



Llywodraeth Cymru
Welsh Government

Air Quality in Wales 2022/23



Welsh Air Quality Forum
Fforwm Ansawdd Awyr Cymru

Creating a world
fit for the future



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



Introduction

This is the 20th annual report on air quality in Wales 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 2022/23. 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/](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 2022/23. Chapter 3 summarises important policy developments that took place in 2022/23. 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 grant scheme that was launched in the 2021 – 2022 financial year. Chapter 8 is from Public Health Wales and provides a review of Air Quality and Public Health in 2022/23. For readers wanting to find out more, additional web-based and published sources of information are summarised in Chapter 9.



Panoramic view of the Cardiff Bay – Cardiff, Wales

The WAQF and its activities in 2022/23

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 2022/23

- 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; ways to tackle air pollution in street canyons; discussion on air quality sensors; NO₂ levels during winter months; Clean Air Day; mobile air quality stations; consultation on the Welsh Clean Air Bill; consultation on the Welsh Government Air Quality, Noise and Soundscape; consultation on the development of future monitoring network proposals.

WAQF meetings 2023

The Welsh Air Quality Forum resumed meetings in 2023. The forum heard updates from the Welsh Government; a presentation on pollution episodes in the summer of 2023 was given by Ricardo; Paul Lewis, 'Clean Air Champion for Wales,' provided an update on work that is taking place. The forum also heard on the latest news from local authorities in Wales.

The Annual Welsh Air Quality Forum Seminar was held as a webinar in 2022 on the 27th October.

There were 54 WAQF members and delegates attending the event. Topics presented were:

- Welsh Government Update
- Healthy Travel Charter
- Clean Air Days
- The benefits of proactive citizen engagement: lessons from two EU projects.
- Issues with Ammonia in Wales
- Airborne particle emissions from Brake and Tyre Wear

The 2023 Annual Welsh Air Quality Forum Seminar will be held at the end of November 2023 and will include presentations on; the Local Air Quality Management support fund; domestic burning; high speed air quality analysis and vehicle emission compliance.

PDF's of these presentations can be found at <https://airquality.gov.wales/reports-seminars/seminars>.



Conwy Castle, Wales, UK

Welsh Government policy update



Portmeirion, Gwynedd, North Wales

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 April 2023, we published an [update report on progress against actions in our Clean Air Plan for Wales – Healthy Air, Healthy Wales](#). Supporting that report, this Air Quality in Wales update sets out the progress we have made in collaboration with our partners and highlights the next steps we are taking.

Strengthening air quality legislation

The Minister for Climate Change introduced the [Environment \(Air Quality and Soundscapes\) \(Wales\) Bill](#) to the Senedd in March 2023. The Bill proposed:

- to provide a framework for setting national air quality targets;
- to amend existing legislation relating to the national air quality strategy; local air quality management; smoke control; clean air zones/low emission zones and vehicle idling;
- to place a duty on Welsh Ministers to promote awareness of air pollution; and
- to place a duty on Welsh Ministers to publish a national soundscapes strategy.

The Bill is continuing its passage through the Senedd and, should the Bill be passed at stage 4, is expected to receive Royal Assent early in 2024.

Working with young people to promoting awareness of air pollution

We have partnered with EESW/Stem Cymru to deliver air quality workshops in schools across Wales. Through this scheme, we launched our [Road to Cleaner Air competition](#) and the winner was announced on Clean Air Day in June 2022.

The competition invited school pupils across Wales to design a sign to be installed on the strategic road network to increase awareness of air quality issues. The design by Miley Fletcher from Bedwas High School was chosen as the winning sign. Designs by Thomas Lukins, also from Bedwas High School, and Amelie Norbury from Christ the Word Catholic School were selected as runners up. The signs are to be manufactured and installed where our reduced 50 mph environmental speed limits have been applied.



New planning guidance to support air quality, noise and soundscape improvements

In October 2022, we launched a consultation on draft [revised planning guidance](#) in the form of 'Technical Advice Note 11: Air Quality, Noise and Soundscape' and 'Supporting Document 1: Soundscape Design'. The revised guidance included proposals to:

- update and replace the existing advice on noise currently contained in Technical Advice Note (TAN) 11: Noise 1997
- add advice relating to air quality and soundscape
- issue a supporting document for the TAN on the subject of soundscape design.

