N	3m
site 6	Cedars Roundabout, Barnstaple	Kerbside	SS 53936	BNG 32409	NO <sub>2</sub>	N	N(100m)	0.5m	N	3m
site 7	Newport Road, Barnstaple	Kerbside	SS 56716	BNG 32203	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
site 8	South Street, Newport, Barnstaple	Kerbside	SS 56671	BNG 32088	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 9	Castle Street, Barnstaple	Kerbside	SS 55559	BNG 33298	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 10	Alexandra Road, Barnstaple	Kerbside	SS 56130	BNG 33181	NO <sub>2</sub>	N	Y (3m)	0.5m	N	3m
site 11	Belle Meadow Road, Barnstaple	Kerbside	SS 55764	BNG 33702	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 12	The Square, Braunton	Kerbside	SS 48896	BNG 36714	NO <sub>2</sub>	Y	Y (1m)	0.5m	N	3m
site 13	The London Inn, Braunton	Kerbside	SS 48731	BNG 36642	NO <sub>2</sub>	Y	Y (1m)	0.5m	N	3m
site 14	Church Street, Ilfracombe	Kerbside	SS 51544	BNG 47330	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site 15	High Street, Ilfracombe	Kerbside	SS 55704	BNG 33169	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
site 16	Broad Street, South Molton	Kerbside	SS 71426	BNG 25877	NO <sub>2</sub>	N	Y (1m)	0.5m	N	3m
site B1	Exeter Road 1, Braunton	Kerbside	SS 49052	BNG 35885	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B2	Exeter Road 2, Braunton	Kerbside	SS 48970	BNG 36071	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B3	Exeter Road 3, Braunton	Kerbside	SS 48916	BNG 36188	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B4	Exeter Road 4, Braunton	Kerbside	SS 48886	BNG 36320	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B5	Exeter Road 5, Braunton	Kerbside	SS 48859	BNG 36407	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B6	South Street 1, Braunton	Kerbside	SS 48712	BNG 36059	NO <sub>2</sub>	N	Y (1m)	1m	N	3m



Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?	Height (m)
site B7	South Street 2, Braunton	Kerbside	SS 48788	BNG 36495	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B8	Chaloners Road, Braunton	Kerbside	SS 48781	BNG 36656	NO <sub>2</sub>	N	Y (1m)	1m	N	3m
site B9	Caen Gardens, Braunton	Kerbside	SS 48619	BNG 36628	NO <sub>2</sub>	Y	Y (4m)	3m	N	3m
site B10	Saunton Road 1, Braunton	Kerbside	SS 48429	BNG 36598	NO <sub>2</sub>	Y	Y (1m)	1m	N	3m
site B11	Saunton Road 2, Braunton	Kerbside	SS 48335	BNG 36648	NO <sub>2</sub>	Y	Y (1m)	1m	N	3m

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
site 1	Kerbside	Diffusion Tube	100%	58	30.47	26.35	32.11	28.39	25.02
site 2	Kerbside	Diffusion Tube	100%	58	30.46	27.93	29.21	27.65	26.45
site 3	Kerbside	Diffusion Tube	100%	50	<b>40.28</b>	34.88	33.91	31.09	30.16
site 4	Kerbside	Diffusion Tube	100%	50	23.89	21.85	21.77	19.93	21.99
site 5	Urban Backgrnd	Diffusion Tube	100%	58	8.47	7.70	22.15	23.31	19.08
site 6	Kerbside	Diffusion Tube	100%	58	24.21	18.33	18.75	17.30	15.27
site 7	Kerbside	Diffusion Tube	100%	58	30.43	27.68	27.80	27.56	25.65
site 8	Kerbside	Diffusion Tube	100%	50	25.22	23.94	24.73	24.26	23.05
site 9	Kerbside	Diffusion Tube	100%	58	17.35	15.28	16.12	15.81	13.37
site 10	Kerbside	Diffusion Tube	100%	58	29.97	27.37	27.70	27.32	25.08

