



2018 AIR QUALITY ANNUAL STATUS REPORT (ASR) FOR FOREST OF DEAN DISTRICT COUNCIL

**In fulfillment of
PART IV OF THE ENVIRONMENT ACT 1995
LOCAL AIR QUALITY MANAGEMENT**

June 2018

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Executive Summary: Air Quality in Our Area

Air quality across the Forest of Dean District remains very good, with measured levels of nitrogen dioxide (NO₂) generally well within national limits.

We have one Air Quality Management Area (AQMA) in the District which is in Lydney and was declared in July 2010. It was identified that traffic congestion (at the T junction between the High Street and the Bream Road) was the most likely cause of the nitrogen dioxide (NO₂) levels which exceeded the national air quality objectives at the time the AQMA was declared.

Monitoring throughout 2017 has not identified any exceedances in the Forest of Dean District.

With the exception of our AQMA, in Lydney High Street, at Bream junction and just up Bream Road, the diffusion tube survey results were marginally lower (about 1 ug^m-³) than those recorded last year. Within the AQMA, the results were very slightly higher than last year, but still below the national air quality objective of 40 ug^m-³. These monitoring points were the only sites with nitrogen dioxide levels within 10 per cent of the annual average air quality objective (i.e. above 36ug^m-³).

As pollutant concentrations may vary significantly from one year to the next, due to the influence of meteorological conditions, it is not desirable to revoke our AQMA whilst we have sites still measuring levels within 10% of the national objective level, set to protect health. Our monitoring survey around the District will continue, in conjunction with planning controls in accordance with national guidance, to try to ensure that pollution levels do not approach the national air quality objective and that those within our AQMA remain closely monitored.

Within Forest of Dean District Council's administrative area there are no point sources of pollution that give rise to concern in respect of air quality. No new or significantly changed sources have been identified within the district. All proposed residential and industrial developments are considered with regard to their potential to increase traffic pollution in the AQMA and other areas.

Air Quality in the Forest of Dean

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.

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

In common with most local authority districts in England and Wales, the main pollutant of concern within Forest of Dean District is nitrogen dioxide from road traffic. Nationwide, levels of nitrogen dioxide have been steadily falling over the years.

We deploy a number of diffusion tube monitors across the District, measuring nitrogen dioxide as part of an ongoing survey. These are collected and sent for analysis on a monthly basis.

Air quality across the Forest of Dean District remains very good with measured levels of nitrogen dioxide (NO₂) generally well below national limits.

The nitrogen dioxide diffusion tube survey results were similar to those recorded last year. Our 2017 monitoring programme confirms that within the Lydney Air Quality Management Area (AQMA), the nitrogen dioxide annual mean objective is no longer exceeded, (although 4 monitoring sites within the AQMA, including the site where we locate 3 tubes together for quality control purposes, recorded levels within 10% of the objective) and at all other monitoring locations it continues to be comfortably met.

The 2005 – 2017 Forest of Dean District Council Air Quality reports are available online at [Department for Environment Food and Rural Affairs UK air information webpage](#).

Actions to Improve Air Quality

Lydney Air Quality Management Area (AQMA) was declared in July 2010 and a subsequent “Further Assessment” was submitted to Defra in June 2011.

It is thought that congestion at the T junction which is in a “street canyon” (i.e. the buildings by the roadside are high compared to the width of the road, preventing exhaust emissions from dispersing easily) was the cause of the previously high NO₂ levels.

Since the “Further Assessment”, there has been an investigation into options to improve air quality in the AQMA. The key change, that may have brought about the required improvement, is the introduction of a 20 mph speed limit in Lydney High Street; it is thought that this had the effect of relieving congestion at the T junction, as drivers on the main road more readily give way to exiting traffic when moving more slowly. Meteorological conditions are also known to impact upon pollution levels as they affect dispersion of polluting emissions.

Gloucestershire County Council is responsible for strategies relating to traffic management across the county. The local transport plan can be viewed on the [Gloucestershire County Council website](#).

The Overarching Transport Strategy is supported by further policy documents relating to: Bus, Cycle, Freight, Highways, Rail and Think Travel.

Local Priorities and Challenges

The nitrogen dioxide diffusion tube monitoring programme will continue and we will review results on a monthly basis, as they are received. We will work with our Planning Department and the County Planning and Highways Departments to ensure that developers of agreed new developments consider potential air quality impacts from the outset, so as not to cause undue deterioration of air quality in the District. We will follow national guidance to ensure air quality impacts are assessed for proposed developments and that any potential adverse impacts are mitigated as necessary.

How to Get Involved

Copies of the latest Air Quality Report can be found on the [FODDC Air Quality webpage](#).

Any queries about Air Quality should be directed to the Technical Pollution team within Forest of Dean District Council. This team can be contacted by email on: ers.pollution@publicagroup.uk

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Local Air Quality Management

This report provides an overview of air quality in Forest of Dean 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 occurs or 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 Forest of Dean 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.

