



Llywodraeth Cymru  
Welsh Government

# Air Pollution in Wales 2015



Welsh Air Quality Forum  
Fforwm Ansawdd Awyr Cymru



Ricardo  
Energy & Environment

---

**This report has been produced by Ricardo Energy & Environment  
on behalf of the Welsh Government and Welsh Air Quality Forum**

---

As from 1 September 2015, Ricardo Energy & Environment became a trading name of Ricardo-AEA Ltd. Ricardo-AEA Ltd was constituted on 8 November 2012 following Ricardo plc's acquisition and goodwill of AEA Technology plc. For full details, please visit [ee.ricardo.com/cms/ownership](http://ee.ricardo.com/cms/ownership)

# Introduction

---

This is the 13<sup>th</sup> annual report on air quality in Wales to be produced by Ricardo Energy & Environment under the auspices of the Welsh Air Quality Forum (WAQF) for the Welsh Government. It aims to provide Welsh citizens and the air quality community with a user-friendly summary of information on local air quality monitoring, pollution levels and their impacts throughout Wales during 2015. It also details the WAQF's activities alongside major policy, technical and scientific developments.

More detailed information, analysis and data covering air quality in Wales can be found on the WAQF's website ([www.welshairquality.co.uk](http://www.welshairquality.co.uk)). All data used in this report are freely available through the website, which has been improved and developed over recent years. The website is used by 22 Local Authorities to submit monitoring data and by thousands more individuals to download data and learn about monitoring sites and measurements that take place. It contains comprehensive data, graphs and information on health effects from a continually increasing number of monitoring stations, together with local forecasts of air quality over the next 5 days. Providing the population of Wales access to reliable and accurate information on the quality of the air we breathe. OpenAir data analysis tools provide a free and open-source tool to analyse, interpret and understand air pollution data. The user-friendly interactive Google Map™ interface allows users to access and analyse data at a glance.

Chapter 2 presents the WAQF's activity in 2015. Chapter 3 summarises important policy developments in 2015. Chapter 4 presents key air quality statistics from all networks and summarises the air quality monitoring networks in Wales. These include air quality monitoring stations run by the Welsh Local Authorities themselves and the national monitoring networks run by the Department for Environment, Food and Rural Affairs (Defra) and Devolved Administrations. Chapters 5 and 6 discuss long-term trends and the spatial distribution of air pollutants across the country. Chapter 7 reports on topics of special interest – this year it looks at Welsh air quality exposure indicators. There is a new chapter this year for Chapter 8 which discusses the effect of air quality in Wales on public health. Finally, for readers wanting to find out more, additional web-based and published sources of information are summarised in Chapter 9.

# The WAQF and its Activities in 2015

The Welsh Air Quality Forum (WAQF) represents the 22 Unitary Councils of Wales and is made up of representatives from Local Authorities, the Welsh Government, Public Health Wales, Natural Resources Wales and several academic institutions. WAQF members direct the operation of the Welsh Air Quality Website and Database, the collection, quality assurance and quality control and dissemination of all data, and the provision of support and training to Local Authorities. The WAQF provides expertise and guidance to ensure that Local Air Quality Management (LAQM) statutory requirements are met and air quality in Wales is reported in an accurate, transparent and timely manner.

## WAQF Highlights from 2015

- The Air Quality in Wales website continued to improve and provide real time updates and information to over 1900 unique visitors per month.
- In 2015 the Welsh Government made funding support available for the implementation of local air quality action plans through its environment and sustainable development single revenue grant to Local Authorities in Wales.
- A mobile trailer is available for Local Authorities to monitor plumes in emergency planning situations. The trailer can measure NO<sub>x</sub>, SO<sub>2</sub>, CO, PM<sub>10</sub> and PM<sub>2.5</sub> along with meteorological parameters and video capture.
- Invited expert speakers continued to provide relevant additional training for officers. The WAQF provides a useful platform for dialogue to enable a more consistent approach to implementing LAQM requirements across Wales.
- Use of the website Discussion Forum continues to enable debate and promote best practice.

## WAQF Meetings 2015

30<sup>th</sup> April: The Forum discussed a spring particulate pollution episode in March which included Saharan dust. Public Health Wales provided an update on the AirAware study carried out with Swansea University in relation to Port Talbot and presented the key aspects of the air pollution alerting system and how well it performed. The WAQF were also informed that Public Health Wales were looking to develop an air quality public health outcome indicator for Wales.

2<sup>nd</sup> July: It was reported that high levels of ozone pollution were experienced throughout England on the 1<sup>st</sup> July with moderate levels recorded in North and South Wales. Swansea local authority informed the Forum of the availability of their Mobile Monitoring Trailer for use in local air quality emergency situations. The Chair (John Vesey, Cardiff) announced his resignation to pursue a career change. The Group thanked John for his hard work and commitment to the Forum and wished him well with his future plans. Ceri Mordecai, Bridgend volunteered to act as Chair until further notice

25<sup>th</sup> November: The increase in background PM concentrations resulting from Bonfire Night was discussed. The Forum received a presentation on Incident Management by the Fire and Rescue Service. An updated proposal for the Air Quality Indicator for the Well-being of Future Generations (Wales) Act 2015 was proposed and colleagues were asked to respond to the consultation. The Best Practice Standards for Improving Environmental Health Services in Wales were to be revised and would be called Practice Standards. LAQM TG 09 was also being revised and a consultation had been launched. The Chair of the Forum (Ceri Mordecai) advised that she would be resigning as her job role had changed so that she was no longer able to attend WAQF meetings.

