



**Forest of Dean**  
— DISTRICT COUNCIL —

# 2016 Air Quality Annual Status Report (ASR)

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

June 2016

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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 (NO<sub>2</sub>) 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. A subsequent “Further Assessment” identified that traffic 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 most likely cause of the nitrogen dioxide (NO<sub>2</sub>) levels which exceeded the national air quality objectives at the time the AQMA was declared. Since the “Further Assessment”, there has been an investigation into options to improve air quality in the AQMA.

Monitoring throughout 2015 has not identified any exceedances in the Forest of Dean District. The nitrogen dioxide diffusion tube survey results were very similar to those recorded last year, when there were also no exceedances of the air quality objective for nitrogen dioxide.

This year there were no exceedances within our Lydney (AQMA) and only two of the nine monitoring points gave results within 10 per cent of the annual average air quality objective for nitrogen dioxide (i.e. above 36ugm<sup>-3</sup>).

The key change that may have contributed to bringing about the required improvement is the introduction of a 20 mph speed limit in Lydney High Street. It is thought that this has 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. The meteorological conditions may also have contributed to the lower levels of pollution as it is during winter when inversions occur more frequently that pollution can accumulate more readily and if these still (often foggy) conditions are less frequent, then the highest pollution levels do not arise so often, thus making the annual average levels lower.

If the NO<sub>2</sub> diffusion tube results continue to exhibit concentrations below the national objectives, it will be desirable to revoke the AQMA. Our monitoring programme will continue, in conjunction with planning controls in accordance with national guidance, to ensure that levels do not exceed the national requirements in the future.

The NO<sub>2</sub> diffusion tube monitoring programme is reviewed on a continuous basis, and, if considered necessary, changes are made, either by relocating existing diffusion tube sites or adding new monitoring sites.

Within Forest of Dean District Council's administrative area there are no sources of pollution that give rise to concern in respect of air quality. Sources that have been considered include: road traffic and other transport sources; industrial, commercial and domestic sources, fugitive and uncontrolled sources.

No new or significantly changed sources have been identified within the district.

## **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 (NO<sub>2</sub>) generally well below national limits.

The nitrogen dioxide diffusion tube survey results were very similar to those recorded last year. Our 2015 monitoring programme confirms that within the Lydney Air Quality Management Area (AQMA), the nitrogen dioxide annual mean objective is no longer exceeded, and at all other monitoring locations it continues to be comfortably met.

If the NO<sub>2</sub> diffusion tube results continue to exhibit concentrations below the national objectives, it will be desirable to revoke the AQMA. Our monitoring programme will continue, in conjunction with planning controls in accordance with national guidance, to ensure that levels do not exceed the national requirements in the future.

The NO<sub>2</sub> diffusion tube monitoring programme is reviewed on a continuous basis, and, if considered necessary, changes are made, either by relocating existing diffusion tube sites or adding new monitoring sites.

There have been no new industrial installations and no new or substantially altered roads within the Forest of Dean. There are also no new commercial, domestic or fugitive sources of emissions.

The 2005 – 2015 Forest of Dean District Council Air Quality reports are available online at [https://uk-air.defra.gov.uk/aqma/local-authorities?la\\_id=106](https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=106).

## **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 NO<sub>2</sub> 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. Further details of these strategies can be found at <http://www.gloucestershire.gov.uk/ltp3>

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 Council’s Website at: <http://www.fdean.gov.uk/residents/environment/environmental-health/air-quality>

Any queries about Air Quality should be directed to the Environmental Protection and Licensing team within Forest of Dean District Council.

This team can be contacted by e mail on: [ers@2020partnership.uk](mailto:ers@2020partnership.uk)

# Table of Contents

<b>Executive Summary: Air Quality in Our Area</b> .....	<b>i</b>
Air Quality in Forest of Dean District .....	iii
Actions to Improve Air Quality .....	iii
Local Priorities and Challenges.....	iv
How to Get Involved.....	iv
<b>1 Local Air Quality Management</b> .....	<b>1</b>
<b>2 Actions to Improve Air Quality</b> .....	<b>2</b>
2.1 Air Quality Management Areas.....	2
2.2 Action Plan Options and their Evaluation	4
2.3 Progress and Impact of Measures to address Air Quality in Forest of Dean District Council	5
2.4 PM <sub>2.5</sub> – Local Authority Approach to Reducing Emissions and or Concentrations.....	8
<b>3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance</b> .....	<b>9</b>
3.1 Summary of Monitoring Undertaken .....	9
3.1.1 Non - Automatic Monitoring Sites.....	9
3.2 Individual Pollutants .....	9
3.2.1 Nitrogen Dioxide (NO <sub>2</sub> ).....	9
<b>Appendix A: Monitoring Results</b> .....	<b>11</b>
<b>Appendix B: Full Monthly Diffusion Tube Results for 2015</b> .....	<b>15</b>
<b>Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC</b> .....	<b>16</b>
<b>Appendix D: Map(s) of Monitoring Locations</b> .....	<b>17</b>
<b>Appendix E: Summary of Air Quality Objectives in England</b> .....	<b>27</b>
<b>Glossary of Terms</b> .....	<b>28</b>

## List of Tables

Table 2.1 – Declared Air Quality Management Area .....	3
Table 3.1 – Progress on Measures to Improve Air Quality.....	6

## List of Figures

Figure 2.1 Map of Lydney AQMA boundaries	2
Fig. 2.1 Graph showing the trend over the last 5 years of nitrogen dioxide levels within our Lydney AQMA	3

Fig. 3.1 Graph showing the trend over the last 5 years of nitrogen dioxide levels around the district (outside of our AQMA)



# 1 Local Air Quality Management

This report provides an overview of air quality in Forest of Dean District during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance 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.

