



Llywodraeth Cymru
Welsh Government

Air Quality in Wales 2021



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 19th 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 2021. 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](#). 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 2021. Chapter 3 summarises important policy developments that took place in 2021. 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 long-term trends and spatial distribution of air pollutants across the country. Chapter 7 reports on a topic of special interest – this year it looks at Wales' first 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 2021. Finally, for readers wanting to find out more, additional web-based and published sources of information are summarised in Chapter 9.



The WAQF and its activities in 2021

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 2021

- 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 diffusion tube monitoring; Clean Air Day; personal air quality monitors and handheld/portable monitors; wood burners; consultation on technical advice notice and consultation on the Welsh Government Clean Air Plan and Bill.

WAQF meetings 2021

Due to COVID-19, meetings of the Welsh Air Quality Forum were suspended. However, the Discussion Forum was used by members to share information and to provide advice during the COVID-19 pandemic. The forum discussions included:

- Green Walls
- Clean Air Day
- Air Quality Sensors
- Wood Burners
- Street Canyons

The Annual Welsh Air Quality Forum Seminar was held as a webinar on 28th September 2021. There were 46 WAQF members and delegates attending the event. The topics presented were;

- Welsh Government Update
- The UK Urban NO₂ Network
- Air Quality Sensors and how best to use them
- Clean Air Champions for Wales
- Trends in critical load and critical level exceedances in the UK
- Public Health Wales update

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



Welsh Government policy update

There were several significant clean air developments in 2021, starting with the Clean Air (Wales) Bill White Paper [consultation](#) which launched in January. The White Paper included proposals on a clean air strategy, an air quality target setting framework, local air quality management (LAQM), road user charging, engine idling, smoke control and workforce guidance. The Bill is currently being developed and is expected to be introduced for consideration by the Senedd in 2023.

[Llwybr Newydd: The Wales Transport Strategy](#) was published in May. The strategy includes key priorities and actions to achieve an accessible, sustainable and efficient transport system. The strategy sets out a regional transport planning approach and a commitment to reduce air quality and noise issues associated with transport.

In June, Clean Air Day Wales was held for the third year. A range of activities took place across Wales, including Newport City Council's clean air event which was attended by the Deputy Minister for Climate Change and pupils from St Julian's School. The event showcased a range of sustainable travel initiatives and vehicles, including Wales' first electric refuse vehicle.

A pilot scheme of Wales' first LAQM grant scheme was launched in September. The purpose of the Local Air Quality Management Support Fund was to assist local authorities in their LAQM duties and to encourage innovative approaches to improving local air quality. Over £355k was made available to support a range of projects and more detail on the scheme can be found in chapter 7.

Key milestones in the [Tackling Roadside Nitrogen Dioxide Concentrations in Wales](#) plan were reached throughout 2021. This includes the demolition of Woodside Terrace in Hafodrynnys, the launch of Cardiff Council's bus retrofit programme, the installation of a new road layout on Castle Street, Cardiff and an updated [FAQ](#) on the 50 mph air quality speed limits.



A schools road sign competition was also launched, challenging pupils to create a sign that can be installed on the strategic road network to increase awareness of air quality issues. The signs are to be manufactured and installed where our reduced 50 mph environmental speed limits have been applied.

Significant work has also been undertaken throughout 2021 by local authorities and other organisations across Wales to achieve cleaner air. This has been no easy task given the ongoing challenges from the COVID-19 pandemic. We are grateful to everyone who has collaborated, supported, and provided input to the development of the achievements reached in 2021 despite these challenging circumstances.

Monitoring networks and data highlights

The Welsh Government and the Welsh Air Quality Forum (WAQF) work closely with air quality experts and the Department for Environment, Food and Rural Affairs (Defra) to monitor and reduce air pollution in Wales. Figure 4.1 illustrates the long-term trends for nitrogen dioxide (NO_2), fine particles (PM_{10} and $\text{PM}_{2.5}$) and ozone (O_3) concentrations in Wales from local authority and AURN monitoring sites. Apart from O_3 , this shows a steady improvement in pollutant concentrations since the 1990s. Note that, as O_3 is a regional pollutant that is transboundary in nature, it is outside the direct control of the Welsh Government and local authorities.

There was a significant reduction in some air pollutant emissions for Wales in 2020 correlating to COVID-19 lockdown restrictions. This was reflected in measured pollutant trends. As shown in figure 4.1, NO_2 levels experienced a sharp dip in 2020 compared to pre-pandemic trends. However, as the implementation of more relaxed restrictions came into play in 2021, NO_2 concentrations began to rise. Note that although concentrations in 2021 were higher than 2020 levels, 2021 concentrations did not exceed pre-pandemic levels and the downward trajectory remains. Conversely, in 2021 a sharp decrease in O_3 is visible due to higher urban NO_x and a cooler summer than in 2020. Particulate concentrations (both PM_{10} and $\text{PM}_{2.5}$) do not appear to have been significantly affected by COVID-19 restrictions and the downward trajectory, seen from the start of the 1990s, continues.

