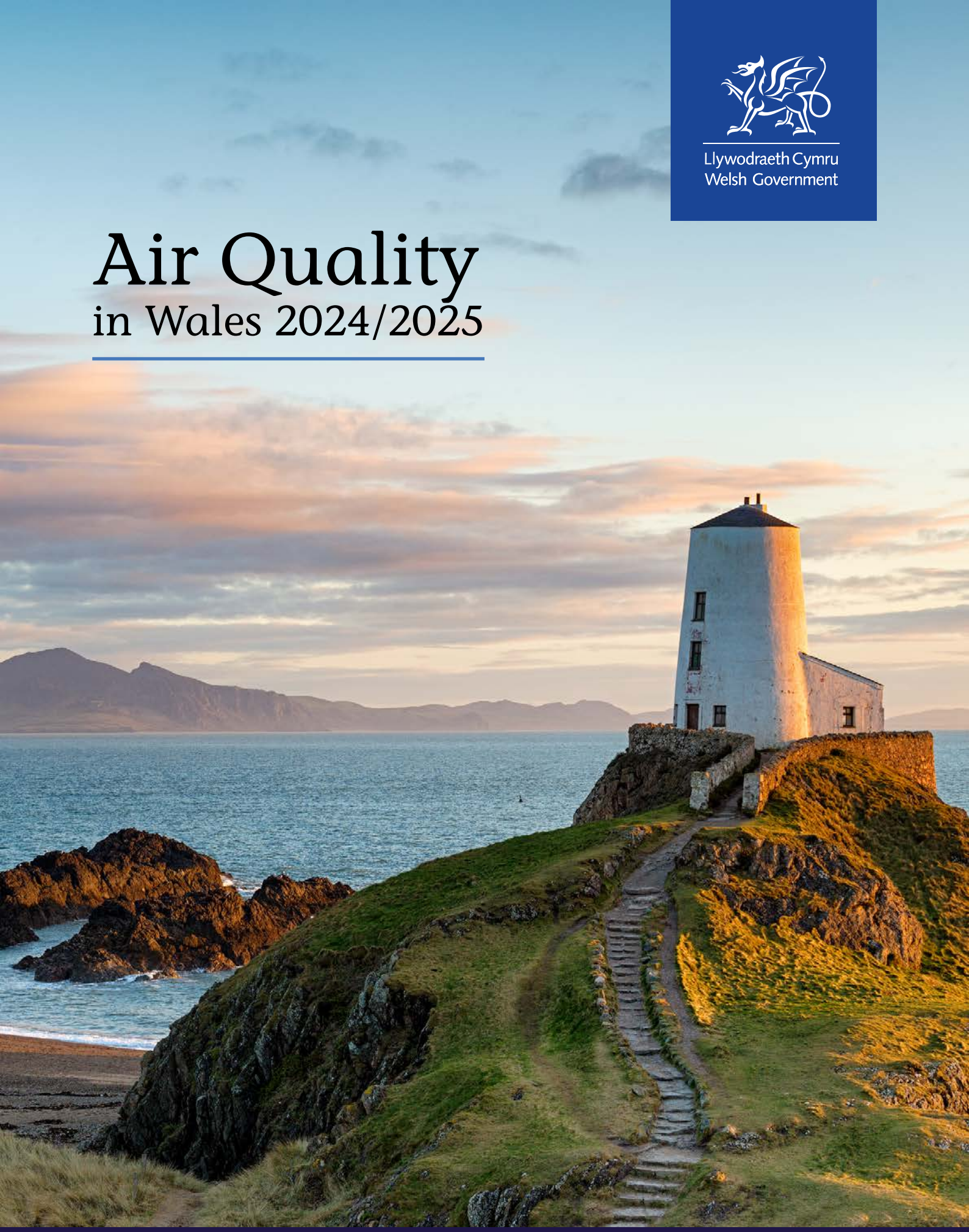
Llywodraeth Cymru
Welsh Government

Air Quality
in Wales 2024/2025



Welsh *Air Quality* Forum

Creating a world
fit for the future

RICARDO

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Introduction

This annual report on air quality in Wales is produced by Ricardo under the auspices of the Welsh Air Quality Forum (WAQF) for the Welsh Government. This report aims to provide Welsh citizens and the air quality community with an intuitive summary of Welsh pollution levels, impacts and monitoring during 2024/25. It also details the WAQF's activities alongside any major policy, technical and scientific developments.

More detailed information, data and analysis can be found on the Welsh Government's website at https://airquality.gov.wales/. The site contains a database of pollutant data collected by 22 Local Authorities and is used by thousands of individuals for both commercial and personal purposes. Primary uses include; data usage and download, education on air quality (including impacts and monitoring) and to provide up-to-date live information on local pollution levels. It contains comprehensive data, graphs and information on the health effects of a continually increasing number of monitoring stations and reports 5-day local air quality forecasts. This gives local residents access to reliable and accurate information on the quality of the air they breathe. OpenAir data analysis tools provide a free and open-source tool to analyse, interpret and understand air pollution data. The user-friendly, interactive map allows users to access and analyse data at a glance.

This report is structured as follows. Chapter 2 presents the WAQF's activities in 2024/25. Chapter 3 summarises important policy developments that took place in 2024/25. Chapter 4 presents key air quality statistics from all monitoring networks in Wales and summarises the data from them. The networks include air quality monitoring stations run by Welsh Local Authorities, the national monitoring networks run by the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Government. Chapters 5 and 6 discuss and present long-term trends and spatial distribution of air pollutants across the country. Chapter 7 outlines an update on the Local Air Quality Management Support Fund and summarises the projects that were awarded funding in 2024/25. Chapter 8 is from Public Health Wales and provides a review of air pollution awareness in health care professionals in Wales. For readers wanting to find out more, additional web-based and published sources of information are summarised in Chapter 9.

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The WAQF and its Activities in 2024/25

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,
- 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 2024/25

- The Air Quality in Wales website (https://airquality.gov.wales) continues to be a valuable resource providing real-time updates and information.
- Use of the website Discussion Forum continues to enable debate and to promote best practice. Topics covered included: discussions on Local Authorities networking on air quality projects, the use of air quality sensors across Wales, approaches to tackle idling.

WAQF Annual Seminar 2024

The Annual Welsh Air Quality Forum Seminar was held as a hybrid event in 2024 on the 28th of November. Forum members were able to attend the seminar which was held at Glamorgan County Cricket Club – Sophia Gardens or join virtually.

There were 40 WAQF members and delegates attending the event in person. Topics presented were:

- Welsh Government Update
- Ammonia emissions from vehicle emissions measurements
- Modelling of quarry emissions
- Indoor air quality monitoring in homes
- ‘Low-Cost’ Sensor monitoring of $PM_{2.5}$ from domestic combustion
- High-frequency air quality measurements by school gates and air quality education.

There was also an update from the Promoting Awareness of Air Pollution Working Group as well as a workshop on the topic of idling.

PDFs of these presentations can be found at https://airquality.gov.wales/reports-seminars/seminars.

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Welsh Government Policy Update

Clean Air Plan for Wales and Air Quality in Wales

The Welsh Government is committed to improving air quality and reducing the impacts of air pollution on human health, biodiversity, the natural environment and our economy. In September 2024, we published an updated report on progress against actions in our Clean Air Plan for Wales – Healthy Air, Healthy Wales. This Air Quality in Wales update outlines further progress we have made in collaboration with our partners and highlights the next steps we are taking.

Strengthening Air Quality Legislation

We are continuing to implement the Environment (Air Quality and Soundscapes) (Wales) Act 2024, which builds on commitments made in the Clean Air Plan, including national air quality targets, promoting awareness of air pollution, local air quality management, smoke control, stationary idling offences and the national strategy on soundscapes.

Priorities over the next 12 months relating to implementation of the Act are:

- Development of new national air quality targets for Wales, taking account of World Health Organisation Guidelines;
- Publication of a delivery plan setting out how we will promote awareness, alongside ways of reducing and limiting the risks associated with air pollution;
- Making regulations to set a penalty range for the offence of stationary vehicle idling. These regulations will be accompanied by guidance for Local Authorities and a broader communication campaign, and;
- Provide ongoing guidance for Local Authorities in relation to legislative changes to the existing smoke control and local air quality management regimes.

