Cardiff Council 2024 Air Quality Progress Report

In fulfilment of Part IV of the Environment Act 1995, as amended by the Environment Act 2021

Local Air Quality Management

Date: December 2024

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Executive Summary: Air Quality in Our Area

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.

Poor air quality in Wales poses a 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 (PM_{10} and $PM_{2.5}$), and primary/ secondary derived nitrogen dioxide (NO_2). Both pollutants primarily originate from motor vehicles.

The UK expert Committee on the Medical Effects of Air Pollution (COMEAP) estimated that air pollution is responsible for "an effect equivalent of between 28,000 and 36,000 deaths (at typical ages) each year" in the UK. In 2022, the UK Health Security Agency updated this estimate; the burden range is now reported as the equivalent of between 29,000 and 43,000 deaths per year[1].

The burden range does not reflect 'actual' deaths from air pollution exposure but is an estimate of the 'equivalent' reduced life expectancy, when summed, which everyone experiences because of air pollution exposure (6-8 months on average but could range from days to years).

In Wales – based on modelled air pollution data pre-pandemic – Public Health Wales estimated the burden of long-term air pollution exposure to be around the equivalent of 1,000 to 1,400 deaths each year[2]. This estimate was calculated using a more accurate method that considers the combined effects of different pollutants, meaning that the overlapping effects of $PM_{2.5}$ and NO_2 are accounted for. Impact estimates are uncertain, however, which is why they should always be presented as a range of values, rather than a single, central estimate.

[1] https://airquality.gov.wales/about-air-quality/health-advice

[2] https://phw.nhs.wales/services-and-teams/environmental-public-health/air-quality/air-pollution-and-health-fact-sheet/

Although estimating the burden of air pollution is difficult, there is clear and strong evidence that it does harm health. It is therefore important to take action to reduce air pollution and the harms that go with it.

Air Quality in Cardiff

Local authorities have a statutory duty under Part IV of the Environment Act 1995 (as amended by the Environment Act 2021) & 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. Details for Air Quality Objectives Included in Regulations for the Purpose of LAQM in Wales can be found in Table 18.

In line with the Cardiff Council's (CC) statutory duties under Part IV of the Environment Act 1995, Shared Regulatory Services (SRS) on behalf of Cardiff Council (CC) undertakes regular air quality monitoring at specifically allocated locations across Cardiff using automated and non-automated principles for ambient air Nitrogen Dioxide (NO_2), Particulate Matter (PM_{10} & $PM_{2.5}$), Sulphur Dioxide (SO_2), Carbon Monoxide (CO) & Ozone (O_3).

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 Technical Guidance (TG22)[3]. The designated monitoring locations are assigned based on relevant exposure and where the Air Quality Objective levels for a particular pollutant applies. TG22 states that annual mean objectives should apply at "All locations where

[3] https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc."

There are currently four Air Quality Management Areas (AQMAs) within Cardiff. These areas are at locations within Ely Bridge, Llandaff, Stephenson Court on Newport Road, and Cardiff City Centre. In 2023, all monitoring locations within the AQMAs were compliant with the relevant objectives for NO_2.

In Cardiff, the main pollutant related to Local Air Quality Management (LAQM) is vehicle derived nitrogen dioxide (NO_2). Nitrogen Oxides (NOx) are formed through combustion of fossil fuels. Primary NO_2 is produced by motor vehicles and is particularly prevalent with diesel engines. Nitric Oxide (NO) is also produced, and chemical reactions with Ozone (O_3) gases within the atmosphere create secondary NO_2. Therefore, the focus on improving air quality within Cardiff in recent years has been to improve and reduce vehicle-derived emissions and exposure to these pollutants.

During 2023, there were no exceedances of air quality objectives within any location in Cardiff. The highest concentration of NO_2 in Cardiff was experienced at diffusion tube site 212 within Llandaff AQMA. However, as displayed in Figure 1, NO_2 concentrations have improved when compared to 2022 and have remained within the annual objective limit for NO_2 since 2019.

Figure 1 - Llandaff AQMA 2019 - 2023 Annual Average NO_2 Diffusion Tube Concentrations µg/m^3.

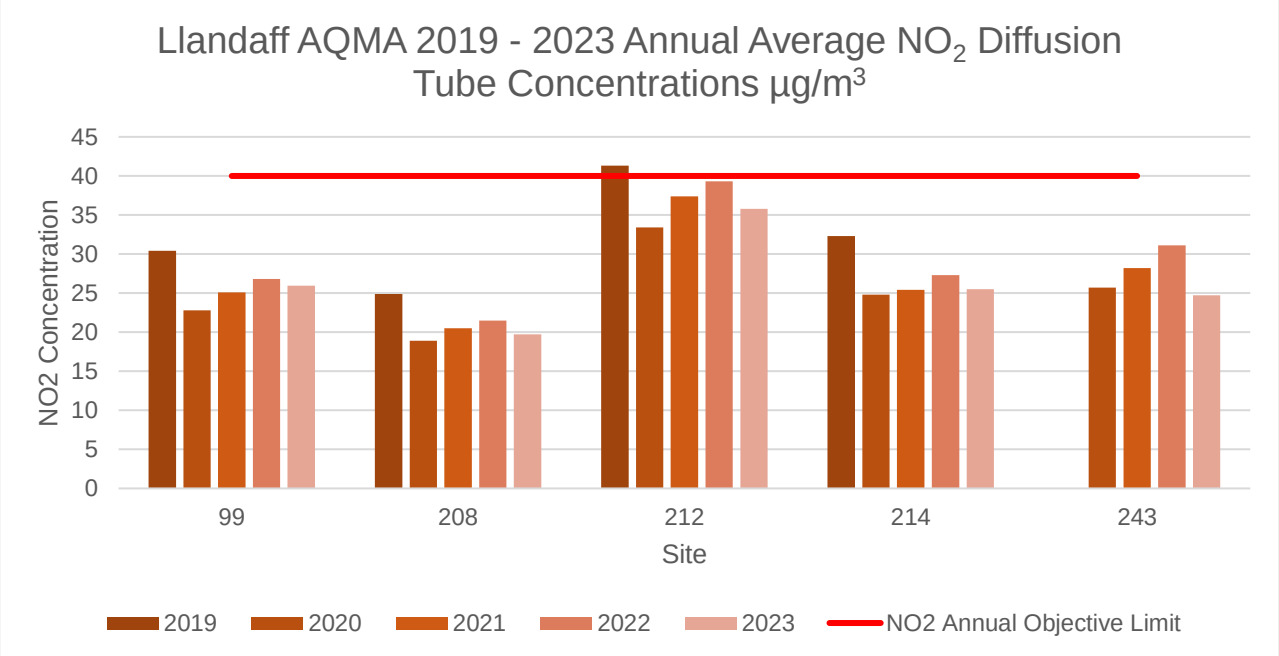
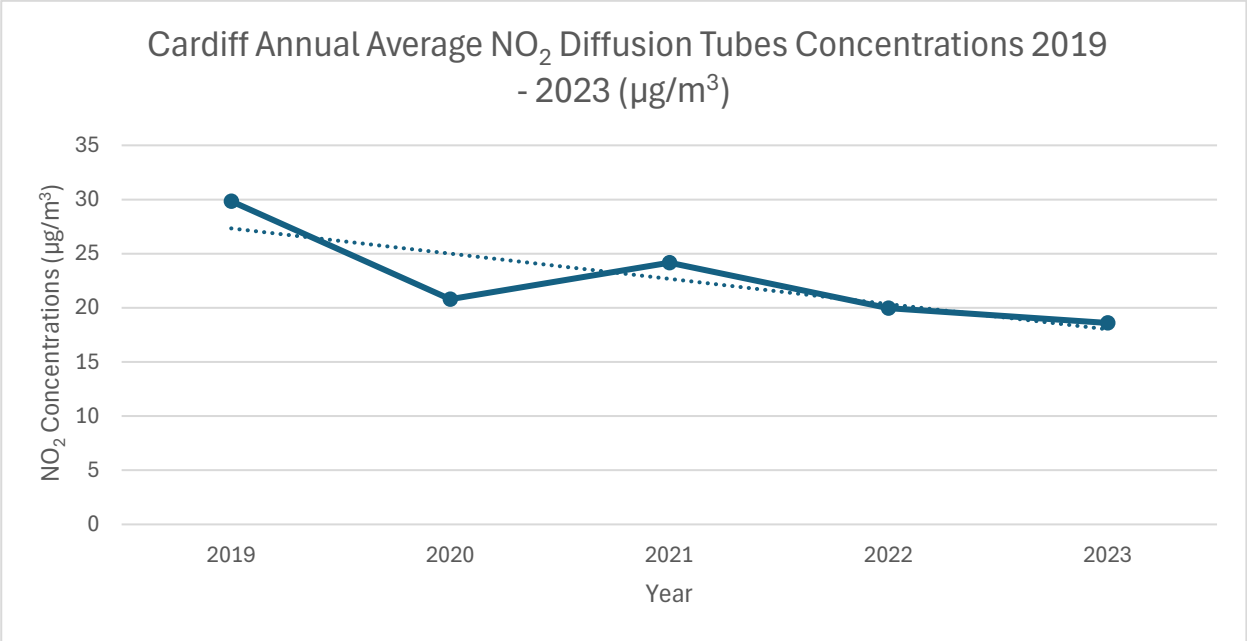


Figure 2 below displays the annual average concentrations of NO_2 at roadside diffusion tube sites since 2019. A decrease of 37% in annual average NO_2 concentrations is evident during this time period. A significant decrease can be seen in 2020 due to Covid-19 pandemic restrictions, which reflects the decrease in traffic during this period. However, when examining average NO_2 concentrations across Cardiff, we are now experiencing levels lower than those during the pandemic.

Figure 2 - Cardiff Annual Average NO_2 Diffusion Tubes Concentrations 2019 - 2023



There are various factors that have contributed to improved air quality in this period. The ongoing turnover in vehicle fleet resulting in the phasing out of older vehicles producing more emissions can improve air quality year by year. Remote and Hybrid working has also remained higher than pre-pandemic levels[4]. These working practices contribute towards decreased traffic and emissions on our roads.

Work carried out by Cardiff Council, as stipulated within the Clean Air Strategy and Action Plan (CASAP), such as the implementation of electric buses has also contributed towards improving air quality.

[4] Coronavirus and homeworking in the UK labour market - Office for National Statistics (ons.gov.uk)

Actions to Improve Air Quality

Clean Air Strategy and Action Plan

Shared Regulatory Services (SRS) and Cardiff Council (CC) are very aware of the concerns for air quality impacts. SRS & CC are committed to achieving levels as low as reasonably practicable by demonstrating levels beyond the annual objectives set for pollutants. In order to improve the air quality in Cardiff, action needed to be taken across the city as a whole. The main air pollutants which cause a public health concern and primarily worsen air quality in Cardiff are particulate matter and primary/ secondary derived nitrogen dioxide (NO_2), derived by transport vehicles.

Welsh Government's publication: Local Air Quality Management, Policy Guidance, June 2017[5] recommended two clear goals:

(1) achieve compliance with the national air quality objectives in specific hotspots; and

(2) reduce exposure to pollution more widely, to achieve the greatest public health benefit.

Collective efforts, therefore, should look beyond targeted action in localised air pollution hotspots and do this in parallel with universal action to reduce risks for everyone.

In view of the statutory obligation to produce an AQAP for each AQMA, in 2019 SRS & CC developed a citywide Clean Air Strategy & Action Plan (CASAP) for Cardiff[6]. The strategy is an evolving document and coincides with Cardiff's Capital Ambition report, helping to implement and deliver the priorities outlined in the Ambition report with an overarching aim to improve air quality to protect and improve public health in Cardiff. The CAS & Action Plan appoints strategic measures that will look to generate a positive impact to citywide air quality levels, in particular traffic derived NO_2 levels. Each measure has endured a cost benefit appraisal procedure by weighting the measures in terms of air quality impact, cost, and timescale. The key theme of the strategic measures is to increase the uptake of sustainable modes of transport by influencing a behavioural change in Cardiff. The CASAP fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP).

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[5] https://www.gov.wales/sites/default/files/publications/2019-04/local-air-quality-management-in-wales.pdf

[6] https://cardiff.moderngov.co.uk/documents/s28264/Cabinet%2021%20March%202019%20Clean%20Air%20App%201%20App%20C.pdf

Electric Buses

Cardiff Council has been successful in supporting the transition of buses on the Cardiff network to becoming fully electric. Cardiff Bus introduced thirty-six new electric buses into their fleet from January 2022. It was delivered through a collaboration between Cardiff Bus and Cardiff Council after a successful bid for funding from the Department for Transport's (DfT) Ultra-Low Emissions Bus (ULEB) Scheme that received funding of £5.7m.

Bus Retrofit Scheme

Following an open application process which ended on the 31st of December 2020, and subsequent review process, two application submissions were deemed successful. Here 80% funding to cover capital costs has been awarded to two bus operators/ companies, a total of £561,612 awarded.

£191,920 has been awarded to Cardiff City Transport Services Ltd (Cardiff Bus) to retrofit twenty buses, and £369,692 has been awarded to Red and White Services Ltd, T/A Stagecoach South Wales to retrofit 29 vehicles.

Both operators completed the programme of works in Q4 of 2021 and have ensured that some of their older buses have improved their NOx emissions by some 90%.

Indicative Automatic Monitoring Network

Utilising One Planet Cardiff Funding, in April 2023, automatic Vortex monitoring sensors were installed at specific locations across Cardiff, primarily within AQMA locations and near schools to measure NO_2 and particulate matter (PM_{10} and $PM_{2.5}$). The monitors will further improve how Cardiff Council measures air pollution to deliver more comprehensive air quality benefits across the city. Data from this monitoring is available within this report.

Figure 3 - VTX Sensor

Local Priorities and Challenges

In June 2021 Cabinet approved the construction of the original City Centre North Scheme as detailed in the initial Clean Air Plan , albeit on an interim basis. This basis of implementing an interim scheme was on the need that any wider impacts following a full post Covid recovery period could be fully accounted for to ensure that no detrimental impacts in terms of congestion and air quality would result from the Clean Air Scheme.

Following implementation of the interim scheme the Council has maintained regular monitoring and assessment of traffic and air quality impacts on Castle Street to demonstrate that compliance is being maintained. The results for 2023 detailed that compliance was achieved with an annual average NO_2 concentration of 33 $\mu g/m^3$ recorded.

Owing to the decision for an interim scheme being implemented in late 2021, the Council has ensured that constant dialogue and ongoing collaboration with Welsh Government officials has been maintained to ensure that the Plan remains on course to deliver and maintain compliance on Castle Street.

In order to formalise a time period to bring forward a permanent scheme on Castle Street, the Welsh Government have issued the Council with a further legal direction under Part IV of the Environment Act 1995. The direction set out measures the Council needed to implement to ensure that compliance for the NO_2 limit value on Castle Street is maintained.

In 2023/24 the Council has been working with Welsh Government and their Clean Air Expert Panel to agree a revised final report and funding to deliver a permanent Castle Street Scheme. This has now been approved by Welsh Government, as per the letter from the Deputy First Minister, received 4th November 2024.

The Council will now progress to final design works with a view to tendering for the main works early in 2025

It will be imperative that the CASAP is reviewed following the full implementation of the Clean Air Plan to further prioritise measures and to ensure air quality levels are continuously improved in Cardiff.

An initial internal working group has begun reviewing all current work programmes, linked to Transport and One Planet Cardiff, in order to ensure that an updated CASAP can be developed which fully aligns with these key commitments, to ensure continued improvements in Cardiff's Air Quality can be achieved. The Council will look to bring forward an updated CASAP in 2025.

How to Get Involved

CC welcomes any correspondence relating to air quality enquiries or concerns. Shared Regulatory Services (SRS) Specialist Services Team represents CC for local air quality management and therefore is contactable using the following email address environment-srswales@valeofglamorgan.gov.uk

For any enquiries surrounding Cardiff's Clean Air Plan, specifically the roll out of mitigation measures please contact Cardiff's Clean Air Team on cleanairproject@cardiff.gov.uk.

Hourly and Monthly average automatic monitoring data for pollutants measured in Cardiff are available to view at https://airquality.gov.wales/

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Previous Work in Relation to Air Quality

Phase 1

The Local Air Quality Management regime commenced with the Air Quality Regulations 1997, which came into force in December of that year. These Regulations were revoked and superseded by the current Air Quality (Wales) Regulations 2000 (as subsequently amended in 2002).

The first phase of the review and assessment process concluded that for six of the seven pollutants included in the regulations there was little, or no risk of the objectives being breached and that Air Quality Management Areas (AQMAs) for these pollutants were not necessary. Measures taken at the national level would be sufficient to ensure that there would be no local “hot spots” of these pollutants and therefore local controls in addition to the national measures would not be required.

However, for the seventh of these pollutants, nitrogen dioxide (NO_2), it was concluded that national control measures such as vehicle emission and fuel standards, controls on industrial emissions, etc., would not, of themselves, be sufficient to ensure that the air quality objectives for this pollutant would not be met in all areas of Cardiff.

Whilst the vast majority of the area would meet the objectives, there were predicted to be local “hot spots” close to heavily trafficked road junctions where there were buildings close to the road and significant amounts of queuing traffic where the objectives would not be met.

As a result, four AQMAs were declared, each having been declared based on measurements and modelling showing predicted breaches of the annual average objective for NO_2. These AQMAs were known as;

- The Cardiff West AQMA
- The Newport Road AQMA
- The Philog AQMA
- The St Mary Street AQMA

The first three of these came into force on 1st December 2000 and the latter on 1st September 2002. Subsequent AQAPs were published in November 2002 and for St Mary Street in February 2010.

Phase 2

The Council's 2003 USA concluded that for five of the seven pollutants regulated under the LAQM regime there was no evidence to suggest that local "hot spots" for these pollutants had been missed in the first phase of the review and assessment process and that there was no need to consider these pollutants further at this time.

The 2003 USA also concluded that no local hot spots of nitrogen dioxide had been overlooked during the first phase of review and assessment and that further detailed assessment of this pollutant was not necessary.

However, whilst the USA concluded that there was no evidence to suggest a likely breach of the 2004 objective for particulate matter (PM_{10}), there was considerable doubt that the provisional 2010 objectives for PM_{10} would be achieved.

As a result of the conclusions of the 2003 USA the Council issued Progress Reports in 2004 and 2005.

Phase 3

Following the 2006 USA, the Council published and consulted upon an Air Quality Management Area (AQMA) Review during the autumn of 2006. This concluded that two of the four AQMAs could be revoked and that the then Cardiff West AQMA should be reduced in size and renamed as the Ely Bridge AQMA. Orders making the changes came into force on 1st February 2007.

The 2007 Progress Report highlighted a potential problem with regard to nitrogen dioxide concentrations on Newport Road in the immediate vicinity of Stephenson Court, where concentrations had been marginally, but consistently, above the Air Quality objective for a few years. It was concluded that the possibility of declaring a new AQMA would be assessed in the 2008 Progress Report.

The monitoring data for the Stevenson Court area presented in the 2008 Progress Report led to the conclusion that a further "watching brief" would be kept with a view to reaching a firm conclusion once ratified monitoring data for the 2008 calendar year became available.

The monitoring data for 2007 presented in the 2008 Progress Report provided reassurance that the Council's decisions in respect of the 2006 AQMA Review were soundly based.

Phase 4

The 2009 USA concluded that a Detailed Assessment for the Stephenson Court area of Newport Road was required as the annual mean concentration of nitrogen dioxide at three sites representative of relevant exposure in the area were above the air quality Objective.

A Detailed Assessment for this area was consulted upon during the summer of 2010 and the AQMA came into force on 1st December 2010.

The Council's 2010 Progress Report was submitted in December 2010 and the 2011 Progress Report in June 2011.

The 2011 Progress Report highlighted abnormally high NO_2 2010 annual mean concentrations across the Council's monitoring network which could not be attributed to a particular source and evidence was presented to show that this was a regional issue probably associated with a prolonged period of unusually cold weather during November and December 2010. After dialogue with Welsh Assembly Government with regard to the conclusions reached about this data it was concluded that the Council would proceed to Detailed Assessments for the Llandaff and Westgate Street areas of the city and review the situation with regard to other exceedances when 2011 data is available and reported in 2012.

A Further Assessment for the Stephenson Court AQMA was submitted to WAG for review in December 2011, i.e. one year after the AQMA was declared, in compliance with Section 84(2)(a) of the Environment Act 1995.

Phase 5

The 2012 USA was the first report in Phase 5 of the review and assessment process. Monitoring data for 2011 largely confirmed that the annual mean concentrations of nitrogen dioxide previously reported for 2010 were unusually elevated, both locally and regionally, and local concentrations had returned to more typical values in 2011. Detailed Assessments in respect of nitrogen dioxide in Westgate Street and for the Llandaff area were consulted upon during the summer of 2012 and as a result a new AQMA for Llandaff was declared on

1st April 2013 and Westgate Street was incorporated into the St Mary Street AQMA; this latter AQMA is now named Cardiff City Centre AQMA.

The Council's 2013 Progress Report recommended proceeding to a Detailed Assessment for the Fairoak Road Roundabout in the Plasnewydd Ward of the city as monitoring data over previous years indicated the need. This was submitted for review during 2014. The Assessment concluded that, as monitoring data for 2013 had returned to Objective compliance, there was no need to declare an AQMA at that time. It was proposed to continue monitoring in the area and review the results year-on-year.

The Further Assessment for the City Centre AQMA was submitted in April 2014 and the conclusion that the declaration of the AQMA was justified was accepted.

A Further Assessment for the Llandaff AQMA was also submitted for review in 2014. This concluded that the declaration of the AQMA was justified based upon monitoring data available at the time. However, as monitoring data for 2013 showed compliance with the Objective, it was concluded that there was no need to develop an Action Plan at that time. Monitoring would continue and the situation would be reviewed year-on-year.

In summary, there are currently four AQMAs in Cardiff; all have been declared in respect of NO_2 resulting from road-traffic emissions:

- Cardiff City Centre AQMA
- Ely Bridge AQMA
- Stephenson Court AQMA
- Llandaff AQMA

Phase 6

The 2015 USA was the first report in Phase 6 of the review and assessment process. Monitoring data for 2014 largely confirmed that the annual mean concentrations of nitrogen dioxide previously reported for 2010 were unusually elevated, both locally and regionally, and local concentrations had returned to more typical values in 2011.

Monitoring data for 2015 indicated that annual mean concentrations of nitrogen dioxide were not unduly elevated during the year and that in some location's concentrations may have been lower than expected. The 2016 Progress Report showed a number of sites

representative of relevant exposure with exceedances of the 40µgm3 annual mean objective; however, these sites and recorded exceedances were not out of character as were predominantly contained within the declared AQMAs.

2017 Annual Progress Report

There are a number of sites representative of relevant exposure with exceedances of the NO_2 annual mean objective (40µg/m^3). These sites are predominantly contained within the declared AQMAs. However, there are four monitoring locations (Site IDs 172, 180, 181, 185) which are not located within AQMAs.

Site 172 (Ocean Way) is a kerbside location situated up to 650m from any relevant exposure, used to examine potential impacts of traffic resulting from industrial development in the area.

Sites 180 & 181 were implemented due to new developments with the potential for adverse air quality impacting the amenity of future occupants (Windsor House, Windsor Lane & Fitzalan Court, Newport Road). Both developments were under construction in 2016, therefore influencing any datasets recorded. Only recently has the student accommodation at Windsor House been completed and construction still continues at the Fitzalan Court site.

Site 185 is not representative of relevant exposure and does not apply to the annual mean objective set for NO_2. Therefore, datasets collected at this monitoring location would apply to the 1-hour objective set for NO_2 (200µg/m3, not to be exceeded more than eighteen times per year).

Monitoring for other pollutants did not result in other exceedances of National Air Quality Standards.

Due to technical issues, Cardiff City Centre's AURN site recorded low data capture for PM10 measured by a TEOM- FDMS sampler. The total data capture for the year was 47.1%. As outlined in LAQM technical guidance, the data from the sampler has been annualised in accordance with Box 7.9 and the 90.4th Percentile value has been given to examine the 24-hour objective.

It was decided not to revoke the Llandaff AQMA. Since the declaration of the Llandaff AQMA in 2013, results have highlighted that levels of $NO_2$are generally improving and are now below the national objective of 40µg/m3 at locations of relevant exposure. Based on recent results the Council could be minded to revoke the AQMA. However, the 2017 APR

highlighted that any decision made to revoke the AQMA needs to be mindful of the potential development of the strategic LDP sites to the north of the AQMA, Plasdwr and BBC Studios. Whilst detailed air quality assessments undertaken as part of the planning process have modelled that there is unlikely to be a detrimental impact on air quality levels in the AQMA, this can only be fully verified through on-going monitoring.

Therefore, in an effort to reassure local residents and to be totally satisfied that levels will remain compliant with the NO_2 standard, SRS on behalf of CC reviewed the non-automatic monitoring network of NO_2 diffusion tubes for 2018. As a result, new and amended monitoring sites have been allocated. Officers will further assess the potential to implement real-time capabilities in the Llandaff AQMA as part of the Council's statutory duties under Part IV of the Environment Act 1995. There are now four monitoring locations within the Llandaff AQMA.

Monitoring for other pollutants did not result in other exceedances of National Air Quality Standards.

2018 Annual Progress Report

Monitoring data for 2017 indicates that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure, within the already established AQMAs, continue to be elevated or exceed the annual mean NO_2 Air Quality Standard (40µg/m³).

The datasets indicate that the annual average objective for NO_2 was breached at monitoring locations outside of the existing AQMAs (Sites 172, 179, 180 & 181).

It is felt that at this stage no further detailed assessments are required.

Site 172 is placed on Ocean Way to monitor potential impacts of traffic resulting from industrial developments in the area. The site is not representative of relevant exposure, the nearest being >650m away. For 2018 Site 172 has been revoked from the monitoring network as it is felt that a strong trend of data has been collected at this location.

The 1-hour objective for NO_2 need only apply to site 179.

Sites 180 & 181 were implemented to monitor air quality levels and therefore the potential impacts to future occupants at new development sites. These developments were still under construction in 2017 and therefore datasets collected will be negatively influenced.

The report also documented the works ongoing to produce the CASAP document, as well as outlining the development of the Feasibility Study in line with the Legal Direction received from the Welsh Minister.

2019 Annual Progress Report

Monitoring undertaken in 2018 confirmed annual average NO_2 levels continued to breach or encroach upon set limit values/ air quality standards within already established AQMAs (7 exceedances of the annual mean objective in total).

The report provided an update regarding the completion of the Clean Air Strategy and Action Plan document (CASAP), as well as an update of mitigation measures proposed to address air quality concerns for Cardiff. The report also documented the finalisation of the Full Business Case (FBC) and its outcome in accordance with Welsh Government's issued Legal Direction.

2020 Annual Progress Report

The 2020 reported identified that in 2019, out of the 100 diffusion tube monitoring locations, 6 monitoring sites recorded exceedances of the annual average objective set for NO_2 (40 $\mu g/m^3$). All six monitoring locations were recorded within the already established City Centre and Llandaff air quality management areas (AQMA).

The report provided an update on the monitoring undertaken at 9 schools across Cardiff where previous studies from Client Earth identified the schools to be in close proximity to road links likely to cause exceedances of the NO_2 air quality standards. Monitoring undertaken at the nine schools fully demonstrated continuous compliance with the annual average air quality standard for NO_2 for two success years. The report also provided an update of monitoring undertaken at a further six schools as part of a citizens science project funded by Natural Resources Wales. Again, monitoring at these six schools demonstrated compliance with the objective for NO_2.

The report documented the approval from Welsh Government of the Final Clean Air Plan and awarding of funding to ensure the Council delivered compliance with the NO_2 limit value under the legal duties of the Ambient Air Quality Directive.

2021 Annual Progress Report

Monitoring data for 2020 indicated that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure, within the already established AQMAs, all showed compliance with the annual mean NO_2 Air Quality Standard (40µg/m³). The results are indicative that the impacts of the COVID lockdowns and restrictions therein have had an impact on pollution levels in Cardiff which is likely owing to traffic volumes having decreased. It is therefore likely that the concentrations recorded in 2020 are not representative of a true business as usual scenario and the results have generated a bias/ underestimation of levels of pollution across Cardiff in 2020.

2022 Annual Progress Report

Monitoring data for 2021 indicates that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure within the already established AQMAs are compliant with the annual mean NO_2 Air Quality Standard (40µg/m³). The results are indicative that the impacts of the COVID lockdowns and restrictions at the beginning of 2021, and the subsequent behavioural changes once restrictions were lifted, may have influenced pollution levels in Cardiff in 2021. It is therefore likely that the concentrations recorded in 2021 are not representative of a true business as usual scenario and the results have generated a bias/ underestimation of levels of pollution across Cardiff in 2021.

Therefore, monitoring within the AQMAs has continued in 2022, consideration of any future actions for the AQMAs will be assessed by the Council once an assessment of the longer-term recovery from Covid has been determined.

2023 Annual Progress Report

The 2023 APR found that concentrations of NO_2 at site 212 within Llandaff AQMA were close to the annual mean NO_2 Air Quality Standard (40µg/m³), therefore further investigation and assessment of the local issues in the AQMA were considered before deciding on whether further action may be necessary.

SRS will continue to monitor and review results in the Stephenson Court AQMA. It may be feasible to consider revoking the AQMA due to continued compliance with the annual mean NO_2 Air Quality Standard (40µg/m³). Any such decision to revoke the AQMA will require

statutory consultation and approval from Welsh Government. The Council will need to undertake a detailed assessment to demonstrate that compliance will continue. Any decision on the revocation of AQMA will need to consider the potential of any revised air quality targets as a result of the Environment (Air Quality and Soundscapes) (Wales) Bill.

At all other locations, concentrations are all below the objectives, therefore no further action was required.

The implementation of COVID measures in the City Centre accelerated the Council's achievement of compliance with limit values for NO_2 under the Ambient Air Quality Directive, on Castle Street. The Interim implementation of the Castle Street Scheme as approved by Welsh Government, was completed at the end of October 2021. The Council has ensured ongoing monitoring has been undertaken. At the time of writing this report a Final Plan is being drafted which includes further assessments using updated traffic data, collected post Covid. The Final Plan will detail that the Councils preferred option will be to install a permanent version of the existing interim scheme, and this will be implemented upon approval from Welsh Government.

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when air quality is close to or above an acceptable level of pollution (known as the air quality objective (Please see Table 18). After declaring an AQMA the authority must prepare an 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. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

A summary of AQMAs declared by Cardiff Council can be found in Table 1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/list

Table 1 - Declared Air Quality Management Areas (AQMA's)

AQMA	Relevant Air Quality Objective(s)	Comments on Air Quality Trend	Description	Action Plan
Cardiff City Centre	NO_2 annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	Former St Mary Street AQMA with the addition of Westgate Street in Cardiff City Centre	Cabinet 13 June 2019 Clean Air Appendix 1 Clean Air FBC.pdf (moderngov.co.uk)
Llandaff	NO_2 annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019, and an improvement since 2022.	Centre on Cardiff Road through Llandaff village	
Stephenson Court	NO_2 annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	From NE and NW boundaries of Stephenson Court, NW boundary of Burgess Court, NW and SW boundaries of Four Elms Court, SW corner of Four Elms Court south across Newport road to the junction with Orbit street, West across Newport Road to the SE corner of Stephenson Court	
Ely Bridge	NO_2 annual mean	This year's monitoring results indicate an improvement in air quality compared to pre-covid data obtained in 2019.	A number of residential premises along the A48 Cowbridge Road West,	

AQMA boundary maps within Cardiff can be viewed at Local Authority Details - Defra, UK and are included in Appendix D.

Implementation of Action Plans

Cardiff Council have taken forward several measures in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2. More detail on these measures can be found in the Air Quality Action Plan relating to designated AQMAs.

Air Quality Action Plans are continuously reviewed and updated whenever deemed necessary, but no less frequently than once every five years. Such updates are completed in close consultation with local communities.