## 2 Actions to Improve Air Quality

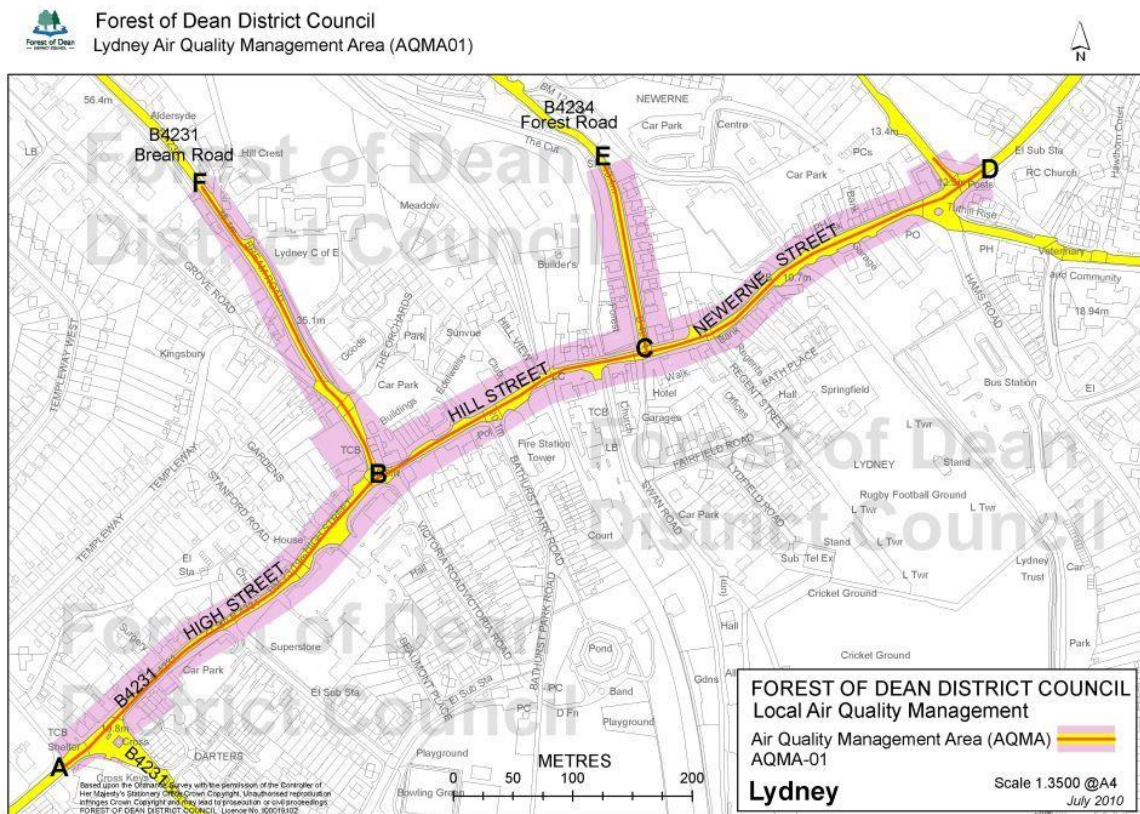
### 2.1 Air Quality Management Areas

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.

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.

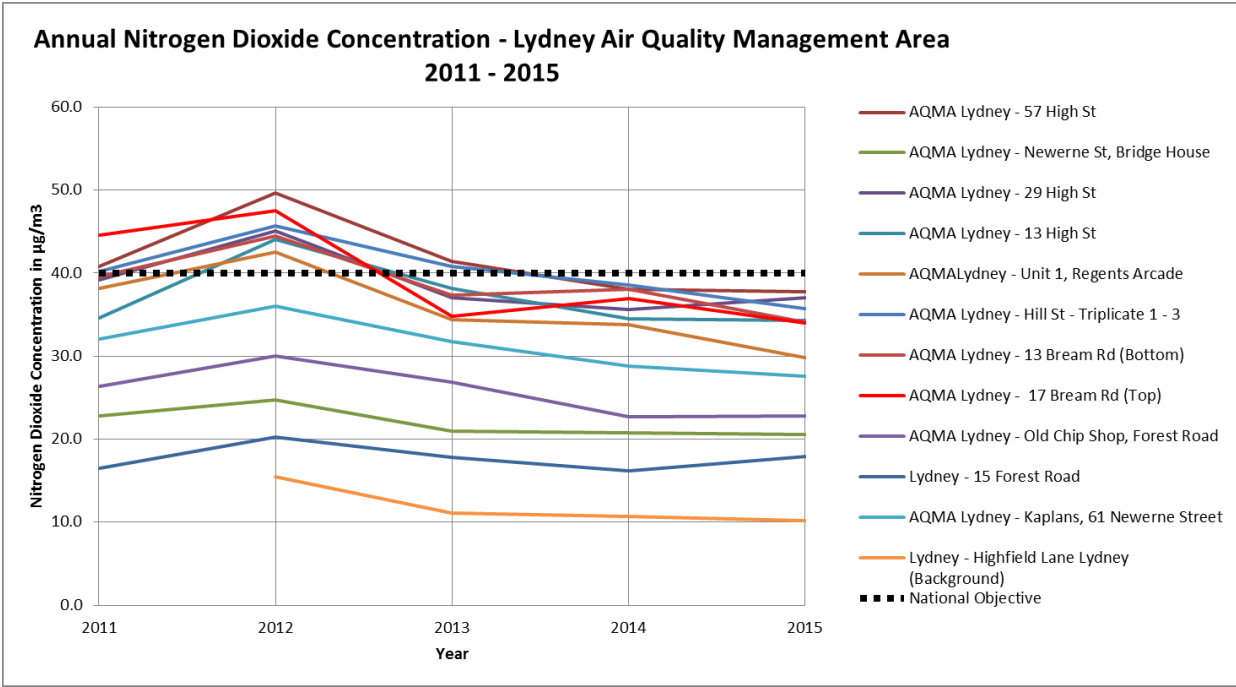
Figure 2.1- Map of Lydney AQMA Boundaries



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).

**Fig. 2.2 Graph showing the trend over the last 5 years of nitrogen dioxide levels within our Lydney AQMA**



It can be seen that levels have been decreasing since 2012 which was a particularly high year for pollution across the whole country. 2015 levels are very similar to those of 2014.

