Cardiff Council 2023 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: November 2023

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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.

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

[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/

Impact estimates are uncertain, however, which is why they should always be presented as a range of values, rather than a single, central estimate. The estimates are also relevant only to a single time and place and should not be used for comparisons.

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.

Pandemic Restrictions and the Impact on Air Quality

The emergency public health restrictions introduced during the pandemic (e.g. lock down and working from home policies) showed just how closely travel, transport and air pollution are connected.

In work commissioned by Welsh Government[3], the changes in concentrations of different air pollutants during lock-down phases were assessed. It showed that travel and transport are significant contributors to air pollution, and that changes in the need to travel and mode of travel can improve air quality.

Policies that recognise these changes and aim to support them being adopted in the long-term are likely to benefit air quality and health.

Remote and Hybrid working has remained higher than pre-pandemic levels. These working practices contribute towards decreased traffic and emissions on our roads. Data is presented by the ONS (Office of National Statistics) for the UK Annual Population Survey in 2019[4]. In the 12-month period from January to December 2019, in the UK there were an estimated 1.7 million people who said that they work mainly from home; this represents just over 5% of the total workforce.

Levels of working from home peaked during the pandemic, with almost half of working adults (49%) reporting having worked from home at some point in the past seven days in the first half of 2020 (3 to 13 April and 11 to 14 June 2020). Two years later (27 April to 8 May 2022), when guidance to work from home was lifted in Great Britain, around 38% of working adults reported having worked from home. In the most recent period (25 January

[3] https://airquality.gov.wales/reports-seminars/reports?page=1

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

to 5 February 2023) around 40% of working adults reported having worked from home at some point in the past seven days.

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

The Environment (Air Quality and Soundscapes) (Wales) Bill[5] was introduced to the Senedd on Monday 20 March 2023, giving the Welsh Government (WG) greater ability to tackle air and noise pollution.

The new Bill is part of a package of measures to improve the quality of the air environment in Wales. It will give powers to Welsh Government to introduce new long-term targets for air quality under a national framework taking account of the latest scientific knowledge including the World Health Organisation Air Quality Guidelines

The Bill will help create low emission zones on Welsh Government trunk roads where needed and will give local authorities more power to tackle vehicle idling.

Air Quality in Cardiff

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

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

[5] https://www.gov.wales/new-powers-tackle-air-and-noise-pollution-will-lead-cleaner-healthier-and-greener-future

improves. Details for Air Quality Objectives Included in Regulations for the Purpose of LAQM in Wales can be found in Table 12.

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} & PM2.5), 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). The designated monitoring locations are assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. TG22 states that annual mean objectives should apply at "All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, car 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 2022, all monitoring locations within the AQMAs were compliant with the relevant objectives for NO_2. However, one non-automatic monitoring site located within the Llandaff AQMA was close to the annual air quality objective limit of 40µg/m^3, with a result of 39.3µg/m^3.

In 2022, all other locations monitored locations within Cardiff show concentrations below the relevant objectives for both nitrogen dioxide and particulate matter.

Actions to Improve Air Quality

SRS and 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[6] 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.

Section 84 of the Environment Act 1995 ensures that action must then be taken at a local level which is outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves. After declaring an AQMA the authority must prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. The AQAP must be **formally** adopted prior to 24 months has elapsed. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

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, 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).

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

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. Therefore, it is likely that the CASAP will need a full review and update in 2024/25.

Local Priorities and Challenges

In addition to Cardiff's four AQMAs and CASAP work, following the formal publication of Defra's UK detailed air quality plan to tackle roadside nitrogen dioxide (NO_2) concentrations in July 2017, it was identified from air quality monitoring undertaken by Cardiff Council (CC) and modelled projections from WG that Cardiff would continue to exceed EU & UK Air Quality Directive Limit Values for NO_2 beyond 2020. The report detailed modelled projections from the Joint Air Quality Unit (JAQU) which showed continued non-compliance of the national annual average NO_2 standard by 2021 along identified road networks. The roads which have been modelled as exceeding the annual limit value are the A4161, the A4232, the A4234, the A470 and the A48. These areas of exceedance are also featured in the CAS & Action Plan document as any mitigation measures implemented on the referenced road links will have an impact on the LAQM AQMAs.

As a result of the detail in the UK Plan, and a subsequent High Court ruling, in March 2018, under Part IV of the Environment Act 1995, Section 85(7), WG issued a formal direction to CC to address its air quality concerns, with reference to the specified five road links. The direction has been governed by the Welsh Minister for Environment who has determined that the direction deemed necessary to meet obligations placed upon the United Kingdom under the **EU Ambient Air Quality Directive (2008/50/EC).**

The Direction specified that CC had to undertake a feasibility study in accordance with the HM Treasury's Green Book approach, to identify the option which will deliver compliance with legal limits for nitrogen dioxide in the area for which the authority is responsible, **in the shortest possible time.**

Cardiff Council has developed a Clean Air Project Team who have met the necessary reporting requirements outlined by the Direction.

The results of the local modelling presented in the Initial Plan, differed to that undertaken by Defra using the Pollution Climate Mapping model. Defra's modelling identified two road links under baseline conditions which were projected to show non-compliance beyond

2021, namely the A48 and the A4232. The localised modelling identified only one road link under baseline conditions projected to show non-compliance beyond 2021, this being the A4161 Castle Street, in the City Centre.

Within the Initial Plan Report a long list of measures developed from the CASAP were qualitatively assessed against a primary objective of achieving compliance with set air quality objectives in the shortest possible time. The measures were considered against secondary objectives and were subjected to further qualitative assessments against the WelTAG Well-being Aspects.

The Council's published Full Business Case (Final Clean Air Plan) documents early intervention measures as well as aspired measures the Council are endorsing to improve localised air quality on the outlined A4161 Castle Street with a vision of improving citywide air quality levels. These measures include;

- Implementation of Electric Buses – 36 Electric Buses to be implemented on a number of routes within the City Centre;
- Bus Retro Fitting Programme;
- Taxi Mitigation Scheme;
- City Centre Transportation Improvements; and
- Active Travel Measures.

The Clean Air Plan initially demonstrated that the outlined package demonstrates the greatest level of compliance on Castle Street, with 31.9µg/m^3 forecasted in 2021 as a result of the implementation of the measures. In addition to achieving compliance on Castle Street, the impact of the package of measures has also been modelled at local air quality monitoring locations, including those locations within existing Air Quality Management Areas (AQMAs). The results of the modelling indicated that all monitoring locations are expected to have concentrations below the 40 µg/m3 which further demonstrates that the package of measures will improve local air quality including within existing AQMAs.

A key component of the Clean Air Plan to deliver compliance was the full implementation of the City Centre Schemes, particularly the City Centre North (Castle Street) Scheme. The schemes would establish a high-quality active travel infrastructure for the city and

improve connectivity between key developments by strategically aligning bus routes and enhancing links with the new Transport Interchange. These schemes were due to commence in early 2020, prior to the onset of the COVID pandemic.

In June 2021 Cabinet approved the construction of the original City Centre North Scheme as detailed in the Clean Air Plan, albeit on an interim basis. The decision to install the scheme as an interim measure was done so on the basis it would be necessary to assess any residual impacts following a full post Covid recovery period, to ensure that no detrimental impacts in terms of congestion and air quality would emerge.

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 on Castle Street.

Constant dialogue and ongoing collaboration with Welsh Government officials has been to ensure that the Plan remains on course to deliver compliance in the shortest possible time.

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. [7] This direction sets on measures the Council needs to implement to ensure that compliance for the NO_2 limit value on Castle Street is maintained.

In 2022 additional assessment works were commissioned to update the previous air quality and transportation modelling, to account for post COVID traffic flows to be assessed in terms of the impact and effectiveness of the Castle Street Scheme.

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.

[7] https://gov.wales/environment-act-1995-activity-ensure-nitrogen-dioxide-compliance-air-quality-direction-2022-cardiff

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%.

EV Taxi Scheme

In Q3 of 2021 the Council procured five fully electric wheelchair accessible Dynamo Hackney Carriage Taxis. In partnership with a local vehicle hire company the Council launched an EV Taxi Lease Scheme with for licensed Cardiff drivers to take up an EV Taxi. This scheme was initially launched in January 2022. Further details for this scheme can be found at https://www.electrictaxiswales.co.uk/english/cardiff-scheme. Unfortunately, the scheme has not seen the uptake of vehicles that was anticipated, and ongoing discussions with Welsh Government have taken place to identify potential improvements to the scheme. In addition, during 2022 Cardiff Council/ SRS as the licensing authority have undertaken further consultation with the Taxi Trade on future licensing amendments. This has resulted in a recent report to the Licensing Authority whereby the committee approved the lifting of the existing moratorium on issuing new hackney carriage plates. The revised agreement will allow new hackney carriage licenses to be issued but only to EVs or Wheelchair Accessible Vehicles with an emission standard of Euro 6 or better.

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 AirQuality-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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1 Actions to Improve Air Quality

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. AQAPs the first three 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 (PM10), there was considerable doubt that the provisional 2010 objectives for PM10 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 (40µgm3). 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 µg/m3). 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.

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 further assessments using updated traffic data, collected post Covid, are being undertaken so as the Council can undertake further detailed assessments in order to identify the most suitable permanent solution for Castle Street. The assessments will enable the Council to comply with the most recent legal direction 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 Appendix A). 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	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. However, one monitoring locations displays NO2 concentrations close to the objective limit	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 https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=394 and are included in Appendix D.

Implementation of Action Plans

Cardiff Council has 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 2More 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 Nitrogen Dioxide (NO_2).

Section 84 of the Environment Act 1995 ensures that action must then be taken at a local level which is outlined in a specific Air Quality Action Plan (AQAP) to ensure that air quality in the identified area improves. After declaring an AQMA the authority must prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. The AQAP must be **formally** adopted prior to 24 months has elapsed. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

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, 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).

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 deadline. WG		

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
									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 developed a 'WOW' (Walk	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
			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	15 schools assigned to the TRO Zone pilot project.	End of 2022 (Subject to funding, possibly longer)	
1.5	Personalised Travel Planning	Promoting Travel Alternatives	Public Service Board Staff Charter.	Public Health Wales/ Vale	Working initially through Cardiff Public Services Board, a Healthy Travel Charter for Cardiff has		Modal shift counts.	Unknown	The Charter was signed by 11 public sector organisations at launch in April 2019, employing over 33,000 staff, with additional		

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 Cardiff Health Board	been developed with major public sector employers and was launched in April 2019.		Number of participating public sector organisations.		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	Completed 2019		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.
1.7			Tredegarville CIW Primary School "Green Wall" project.	CC	Complete	August 2019	Air quality levels recorded at the school via non-automated	No target	Successful application under the Landfill Communities Fund to cover the supply and installation of outdoor green walls at Tredegarville CIW Primary		Investigate monthly average diffusion tube results following implementation.

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
							principle diffusion tubes.		School. Successfully installed August 2019. Additional Schools have been included in further Living Wall Projects in 2022.		
1.8			Dusty Forge/ Kitchener Primary School/ Birchgrove Primary School. Green Wall Projects	CC	Ongoing	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 to monitor changes in air quality and biodiversity.		Investigate monthly average diffusion tube results following implementation
Infrastructure											
2.1	Bus Route Improvement	Transport Planning and Infrastructure	City Centre Improvement Schemes (3	CC & WG	2018	2019 (City Centre West Initiated)	FBC	To ensure development does not cause	City Centre West (central Sq. 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
			elements East side/ City Centre North/ City Centre West)			2020 (city centre north and east initiated)		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 modelling shows levels of 28 µg/m^3 will be achieved.	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 installed an opened from Nov 2021. City Centre East scheme commenced site preparation works 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
									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 Cardiff for the end of Summer 2019. Completion of the rollout of the Ebike fleet by September 2021, delivering a new fleet of	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
									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 cycleway 1. Phase 2 constructed in 21/22** Phase 1 between Cowbridge Road and Western Avenue via	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
									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 Western Avenue with Llandaff̈ village. **Pop Up Cycleways** •Cross City Scheme complete and ready for junction switch		

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
									on when traffic conditions allow •Bay Pop Up complete, now requires new street lighting to be compliant with safety regulations. •Scheme to open officially once the lighting work is complete Hailey Park •Scheme awaiting tender following consultation outcome		

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 5 •Scheme out to consultation •Scheduled to be on site Q1/2 2022-23 Cycleway 1 •Scheme entered on site September 2021 •Work progressing well •Controlled Parking Scheme to follow early 2022		

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
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 reduce levels to as low as reasonably practicable	Construction of the Interchange has continued throughout 2021 and remains on course to be completed in 2023.	S106 funding acquired for the amount of £10,000 to enhance air quality monitoring capabilities.	
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,		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
									integrated ticketing pilot between Cardiff and Newport in 2022, plans for new transport interchanges (Cardiff Central, Waungron and Cardiff Parkway) 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	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
									hopefully expand 20mph limit areas in Grangetown. 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	

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
2.7	20 mph Zones	Traffic Management		Welsh Gov	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	Nationwide September 2023.	
Lower Emission Vehicles											
3.1	Public Vehicle Procurement		Ultra-Low Emission Bus (ULEB) fund made available by the Department		Ongoing	Three year rolling programme 2019- 2021	Improvements to air quality levels (NO_2) monitored by indicative methods by CC at sensitive receptor	>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.		

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
			for Transport (DfT).				locations on specified routes				
3.2	Company Vehicle Procurement- Prioritising uptake of low emission vehicles/ EV recharging	Promoting Low Emission Transport	Sustainable fuels strategy- assessment of Cardiff Council vehicle fleets	CC, DfT & Cardiff Bus	Ongoing	Economic savings and reduced Carbon footprint	Unknown	End of 2021 59 charge points 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	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
								being delivered prior 31st March. 1 on pre-order, which will be in 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	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
									installed across the City. Second phase of 5 sites with 1 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		

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
									locations in the City Centre and Bay. 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	CC	Ongoing		Uptake for the funding.	To ensure development does not cause any adverse impact and where possible	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

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
			Hackney and Private Hire Vehicles. Clean Air Funding allocated to provide EV grants for taxis.					reduce levels to as low as reasonably practicable			vehicles need to be incentivised.
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	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
			Council will administer 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	

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
4.2	Taxi Licensing Conditions	Policy Guidance and Development Control	Amendments made to Cardiff taxi licensing conditions to promote a cleaner fleet.	CC	2019- 2020		Taxi fleet composition %.		Impacted owing to COVID impacts on Taxi trade during 2020-21	Ongoing and will need to be 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 2022

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 at three sites during 2022. Table 3 presents the details of the sites. National monitoring results are available at https://airquality.gov.wales/.

In addition to the above monitoring, four additional air monitoring sensors were located across Cardiff. These monitors provide indicative air quality monitoring data.

Maps showing the location of the monitoring sites are provided in Figure 1 and Figure 2. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

2.1.2 Non-Automating Monitoring Sites

SRS on behalf of Cardiff Council undertook non- automatic (passive) monitoring of NO_2 at 135 sites during 2022. Table 4 presents the details of the sites.