Actions to Improve Air Quality

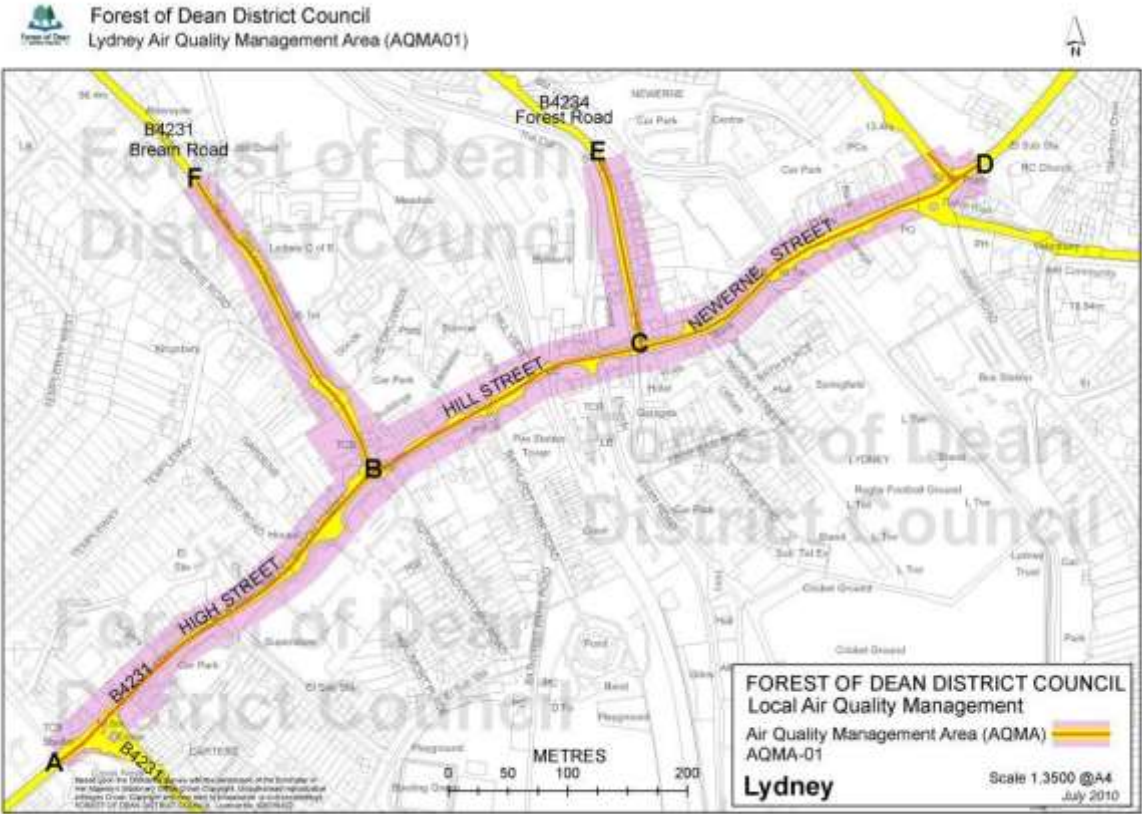
Air Quality Management Areas

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.

The Forest of Dean District Council declared Lydney AQMA in July 2010.

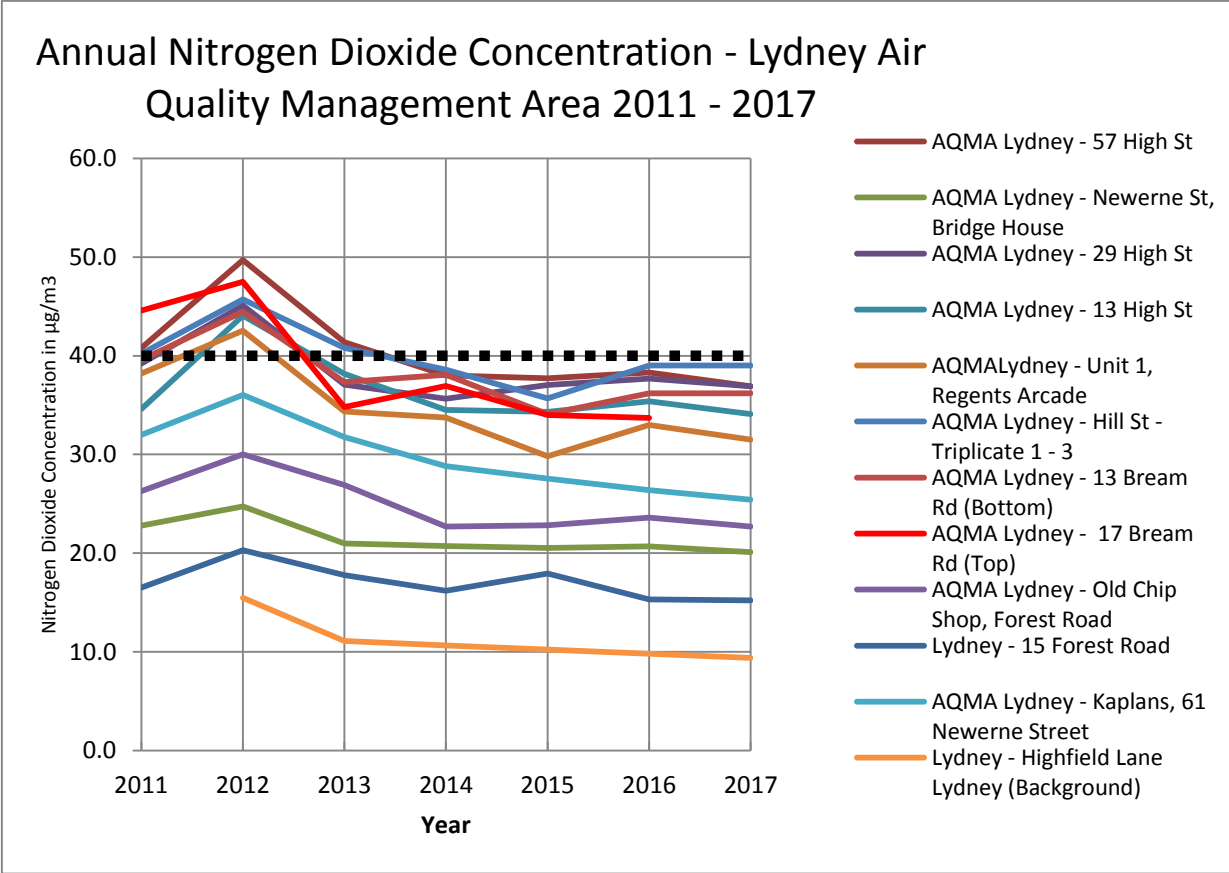
This AQMA was designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Standards Regulations 2007.

Figure 2.1- Map of Lydney AQMA Boundaries



The outlined area on the map above (Figure 2.1) shows the designated AQMA in Lydney, which incorporates roads affronting residential properties in High Street, Hill Street and Newerne Street from Temple Way junction (A) to Albert Street Junction (D); and Bream Road from High Street junction (B) to approximately 75m past the entrance to Lydney C of E Primary School (F); and Forest Road from Hill Street (C) to just past 17 Forest Road (E).

Figure 2.2 Graph showing the trend over the last 7 years of nitrogen dioxide levels within our Lydney AQMA



If we compare the nitrogen dioxide concentrations measured in our Lydney AQMA during the last three or four years with those of 2011 it can be seen that at the 4 sites where the readings were the highest in 2011 ($40\mu\text{g}/\text{m}^3$ or above) there has been a decrease in levels, but that in the last 4 years the levels have not changed much. At all the other sites, where the concentration did not exceed $40\mu\text{g}/\text{m}^3$ in 2011, the levels have not changed significantly since 2011. (2012 was a particularly high year for pollution across the whole country due to meteorological conditions that year, and the 2012 levels provide an indication of the impact that meteorology can have in our AQMA.)

Table 0.1 – Declared Air Quality Management Area

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Lydney AQMA	NO ₂ annual mean	Lydney	High Street, Hill Street and Newerne Street from Temple Way junction (A) to Albert Street Junction (D); and Bream Road from High Street junction (B) to approximately 75m past the entrance to Lydney C of E Primary School (F); and Forest Road from Hill Street (C) to just past 17 Forest Road (E).	<p>The draft Lydney AQMA Action Plan January 2015 is available on the FODDC Air Quality webpage.</p> <p>Since introduction of a 20mph speed limit at the junction the nitrogen dioxide levels have fallen below the national air quality objective level. As levels remain within 10% of the limit we have not retracted the AQMA.</p>

Action Plan Options and their Evaluation

Various options were assessed and assigned scores. Those options scoring 20 or more were considered to be the most feasible and cost effective options for positive air quality impacts in the town centre.