The Annual Welsh Air Quality Forum Seminar took place on 8<sup>th</sup> October at the Media Resources Centre in Llandrindod Wells. Over 60 WAQF members and delegates attended the event, at which the 2014 20<sup>th</sup> Anniversary Annual Report was circulated. The topics presented were;

- Latest Evidence on Health Impacts of Nitrogen Dioxide Pollution.
- The Public Health Burden of Air Pollution in Wales.
- Statistical Analysis of the Neath Port Talbot Air Aware Study.
- Novel Analysis of Air Pollution Sources and Trends using Openair Tools.
- Developing a Low Emissions Strategy.
- Assessing the AQ Impact of Housing Development.
- LAQM Helpdesk Update and Action Planning.
- SoNaRR Introduction (Natural Resources Wales).



# Welsh Government policy update

Air pollutant concentrations are highly dependent on location, as they are influenced by traffic, domestic, industrial and agricultural sources as well as by more distant sources and meteorological factors. The susceptibility of individuals and populations also varies across an area. Air pollution, impaired health and deprivation can combine to create increased and disproportionate disease burdens between and within regions.

Around 40 air quality management areas (AQMA) have been declared by Local Authorities in Wales in the last decade and a half. Very few AQMA have been revoked to date, and people living and working within AQMA are likely to be exposed to higher concentrations of air pollution than elsewhere. However, the air pollutants of concern from a public health perspective hold 'non-threshold' status, which means there is no 'safe' level of exposure, and the national air quality objectives used to identify AQMA should not be seen as 'safe' levels. Air pollution can cause adverse effects on health and quality of life at lower exposures, depending on the circumstances of the exposed individual. As a consequence, the majority of the avoidable health burden associated with air pollution in Wales is the result of population exposures outside AQMA.

Air pollution can also adversely affect sensitive forms of wildlife and natural habitats. Local air quality management (LAQM) focuses primarily on human exposure, and measures aiming to bring down pollution only in narrowly defined residential hotspots will rarely yield substantial benefits for nature. However, measures to bring down pollution exposure for the population as a whole through reductions in overall emissions are likely to also reduce exposure for sensitive species and habitats. They should also result in less carbon dioxide being released into the atmosphere, and reduce Wales' contribution to global climate change.

The Welsh Government does not wish to see a reduction in action to tackle local pollution hotspots. On the contrary, we expect to see an effective local air quality action plan put in place for each and every AQMA, tailored to each area's own unique circumstances, within 18 months of an AQMA being declared. Anticipated changes to local circumstances are no excuse to delay putting an action plan in place.

Action plans can be living documents, which are reviewed and revised as circumstances change and new information comes to light. Where development proposals mean things are likely to change in an area, local air quality action plans should focus on informing and influencing those changes to ensure they are brought about in such a way as to improve air quality rather than allowing it to worsen. Once the development is complete, the situation can be re-assessed and the action plan revised accordingly, or the AQMA revoked.

But although tackling hotspots is important, there are greater health benefits to be gained by reducing pollution levels more widely than just in non-compliant areas. There is also a health cost to the population when levels of air pollution are permitted to increase, regardless of whether or not national air quality objectives are breached. Statutory policy guidance issued by the Welsh Ministers encourages Local Authorities to consider developing a local air quality strategy to maintain good air quality more broadly than just in and around AQMA, but very few have chosen to develop such a strategy to date.

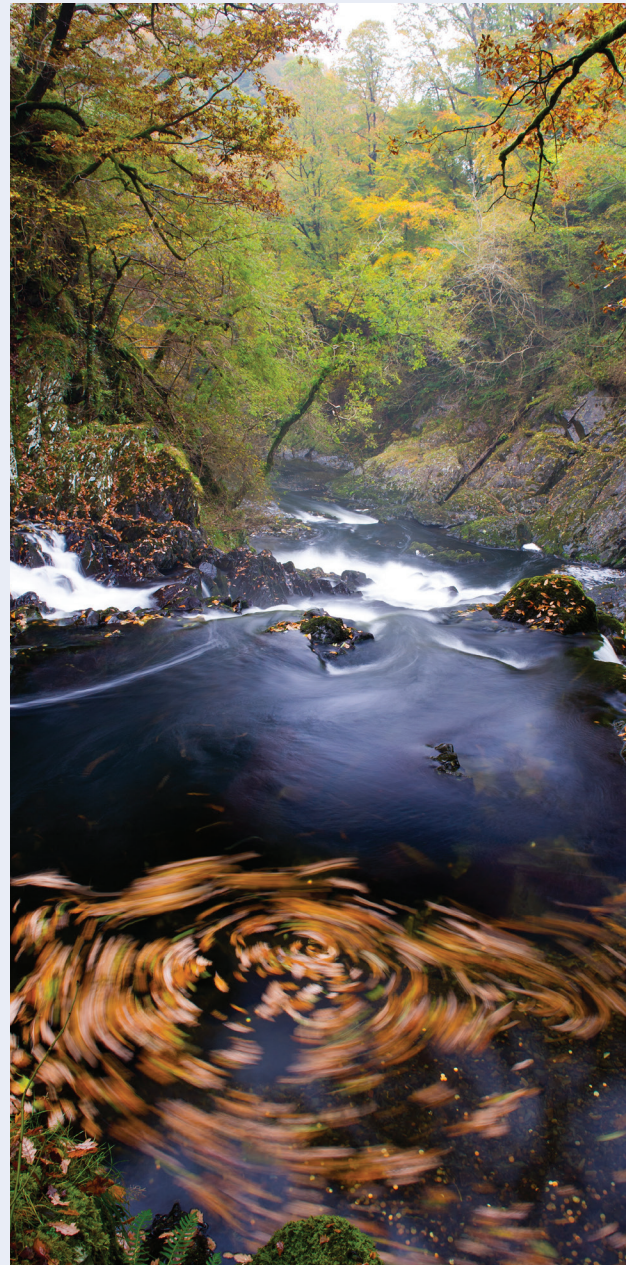
We now have a national exposure indicator for NO<sub>2</sub> under the Well-being of Future Generations (Wales) Act 2015 ("the WFG Act") and the Public Health Outcomes Framework, which, together with supplementary indicators for PM<sub>2.5</sub> and PM<sub>10</sub>, considers the exposure of the population as a whole to air pollution (see chapter 7).