Welsh Government officials have been considering the consultation responses during the course of 2023 to inform changes to the draft TAN ahead of its adoption. The final version of this TAN will also take account of the Environment (Air Quality and Soundscapes) (Wales) Act which we expect to become law in early 2024 (see below), and also the responses to the consultation that we ran from June to October 2023 on the [draft Noise and Soundscape Plan 2023-2028](#), our national soundscapes strategy.



Funding to deliver local air quality improvements

Following the first pilot round of the Local Air Quality Management Support Fund, a second round was run between October 2022 and April 2023. This round was revenue only grant and £91,403.87 in total was awarded to projects delivered by Bridgend County Borough Council, Neath Port Talbot County Borough Council, Newport City Council and City and County of Swansea Council. More information about these projects can be found on page 13.

The lessons learned from the pilot rounds informed the final design of the Local Air Quality Management Support Fund which the Minister for Climate Change officially launched in March 2023 as a capital and revenue grant with a budget of £1m per annum.

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 (NO₂), fine particles (PM₁₀) and ozone (O₃) 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. With the exception of O₃, concentrations of pollutants have exhibited an overall decline since the pollutant records began. It is worth noting that O₃ qualifies as a regional pollutant, with transboundary characteristics, and as such its regulation falls beyond immediate purview of the Welsh Government and local authorities.

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 2022, there were a total of 42 automatic monitoring sites distributed across Wales that were operated by local authorities. Note that, during 2022, there were three site closures (Anglesey Brynteg, Anglesey Llynfaes, Anglesey Penhesgyn 3).

These sites contain equipment that automatically measures carbon monoxide (CO), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), ozone (O₃), coarse (PM₁₀) and fine (PM_{2.5}) particulate matter. In addition to these, there were several hundred diffusion tubes measuring monthly mean NO₂ levels. Overall, the average data capture for the automatic instruments for 2022 was 88%.

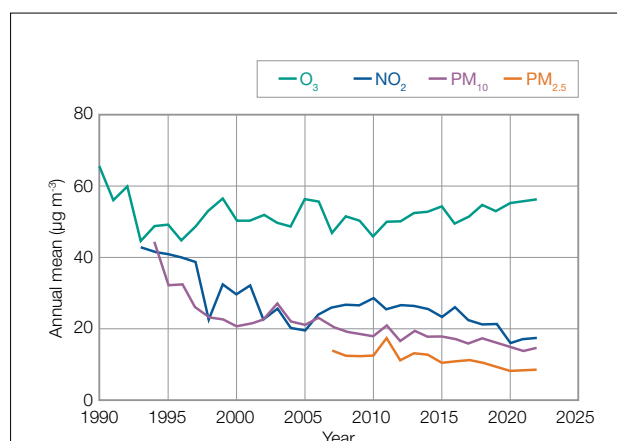


Figure 4.1

Key ambient air pollutant trends in Wales 1990-2022

Daily Air Quality Index

In 2022, ambient concentrations of PM₁₀ were 'moderate' on 40 days, 'high' on 8 days and 'very high' on 1 days (as defined by the Daily Air Quality Index bandings). For PM_{2.5} there were 6 days with 'moderate' concentrations, no days were recorded as 'high' or 'very high' for PM_{2.5} concentrations. For NO₂, there was 1 day with 'moderate' concentrations, 3 days of 'high' and no days of 'very high' concentrations - this was due to a diesel generator being in service close to the Marchlyn Mawr monitoring site for 4 days in December 2022. SO₂ had no 'moderate', 'high' or 'very high' levels recorded. For O₃, there were 37 days with 'moderate' levels, 3 days recorded as 'high' and no days recorded as 'very high'. Overall, pollution levels in Wales were low for 284 days, moderate for 66 days, high for 14 days and very high for 1 days. Therefore, 78% of the time, pollution levels were low 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 2022 no monitoring sites in Wales exceeded any Air Quality Strategy (AQS) Objective (or corresponding EU limit value) for PM₁₀, PM_{2.5}, CO, SO₂, benzene or lead. No Welsh monitoring sites exceeded the annual mean objective of 40 µg m⁻³ for NO₂. However, one

site (Marchlyn Mawr) exceeded the AQS Objective for hourly mean NO_2 concentration ($200 \mu\text{g m}^{-3}$ for more than 18 hours) 40 times. These exceedances were caused by a diesel generator being in service close to the monitoring site for 4 days in December 2022. Eight sites in Wales exceeded the AQS Objective for O_3 ($100 \mu\text{g m}^{-3}$ as a maximum daily 8-hour mean) on more than the permitted 10 occasions. These were Aston Hill, Cardiff Centre, Narberth, Swansea Morriston Roadside, Marchlyn Mawr, Port Talbot Margam, Swansea Cwm Level Park and Cwmbran Crownbridge. These exceedances mainly occurred across two prominent high-ozone periods during heatwave conditions in July and August 2022; specifically on the 17th-18th of July and the 12th-14th of August.