There were 8 options which score higher than 20, as detailed below:

- Option 1 - Action Schemes
- Option 2 - Bream Road – Signalisation
- Option 7 - Switch off engines at steam train level crossing whilst idling
- Option 8 - Reduce parking near Lydney C of E School and encourage parking in car park at the bottom of Bream Road
- Option 10 - Promote regular HGV servicing and emission testing to ensure cleaner running vehicles
- Option 13 - Newerne Street Link
- Option 14 - Improve rail services and facilities
- Option 15 - Other public transport services

Option 1 aligns with Gloucestershire County Council's LTP regarding 'smarter choices', their 'Active Together' scheme and their 'Connecting Places' proposals. It provides low cost methods to encourage mode shift from the private car.

Options 2 and 13 are being promoted by Gloucestershire County Council as part of the Lydney Highway Strategy and funding is either provisionally available or is being actively sought.

Options 7, 8 and 10 are not necessarily straightforward to implement.

Options 14 and 15 involve other organisations, e.g. Network Rail, Great Western Trains, Arriva Trains, Stagecoach, Forest Routes Community Transport, etc. Funding is provisionally available for improving the railway station by providing a cycle link from the town centre to the railway, with cycle parking at each end of the scheme;

Progress and Impact of Measures to Address Air Quality in Forest of Dean District

Forest of Dean District Council has taken forward a number of measures during the current reporting year in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 0.2. Forest of Dean District Council expects the following measures to be completed over the course of the next reporting year:

- Continuation of nitrogen dioxide diffusion tube monitoring survey across the district
- Continuation of consultation with Forest of Dean District Planning Department as well as with Gloucestershire Highways and Planning Departments.
- Air Quality Group meetings with neighbouring authorities.

Table 0.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1		Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	FOD Council	2014	2015	Approved policy in place and in use, with associated technical guidance available on FODDC website	Address potential increase in vehicular emissions due to vehicle usage associated with new residential and business developments	Policy approved and in use from 30 July 2015.	Completed	http://www.fdean.gov.uk/media/3428/air-quality-technical-planning-guidance.pdf
2		Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality						Gloucestershire Air Group meetings	Ongoing	
3		Promoting Travel Alternatives	Encourage / Facilitate home-working							Ongoing	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4		Promoting Travel Alternatives	Promotion of walking	FOD Council							
5		Public Information	Via the Internet	FOD Council							
		Traffic Management	Reduction of speed limits, 20mph zones	Gloucestershire County Council			Improved traffic flow at peak hours in the Lydney	Yes		Completed	Since introduction of a 20mph speed limit at the key AQMA junction, the nitrogen dioxide levels have fallen below the national air quality objective level. As levels remain within 10% of the limit we have not retracted the AQMA.

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.

Other than the potential source from vehicles, no significant source of PM_{2.5} has been identified within the District. Forest of Dean District Council is working with Gloucestershire County Council to identify measures within the Local Transport Plan and the Health and Wellbeing Plan that will contribute towards a reduction in PM_{2.5}

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

Summary of Monitoring Undertaken

This section sets out what monitoring has taken place and how the results compare with the national objectives, set to protect health.

1.1.1 Non-Automatic Monitoring Sites

Forest of Dean District Council undertook non- automatic (passive) monitoring of NO₂ using diffusion tubes at 28 sites during 2017. We exposed 3 tubes at one site within the AQMA for Quality Control purposes, so we have 30 results each month. We average out the results of the triplicate tubes to provide one result for that location. Table A1 in Appendix A provides technical details of the diffusion tube monitoring sites.

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

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on the bias adjustment are provided in Appendix C. There were sufficient results from each site in 2017 so annualisation was not required (i.e. >75% data collection at each monitoring site) other than at one site in our Lydney AQMA, where we locate our triplicate tubes., LYD 17, LYD 18 and LYD 19. Work on the property involving scaffolding prevented us putting our tubes out at that location from January till end of April. Our results for the remaining 8 months of the year were annualised in accordance with the procedure outlined in the Defra Technical Guidance note (TG16) and can be seen in Appendix C. The annual average result for this set of tubes was the highest result within our AQMA at 37.1 µg/m³.

1.1.2 Nitrogen Dioxide (NO₂)

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

The full 2017 dataset of monthly mean values is provided in Appendix B.

Figure 3.I Graph showing the trend over the last 7 years of nitrogen dioxide levels around the district (outside of our AQMA)