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

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Lydney AQMA	NO <sub>2</sub> 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).	The draft Lydney AQMA Action Plan January 2015 is available on the FODDC website, <a href="#">here</a> .

## 2.2 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;

## **2.3 Progress and Impact of Measures to address Air Quality in Forest of Dean District Council**

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 2.2. 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 2.2 – 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	<a href="http://www.fdean.gov.uk/media/3428/air-quality-technical-planning-guidance.pdf">http://www.fdean.gov.uk/media/3428/air-quality-technical-planning-guidance.pdf</a>
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	
4		Promoting Travel Alternatives	Promotion of walking	FOD Council							
5		Public Information	Via the Internet	FOD Council							

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
		Traffic Management	Reduction of speed limits, 20mph zones	Gloucestershire County Council			Improved traffic flow at peak hours in the Lydney	Yes		Completed	

## 2.4 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.

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

- 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<sub>2.5</sub>



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

## 3.1 Summary of Monitoring Undertaken

### 3.1.1 Non-Automatic Monitoring Sites

Forest of Dean District Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 30 sites during 2015. Appendix A shows the details of the sites.

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

## 3.2 Individual Pollutants

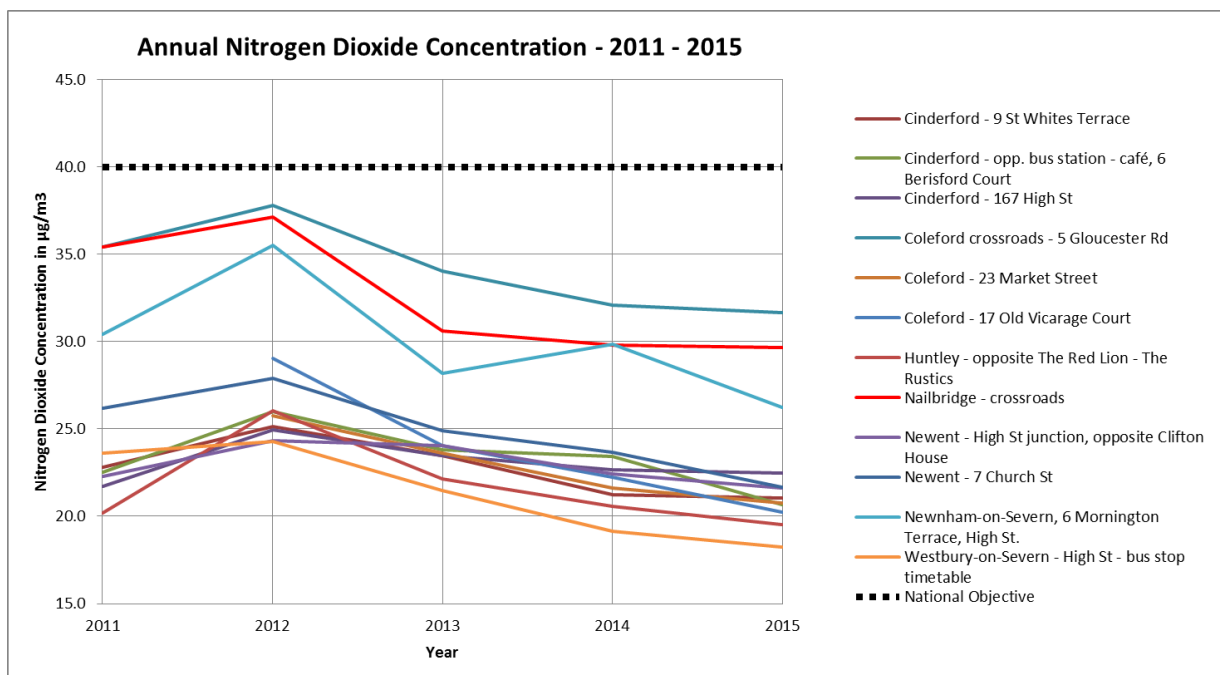
The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on the bias adjustment are provided in Appendix C. (There were sufficient results from each site in 2015 so annualisation was not required.)

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

Table A.1 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

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

**Fig. 3.1 Graph showing the trend over the last 5 years of nitrogen dioxide levels around the district (outside of our AQMA)**



From Figure 3.1, which shows the trend of nitrogen dioxide levels monitored around the district (outside of our Lydney AQMA), it can be seen that levels are gradually decreasing in the district albeit slowly. It can be clearly seen that the levels are well below the national standard of  $40\mu\text{g}\text{m}^{-3}$  which is marked by a dotted line on the graph.

