Shared Regulatory Services
Gwasanaethau Rheoliadol a Rennir

Caerdydd
Aer Glân
Clean Air
Cardiff

DRAFT FOR REVIEW

2021 Annual Air Quality Progress Report for Cardiff Council

In fulfillment of Part IV of the
Environment Act 1995
Local Air Quality Management

2021

Local Authority Officer	Jason Bale
Department	Planning Transport Environment/ Shared Regulatory Services
Address	County Hall, Cardiff, CF10 4RW
Telephone	
E-mail	jbale@cardiff.gov.uk
Report Reference number	LAQM.2021PR
Date	

Executive Summary: Air Quality in Our Area

Public Health

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

What we know is that poor air quality in Wales poses as a significant concern for Public Health, 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) estimates that air pollution is responsible for "an effect equivalent of between 28,000 and 36,000 deaths (at typical ages) each year". This does not mean there are 'actual' deaths from air pollution exposure; rather, that the reduced life expectancy which everyone experiences because of air pollution exposure (6-8 months on average, but could range from days to years) is 'equivalent' to between 28,000 and 36,000 deaths when summed. In Wales, based on the latest data available (for 2017), Public Health Wales estimates the burden of long-term air pollution exposure to be the equivalent of 1,000 to 1,400 deaths (at typical ages) each year.

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

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

Fundamentally, it is plausible that air pollution affects everyone to some extent. Whilst the legislative air quality limit values are based on epidemiological evidence and are ultimately intended to protect public health, there is also recognition that health effects may be experienced below these thresholds for some of the key pollutants (e.g. $PM_{2.5}$ and NO_2), particularly affecting most susceptible groups: young children, the elderly and those with pre-existing health conditions and comorbidities. Acknowledged as the triple jeopardy concept- air pollution combines with other aspects of the social and physical environment to create an inequitable disease burden on more deprived parts of society; populations of areas with low socioeconomic status are prone to exacerbated effects from exposure to air pollution, in part as they are more likely to suffer pre-existing health conditions as a result of their poorer living conditions and lifestyle, but also as they are more vulnerable, being more likely to be living in areas with higher levels of air pollution.

Air Quality in the City of Cardiff Council

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 or not air quality objectives are likely to be achieved.

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

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

With regards to prioritising ambient air quality sampling locations, the Council adopts a risk-based approach to any allocation of monitoring sites, considering the requirements of The Department for Environment, Food and Rural Affairs' (Defra) Local Air Quality Management Technical Guidance 16 (TG16), April 2021. The designated monitoring locations are assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. TG16 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."

Monitoring Network

In 2020, Cardiff had four automatic air quality monitoring sites, equivalent to Automated Urban Rural Network (AURN) standards, located at Frederick Street in the City Centre, Richard's Terrace, just off Newport Road, Castle Street and Lakeside Primary School.

Cardiff Frederick Street (Urban Background)- AURN 1

The site monitors on a 24/7 basis measuring levels of NO_2, PM_{10} & $PM_{2.5}$, SO_2, CO and O_3 feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Richard's Terrace, Newport Road (Urban Traffic)- AURN 2

The site monitors on a 24/7 basis measuring levels of NO_2 & PM_{10} at that location, feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Cardiff Castle Street (Urban Traffic/ Roadside)

Commissioned in October 2020 with the financial support of Welsh Government. The site monitors on a 24/7 basis measuring levels NO_2, PM_{10} & $PM_{2.5}$ at that location, forming part of the Welsh Air Quality Network.

Cardiff Lakeside (Urban Background)

The site monitors on a 24/7 basis measuring levels of Polycyclic aromatic hydrocarbons (PAH) at that location, feeding data directly into Defra's PAH Digitel (solid phase) Network. SRS serve as a local site

operator to this site, however data interpretation is sanctioned by the consultants Ricardo Energy and Environment Ltd, whereby concentrations are compared to the national air quality objective for B[*a*]P in ambient air, based on an annual mean concentration of 0.25 ng/m^3. Details can be found in the UK Air Quality Strategy (Defra, 2007). Therefore, the purpose of this site and results derived are not corresponded to any of the limit values outlined for the purposes of LAQM in Wales.