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 3 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

Wales has four polycyclic aromatic hydrocarbon (PAH) network sites. These monitor compliance with Directive 2005/107/EC (the 4th daughter directive), which includes a target value of 1 ng m^{-3} for the annual mean concentration of benzo[a]pyrene ($\text{C}_{20}\text{H}_{12}$) as a representative PAH, not to be exceeded after 31 December 2012. This network uses the PM_{10} '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.

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 $1 \text{ km} \times 1 \text{ km}$ maps for $\text{PM}_{2.5}$ and PM_{10} across Wales, as well as the background $1 \text{ km} \times 1 \text{ km}$ map for oxides of nitrogen used for human health impact assessments.

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), the most widely exceeded limit value is the annual mean NO₂ concentration (40 µgm⁻³). Figure 5.1 shows the trend in annual mean NO₂ concentration at long-running Welsh 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 NO₂ at Welsh urban traffic sites has exhibited a consistent decline from 33.8 µgm⁻³ in 2008 to 21.7 µgm⁻³ in 2022. Notably, 2020 marked a record low in annual mean NO₂ concentrations 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, these concentrations have shown little variation since then, remaining virtually unchanged in 2022.

Urban background sites are represented by the longest-running site of this type (Cardiff Centre) and the mean of all urban background long-running sites. At urban background sites, a consistent decline in NO₂ concentrations has been observed since 1997. In comparison to urban traffic sites, urban background sites experienced the lowest annual mean concentration of NO₂ on record in 2022 at 12.9 µgm⁻³. This indicates that these sites experienced relatively lower influence from COVID-19 restrictions. This is primarily due to their considerable distance from major roads and reduced exposure to vehicular emissions.

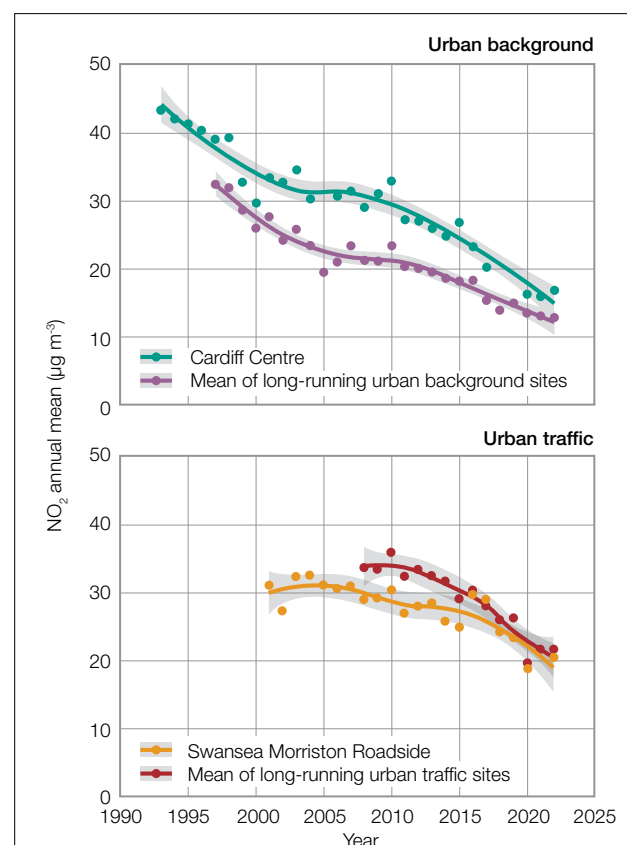


Figure 5.1

Annual mean NO₂ concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

Particulate Matter

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

Since records began, the annual mean concentrations of PM_{10} at urban background sites has steadily decreased from $34.4 \mu g m^{-3}$ in 1997 to $14.7 \mu g m^{-3}$ in 2022. Between 1997 and 2010, the annual mean PM_{10} concentration reduced rapidly: by an average of $1.28 \mu g m^{-3}$ each year. However, in

more recent years there has been a discernible deceleration in the rate of decrease. Between 2010 and 2022 the average annual rate of decline moderated to approximately $0.4 \mu g m^{-3}$. At urban traffic sites concentrations have decreased at a steady $0.4 \mu g m^{-3}$ per year from $21.7 \mu g m^{-3}$ in 2007 to $15.7 \mu g m^{-3}$ in 2022. The rate of decrease has increased over the last decade due to more stringent emission standards in the transport sector.

Despite the general downward trend in PM_{10} concentrations observed at both urban background and traffic monitoring sites in Wales, it is notable that the concentrations in 2022 exceeded those recorded in 2021. Specifically, concentrations at urban background sites increased by 11%, while urban traffic sites witnessed a 3.5% increase. This indicates that the rise in concentrations is not primarily attributable to traffic emissions. According to the NAEI, the growth in emissions from the residential sector, driven by the increased use of wood as domestic fuel, appears to be the main factor behind elevated 2022 concentrations.

In Figure 5.3, annual mean $PM_{2.5}$ concentrations are represented by the mean of long-running urban background sites. In general, the annual average concentrations of $PM_{2.5}$ have shown little variation since records began in 2008, remaining virtually unchanged since 2020.

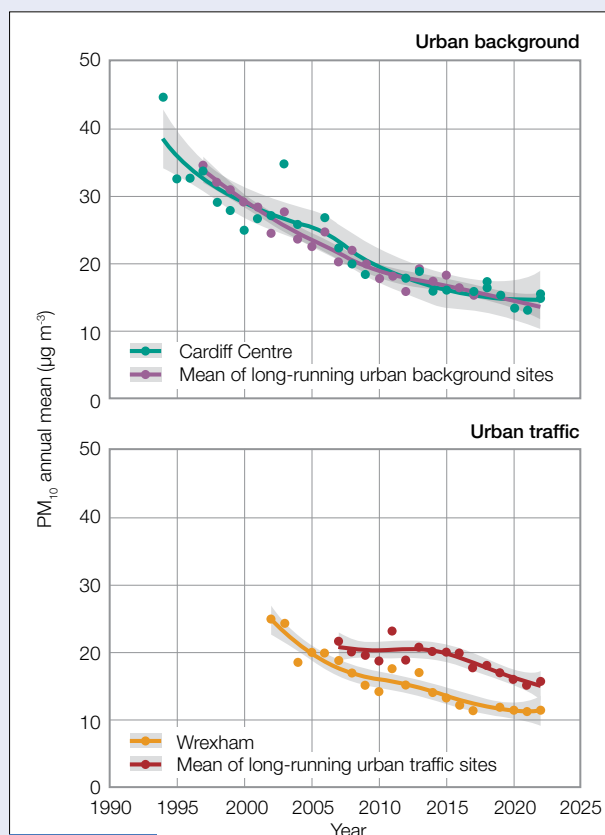


Figure 5.2

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.

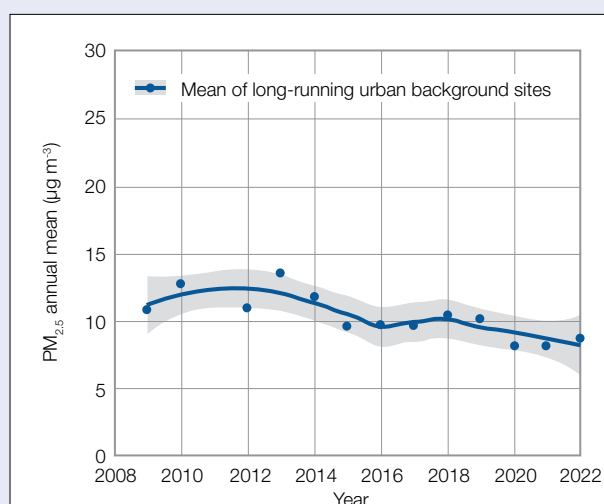


Figure 5.3

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.

Ozone

Due to the inverse photochemical relationship between tropospheric O_3 and NO_x (where NO_x is high, O_3 is low and vice versa), O_3 concentrations tend to be highest at rural locations. Ozone concentrations can vary substantially between years because of the inter-annual variability in meteorology. Some variation from year-to-year is expected due to fluctuations in the occurrence of hot summer weather conditions which are associated with high O_3 concentrations.

Figure 5.4 shows annual mean O_3 concentrations at Aston Hill, the longest running rural monitoring site, Cardiff Centre a long running urban site, and also the mean of all long-running rural sites. Over the years, an overall upward trend in rural O_3 concentrations is evident. Highest annual mean rural ozone concentrations were recorded in 2006, coinciding with a record-breaking European heatwave. Notably, 2022 witnessed the second highest O_3 concentrations on record, with a 6% increase in concentrations observed in the mean of long-running sites between 2021 and 2022. This spike in concentrations is also attributed to an unusually hot summer, which is conducive to increased O_3 formation. The Cardiff Centre urban monitoring site shows an even more marked long-term increase in annual mean ozone, reflecting the inverse relationship between O_3 and NO_x described above. As NO_x concentrations have decreased at urban sites such as Cardiff Centre the levels of O_3 have correspondingly increased.

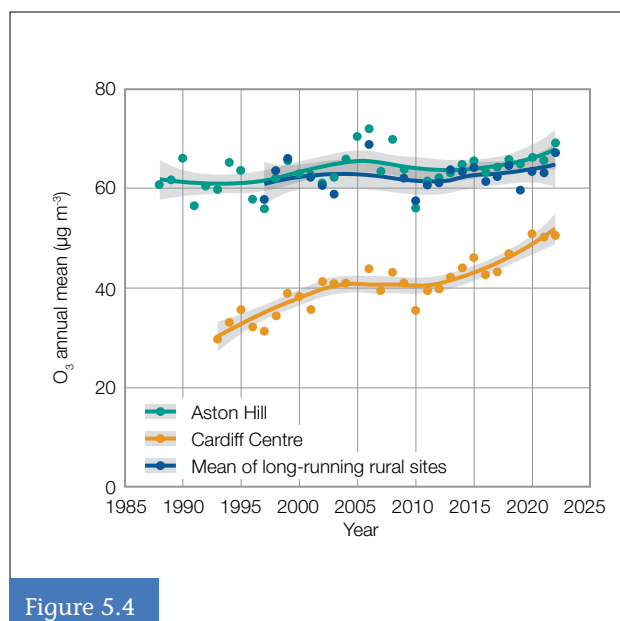


Figure 5.4

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.

Maps of air quality

The maps in Figure 6.1 present 2022 background concentrations for NO_2 , O_3 , PM_{10} and $\text{PM}_{2.5}$. 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. 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.

 NO_2

Annual mean ($\mu\text{g m}^{-3}$)

- 10 and below
- 11-20
- 21-30
- 31-40
- Above 40



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

Ozone

Number of days

- 1 and below
- 2-5
- 6-10
- 11-15
- 16-25
- Above 25



The target value for O_3 is $120 \mu\text{g m}^{-3}$ as an 8-hour mean, not to be exceeded more than 25 times per year averaged over 3 years. The map shows the number of days the concentration was above the target value in 2021.

 PM_{10}

Annual mean ($\mu\text{g m}^{-3}$)

- 10 and below
- 11-15
- 16-20
- 21-30
- 31-40
- Above 40

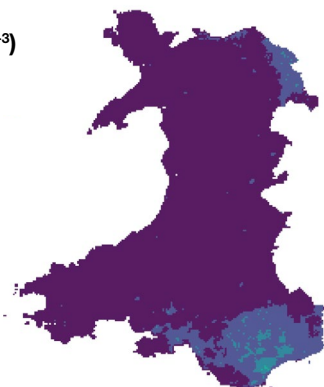


The PM_{10} limit value for annual mean concentration is $40 \mu\text{g m}^{-3}$. The map shows that elevated levels of PM_{10} are associated with urban areas and major roads.

 $\text{PM}_{2.5}$

Annual mean ($\mu\text{g m}^{-3}$)

- 5 and below
- 6-7
- 8-10
- 11-15
- 16-20
- Above 20



The $\text{PM}_{2.5}$ limit value is $25 \mu\text{g m}^{-3}$. The map shows that elevated levels of $\text{PM}_{2.5}$ are associated with urban areas and major roads.

Figure 6.1

Maps showing background concentrations of Nitrogen Dioxide, Ozone, PM_{10} and $\text{PM}_{2.5}$ particulate matter.

The Local Air Quality Management Support Fund

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. Building on the first pilot round, a second round was run in the 2022-2023 financial year. This round supported bids for revenue funding only. All local authorities in Wales were 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 six local authorities and £91,403.87 of revenue funding was awarded to deliver the successful projects. Bridgend County Borough Council, Neath Port Talbot County Borough Council, Newport City Council and the City and County of Swansea Council were successful in securing funding and have provided the following updates on their grant funded projects to date.

Bridgend County Borough Council – Park Street Air Quality Action Plan Support

During the development of the Park Street, Bridgend Air Quality Action Plan (AQAP), Shared Regulatory Services (SRS) have investigated traffic management options that were required to improve air quality at the worst affected sites within Park Street.

Sites currently exceeding air quality annual objectives are isolated to one area of Park Street. This area experiences higher concentrations of pollutants due to the proximity of houses to a heavily trafficked primary route with congestion issues. These issues are compounded by gradients increasing engine load and poor dispersion caused by buildings.

Three traffic management options were agreed within the work steering group for further modelling and assessments. The results from these assessments showed an improvement in air quality with implementation of these measures. However, the results predicted concentrations would remain slightly above annual objective limit for nitrogen dioxide at three receptors if implemented in 2023. Further measures needed to be investigated before publishing the final AQAP.



Ogmore Castle, Bridgend, Wales, UK

Funding was approved through the LAQM support fund to investigate the impact of bus electrification and HGV restrictions. SRS commissioned external consultants to undertake transport and air quality modelling work for the above options to illustrate any benefits to nitrogen dioxide currently identified as exceeding objective limits. The measures were assessed to work in conjunction with previous scenarios where transport and air quality modelling have been undertaken. The results from these assessments will be available in the final published AQAP.

Neath Port Talbot County Borough Council (NPT)

Project 1 – Air Quality Analysis Training

The Council was awarded funding to host a 2-day course for up to 10 delegates on the use of openair and R (two air quality analysis software packages). The course ran in March 2023, spare spaces were offered to neighbouring authorities and the training was well attended.

The course upskilled staff to be able to carry out detailed analysis of all data sources and provide reports in a clear and concise manner. In NPT particularly it is helping the team provide meaningful input into the Clean Air for Port Talbot Short Term Action Plan (STAP) and the associated Data Team meetings and to identify effective measures to improve air quality within the Port Talbot AQMA.

Project 2 – Clean Air for Port Talbot Short Term Action Plan Support

Welsh Government is currently reviewing the Clean Air for Port Talbot STAP. Funding was awarded to enable NPT to engage air quality consultants Ricardo to review its input into the STAP. This funding has delivered:

- Identification and evaluation of the PM10 contributions from all industrial sources in the area.
- A review of all historic air quality studies to identify any outstanding items and make recommendations for future actions.
- A review of background monitoring locations and assessment of transboundary pollution to identify a suitable method for assessment on breach days.
- Review of monitoring sites in Port Talbot on breach days, including Vortex monitors, to ascertain trends and source apportionment at a local level.
- Technical support for the STAP Data Team meetings.

Project 3 – NPT Air Quality Action Plan Review

Funding was awarded for NPT to engage air quality consultants Ricardo to assist in reviewing its Air Quality Action Plan (AQAP).

The previous Action Plan was produced in 2012 and many of the measures are complete. The complex nature of the emission sources impacting the AQMA requires a detailed knowledge of processes and source apportionment to identify meaningful action plan measures.

The AQAP review has commenced, stakeholder meetings have been held and feedback has been reviewed. A “long list” of actions has been drafted and actions are being prioritised.

It is anticipated that this will link very closely with project 2. It will provide information that will enable detailed design and analysis of action plan measures. The AQAP will include an options appraisal and should reflect the work of the STAP and the recommendations contained within.

Looking forward to the Environment (Air Quality and Soundscapes) (Wales) Bill 2023, NPT would also like to future proof the AQAP to proactively address sources of PM_{2.5}.

Newport City Council

Newport City Council obtained grant funding to undertake dispersion modelling in relation to scenarios which form part of their air quality action plan (AQAP). Some measures and approaches to improving air quality do not lend themselves to modelling so in these instances the Council was reliant upon the cost benefit analysis associated with measures proposed in its AQAP. Scenarios looked at are set out in the table below. The AQAP is due for publication late 2023/early 2024.