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 2021, there were a total of 41 automatic monitoring sites distributed across Wales that were operated by local authorities. Note that, during 2021, there was one site closure (V Glamorgan Windsor Road, Penarth) and one site that began operation (Wrexham Chirk Community Hospital).

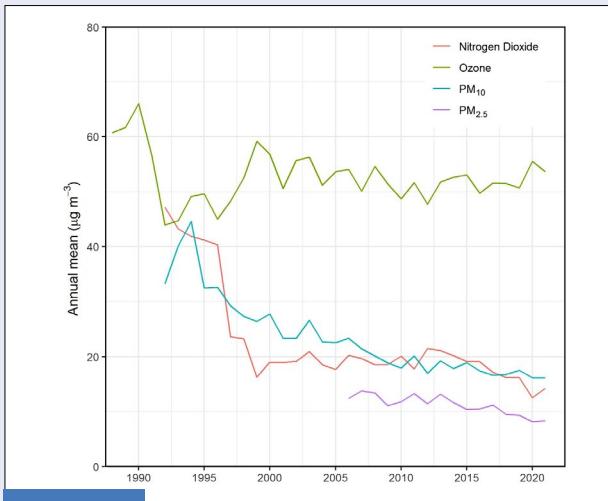


Figure 4.1

Key ambient air pollutant trends in Wales 1990-2021

These sites contain equipment that automatically measures carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), fine particles (PM_{10} and $\text{PM}_{2.5}$). 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 2021 was 84%. This reflects the fact that there was a site closure at the start of 2021 and a site opened partway through the year, lowering the overall figure. If these sites are removed, the overall data capture was 88%.

Daily Air Quality Index

In 2021, ambient concentrations of PM_{10} were ‘moderate’ on 67 days, ‘high’ on 14 days and ‘very high’ on 11 days (as defined by the Daily Air Quality Index bandings). For $\text{PM}_{2.5}$ there were 6 days with ‘moderate’ concentrations and 1 day with ‘high’ concentrations. No days were recorded as ‘very high’ for $\text{PM}_{2.5}$ concentrations. For NO_2 , there were 3 days with ‘moderate’ concentrations, 1 day of ‘high’ and no days of ‘very high’ concentrations. SO_2 had no ‘moderate’, ‘high’ or ‘very high’ levels recorded. For O_3 , although there were 22 days with ‘moderate’ levels there were no days recorded as ‘high’ or ‘very high’. Overall, pollution levels in Wales were low for 279 days, moderate for 68 days, high for 7 days and very high for 11 days. Therefore, 76% 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 2021 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. One Welsh monitoring site (Hafod-yr-ynys) exceeded the annual mean objective of 40 µgm⁻³ for NO₂. However, no sites exceeded the AQS Objective for hourly mean NO₂ concentration (200 µgm⁻³ for more than 18 hours). Three sites in Wales exceeded the AQS Objective for O₃ (100 µgm⁻³ as a maximum daily 8-hour mean) on more than the permitted 10 occasions. These were Aston Hill, Marchlyn Mawr and Cwmbran Crownbridge. These exceedances are most likely due to the prolonged hot weather in the summer of 2021.

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 NO₂ Network

The UK Urban NO₂ Network (UUNN) is an air quality monitoring network that provides measurements of nitrogen dioxide (NO₂) concentrations at urban traffic sites. NO₂ measurement data provided by the UUNN is used to assess compliance against the annual mean NO₂ 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 PM₁₀. 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 ngm⁻³ for the annual mean concentration of benzo[a]pyrene (C₂₀H₁₂) as a representative PAH, not to be exceeded after 31 December 2012. This network uses the PM₁₀ '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) 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 the secondary inorganic aerosol used to produce the 1 km x 1 km maps for PM_{2.5} and PM₁₀, as well as the background 1 km x 1 km map for oxides of nitrogen used for human health impact assessments.



Air quality trends

The number of automatic monitoring sites in Wales has increased greatly in recent years. While this helps to improve our understanding of air quality across the country, it potentially complicates the investigation of how air quality has changed over time. If such investigations are based on all available data, discontinuities and false trends may be introduced because of changes in the composition of the network. Therefore, in this report, the investigation of changes has been based on subsets of long-running sites rather than on every site in the network. This should lead to a more robust assessment. Note that the annual mean concentration of a pollutant is the average of all included sites with an annual data capture greater than or equal to 50%.

Nitrogen Dioxide

In Wales (and the rest of the UK), the most widely exceeded limit value is the annual mean NO_2 concentration ($40 \mu\text{g m}^{-3}$). Figure 5.1 shows the trend in annual mean NO_2 concentration at long-running Welsh sites.