Funding to Deliver Local Air Quality Improvements

Following the pilot rounds of the Local Air Quality Management Support Fund in 2021 and 2022, the Minister for Climate Change announced the official launch of the Support Fund as a grant fund in April 2023, with total capital and revenue valued at £1m per annum.

This grant was replicated for the 2024-2025 scheme year, and a total of six Local Authorities were successful in securing funding for 19 projects. A summary of the outcomes of the 2024-2025 projects can be found in Chapter 7.

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Monitoring Networks and Data Highlights

The Welsh Government and the Welsh Air Quality Forum (WAQF) maintain a close collaborative relationship with air quality experts and the Department for Environment, Food and Rural Affairs (Defra) to actively oversee and mitigate air pollution within Wales. Figure 4.1 illustrates the annual average long-term trends for nitrogen dioxide (NO_2), fine particles (PM_{10} and $PM_{2.5}$) and ozone (O_3) concentrations across Wales. These trends are derived from measurements taken at monitoring sites affiliated with Local Authorities and the Automatic Urban and Rural Network (AURN), where annual data capture was 75% or greater.

All pollutants, except O_3, have shown an overall decline in concentrations since the pollutant records began. However, as O_3 qualifies as a regional pollutant with transboundary characteristics, its regulation falls beyond immediate purview of the Welsh Government and Local Authorities.

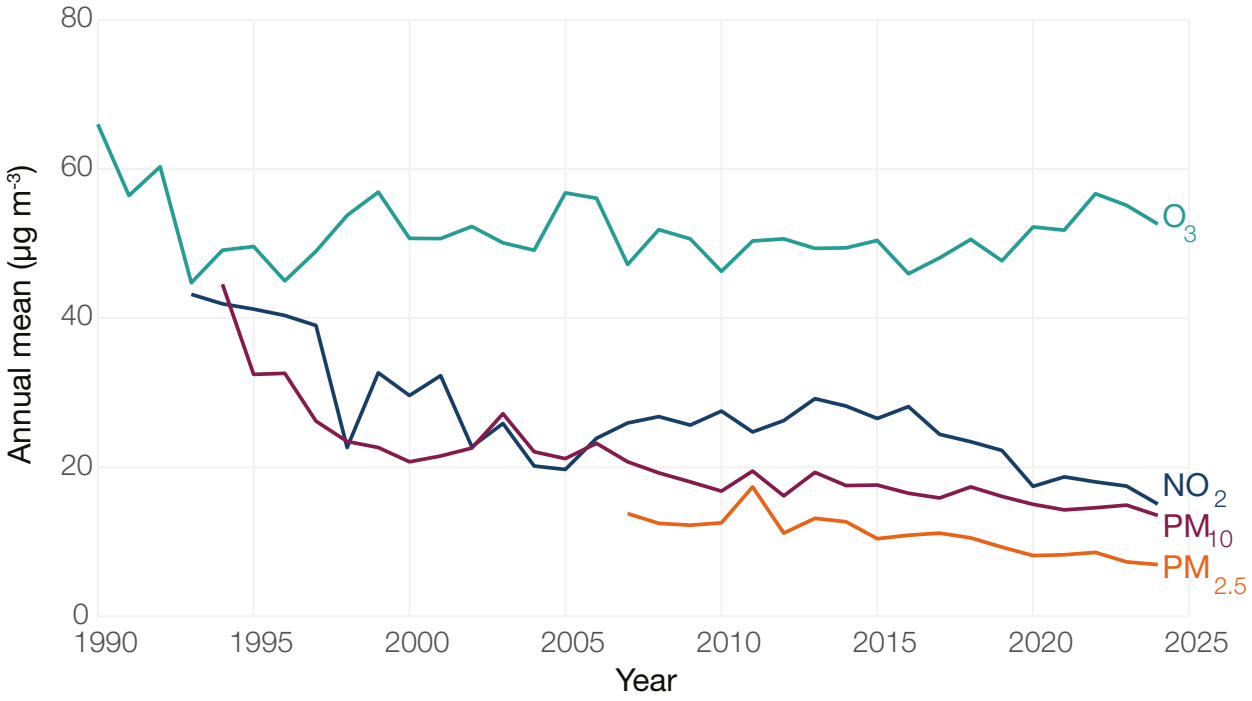

Figure 4.1 Key Ambient Air Pollutant Trends in Wales 1990-2024

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 the 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.

At the start of 2024, there were a total of 37 active automatic monitoring sites distributed across Wales that were operated by Local Authorities. In January 2024, Port Talbot Mobile Monitoring station was commissioned. Furthermore, in June 2024, 5 new monitoring sites were opened: Newport M4 Junction 25 West, Port Talbot M4 Junction, Aston Expressway, A494 Deeside, Rhondda-Cynon-Taff Pontypridd A470 and Wrexham A438. At the end of 2024, there were a total of 43 active automatic monitoring sites across Wales. A detailed map of the location of these monitoring stations can be found at the end of this report (Figure 9.2).

These sites contain equipment that automatically measures carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), coarse (PM_{10}) and fine ($PM_{2.5}$) particulate matter. In addition to these, there were several hundred diffusion tubes measuring monthly mean NO_2 levels.

Overall, the average data capture for the automatic instruments for 2024 was 83%.

Daily Air Quality Index

In 2024, ambient PM_{10} concentrations were 'moderate' on 34 days, 'high' on 11 days and 'very high' on 4 days (as defined by the Daily Air Quality Index bandings). $PM_{2.5}$ concentrations were 'moderate' on 3 days, with no days recorded at 'high' or 'very high'. There were no recorded days with 'moderate', 'high' or 'very high' levels for NO_2 or SO_2 concentrations in 2024. For O_3, there were 33 days with 'moderate' levels, 1 day recorded as 'high' and no days recorded as 'very high'. Overall, in Wales, pollution levels were 'low' on 291 days, 'moderate' on 59 days, 'high' on 12 days and 'very high' on 4 days. Therefore, pollution levels were 'low' on 80% of the days in 2024 across the whole of Wales. Details of the Daily Air Quality Index banding system used can be found here.

Summary of Exceedances

Exceedance statistics, generated from the Welsh Air Quality database, indicate that in 2024 no monitoring sites in Wales exceeded any national air quality objective (or corresponding Air Quality Standards (Wales) Regulations 2010 limit value) for NO_2, PM_{10}, $PM_{2.5}$, CO, SO_2, benzene or lead.

Three sites in Wales exceeded the AQS Objective for O_3 (100 µg/m^3 as a maximum daily 8-hour mean) on more than the permitted 10 occasions. These were Cardiff Centre, Cwmbran Crownbridge

and Swansea St Thomas DOAS. These exceedances mainly occurred across three prominent high-ozone periods during May, July and August 2024; specifically on the 9th to 12th and 19th to 20th of May and the 29th of July to 1st of September. These periods of elevated ozone pollution occurred on hot days under calm wind conditions that resulted in poor dispersion of local emissions.

The National Air Quality Monitoring Networks Operating in Wales

Several national air quality monitoring networks operate across Wales. These networks are used to ensure regulatory requirements are met and to provide information for air quality researchers, the medical community and members of the public.

Automatic Urban and Rural Network
There are 11 air quality monitoring sites in Wales that are part of the UK Automatic Urban and Rural Network (AURN). For gaseous pollutants, the AURN uses the reference methods of measurement defined in the relevant EU Directive. 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'.

UK Urban NO_2 Network
The UK Urban NO_2 Network (UUNN) is an air quality monitoring network that provides measurements of nitrogen dioxide (NO_2) concentrations at urban traffic sites. NO_2 measurement data provided by the UUNN is used to assess compliance against the annual mean NO_2 limit value set out in the Air Quality Standards Regulations (2010). There are currently three monitoring sites in Wales.