The Welsh Government proposes each Local Authority's annual progress report from 2017 onwards should state what policies the Local Authority has in place to reduce average levels of NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and noise pollution at dwellings across the Local Authority, taking into consideration the Welsh air quality exposure indicators and national noise maps. The Welsh Government also proposes any new or updated local air quality action plan from 2017 onwards should state how the actions contained therein are being taken forward not solely with a view to achieving technical compliance with the national air quality objectives, but also with a view to maximising their contribution to reducing average levels of NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and noise pollution at dwellings across the Local Authority, and thereby to achieving the greatest public health benefit.

---

The Welsh Government proposes to issue new statutory policy guidance which will stress the greater public health benefits likely to result from actions to reduce air and noise pollution in an integrated fashion over a wider area, over and above those expected to result from actions seeking only to achieve technical compliance with the national air quality objectives in AQMAs. Under the WFG Act, public bodies are required to carry out sustainable development, which is underpinned by five ways of working: long term, prevention, collaboration, integration and involvement. Working in accordance with these principles is needed if we are to achieve and maintain good air quality at a local, regional and national level as we work towards achieving all seven of the national well-being goals<sup>1</sup>.

A public consultation on these and other proposed changes to how we carry out local air quality and noise management in Wales is running from now until 6 December. Full details may be found in the consultation section of the Welsh Government's website.



<sup>1</sup> A prosperous Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language, a globally responsible Wales.

## Monitoring Networks and Data Highlights

The Welsh Government and the Welsh Air Quality Forum (WAQF) work closely with air quality experts and the Department for Environment, Food and Rural Affairs (Defra) to monitor and reduce air pollution in Wales. Figure 4.1 illustrates the long-term trends for nitrogen dioxide, particulate matter up to 10 µm in size (PM<sub>10</sub>) and ozone concentrations in Wales. Apart from ozone this shows a steady improvement in pollutant concentrations since the 1990s. As ozone is a regional pollutant that is transboundary in nature, it is outside the direct control of the Welsh Government and Local Authorities.

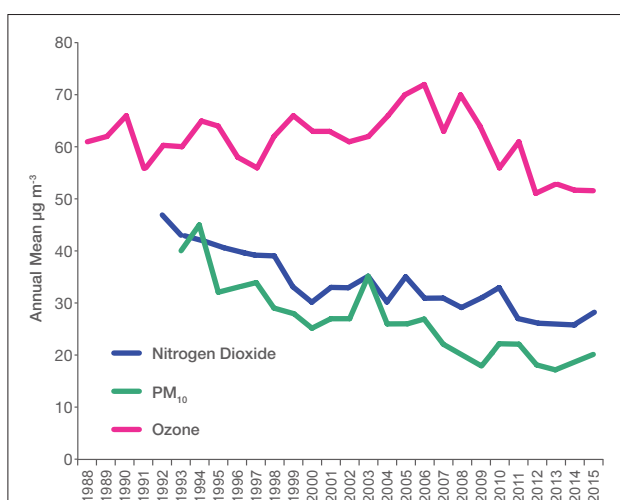


Figure 4.1

Ambient pollutant trends in Wales 1990-2015.

### Local Authority Monitoring

Air quality monitoring in Wales is undertaken by Local Authorities and through national networks managed by the Welsh Government. There are two main types of air pollution monitoring – automatic monitoring and passive sampling. Automatic monitoring uses continuous analysis techniques to measure and record ambient concentrations of a range of air pollutants. Passive samplers (such as diffusion tubes) contain a chemical reagent that adsorbs the pollutant from the air. Samplers are exposed for a period of time and analysed in a laboratory. In 2015, there were a total of 43 automatic monitoring sites distributed across the country that were operated by Local Authorities.

These sites contain equipment that automatically measures carbon monoxide, nitrogen oxides, sulphur dioxide, ozone, PM<sub>10</sub> and particulate matter up to 2.5 µm in size (PM<sub>2.5</sub>). In addition to these, there were several hundred diffusion tubes measuring monthly mean nitrogen dioxide levels. Overall, data capture for the automatic instruments operated by Local Authorities during the year was 93%.

