

Meeting of:	Cabinet
Date of Meeting:	Monday, 27 September 2021
Relevant Scrutiny Committee:	Environment and Regeneration
Report Title:	Local Air Quality Management Annual Progress Report 2021
Purpose of Report:	To seek approval for the 2021 Local Air Quality Management Annual Progress Report (APR) on air quality monitoring conducted in 2020 to enable submission to Welsh Government no later than 30th September 2021.
Report Owner:	Report of the Cabinet Member for Legal, Regulatory and Planning Services
Responsible Officer:	Miles Punter Director of Environment and Housing
Elected Member and Officer Consultation:	Head of Service for Shared Regulatory Services
Policy Framework:	This is a matter for Executive decision by Cabinet
<p>Executive Summary:</p> <ul style="list-style-type: none"> • Under Section 82 of the Environment Act 1995 every local authority has an obligation to regularly review and assess air quality in their areas, and to determine whether or not air quality objectives are likely to be achieved. • In pursuance of this, the Council produces a Local Air Quality Management report • The report satisfies the relevant legal requirements examining results of air quality monitoring undertaken across the Vale of Glamorgan during 2020. • A draft copy of the Annual Progress Report needs to be approved and issued to Welsh Government no later than 30th September 2021. • The report confirms that air quality within the Vale of Glamorgan continues to meet all the relevant air quality objectives 	

Recommendations

1. That Cabinet notes the monitored results gathered in 2020.
2. That Cabinet recommends the finalisation of the 2021 Annual Progress Report, attached at Appendix 1 to this report, for submission to Welsh Government for approval.

Reason for Recommendations

1. and 2.

The report fulfils the requirements of the statutory Local Air Quality Management (LAQM) process under Part IV of the Environment Act 1995, and the report contains results of air quality data captured in 2020.

1. Background

- 1.1 The LAQM process places a statutory duty on all local authorities to regularly review and assess air quality in their areas and to determine whether the air quality objectives to protect health are likely to be achieved.
- 1.2 Welsh Government issues statutory policy guidance to Local Authorities under Section 88 of the Environment Act 1995 to bring the local air quality management system in Wales into line with the sustainable development principle outlined in Welsh Government's Well-being for Future Generations Act 2015. This guidance, with which local authorities must have regard when carrying out their air quality functions under the Environment Act 1995, sets out that authorities in Wales have to produce an Annual Progress Report in draft form by 30th September each year and publish it by 31st December at the latest.
- 1.3 The Annual Progress Report must include monitoring results for the previous calendar year, a progress report on action plan implementation and an update on any new policies or developments likely to affect local air quality.
- 1.4 Note that during the 2020 calendar year, the Windsor Road, Penarth Air Quality Management Area (AQMA) was still in place. Following consideration previously by Cabinet, it was revoked in January 2021.

2. Key Issues for Consideration

- 2.1 There are no monitoring sites with nitrogen dioxide (NO₂) concentrations in exceedance of the applicable LAQM air quality objectives for Wales in 2020; annual average (40µg/m³) and 1-hour (200µg/m³ not to be exceeded > 18 times per year).
- 2.2 The results of the monitoring indicate that the annual average particulate matter PM₁₀ concentrations at the then Windsor Road monitoring station were

compliant with the air quality objective of 40µg/m³. This is the only location across the Vale where PM₁₀ was actively monitored.

- 2.3** Although Ozone (O₃) is not included in the Local Air Quality Management system, the results are included in the report for completeness. There are no exceedances of the 8-hour mean objective of 100µg/m³ on more than 10 days per year as set by the Expert Panel on Air Quality Standards (EPAQs). This is the only location across the Vale where O₃ is actively monitored.
- 2.4** The monitoring during 2020 within the then Windsor Road Air Quality Management Area (AQMA) shows continued compliance with regards to the applicable air quality objectives for NO₂ (annual average (40µg/m³) and 1-hour (200µg/m³ not to be exceeded > 18 times per year).
- 2.5** The COVID-19 pandemic has impacted air quality at local, regional and national scales and presented challenges to Local Authorities in undertaking statutory LAQM duties. In 2020 a reduction of 19% in the NO₂ annual mean concentration was experienced at Vale of Glamorgan roadside diffusion tube monitoring sites relative to 2019.

3. How do proposals evidence the Five Ways of Working and contribute to our Well-being Objectives?

- 3.1.** The Well-Being of Future Generations (Wales) Act 2015 places a 'well-being duty' on public bodies aimed at achieving seven national well-being goals for Wales - a Wales that is prosperous, resilient, healthier, more equal, has cohesive communities, a vibrant culture and thriving Welsh language, and is globally responsible.
- 3.2.** In discharging its duties under the 2015 Act, the Council has set and published Well-being objectives designed to maximise its contribution to achieving the national Well-being goals. The Well-being objectives are set out in Vale Council's Well-being Objectives and Improvement Plan Part 1 2019/20:
<https://www.valeofglamorgan.gov.uk/Documents/Our%20Council/Achieving%20our%20vision/Improvement-Plan/Improvement-Plan-Part-1-Well-being-Objectives-2019-20-Final.pdf>
- 3.3.** When exercising its functions, the Council is required to take all reasonable steps to meet its Well-being objectives. This means that the decision makers should consider how the proposed decision will contribute towards meeting the Well-being objectives and must be satisfied that all reasonable steps have been taken to meet those objectives.
- 3.4.** The Well-being duty also requires the Council to act in accordance with a 'sustainable development principle'. This principle requires the Council to act in a way which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. Put simply, this means that Council decision makers must take account of the impact

of their decisions on people living their lives in Wales in the future. In doing so, the Council must:

- Look to the long term;
- Focus on prevention by understanding the root causes of problems;
- Deliver an integrated approach to achieving the seven national well-being goals;
- Work in collaboration with others to find shared sustainable solutions; and
- Involve people from all sections of the community in the decisions which affect them.

3.5. The Corporate Plan for the Vale of Glamorgan Council for 2016-2020, includes a Well-Being Outcome which is - An Environmentally Responsible and Prosperous Vale. A key part of this outcome states that The Vale of Glamorgan Council will look 'to protect our environment for future generations.'

3.6. This Progress Report demonstrates that currently Air Quality within the Vale meets air quality objectives set in Wales and exhibits that The Vale of Glamorgan Council is meeting its desired objectives and outcomes.

4. Resources and Legal Considerations

Financial

4.1 SRS has an existing budget to complete a programme of air quality monitoring across the Vale.

Employment

4.2 There are no employment implications.

Legal (Including Equalities)

4.3 With regards to annual reporting requirements under the LAQM regime, Welsh Government issues statutory policy guidance to Local Authorities under section 88 of the Environment Act 1995 to bring the local air quality management system in Wales into line with the sustainable development principle in our Future Generations legislation. This guidance, with which local authorities must have regard to when carrying out their air quality functions under the 1995 Act, sets out that authorities in Wales have to produce an Annual Progress Report in draft form by 30 September each year and publish it by 31 December at the latest. This must include monitoring results for the previous calendar year, a progress report on action plan implementation and an update on any new policies or developments likely to affect local air quality.

- 4.4** Section 82 of the Environment Act 1995 places a duty on all Local Authorities to review periodically air quality in their area. This includes assessment of compliance of present and likely future air quality to comply with the objectives of the Air Quality (Wales) Regulations 2010.
- 4.5** Where air quality is unlikely to meet the objectives Section 83 of the Environment Act 1995 requires that the Council declares an Air Quality Management Area.
- 4.6** Section 84 of the Environment Act 1995 places a duty on the Council to develop an Action Plan to address the situation.
- 4.7** The Authority has a statutory duty to produce and publish reports fulfilling the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and relevant Policy.
- 4.8** There are no equal opportunities implications from the publication of the report. Invitations to comment will be sent to all known stakeholders and interest groups to provide an opportunity for comments.

5. Background Papers

None.



Vale of Glamorgan Council 2021 Air Quality Progress Report

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

September 2021

Local Authority Officer	Adam Spear
Department	Specialist Enterprise Services
Address	Civic Offices, Holton Road, Barry CF63 4RU
Telephone	0300 123 6696
e-mail	aspear@valeofglamorgan.gov.uk
Report Reference number	2021 Air Quality Progress Report for Vale of Glamorgan Council
Date	September 2021

Executive Summary: Air Quality in Our Area

Public Health

What has become distinctly apparent is that air Pollution is a local and national problem. Long-term exposure reduces life expectancy by increasing mortality, as well as increasing morbidity risks from heart disease and strokes, respiratory diseases, lung cancer and other effects.

What we know is that poor air quality in Wales poses a significant concern for Public Health and is regarded as the most significant environmental determinant of health. Its associated adverse risk to public health is particularly prevalent within urban areas and near major roads. The pollutants of primary concern for public health are particulate matter and primary/ secondary derived nitrogen dioxide (NO₂). Both pollutants primarily originate from motor vehicles.

The UK expert Committee on the Medical Effects of Air Pollution (COMEAP) estimates that air pollution is responsible for “an effect equivalent of between 28,000 and 36,000 deaths (at typical ages) each year”. This does not mean there are ‘actual’ deaths from air pollution exposure; rather, that the reduced life expectancy which everyone experiences because of air pollution exposure (6-8 months on average but could range from days to years) is ‘equivalent’ to between 28,000 and 36,000 deaths when summed. In Wales, based on the latest data available (for 2017), Public Health Wales estimates the burden of long-term air pollution exposure to be the equivalent of 1,000 to 1,400 deaths (at typical ages) each year.

Examining the most recent datasets (2017) made available by Public Health Wales for the total number of all-cause non-accidental deaths registered in the Cardiff and Vale University Health Board area, the long-term mortality burden attributable to air pollution (fine particulate matter and nitrogen dioxide combined) is an estimated effect equivalent to 178- 227 deaths.

Despite the efforts made by national government and local authorities there is an apparent disconnect between air quality management and Public Health. The status of Air Quality management in Wales focuses upon a hotspot approach and fails to reference other factors such as socioeconomic status or exposure to other environmental determinants of health.

Fundamentally, it is plausible that air pollution affects everyone to some extent. Whilst the legislative air quality limit values are based on epidemiological evidence and are ultimately intended to protect public health, there is also recognition that health effects may be experienced below these thresholds for some of the key pollutants (e.g., PM_{2.5} and NO₂), particularly affecting the most susceptible groups: young children, the elderly and those with pre-existing health conditions and comorbidities. Acknowledged as the triple jeopardy concept- air pollution combines with other aspects of the social and physical environment to create an inequitable disease burden on more deprived parts of society; populations of areas with low socioeconomic status are prone to exacerbated effects from exposure to air pollution. In part this is because they are more likely to suffer pre-existing health conditions as a result of their poorer living conditions and lifestyle, and also as they are more vulnerable, being more likely to be living in areas with higher levels of air pollution.

The impact of Covid-19 on Air Quality Monitoring

The COVID-19 pandemic has impacted air quality at local, regional and national scales and presented challenges to Local Authorities in undertaking statutory LAQM duties. The impact of Covid-19 on air quality is identified in Appendix E.

Air Quality in the Vale of Glamorgan

Local authorities have a statutory duty under Part IV of the Environment Act 1995 & Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 to manage local air quality. Under Section 82 of the Environment Act 1995 the Local Air Quality Management (LAQM) process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether air quality objectives are likely to be achieved.

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138) and Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298). Where the air quality reviews indicate that the air quality objectives may not be met the local authority is required to designate an Air Quality Management Area (AQMA). Action must then be taken at a local level and outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves.

In line with the Vale of Glamorgan Council's (VoGC) statutory duties, under Part IV of the Environment Act 1995 Shared Regulatory Services (SRS) on behalf of VoGC undertakes regular air quality monitoring at specifically allocated locations across the Vale District using automated and non-automated principles for ambient air, nitrogen dioxide (NO₂), particulate matter (PM₁₀) & ozone (O₃).

With regards to prioritising ambient air quality sampling locations, the Council adopts a risk-based approach to any allocation of monitoring sites, considering the requirements of The Department for Environment, Food and Rural Affairs' (Defra) Local Air Quality Management (LAQM) Technical Guidance 16 (TG16), February 2018. The designated monitoring locations are assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. TG (16) states that annual mean objectives should apply at "All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc."

Automatic Monitoring Sites

In 2020 VoGC operated 1 automatic analyser located on Windsor Road, Penarth. The monitoring site measures on a 24/7 basis measuring levels of Nitrogen Dioxide, PM₁₀ and Ozone and forms part of the Welsh Air Quality Network. The results of this air quality monitoring can be viewed online at <http://www.welshairquality.co.uk>.

In 2018, SRS gave commitment to enhance monitoring capabilities via purchasing two near real time indicative air quality analysers. The analysers have been specifically placed in the Barry locality of The Vale of Glamorgan Council area and represent relevant exposure. The analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM₁₀ & PM_{2.5}, and do so every 15 minutes (the data for this is uploaded every hour). Information regarding the specification of the monitors can be viewed at <https://www.aqmesh.com/product/>. These monitors do not form part of the regulated Welsh automated monitoring network, but as specified they are an indicative form of monitoring and a useful tool to look at datasets on a high-resolution basis. In 2020, these monitors were placed in Dock View Road, Barry & Holton Road, Barry. In February 2021, another monitor was

installed in St Brides Major to assess the impact of air quality for the 20mph speed limit pilot scheme in the village.

Details of the monitoring sites and their collected datasets can be viewed via the SRS webpage at:

English: <https://www.srs.wales/en/Environmental-Health/Noise-and-Air-Pollution/Air-quality-and-pollution/Air-Monitoring.aspx>

Welsh: <http://www.srs.wales/cy/Environmental-Health/Noise-and-Air-Pollution/Air-quality-and-pollution/Air-Monitoring.aspx>

You will note that results are compared with the following air quality objectives.

Nitrogen Dioxide (NO₂)

Annual Average not to exceed 40µg/m³ (micrograms per metre cubed); and
1 Hour average not to exceed 200 µg/m³ more than 18 times per year.

PM₁₀

Annual Average not to exceed 40µg/m³; and
24 Hour Mean not to exceed 50 µg/m³ more than 35 days per year.

PM_{2.5}

Annual Average not to exceed 25 µg/m³.

Non-automatic Monitoring Sites

In 2020 there were 51 specifically allocated non-automatic monitoring sites across the Vale which monitored levels of nitrogen dioxide (NO₂). These sites are supported and maintained by SRS on behalf of the VoGC. The non-automatic sites do not provide live data; instead, they consist of diffusion tubes which are placed at each of the sites, collected and replaced on a rolling monthly basis. The results derived from the tube sampling are then averaged over the year to enable a

comparison of the results against the annual average (**40µg/m³**) and 1-hour (**200µg/m³ not to be exceeded > 18 times per year**) air quality objectives for NO₂.

The NO₂ non-automatic monitoring network utilised in the Vale almost mirrors that of the existing 2019 non-automated network, however a new NO₂ monitoring locations were commissioned at Cross Common Road, Dinas Powys to enhance our understanding of NO₂ levels from Cardiff Road, and Buttrills Road, Barry to increase our monitoring capability in the Barry area.

This Annual Progress Report confirms that in 2020 air quality within the Vale of Glamorgan continues to meet the relevant air quality objectives, including within the then Air Quality Management Area (AQMA) on Windsor Road, Penarth.

There were no recorded exceedances of the 1-hour NO₂ objective at any of the monitoring locations in 2020.

From the 51 locations monitored throughout the Vale with the use of passive diffusion tubes, no sites breached the national NO₂ annual objective of 40µg/m³ or the NO₂ 1-hour objective (**200µg/m³, not to be exceeded more than 18 times per year**). Detailed in the Local Air Quality Management (LAQM) TG (16), paragraphs 7.90 & 7.91 focus on predicting exceedances of the NO₂ 1-hour objective (**200µg/m³, not to be exceeded more than 18 times per year**) with the use of NO₂ diffusion tubes. It is stated that *“exceedances of the NO₂ 1-hour mean are unlikely to occur where the annual mean is below 60µg/m³.”* Therefore, based on the 2020 datasets it can be concluded that the NO₂ 1-hour objective was not breached.

Revocation of the Windsor Road, Cogan, Penarth AQMA

Highlighted by previous findings in the VoGC's 2018 APR; due to continual compliance over a three-year period with the national air quality objectives set for nitrogen dioxide (NO₂) and in accordance with Local Air Quality Management in Wales Policy Guidance, June 2017, it was decided and approved by Cabinet to initiate the process to revoke the AQMA on Windsor Road, Cogan, Penarth.

Following that decision in 2018, SRS have adhered to the requirements of LAQM statutory guidance to ensure that the correct process has been implemented to inform the decision to officially revoke the AQMA.

As outlined within the VoGC 2019 APR; In 2020, in order to proceed with the formal revocation of the Windsor Road, Cogan, Penarth AQMA, in line with the requirements of WG, a detailed air quality assessment was undertaken to finalise the decision to revoke the AQMA. This detailed report is appended to the Vale Council's 2020 Cabinet report as Appendix 2B. The report adheres to the requirements stipulated by Welsh Government's policy guidance, demonstrating that compliant air quality levels are being met and demonstrate with a degree of certainty that these monitored compliant levels will be sustained for future years.

The assessment undertaken utilised best practise techniques and guidance to ensure a conservative outcome. In accordance with the air quality objectives applicable to LAQM in Wales, concentrations of NO₂ and PM₁₀ were examined at 28 sensitive receptor locations geographical placed within and in close proximity to the established AQMA boundary. The report takes into consideration previous reporting levels as well as using air quality dispersion modelling software (ADMS-Roads, Version 4.1.1) and Latest Emission Factors (Version 9.0) to look at current pollutant concentrations and projected concentrations. Three modelling year scenarios were chosen for this study (2018, 2023 and 2028).

Utilising Tables 5.1- 5.3 of the detailed report, the predicted concentrations of NO₂ and PM₁₀ at all modelled receptors within the Windsor Road, Cogan, Penarth AQMA are well below both the annual mean and short term AQS objectives for all modelled year scenarios. As stated by the report.

-The maximum annual mean NO₂ concentration predicted at existing receptor locations within the Windsor Road AQMA was at receptors R16 and R18 with a predicted concentration of 31.2µg/m³, 78% of the annual mean NO₂ AQS objective. Similarly, the maximum annual mean concentrations predicted in the future year scenarios (2023 and 2028) were at receptors R16 and R18 (21.4µg/m³ and 15.7µg/m³ respectively). Both receptors are located on the façade of a property bordering the A4160 (Windsor Road), located along the south-western extent of the AQMA.

-Given that the NO₂ annual mean concentrations predicted at all receptor locations are below this limit for all scenarios, exceedances of the 1-hour NO₂ AQS objective are unlikely.

-The maximum predicted annual mean PM₁₀ concentration at existing receptor locations for the 2018 scenario was at receptors R16 and R18 with a predicted concentration of 21.8µg/m³, 54.5% of the annual mean PM₁₀ AQS objective. Similarly, the maximum annual mean concentrations predicted in the future year scenarios (2023 and 2028) were at receptors R16 and R18 (20.6µg/m³ and 20.1µg/m³ respectively). Both receptors are located within the Windsor Road AQMA.

-The number of days where PM₁₀ concentrations were predicted to be above the 24-hour PM₁₀ 50µg/m³ AQS objective was less or equal to 6 days for all modelled scenarios at all receptor locations. This is well below the 35 permitted exceedances.

Considering the captured annual monitoring datasets and given the outcomes derived by the detailed air quality modelling, the decision was finalised to revoke the Windsor Road, Penarth AQMA official order. This revocation order came into force on 01 January 2021. The Windsor Road automatic monitoring site was also decommissioned and removed in January 2021.

Actions to Improve Air Quality

Improved monitoring

To improve its monitoring capabilities, for 2020, as part of a yearly review SRS have amended and improved the network of diffusion tubes previously assigned in previous years for the LAQM regime. The amendments include improved monitoring locations to represent the locality of monitoring objectives and implementation of additional sites.

Reporting of this data is included in Section 2.2 of this report.

How to Get Involved

VoGC welcomes any correspondence relating to air quality enquiries or concerns. Shared Regulatory Services (SRS) Specialist Services Team represents VoGC for air quality management and therefore is contactable via the webpage www.srs.wales/en/Home.aspx. Hourly and monthly average monitoring data for pollutants measured at the Penarth, Windsor Road site is available at <https://airquality.gov.wales/>

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1 Actions to Improve Air Quality

1.1 Previous Work in Relation to Air Quality

First Round of Review and Assessment

Between 1999 and 2001, the Vale of Glamorgan Council published reports corresponding to stages 1, 2 and 3 of the first round of review and assessment of air quality. These assessments predicted no exceedances of any of the objectives but concluded that monitoring should continue for nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and particulate matter (PM₁₀).

Second Round of Review and Assessment

Following new technical and policy guidance issued by Defra, the Vale published its first Updating and Screening Assessment (USA) in June 2003. The USA concluded that no nitrogen dioxide or (PM₁₀) exceedances were likely but that monitoring should continue. However, it was suggested that there was a requirement to continue to a Detailed Assessment for the 15- minute limit of SO₂ in Rhoose.

The Council proceeded to publish Progress Reports in 2004 and 2005, which identified exceedances of the 15-minute SO₂ objectives in Rhoose. The Council therefore proceeded to publish a Detailed Assessment in 2005 which concluded that there was no need to declare an AQMA but to continue monitoring.

Third Round of Review and Assessment

The published its second USA in June 2006, which again concluded that there was no requirement to go onto the detailed stage. However, the USA did note that NO₂ concentrations were close to the limit at Penarth due to road works and recommend that a Detailed Assessment to be carried out if there was no change.

The Council published Progress Reports in 2007 and 2008, which identified that nitrogen dioxide concentrations continued to be close to the limit value at Penarth. A Detailed Assessment was recommended.

The Detailed Assessment of NO₂ in the Penarth area was published in June 2009. It concluded that there were no exceedances of either NO₂ limit but recommended continued monitoring.

Fourth Round of Review and Assessment

The Council published its third USA in June 2009. Nitrogen Dioxide, Sulphur Dioxide and Particulate Matter (PM₁₀) were being monitored in the area by both the Vale and RWE npower. There were no recorded nitrogen dioxide exceedances however; annual mean concentration at Windsor Road in Penarth was close to the limit. There were no exceedances of SO₂ 15-minute or 24-hour means. There were 6 exceedances of the PM₁₀ daily mean concentration and no exceedances of the PM₁₀ annual mean objective.