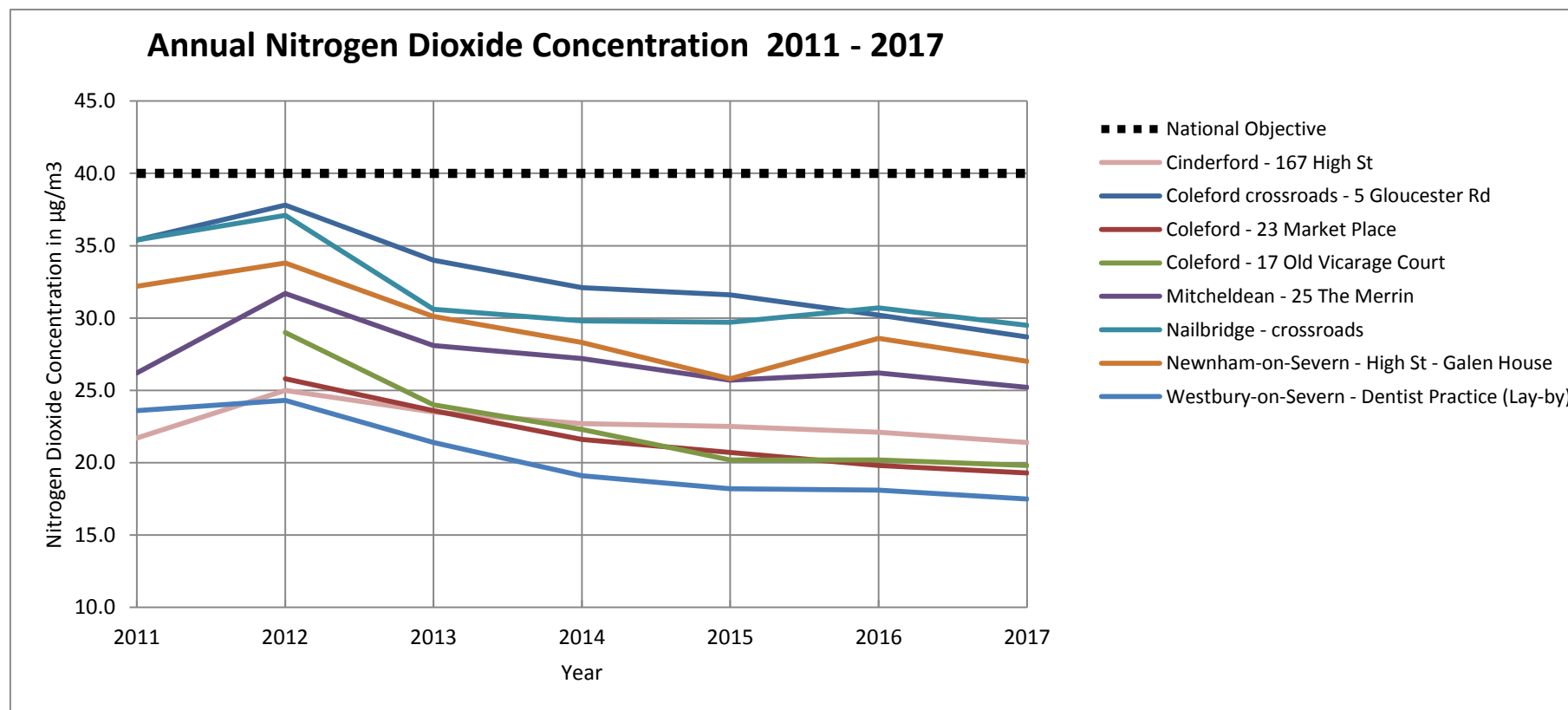


Figure 3.I shows the trend of nitrogen dioxide levels monitored around the district (outside of our Lydney AQMA).

If we compare current monitoring results with those from 2011, it can be seen that at the sites with the highest levels ($> 25 \mu\text{g}/\text{m}^3$) there has been a gradual decrease in nitrogen dioxide levels. Levels at most of the other sites have remained broadly similar.

It can be clearly seen that the nitrogen dioxide levels outside of the AQMA are well below the national standard of $40 \mu\text{g}/\text{m}^3$ which is marked by a dotted line on the graph.

The results of monitoring within our Lydney AQMA demonstrated that away from the Bream junction with Hill Street and High Street, the levels are as expected near busy roads. They range from 20.1 – 34.1 $\mu\text{g}/\text{m}^3$. No other locations being monitored in the district experienced annual average levels above 30 $\mu\text{g}/\text{m}^3$ once bias adjustment had been carried out. There were four locations within the AQMA, close to the junction, where the results lay within 10% of the national air quality objective. These were as follows:

Tube reference	Location	Nitrogen dioxide concentration ($\mu\text{g}/\text{m}^3$)
LYD 01	Top High Street	36.9
LYD 03	Mid High Street	36.9
LYD 16	Top High Street	36.9
LYD 17,18 and 19 (triplicate)	Hill Street	37.4, 36.9, 37.1 Average 37.1

As these levels within our AQMA still lie within 10% of the national air quality objective, we have not rescinded the AQMA designation.

Appendix A: Monitoring Results

Table A.1 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Worst-Case Exposure?
CIN03	Cinderford – Bottom High St	Roadside	365291	214732	NO ₂	No	Y (<1m)	1m	Yes
CIN04*	Cinderford - 31 Market St (CANDI)	Roadside	365637	214012	NO ₂	No	Y (<1m)	1.5m	Yes
COL01	Coleford –Gloucester Road	Suburban	357629	210787	NO ₂	No	Y (<1m)	2m	Yes
COL02	Coleford – Market Place	Suburban	357553	210757	NO ₂	No	Y (<1m)	7m	Yes
COL03	Coleford – Old Vicarage Court	Suburban	357742	210580	NO ₂	No	Y (<1m)	7m	Yes
HUN03*	Huntley – Opposite 3 Frogmore Road	Roadside	372370	219678	NO ₂	No	N (<1m)	1.5m	Yes
LIT01*	Littledean - Deancroft	Roadside	3 67016	213431	NO ₂	No	N (3m)	1.5m	Yes
LYD01	Lydney – Top High St	Roadside	363142	203074	NO ₂	Yes	Y (<1m)	2m	Yes
LYD02	Lydney – Newerne Street	Urban Centre	363523	203261	NO ₂	Yes	Y (<1m)	4m	Yes
LYD03	Lydney – Mid High St	Suburban	363025	202964	NO ₂	Yes	Y (<1m)	1m	Yes
LYD04	Lydney – Bottom High St	Suburban	362964	202909	NO ₂	Yes	Y (<1m)	1m	Yes
LYD05	Lydney - Regents Arcade	Urban Centre	363443	203206	NO ₂	Yes	Y (1m)	1m	Yes
LYD08	Lydney – Mid Bream Road	Roadside	363107	203217	NO ₂	Yes	Y (<1m)	2m	Yes
LYD09	Lydney – Top Bream Road	Kerbside	363046	203322	NO ₂	Yes	Y (<1m)	<1m	Yes
LYD10	Lydney – Old Chip Shop, Forest Road	Roadside	363405	203237	NO ₂	Yes	Y (<1m)	2m	Yes
LYD11	Lydney – Forest Road	Kerbside	363391	203337	NO ₂	Yes	Y (<1m)	<1m	Yes
LYD12	Lydney –Newerne Street	Urban Centre	363607	203322	NO ₂	Yes	Y (<1m)	2m	Yes
LYD15	Lydney – Highfield Lane	Suburban	364087	204137	NO ₂	Yes	N (1m)	1m	Yes
LYD16*	Lydney – Top High	Urban Centre	363142	203069	NO ₂	Yes	Y (1m)	1m	Yes
LYD17*	Lydney - Hill St - (Triplicate 2 of 3)	Urban Centre	363185	203111	NO ₂	Yes	Y (<1m)	1.5m	Yes
LYD18*	Lydney - Hill St - (Triplicate 2 of 3)	Urban Centre	363185	203111	NO ₂	Yes	Y (<1m)	1.5m	Yes
LYD19*	Lydney – Hill St - (Triplicate 3 of 3)	Urban Centre	363185	203111	NO ₂	Yes	Y (<1m)	1.5m	Yes
MIT01	Mitcheldean –The Merrin	Roadside	366483	218277	NO ₂	No	N (2m)	1m	Yes
MIT02	Mitcheldean –Gloucester Road	Roadside	366584	218349	NO ₂	No	N (<1m)	2m	Yes
NAI01	Nailbridge – Crossroads	Roadside	364555	216226	NO ₂	No	N (<1m)	1m	Yes
NEW03*	Newent - High Street	Roadside	372117	226049	NO ₂	No	N (1m)	2m	Yes
NOS02	Newnham-on-Severn - High St	Roadside	369038	211590	NO ₂	No	N (<1m)	2.5m	Yes
NOS04	Newnham-on-Severn - High St	Roadside	369199	211927	NO ₂	No	N(<1m)	3m	Yes

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Worst-Case Exposure?
WOS0 1	Westbury-on-Severn - High St - bus stop	Roadside	371649	214054	NO ₂	No	N (<1m)	10m	Yes
WOS0 1	Westbury-on-Severn - High Street	Roadside	371630	214125	NO ₂	No	N (<1m)	1.5m	Yes

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
CIN03	Cinderford – Bottom High St	Diffusion Tube	100	100	23.5	22.7	22.5	22.1	21.4
CIN04*	Cinderford - 31 Market St (CANDI)	Diffusion Tube	100	100					22.9
COL01	Coleford –Gloucester Road	Diffusion Tube	100	100	34.0	32.1	31.6	30.2	28.7
COL02	Coleford – Market Place	Diffusion Tube	100	100	23.6	21.6	20.7	19.8	19.3
COL03	Coleford – Old Vicarage Courtt	Diffusion Tube	83	83	24.0	22.3	20.2	20.2	19.8
HUN03*	Huntley – Frogmore Road	Diffusion Tube	100	100					9.5
LIT01*	Littledean - Deancroft	Diffusion Tube	100	100					27.0
LYD01	Lydney – Top High St	Diffusion Tube	100	100	41.4	38.0	37.7	38.4	36.9
LYD02	Lydney – Newerne Street	Diffusion Tube	100	100	21.0	20.7	20.5	20.7	20.1
LYD03	Lydney – Mid High St	Diffusion Tube	92	92	37.1	35.6	37.0	37.7	36.9
LYD04	Lydney – Bottom High St	Diffusion Tube	92	92	38.2	34.5	34.3	35.4	34.1
LYD05	Lydney - Regents Arcade	Diffusion Tube	100	100	34.3	33.7	29.8	33.0	31.5
LYD08	Lydney – Mid Bream Road	Diffusion Tube	100	100	37.3	38.1	34.1	35.5	34.1
LYD09	Lydney – Top Bream Rd	Diffusion Tube	100	100	34.8	36.9	34.0	34.2	32.6
LYD10	Lydney – Forest Road	Diffusion Tube	100	100	26.9	22.7	22.8	23.6	22.7

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
LYD11	Lydney – Forest Road	Diffusion Tube	100	100	17.8	16.2	17.9	15.3	15.2
LYD12	Lydney –Newerne Street	Diffusion Tube	92	92	31.7	28.8	27.6	26.4	25.4
LYD15	Lydney – Highfield Lane	Diffusion Tube	100	100	11.1	10.7	10.2	9.8	9.4
LYD16*	Lydney – Top High	Diffusion Tube	100	100					36.9
LYD17*	Lydney - High St - (Triplicate 2 of 3)	Diffusion Tube	66	66					37.4
LYD18*	Lydney - High St - (Triplicate 2 of 3)	Diffusion Tube	66	66					36.9
LYD19*	Lydney - Hilgh St - (Triplicate 3 of 3)	Diffusion Tube	66	66					37.1
MIT01	Mitcheldean –The Merrin	Diffusion Tube	100	100	28.1	27.2	25.7	26.2	25.2
MIT02	Mitcheldean – Gloucester Road	Diffusion Tube	100	100				23.8	22.6
NAI01	Nailbridge – Crossroads	Diffusion Tube	100	100	30.6	29.8	29.7	30.7	29.5
NEW03*	Newent - High Street	Diffusion Tube	100	100					26.2
NOS02	Newnham-on-Severn - High St	Diffusion Tube	100	92	30.1	28.3	25.8	28.6	27.0
NOS04	Newnham-on-Severn - High St	Diffusion Tube	83	83	28.2	29.9	26.3	26.1	24.0
WOS01	Westbury-on-Severn - High St - bus stop	Diffusion Tube	100	100	21.4	19.1	18.2	18.1	17.5
WOS02*	Westbury-on-Severn - High Street	Diffusion Tube	92	92					27.2

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

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

- (2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Technical Guidance LAQMTG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

*New Sites

Appendix B: Full Monthly Diffusion Tube Results for 2017

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

2017 Ref	AIR QUALITY DIFFUSION TUBE RESULTS -2017	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	2017 Mean Unadjusted	2017 Bias Adjusted x0.87*and annualised (1)
		NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	
CIN03	Cinderford - 167 High St	31.5	25.7	26.8	25.0	25.6	16.0	21.9	19.5	22.2	26.1	28.1	27.1	24.6	21.4
CIN04	Cinderford - 31 Market St	38.2	27.4	28.0	29.0	23.3	19.5	23.6	21.3	16.7	27.9	32.1	28.8	26.3	22.9
COL01	Coleford crossroads - 5 Gloucester Rd	40.7	25.7	41.5	36.2	31.1	31.7	28.0	29.8	31.8	31.5	35.6	32.9	33.0	28.7
COL02	Coleford - 23 Market Place	34.4	26.0	22.5	19.7	21.3	18.2	16.8	16.7	18.5	20.6	27.8	23.1	22.1	19.3
COL03	Coleford - 17 Old Vicarage Court	31.2	23.6	26.4	23.8	19.9	18.1	17.0	15.5			27.1	25.1	22.8	19.8
HUN03	Huntley - opposite 9 Frogmore Road	22.9	13.2	12.2	6.4	8.6	6.2	6.7	6.7	8.0	10.9	13.7	15.3	10.9	9.5
LIT01	Littledean - Deancroft	38.7	30.4	33.9	31.1	31.0	27.4	28.6	27.9	29.8	29.2	30.6	33.9	31.0	27.0
LYD01	Lydney - 57 High St	43.4	42.9	42.5	46.8	42.2	44.5	37.3	39.0	39.7	39.3	46.9	45.0	42.5	36.9
LYD02	Lydney - Newerne St, Bridge House	29.0	26.9	26.4	17.7	17.7	24.5	18.1	19.8	20.7	24.2	25.8	26.5	23.1	20.1
LYD03	Lydney - 33 High St	53.0	49.5	44.7	42.2	34.9	36.9		31.1	36.1	40.8	47.7	50.1	42.5	36.9
LYD04	Lydney - 13 High St	50.0	42.5	43.3	44.4		37.2	29.9	28.6	35.2	35.2	45.3	39.0	39.1	34.1
LYD05	Lydney - Unit 1, Regents Arcade	39.2	40.2	40.6	30.8	36.2	40.7	33.9	30.3	35.4	31.9	39.2	36.6	36.3	31.5
LYD08	Lydney - 13 Bream Rd (Bottom)	49.5	39.1	41.6	38.9	35.0	42.1	34.4	33.2	38.1	33.9	47.3	37.4	39.2	34.1
LYD09	Lydney - 17 Bream Rd (Top)	50.3	40.4	38.0	37.2	33.9	39.7	34.6	32.2	32.0	33.9	42.7	35.2	37.5	32.6
LYD10	Lydney - Old Chip Shop, Forest Road	36.1	30.1	28.6	25.7	23.3	24.4	22.3	18.6	22.2	24.9	29.1	27.5	26.1	22.7
LYD11	Lydney - 15 Forest Road	28.0	21.5	19.7	15.1	14.2	15.5	13.6	7.3	14.8	16.2	22.3	22.1	17.5	15.2
LYD12	Lydney - Kaplans, 61 Newerne Street	37.0	29.5	33.2	33.1	26.5	27.4	24.0	22.9	24.8		32.9	29.9	29.2	25.4
LYD15	Lydney - Highfield Lane (Background)	22.6	14.4	14.0	7.1	7.6	6.9	7.8	6.8	7.3	12.1	11.7	11.0	10.8	9.4
LYD16	Lydney - 55 High Street Launderette	44.9	43.5	38.0	43.0	36.9	45.5	34.3	31.1	40.4	36.9	67.2	47.0	42.4	36.9
LYD17	Lydney - 61 High Street (Triplicate 1 of 3)					34.3	40.9	31.1	30.4	34.8	31.4	43.2	38.2	35.5	37.4
LYD18	Lydney - 61 High Street (Triplicate 2of 3)					36.4	40.0	34.5	29.5	30.7	32.8	37.9	38.5	35.0	36.8
LYD19	Lydney - 61 High Street (Triplicate 3of 3)					36.4	40.0	34.5	29.5	30.7	32.8	38.5	39.4	35.2	37.1
MIT01	Mitcheldean - opp25 The Merrin	38.5	31.0	32.6	32.4	23.9	23.0	26.5	24.3	26.7	25.8	31.9	30.9	29.0	25.2
MIT02	Mitcheldean - Old Cottage, Gloucester Road	40.2	29.8	26.3	26.2	25.1	19.6	24.2	19.4	24.8	23.1	27.8	24.9	26.0	22.6