Heavy Metals Network
There are six monitoring sites in Wales for heavy metals and they belong to the UK Heavy Metals Network. Airborne particulate matter is sampled and analysed for metal concentrations in PM_{10}. The metal concentration data are then combined with the local meteorological data (such as rainfall) to calculate values for wet deposition (from precipitation), dry deposition (such as dust settling) and cloud deposition (condensation of cloud droplets).

PAH Monitoring Network
In 2024, Wales had five polycyclic aromatic hydrocarbon (PAH) network sites, following the opening of the Margam Youth Centre site that year. These monitor compliance the Air Quality Standards Regulations 2010 which includes a target value of 1 ngm^{-3} for the annual mean concentration of benzo[a] pyrene ($C_{20}H_{12}$) as a representative PAH, not to be exceeded after 31 December 2012. This network uses the PM_{10} 'Digitel™' 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.

UK Eutrophying and Acidifying Pollutants Network
The UK Eutrophying and Acidifying Pollutants (UKEAP) monitoring programme consists of a number of networks that monitor the deposition of both eutrophying and acidifying compounds in the United Kingdom. Due to the success of emission reductions in sulphur dioxide, acidification is no longer the issue it once was, but nitrogen pollution continues to be a concern. While its main emphasis has always been the assessment of potential impacts on UK ecosystems, UKEAP also provides the background concentration field for secondary inorganic aerosol which is used to determine the 1 km x 1 km maps for $PM_{2.5}$ and PM_{10} across Wales, as well as the background 1 km x 1 km map for oxides of nitrogen used for human health impact assessments.

River Usk

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Air Quality Trends

In recent years, the number of automatic monitoring sites in Wales has significantly increased. While the expansion has enhanced our grasp of air quality throughout the country, it has introduced a potential challenge when examining changes in air quality over time. Relying on the entirety of available data for such investigations may inadvertently introduce discontinuities and misleading trends due to shifts in the network's composition. As a result, this report adopts a more focused approach by scrutinising changes in the air quality based on subsets of well-established monitoring sites that have been operational for a decade or longer and continue to provide data up to the present day. This ensures a more robust assessment of air quality trends.

Our assessment of annual mean pollutant concentrations relies on data from all sites with an annual data capture rate of 75% or higher, enhancing the accuracy of our findings. In certain instances, like the case of Port Talbot, where nearby sites have replaced the original, we treat them as a unified entity for the purposes of this report.

Nitrogen Dioxide

In Wales (and the rest of the UK), historically the most widely exceeded limit value is the annual mean NO_2 concentration (40 µg/m³). Figure 5.1 shows the trend in annual mean NO_2 concentration at long-running Welsh sites.

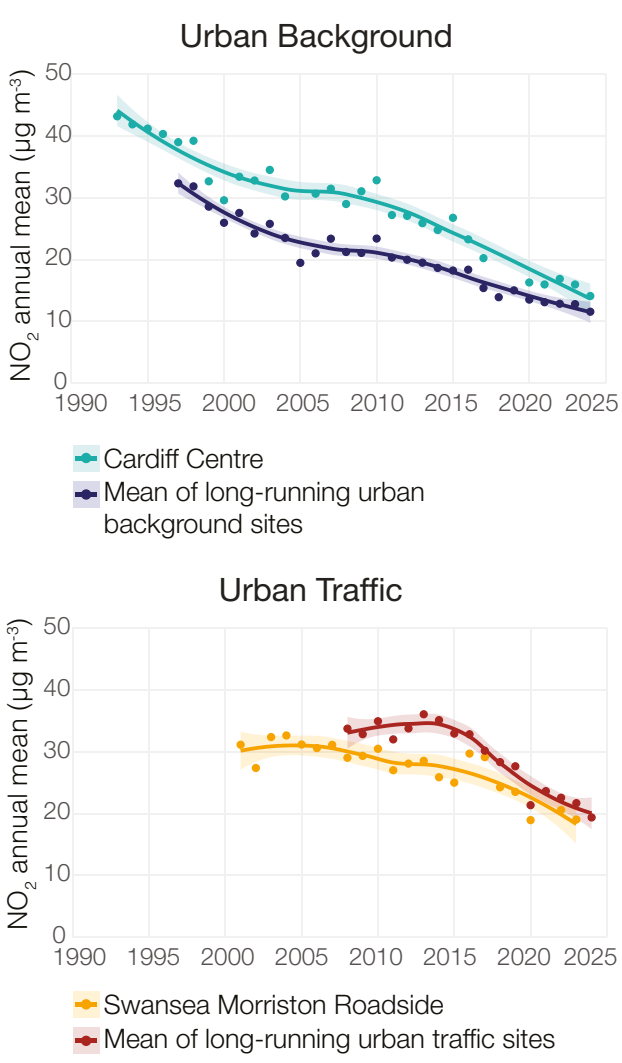


Figure 5.1 Annual mean NO_2 concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

Urban traffic monitoring sites, defined as those situated within 10 meters of a major road, are represented by the longest-running roadside site (Swansea Morriston Roadside) in operation since 2001 and the mean of all urban traffic long-running sites. Although urban traffic monitoring sites were open prior to 2008, we have not included this data in this report. The deliberate exclusion is due to the restricted availability of sites in operation prior to 2008 that remain open to date with an annual capture rate of 75% or higher, inclusion of this data would lead to a distorted representation.

The annual mean concentration of NO_2 at Welsh urban traffic sites has exhibited an overall decline from 33.8 µg/m^3 in 2008 to 19.4 µg/m^3 in 2024. Notably, in 2020, NO_2 concentrations were recorded to reach a record low at the time of 21.36 µg/m^3 which was largely attributed to the decreased vehicular traffic resulting from COVID-19 restrictions. Following this in 2021, there was a notable upturn in annual mean concentrations, corresponding to the gradual easing of restrictions. However, concentrations have shown a steady decline since, retaining the overall decreasing trend previously observed. In 2024, annual mean NO_2 concentrations are shown to be lower than that measured during the COVID-19 pandemic in 2020.

The urban background sites, including the longest-running site at Cardiff Centre and the average of all similar long-running sites, have shown a consistent decline in NO_2 concentrations since 1997. In 2024, these sites also recorded their lowest annual mean NO_2 concentration to date, at 11.6 µg/m^3, slightly down from 12.8 µg/m^3 in 2023. 2024 continues the trend from 2023 of no NO_2 exceedances in Wales.

Particulate Matter

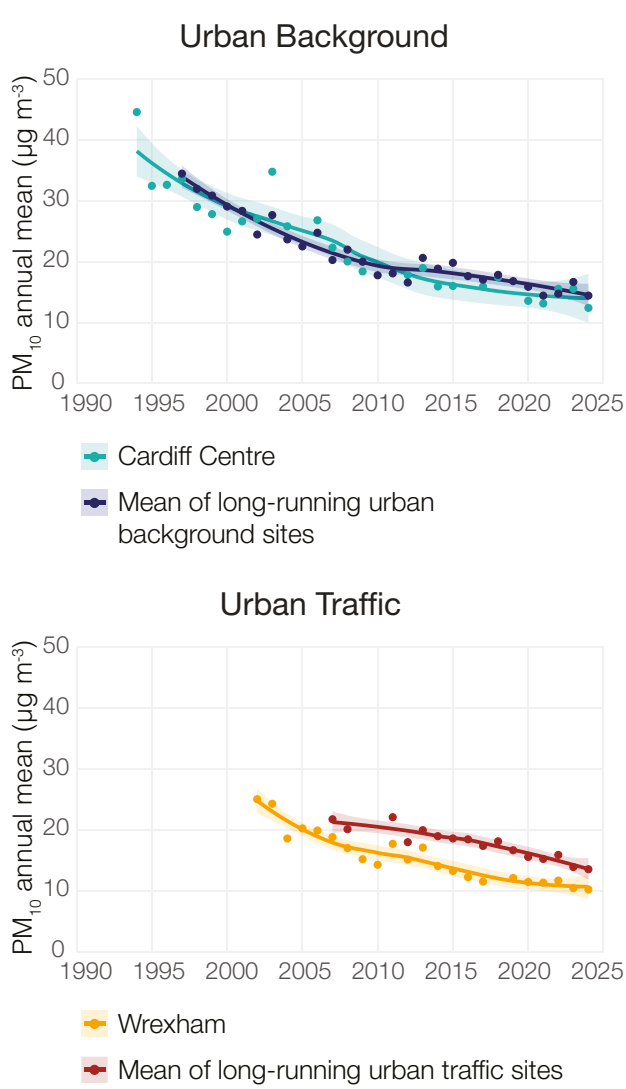


Figure 5.2 Annual mean PM_{10} concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

Figures 5.2 and 5.3 show trends in annual mean concentrations of fine particulates (PM_{10} and $PM_{2.5}$).