The 2010 Progress Report concluded that there were no exceedances of the relevant standards for any of the pollutants measured and that there was no need to proceed to a Detailed Assessment. The 2011 Progress Report concluded that there were no exceedances of the NO₂ or SO₂ objectives; however, NO₂ concentrations remain close to objective in some places. Several exceedances of the 24-hour mean for PM₁₀ were recorded in Fonmon and Penarth but still remained within the permitted 35 exceedances per annum.

Fifth Round of Review and Assessment

The Vale of Glamorgan Council published its fourth USA in April 2012, which again concluded that some locations continued to be at or close to the annual mean NO₂ concentrations. Appendix D of the report contains a Detailed Assessment of the air quality in Cogan.

The Detailed Assessment identified several locations on Windsor Road in Penarth, where the annual mean NO₂ objective was likely to be exceeded and that no exceedances of the 1-hour mean were likely. It was therefore recommended that an Air Quality Management Area (AQMA) be declared to include, as a minimum the residential properties with concentrations $\geq 36 \mu\text{g}/\text{m}^3$. It was also recommended that the monitoring network be extended to include locations at the façade of properties on Windsor Road, the results of which could be used to inform a further assessment.

The 2013 Progress Report recommended that; diffusion tubes with consistently low, compliant concentrations, be re-deployed in new locations; additional tubes be placed at locations where the

NO₂ concentrations are consistently close to the annual mean objective with relevant exposure; Penarth's automatic monitor be relocated to within the proposed AQMA; and that the indicative PM₁₀ monitor be replaced with a gravimetric equivalence monitor. The 2014 Progress Report concluded that there was no need to proceed to a Detailed Assessment for any of the pollutants monitored.

An AQMA was declared on 1st August 2013 for a section of Windsor Road, Penarth with respect to the annual mean objective NO₂. NO₂ concentrations were high due to congested traffic moving through a partial 'street canyon' with residential exposure along the western flank. The AQMA is highlighted in Figure 1.

Sixth Round of Review and Assessment

The Council published its fifth USA in May 2015 which confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (Windsor Road, Penarth). 2015's USA also highlighted the need for further investigations with regards to three biomass boiler installations.

The **2016** Annual Progress Report confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (Windsor Road, Penarth). It was highlighted that it would be decided following the examination of the 2016 dataset whether to revoke the Windsor Road, Penarth AQMA. Three biomass boiler installations were investigated, and it was ascertained if their emissions would breach targeted emission thresholds.

The **2017** Annual Progress Report confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (AQMA) on Windsor Road, Penarth.

Following a review of the 2016 NO₂ diffusion tube network, it was agreed to assign and relocate new monitoring locations. The new locations have been allocated based on known areas of particularly elevated traffic flows and foreseeable development, all with nearby relevant exposure. These newly monitored areas for 2017 are Llantwit Major, Gileston, St Athan, Rhoose (Fonmon), Barry Docks and Saint Brides Major.

The **2018** Annual Progress Report confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (AQMA) on Windsor Road, Penarth. It was made a priority that the decision to revoke the Windsor Road, Cogan, Penarth AQMA was supported by a detailed assessment and a public consultation was undertaken to review the supporting assessment prior to submission to Welsh Government to formalise the revocation of the AQMA Order.

The **2019** Annual Progress Report confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (AQMA) on Windsor Road, Penarth. It was made a priority that the decision to revoke the Windsor Road, Cogan, Penarth AQMA was supported by a detailed assessment and a public consultation was undertaken to review the supporting assessment prior to submission to Welsh Government to formalise the revocation of the AQMA Order.

The **2020** Annual Progress Report confirmed that air quality within the Vale of Glamorgan continued to meet the relevant air quality objectives, including within the existing Air Quality Management Area (AQMA) on Windsor Road, Penarth. The revocation order for the Windsor Road, Cogan, Penarth AQMA came into force on 1st January 2021.

1.2 Air Quality Management Areas

Where the air quality reviews indicate that the air quality objectives are not being achieved, or are not likely to be achieved, Section 83 of the 1995 Environment Act requires local authorities to designate an Air Quality Management Area ('AQMA'). Air Quality Management Areas (AQMA) are declared when air quality is close to or above an acceptable level of pollution (known as the air quality objective (Please see Appendix A)). Section 84 of the Act ensures that action must then be taken at a local level which is outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves. The authority must prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. The AQAP must be **formally**

adopted prior to 24 months has elapsed. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

Due to the revocation of the Windsor Road, Penarth AQMA on the 1st of January 2021, there are now no AQMAs within the Vale of Glamorgan Council area.

Figure 1 - Boundary of the former Windsor Road, Penarth AQMA

Windsor Road, Cogan, Penarth AQMA- declared 1st August 2013, revoked 1st January 2021



Welsh Government's Local Policy Guidance, "Local Air Quality Management in Wales" June 2017 states:

4.14 Local Authorities wishing to revoke or reduce an AQMA **should only do so with the approval of the Welsh Government following a review and consultation with the local communities affected.** The review should **clearly demonstrate national air quality objectives are being met and will continue to be met.** In other words, the Local Authority **should have confidence the observed improvements will be sustained.** Typically, this requires **three years or more of full compliance**, but once the revocation or reduction has been agreed by the Welsh Government, **it should occur without delay.** Following a revocation, the Local Authority should ideally put in place a local or regional air

quality strategy to ensure air quality remains a high-profile issue and conditions are prevented from deteriorating in future.

2 Air Quality Monitoring Data and Comparison with Air Quality Objectives

Summary of Monitoring Undertaken in 2020

2.1.1 Automatic Monitoring Sites

The Vale of Glamorgan Council operated three automatic monitor stations during 2020.

Dock View Road & Holton Road Indicative Monitors

As previously discussed, in 2018 SRS on behalf of the VoGC has commissioned two near real-time indicative automatic monitors. The AQMesh analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM₁₀ & PM_{2.5}, and do so every 15 minutes (data uploaded every hour). The data from the monitor is sent to a cloud server where it is corrected for temperature, pressure and relative humidity as well as cross gas interference.

Penarth, Windsor Road

This monitor is operated by Shared Regulatory Services (SRS) on behalf of the Vale Council and is classified as a roadside monitor. It was commissioned in 2014 following a re-location from the site (Grid reference: 317550, 171483) to be within the Windsor Road AQMA. The monitoring site measures nitrogen dioxide, PM₁₀ and Ozone (O₃) and forms part of the Welsh Air Quality Network. The station is calibrated by a Local Authority Officer on a fortnightly basis and serviced and maintained by an approved contractor on a six-monthly basis following QA/QC checks. Data obtained from the monitor is checked for validation and ratified by Ricardo-AEA. For 2020, data capture for NO₂ was recorded at 96% and 90% for PM₁₀.

2.1.2 Non-Automating Monitoring Sites

Shared Regulatory Services (SRS) on behalf of the Vale of Glamorgan Council carries out monitoring of ambient air quality for Nitrogen Dioxide (NO₂). During the period since the 2020 Annual Progress Report, monitoring of NO₂ using passive diffusion tubes has been carried out at 51 locations throughout the Vale. The locations of the diffusion tubes are described Tables 2 - 8 and shown in figures 4 - 14.

NO₂ Diffusion Tube Locations

The location of where NO₂ monitoring has taken place.

- a. Cowbridge (Area A)
- b. Llantwit Major (Area B)
- c. Saint Brides Major (Area C)
- d. Culverhouse (Area D)
- e. Dinas Powys (Area E)
- f. Penarth (Area F)
- g. Barry/ Sully (Area G)

Laboratory Methods and Analysis of Diffusion Tubes

Analysis of the exposed tubes is carried out by Socotec UK Ltd, Didcot operating procedure ANU/SOP/1015. The tubes are prepared by spiking acetone:triethanolamine (50:50) on the grids prior to the tubes being assembled. The tubes are desorbed with distilled water and the extract analysed using a segmented flow auto analyser with ultraviolet detection. As set out in the practical guidance, the results were initially calculated assuming an ambient temperature of 11°C and then adjusted to 20°C to allow direct comparison with EU limits. The national bias correction factor for this laboratory was utilised as opposed to our own local co-location data. Adopting best practice guidance and adopting a conservative approach a bias correction factor of 0.76 was obtained and applied using the DEFRA website which is available using the following link: <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Where valid data capture for the year is less than 75% (9 months), where necessary the continuous and NO₂ diffusion tube monitoring data have been "annualised" following the methods as described in Defra's LAQM (TG16), Boxes 7.9 & 7.10.

Where an exceedance is measured at a monitoring site not representative of public exposure, NO₂ concentration at the nearest relevant exposure has been estimated based on the “NO₂ fall-off with distance” calculator (<http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>). The procedure is described in LAQM (TG16), Section 7.77-7.79.

Table 1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Penarth, Windsor Road	Penarth, Windsor Road	Roadside	317598	172399	2.5	NO ₂	Y	Chemiluminescent Analyser	Y (2m)	2m	Y
						PM ₁₀		Beta Attenuation Monitor with Gravimetric Equivalence			
						O ₃		UV absorption analyser			
Dock View Road	Dock View Road, Barry	Roadside	312401	167947	3.5	NO ₂ & PM ₁₀	N	Electrochemical Sensor	Y (2.5m)	1.5m	Y
Holton Road	Holton Road, Barry	Roadside	312193	168239	4	NO ₂ & PM ₁₀	N	Electrochemical Sensor	Y (3m)	0.5m	N

Map(s) of Automatic Monitoring Sites

Figure 2 - Map of Windsor Road, Penarth Automatic Monitoring Site

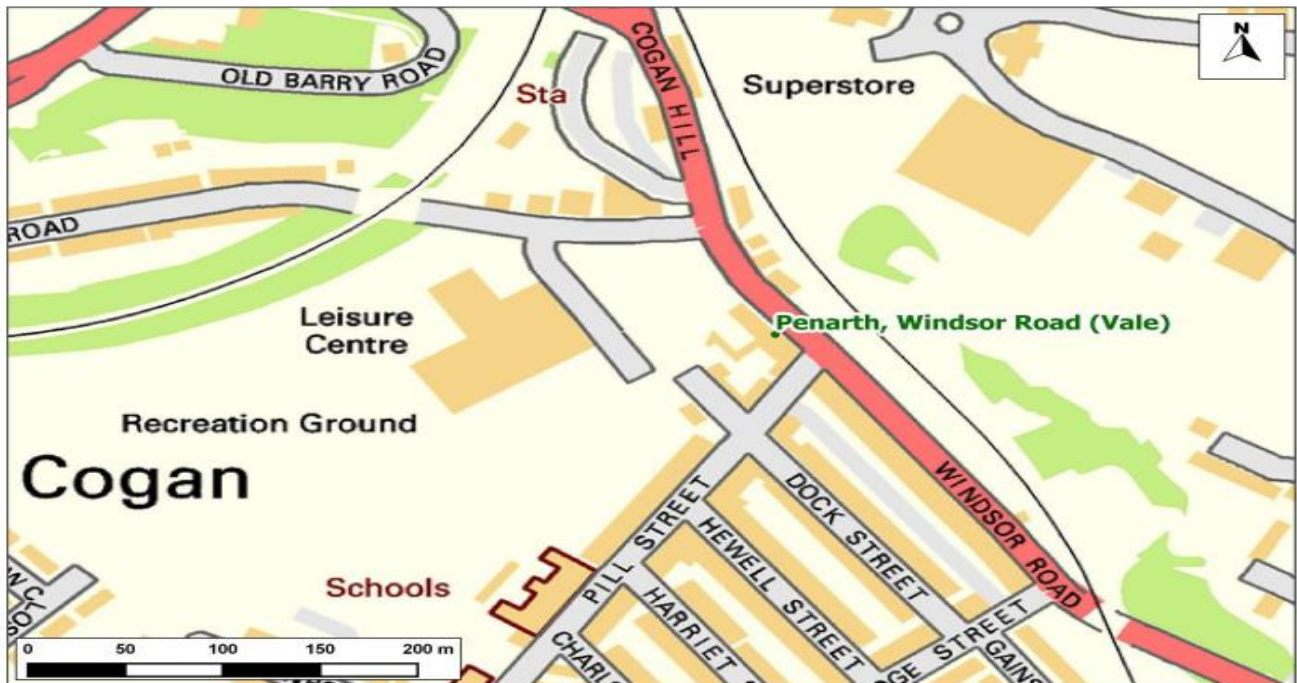


Figure 3 - Map of Holton Road and Dock View Road Indicative Automatic Monitoring Sites

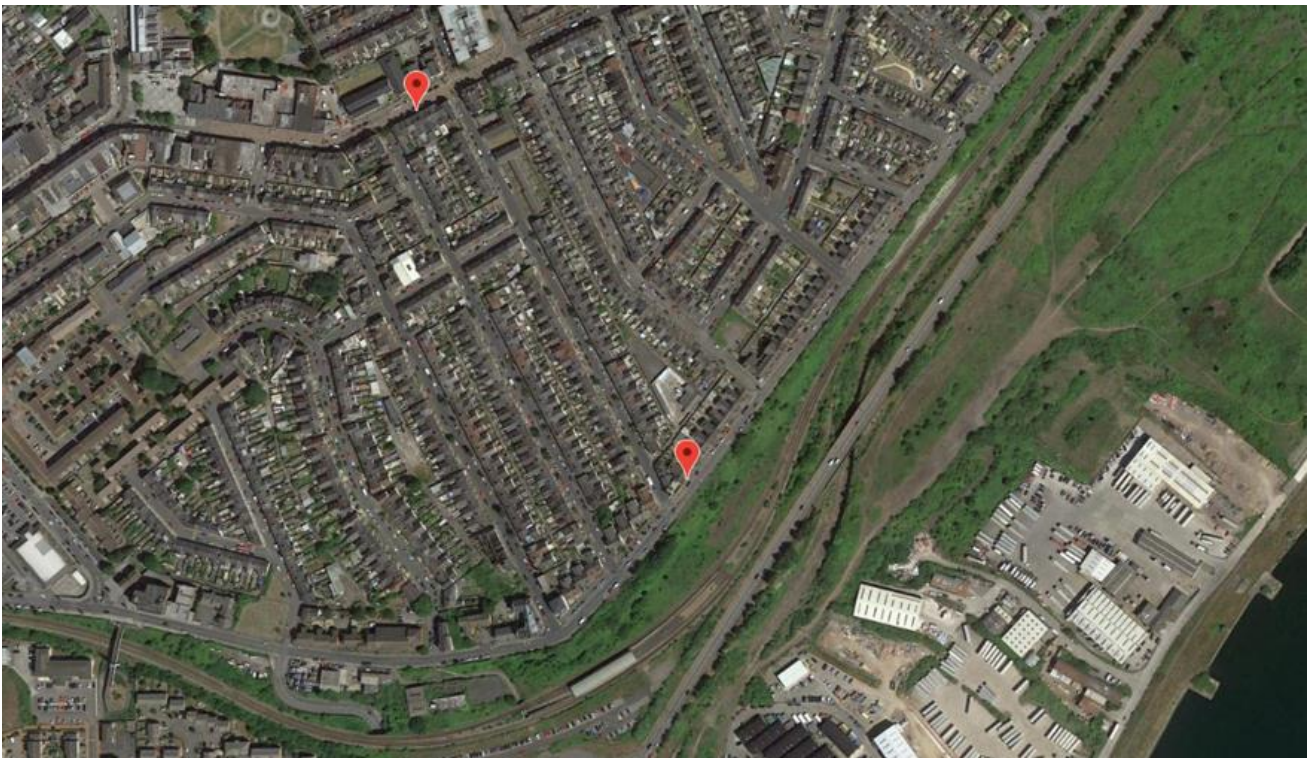


Table 2 - Details of Non-Automatic Monitoring Sites in Cowbridge

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
COWBRIDGE											
65	1 Riverside Mews, Cowbridge	Roadside	299614	174592	1.5	NO ₂	N	N	Y (0.00)	4m	Y
101	37 Westgate House	Kerbside	298903	174907	1.5	NO ₂	N	N	Y (0.00)	0.75m	Y
108	4 Cardiff Road, Cowbridge	Kerbside	299967	174311	1.5	NO ₂	N	N	Y (0.00)	0.75m	Y
118	6 Middlegate Walk, Cowbridge	Urban Background	299646	174920	1.5	NO ₂	N	N	Y (0.00)	30m	Y

Table 3 - Details of Non-Automatic Monitoring Sites in Llantwit Major

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
LLANTWIT MAJOR											
93	Le Pouliguen Way	Roadside	297171	168741	1.5	NO ₂	N	N	Y (0.00)	4.8m	Y
94	5 Boverton Road	Roadside	297069	168715	1.5	NO ₂	N	N	Y (0.00)	7.4m	Y
96	Old Froglands Farm	Suburban	299045	169126	1.5	NO ₂	N	N	Y (0.00)	86m	Y

Table 4 - Details of Non-Automatic Sites in Saint Brides Major

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
SAINT BRIDES MAJOR											
103	September Cottage	Roadside	289530	174896	1.5	NO ₂	N	N	Y (0.00)	6.5m	Y
104	Greengate Cottage	Roadside	289496	174858	1.5	NO ₂	N	N	Y (0.00)	12.5m	Y
105	St. Brides Primary School Walkway Entrance	Kerbside	289473	174752	1.5	NO ₂	N	N	N (8.05)	0.95m	N
106	Dany Bryn House	Roadside	289454	174668	1.5	NO ₂	N	N	Y (0.00)	2.1m	Y
107	Hillboro	Roadside	289512	174805	1.5	NO ₂	N	N	Y (0.00)	7.5m	Y

Table 5 - Details of Non-Automatic Sites in Brooklands Terrace, Culverhouse Cross

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CULVERHOUSE											
38	2 Horseshoes	Roadside	311892	174513	1.5	NO ₂	N	N	Y (0.00)	2m	Y

Table 6 - Details of Non-Automatic Sites in Dinas Powys

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DINAS POWYS											
46	46 Cardiff Road	Roadside	315747	171369	1.5	NO ₂	N	N	Y (0.00)	5m	N
61	Railway Terrace	Roadside	316433	171932	2.5	NO ₂	N	N	Y (0.00)	2m	Y
67	2 Matthew Terrace	Roadside	316488	172004	1.5	NO ₂	N	N	Y (0.00)	2.5m	Y
72a	Dinas Powys Infants School	Roadside	315841	171527	1.5	NO ₂	N	Y	Y (0.00)	7m	Y
89	9 Wayside Cottages, Cardiff Road	Roadside	316447	171963	2.5	NO ₂	N	N	Y (0.00)	3m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA ?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure ? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure ?
DINAS POWYS											
90	16 Railway Terrace, Cardiff Road	Roadside	316453	171945	1.5	NO ₂	N	N	Y (0.00)	3m	Y
109	85 Cardiff Road, Dinas Powys	Roadside	315739	171444	1.5	NO ₂	N	N	Y (0.00)	5m	Y
110	103 Cardiff Road, Dinas Powys	Roadside	31585	171555	1.5	NO ₂	N	N	Y (0.00)	4m	Y
111	203 Cardiff Road, Dinas Powys	Roadside	316366	171823	1.5	NO ₂	N	N	Y (0.00)	3m	Y
119	Cross Common Road	Kerbside	312405	167951	1.5	NO ₂	N	N	Y (0.00)	1m	Y

Table 7 - Details of Non-Automatic Sites in Penarth

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
PENARTH											
22	Stanwell Road	Kerbside	318505	171496	1.5	NO ₂	N	N	N (8.00)	1m	N
53	168 Windsor Road	Roadside	317589	172411	1.5	NO ₂	Y	N	Y (0.00)	5m	Y
56	134 Andrew Road	Kerbside	316814	172443	1.5	NO ₂	N	N	Y (0.00)	10m	Y
62	154 Windsor Road	Roadside	317633	172357	1.5	NO ₂	Y	N	Y (0.00)	2m	Y
70	Ty-Isaf	Roadside	316731	172391	1.5	NO ₂	N	N	Y (0.00)	3m	Y

Sit e ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutant s Monitored	In AQMA ?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure ? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure ?
PENARTH											
73a	Windsor Road Monitor 1	Roadside	317598	172399	1.5	NO ₂	Y	Y	2m	2m	Y
73b	Windsor Road Monitor 1	Roadside	317598	172399	1.5	NO ₂	Y	Y	2m	2m	Y
73c	Windsor Road Monitor 1	Roadside	317598	172399	1.5	NO ₂	Y	Y	2m	2m	Y
74	114 Windsor Road	Roadside	317708	172259	1.5	NO ₂	Y	N	Y (0.00)	2.5m	Y
76	160 Windsor Road	Roadside	317627	172371	1.5	NO ₂	Y	N	Y (0.00)	2.5m	Y
79	Marine Scene	Roadside	317549	172572	1.5	NO ₂	N	N	N (2.80)	1.2m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA ?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure ? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure ?
PENARTH											
82	98b Windsor Road	Roadside	318061	171944	1.5	NO ₂	N	N	Y (0.00)	8m	Y
88	134 Windsor Road	Roadside	317668	172312	1.5	NO ₂	Y	N	Y (0.00)	3.5m	Y
100	141 Plassey Street	Roadside	317968	172105	1.5	NO ₂	N	N	Y (0.00)	4.5m	Y
112	Cogan Hill Flats	Roadside	317434	172729	1.5	NO ₂	N	N	Y (0.00)	10m	Y
113	3 Plassey Street	Roadside	317999	172067	1.5	NO ₂	N	N	Y (0.00)	3m	Y