No.	Caerleon High Street	Caerphilly Road	Cefn Road	Chepstow Road/ Caerleon Road	George Street	Malpas Road
MS1	Changing flow and number of vehicles (assumed to be a 5% upgrade to EV)					
MS2	100% eBus services impact					
MS3	–	20mph impact	20mph impact	–	20mph impact	20mph impact
MS4	–	Green barrier	–	–	–	–
MS5	Combined scenario (includes measures 1&2 above)	Combined scenario (includes measures 1,2,3 & 4 above)	Combined scenario (includes measures 1,2 & 3 above)	Combined scenario (includes measures 1,2 and 4 above)	Combined scenario (includes measures 1,2 & 3 above)	Combined scenario (includes measures 1,2 and 3 above)
MS6	–	Combined scenario (excluding 20mph zones)	Combined scenario (excluding 20mph zones)	–	Combined scenario (excluding 20mph zones)	Combined scenario (excluding 20mph zones)

City and County of Swansea – Engine Idling Study

The Council's previously funded engine idling study in Sketty, Swansea in 2022, demonstrated that behaviour change messaging reduced engine idling and improved air quality. This study examined the impact of behaviour change messaging on air quality and noise levels in a different school route site (Oystermouth Primary School, Newton Road, Mumbles).

This study did not include actual engine idling counts (as previously carried out) as the significant impact of the messaging on this has already been demonstrated at the Sketty site. The aim was to run this study for a longer time-period to collect more data on the impact of the messaging on air quality and noise directly.

Only one message ("Switching off your engine when stationary improves air quality") was used as this was shown to be the most effective previously. This message is based on the previous literature that suggests many people are unaware that this action can make a difference to air quality even for very short periods of time. This was placed on stationary yellow signs on the roadside as done previously, as well as on banners on the school railings.

An important addition to this study is that local residents were invited to fill in a survey pre-and post-messaging intervention, examining their beliefs, attitudes and behaviours around air quality management and engine idling. This was to examine baseline attitudes, beliefs and behaviours (about which little is currently known) and any pre/post changes. Local residents were contacted with an online link to the survey attached to an email and kindly sent out via Oystermouth School (from its Head Teacher) and Mumbles Community Council.

LAQM Support Fund next steps

Following completion of the pilot rounds, the LAQM Support Fund was formally launched by the Minister for Climate Change Julie James in March 2023. The scheme provides capital and revenue funding within a budget of £1m per annum enables all local authorities in Wales to bid for additional support to improve air quality in their area.

Air quality and public health – a year in review

Air pollution and health

The Environment (Air Quality and Soundscapes) (Wales) Bill

Following the publication of The Clean Air Plan for Wales¹ in August 2020, Public Health Wales (PHW) continues to support the development of The Environment (Air Quality and Soundscapes) (Wales) Bill. PHW has drawn upon the latest health research, knowledge and intelligence to highlight that air pollution is the largest environmental risk to public health^{2,3,4}. This has highlighted that health harms are possible even at low levels of air pollution⁵ and that the estimated costs to health and social care services in the UK are substantial⁶. Therefore, any reductions, particularly of particulate matter (PM) or nitrogen dioxide (NO₂), will benefit health.

PHW's work is supporting Welsh Government and other local and national partners in the implementation of policy changes on air pollution and people-centred interventions that focus on health and wellbeing. A particular challenge with introducing or changing any policy or intervention is to ensure that inequalities are not introduced or increased by it, alongside any intended benefit. Although air pollution in Wales is improving overall, differences in experience still exist at a local level, resulting in issues of environmental injustice and social and health inequalities⁷. Therefore, it is important for changes and developments in policy and practice to be considered simultaneously with wider societal, behavioural and environmental aspects. This will both support overall public health gains as well as the aims of the Wellbeing and Future Generations (Wales) Act 2015.

Changing the default speed limit in Wales from 30mph to 20mph

An example of a policy change that has broad benefits to public health, including the potential for longer term improvements to air quality, reduction of road traffic injuries and increased active travel, is the implementation of the default 20mph in Wales. PHW has been supporting the policy and strategy changes for its introduction in September 2023.

In terms of short-term effects, the evidence is not definitive, but it is generally agreed that there is no increase in air pollution compared with 30mph⁸. However, longer-term, there are likely to be wider benefits based on the evidence relating to physical activity levels. Over time, it has been consistently reported that fear of speeding traffic is a major reason why people are reluctant to walk or cycle⁹, leading them to be more likely to travel by car and create pollution. Evidence shows that the introduction of 20mph speed limits is associated with increased walking and cycling¹⁰. More walking and cycling means fewer car journeys and less pollution. It is reasonable to suggest that, over time, this effect will be cumulative with more people feeling able to walk or cycle, particularly for short, local journeys. Given that short journeys by car make a significant contribution to air pollution¹¹ any substantial reduction in these is likely to bring about air quality gains.