In Figure 5.2 the annual mean PM_{10} concentrations at urban background sites, is represented by the longest-running site of this type (Cardiff Centre) and the average all long-running sites. Urban traffic site concentrations are represented by the longest-running PM_{10} site of this type, Wrexham, and the mean of all long-running sites.

Annual mean PM_{10} concentrations at urban background sites have shown a steady decline since records began, from 34.4 µg/m³ in 1997 to 14.4 µg/m³ in 2024. In 2022 and 2023, concentrations showed a small increase which may be due to increased construction activities associated with economic growth, including housing and infrastructure projects as well as adverse weather conditions, which can spread dust over wider areas. In 2024, PM_{10} concentrations at urban background sites are similar to those measured in 2021. While overall air quality in Wales has improved over the long term due to stricter regulations, specific sectors such as construction have contributed to localised increases in pollution, particularly in urban areas near major projects[1,2].

[1] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-summary

[2] https://media.service.gov.wales/news/building-a-stronger-future-for-welsh-construction

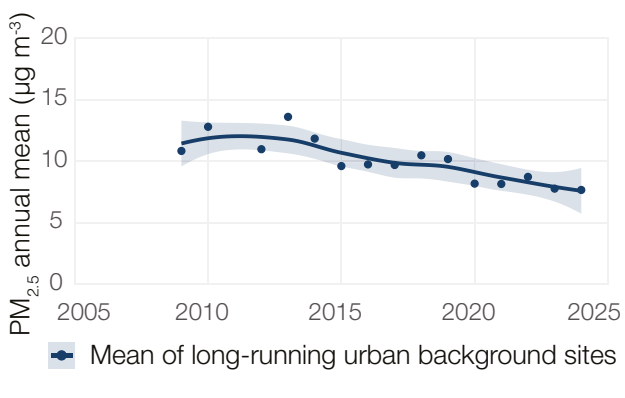


Figure 5.3 Annual mean $PM_{2.5}$ concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

PM_{10} concentrations at urban traffic sites have decreased from 21.7 µg/m³ in 2007 to a record low of 13.5 µg/m³ in 2024, marking an 2.6% decrease from 2023 levels. This significant decline over the past decade can largely be attributed to the adoption of stricter vehicle emission standards in Wales, including cleaner transport technologies and the promotion of electric vehicles. Additionally, improvements in public transport infrastructure have further reduced traffic-related air pollution.

Figure 5.3 illustrates the average annual mean $PM_{2.5}$ concentrations at established urban background monitoring sites throughout Wales. Since 2009, there has been a notable decrease in $PM_{2.5}$ levels, with the concentration falling by 29.3% from 10.8 µg/m³ in 2009 to 7.7 µg/m³ in 2024. In 2024, $PM_{2.5}$ concentrations also saw a decline of 1.4% compared to 2023. This overall decreasing trend can be attributed to several factors, including stricter emissions regulations, advancements in vehicle technology, and increased use of cleaner energy sources.

Ozone

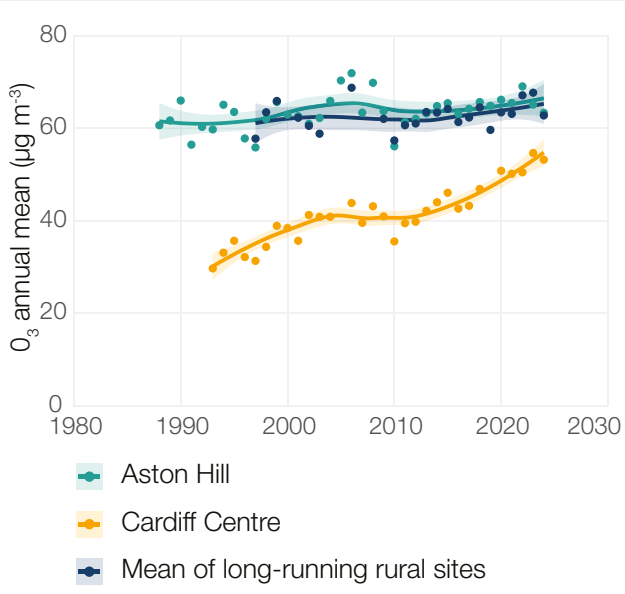


Figure 5.4 Annual mean O_3 concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

Due to the inverse photochemical relationship between tropospheric O_3 and NOx—where elevated NOx levels typically suppress O_3 concentrations and vice versa—O_3 levels are generally higher in rural areas. The concentration of O_3 can exhibit significant variability from year to year due to changes in meteorological conditions. This variability is often influenced by fluctuations in summer weather patterns, which can lead to higher O_3 levels during hotter periods.

Figure 5.4 illustrates the annual mean O_3 concentrations from various monitoring sites: Aston Hill, the longest-running rural site; Cardiff Centre, a well-established urban site; and the average across all long-running rural sites. There is shown to be a noticeable increasing trend in rural O_3 concentrations over time. The peak annual mean concentration was recorded in 2006 at 68.8 µg/m³, coinciding with an exceptionally hot European heatwave. In 2024, the average annual O_3 concentration was 62.8 µg/m³ which is a 7.3% decrease from 2023. This decrease in concentrations is contrasting to the overall increases observed in 2022 and 2023.

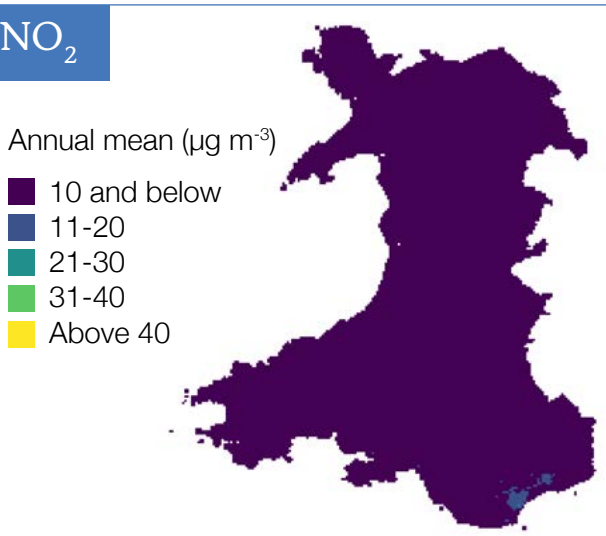
At the urban site of Cardiff Centre, there is a more significant long-term increase in annual mean O_3 concentrations. This highlights the inverse relationship between O_3 and NOx and the impact of reduced NOx emissions on urban air quality and the consequent rise in O_3 levels. O_3 concentrations in urban areas such as Cardiff Centre have risen as NOx concentrations have decreased.

6

Maps of Air Quality

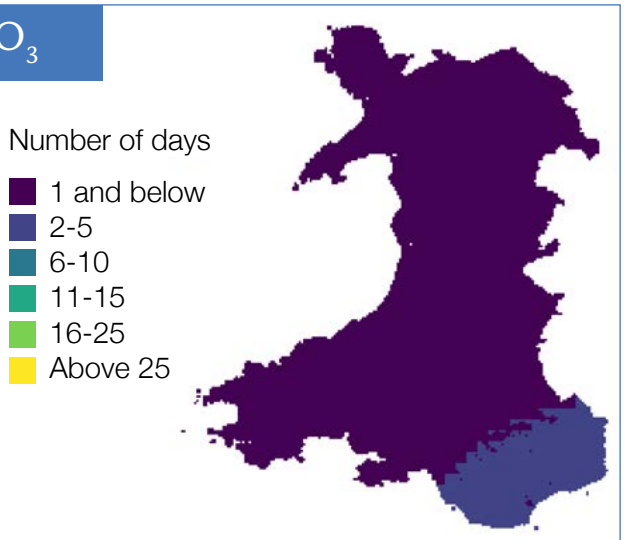
The maps in Figure 6.1 present 2024 background concentrations for NO_2, O_3, PM_{10} and $PM_{2.5}$. These modelled maps of ambient concentrations were calculated from National Atmospheric Emissions Inventory (NAEI) data using a dispersion modelling approach. The model output was calibrated using monitored data from the national monitoring networks. These modelled maps were then verified against the Local Authority monitoring data. In these maps, the modelled ambient concentrations are compared with Air Quality Standards (Wales) Regulations 2010 limit and target values.