Table 8 - Details of Non-Automatic Sites in Barry and Sully

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
BARRY											
8	Tynewydd Road	Kerbside	311797	168503	1.5	NO ₂	N	N	N (4.00)	1m	N
41	Dispenser Road	Urban Background	315278	168451	1.5	NO ₂	N	N	N	128m	N
64	Holton Road	Roadside	311690	168042	1.5	NO ₂	N	N	Y (0.00)	3m	Y
66	17 Churchill Terrace	Roadside	313342	168823	1.5	NO ₂	N	N	Y (0.00)	2.5m	Y
102	Powell Dyffryn Way	Roadside	311115	167041	1.5	NO ₂	N	N	N (3.40)	1m	N
114	107 Dock View Road	Roadside	312585	168171	1.5	NO ₂	N	N	Y (0.00)	3m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with (m) to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
BARRY											
115	20 Barry Road, Cadoxton	Kerbside	312677	168171	1.5	NO ₂	N	N	Y (0.00)	1m	Y
116	Ffordd y Mileniwm	Roadside	311371	167628	1.5	NO ₂	N	N	Y (0.00)	5m	Y
117	1 Riverside Place, Barry	Kerbside	313612	166807	1.5	NO ₂	N	N	Y (0.00)	1m	Y
119	Dockview Road co-location	Kerbside	315445	170577	1.5	NO ₂	N	N	N (3.00)	1m	N
121	Buttrills Road	Kerbside	311270	168363	1.5	NO ₂	N	N	N (3.00)	1m	N

Figure 4 - Map(s) of Non-Automatic Monitoring Sites in Cowbridge

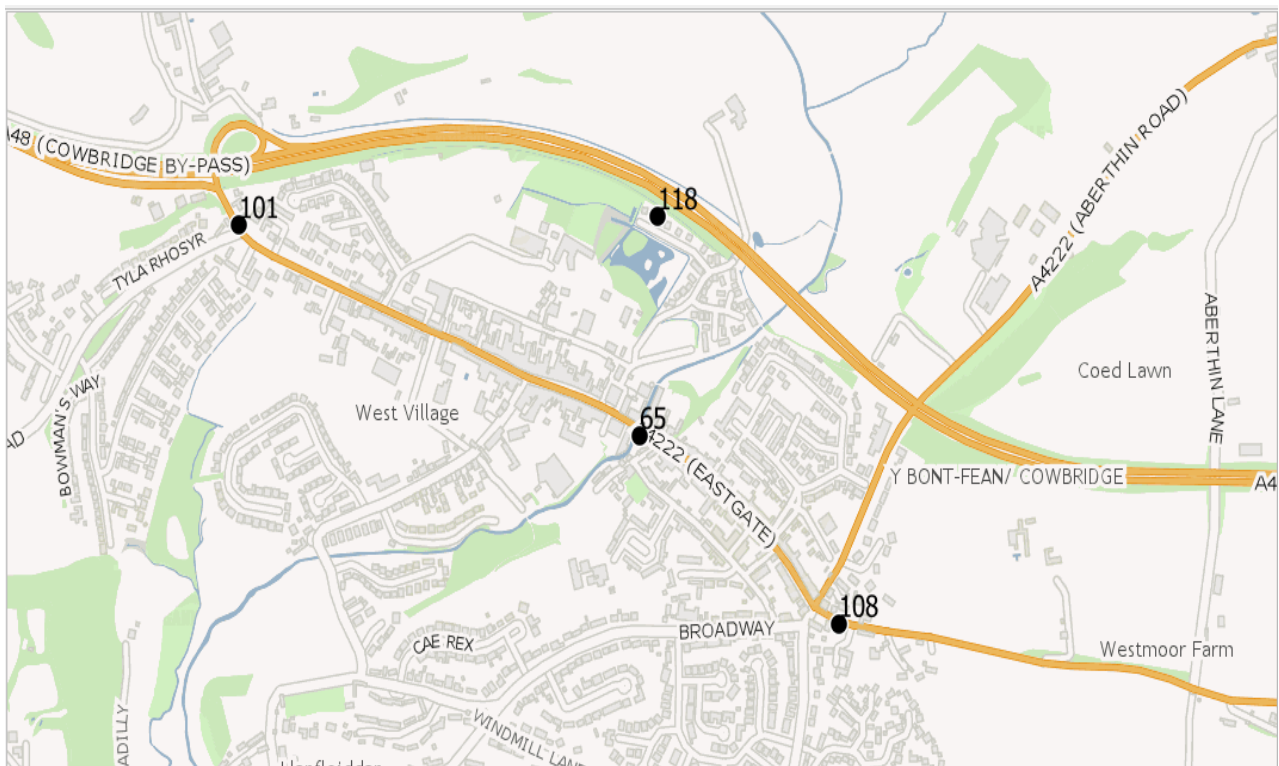


Figure 5 - Map(s) of Non-Automatic Monitoring Sites in Llantwit Major

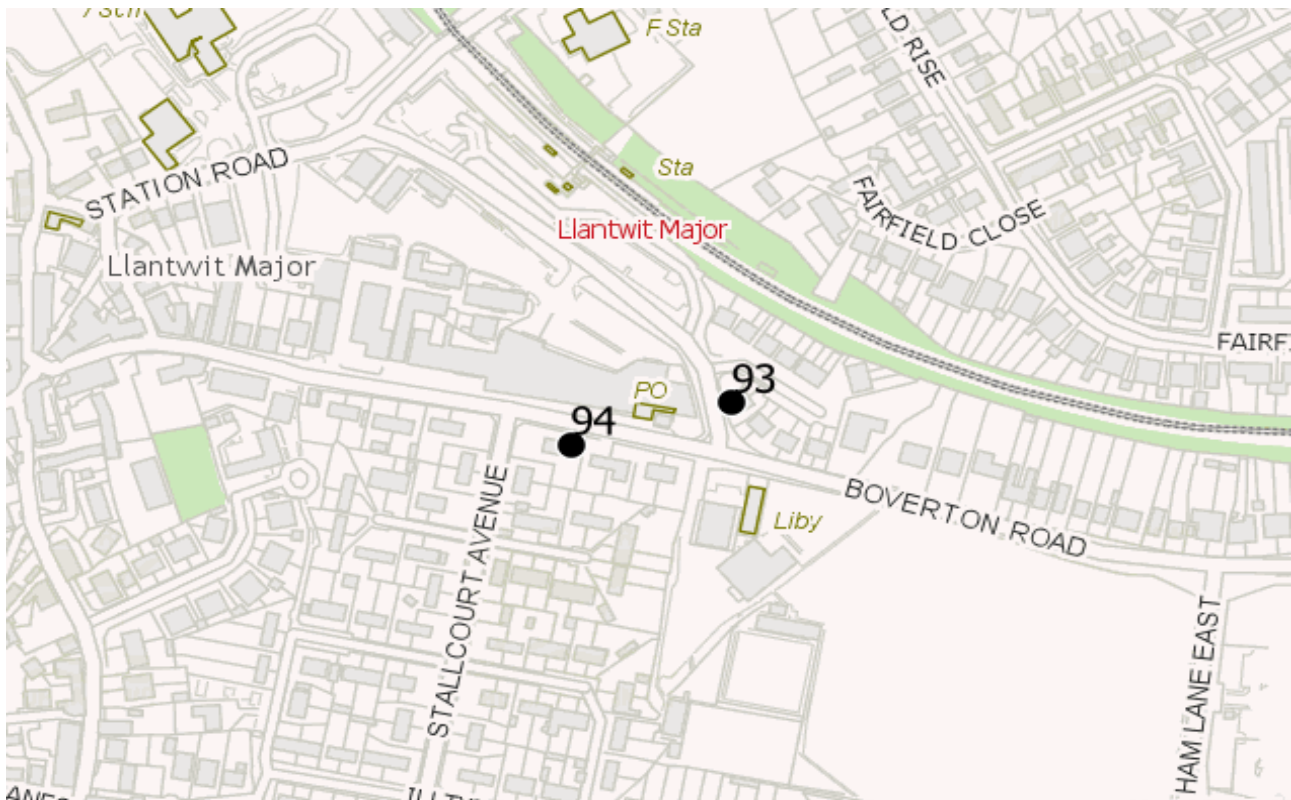


Figure 6 - Map(s) of Non-Automatic Monitoring Sites in St Brides Major

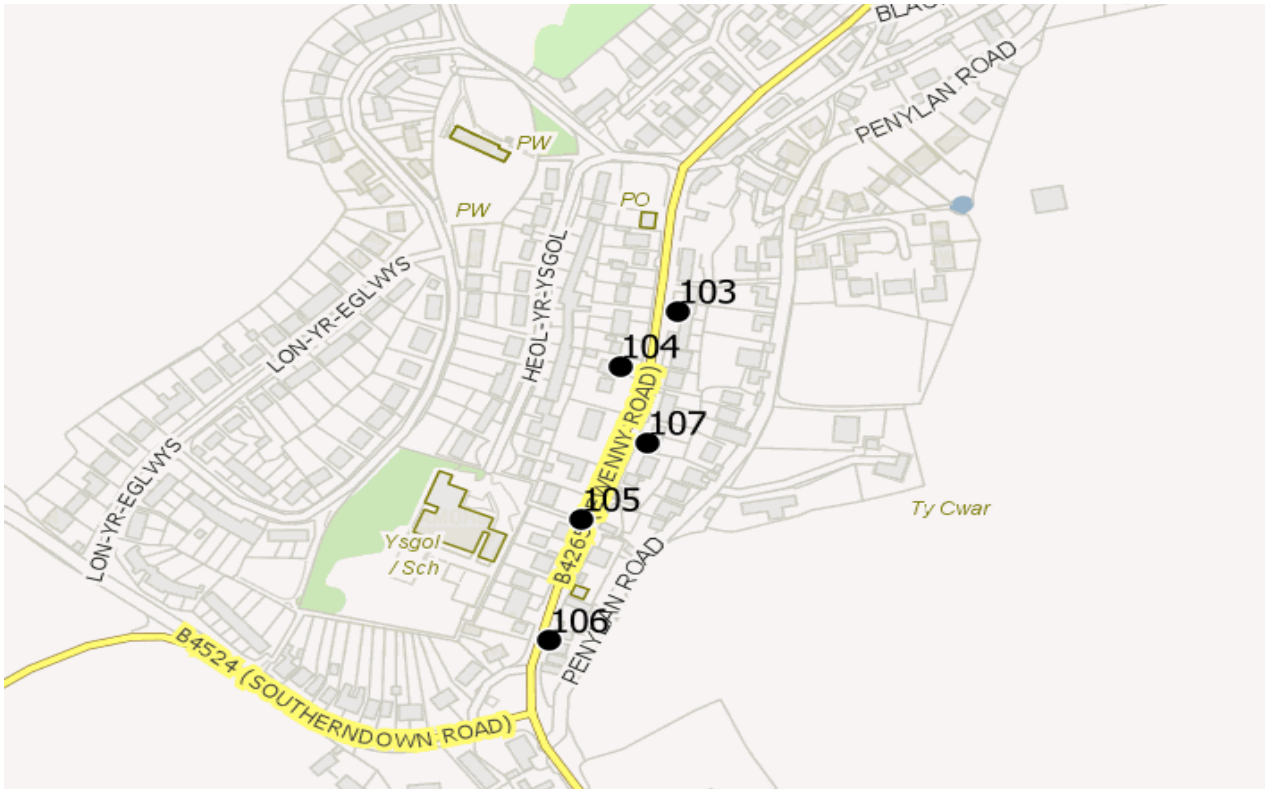


Figure 7 - Map(s) of Non-Automatic Monitoring Sites in Brooklands Terrace, Culverhouse Cross

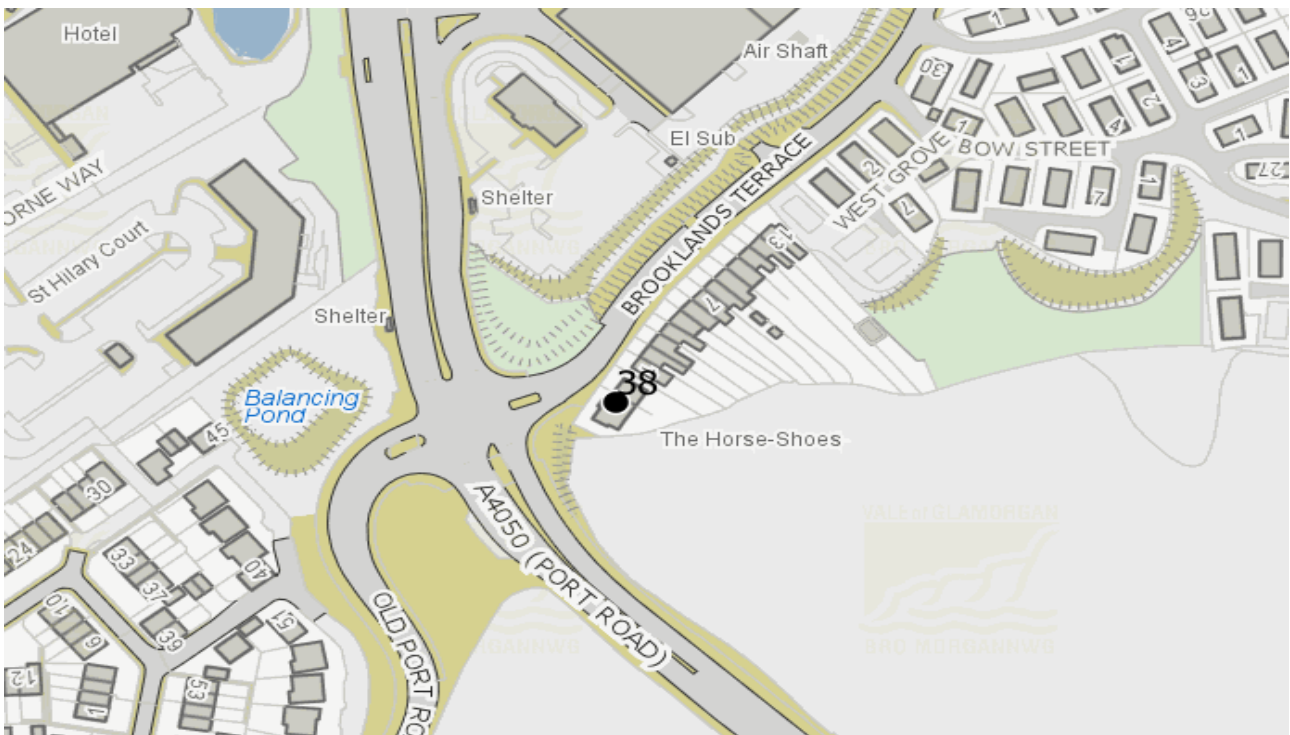


Figure 8 - Map(s) of Non-Automatic monitoring Sites in Dinas Powys, Cross Common Road