¹ Welsh Government (2020). The Clean Air Plan for Wales. <https://www.gov.wales/sites/default/files/publications/2020-08/clean-air-plan-for-wales-healthy-air-healthy-wales.pdf>

² PHE (2018) Health Matters. <https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution>

³ WHO (2016). Ambient air pollution: a global assessment of exposure and burden of disease. <https://apps.who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf?sequence=1&isAllowed=y>

⁴ Senedd Cymru, Welsh Parliament (2023). The Environment (Air Quality and Soundscapes) (Wales) Bill. Consultation Response. <https://business.senedd.wales/documents/s136113/AQS%2003%20Public%20Health%20Wales.pdf>

⁵ Stafoggia, M., Oftedal, B., Chen, J., Rodopoulou, S., Renzi, M., Atkinson, R. W., ... & Janssen, N. A. (2022). Long-term exposure to low ambient air pollution concentrations and mortality among 28 million people: results from seven large European cohorts within the ELAPSE project. *The Lancet Planetary Health*, 6(1), e9-e18. [https://www.thelancet.com/journals/lanph/article/PIIS2542-5196\(21\)00277-1/fulltext](https://www.thelancet.com/journals/lanph/article/PIIS2542-5196(21)00277-1/fulltext)

⁶ Pimpin L, Retat L, Fecht D, de Preux L, Sassi F, et al. (2018) Estimating the costs of air pollution to the National Health Service and social care: An assessment and forecast up to 2035. *PLOS Medicine* 15(7): e1002602. <https://doi.org/10.1371/journal.pmed.1002602>

⁷ Horton, A., Jones, S.J. and Brunt, H. (2022). Air pollution and public health vulnerabilities, susceptibilities and inequalities in Wales, UK. *Journal of Public Health*. <https://doi.org/10.1093/pubmed/fdac083>

⁸ Transport and Environmental Analysis Group (2013). Imperial College London. An evaluation of the estimated impacts of vehicle emissions of a 20mph speed restriction in central London. Centre for Transport Studies. https://cleanair.london/app/uploads/CAL-167-City-of-London_20mph_speed-restriction-air-quality-report-2013-for-web.pdf

⁹ Cohen J, Boniface S, Watkins S. Health implications of transport planning, development and operations. *J Transport Health* 2014;1:63–72. <https://www.sciencedirect.com/science/article/abs/pii/S2214140513000169>

¹⁰ Bristol City Council. Greater Bristol Cycling City: End of Project Report, 2011. June 2011: <https://betterbybike.info/app/uploads/2020/07/Cycling-City-end-of-project-report.pdf>

¹¹ Krzyzanowski, M., Kuna-Dibbert, B., and Schneider, J. (2005). Health effects of transport related air pollution. WHO. Europe. <https://iris.who.int/bitstream/handle/10665/328088/9789289013734-eng.pdf?sequence=3&isAllowed=y>

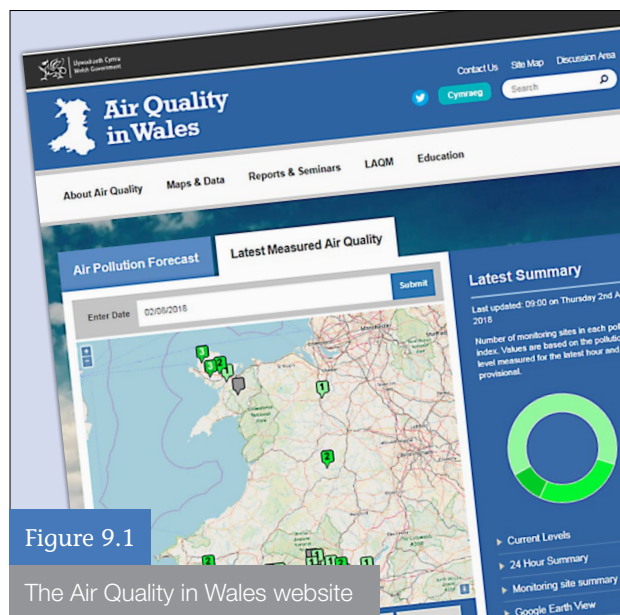
More information

The Air Quality in Wales website

The Air Quality in Wales website (<https://airquality.gov.wales/>) 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.
- 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.



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 with a few seconds.



Three Cliffs Bay, Gower, Wales, UK

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 Affairs (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).