NO_2



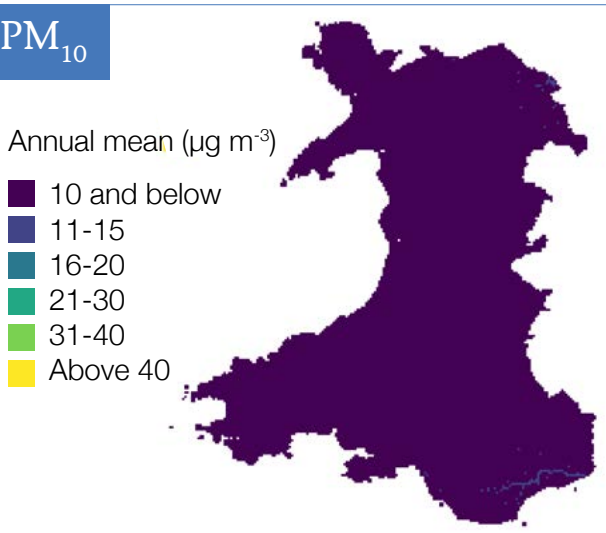
The limit value for annual mean concentration of NO_2 is 40 µgm^{-3}. This background map shows elevated NO_2 levels are associated with urban areas and principal road links.

O_3



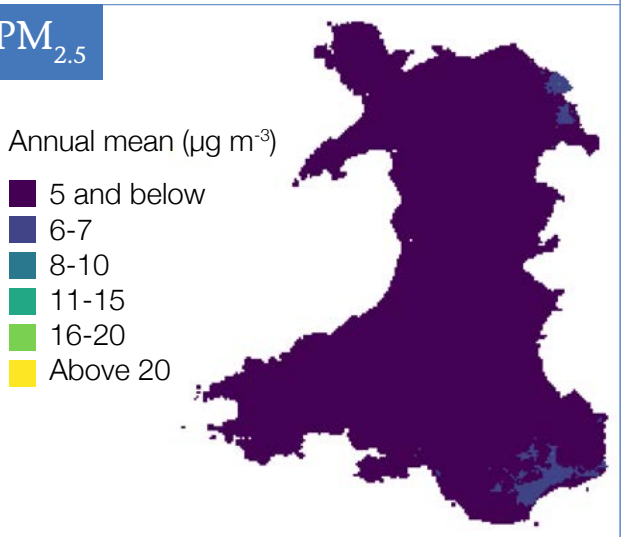
The target value for O_3 is 120 µgm^{-3} as an 8-hour mean, not to be exceeded more than 25 times per year averaged over 3 years.

PM_{10}



The PM_{10} limit value for annual mean concentration is 40 µgm^{-3}. The map shows that elevated levels of PM_{10} are associated with urban areas and major roads.

$PM_{2.5}$



The $PM_{2.5}$ limit value for annual mean concentration is 25 µgm^{-3}. The map shows that elevated levels of $PM_{2.5}$ are associated with urban areas and major roads.

Figure 6.1 Maps showing background concentrations of nitrogen dioxide, ozone, PM_{10} and $PM_{2.5}$ particulate matter

7

The Local Air Quality Management

The Local Air Quality Management (LAQM) Support Fund is a grant scheme run by the Welsh Government to support Local Authorities in carrying out their LAQM duties. Following two pilot rounds, the Minister for Climate Change announced the fund as a grant scheme from April 2023, which continued as a further fund for the 2024 financial year.

All Local Authorities in Wales are invited to submit bids that met one or more of the following criteria:

- Prevention – action that seeks to improve air quality and prevent worsening of concentrations and/or an exceedance of legal limits.
- Mitigation – action that seeks to improve air quality in an air quality management area (AQMA).
- Innovation – action using innovative methods or technologies to improve air quality and/or reduce exposure to pollution.

A range of bids were submitted by Local Authorities across Wales, with six being successful in securing funding. Some of the projects are summarised below:

Spotlight project

Burn Alerts in Swansea: Testing a New Approach to Reducing Domestic Burning Emissions

Accounting for over a third of all Wales' fine particulate matter ($PM_{2.5}$) emissions, burning solid fuels for home heating is a major contributor to air pollution and a growing public health concern. $PM_{2.5}$ is problematic because of its 'systemic toxicity', infiltrating every organ in the body via the lungs and bloodstream. Long-term exposure is linked with increased mortality rates, and a range of cardiovascular and respiratory conditions.

The Environment and Soundscapes (Wales) Act 2024 tightened domestic burning regulations, but limitations remain. By defining the pollution to be controlled as visible 'smoke', the legislation avoids focusing directly on the relatively invisible $PM_{2.5}$. This is problematic because one hour of burning 'approved' wood in an 'approved' stove produces 300 times more $PM_{2.5}$ than a gas boiler. However, this use is widely permitted by the Act. As a result, even the very latest regulations struggle to address emissions from the latest appliances – let alone older stoves.

Our project, supported by the Local Air Quality Management Fund (LAQMF), designed and tested an air quality alert system to fill this regulatory gap. Known as a 'burn alert' system, it uses hyper-local sensor networks to help householders make informed choices about burning. If $PM_{2.5}$ at their postcode goes above a certain threshold, they receive an email and/or SMS message asking them not to burn. This prevents emissions before they happen and, in doing so, tackles air pollution at source. A short explanation animation can be viewed here - https://youtu.be/bK3w1H-P4js.

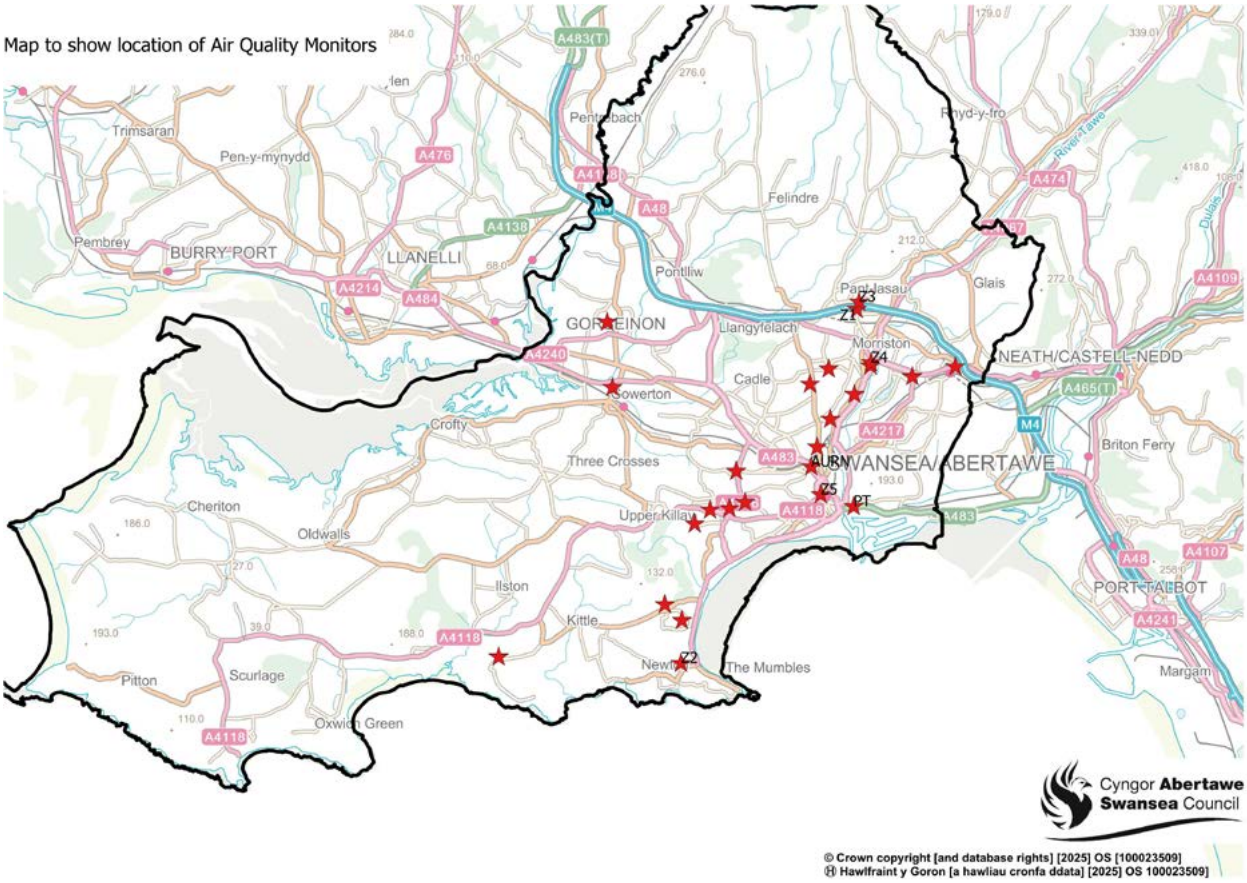


Figure 7.1

In winter 2024-25, Swansea Council installed 18 new $PM_{2.5}$ sensors across Swansea (see figure 7.1), taking the total to 25, and recruited 50 people to test the system over four weeks. The majority of users followed the guidance not to burn, preventing hundreds of hours of emissions. Participants also reported improved understanding of air quality, highlighting the system's ability not only to reduce immediate emissions, but also lay the groundwork of public understandings for longer-term improvements.

Swansea Council also conducted a public health impact analysis to model the effects of reduced emissions. In one small area of Swansea, even modest adherence to alerts showed measurable reductions in several serious health conditions. This highlights the potential of the burn alert system to complement existing regulations and produce visible improvements in public health.

A follow-up LAQMF-funded project is now underway to develop a broader, personalised alert system for a wider range of users. Taking lessons from the burn alert, this new system will target a range of polluting behaviours and offer users greater customisation over the alerts they receive.

Other awards made:

Newport

Project 1: Newport: Project Officer resource
Continuation of this post has been vital in supporting and delivering projects and the postholder has grown in experience and capacity to deliver additional projects.

Project 2: School Student Air Quality Monitoring Project
This has been a really popular project with Schools in Newport and is welcomed each year that it is run. A different year group of students gains an insight into how we monitor our environment and make sense of the results; and resultant behaviours people can consider to reduce their impacts.

Project 3: Caerleon Schools Walking Schemes Study
What started as initially a workshop-based enquiry for schools and the community seeking ideas and attitudes towards walking schemes for local schools in and around Caerleon; has developed into a broader air quality vision for the town and a placemaking output for this project. The results of which form the foundation for doing design and piloting work in subsequent years which will integrate air quality measures in the form of active travel, green infrastructure and public realm improvements that put pedestrians at the centre of Caerleon.

Project 4: Maindee Festival
A popular local festival which has chosen environmental themes in recent years has benefitted from a modest grant contribution to undertake workshops and festival activities.

Project 5: Air Quality Literacy
Working in partnership with Swansea City Council and Swansea University, Newport City council have partaken in YouGov survey work regarding air quality literacy in two waves prior to and after messaging work has been undertaken in Swansea. Newport was effectively the 'control' group however, Newport's air quality messaging has not gone unnoticed!

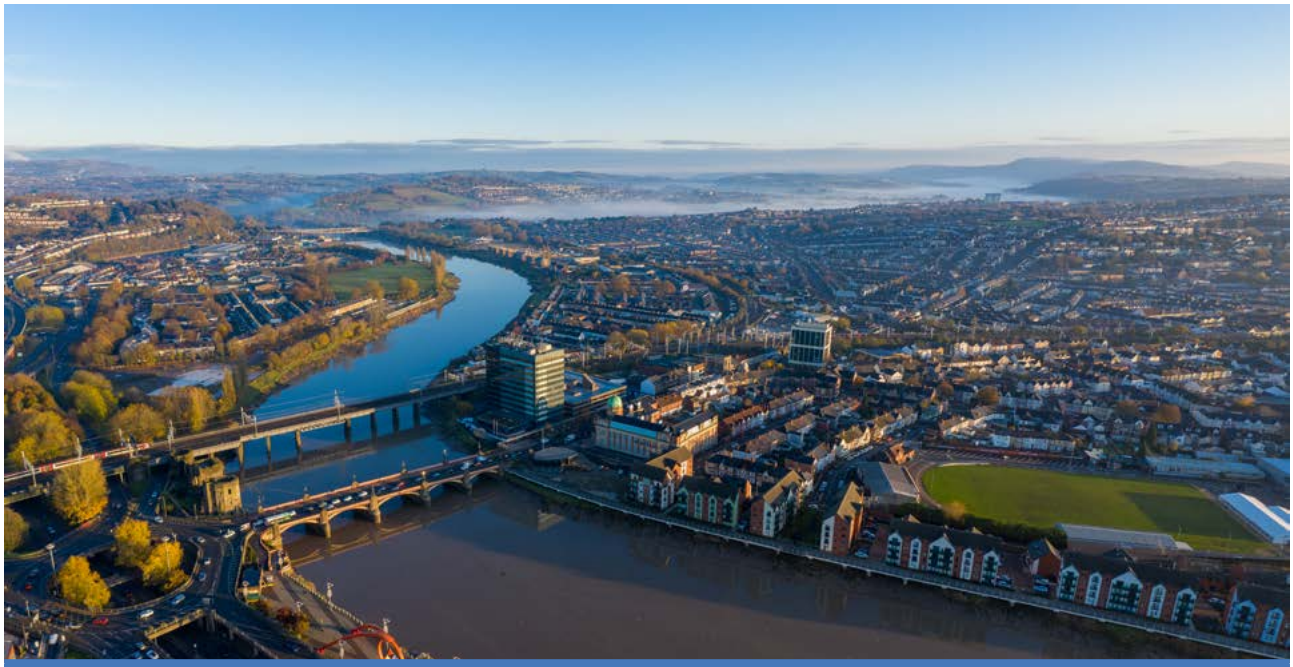
Project 6: Zephyr Maintenance to April 2025
Networks of sensors inevitably require support packages, and it has been possible to maintain a Zephyr network with grant in during 24/25.

Project 7: Handheld Particulate Monitor
The emerging importance of air quality work in relation to particulate matter has warranted the purchase of a handheld instrument 'Ranger' which allows real time sampling of particulates in indoor and outdoor environments. This has been used to good effect in demonstrating exposures during the night of November 5th (Bonfire Night) and regulation of illegal bonfire activities.

Project 8: Bettair Nodes
Sensor innovation has led to the development of instruments that now incorporate sound level meters. Piloting of Bettair nodes which adopt this technology and are ideally suited to the air quality and soundscape agenda we have via legislation. Strategic coverage of the whole of Newport has been adopted with Bettair units such that all land use types and AQMAs are captured in terms of air quality and sound. The strategic use of these units will be refined going forward e.g. Local Development Plans, Open Space management.

Project 9: 'Soundscapes' Sound Level Meter
The soundscapes agenda requires in situ verification of noise levels observed or described and as such a suitable type 1 sound level meter was warranted. This is actively being used in a range of sound related work including Bettair installation verification.

Project 10: EMAQ Subscription and Training Packages
New members of staff delivering LAQM projects and core work have been able to benefit from the wealth of training that EMAQ provide on air quality. With no inhouse capability the EMAQ service is valued.