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
site 11	Kerbside	Diffusion Tube	100%	58	27.23	25.02	26.57	24.08	22.04
site 12	Kerbside	Diffusion Tube	100%	33	<b>44.35</b>	38.84	38.87	0.00	<b>40.97</b>
site 13	Kerbside	Diffusion Tube	100%	50	<b>41.57</b>	<b>42.32</b>	<b>40.70</b>	<b>40.53</b>	30.83
site 14	Kerbside	Diffusion Tube	100%	58	24.72	20.97	20.18	21.89	16.47
site 15	Kerbside	Diffusion Tube	100%	58	20.89	18.70	17.62	18.43	16.66
site 16	Kerbside	Diffusion Tube	100%	50	28.85	22.65	24.51	22.41	18.95
site B1	Kerbside	Diffusion Tube	100%	50	16.16	14.80	14.00	16.60	15.30
site B2	Kerbside	Diffusion Tube	100%	50	20.13	16.87	6.61	16.66	17.27
site B3	Kerbside	Diffusion Tube	100%	58	25.48	26.49	24.21	19.72	19.17
site B4	Kerbside	Diffusion Tube	100%	58	17.93	16.67	19.33	21.38	16.10
site B5	Kerbside	Diffusion Tube	100%	58	<b>40.45</b>	37.42	32.65	34.14	36.69

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
site B6	Kerbside	Diffusion Tube	100%	42	15.79	14.07	7.41	9.79	9.34
site B7	Kerbside	Diffusion Tube	100%	25	16.52	14.40	14.15	0.00	13.58
site B8	Kerbside	Diffusion Tube	100%	58	26.19	24.90	22.49	22.66	21.31
site B9	Kerbside	Diffusion Tube	100%	58	16.19	14.98	16.95	14.78	17.50
site B10	Kerbside	Diffusion Tube	100%	58	22.46	22.41	19.66	24.34	20.50
site B11	Kerbside	Diffusion Tube	100%	58	21.05	19.64	20.67	20.70	18.14

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

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%.

(4) November 2017 Revision: 2015 data from tubes exposed >35 days has been removed. See Appendix C for details.

## Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2015

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted <sup>(1)</sup>	
	site 1	30.91	34.89	-	-	-	27.10	20.47	27.04	-	45.38	21.47			-
site 2	35.98	40.02	-	-	-	30.72	27.90	27.99	-	31.88	24.61	-	31.30	26.45	
site 3	35.53	40.60	-	-	-	33.85	34.93	30.97	-	41.02	-	-	36.15	30.16	
site 4	-	33.28	-	-	-	21.35	18.39	21.17	-	31.89	23.53	-	24.94	21.99	
site 5	25.09	21.49	-	-	-	23.07	20.99	21.31	-	31.15	14.97	-	22.58	19.08	
site 6	18.65	20.51	-	-	-	14.11	14.40	15.89	-	25.67	17.25	-	18.07	15.27	
site 7	35.01	33.59	-	-	-	27.95	26.65	22.49	-	35.38	31.40	-	30.35	25.65	
site 8	32.88	33.34	-	-	-	25.40	-	27.16	-	30.08	25.08	-	28.99	23.05	

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted <sup>(1)</sup>
site 9	18.63	20.70	-	-	-	11.48	10.68	13.31	-	21.77	14.22	-	15.83	13.37
site 10	34.95	34.04	-	-	-	22.20	23.75	27.04	-	34.43	31.36	-	29.68	25.08
site 11	28.03	33.89	-	-	-	23.29	20.45	22.03	-	31.64	23.27	-	26.09	22.04
site 12	-	-	-	-	-	46.47	-	43.86	-	49.39	39.42	-	44.79	<b>40.97</b>
site 13	32.27	39.45	-	-	-	43.84	13.84	44.96	-	47.34	-	-	36.95	30.83
site 14	18.28	19.82	-	-	-	20.04	16.46	21.74	-	25.40	14.65	-	19.48	16.47
site 15	18.07	19.37	-	-	-	18.53	22.80	21.27	-	18.84	19.10	-	19.71	16.66
site 16	31.16	24.22	-	-	-	19.93		19.61	-	27.37	20.72	-	23.84	18.95
site B1	17.41	21.43	-	-	-	13.87	13.71	17.56	-	26.02	-	-	18.33	15.30
site B2	20.64	-	-	-	-	17.99	16.29	18.02	-	23.88	17.01	-	18.97	17.27