Each of the outlined AQMAs were declared as a result of road-traffic derived NO_2.

In view of the statutory obligation to produce an AQAP for each AQMA, in 2019 SRS & CC developed a citywide Clean Air Strategy & Action Plan (CASAP) for Cardiff. The strategy is an evolving document and coincides with Cardiff's Capital Ambition report[7], helping to implement and deliver the priorities outlined in the Ambition report with an overarching aim to improve air quality to protect and improve public health in Cardiff. The CAS & Action Plan appoints strategic measures that will look to generate a positive impact to citywide air quality levels, in particular traffic derived NO_2 levels. Each measure has endured a cost benefit appraisal procedure by weighting the measures in terms of air quality impact, cost, and timescale. The key theme of the strategic measures is to increase the uptake of sustainable modes of transport by influencing a behavioural change in Cardiff. The CASAP fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP).

[7] https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/capital-ambition/Pages/default.aspx

Table 2 - Progress on Measures to Improve Air Quality

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
Modal Shift & Influencing Travel Choice											
1.1	Increase Bus Use	Alternatives to private vehicle use	Proposals are in place for a park and ride system at Junction 33 which would look to intercept traffic on the A470, north Cardiff.	CC	No definite Start Date		Bus patronage figures produced via telematics	Unknown	The preparation of a draft Park and Ride Strategy for Cardiff has begun, and the Park and Ride at Junction 33 is being planned for delivery by the developer	Ongoing	
1.2	Promotion of cycling and walking	Promoting Travel Alternatives	DRAFT Cycling Strategy sets out to double number of cycling trips by 2026; 9.2%	CC	Ongoing		Cycle trips generated/ questionnaires	Unknown	Draft report and Cabinet Report seeking approval to undertake statutory consultation	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			modal share in 2015 to 18.4% in 2026. Five cycleways proposed. The INM prioritises cycling and walking routes over 15-year period.						has been prepared and will be considered by Cabinet in The number of responses and technical work required means that it will not be possible to evaluate comments and make appropriate adjustments to draft Map and complete it in time to meet Welsh Government's (WG) 31st December 2021		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									deadline. WG officers to be informed that Cardiff unable to meet 31st December 2021 deadline and Council officers will seek extension of deadline in light of exceptional level of engagement on Cardiff's Active Travel Network Map		
1.3	School Travel Plans		CC has engaged with 'Living Streets' charity and have	CC & Living Streets Charity	Ongoing		Report updates from Living Streets	Unknown	In 2021 this has increased to 43 schools	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			developed a 'WOW' (Walk Once a Week) scheme in seven allocated schools in Cardiff.								
1.4	School Travel Plans		Cardiff Council's Schools Streets Project and its Traffic Regulation Order (TRO) pilot project.	CC	Ongoing		Monthly average NO_2 levels examined at School property, Inside TRO and Outside TRO zone at residential facades. Questionnaires for school pupils and parents.	Unknown	21 schools assigned to the TRO Zone pilot project.	Ongoing	All locations remain well below NO2 annual objective limit.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1.5	Personalised Travel Planning	Promoting Travel Alternatives	Public Service Board Staff Charter.	Public Health Wales/ Vale and Cardiff Health Board	Working initially through Cardiff Public Services Board, a Healthy Travel Charter for Cardiff has been developed with major public sector employers and was launched in April 2019.		Modal shift counts. Number of participating public sector organisations.	Unknown	The Charter was signed by 11 public sector organisations at launch in April 2019, employing over 33,000 staff, with additional public and private sector organisations subsequently invited to sign up to the Charter.		
1.6	Increase awareness of air quality concerns	Public Information	Cardiff 'car-free' day	CC			Air Quality Measurements.	No target	When comparing Sunday 19th May to Car-Free Day event 12th May, the daily average reduction for NO2 is as follows. Duke Street/ Castle Street- 16.11% Stephenson Court on Newport Road- 28.15% Westgate Street- 13.62% Lower Cathedral Road- +9.14%		Try to geographically expand and hold car-free days more regularly in Cardiff.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
1.7			Tredegarville CIW Primary School "Green Wall" project.	CC	Complete	August 2019	Air quality levels recorded at the school via non-automated principle diffusion tubes.	No target	Successful application under the Landfill Communities Fund to cover the supply and installation of outdoor green walls at Tredegarville CIW Primary School. Successfully installed August 2019. Additional Schools have been included in further Living Wall Projects in 2022.		Investigate monthly average diffusion tube results following implementation. Reduction seen at façade.
1.8			Dusty Forge/ Kitchener Primary School/ Birchgrove Primary School. Green Wall Projects	CC	Complete	November 2020	Air quality levels recorded via non-automated principle diffusion tubes.	No Target	Welsh Government's 'Local Places for Nature' scheme. In summary it is proposed to install green walls at 2 Council owned buildings in areas of poor air quality and develop a citizen science project with the local community		Investigate monthly average diffusion tube results following implementation. Reductions seen at school façade.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									to monitor changes in air quality and biodiversity.		
Infrastructure											
2.1	Bus Route Improvement	Transport Planning and Infrastructure	City Centre Improvement Schemes (3 elements East side/ City Centre North/ City Centre West)	CC & WG	2018	2019 (City Centre West Initiated) 2020 (city centre north and east initiated)	FBC	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable. Package of City Centre Schemes deemed to improve air quality levels for Castle Street. Revised	City Centre West (central Sq. Scheme) continued construction throughout 2021, with view of completion by 2023 for opening of Bus Interchange in 2023. Castle Street remained closed through most of 2021, with interim scheme	2024	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
								modelling shows levels of 28 µg/m^3 will be achieved.	installed an opened from Nov 2021. City Centre East scheme commenced site preparation works in November 2021, with main works commencing early 2022.		
2.2	Public Cycle hire Scheme		Ovo Bike Hire Scheme	CC	Ongoing		Daily reports on usage provided to CC. 150,000 rentals reported since March 2018.	Unknown	50 docking stations installed providing 500 bicycles for public use. Extra 500 bicycles assigned to	Completed and continues to be expanded and enhanced.	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Cardiff for the end of Summer 2019. Completion of the rollout of the Ebike fleet by September 2021, delivering a new fleet of 125 bikes in up to 15 rental stations. Completion was delayed into Q1/2 of 2022		
2.3	Cycle Network		Proposed Cycleways	CC & WG	Ongoing		Cycling trip counts.	3.5% modal shift which aligns with the assumptions derived in the feasibility study.	Cycleway 1 St Andrew's Crescent to Senghennydd Road **(works are complete for phase 1 of**	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									cycleway 1. Phase 2 constructed in 21/22. Phase 1 between Cowbridge Road and Western Avenue via Sophia Gardens and Pontcanna Fields has been fully delivered and the Council has completed a detailed consultation on the options for Phase 2 which will connect		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Western Avenue with Llandaff village. **Pop Up Cycleways** •Cross City Scheme complete and ready for junction switch on when traffic conditions allow •Bay Pop Up complete, now requires new street lighting to be compliant with safety regulations.		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									•Scheme to open officially once the lighting work is complete Hailey Park •Scheme awaiting tender following consultation outcome Cycleway 5 •Scheme out to consultation •Scheduled to be on site Q1/2 2022-23		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Cycleway 1 •Scheme entered on site September 2021 •Work progressing well •Controlled Parking Scheme to follow early 2022		
2.4	Public transport improvements-interchanges stations and services		New Cardiff Central Interchange development	CC	Ongoing		Detailed AQAs quantifying the level of impact to air quality levels.	To ensure development does not cause any adverse impact and where possible	Construction of the Interchange has continued throughout 2021 and remains on		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
								reduce levels to as low as reasonably practicable	course to be completed in 2023.		
2.4	Public transport improvements- interchanges stations and services 20 mph zones		Cardiff Capital Region Metro - Proposed by WG (Rail and bus based rapid transit routes).	CC	Ongoing			Unknown- supporting AQA will be a likely during the design and application stages	Good progress has been made to identify measures to encourage the use of sustainable travel as the economy recovers in partnership with the Welsh Government, the Burns Delivery Unit, Transport for Wales, City Region, public transport operators and key stakeholders. These measures include corridor improvements for Active Travel, bus priority, ongoing financial support for the bus services, integrated ticketing pilot between Cardiff and Newport in 2022, plans for new transport interchanges (Cardiff Central, Waungron and Cardiff Parkway)		Ongoing

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									and study work on new Metro station and line improvements.		
2.5			Implement further speed restrictions and enhance those already established "20mph Zones"	CC & WG	Ongoing		Safety figures & Monthly Average Diffusion tube results.	Unknown	CC has introduced 'signs only' 20mph limits in Cathays and Plasnewydd area. Approach coincides with the Safe Routes to School Programme. Plans are in place to hopefully expand 20mph limit areas in Grangetown.	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									This is complete.		
2.6	20 mph Zones	Traffic Management		CC	Implementation		Realtime Monitoring	Unknown	Cardiff North Area has been included as a Pilot Area for WG assessment into 20 mph where existing limits are 30 mph. This study will assist in National roll out of 20 mph as default urban speed limit.	2022	
2.7	20 mph Zones	Traffic Management		Welsh Gov	Implementation		Realtime Monitoring	Unknown	Cardiff North Area has been included as a Pilot Area for	Nationwide September 2023.	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									WG assessment into 20 mph where existing limits are 30 mph. This study will assist		
Lower Emission Vehicles											
3.1	Public Vehicle Procurement		Ultra-Low Emission Bus (ULEB) fund made available by the Department for Transport (DfT).		Ongoing	Three year rolling programme 2019- 2021	Improvements to air quality levels (NO_2) monitored by indicative methods by CC at sensitive receptor locations on specified routes	>2µg/m3 reductions in NO_2 sensitive receptor locations along Westgate Street	Application received by DfT and deemed successful. Initial buses delivered in November 2021 and all 36 launched in January 2022.		
3.2	Company Vehicle		Sustainable fuels strategy-	CC, DfT &	Ongoing	Economic savings and	Unknown	End of 2021 59 charge points	Ongoing		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
	Procurement- Prioritising uptake of low emission vehicles/ EV recharging	Promoting Low Emission Transport	assessment of Cardiff Council vehicle fleets	Cardiff Bus		reduced Carbon footprint		across 7 Council sites fully implemented. 6 Rapid chargers which will support charging for 12 refuse Vehicles. 7 E RCV in service with. 11 EVs on order for purchase or being delivered prior 31st March. 1 on pre-order, which will be in			

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
								by the end of the year. The total will be 37 on fleet by the end of 2022, which are all purchased, owned vehicles.			
3.3	EV recharging		Increase EV charging points for Cardiff residents/ workers.	CC	Ongoing		EV vehicle counts/ EV point usage.	Unknown	Progression of residential EV charging locations has ensured that 15 locations with a total of fast charging points have been installed across the City. Second phase of 5 sites with 1	Ongoing	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									charge points was being progressed before being impacted by COVID – these are now planned for late August/ early September. 6 Rapid Charging stations have been installed with site operator Osprey Charging at locations in the City Centre and Bay.		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Two additional schemes looking will increase to increase the number of publicly accessible charging stations in the city from 58 to around 75 before the end 2022.		
3.4	Taxi incentive to operate cleaner vehicles		Improve the emission standard profile of Cardiff's licensed Hackney and Private Hire	CC	Ongoing		Uptake for the funding.	To ensure development does not cause any adverse impact and where possible reduce levels to as low as	Due to COVID-19, the launch of the scheme was impacted and ongoing discussions with WG on use of allocated funding.		To achieve greatest air quality improvements zero emission or ULEV classified vehicles need to be incentivised.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			Vehicles. Clean Air Funding allocated to provide EV grants for taxis.					reasonably practicable			
3.5	Cardiff Clean Bus Retrofit Scheme 2020-21		Improve the emissions profile by improving the euro standard composition of bus fleets operated in Cardiff. Via a competitive tender application process, Cardiff Council will administer	CC & WG	COMPLETED 2021/22		Number of bus vehicles converted;	FBC identifies that the retrofit alone would achieve compliance on Castle Street 39.6 µg/m^3 with 150 vehicles retrofitted.	Scheme went live on 1st October 2020 and a total of 49 buses have been retrofitted as of September 2021.		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			a retrofit scheme aimed at improving the emission output of bus vehicles operated in Cardiff.								
Policy											
4.1	Citywide strategy to reduce emissions and improve air quality		Cardiff Clean Air Strategy and Action Plan (CASAP)		2018		Recorded Improvements to air quality levels (NO_2) monitored by indicative methods by CC at sensitive receptor locations	Annual average NO_2 levels to be recorded at <35µg/m3 at residential façade locations with specified AQMAs.	Finalised and approved by Cabinet. Submitted to Welsh Government for review.	Ongoing	
4.2	Taxi Licensing Conditions	Policy Guidance and	Amendments made to	CC	2019- 2020		Taxi fleet composition %.		Impacted owing to COVID	Ongoing and will need to be	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
		Development Control	Cardiff taxi licensing conditions to promote a cleaner fleet.						impacts on Taxi trade during 2020-21	reviewed in 2023	
4.3	Transport White Paper	Promoting Low Emission Transport	The Transport White Paper was launched on 15 January 2020 and lays out an ambitious 10-year plan to tackle the climate emergency, reduce congestion and improve air quality.	CC	2020- 2030		Improved air quality levels/ journey time. Sustainable modes patronage.	To generate air quality levels as low as reasonably practicable.	Published document 2020.		

2 Air Quality Monitoring Data and Comparison with Air Quality Objectives

Summary of Monitoring Undertaken in 2023

2.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how results compare with the objectives.

SRS on behalf of CC undertook automatic (continuous) monitoring and carried out Local Site Operator (LSO) duties at five sites during 2023. Three of these sites, Castle Street, Newport Road, and Cardiff City Centre are part of the Welsh Automatic Urban Pollution Monitoring Network and the Automatic Urban and Rural Network (AURN). Data from these monitors undergoes quality assurance and quality control (QC/QA) ratification processes from external consultants. Table 3 presents the details of the sites. National monitoring results are available at https://airquality.gov.wales/. Maps showing the location of the monitoring sites are provided in Figure 4 to Figure 13. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

Monitors for Poly Aromatic Hydrocarbon (PAH) and Toxic Organic Micro Particle (TOMP) networks are located at an urban background location within Cardiff. Information from PAH and TOMP monitoring is not included within this report and instead can be found at Polycyclic Aromatic Hydrocarbons (PAH) data - Defra, UK and Toxic Organic Micro Pollutants (TOMPs) Networks - Defra, UK.

In addition to the above monitoring, 45 Vortex additional air monitoring sensors were located across Cardiff from April 2023. These sensors provide indicative air quality data for NO_2, PM_{10}, $PM_{2.5}$ and O_3 at specific locations within AQMA's and close to schools. To reduce the risk of vandalism and theft, these monitors are located at a height of three to four metres. Maps showing the location of the monitoring sites are provided in Figure 4 to Figure 13. Further details for these monitors can be found at VTX Air Quality Monitors | Vortex (vortexiot.com)

2.1.2 Non-Automating Monitoring Sites

SRS on behalf of Cardiff Council undertook non- automatic (passive) monitoring of NO_2 at 139 sites during 2023. Table 4 presents the details of the sites.

Maps showing the location of the monitoring sites are provided in Figure 14 to Figure 25. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Table 3 - Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Cardiff City Centre AURN	Urban Background	318416	176525	NO_2	N	Chemiluminescence	Y (5m)	200m	N
				PM_{10}, $PM_{2.5}$		TEOM- FDMS	Y (5m)	200m	N
				SO_2		UV Fluorescence	Y (5m)	200m	N
				CO		Infra-Red GFC	Y (5m)	200m	N
				O_3		UV Absorption	Y (5m)	200m	N
Cardiff Newport Road AURN	Roadside/ Urban Traffic	320095	177520	NO_2	N	Chemiluminescence	Y (12m)	4.5m	N
				PM_{10}		Beta Attenuation Monitor with Gravimetric Equivalence	Y (12m)	4.5m	N
Cardiff Castle Street	Roadside/ Urban Traffic	318055	176459	NO_2	N	Chemiluminescence	Y(2m)	2m	Y

Notes: (1) 0m indicates that the sited monitor represents exposure and as such no distance calculation is required.

Table 4 – Vortex Sensor Locations

Sensor Number	Network	Road	x	y
SN-0604	Ely Bridge AQMA	Cowbridge Road West	314527	176788
SN-0677	Ely Bridge AQMA	Cowbridge Road West	314418	176721
SN-0572	Ely Bridge AQMA	Mills Road	314437	176827
SN-0659	Ely Bridge AQMA	Dyfrig Road	314634	176752
SN-0634	Stephenson Court AQMA	Newport Road	319293	176923
SN-0370	Stephenson Court AQMA	Glossop Road	319221	176846
SN-0131	Stephenson Court AQMA	Newport Road	319410	176988
SN-0523	Stephenson Court AQMA	City Road	319142	176976
SN-0359	Stephenson Court AQMA	Glossop Road	319287	176792
SN-0398	Stephenson Court AQMA	Longcross Street	319387	176812
SN-0649	Llandaff AQMA	Llantrisant Road	315141	178234
SN-0609	Llandaff AQMA	Cardiff Road	315231	178188
SN-0517	Llandaff AQMA	Cardiff Road	315264	178100
SN-0638	City Centre AQMA	Westgate Street	318134	176229
SN-0076	City Centre AQMA	Castle Street	318034	176444
SN-0596	City Centre AQMA	Westgate Street	318204	176174
SN-0648	City Centre AQMA	Cowbridge Road East	317913	176450
SN-0286	City Centre AQMA	Westgate Street	318065	176287
SN-0409	City Centre AQMA	Westgate Street	317984	176374
SN-0539	Radyr	Park Road	312855	180732
SN-0629	Coryton	Pendwyallt Road	314319	181146

Sensor Number	Network	Road	x	y
SN-0704	Rhiwbina	Lon Ucha	315806	181349
SN-0371	Llanishen	Ty Glas Avenue	317913	181608
SN-0592	Lisvane	Rowan Way	318615	183240
SN-0598	Pontprennau	Heol Pontprennau	320975	182589
SN-0353	Pentwyn	Pentwyn Drive	320675	181553
SN-0673	St Mellons	Dunster Road	322603	181095
SN-0610	St Mellons	Meadowlark Close	323187	181192
SN-0616	Rumney	Llanstephan Road	322190	179408
SN-0705	Llanishen	Fidlas Aveune	318320	181005
SN-0615	Birchgrove	Birchgrove Road	316726	179780
SN-0620	Llandaff	Hawthorn Road East	314935	179282
SN-0628	Fairwater	Beechley Drive	313024	177954
SN-0362	Ely	Grand Avenue	313098	176208
SN-0613	Canton	Radnor Road	316189	176837
SN-0672	Canton	Wyndham Crescent	316859	176737
SN-0644	Grangetown	Clare Road	317672	175536
SN-0694	Cardiff Bay	Adelaide Street	318924	174454
SN-0364	Tremorfa	Mervyn Road	320911	176775
SN-0680	Adamsdown	Constellation Street	319632	176649
SN-0601	Cathays	Cathays Terrace	318033	178215
SN-0685	Cathays	North Road	317065	178774
SN-0576	Penylan	Colchester Avenue	320010	178295
SN-0541	Cathays	Whitchurch Road	317583	178718
SN-0682	Pontcanna	Cathedral Road	316595	177392

Figure 4 - Automatic Monitoring Sites Cardiff Northwest

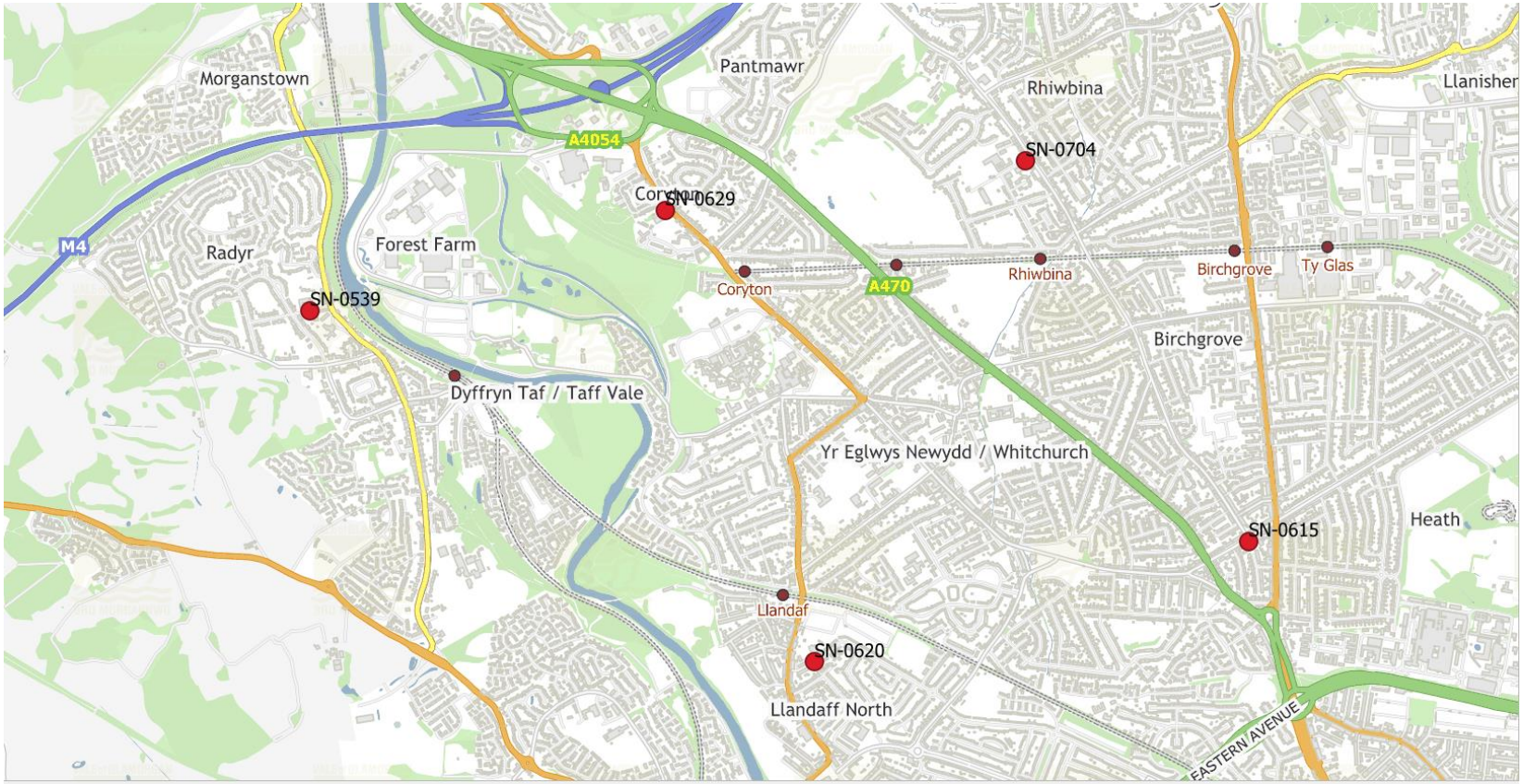


Figure 5 - Automatic Monitoring Sites Cardiff Northeast

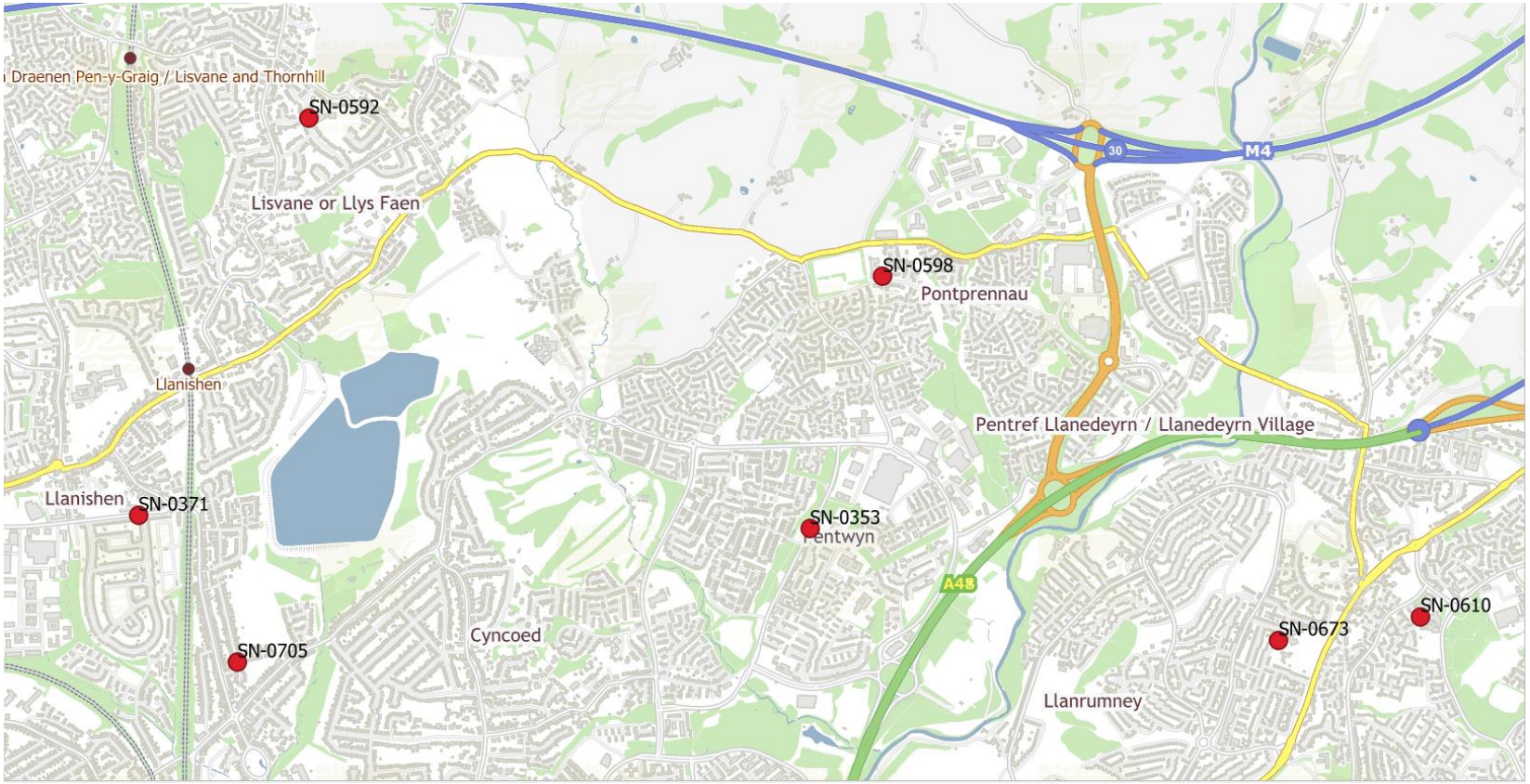


Figure 6 - Automatic Monitoring Sites Cardiff East

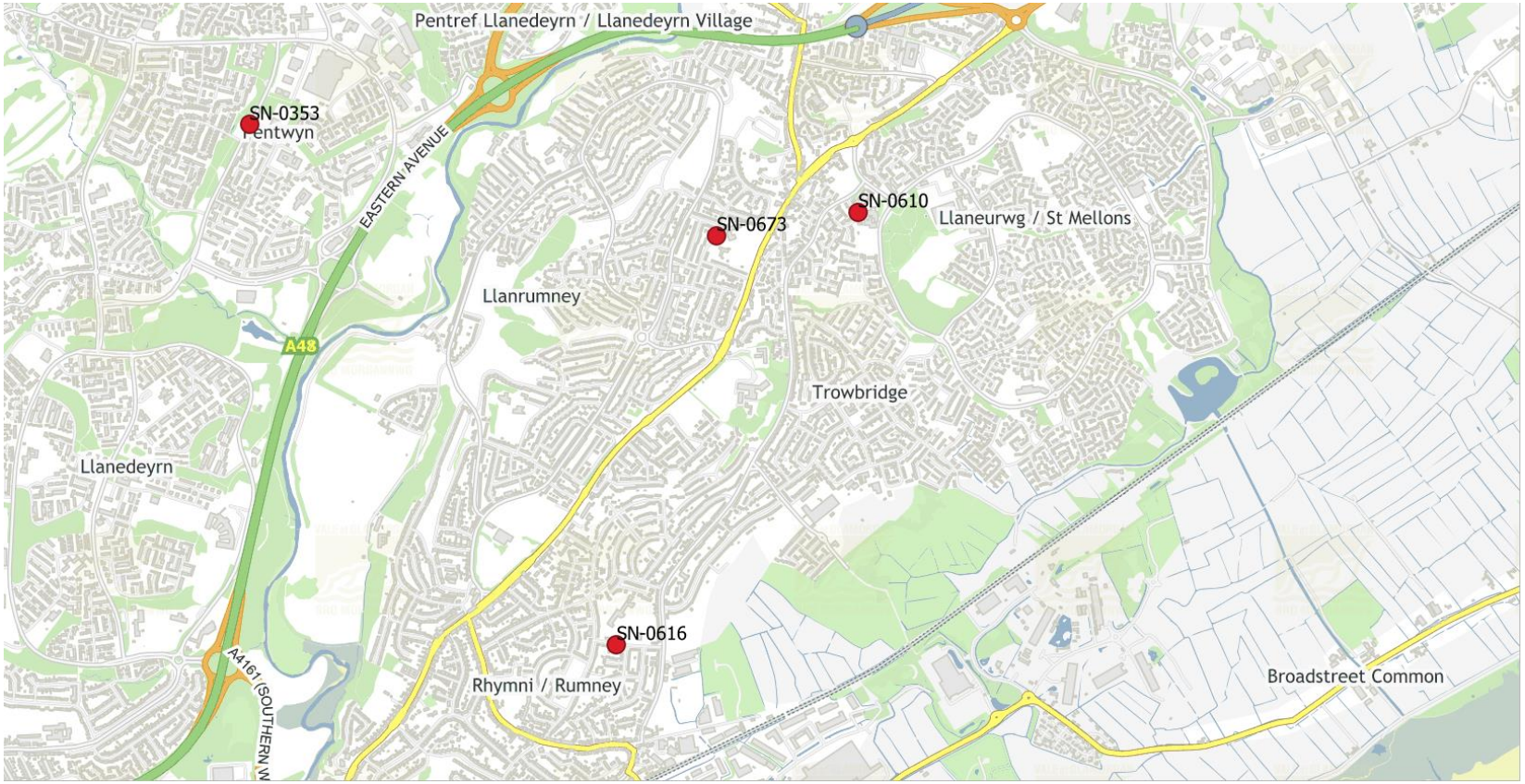


Figure 7 - Automatic Monitoring sites Cardiff Centre

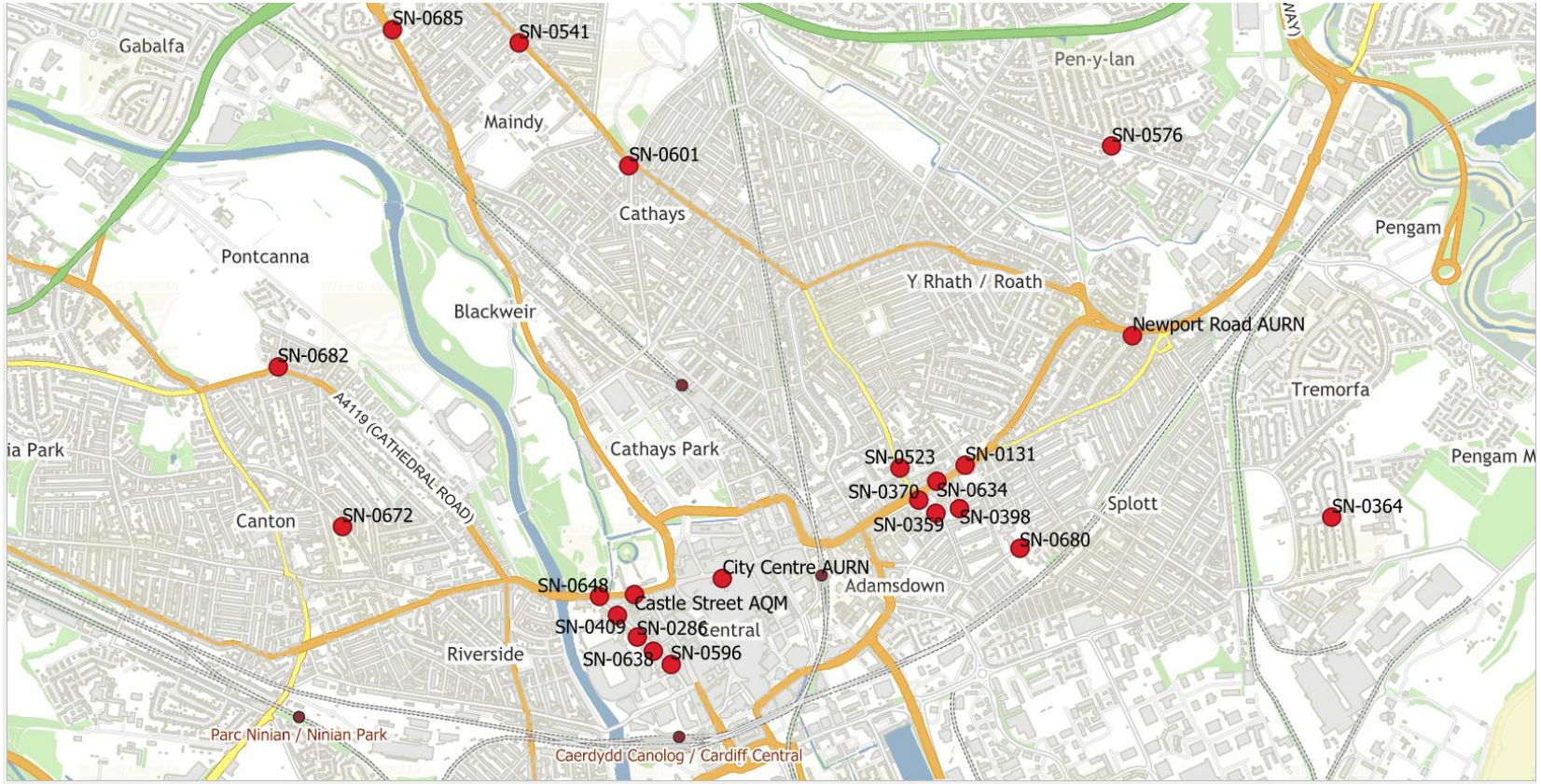


Figure 8 - Automatic Monitoring Sites Cardiff South

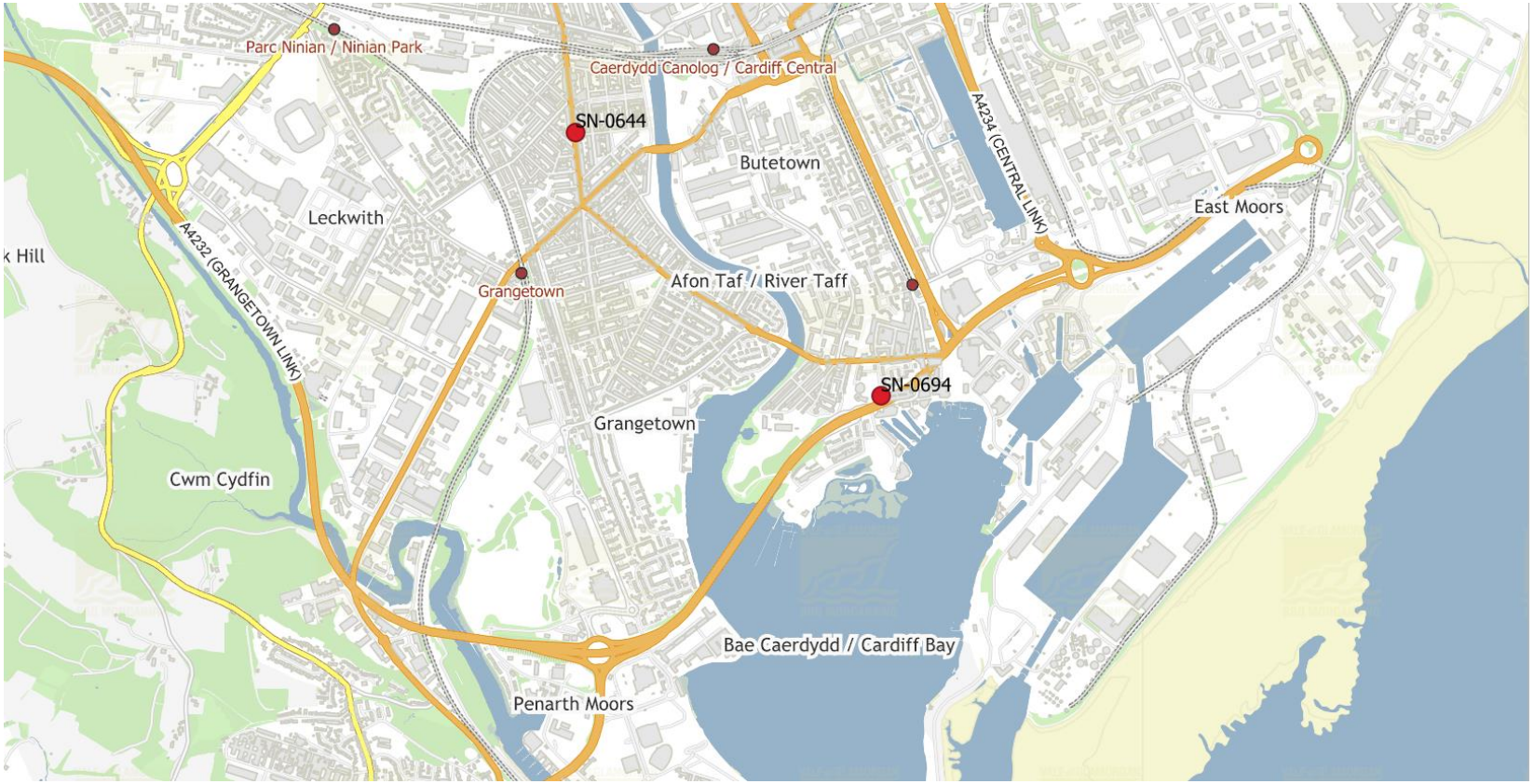


Figure 9 - Automatic Monitoring Sites Cardiff West

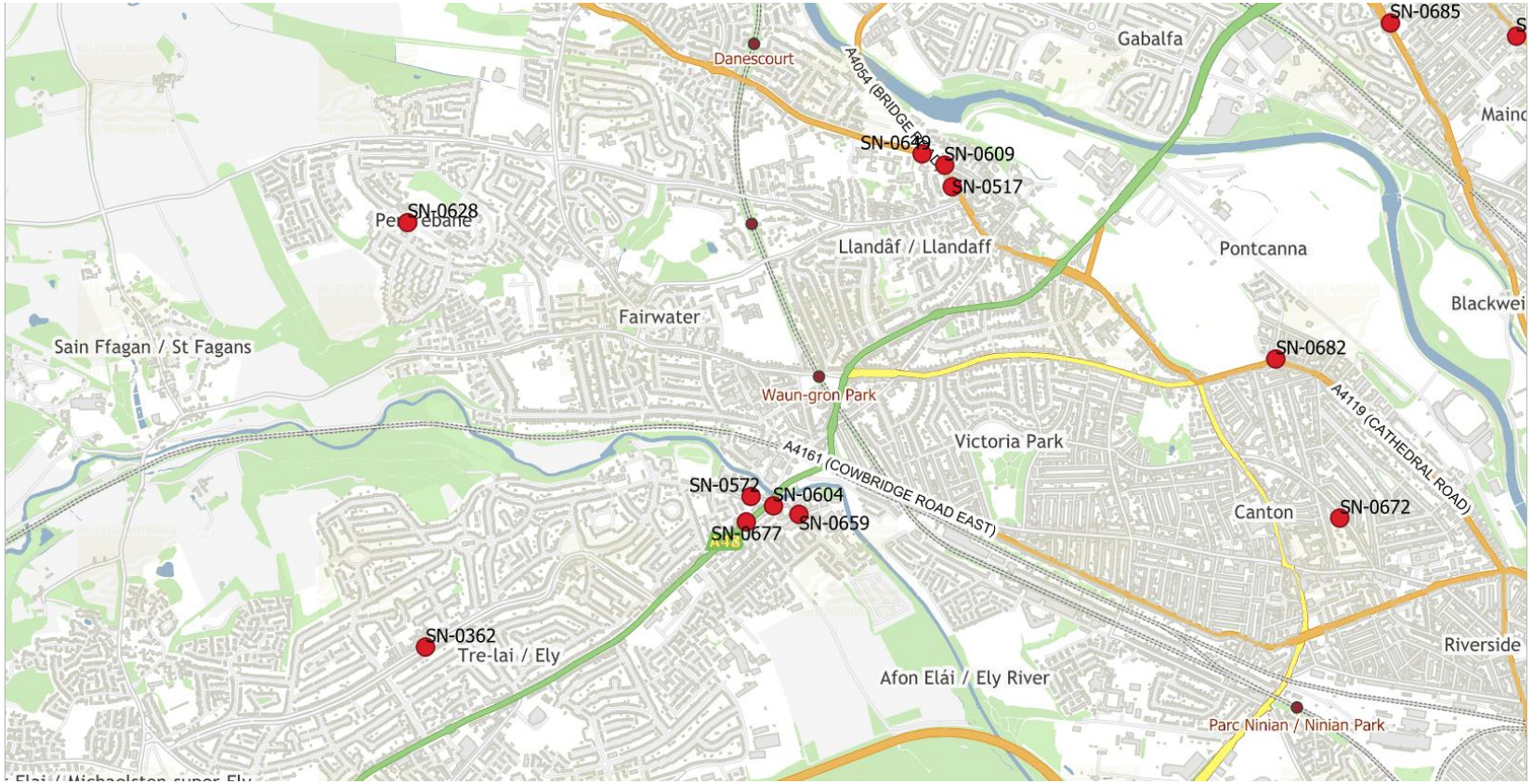


Figure 10 - Automatic Monitoring Sites Ely Bridge AQMA

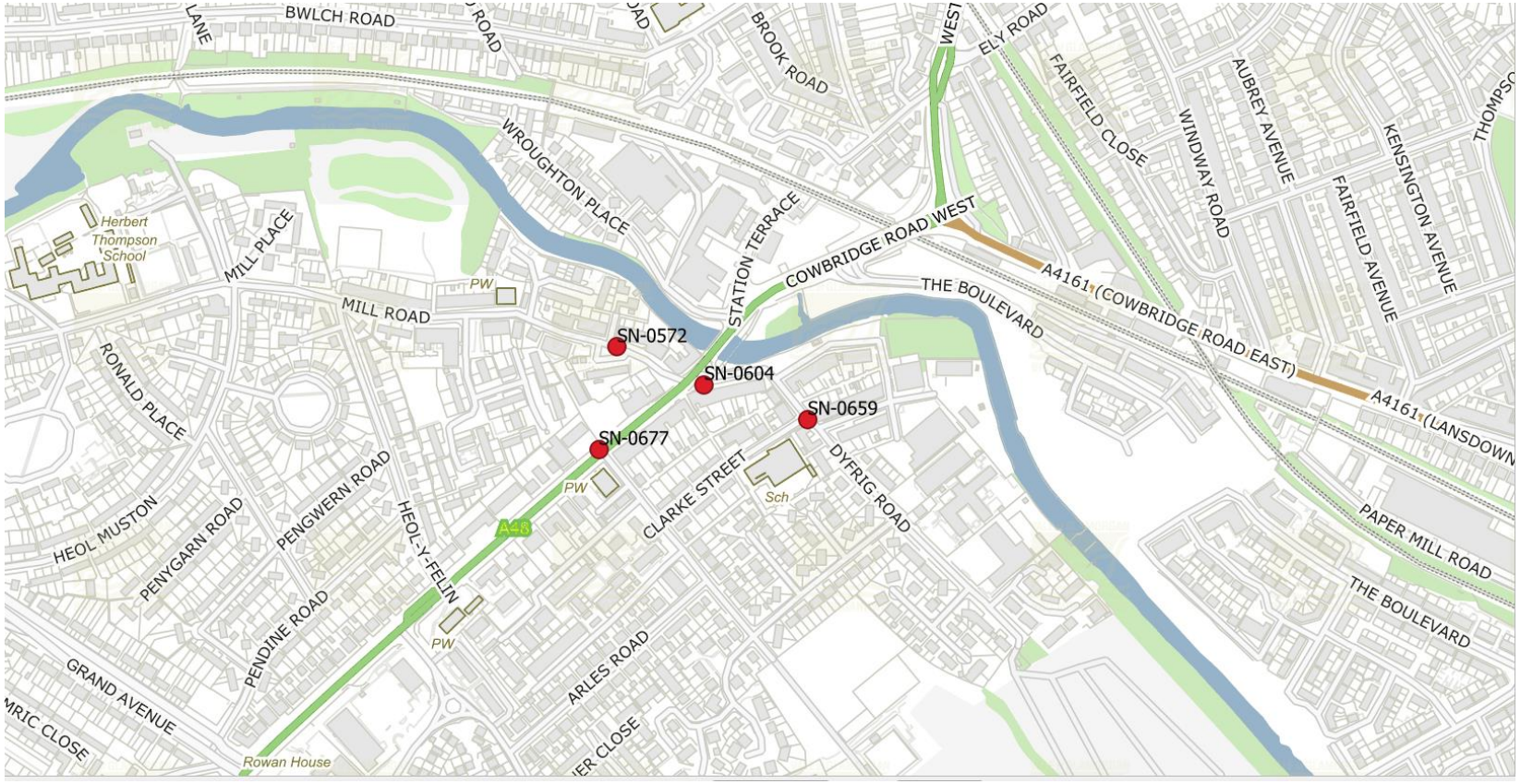


Figure 11 - Automatic Monitoring Sites Cardiff City Centre AQMA

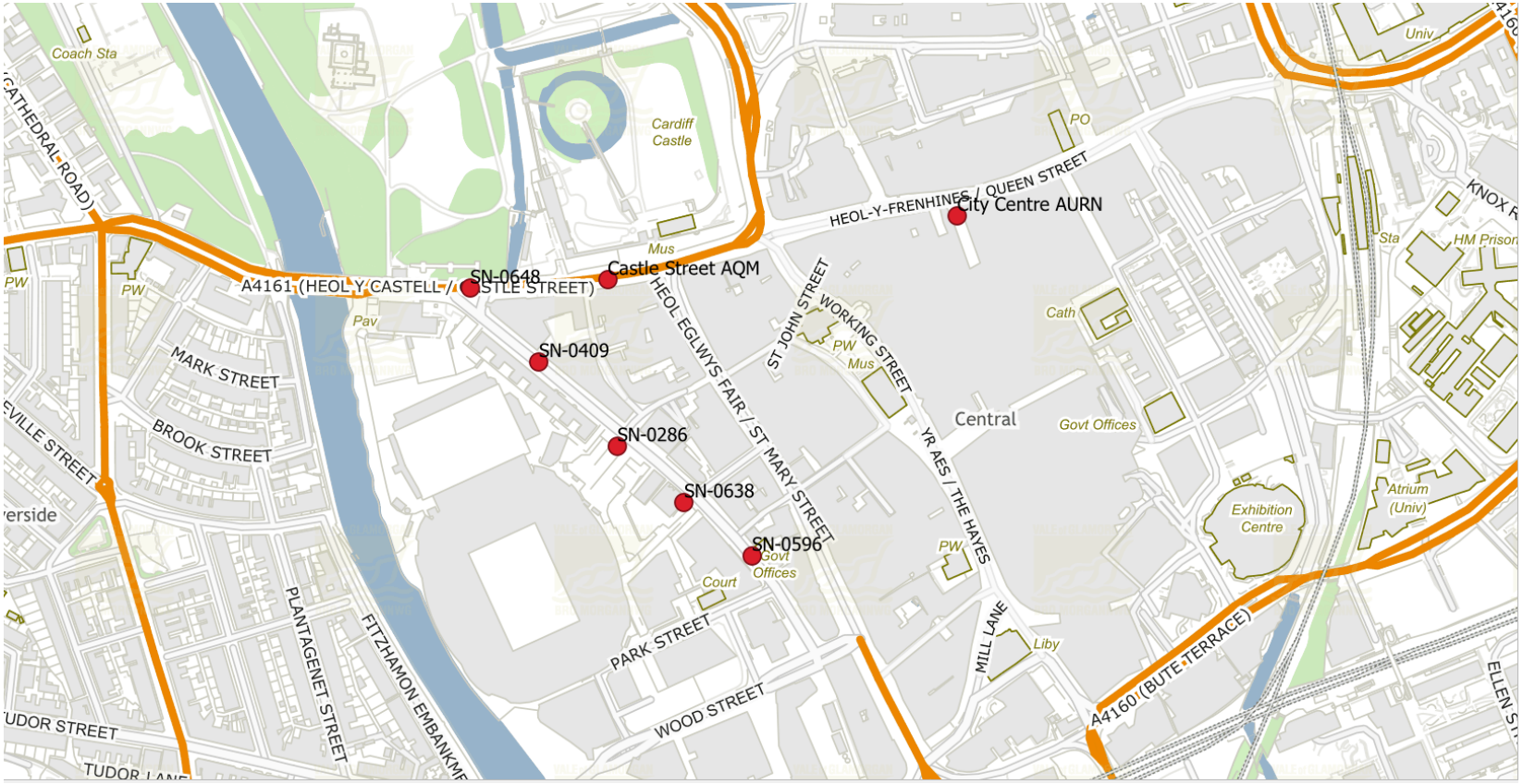


Figure 12 - Automatic Monitoring Sites Stephenson Court, Newport Road AQMA

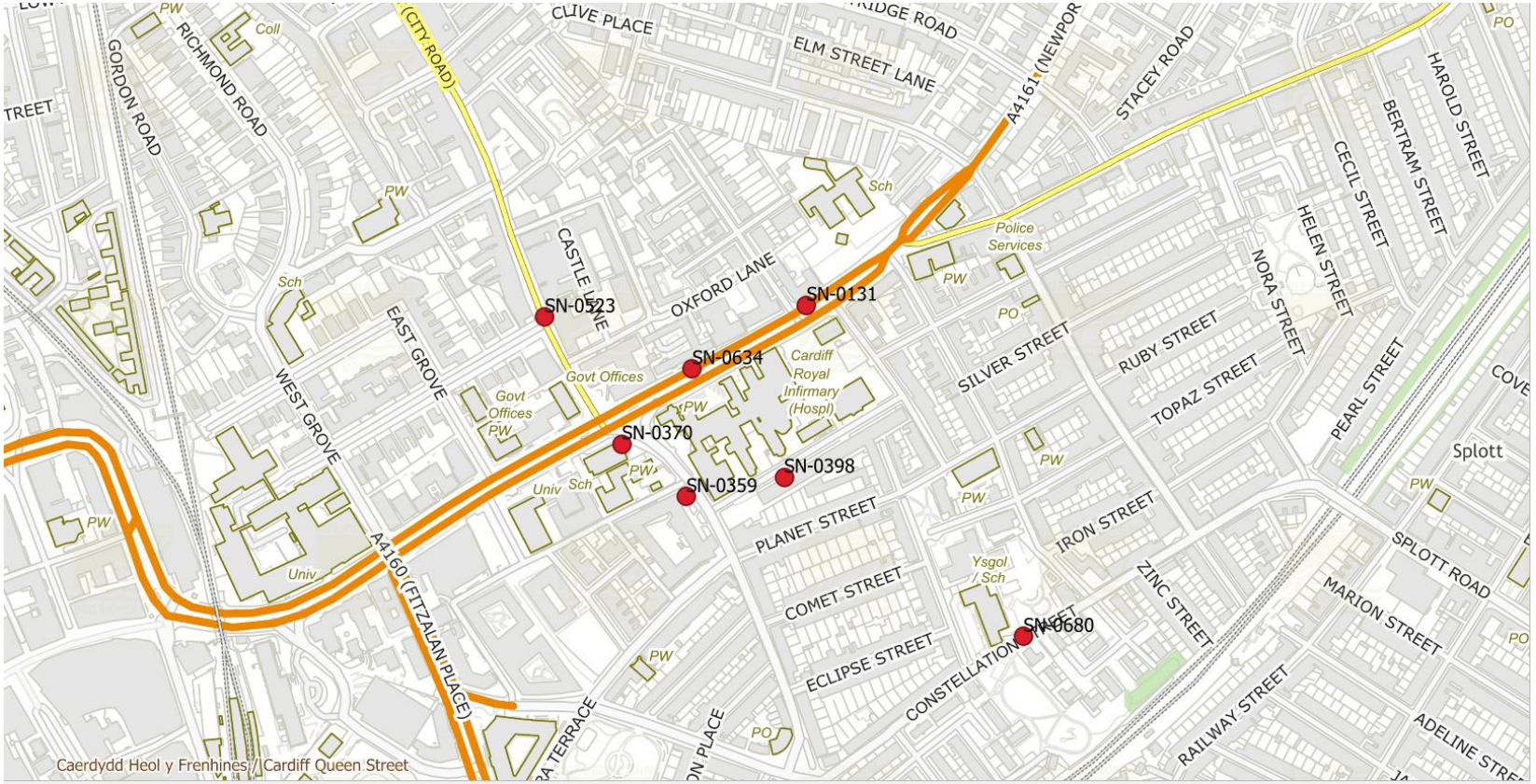


Figure 13 - Automatic Monitoring Sites Llandaff AQMA

Table 5 - Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
16	167 Ninian Park Road	Roadside	317040	176060	NO2		0.0	5.0	No
258	Lamp post Penarth Road	Roadside	317760	175310	NO2		4.0	2.0	No
58	Westgate Street	Kerbside	317937	176400	NO2	City Centre AQMA	5.0	0.0	No
81	Stephenson Court	Roadside	319387	176980	NO2	Newport Road AQMA	0.0	5.0	No
86	19 Fairoak Road	Roadside	318452	178805	NO2		0.0	10.0	No
96	Manor Way Junction	Roadside	316601	179653	NO2		0.0	5.0	No
98	Western Avenue (premises)	Roadside	314805	177345	NO2		0.0	10.0	No
99	Cardiff Road Llandaff	Roadside	315275	178117	NO2	Llandaff AQMA	0.0	3.0	No
259	Wellfield Road	Kerbside	319201	178031	NO2		4.0	1.0	No
260	St Marys Catholic School, Canton	Roadside	316847	176762	NO2		0.0	2.0	No
264	Beechley Drive	Roadside	313142	177870	NO2		0.0	7.0	No
106	30 Caerphilly Road	Roadside	316851	179520	NO2		0.0	5.0	No
112	17 Sloper Road	Roadside	316613	175910	NO2		0.0	5.0	No
115	21 Llandaff Road	Roadside	316604	176641	NO2		0.0	3.0	No
117	25 Cowbridge Road West	Roadside	314458	176735	NO2	Ely Bridge AQMA	0.0	2.0	No
126	Westgate Street Flats	Roadside	317946	176387	NO2	City Centre AQMA	0.0	5.0	No
128	117 Tudor Street	Roadside	317540	175979	NO2		0.0	5.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
131	Dragon Court	Roadside	319292	176932	NO2	Newport Road AQMA	0.0	5.0	No
143	Windsor House	Roadside	318009	176337	NO2		0.0	6.0	No
144	Marlborough House	Roadside	318046	176307	NO2	City Centre AQMA	0.0	6.0	No
147	211 Penarth Road	Roadside	317636	175161	NO2		0.0	7.0	No
148	161 Clare Road	Roadside	317695	175389	NO2		0.0	5.0	No
149	10 Corporation Road	Roadside	317764	175174	NO2		0.0	5.0	No
156	2a/4 Colum Road	Roadside	317997	177412	NO2		0.0	5.0	No
157	47 Birchgrove Road	Roadside	316605	179703	NO2		0.0	8.0	No
158	64/ 66 Cathays Terrace	Roadside	318093	177716	NO2		0.0	3.0	No
159	IMO façade replacement	Roadside	320709	177918	NO2		0.0	4.0	No
166	163 Lansdowne Road	Roadside	315950	176424	NO2		0.0	5.0	No
168	570 Cowbridge Road East	Roadside	314856	176929	NO2		0.0	5.0	No
174	76 North Road	Kerbside	317508	177868	NO2		0.0	1.0	No
179	Altolusso, Bute Terrace	Roadside	318627	176039	NO2		5.0	2.0	No
183	Station Terrace	Kerbside	318765	176623	NO2		5.0	0.0	No
184	Hophouse, St Mary Street	Roadside	318335	176074	NO2	City Centre AQMA	0.0	3.0	No
186	Dempsey’s Public House, Castle Street	Roadside	318044	176449	NO2	City Centre AQMA	0.0	3.0	No
187	Angel Hotel	Roadside	317944	176436	NO2	City Centre AQMA	0.0	3.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
188	Westgate Street (45 Apartments)	Roadside	318229	176154	NO2	City Centre AQMA	0.0	3.0	No
191	7 Mackintosh Place	Roadside	318724	177776	NO2		0.0	3.0	No
194	115 Cowbridge Road West	Roadside	313870	176212	NO2		0.0	12.0	No
195	244 Newport Road	Roadside	320147	177523	NO2		0.0	6.0	No
196	2 Pencisely Road	Roadside	316223	177305	NO2		0.0	6.0	No
198	Next Building to Stephenson Court	Roadside	319348	176958	NO2	Newport Road AQMA	0.0	5.0	No
199	157 Newport Road	Roadside	319599	177174	NO2		0.0	12.0	No
200	350 Whitchurch Road	Roadside	317038	179073	NO2		0.0	3.0	No
201	23 Lower Cathedral Road	Roadside	317547	176411	NO2		0.0	3.0	No
202	22 Clare Street	Roadside	317604	176053	NO2		0.0	3.0	No
203	10 Fairoak Road	Roadside	318255	178533	NO2		0.0	4.0	No
204	53 Neville Street	Roadside	317487	176303	NO2		0.0	5.0	No
207	42 Waungron Road	Roadside	314769	177343	NO2		0.0	7.0	No
208	2 Llantrisant Road	Roadside	315152	178245	NO2	Llandaff AQMA	0.0	3.0	No
209	178 North Road	Roadside	317200	178537	NO2		0.0	3.0	No
210	485 Caerphilly Road	Roadside	316692	181088	NO2		0.0	7.0	No
211	19 Well Wood Close, Penylan	Roadside	320247	178903	NO2		0.0	28.0	No
212	Bridge Road	Kerbside	315197	178221	NO2	Llandaff AQMA	0.0	1.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
214	Mitre Place	Roadside	315254	178153	NO2	Llandaff AQMA	0.0	3.0	No
218	16-18 Cowbridge Road West	Roadside	314471	176889	NO2	Ely Bridge AQMA	0.0	4.0	No
254	Giraffe Nusery Cathedral road	Roadside	317529	176340	NO2		0.0	2.0	No
220	Fitzalan Court Newport Road	Kerbside	318955	176823	NO2		6.0	1.0	No
221	Stuttgarter Strasse (New student flats)	Kerbside	318530	177468	NO2		8.0	1.0	No
190	3 Pearson Street	Roadside	319056	177343	NO2		0.0	1.0	No
224	110 Cardiff Road	Roadside	315714	177740	NO2		0.0	4.0	No
243	25 Cardiff Road	Kerbside	315712	178789	NO2	Llandaff AQMA	4.0	1.0	No
244	25 Bridge Road	Roadside	314963	178846	NO2		0.0	4.0	No
245	47 Willows Ave	Urban Background	321006	179081	NO2		0.0	0.0	No
263	Pierhead Street	Roadside	319715	174791	NO2		0.0	4.0	No
247	Radyr Primary school	Roadside	312857	180734	NO2		4.0	2.0	No
262	54 Llandaff Road	Kerbside	316593	176728	NO2		2.0	2.0	No
249	Wentloog Road, Rumney	Roadside	318201	180367	NO2		0.0	3.0	No
250	Central Square Cardiff, City Centre	Roadside	318196	176038	NO2		4.0	2.0	No
251	Heol Isaf, Radyr	Kerbside	313244	180367	NO2		0.0	5.0	No
255, 256, 257	Castle Street Co-Location 3	Roadside	314505	176769	NO2	City Centre AQMA	0.0	1.5	Yes

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
192	3 Cowbridge road West	Roadside	314505	176769	NO2	Ely Bridge AQMA	0.0	3.0	No
265	Green Giraffe Nursery, Cardiff Bay	Kerbside	317684	173479	NO2		3.0	2.0	No
TRO-001	Whitchurch High Lower School	Kerbside	315621	180320	NO2		4.0	5.0	No
TRO-002	Glan-Y-Nant Terrace (inside)	Roadside	315589	180316	NO2		0.0	2.0	No
TRO-003	Crossroads of Old Church Rd and Glan-Y-Nant terrace (outside)	Kerbside	315548	180315	NO2		5.0	2.0	No
TRO-004	Ysgol Melin Gruffydd School	Roadside	315620	180360	NO2		0.0	2.0	No
TRO-005	34 Glan-Y-Nant Rd (inside)	Roadside	315608	180151	NO2		0.0	3.0	No
TRO-006	36 Old Church Rd (outside)	Roadside	315497	180140	NO2		0.0	2.0	No
TRO-007	Peter Lea Primary	Roadside	313878	178319	NO2		0.0	3.0	No
TRO-008	36 Carter Place	Roadside	313894	178331	NO2		0.0	4.0	No
TRO-009	3 Carter Place	Roadside	314022	178334	NO2		0.0	5.0	No
TRO-010	Llandaff Church in Wales Primary	Kerbside	315274	177784	NO2		5.0	5.0	No
TRO-011	20 Hendre Rd Llandaff	Kerbside	315279	177750	NO2		0.0	1.0	No
TRO-012	48 Hendre Rd Llandaff	Roadside	315209	177668	NO2		0.0	3.0	No
TRO-013	Pencaeru School	Kerbside	312803	175519	NO2		0.0	3.0	No
TRO-014	16 Cyntwell Avenue	Roadside	312809	175496	NO2		0.0	4.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
TRO-015	6A Cyntwell Avenue	Roadside	312734	175411	NO2		0.0	3.0	No
TRO-016	Llansdowne Primary School	Roadside	315811	176555	NO2		0.0	3.0	No
TRO-017	29 Norfolk Street	Roadside	315801	176492	NO2		0.0	4.0	No
TRO-018	Llansdowne Road	Roadside	315801	176492	NO2		0.0	4.0	No
TRO-019	St Cuthberts Primary School	Kerbside	319027	175493	NO2		0.0	1.0	No
TR0-020	Letton Road	Kerbside	318910	175456	NO2		2.0	1.0	No
TRO-021	58 Letton Road	Kerbside	318945	175546	NO2		2.0	1.0	No
TRO-022	Tredegarville	Roadside	319268	176804	NO2		0.0	4.0	No
TRO-023	Newport Road School Lane Zone	Kerbside	319228	176777	NO2		0.0	1.0	No
TRO-024	Glossops Road	Kerbside	319283	176827	NO2		5.0	1.0	No
TRO-025	St Peters Primary School	Roadside	319394	177096	NO2		0.0	1.0	No
TRO-026	Southey Street	Kerbside	319339	177006	NO2		2.0	1.0	No
TRO-027	Wordsworth Avenue	Kerbside	319327	177080	NO2		2.0	1.0	No
TRO-028	St Monica's / Gladstone Primary School	Roadside	317982	178180	NO2		0.0	3.0	No
TRO-029	Pentyrch Street	Kerbside	317987	178156	NO2		2.0	1.0	No
TRO-030	Cwmdare Street	Kerbside	317855	178921	NO2		2.0	1.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
TRO-031	Lakeside Primary School	Roadside	319031	179949	NO2		0.0	1.0	No
TRO-032	Ontario Way	Kerbside	319012	180050	NO2		2.0	1.0	No
TRO-033	Woolaston Avenue	Kerbside	318898	180012	NO2		2.0	1.0	No
TRO-034	Bryn Hafod Primary School	Roadside	321817	180406	NO2		0.0	1.0	No
TRO-035	8 Blagdon Close	Kerbside	321847	180402	NO2		2.0	1.0	No
TRO-036	Uphill Road	Kerbside	321834	180331	NO2		2.0	1.0	No
TRO-037	Glan Y Afon Primary School	Roadside	321705	181427	NO2		0.0	1.0	No
TRO-038	Browning Close	Kerbside	321738	181398	NO2		2.0	1.0	No
TRO-039	Thackeray Crescent	Kerbside	321834	181282	NO2		2.0	1.0	No
TRO-040	Willow Brook Primary School	Kerbside	324489	180953	NO2		0.0	1.0	No
TRO-041	Bullrush Close	Kerbside	324519	180949	NO2		2.0	1.0	No
TRO-042	Sandbrook Road	Kerbside	324529	180975	NO2		2.0	1.0	No
TRO-043	Creigau Primary School	Kerbside	307904	181561	NO2		0.0	1.0	No
TRO-044	Tregarth Court	Kerbside	307896	181569	NO2		2.0	1.0	No
TRO-045	TY-Nant Road	Kerbside	307967	181585	NO2		2.0	1.0	No
TRO-046	Rhiwbina Primary School	Roadside	315760	181322	NO2		5.0	1.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
TRO-047	Lon-Y-Dail	Roadside	315746	181209	NO2		5.0	1.0	No
TRO-048	Heol-Y-Deri	Roadside	315825	181374	NO2		5.0	1.0	No
TRO-049	Fitzalan School	Roadside	315955	175898	NO2		20.0	1.0	No
TRO-050	Ysgol Gymraeg Pwll Coch	Roadside	316032	175869	NO2		5.0	1.0	No
TRO-051	Lawrenny Avenue	Roadside	316150	175887	NO2		3.0	2.0	No
TRO-052	Coed Y Gof	Roadside	313000	178061	NO2		5.0	2.0	No
TRO-053	Lime Grove	Roadside	312944	178097	NO2		6.0	1.0	No
TRO-054	Maple Road	Roadside	312883	178154	NO2		5.0	1.0	No
TRO-055	Kitchener Primary School	Kerbside	316735	176217	NO2		3.0	1.5	No
TRO-056	11 Railway Terrace	Kerbside	316826	176156	NO2		3.0	1.5	No
TRO-057	196 Ninian Park Road	Kerbside	316823	176118	NO2		2.0	0.5	No
TRO-058	St Pauls Primary School	Kerbside	317760	174651	NO2		5.0	1.5	No
TRO-059	Bromsgrove Street	Kerbside	317727	174689	NO2		2.0	1.0	No
TRO-060	Paget Street	Kerbside	317758	174813	NO2		15.0	0.5	No
TRO-061	St Mellons Primary School (New Build no access currently)	Kerbside	322302	182343	NO2		5.0	3.0	No
TRO-062	Bridge Road	Kerbside	322335	182272	NO2		2.0	4.0	No

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser
TRO-063	Church Road	Kerbside	322244	182234	NO2		2.0	4.0	No
GW-017	Ysgol Mynydd Bychan Signpost (Outside school)	Kerbside	317602	178703	NO2		4.0	1.5	No
GW-018	Ysgol Mynydd Bychan Signpost (Outside school)	Kerbside	317561	178746	NO2		4.0	1.5	No
GW-019	Ysgol Mynydd Bychan Façade 1	Roadside	317564	178735	NO2		0.0	5.5	No
GW-020	Ysgol Mynydd Bychan Façade 2	Roadside	317590	178708	NO2		0.0	5.5	No

Notes:

(1) 0m indicates that the sited monitor represents exposure and as such no distance calculation is required.

(2) N/A if not applicable.

Figure 14 - Map of Non-Automatic Sites in Radyr and Creigiau

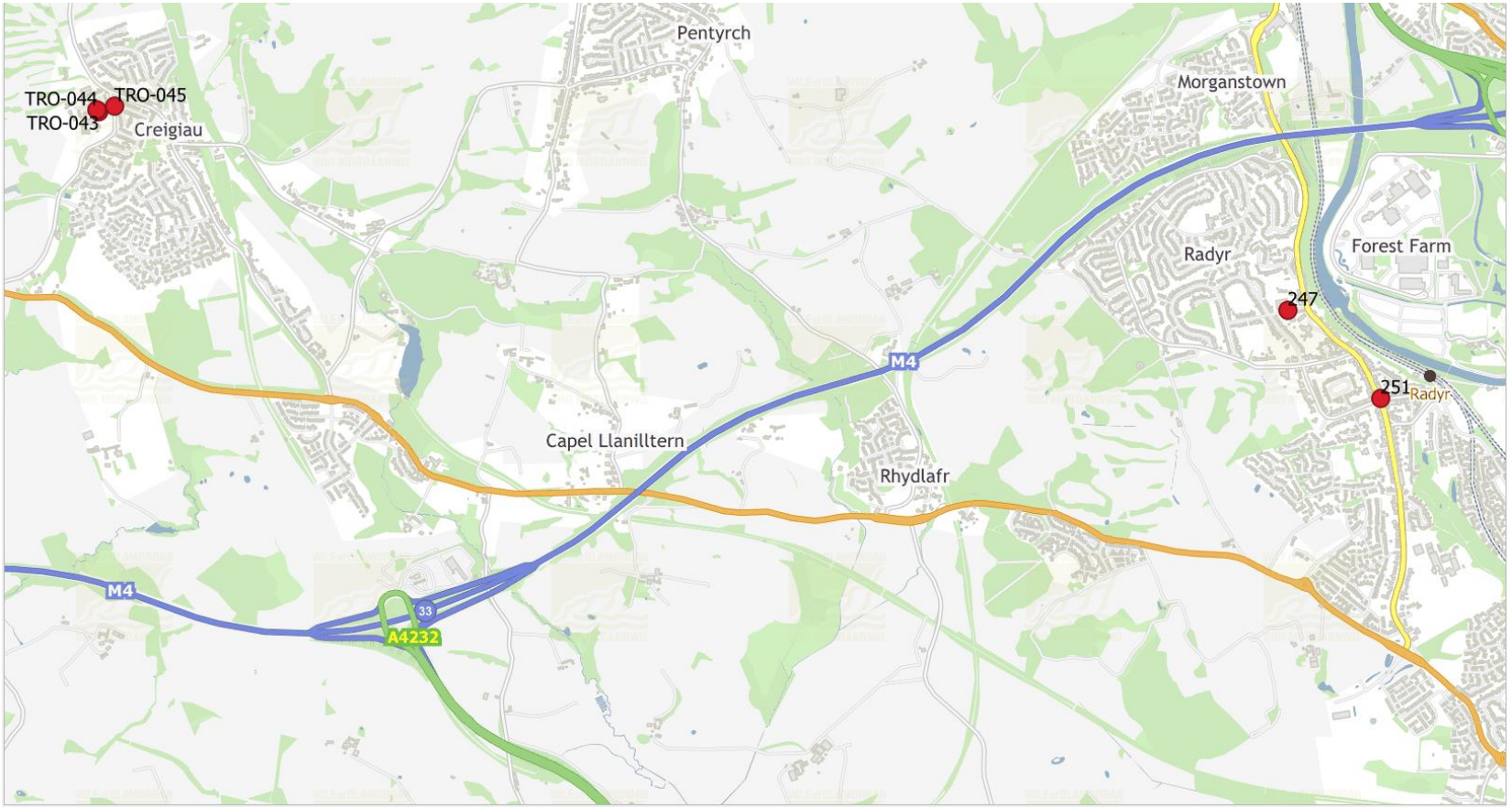


Figure 15 - Map of Non-Automatic Monitoring Sites Cardiff Northwest

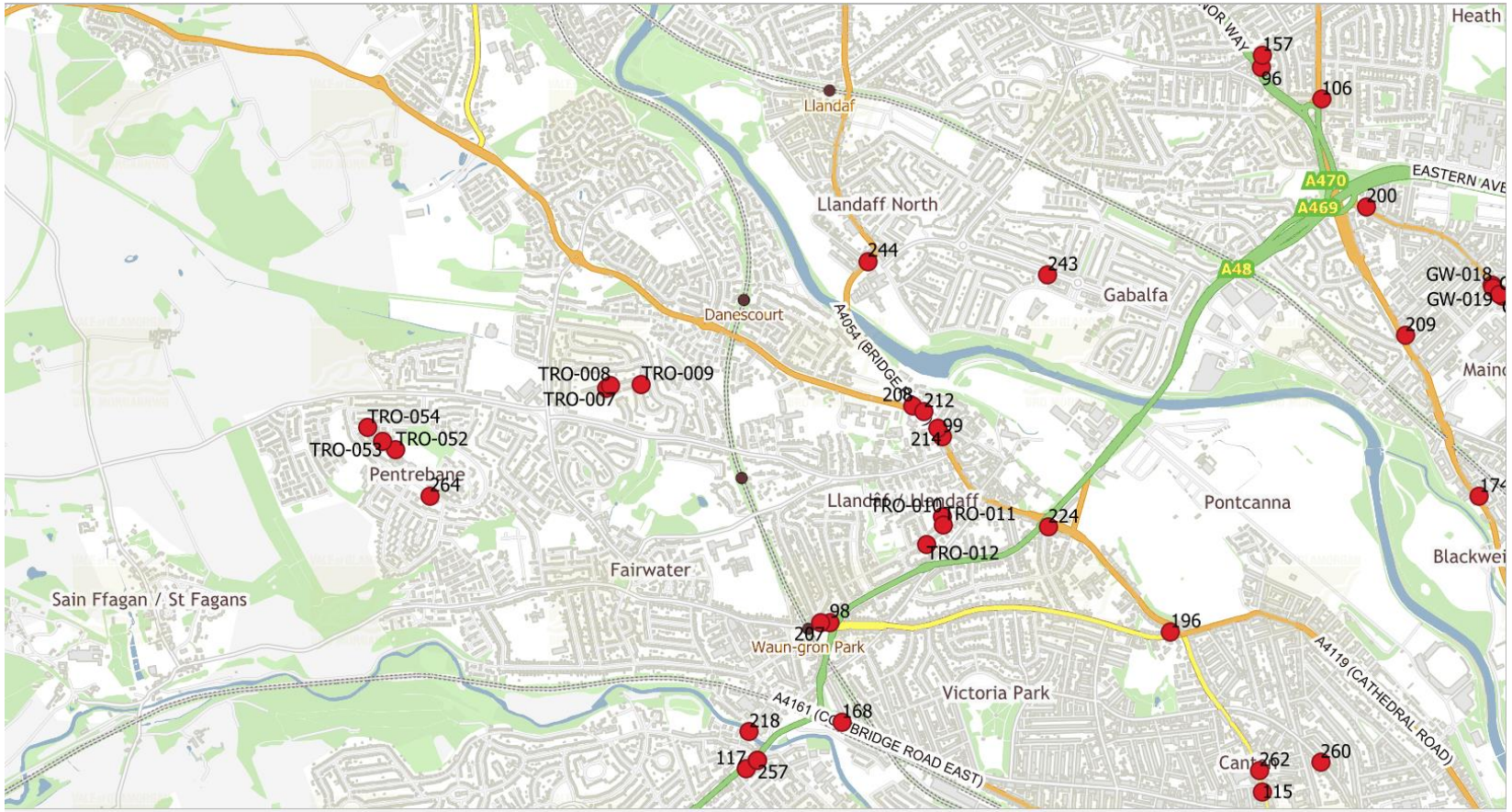


Figure 16 - Map of Non-Automatic Monitoring Sites Cardiff North

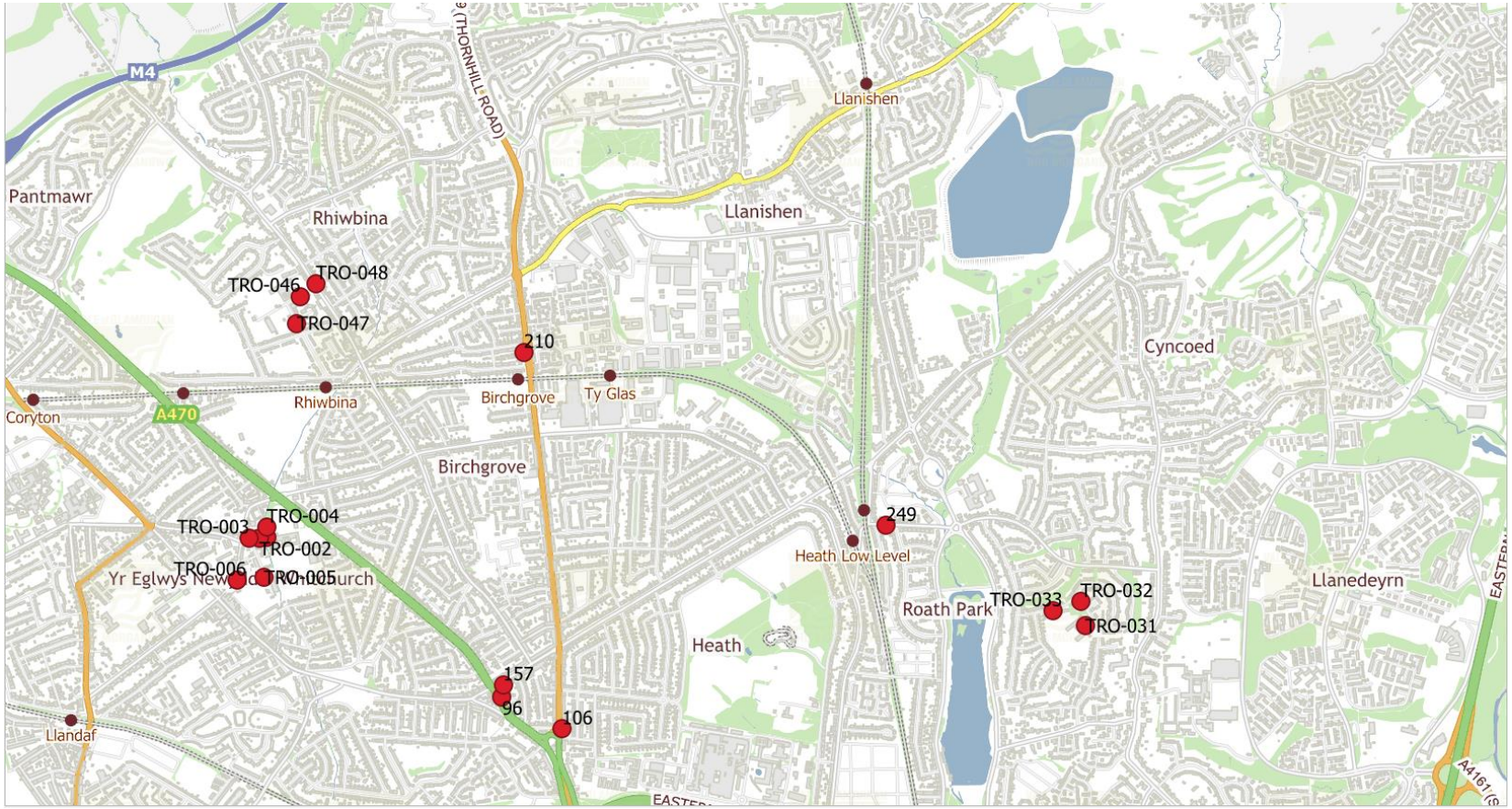


Figure 17 - Map of Non-Automatic Monitoring Sites Cardiff East

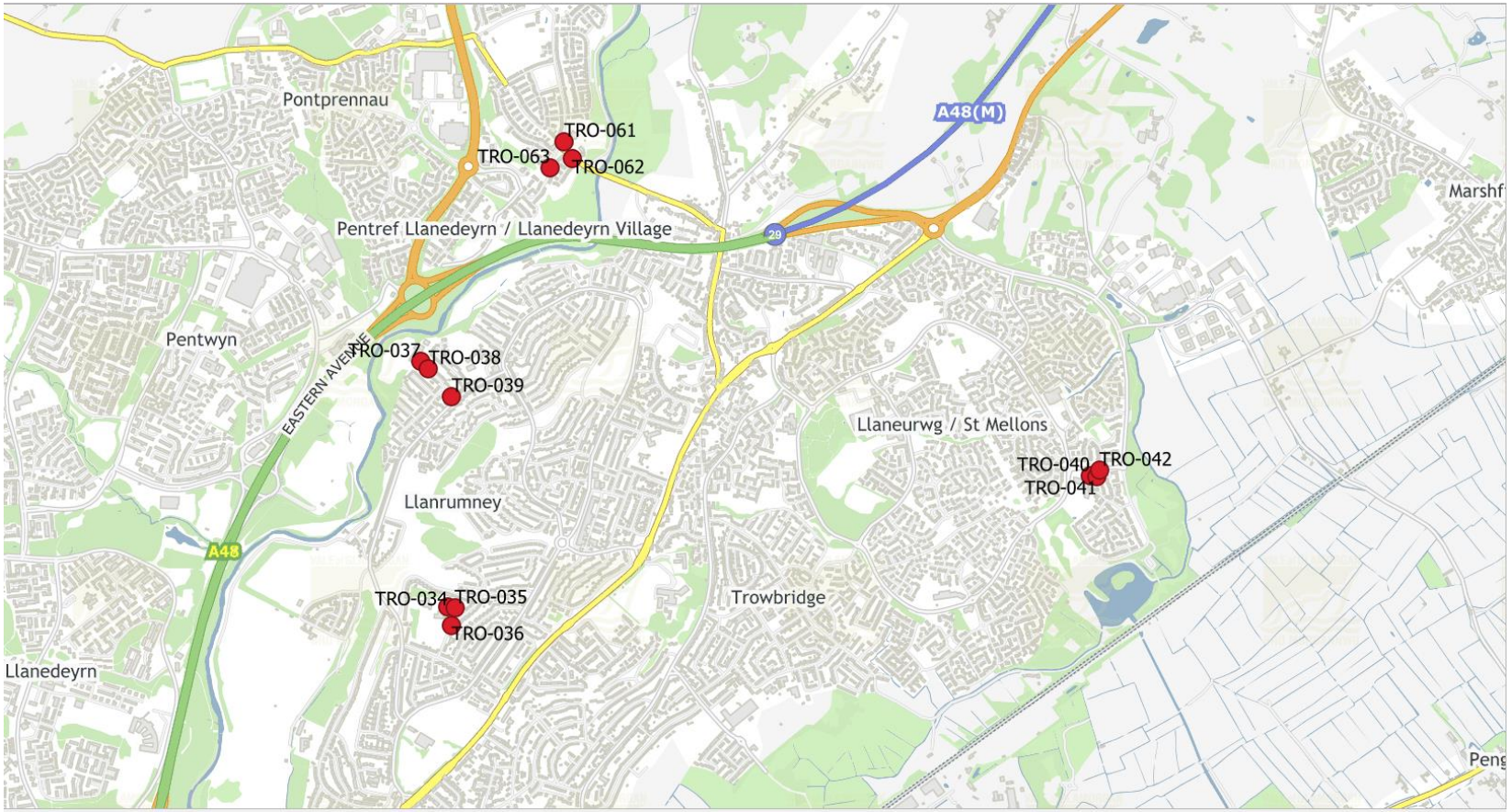


Figure 18 - Map of Non-Automatic Monitoring Sites in Cathays, Roath, Penylan and Tremorfa

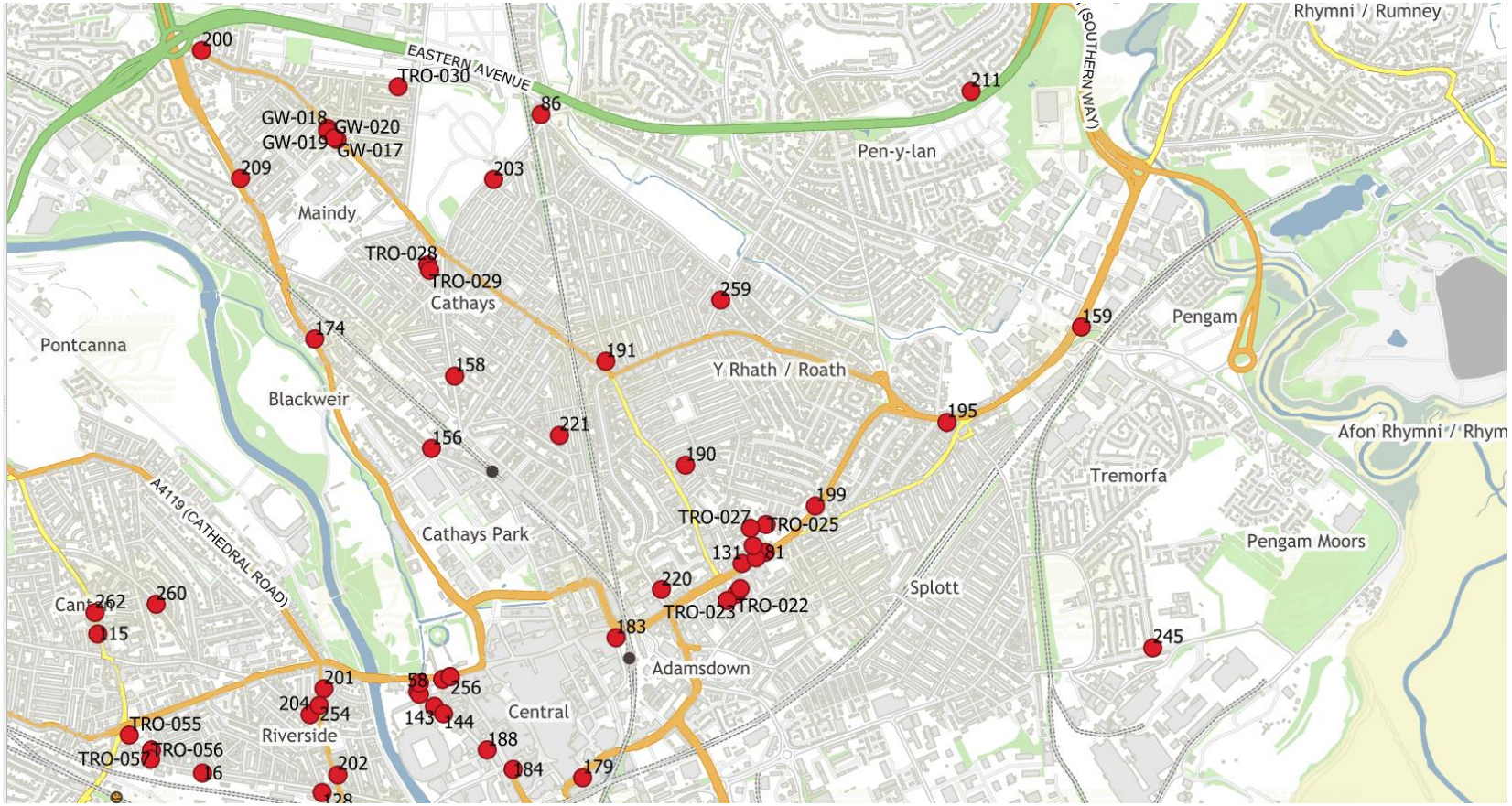


Figure 19 - Map of Non-Automatic Monitoring Sites Cardiff South

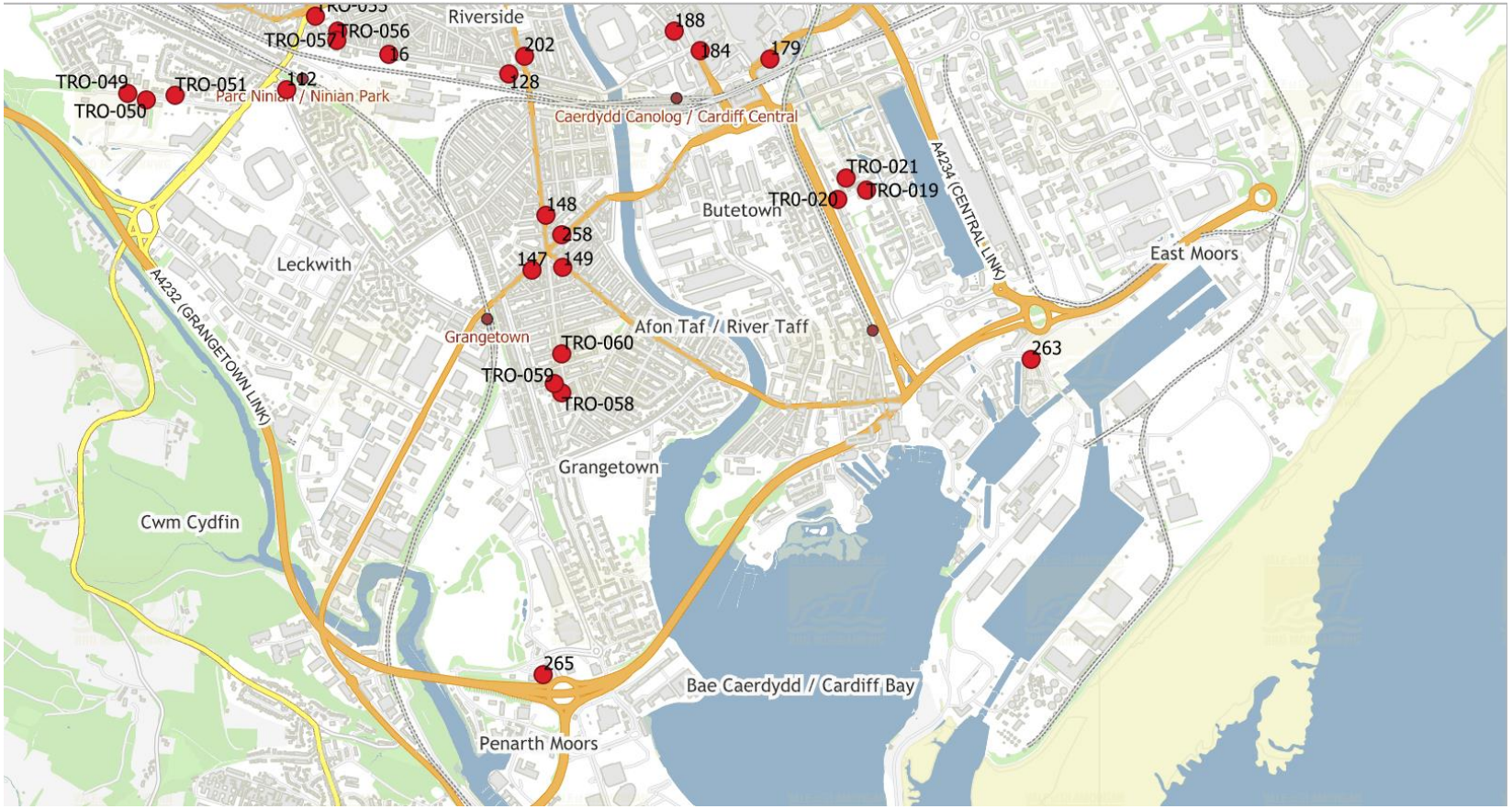


Figure 20 - Map of Non-Automatic Monitoring Sites in Canton, Leckwith and Grangetown

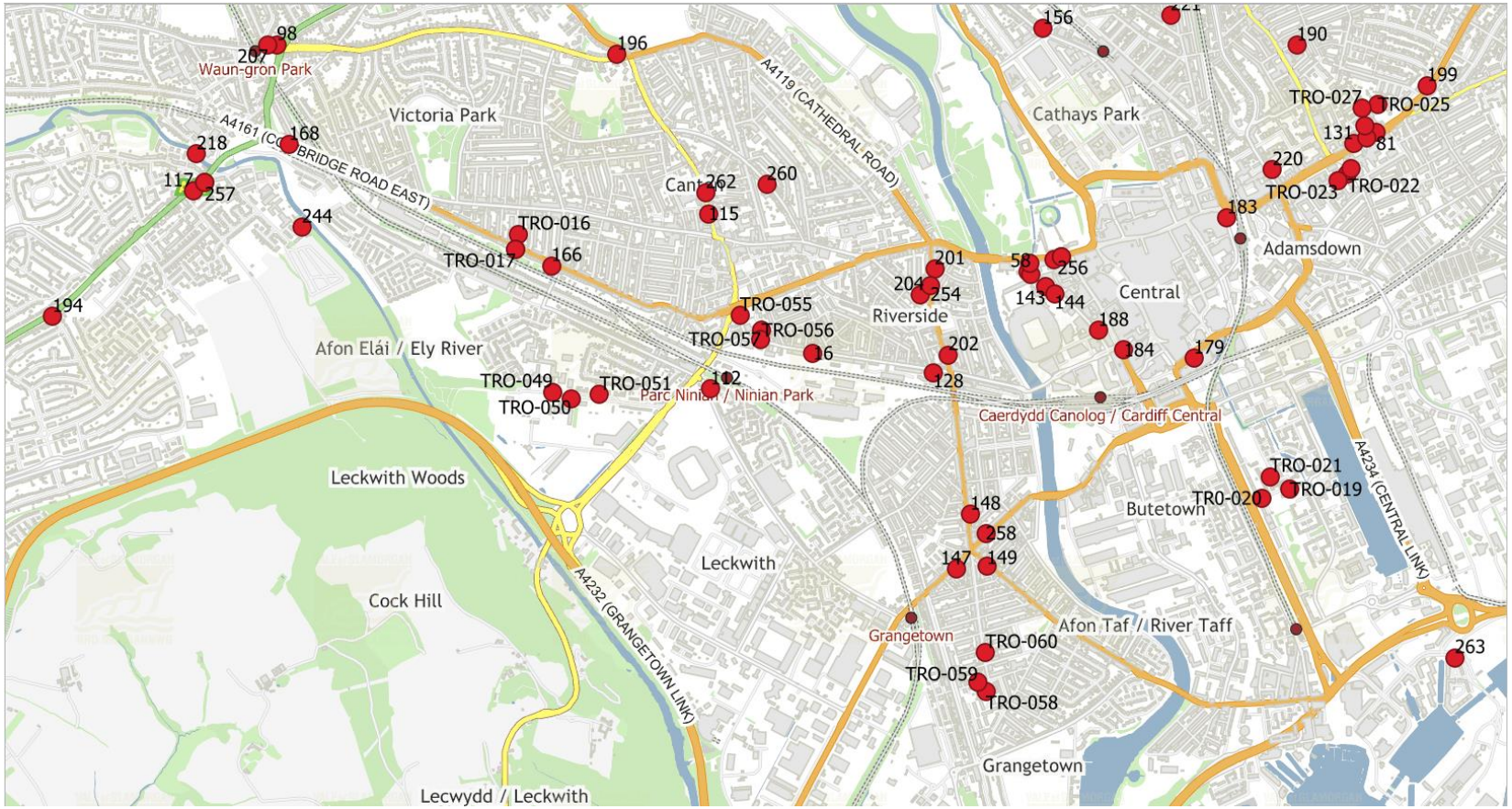


Figure 21 - Map of Non-Automatic Monitoring Sites Cardiff East

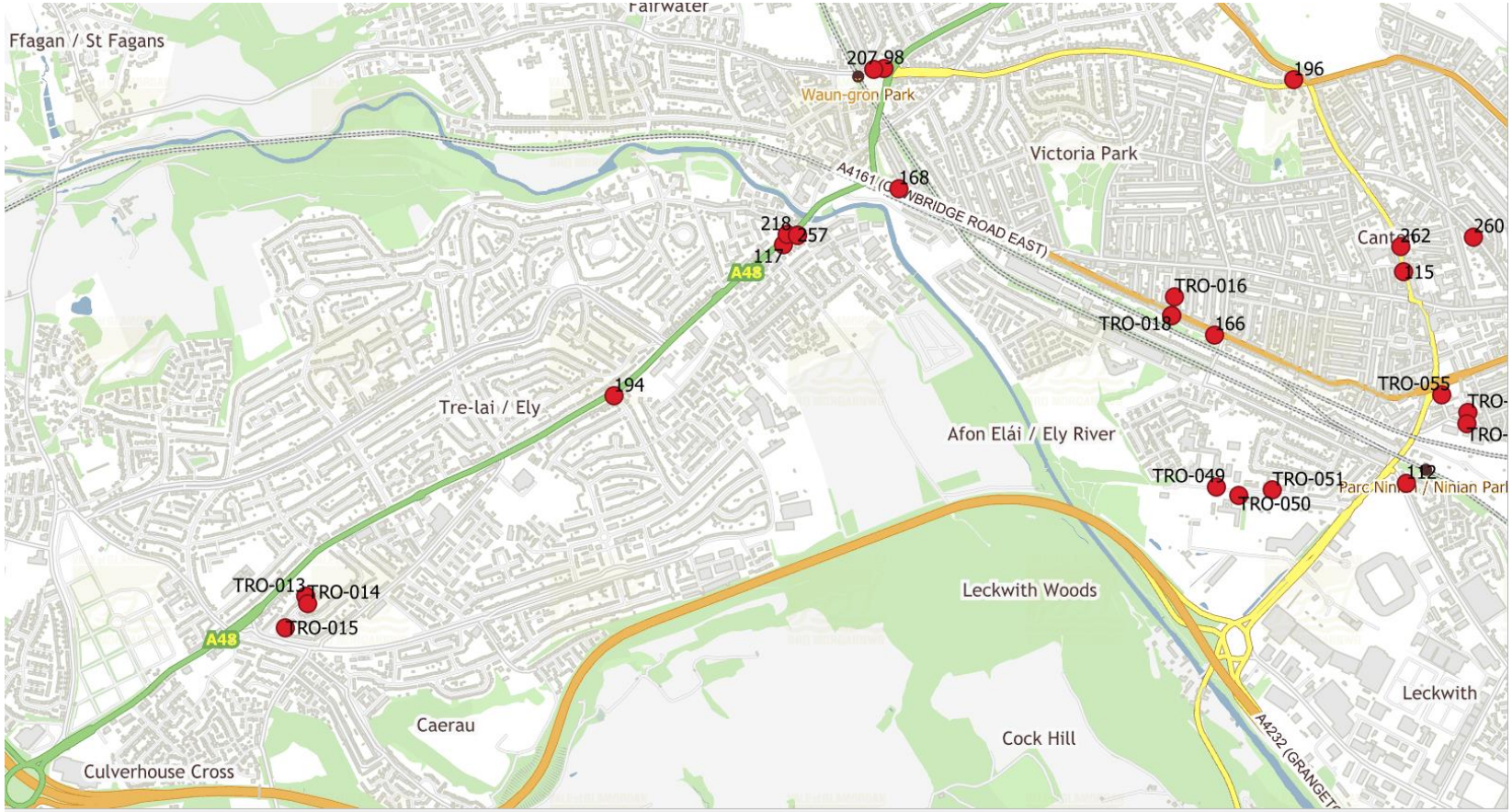


Figure 22 - Map of Non-Automatic Monitoring Sites Llandaff AQMA

Figure 23 - Map of Non-Automatic Monitoring Sites Stephenson Court, Newport Road AQMA

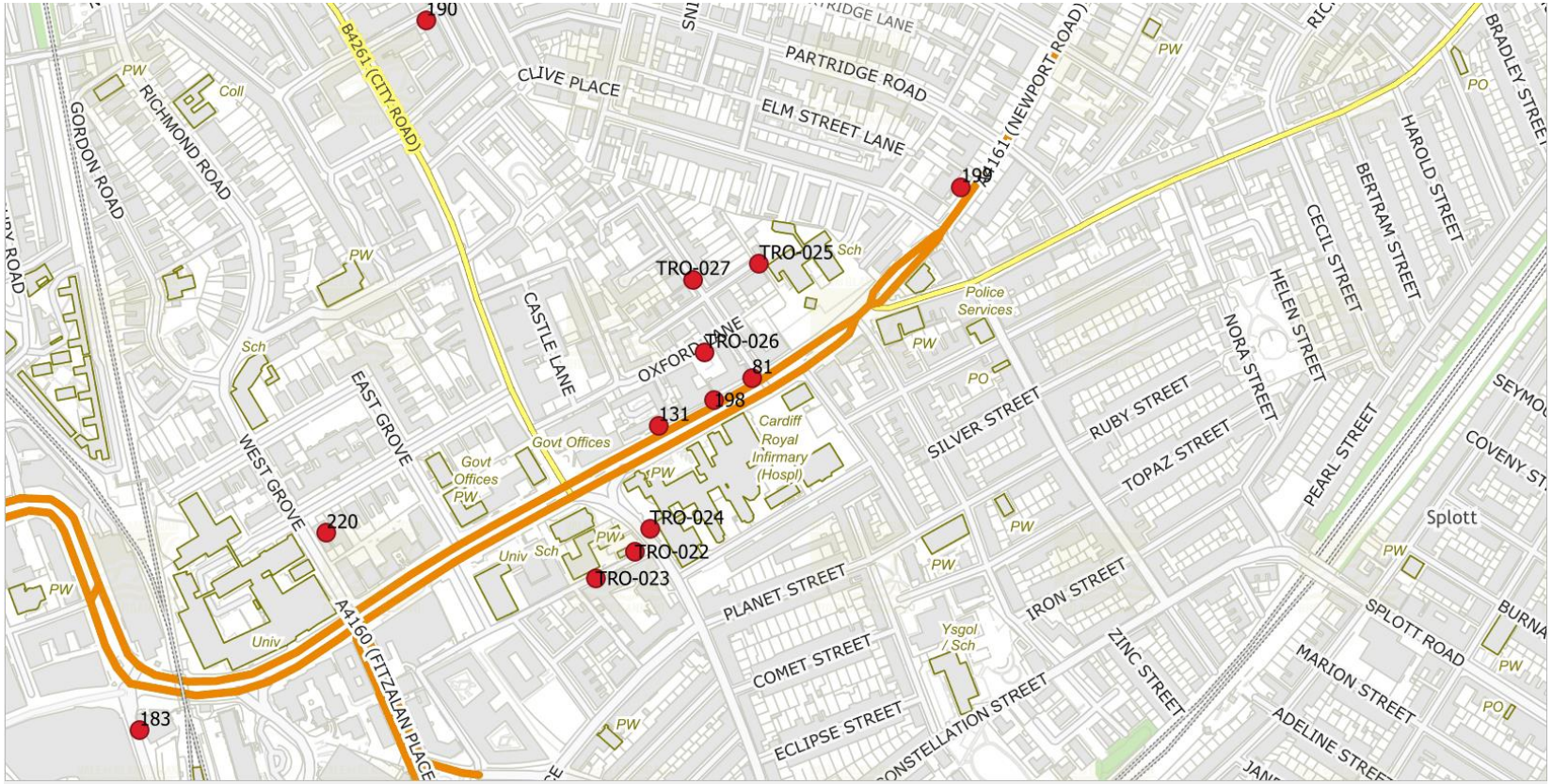


Figure 24 - Map of Non-Automatic Monitoring Sites Cardiff City Centre AQMA

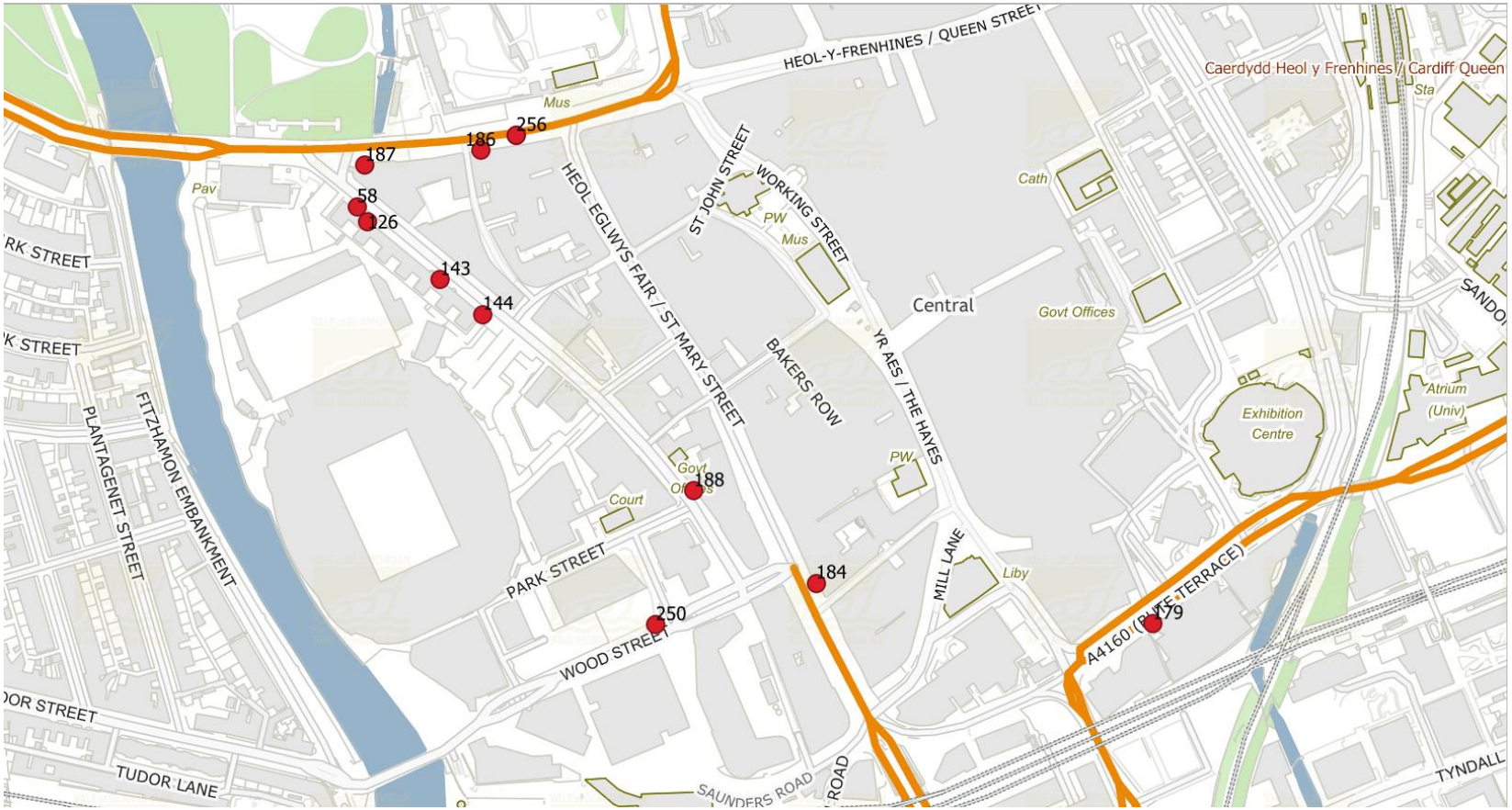
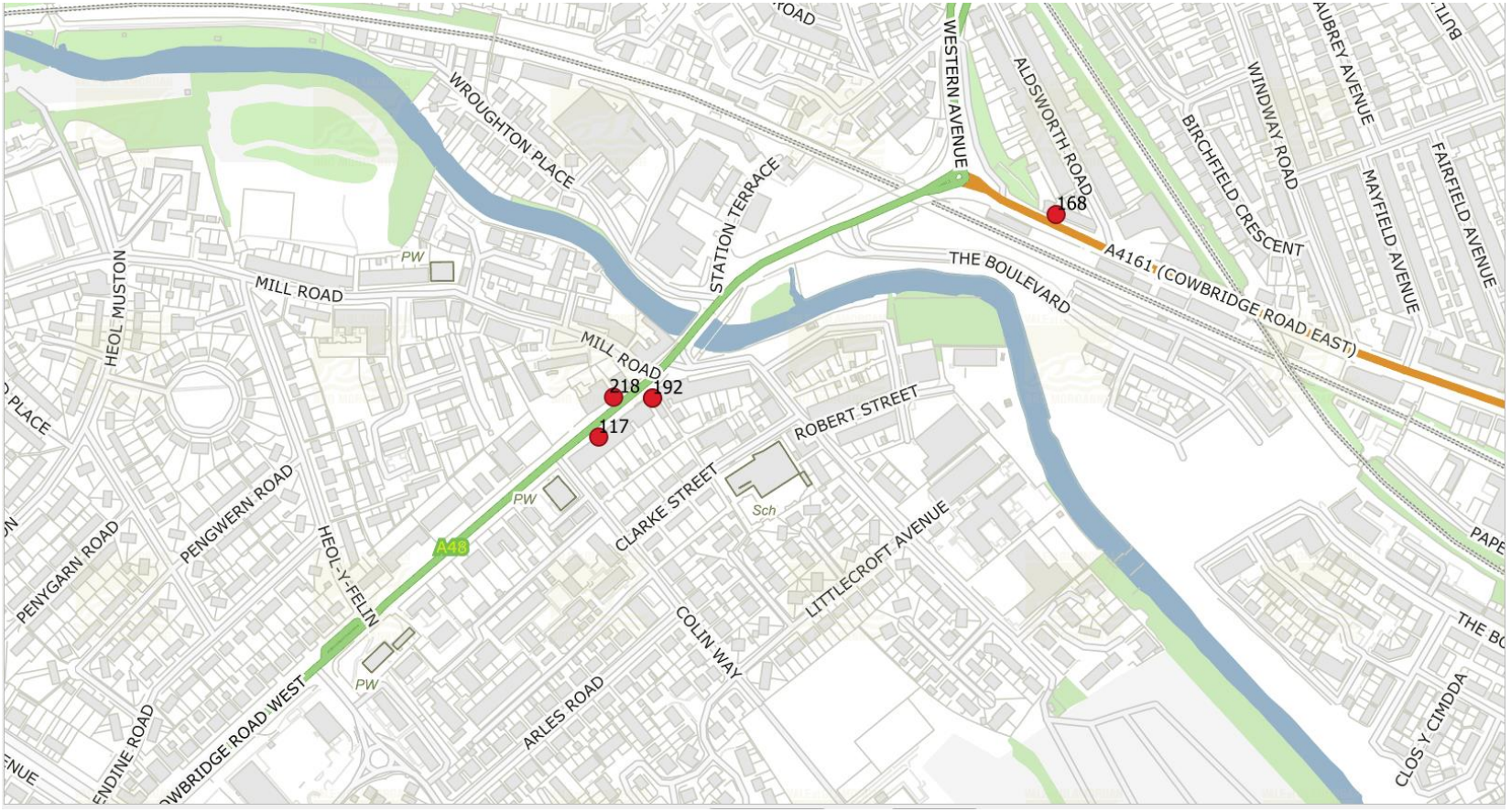


Figure 25 - Map of Non-Automatic Monitoring Sites Ely Bridge AQMA



2023 Air Quality Monitoring Results

Table 6 - Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2019	2020	2021	2022	2023
Cardiff City Centre AURN	Urban background	Automatic	95	95	12	16	16	17	16
Cardiff, Newport Road AURN	Roadside	Automatic	100	100	29	19	22	22	19
Cardiff Castle Street	Roadside	Automatic	100	100			25	34	33

Table 7 - Annual Mean NO_2 Monitoring Results: Indicative Automatic Monitoring (µg/m^3)

Sensor Number	Network	Location	% Data Capture May – December 2023	NO2 µg/m3 2023
SN-0604	Ely Bridge AQMA	Cowbridge Road West	100	9.6
SN-0677	Ely Bridge AQMA	Cowbridge Road West	100	15.9
SN-0572	Ely Bridge AQMA	Mills Road	88	19.8
SN-0659	Ely Bridge AQMA	Dyfrig Road	100	7.2
SN-2058	Stephenson Court AQMA	Newport Road	0	Sensor error
SN-0370	Stephenson Court AQMA	Glossop Road	94	19.5
SN-0131	Stephenson Court AQMA	Newport Road	94	11.5
SN-0523	Stephenson Court AQMA	City Road	100	10.7
SN-0359	Stephenson Court AQMA	Glossop Road	94	20.8
SN-0398	Stephenson Court AQMA	Longcross Street	94	12.2
SN-0649	Llandaff AQMA	Llantrisant Road	87	12.4
SN-0609	Llandaff AQMA	Cardiff Road	88	10.1
SN-0517	Llandaff AQMA	Cardiff Road	68	9
SN-0638	City Centre AQMA	Westgate Street	95	18.9
SN-0596	City Centre AQMA	Westgate Street	99	10.9
SN-0648	City Centre AQMA	Cowbridge Road East	99	10.2
SN-0286	City Centre AQMA	Westgate Street	24	11
SN-0409	City Centre AQMA	Westgate Street	99	12.8
SN-0539	Radyr	Park Road	100	16.6
SN-0629	Coryton	Pendwyallt Road	100	12.4
SN-0704	Rhiwbina	Lon Ucha	100	7.6
SN-0371	Llanishen	Ty Glas Avenue	100	14.3
SN-0592	Lisvane	Rowan Way	100	18.7
SN-0598	Pontprennau	Heol Pontprennau	100	13.2
SN-0353	Pentwyn	Pentwyn Drive	19	18.9

Sensor Number	Network	Location	% Data Capture May – December 2023	NO2 µg/m3 2023
SN-0673	St Mellons	Dunster Road	100	12.4
SN-0610	St Mellons	Meadowlark Close	100	13.9
SN-0616	Rumney	Llanstephan Road	100	16.2
SN-0705	Llanishen	Fidlas Aveune	88	8.8
SN-0615	Birchgrove	Birchgrove Road	23	14.3
SN-0620	Llandaff	Hawthorn Road East	99	7.5
SN-0628	Fairwater	Beechley Drive	100	20.7
SN-0362	Ely	Grand Avenue	100	19.2
SN-0644	Grangetown	Clare Road	99	14.2
SN-0694	Cardiff Bay	Adelaide Street	100	20.3
SN-0364	Tremorfa	Mervyn Road	28	15.1
SN-0680	Adamsdown	Constellation Street	100	18.7
SN-0601	Cathays	Whitchurch Road	100	15.1
SN-0685	Cathays	North Road	100	12
SN-0576	Penylan	Colchester Avenue	40	31.1
SN-0541	Cathays	Whitchurch Road	100	17.7
SN-0682	Pontcanna	Cathedral Road	100	7.5

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

Table 2.8 – Annual Mean NO_2 Monitoring Results: Non-Automatic Diffusion Tube Monitoring (µg/m^3)

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
							2019	2020	2021	2022	2023
16	167 Ninian Park Road	317040	176060	Roadside	83.2	83.2	27.3	23.6	23.2	24.1	21.7
258	Lamp post Penarth Road	317760	175310	Roadside	75.8	75.8			29.4	29.5	26.7
58	Westgate Street	317937	176400	Kerbside	82.6	82.6	**41.2**	30.0	30.8	31.0	30.7
81	Stephenson Court	319387	176980	Roadside	90.6	90.6	34.4	27.2	29.3	27.0	24.5
86	19 Fairoak Road	318452	178805	Roadside	83.2	83.2	31.7	25.8	27.0	28.6	27.1
96	Manor Way Junction	316601	179653	Roadside	75.5	75.5	29.4	22.2	24.2	25.2	22.4
98	Western Avenue (premises)	314805	177345	Roadside	83.2	83.2	24.6	20.0	20.8	22.0	19.2
99	Cardiff Road Llandaff	315275	178117	Roadside	100.0	100.0	30.4	22.8	25.1	26.8	25.9
259	Wellfield Road	319201	178031	Kerbside	75.5	75.5				26.1	20.5
260	St Marys Catholic School, Canton	316847	176762	Roadside	75.5	75.5				20.6	18.9
264	Beechley Drive	313142	177870	Roadside	83.2	83.2				11.5	9.8

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
106	30 Caerphilly Road	316851	179520	Roadside	65.8	65.8	28.3	24.5	23.7	24.5	20.9
112	17 Sloper Road	316613	175910	Roadside	83.2	83.2	25.8	20.7	23.1	22.9	20.9
115	21 Llandaff Road	316604	176641	Roadside	83.2	83.2	30.6	25.3	25.6	27.5	25.0
117	25 Cowbridge Road West	314458	176735	Roadside	100.0	100.0	36.8	30.7	36.0	33.7	31.0
126	Westgate Street Flats	317946	176387	Roadside	92.6	92.6	33.3	22.3	24.0	25.3	25.6
128	117 Tudor Street	317540	175979	Roadside	83.2	83.2	29.8	25.0	25.0	27.2	26.9
131	Dragon Court	319292	176932	Roadside	100.0	100.0	35.7	28.8	26.7	26.0	24.8
143	Windsor House	318009	176337	Roadside	92.6	92.6	35.6	23.5	25.7	25.7	25.4
144	Marlborough House	318046	176307	Roadside	100.0	100.0	33.9	25.0	26.4	27.9	27.6
147	211 Penarth Road	317636	175161	Roadside	83.2	83.2	26.9	20.5	23.8	24.3	22.0
148	161 Clare Road	317695	175389	Roadside	25.1	25.1	25.6	21.3	23.9	24.0	20.7
149	10 Corporation Road	317764	175174	Roadside	83.2	83.2	30.1	26.8	25.9	27.1	26.2

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
156	2a/4 Colum Road	317997	177412	Roadside	83.2	83.2	24.8	17.4	20.1	21.9	19.5
157	47 Birchgrove Road	316605	179703	Roadside	83.2	83.2	23.6	19.3	19.4	19.3	19.6
158	64/ 66 Cathays Terrace	318093	177716	Roadside	65.8	65.8	24.2	17.6	21.0	22.4	20.2
159	IMO façade replacement	320709	177918	Roadside	83.2	83.2	32.2	26.4	27.4	28.7	26.7
166	163 Lansdowne Road	315950	176424	Roadside	75.2	75.2	31.4	26.3	26.7	27.1	27.8
168	570 Cowbridge Road East	314856	176929	Roadside	83.2	83.2	24.7	21.1	22.7	23.6	20.9
174	76 North Road	317508	177868	Roadside	83.2	83.2	26.8	17.7	20.0	23.2	21.5
179	Altolusso, Bute Terrace	318627	176039	Kerbside	90.6	90.6	33.1	32.4	37.6	31.7	36.0
183	Station Terrace	318765	176623	Kerbside	92.0	92.0	30.9	23.5	23.7	25.9	22.2
184	Hophouse, St Mary Street	318335	176074	Roadside	58.1	58.1	**40.5**	28.3	27.5	28.3	24.7
186	Dempsey's Public House, Castle Street	318044	176449	Roadside	75.2	75.2	**42.7**	23.1	24.5	31.6	30.8
187	Angel Hotel	317944	176436	Roadside	50.1	50.1	**43.9**	25.7	26.1	31.5	27.6

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
188	Westgate Street (45 Apartments)	318229	176154	Roadside	100.0	100.0	**43.7**	32.5	26.8	28.5	26.7
191	7 Mackintosh Place	318724	177776	Roadside	83.2	83.2	27.9	22.5	24.3	25.4	23.2
194	115 Cowbridge Road West	313870	176212	Roadside	73.6	73.6	20.4	15.8	18.4	20.2	19.5
195	244 Newport Road	320147	177523	Roadside	83.2	83.2	31.2	24.2	24.6	25.0	22.1
196	2 Pencisely Road	316223	177305	Roadside	83.2	83.2	25.2	19.4	22.0	22.6	19.9
198	Next Building to Stephenson Court	319348	176958	Roadside	100.0	100.0	33.5	25.7	28.7	28.3	26.3
199	157 Newport Road	319599	177174	Roadside	83.2	83.2	25.0	20.7	20.1	20.1	19.0
200	350 Whitchurch Road	317038	179073	Roadside	65.8	65.8	31.1	27.4	27.4	27.6	25.2
201	23 Lower Cathedral Road	317547	176411	Roadside	83.2	83.2	28.9	22.1	24.0	27.0	23.1
202	22 Clare Street	317604	176053	Roadside	73.6	73.6	27.6	23.3	24.5	26.3	22.9
203	10 Fairoak Road	318255	178533	Roadside	67.5	67.5	20.6	17.2	17.1	17.6	14.8
204	53 Neville Street	317487	176303	Roadside	73.6	73.6	22.1	18.7	20.1	20.9	20.3

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
207	42 Waungron Road	314769	177343	Roadside	83.2	83.2	20.6	16.7	18.3	18.6	17.1
208	2 Llantrisant Road	315152	178245	Roadside	100.0	100.0	24.9	18.9	20.5	21.5	19.7
209	178 North Road	317200	178537	Roadside	83.2	83.2	22.3	15.2	16.6	19.1	19.1
210	485 Caerphilly Road	316692	181088	Roadside	65.8	65.8	20.4	16.6	17.5	18.2	16.3
211	19 Well Wood Close, Penylan	320247	178903	Roadside	56.2	56.2	21.8	18.1	19.7	18.4	17.1
212	Bridge Road	315197	178221	Kerbside	92.6	92.6	**41.3**	33.4	37.4	39.3	35.8
214	Mitre Place	315254	178153	Roadside	82.9	82.9	32.3	24.8	25.4	27.3	25.5
218	16-18 Cowbridge Road West	314471	176889	Roadside	90.4	90.4	35.5	28.2	31.6	31.4	28.5
254	Giraffe Nusery Cathedral road	317529	176340	Roadside	75.5	75.5			27.7	30.2	26.6
220	Fitzalan Court Newport Road	318955	176823	Kerbside	90.6	90.6	38.4	27.9	30.4	31.3	28.0
221	Stuttgarter Strasse (New student flats)	318530	177468	Kerbside	100.0	100.0		30.4	26.9	33.8	30.2
190	3 Pearson Street	319056	177343	Roadside	83.2	83.2	23.4	20.7	20.1	21.1	19.8

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
224	110 Cardiff Road	315714	177740	Roadside	83.2	83.2	23.1	18.5	18.8	18.5	17.4
243	25 Cardiff Road	315712	178789	Kerbside	75.2	75.2		25.7	28.2	31.1	24.7
244	25 Bridge Road	314910	176584	Roadside	83.2	83.2		18.2	18.0	18.7	19.3
245	47 Willows Ave	321006	179081	Urban Background	83.2	83.2		14.3	15.0	15.4	14.8
263	Pierhead Street	319715	174791	Roadside	83.2	83.2				14.4	16.2
247	Radyr Primary school	312857	180734	Roadside	58.1	58.1			11.4	12.7	11.1
262	54 Llandaff Road	316593	176728	Kerbside	83.2	83.2				15.3	19.1
249	Wentloog Road, Rumney	318201	180367	Roadside	83.2	83.2		17.3	16.5	16.2	16.5
250	Central Square Cardiff, City Centre	313244	176769	Roadside	57.9	57.9		26.7	28.4	26.3	24.7
251	Heol Isaf, Radyr	313244	180367	Kerbside	83.2	83.2		13.5	14.9	15.6	14.5
255, 256, 257	Castle Street Co-Location 3	314505	176769	Roadside	92.6	92.6			25.8	33.3	33.0
192	3 Cowbridge road West	314505	176769	Roadside	92.6	92.6	38.6	30.8	31.7	33.3	30.9

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
265	Green Giraffe Nursery, Cardiff Bay	317684	173479	Kerbside	50.1	50.1					13.6
TRO-001	Whitchurch High Lower School	315621	180320	Kerbside	73.6	73.6		10.9	11.9	12.6	14.0
TRO-002	Glan-Y-Nant Terrace (inside)	315589	180316	Roadside	76.6	76.6		12.9	13.4	13.6	13.0
TRO-003	Crossroads of Old Church Rd and Glan-Y-Nant terrace (outside)	315548	180315	Kerbside	84.6	84.6		15.6	16.0	15.0	13.4
TRO-004	Ysgol Melin Gruffydd School	315620	180360	Roadside	100.0	100.0		9.8	11.9	12.0	11.7
TRO-005	34 Glan-Y-Nant Rd (inside)	315608	180151	Roadside	92.0	92.0		11.5	11.6	12.2	11.6
TRO-006	36 Old Church Rd (outside)	315497	180140	Roadside	67.2	67.2		17.0	17.0	19.3	16.4
TRO-007	Peter Lea Primary	313878	178319	Roadside	100.0	100.0		9.4	10.4	11.0	10.1
TRO-008	36 Carter Place	313894	178331	Roadside	100.0	100.0		8.4	8.6	8.6	8.3
TRO-009	3 Carter Place	314022	178334	Roadside	82.4	82.4		9.3	9.2	9.8	9.7
TRO-010	Llandaff Church in Wales Primary	315274	177784	Kerbside	92.0	92.0		10.5	10.6	12.5	11.2
TRO-011	20 Hendre Rd Llandaff	315279	177750	Kerbside	100.0	100.0		12.2	10.9	12.2	11.1

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
TRO-012	48 Hendre Rd Llandaff	315209	177668	Roadside	100.0	100.0		10.6	10.4	11.2	10.5
TRO-013	Pencaeru School	312803	175519	Kerbside	100.0	100.0		9.9	9.0	9.3	8.4
TRO-014	16 Cyntwell Avenue	312809	175496	Roadside	90.4	90.4		14.1	13.7	10.3	12.2
TRO-015	6A Cyntwell Avenue	312734	175411	Roadside	100.0	100.0		11.5	11.8	10.4	10.7
TRO-016	Llansdowne Primary School	315811	176555	Roadside	75.2	75.2		16.9	15.9	16.1	16.5
TRO-017	29 Norfolk Street	315801	176492	Roadside	100.0	100.0		21.1	16.1	25.1	16.5
TRO-018	Llansdowne Road	315801	176492	Roadside	82.6	82.6			23.3	17.1	25.8
TRO-019	St Cuthberts Primary School	319027	175493	Kerbside	84.6	84.6			14.5	14.5	13.1
TR0-020	Letton Road	318910	175456	Kerbside	84.6	84.6			14.7	15.3	12.5
TRO-021	58 Letton Road	318945	175546	Kerbside	100.0	100.0			17.2	16.5	13.6
TRO-022	Tredegarville	319268	176804	Roadside	84.3	84.3			19.3	19.9	17.5
TRO-023	Newport Road School Lane Zone	319228	176777	Kerbside	92.6	92.6			19.5	19.2	17.3

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
TRO-024	Glossops Road	319283	176827	Kerbside	47.7	47.7			29.6	32.4	26.2
TRO-025	St Peters Primary School	319394	177096	Roadside	100.0	100.0			15.3	15.5	15.2
TRO-026	Southey Street	319339	177006	Kerbside	84.6	84.6			14.8	16.0	13.1
TRO-027	Wordsworth Avenue	319327	177080	Kerbside	92.6	92.6			16.4	18.5	15.6
TRO-028	St Monica's / Gladstone Primary School	317982	178180	Roadside	100.0	100.0			13.4	16.4	12.6
TRO-029	Pentyrch Street	317987	178156	Kerbside	92.6	92.6			14.4	14.6	13.6
TRO-030	Cwmdare Street	317855	178921	Kerbside	83.2	83.2			13.8	15.1	13.9
TRO-031	Lakeside Primary School	319031	179949	Roadside	100.0	100.0			10.5	11.2	9.5
TRO-032	Ontario Way	319012	180050	Kerbside	82.4	82.4			10.0	10.2	10.2
TRO-033	Woolaston Avenue	318898	180012	Kerbside	100.0	100.0			11.1	11.1	9.8
TRO-034	Bryn Hafod Primary School	321817	180406	Roadside	100.0	100.0			10.3	9.4	9.9
TRO-035	8 Blagdon Close	321847	180402	Kerbside	100.0	100.0			11.1	11.3	11.2

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
TRO-036	Uphill Road	321834	180331	Kerbside	67.2	67.2			11.3	10.6	10.8
TRO-037	Glan Y Afon Primary School	321705	181427	Roadside	0.0	0.0			4.1	10.6	-
TRO-038	Browning Close	321738	181398	Kerbside	82.4	82.4			11.8	11.8	12.0
TRO-039	Thackeray Crescent	321834	181282	Kerbside	83.2	83.2			13.4	13.8	12.8
TRO-040	Willow Brook Primary School	324489	180953	Kerbside	90.4	90.4			13.2	12.2	9.9
TRO-041	Bullrush Close	324519	180949	Kerbside	100.0	100.0			11.5	10.8	10.1
TRO-042	Sandbrook Road	324529	180975	Kerbside	100.0	100.0			13.4	12.2	11.3
TRO-043	Creigau Primary School	307904	181561	Kerbside	100.0	100.0			7.9	8.6	7.7
TRO-044	Tregarth Court	307896	181569	Kerbside	100.0	100.0			8.0	8.5	7.4
TRO-045	TY-Nant Road	307967	181585	Kerbside	100.0	100.0			10.7	10.3	9.4
TRO-046	Rhiwbina Primary School	315760	181322	Roadside	92.3	92.3				10.8	11.3
TRO-047	Lon-Y-Dail	315746	181209	Roadside	74.9	74.9				9.8	10.7

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
TRO-048	Heol-Y-Deri	315825	181374	Roadside	100.0	100.0				13.0	14.8
TRO-049	Fitzalan School	315955	175898	Roadside	100.0	100.0				11.1	13.0
TRO-050	Ysgol Gymraeg Pwll Coch	316032	175869	Roadside	90.4	90.4				11.5	13.1
TRO-051	Lawrenny Avenue	316150	175887	Roadside	100.0	100.0				11.4	12.3
TRO-052	Coed Y Gof	313000	178061	Roadside	92.6	92.6				-	9.5
TRO-053	Lime Grove	312944	178097	Roadside	67.2	67.2				-	9.3
TRO-054	Maple Road	312883	178154	Roadside	15.2	15.2				-	-
TRO-055	Kitchener Primary School	316735	176217	Kerbside	90.4	90.4					22.4
TRO-056	11 Railway Terrace	316826	176156	Kerbside	92.6	92.6					19.1
TRO-057	196 Ninian Park Road	316823	176118	Kerbside	92.6	92.6					22.2
TRO-058	St Pauls Primary School	317760	174651	Kerbside	68.6	68.6					14.0
TRO-059	Bromsgrove Street	317727	174689	Kerbside	82.9	82.9					13.3

Diffusion Tube ID	Site Location	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2023 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
							2019	2020	2021	2022	2023
TRO-060	Paget Street	317758	174813	Kerbside	100.0	100.0					13.9
TRO-061	St Mellons Primary School (New Build no access currently)	322302	182343	Kerbside	32.8	32.8					13.4
TRO-062	Bridge Road	322335	182272	Kerbside	57.6	57.6					11.8
TRO-063	Church Road	322244	182234	Kerbside	50.1	50.1					13.5
GW-017	Ysgol Mynydd Bychan Signpost (Outside school)	317602	178703	Kerbside	32.8	32.8					19.0
GW-018	Ysgol Mynydd Bychan Signpost (Outside school)	317561	178746	Kerbside	32.8	32.8					20.8
GW-019	Ysgol Mynydd Bychan Façade 1	317564	178735	Roadside	25.3	25.3					20.1
GW-020	Ysgol Mynydd Bychan Façade 2	317590	178708	Roadside	32.8	32.8					20.1

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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 26 - Trends in Annual Mean NO_2 Concentrations Cardiff Automatic Monitors µg/m^3

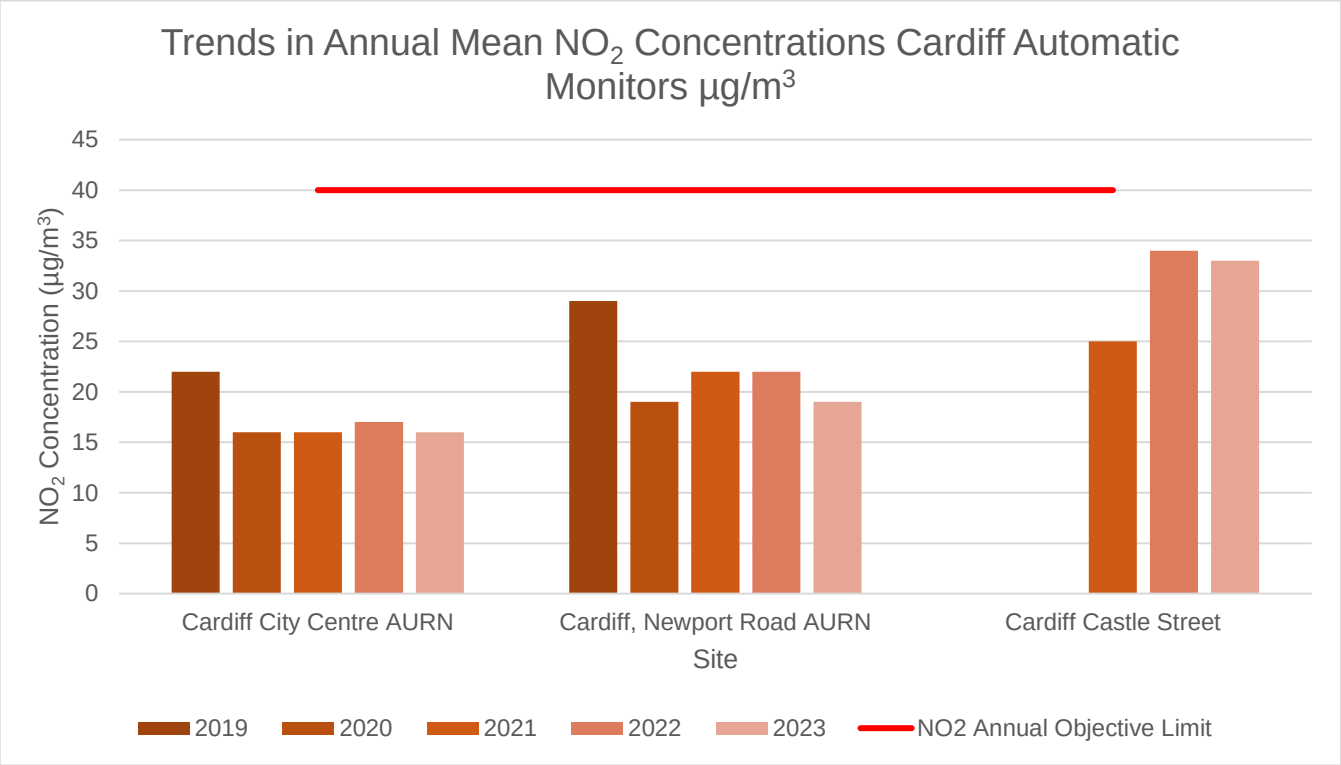


Figure 26 displays trends from Welsh Urban Air Quality Monitoring and AURN network monitors. A stable trend in NO_2 concentrations can be seen at all locations since 2020, with improvements since 2019 at Cardiff City Centre AURN and Newport Road AURN. In 2021, the decrease in NO_2 concentrations at the Castle Street monitor is attributed to the closure of Castle Street to vehicles other than buses and taxis, until June 2021, when Castle Street was reopened to all vehicles.

Figure 27 - Llandaff AQMA 2019 - 2023 Annual Average NO_2 Diffusion Tube Concentrations µg/m^3

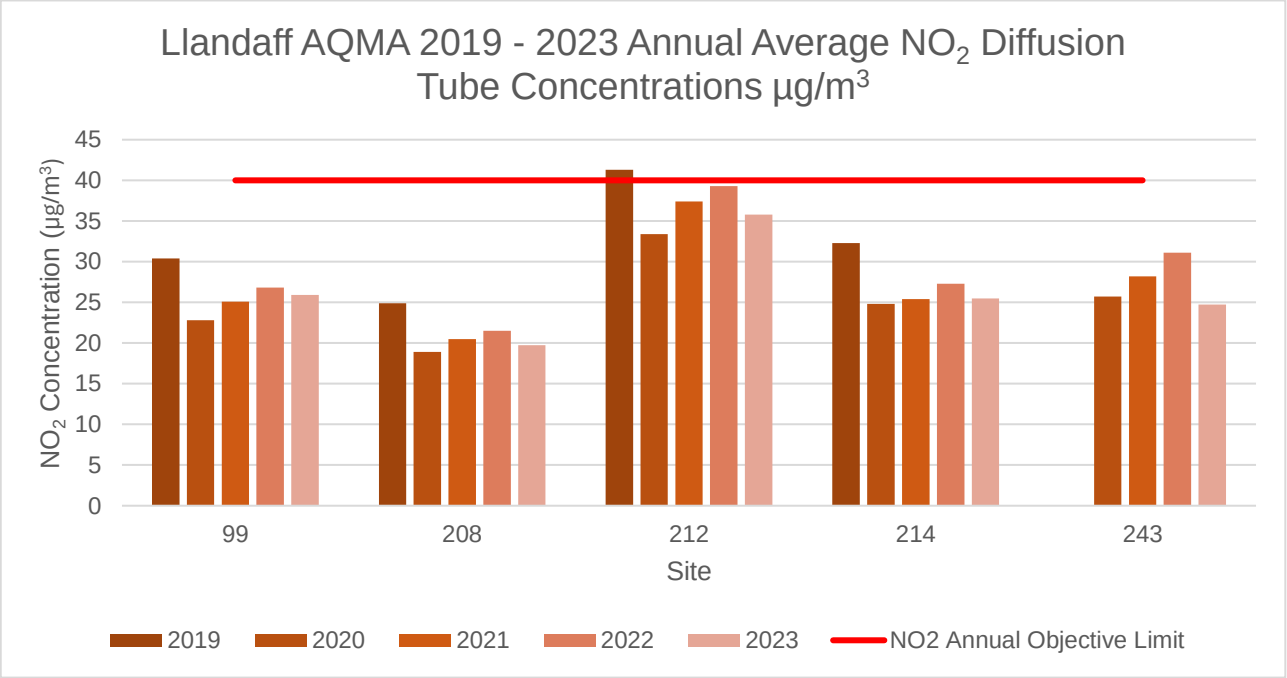


Figure 27 displays NO_2 diffusion tube locations within Llandaff AQMA. All locations have been within the NO_2 annual objective limit since 2019. An improvement in NO_2 concentrations is evident at all locations in 2023 when compared to 2022.

Figure 28 - Trends in Annual Mean NO_2 Concentrations City Centre AQMA µg/m^3

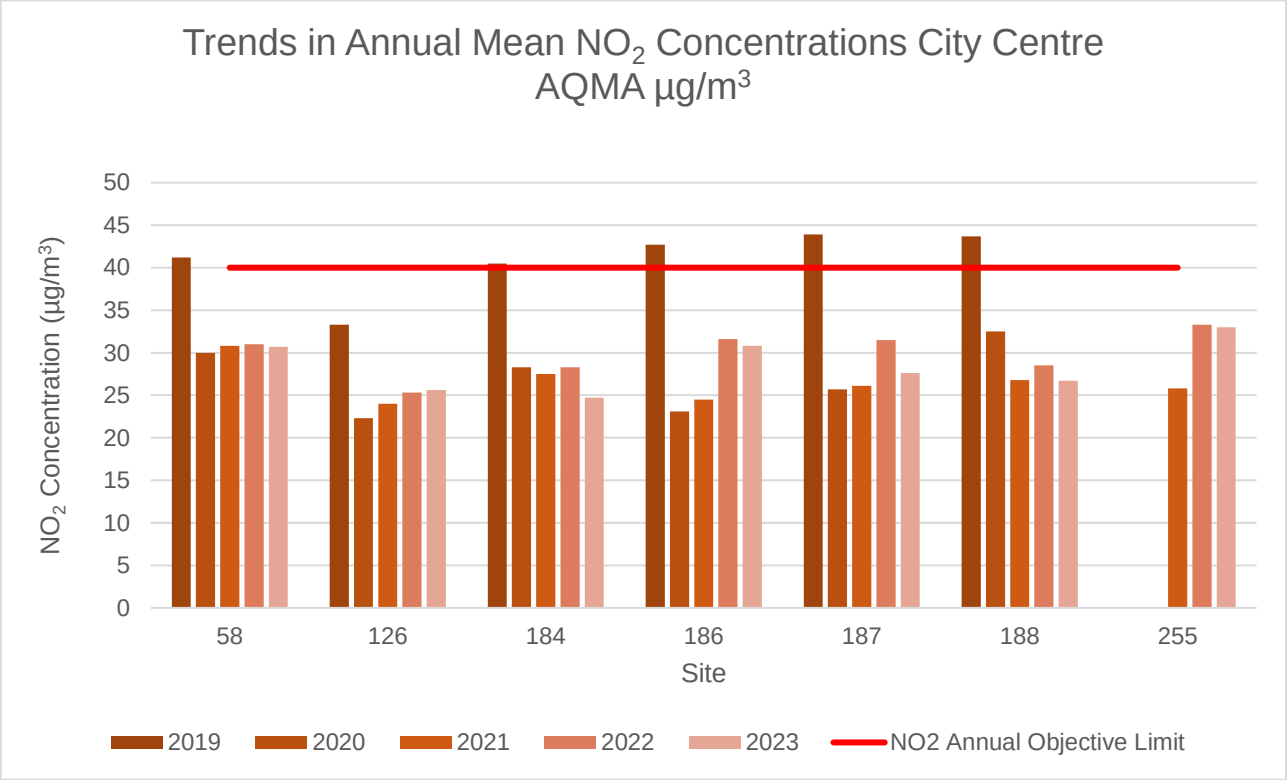


Figure 28 displays NO_2 diffusion tube locations within, and close to the City Centre AQMA. All locations have been within the NO_2 annual objective limit since 2019. An increase in NO_2 concentrations at sites 186 and 187 from 2022 are due to the re-opening of Castle Street to all vehicles in June 2021. There is a decrease in NO_2 concentrations all but one location when comparing 2022 results to 2023. Site 126 has a slight increase within this time period.

Figure 29 - Trends in Annual Mean NO_2 Concentrations Stephenson Court, Newport Road AQMA µg/m^3

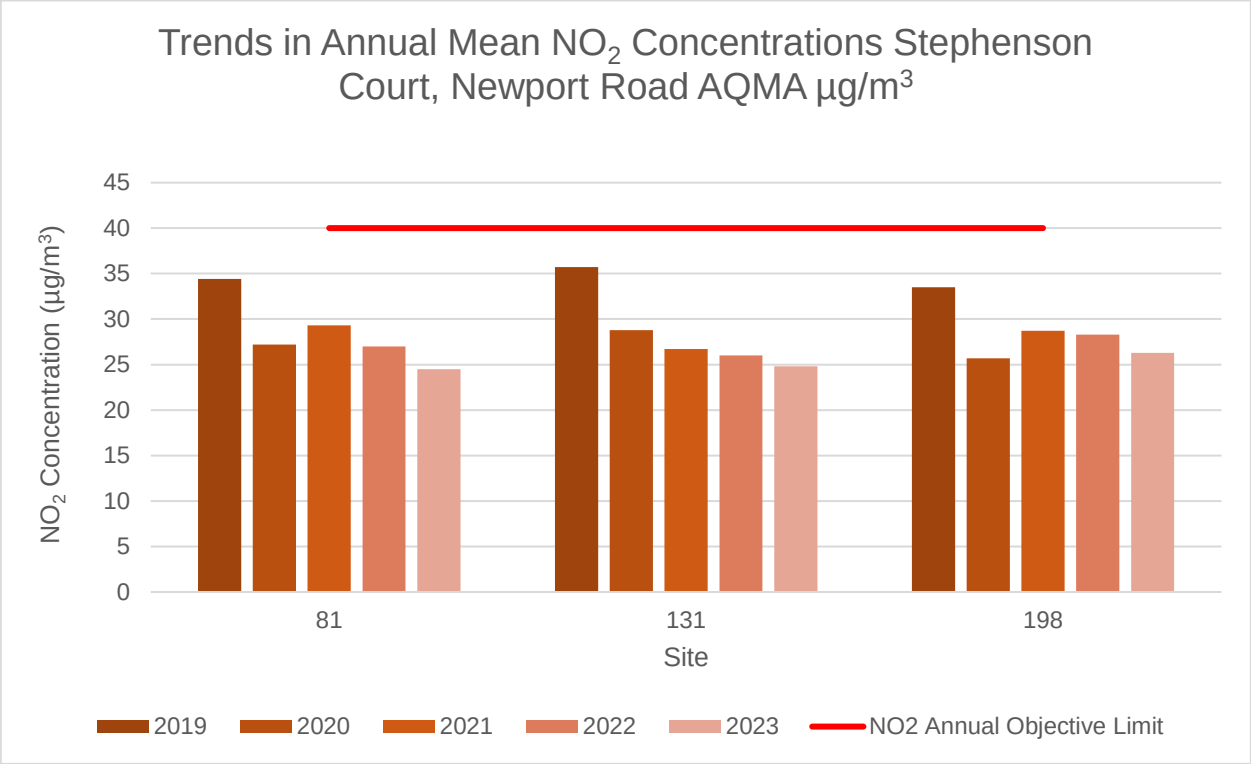


Figure 29 displays NO_2 diffusion tube locations Stephenson Court, Newport Road AQMA. All locations have been within the NO_2 annual objective limit since before 2019, and a decreasing trend in NO_2 concentrations within this time. This indicates that the Council could consider revocation of this AQMA subject to further detailed assessment.

Figure 30 - Trends in Annual Mean NO_2 Concentrations Ely Bridge AQMA µg/m^3

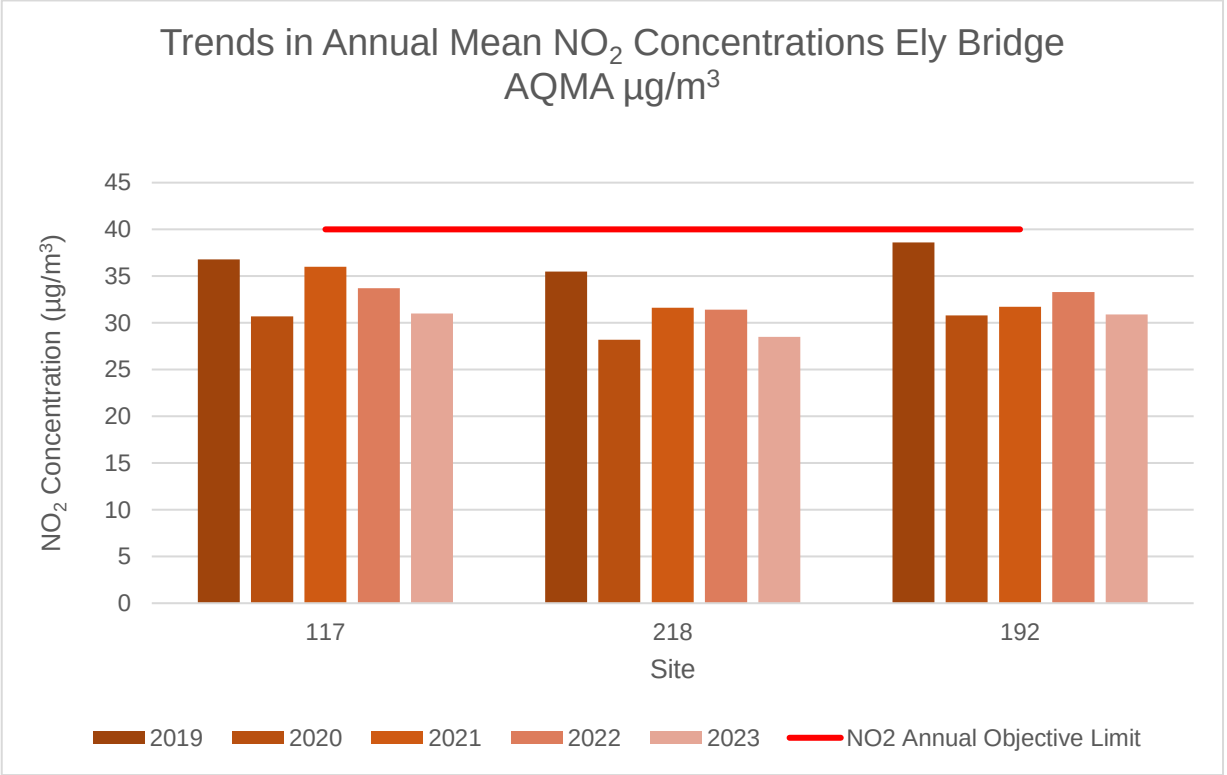


Figure 30 displays NO_2 diffusion tube locations within the Ely Bridge AQMA. All locations have been within the NO_2 annual objective limit since before 2019, and a decreasing trend in NO_2 concentrations within this time. This indicates that the Council could consider revocation of this AQMA subject to further detailed assessment.

Figure 31 - Cardiff Annual Average NO_2 Diffusion Tubes Concentrations 2019 - 2023 (µg/m^3)

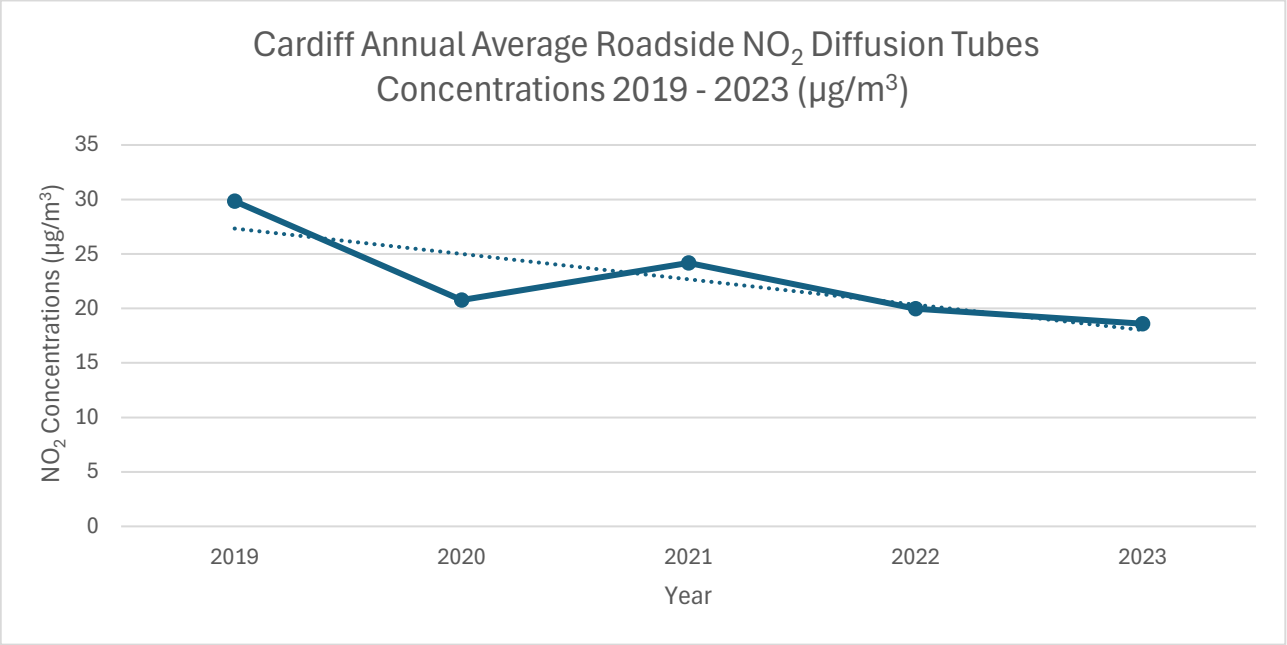


Figure 31 displays average annual NO_2 concentrations at roadside and kerbside locations within the Cardiff area. A decreasing trend is evident since 2019. A decrease of 37% in annual average NO_2 concentrations is evident during this time period. A significant decrease can be seen in 2020 due to Covid-19 pandemic restrictions. which reflects the decrease is traffic during this period. However, when examining average NO_2 concentrations across Cardiff, we are now experiencing levels lower than those experienced during the pandemic.

Table 9 - 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Cardiff City Centre AURN	Urban background	Automatic	95	95	0	0	0	0	0
Cardiff, Newport Road AURN	Roadside	Automatic	100	100	0	0	0	0	0
Cardiff Castle Street	Roadside	Automatic	100	100			0	0	0

Table 10 – Indicative Sensor Network 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0604	Ely Bridge AQMA	Cowbridge Road West	100	0
SN-0677	Ely Bridge AQMA	Cowbridge Road West	100	0
SN-0572	Ely Bridge AQMA	Mills Road	88	0
SN-0659	Ely Bridge AQMA	Dyfrig Road	100	0
SN-2058	Stephenson Court AQMA	Newport Road	0	Sensor error
SN-0370	Stephenson Court AQMA	Glossop Road	94	0
SN-0131	Stephenson Court AQMA	Newport Road	94	0
SN-0523	Stephenson Court AQMA	City Road	100	0
SN-0359	Stephenson Court AQMA	Glossop Road	94	0
SN-0398	Stephenson Court AQMA	Longcross Street	94	0
SN-0649	Llandaff AQMA	Llantrisant Road	87	0
SN-0609	Llandaff AQMA	Cardiff Road	88	0
SN-0517	Llandaff AQMA	Cardiff Road	68	0

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0638	City Centre AQMA	Westgate Street	95	0
SN-0596	City Centre AQMA	Westgate Street	99	0
SN-0648	City Centre AQMA	Cowbridge Road East	99	0
SN-0286	City Centre AQMA	Westgate Street	24	0
SN-0409	City Centre AQMA	Westgate Street	99	0
SN-0539	Radyr	Park Road	100	0
SN-0629	Coryton	Pendwyallt Road	100	0
SN-0704	Rhiwbina	Lon Ucha	100	0
SN-0371	Llanishen	Ty Glas Avenue	100	0
SN-0592	Lisvane	Rowan Way	100	0
SN-0598	Pontprennau	Heol Pontprennau	100	0
SN-0353	Pentwyn	Pentwyn Drive	19	0
SN-0673	St Mellons	Dunster Road	100	0
SN-0610	St Mellons	Meadowlark Close	100	0
SN-0616	Rumney	Llanstephan Road	100	0
SN-0705	Llanishen	Fidlas Aveune	88	0
SN-0615	Birchgrove	Birchgrove Road	23	0
SN-0620	Llandaff	Hawthorn Road East	99	0
SN-0628	Fairwater	Beechley Drive	100	0
SN-0362	Ely	Grand Avenue	100	0
SN-0644	Grangetown	Clare Road	99	0
SN-0694	Cardiff Bay	Adelaide Street	100	0
SN-0364	Tremorfa	Mervyn Road	28	0
SN-0680	Adamsdown	Constellation Street	100	0
SN-0601	Cathays	Cathays Terrace	100	0
SN-0685	Cathays	North Road	100	0
SN-0576	Penylan	Colchester Avenue	40	0

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0541	Cathays	Whitchurch Road	100	0
SN-0682	Pontcanna	Cathedral Road	100	0

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 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%).

Table 11 - Annual Mean Automatic PM_{10} Monitoring Results (µg/m3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Cardiff City Centre AURN	Urban background	Automatic	94	94	23	14	13	16	16
Cardiff, Newport Road AURN	Roadside	Automatic	97	97	19	17	17	18	16
Cardiff Castle Street	Roadside	Automatic	99	99			12	20	18

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG22 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%).

Table 12 – Indicative Sensor Network Annual Mean Automatic PM_{10} Monitoring Results (µg/m3)

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0604	Ely Bridge AQMA	Cowbridge Road West	100	6.5
SN-0677	Ely Bridge AQMA	Cowbridge Road West	100	10.8
SN-0572	Ely Bridge AQMA	Mills Road	88	6.7
SN-0659	Ely Bridge AQMA	Dyfrig Road	100	5.3
SN-2058	Stephenson Court AQMA	Newport Road	0	Sensor error
SN-0370	Stephenson Court AQMA	Glossop Road	94	5.7
SN-0131	Stephenson Court AQMA	Newport Road	94	9.9
SN-0523	Stephenson Court AQMA	City Road	100	8.3
SN-0359	Stephenson Court AQMA	Glossop Road	94	5.5
SN-0398	Stephenson Court AQMA	Longcross Street	94	6.2
SN-0649	Llandaff AQMA	Llantrisant Road	87	8
SN-0609	Llandaff AQMA	Cardiff Road	88	5
SN-0517	Llandaff AQMA	Cardiff Road	68	7.8
SN-0638	City Centre AQMA	Westgate Street	95	8
SN-0596	City Centre AQMA	Westgate Street	99	6.4
SN-0648	City Centre AQMA	Cowbridge Road East	99	7
SN-0286	City Centre AQMA	Westgate Street	24	7.9
SN-0409	City Centre AQMA	Westgate Street	99	8
SN-0539	Radyr	Park Road	100	7
SN-0629	Coryton	Pendwyallt Road	100	3.9
SN-0704	Rhiwbina	Lon Ucha	100	6.6
SN-0371	Llanishen	Ty Glas Avenue	100	6.7
SN-0592	Lisvane	Rowan Way	100	5.1
SN-0598	Pontprennau	Heol Pontprennau	100	5
SN-0353	Pentwyn	Pentwyn Drive	19	5.7

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0673	St Mellons	Dunster Road	100	10
SN-0610	St Mellons	Meadowlark Close	100	5.3
SN-0616	Rumney	Llanstephan Road	100	7.1
SN-0705	Llanishen	Fidlas Aveune	88	12.4
SN-0615	Birchgrove	Birchgrove Road	23	7.4
SN-0620	Llandaff	Hawthorn Road East	99	5.6
SN-0628	Fairwater	Beechley Drive	100	8.8
SN-0362	Ely	Grand Avenue	100	8
SN-0644	Grangetown	Clare Road	99	7.7
SN-0694	Cardiff Bay	Adelaide Street	100	12.8
SN-0364	Tremorfa	Mervyn Road	28	12.3
SN-0680	Adamsdown	Constellation Street	100	10.3
SN-0601	Cathays	Cathays Terrace	100	5.3
SN-0685	Cathays	North Road	100	7.6
SN-0576	Penylan	Colchester Avenue	40	6.1
SN-0541	Cathays	Whitchurch Road	100	5.7
SN-0682	Pontcanna	Cathedral Road	100	7.6

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**.

Figure 32 – Trends in Annual Mean PM_{10} Concentrations

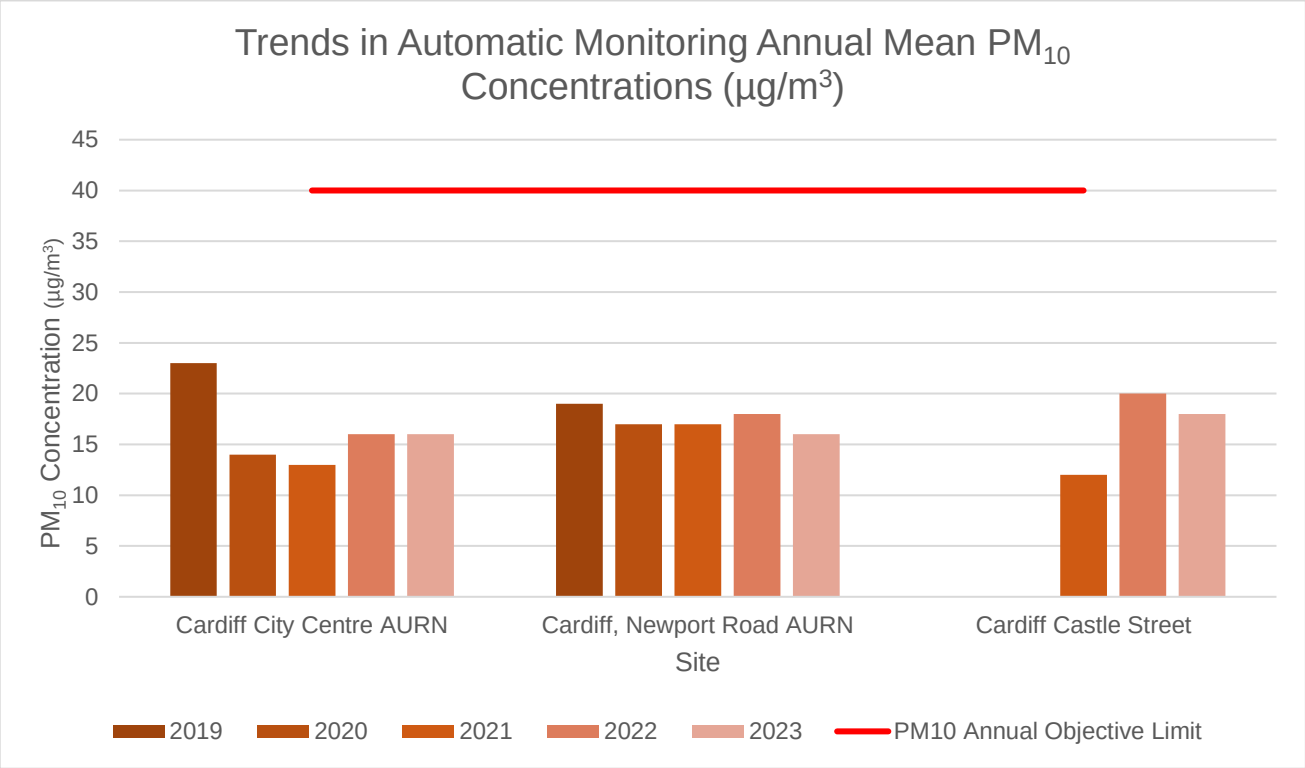


Figure 32 – Trends in Annual Mean PM_{10} Concentrationsdisplays trends from Welsh Urban Air Quality Monitoring and AURN network monitors. PM_{10} concentrations are within the annual objective limit at all locations. A stable trend in PM_{10} concentrations can be seen at all locations since 2019, with reductions in PM_{10} concentrations of 30% at Cardiff City Centre AURN and 15% at Newport Road AURN. In 2021, the decrease in PM_{10} concentrations at the Castle Street monitor is attributed to the closure of Castle Street to vehicles other than buses and taxis until June 2021, when Castle Street was reopened to private vehicles.

Table 13 - 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
Cardiff City Centre AURN	Urban background	Automatic	94	94	0	0	0	0	0
Cardiff, Newport Road AURN	Roadside	Automatic	97	97	0	0	0	0	0
Cardiff Castle Street	Roadside	Automatic	99	99			0	0	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-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%).

Table 14 – Indicative Sensor Network 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0604	Ely Bridge AQMA	Cowbridge Road West	100	0
SN-0677	Ely Bridge AQMA	Cowbridge Road West	100	0
SN-0572	Ely Bridge AQMA	Mills Road	88	0
SN-0659	Ely Bridge AQMA	Dyfrig Road	100	0
SN-2058	Stephenson Court AQMA	Newport Road	0	Sensor error
SN-0370	Stephenson Court AQMA	Glossop Road	94	0
SN-0131	Stephenson Court AQMA	Newport Road	94	0
SN-0523	Stephenson Court AQMA	City Road	100	0
SN-0359	Stephenson Court AQMA	Glossop Road	94	0
SN-0398	Stephenson Court AQMA	Longcross Street	94	0
SN-0649	Llandaff AQMA	Llantrisant Road	87	0
SN-0609	Llandaff AQMA	Cardiff Road	88	0
SN-0517	Llandaff AQMA	Cardiff Road	68	0
SN-0638	City Centre AQMA	Westgate Street	95	0
SN-0596	City Centre AQMA	Westgate Street	99	0
SN-0648	City Centre AQMA	Cowbridge Road East	99	0
SN-0286	City Centre AQMA	Westgate Street	24	0
SN-0409	City Centre AQMA	Westgate Street	99	0
SN-0539	Radyr	Park Road	100	0
SN-0629	Coryton	Pendwyallt Road	100	0
SN-0704	Rhiwbina	Lon Ucha	100	0
SN-0371	Llanishen	Ty Glas Avenue	100	0
SN-0592	Lisvane	Rowan Way	100	0
SN-0598	Pontprennau	Heol Pontprennau	100	0
SN-0353	Pentwyn	Pentwyn Drive	19	0

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0673	St Mellons	Dunster Road	100	0
SN-0610	St Mellons	Meadowlark Close	100	0
SN-0616	Rumney	Llanstephan Road	100	0
SN-0705	Llanishen	Fidlas Aveune	88	0
SN-0615	Birchgrove	Birchgrove Road	23	0
SN-0620	Llandaff	Hawthorn Road East	99	0
SN-0628	Fairwater	Beechley Drive	100	0
SN-0362	Ely	Grand Avenue	100	0
SN-0644	Grangetown	Clare Road	99	0
SN-0694	Cardiff Bay	Adelaide Street	100	0
SN-0364	Tremorfa	Mervyn Road	28	0
SN-0680	Adamsdown	Constellation Street	100	0
SN-0601	Cathays	Cathays Terrace	100	0
SN-0685	Cathays	North Road	100	0
SN-0576	Penylan	Colchester Avenue	40	0
SN-0541	Cathays	Whitchurch Road	100	0
SN-0682	Pontcanna	Cathedral Road	100	0

Table 15 - $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2019	2020	2021	2022	2023
Cardiff City Centre AURN	Urban background	Automatic	50	94	12	7	9	11	10
Cardiff Castle Street	Roadside	Automatic	95	97			9	10	8

Notes:

All means have been “annualised” as per LAQM.TG22 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%).

Table 16 – Indicative Sensor Network $PM_{2.5}$ Monitoring Results (µg/m^3)

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0604	Ely Bridge AQMA	Cowbridge Road West	100	2.3
SN-0677	Ely Bridge AQMA	Cowbridge Road West	100	4.7
SN-0572	Ely Bridge AQMA	Mills Road	88	2.3
SN-0659	Ely Bridge AQMA	Dyfrig Road	100	1.9
SN-2058	Stephenson Court AQMA	Newport Road	0	Sensor error
SN-0370	Stephenson Court AQMA	Glossop Road	94	2.3
SN-0131	Stephenson Court AQMA	Newport Road	94	3
SN-0523	Stephenson Court AQMA	City Road	100	2.5
SN-0359	Stephenson Court AQMA	Glossop Road	94	2.3
SN-0398	Stephenson Court AQMA	Longcross Street	94	2.7
SN-0649	Llandaff AQMA	Llantrisant Road	87	3.2
SN-0609	Llandaff AQMA	Cardiff Road	88	2.0
SN-0517	Llandaff AQMA	Cardiff Road	68	1.7
SN-0638	City Centre AQMA	Westgate Street	95	2.0
SN-0596	City Centre AQMA	Westgate Street	99	2.0
SN-0648	City Centre AQMA	Cowbridge Road East	99	1.8
SN-0286	City Centre AQMA	Westgate Street	24	1.9
SN-0409	City Centre AQMA	Westgate Street	99	1.9
SN-0539	Radyr	Park Road	100	1.6
SN-0629	Coryton	Pendwyallt Road	100	1.3
SN-0704	Rhiwbina	Lon Ucha	100	2.3
SN-0371	Llanishen	Ty Glas Avenue	100	1.7
SN-0592	Lisvane	Rowan Way	100	1.9
SN-0598	Pontprennau	Heol Pontprennau	100	2.1
SN-0353	Pentwyn	Pentwyn Drive	19	2.7

Sensor Number	Network	Location	% Data Capture May – December 2023	2023
SN-0673	St Mellons	Dunster Road	100	5.6
SN-0610	St Mellons	Meadowlark Close	100	1.9
SN-0616	Rumney	Llanstephan Road	100	1.8
SN-0705	Llanishen	Fidlas Aveune	88	9.3
SN-0615	Birchgrove	Birchgrove Road	23	3.0
SN-0620	Llandaff	Hawthorn Road East	99	1.2
SN-0628	Fairwater	Beechley Drive	100	3.3
SN-0362	Ely	Grand Avenue	100	2.3
SN-0644	Grangetown	Clare Road	99	2.3
SN-0694	Cardiff Bay	Adelaide Street	100	1.7
SN-0364	Tremorfa	Mervyn Road	28	11.5
SN-0680	Adamsdown	Constellation Street	100	8.5
SN-0601	Cathays	Cathays Terrace	100	1.7
SN-0685	Cathays	North Road	100	2.7
SN-0576	Penylan	Colchester Avenue	40	1.6
SN-0541	Cathays	Whitchurch Road	100	2.2
SN-0682	Pontcanna	Cathedral Road	100	1.9

Figure 33 – Trends in Annual Mean $PM_{2.5}$ Concentrations

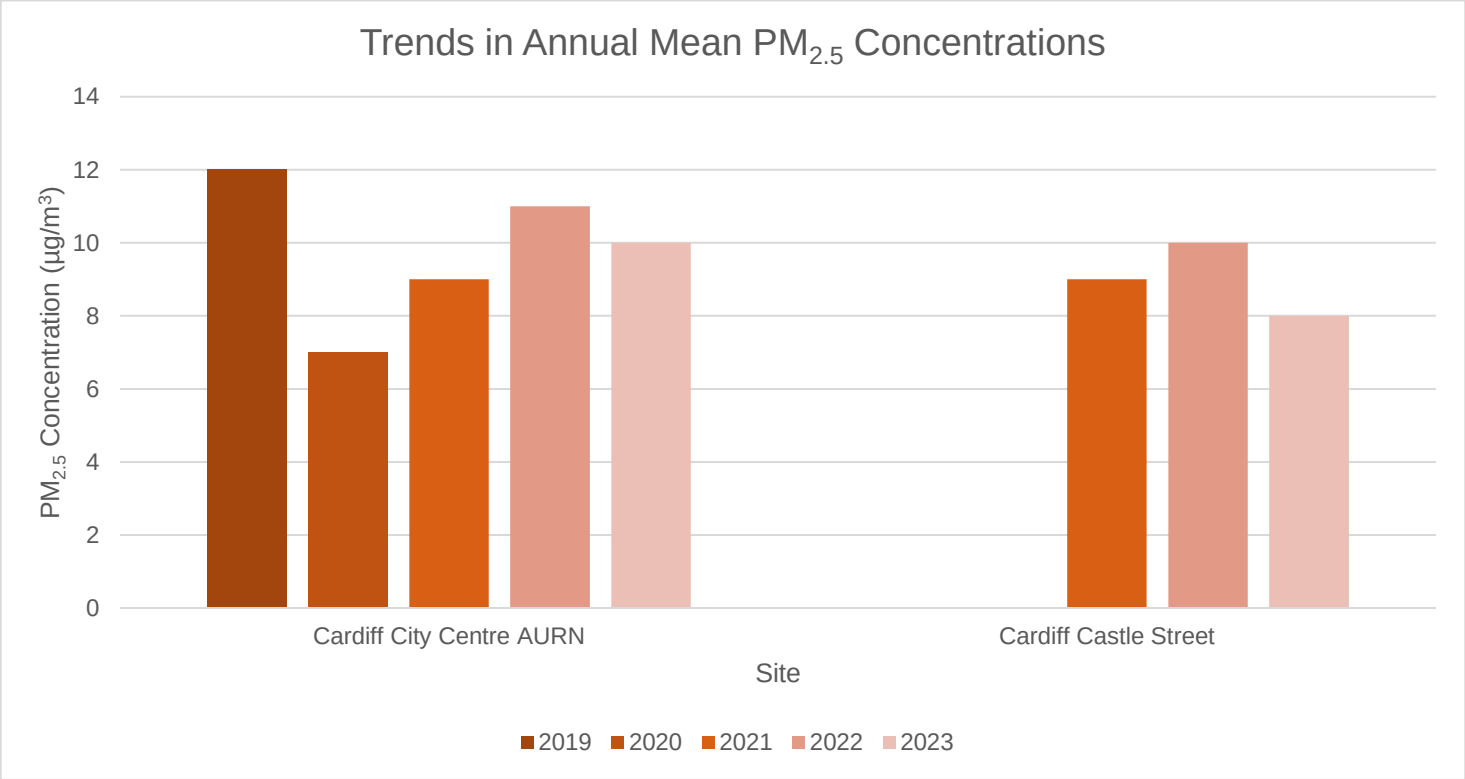


Figure 33 displays trends in $PM_{2.5}$ concentrations at Cardiff City Centre urban background and Cardiff Castle Street Roadside monitoring stations. In general, trends are decreasing when compared to concentrations seen in 2019. Decreased $PM_{2.5}$ concentrations in 2020 and 2021 are evident, due to decreased traffic using the road network and the closure of Castle Street to private vehicles until July 2021.

Comparison of 2023 Monitoring Results with Previous Years and the Air Quality Objectives

2.1.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide was measured during 2023 at three sites equipped with an automatic NOx analyser, and by a network of 139 diffusion tubes. NO_2 was also measured by 45 indicative automatic sensors in various locations across Cardiff on AQMA's and locations close to schools.

In order to ratify the 2023 diffusion tube dataset, a local bias adjustment factor of 0.82 was applied to the annual average readings. The factor was derived from a co-location study carried out at the Castle Street automatic monitor. The local bias correction factor was utilized as it would provide results representative of a worst-case scenario.

There were no exceedances in either the annual or short-term air quality objectives for NO_2 at any automatic and non-automatic monitoring site during 2023.

A decrease of 37% in annual average roadside NO_2 concentrations is evident since 2019. A significant decrease can be seen in 2020 due to Covid-19 pandemic restrictions reflects the decrease is traffic during this period. However, when examining average NO_2 concentrations at non-automatic diffusion tube sites across Cardiff, we are now experiencing pollutant concentrations at levels lower than those experienced during the pandemic.

2.1.4 Particulate Matter (PM_{10})

Monitoring of PM_{10} was carried out at the Cardiff Centre AURN, Newport Road AURN and Cardiff Castle Street monitoring sites. PM_{10} monitoring was also carried out by 45 indicative automatic sensors. The results of the monitoring indicates that recorded PM_{10} concentrations at these monitoring stations are compliant with both the annual mean and 24-hour mean Air Quality Objectives set for PM_{10}.

A stable trend in PM_{10} concentrations can be seen at all locations since 2020, with reductions in PM_{10} concentrations of 30% at Cardiff City Centre AURN and 15% at Newport Road AURN

2.1.5 Particulate Matter ($PM_{2.5}$)

Monitoring for $PM_{2.5}$ was carried out at the Cardiff Castle Street, Cardiff Centre AURN and four indicative monitoring sites. There is no formal Air Quality Objective in Wales for $PM_{2.5}$, although all concentrations are compliant with the EU target value of 25 µg/m_3.

2.1.6 Other Pollutants Monitored

Sulphur Dioxide (SO_2)

Sulphur dioxide was measured at the Cardiff Centre AURN automatic monitoring site during 2023. The site is classified as “Urban Background” and is a relevant location for the 15-minute and 1-hour Objectives. There were no exceedances of the set objectives during 2022.

Ozone (O_3)

Ozone monitoring is useful due to its potential correlations with other pollutants. In 2023, ozone was measured at the Cardiff City Centre AURN site. 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/m^3 on more than 10 days per year. There were no exceedances of the ozone objective in Cardiff in 2022.

Carbon Monoxide (CO)

Carbon monoxide was also monitored at Cardiff City AURN site during 2023. There were no exceedances of the Air Quality Strategy Objective for (CO) 8-hour running mean > 10 mg/m^3 during this period.

Summary of Compliance with AQS Objectives as of 2023

SRS on behalf of Cardiff Council have examined the results from monitoring in Cardiff. Concentrations for all pollutants are all below the relevant air quality objectives, therefore no further action is required. Concentrations of NO_2 at site 212 within Llandaff AQMA have been found to be close to the annual mean NO_2 Air Quality Standard (40µg/m^3) in recent years. However, NO_2 concentrations at this location in 2023 have improved when compared

to 2022, and are currently below the threshold of within 10% of the annual mean NO_2. It is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean NO_2 concentrations being lower than 36µg/m^3. Continued monitoring is required to assess trends at this location. It is likely that an increase in NO_2 concentrations close to, or exceeding the NO_2 annual objective limit will require investigation and assessment of the local issues in the AQMA, and further action may be necessary.

Concentrations of 36.0µg/m^3 NO2 at diffusion tube site 179 are located at a kerbside site. Therefore, this does not represent relevant exposure. After application of distance correction calculations to the nearest building façade, the relevant exposure concentration has been corrected to 31.0µg/m^3. Full results displaying distance corrected concentrations for NO_2 can be found in Table 20.

SRS will continue to monitor and review results in the Stephenson Court AQMA. It may be feasible to consider revoking the AQMA due to continued compliance with the annual mean NO_2 Air Quality Standard (40µg/m^3). Any such decision to revoke the AQMA will require statutory consultation and approval from Welsh Government. The Council will need to undertake a detailed assessment to demonstrate that compliance will continue. Any decision on the revocation of AQMA will need to consider the potential of any revised air quality targets as a result of the Environment (Air Quality and Soundscapes) (Wales) Bill.

3 New Local Developments

SRS of behalf of Cardiff Council continues to monitor the impact of proposed developments and recent developments already underway or in use.

There have been several planning applications for residential and commercial developments within the last year which required air quality assessments due to the introduction of new receptors or increased emissions due to additional vehicle movements. No air quality assessment received by the council have predicted adverse air quality impacts related to any new developments.

The following developments may either be of significance in respect of local air quality or be a proposed development where air quality is a consideration.

Velindre Cancer Centre

Application was received for the temporary construction access route for the construction of the approved Velindre Cancer Centre, for a period of no more than 48 months following the completion of the related highway improvement works.

A revised air quality assessment (AQA) was undertaken as part of this application to ascertain the likely air quality impacts associated with the amended proposal through its construction phase. The results from the assessment show that the changes in construction traffic on Pendwyallt Road and Park Road from using this access route is expected to have a negligible air quality impact on nearby sensitive human health and ecological receptors. The predicted concentrations of pollutants at receptors also remain well below the air quality objectives and therefore the air quality impacts associated with the southern access route are not significant in accordance with guidance set out by EPUK and IAQM.

As such no specific planning condition was initially requested for further mitigation in terms of air quality impacts. However, the planning committee, took into consideration several concerns raised by residents placed the following condition on the approval notice dated 2nd February 2021:

Condition 11: Prior to commencement of the development hereby approved details of an air monitoring unit and its location shall be submitted to and approved in writing with the Local Planning Authority. The monitoring unit shall be implemented in accordance with the

approved details and remain operational until cessation of the development. Data from the air monitoring unit shall be provided to the Local Planning Authority on request.

Reason: To monitor air quality in accordance with Policy EN13 of the adopted Cardiff Local Plan (2006-2026).

The developer's appointed consultants have installed automatic air monitoring units at various locations along the access road measuring nitrogen dioxide and particulate matter as well as implementation of a diffusion tube monitoring program. Monthly reports are issued displaying data collected in this area and can be found at the following link, https://velindre.nhs.wales/transforming-cancer-services/news/tcs-news/air-quality/air-quality-documents/

The enabling works for the Velindre cancer centre have now been completed. Air quality monitoring will continue at the relevant locations to ensure there is no adverse impact on local air quality due to construction of the centre.

Inland Revenue Buildings, Ty-Glas Road Demolition

An application for a demolition project for the Inland Revenue Buildings, Ty-Glas Road was received in 2023. To accompany the application, a detailed Air Quality Dust Management Plan (AQDMP) was submitted. This management plan included an assessment is based on the principles provided within the Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction [8]. This guidance is considered industry standard for the assessment and mitigation of dust impacts related to demolition and construction. Listed within the assessment are various mitigation measures related to dust abatement, dust and particulate monitoring, and dust nuisance reporting during the period of demolition.

The report recommended a trigger level of 190 µg/m^3 is set as a 1 hour mean for concentrations of PM_{10} close to construction sites. Where the site threshold for PM_{10} is being significantly breached, developers should stop work immediately and ensure best practice measures are in place before restarting. When the trigger level is exceeded, alerts will be sent to the Site Manager. An internal amber PM_{10} alert will be set at 150 ug/m^3 (15-minute

[8] https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

mean). SRS have reviewed PM_{10} data during the period of construction and have concluded that the trigger level set within the AQDMP has not been breached. Concentrations at the monitored locations are also within the relevant air quality objectives for PM_{10}, despite these monitoring locations being at the boundary of the demolition site.

Road Traffic Sources (and Other Transport)

Cardiff Council have considered road traffic sources extensively in both this and each year in 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 2023, SRS on behalf of Cardiff 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, which have not been adequately considered in previous rounds of Review and Assessment.

Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

SRS on behalf of Cardiff Council can confirm that in 2023 there were no new or proposed Industrial / Fugitive or Uncontrolled Sources / Commercial Sources for which an air quality assessment has been carried out.

Other Sources

Domestic Wood Burners

Previous reports have confirmed that there are no known areas in Cardiff where coal or solid fuel burning provides a significant level or primary household heating. Nothing has changed in this regard since the 2023 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 were they to wish to install log-burners or similar appliances in their homes. There are no smoke control areas in Cardiff and hence no legal requirements with regard to 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, are recommended to seek out an appliance certified for use in a smoke control area.

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

4 Policies and Strategies Affecting Airborne Pollution

SRS on behalf of Cardiff Council have coordinated and developed a Clean Air Strategy (CAS) & Action Plan document. The document outlines a citywide approach to mitigate poor air quality in Cardiff and recognises that interventions to address poor air quality cannot be utilised and implemented locally. Therefore, citywide measures need to be put into practise to hopefully provide citywide improvements to air quality.

The document fulfils the requirements of the LAQM process to produce an Air Quality Action Plan (AQAP). The document also captures the Direction given to CC in March 2018 by WG for Cardiff to address its air quality concerns along highlighted major road networks.

Local / Regional Air Quality Strategy

Cardiff's LDP 2006-2026, forms the basis for decisions on land use planning in Cardiff up to 2026 and assumes that, within the plan's time frame, approximately 40,000 new jobs and 41,100 new dwellings will be developed in Cardiff as a direct response to Cardiff's role as the economic driver of the City- region.

In addition to its independent examination, the LDP was subject to a Strategic Environmental Assessment (SEA) to ensure that the policies reflect sustainability principles and consider environmental impacts.

Policy KP2 of the LDP allocates 8 Strategic Sites to help meet the need for new dwellings and jobs. These strategic allocations on both greenfield and brownfield sites will include 500 homes or more and/or include significant employment/mixed uses which will bring significant benefits to the city. The sites are:

(i) Cardiff Central Enterprise Zone;

(ii) Former Gas Works, Ferry Road;

(iii) North West Cardiff;

(iv) North of Junction 33 on the M4;

(v) South of Creigiau;

(vi) North East Cardiff (West of Pontprennau);

(vii) East of Pontprennau Link Road; and

(viii) South of St. Mellons Business Park – Employment Only.

The LDP identifies that sustainable transportation solutions are required in order to respond to the challenges associated with new development by setting out an approach aimed at minimising car travel, maximising access by sustainable transportation and improving connectivity between Cardiff and the wider region.

The Plan sets out a strategy to achieve this by making the best use of the current network, managing demand, and reducing it where possible by widening travel choices. The aim is to secure a modal split of 50% car and 50% non-car modes.

The following LDP policies are of relevance to air quality;

KP8: SUSTAINABLE TRAVEL

For Cardiff to accommodate the planned levels of growth, existing and future residents will need to be far less reliant on the private car. Therefore, ensuring that more everyday journeys are undertaken by sustainable modes of transport, walking, cycling and public transport, will be essential.

Development in Cardiff will be integrated with transport infrastructure and services in order to:

i. Achieve the target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport.

ii. Reduce travel demand and dependence on the car;

iii. Enable and maximise use of sustainable and active modes of transport;

iv. Integrate travel modes;

v. Provide for people with particular access and mobility requirements;

vi. Improve safety for all travellers;

vii. Maintain and improve the efficiency and reliability of the transport network

viii. Support the movement of freight by rail or water; and

ix. Manage freight movements by road and minimise their impacts.

KP14: HEALTHY LIVING

Cardiff will be made a healthier place to live by seeking to reduce health inequalities through encouraging healthy lifestyles, addressing the social determinants of health and providing accessible health care facilities. This will be achieved by supporting developments which provide for active travel, accessible and useable green spaces, including allotments.

KP18: NATURAL RESOURCES:

In the interests of the long-term sustainable development of Cardiff, development proposals must take full account of the need to minimise impacts on the city's natural resources and minimise pollution, in particular the following elements.....minimising air pollution from industrial, domestic and road transportation sources and managing air quality.

EN13: AIR, NOISE, LIGHT POLLUTION AND LAND CONTAMINATION

Development will not be permitted where it would cause or result in unacceptable harm to health, local amenity, the character and quality of the countryside, or interests of nature conservation, landscape or built heritage importance because of air, noise, light pollution, or the presence of unacceptable levels of land contamination.

C6: HEALTH

Priority in new developments will be given to reducing health inequalities and encouraging healthy lifestyles through:

i. *Identifying sites for new health facilities, reflecting the spatial distribution of need, ensuring they are accessible and have the potential to be shared by different service providers; and*

ii. *Ensuring that they provide a physical and built environment that supports interconnectivity, active travel choices, promotes healthy lifestyles and enhances road safety.*

The LDP also outlines the approach the Council will take to increase the proportion of people travelling by sustainable modes and to achieve the 50:50 modal split target. This will involve:

- enabling people to access employment, essential services and community facilities by walking and cycling through, for example, high quality, sustainable design, and measures to minimise vehicle speed and give priority to pedestrians and cyclists;

- developing strategic bus and rapid transit corridor enhancements and facilitating their integration with the wider transport network;
- facilitating the transfer between transport modes by, for example, improving existing interchanges and developing new facilities such as strategically located park and ride facilities; and
- maximising provision for sustainable travel within new developments and securing infrastructure investment which can support modal shift within existing settlements.

Air Quality Planning Policies

The Council agreed with Welsh Government in March 2021 a timetable to prepare a Replacement LDP to cover the period 2021 to 2036. The timetable proposes a 3.5-year preparation process with adoption of the Replacement LDP due at the end of 2024.

The first stage in preparation of the Replacement LDP was consultation on the Vision, Issues and Objectives for the plan which was completed in summer 2021. Following this consultation Cabinet and Council agreed a Vision and Objectives for the plan in September 2021. The agreed Vision and Objectives includes a commitment to create healthier environments, reduce inequalities and enhance wellbeing including specifically setting out how air quality can be enhanced. This agreed Vision and Objectives will set the context for the plan as it evolves in more detail through the preparation process over the next few years.

Local Transport Plans and Strategies

The Transport White Paper was launched on 15 January 2020 and lays out an ambitious 10- year plan to tackle the climate emergency, reduce congestion and improve air quality. It includes proposals for developing the Southeast Wales Metro, including new Metro lines connecting new and existing communities in the city, Rapid Bus Transport, Active Travel and improvements to our streets and the future of the car, including reducing car ownership through car clubs and greening through the expansion of EV charging infrastructure. Key regional projects are identified, with significant improvements proposed for all the major routes into the city. It also outlines the intention to consider all delivery options and to work with Welsh Government to

develop a comprehensive investment plan. The timescale for the White Paper was amended in line with ongoing developments in relation to the Clean Air Plan to ensure alignment. The document is available at;

https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/transport-policies-plans/transport-white-paper/Documents/White%20Paper%20for%20Cardiff%20Transport%202019.pdf

Active Travel Plans and Strategies

The Active Travel Network Map shows existing and future routes for walking and cycling that will help residents travel around the city more easily. We have done this in order to meet the requirements of the Active Travel (Wales) Act 2013.

The future routes shown on the map are proposals to be introduced over the next 15 years. The map will be used to decide which walking and cycling transport schemes will be prioritised for design and implementation.

The existing routes have been audited to show that they meet the standards required by the Welsh Government Active Travel Design Guidance. Other routes for walking and cycling are available in Cardiff but only those which meet these standards are shown on the map.

Following the 2021 public consultation, the council revised the Active Travel Network Map which was approved by Welsh Government in December 2022.

Further details can be found at the following link https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/transport-policies-plans/Active-Travel-Network-Map/Pages/default.aspx

Local Authorities Well-being Objectives

In 2015 Welsh Government made a new law called the Well-being of Future Generations (WFG) (Wales) Act. The new law has the sustainable development principle at its heart. This means that we need to work in a way that improves wellbeing for people today without doing anything that could make things worse for future generations. There are seven national well-being goals that form the basis of the Act and five ways of working which support the goals.

CC 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.

Under the WFG Act the Cardiff Public Services Board (PSB) has produced its Well-Being Plan for 2018- 2023, which sets out the Cardiff PSB's priorities for action over the next 5 years, and beyond. The Plan contains Well-being Objectives, high-level priorities that the Cardiff PSB have identified as being most important. It also contains 'Commitments,' or practical steps that the city's public services, together, will deliver over the next 5 years. The Well-Being Plan has set out Well-Being Objectives as follows:

- **Objective 1** - A Capital City that Works for Wales;
- **Objective 2** - Cardiff grows in a resilient way;
- **Objective 3 -**Safe, Confident and Empowered Communities
- **Objective 4** - Cardiff is a great place to grow up;
- **Objective 5** - Supporting People out of poverty;
- **Objective 6** - Cardiff is a great place to grow older; and
- **Objective 7 -**Modernising and Integrating Our Public Services

Within the Well-Being Plan Objective 2 details the following: *Cardiff is one of Britain's fastest growing cities and is by far the fastest growing local authority area in Wales. Successful cities are those in which people want to live and this growth is welcomed and a sure sign of strength for the city. However, this growth will bring challenges too, putting pressure on both the city's physical infrastructures, community cohesion, its natural environment, and public services. Managing the impacts of this population growth and of climate change in a resilient and sustainable fashion will be a major long-term challenge for Cardiff.*

Improving levels of NO_2 and particulate matter (PM_{10}, $_{2.5}$) is a City level outcome indicator that the PSB will seek to impact in order to meet this specific Objective. The Plan forecasts a future Cardiff with improved air quality and has committed to taking 'a *city-wide response*

to air pollution through supporting the development and delivery of a Cardiff Clean Air Strategy.

Green Infrastructure Plans and Strategies

Outlined in Cardiff's Local Development Plan (LDP) 2006- 2026, Policy **KP16** focuses upon Green infrastructure.

Policy KP16 Green Infrastructure

The policy aims to ensure that Cardiff's green infrastructure assets are strategically planned and delivered through a green infrastructure network. Other policies in the Plan provide more detailed guidance on aspects of these assets, together with supporting SPG.

Where development is permitted, planning conditions and/or obligations will be used to protect or enhance the natural heritage network.

New developments should incorporate new and / or enhanced green infrastructure of an appropriate size, type and standard to ensure no fragmentation or loss of connectivity.

Where the benefits of development outweigh the conservation interest, mitigation and/or compensation measures will be required to offset adverse effects and appropriate planning obligations sought. The implementation of policies designed to provide and protect public open space throughout Cardiff would also serve to offset any increase in recreational pressure on the Cardiff Beech Woods SAC, thereby helping to avoid likely significant effect upon that site.

Management of Cardiff's green infrastructure network should be in place prior to development, and appropriate planning obligations sought. SPG on this topic will more fully outline the extent of Cardiff's green infrastructure and how this policy can be implemented in more detail.

As previously mentioned, a new Supplementary Planning Guidance (SPG) concerning Green Infrastructure was approved in 2017 by CC to provide a detailed understanding to the elements raised in the LDP.

- This document provides planning advice on a number of areas relating to development and the environment, including protection and provision of open space, ecology and biodiversity, trees, soils, public rights of way, and river corridors.

- The new document also differs from previous SPGs by providing more in-depth design advice, aimed at giving developers a clearer understanding of the approach expected when submitting designs for new developments. By having this information up-front developers are better able to provide suitable designs to the Council through the planning process.

Climate Change Strategies

Cardiff Council declared a climate emergency in 2019 and has since been preparing the One Planet Strategy which sets out how we will respond and tackle this emergency and become carbon neutral Zero as a Council and a City by 2030. A draft One Planet strategy was published for consultation in October 2020 and public feedback on this, alongside a detailed analysis of the Council and city's current carbon position, have informed and shaped the final 2021 One Planet Cardiff Strategy report and action plan.

In producing the 2021 OPC Strategy the Council has completed a detailed carbon baselining and impact assessment. This key milestone has enabled an understanding of the current carbon position, both of Council operations and also of the wider City.

The OPC Strategy confirms the Council's commitment to ensuring that Cardiff will become a Carbon Neutral Council by 2030. It also confirms the Councils commitment to work in partnership with city wide stakeholders to determine a pathway to achieve a Carbon Neutral City by 2030. Full details of the final strategy are available at https://www.oneplanetcardiff.co.uk/

5 Conclusion and Proposed Actions

Conclusions from New Monitoring Data

Monitoring data for 2023 indicates that annual mean concentrations of nitrogen dioxide recorded at sites of relevant exposure within the already established AQMAs are compliant with the annual mean NO_2 Air Quality Standard (40µg/m³). The highest concentration of monitored NO_2 was within Llandaff AQMA, site 212, which displays an annual result of 35.8µg/m^3. Therefore, trends will be closely examined at this location and action taken accordingly.

SRS will continue to monitor and review results in the Stephenson Court AQMA. It may be feasible to consider revoking the AQMA due to continued compliance with the annual mean NO_2 Air Quality Standard (40µg/m³).

All other monitoring sites remain compliant with the relevant objectives in 2023.

Conclusions relating to New Local Developments

SRS on behalf of Cardiff Council will continue to work with developers and consultants to ensure that planning applications consider and minimise the operational air quality impacts of proposed developments. This is achieved through the request and review of Air Quality Assessments (AQA's), and in the case of demolition and construction related air quality impacts, the review of any mitigation measures listed within AQA's, or Construction Environmental Management plans (CEMP's) related to construction traffic or dust management.

Other Conclusions

The implementation of COVID measures in the City Centre accelerated the Council's achievement of compliance with limit values for NO_2 under the Ambient Air Quality Directive, on Castle Street. The Interim implementation of the Castle Street Scheme as approved by Welsh Government, was completed at the end of October 2021. The Council has ensured ongoing monitoring has been undertaken. At the time of writing this report a Final Plan is being drafted which includes further assessments using updated traffic data, collected post Covid. The Final Plan will detail that the Councils preferred option will be to install a

permanent version of the existing interim scheme, and this will be implemented upon approval from Welsh Government.

Proposed Actions

As a result of the information provided herein, it is proposed to -

1. Deliver and implement the proposed mitigation measures quantified within the Clean Air Plan;
2. Continue monitoring within and around the existing AQMAs and other areas of concern. The diffusion tube network appointed by SRS on behalf of Cardiff Council will be reviewed and an assessment on locations made.
3. Review the Realtime indicative Monitoring Network.
4. Continue to drive Air Quality as a major aspect to be considered during any planning applications.
5. Submit an Annual Progress Report (APR) in 2025; and
6. Update the existing Clean Air Strategy and Action Plan to represent most recent actions in 2023/2024.

References

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Cardiff Council 2022 Annual Progress Report https://www.srs.wales/Documents/Air-Quality/Cardiff/30.01.23-Cardiff-2022-APR-report-V2.pdf

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

Table 17 - Full Monthly Diffusion Tube Results for 2023 (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
16	317040	176060	27.0	27.2	26.9	30.7			20.5	23.5	28.1	31.6	24.6	24.6	26.5	21.7	-
258	317760	175310		41.8	30.9	36.9			24.7	30.0	30.6	34.1	33.6	29.9	32.5	26.7	-
58	317937	176400	43.5	37.4	35.8	48.4	33.7	34.0	29.7	36.5	32.8	42.3			37.4	30.7	-
81	319387	176980	40.5	36.8	31.3	30.2		25.8	22.8	27.0	28.6	31.2	31.8	22.9	29.9	24.5	-
86	318452	178805	38.5	38.5	32.9	30.7			26.6	27.1	34.4	35.8	34.7	31.4	33.1	27.1	-
96	316601	179653	29.6	36.2	28.7	33.5			17.1	26.0	24.4	26.4	23.6		27.3	22.4	-
98	314805	177345	25.4	28.0	25.9	28.7			17.4	16.8	16.2	28.2	27.3	20.5	23.4	19.2	-
99	315275	178117	34.3	38.1	32.7	40.0	32.8	29.3	25.8	27.2	35.9	29.8	33.7	19.9	31.6	25.9	-
259	319201	178031	31.5	27.1	29.1	31.2			18.7	23.6		33.7	11.5	18.9	25.0	20.5	-
260	316847	176762	34.2	27.7	25.4	24.1			14.1	15.5	22.3		26.3	17.4	23.0	18.9	-
264	313142	177870	16.8	15.4	11.9	8.5			7.7	8.7	11.5	14.3	16.1	8.6	12.0	9.8	-
106	316851	179520	38.1	32.7	32.0	27.9			9.8			26.9	35.3	23.7	28.3	20.9	-
112	316613	175910	34.3	29.9	24.8	33.0			17.6	22.8	25.0	27.8	23.0	16.9	25.5	20.9	-
115	316604	176641	33.9	33.9	31.4	31.5			22.4	25.4	31.8	35.1	32.8	27.1	30.5	25.0	-
117	314458	176735	38.1	45.7	46.0	48.5	39.5	36.0	23.0	30.9	42.3	40.3	35.7	27.2	37.8	31.0	-
126	317946	176387	32.9	34.6	32.3	36.7	28.4		23.3	25.4	34.1	35.0	34.3	26.4	31.2	25.6	-
128	317540	175979	35.9	37.2	37.0	36.4			25.4	26.6	35.8	32.1	34.3	27.0	32.8	26.9	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
131	319292	176932	37.8	37.3	27.3	30.2	24.5	26.1	23.3	26.4	31.3	33.5	35.7	29.0	30.2	24.8	-
143	318009	176337	32.7	37.0	29.3	35.6	29.0		25.9	31.2	33.7	36.5	25.4	25.1	31.0	25.4	-
144	318046	176307	36.2	42.3	34.0	26.0	27.8	26.8	30.6	29.4	37.7	41.5	40.5	31.6	33.7	27.6	-
147	317636	175161	39.3	30.6	28.0	32.6			12.7	23.1	28.8	30.5	27.4	15.6	26.9	22.0	-
148	317695	175389	34.6	33.8	29.2										32.5	20.7	-
149	317764	175174	47.3	38.3	26.2	32.1			22.5	23.8	32.0	32.0	35.2	30.0	31.9	26.2	-
156	317997	177412	27.8	31.6	27.0	31.9			11.4	19.3	18.1	25.5	28.4	16.6	23.8	19.5	-
157	316605	179703	32.6	27.8	24.2	26.8			16.4	16.2	21.4	25.6	25.9	22.4	23.9	19.6	-
158	318093	177716	29.3	29.4	27.7	35.6			12.5	19.1		28.3		18.2	25.0	20.2	-
159	320709	177918	35.5	38.5	32.1	32.2			23.2	27.1	35.2	36.2	35.5	29.7	32.5	26.7	-
166	315950	176424	39.7	30.7	33.8	37.2				43.1	32.7	33.2	30.8	24.3	33.9	27.8	-
168	314856	176929	32.4	32.3	23.2	26.9			16.9	23.0	22.0	29.0	30.6	18.3	25.5	20.9	-
174	317508	177868	30.8	33.4	31.1	32.1			12.5	20.1	26.2	31.9	27.1	17.5	26.3	21.5	-
179	318627	176039	39.9	52.9	45.2	46.9		44.9	39.5	37.9	40.9	45.9	44.9	44.5	43.9	36.0	31.0
183	318765	176623	27.2	29.5	26.2	35.9	28.2	25.1		20.6	30.3	29.0	26.3	19.7	27.1	22.2	-
184	318335	176074	38.1	40.3	33.3				17.4			40.4	37.3	28.9	33.7	24.7	-
186	318044	176449		39.0	40.4	45.4	31.8	33.2	25.6	30.7	44.6	47.5			37.6	30.8	-
187	317944	176436		38.5	46.1	45.0		26.2					33.0	31.2	36.7	27.6	-
188	318229	176154	24.4	39.6	35.2	34.3	31.4	29.6	26.5	28.0	33.8	41.0	36.4	29.9	32.5	26.7	-
191	318724	177776	35.6	25.7	30.5	29.5			21.5	22.3	30.3	29.2	32.5	26.4	28.4	23.2	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
194	313870	176212	11.5	29.3	22.8	26.1			12.6	20.2	21.7	21.3		48.4	23.8	19.5	-
195	320147	177523	36.2	32.6	30.9	30.3			20.1	23.6	29.1	33.5	18.5	14.5	26.9	22.1	-
196	316223	177305	29.6	28.4	25.7	30.3			16.9	22.9	27.5	24.0	22.4	14.6	24.2	19.9	-
198	319348	176958	39.7	38.2	29.3	36.7	26.1	26.1	24.7	28.8	32.7	38.4	34.8	29.0	32.0	26.3	-
199	319599	177174	32.1	26.8	22.6	24.4			15.3	18.2	22.7	24.9	27.7	17.3	23.2	19.0	-
200	317038	179073	42.4	42.1	32.6	29.9			20.5	26.4	29.8			21.1	30.6	25.2	-
201	317547	176411	33.6	34.1	32.4	36.4			13.3	18.9	24.1	33.4	35.0	21.1	28.2	23.1	-
202	317604	176053	32.8	19.8		38.4			20.9	23.7	32.9	32.6	27.6	22.1	27.9	22.9	-
203	318255	178533	26.0	25.0	19.3					14.3	18.9	22.5	21.2	14.5	20.2	14.8	-
204	317487	176303	28.0	27.7	25.2	30.6			12.1		33.2	25.6	24.4	16.3	24.8	20.3	-
207	314769	177343	24.6	25.7	23.3	27.6			10.3	18.8	20.1	21.5	22.2	14.0	20.8	17.1	-
208	315152	178245	35.2	27.9	25.2	24.3	15.9	19.3	17.7	19.1	26.9	25.9	27.8	23.6	24.1	19.7	-
209	317200	178537	38.5	26.7	21.1	23.8			20.5	14.1	21.2	22.4	27.6	17.0	23.3	19.1	-
210	316692	181088	27.8	27.2	20.1	21.0			11.4		18.0		34.5	14.2	21.8	16.3	-
211	320247	178903	24.9	25.2	23.4	22.5			14.3			24.9		18.9	22.0	17.1	-
212	315197	178221	61.1	50.2	46.3	53.2	45.3		25.7	38.6	43.4	45.2	44.1	26.9	43.6	35.8	-
214	315254	178153	36.6	33.5	33.5	39.3	23.1		25.0		29.6	32.4	34.3	23.5	31.1	25.5	-
218	314471	176889	46.7	45.1	35.3	40.2	32.7	32.0	26.7	30.5	34.2	34.4		24.3	34.7	28.5	-
254	317529	176340	39.7	41.7	29.0	32.9			30.8	23.8	32.3		30.4	31.2	32.4	26.6	-
220	318955	176823	37.7	39.3	39.0	40.2		31.3	22.5	27.4	40.0	40.4	29.4	28.8	34.2	28.0	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
221	318530	177468	53.0	36.7	38.5	41.0	32.1	32.3	24.8	28.1	39.6	39.0	37.6	39.4	36.8	30.2	-
190	319056	177343	26.5	28.5	23.8	28.3			14.2	20.0	25.1	29.5	23.2	22.8	24.2	19.8	-
224	315714	177740	23.6	28.1	21.9	23.9			12.3	15.8	17.6	22.7	29.9	15.8	21.2	17.4	-
243	315712	178789	41.4	37.2	35.5	29.9	21.6		15.0	24.7	29.1	37.1			30.2	24.7	-
244	314910	176584	33.1	29.0	23.1	24.4			14.3	19.2	21.3	22.9	28.0	20.1	23.5	19.3	-
245	321006	179081	24.6	20.9	19.4	15.6			12.2	12.3	17.8	18.5	23.3	16.3	18.1	14.8	-
263	319715	174791	32.2	24.8	18.1	20.5			8.7	17.6	17.4	20.7	23.6	13.9	19.8	16.2	-
247	312857	180734	15.6	20.7	15.2	13.6			6.8	10.5	13.4				13.7	11.1	-
262	316593	176728	32.9	27.0	25.3	25.7			13.5	17.9	22.5	24.6	25.6	17.6	23.3	19.1	-
249	318201	180367	27.6	24.6	15.0	18.9			10.4	15.1	16.8	21.4	28.1	23.0	20.1	16.5	-
250	313244	176769	35.4	40.1	36.7	36.6						31.1	36.6	34.9	35.9	24.7	-
251	313244	180367	21.5	23.6	21.2	22.0			8.2	12.5	15.0	20.0	20.3	12.2	17.7	14.5	-
255	318075	176462	23.2	45.3	43.6	48.2	34.1				48.8	49.9	35.8	41.7	-	-	-
256	318075	176462	43.4	45.2	22.1	48.2	35.1		34.0	32.8	48.7	46.3	44.0	40.1	-	-	-
257	314505	176769	45.1	45.9	35.5	48.8	32.7		29.8	34.9	49.4	46.3	45.2	36.5	40.2	33.0	-
192	314505	176769	42.0	42.0	44.8	39.0	36.7		30.8	31.0	32.7	39.3	44.4	31.8	37.7	30.9	-
265	317684	173479	24.0	24.3	14.3							22.9	22.7	12.7	20.2	13.6	-
UHW-001	317329	179260		35.2	29.0	30.6	19.3	18.2	16.0	25.6	27.4	28.7	38.9	36.7	27.8	22.8	-
UHW-002	317372	179281		26.0	26.2	27.3	18.1	21.7	18.2	19.7	29.1	30.3		23.1	24.0	19.7	-
UHW-003	317377	179410		29.6	27.4	25.1	18.5		24.7	18.4	28.2	25.1	35.0	31.2	26.3	21.6	-

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			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
UHW-004	317406	179497		21.8	25.3	23.8	15.9		15.3	15.1	21.2	25.2	27.2	20.3	21.1	17.3	-
UHW-005	317474	179502		24.6	25.6	22.5	14.4	12.0	15.5	15.1	22.6	22.6	29.7	20.9	20.5	16.8	-
UHW-006	317590	179482		23.3	19.1	18.6	11.7	11.2	13.9	14.6	19.9	25.9	26.6	17.3	18.4	15.1	-
UHW-007	317787	179317		29.1	23.8	20.5	14.4	14.8	15.0	18.4	25.3	40.2	32.6	22.9	23.4	19.2	-
UHW-008	317717	179220			37.2	35.1	28.2	27.2	27.5	27.9		29.3		35.7	31.0	30.2	-
UHW-009	317600	179377		35.2	29.5	26.8		20.9	19.7	22.8	26.2	31.3	35.6	31.2	27.9	22.9	-
UHW-010	317505	179230		39.6	28.8	31.4	22.4	18.6	18.7	25.1	30.5		39.7	30.1	28.5	23.4	-
UHW-011	317435	179252		31.5	26.4	28.9	20.2	17.5	17.5	20.1	26.4	26.0	33.2	27.5	25.0	20.5	-
UHW-012	317375	179252		36.0	30.3	33.9	23.7	18.2	25.5	28.4		36.2		20.8	28.1	23.1	-
TRO-001	315621	180320	28.3	19.3	17.6	16.1			8.6		14.1	18.3	18.7	12.4	17.0	14.0	-
TRO-002	315589	180316	26.0	18.8	13.7		10.5	9.1		12.3		14.5	21.6	15.7	15.8	13.0	-
TRO-003	315548	180315	33.4	18.1	12.2	19.7	11.8	10.2	10.3	15.2	19.3		13.4		16.4	13.4	-
TRO-004	315620	180360	23.6	16.8	13.4	15.1	9.5	8.5	6.3	11.3	15.1	17.2	20.4	13.8	14.3	11.7	-
TRO-005	315608	180151	22.2		23.8	13.6	9.7	8.4	6.5	10.9	14.9	15.2	19.4	11.3	14.2	11.6	-
TRO-006	315497	180140	28.7	19.1	19.9		16.5	15.2	11.8	17.4		23.8	<0.6		19.1	16.4	-
TRO-007	313878	178319	18.6	15.1	13.3	13.7	8.6	8.5	6.2	10.2	10.7	12.4	17.6	12.6	12.3	10.1	-
TRO-008	313894	178331	16.1	12.9	9.7	10.6	7.2	5.7	5.1	8.0	9.5	10.5	13.7	12.2	10.1	8.3	-
TRO-009	314022	178334	19.2	14.1	10.8	12.0	7.5	6.4			10.2	12.1	15.0	10.4	11.8	9.7	-
TRO-010	315274	177784	22.5	15.8	13.2	13.7	8.4	7.7		10.8	13.5	15.1	16.0	13.5	13.7	11.2	-
TRO-011	315279	177750	17.7	16.4	14.9	18.7	8.1	8.0	7.6	10.6	16.0	13.7	17.9	12.7	13.5	11.1	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
TRO-012	315209	177668	20.1	15.8	13.2	14.6	8.7	7.4	6.2	10.9	12.3	14.4	17.8	12.8	12.9	10.5	-
TRO-013	312803	175519	12.8	13.8	11.8	14.1	7.8	7.2	5.4	7.0	9.9	9.9	13.6	10.1	10.3	8.4	-
TRO-014	312809	175496	24.1	15.1	14.1	14.5	9.4	8.8	5.8	10.0	14.0	12.2	<0.6	35.3	14.8	12.2	-
TRO-015	312734	175411	22.4	15.0	12.7	14.3	9.4	9.7	8.5	10.0	13.9	13.4	14.7	13.2	13.1	10.7	-
TRO-016	315811	176555	30.3	22.9	18.8	20.6	12.2		10.5			15.7	26.4	23.5	20.1	16.5	-
TRO-017	315801	176492	29.1	21.0	18.1	20.0	12.4	15.1	22.1	17.2	18.3	19.3	28.9	20.4	20.2	16.5	-
TRO-018	315801	176492	40.0	29.8	31.1	29.4		49.2		28.6	31.4	26.3	20.6	28.1	31.5	25.8	-
TRO-019	319027	175493	24.2	20.5	14.7	18.7	11.8	11.0	9.5	16.6		14.7	17.9		16.0	13.1	-
TR0-020	318910	175456			17.2	19.3	13.7	13.3	11.6	18.5	14.1	17.9	11.3	15.3	15.2	12.5	-
TRO-021	318945	175546	25.3	23.8	18.1	18.3	12.2	12.0	10.5	18.1	15.9	20.9	13.7	10.7	16.6	13.6	-
TRO-022	319268	176804	34.2		16.6	24.4	16.4	16.1	15.0	22.7	22.6	23.7	22.2		21.4	17.5	-
TRO-023	319228	176777		29.0	23.9	21.0	14.5	16.2	13.2	20.8	23.6	24.5	26.8	18.9	21.1	17.3	-
TRO-024	319283	176827	45.8					33.6			26.0	38.7	38.5	28.5	35.2	26.2	-
TRO-025	319394	177096	25.6	23.3	16.8	20.2	11.3	11.1	11.1	15.7	21.4	23.6	25.7	16.3	18.5	15.2	-
TRO-026	319339	177006			16.3	19.1	11.2	13.5	11.0	14.8	17.1	20.7	19.6	16.6	16.0	13.1	-
TRO-027	319327	177080		25.8	21.0	21.9	13.0	10.9	12.5	17.6	20.4	23.1	25.6	17.3	19.0	15.6	-
TRO-028	317982	178180	24.5	24.7	13.0	17.3	11.3	10.7	7.8	13.9	12.0	17.0	21.0	10.5	15.3	12.6	-
TRO-029	317987	178156		20.3	19.7	20.9	13.1	10.8	8.9	16.5	14.7	20.7	24.4	13.0	16.6	13.6	-
TRO-030	317855	178921	22.1	23.8	13.4	20.3			8.6	14.8	14.5	17.8	22.2	12.2	17.0	13.9	-
TRO-031	319031	179949	20.7	14.9	13.8	12.4	6.6	6.8	5.8	8.2	10.9	13.3	15.2	10.2	11.6	9.5	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
TRO-032	319012	180050	20.3	15.6		13.7	7.5	6.5		8.7	12.1	13.8	15.1	11.1	12.4	10.2	-
TRO-033	318898	180012	12.0	18.2	12.5	13.1	8.0	10.5	6.8	8.8	12.9	11.3	17.9	11.4	12.0	9.8	-
TRO-034	321817	180406	18.3	15.5	12.8	12.3	7.8	6.8	8.0	7.8	11.9	14.8	18.9	10.7	12.1	9.9	-
TRO-035	321847	180402	12.5	18.3	13.5	13.9	7.6	7.6	12.9	8.1	23.8	16.4	17.7	10.9	13.6	11.2	-
TRO-036	321834	180331	22.6	18.7	14.7			7.9		7.7		15.2	18.2	10.8	14.5	10.8	-
TRO-037	321705	181427														-	-
TRO-038	321738	181398	23.3	20.1		14.1	8.8	7.9		9.5	14.5	16.4	19.0	12.3	14.6	12.0	-
TRO-039	321834	181282	22.9	22.1	14.8	14.7			10.8	9.5	15.5	17.2	16.9	11.2	15.6	12.8	-
TRO-040	324489	180953	12.7	17.3	12.7	13.8	9.4	8.3	8.8		7.9	14.5	15.5	11.6	12.0	9.9	-
TRO-041	324519	180949	23.4	16.0	11.6	12.8	7.7	6.6	10.3	7.8	11.4	13.5	14.2	12.6	12.3	10.1	-
TRO-042	324529	180975	22.9	17.7	14.1	14.9	9.2	10.4	9.9	8.7	14.3	16.4	15.8	11.0	13.8	11.3	-
TRO-043	307904	181561	18.3	11.4	9.0	10.1	6.1	6.0	5.5	6.7	8.5	9.0	12.0	9.9	9.4	7.7	-
TRO-044	307896	181569	17.9	11.0	8.1	12.4	6.3	5.8	5.2	6.1	8.4	9.5	11.2	5.9	9.0	7.4	-
TRO-045	307967	181585	14.8	14.9	13.3	14.0	9.6	8.4	7.7	9.5	11.6	10.1	11.8	11.8	11.5	9.4	-
TRO-046	315760	181322	22.7	16.8	14.4	12.9	7.0	12.6	10.3	7.3		16.4	17.7	14.1	13.8	11.3	-
TRO-047	315746	181209	25.2	14.6			10.6	8.3	8.3	6.5	21.5		8.0	14.9	13.1	10.7	-
TRO-048	315825	181374	30.1	18.6	17.7	18.8	14.4	13.4	13.2	8.6	19.7	21.1	22.8	18.1	18.0	14.8	-
TRO-049	315955	175898	23.3	18.6	17.4	21.4	11.4	11.3	9.4	13.8	13.3	15.9	23.5	10.6	15.8	13.0	-
TRO-050	316032	175869	24.7	20.6		19.9	11.2	10.5	9.4	13.2	13.3	14.6	22.1	15.7	15.9	13.1	-
TRO-051	316150	175887	16.7	18.9	16.9	18.6	11.5	11.3	9.1	13.3	13.5	16.4	20.8	13.7	15.1	12.3	-

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.82) and Annualised	Distance Corrected to Nearest Exposure
TRO-052	313000	178061	21.4	12.5	9.6	11.5	10.6		5.6	7.7	10.0	11.8	15.8	11.1	11.6	9.5	-
TRO-053	312944	178097			10.7	13.5	7.2	6.6	7.1	8.6	9.9	13.4			9.6	9.3	-
TRO-054	312883	178154	22.3								10.5		<0.6		-	-	-
TRO-055	316735	176217	34.9	38.3	26.4	33.7	22.7	18.4	22.5	25.8	21.9	28.9		26.5	27.3	22.4	-
TRO-056	316826	176156	26.9	30.4	25.7	24.3	15.0		14.5	20.6	21.9	24.4	32.2	20.2	23.3	19.1	-
TRO-057	316823	176118		38.2	34.1	34.7	22.0	16.5	22.2	26.4	29.7	30.6	17.2	26.5	27.1	22.2	-
TRO-058	317760	174651	29.9		14.6		11.5	10.1		15.2	13.5		23.4	17.5	17.0	14.0	-
TRO-059	317727	174689		22.6		19.6	11.2	8.9	10.1	15.7	13.7	16.6	26.3	17.0	16.2	13.3	-
TRO-060	317758	174813	29.4	25.0	14.1	19.8	11.4	11.7	12.8	18.8	16.1	19.9	7.9	17.2	17.0	13.9	-
TRO-061	322302	182343									16.1	18.3	23.1	13.7	17.8	13.4	-
TRO-062	322335	182272	25.7	18.7	13.7			10.8				14.9	19.0	13.5	16.6	11.8	-
TRO-063	322244	182234		21.6	15.8	17.4	12.2	10.0	11.9						14.8	13.5	-
GW-017	317602	178703	33.0	32.9	27.3	20.9									28.5	19.0	-
GW-018	317561	178746	34.3	34.1	30.2	25.8									31.1	20.8	-
GW-019	317564	178735		32.9	26.6	24.3									27.9	20.1	-
GW-020	317590	178708	32.2	34.1	28.2	25.8									30.1	20.1	-

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

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, as amended by the Environment Act 2021, 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 must then be reviewed and updated no later than every five years; or if a local authority considers there is a need for further or different measures to be taken in order to achieve air quality standards; or if significant changes to sources occur within your local area.

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 18.

The table shows the objectives in units of micrograms per cubic metre µg/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 18 - 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 (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2010
Particulate Matter (PM_{10})	40µg/m^3	Annual mean	31.12.2010
Sulphur dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
Sulphur dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
Sulphur dioxide (SO_2)	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

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

Diffusion Tube Annualisation

30 diffusion tube sites required annualisation in 2023. Details for these sites are provided in Table 21**Error! Reference source not found.**. Annualisation is required for any site with data capture less than 75% but greater than 25%.

Diffusion Tube Bias Adjustment Factors

A local bias adjustment factor of 0.82 has been applied to the 2023 monitoring data. A summary of bias adjustment factors used over the past five years is presented in Table 19.

Obtaining a local bias adjustment factor was performed by carrying out a co-location study at Castle Street continuous automatic monitor. Triplicate diffusion tubes were sited next to the NOX inlet of the monitoring station. The diffusion tube results are then compared to those measured by the continuous monitor. Once all ratified annual data is obtained, a data check is carried out to check the precision of data. Precision is calculated based on the diffusion tube data only. Tube precision is categorised as good or poor. Good precision applies where the coefficient of variation (CV) of triplicate diffusion tubes for eight or more periods during the year is less than 20%, and the average CV of all monitoring periods is

less than 10%. Poor precision applies where the CV of four or more periods is greater than 20% and/or the average CV is greater than 10%. Details for this co-location study are presented in Table 22.

Table 19 - Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	Local	-	0.82
2022	Local	-	0.79
2021	National	03/22	0.78
2020	National	06/21	0.76
2019	National	09/20	0.75

NO_2 Fall-off with Distance from the Road

In 2023, one site within Cardiff required distance correction. Concentrations of 36.0µg/m^3 NO_2 at diffusion tube site 179 are located at a kerbside site. Therefore, this does not represent relevant exposure. As shown in Table 20 below, after application of distance correction calculations to the nearest building façade, the relevant exposure concentration has been corrected to 31.0µg/m^3.

Table 20 - NO_2 Fall-off with distance from the Road Calculation

Diffusion Tube ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m^3)		
	Monitoring Site to Kerb	Receptor to Kerb	Bias Adjusted and Annualised	Background	Predicted at Receptor
179	2.0	7.0	36.0	18.9	31.0

QA/QC of Automatic Monitoring

Local Site Operator duties are performed by officers within the Shared Regulatory Services Environment Team. Cardiff Newport Road and Cardiff Centre Automatic Urban Rural Network (AURN) sites are owned by DEFRA and managed by Bureau Veritas. SRS officers are contracted to visit these sites at fortnightly and monthly intervals to carry out calibrations. The AURN is the UK's largest automatic monitoring network and is the main network used for compliance reporting against the Ambient Air Quality Directives.

The Cardiff Castle Street automatic monitor is owned and managed by Cardiff Council. This monitor is calibrated fortnightly by an officer from the Shared Regulatory Services Environment Team.

Automatic monitoring data presented in this APR from the above monitors is ratified by Ricardo. Live and historical data is available at https://airquality.gov.wales/.

In addition to the network monitors, 45 indicative monitors where also used in Cardiff in 2023. 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. Prior to deployment, all candidate devices undergo a two week burn-in period on our calibration rig. Data is compared against gold-standard devices, which are routinely sent to be co-located at a local AURN site and calibrated accordingly. Once a deployment is complete, an internal review of the data is performed after a standard two-week bedding in period to ensure all the devices are working correctly. An AI model is used to correct for calibration drift whilst a device is co-located with a local AURN site for reference and to highlight drift issues.

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10} and $PM_{2.5}$ monitors utilised within Cardiff do not required the application of a correction factor.

Automatic Monitoring Annualisation

All NO_2 automatic monitoring locations within Cardiff 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.

Table 21 - Annualisation Summary (concentrations presented in µg/m^3)

Diffusion Tube ID	Annualisation Factor Site 1 Name	Annualisation Factor Site 2 Name	Annualisation Factor Site 3 Name	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
106	0.8880	0.9143			0.9012	28.3	25.5
148	0.7776	0.7735			0.7756	32.5	25.2
158	0.9818	0.9914			0.9866	25.0	24.7
184	0.8776	0.9092			0.8934	33.7	30.1
187	0.9040	0.9329			0.9184	36.7	33.7
194	0.9899	1.0006			0.9952	23.8	-
200	0.9972	1.0078			1.0025	30.6	30.7
202	0.9383	0.9475			0.9429	27.9	-
203	0.8823	0.9036			0.8930	20.2	18.0
204	0.9041	0.9299			0.9170	24.8	-
210	0.9016	0.9283			0.9149	21.8	19.9
211	0.9396	0.9575			0.9486	22.0	20.9
247	0.9901	0.9793			0.9847	13.7	13.5
250	0.8271	0.8512			0.8392	35.9	30.1
265	0.8079	0.8372			0.8225	20.2	16.6

Diffusion Tube ID	Annualisation Factor Site 1 Name	Annualisation Factor Site 2 Name	Annualisation Factor Site 3 Name	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
UHW-008	1.1801	1.1977			1.1889	31.0	36.9
TRO-001	0.9041	0.9299			0.9170	17.0	-
TRO-006	1.0650	1.0300			1.0475	19.1	20.0
TRO-024	0.8891	0.9239			0.9065	35.2	31.9
TRO-036	0.9029	0.9197			0.9113	14.5	13.2
TRO-047	1.0192	1.0090			1.0141	13.1	-
TRO-053	1.1815	1.1736			1.1776	9.6	11.3
TRO-058	0.9950	1.0128			1.0039	17.0	17.0
TRO-061	0.8833	0.9484			0.9158	17.8	16.3
TRO-062	0.8572	0.8808			0.8690	16.6	14.4
TRO-063	1.1231	1.0918			1.1075	14.8	16.4
GW-017	0.8180	0.8098			0.8139	28.5	23.2
GW-018	0.8180	0.8098			0.8139	31.1	25.3
GW-019	0.8838	0.8754			0.8796	27.9	24.6
GW-020	0.8180	0.8098			0.8139	30.1	24.5

Table 22 - Local Bias Adjustment Calculations

	STEP 3a Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Adjustment Factor A	0.82 (0.77 - 0.87)
Diffusion Tube Bias B	22% (15% - 29%)
Diffusion Tube Mean (µg/m^3)	41.4
Mean CV (Precision)	5.5%
Automatic Mean (µg/m^3)	33.8
Data Capture	100%
Adjusted Tube Mean (µg/m^3)	34 (32 - 36)

Overall Diffusion Tube Precision	**Good Overall Precision**
Overall Continuous Monitor Data Capture	**Good Overall Data Capture**

Local Bias Adjustment Factor	**0.82**

Notes:

A single local bias adjustment factor has been used to bias adjust the 2023 diffusion tube results.

Appendix D: AQMA Boundary Maps

Figure 34 - City Centre AQMA

Figure 35 - Stephenson Court AQMA

Figure 36 - Ely Bridge AQMA

Figure 37 - Llandaff AQMA

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