2017		Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	2017 Mean	2017 Bias Adjusted x0.87*and annualised (1)
Ref	AIR QUALITY DIFFUSION TUBE RESULTS -2017	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	NO ₂ µg/m ³	Unadjusted	
NA01	Nailbridge - Crossroads	43.1	35.0	35.8	39.1	29.6	32.4	30.9	26.8	29.2	31.6	38.5	35.2	33.9	29.5
NEW03	Newent – 12 High Street	41.8	32.6	32.7	35.0	28.4	23.8	27.2	22.7	28.6	26.2	31.2	31.8	30.2	26.2
NOS02	Newnham-on-Severn - High St - Galen House	41.2	36.2	36.4	29.9	33.7	27.1	28.2	25.7	22.8	29.6	31.0	30.0	31.0	27.0
NOS04	Newnham-on-Severn, Opp 6 Mornington Terrace,	42.8	28.0	32.9	25.1	30.9	26.7			20.4	19.9	25.9	23.6	27.6	24.0
WOS01	Westbury-on-Severn - Dentist Practice (Lay-by)	32.0	23.3	19.9	17.0	18.9	15.9	17.2	16.3	18.3	18.2	24.4	20.6	20.2	17.5
WOS02	Westbury-on-Severn - High St		42.6	42.4	27.0	26.7	28.2	29.5	28.0	27.6	28.8	34.2	28.4	31.2	27.2

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

NB: The triplicate set of diffusion tubes sited at 61, High Street Lydney were not exposed during Jan, Feb, March and April due to building works being carried out at that location. For this reason, the remaining 8 months of data required annualisation as well as bias adjustment. (See Appendix C). The average annualised result for this site was **37.1** after bias adjustment.

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

Annualisation

At our triplicate diffusion tube monitoring site in Lydney, less than 9 months data was collected. Where this occurs, the results can be used for comparison with the annual average national objective of 40 $\mu\text{g m}^{-3}$ provided the collected data is “annualised”. As we had good background data from monitoring carried out at a location relatively close to the site where we had insufficient data, the results from this site were used for annualisation purposes. Annualisation was carried out in accordance with guidance provided in Defra LAQM TG 16¹ (Paragraph 7.190 and Box 7.10)

Site requiring annualisation	Months of data missing	B/g site data used for annualisation	Calculated annualisation factor
Lydney 61 High Street (triplicate tubes)	Jan, Feb, Mar, Apr	Lydney: Highfield Lane	1.21

Month	Highfield Lane (B)	T1, T2, T3	B when D is available
Jan	22.6	-	-
Feb	14.4	-	-
Mar	14.0	-	-
Apr	7.1	-	-
May	7.6	34.3, 36.4, 36.4	7.6
Jun	6.9	40.9, 40.0, 40.0	6.9
Jul	7.8	31.1, 34.5, 34.5	7.8
Aug	6.8	30.4, 29.5, 29.5	6.8
Sept	7.3	34.8, 30.7, 30.7	7.3
Oct	12.1	31.4, 32.8, 32.8	12.1
Nov	11.7	43.2, 37.9, 38.5	11.7
Dec	11.0	38.2, 38.5, 39.4	11.0
Average	10.8	35.5, 35.0, 35.2	8.9

The average of the triplicate site results multiplied by the annualisation factor is 42.63. When adjusted using the Bias Adjustment Factor of 0.87 the annualised average at the triplicate site is **37.1**

¹DEFRA Local Air Quality Management Technical Guidance (TG16) February 2018

Diffusion Tube Bias Adjustment Factors

The diffusion tubes (20% TEA in water) were supplied and analysed by Gradko. The tubes at all locations throughout the area have a monthly exposure period. A bias adjustment factor of 0.87, based upon 39 studies, was obtained via the national bias spreadsheet, and this was applied to all diffusion tubes.

This spreadsheet is available on the [Department for Environment Food and Rural Affairs website](#).

The bias adjustment factor for 2017 data analysed by Gradko (20% TEA in water method), based upon 39 studies is 0.87 (July 2018), as highlighted in the table below.

Diffusion Tube Bias Adjustment Factors 06/18 Issue of the Spreadsheet				New (06/18) Update			
Laboratory	Method	Year	Previous Number of Studies	No. Studies Added	Total No. of Studies	Factor	Change in Factor
Aberdeen Scientific Services	20% TEA in water	2017	7	0	7	0.79	0.01
Edinburgh Scientific Services	50% TEA in acetone	2017	2	4	6	0.81	-0.08
ESG Didcot	20% TEA in water	2017	2	3	5	0.74	0.03
ESG Didcot	50% TEA in acetone	2017	27	2	29	0.77	0.00
ESG Glasgow	20% TEA in water	2017	1	0	1	0.8	0.00
ESG Glasgow	50% TEA in acetone	2017	1	0	1	0.78	0.00
Glasgow Scientific Services	20% TEA in water	2017	6	4	10	0.9	-0.01
Gradko	20% TEA in water	2017	34	5	39	0.87	-0.02
Gradko	50% TEA in acetone	2017	22	3	25	0.96	-0.01
Lambeth Scientific Services	50% TEA in acetone	2017	1	4	5	0.93	0.03
Milton Keynes Council	20% TEA in water	2017	1	3	4	0.76	-0.13
Somerset County Council	20% TEA in water	2017	2	0	2	0.77	0.00
South Yorkshire Air Quality Samplers	50% TEA in acetone	2017	2	0	2	0.88	0.00
Staffordshire Scientific Services	20% TEA in water	2017	14	5	19	0.88	-0.01
Tayside Scientific Services	20% TEA in water	2017	5	0	5	0.72	0.00
West Yorkshire Analytical Services	50% TEA in acetone	2017	4	5	9	0.77	-0.01
Number of Studies Included			131	38	169		

9 studies were updated due to ratified data becoming available since the March 2018.

Appendix D: Maps of Monitoring Locations

CIN03 - Bottom High Street, Cinderford



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
CIN03	22.7	22.5	22.1	21.4

CIN04 - Market Street, Cinderford



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
CIN04	-	-	-	22.9

COL01 - Gloucester Road, Coleford, COL02 – Market Place, Coleford



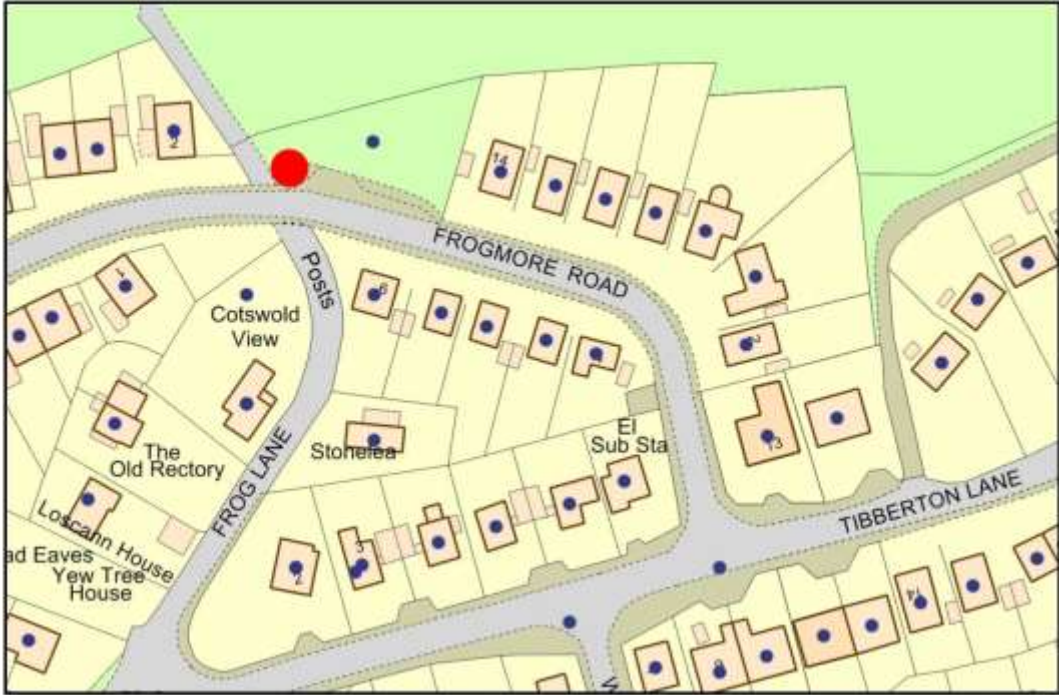
Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
COL01	32.1	31.6	30.2	28.7
COL02	21.6	20.7	19.8	19.3

COL03 – Old Vicarage Court, Coleford



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
COL03	22.3	20.2	20.2	19.8

HUN04 – Frogmore Road, Huntley



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
HUN04	-	-	-	9.5

LIT01 – Broad Street, Littledean



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
LIT01	-	-	-	27.0

LYD01, LYD16,17,18,19 – Top High Street, Lydney,



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
LYD01	38.0	37.7	38.4	36.9
LYD16	-	-	-	36.9
LYD17	-	-	-	30.9
LYD18	-	-	-	30.5
LYD19	-	-	-	30.6

LYD03 - 29 High Street Lydney, LYD04 - 13 High Street, Lydney



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
LYD03	35.6	37.0	37.7	36.9
LYD04	34.5	34.3	35.4	34.1

LYD02 - Bridge House, Newerne Street Lydney, LYD05 – Regents Arcade, Lydney



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
LYD02	20.7	20.5	20.7	20.1
LYD05	33.7	29.8	33.0	31.5

LYD08 13 Bream Road, Lydney, LYD09 17 Bream Road, Lydney



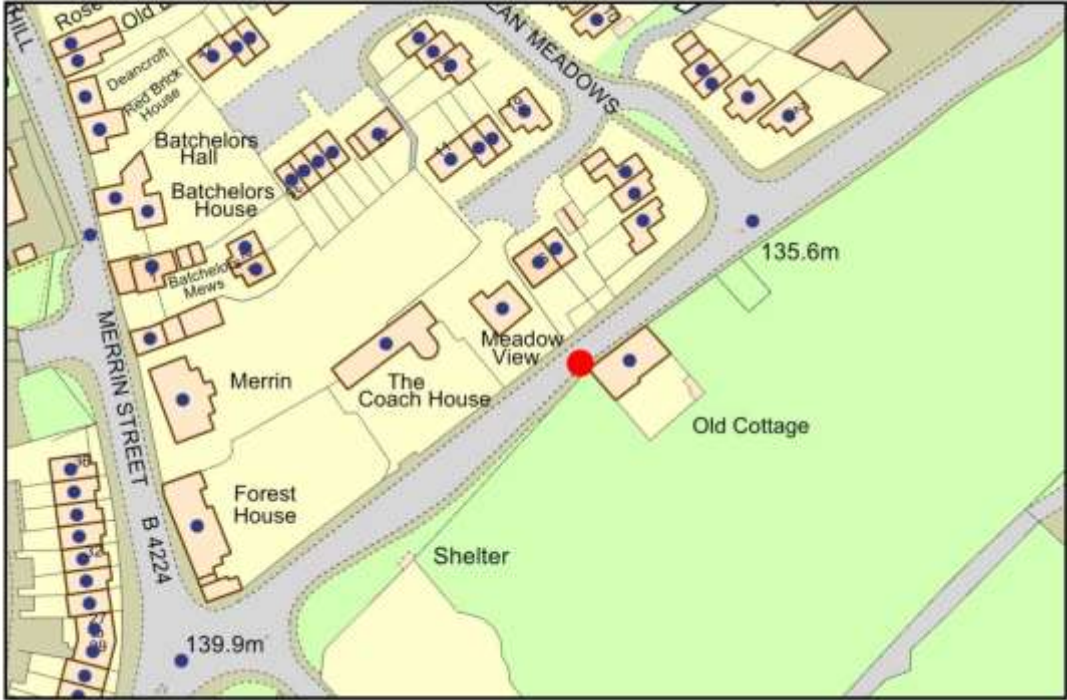
Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
LYD08	38.1	34.1	35.5	34.0
LYD09	36.9	34.0	34.2	32.6

MIT01 The Merrin, Mitcheldean



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
MIT01	27.2	25.7	26.2	25.2

MIT02 Gloucester Road, Mitcheldean



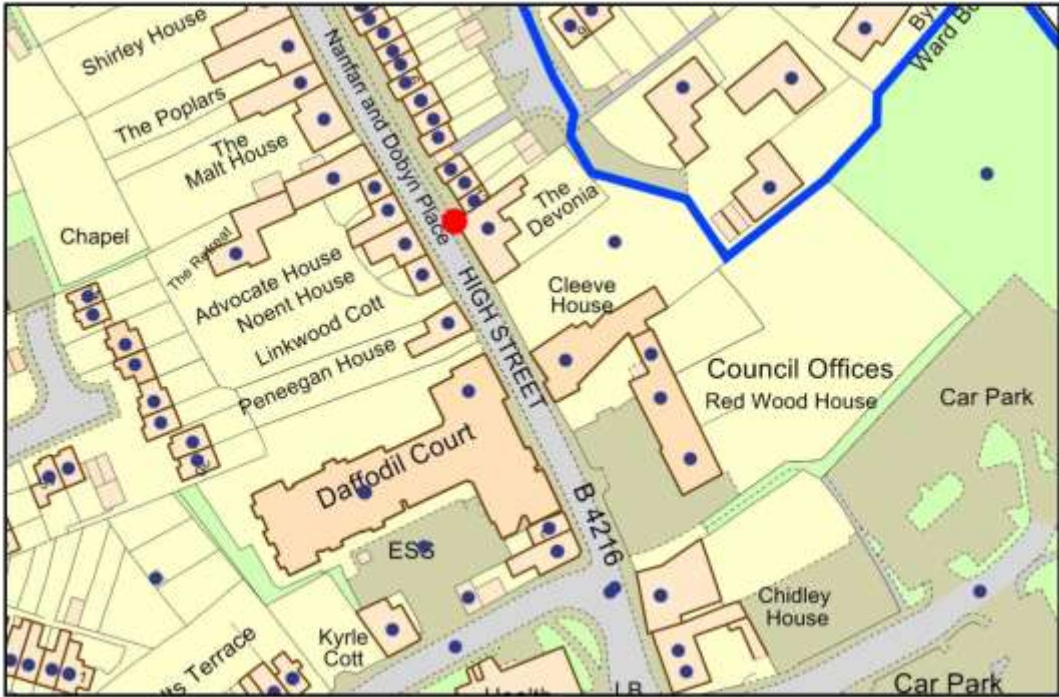
Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
MIT02	-	-	23.8	22.6

NAI01 Crossroads, Nailbridge



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
NAI01	29.8	29.7	30.7	29.5

NEW03 High Street, Newent



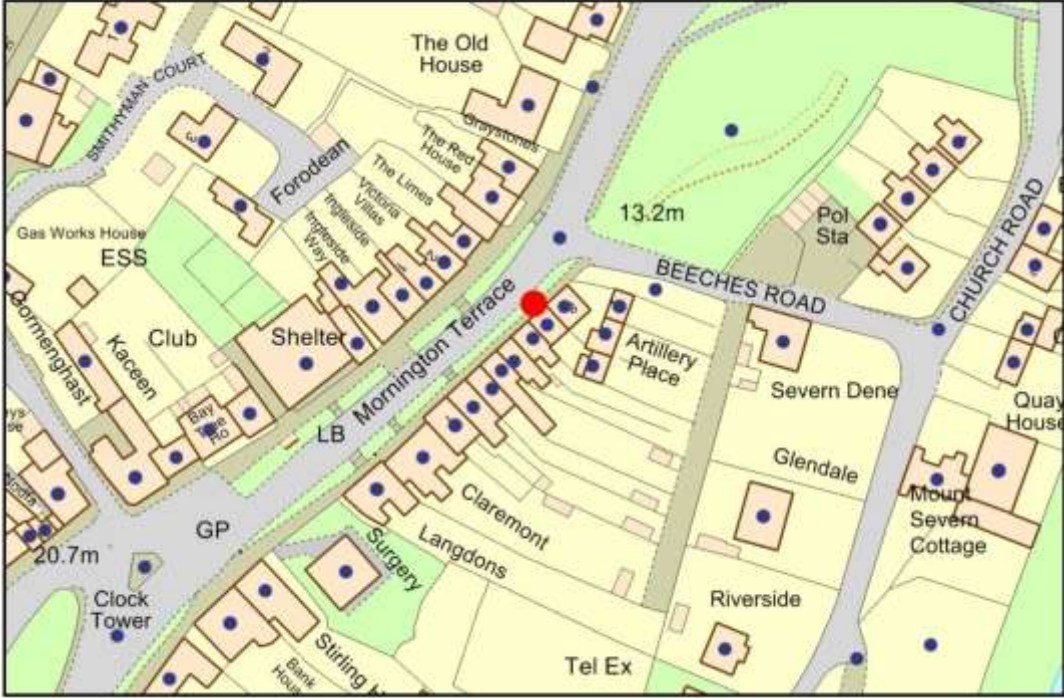
Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
NEW03	-	-	-	26.2

NOS02 High Street, Newnham



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
NOS02	28.3	25.8	28.6	27.0

NOS04 Mornington Terrace



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
NOS04	29.9	26.3	26.1	24.0

WOS01 Westbury-on-Severn



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
WOS01	19.1	18.2	18.1	17.5

WOS02 High Street, Westbury-on-Severn



Site	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Bias Adjusted			
	2014	2015	2016	2017
WOS02	-	-	-	27.2

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Defra have a page describing all the objectives that apply across the UK, and when they should be met, which can be viewed on the [DEFRA website](#).

The following table provides a brief description of the objectives in England:

Pollutant	Air Quality Objective ²	
	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

² 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
EU	European Union
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control