Figure 9 - Map(s) of Non-Automatic Monitoring Sites in Dinas Powys, Cardiff Road

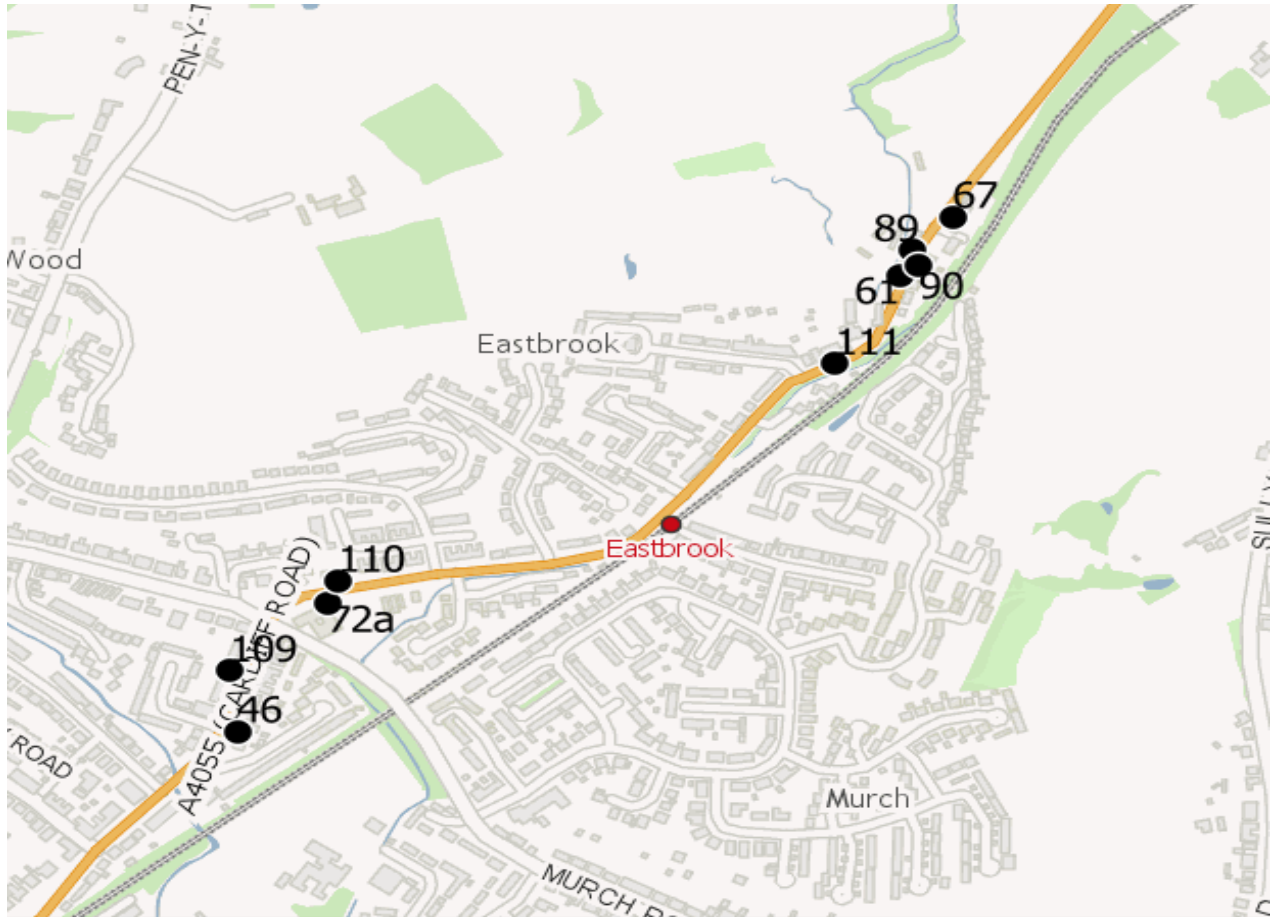


Figure 10 - Map(s) of Non-Automatic Monitoring Sites in Penarth

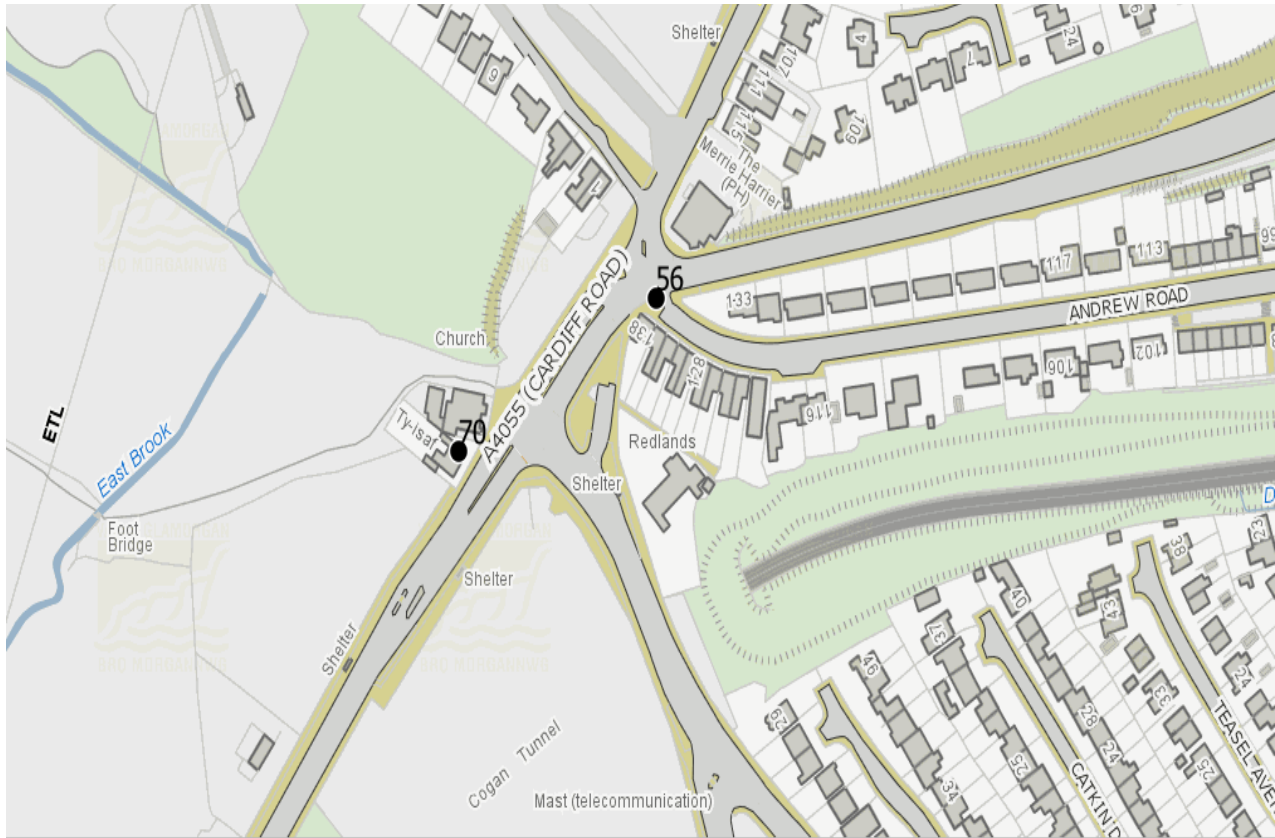


Figure 11 - Map(s) of Non-Automatic Monitoring Sites in Penarth

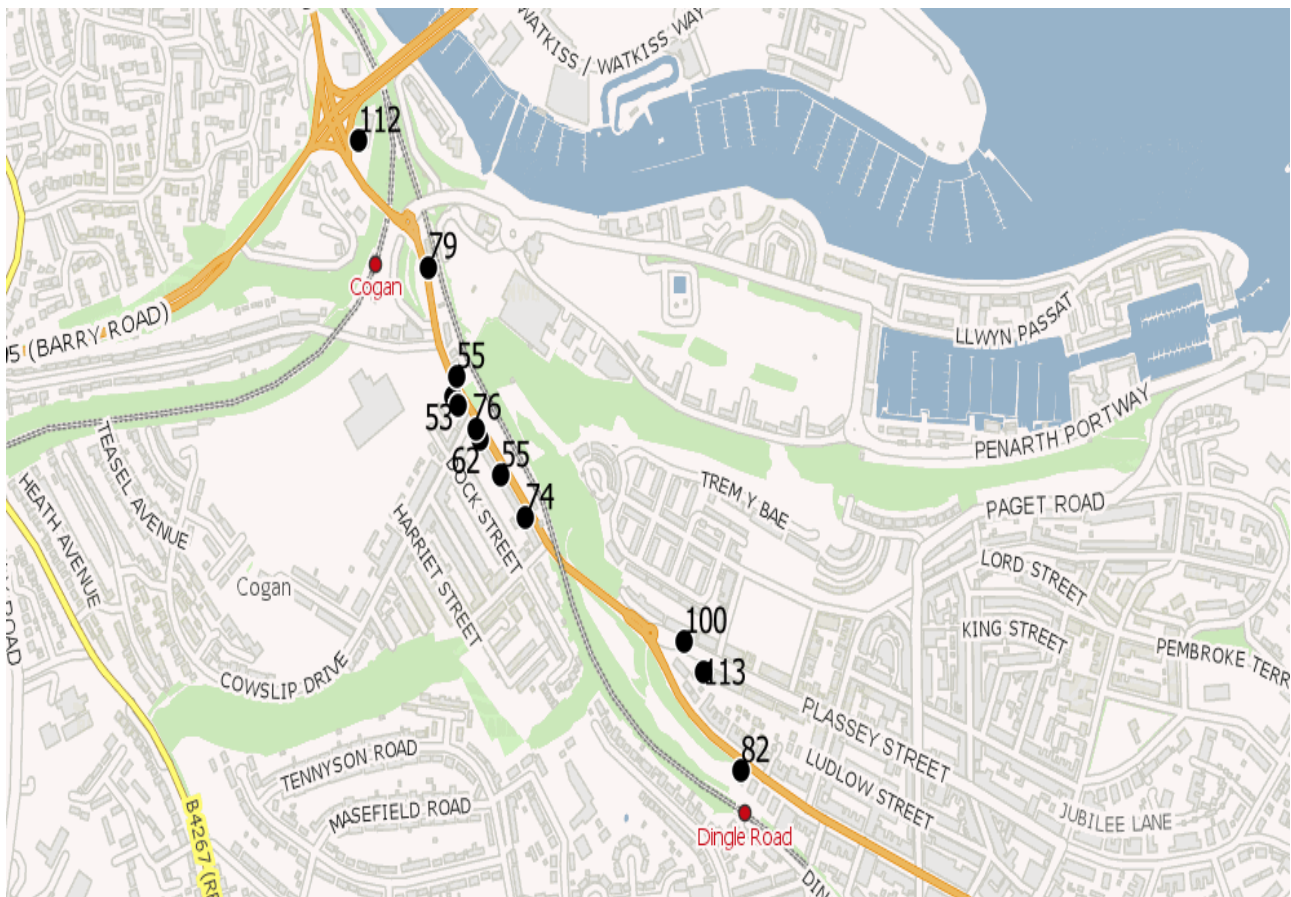


Figure 12 - Map(s) of Non-Automatic Monitoring Sites in Penarth

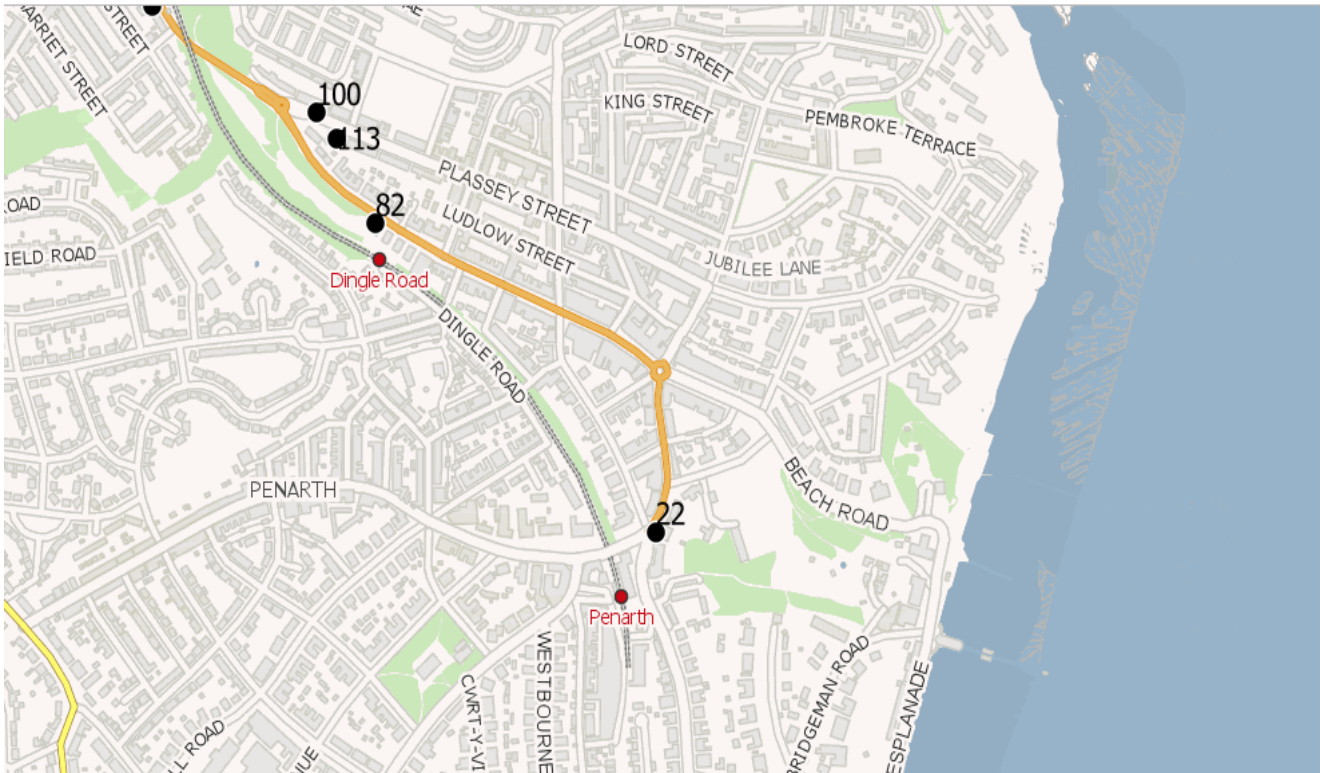


Figure 13 - Map(s) of Non-Automatic Monitoring Sites in Barry

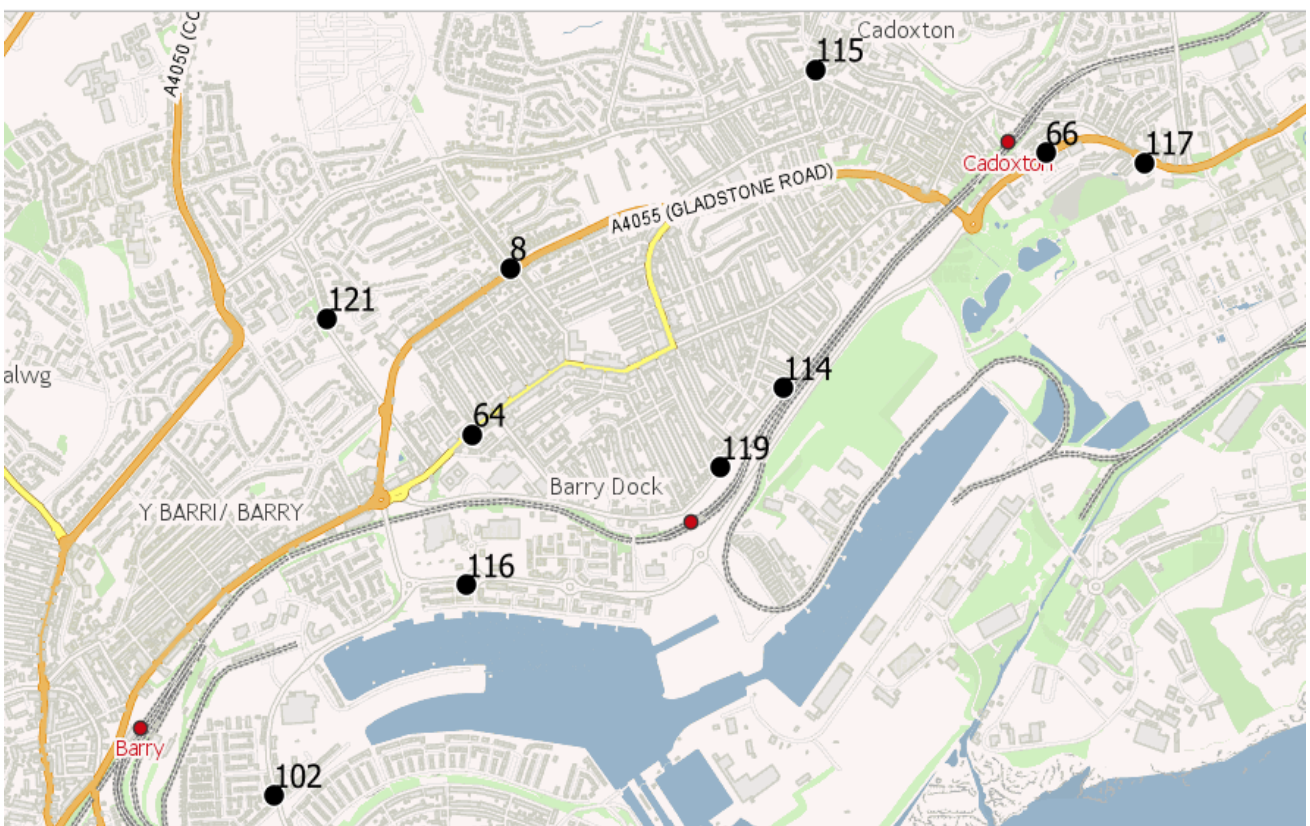
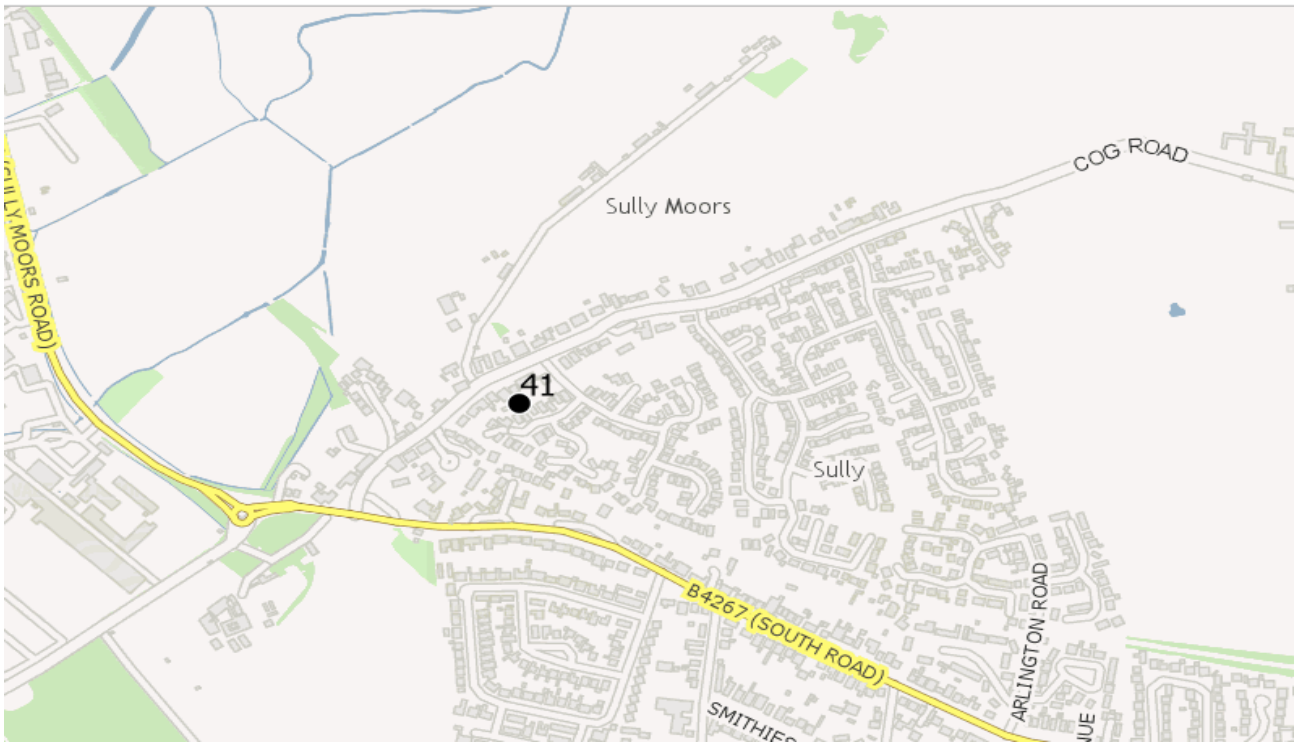


Figure 14 - Map(s) of Non-Automatic Monitoring Sites in Sully



2.2 2020 Air Quality Monitoring Results

Table 9 - Annual Mean NO₂ Monitoring Results Cowbridge

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
COWBRIDGE									
65	Roadside	75	N	15.9	15.9	15.2	14.9	16	11.6
101	Kerbside	75	N	-	-	19.9	16.5	15.9	13.1
108	Kerbside	75	N	-	-	19.9	24.4	23.3	16.4
118	Urban Background	67	N	-	-	-	-	8.4	6.6

Table 10 - Annual Mean NO₂ Monitoring Results Llantwit Major

Site ID	Site Type	Valid Data Capture 2019 (%) (1)	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias (2)					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
LLANTWIT MAJOR									
93	Roadside	100	N	-	-	11.3	10.9	10.4	8.1
94	Roadside	92	N	-	-	9.3	9.4	8.8	7.3
96	Suburban	100	N	-	-	9.4	10.2	7.9	5.7

Table 11 - Annual Mean NO₂ Monitoring Results St Brides Major

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
SAINT BRIDES MAJOR									
103	Roadside	100	N	-	-	10	10.7	10.8	7.7
104	Roadside	83	N	-	-	10.5	11.2	11.9	8.3
105	Kerbside	100	N	-	-	12.3	12.1	11.8	8.5
106	Roadside	100	N	-	-	9.4	10.3	10.3	7.3
107	Roadside	100	N	-	-	7.3	7.7	7.9	6.1

Table 12 - Annual Mean NO2 Monitoring Results Brooklands Terrace, Culverhouse Cross

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m ³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
CULVERHOUSE CROSS / BROOKLANDS TERRACE									
38	Roadside	100	N	23.3	25.9(2)	19.6	19.4	18.6	14.4

Table 13 - Annual Mean NO2 Monitoring Results Dinas Powys

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
DINAS POWYS									
46	Roadside	50	N	18.6	18.7	17.1	17.9	16.7	11.6
61	Roadside	42	N	30.1	31.5	30.4	31	28.8	26.5
67	Roadside	75	N	24.2	24.8(2)	21.4	23.6	22.7	18.1
72a	Roadside	67	N	23.8	21.9(2)	19.9	19.8	18.5	15.1
89	Roadside	75	N	30.8	31.8	28.3	27.9	26.2	21.7
90	Roadside	75	N	21.4	21.2	19.7	21.3	20.9	15.8
109	Roadside	67	N	-	-	-	19.4	19.6	17.0
110	Roadside	75	N	-	-	-	20.4	19.3	16.8
111	Roadside	50	N	-	-	-	23.6	22.7	20.9
120	Roadside	75	N	-	-	-	-	-	13.2

Table 14 - Annual Mean NO2 Monitoring Results Penarth

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
PENARTH									
22	Kerbside	58	N	23.7	23.6	21.8	20.3	19.7	15.8
53	Roadside	75	Y	30.8	31.5	29.8	27.7(2)	28.7	24.4
56	Kerbside	75	N	40.3/ 29.4(3)	17.5(2)	23.2	20.5	22.2	17.1
62	Roadside	75	Y	31.7	33.2	31.2	28.1	29.2	22.2
70	Roadside	75	N	23.2	24.6	20.3	22.3	19.8	15.8
73a	Roadside	58	Y	30.2	32	31	28.9	29.4	22.7
73b	Roadside	75	Y	29.8	31	30.6	29.7	29.1	23.3
73c	Roadside	75	Y	30	31.2	30.5	30.4	30.1	22
74	Roadside	75	Y	28	28.2	28.4	22.7(2)	25.4	27.5
76	Roadside	75	Y	32	32.4	30.7	29.9	28.1	11.8
79	Roadside	67	Y	37.5	44.4/ 37.2(3)	38.3/ 32.3 (3)	37.9/ 31.6(3)	36.0/ 30.1(3)	27.5
82	Roadside	50	N	17.4	18	16.9	17.1	16	17.1
88	Roadside	75	Y	30.7	31.4	29.8	27.6	28.4	15.9

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
PENARTH									
100	Roadside	83	N			23.9	24	22.9	17.6
112	Roadside	75	N				19.4	19.8	15.9
113	Roadside	92	N				21.7	22.3	17.6

Table 15 - Annual Mean NO₂ Non-Automatic Monitoring Results Barry

Site ID	Site Type	Valid Data Capture 2019 (%) ⁽¹⁾	Within AQMA?	Annual Mean Concentration (µg/m ³) - Adjusted for Bias ⁽²⁾					
				2015 Bias Adjustment Factor = 0.88	2016 Bias Adjustment Factor = 0.78	2017 Bias Adjustment Factor = 0.77	2018 Bias Adjustment Factor = 0.76	2019 Bias Adjustment Factor = 0.75	2020 Bias Adjustment Factor = 0.76
BARRY									
8	Kerbside	75	N	33.6(2)	23.5(2)	31.9	28.1	27.5	22.9
41	Urban Background	75	N	13.1	14.5(2)	11.5	10.9	10.6	8.4
64	Roadside	75	N	20.8(2)	20.4(2)	17.5	16.6	17.8	12.8
66	Roadside	75	N	30.9	27.7	30.4	26.7	26.3	23.8
102	Roadside	75	N	-	-	17.4	17.9	17.0	14.6
114	Roadside	75	N	-	-	-	13.5	13.4	11.5
115	Kerbside	75	N	-	-	-	26.2	25.9	21.9
116	Roadside	75	N	-	-	-	-	17.5	15.3
117	Kerbside	67	N	-	-	-	-	26.7	21.9
119	Kerbside	75	N	-	-	-	-	18.9	15.4
121	Kerbside	75	N	-	-	-	-	-	22.4

Notes:

(1) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(2) Diffusion tube data has been “bias adjusted” in accordance with Box 7.11 in LAQM.TG16 and “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details

(3) Diffusion tube data has been corrected for distance to represent relevant exposure in accordance with Sections 7.77- 7.79 in LAQM.TG16 “Fall-off in NO₂ concentrations with Distance from the Road

Trends in Annual Mean NO₂ Concentration

Figure 15 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Sites in Cowbridge

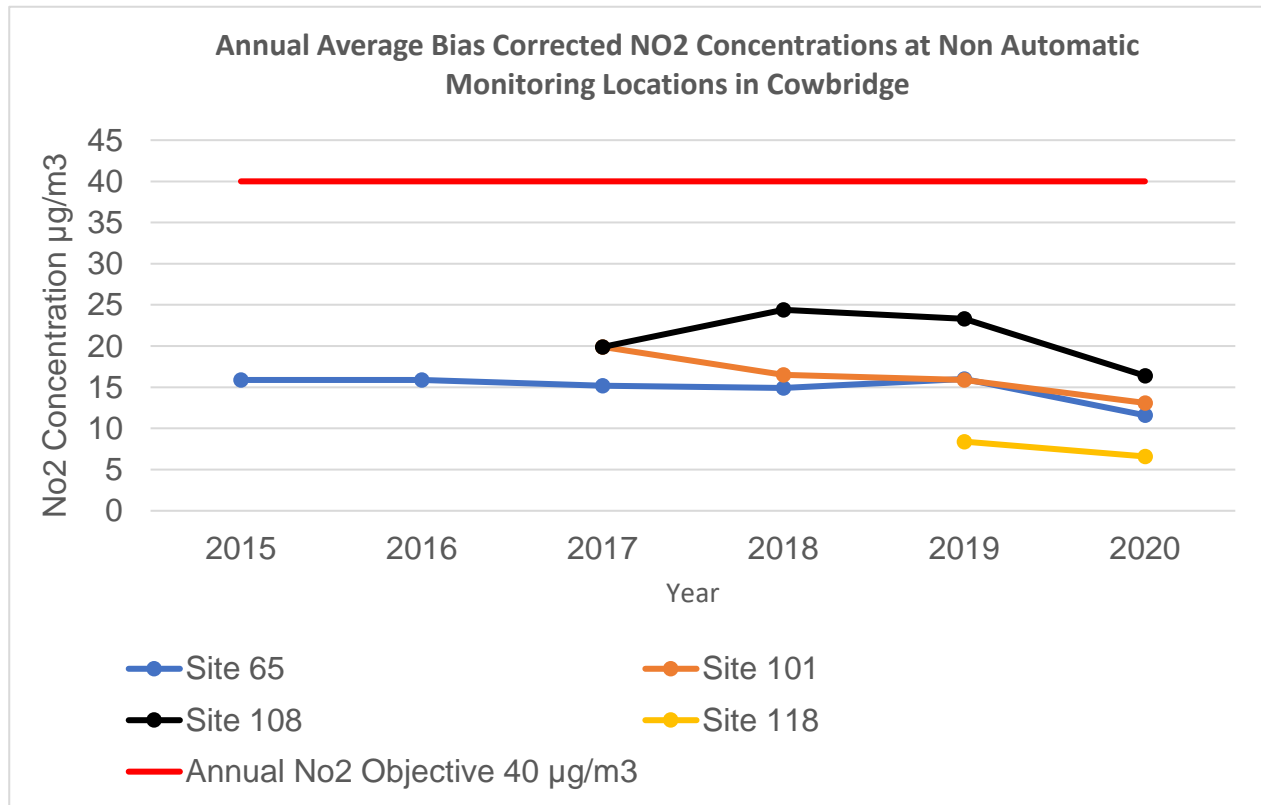


Figure 16 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Sites in Llantwit Major