Ambient concentrations of PM<sub>10</sub> were “Moderate” on 66 days, “High” on 16 days and “Very High” on 8 days (as defined by the Daily Air Quality Index bandings) during the year. For nitrogen dioxide, there were 86 days with “Moderate” concentrations; there was 1 day with “High” levels recorded in 2015 and no days recording “very high”. There was 1 day with “Moderate” levels for sulphur dioxide, no “High” or “Very High” levels were recorded. There were 24 days with “Moderate” ozone and no days with “High” or “Very High” ozone, as measured by the monitoring sites operated by Local Authorities. Overall, pollution levels in Wales were low for 204 days, moderate for 137 days, high for 16 days and very high for 8 days. So, for 56% of the time, pollution levels were low across the whole of the Wales. Details of the Daily Air Quality Index banding system used to describe pollution levels for the public during 2015 can be found at <http://uk-air.defra.gov.uk/air-pollution/daq>

### Summary of Exceedances

Exceedance statistics generated from the ‘Air Quality in Wales’ website show that no monitoring sites in Wales exceeded any Air Quality Strategy (AQS) Objectives (or corresponding EU limit values) for carbon monoxide, sulphur dioxide, benzene or lead during 2015.

Four Welsh monitoring sites (Rhondda Mountain Ash, Caerphilly Hafodyrnys, Newport M4 Junction 25 and Swansea Station Court High Street) exceeded the annual mean objective of 40 µg m<sup>-3</sup> for nitrogen dioxide. Caerphilly Hafodyrnys and Rhondda Mountain Ash also exceeded the AQS Objective for hourly mean nitrogen dioxide concentration on more than the permitted 18 occasions in 2015.

One site in Wales exceeded the AQS Objective for ozone (100 µg m<sup>-3</sup> as a maximum daily 8-hour mean) on more than the permitted 10 occasions. This was Pembroke Power Station.

## The National Air Quality Monitoring Networks Operating in Wales

There are several national air quality monitoring networks operating across Wales. These report air pollution levels in Wales that can be assessed against regulatory requirements and to provide information for air quality researchers, the medical community and members of the public.

### Automatic Urban and Rural Network

There are 10 air quality monitoring sites in the UK Automatic Urban and Rural Network (AURN) operating across Wales. The techniques used for monitoring the gaseous pollutants in the AURN are the reference methods of measurement defined in the relevant EU Directives. For particulate matter, the AURN uses methods that have demonstrated equivalence to the reference method, but which (unlike the reference method) allow continuous monitoring and provision of this information in 'real time'.

### Urban and Industrial Metals Network

There are six UK Urban and Industrial Metals Network monitoring sites located in Wales.

### PAH Monitoring Network

Wales has four polycyclic aromatic hydrocarbon (PAH) network sites. These monitor compliance with the 4<sup>th</sup> Daughter Directive, which includes a target value of 1 ng m<sup>-3</sup> for the annual mean concentration of benzo[a]pyrene as a representative PAH, not to be exceeded after 31<sup>st</sup> December 2012. This network uses the PM<sub>10</sub> "DigitelTM" sampler. Ambient air is sampled through glass fibre filters and polyurethane foam pads, which capture the PAH compounds for later analysis in a laboratory.

### Black Carbon Network

Black carbon is fine, dark carbonaceous particulate matter produced from the incomplete combustion of materials containing carbon (for example coal, oil and biomass (such as wood)). It is of concern due to possible health impacts and as a suspected contributor to climate change. There is one monitoring site in Wales that measures this parameter. The site, in Cardiff, is part of the Black Carbon Network.

This uses an automatic instrument called an aethalometer that measures black carbon directly using a real-time optical transmission technique.



### Rural Metals Network

There is one monitoring site in Wales, which belongs to the national Rural Metals Network. This rural network complements the statutory UK Metals Network, which predominantly monitors at industrial and urban locations. Airborne particulate matter is sampled and analysed for metals concentrations in PM<sub>10</sub>. The metal concentration data are then combined with the local meteorological data (rainfall, etc) to calculate values for wet deposition (from rain, snow, etc), dry deposition (from dust settling, etc) and cloud deposition (condensation of cloud droplets).

### UK Eutrophying and Acidifying Pollutants Network

The UK Eutrophying and Acidifying Atmospheric Pollutants (UKEAP) network provides information on deposition of eutrophying and acidifying compounds in the UK and assessment of their potential impacts on ecosystems. Other measurements – including sulphur dioxide, nitrogen dioxide and particulate sulphate – have also been made within the programme, to provide a more complete understanding of precipitation chemistry in the UK.





# Air Quality Trends

The number of automatic monitoring sites in Wales has increased greatly in recent years. While this helps to improve our understanding of air quality across the country, it potentially complicates the investigation of how air quality has changed over time. If such investigations are based on all available data, discontinuities and false trends may be introduced because of changes in the composition of the network. Therefore, in this report, investigation of changes has been based on subsets of long-running sites rather than on every site in the network. This should lead to a more robust assessment.

## Nitrogen Dioxide

In Wales (and the rest of the UK), the most widely exceeded limit value is the annual mean nitrogen dioxide concentration ( $40 \mu\text{g m}^{-3}$ ). Figure 5.1 shows how annual mean nitrogen dioxide concentrations have varied with time.