Maps showing the location of the monitoring sites are provided in Figure 3 to Figure 7. 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

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?
				PM_{10}, $PM_{2.5}$	N	Beta Attenuation Monitor with Gravimetric Equivalence	Y(2m)	2m	Y
Lower Cathedral Road AQMesh	Roadside/ Urban Traffic	317540	176437	NO_2	N	Electrochemical Sensor	Y (0.5m)	1.5m	Y
				PM_{10}, $PM_{2.5}$					
North Road AQMesh	Roadside/ Urban Traffic	317516	177854	NO_2	N	Electrochemical Sensor	Y (2m)	1.5m	N
				PM_{10}, $PM_{2.5}$					
Lansdowne Road, Canton AQMesh	Roadside/ Urban Traffic	315960	176345	NO_2	N	Electrochemical Sensor	N (5m)	1.5m	N
				PM_{10}, $PM_{2.5}$					
Llandaff AQMA AQMesh	Roadside/ Urban Traffic	315198	178220	NO_2	Y	Electrochemical Sensor	Y (0.5m)	1.5m	Y
				PM_{10}, $PM_{2.5}$					

Notes:

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

Figure 1 - Map(s) of Automatic Monitoring Sites

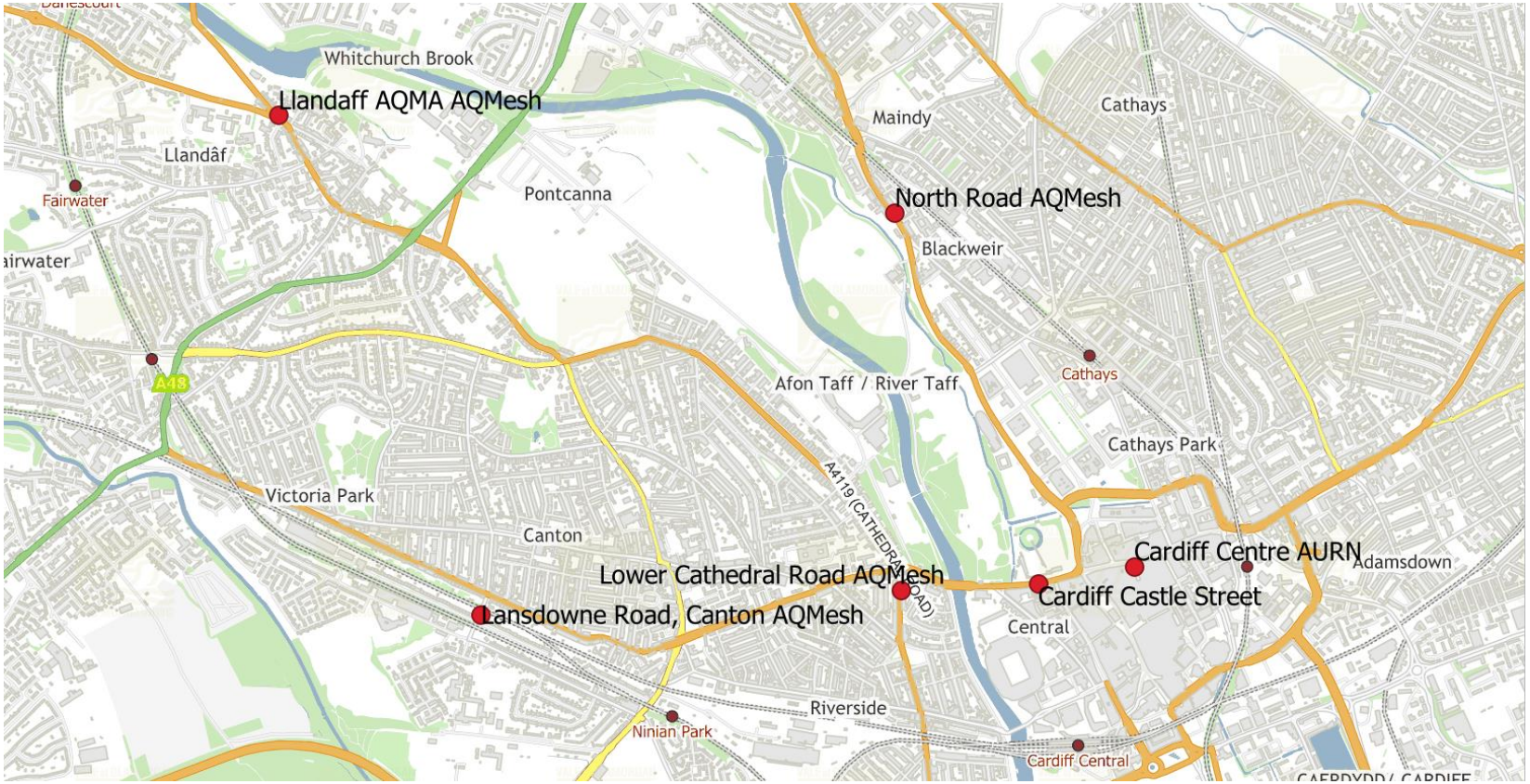


Figure 2 - Map(s) of Automatic Monitoring Sites

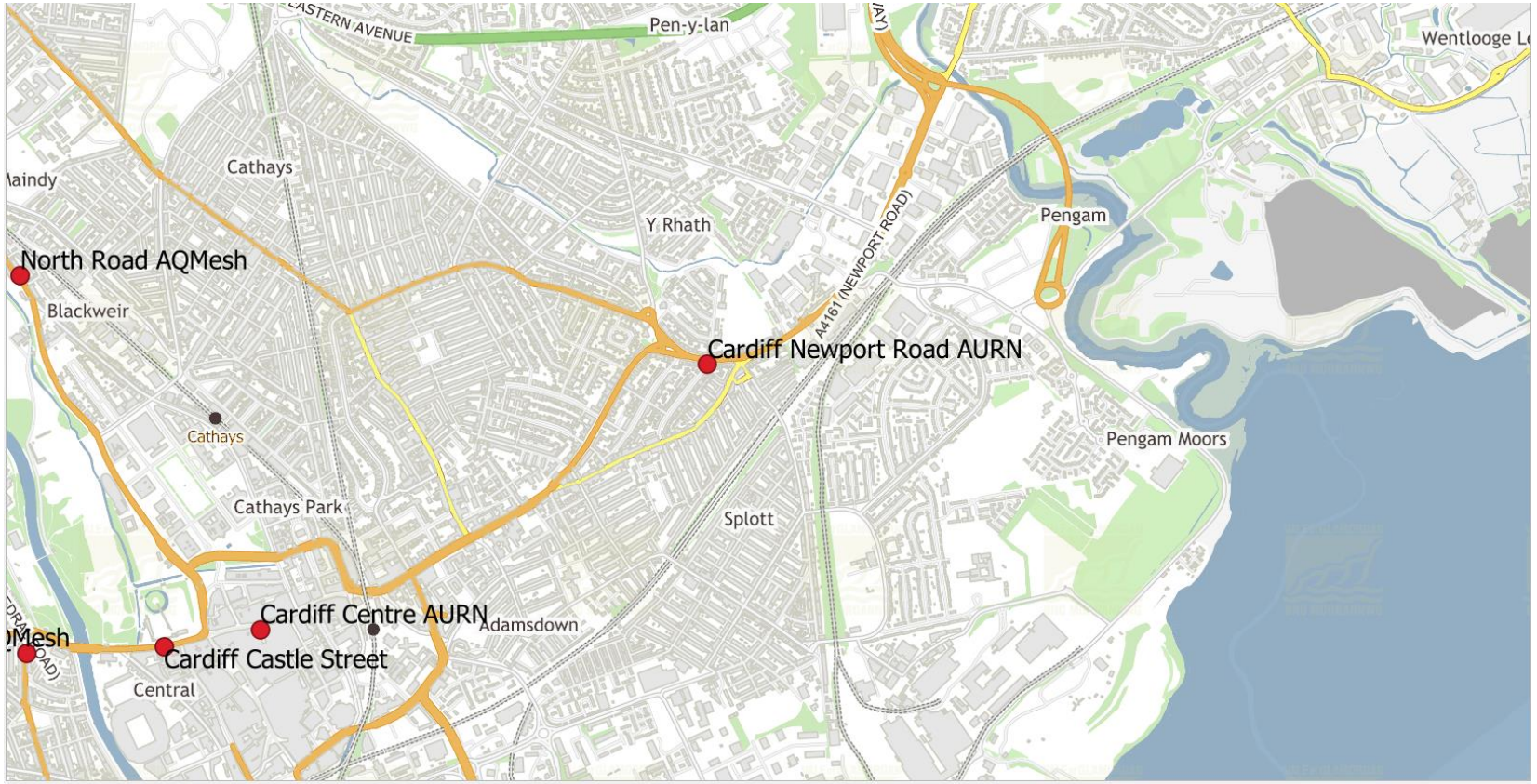


Table 4 - Details of Non-Automatic Monitoring Sites

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)
16	167 Ninian Park Road	Roadside	317040	176060	NO2		0.0	5.0
258	Lamppost 116 Penarth Road	Roadside	317760	175310	NO2		4.0	2.0
58	Westgate Street	Kerbside	317937	176400	NO2	City Centre AQMA	5.0	0.0
81	Stephenson Court	Roadside	319387	176980	NO2	Newport Road AQMA	0.0	5.0
86	19 Fairoak Road	Roadside	318452	178805	NO2		0.0	10.0
96	Manor Way Junction	Roadside	316601	179653	NO2		0.0	5.0
98	Western Avenue (premises)	Roadside	314805	177345	NO2		0.0	10.0
99	Cardiff Road Llandaff	Roadside	315275	178117	NO2	Llandaff AQMA	0.0	3.0
259	Wellfield Road	Kerbside	319201	178031	NO2		4.0	1.0
260	St Marys Catholic School, Canton	Roadside	316847	176762	NO2		0.0	2.0
261	Caer Ceffyl	Urban Background	311186	180196	NO2		0.0	50.0
106	30 Caerphilly Road	Roadside	316851	179520	NO2		0.0	5.0
112	17 Sloper Road	Roadside	316613	175910	NO2		0.0	5.0

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)
115	21 Llandaff Road	Roadside	316604	176641	NO2		0.0	3.0
117	25 Cowbridge Road West	Roadside	314458	176735	NO2	Ely Bridge AQMA	0.0	2.0
126	Westgate Street Flats	Roadside	317946	176387	NO2	City Centre AQMA	0.0	5.0
128	117 Tudor Street	Roadside	317540	175979	NO2		0.0	5.0
131	Dragon Court	Roadside	319292	176932	NO2	Newport Road AQMA	0.0	5.0
143	Windsor House	Roadside	318009	176337	NO2		0.0	6.0
144	Marlborough House	Roadside	318046	176307	NO2	City Centre AQMA	0.0	6.0
147	211 Penarth Road	Roadside	317636	175161	NO2		0.0	7.0
148	161 Clare Road	Roadside	317695	175389	NO2		0.0	5.0
149	10 Corporation Road	Roadside	317764	175174	NO2		0.0	5.0
156	2a/4 Colum Road	Roadside	317997	177412	NO2		0.0	5.0
157	47 Birchgrove Road	Roadside	316605	179703	NO2		0.0	8.0
158	64/ 66 Cathays Terrace	Roadside	318093	177716	NO2		0.0	3.0

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)
159	IMO façade replacement	Roadside	320709	177918	NO2		0.0	4.0
166	163 Lansdowne Road	Roadside	315950	176424	NO2		0.0	5.0
168	570 Cowbridge Road East	Roadside	314856	176929	NO2		0.0	5.0
174	76 North Road	Kerbside	317508	177868	NO2		0.0	1.0
179	Altolusso, Bute Terrace	Roadside	318627	176039	NO2		5.0	2.0
183	Station Terrace	Kerbside	318765	176623	NO2		5.0	0.0
184	Hophouse, St Mary Street	Roadside	318335	176074	NO2	City Centre AQMA	0.0	3.0
186	Dempsey's Public House, Castle Street	Roadside	318044	176449	NO2	City Centre AQMA	0.0	3.0
187	Angel Hotel	Roadside	317944	176436	NO2	City Centre AQMA	0.0	3.0
188	Westgate Street (45 Apartments)	Roadside	318229	176154	NO2	City Centre AQMA	0.0	3.0
191	7 Mackintosh Place	Roadside	318724	177776	NO2		0.0	3.0
194	115 Cowbridge Road West	Roadside	313870	176212	NO2		0.0	12.0
195	244 Newport Road	Roadside	320147	177523	NO2		0.0	6.0

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)
196	2 Pencisely Road	Roadside	316223	177305	NO2		0.0	6.0
198	Next Building to Stephenson Court	Roadside	319348	176958	NO2	Newport Road AQMA	0.0	5.0
199	157 Newport Road	Roadside	319599	177174	NO2		0.0	12.0
200	350 Whitchurch Road	Roadside	317038	179073	NO2		0.0	3.0
201	23 Lower Cathedral Road	Roadside	317547	176411	NO2		0.0	3.0
202	22 Clare Street	Roadside	317604	176053	NO2		0.0	3.0
203	10 Fairoak Road	Roadside	318255	178533	NO2		0.0	4.0
204	53 Neville Street	Roadside	317487	176303	NO2		0.0	5.0
207	42 Waungron Road	Roadside	314769	177343	NO2		0.0	7.0
208	2 Llantrisant Road	Roadside	315152	178245	NO2	Llandaff AQMA	0.0	3.0
209	178 North Road	Roadside	317200	178537	NO2		0.0	3.0
210	485 Caerphilly Road	Roadside	316692	181088	NO2		0.0	7.0
211	19 Well Wood Close, Penylan	Roadside	320247	178903	NO2		0.0	28.0

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)
212	Bridge Road	Kerbside	315197	178221	NO2	Llandaff AQMA	0.0	1.0
214	Mitre Place	Roadside	315254	178153	NO2	Llandaff AQMA	0.0	3.0
218	16-18 Cowbridge Road West	Roadside	314471	176770	NO2	Ely Bridge AQMA	0.0	4.0
254	Giraffe Nursery Cathedral road	Roadside	317529	176340	NO2		0.0	2.0
220	Fitzalan Court Newport Road	Kerbside	318919	176676	NO2		6.0	1.0
221	Stuttgarter Strasse (New student flats)	Kerbside	318530	177468	NO2		8.0	1.0
190	3 Pearson Street	Roadside	319056	177343	NO2		0.0	1.0
224	110 Cardiff Road	Roadside	315714	177740	NO2		0.0	4.0
243	25 Cardiff Road	Kerbside	315318	178042	NO2	Llandaff AQMA	4.0	1.0
244	25 Bridge Road	Roadside	314910	176584	NO2		0.0	4.0
245	47 Willows Ave	Urban Background	321006	179081	NO2		0.0	0.0
263	Pierhead Street	Roadside	319715	174791	NO2		0.0	4.0
247	Radyr Primary school	Roadside	321709	176022	NO2		4.0	2.0

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)
262	54 Llandaff Road	Kerbside	316593	176728	NO2		2.0	2.0
249	Wentlooge Road, Rumney	Roadside	318201	180367	NO2		0.0	3.0
250	Central Square Cardiff, City Centre	Roadside	313244	176769	NO2		4.0	2.0
251	Heol Isaf, Radyr	Kerbside	313244	180367	NO2		0.0	5.0
255, 256, 257	Castle Street Co-Location 3	Roadside	314505	176769	NO2	City Centre AQMA	0.0	1.5
192	3 Cowbridge road West	Roadside	314505	176769	NO2	Ely Bridge AQMA	0.0	3.0
TRO-001	Whitchurch High Lower School	Kerbside	315621	180320	NO2		4.0	5.0
TRO-002	Glan-Y-Nant Terrace (inside)	Roadside	315589	180316	NO2		0.0	2.0
TRO-003	Crossroads of Old Church Rd and Glan-Y-Nant terrace (outside)	Kerbside	315548	180315	NO2		5.0	2.0
TRO-004	Ysgol Melin Gruffydd School	Roadside	315620	180360	NO2		0.0	2.0
TRO-005	34 Glan-Y-Nant Rd (inside)	Roadside	315608	180151	NO2		0.0	3.0
TRO-006	36 Old Church Rd (outside)	Roadside	315497	180140	NO2		0.0	2.0
TRO-007	Peter Lea Primary	Roadside	313878	178319	NO2		0.0	3.0