Site ID	NO <sub>2</sub> Mean Concentrations (µg/m <sup>3</sup> )													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted <sup>(1)</sup>
site B3	27.42	29.02	-	-	-	24.44	13.18	26.12	-	30.25	8.37	-	22.69	19.17
site B4	18.09	21.12	-	-	-	14.44	20.39	18.21	-	30.34	10.80	-	19.06	16.10
site B5	47.81	46.97	-	-	-	46.33	45.49	37.86	-	46.68	32.77	-	43.42	36.69
site B6	12.68	15.27	-	-	-	8.45	-	-	-	17.24	7.98	-	12.32	9.34
site B7	-	-	-	-	-	12.82	-	-	-	23.07	10.76	-	15.55	13.58
site B8	23.76	25.95	-	-	-	23.08	21.91	28.72	-	31.59	21.55	-	25.22	21.31
site B9	17.05	19.12	-	-	-	14.59	45.63	15.81	-	21.91	10.84	-	20.71	17.50
site B10	23.30	25.33	-	-	-	19.30	25.41	31.18	-	32.91	12.41	-	24.26	20.50
site B11	19.06	21.09	-	-	-	29.44	17.26	19.03	-	27.02	17.38	-	21.47	18.14

(1) See Appendix C for details on bias adjustment

(2) November 2017 Revision: Data from tubes exposed >35 days has been removed. See Appendix C for details.

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

### C.1 – Supporting Technical Information

The Council's Updating and Screening Assessment report, dated April 2015, concluded as follows:

- There are no road traffic sources that have not been adequately considered in previous rounds of Review and Assessment
- There are no other transport sources that have not been adequately considered in previous rounds of Review and Assessment
- There are no industrial sources that have not been adequately considered in previous rounds of Review and Assessment
- There are no commercial and domestic sources that have not been adequately considered in previous rounds of Review and Assessment
- There are no fugitive or uncontrolled sources that have not been adequately considered in previous rounds of Review and Assessment
- This report confirms that there are no other exceedances identified, other than those which exist in the declared AQMA - specifically, at site 13

The Council will continue to monitor for potential exceedances of the Air Quality Objectives through the Air Quality Annual Status Reporting regime and through its regulatory roles, involvement in the planning process and continued monitoring of air quality across the District.

### C.2 – Air Quality Monitoring Data QA/QC

#### **Diffusion Tube Exposure: Revised Calculations (2017)**

In November 2017 the 2015 monitored annual mean NO<sub>2</sub> results were reassessed - in light of concerns about the reliability of data associated with tubes that had been exposed for more than 35 days.

Advice obtained from the tube analysis laboratory (Gradko) and subsequent discussion with Defra's LAQM Helpdesk confirmed that it is not possible to quality assure results where tubes are exposed for over 35 days. The results have therefore



been recalculated to remove tubes which were exposed for over 35 days – and the revised results are provided at Appendix B in Table B.1.

All reasonable efforts will continue to be made to ensure tubes are collected within the 35 day period. In the exceptional circumstance of this not being able to be achieved, relevant tubes will be removed from the annualisation calculations to the future.

### **Diffusion Tube Annualisation**

A short-term correction factor was applied to data from sites with a collection efficiency of below 75% and those which had a collection efficiency of below 100% and an unadjusted annual mean concentration of > 36 ug/m<sup>3</sup> – in accordance with advice received from the LAQM helpdesk.

Annualisation was undertaken using the average correction factor derived from monthly mean data from the continuous monitoring stations of “Bournemouth” and “Bristol St Pauls”. Corrections were undertaken for each relevant site in accordance with advice from the LAQM helpdesk.

### **Diffusion Tube Bias Adjustment Factor**

The bias adjustment factor applied to the annual mean concentration was 0.88. This was calculated using the spreadsheet at:-

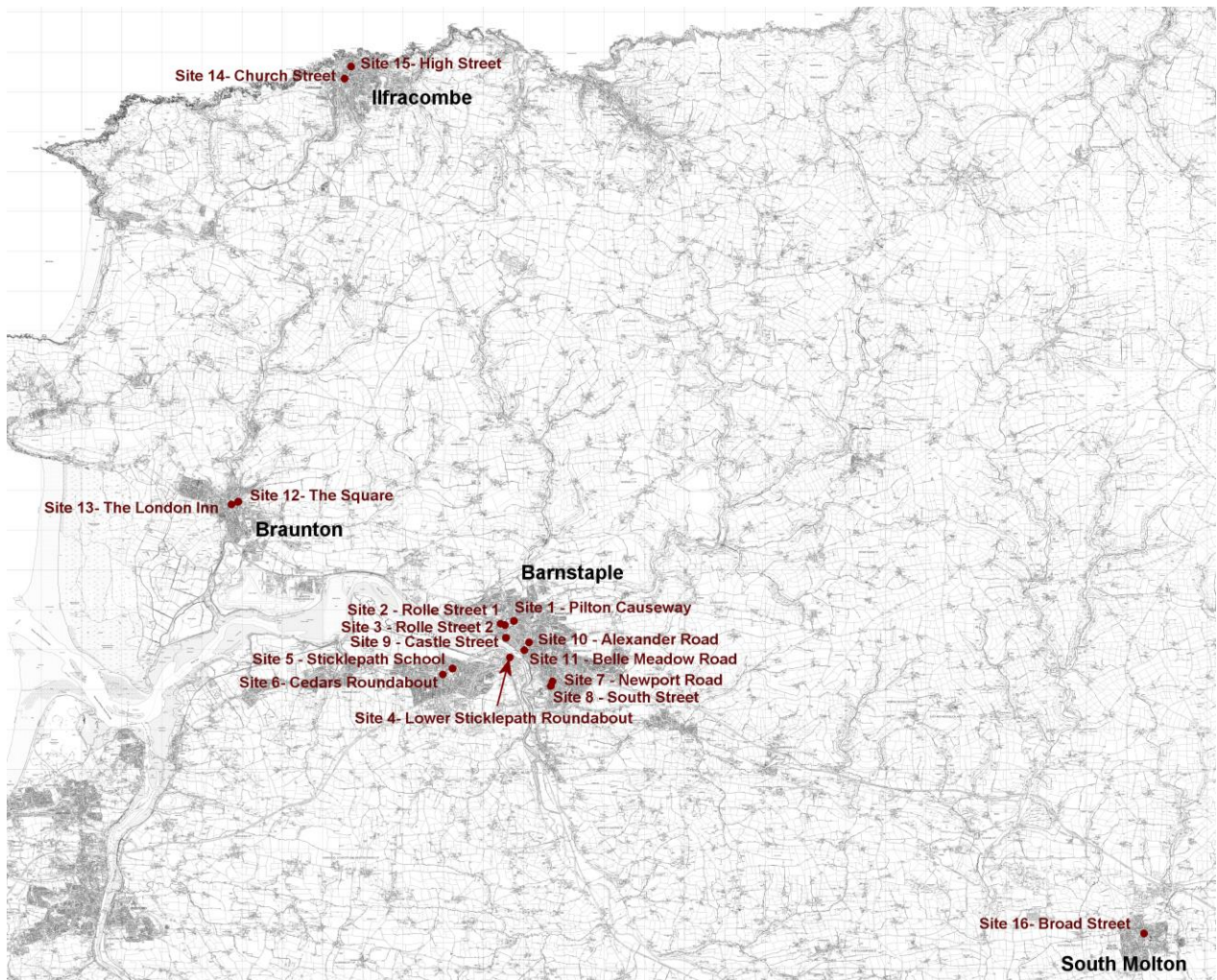
<https://laqm.defra.gov.uk/>

*Database\_Diffusion\_Tube\_Bias\_Factors-v06 / 16-Final.xls*

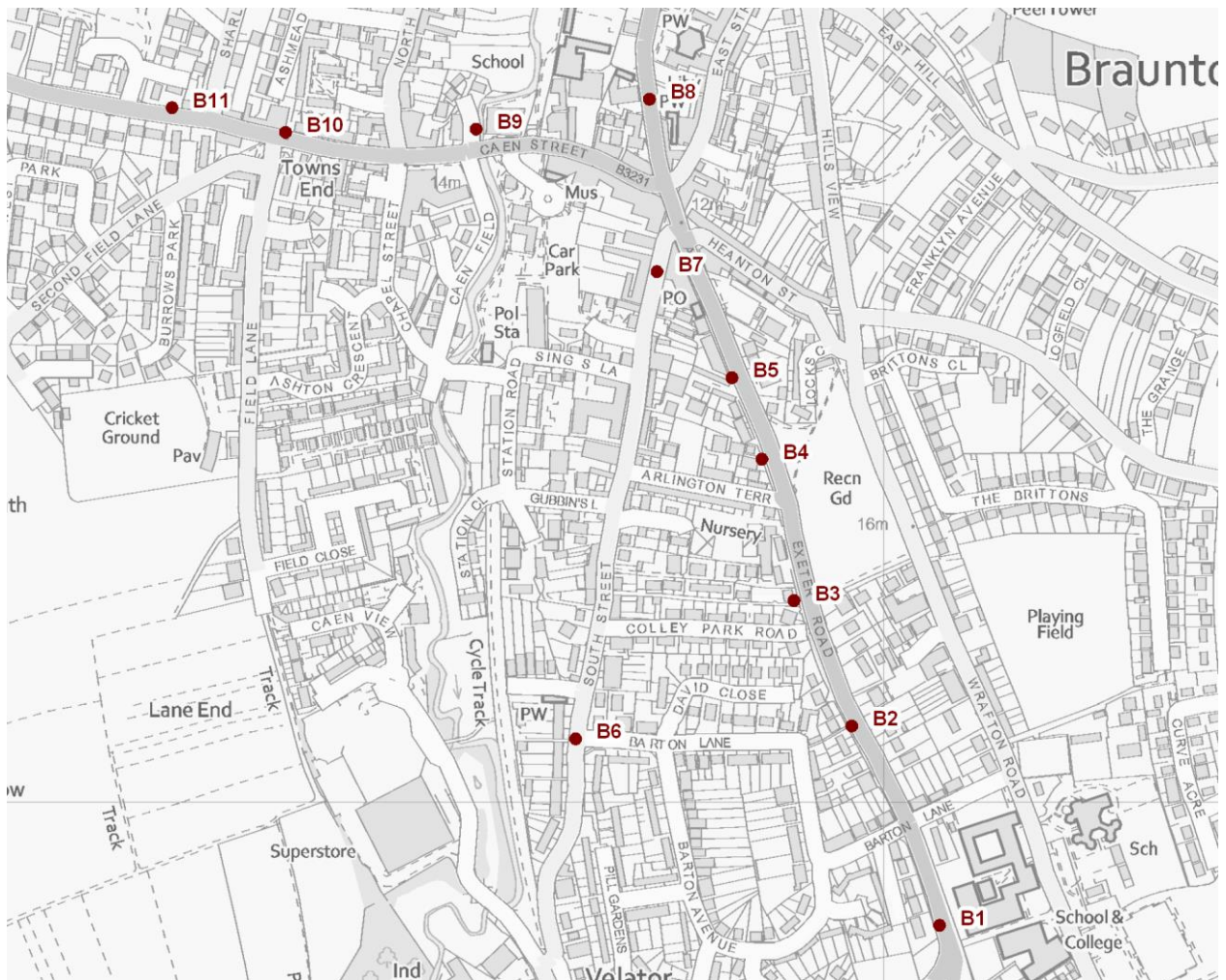
The spreadsheet was accessed on 28<sup>th</sup> September 2016, inputting “Gradko” as the analysing laboratory and “20% TEA in water” for the preparation.

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

### Diffusion Tube Monitoring Locations – North Devon Permanent Sites



**Diffusion Tube Monitoring Locations – Branton AQMA Sites**



## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

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

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

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
...	...



## References

DEFRA (2016) – Local Air Quality Management Technical Guidance TG16

DEFRA (2016) – Local Air Quality Management Policy Guidance PG16