Urban background sites are represented by the longest running site of this type (Cardiff Centre) from 1992, and a subset of four long-running sites which have all been in operation since 2003, with annual data capture of at least 50% – Cardiff Centre, Cwmbran, Newport St Julians and Port Talbot (replaced by the nearby Port Talbot Margam site in 2007 – the two Port Talbot sites are treated as one for the purpose of the graph). Cardiff Centre shows a clear decrease from 1992 to around 2000, after which the downward trend appears to have levelled off. The mean for the long-running sites shows a slight decrease through the 2000s, although 2010 was a higher year.

Urban traffic sites (those within 10 m of a major road) are represented by the longest-running roadside site (Swansea Morrision) from 2001, and a subset of two long-running sites that have been in operation since 2002 – Swansea Morrision and Wrexham. Neither Swansea Morrision nor the mean of the two long-running sites shows any clear pattern of increase or decrease in nitrogen dioxide concentration in recent years.

## Particulate Matter

Figure 5.2 shows how annual mean concentrations of particulate matter up to  $10 \mu\text{m}$  in size ( $\text{PM}_{10}$ ) have generally decreased in recent years at urban background and urban traffic sites.

Urban non-roadsite sites are represented by the mean of three long-running sites from 2001 (Cardiff Centre, Cwmbran, and Port Talbot/Port Talbot Margam – again, the latter two are treated as one site for this purpose). Please note that Port Talbot/Port Talbot Margam is classified as urban industrial rather than urban background as it is located in the vicinity of a large steelworks. It has been included because there are few long-running urban non-roadsite sites.

Cardiff Centre (which has operated for longer than any other site) is also shown individually. All sites have at least 70% annual data capture except Cardiff Centre in 2010.

Urban traffic sites are represented by the mean of two long-running sites from 2002 – Rhondda-Cynon-Taf Nantgarw and Wrexham. Wrexham (the longest-running traffic site) is also shown individually.

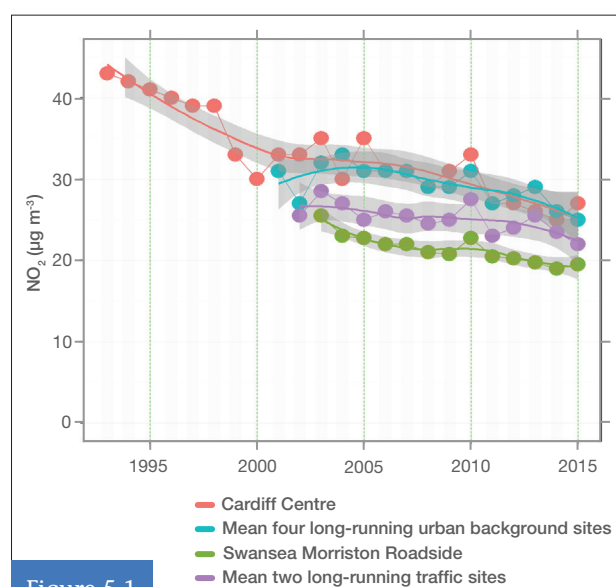


Figure 5.1

Annual Mean Nitrogen Dioxide Concentration at Long-running Sites in Wales.

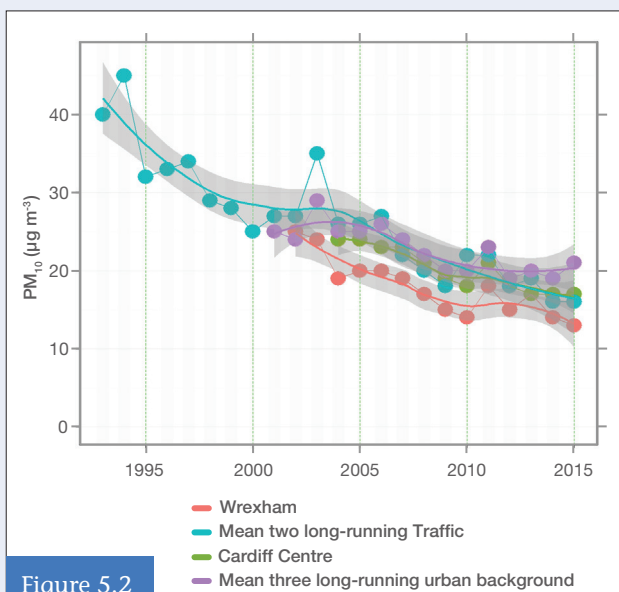


Figure 5.2

Annual Mean PM<sub>10</sub> Concentrations at Long-running Sites in Wales.

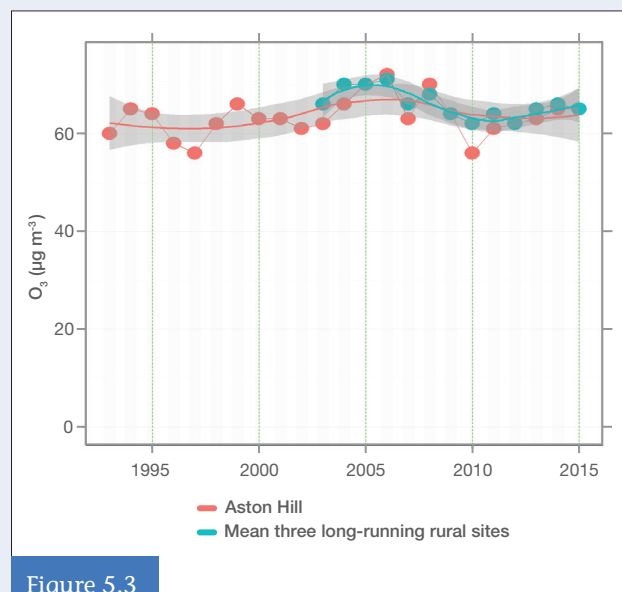


Figure 5.3

Annual Mean Ozone Concentrations at Long-running Sites in Wales.