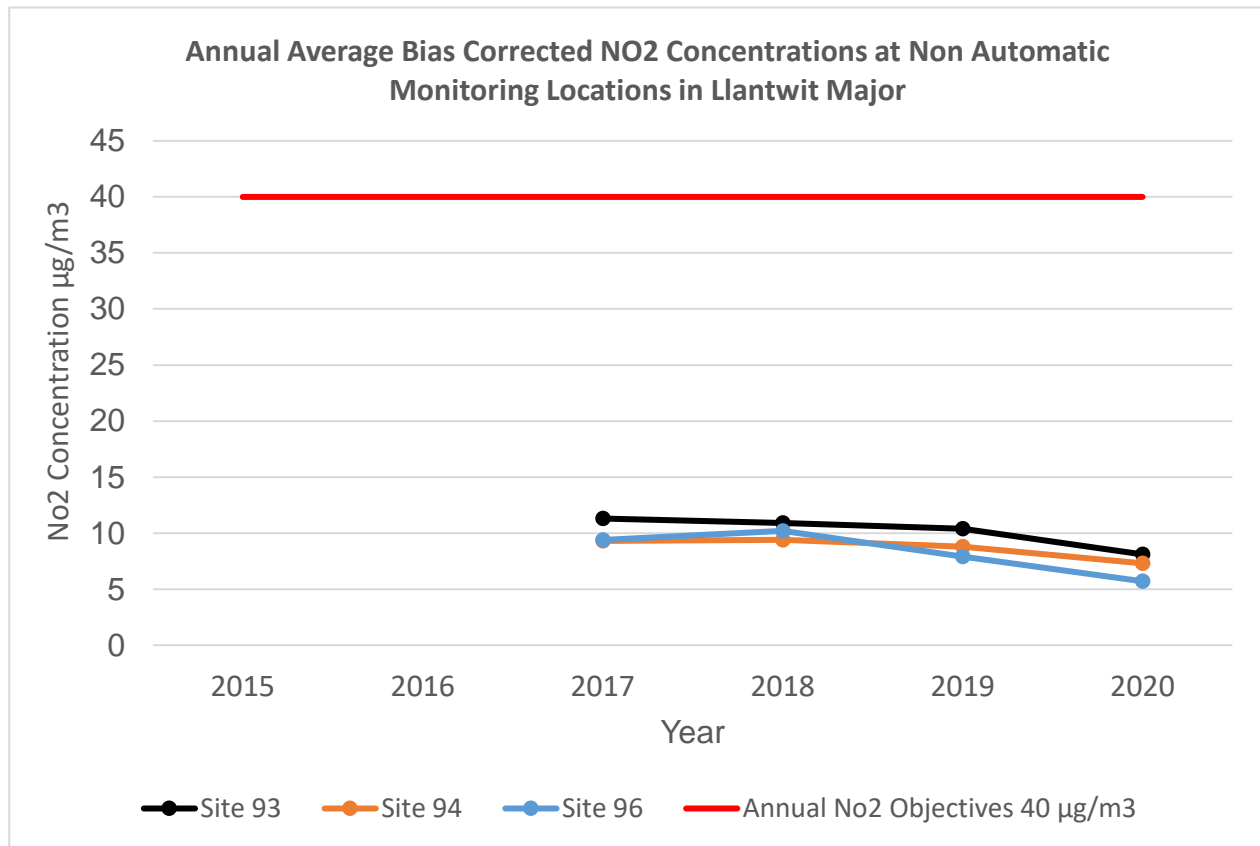


Figure 17 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Sites in St Brides Major

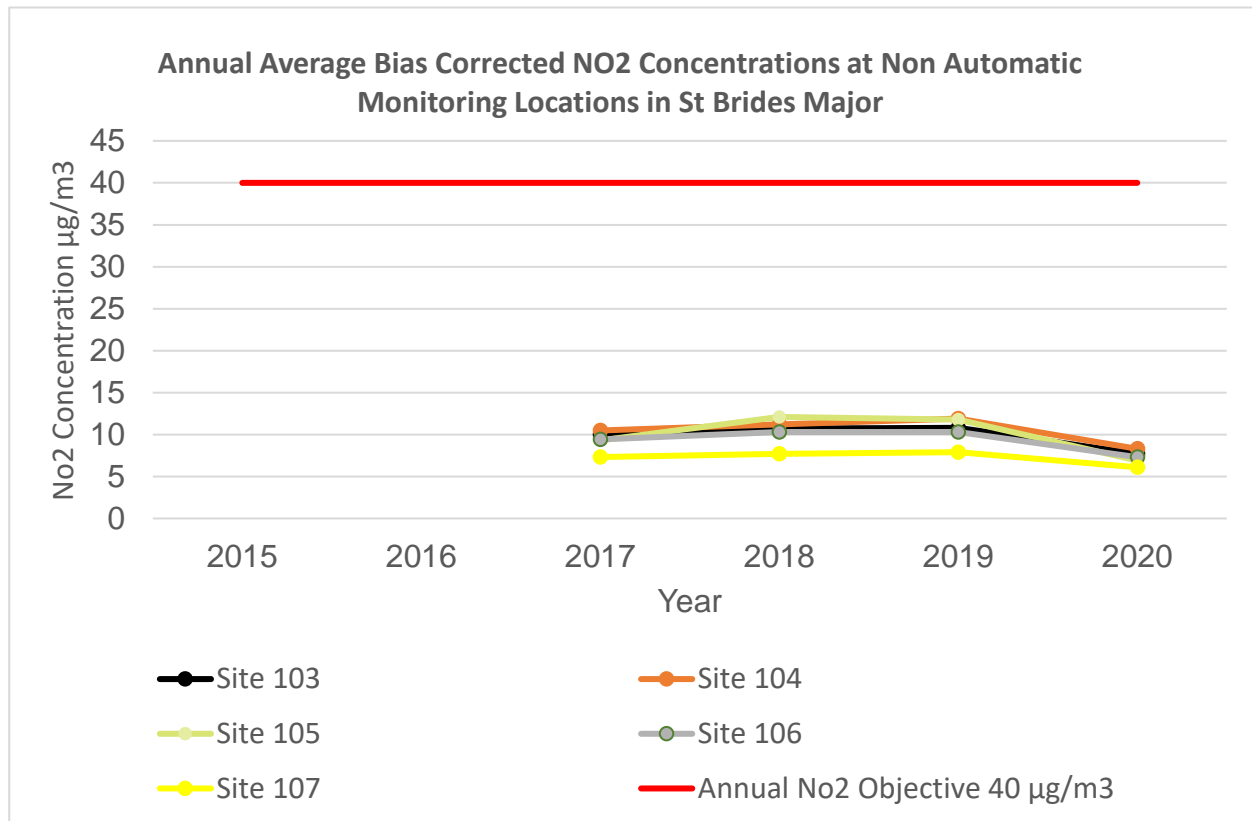


Figure 18 - Annual Average Bias Corrected NO2 Concentrations at Non Automatic Sites in Brooklands Terrace, Culverhouse Cross

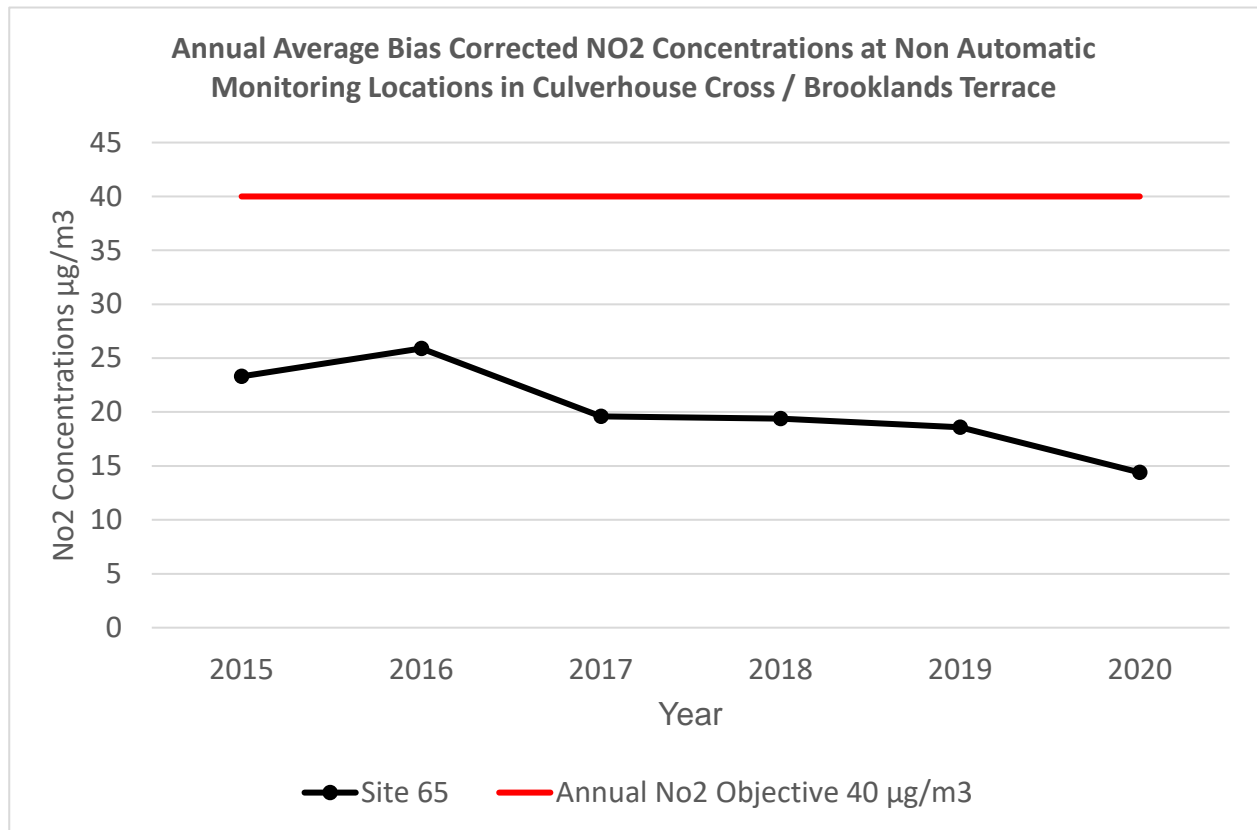


Figure 19 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Sites in Dinas Powys

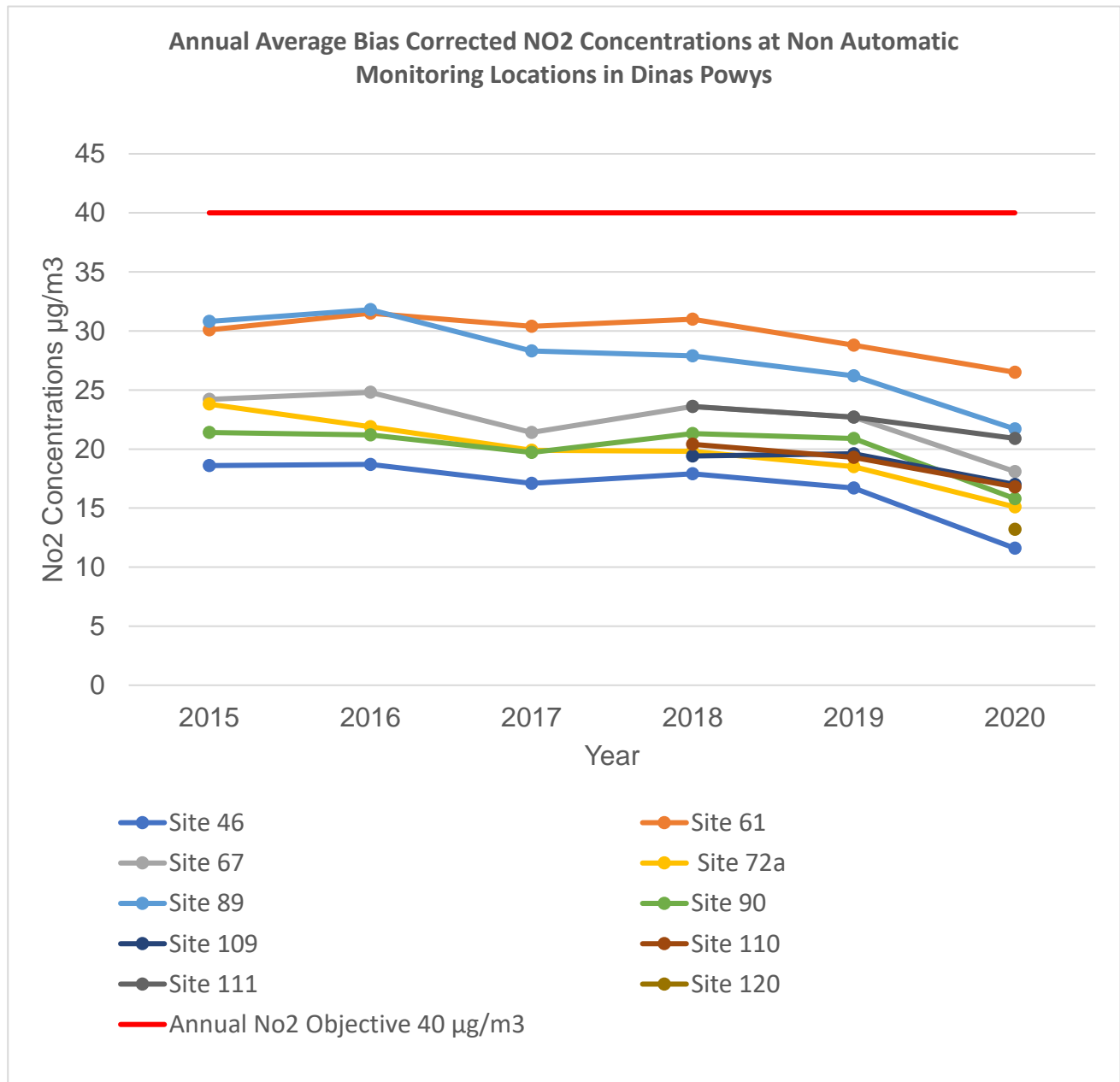


Figure 20 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Locations in Windsor Road, Penarth AQMA

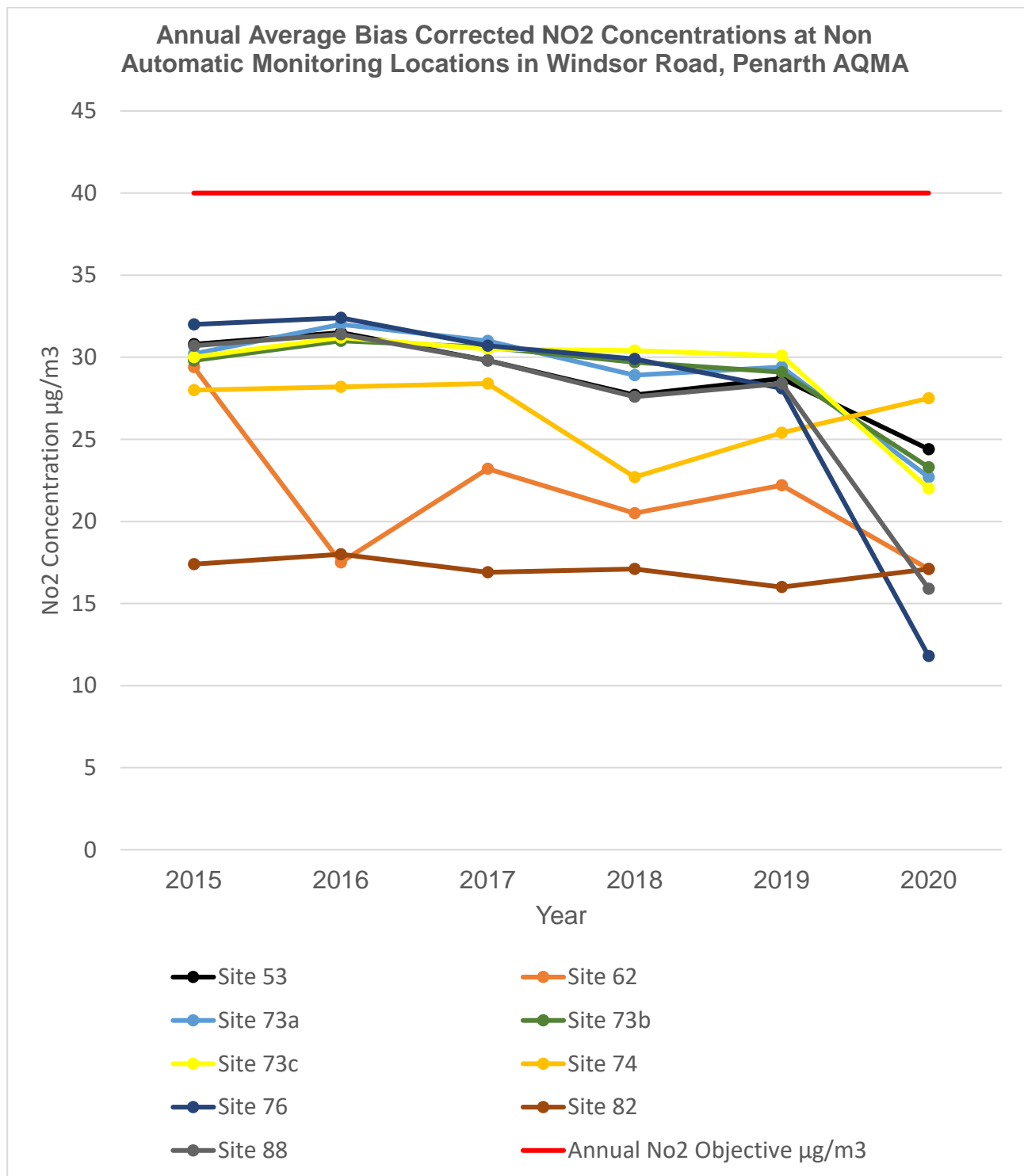


Figure 20 illustrates the annual average NO₂ datasets recorded at residential facades within the Windsor Road AQMA. The graph indicates compliance with the annual average objective at every monitored location since 2013.

Figure 21 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Sites in Penarth

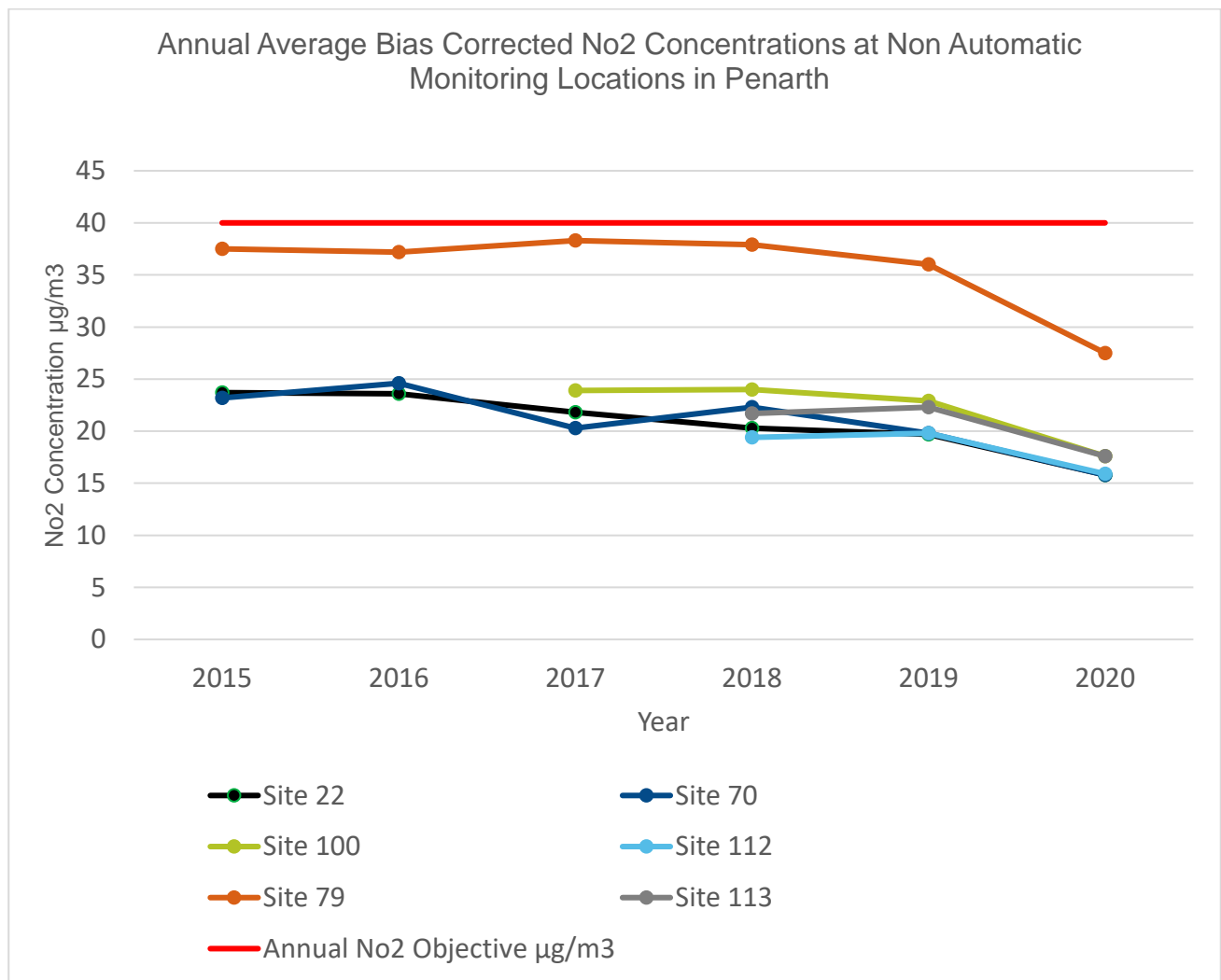


Figure 22 - Annual Average Bias Corrected NO₂ Concentrations at Non-Automatic Monitoring Sites in Barry