River Usk - Newport city centre

Carmarthenshire

Introduction

In 2024–25, the Cyngor Sir Gâr was awarded funding through the Local Air Quality Management (LAQM) Grant Scheme to deliver two targeted projects aimed at improving air quality awareness and promoting sustainable travel behaviours among primary school pupils. This report outlines the implementation, outcomes, and evaluation of both projects.

Project 1: Walk to School Challenge

Total Cost: £7,782

Project Description

This initiative aimed to encourage active travel among pupils attending schools located in or near Air Quality Management Areas (AQMAs). Thirteen schools were initially identified, with a combined potential reach of 3,430 pupils. The project was delivered via an online platform where pupils and teachers recorded their daily travel modes. Pupils were rewarded with collectible badges for choosing active travel options such as walking, cycling, or scooting. The challenge was delivered in partnership with the national WOW Living Streets programme.

Delivery and Participation

- Schools Targeted: 13
- Schools Participated: 10 (including 5 from the original 13)
- Pupils Engaged: Approx. 1,350
- Over 24,000 active travel journeys recorded this school year from the schools that participated

Benefits and Positive Outcomes

- Pupils were highly motivated by the badge reward system, which fostered a sense of achievement and friendly competition between classrooms.
- The initiative helped pupils reflect on their travel habits and encouraged behavioural change.
- Collaboration with the Road Safety Team enhanced the delivery and safety messaging.
- Positive health impacts on pupils
- The programme was well-received by pupils, as illustrated by this quote:

"I like the WOW Travel Tracker because it makes me happy. I walk to school every day so I can earn my badge. I like to tell my friends that drive to school that they need to park and walk so they can earn a badge too. If we all park away from the school, then it helps the air be better for our health and plants will grow."

Pupil, Age 7, Ysgol Cefneithin

Challenges and Limitations

- Some schools were reluctant to participate or only committed to a short trial period (e.g., one month).
- Rural schools, such as Ysgol Nantgaredig, faced logistical challenges due to dispersed catchment areas and busy surrounding roads, which limited the feasibility of active travel.

"We have found it to be unsuitably structured for the children of Nantgaredig who travel from various locations. With the locality of the school being on very busy roads, this has made the drop and stride aspect difficult."

School Representative, Ysgol Nantgaredig

Project 2: Sustainable Travel and Air Quality Workshops

Total Cost: £17,800

Project Description

This project involved the delivery of a bilingual, interactive performance and accompanying teaching materials to 20 primary schools. The sessions explored the causes and health impacts of poor air quality and promoted sustainable travel behaviours. Each school received access to five bilingual lesson plans to support continued learning. The programme culminated in school-led activities for Clean Air Day.

Delivery and Participation

- Schools Visited: 20
- Language Split: 12 Welsh-medium, 8 English-medium
- Pupils Engaged: 790
- Teaching Materials Provided: 5 bilingual lesson plans per school

Benefits and Positive Outcomes

- The performances were described as fun, engaging, and age appropriate.
- Teachers reported that the sessions effectively communicated key messages about air pollution and sustainable travel.
- 100% of participating teachers stated that they would recommend the activity to other schools.
- The bilingual delivery ensured accessibility and inclusivity across the region.

Cefneithin

Teacher Feedback:

"Good afternoon, I just wanted to say thank you for the amazing show yesterday. The children thoroughly enjoyed and gained so much information in a fun and engaging way. If there are any further opportunities for further shows about any topics, we would be very keen to know about them and I can share them with other year groups."
Jack, Ysgol Bro Banw

"Neges hynod o bwysig mewn ffordd maent plant yn ddeall - Digon o ailadrodd a gemau egluro'r neges mewn ffordd syml ond effeithiol."
Teacher, Ysgol Gymraeg Brynsierfel

"Very informative and educational but in a fun way. Interactive and powerful message about air pollution."
Teacher, Model Church in Wales School

Conclusion

The 2024–25 LAQM Grant enabled the Local Authority to deliver two impactful projects that raised awareness of air quality issues and encouraged sustainable travel among primary school pupils. While participation levels varied, the feedback from both pupils and educators was overwhelmingly positive. The projects have laid a strong foundation for future engagement and behaviour change, contributing to the wider goals of improving local air quality and public health.

River Towy, Llandeilo, Carmarthenshire,

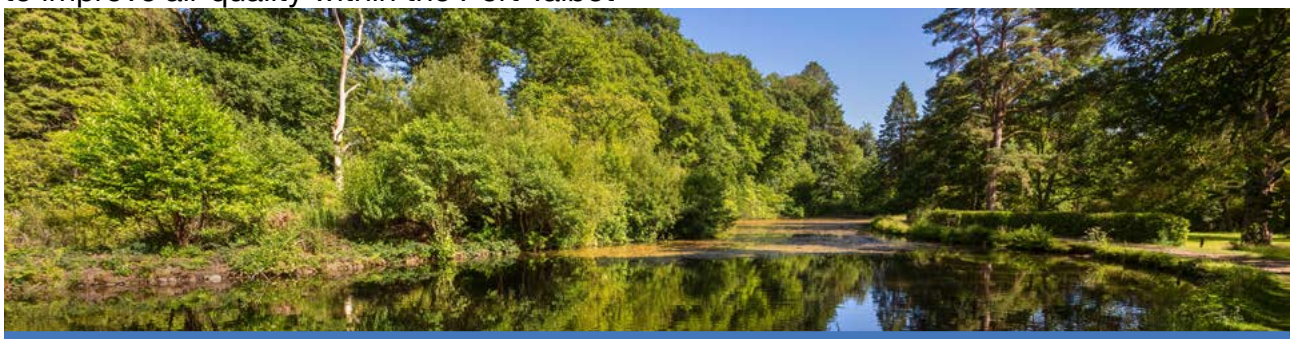
Neath Port Talbot

Project 1: STAP Support and Breach Day Investigation Reports
The purpose of this project is to support the Clean Air for Port Talbot Short Term Action Plan (STAP) by providing detailed breach day investigation reports and specialist air quality knowledge from Ricardo. The project aims to identify causes and solutions for periods of high PM_{10} concentrations within the Port Talbot Air Quality Management Area (AQMA), with a focus on the Prince Street monitor, which recently exceeded air quality objectives.

Project 2: NPT Air Quality Action Plan Review – Amendment to Include Prince Street
This project aims to update the Neath Port Talbot (NPT) Air Quality Action Plan (AQAP) to reflect recent exceedances of the 24-hour PM_{10} Air Quality Objective at the Prince Street monitor. The update is necessary to comply with Local Air Quality Management (LAQM) requirements. The project will last approximately 3 months, with completion including reports within 6 months. The goal is to produce a robust AQAP that enables targeted interventions to improve air quality within the Port Talbot

Project 3: Upgrade to Existing Air Quality Monitoring Network - Cimla Road
The project aims to replace the outdated and now offline Nitrogen Dioxide analyser at Cimla Road in Neath, a key monitoring site near residential properties, to ensure continued real-time air quality surveillance. This will help the Council track pollution trends, support diffusion tube calibration, and respond proactively to any increases in NO_2 levels, especially in light of upcoming stricter targets under the Environment (Air Quality and Soundscapes) (Wales) Act 2024.

Project 4: Wall Colmonoy Air Quality and Industrial Compliance Support Phase 2
The project aims to improve air quality in the Swansea Valley by installing five low-cost sensors around the Wall Colmonoy site to monitor nickel concentrations in real time, identify pollution hotspots, and support targeted mitigation measures. The project will use new monitoring data alongside existing sources and meteorological information to better understand local sources of nickel exceedance, inform regulatory actions, and contribute to public health protection by preventing future breaches of air quality standards.



Craig y Nos Country park in the Swansea Valley

Project 5: AQAP Measures 39 and 40 Education and Awareness Campaign
This project aims to raise awareness in the Port Talbot AQMA about the impact of domestic burning on air quality. The project will develop a solid fuel and/or bonfire policy and conduct a community awareness campaign to discourage waste burning and promote alternative disposal methods. The goal is to reduce air pollution and prevent exposure to pollutants like $PM_{2.5}$. If successful, the project could expand to address commercial waste burning. The project supports the Environment (Air Quality and Soundscapes) (Wales) Act 2024 and aims to improve public health by engaging residents in proactive air quality improvement efforts.