## Ozone

Ozone concentrations tend to be highest at rural locations. Figure 5.3 shows how annual mean rural ozone concentration has changed over time. This is based on the mean concentration measured by three long-running sites in Wales (shown by the grey line) – Aston Hill, Marchlyn

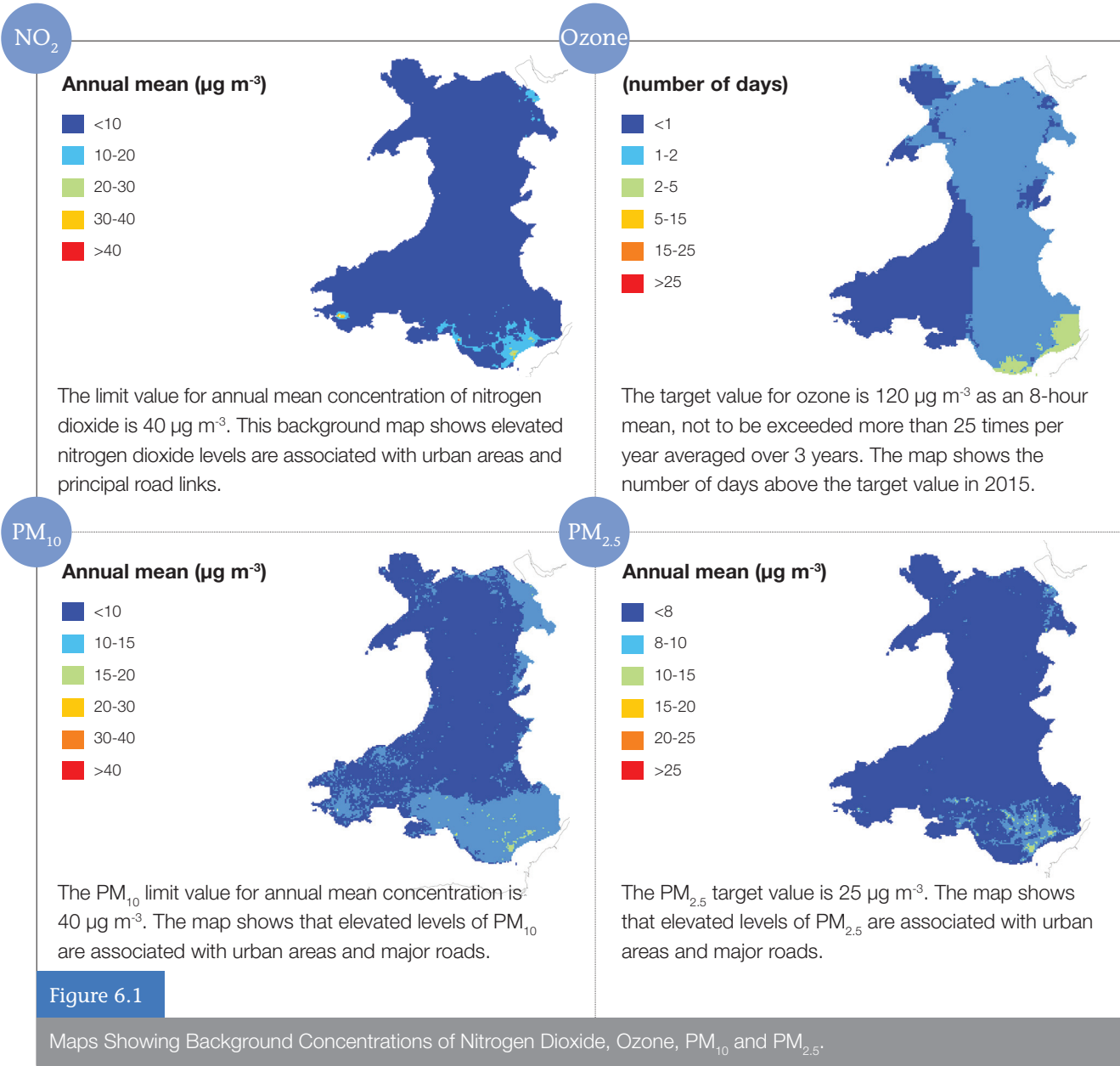
Mawr and Narbeth. All have been in operation since 2003 or earlier, with data capture of at least 70%. Also shown is Aston Hill alone – this site has been monitoring ozone since the late 1980s. Although there are no clear trends, concentrations vary considerably from year to year because of variation in meteorological factors.



6

# Maps of Air Quality

The maps in Figure 6.1 present 2015 background concentrations for nitrogen dioxide, ozone, and particulate matter up to 10 µm in size (PM<sub>10</sub>) and smaller than 2.5 µm (PM<sub>2.5</sub>). These modelled maps of ambient concentrations were calculated from National Atmospheric Emissions Inventory (NAEI) data using a dispersion modelling approach. The model output was calibrated using monitored data from the national monitoring networks. These modelled maps were then verified against the local authority monitoring data. A more detailed report comparing the Welsh air quality monitoring data to modelled concentrations will be published in due course. In these maps, the modelled ambient concentrations are compared with EU limit values.