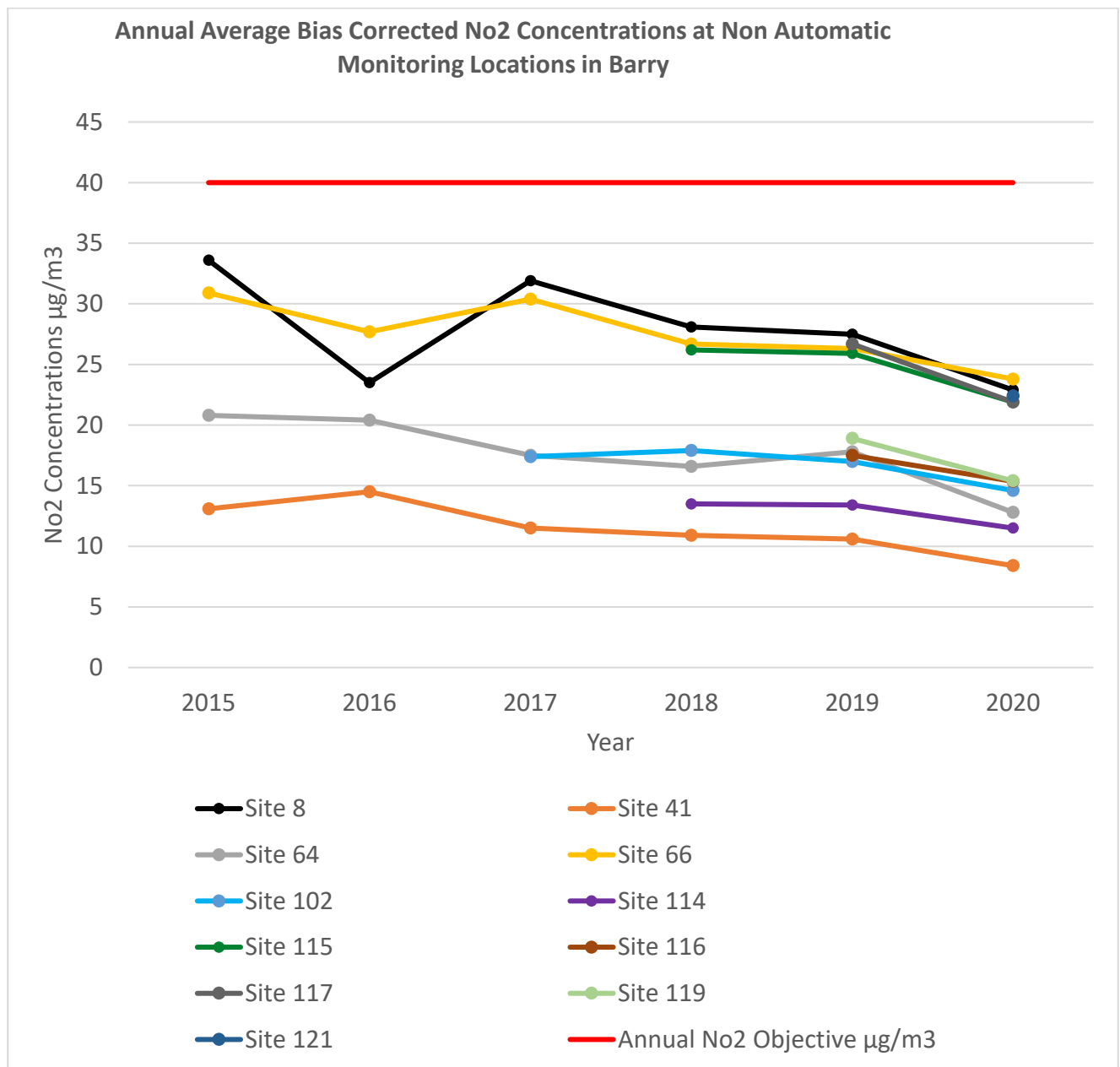


Table 16 - Automatic Annual Mean NO2 Monitoring Results (2015-2020)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ⁽¹⁾	Valid Data Capture 2020 % ⁽²⁾	Annual Mean Concentration (µg/m ³)					
					2015	2016	2017	2018	2019	2020
Penarth, Windsor Road	Roadside	Y	100	96	26.5	28.3	26.5	24.5	25.7	20
Dock View Road	Roadside	N	N/A	96	-	-	-	-	23.2	19
Holton Road	Roadside	N	N/A	96	-	-	-	-	23.7	20.2

Notes:

Any exceedances of the Annual Average NO2 objective (40µg/m³) are shown in bold.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Data has been “annualised” as per Boxes 7.9 in LAQM.TG16 where valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table 17 - 1-Hour Mean NO₂ Monitoring Results, Number of 1-Hour Means >200µg/m³

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ⁽¹⁾	Valid Data Capture 2020 % ⁽²⁾	Number of Hourly Means (> 200µg/m ³) ⁽³⁾					
					2015	2016	2017	2018	2019	2020
Penarth, Windsor Road	Roadside	Y	100	96	0	0	0	0	0	0
Dock View Road	Roadside	N	N/A	N/A	-	-	-	-	0	0
Holton Road	Roadside	N	N/A	N/A	-	-	-	-	0	0

Notes:

Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

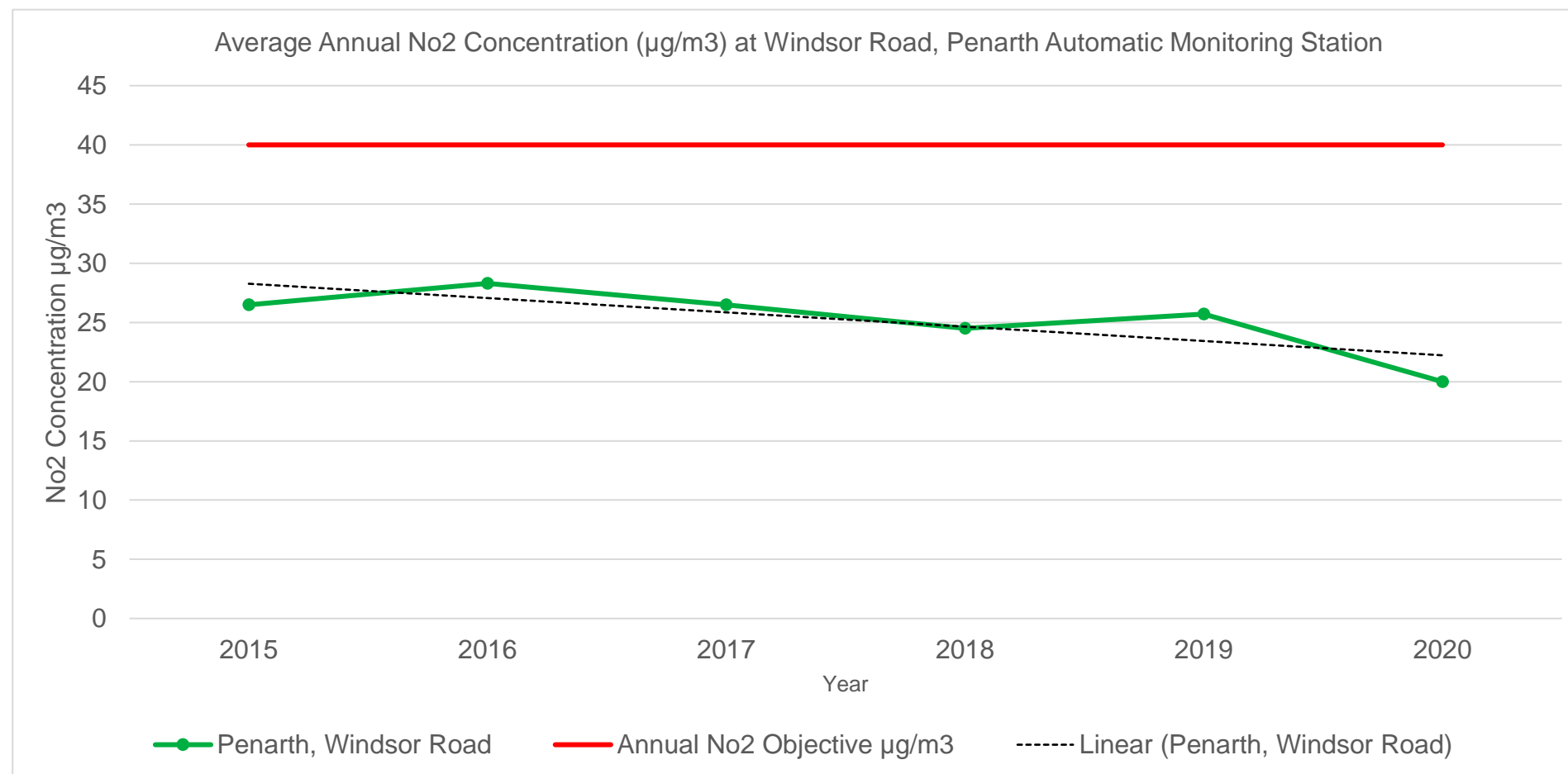
Figure 23 - Average Annual NO₂ Concentration at Windsor Road, Penarth Automatic Monitoring Station

Figure 23 indicates a stable decreasing trend in annual average NO₂ concentrations recorded at the Penarth, Windsor Road AMS.

Table 18 - Annual Mean PM10 Monitoring Results

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Confirm Gravimetric Equivalent (Y or N/A)	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾					
						2015	2016	2017	2018	2019	2020
Penarth, Windsor Road	Roadside	Y	100	90.74	Y	20.8	21.4	15.6	21.7	21.6	19
Dock View Road	Roadside	N	N/A	N/A	N/A	-	-	-	-	11.2	7.3
Holton Road	Roadside	N	N/A	N/A	N/A	-	-	-	-	8.99	8.7

Notes:

Exceedances of the PM₁₀ annual mean objective of 40µg/m³ are shown in **bold**.

All means have been “annualised” as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

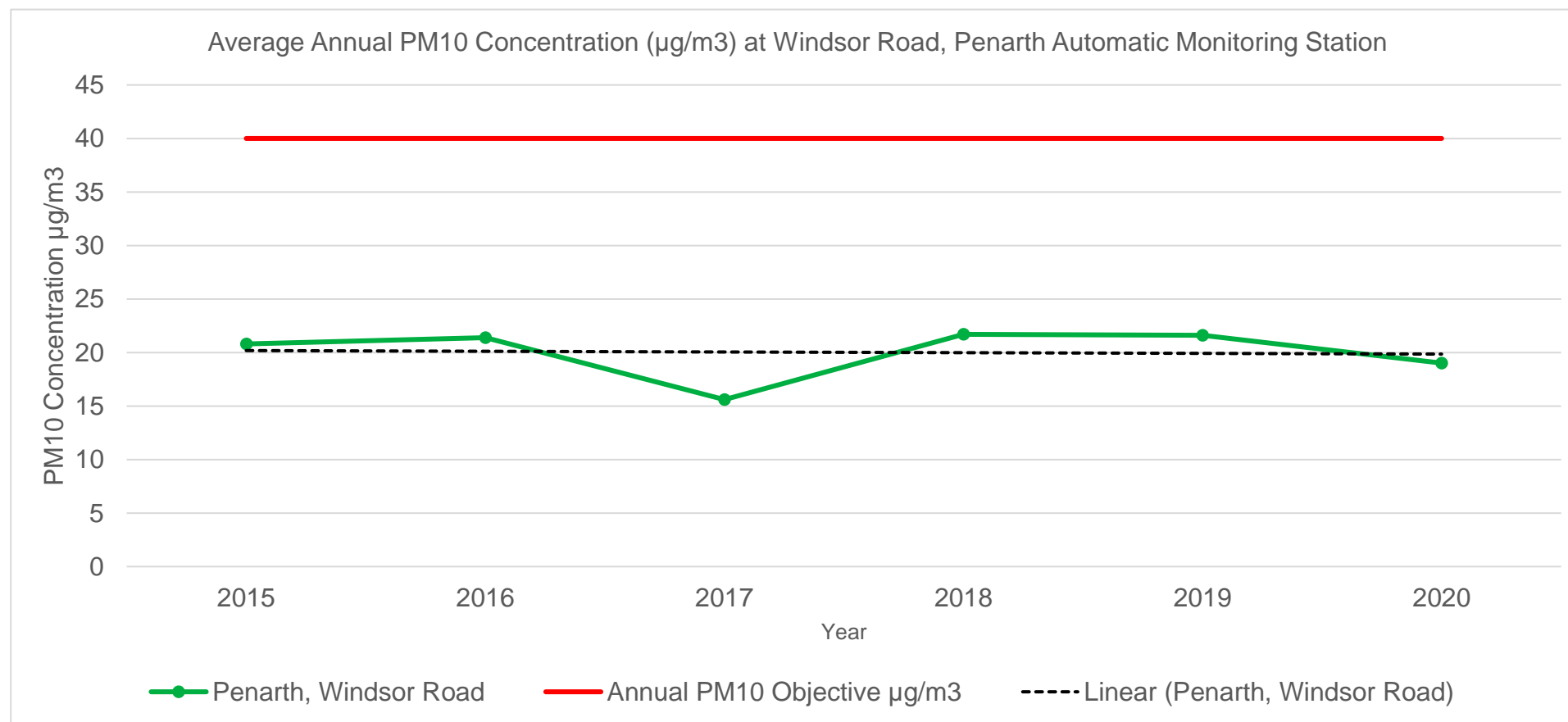
Figure 24 - Average Annual PM10 Concentration at Windsor Road, Penarth Automatic Monitoring Station

Figure 24 indicate a compliant stable trend in PM_{10} levels at the Penarth, Windsor Road AMS.

Table 19 - Automatic 24-Hour Mean PM10 Monitoring Results (2015-2020)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020 (%) ⁽²⁾	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m ³ ⁽³⁾					
						2015	2016	2017	2018	2019	2020
Penarth, Windsor Road	Roadside	Y	100	90.74	Y	4 (31.2)	1 (31.9)	2	0	6	0
Dock View Road	Roadside	N	N/A	N/A	N/A	-	-	-	-	9	0
Holton Road	Roadside	N	N/A	N/A	N/A	-	-	-	-	0	0

Notes: Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Table 20 - Automatic Ozone (O3) Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2020(%) ⁽²⁾	Number of Exceedances
					Number of days where the 8-hour mean >100µg/m ³
Penarth, Windsor Road	Roadside	Y	100	91.6	7

Notes:

Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

2.3 Comparison of 2020 Monitoring Results with Previous Years and the Air Quality Objectives

During 2020 monitoring was carried out for nitrogen dioxide (NO₂), particulate matter (PM₁₀), and ozone (O₃).

2.3.1 Nitrogen Dioxide (NO₂)

Nitrogen dioxide was measured during 2020 at three automated sites equipped with an NO₂ monitoring capabilities, as well as by a network of 51 passive diffusion tubes.

To ratify the 2020 diffusion tube dataset, a bias adjustment factor of 0.76 was applied to the annual average readings. The factor was derived from the Defra website which gave the average correction factor from 42 co-location studies across the UK, whereby the analytical laboratory and method used was the same as the VoGC. The national bias correction factor was utilized as it would provide results representative of a worst-case scenario. The bias correction factor of 0.76 was obtained from the following website: <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Monitoring of NO₂ continued to be carried out at the Penarth, Windsor Road site during 2020. As previously discussed, 2018 saw the introduction of two near real time automated indicative monitoring commissioned by SRS on behalf of the VoGC and installed in the Barry area.

Datasets obtained from the two automated monitoring sensors and the Penarth, Windsor Road site have been cross referenced to the annual and 1-hour average objectives set for NO₂. The findings summarised in Table 16 & Table 17 indicate compliance with both objectives.

The nitrogen dioxide diffusion tube data is summarised in Tables 9 - 15. The full dataset (raw monthly mean values) is included in Appendix A. All data displayed in Table 9 – 15 has been bias adjusted and where necessary annualised in accordance with Box 7.10 of LAQM TG(16).

Evidence of the sites annualised can be seen in Appendix C with the bias adjustment factor of 0.76 applied.

As outlined by Table 9-15; the nitrogen dioxide concentrations measured by the passive diffusion tubes show that there were no exceedances of the national air quality objectives for NO₂ (annual average 40µg/m³ & 1-hour average 200µg/m³ not be exceeded more than 18 times per year). In accordance with LAQM best practise guidance, there are no monitoring sites in the district with annual average concentrations above 60µg/m³ in 2020. Therefore, this indicates it is unlikely that the hourly nitrogen dioxide objective was exceeded.

As previously detailed, due to continual compliance with the national air quality objectives set for NO₂ the Vale of Glamorgan Council revoked the Windsor Road, Cogan, Penarth AQMA on 1st January 2021.

2.3.2 Particulate Matter (PM₁₀)

In 2020 continuous monitoring of PM₁₀ was undertaken at three automatic monitoring sites in the Vale.

Two indicative near-real time air quality monitors adopt the use of electrochemical sensors to examine levels of PM₁₀.

In addition, the Penarth, Windsor Road site was located within the previously declared AQMA and calculated particulate matter using a gravimetric Beta Attenuation Monitor (BAM).

The PM₁₀ data from the Windsor Road monitor has been provided as gravimetric equivalence (applying the conversion factor of 0.83 as stipulated in Defra's LAQM TG (16), Section 7.151). The results are presented in Table 18 & Table 19.

The results of the monitoring indicate that recorded PM₁₀ concentrations at all monitored locations are compliant with both the annual mean (40µg/m³) and 24-hour mean (>50 µg/m³ not to be exceeded more than 18 times per year) AQS objectives set for PM₁₀.

2.3.3 Other Pollutants Monitored

In 2020, ozone was measured at the Windsor Road, Penarth monitoring site. Although Ozone is not included in the Local Air Quality Management system, the results are included in Table 20 for completeness. The results are compared with the running 8-hour mean objective as set by the Expert Panel on Air Quality Standards (EPAQs) which states the running 8-hour mean should not exceed 100µg/m³ on more than 10 days per year. There are no exceedances of the ozone objective in the Vale in 2020.

2.4 Summary of Compliance with AQS Objectives as of 2020

SRS has reviewed the results from the monitoring undertaken across the Vale of Glamorgan area in 2020.

The automated and non- automated datasets show compliance with the AQS objectives at all locations.

Based on continued compliance over a three-year period with the national air quality objectives set for NO₂ (annual average 40µg/m³ & 1-hour average 200µg/m³ not to be exceeded more than 18 times per year), in accordance with Local Air Quality Management in Wales, Policy Guidance, June 2017, the Vale of Glamorgan Council has revoked the Penarth, Windsor Road AQMA.

3 New Local Developments

3.1.1 Road Traffic Sources (and Other Transport)

SRS on behalf of VoGC continue to work and engage with the Transport and Highways team in the Council, consulting upon any road network proposals that have the potential to influence local air quality levels.

3.1.2 Narrow Congested Streets with Residential Properties Close to the Kerb

SRS on behalf of the VoGC has considered road traffic sources extensively in both this and earlier reports; the monitoring network is very largely focused on measuring concentrations of nitrogen dioxide close to many of them. These have been discussed either in previous reports or earlier in this report.

There are no newly identified road traffic sources which need to be considered.

For 2020 SRS on behalf of the VoGC Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.1.3 Busy Streets Where People May Spend 1-hour or closer to Traffic

SRS on behalf of the VoGC confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.1.4 Roads with a High Flow of Buses and/or HGVs.

SRS on behalf of the VoGC confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.1.5 Junctions

Junctions have been fully considered in previous annual reviews and assessments. SRS on behalf of the VoGC can confirm that there are no new/newly identified busy junctions/busy roads where exceedances of either the NO₂ or PM₁₀ objectives are likely.

3.1.6 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Northern Access Road

The end of 2019 marked the completion of construction works for the St. Athan Northern Access Road.

As highlighted in the 2018 APR, SRS on behalf of the VoGC can confirm, following approval in late 2017, construction works had begun for the Northern Access Road (NAR) which will provide a link from the B4265 near Llantwit Major in the west to Eglwys Brewis Road in Picketston in the east. Works to construct these developments are currently ongoing.

As previously outlined in the 2017 APR, as highlighted by the supporting air quality assessment (AQA);

Predicted annual mean NO₂ and Particulate Matter (PM₁₀ and PM_{2.5}) concentrations are expected to be well below the annual mean objective at all receptors in the study area. Overall, receptors are predicted to experience a negligible effect in accordance with the Institute of Air Quality Management (IAQM) /Environmental Protection UK (EPUK) guidance (2015), which is considered to be not significant, in both the opening year of 2019 and the future year of 2034.

The AQA did indicate a degree of risk identified with respect to dust and PM₁₀ because of construction phase activities. The report states:

“There are estimated to be between 10 and 100 dust sensitive properties within 20 m of potential construction work areas within the site. The sensitivity of the area to dust soiling due to the construction activity is therefore considered to be high.”

“The medium dust emission magnitude coupled with the high sensitivity to property and amenity effects suggests that the risk of dust impacts to property and amenity due to construction activity is medium.”

In response to these findings a pre commencement planning condition was implemented.

Condition: Dust Control

Prior to the commencement of development, a scheme (Construction Environmental Management Plan) to minimise dust emissions arising from demolition and construction activities on site shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall include details of dust suppression measures and the methods to monitor emissions of dust arising from the development. The construction phase shall be implemented in accordance with the approved scheme, with the approved dust suppression measures being maintained in a fully functional condition for the duration of the construction phase.

Reason: To assess air quality and agree any mitigation measures that may be required to safeguard the amenity of nearby residents in the area.

The CEMP was received, and applicable condition was discharged.

For 2021, non-automatic NO₂ diffusion tube monitoring is being implemented at a specific sensitive receptor locations in the vicinity of the proposed development, after being temporarily ceased in 2020 with only 2 months of data due to the Covid-19 pandemic.

A4226 '5 Mile Lane' road infrastructure improvement works

The A4226 (Five Mile Lane) connects Barry at the Waycock Cross roundabout with the Sycamore Cross junction on the A48 and comprises an essential part of the highway network leading to the Enterprise Zone. The proposed Five Mile Lane Highway Improvements stem from the Welsh Government's proposals to trunk the route Culverhouse Cross – Sycamore Cross – Five Mile Lane – Airport. The Council has previously received a Principal Road Grant from the Welsh Government to advance the Five Mile Lane Highway Improvement Scheme, and to date this work has involved the signalisation of Sycamore Cross junction, as well as initial design and feasibility work together with various environmental assessments.

In October 2019 works were completed for the A4226. As part those completed works, a new footpath and cycleway has been built, along with a bridleway and bridge.