Project 6: AQAP Measure 42 M4 Study
The project aims to determine nitrogen dioxide concentrations at points of relevant exposure along the M4 in Port Talbot. The project will install 30 diffusion tubes along the M4 corridor between Junctions 41 and 42, within the Port Talbot AQMA and the 50mph speed limit zone. Over a six-month monitoring period, the data collected will be reviewed by Ricardo to identify hotspot areas and prioritize interventions. The goal is to improve air quality holistically, targeting not just PM_{10} but also other pollutants like $PM_{2.5}$ associated with traffic. This proactive approach aligns with the Environment (Air Quality and Soundscapes) (Wales) Act 2024 and aims to protect public health by addressing air quality problems promptly.

Nitrogen dioxide (NO_2) compliance

In October 2024 Welsh Government published the annual monitoring report for the 2022 and 2023 calendar years[3]. The report presents data on the pollutant concentrations measured on the five sites on the Welsh Government Motorway and Trunk Road network previously identified as exceeding the limit value. The report also provides an update on the Welsh Government's progress in implementing actions to achieve sustained compliance at the five sites. A further report, covering the 2024 calendar year, is expected to be published in autumn 2025.

Funding was awarded to Cardiff Council in 2024-25 to support their costs in finalising plans for a permanent, compliant, road scheme at A4161 Castle Street. Funding was also awarded to Caerphilly County Borough Council for their final costs in delivering a compliant scheme at A472 Hafod-yr-ynys Road.

[3] https://www.gov.wales/sites/default/files/publications/2024-10/annual-data-on-no2-concentrations-for-the-motorway-and-trunk-road-2022-to-2023.pdf

8

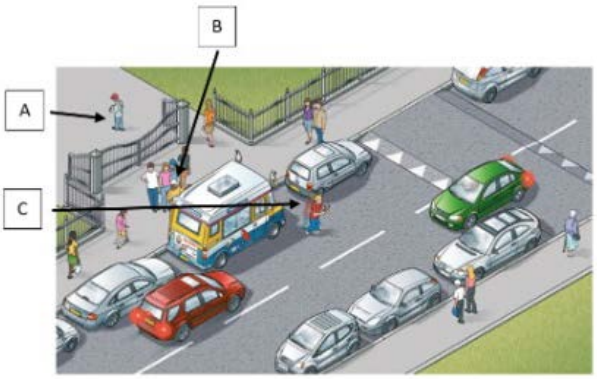
Air Pollution Awareness in Health Care Professionals in Wales

Public Health Wales (PHW) commissioned Swansea University to assess the awareness, knowledge, and communication practices of Health Care Professionals (HCPs) in Wales in relation to air pollution and its health impacts.

Prompted by the coroner's report into the case of Ella Adoo Kissi-Debrah, whose death was linked to air pollution[4], the study reflected the perceived role of HCPs in educating patients about air quality risks. Despite the improving picture of air pollution in Wales[5], we know that there is no safe level of air pollution and those in poor health, and deprived populations, are at greater risk of adverse health impacts as a result of exposure[6].

An online survey targeted patient-facing HCPs across Wales. The survey used the Swansea Air-Quality Literacy Scale (SAQLS), a newly created test of 20 questions (see figure 8.1), that can rapidly assess people's intuitive understanding of air quality issues in a broad range of adult populations.

Figure 8.1 An example of one of the 20 questions.



Which of these people will be breathing the cleanest air?

- Persons A
- Persons B and C
- No difference

Respondents represented all major Welsh health boards and sectors (Primary, Secondary, and Other Care). The survey found:

- Low engagement with patients: Most HCPs do not discuss air pollution with patients.
- Barriers identified: The main reasons for not discussing air pollution were lack of knowledge and time.
- Information gaps: 83–93% of HCPs were unaware of where to find reliable local air quality data.
- Desire for resources: Most respondents wanted signposting to reliable information and, to a lesser extent, training.

[4] https://www.judiciary.uk/prevention-of-future-death-reports/ella-kissi-debrah/
[5] https://www.airquality.gov.wales/laqm/air-quality-management-areas
[6] https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution

- Vulnerability perceptions: HCPs recognized respiratory and cardiac patients as vulnerable but were less knowledgeable about others, such as mental health patients.
- Knowledge and confidence: Self-rated knowledge and confidence in advising patients was low.
- Literacy vs. confidence disconnect: HCPs scored higher than the general public on the Swansea Air-Quality Literacy Scale (SAQLS), but this did not correlate with their self-assessed knowledge or confidence, suggesting many "don't know what they don't know."

When looking in detail at the location of HCP practice, there is a weak positive correlation between the concentration NO_2 and $PM_{2.5}$ at place of medical practice and self-reported air pollution knowledge. Where HCP discuss air pollution with their patients, there is a positive correlation between air pollution and positivity of the patient reaction.

HCP were invited to provide open-ended responses, four main themes emerged:

1. Desire for reliable information: HCPs want practical, evidence-based advice and local air quality data to guide patient discussions.
2. Concerns raised: Issues included health inequalities, inadequate infrastructure, time constraints, and the risk of increasing patient anxiety.
3. Importance of clean air: Clean air was viewed as a human right, with concerns raised about both outdoor and indoor air quality.
4. Perceived irrelevance: Some HCPs, especially in rural areas or those practicing in mental health services, felt air pollution was not relevant to their patients.

The study revealed a significant gap in air pollution awareness and communication among HCPs in Wales. While there is a strong desire for more information and tools, current knowledge and confidence levels are low. PHW are developing an action plan to make recommendations on how these findings can be addressed, targeting education, better access to local air quality data, and systemic support to enable HCPs to play a more active role in protecting public health from air pollution.

The full report can be found here (Welsh) or here (English).

9

More Information

The Air Quality in Wales Website

The Air Quality in Wales website (https://airquality.gov.wales/) shown in Figure 9.1 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, 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 OpenStreetMap™ showing the overall pollution situation at sites across Wales.
- Latest data from all automatic monitoring sites in Wales, accessible from this map (figure 9.2 shows Welsh Automatic Monitoring Sites at the end of 2024).
- Air pollution forecasts for the whole of Wales.
- Information on the latest 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.

Figure 9.1 The Air Quality in Wales Website

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

- From the home page, select ‘Maps & Data’ from the main menu.
- Click on ‘Measurements’.
- 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 within a few seconds.

Crickhowell bridge, Brecon Beacons

Current and Forecast Air Quality (National and Local)

In addition to the Air Quality in Wales website, current and forecast air quality is rapidly available in a user-friendly form from:

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

Health Effects of Air Pollution

Information on the health effects of air pollution and the UK pollution banding system can be found on the Department for Environment, Food and Rural Affair's (Defra) website (https://airquality.gov.wales/about-air-quality/daily-air-quality-index).

Local Air Quality Issues

For further information on air quality issues in your area, please contact the environmental health department at your local district council office. Further information on Local Air Quality Management may also be found on:

- The Local Authority support site (http://laqm.defra.gov.uk).

General Information on Air Quality

The Welsh Government Environment and Countryside links (https://gov.wales/air-pollution).

The UK Air Information Resource (https://uk-air.defra.gov.uk).

The National Atmospheric Emissions Inventory (http://naei.beis.gov.uk).

The Defra Air Quality Information Web Resource (https://uk-air.defra.gov.uk).

The Northern Ireland Air Quality website (https://www.airqualityni.co.uk/).

The Scottish Air Quality website (http://www.scottishairquality.scot/).

The Air Quality in England website (www.airqualityengland.co.uk).

The Pollutant Release and Transfer Register (https://www.gov.uk/guidance/uk-pollutant-release-and-transfer-register-prtr-data-sets).

The Environment Agency (https://www.gov.uk/government/organisations/environment-agency).

Natural Resources Wales (www.naturalresourceswales.gov.uk).

Figure 9.2 Welsh Automatic Monitoring Sites at the end of 2024

Llywodraeth Cymru
Welsh Government

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

Welsh *Air Quality* Forum
Fforwm Ansawdd Awyr Cymru

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