Welsh Government OS license number - 100017916

## Welsh air quality exposure indicators

Local air quality management requires Local Authorities to monitor air quality across their territory but only requires them to take action where national air quality objectives are being breached. However, there are health benefits to be gained by reducing pollution levels more widely than just in non-compliant areas. There is also a health cost to the population when levels of air pollution are permitted to increase, regardless of whether or not national air quality objectives are breached.

The Well-being of Future Generations (Wales) Act 2015 (“the WFG Act”) puts on a statutory footing Public Services Boards (PSBs) made up of Local Authorities, Local Health Boards, fire and rescue services and Natural Resources Wales. Each PSB must improve the economic, social, environmental and cultural well-being of its area by contributing to the achievement of the seven national well-being goals<sup>2</sup>. A PSB must carry out an assessment of local well-being. It is then required to set well-being objectives

and implement a local well-being plan. Each assessment of local well-being must include reference to the national indicators set by the Welsh Government. One of these is the average NO<sub>2</sub> concentration outside people’s homes.

Each year the UK Government’s Pollution Climate Mapping (PCM) model calculates average pollutant concentrations for each square kilometre of the UK. The model is calibrated against measurements taken from the UK’s national air quality monitoring network. The calibrated average air pollution data for past years and further information on the model are available on-line at <https://uk-air.defra.gov.uk/data/pcm-data>

**Table 1 Average NO<sub>2</sub> concentration at residential dwelling locations (µg/m<sup>3</sup>)**

Local Health Board	2007	2008	2009	2010	2011	2012	2013	2014
Abertawe Bro Morgannwg <sup>3</sup>	14	14	13	14	13	13	12	11
Aneurin Bevan <sup>4</sup>	17	16	17	18	16	15	14	13
Betsi Cadwaladr <sup>5</sup>	10	10	10	11	9	9	9	8
Cardiff and Vale	19	20	20	22	20	20	19	19
Cwm Taf <sup>6</sup>	13	13	13	14	12	12	12	11
Hywel Dda <sup>7</sup>	9	8	8	8	8	8	8	7
Powys	8	7	7	8	7	6	6	5
<b>Wales</b>	<b>14</b>	<b>13</b>	<b>13</b>	<b>14</b>	<b>13</b>	<b>13</b>	<b>12</b>	<b>11</b>

<sup>2</sup> A prosperous Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language, a globally responsible Wales.

<sup>3</sup> Covering Bridgend, Neath Port Talbot and Swansea.

<sup>4</sup> Covering Blaenau Gwent, Caerphilly, Monmouthshire, Newport and Torfaen.

<sup>5</sup> Covering North Wales.

<sup>6</sup> Covering Merthyr Tydfil and Rhondda Cynon Taf.

<sup>7</sup> Covering Carmarthenshire, Ceredigion and Pembrokeshire.



The Welsh Government has used this published data to assign an average concentration of NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> to each residential dwelling in Wales based on which square kilometre of Wales it sits in. For each census output area, we have averaged the pollutant concentrations associated with each dwelling within it to give an average NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> concentration across the census output area. For each Local Authority, each Local Health Board and Wales as a whole, we have calculated a population-weighted average over the constituent census output areas to give an average NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> concentration based on where people live. We can do this separately for each

recent year of data and see whether we think the average NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> concentration where people live is going up or down.

The average NO<sub>2</sub> concentration where people live is a national indicator for the purposes of both the WFG Act and Wales' Public Health Outcomes Framework, but attention should also be given to the average PM<sub>2.5</sub> concentration where people live, as there are no national air quality objectives in regulations for this pollutant.

**Table 2 Average PM<sub>2.5</sub> concentration at residential dwelling locations (µg/m<sup>3</sup>)**

Local Health Board	2007	2008	2009	2010	2011	2012	2013	2014
Abertawe Bro Morgannwg	9	9	9	9	9	9	10	10
Aneurin Bevan	9	10	10	10	10	10	11	11
Betsi Cadwaladr	7	7	8	8	8	8	9	8
Cardiff and Vale	10	10	11	11	11	10	11	10
Cwm Taf	9	9	9	9	10	9	11	10
Hywel Dda	8	8	8	8	8	8	9	9
Powys	7	7	8	8	8	8	8	8
<b>Wales</b>	<b>8</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>10</b>	<b>10</b>

**Table 3 Average PM<sub>10</sub> concentration at residential dwelling locations (µg/m<sup>3</sup>)**

Local Health Board	2007	2008	2009	2010	2011	2012	2013	2014
Abertawe Bro Morgannwg	16	14	13	13	14	12	14	13
Aneurin Bevan	17	15	15	14	15	13	15	15
Betsi Cadwaladr	13	12	12	12	13	12	12	12
Cardiff and Vale	18	16	16	15	16	13	15	15
Cwm Taf	16	14	14	13	14	12	15	14
Hywel Dda	15	13	12	12	13	12	13	12
Powys	13	12	12	11	12	11	12	11
<b>Wales</b>	<b>16</b>	<b>14</b>	<b>14</b>	<b>13</b>	<b>14</b>	<b>12</b>	<b>14</b>	<b>13</b>

## Air pollution: A public health priority

Air pollution problems persist in Wales and pose significant public health risks. In the contemporary context of air quality management, the pollutants of most concern are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). Exposure is associated with increased mortality and morbidity from heart disease and strokes, respiratory diseases, lung cancer and other effects. Costing the UK around £20b per year, the health burden linked to each pollutant, independently, is substantial:

Pollutant	Avoidable deaths (UK)	Avoidable deaths (Wales)	Years of Life Lost (UK)	Years of Life Lost (Wales)
PM <sub>2.5</sub>	29,000	1,300	307,000	13,500
NO <sub>2</sub>	23,500	1,100	277,000	13,200

While these headlines provide profile and scope, they mask sub-national variations in air pollution and linked risks which arise primarily because of influences from local pollution sources (e.g. transport and industry). Also, a triple jeopardy exists where pollution, impaired health and deprivation interact to create increased and disproportionate disease burdens (inequalities) between and within regions.

Most of the avoidable air pollution mortality burden results from population exposures outside designated 'hotspot' Air Quality Management Areas. This is recognised by Welsh Government who are calling for 'exposure reduction' action (to reduce risks for all) to run in parallel with targeted interventions in the most polluted areas (to resolve localised problems and reduce health risks and inequalities). From a public health perspective, this is important and was considered in a recent study in Wales where air pollution, deprivation and health data were linked to assess associations<sup>8</sup>. It found that when air pollution and deprivation status were considered simultaneously, their interaction modified and strengthened associations with all-cause non-accidental and respiratory disease mortality outcomes, especially in 'most' deprived areas.

Based on this evidence, an effective air quality management approach is one that combines national-level action to assess and reduce risks for all and local-level intervention targeted in high-risk communities to reduce air pollution-related health inequalities. Given that air pollution and wider health determinants are inextricably linked, the approach must be fully integrated with, and supported by, public health policy and practice.

Despite the Local Air Quality Management (LAQM) regime calling for action to assess and reduce air pollution to protect public health, a recent evidence critique highlighted a disconnect between LAQM and public health policy and practice<sup>9</sup>. Several 'structure' and 'process' weaknesses are blamed for public health professionals being disengaged, including: a poorly defined public health role, narrow prescribed process scope, risk assessment uncertainties, ineffective communications, shallow evaluation, disconnected policy. To address identified problems, a study is now underway to achieve consensus on the role of public health in LAQM, as well as identify opportunities, barriers, solutions and the added value that could result from a more focused and supported air quality management process.

Although air pollution is a public health priority in Wales, its management is very much a collaborative endeavour; public bodies, private companies, third sector partners and the public all have important roles to play. Acting to address identified shortfalls in current air quality management arrangements is timely. Welsh Government is committed to review LAQM and the NHS in Wales is being urged to place more emphasis on preventing disease by tackling major public health risks such as air pollution. Crucially, the evolving policy landscape in Wales, connected by the Well-being of Future Generation (Wales) Act 2015, now requires public bodies to work together to deliver sustainable health and wellbeing improvements.

This is an opportunity not to be missed.

**Huw Brunt**  
(Lead Consultant in Environmental Public Health)

<sup>8</sup> Brunt H, Barnes J, Jones SJ, Longhurst JWS, Scally G, Hayes ET (2016). Air pollution, deprivation and health: Understanding relationships to add value to local air quality management policy and practice in Wales, UK. *J Public Health* (in press).

<sup>9</sup> Brunt H, Barnes J, Longhurst JWS, Scally G, Hayes ET (2016). Local Air Quality Management policy and practice in the UK: the case for greater Public Health integration and engagement. *J Env Science and Policy*; 58: 52-60.



# More information

## The Air Quality in Wales Website



Figure 9.1

The Air Quality Website

The Air Quality in Wales website ([www.welshairquality.co.uk](http://www.welshairquality.co.uk)) is available in English and Welsh. It provides information on all aspects of air pollution in Wales. The site is one of a family of air quality websites produced by Ricardo Energy & Environment, which includes air quality websites for the UK, Northern Ireland, Scotland and England.

The website has been designed to be a user-friendly and interactive resource containing comprehensive information on all aspects of air pollution:

- A colour-coded Google map showing the overall current pollution situation at sites across Wales.
- Latest data from all automatic monitoring sites in Wales, accessible from this map.
- Air pollution forecasts for the whole of Wales.
- Information on the latest news, developments and publications.
- Detailed information on automatic monitoring sites.
- A wide range of background information on air pollution sources, health impacts, monitoring techniques, standards and policy issues.
- Access to air quality data and statistics – for automatic and sampler sites – going back to 1986.
- Provision to submit data via innovative web forms to the Archive.

- Headline air quality indicators, trends and modelled future scenarios.
- Links to national and global information resources on air quality.
- A password-protected area for members of the Welsh Air Quality Forum (WAQF).
- Overview of the data ratification and verification procedures.

To access data used in this Annual Report, follow these simple steps:

- From the home page, select “Data” from the main menu.
- Click “Download/Submit Data”.
- Click “Download Data”.
- Select “Parameter Group” (type of data required).
- Select “Pollutant Species”.
- Select “Local Authority Region”.
- Select “Statistic Type” (for example, daily mean).
- Select “Date Range”.
- Select “Specific Monitoring Site(s)”.

Then, provide your email address and the data will be emailed to you with a few seconds.

## Current and Forecast Air Quality (National and Local)

In addition to the Air Quality in Wales website, this information is rapidly available in a user-friendly form from:

- The Air Pollution Information Service on freephone 0800 556677.
- The UK Air Information Resource (<http://uk-air.defra.gov.uk/>).