Urban background sites are represented by the longest-running site of this type (Cardiff Centre) which has been in operation since 1992 and the mean of four long-running sites; Cardiff Centre and three sites (Cwmbran, Newport St Julians and Port Talbot) that have been in operation since 2003. Note that Port Talbot was replaced by the nearby Port Talbot Margam site in 2007. The two sites are therefore treated as one for the purpose of this report. Cardiff Centre shows a clear decrease in the annual mean concentration of NO_2 from 1992 to 2021. This correlates with the trend observed in the mean of the four urban background sites that reports a steady decline in NO_2 concentrations since 2003. Note, that following the lowest annual mean concentration of NO_2 on record in 2020, the mean increased in 2021. This is likely due to COVID-19 restrictions.

Urban traffic sites (those within 10 m of a major road) are represented by the longest-running roadside site (Swansea Morriston) which has been in operation since 2001 and the mean of two long-running sites; Swansea Morriston and Wrexham that has been in operation since 2002. As seen in figure 5.1, the annual mean concentration of NO_2 at urban traffic sites has declined since records began in 2001. All urban traffic sites experienced their lowest annual mean NO_2 concentrations on record in 2020. Again, this is likely due to the reduction in traffic as a result of COVID-19 restrictions. All urban traffic annual mean concentrations increased in 2021 correlating with the easing of restrictions.

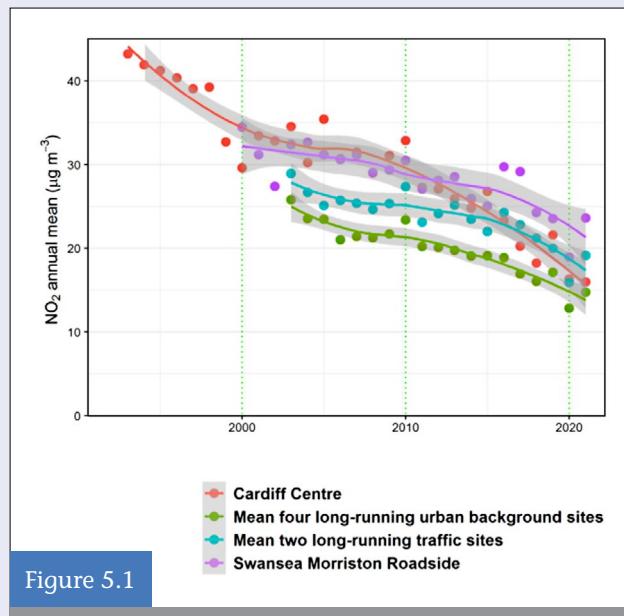


Figure 5.1

Annual mean nitrogen dioxide concentration 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 particles (PM_{10} and $\text{PM}_{2.5}$). The urban background sites, for PM_{10} (Figure 5.2), are again represented by the longest-running site of this type (Cardiff Centre) and the average of three long-running sites including Cardiff Centre, Cwmbran and Port Talbot. Port Talbot Margam again replaced the Port Talbot site from 2007 onwards and is treated as one site for the purpose of this graph. Please note that the Port Talbot sites are classified as urban industrial sites rather than urban background sites due to their proximity to a large steelworks. They have been included as there are few long-running urban, non-roadside sites. As seen in figure 5.2, Cardiff Centre shows a decrease in PM_{10} concentrations from 2020 to 2021. However, the annual mean for the three longest-running sites increased in 2021 following covid restrictions in 2020.

Urban traffic sites (Figure 5.2) are represented by the mean of two long-running sites in operation since 2002 (Rhondda-Cynon-Taf Nantgarw and Wrexham). Wrexham is also shown individually. Since records began, PM_{10} at urban traffic sites has generally decreased annually. Due to the diverse range of emission sources that contribute to particulate matter, there are a few reasons for this long-term trend. However,



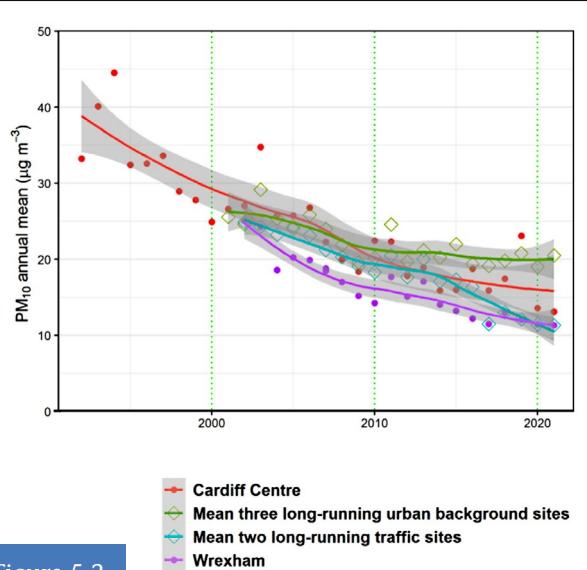


Figure 5.2

Annual mean PM₁₀ concentrations at long-running sites in Wales. The shaded areas represent the 95% confidence level for the annual mean concentration of the sites.

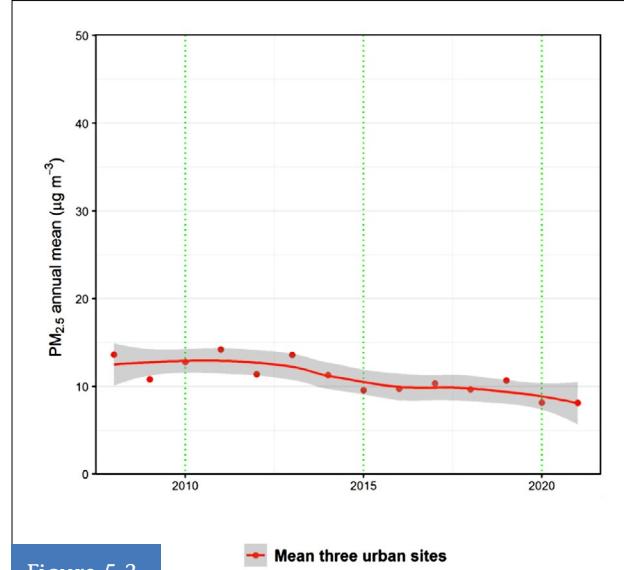


Figure 5.3

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.

the introduction of more stringent emission standards in the transport and industrial sectors are major drivers of this decline.

Urban background sites, for PM_{2.5} (Figure 5.3), are represented by the mean of three long-running sites (Cardiff Centre, Newport St Julians and Port Talbot Margam) that began PM_{2.5} measurements in 2008. In general, the annual average concentrations of fine particulates has steadily decreased since records began. In 2021, concentrations rose from 2020 levels again correlating with the ease of covid restrictions. Note that the overall trend in PM_{2.5} correlates with that of PM₁₀ at urban background sites. This is due to the fact that PM_{2.5} is a subset of PM₁₀ and thus, has similar emission sources.

Ozone

Due to the inverse photochemical relationship between O₃ and NO_x (where NO_x is high, O₃ is low and vice versa), O₃ concentrations tend to be highest at rural locations. Figure 5.4 shows how annual mean rural O₃ concentration has changed over time. This is based on the mean concentration measured by three long-running sites in Wales (Aston Hill, Marchlyn Mawr and Narbeth). These sites have all have been in operation since 2003 with data capture of at least

70%. Also shown is Aston Hill individually. This site has been monitoring ozone since the late 1980s. Although there are no clear trends, concentrations vary considerably from year to year because of the variation in meteorological factors.

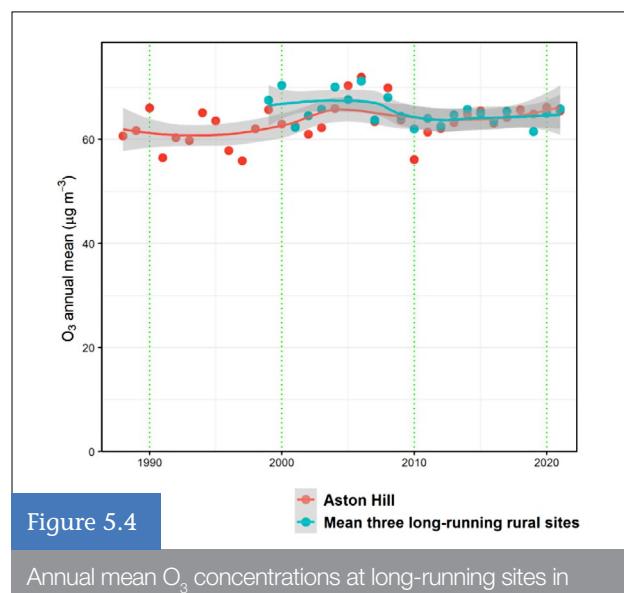
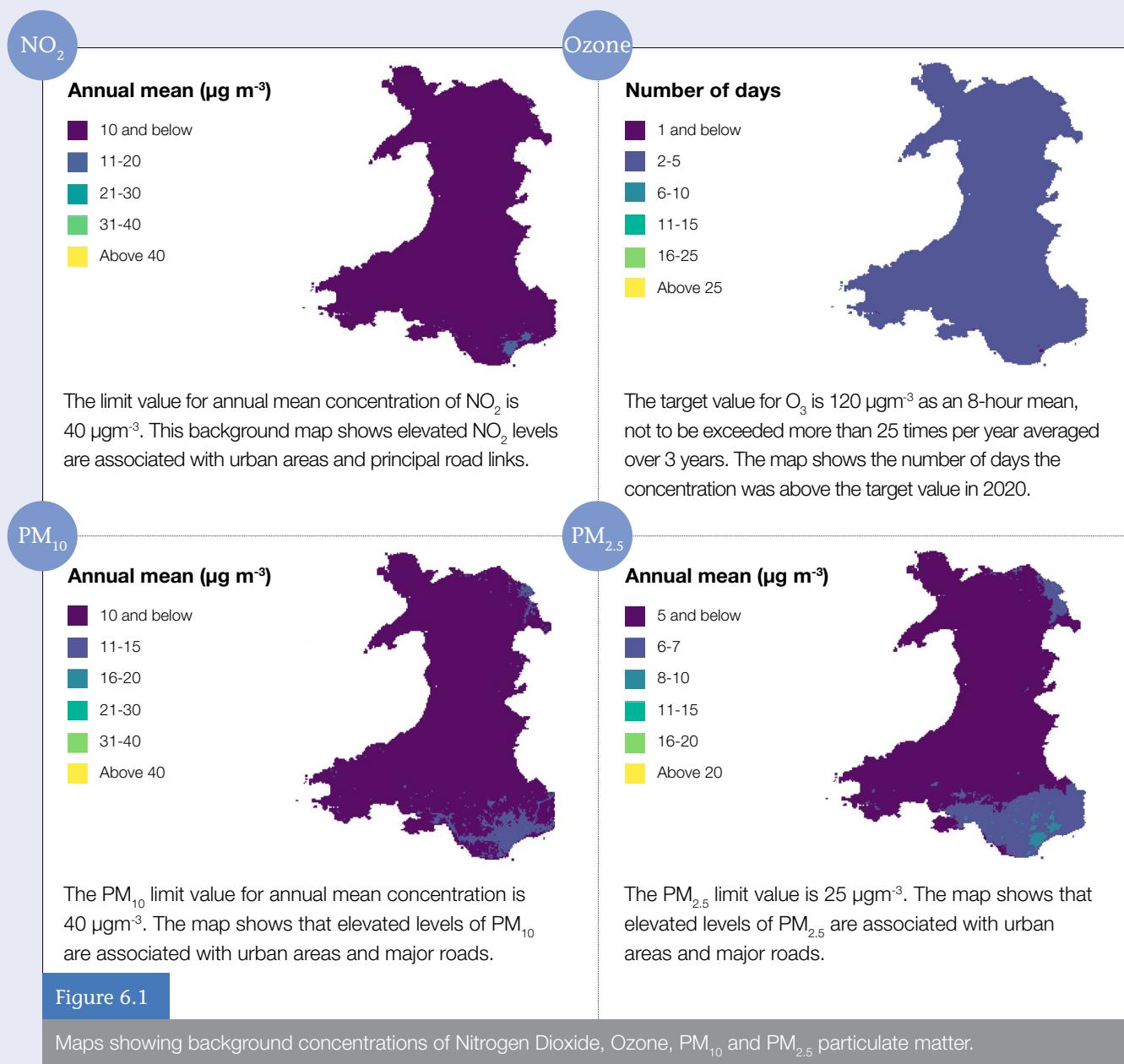


Figure 5.4

Annual mean O₃ 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 2021 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.



The Local Air Quality Management Support Fund

Wales' first Local Air Quality Management (LAQM) grant scheme was launched in the 2021 – 2022 financial year. The LAQM Support Fund is a pilot grant scheme run by the Welsh Government to support local authorities in carrying out their LAQM duties. All local authorities in Wales were invited to submit bids that meet 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 four local authorities and over £355k was awarded to deliver the successful projects. 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 updates on their grant funded projects below.

Neath Port Talbot County Borough Council

Neath Port Talbot County Borough Council (NPT) was awarded funding from the LAQM Support Fund for three projects in support of their air quality monitoring in the County Borough.

Project 1 – Upgrade to monitoring network

Neath Port Talbot has a comprehensive monitoring network that it has operated for many years, providing good air quality data for the area and, in particular, in and around Port Talbot's Steelworks. However, the monitors were ageing and the machines were regularly developing faults and requiring repair which was impacting on data capture. The only feasible options were to upgrade or discontinue the monitors. Prince Street and Little Warren are considered high priority for the continued monitoring in and around the Port Talbot Steelworks and also the AQMA. Monitoring at Dyffryn School was considered important in light of future air quality policies for PM_{2.5} and sensitive receptors. Three NO₂ Automatic Air Quality Analysers were replaced with new BAM units monitoring for PM₁₀ and PM_{2.5}.

The machines would future proof the monitoring network and by providing for the monitoring of PM_{2.5} at each location, monitoring would be available for the imminent PM_{2.5} air quality objective. The continued high quality monitoring data will provide a good evidence base for Neath Port Talbot's review of their Air Quality Action Plan (AQAP) in 2022.

Project 2 – Mobile air quality station

Following an incident in which Neath Port Talbot Council had to try and access quick air quality monitoring data it was identified that there is insufficient equipment in the area to assist local authorities in these situations. Neath Port Talbot therefore bid to purchase an air quality trailer capable of monitoring for NO, NO₂, NO_x, SO₂ and particulates.

The mobile monitor will enable Neath Port Talbot to gather spatial real time monitoring in problematic areas to identify appropriate remedial and corrective actions and also allow them to support other local authorities in emergency monitoring situations. The mobile monitor is intended to increase our knowledge and understanding of air quality in areas where traditional reference methods may not be possible but also to identify previously unfound hotspots or problem locations. This will enable better targeting of air quality interventions and policies thereby reducing long term exposure to air pollution.

Project 3 – Purchase of a meteorological sensor

Monitoring of the concentrations of 13 airborne metals has been carried out in the Pontardawe area since 1972 as part of the Defra and Devolved Administrations Heavy Metals Network. The purpose of the network is to provide evidence of the concentrations of heavy metals in air near industrial sources and areas of population.

The concentrations of Nickel in Pontardawe periodically exceeds the 4th Air Quality Daughter Directive (2004/107/EC) target value. There are two potential industrial sources of metals in the Swansea Valley, namely, The Mond in Clydach and Wall Colmonoy in Pontardawe. The use of met data is important to demonstrate the source of the Nickel and to target interventions. The met sensor at Pontardawe has not been working properly for some time. Temporary fixes have been carried out but do not provide a long-term solution to the problem. The funding has enabled Neath Port Talbot to purchase a new met sensor for use in the nickel monitoring carried out as part of the Heavy Metals Network.

Newport City Council

Newport City Council (NCC) obtained grant funding to cover a twofold requirement. Firstly, to undertake an Air Quality Action Plan (AQAP) scoping exercise to assist NCC in creating a roadmap for our Air Quality Action Planning work which has started with a refresh of their Air Quality Action Plan.

Project 1 – AQAP Scoping Exercise

The work undertaken by AECOM looked the current air quality picture in NCC and identified air quality priorities and approaches to modelling for an authority which has 11 Air Quality Management Areas (AQMAs). The scoping document produced looked at the development and implementation of the NCC AQAP and the ultimate development of measures which assisted officers in clarifying the potential structure and content of the NCC AQAP.

Project 2 – Low-Cost Sensors for AQMAs

The second aspect to grant monies obtained for 2021/22 related to purchase of Zephyr Air Quality sensor systems. The purchase of 4 of these instruments has enabled NCC to provide real time monitoring coverage for its 6 non-M4 based AQMAs. The data gathered by the devices can be called upon when looking at pollution over time relationships. This in turn enables NCC to better match interventions with peak periods of pollution that are captured.

An additional unit has also been deployed to the closest residential receptors by the Bryn Glas tunnels; providing real time data on M4 based pollution in this locality. This data again can be called upon should peak pollution and time of day interventions be considered by Welsh Government in relation to the M4 at Bryn Glas.



Zephyr units deployed in a street canyon in Caerleon and a highway setting in Malpas Road, Newport.

City and County of Swansea Council

Project 1 – Green Screen projects

As part of the Welsh Government LAQM Grant, four Air Quality monitors have been purchased and installed at two Primary Schools in Swansea, Oystermouth and Morriston Primary and are collecting data at fence line and yard locations. The Hedera species, Green Screens, have been purchased and are currently being looked after at the Council's Botanical Gardens ahead of planting this Autumn. The hypothesis to be tested is that installation of a living 'Green Screen' has a positive effect upon air quality.

Project 2 – Engine Idling Study

The collaboration study with Swansea University and ThinkAir has commenced to collect data to look at the use of Behavioural Change Theory, via the use of Messaging Signs, to influence motorists to switch their engines off at the traffic lights at a busy Junction of Vivian Road and Gower Road in Sketty, Swansea. The study period took place between the 11th and the 27th July 2022, to capture data during a control week and a week of messages being displayed. Data measured includes sound pressure level, NO₂, PM_{2.5}, PM₁₀, CO₂ and vehicle count with analysis and dispersion modelling.

Project 3 – City Centre Air Quality Network

The aim of this project is to analyse the air quality and traffic datasets as part of the Council's Annual Progress Report and Air Quality Action Plan processes. Vortex units have been purchased and bench tested and installation of the network will be carried out shortly.

LAQM Support Fund Next Steps

The range of projects delivered by the local authorities under the grant scheme illustrates the varied challenges faced in tackling air pollution, as well as the opportunities and possible solutions. The Welsh Government is evaluating the LAQM Support Fund to inform potential future funding opportunities.



Air quality and public health – a year in review

Air pollution and health

Wildfires

In recent years there have been an increasing number of hot summers. Hot weather can lead to an increase in wildfires which are a well-known problem in parts of Wales, especially in the South Wales valleys. These fires are often close to people's homes and as well as presenting a risk to property, life and the environment, the smoke is also hazardous to health. Wildfire smoke can contain large amounts of fine and ultra-fine particles and potentially harmful gases such as carbon monoxide, nitrogen oxides, acrolein and formaldehyde. Large wildfire events can also generate secondary pollutants such as ozone. Evidence from many other countries demonstrate that smoke from wildfires can result in exceedances of health-based air quality standards. There is strong epidemiological evidence that exposure to wildfire smoke can cause the same range of health effects as exposure to other forms of air pollution. These can include increased admissions to hospital for respiratory and cardiovascular problems, increase consultation in primary care for conditions such as asthma, greater prescribing of medication etc. Furthermore, many wildfires are in our most deprived communities where health is already poor and people more susceptible to air pollution.

Current climate change predictions suggest that we will see conditions more favourable for wildfires. Projections by the Met Office suggest that a 2°C increase in global temperatures will double the days in the UK with very high fire danger and extend the wildfire season into late summer and autumn.¹ In the future, wildfire events are also likely to coincide with periods of extreme hot weather and drought which will also challenge people's health.

The health effects of wildfires, including the impacts on air quality, are currently being reviewed as part of the latest update to the UK Health Effects of Climate Change Report. This review will look to improve our understanding as to how climate change will affect wildfires and what additional risks this may present to communities in the UK, including Wales.

Air pollution and public health vulnerabilities, susceptibilities and inequalities

Air pollution, deprivation and poor health are closely linked; highlighting issues of environmental injustice, social and health inequalities. However, national reports mask local-level air pollution variations and inequalities in exposure. A recent study² by Public Health Wales explores the vulnerabilities, susceptibilities and inequalities to understand and assess the burden of air pollution on health, in Wales.



¹ <https://nhess.copernicus.org/articles/22/559/2022/nhess-22-559-2022.pdf>

² 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>



Lower Super Output Area (LSOA) level data for air pollution (NO_2 and $\text{PM}_{2.5}$), population demographics and deprivation for the years 2012-2018, for Wales, were analysed. These data precede the COVID-19 pandemic and do not comment on any associated air quality effects.

Air pollution data were categorised according to concentration, based on the 2005 WHO annual air pollution guideline values. Mid-year populations and income data (from the Welsh Index of Multiple Deprivation) were used to describe population vulnerabilities, susceptibilities and inequalities.

The study found that air quality is improving in Wales but local-level variations and inequalities exist (figure 8.1). Air pollution in 'most deprived' areas was consistently higher than in 'least deprived areas'. These trends are masked by national-level assessments.

It also found that:

- More people lived in less polluted areas by 2018 compared with 2012; this was particularly beneficial in terms of NO_2 exposure.
- But, the most deprived areas were still more likely to be more polluted in 2018 compared with the least deprived areas.
- For both pollutants, proportions of those ages 65+ were consistently significantly higher in the less polluted areas, compared with more polluted areas.
- Work is still needed to improve air quality for all, but particularly young people and those in the most deprived areas.

This study provides further evidence for the links between air pollution, deprivation and health. Societal, behavioural and environmental decisions in policy and practice should be considered simultaneously, to align priorities and outcomes for prevention and interventions. Public Health Wales continues to work with Welsh Government and partners to assess the burden on health and integrate policies associated with air pollution, in the broadest possible public health context.

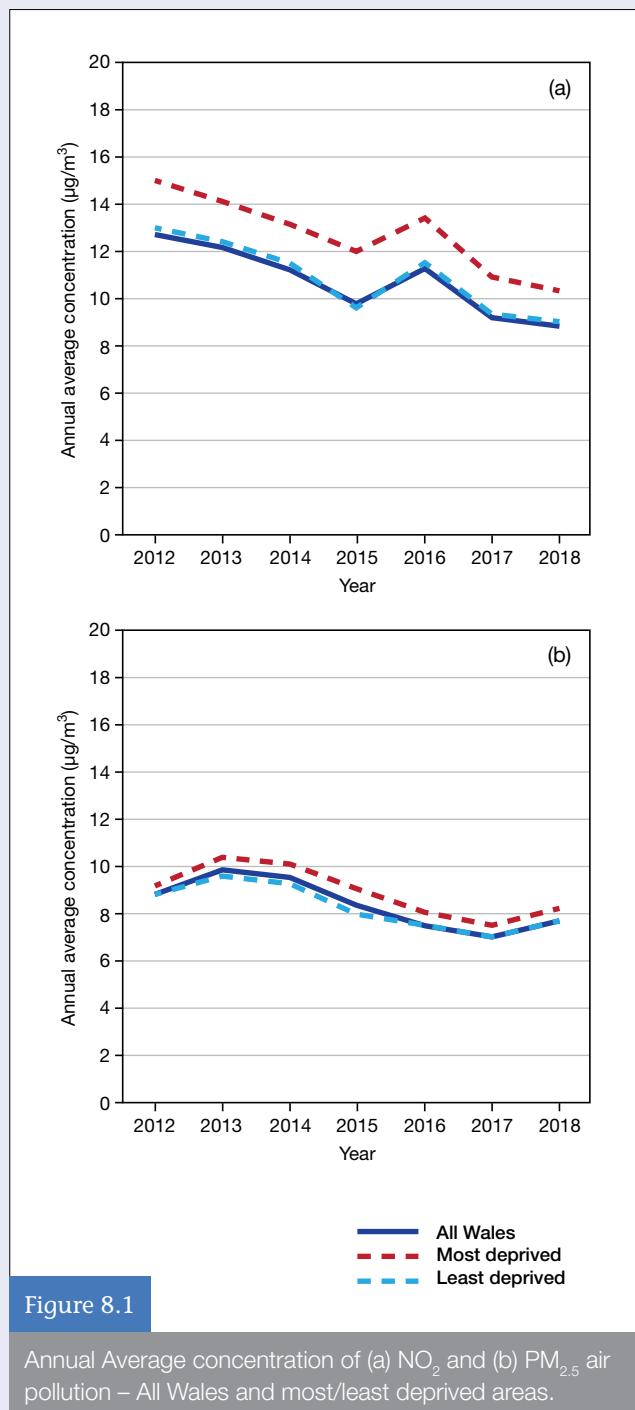


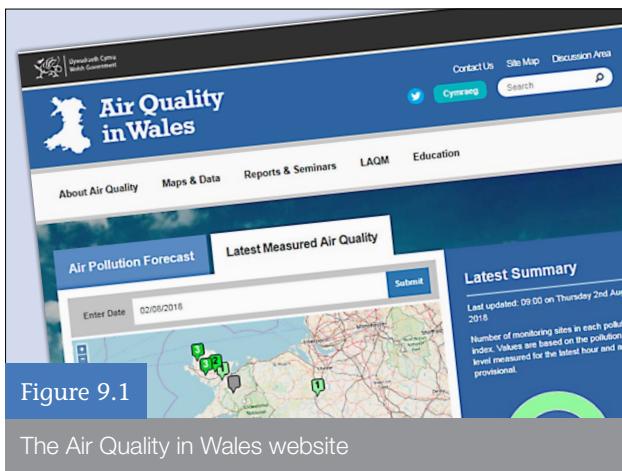
Figure 8.1

Annual Average concentration of (a) NO_2 and (b) $\text{PM}_{2.5}$ air pollution – All Wales and most/least deprived areas.



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.

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's (Defra) website (<https://airquality.gov.wales/about-air-quality/daily-air-quality-index>).

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).

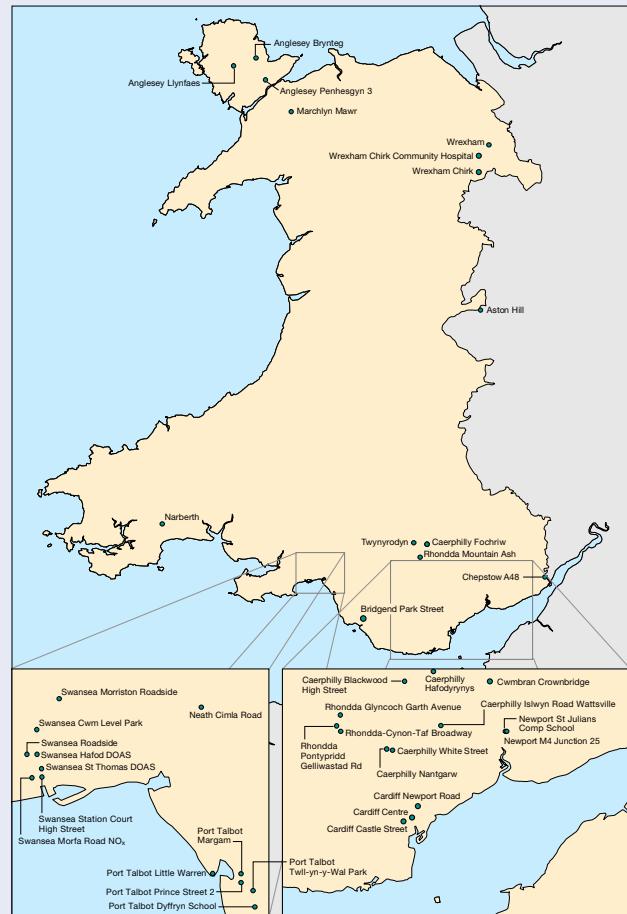


Figure 9.2

Welsh automatic monitoring sites in 2021

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>).