## Appendix A: Monitoring Results

Table A.2 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?
CIN01	Cinderford – St Whites Terrace	Roadside	365458	212855	NO <sub>2</sub>	No	Y (<1m)	4m	Yes
CIN02	Cinderford – Berisford Court	Urban Centre	365814	214014	NO <sub>2</sub>	No	Y (2m)	1m	Yes
CIN03	Cinderford – Bottom High St	Roadside	365291	214732	NO <sub>2</sub>	No	Y (<2m)	1m	Yes
COL01	Coleford – Gloucester Road	Suburban	357629	210787	NO <sub>2</sub>	No	Y (<1m)	2m	Yes
COL02	Coleford – Market Place	Suburban	357553	210757	NO <sub>2</sub>	No	Y (<1m)	7m	Yes
COL03	Coleford – Old Vicarage Court	Suburban	357742	210580	NO <sub>2</sub>	No	Y (<1m)	7m	Yes
HUN02	Huntley - The Red Lion junction	Roadside	372198	219359	NO <sub>2</sub>	No	N (<1m)	1m	Yes
LYD01	Lydney – Top High St	Roadside	363142	203074	NO <sub>2</sub>	Yes	Y (<1m)	2m	Yes
LYD02	Lydney – Newerne Street	Urban Centre	363523	203261	NO <sub>2</sub>	Yes	Y (<1m)	4m	Yes
LYD03	Lydney – Mid High St	Suburban	363025	202964	NO <sub>2</sub>	Yes	Y (<1m)	1m	Yes
LYD04	Lydney – Bottom High St	Suburban	362964	202909	NO <sub>2</sub>	Yes	Y (<1m)	1m	Yes
LYD05	Lydney - Regents Arcade	Urban Centre	363443	203206	NO <sub>2</sub>	Yes	Y (1m)	1m	Yes
LYD06	Lydney – Bream Junction (Triplicate 1of3)	Suburban	363189	203110	NO <sub>2</sub>	Yes	N (1m)	1m	Yes
LYD08	Lydney – Mid Bream Road	Roadside	363107	203217	NO <sub>2</sub>	Yes	Y (<1m)	2m	Yes
LYD09	Lydney – Top Bream Road	Kerbside	363046	203322	NO <sub>2</sub>	Yes	Y (<1m)	<1m	Yes
LYD10	Lydney – Old Chip Shop, Forest Road	Roadside	363405	203237	NO <sub>2</sub>	Yes	Y (<1m)	2m	Yes
LYD11	Lydney – Forest Road	Kerbside	363391	203337	NO <sub>2</sub>	Yes	Y (<1m)	<1m	Yes
LYD12	Lydney –Newerne Street	Urban Centre	363607	203322	NO <sub>2</sub>	Yes	Y (<1m)	2m	Yes
LYD13	Lydney – Bream Junction (Triplicate 2of3)	Suburban	363189	203110	NO <sub>2</sub>	Yes	N (1m)	1m	Yes
LYD14	Lydney – Bream Junction (Triplicate 3of3)	Suburban	363189	203110	NO <sub>2</sub>	Yes	N (1m)	1m	Yes
LYD15	Lydney – Highfield Lane	Suburban	364087	204137	NO <sub>2</sub>	Yes	N (1m)	1m	Yes
MIT01	Mitcheldean –The Merrin	Roadside	366483	218277	NO <sub>2</sub>	No	Y (2m)	1m	Yes
NAI01	Nailbridge – Crossroads	Roadside	364555	216226	NO <sub>2</sub>	No	N (<1m)	1m	Yes
NEW01	Newent – opposite Clifton House, High St	Suburban	372058	226159	NO <sub>2</sub>	No	N (1m)	1m	Yes
NEW02	Newent – Church Street	Urban Centre	372288	225852	NO <sub>2</sub>	No	Y (<1m)	2m	Yes
NOS02	Newnham-on-Severn - High St	Roadside	369038	211590	NO <sub>2</sub>	No	Y (<1m)	2m	Yes
NOS03	Newnham-on-Severn - High St	Roadside	369135	211870	NO <sub>2</sub>	No	Y (<1m)	3m	Yes
NOS04	Newnham-on-Severn - High St	Roadside	369200	211929	NO <sub>2</sub>	No	Y (<1m)	3m	Yes
NOS05	Newnham-on-Severn - High St	Roadside	369040	211679	NO <sub>2</sub>	No	Y (<1m)	12m	Yes
WOS01	Westbury-on-Severn - High St - bus stop	Roadside	371649	214054	NO <sub>2</sub>	No	N (5m)	2m	Yes

**Table A.1 – Annual Mean NO<sub>2</sub> Monitoring Results**

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
CIN01	Cinderford – St Whites Terrace	Diffusion Tube	100	100	22.8	25.1	23.5	21.2	21.0
CIN02	Cinderford – Berisford Court	Diffusion Tube	100	100	22.5	26.0	23.8	23.4	20.6
CIN03	Cinderford – Bottom High St	Diffusion Tube	100	100	21.7	25.0	23.5	22.7	22.5
COL01	Coleford – Gloucester Road	Diffusion Tube	100	100	35.4	37.8	34.0	32.1	31.6
COL02	Coleford – Market Place	Diffusion Tube	100	100		25.8	23.6	21.6	20.7
COL03	Coleford – Old Vicarage Court	Diffusion Tube	100	100		29.0	24.0	22.3	20.2
HUN02	Huntley - The Red Lion junction	Diffusion Tube	100	100	20.2	26.0	22.1	20.5	19.5
LYD01	Lydney – Top High St	Diffusion Tube	100	100	<b>40.8</b>	<b>49.7</b>	<b>41.4</b>	38.0	37.7
LYD02	Lydney – Newerne Street	Diffusion Tube	100	100	22.8	24.7	21.0	20.7	20.5
LYD03	Lydney – Mid High St	Diffusion Tube	100	100	39.2	<b>45.1</b>	37.1	35.6	37.0
LYD04	Lydney – Bottom High St	Diffusion Tube	100	100	34.6	<b>44.1</b>	38.2	34.5	34.3
LYD05	Lydney - Regents Arcade	Diffusion Tube	100	100	38.2	<b>42.5</b>	34.3	33.7	31.7
LYD06	Lydney – Bream Junction (1of3)	Diffusion Tube	92	92	<b>41.5</b>	<b>45.7</b>	<b>40.8</b>	38.6	35.7
LYD08	Lydney – Mid Bream Road	Diffusion Tube	100	100	39.6	<b>44.5</b>	37.3	38.1	34.1
LYD09	Lydney – Top Bream Road	Diffusion Tube	100	100	<b>44.6</b>	<b>47.5</b>	34.8	36.9	34.0
LYD10	Lydney – Chip Shop, Forest Road	Diffusion Tube	100	100	26.3	30.0	26.9	22.7	22.8

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
LYD11	Lydney – Forest Road	Diffusion Tube	100	100	16.5	20.3	17.8	16.2	16.2
LYD12	Lydney –Newerne Street	Diffusion Tube	100	100	32.0	36.0	31.7	28.8	27.6
LYD13	Lydney – Bream Junction (2of3)	Diffusion Tube	83	83	<b>40.1</b>	<b>46.4</b>	<b>40.5</b>	36.8	35.5
LYD14	Lydney – Bream Junction (3of3)	Diffusion Tube	83	83	39.0	<b>44.3</b>	<b>40.3</b>	38.2	35.7
LYD15	Lydney – Highfield Lane	Diffusion Tube	100	100		15.5	11.1	10.7	10.2
MIT01	Mitcheldean –The Merrin	Diffusion Tube	100	100	26.2	31.7	28.1	27.2	25.7
NAI01	Nailbridge – Crossroads	Diffusion Tube	100	100	35.4	37.1	30.6	29.8	29.7
NEW01	Newent – opp Clifton House, High St	Diffusion Tube	100	100	22.3	24.3	24.0	22.4	21.6
NEW02	Newent – Church Street	Diffusion Tube	100	100	26.2	27.9	24.9	23.7	21.7
NOS02	Newnham-on-Severn - High St	Diffusion Tube	100	100	32.2	33.8	30.1	28.3	25.8
NOS03	Newnham-on-Severn - High St	Diffusion Tube	92	92	32.1	31.1	27.1	26.7	23.1
NOS04	Newnham-on-Severn - High St	Diffusion Tube	100	100	30.4	35.5	28.2	29.9	26.3
NOS05	Newnham-on-Severn - High St	Diffusion Tube	100	100	26.1	27.9	25.6	24.1	23.1
WOS01	Westbury-on-Severn - High St	Diffusion Tube	100	100	23.6	24.3	21.4	19.1	18.2

Notes: Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> 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 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 2015

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

See Appendix C for details on bias adjustment

2015 Ref	AIR QUALITY DIFFUSION TUBE RESULTS -2015 Start	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	2015 Mean Unadjusted	2015 Adjusted x0.91	
		NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>		
CIN01	Cinderford - 9 St Whites Terrace	Jul-08	32.0	29.1	25.4	22.7	19.2	20.2	17.7	21.1	24.9	30.1	19.3	15.8	23.1	21.0
CIN02	Cinderford - opp. bus station - café, 6 Berisford Court	May-09	28.5	25.0	21.4	23.8	16.7	17.2	22.5	23.0	22.2	24.9	23.0	24.0	22.7	20.6
CIN03	Cinderford - 167 High St	May-09	38.8	29.0	24.4	22.7	19.3	19.0	21.5	21.8	26.5	29.7	23.1	20.8	24.7	22.5
COL01	Coleford crossroads - 5 Gloucester Rd	May-09	41.7	42.6	30.4	35.8	31.7	32.2	33.3	35.2	33.2	36.4	31.2	33.5	34.8	31.6
COL02	Coleford - 23 Market Street	Jan-12	28.7	27.0	22.0	25.7	18.6	18.3	20.5	20.8	22.6	24.6	22.5	22.3	22.8	20.7
COL03	Coleford - 17 Old Vicarage Court	Jan-12	20.7	27.6	22.7	25.2	19.7	18.3	18.8	23.3	25.6	28.3	20.1	16.3	22.2	20.2
HUN02	Huntley - opposite The Red Lion - The Rustics	May-09	24.0	27.6	23.7	24.7	19.1	18.0	17.6	19.4	23.3	26.0	16.8	16.5	21.4	19.5
LYD01	Lydney - 57 High St	Jul-08	50.4	45.2	38.1	40.8	35.1	37.6	39.8	41.5	43.5	42.7	42.5	40.4	41.5	37.7
LYD02	Lydney - New erne St, Bridge House - Tucker	May-09	29.0	29.7	22.2	21.0	18.6	19.9	21.1	20.2	18.7	20.2	22.9	27.3	22.6	20.5
LYD03	Lydney - 29 High St	Jul-08	47.1	44.4	38.6	38.8	36.6	34.9	38.1	36.2	39.5	40.9	49.2	44.0	40.7	37.0
LYD04	Lydney - 13 High St	Mar-10	46.4	45.6	37.8	34.4	30.1	34.7	34.3	36.6	38.2	38.4	40.7	35.5	37.7	34.3
LYD05	Lydney - Unit 1, Regents Arcade	Jul-08		35.7	39.0	29.4	31.1	34.1	36.7	37.0	30.8	31.8	32.4	45.2	34.8	31.7
LYD06	Lydney - Hill St - Inspirations Gallery (TriPLICATE 1 of 3)	Jul-08	35.4	43.8	40.4	41.7	32.5	37.0	35.3	39.6	42.5		42.2	40.8	39.2	35.7
LYD08	Lydney - 13 Bream Rd (Bottom)	Jan-10	43.3	36.8	36.0	35.9	34.1	36.2	37.2	38.4	40.0	37.6	42.0	32.0	37.5	34.1
LYD09	Lydney - 17 Bream Rd (Top)	May-09	41.7	45.1	34.3	34.8	35.9	35.3	35.5	39.0	37.0	36.2	36.8	36.5	37.3	34.0
LYD10	Lydney - Old Chip Shop, Forest Road	Nov-10	31.5	29.0	16.1	23.8	20.3	23.6	23.1	25.6	25.4	27.2	26.3	29.1	25.1	22.8
LYD11	Lydney - 15 Forest Road	Nov-10	22.5	22.7	25.7	15.3	11.7	14.3	13.8	15.6	16.2	17.0	18.3	20.5	17.8	16.2
LYD12	Lydney - Kaplans, 61 New erne Street	Nov-10	33.0	36.0	29.5	30.6	27.2	29.0	27.4	27.6	31.9	34.1	28.7	28.5	30.3	27.6
LYD13	Lydney - Hill St - Inspirations Gallery (TriPLICATE 2 of 3)	Jan-11	39.5	42.0		43.0	34.9	32.7	36.3	39.4	40.4		40.1	41.7	39.0	35.5
LYD14	Lydney - Hill St - Inspirations Gallery (TriPLICATE 3 of 3)	Jan-11	47.8		39.4	40.6	34.3	38.7	37.9	38.1	41.2		34.7	39.5	39.2	35.7
LYD15	Lydney - Highfield Lane (Background)	Jan-12	15.2	15.9	13.7	10.8	8.4	6.6	8.7	9.3	9.0	12.0	11.2	13.9	11.2	10.2
MIT01	Mitcheldean - opposite Lamb Inn - 25 The Merrin	May-09	36.8	33.4	25.7	29.7	25.0	28.4	27.7	26.3	29.2	29.6	25.5	21.4	28.2	25.7
NAI01	Nailbridge - crossroads	May-09	31.2	35.8	34.0	30.6	31.2	32.1	32.2	33.2	37.4	35.7	31.7	26.1	32.6	29.7
NEW01	New ent - High St junction, opposite Clifton House	May-09	28.4	29.7	24.0	21.3	17.8	19.9	19.3	23.6	25.6	30.4	22.2	22.6	23.7	21.6
NEW02	New ent - 7 Church St	May-09	29.9	28.0	23.8	28.2	18.8	19.2	19.8	21.7	24.1	28.8	19.6	24.0	23.8	21.7
NOS02	New nham-on-Severn - High St - Galen House	Jan-10	27.7	32.9	25.9	34.7	24.0	27.5	20.9	22.2	29.5	36.0	28.8	30.3	28.4	25.8
NOS03	New nham-on-Severn, High Street, Stirling House	Jan-10	29.1	31.0	26.5	27.3	22.6	22.3	24.5	26.9	18.2		23.2	27.2	25.3	23.1
NOS04	New nham-on-Severn, 6 Mornington Terrace, High St.	Nov-10	34.3	37.9	27.0	29.3	23.4	22.1	26.7	29.8	27.0	27.9	26.7	34.1	28.9	26.3
NOS05	New nham-on-Severn, Upper Merton Hse, High Street	Nov-10	29.8	31.7	31.0	25.0	18.2	18.3	26.7	17.2	23.6	28.3	28.7	25.8	25.4	23.1
WOS01	Westbury-on-Severn - High St - bus stop timetable	Jul-08	26.5	26.6	19.3	19.5	16.0	14.4	15.8	23.2	18.8	22.7	18.7	19.1	20.1	18.2