3.1.7 Roads with Significantly Changed Traffic Flows

The criteria for assessing roads with significantly changed traffic flows are set out in Table 7.1, row/point 6 of DEFRA's LAQM TG (16), 2018. Predictions of increased traffic do not approach 25% on roads with more than 10,000 vehicles per day.

SRS on behalf of the VoGC confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.1.8 Bus and Coach Stations

SRS on behalf of the VoGC confirms that there are no relevant bus stations in the Local Authority area.

3.1.9 Airports

The criteria for assessing airports are set out in Section 7.16 of Defra's LAQM TG(16), 2018. The Vale confirms that there are two airports in the Local Authority area: Cardiff Wales Airport and MOD St Athan. Neither of these airports meets the criteria for further consideration.

SRS on behalf of the VoGC confirms that there are no airports meeting the criteria in the Local Authority area.

3.1.10 Railways (Diesel and Steam Trains)

Defra's LAQM TG(16), 2018 suggests that SO₂ emissions from diesel locomotives may be significant if there are outdoor locations where locomotives are regularly stationary for more than 15 minutes and where members of the public could be regularly exposed over this period at such locations.

Defra's LAQM TG(16), 2018 also requires consideration of exposure to nitrogen dioxide within 30m of certain specified railway lines in those areas where the annual mean background concentration is above 25µgm⁻³.

3.1.11 Stationary Trains

SRS on behalf of the VoGC confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

3.1.12 Moving Trains

LAQM TG(09) introduced a new requirement to assess the potential for exceedance of nitrogen dioxide objectives. The assessment criteria are in relation to large numbers of diesel locomotive movements where there is relevant exposure within 30metres of the track in areas where the

background annual mean concentration of nitrogen dioxide is above $25\mu\text{m}^3$.

SRS on behalf of the VoGC confirms that there are no locations with many movements of diesel locomotives, and potential long-term relevant exposure within 30m.

3.1.13 Ports (Shipping)

SRS on behalf of the VoGC confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

3.2 Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

3.2.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Biomass Gasification Facility, Woodham Road, Barry

As previously outlined in the 2017 APR: on the 31st July 2015 the Vale Council approved planning permission for the construction and operation of a biomass gasification facility at Woodham Road, Barry, CF63 4JE (Grid Reference ST 12610 67683). It was noted in the 2017 APR that Natural Resources Wales (NRW) were going through a second round of consultation in regard to a permit application for the proposed operation, submitted by Biomass UK NO.2 Ltd. This second round of consultation was formed because of a Section 5 amendment direction sanctioned by NRW; "NRW Schedule 5 notice re Biomass requesting more information" dated 4 May 2017. As part of the amendment a revised air quality assessment (AQA) was submitted in July 2017. Following much dialogue involving comments passed by SRS on behalf of VoGC, NRW granted approval for the sites permit application in February 2018. Quite recently, VOG Planners have issued a Stop Notice on the plant, for matters to be agreed.

Currently the plant is yet to be operational, although trials have been undertaken.

Cog Moors Wastewater Treatment Works

In the late part of 2017, a full permission was sought after for the following proposal;

2017/01203/FUL- for the change of use of land as an extension to the existing wastewater treatment works site and the construction of an Advanced Anaerobic Digestion (AAD) Plant, together with associated landscaping and mitigation measures and the formation of a temporary construction compound at Cog Moors Wastewater Treatment Works (WwTW), Cardiff Road, Dinas Powys.

Supporting AQA was submitted in accordance with the referenced planning application. The assessment concluded.

The results of the pollution model indicate that the AAD plant will not lead to exceedances of air pollution thresholds, and pollution levels are expected to be well below human health-based thresholds with the plant in operation. The emissions from the AAD plant are also predicted to have no significant effects on ecology and habitats.

The application was approved in 2018, and the Construction of the AAD plant was completed in Spring 2021.

3.2.2 Existing Installations where Emissions have Increased Substantially, or New Relevant Exposure has been introduced

SRS on behalf of the VoGC can confirm there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

3.2.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

There are no new or significantly changed industrial installations for which previous air quality assessments have not been carried out and which could give rise to potentially significant emissions of regulated pollutants either within the Vale or within neighbouring local authorities.

SRS on behalf of the VoGC can confirm that there are new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

3.2.4 Major Fuel (Petrol) Storage Depots

SRS on behalf of the VoGC can confirm that there are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

3.2.5 Petrol Stations

There are no new petrol stations in the Vale District with throughputs greater than 2000m³ per annum with a busy road nearby where there is relevant exposure within 10m of the pumps.

SRS on behalf of the VoGC can confirm that there are no petrol stations meeting the specified criteria.

3.2.6 Poultry Farms

The criteria for assessing poultry farms are set out in Table 7.3, point 4 of TG (16) (Defra, 2016). No farms exceeding the relevant criteria (turkey units with greater than 100,000 birds, naturally ventilated units with greater than 200,000 birds or mechanically ventilated units with greater than 400,000) have been identified.

SRS on behalf of the VoGC can confirm that there are no poultry farms meeting the specified criteria.

3.3 Commercial and Domestic Sources

3.3.1 Biomass Combustion – Individual Installations

As highlighted in Section 3.2.1 a permit application for the biomass gasification facility at Woodham Road, Barry was approved by Natural Resources Wales (NRW). Commissioning works took place

during 2018, however the facility has not been operational under testing conditions since April 2020 due to the ongoing disruptive effects of COVID-19 effecting the security of fuel supply. This has severely disrupted the operation of the facility and only necessary maintenance activities have been carried out in the intervening period.

In February 2021, the Welsh Government confirmed the scope of a voluntary and retrospective Environmental Impact Assessment (EIA) to be prepared by Biomass UK No.2 Ltd. Following this, on Friday 30 April 2021, Biomass UK No.2 Ltd submitted an Environmental Statement, which presents the findings of the EIA, to the Welsh Government. The Environmental Statement concludes that there are no likely significant environmental effects arising from the development, which have not already been suitably mitigated through existing planning and environmental permitting controls.

The facility is regulated under a Natural Resources Wales Environmental Permit (Permit Number: EPR/AB3790ZB) which outlines an emission to air schedule. This permit specifies emissions generated at the source, i.e., the stack exhaust. The schedule provides a monitoring time schedule and applicable emissions monitoring standards that are required. Monitoring undertaken to comply with the conditions within the permit will be facilitated by accredited personnel and equipment.

3.3.2 Biomass Combustion – Combined Impacts

Previous reports have confirmed that there are no known areas in The Vale District where coal or solid fuel burning provides a significant level or primary household heating. Nothing has changed in this regard since the 2020 APR, despite the potential for increasing popularity of solid fuel heating with increased fossil-fuel prices, and there is no need to consider this further at this time.

3.4 Other Sources

3.4.1 Domestic Solid-Fuel Burning

Previous reports have confirmed that there are no known areas in The Vale District where coal or solid fuel burning provides a significant level or primary household heating. Nothing has changed

in this regard since the 2019 APR, despite the potential for increasing popularity of solid fuel heating with increased fossil-fuel prices, and there is no need to consider this further at this time.

It should be noted that the Council receives a number of enquiries each year from residents in respect of national or local requirements where they wish to install log-burners or similar appliances in their homes. There are no smoke control areas in The Vale and hence no legal requirements regarding appliances that may be installed. However, residents are always reminded of the legislation in respect of statutory smoke nuisance and, where they can't be persuaded otherwise for reasons of air quality and health, recommended to seek out an appliance certified for use in a smoke control area.

SRS on behalf of the VoGC can confirm that there are no areas of significant domestic fuel use in the Local Authority area.

4 Policies and Strategies Affecting Airborne Pollution

4.1 Air Quality Planning Policies

Local Development Plan (LDP) 2011- 2026

On the 28th June 2017 the Council adopted the Vale of Glamorgan Local Development Plan 2011-2026. The LDP became operative on its adoption and supersedes the previous adopted Unitary Development Plan (UDP). The LDP will be the basis for decisions on land use planning in the Vale of Glamorgan and will be used by the Council to guide and manage new development proposals.

The Plan sets out the vision, objectives, strategy and policies for managing development in the Vale of Glamorgan and contains a number of local planning policies and makes provision for the use of land for the purposes of housing, employment, retailing, recreation, transport, tourism, minerals, waste, and community uses. It also seeks to identify the infrastructure that will be required to meet the growth anticipated in the Vale of Glamorgan up to 2026 and provides a monitoring framework for assessing the effectiveness of the Plan.

Also highlighted within the LDP document is Policy **MD7** (Environmental Protection).

POLICY MD7 -

ENVIRONMENTAL PROTECTION

Development proposals will be required to demonstrate they will not result in an unacceptable impact on people, residential amenity, property and / or the natural environment from either:

1. Pollution of land, surface water, ground water and the air.
2. Land contamination.
3. Hazardous substances.
4. Noise, vibration, odour nuisance and light pollution.
5. Flood risk and consequences.
6. Coastal erosion or land stability.

7. The loss of the best and most versatile agricultural land; or
8. Any other identified risk to public health and safety.

Where impacts are identified the Council will require applicants to demonstrate that appropriate measures can be taken to minimise the impact identified to an acceptable level. Planning conditions may be imposed, or legal obligation entered into, to secure any necessary mitigation and monitoring processes.

Featured as a main objective of the adopted LDP;

Objective 4- To protect and enhance the Vale of Glamorgan’s historic, built, and natural environment

The historic, built, and natural environment of the Vale of Glamorgan is highly valued by residents and visitors and includes European, National and local designations which provide local identity and distinctiveness and present opportunities for recreation and tourism. The LDP will ensure that these natural and built environmental assets are protected, conserved and where appropriate enhanced as an important resource for local people and which attract visitors and contributes to the local economy.

4.2 Local Transport Plans and Strategies

The Local Transport Plan (LTP) 2015- 2030.

The Vale of Glamorgan authority is part of the Capital Region which comprises of Cardiff and the nine south east unitary authorities. The implementation of this policy was carried out to support Welsh Government’s vision in the future development of the Capital Region and commitment to a low carbon future.

“The Capital Region is committed to a low carbon future, which has a transport network and mobility culture that positively contributes to a thriving economy and the health and wellbeing of its citizens and where sustainable travel is the option of choice”

The LTP looks to tackle growing traffic levels (and hence air quality impacts) by providing strategies which focus upon providing efficient and effective transport networks. In order to be successful, the plans need a collaborative approach for the future development of the Capital Region's transport needs, therefore providing improved mobility for both residents and visitors, enhanced accessibility to jobs and services and fundamentally sustainable economic growth.

"This Local Transport Plan (LTP) seeks to identify the sustainable transport measures required to ensure the Vale of Glamorgan Council adheres to current requirements and good practices to allow for a sustainable transport environment for the period 2015 to 2020 as well as looking forward to 2030"

The LTP policy recognises the Council's objective to achieving sustainable travel (alternatives to using cars) and reducing negative impacts on the environment. The policy suggests that through improved transport infrastructure and transport services this can be achieved.

4.3 Active Travel Plans and Strategies

Active Travel

The Vale of Glamorgan Council is working to promote and improve opportunities for active travel within the local authority area. Active travel means walking and cycling (including the use of mobility scooters) for everyday journeys. This includes journeys to school, to work, to the shops or to access services e.g. health or leisure centres.

In September 2014, the Welsh Government introduced the [Active Travel \(Wales\) Act 2013](#) which makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel within certain settlements, as specified by Welsh Government.

The Council submitted its Integrated Network Maps in November 2017 which set out the Authority's aspirations for improving active travel routes across the County over the next 15 years. They included routes that were currently used but may not have met the standard of Active Travel routes,

or they were routes that did not exist but were identified within other strategic plans, or identified through the consultation process.

Section 4 of the Act requires that the next edition of the INM should be submitted by local authorities three years following the previous edition, or no later than a date specified by the Welsh Ministers. In view of circumstances at this time, Ministers consider it appropriate to extend the submission of the next round of integrated networks maps and updated existing routes maps to 31 December 2021.

The Vale of Glamorgan Council will be asking for the public to be fully involved in the Active Travel Network Mapping process and will be arranging for questionnaires, surveys, and public consultations.

We hope that the information gained through the consultations will help identify routes that need improving to get more people to walk and cycle more and not use their car to get to a destination.

Barry Active Travel Route

Funding was granted to produce detailed design and carry out usage surveys in 20/21 for Waycock Cross, Barry to the Airport, in order to submit an application for construction in 21/22. The Council will continue to push for this much needed Active Travel link to be funded to link Rhoose and Barry and in turn Barry and Cardiff.

St Athan Active Travel Route

The proposed route is creating a shared use facility for pedestrians and cyclists by increasing the width of the existing pathway. Concerns have been raised about the highway environment in this area, specifically for pedestrians, and those school pupils who will be walking, scooting or cycling to school. In response, officers from the Council have investigated options to make improvements which will create a safer walking, cycling and wheeling environment. The main road safety issues identified were related to vehicle speeds and the pedestrian facilities.

The measures will deliver a safer pedestrian and cyclist environment, particularly for vulnerable road users and school pupils, and will improve accessibility to the community area.

Other Active Travel Routes

Feasibility and design works will be undertaken on potential AT routes along Llanmaes Road, Llantwit Major; Geraints Way, Cowbridge and Cardiff Road, Barry through the Active Travel Core Allocation Fund.

For the latest available Active Travel report which highlights completed projects and commitments please utilise the following link.

<https://www.valeofglamorgan.gov.uk/Documents/Living/Transport/Active-Travel/TRA125521-Active-Travel-19-20-annual-report-FINAL.pdf>

Education

The Council offers National Standard Cycle Training levels 1 & 2 to all its primary schools.

Kerbcraft teaches children aged from 5-7 how to be safer pedestrians by taking them onto real roads and showing them how the right decision-making and behaviour can really help them to keep safe.

The Council engaged the services of Sustrans Cymru to undertake school engagement sessions at 8 Vale schools to create active travel maps showing routes to schools. Maps were distributed to schools in Penarth, Barry and Llantwit Major in the first term of academic year 20/21.

Each Primary School in the Vale received 4 balance bikes for use in schools (188 in total) to encourage early positive cycle behaviour. Funding for further provision has been agreed for financial year 20/21.

E-Bike hire scheme

The Vale of Glamorgan Council is the first council in Wales to launch an electric bike share scheme. Following the success of the nextbike cycle hire scheme in Cardiff, we received requests for a similar system in the Vale.

In response to this, a pilot scheme was launched in Penarth and nextbike installed six docking stations, with one also due to launch in Sully.

Electric bikes (E-bikes) are a combination of a conventional bike with a motor that take some of the effort out of pedalling for the rider.

Figure 25 - E-Bikes Located at Cosmeston Country Park



With top speeds of 25km per hour, the e-bikes can cover greater distances in less time and with less effort than conventional cycles.

Docking stations have been installed in the following locations –

- Windsor Road, Penarth
- The Esplanade, Penarth
- Penarth Train Station

- Cosmeston Country Park
- Llandough Hospital
- The Barrage

We will soon be installing stations in:

- Sully
- Dinas Powys

Penarth Cardiff Barrage Sustainable Transport Corridor

For 2019 VoGC together with external consultants completed a Welsh Transport Planning and Appraisal Guidance (WelTAG) Stage 1 'Strategic Outline Case' to develop various options for improving sustainable connectivity through the corridor between Penarth and Cardiff Barrage.

More information on this study can be found here - <https://www.valeofglamorgan.gov.uk/en/living/Roads/Transport-Studies/Penarth-Cardiff-Barrage-Sustainable-Transport-Corridor-Study>

M4 (Junction 34) to A48 Traffic Improvements

The Council has been working with an independent technical consultant to develop proposals for a new road linking the M4 and A48 and a new park and ride at Junction 34 of the M4.

Two possible road routes were identified as part of a WelTAG Stage Two study, both of which would improve links between the M4 and A48, reduce journey times to the airport, and help tackle local traffic congestion.

The public and other interested groups were asked to comment on these proposals in 2018. The Review Group (who were appointed to make recommendations) considered the matter on 02 October 2018.

The Review Group and Council Cabinet took the decision to undertake further feasibility work looking at improvements to the existing road which was undertaken as a WelTAG Stage Two Plus study.

A consultation on the WelTAG Stage Two Plus was undertaken between 30 September and 23 December 2020 and will be reported to Cabinet in March 2021.

More information on this study can be found here –

<https://www.valeofglamorgan.gov.uk/en/living/Roads/Transport-Studies/M4-Junction-34-to-A48-Transport-Improvements>

Dinas Powys Transport Network Study

The Council commissioned consultants Arcadis to undertake a WelTAG (Welsh Transport Planning and Appraisal Guidance) Stage One, Two and Two Plus study to develop and appraise potential options for improving the transport network through Dinas Powys (not progressed further than WelTAG Stage 2 Plus – March 2021).

More information on this study can be found here –

<https://www.valeofglamorgan.gov.uk/en/living/Roads/Transport-Studies/Dinas-Powys-Transport-Network-Study>

Introduction of 20mph limits

St Brides Major

The main road running through the village has been accepted as a pilot scheme for the speed restriction, which will apply from entry to exit. Signs indicating the new limit are on display as drivers approach St Brides, with further smaller signs placed at intervals along the road. The move comes after residents raised concerns about the level of traffic travelling through the village, particularly the frequency with which Heavy Goods Vehicles used the route.

Representations made to the Council and feedback from a consultation exercise suggested they wanted the current 30 mph limit to be lowered. As one of several pilot schemes throughout Wales,

data from the scheme will be gathered ahead of 20mph limits potentially being introduced more widely Wales in 2023.

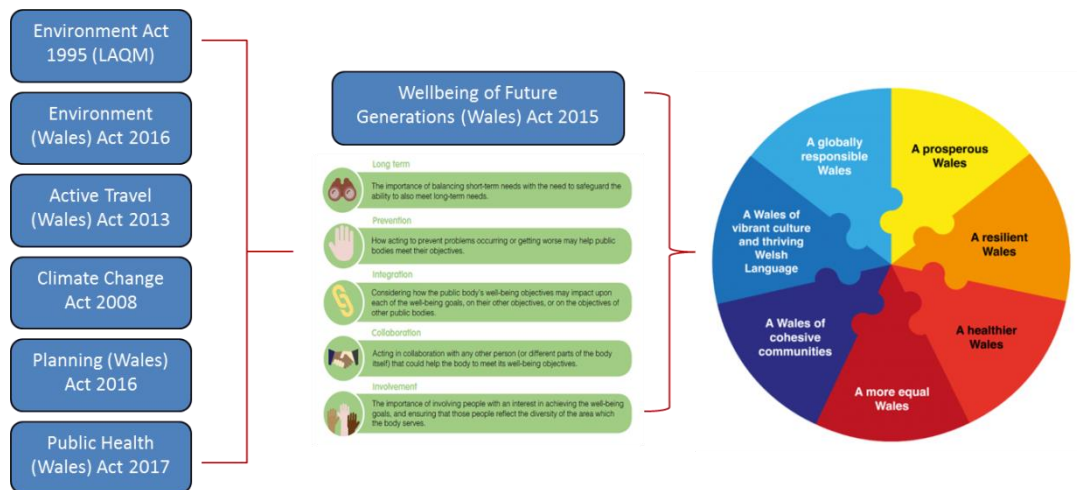
In addition to the existing non-automatic air quality monitoring being carried out in St Brides Major, an automatic monitor has been installed to assess the impact of the reduction in the speed limit on air quality in the area.

4.4 Local Authorities Well-being Objectives

Well-being of Future Generations (Wales) Act 2015

SRS/ VoGC adopts the principles of The Well-being of Future Generations (Wales) Act 2015. The Act is a significant enabler to improve air quality as it calls for sustainable cross-sector action based on the principles of long-term, prevention-focused integration, collaboration and involvement. It intends to improve economic, social, environmental, and cultural well-being in Wales to ensure the needs of the present are met without compromising the ability of future generations to meet their own needs. The Act places responsibilities on public bodies in Wales to work in new ways (including via Public Services Boards) towards national Well-being goals. Progress is measured against a suite of well-being and Public Health Outcomes Framework indicators; there is one specifically concerned with air pollution.

As Figure 26 illustrates below, the Act is the legislative vehicle for “Health in all Policies in Wales” and provides the underpinning principles for all policy and decision making, including economic development, in Wales. Reducing air pollution, health risks and inequalities can help contribute to most, if not all, of the well-being goals. As such, the Act presents excellent opportunities to change policy and practice to enhance air quality management arrangements across The Vale (and wider).

Figure 26 - The Well-being of Future Generations (Wales) Act 2015

Welsh Government, Clean Air Plan for Wales, Healthy Air Healthy Wales

At the time of drafting this report WG has published its latest plan which underpins its commitment and long-term ambition to improve air quality in Wales. The plan sets out WG's policy direction and proposed actions to reduce air pollution to support improvement in public health and the natural environment. Actions are proposed across four thematic themes, examined as People, Environment, Prosperity and Place.

The plan and its proposed actions is available at

<https://gov.wales/sites/default/files/publications/2020-08/clean-air-plan-for-wales-healthy-air-healthy-wales.pdf>

SRS/ VGBC support the aspirations of the plan and welcome the development of more stringent mitigation measures that will enable a cohesive approach to air quality management and protecting public health and the natural environment.

4.5 Green Infrastructure Plans and Strategies

Featured in the adopted LDP, a main objective of the LDP is;

To ensure that development within the Vale of Glamorgan makes a positive contribution towards reducing the impact of and mitigating the adverse effects of climate change.

The LDP will seek to ensure that new development makes a positive contribution towards reducing the impact of and mitigating the adverse effects of climate change. New development will be located in sustainable locations that minimise the need to travel, incorporate sustainable design and building solutions. The Council's Renewable Energy Assessment (2016) has identified opportunities in the Vale of Glamorgan for a range of renewable energy schemes, particularly from standalone solar PV developments, small clusters of wind energy potential, biomass, and micro generation including Building Integrated Renewables [BIR]. Accordingly, to contribute towards meeting national renewable energy targets the Plan includes monitoring targets to meet 21.19% of projected electricity demand and 1.48% of projected heat demand in the Vale of Glamorgan through renewable sources by 2026. Therefore, the LDP will also promote energy conservation and local renewable energy generation. To mitigate the adverse effects of climate change new development will avoid areas susceptible to flooding.