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)
TRO-008	36 Carter Place	Roadside	313894	178331	NO2		0.0	4.0
TRO-009	3 Carter Place	Roadside	314022	178334	NO2		0.0	5.0
TRO-010	Llandaff Church in Wales Primary	Kerbside	315274	177784	NO2		5.0	5.0
TRO-011	20 Hendre Rd Llandaff	Kerbside	315279	177750	NO2		0.0	1.0
TRO-012	48 Hendre Rd Llandaff	Roadside	315209	177668	NO2		0.0	3.0
TRO-013	Pencaeru School	Kerbside	312803	175519	NO2		0.0	3.0
TRO-014	16 Cyntwell Avenue	Roadside	312809	175496	NO2		0.0	4.0
TRO-015	6A Cyntwell Avenue	Roadside	312734	175411	NO2		0.0	3.0
TRO-016	29 Norfolk St	Roadside	315811	176555	NO2		0.0	3.0
TRO-017	209 Lansdowne Rd	Roadside	315801	176492	NO2		0.0	4.0
TRO-018	Lansdowne Primary School	Roadside	315801	176492	NO2		0.0	4.0
TRO-019	St Cuthberts Primary School	Kerbside	319027	175493	NO2		0.0	1.0
TR0-020	Letton Road	Kerbside	318910	175456	NO2		2.0	1.0

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)
TRO-021	58 Letton Road	Kerbside	318945	175546	NO2		2.0	1.0
TRO-022	Tredegarville	Roadside	319268	176804	NO2		0.0	4.0
TRO-023	Newport Road School Lane Zone	Kerbside	319228	176777	NO2		0.0	1.0
TRO-024	Glossops Road	Kerbside	319283	176827	NO2		5.0	1.0
TRO-025	St Peters Primary School	Roadside	319394	177096	NO2		0.0	1.0
TRO-026	Southey Street	Kerbside	318378	177086	NO2		2.0	1.0
TRO-027	Wordsworth Avenue	Kerbside	319327	177080	NO2		2.0	1.0
TRO-028	St Monica's / Gladstone Primary School	Roadside	317982	178180	NO2		0.0	3.0
TRO-029	Pentyrch Street	Kerbside	317987	178156	NO2		2.0	1.0
TRO-030	Cwmdare Street	Kerbside	317855	178921	NO2		2.0	1.0
TRO-031	Lakeside Primary School	Roadside	319031	179949	NO2		0.0	1.0
TRO-032	Ontario Way	Kerbside	319012	180050	NO2		2.0	1.0
TRO-033	Woolaston Avenue	Kerbside	318898	180012	NO2		2.0	1.0

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)
TRO-034	Bryn Hafod Primary School	Roadside	321817	180406	NO2		0.0	1.0
TRO-035	8 Blagdon Close	Kerbside	321847	180402	NO2		2.0	1.0
TRO-036	Uphill Road	Kerbside	321834	180331	NO2		2.0	1.0
TRO-037	Glan Y Afon Primary School	Roadside	321705	181427	NO2		0.0	1.0
TRO-038	Browning Close	Kerbside	321738	181398	NO2		2.0	1.0
TRO-039	Thackerey Crescent	Kerbside	321834	181282	NO2		2.0	1.0
TRO-040	Willow Brook Primary School	Kerbside	324489	180953	NO2		0.0	1.0
TRO-041	Bullrush Close	Kerbside	324519	180949	NO2		2.0	1.0
TRO-042	Sandbrook Road	Kerbside	324529	180975	NO2		2.0	1.0
TRO-043	Creigau Primary School	Kerbside	307904	181561	NO2		0.0	1.0
TRO-044	Tregarth Court	Kerbside	307896	181569	NO2		2.0	1.0
TRO-045	TY-Nant Road	Kerbside	307967	181585	NO2		2.0	1.0
TRO-046	Rhiwbina Primary School	Roadside	315760	181322	NO2		5.0	1.0

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)
TRO-047	Lon-Y-Dail	Roadside	315746	181209	NO2		5.0	1.0
TRO-048	Heol-Y-Deri	Roadside	315825	181374	NO2		5.0	1.0
TRO-049	Fitzalan School	Roadside	315955	175898	NO2		20.0	1.0
TRO-050	Ysgol Gymraeg Pwll Coch	Roadside	316032	175869	NO2		5.0	1.0
TRO-051	Lawrenny Avenue	Roadside	316150	175887	NO2		3.0	2.0
TRO-052	Coed Y Gof	Roadside	313000	178061	NO2		5.0	2.0
TRO-053	Lime Grove	Roadside	312944	178097	NO2		6.0	1.0
TRO-054	Maple Road	Roadside	312883	178154	NO2		5.0	1.0
GW-013	Birchgrove Primary Traffic lights (Outside school)	Kerbside	316720	179799	NO2		4.0	1.5
GW-014	Birchgrove Primary sign (Outside school)	Kerbside	316744	179810	NO2		4.0	1.5
GW-015	Birchgrove Primary Façade 1	Roadside	316736	179783	NO2		0.0	5.5
GW-016	Birchgrove Primary Façade 2	Roadside	316767	179801	NO2		0.0	5.5
GW-017	Ysgol Mynydd Bychan Signpost (Outside school)	Kerbside	317602	178703	NO2		4.0	1.5

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)
GW-018	Ysgol Mynydd Bychan Signpost (Outside school)	Kerbside	317561	178746	NO2		4.0	1.5
GW-019	Ysgol Mynydd Bychan Façade 1	Roadside	317564	178735	NO2		0.0	5.5
GW-020	Ysgol Mynydd Bychan Façade 2	Roadside	317590	178708	NO2		0.0	5.5

Notes:

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

Figure 3 - Map of Non-Automatic Monitoring Sites in Cardiff

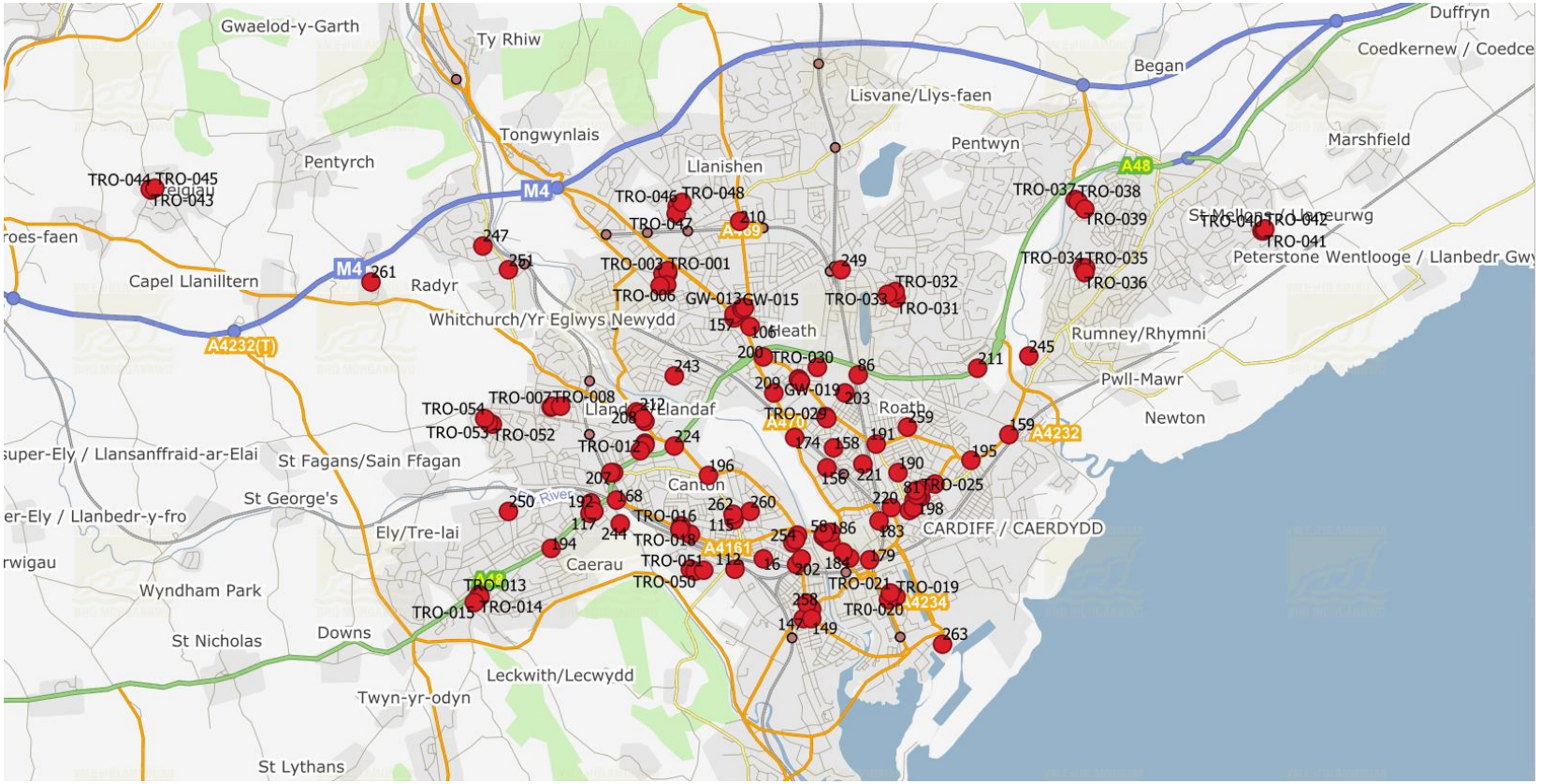


Figure 4 – Map of Non-Automatic Monitoring Sites in Cardiff City Centre AQMA

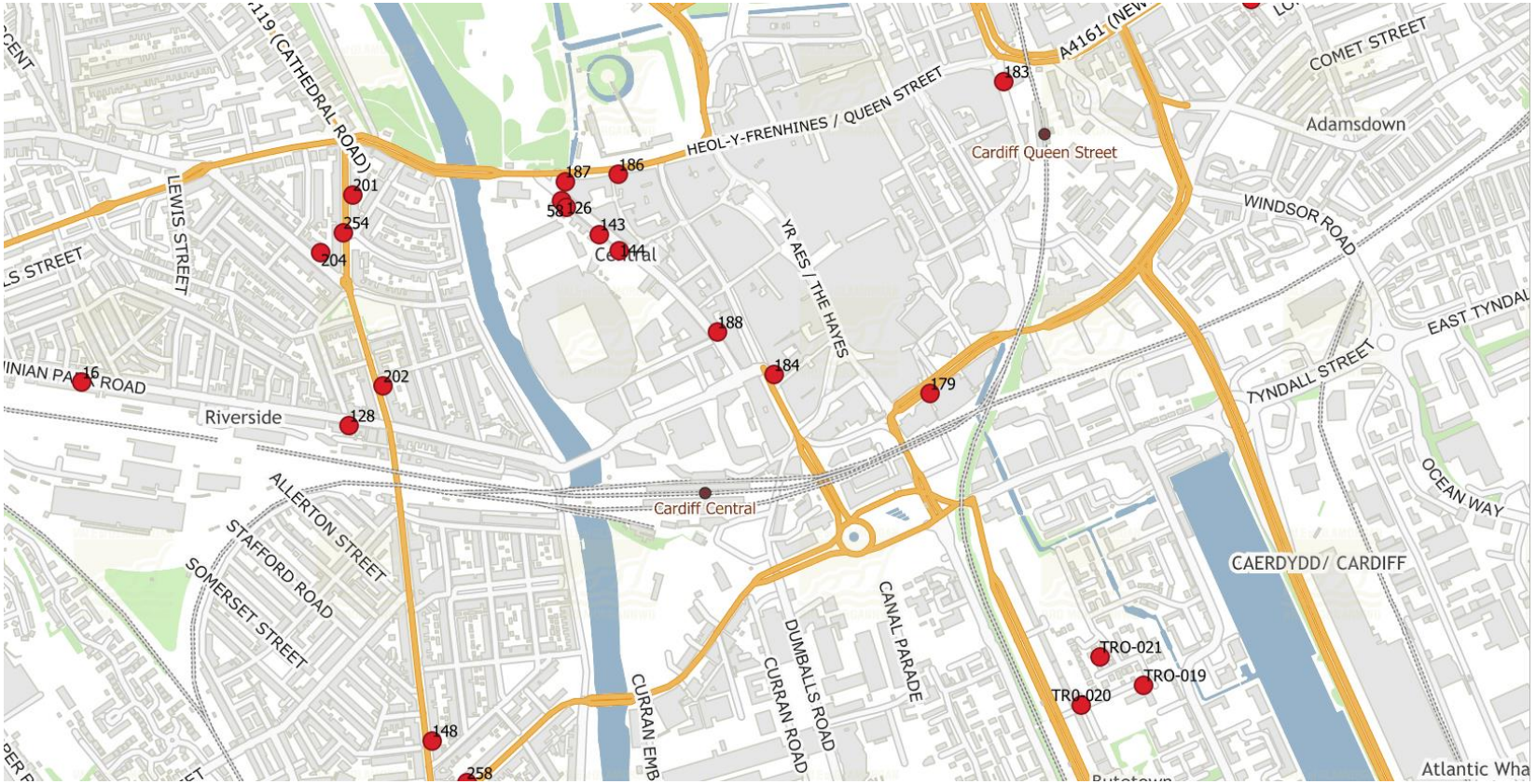


Figure 5 - Map of Non-Automatic Monitoring Sites in Stephenson Court AQMA

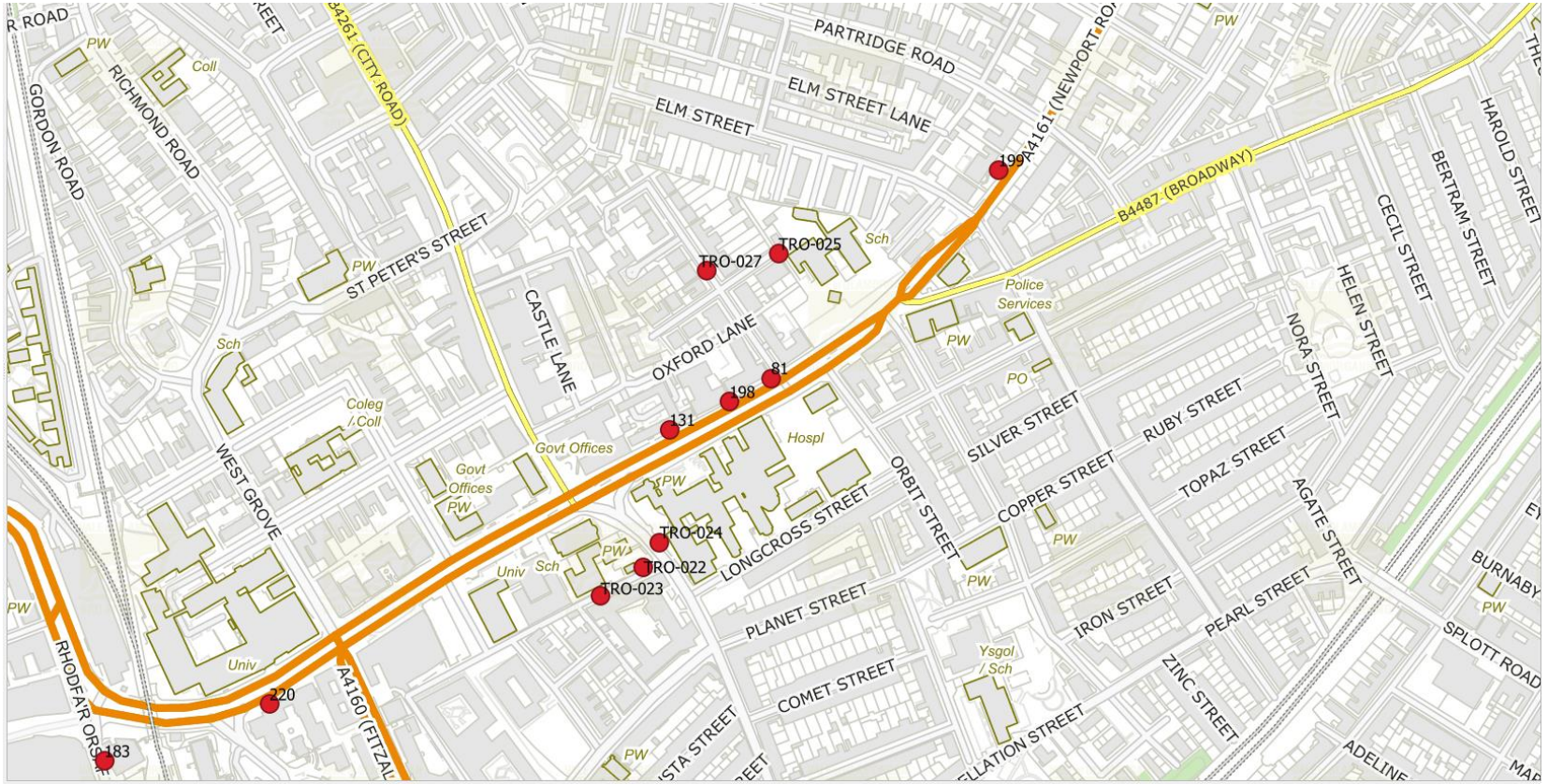


Figure 6 - Map of Non-Automatic Monitoring Sites in Llandaff AQMA

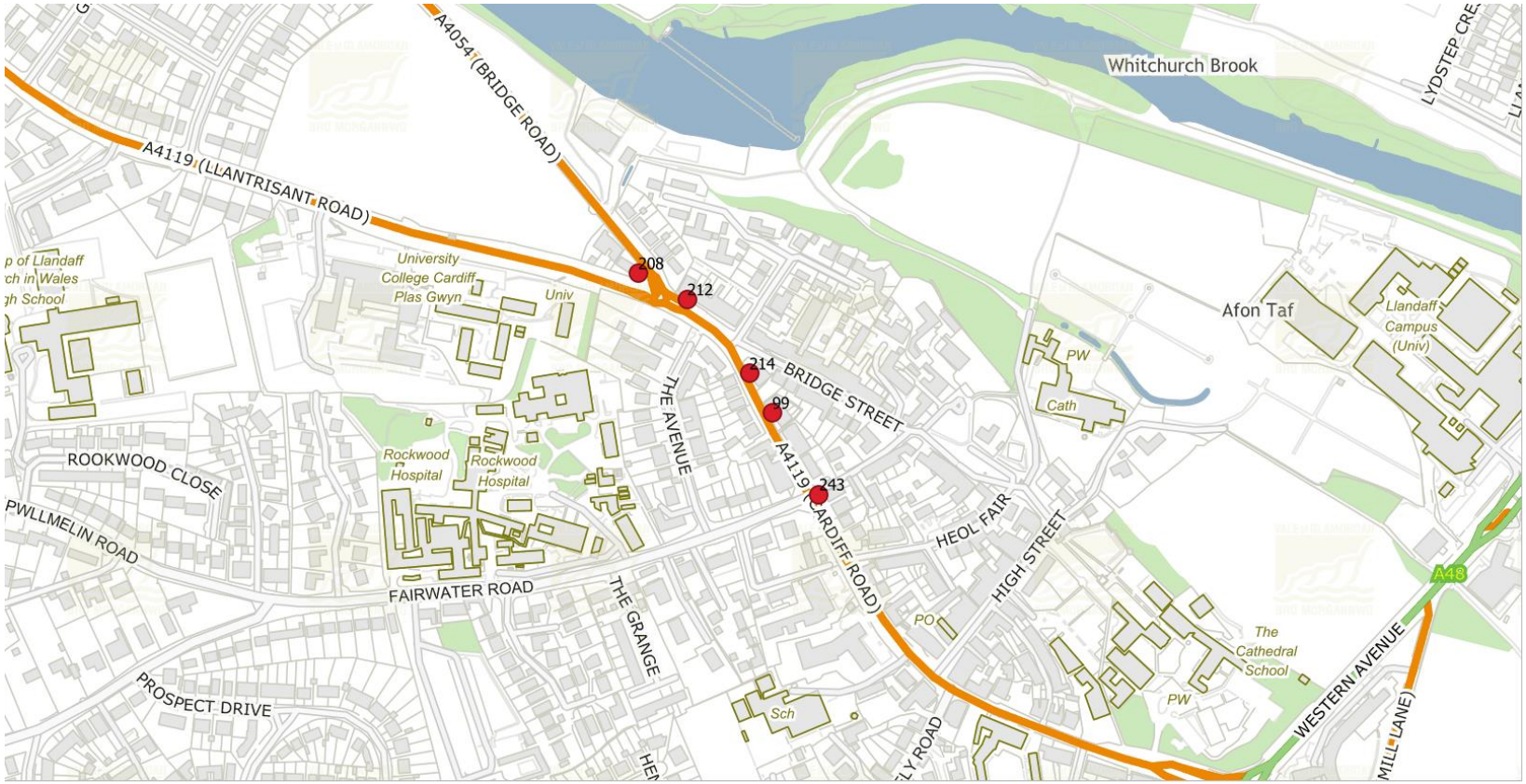
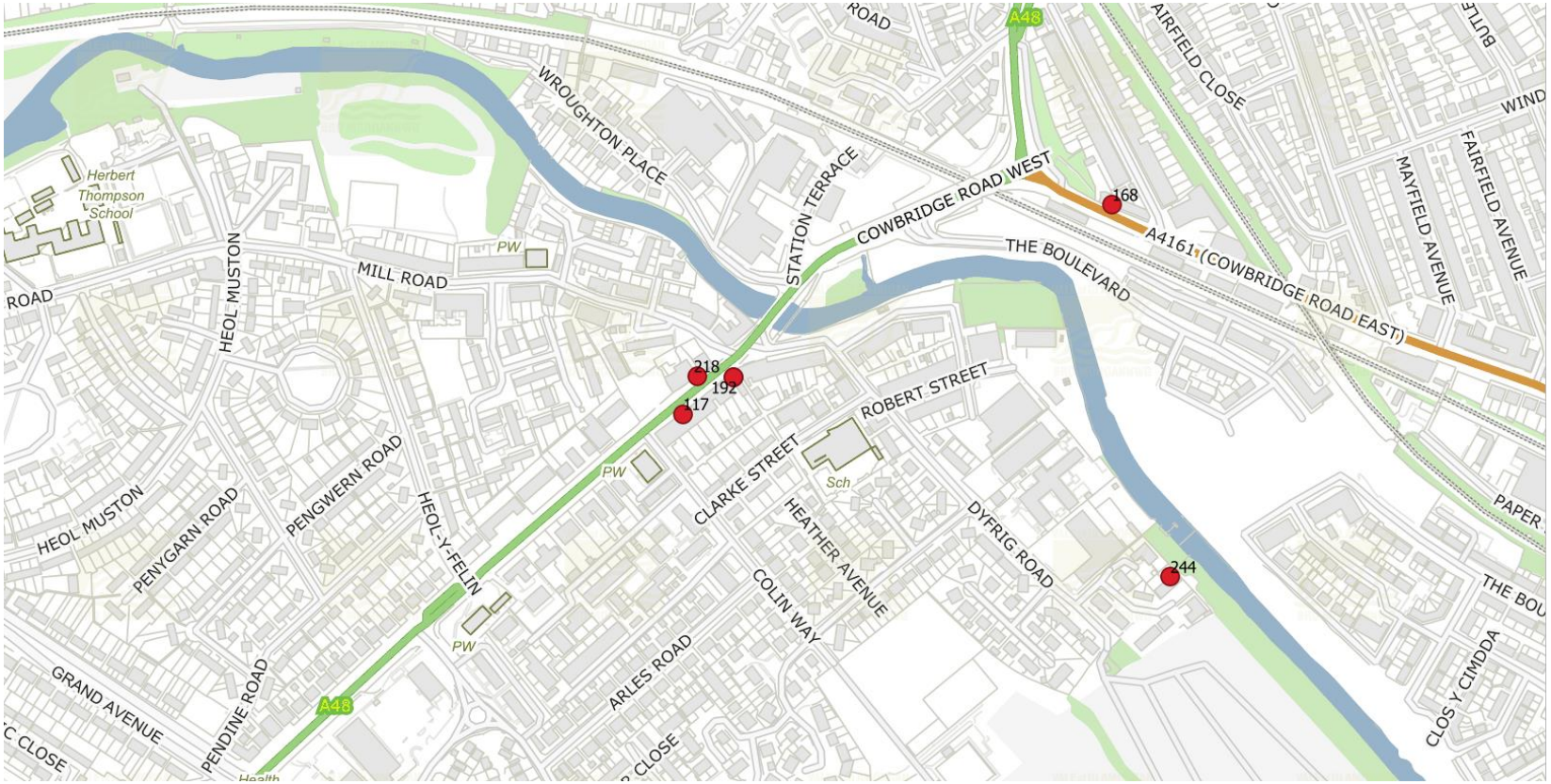


Figure 7 – Map of Non-Automatic Monitoring Sites in Ely Bridge AQMA



2022 Air Quality Monitoring Results

Table 5 - Annual Mean Automatic NO_2 Monitoring Results 2022

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
Cardiff City Centre AURN	Urban background	Automatic	88	88	18	12	16	16	17
Cardiff, Newport Road AURN	Roadside	Automatic	97	97		29	19	22	22
Cardiff Castle Street	Roadside	Automatic	100	100				25	34
Lower Cathedral Road AQMesh	Roadside	Indicative Automatic	71	71				19.9	27.7
North Road AQMesh	Roadside	Indicative Automatic	100	100				22.1	26.7
Lansdowne Road, Canton AQMesh	Roadside	Indicative Automatic	100	100				25.6	30.6
Llandaff AQMA AQmesh	Roadside	Indicative Automatic	100	42				25.6	27.5

Table 6 - Annual Mean Non-Automatic NO_2 Monitoring Results 2022

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
						2018	2019	2020	2021	2022
16	317040	176060	Roadside	100.0	100.0	27.8	27.3	23.6	23.2	24.1
258	317760	175310	Roadside	100.0	100.0				29.4	29.5
58	317937	176400	Kerbside	100.0	100.0	45.8	41.2	30	30.8	31.0
81	319387	176980	Roadside	100.0	100.0	34.9	34.4	27.2	29.3	27.0
86	318452	178805	Roadside	100.0	100.0	33.4	31.7	25.8	27	28.6
96	316601	179653	Roadside	100.0	100.0	31.4	29.4	22.2	24.2	25.2
98	314805	177345	Roadside	100.0	100.0	26.1	24.6	20	20.8	22.0
99	315275	178117	Roadside	100.0	100.0	31.7	30.4	22.8	25.1	26.8
259	319201	178031	Kerbside	100.0	100.0					26.1
260	316847	176762	Roadside	100.0	100.0					20.6
261	311186	180196	Urban Background	100.0	100.0					11.5
106	316851	179520	Roadside	100.0	100.0	27.8	28.3	24.5	23.7	24.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
112	316613	175910	Roadside	92.1	92.1	26.7	25.8	20.7	23.1	22.9
115	316604	176641	Roadside	100.0	100.0	30.0	30.6	25.3	25.6	27.5
117	314458	176735	Roadside	90.4	90.4	**40.0**	36.8	30.7	36.0	33.7
126	317946	176387	Roadside	92.1	92.1	35.1	33.3	22.3	24.0	25.3
128	317540	175979	Roadside	100.0	100.0	28.3	29.8	25.0	25.0	27.2
131	319292	176932	Roadside	100.0	100.0	38.2	35.7	28.8	26.7	26.0
143	318009	176337	Roadside	92.3	92.3	37.3	35.6	23.5	25.7	25.7
144	318046	176307	Roadside	92.6	92.6	34.3	33.9	25	26.4	27.9
147	317636	175161	Roadside	100.0	100.0	29.3	26.9	20.5	23.8	24.3
148	317695	175389	Roadside	100.0	100.0	26.6	25.6	21.3	23.9	24.0
149	317764	175174	Roadside	100.0	100.0	31.3	30.1	26.8	25.9	27.1
156	317997	177412	Roadside	100.0	100.0	26.8	24.8	17.4	20.1	21.9
157	316605	179703	Roadside	100.0	100.0	25.1	23.6	19.3	19.4	19.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
158	318093	177716	Roadside	100.0	100.0	26.2	24.2	17.6	21	22.4
159	320709	177918	Roadside	100.0	100.0	35.6	32.2	26.4	27.4	28.7
166	315950	176424	Roadside	100.0	100.0	30.6	31.4	26.3	26.7	27.1
168	314856	176929	Roadside	100.0	100.0	26	24.7	21.1	22.7	23.6
174	317508	177868	Kerbside	100.0	100.0	28.2	26.8	17.7	20	23.2
179	318627	176039	Roadside	84.9	84.9	43	33.1	32.4	37.6	31.7
183	318765	176623	Kerbside	100.0	100.0	31.1	30.9	23.5	23.7	25.9
184	318335	176074	Roadside	82.5	82.5	39.9	40.5	28.3	27.5	28.3
186	318044	176449	Roadside	66.0	66.0	45.8	42.7	23.1	24.5	31.6
187	317944	176436	Roadside	57.5	57.5	50.8	43.9	25.7	26.1	31.5
188	318229	176154	Roadside	90.4	90.4	52.4	43.7	32.5	26.8	28.5
191	318724	177776	Roadside	100.0	100.0	29.7	27.9	22.5	24.3	25.4
194	313870	176212	Roadside	100.0	100.0	22	20.4	15.8	18.4	20.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
195	320147	177523	Roadside	100.0	100.0	31.6	31.2	24.2	24.6	25.0
196	316223	177305	Roadside	100.0	100.0	24.9	25.2	19.4	22	22.6
198	319348	176958	Roadside	100.0	100.0	35.1	33.5	25.7	28.7	28.3
199	319599	177174	Roadside	100.0	100.0	23.9	25	20.7	20.1	20.1
200	317038	179073	Roadside	100.0	100.0	33.4	31.1	27.4	27.4	27.6
201	317547	176411	Roadside	84.4	84.4	30.3	28.9	22.1	24	27.0
202	317604	176053	Roadside	84.7	84.7	27.8	27.6	23.3	24.5	26.3
203	318255	178533	Roadside	100.0	100.0	21.6	20.6	17.2	17.1	17.6
204	317487	176303	Roadside	100.0	100.0	23.3	22.1	18.7	20.1	20.9
207	314769	177343	Roadside	100.0	100.0	21.7	20.6	16.7	18.3	18.6
208	315152	178245	Roadside	100.0	100.0	25.4	24.9	18.9	20.5	21.5
209	317200	178537	Roadside	100.0	100.0	22.7	22.3	15.2	16.6	19.1
210	316692	181088	Roadside	100.0	100.0	21.7	20.4	16.6	17.5	18.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
211	320247	178903	Roadside	100.0	100.0	21.7	21.8	18.1	19.7	18.4
212	315197	178221	Kerbside	100.0	100.0	47.1	41.3	33.4	37.4	39.3
214	315254	178153	Roadside	100.0	100.0		32.3	24.8	25.4	27.3
218	314471	176770	Roadside	100.0	100.0		35.5	28.2	31.6	31.4
254	317529	176340	Roadside	92.3	92.3				27.7	30.2
220	318919	176676	Kerbside	80.8	80.8		38.4	27.9	30.4	31.3
221	318530	177468	Kerbside	100.0	100.0			30.4	26.9	33.8
190	319056	177343	Roadside	100.0	100.0	23.2	23.4	20.7	20.1	21.1
224	315714	177740	Roadside	100.0	100.0		23.1	18.5	18.8	18.5
243	315712	178789	Kerbside	92.1	92.1			25.7	28.2	31.1
244	314910	176584	Roadside	92.3	92.3			18.2	18	18.7
245	321006	179081	Urban Background	100.0	100.0			14.3	15	15.4
263	319715	174791	Roadside	67.4	67.4					14.4

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
247	321709	176022	Roadside	100.0	100.0				11.4	12.7
262	316593	176728	Kerbside	42.5	42.5					15.3
249	318201	180367	Roadside	100.0	100.0			17.3	16.5	16.2
250	313244	176769	Roadside	82.2	82.2			26.7	28.4	26.3
251	313244	180367	Kerbside	100.0	100.0			13.5	14.9	15.6
255, 256, 257	314505	176769	Roadside	90.4	90.4				25.8	33.3
192	314505	176769	Roadside	100.0	100.0	39.7	38.6	30.8	31.7	33.3
TRO-001	315621	180320	Kerbside	76.4	76.4			10.9	11.9	12.6
TRO-002	315589	180316	Roadside	100.0	100.0			12.9	13.4	13.6
TRO-003	315548	180315	Kerbside	84.9	84.9			15.6	16	15.0
TRO-004	315620	180360	Roadside	90.4	90.4			9.8	11.9	12.0
TRO-005	315608	180151	Roadside	100.0	100.0			11.5	11.6	12.2
TRO-006	315497	180140	Roadside	77.3	77.3			17	17	19.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
TRO-007	313878	178319	Roadside	100.0	100.0			9.4	10.4	11.0
TRO-008	313894	178331	Roadside	100.0	100.0			8.4	8.6	8.6
TRO-0099	314022	178334	Roadside	100.0	100.0			9.3	9.2	9.8
TRO-010	315274	177784	Kerbside	92.3	92.3			10.5	10.6	12.5
TRO-011	315279	177750	Kerbside	100.0	100.0			12.2	10.9	12.2
TRO-012	315209	177668	Roadside	100.0	100.0			10.6	10.4	11.2
TRO-013	312803	175519	Kerbside	100.0	100.0			9.9	9	9.3
TRO-014	312809	175496	Roadside	67.4	67.4			14.1	13.7	10.3
TRO-015	312734	175411	Roadside	92.1	92.1			11.5	11.8	10.4
TRO-016	315811	176555	Roadside	100.0	100.0			16.9	15.9	16.1
TRO-017	315801	176492	Roadside	92.3	92.3			21.1	16.1	25.1
TRO-018	315801	176492	Roadside	92.3	92.3				23.3	17.1
TRO-019	319027	175493	Kerbside	100.0	100.0				14.5	14.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
TR0-020	318910	175456	Kerbside	55.6	55.6				14.7	15.3
TRO-021	318945	175546	Kerbside	100.0	100.0				17.2	16.5
TRO-022	319268	176804	Roadside	40.8	40.8				19.3	19.9
TRO-023	319228	176777	Kerbside	77.0	77.0				19.5	19.2
TRO-024	319283	176827	Kerbside	77.3	77.3				29.6	32.4
TRO-025	319394	177096	Roadside	100.0	100.0				15.3	15.5
TRO-026	318378	177086	Kerbside	100.0	100.0				14.8	16.0
TRO-027	319327	177080	Kerbside	100.0	100.0				16.4	18.5
TRO-028	317982	178180	Roadside	90.1	90.1				13.4	16.4
TRO-029	317987	178156	Kerbside	82.5	82.5				14.4	14.6
TRO-030	317855	178921	Kerbside	100.0	100.0				13.8	15.1
TRO-031	319031	179949	Roadside	92.3	92.3				10.5	11.2
TRO-032	319012	180050	Kerbside	92.3	92.3				10	10.2

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
TRO-033	318898	180012	Kerbside	92.1	92.1				11.1	11.1
TRO-034	321817	180406	Roadside	92.9	92.9				10.3	9.4
TRO-035	321847	180402	Kerbside	100.0	100.0				11.1	11.3
TRO-036	321834	180331	Kerbside	57.5	57.5				11.3	10.6
TRO-037	321705	181427	Roadside	22.5	22.5				4.1	10.6
TRO-038	321738	181398	Kerbside	100.0	100.0				11.8	11.8
TRO-039	321834	181282	Kerbside	100.0	100.0				13.4	13.8
TRO-040	324489	180953	Kerbside	84.7	84.7				13.2	12.2
TRO-041	324519	180949	Kerbside	90.4	90.4				11.5	10.8
TRO-042	324529	180975	Kerbside	100.0	100.0				13.4	12.2
TRO-043	307904	181561	Kerbside	100.0	100.0				7.9	8.6
TRO-044	307896	181569	Kerbside	100.0	100.0				8	8.5
TRO-045	307967	181585	Kerbside	100.0	100.0				10.7	10.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
						2018	2019	2020	2021	2022
TRO-046	315760	181322	Roadside	75.0	24.9					10.8
TRO-047	315746	181209	Roadside	100.0	34.8					9.8
TRO-048	315825	181374	Roadside	100.0	34.8					13.0
TRO-049	315955	175898	Roadside	100.0	34.8					11.1
TRO-050	316032	175869	Roadside	75.0	27.4					11.5
TRO-051	316150	175887	Roadside	100.0	34.8					11.4
TRO-052	313000	178061	Roadside	50.0	15.3					-
TRO-053	312944	178097	Roadside	50.0	17.0					-
TRO-054	312883	178154	Roadside	50.0	17.0					-
GW-013	316720	179799	Kerbside	100.0	100.0					20.5
GW-014	316744	179810	Kerbside	100.0	100.0					21.0
GW-015	316736	179783	Roadside	100.0	100.0					16.9
GW-016	316767	179801	Roadside	100.0	100.0					17.9

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	NO_2 Annual Mean Concentration ($\mu g/m^3$)				
						2018	2019	2020	2021	2022
GW-017	317602	178703	Kerbside	100.0	77.0					16.5
GW-018	317561	178746	Kerbside	100.0	77.0					18.9
GW-019	317564	178735	Roadside	76.0	59.5					17.4
GW-020	317590	178708	Roadside	100.0	77.0					18.7

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.**

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.

(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 8 - Annual Mean NO_2 Automatic Monitoring Trends µg/m³

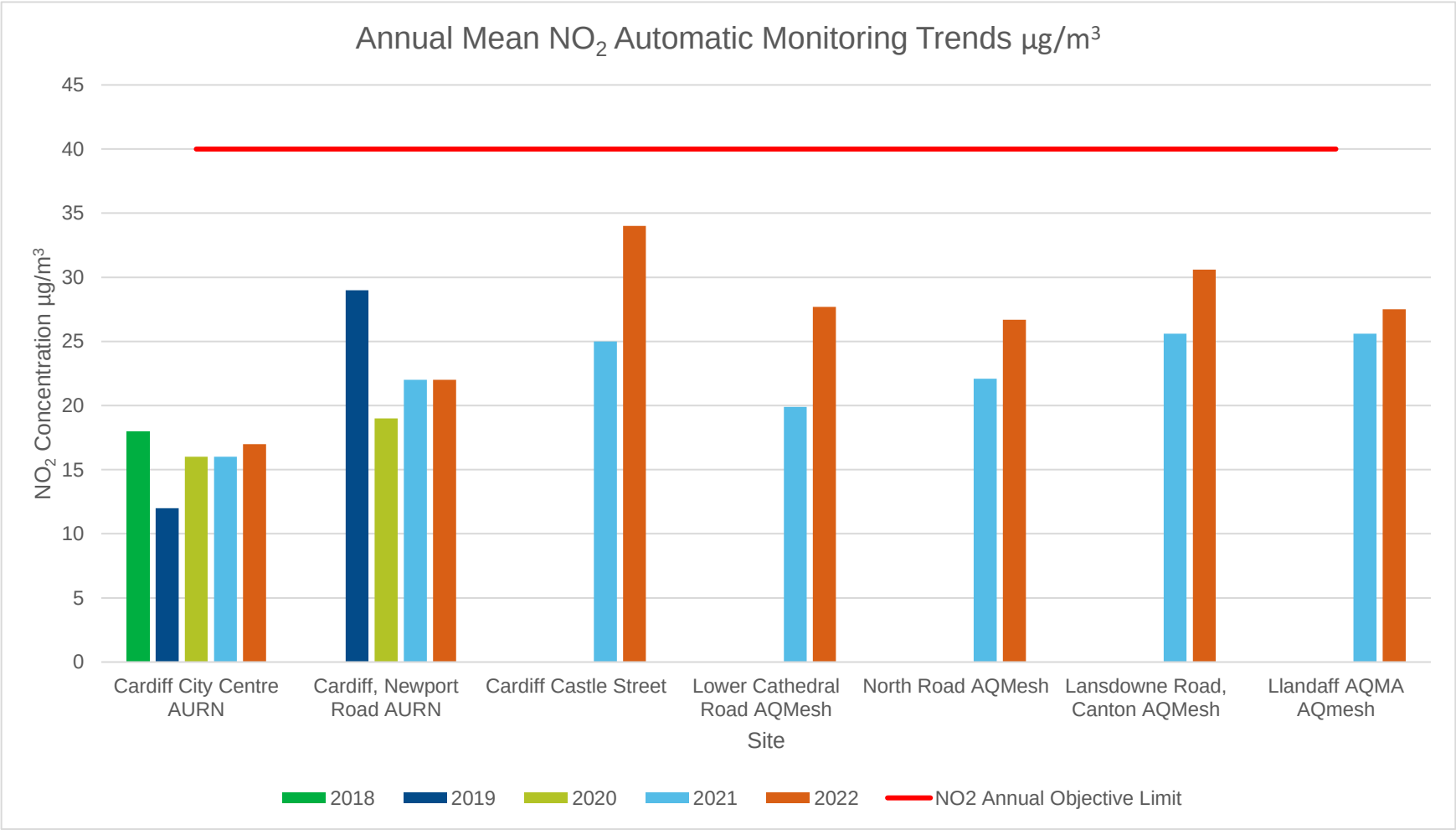


Figure 8 displays trends in NO_2 concentrations from automatic monitors in Cardiff. All locations display compliance with the annual mean NO_2 Air Quality Standard (40µg/m³) at all locations in since 2018. The is a slight increasing trend in NO_2 concentrations since 2020.

Figure 9 - City Centre AQMA Annual Mean NO_2 Trends µg/m³

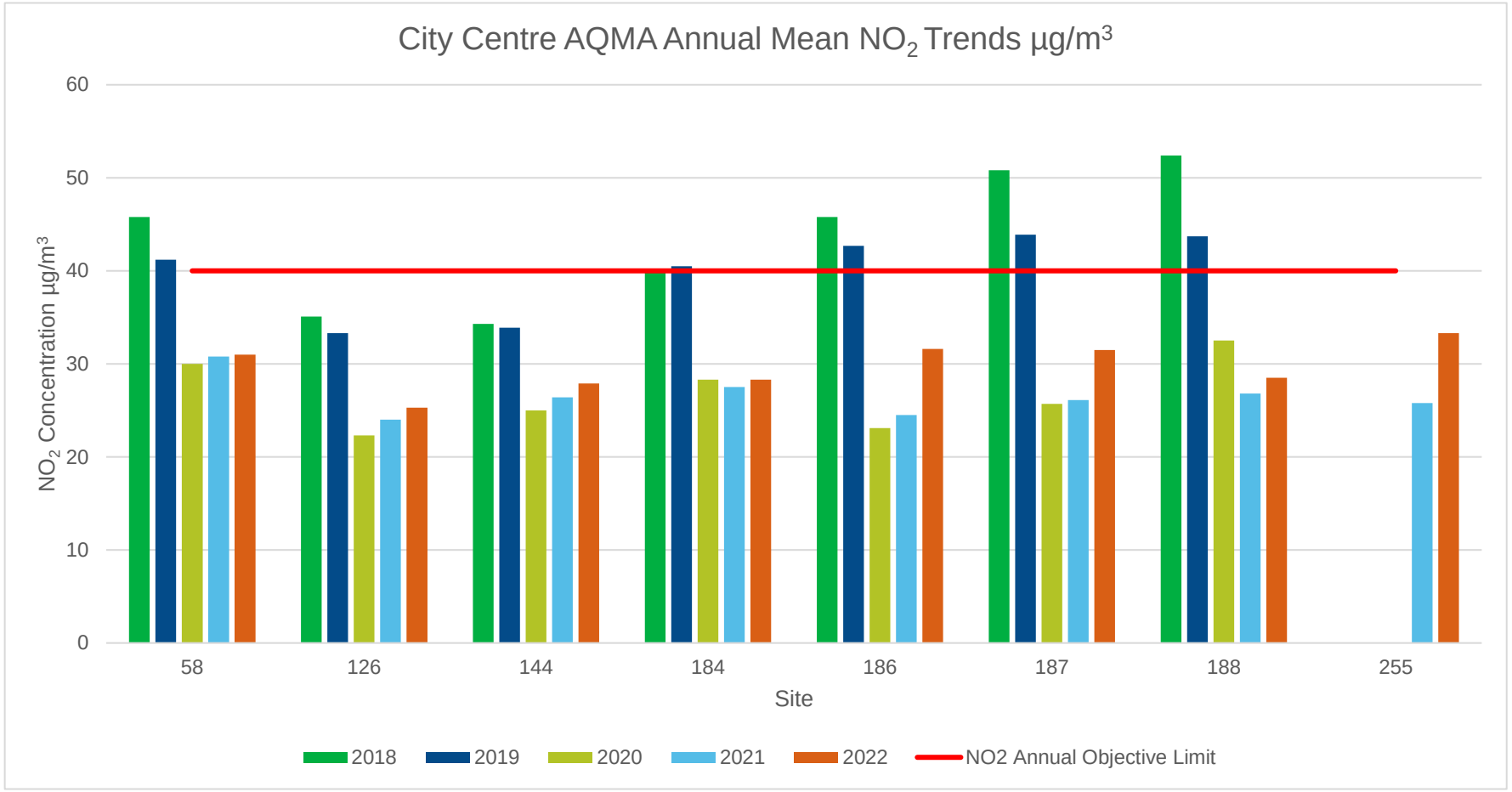


Figure 9 displays trends in NO_2 concentrations from non-automatic sites in Cardiff AQMA. All locations display compliance with the annual mean NO_2 Air Quality Standard (40µg/m³) at all locations in 2022. Improvements in NO_2 concentrations are evident when compared to 2019. The is a slight increasing trend in NO_2 concentrations since 2020.

Figure 10 – Stephenson Court AQMA Annual Mean NO^2 Trends $\mu g/m^3$

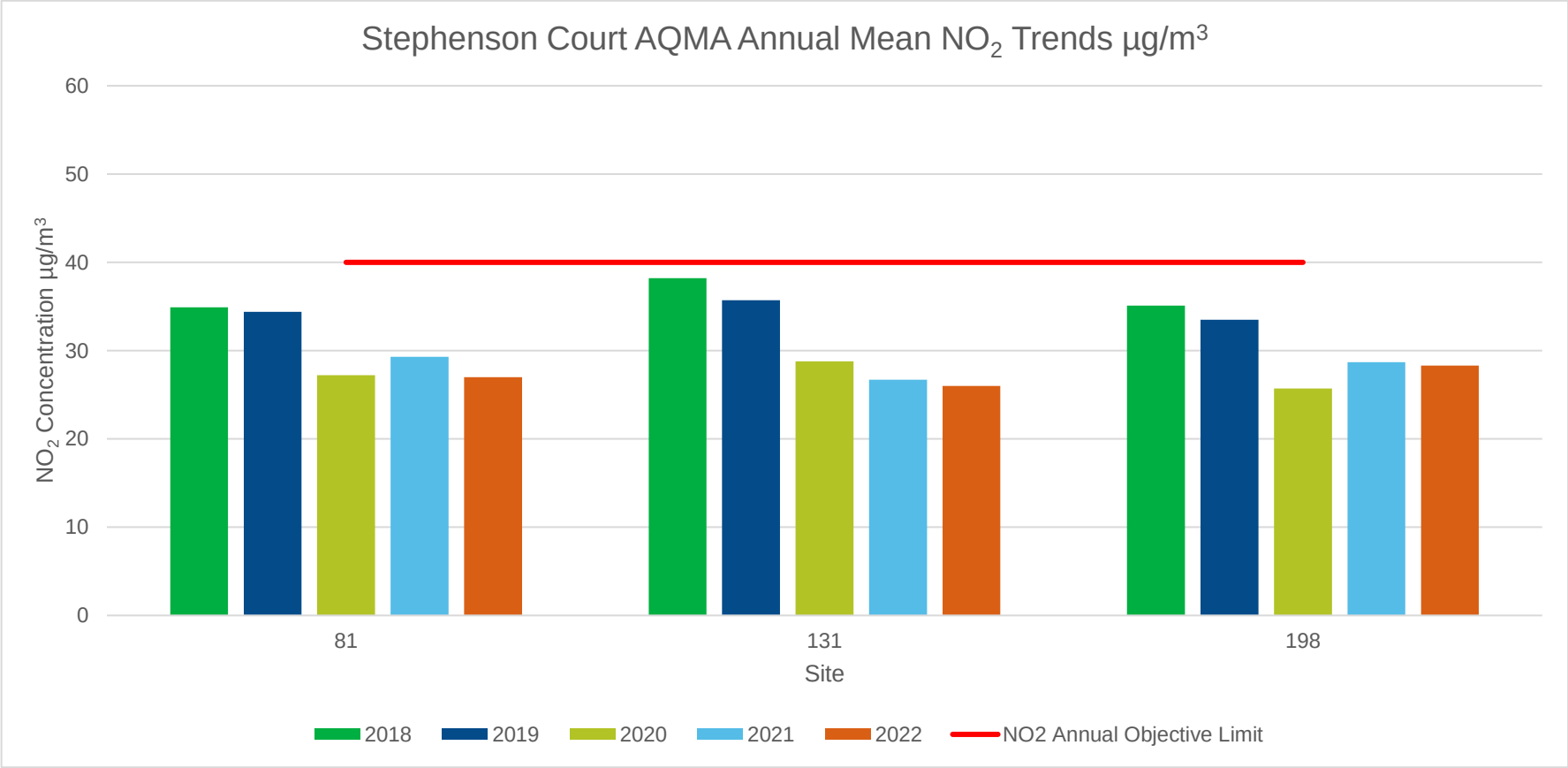


Figure 10 displays trends in NO_2 concentrations from non-automatic sites in Stephenson Court AQMA. All locations display compliance with the annual mean NO_2 Air Quality Standard ($40\mu g/m^3$) since 2018, and a stable trend in NO_2 concentrations since 2020.

Figure 11 - Llandaff AQMA Annual Mean NO_2 Trends µg/m³

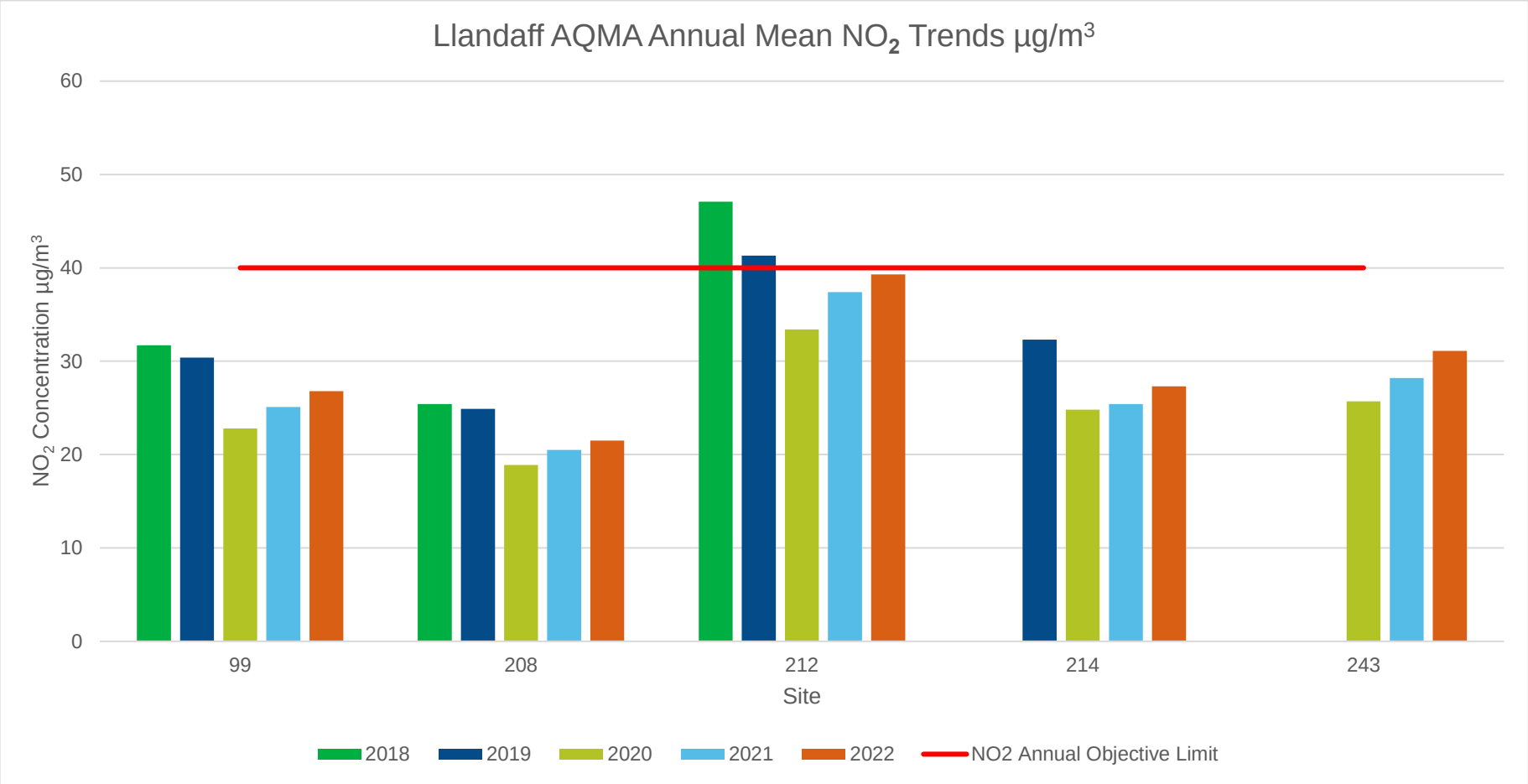


Figure 11 displays trends in NO_2 concentrations from non-automatic sites in Llandaff AQMA. In 2022 all locations display compliance with the annual mean NO_2 Air Quality Standard (40µg/m³). However, Site 212 is close to exceeding the annual mean NO_2 Air Quality Standard (40µg/m³). The is a slight increasing trend in NO_2 concentrations since 2020.

Figure 12 - Ely Bridge AQMA Annual Mean NO_2 Trends µg/m³

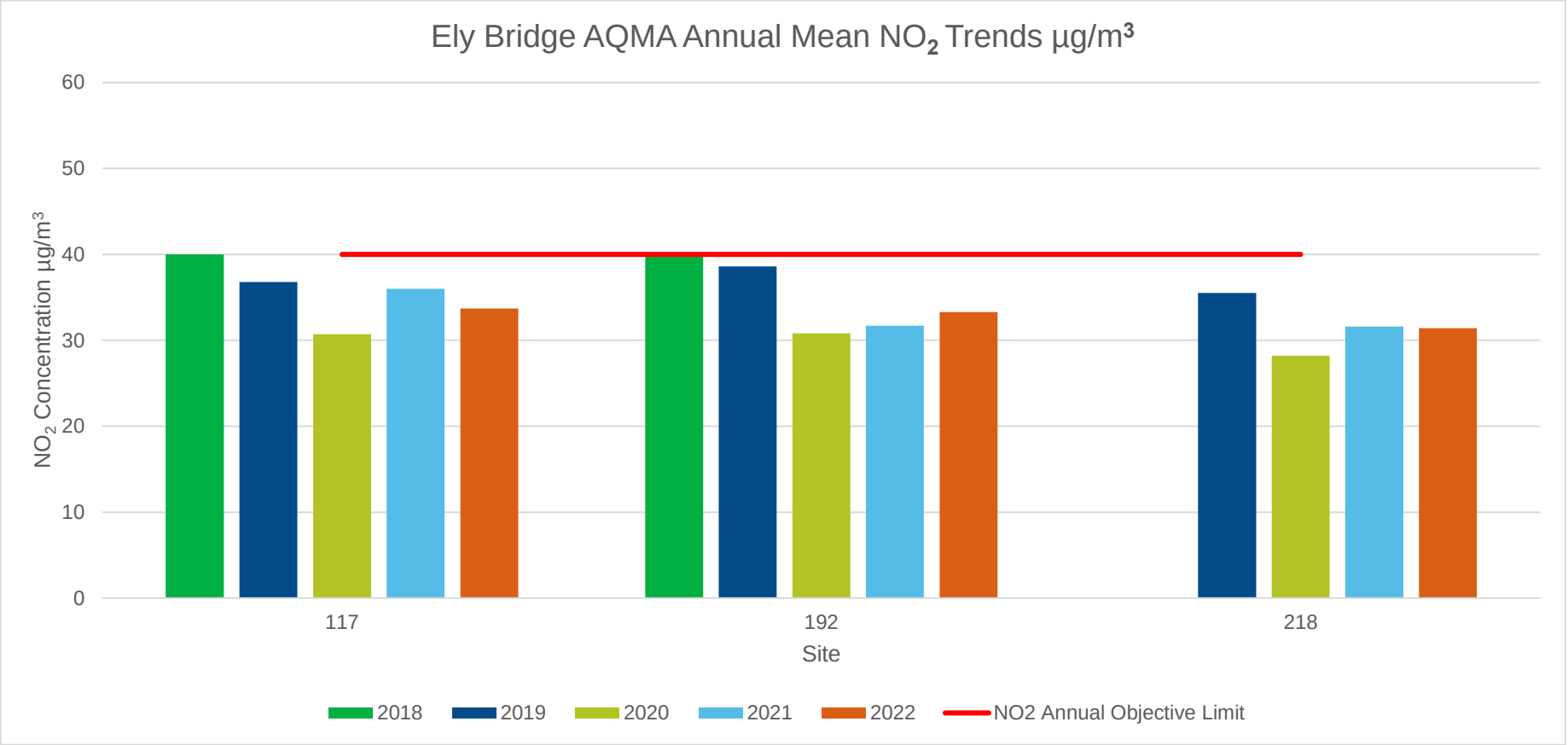


Figure 12 displays trends in NO_2 concentrations from non-automatic sites in Ely Bridge AQMA. All locations display compliance with the annual mean NO_2 Air Quality Standard (40µg/m³) since 2018, and a stable trend in NO_2 concentrations since 2020.

Table 7 - 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 2022 (%) (2)	2018	2019	2020	2021	2022
Cardiff City Centre AURN	Urban background	Automatic	88	88	0	0	0	0	0
Cardiff, Newport Road AURN	Roadside	Automatic	97	97	0	0	0	0	0
Cardiff Castle Street	Roadside	Automatic	100	100				0	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 8 - Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2022 (%) (2)	2018	2019	2020	2021	2022
Cardiff City Centre AURN	Urban background	Automatic	88	88	17	23	14	13	16
Cardiff, Newport Road AURN	Roadside	Automatic	97	97		19	17	17	18
Cardiff Castle Street	Roadside	Automatic	100	100				12	20
Lower Cathedral Road AQMesh	Roadside	Indicative Automatic	71	71				11.1	12.7
North Road AQMesh	Roadside	Indicative Automatic	100	100				9.5	9.2
Lansdowne Road, Canton AQMesh	Roadside	Indicative Automatic	100	100				16.6	17.2
Llandaff AQMA AQmesh	Roadside	Indicative Automatic	100	42				9.3	13.9

Notes:

Exceedances of the PM_{10} annual mean objective of $40\mu g/m^3$ 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%).

Figure 13 - Trends in Automatic Annual Mean PM_{10} Concentrations

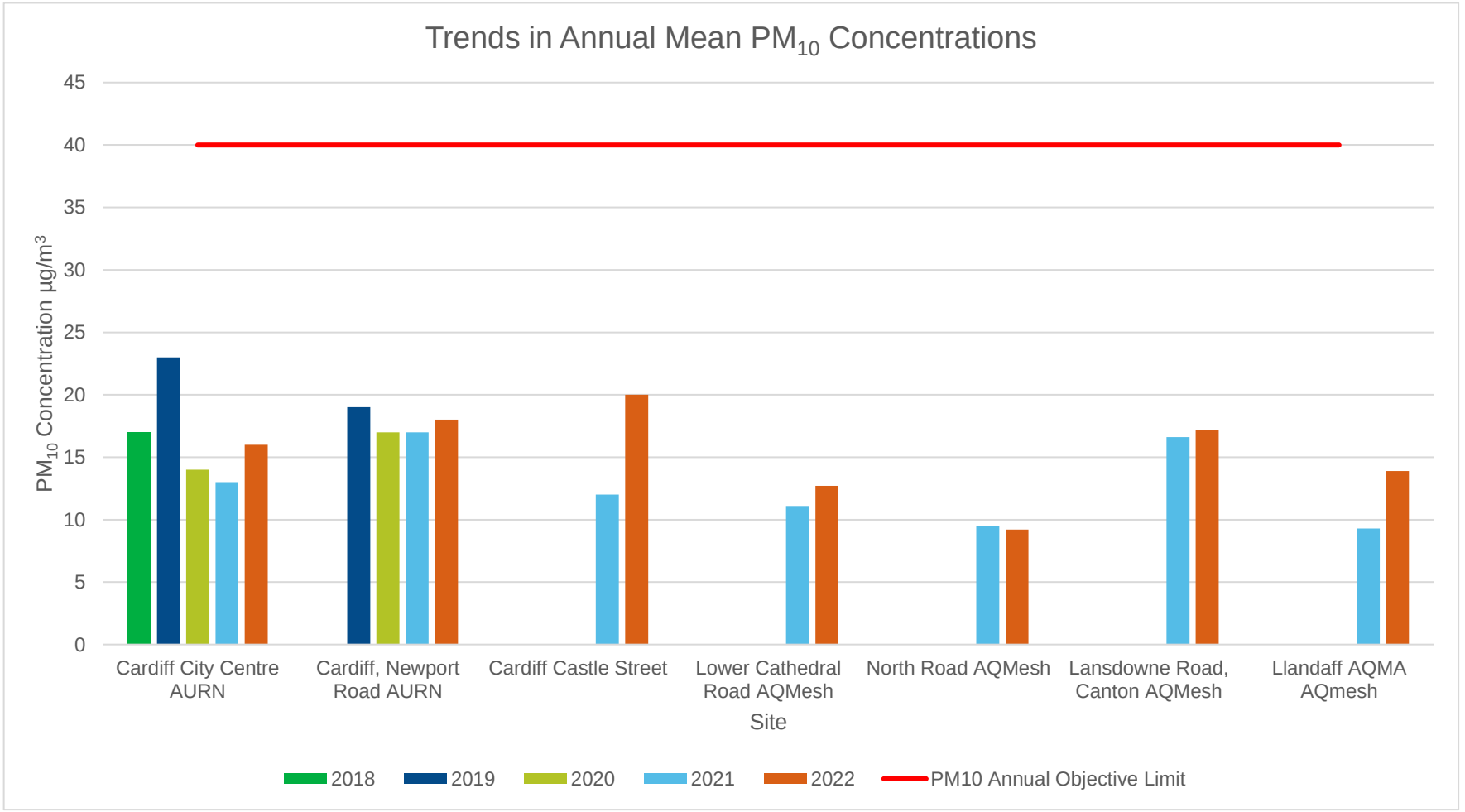


Figure 13 displays trends in PM_{10} concentrations from automatic sites in Cardiff. All locations display compliance with the annual mean NO_2 Air Quality Standard (40µg/m³) since 2018.

Table 9 - 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 2022 (%) (2)	2019	2020	2021	2022
Cardiff City Centre AURN	Urban background	Automatic	88	88	0	0	0	0
Cardiff, Newport Road AURN	Roadside	Automatic	97	97	0	0	0	0
Cardiff Castle Street	Roadside	Automatic	100	100			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 10 - $PM_{2.5}$ 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
Cardiff City Centre AURN	Urban background	Automatic	88	88	12	7	9	11
Cardiff Castle Street	Roadside	Automatic	100	100			9	10
Lower Cathedral Road AQMesh	Roadside	Indicative Automatic	71	71			8.5	7.6
North Road AQMesh	Roadside	Indicative Automatic	100	100			7.8	7.1
Lansdowne Road, Canton AQMesh	Roadside	Indicative Automatic	100	100			11.4	11
Llandaff AQMA AQmesh	Roadside	Indicative Automatic	100	42				8.4

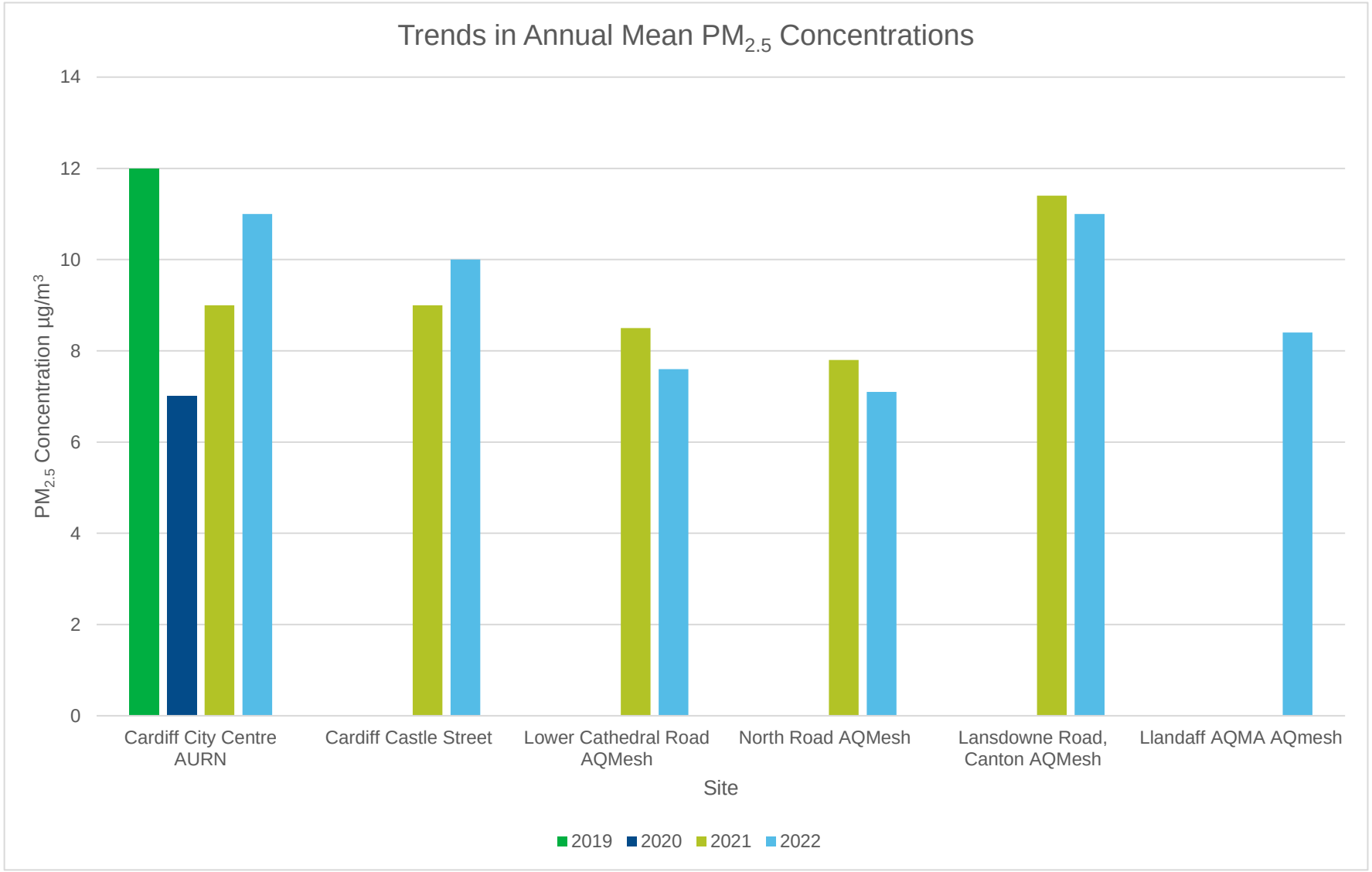
Notes:

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%).

Figure 14 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Comparison of 2022 Monitoring Results with Previous Years and the Air Quality Objectives

During 2022, monitoring was carried out for nitrogen dioxide (NO_2), particulate matter (PM_{10}), sulphur dioxide (SO_2), carbon monoxide (CO) and ozone (O3).

2.1.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide was measured during 2022 at three sites equipped with an automatic NOx analyser and by a network of 135 diffusion tubes. NO_2 was also measured by four indicative automatic monitors in various locations.

In order to ratify the 2022 diffusion tube dataset, a local bias adjustment factor of 0.79 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 2022. Results from most monitoring sites in 2022 show slightly increased NO_2 concentrations compared to 2021, but still maintain a reduction compared to 2019 pre-Covid.

2.1.4 Particulate Matter (PM_{10})

As described in previous sections, monitoring of PM_{10} has 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 four indicative automatic monitors. The results of the monitoring indicate that recorded PM_{10} concentrations at these monitoring stations are compliant with both the annual mean (40µg/m^3) and 24-hour mean (>50 µg/m3 not to be exceeded more than 18 times per year) Air Quality Objectives set for PM_{10}.

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/m3.

2.1.6 Other Pollutants Monitored

Sulphur Dioxide (SO_2)

Sulphur dioxide was measured at the Cardiff Centre AURN automatic monitoring site during 2022. 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 2022, 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/m3 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 2022. There were no exceedances of the Air Quality Strategy Objective for (CO) 8-hour running mean > 10 mg/m3 during this period.

Summary of Compliance with AQS Objectives as of 2022

SRS on behalf of Cardiff Council has examined the results from monitoring in the Cardiff. 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/m³), therefore further investigation and assessment of the local issues in the AQMA is required 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 is required.

3 New Local Developments

The 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 or 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 now 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/

Road Traffic Sources (and Other Transport)

Cardiff Council has 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 2022 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 2022 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 2018 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, 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

Local / Regional Air Quality Strategy

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.

Air Quality Planning Policies

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.

4.1.1 Replacement LDP

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 2022 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). However, one monitoring location within Llandaff AQMA, site 212, displays an annual result of 39.3µg/m^3. Therefore, further mitigation measures will need to be assessed to improve air quality concentrations at this location.

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 2022.

Conclusions relating to New Local Developments

SRS on behalf of Cardiff Council will continue to monitor data gathered by the developer's air quality consultants for Velindre Construction Access 20/01110/MJR, as part of planning condition 11.

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.

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. Implementation of the updated Realtime Monitoring Network (completed).
4. Continue to drive Air Quality as a major aspect to be considered during any planning applications, most importantly Cardiff Central Development;
5. Submit an Annual Progress Report (APR) in 2024; and
6. Update the existing Clean Air Strategy and Action Plan to represent most recent actions in 2023/2024.

References

Department for Environment, Food and Rural Affairs, 2003. Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III Local Air Quality Management, Technical Guidance LAQM.TG(22). https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

Welsh Government, Local Air Quality Management in Wales, Policy Guidance https://www.gov.wales/sites/default/files/publications/2019-04/local-air-quality-management-in-wales.pdf

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

Cardiff Council Clean Air Plan 2019 https://cardiff.moderngov.co.uk/documents/s28264/Cabinet%2021%20March%202019%20Clean%20Air%20App%201%20App%20C.pdf

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 11 - Full Monthly Diffusion Tube Results for 2022 (µg/m^3)

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
16	44.8	28.0	36.8	28.0	26.2	22.9	23.9	23.8	27.1	33.3	33.4	38.0	30.5	24.1	-
258	52.5	34.8	41.4	38.3	31.4	32.3	36.0	36.6	38.5	33.6	25.8	46.6	37.3	29.5	-
58	52.8	38.2	44.8	34.8	38.0	34.0	36.7	38.4	37.2	37.9	35.9	41.7	39.2	31.0	-
81	50.6	35.1	38.0	34.8	30.2	28.0	29.6	29.3	37.2	30.2	29.4	37.8	34.2	27.0	-
86	49.6	41.9	36.0	32.5	33.0	31.8	32.3	28.7	33.3	34.7	39.8	40.1	36.1	28.6	-
96	51.7	27.2	42.0	36.2	25.3	23.8	26.3	28.3	29.8	28.3	27.8	36.6	31.9	25.2	-
98	43.7	24.7	36.7	27.9	23.7	21.2	23.0	24.0	24.6	27.2	23.8	33.0	27.8	22.0	-
99	50.5	22.2	50.9	36.8	24.3	22.9	29.0	35.7	34.9	30.6	31.1	38.9	34.0	26.8	-
259	52.5	26.6	42.7	33.6	24.1	24.1	26.6	30.5	29.2	31.9	34.1	40.2	33.0	26.1	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
260	44.4	27.0	29.6	23.6	19.6	18.1	22.1	17.9	22.6	27.3	25.2	35.3	26.1	20.6	-
261	26.8	13.3	17.7	14.6	10.3	10.5	13.5	12.2	12.2	11.9	7.9	23.1	14.5	11.5	-
106	46.7	30.5	33.5	27.0	24.5	25.0	27.1	21.4	26.9	32.7	39.1	37.0	31.0	24.5	-
112	44.8	22.9	37.6	30.6	22.2	20.5	26.2	27.9	28.7	25.1		32.2	29.0	22.9	-
115	52.5	33.7	36.4	31.0	29.8	28.6	34.2	29.4	30.6	33.9	39.0	38.2	34.8	27.5	-
117	53.4	32.4	61.1	46.6		33.5	44.1	47.0	41.6	40.9	28.5	40.4	42.7	33.7	-
126	43.3		36.8	30.3	30.6	25.4	31.2	27.9	29.6	29.4	32.4	35.5	32.0	25.3	-
128	46.7	34.2	37.5	31.1	27.8	26.0	33.9	27.9	27.9	37.2	42.6	40.6	34.5	27.2	-
131	51.2	32.7	35.4	32.9	29.5	26.0	30.0	29.4	29.5	29.5	32.7	36.5	32.9	26.0	-
143	44.6	30.4	37.3	31.7	31.4	28.6		28.0	31.8	32.0	26.7	35.4	32.5	25.7	-
144	43.8	34.7	32.5	35.8	37.5	31.3	32.0	31.9		35.0	37.0	37.6	35.4	27.9	-
147	50.1	21.0	42.7	30.3	22.6	21.2	24.5	31.3	28.4	27.9	32.0	36.7	30.7	24.3	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
148	47.4	20.1	39.2	34.0	22.7	21.8	25.6	30.4	31.8	27.6	29.0	34.5	30.3	24.0	-
149	51.1	33.8	35.0	33.9	30.3	27.5	30.9	28.2	33.1	33.1	32.2	42.1	34.3	27.1	-
156	43.1	19.7	40.9	31.3	19.3	17.4	20.5	26.2	25.9	25.7	27.3	35.8	27.8	21.9	-
157	43.2	26.7	27.9	19.7	20.1	19.6	19.8	17.4	21.4	26.0	20.5	31.1	24.5	19.3	-
158	51.2	28.0	38.5	29.3	18.2	18.0	19.8	20.4	24.1	27.4	29.4	36.3	28.4	22.4	-
159	51.4	31.0	44.7	34.6	29.3	28.5	32.4	34.8	32.9	37.6	37.9	41.1	36.4	28.7	-
166	47.8	36.7	38.1	32.0	30.9	29.8	31.3	28.0	29.5	32.4	35.4	39.4	34.3	27.1	-
168	45.9	24.6	37.7	29.2	23.9	22.3	25.1	30.8	28.9	24.7	32.0	33.0	29.8	23.6	-
174	44.8	21.3	41.1	30.0	19.3	19.5	24.2	28.2	29.5	30.1	26.4	37.5	29.3	23.2	-
179		39.5	48.8	48.6	48.6	32.2	33.8	14.0	43.4	44.5		47.5	40.1	31.7	-
183	45.8	20.7	46.5	35.3	25.4	23.7	27.9	30.7	31.0	31.0	35.4	39.7	32.8	25.9	-
184	51.6	32.2		35.6		24.1	30.3	37.2	34.0	36.1	39.5	37.0	35.8	28.3	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
186		33.5	46.5	37.5		31.5		35.2	37.5	39.9	47.8		38.7	31.6	-
187	57.9	37.2	48.8	38.6	37.7				39.7		50.2		44.3	31.5	-
188	55.3	29.0	46.7	34.6	32.4	28.6	32.1	34.7	32.4	35.9	35.5		36.1	28.5	-
191	51.2	33.2	37.5	27.7	27.2	24.2	26.8	23.7	30.5	34.7	30.2	39.3	32.2	25.4	-
194	41.2	19.9	33.5	26.4	19.0	18.1	20.3	25.9	22.8	20.0	26.4	33.4	25.6	20.2	-
195	45.1	26.5	39.0	30.2	26.3	25.0	27.6	26.7	26.7	32.5	35.8	39.0	31.7	25.0	-
196	43.1	23.8	36.4	28.6	21.3	20.6	23.3	27.4	27.4	29.6	29.0	32.3	28.6	22.6	-
198	54.2	38.6	37.8	35.2	34.3	30.5	30.8	32.4	33.0	33.8	35.5	33.4	35.8	28.3	-
199	43.4	25.4	29.9	24.8	20.7	18.5	21.7	19.4	21.5	23.9	28.6	27.6	25.5	20.1	-
200	55.6	31.6	40.2	37.6	28.4	26.4	27.5	34.5	33.1	30.7	33.4	40.8	35.0	27.6	-
201	51.6	27.0	45.4	32.4	25.2	24.5		34.5	33.3	33.6		34.5	34.2	27.0	-
202	43.1	25.2	42.2	32.4	28.4	26.1			30.3	34.0	33.7	37.9	33.3	26.3	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
203	39.3	18.6	30.0	21.3	16.6	14.2	15.9	16.6	17.8	22.1	25.1	29.3	22.2	17.6	-
204	42.7	21.4	35.9	25.6	19.1	17.4	18.7	24.8	24.8	26.5	25.7	35.6	26.5	20.9	-
207	37.7	18.8	32.1	23.6	17.7	17.2	19.1	19.7	20.0	21.4	25.9	28.8	23.5	18.6	-
208	40.6	29.3	28.9	24.4	22.3	21.0	23.3	20.0	23.8	29.1	32.1	32.0	27.2	21.5	-
209	41.4	18.1	30.5	22.6	17.0	15.7	18.0	16.1	23.5	25.2	31.5	29.9	24.1	19.1	-
210	38.6	22.0	28.0	22.0	17.5	16.2	17.3	17.9	20.0	19.6	26.0	31.4	23.0	18.2	-
211	37.5	21.7	28.3	22.7	18.3	18.2	17.6	18.2	21.2	26.1	22.5	27.3	23.3	18.4	-
212	65.4	38.4	65.3	50.2	39.4	37.2	42.3	51.9	50.1	44.4	60.6	51.4	49.7	39.3	-
214	46.3	30.5	45.5	31.3	30.2	29.2	31.5	33.1	32.5	31.8	33.7	39.1	34.6	27.3	-
218	54.4	39.7	43.0	42.3	37.0	32.8	33.9	37.8	38.7	35.0	39.1	43.4	39.8	31.4	-
254	48.1	36.6	47.4	38.9	40.2	32.2		31.8	31.9	33.9	35.0	44.2	38.2	30.2	-
220	51.4	34.0	55.8			28.9	32.7	35.9	34.6	41.4	37.0	45.1	39.7	31.3	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
221	57.3	43.9	46.7	40.5	37.8	36.3	39.8	39.6	41.7	38.6	45.7	45.5	42.8	33.8	-
190	47.2	27.6	30.2	24.7	21.5	19.7	23.3	20.3	24.5	27.3	27.3	27.2	26.7	21.1	-
224	38.1	19.9	31.3	24.5	18.1	16.2	19.5	22.8	21.6	21.0	15.3	32.7	23.4	18.5	-
243	60.6	39.6		31.6	38.6	35.1	32.8	32.5	36.8	44.1	39.2	42.2	39.4	31.1	-
244	38.4	23.9	23.1	21.4	19.9		19.5	19.1	21.4	21.0	23.5	29.0	23.7	18.7	-
245	32.6	20.0	22.4	16.3	15.3	13.9	14.3	14.0	19.8	20.8	19.3	25.3	19.5	15.4	-
263					16.2	15.7	17.4	17.6	21.6	17.1	21.6	27.7	19.4	14.4	-
247	29.0	12.9	21.2	14.3	10.6	9.3	11.4	17.9	12.9	13.3	17.0	22.7	16.0	12.7	-
262								18.5	19.6	26.3	27.0	26.3	23.5	15.3	-
249	37.5	20.1	27.0	19.0	15.1	13.8	13.7	14.6	15.9	17.5	21.7	29.6	20.5	16.2	-
250	46.4	29.2	44.8	33.6	31.7	27.7	25.4	18.5	30.5			44.5	33.2	26.3	-
251	33.4	14.6	29.1	19.7	14.4	12.6	15.4	14.6	16.6	17.1	22.6	26.8	19.7	15.6	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
255	53.7	37.7	47.9	41.0	40.8	36.4	39.4	31.7	41.5	46.9	52.6		-	-	-
256	52.4	39.2	49.9	41.4	41.8	36.4	36.9	16.2	40.3	44.0	45.9		-	-	-
257	54.3	41.2	50.8	42.3	41.1	38.0	40.0	40.4	39.6	49.1	40.0		42.1	33.3	-
192	55.8	35.4	41.9	44.2	37.5	35.1	38.7	43.4	41.8	42.6	39.8	49.9	42.2	33.3	-
TRO-001	28.2			14.2	10.6	10.2		9.3	12.2	14.9	17.6	25.9	15.9	12.6	-
TRO-002	31.0	17.2	23.6	15.3	10.3	10.9	11.4	12.2	12.8	15.6	19.7	26.7	17.2	13.6	-
TRO-003		20.0	24.4	19.9	13.6	13.1	14.4	15.6	18.1	20.3		30.9	19.0	15.0	-
TRO-004	29.5	14.7	22.6	14.6	9.3	9.1	10.0	10.9	11.8	13.1	21.5		15.2	12.0	-
TRO-005	28.4	14.7	20.1	13.0	9.7	9.2	9.8	10.1	9.9	13.6	21.9	24.4	15.4	12.2	-
TRO-006	36.9	20.0	30.5	19.6	14.2	14.9				22.3	27.8	33.3	24.4	19.3	-
TRO-007	24.2	13.1	19.4	11.2	8.2	8.2	9.4	9.5	9.4	12.2	19.9	21.8	13.9	11.0	-
TRO-008	20.7	10.7	14.9	8.8	6.3	7.0	7.4	8.3	7.5	9.8	11.9	16.6	10.8	8.6	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
TRO-0099	23.4	11.1	17.2	11.8	7.6	7.1	8.2	8.4	8.4	11.3	16.9	17.0	12.4	9.8	-
TRO-010	27.4	15.3	20.6	12.4	8.5	9.0	8.8		10.3	15.2	20.2	26.1	15.8	12.5	-
TRO-011	28.0	15.0	21.5	12.4	9.1	8.3	9.6	9.3	10.8	15.5	20.1	25.4	15.4	12.2	-
TRO-012	25.5	12.0	19.1	12.3	8.8	7.7	9.0	9.5	9.9	13.6	18.5	23.7	14.1	11.2	-
TRO-013	17.5	10.9	19.7	11.6	8.4	7.2	8.2	8.4	9.5	8.5	11.7	19.0	11.7	9.3	-
TRO-014					11.0	9.3	10.2	10.6	12.9	12.4	19.7	24.8	13.9	10.3	-
TRO-015	25.2	14.9		10.7	10.2	9.3	10.3	12.4	12.5	11.4	5.3	22.8	13.2	10.4	-
TRO-016	34.8	18.9	21.7	19.0	13.6	13.6	15.3	16.9	16.3	19.4	26.9	28.2	20.4	16.1	-
TRO-017	46.3	33.9	34.1	27.7	27.1	26.1	26.1		25.8	31.2	35.5	36.0	31.8	25.1	-
TRO-018	36.8	21.6	28.3	18.5	13.0	12.9		17.6	16.3	20.0	26.6	26.3	21.6	17.1	-
TRO-019	35.5	17.6	22.4	20.0	12.0	11.9	14.1	13.6	15.6	16.0	16.0	25.5	18.4	14.5	-
TR0-020	34.8	20.0	23.6	17.3		12.6	15.1	15.9					19.9	15.3	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
TRO-021	39.2	20.7	26.1	19.8	14.6	13.7	15.9	17.2	18.0	18.1	19.6	27.7	20.9	16.5	-
TRO-022		26.5	32.0	25.9		16.6	18.2						23.8	19.9	-
TRO-023	36.4	24.7	28.1	22.9	17.5	16.5		17.4		23.3		32.4	24.4	19.2	-
TRO-024		40.7	46.3	42.7	32.3	33.4		42.7	39.3	39.8		51.6	41.0	32.4	-
TRO-025	36.4	21.0	27.0	18.8	13.0	13.4	14.1	12.1	14.4	18.8	18.3	27.5	19.6	15.5	-
TRO-026	35.2	22.4	27.2	19.0	13.8	12.9	14.3	13.2	14.8	19.0	20.6	30.3	20.2	16.0	-
TRO-027	37.6	24.8	32.3	28.2	16.9	13.8	16.1	15.8	15.5	20.2	26.6	33.7	23.5	18.5	-
TRO-028	38.5	20.9	31.7	17.4	11.5	11.0	13.1	13.4	16.8		21.6	32.5	20.8	16.4	-
TRO-029	31.2	15.8	25.3	20.8	12.3	11.8	15.5	16.4	15.1	20.4			18.5	14.6	-
TRO-030	30.3	18.4	26.3	17.5	12.1	11.6	13.1	14.0	16.3	18.9	22.8	27.8	19.1	15.1	-
TRO-031	29.3	14.3	16.7	13.0	8.5	8.4		8.2	9.8	12.0	13.1	23.1	14.2	11.2	-
TRO-032	28.6	14.3	17.9	13.0	8.4	7.7	1.1		9.1	13.6	11.5	17.1	12.9	10.2	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
TRO-033	30.5		17.6	12.8	8.5	8.7	9.7	8.7	8.6	12.4	14.8	22.4	14.1	11.1	-
TRO-034		13.0	17.4	12.1	8.2	7.5	8.1	8.3	8.1	12.0	18.3	18.0	11.9	9.4	-
TRO-035	26.3	14.7	19.6	12.4	8.5	8.6	10.2	10.1	8.4	13.1	17.7	22.0	14.3	11.3	-
TRO-036	25.2	13.4	19.4	12.3				9.1	8.9	14.1			14.6	10.6	-
TRO-037	27.8					9.9		9.8					15.8	10.6	-
TRO-038	25.4	16.1	20.1	14.4	9.8	9.5	10.7	9.0	10.6	13.9	19.0	21.4	15.0	11.8	-
TRO-039	32.7	17.6	22.7	15.6	10.4	10.1	12.1	13.0	11.6	15.4	23.0	25.5	17.5	13.8	-
TRO-040	28.4	14.3	22.0	14.4	9.2	9.2			10.1	13.1	12.0	21.7	15.4	12.2	-
TRO-041	26.0	14.6	18.3		7.7	8.0	9.1	11.2	8.8	12.1	14.3	20.8	13.7	10.8	-
TRO-042	28.7	15.8	23.8	15.5	10.4	9.7	12.4	12.1	12.4	14.1	9.7	21.3	15.5	12.2	-
TRO-043	21.9	11.4	13.4	10.0	6.5	6.3	6.8	7.2	6.8	8.2	13.3	18.8	10.9	8.6	-
TRO-044	20.1	10.8	13.1	9.8	7.0	6.4	6.9	6.7	5.5	8.8	16.7	17.8	10.8	8.5	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
TRO-045	23.8	13.6	15.5	15.0	9.4	8.6	9.8	9.3	8.9	10.6	11.0	21.1	13.1	10.3	-
TRO-046									11.1		21.8	24.7	19.2	10.8	-
TRO-047									10.4	12.0	17.8	24.5	16.2	9.8	-
TRO-048									16.9	18.2	21.5	29.4	21.5	13.0	-
TRO-049									14.9	16.1	15.7	26.7	18.4	11.1	-
TRO-050										14.1	19.3	27.1	20.2	11.5	-
TRO-051									13.3	15.1	21.9	25.2	18.9	11.4	-
TRO-052									8.1		11.1		-	-	-
TRO-053									9.6			19.0	-	-	-
TRO-054									10.0			26.3	-	-	-
GW-013	42.4	25.2	28.0	23.3	18.5	18.6	18.9	20.3	23.2	25.4	31.7	36.3	26.0	20.5	-
GW-014	45.8	25.3	31.8	22.9	19.8	18.8	20.2	20.6	23.8	28.7	33.4	27.6	26.6	21.0	-

Diffusion Tube ID	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 (0.79) and Annualised	Distance Corrected to Nearest Exposure
GW-015	40.2	21.6	27.8	19.3	15.4	14.6	15.2	15.4	17.1	17.8	23.2	28.7	21.4	16.9	-
GW-016	39.6	22.7	29.4	19.9	14.9	13.9	14.6	15.6	18.6	21.8	28.3	32.3	22.6	17.9	-
GW-017				19.5	15.1	14.8	18.7	18.8	21.6	22.3	24.3	33.0	20.9	16.5	-
GW-018				20.9	18.3	18.2	20.7	20.6	24.3	25.6	31.9	34.3	23.9	18.9	-
GW-019				20.0	17.3	15.5	18.3	16.8	20.0	21.8			18.5	17.4	-
GW-020				20.3	21.1	20.8	22.2	19.7	23.7	27.6	25.6	32.2	23.7	18.7	-

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.**

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

(2) Distance corrected to the nearest relevant public exposure

Appendix B: A Summary of Local Air Quality Management

Purpose of an Annual Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment Act 1995, 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 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 12**Error! Reference s ource not found.**.

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 12 - 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

16 diffusion tube sites required annualisation in 2022. Details for these sites are provided in Table 14. Annualisation is required for any site with data capture less than 75% but greater than 25%.

Diffusion Tube Bias Adjustment Factors

SRS on behalf of BCBC have applied a local bias adjustment factor of 0.79 to the 2022 monitoring data. A summary of bias adjustment factors used over the past five years is presented in Table 13.

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 15.

Table 13 - Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
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

No diffusion tube NO_2 monitoring locations within Cardiff required distance correction during 2022.

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, four indicative monitors where also used in Cardiff in 2022. 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. The monitors are co-located annually to check accuracy. However, these are not compliant with the standard reference method and should only be used for indicative assessment purposes.

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

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

Automatic Monitoring Annualisation

All regulated 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.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Cardiff required distance correction during 2022.

Table 14 - Annualisation Summary (concentrations presented in µg/m^3)

Diffusion Tube ID	Annualisation Factor Cardiff Centre	Annualisation Factor St Julians Newport	Annualisation Factor Bristol St Pauls	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
186	0.9633		1.1040		1.0337	38.7	40.0
187	0.8491		0.9526		0.9009	44.3	39.9
263	0.9539	0.7692	1.1000		0.9410	19.4	18.2
262	0.8314	0.6777	0.9584		0.8225	23.5	19.4
TRO-014	0.9539	0.7692	1.1000		0.9410	13.9	13.0
TR0-020	0.9098		1.0352		0.9725	19.9	19.4
TRO-022	0.9866		1.1277		1.0572	23.8	25.2
TRO-036	0.8602		0.9735		0.9168	14.6	13.4
TRO-037	0.8971	0.6411	1.0011		0.8465	15.8	13.4
TRO-046	0.7235	0.5917	0.8244		0.7132	19.2	13.7
TRO-047	0.7770	0.6407	0.8856		0.7678	16.2	12.4
TRO-048	0.7770	0.6407	0.8856		0.7678	21.5	16.5
TRO-049	0.7770	0.6407	0.8856		0.7678	18.4	14.1
TRO-050	0.7312	0.6127	0.8308		0.7249	20.2	14.6
TRO-051	0.7770	0.6407	0.8856		0.7678	18.9	14.5

Diffusion Tube ID	Annualisation Factor Cardiff Centre	Annualisation Factor St Julians Newport	Annualisation Factor Bristol St Pauls	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
GW-019	1.1004		1.2712		1.1858	18.5	22.0

Table 15 - Local Bias Adjustment Calculations

	STEP 3a Local Bias Adjustment Input 1
Periods used to calculate bias	11
Bias Adjustment Factor A	0.79 (0.74 - 0.85)
Diffusion Tube Bias B	27% (18% - 35%)
Diffusion Tube Mean (µg/m^3)	42.7
Mean CV (Precision)	5.2%
Automatic Mean (µg/m^3)	33.7
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	**0.79**

Notes:

A single local bias adjustment factor has been used to bias adjust the 2022 diffusion tube results.

Appendix D: AQMA Boundary Maps

Figure 15 - Cardiff City Centre AQMA

Figure 16 - Stephenson Court AQMA

Figure 17 - Ely Bridge AQMA

Figure 18 - 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