\*The July results for Lydney tube 05 (Unit 1 Regents Arcade) and Lydney tube 11 (15 Forest Road) were transposed. An error in labelling was identified.

## 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 Gradko. The tubes at all locations throughout the area have a monthly exposure period. A bias adjustment factor of 0.91, based upon 29 studies, was obtained via the national bias spreadsheet, and this was applied to all diffusion tubes.

This spreadsheet is available at:

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

The bias adjustment factor for 2015 data analysed by Gradko (20% TEA in water method), based upon 29 studies is 0.91, as highlighted in the table below.

Diffusion Tube Bias Adjustment Factors 03/16 Issue of the Spreadsheet				
Laboratory	Method	Year	New (03/16) Factor	
			No. of Studies	Factor
Aberdeen Scientific Services	20% TEA in water	2015	1	0.81
Edinburgh Scientific Services	50% TEA in acetone	2015	3	0.81
ESG Didcot	20% TEA in water	2015	3	0.81
ESG Didcot	50% TEA in acetone	2015	21	0.81
ESG Glasgow	20% TEA in water	2015	1	0.77
ESG Glasgow	50% TEA in acetone	2015	1	0.78
Glasgow Scientific Services	20% TEA in water	2015	6	0.98
<b>Gradko</b>	<b>20% TEA in water</b>	<b>2015</b>	<b>29</b>	<b>0.91</b>
Gradko	50% TEA in acetone	2015	15	0.95
Kirklees Council	50% TEA in acetone	2015	3	0.76
Lambeth Scientific Services	50% TEA in acetone	2015	2	1.07
Milton Keynes Council	20% TEA in water	2015	1	0.76
Northampton BC	20% TEA in water	2015	1	0.66
Somerset County Council	20% TEA in water	2015	3	0.87
South Yorkshire Air Quality Samplers	50% TEA in acetone	2015	2	0.84
Staffordshire Scientific Services	20% TEA in water	2015	15	0.84
Tayside Scientific Services	20% TEA in water	2015	5	0.77
West Yorkshire Analytical Services	50% TEA in acetone	2015	5	0.76
<b>Number of Studies Included</b>			<b>117</b>	



# Appendix D: Maps of Monitoring Locations

CIN01 - St Whites Terrace, Cinderford



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
CIN01	25.1	23.5	21.2	21.0



CIN02 - Berisford Court, Cinderford



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
CIN02	26.0	23.8	23.4	20.6

CIN03 - Bottom High Street, Cinderford



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
CIN03	25.0	23.5	22.7	22.5



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



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
COL01	37.8	34	32.1	31.6
COL02	25.8	23.6	21.6	20.7

COL03 – Old Vicarage Court, Coleford



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
COL03	29.0	24.0	22.3	20.2

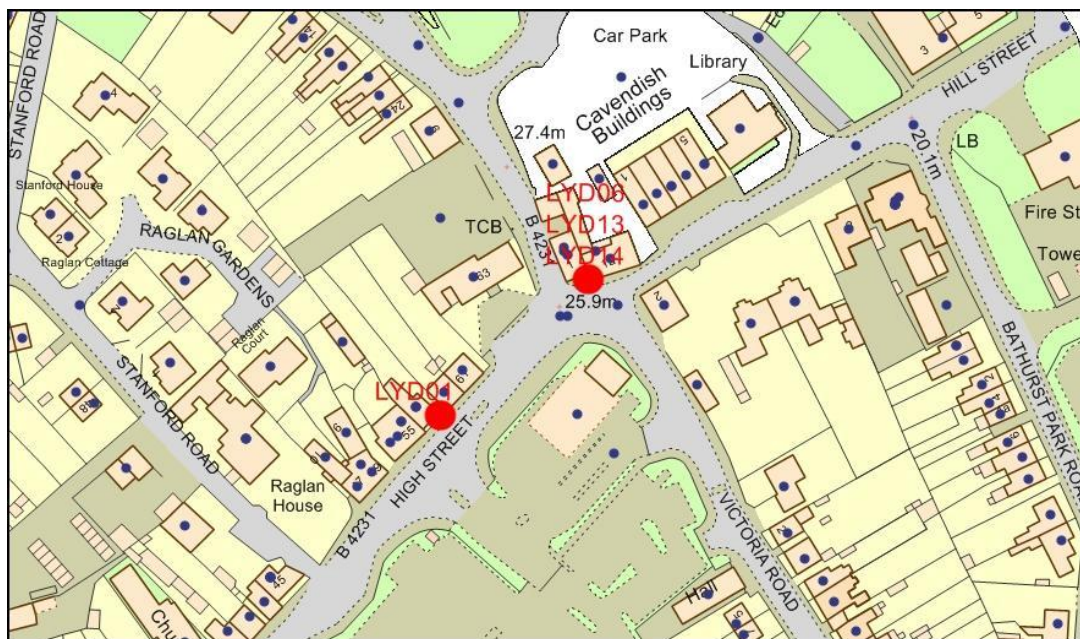
HUN02 - A40 Red Lion Junction, Huntley



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
HUN02	23.2	22.1	20.5	19.5



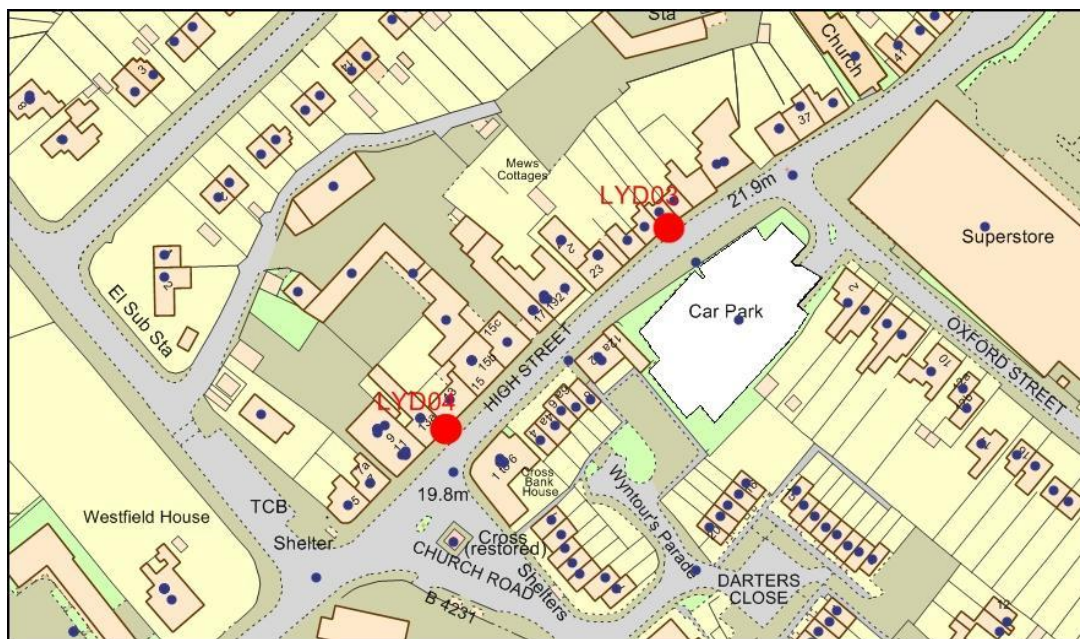
LYD01 – Top Hill Street, Lydney, LYD06/13/14 – Bottom Hill Street, Lydney



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
LYD01	49.7	41.4	38	37.7
LYD06	45.7	40.8	38.6	35.7

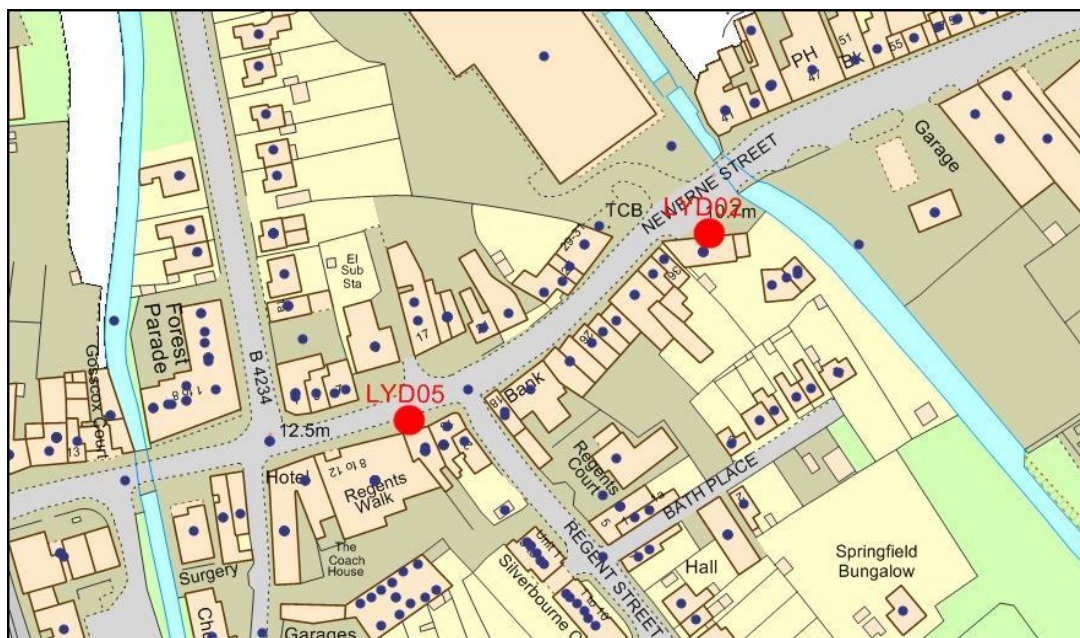
Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
LYD13	46.4	40.5	36.8	35.5
LYD14	44.5	40.3	38.2	35.7

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



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
LYD03	45.1	37.1	35.6	37.0
LYD04	44.1	38.2	34.5	34.3

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



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
LYD02	24.7	21	20.7	20.5
LYD05	42.5	34.3	33.7	31.5



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

LYD06



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
LYD08	44.5	37.3	38.1	34.1
LYD09	47.5	34.8	36.9	34.0

MIT01 The Merrin, Mitcheldean



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
MIT01	31.7	28.1	27.2	25.7

NAI01 Crossroads, Nailbridge



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
NAI01	37.1	30.6	29.8	29.7

NEW01 High Street, Newent



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
NEW01	24.3	24.0	22.4	21.6

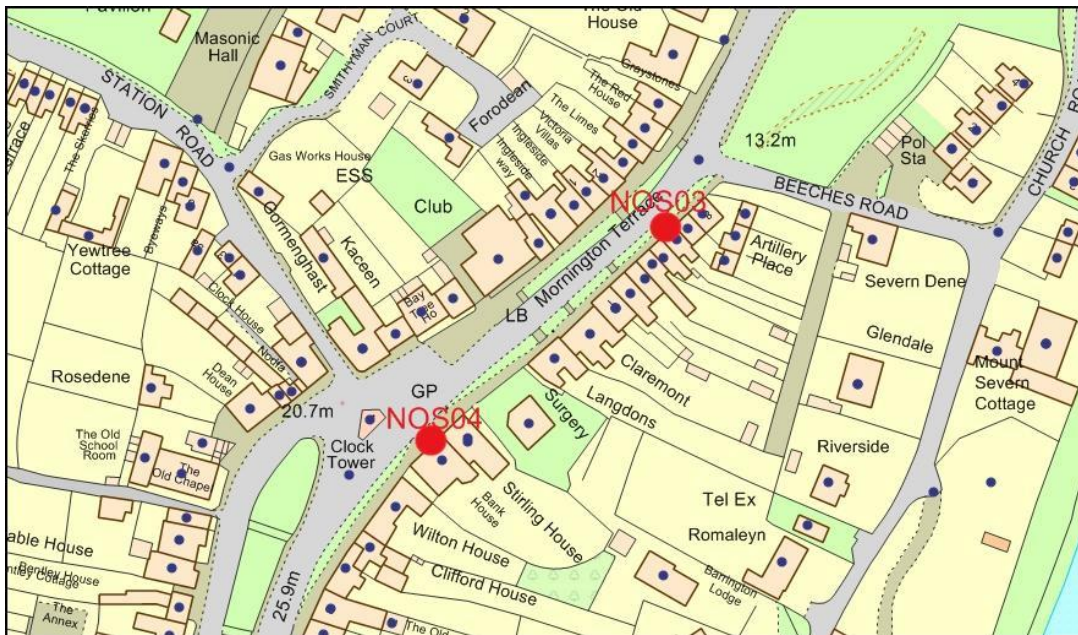


NEW02 Church Street, Newent



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
NEW02	27.9	24.9	23.7	21.7

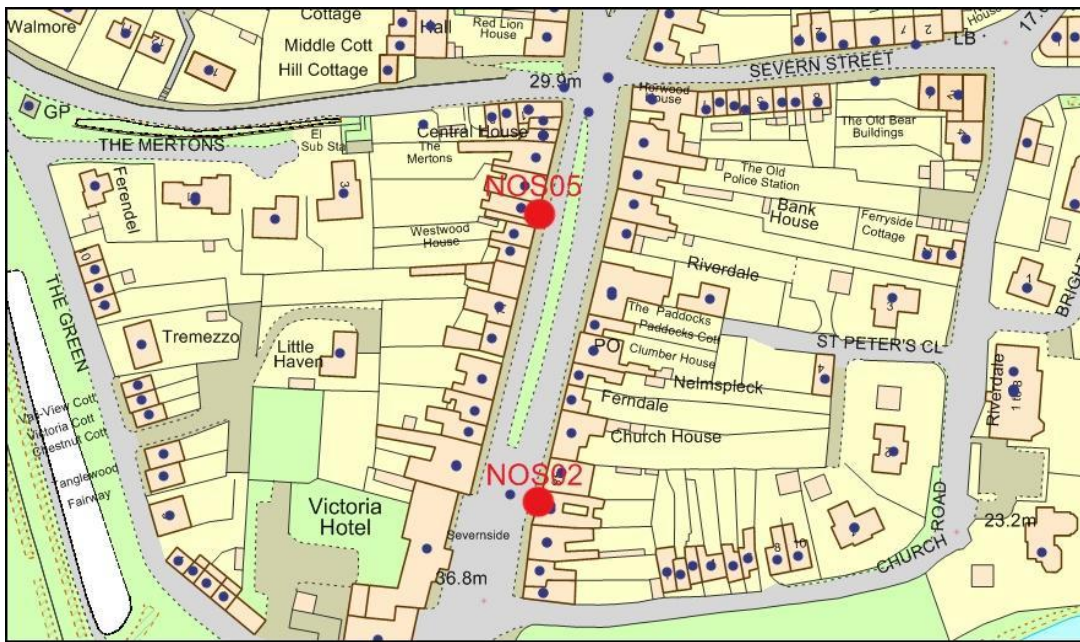
NOS04 opposite Clock Tower, Newnham, NOS03 Mornington Terrace



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
NOS03	31.1	27.1	26.7	23.1
NOS04	35.5	28.2	29.9	26.3



NOS02 High Street, Newnham, NOS05 High Street, Newnham



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
NOS02	33.8	30.1	28.3	25.8
NOS05	27.9	25.6	24.1	23.1

WOS01 Bus Stop A48, Westbury-on-Severn



Site	Annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ) Bias Adjusted			
	2012	2013	2014	2015
WOS01	24.3	21.4	19.1	18.2

## 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, here: [https://uk-air.defra.gov.uk/assets/documents/Air\\_Quality\\_Objectives\\_Update.pdf](https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf)

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

Pollutant	Air Quality Objective <sup>1</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>1</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Glossary of Terms

Please add a description of any abbreviation included in the ASR – An example is provided below.

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 <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
...	...

