



**STROUD
DISTRICT
COUNCIL**
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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

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Executive Summary: Air Quality in Our Area

The most significant influence on air quality within Stroud District arises from road traffic emissions. The principal pollutant of concern from road traffic is Nitrogen Dioxide. The overall picture for the District is that air quality continues to be very good.

In 2017, Nitrogen Dioxide levels from the previous monitoring period were noted to have stabilised slightly following a slow downward trend over previous years. Over the past year the majority of monitoring locations have reported decreases in levels of Nitrogen Dioxide. However, a small number of locations report slightly elevated levels of Nitrogen Dioxide. It should be noted that these increases are marginal and are well within the accepted variability for results accrued utilising diffusion tubes.

The downward shift in Nitrogen Dioxide levels identified over the past year appears to fit with the overall slowly descending trend noted over the longer period. However, given that some sites have reported slightly elevated Nitrogen Dioxide levels against those reported in 2017, it is necessary to continue to review this position over the coming years in conjunction with other local authority and national data.

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, as 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.

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

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

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

The 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 (AQMAs) within the District.

Diffusion tubes are used to measure Nitrogen Dioxide and a number of these are located across the District. These tubes are collected and sent off for analysis on a monthly basis. Over the last few years the tubes have indicated a steadily decreasing trend in Nitrogen dioxide levels. This year, none of the tubes have reported levels of Nitrogen Dioxide at or above the annual average.

Actions to Improve Air Quality

Gloucestershire County Council has responsibility 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 specific policy documents relating to bus travel, the cycle network, the freight network, highways, rail travel and think travel, which is a document promoting travel choice.

Local Priorities and Challenges

A 65.3 MW energy from waste plant is currently under construction at Javelin Park, near Haresfield. This is due to be commissioned in 2019. Stroud District Council's Environmental Protection Manager meets on a regular basis with a Community Liaison Group made up of the operating company, Town and Parish Councils, the Environment Agency, Gloucestershire County Council and nearby sensitive receptors to discuss issues that concern the local community. One of the issues raised at the liaison group relates to the impact of the incinerator on local air quality. Assessments completed for the planning and permitting regimes indicate that there will be no significant impact as a result of the operation of the plant. Despite this, a number of extra NO_x diffusion tubes have been located in the area with a view to providing reassurance to local residents by measuring background levels prior to commissioning of the plant and then continuing afterwards. It is also proposed that two continuous PM₁₀ monitors are to be positioned at local sites. These will be installed approximately 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 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 demonstrating the strategies employed 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 D.1 in Appendix D.

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 the measures it intends to put in place in pursuit of compliance with the objectives.

Stroud District Council does not have any AQMAs.

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

DEFRA's appraisal of last year's ASR concluded that five sites lie within 10% of the air quality objective and this has been the case over the previous five years. It was recommended that the Council considers declaring an AQMA for sites 21a, 25a, 25c, 25d and 25e.

The appraisal identified that only one site (16a) failed to report substantially lower concentrations than 2012. Additionally, three sites (25c, 25d and 25e) were the only sites not to report a decrease (minor) in the period 2015-2016. The appraisal suggested that the Council pay close attention to these sites (16a, 25c, 25d and 25e).

Stroud District Council has taken forward a number of direct measures in pursuit of improving local air quality.

- Additional Nitrogen Dioxide diffusion tubes have been located across the district to provide background levels of Nitrogen Dioxide prior to the commissioning of the Javelin Park Incinerator. Going forward, monitoring of levels will continue following commissioning of the plant.
- Age restrictions have been imposed on vehicles which can be licensed as Private Hire Taxis.

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.

Stroud District Council is taking the following measures to address PM_{2.5}:

- Continue to work with Gloucester County Council to identify areas within the Local Transport Plan that will contribute towards a reduction in PM_{2.5}.
- Work continues on the review and update to Stroud District Council's Health and Well Being Plan and the development of policies and strategies which will reduce PM_{2.5} 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 undertaken any automatic monitoring during 2017.

3.1.2 Non-Automatic Monitoring Sites

Stroud District Council undertook non- automatic (passive) monitoring of NO₂ at 22 sites during 2017. Table A.1 in Appendix A shows the details of the sites.

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.1 in Appendix A provides details of the non-automatic monitoring sites.

Table A.2 in Appendix A shows the ratified and adjusted monitored NO₂ annual mean concentrations results for the 2017 monitoring period. Table A.2 also compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40 µg/m³.

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

There are no exceedances of the air quality objective of 40 µg/m³. Therefore, as per paragraph 7.78 of TG 16, distance attenuation has only been calculated for monitoring locations that report annual mean concentrations within 10% of the annual objective of 40µg/m³ (i.e. above 36 µg/m³), in order to account for uncertainty in

diffusion tube monitoring concentration data. This is with the exception of site ID 38 where there is no relevant exposure.

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?	Tube co-located with a Continuous Analyser?	Distance to kerb of nearest road (m) ⁽²⁾	Distance to Relevant Exposure (m) ⁽¹⁾	Height (m)
3	Brookthorpe – North View	Roadside	383410	212570	NO ₂	N	N	19.8	0	2
4b	Cainscross – The Rosaries	Roadside	383511	205044	NO ₂	N	N	2.0	4.0	2.4
4a	Cainscross – 22 Westward Road	Kerbside	388472	204986	NO ₂	N	N	4.4	0	2.4
15	Nailsworth – Bath Road	Kerbside	385023	199748	NO ₂	N	N	4.1	11.7	2.4
16a	Painswick – St Marys House	Kerbside	386492	209473	NO ₂	N	N	2.0	3.3	2
16	Painswick – High Street Lights	Kerbside	386677	209768	NO ₂	N	N	0.5	3.2	2.4
16b	Painswick – Traffic Camera	Kerbside	386700	209794	NO ₂	N	N	0.5	1.0	2.4
16c	Painswick – Melrose	Roadside	386810	209992	NO ₂	N	N	2.8	4.8	2.4
21a	Stroud – British Oak Bowbridge	Roadside	385785	204370	NO ₂	N	N	1.3	1.9	2.4
25c	Stroud – 1 Signal House, Dudbridge Hill	Roadside	383655	204551	NO ₂	N	N	0.7	0.9	1.5
25d	Stroud – 2 Signal House, Dudbridge Hill	Roadside	383659	204556	NO ₂	N	N	3.9	0	2.4
25e	Stroud – 3 Signal House, Dudbridge Hill	Roadside	383662	204554	NO ₂	N	N	2.9	0	2.4
25f	Stroud – 4 Signal House, Dudbridge Hill	Roadside	383676	204545	NO ₂	N	N	8.0	0	2.4
25g	Stroud – 5 Signal House, Dudbridge Hill	Roadside	383672	205538	NO ₂	N	N	2.5	0	5

31	Upton St Leonards – 50 Woodland Green	Kerbside	386301	215294	NO ₂	N	N	0.5	8.0	2.4
34	30, Hunts Grove Drive, Hardwick	Kerbside	381142	212271	NO ₂	N	N	N/A	N/A	2.4
33	Trevose, Hardwicke	Kerbside	380188	211951	NO ₂	N	N	4.7	21.7	2.4
35	The Lodge Haresfield	Kerbside	380232	210421	NO ₂	N	N	N/A	N/A	2.4
36	Martyn Close	Kerbside	387370	215940	NO ₂	N	N	N/A	N/A	2.4
37	Grove Lane, Westend	Kerbside	378290	206899	NO ₂	N	N	N/A	N/A	2.4
25a	Stroud – Signal House, Dudbridge Hill	Roadside	30, 383652	204557	NO ₂	N	N	2.7	5.7	2.4
38	Stroud, Beeches Green	Kerbside	384929	205522	NO ₂	N	N	3.0	N/A	2.4

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) Monitoring Points 34, 35, 36 & 37 included to monitor background levels before and after incinerator installed at Javelin Park. Relevant receptors not considered at these sites.

(4) Monitoring Point 38 included to provide information relating to short term exposure, no long term relevant receptors.

Table A.2 – 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⁾				
					2013	2014	2015	2016	2017
3	Roadside	Diffusion tube	N/A	100	28.6	25.07	25.9	27.64	21.67
4b	Roadside	Diffusion tube	N/A	100	32.5	29.5	27.5	29.4	30.68
4a	Kerbside	Diffusion tube	N/A	100	30.6	28.40	25.7	29.09	24.88
15	Kerbside	Diffusion tube	N/A	100	26.5	27.76	24.9	25.54	22.06
16a	Kerbside	Diffusion tube	N/A	92	28.9	26.85	24.2	31.12	21.58
16	Kerbside	Diffusion tube	N/A	92	31.3	29.3	29.5	30.1	35.51
16b	Kerbside	Diffusion tube	N/A	92	33.7	36.5	31.3	31.5	28.57
16c	Roadside	Diffusion tube	N/A	92	25.8	25.07	23.8	25.47	20.92
21a	Roadside	Diffusion tube	N/A	92	39.5	35.6	37.6	38.4	38.64
25c	Roadside	Diffusion tube	N/A	83	39.8	42.00	39.5	39.1	38.98
25d	Roadside	Diffusion tube	N/A	92	40.8	41.7	38.2	37.1	34.02
25e	Roadside	Diffusion tube	N/A	100	39.9	37.2	37.9	37.8	35.97
25f	Roadside	Diffusion tube	N/A	100	28.7	27.96	25.0	28.09	25.54
25g	Roadside	Diffusion tube	N/A	100	31.0	29.52	26.7	28.93	24.77
31	Kerbside	Diffusion tube	N/A	100	26.9	22.91	24.6	27.05	21.42

34	Kerbside	Diffusion tube	N/A	100	N/A	N/A	N/A	19.07	14.58
33	Kerbside	Diffusion tube	N/A	92	N/A	N/A	N/A	34.64	30.15
35	Kerbside	Diffusion tube	N/A	100	N/A	N/A	N/A	24.08	20.00
36	Kerbside	Diffusion tube	N/A	92	N/A	N/A	N/A	16.24	14.17
37	Kerbside	Diffusion tube	N/A	83	N/A	N/A	N/A	16.67	12.64
25a	Roadside	Diffusion tube	N/A	92	37	37.8	36.2	36.2	30.98
38	Kerbside	Diffusion tube	N/A	100	N/A	N/A	N/A	N/A	36.32

X Diffusion tube data has been bias corrected

X 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.

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 (0.77) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
3	39.86	31.96	30.36	26.02	25.90	26.89	21.53	32.41	17.11	27.08	30.96	27.70	28.15	21.67	-
4b	52.76	43.83	40.45	38.44	36.84	34.87	29.73	31.74	39.26	39.12	50.62	40.52	39.85	30.68	-
4a	48.76	35.18	31.93	30.53	28.74	23.99	23.43	26.93	29.53	30.06	39.95	38.73	32.31	24.88	-
15	37.81	34.41	30.82	26.14	27.46	24.98	22.41	22.17	23.59	27.76	34.87	31.40	28.65	22.06	-
16a	40.02	25.96	27.97	26.08	25.99	22.14	27.37	25.67	26.83	24.57	35.65		28.02	21.58	-
16	65.00	43.06	47.85	48.86	37.07	40.74	37.88	41.04	38.90	47.24	59.71		46.12	35.51	-
16b	53.98	39.36	39.86	39.44	31.44	25.90	28.76	30.79	34.88	36.92	46.75		37.10	28.57	-
16c	36.52	29.37	28.37	23.57	26.77	25.17	22.83	23.47	25.09	25.88	31.88		27.17	20.92	-
21a	61.57	51.89	50.65	51.87	46.73	42.86	43.11	44.28		51.90	59.47	47.73	50.19	38.64	33.0
25c	67.73	56.03	51.58	50.17	53.92	38.77	39.22	39.94			61.91	46.92	50.62	38.98	34.6
25d	54.05	46.61	45.46	47.35	44.58	36.52	38.81	34.66		46.61	49.44	41.84	44.18	34.02	-
25e	58.09	47.91	50.01	46.66	47.42	44.24	38.94	41.09	43.46	47.87	47.83	46.98	46.71	35.97	-
25f	50.48	32.06	43.01	27.27	27.14	20.62	25.47	22.48	27.97	28.23	58.20	35.15	33.17	25.54	-
25g	46.44	33.55	28.08	29.91	32.45	23.79	26.72	26.09	30.37	29.54	42.16	37.00	32.17	24.77	-
31	32.76	28.41	31.70	29.78	23.20	19.10	20.65	22.17	24.01	27.60	37.66	36.76	27.82	21.42	-
34	54.71	21.45	17.29	15.29	12.80	9.47	9.31	12.91	12.07	14.78	24.01	23.08	18.93	14.58	-
33	39.45		31.00	38.38	31.07	37.84	34.78	38.01	38.42	40.69	50.23	50.79	39.15	30.15	-

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35	21.34	24.38	29.07	23.82	23.52	18.31	18.99	20.02	24.01	23.21	30.47	54.54	25.97	20.00	-
36	30.39	23.17	20.79	14.41	13.76	7.76	12.41	10.82		15.56	22.20	31.11	18.40	14.17	-
37		21.59	17.24	12.15		8.68	15.51	12.29	14.77	15.35	24.84	21.81	16.42	12.64	-
25a	53.43	44.16	43.48	40.32	28.01	28.08	36.54	34.92	41.90	40.85	50.86		40.23	30.98	-
38	54.36	47.38	48.73	50.11	48.84	41.67	43.99	40.83	46.58	49.44	49.98	44.15	47.17	36.32	-

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) Distance corrected to nearest relevant public exposure.

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

Diffusion Tube Bias Adjustment Factors

All diffusion tubes were supplied and analysed by Somerset Scientific Services at Somerset County Council. All tubes at all locations have a monthly exposure period. A bias adjustment factor of 0.77 was obtained *via* the national bias spreadsheet and applied to all diffusion tubes. The bias adjustment factor was devised from two studies. The national bias spreadsheet is available at:

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

Where necessary, the results were distance attenuated using the methodology at:

<https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

QA/QC of diffusion tube monitoring

All diffusion tubes (20% TEA in water) were supplied and analysed by Somerset Scientific Services at Somerset County Council. All tubes at all locations have a monthly exposure period. A bias adjustment factor of 0.77 was obtained *via* the national bias spreadsheet and applied to all diffusion tubes. The bias adjustment factor was devised from two studies.

The summary of laboratory performance in air NO₂ proficiency testing scheme (April 2016 – February 2018) at:

<https://laqm.defra.gov.uk/assets/AIR-PT-Rounds-13-to-24-Apr-2016-Feb-2018.pdf>

outlines that Somerset Scientific Services achieved 100% proficiency in rounds January – February, April – May, July – August and 75% in the September – October round in 2017.

Appendix D: Summary of Air Quality Objectives in England

Table D.1 – Air Quality Objectives in England

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

⁴ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

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 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
SO ₂	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance (TG16) February 2018
- National bias adjustment factor spreadsheet: <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>
- Nitrogen dioxide fall off with distance calculator: <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>
- QA QC Framework <https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>
- Stroud District Council Annual Status Report 2016