Green Dragon

The Council is committed to obtaining at least Green Dragon Level 1 across the whole of the Council. Green Dragon is a scheme that raises awareness of environmental issues among businesses and staff and promotes sustainable working practices including: -

- reduced waste disposal costs
- increased efficiency
- improved processes
- aids in the achievement of national legislation

5 Conclusion and Proposed Actions

5.1 Conclusions from New Monitoring Data

SRS on behalf of the VoGC has examined the results from monitoring undertaking in 2020. There were no exceedances of any pollutant objective in 2020, including monitoring locations within the declared AQMA.

As outlined within VoGC 2019 APR; In 2019, to proceed with the formal revocation of the Windsor Road, Cogan, Penarth AQMA, in line with the requirements of WG, a detailed air quality assessment was undertaken to finalise the decision to revoke the AQMA. This detailed report is appended to the 2020's Vale Council Cabinet report as Appendix 2B. The report adheres to the requirements stipulated by Welsh Government's policy guidance, demonstrating that compliant air quality levels are being met and demonstrate with a degree of certainty that these monitored compliant levels will be sustained for future years.

The assessment undertaken utilised best practise techniques and guidance to ensure a conservative outcome. In accordance with the air quality objectives applicable to LAQM in Wales, concentrations of NO₂ and PM₁₀ were examined at 28 sensitive receptor locations geographically placed within and in close proximity to the established AQMA boundary. The report takes into consideration previous reporting levels as well as uses air quality dispersion modelling software (ADMS-Roads, Version 4.1.1) and latest emission factors (Version 9.0) to look at current pollutant concentrations and projected concentrations. Three modelling year scenarios were chosen for this study (2018, 2023 and 2028).

Utilising Tables 5.1- 5.3 of the detailed report, the predicted concentrations of NO₂ and PM₁₀ at all modelled receptors within the Windsor Road, Cogan, Penarth AQMA are well below both the annual mean and short term AQS objectives for all modelled year scenarios. As stated by the report.

-The maximum annual mean NO₂ concentration predicted at existing receptor locations within the Windsor Road AQMA was at receptors R16 and R18 with a predicted concentration of 31.2µg/m³, 78% of the annual mean NO₂ AQS objective. Similarly, the maximum annual mean concentrations predicted in the future year scenarios (2023 and 2028) were at receptors R16 and R18 (21.4µg/m³

and 15.7µg/m³ respectively). Both receptors are located on the façade of a property bordering the A4160 (Windsor Road), located along the south-western extent of the AQMA.

-Given that the NO₂ annual mean concentrations predicted at all receptor locations are below this limit for all scenarios, exceedances of the 1-hour NO₂ AQS objective are unlikely.

-The maximum predicted annual mean PM₁₀ concentration at existing receptor locations for the 2018 scenario was at receptors R16 and R18 with a predicted concentration of 21.8µg/m³, 54.5% of the annual mean PM₁₀ AQS objective. Similarly, the maximum annual mean concentrations predicted in the future year scenarios (2023 and 2028) were at receptors R16 and R18 (20.6µg/m³ and 20.1µg/m³ respectively). Both receptors are located within the Windsor Road AQMA.

-The number of days where PM₁₀ concentrations were predicted to be above the 24-hour PM₁₀ 50µg/m³ AQS objective was less or equal to 6 days for all modelled scenarios at all receptor locations. This is well below the 35 permitted exceedances.

Considering the captured annual monitoring datasets and given the outcomes derived by the detailed air quality modelling, the Windsor Road, Penarth AQMA was revoked in January 2021.

5.2 Conclusions relating to New Local Developments

Section 3.5 details a number of local developments seeking planning consent recently or for which a planning application has been received.

These applications have been handled accordingly where Air Quality Assessments have been produced and appropriate planning conditions applied.

5.3 Other Conclusions

There are no other conclusions to be drawn from the information provided herein.

5.4 Proposed Actions

Non- automated monitoring with the use of diffusion tubes **WILL** continue along Windsor Road, Penarth. Automatic monitoring on Windsor Road ceased in January 2021 and the monitoring station was decommissioned and removed.

The Specialist Services Team of SRS will work with VoGC representatives from Highways & Transport and Planning Department, and outline measures which have been undertaken, the effectiveness of these measures and future commitments/initiatives that the Council may need to consider to be implemented in the area to ensure compliance is maintained and improved upon.

As a long-term measure, SRS would recommend that the Vale of Glamorgan Council consider developing a Clean Air Strategy with its main objective to improve air quality and protect public health, whilst considering the sustainable development and future growth within the authority.

References

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9. Clean Air Advisory Panel Report – Impact of the COVID-19 Pandemic on air quality in Wales
<https://airquality.gov.wales/reports-seminars/reports>

Appendices

Appendix A: Monthly Diffusion Tube Monitoring Results

Appendix B: A Summary of Local Air Quality Management

Appendix C: Air Quality Monitoring Data QA/QC

Appendix D: AQMA Boundary Maps

Appendix E: Impact of COVID-19 upon LAQM

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Table A.1 – Full Monthly Diffusion Tube Results for 2020 ($\mu\text{g}/\text{m}^3$)

Site No	Nitrogen Dioxide Sites, VALE CBC	06/01/2020 - 03/02/2020	03/02/2020 - 04/03/2020		04/03/2020 - 01/04/2020	01/04/2020 - 30/06/2020	30/06/2020 - 28/07/2020	28/07/2020 - 02/08/2020	02/08/2020 - 28/09/2020	28/09/2020 - 03/11/2020	03/11/2020 - 03/12/2020	03/12/2020 - 04/01/2021	Annual average	Bias adjusted (0.70) and annual	% Data Capture
COWBRIDGE															
108	4 Cardiff Road, Cowbridge	40.30	25.7		14.20	15.80	13.40	18.20	13.10	22.6	26.40	26.7	21.6	16.4	75
65	1 Riverside Mews, Cowbridge	22.30	12.50		9.40	9.90	6.40	10.30	26.10	17.1	20.60	18.5	15.3	11.6	82
118	6 Middlegate walk, Cowbridge	14.30	7.90			5.80	3.30	5.80	7.00	7.9	14.80	11.2	8.7	6.6	73
101	37 Westgate House	33.10	19.30		10.70	11.30	10.00	12.10	20.00	11.9	23.30	20.7	17.2	13.1	82
LLANTWIT MAJOR															
93	Le Poulguen Way	16.10	7.20		7.40	7.30	4.80	8.50	12.50	9.4	18.00	14.8	10.6	8.1	82
94	5 Boverton Road	13.80	6.80		7.50	6.50	4.80	7.00	8.80	8.6	18.80	13.5	9.6	7.3	82
96	Old Froglands Farm	10.70	5.20		5.50	5.30	2.6	4.30			17.40	10.5	7.7	5.7	64
SAINT BRIDES															
103	September Cottage	16.10	8.2		7.8	7.3	3.3	8.6	9	9.3	17.5	14.4	10.2	7.7	82
104	Greengate Cottage	17.10	8.1		9	8.5	4.7	9.2	10.9	10	16.2	14.9	10.9	8.3	82
105	St. Brides Primary School Walkway Entrance	21.70	9.1		7.6	8.9	5.4	9.6			12.1	10.6	8.5	8.5	55
106	Dany Bryn House	15.60	7.2		7.5	7.1	3	7.5	9.5	8.6	15.4	14.8	9.6	7.3	82
107	Hillboro	12.70	6.1		6.1	5	3	5.9	7.2	7	13.6	13.3	8.0	6.1	82
CULVERHOUSE															
38	2 Horseshoes	28.00	20.50		12.00	14.00	13.80	14.4	20.00	18.3	27	21.10	18.9	14.4	82
DINAS POWYS															
46	46 Cardiff Road	26.50	13.60		14.60	13.90	8.20	16.80					15.6	11.6	55
61	Railway Terrace	47.10				17.60	21.50	30.80					29.3	26.5	36
67	2 Matthew Terrace	31.10	16.60		21.20	20.90	12.10	26.50	27.00	22.4	33.00	27.40	23.8	18.1	82
72a	Dinas Powys Infants School	28.40	17.10		15.50	11.60		16.10	18.60	20.1	27.60	23.90	19.9	15.1	73
92	9 Wayside Cottages, Cardiff Road	42.90	23.20		21.9	25.30	15.60	28.30	29.80	30.9	38.20	29.60	28.6	21.7	82
91	16 Railway Terrace, Cardiff Road	33.20	19.00		15.40	17.60	11.00	19.70	19.80	21.5	30.4		20.8	15.8	82
109	85 Cardiff Road, Dinas Powys	32.40	20.70			15.20	13.80	17.30	22.80	22	30.7	27.00	22.4	17.0	73
110	103 Cardiff Road, Dinas Powys	34.40	19.50		11.80	16.90	13.30	19.50	23.00	23.3	32.9	26.70	22.1	16.8	82
111	203 Cardiff Road, Dinas Powys	35.40	21.20		19.00	20.60	21.30	22.80					23.4	20.9	55
120	Cross Common Road, Dinas powys	25.5	16.4		10.2	12.5	10.1	14.6	17.3	19.1	23.1	25.1	17.4	13.2	82
PENARTH															
22	Stanwell Road	32.20				12.80	13.50	15.90	20.50	21.70	29.70	26.50	21.6	15.8	64
112	Cogan Hill Flats	32.20	18.90		12.70	13.20	12.10	18.40	23.10	19.9	32.00	27.30	21.0	15.9	82
53	168 Windsor Road	40.20	34.40		16.80	19.10	16.40	24.30	33.70		73.00	30.50	32.0	24.4	73
90	159 Windsor Road	33.70	23.80		16.50	16.80	11.40	27.70	29.10	25.80	27.50	26.50	23.9	18.1	82
56	134 Andrew Road	34.50	21.20		14.00	21.90	14.70	19.00	23.80	21.1	29	26.2	22.5	17.1	82
62	154 Windsor Road	45.40	32.50		17.50	20.90	17.00	21.70	34.60	31.2	37.1	34.60	29.3	22.2	82
70	Ty-isaf	28.80	19.10		16.40	16.40	7.80	21.20	23.90	19.30	30.10	25.10	20.8	15.8	82
73a	Windsor Road Monitor 1		29.10		18.40	22.30	18.00	26.6		34.1	41.8	37.5	28.5	22.7	64
73b	Windsor Road Monitor 2	42.50	30.00		17.90	21.40	19.60	28.3	41.1	39.3	36.50	29.6	30.6	23.3	82
73c	Windsor Road Monitor 3	45.20	25.80		19.70	19.40	18.30	26.5	37.7	36.3	36.6	24.5	29.0	22.0	82
74	114 Windsor Road	41.10	30.10		15.90	18.00	15.40	20.10	28.80	26.6	35.6	29.40	26.1	19.8	82
76	160 Windsor Road	45.00	33.00		17.80	20.30	16.60	25.40	35.60	29.2	37.3	31.80	29.2	22.2	82
100	141 Plassey Street	37.40	20.90		12.90	15.80	16.00	18.60	21.90	20.40	34.1	27.3	22.5	17.1	82
79	Marine Scene	50.70	NO DATA		29.10	29.40	21.70		44.40	34.3	48.5	42.7	37.6	27.5	73
113	03 Plassey Street	32.50	26.10		18.30	18.00	10.90	21.90	25.20	22.90	29.5	25.7	23.1	17.6	82
82	98b Windsor Road	26.30	13.10		10.80	11.70			14.00	15.8			15.3	11.8	55
88	134 Windsor Road	45.40	34.20		24.10	21.90	19.10	25.10	34.20	30.8	35.7		30.1	22.8	82
BARRY															
8	Tynewydd Road	41.10	32.60		21.50	21.70	23.50	24.10	34.00	30.70	40.8	31.4	30.1	22.9	82
41	Dispenser Road	17.40	12.10		7.30	7.40	6.80	6.90	9.00	11.4	17.6	14.3	11.0	8.4	82
64	Holton Road	27.30	13.60		13.50	12.60	6.90	15.50	16.20	17.10	24.5	21.8	16.9	12.8	82
66	17 Churchill Terrace	48.70	36.50		19.40	22.30	23.30	24.60	33.20	30.9	41.3	32.30	31.3	23.8	82
116	Flordd y Mileniwm, Barry	29.70	19.90		12.50	13.20	10.60	14.00	19.20	22.5	34.1	25.30	20.1	15.3	82
117	1 Riverside Place, Barry	43.80	31.10		17.50	22.70	18.20	25.10		27.1	38.3	35.10	28.8	21.9	73
102	Powell Dyffryn Way	26.60	17.50		12.50	13.20	10.10	16.60	19.30	19.2	31.5	25.00	19.2	14.6	82
114	107 Dock View Road	21.30	11.20		11.20	10.00	6.00	12.20	21.30	13.7	25.5	19.10	15.2	11.5	82
115	20 Barry Road, Cadogton	41.40	28.10		22.70	23.20	21.00	24.00	30.80	28.2	40	29.40	28.9	21.9	82
119	Dock View Road Co-location	30.40	16.50		11.90	14.80	12.80	17.00	21.30	21.1	31.9	25.40	20.3	15.4	82
121	Buttrills Road	44.50	29.20		19.30	21.10	14.80	25.40	32.5	30.7	43.60	33.0	29.4	22.4	82

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to the nearest relevant public exposure

Appendix B: A Summary of Local Air Quality Management

Purpose of an Annual Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment Act 1995 and associated government guidance. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are being achieved. Where exceedances occur, or are likely to occur, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) within 18 months of declaration setting out the measures it intends to put in place in pursuit of the objectives. Action plans should then be reviewed and updated where necessary at least every five years.

For Local Authorities in Wales, an Annual Progress Report replaces all other formal reporting requirements and have a very clear purpose of updating the general public on air quality, including what ongoing actions are being taken locally to improve it if necessary.

Air Quality Objectives

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in Table 21.

The table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 21 - Air Quality Objectives Included in Regulations for the Purpose of LAQM in Wales

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as	Date to be achieved by
Nitrogen Dioxide (NO₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen Dioxide (NO₂)	40µg/m ³	Annual mean	31.12.2005
Particulate Matter (PM₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2010
Particulate Matter (PM₁₀)	40µg/m ³	Annual mean	31.12.2010
Sulphur dioxide (SO₂)	350µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO₂)	125µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO₂)	266µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	16.25µg/m ³	Running annual mean	31.12.2003
Benzene	5µg/m ³	Annual mean	31 12 2010
1,3 Butadiene	2.25µg/m ³	Running annual mean	31.12.2003
Carbon Monoxide	10.0mg/m ³	Maximum Daily Running 8-Hour mean	31.12.2003
Lead	0.25µg/m ³	Annual Mean	31.12.2008

Appendix C: Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors

A database of bias adjustment factors determined from Local Authority co-location studies throughout the UK has been collated by the LAQM Helpdesk. The National Diffusion Tube Bias Adjustment Factor Spreadsheet (Version 06/21) was used to obtain an overall adjustment factor of 0.76 from the input data shown in the following screenshot. This overall factor is based on 42 co-location studies where the tube preparation method and analysis laboratory used were the same as those used by VoGC.

Figure 27 - National Diffusion Tube Bias Adjustment Factor Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet						Spreadsheet Version Number: 06/21				
Follow the steps below in the correct order to show the results of relevant co-location studies						This spreadsheet will be updated at the end of Sept 2021				
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods						Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet				
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.						LAQM Helpdesk Website				
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.						Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.				
Step 1:		Step 2:	Step 3:	Step 4:						
Select the Laboratory that Analyses Your Tubes from the Drop-Down List		Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ³ shown in blue at the foot of the final column.						
If a laboratory is not shown, we have no data for this laboratory.		If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data ²	If you have your own co-location study then see footnote ⁴ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953						
Analysed By ¹	Method	Year ²	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁵	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	50% TEA in acetone	2020	R	East Suffolk Council	12	30	25	19.6%	G	0.84
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Canterbury City Council	10	13	10	28.1%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Canterbury City Council	9	26	20	29.6%	G	0.77
SOCOTEC Didcot	50% TEA in acetone	2020	UB	Kingston upon Hull City Council	12	24	18	34.8%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	27	21	28.5%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	Ipswich Borough Council	12	36	26	36.3%	G	0.73
SOCOTEC Didcot	50% TEA in acetone	2020	R	Thanet District Council	9	20	17	21.2%	G	0.83
SOCOTEC Didcot	50% TEA in acetone	2020	R	Medway Council	12	26	18	41.7%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	B	Medway Council	11	20	10	96.3%	G	0.51
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	23	22	5.6%	G	0.95
SOCOTEC Didcot	50% TEA in acetone	2020	B	Gravesham Borough Council	12	27	24	16.1%	G	0.86
SOCOTEC Didcot	50% TEA in acetone	2020	R	Monmouthshire County Council	10	32	24	35.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	UI	North Lincolnshire Council	13	18	14	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	24	19	29.0%	G	0.78
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	11	22	17	34.3%	G	0.74
SOCOTEC Didcot	50% TEA in acetone	2020	R	City of York Council	12	33	23	40.4%	G	0.71
SOCOTEC Didcot	50% TEA in acetone	2020	R	Cambridge City Council	10	30	20	47.6%	G	0.68
SOCOTEC Didcot	50% TEA in acetone	2020	R	Wrexham County Borough Council	9	17	13	26.6%	G	0.79
SOCOTEC Didcot	50% TEA in acetone	2020	KS	Marylebone Road Intercomparison	11	59	43	38.0%	G	0.72
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	10	23	23	2.2%	G	0.98
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	12	22	19	18.6%	G	0.84
Socotec Didcot	50% TEA in acetone	2020	R	Horsham District Council	9	25	18	42.0%	G	0.70
Socotec Didcot	50% TEA in acetone	2020	R	Dacorum Borough Council	10	24	19	25.2%	G	0.80
Socotec Didcot	50% TEA in acetone	2020	R	Huntingdonshire District Council	12	36	25	47.1%	G	0.68
Overall Factor ³ (24 studies)					Use 0.76					

Discussion of Choice of Factor to use

The bias adjustment factor applied to all 2020 data is 0.76. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 06/21.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes are supplied and analysed by Socotec UK Ltd Didcot, using the 50% triethanolamine (TEA) in water method. Socotec UK Ltd Didcot participates in the Annual Field Inter-Comparison Exercise and Workplace Analysis Scheme for Proficiency (WASP) inter-comparison scheme for nitrogen dioxide diffusion tube analysis. From April 2014 the WASP Scheme was combined with the STACKS scheme to form the new AIR scheme, which Socotec UK Ltd Didcot participates in. The AIR scheme is an independent analytical proficiency testing scheme operated by LGC Standards and supported by the Health and Safety Laboratory (HSL).

The laboratory Socotec UK Ltd Didcot is regarded ranked as the highest rank of satisfactory in relation to the WASP intercomparison scheme for spiked nitrogen dioxide diffusion tubes.

Information regarding tube precision can be obtained via <http://laqm.defra.gov.uk/diffusion-tubes/precision.html> Information regarding WASP results can be obtained via <http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>

Table 22 - Bias Adjustment Factor

Year	Local or National	National Reference	Adjustment Factor
2020	National	06/21	0.76
2019	National	09/20	0.75
2018	National	06/19	0.77

NO₂ Fall-off with Distance from the Road

No diffusion tube NO₂ monitoring locations within the Vale of Glamorgan required distance correction during 2020.

PM₁₀ and PM_{2.5} Monitoring Adjustment

The PM monitor at the Penarth, Windsor Road site is a Beta Attenuation Monitor (BAM) with gravimetric equivalence. Therefore, in order to present the data as gravimetric equivalence, a conversion factor of 0.83 has been applied, using the European Standards.

Automatic Monitoring Annualisation

All automatic monitoring locations within the Vale of Glamorgan recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO₂ Fall-off with Distance from the Road

No automatic NO₂ monitoring locations within the Vale of Glamorgan required distance correction during 2020.

Table 23 - Annualisation Table (concentrations presented in $\mu\text{g}/\text{m}^3$)

Site ID	Annualisation Factor St Julian's Newport	Annualisation Factor Bristol St Paul's	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
96	0.9864	0.9783	0.9824	5.8	5.7	
105	1.0448	1.0713	1.0580	8.1	8.5	
46	0.9864	0.9783	0.9824	11.9	11.6	
61	1.1506	1.2312	1.1909	22.2	26.5	
111	1.1266	1.2269	1.1768	17.8	20.9	
22	0.9823	0.9418	0.9620	16.4	15.8	
73A	1.0426	1.0528	1.0477	21.6	22.7	
79	0.9836	0.9404	0.9620	28.6	27.5	
82	1.0185	1.0158	1.0172	11.6	11.8	

Appendix D: AQMA Boundary Maps

Figure 28 - Boundary Map of Windsor Road, Penarth AQMA



Appendix E: Impact of COVID-19 upon LAQM

The COVID-19 pandemic has impacted air quality at local, regional and national scales and presented challenges to Local Authorities in undertaking statutory LAQM duties. This section outlines the impact of COVID 19 on air quality in the Vale of Glamorgan during 2020. Welsh Government have produced a report where further detail on air quality impacts from COVID-19 at national scale can be viewed through the [Reports & Seminars section of air quality.gov.wales](https://www.airquality.gov.wales/reports-seminars).

Impacts of COVID-19 on Air Quality within the Vale of Glamorgan

In 2020 a reduction of 19% in the NO₂ annual mean concentration was experienced at all roadside diffusion tube monitoring sites relative to 2019.

The automatic monitor located at Windsor Road, Penarth showed a reduction in NO₂ daily mean concentrations of 41% for the months of April to June 2020 relative to the previous months of January to March 2020. A total reduction of 22% in NO₂ annual mean concentration was also experienced at Windsor Road, Penarth monitoring station compared to 2019.

Opportunities Presented by COVID-19 upon LAQM within the Vale of Glamorgan

No LAQM related opportunities have arisen as a consequence of COVID-19 within the Vale of Glamorgan.

Challenges and Constraints Imposed by COVID-19 upon LAQM within the Vale of Glamorgan

During 2020, access to several diffusion tube monitoring sites was restricted due to their locations on residential buildings. Therefore, it was not possible to maintain diffusion tube exposure periods for April to June in line with the national monitoring calendar for several sites. This has affected data capture within 2020, resulting in a 9 non-automatic monitoring sites having to be annualised.

This has been assessed as having a Medium impact relating to Table 24.

The impacts as presented above are aligned with the criteria as defined in Table 24, with professional judgement considered as part of their application.

Table 24 - Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide