



**STROUD  
DISTRICT  
COUNCIL**  
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## 2017 Air Quality Annual Status Report (ASR)

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

October 2017

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## Executive Summary: Air Quality in Our Area

The primary influence on Air Quality within Stroud District remains road traffic with the primary pollutant of concern being Nitrogen Dioxide. Air quality across the district generally remains very good with measured levels of Nitrogen Dioxide generally well below national limits. The overall trend is that Nitrogen Dioxide levels are relatively stable.

There are a few areas which have shown a slight increase in levels. However, these increases are marginal and well within the accepted accuracy of measurements made with diffusion tubes.

It is not possible to conclude from one year of relatively stable levels whether this contradicts the predicted downward trend. A watching brief will be kept on this over the next few years and comparisons will be made with other authorities to see if a national trend exists.

The two sites at Dudbridge that had crept above the levels in 2014, fell slightly in 2015 and have fallen further in 2016. For the 2016 period these tubes had been re-sited to avoid the influence of the corners of buildings and boiler flues.

## Air Quality in Stroud District

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>.

The main pollutant of concern within Stroud District is Nitrogen Dioxide from road traffic. Levels of Nitrogen Dioxide have been steadily falling over the years. There are currently no Air Quality Management Areas within the District.

There are a number of Diffusion Tubes located across the District, measuring Nitrogen Dioxide. These are collected and sent off for analysis on a monthly basis. Two of the tubes located at Dudbridge have shown readings on or slightly above the annual average. These tubes however have shown a general downward trend over the last few years.

## Actions to Improve Air Quality

Gloucestershire County Council is responsible for strategies relating to traffic management across the County. Further details of these strategies can be found at <http://www.gloucestershire.gov.uk/ltp3>.

The Overarching Transport Strategy is supported through the following policy documents:

Bus  
Cycle  
Freight  
Highways  
Rail  
Think Travel

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

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

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

## Local Priorities and Challenges

A 65.3 MW Energy from Waste Plant is currently under construction at Javelin Park, near Haresfield. This plant is due to be commissioned in 2018. A Community Liaison Group made up of Parish and Town Councils, the Environment Agency, Gloucestershire County Council, nearby sensitive receptors and Stroud District Council's Environmental Protection Manager meets on a regular basis to discuss issues that concern the local community. One of the issues raised was concerns regarding the impact of the incinerator on local air quality. Assessments via the Planning and Permitting regimes indicated that there would be no significant impact. A number of extra NO<sub>x</sub> tubes have been positioned throughout the district where modelling shows any plume from the incinerator may ground. This is with a view to providing reassurance monitoring to local residents by measuring background levels prior to commissioning then continuing afterwards. It is also currently proposed to install two continuous PM<sub>10</sub> monitors at local sites. These will be installed 6 months prior to commissioning and will remain in place for a period of 30 months thereafter. This is also to provide reassurance monitoring to the local community.

## How to Get Involved

Copies of the latest Air Quality Report for Stroud District can be found on the Council's Website at <https://www.stroud.gov.uk/environment/environmental-health/pollution-and-nuisance/air-quality>.

Any queries about Air Quality should be directed to the Environmental Protection team within Stroud District Council.

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## 1 Local Air Quality Management

This report provides an overview of air quality in Stroud District during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Stroud District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

## **2 Actions to Improve Air Quality**

### **2.1 Air Quality Management Areas**

Air Quality Management Areas (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 the objectives.

Stroud District Council currently does not have any AQMAs.

### **2.2 Progress and Impact of Measures to address Air Quality in Stroud District**

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

- Introduction of additional Nitrogen Dioxide diffusion tubes across the district to provide background levels of Nitrogen Dioxide prior to the commissioning of the Javelin Park Incinerator, and ongoing levels following commissioning.
- Introduction of restrictions on the age of vehicles which can be licensed as Private Hire Taxis.



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

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

Stroud District Council is taking the following measures to address PM<sub>2.5</sub>:

- Continue to work with Gloucester County Council to identify areas within the Local Transport Plan that will contribute towards a reduction in PM<sub>2.5</sub>
- In 2018 Stroud District Council will be reviewing and updating the Health and Well Being Plan. Discussions have been ongoing across the Council regarding identifying synergies between that plan, the strategic partners identified in it and the development of policies and strategies which will reduce PM<sub>2.5</sub> across the district.

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

### 3.1 Summary of Monitoring Undertaken

#### 3.1.1 Automatic Monitoring Sites

Stroud District Council has not carried out any automatic monitoring during 2016.

#### 3.1.2 Non-Automatic Monitoring Sites

Stroud District Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 21 sites during 2016. Table A.1 in Appendix A shows the details of the sites.

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

Further details on Quality Assurance/Quality Control (QA/QC) 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>)

Table A.1 in Appendix A provides details relating to the Monitoring Tubes.

Table A.2 in Appendix A shows the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations results for the 2016 monitoring period.

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

There are no results which exceed the national annual mean NO<sub>2</sub> limit.

There are no exceedances of the air quality objective of 40µg/m<sup>3</sup>.

Recognising the volume of traffic at Beeches Green and the nature of the locality, that being a steep hill and enclosed on either side, a NO<sub>x</sub> tube was installed there in July 2016 and only 6 months of data are currently available. There are no significant relevant receptors within 20 metres of the road; however there is a bus stop, so it was decided to consider the short term exposure limits. All monthly measurements to date have been significantly below the 60 µg/m<sup>3</sup> that would trigger a more detailed investigation. This will be reported on in more detail in the next report.

## Appendix A: Monitoring Results

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

Site I.D	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
3	Brookthorpe – North View	Roadside	383410	212570	NO <sub>2</sub>	N	N	Y(19.8m)	1m	Y
4b	Cainscross – 2 The Rosaries	Roadside	385308	205044	NO <sub>2</sub>	N	N	Y(4.0m)	2.0m	Y
4a	Cainscross – 22 Westward Road	Kerbside	308471	204988	NO <sub>2</sub>	N	N	Y(0.0m)	4.4m	Y
15	Nailsworth – Bath Road	Kerbside	385016	199727	NO <sub>2</sub>	N	N	N	3.4m	Y
16a	Painswick – St Marys House	Kerbside	386492	209473	NO <sub>2</sub>	N	N	Y(3.3m)	2.0m	Y
16	Painswick – High Street Lights	Kerbside	386677	209768	NO <sub>2</sub>	N	N	Y(3.2m)	0.5m	Y
16b	Painswick – Traffic Camera	Kerbside	386700	209794	NO <sub>2</sub>	N	N	Y(0.5m)	1.0m	Y
16c	Painswick – Melrose	Roadside	386810	209992	NO <sub>2</sub>	N	N	Y(2.8m)	4.8m	Y
21a	Stroud – British Oak Bowbridge	Roadside	385785	204370	NO <sub>2</sub>	N	N	Y(1m)	2.0m	Y
25a	Stroud – Signal House, Dudbridge Hill	Roadside	383652	204557	NO <sub>2</sub>	N	N	Y(5.0m)	2.7m	N
25c	Stroud – 1 Signal House, Dudbridge Hill	Roadside	383655	204551	NO <sub>2</sub>	N	N	Y(2.2m)	0.7m	Y
25d	Stroud – 2 Signal House, Dudbridge Hill	Roadside	383659	204556	NO <sub>2</sub>	N	N	Y(2.3m)	1.7m	Y
25e	Stroud – 3 Signal House, Dudbridge Hill	Roadside	383662	204554	NO <sub>2</sub>	N	N	Y(4.2m)	3.1m	Y

Site I.D	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
25f	Stroud – 4 Signal House, Dudbridge Hill	Roadside	383676	204545	NO <sub>2</sub>	N	N	Y(0.0m)	8.0m	Y
25g	Stroud – 5 Signal House, Dudbridge Hill	Roadside	383672	205538	NO <sub>2</sub>	N	N	Y(0.0m)	2.5m	Y
31	Upton St Leonards – 50 Woodland Green	Kerbside	386301	215294	NO <sub>2</sub>	N	N	Y(8.8m)	0.5m	Y
33	Trevoise, Hardwicke	Kerbside	380188	211951	NO <sub>2</sub>	N	N	21.7	4.7	Y
34	Hunts Grove Drive, Hardwick	Kerbside	381142	212276	NO <sub>2</sub>	N	N	N/A	N/A	N/A
35	The Lodge Haresfield	Kerbside	380232	210421	NO <sub>2</sub>	N	N	N/A	N/A	N/A
36	Martyn Close	Kerbside	387370	215940	NO <sub>2</sub>	N	N	N/A	N/A	N/A
37	Grove Lane, Westend	Kerbside	378290	206899	NO <sub>2</sub>	N	N	N/A	N/A	N/A
38	Stroud, Beeches Green	Kerbside	384929	205522	NO <sub>2</sub>	N	N	N	3m	N/A

- (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) 25 c & d were moved in January 2016 to avoid any potential influence from flue, distances of new locations now included.
- (4) Monitoring Points 33, 35, 36 & 37 included to monitor background levels before and after incinerator installed at Javelin park. Relevant receptors not considered at these sites.
- (5) Monitoring Point 38 included to provide information relating to short term exposure, no long term relevant receptors

Table A.2 - Results of Nitrogen Dioxide Diffusion Tubes in 2016

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2016 Number of Months	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88)
								2016 ( $\mu\text{g}/\text{m}^3$ )
3	Brookthorpe – North View	Roadside	N	N	12	N/A	N	27.64
4b	Cainscross – 2 The Rosaries	Roadside	N	N	12	N/A	Y	29.4
4a	Cainscross – 22 Westward Road	Kerbside	N	N	12	N/A	N	29.09
15	Nailsworth – Bath Road	Kerbside	N	N	12	N/A	N	25.54
16a	Painswick – St Marys House	Kerbside	N	N	12	N/A	N	31.12
16	Painswick – High Street lights	Kerbside	N	N	12	N/A	Y	30.12
16b	Painswick – Traffic Camera	Kerbside	N	N	12	N/A	Y	31.5
16c	Painswick - Melrose	Roadside	N	N	12	N/A	N	25.47

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2016 Number of Months	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88)
								2016 ( $\mu\text{g}/\text{m}^3$ )
21a	Stroud - Bowbridge	Roadside	N	N	12	N/A	Y	38.4
25a	Stroud – Signal House, Dudbridge Hill	Roadside	N	N	9	N**	Y	36.2
25c	Stroud – 1 Signal House, Dudbridge Hill	Roadside	N	N	9	Y	N	39.1
25d	Stroud – 2 Signal House, Dudbridge Hill	Roadside	N	N	12	N	N	37.1
25e	Stroud – 3 Signal House, Dudbridge Hill	Roadside	N	N	12	Y	N	37.8
25f	Stroud – 4 Signal House, Dudbridge Hill	Roadside	N	N	12	N	N	28.09
25g	Stroud – 5 Signal House, Dudbridge Hill	Roadside	N	N	12	N	N	28.93
31	Upton St Leonards –50 Woodland Green	Kerbside	N	N	11	N/A	N	27.05

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Data Capture 2016 Number of Months	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88)
								2016 ( $\mu\text{g}/\text{m}^3$ )
33	Trevose, Hardwicke	Kerbside	N	N	12	N/A	N/A	34.64
34	Hunts Grove Drive, Hardwicke	Kerbside	N	N	9	N/A	N/A	19.07
35	The Lodge, Haresfield	Kerbside	N	N	11	N/A	N/A	24.08
36	9, Martyn Close, Brockworth	Kerbside	N	N	12	N/A	N/A	16.24
37	Grove Lane, Westend	Kerbside	N	N	12	N/A	N/A	16.67
38	Stroud - Beeches Green	Kerbside	N	N	6	N/A	N/A	N/A

Table A.1 – Results of Nitrogen Dioxide Diffusion Tubes (2012 to 2016)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ ) - Adjusted for Bias <sup>a</sup>				
			2012 (Bias Adjustment Factor = 0.95)	2013 (Bias Adjustment Factor = 0.90)	2014 (Bias Adjustment Factor = 0.89)	2015 (Bias Adjustment Factor = 0.87)	2016 (Bias Adjustment Factor = 0.88)
3	Roadside	N	35.3	28.6	25.07	25.9	27.64
4b	Roadside	N	38.9*	32.5*	29.5	27.5	29.4
4a	Kerbside	N	37.5	30.6	28.40	25.7	29.09
15	Kerbside	N	32.3	26.5	27.76	24.9	25.54
16a	Kerbside	N	29.0	28.9	26.85	24.2	31.12
16	Kerbside	N	36.3*	31.3*	29.3	29.5	30.1
16b	Kerbside	N	38.5*	33.7*	36.5	31.3	31.5
16c	Roadside	N	28.5	25.8	25.07	23.8	25.47
21a	Roadside	N	<b>44.3*</b>	39.5*	35.6	37.6	38.4
25a	Roadside	N	<b>49.8*</b>	37*	37.8	36.2	36.2
25c	Roadside	N	<b>48.8</b>	39.8	<b>42.00</b>	39.5	39.1
25d	Roadside	N	<b>46.3</b>	<b>40.8</b>	<b>41.7</b>	38.2	37.1
25e	Roadside	N	<b>46.0</b>	39.9	37.2	37.9	37.8
25f	Roadside	N	35.2	28.7	27.96	25.0	28.09
25g	Roadside	N	34.2	31.0	29.52	26.7	28.93
31	Kerbside	N	33.7	26.9	22.91	24.6	27.05
33	Kerbside	N	N/A	N/A	N/A	N/A	34.64
34	Kerbside	N	N/A	N/A	N/A	N/A	19.07
35	Kerbside	N	N/A	N/A	N/A	N/A	24.08
36	Kerbside	N	N/A	N/A	N/A	N/A	16.24
37	Kerbside	N	N/A	N/A	N/A	N/A	16.67
38	Kerbside	N	N/A	N/A	N/A	N/A	N/A

Notes: Exceedances of the NO<sub>2</sub> annual mean objective of 40 $\mu\text{g}/\text{m}^3$  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%. See Appendix C for details.

**Table A.4 – Distance Attenuation Data**

Site ID	Raw Data µg/m <sup>3</sup>	Bias Adjusted (0.88) µg/m <sup>3</sup>	Background level µg/m <sup>3</sup>	Tube to kerb m	Receptor to kerb m	Predicted level µg/m <sup>3</sup>
4b	40.26	35.43	11.81	2.0	6.0	29.4
16	45.30	39.86	10.18	0.5	3.2	30.1
16b	38	33.44	10.18	1.0	1.5	31.5
21a	49.19	43.29	11.62	2.7	5.0	38.4
25a	46.03	40.51	12.57	2.7	5.0	36.2
25c	52.75	46.42	12.57	0.7	2.2	39.1
25d	44.25	38.94	12.57	1.7	2.3	37.1
25e	46.30	40.74	12.57	3.1	4.2	37.8

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

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

	LOCATION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVERAGE
3	BROOKTHORPE - NORTH VIEW	31.5	32.2	32.6	29.1	32.7	29.3	24.4	28.66	27.65	33.33	34.81	40.60	31.41
4b	CAINSCROSS - 2, THE ROSARIES	44.6	41.8	43.4	38.9	43.7	37.0	35.4	32.92	33.31	44.00	40.69	47.40	40.26
4a	CAINSCROSS - 22, WESTWARD ROAD	37.0	36.7	36.5	33.0	35.3	27.5	28.7	25.10	27.56	33.39	34.34	41.75	33.06
15	NAILSWORTH - BATH RD	34.0	32.2	30.3	26.6	32.5	28.9	21.3	23.00	21.14	29.97	31.64	36.79	29.02
16a	PAINSWICK - ST MARYS HOUSE	31.7	31.5	34.7	28.8	30.8	34.4	25.1	25.67	26.52	35.80	34.44	33.90	31.12
16	PAINSWICK - HIGH ST LIGHTS	48.0	49.7	52.7	43.2	45.8	43.7	40.7	40.43	39.59	43.83	46.19	49.69	45.30
16b	PAINSWICK - TRAFFIC CAMERA	43.4	43.3	44.6	34.7	38.4	23.6	30.0	29.81	34.92	41.05	39.75	52.56	38.00
16c	PAINSWICK - MELROSE	31.1	26.4	30.9	26.8	27.7	29.7	24.9	22.94	26.38	32.62	31.73	36.15	28.95
21a	STROUD - BOWBRIDGE	53.6	49.0	50.8	48.2	51.1	47.4	44.5	46.91	46.01	50.37	49.73	52.66	49.19
25a	SIGNAL HOUSE		46.9	52.7	48.6	50.5		37.5	38.71	36.48	50.78		52.07	45.98 <sup>1</sup>
25c	STROUD - 1, SIGNAL HOUSE	49.7	48.3	59.5	52.1	64.2	52.9			45.72	59.51			52.75 <sup>1</sup>
25d	STROUD - 2, SIGNAL HOUSE	49.0	43.5	43.3	43.1	51.4	45.4	41.6	37.37	36.66	45.12	47.91	46.67	44.25
25e	STROUD - 3, SIGNAL HOUSE	47.4	45.0	48.2	44.6	53.8	48.9	43.9	42.21	42.84	44.89	46.05	47.85	46.30
25f	STROUD - 4, SIGNAL HOUSE	33.1	36.3	35.0	31.3	36.2	31.5	23.3	25.10	26.85	35.33	35.18	33.84	31.92
25g	STROUD - 5, SIGNAL HOUSE	32.5	32.5	34.1	33.5	36.6	34.6	25.9	27.07	29.73	37.81	30.61	39.78	32.88
31	UPTON ST LEONARDS - 50, WOODLAND GREEN	34.3	33.8	35.1	32.7	29.3	26.8	23.6		22.42	28.26	35.56	36.37	30.74
33	TREVOSE, HARDWICKE	44.6	43.9	40.7	36.5	42.2	22.8	42.7	39.41	38.08	37.10	38.68	45.77	39.36
34	HUNTS GROVE DRIVE, HARDWICKE	26.1			16.5		32.7	12.1	11.81	16.28	23.36	25.76	30.50	21.67
35	THE LODGE, HARESFIELD	27.7	25.5	30.2	26.3	24.6	14.8		22.05	25.34	33.74	35.09	35.75	27.36
36	9, MARTYN CLOSE, BROCKWORTH	22.6	19.5	21.3	15.9	14.9	17.5	11.1	12.00	13.55	20.59	23.24	29.49	18.46
37	GROVE LANE, WESTEND	21.5	20.6	20.5	15.9	14.5	16.2	12.5	13.21	15.62	22.00	26.28	28.60	18.94
38	STROUD - BEECHES GREEN							48.0	48.50	46.24	51.85	50.11	46.82	48.59

<sup>1</sup> Post-annualisation averages – see Tables B.2 and B.3 for derivation

Table B.2 –25c Annualised

	25C	25D		25E		25F		25G	
	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm
Month	S1	S2	S2 When S1 result	S3	S3 When S1 result	S4	S4 When S1 result	S5	S5 When S1 result
Jan	49.7	49.0	49.0	47.4	47.4	33.1	33.1	32.5	32.5
Feb	48.3	43.5	43.5	45.0	45.0	36.3	36.3	32.5	32.5
Mar	59.5	43.3	43.3	48.2	48.2	35.0	35.0	34.1	34.1
Apr	52.1	43.1	43.1	44.6	44.6	31.3	31.3	33.5	33.5
May	64.2	51.4	51.4	53.8	53.8	36.2	36.2	36.6	36.6
Jun	52.9	45.4	45.4	48.9	48.9	31.5	31.5	34.6	34.6
Jul		41.6		43.9		23.3		25.9	
Aug		37.37		42.21		25.10		27.07	
Sep	45.72	36.66	36.66	42.84	42.84	26.85	26.85	29.73	29.73
Oct	59.51	45.12	45.12	44.89	44.89	35.33	35.33	37.81	37.81
Nov		47.91		46.05		35.18		30.61	
Dec		46.67		47.85		33.84		39.78	
Average	54.0	44.2	44.7	46.3	46.9	31.9	33.2	32.9	33.9
Ratio R Am/Pm			0.990360042		0.986268556		0.96124894		0.969877341
Average ratio	0.97693872								
S1 Annual Mean estimate	52.75								
Distance attenuation	National B215	12.6							

Table B.3 –25a Annualised

	25A	25D		25E		25F		25G	
	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm	Am	Period Mean Pm
Month	S1	S2	S2 When S1 result	S3	S3 When S1 result	S4	S4 When S1 result	S5	S5 When S1 result
Jan		49.0		47.4		33.1		32.5	
Feb	46.9	43.5	43.5	45.0	45.0	36.3	36.3	32.5	32.5
Mar	52.7	43.3	43.3	48.2	48.2	35.0	35.0	34.1	34.1
Apr	48.6	43.1	43.1	44.6	44.6	31.3	31.3	33.5	33.5
May	50.5	51.4	51.4	53.8	53.8	36.2	36.2	36.6	36.6
Jun		45.4		48.9		31.5		34.6	
Jul	37.5	41.6	41.6	43.9	43.9	23.3	23.3	25.9	25.9
Aug	38.71	37.37	37.37	42.21	42.21	25.10	25.10	27.07	27.07
Sep	36.48	36.66	36.66	42.84	42.84	26.85	26.85	29.73	29.73
Oct	50.78	45.12	45.12	44.89	44.89	35.33	35.33	37.81	37.81
Nov		47.91		46.05		35.18		30.61	
Dec	52.07	46.67	46.67	47.85	47.85	33.84	47.85	39.78	39.78
Average	46.0	44.2	43.2	46.3	45.9	31.9	33.0	32.9	33.0
Ratio R Am/Pm			1.024447176		1.008234453		0.966475768		0.996695659
Average ratio	0.998963264								
S1 Annual Mean estimate	<b>45.98</b>								
Distance attenuation	National B215	12.57							

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

### Diffusion Tube Bias Adjustment Factors

The diffusion tubes (20% TEA in water) were supplied and analysed by Somerset Scientific Services. The tubes at all locations throughout the area have a monthly exposure period. A bias adjustment factor of 0.88 (being the overall factor based on 3 studies) obtained via the national bias spreadsheet, was applied to all diffusion tubes.

This spreadsheet is available at:

<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

The results were distance attenuated using the methodology at:

<http://laqm.defra.gov.uk/documents/NO2withDistancefromRoadsCalculatorIssue4.xls>

### QA/QC of diffusion tube monitoring

The diffusion tubes (20% TEA in water) were supplied and analysed by Somerset Scientific Services. The tubes at all locations throughout the area have a monthly exposure period. A bias adjustment factor of 0.88 obtained via the National Bias Spreadsheet was applied to all diffusion tubes.

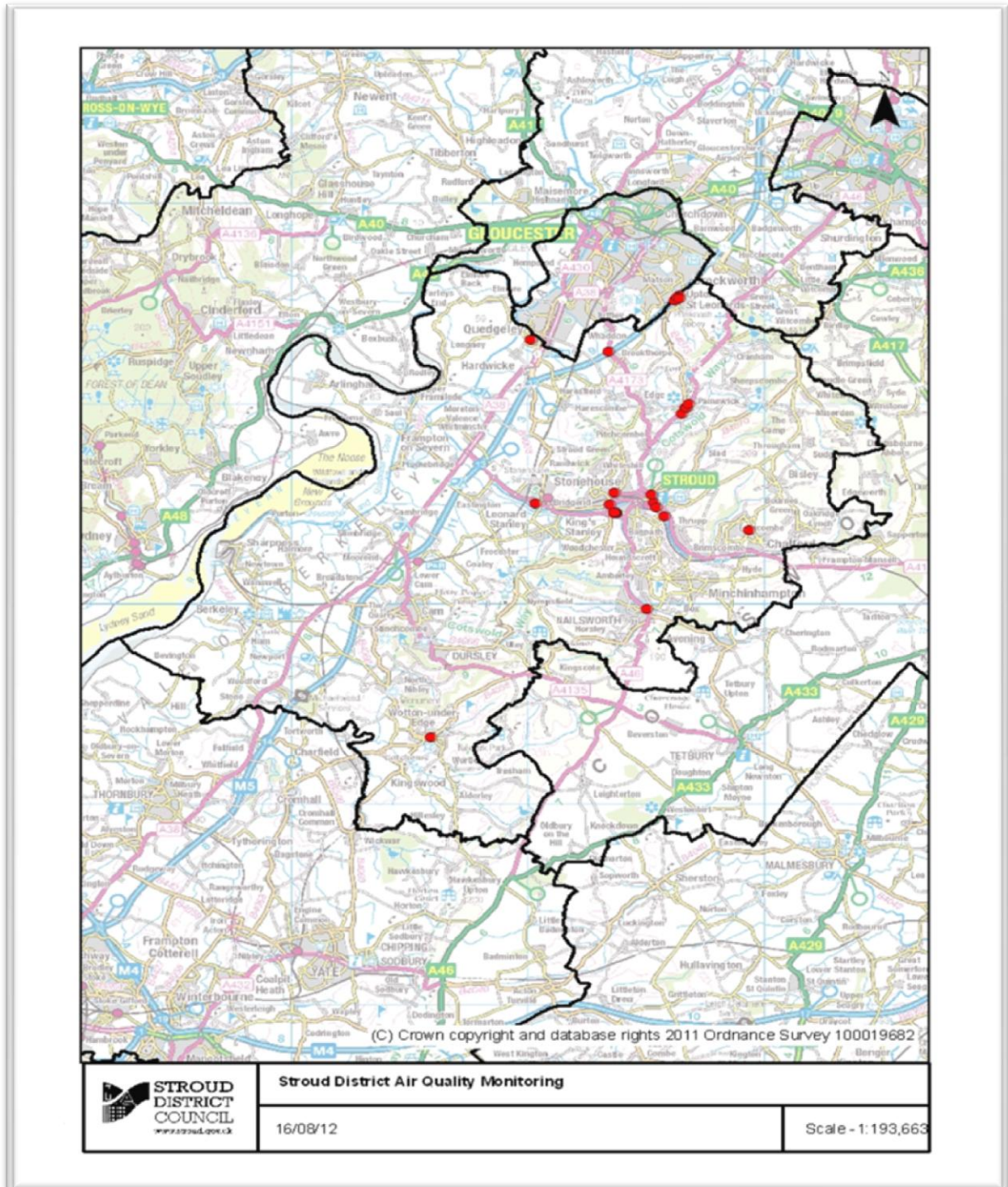
Summary of Laboratory Performance in WASP NO<sub>2</sub> Proficiency Testing Scheme for Rounds AR012-16

Details are available at:

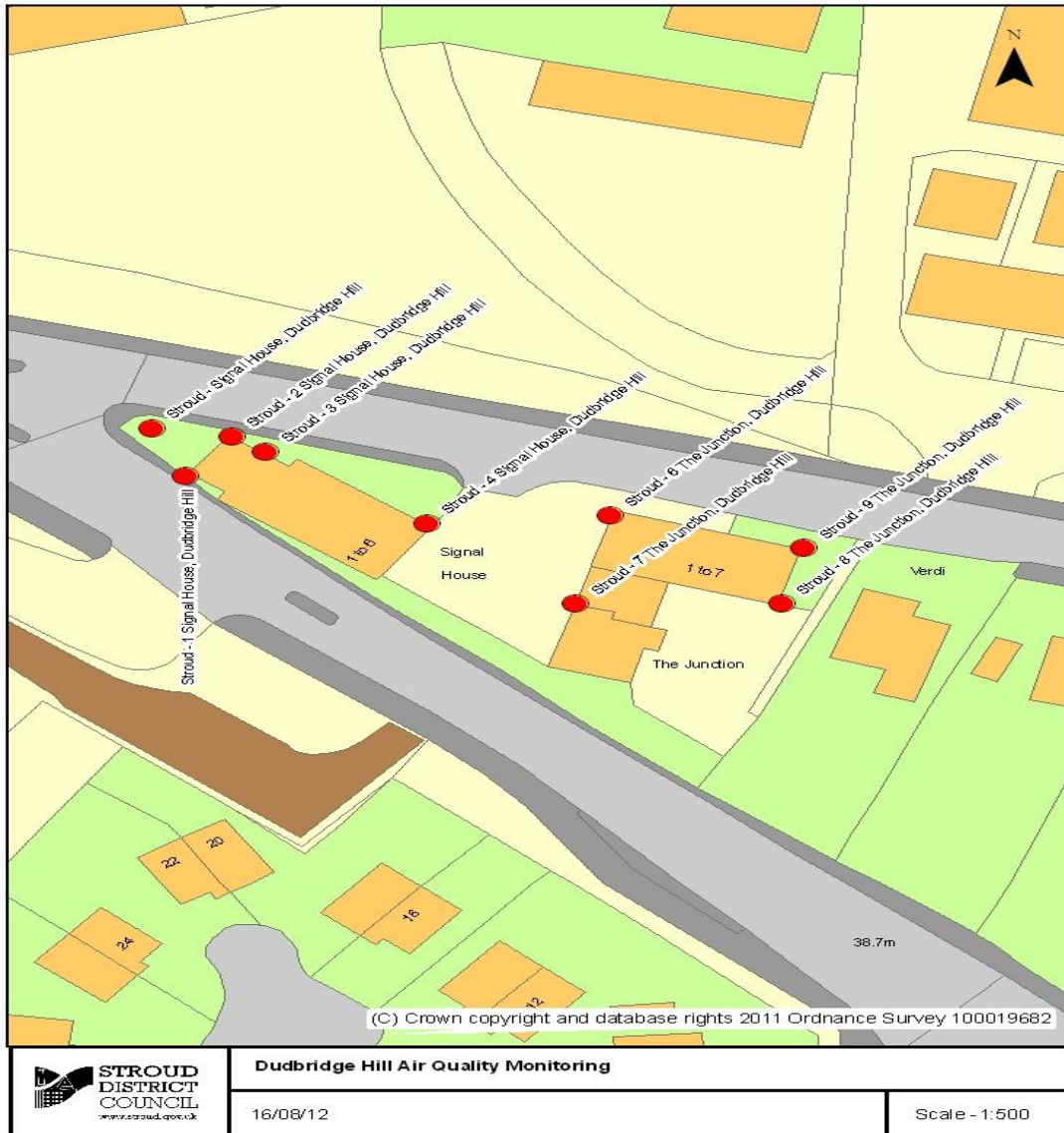
<https://laqm.defra.gov.uk/assets/airptrounds12to22jan2016oct20171.pdf>

This shows 100% efficiency for Somerset Scientific Services for AR012-16 covering 2016.

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



Map of Non-Automatic Monitoring Sites



Detailed Map of Dudbridge Hill Diffusion Tube 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

## Summary of Previous Reports

Stroud District Council has previously undertaken the following Review and Assessment reports, all of which are available at:

[www.stroud.gov.uk/docs/environment/air\\_quality.asp](http://www.stroud.gov.uk/docs/environment/air_quality.asp)

Updating and Screening Assessment 2003

- Progress Report 2004
- Progress Report 2005
- Updating and Screening Assessment 2006
- Progress Report 2007
- Progress Report 2008
- Updating and Screening Assessment 2009
- Progress Report 2010
- Progress Report 2011
- Updating and Screening Assessment 2012
- Progress Report 2013
- Progress Report 2014
- Updating and Screening Assessment 2015
- Annual Status Report 2016

There are no current AQMAs within our administrative area. A brief summary of the previous reports are below.

### **Conclusions of Updating and Screening Assessment 2006:**

- This assessed that the objectives for Carbon Monoxide, Benzene, 1,3-butadiene, Lead, PM10, Sulphur Dioxide were unlikely to be exceeded at any location within the administrative area of Stroud District, and therefore no Detailed Assessments were required.
- The assessment has indicated that the 2005 Nitrogen Dioxide annual mean objective will not be exceeded at any location within the administrative area of Stroud District Council, and therefore a Detailed Assessment will not be required. The assessment also indicated that the 2005 NO<sub>2</sub> hourly objective is unlikely to be exceeded, and therefore a Detailed Assessment will not be required with respect to the hourly mean.

- No new roads or roads with significantly changed flows within the administrative area of Stroud District Council were identified since the last round of Review and Assessment.
- Seven additional small waste oil burners (PG 1/1 (95)) had been permitted in Stroud District Council since the last round of Review and Assessment. It is not considered that these processes would have a significant influence on local air quality within the authority.

**Conclusions of Review and Assessment Progress Report 2007:**

- From the evidence provided in this report, no exceedences of the air quality objectives are likely to occur at any location within Stroud District Council's area. As a result of this it was recommended that Stroud District Council undertake a Progress Report in 2008.
- No other exceedences of the air quality objectives for Ozone and Sulphur Dioxide are likely.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead and 1,3-butadiene.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.

**Conclusions of Review and Assessment Progress Report 2008:**

- From the evidence provided in this report, no exceedences of the air quality objectives are likely to occur at any location within Stroud District Council's area. Therefore, Stroud District Council will undertake an Updating and Screening Assessment 2009.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide,
- Benzene, Lead, 1,3-butadiene, PM10, SO<sub>2</sub> or Ozone.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.

**Conclusions of Updating and Screening Assessment Report 2009:**

- From the evidence provided in this report, an exceedence of the air quality objectives for NO<sub>2</sub> was shown to occur at one location within Stroud District Council's area, at Cainscross - Stroud.

## **Stroud District Council**

- Stroud District Council will undertake a full review of its diffusion tube locations with specific attention to the above location.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.
- Stroud District council will undertake a Progress Report in 2010.

### **Conclusions of Progress Report 2010:**

- From the evidence provided in this report, no exceedence of the air quality objectives for NO<sub>2</sub> was shown to occur at Cainscross - Stroud.
- Stroud District Council will undertake a Detailed Assessment of the air quality at Dudbridge, Stroud.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.
- Stroud District council will undertake a Progress Report in 2011

### **Conclusions of Progress Report 2011:**

- From the evidence provided in this report, no exceedence of the air quality objectives for NO<sub>2</sub> was shown to occur at Cainscross - Stroud.
- Increase the monitoring with diffusion tubes at Dudbridge in anticipation of moving to a Detailed Assessment.
- Stroud District Council will undertake a Detailed Assessment of the air quality at Dudbridge, Stroud.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.

### **Conclusions of Updating and Screening Assessment Report 2012:**

- From the evidence provided in this report, no exceedence of the air quality objectives for NO<sub>2</sub> was shown to occur at Cainscross - Stroud.

- Increase the monitoring with diffusion tubes at Dudbridge in anticipation of moving to a Detailed Assessment.
- Stroud District Council will undertake a Detailed Assessment of the air quality at Dudbridge, Stroud.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.

### **Conclusions of Progress Report 2013**

- Carry out a period of real time monitoring for NO<sub>2</sub> at Bowbridge and Dudbridge during 2013 to enable detailed assessments of these sites to be made.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.
- Stroud District Council currently carries out no monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.

### **Conclusions of Progress Report 2014**

- 2013 diffusion tube results show one marginal exceedance of the 40 µg/m<sup>3</sup> annual objective for NO<sub>2</sub>. This was at Dudbridge.
- Realtime NO<sub>2</sub> monitoring will be carried out at Bowbridge in 2014 and the results reported back in the 2015 Updating and Screening Report
- Attempts were made to install continuous monitoring at Dudbridge to obtain more precise readings for that area; however a suitable power supply could not be obtained.
- NO<sub>2</sub> levels have fallen in 2013 such that there is only one marginal exceedance out of the ten NO<sub>x</sub> tubes at the Dudbridge Hill site.
- There are no new developments of significance that will influence air quality in the Stroud District Council area.
- As a result of previous Updating and Screening assessments Stroud District Council does not carry out monitoring for Carbon Monoxide, Benzene, Lead, 1,3-butadiene, PM<sub>10</sub>, SO<sub>2</sub> and Ozone.

**Conclusions of Updating and Screening Report 2015**

- There is a general trend of falling emissions levels across the district.
- The Air Quality across the District is generally very good
- The main influence on air quality within Stroud District is road traffic emissions
- The general downward trend in emissions levels is in keeping with that predicted nationally due to newer vehicles with tighter individual emission limits.
- NO<sub>2</sub> from traffic continues to be the primary pollutant of concern.

**Conclusions of Annual Status Report 2016**

- The main influence on air quality within Stroud District is road traffic emissions
- NO<sub>2</sub> from traffic continues to be the primary pollutant of concern.
- There are two monitoring sites 25C & 25D which are on or slightly over the national average mean NO<sub>2</sub>. The levels at these sites, in keeping with the national trend, have fallen slightly since 2014. There are concerns that due to their location, one being on the corner of a building and the other next to a balanced flue, they may be over reading. The tubes will be re-sited prior to the next monitoring period (2016) to provide more accurate measurements of relevant exposure.