Summarised results for various pollutants for the outlined automatic monitoring stations can be found at http://www.welshairquality.co.uk & https://uk-air.defra.gov.uk/interactive-map

AQ Mesh Analysers

In addition to the newly commissioned automated monitoring station on Castle Street, Cardiff Council has acquired the use of 7 near real time indicative air quality analysers. 5 analysers were purchased with the financial support of Welsh Government and the 6th & 7th analysers were facilitated by the SRS who had successfully accrued funding via a S106 planning contribution. The analysers have been specifically placed and represent relevant exposure. The monitors are located at the following locations:

Clean Air Monitors

Westgate Street -
Lower Catherdral Road
Tudor Street
North Road
Penarth Road

S106 Monitors

Llandaff – Bridge Street
Canton – Lansdowne Rd (installed 2021)

The analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM10 & PM2.5, and do so every 15 minutes (data uploaded every hour). Information regarding the specification of the monitors can be viewed at https://www.aqmesh.com/product/. These monitors do not form part of the regulated Welsh automated monitoring network, but as specified they are an indicative form of monitoring and a useful tool to look at datasets on a high-resolution basis. An online platform to access the available datasets is yet to be finalised with Cardiff Council's webpage development team.

Non-automatic Monitoring Sites- In 2020 there were 92 specifically allocated non automatic monitoring sites across Cardiff which monitored levels of nitrogen dioxide (NO_2). These sites are supported and maintained by SRS on behalf of CC. The non-automatic sites do not provide live data; instead they consist of diffusion tubes which are placed at each of the sites, collected and replaced on a rolling monthly basis. The results derived from the tube sampling are then averaged over the year to enable a comparison of the results against the annual average **(40µg/m^3)** and 1-hour **(200µg/m^3 not to be exceeded > 18 times per year)** air quality objectives for NO_2.

Analysis of Diffusion Tubes

Annual Average- Once erroneous data have been deleted, it is necessary to calculate the annual average. The data need to be annualised, and then bias corrected. In order to do this, firstly the annual average is calculated for all sites.

Annualisation- Where valid data capture for the year is less than 75% (9 months), where necessary the continuous and NO_2 diffusion tube monitoring data have been ''annualised'' following the methods as described in Defra's LAQM (TG16), Boxes 7.9 & 7.10.

Bias Adjustment- After annualisation, the diffusion tubes should be corrected for bias. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. This should not be confused with precision, which is an indication of how similar the results of duplicate or triplicate tubes are to each other. While it is possible to adjust diffusion tube results to account for bias, it is not possible to correct for poor precision. A spreadsheet-based tool has been developed that allows local authorities to easily calculate the bias and precision of their tubes.

There are two bias adjustment figures made available to Local Authorities. Firstly there is the Local Authorities' local bias adjustment figure calculated using a co-location study at a local reference automated site (Frederick Street being the site used in Cardiff), and secondly there is the national bias adjustment factor derived by all individual co-location studies undertaken that utilise the same laboratory and analytical techniques for diffusion tube analysis. It must be decided which factor to use based upon quality assurance and increased certainty.

The bias adjustment factor applied to Cardiff's 2020 data is 0.76. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 06/21. Due to insufficient data capture <90%, in accordance with Defra's LAQM (TG16), Box 7.11 it is preferable not to perform a co-location study due to concerns associated with the data quality. The National Bias Adjustment Factor supplied by the LAQM Defra website, based on 24 studies, which appointed Socotec UK Ltd Didcot laboratory, gave a figure of 0.76 and so this has been adopted for ratification purposes.

Distance Correction- Where an exceedance is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure has been estimated based on the "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html).The procedure is described in LAQM (TG16), Section 7.77-7.79.

For 2020 the NO_2 diffusion tube network was extensively reviewed and amended to improve and encapsulate a wider footprint of the Cardiff Council area. As part of the improvements new monitoring sites were commissioned within the designated AQMAs, as well new sites commissioned in support of project related work that required air quality monitoring datasets. Such project work included a School's Street Project and its Traffic Regulation Order (TRO) project. Here this work was commissioned in late 2019 by Cardiff Council's Transportation, Policy and Strategy Team which involves the temporary closure of road links surrounding specific schools in Cardiff, 6 in total. To note; this described TRO project has grown to 15 schools in total since December 2020.

Summary of results collated in 2020

Automated monitoring- Results highlighted in **Section 2.2** of this report indicate compliance with the relevant air quality standards applicable for the purpose of LAQM in Wales.

Non- automated monitoring- In 2020, compliance with the set annual average objective for NO_2 (40µg/m^3) was achieved at all monitored locations. One would expect these compliant levels was a result of the impacts of COVID-19 and the national lockdowns resulting in subsequent reductions in traffic volumes and emissions therein.

In accordance with Welsh Government's (WG) Local Air Quality Management Policy Guidance, July 2017, SRS and CC recognise that there is no defined "safe level" when describing levels of air quality. Although compliant levels were achieved at all monitored locations in 2020, subsequently as a result of COVID-19 impacts, Cardiff Council remains vigilant and will work towards sustaining/ improving these levels of compliance across the city for future years.

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 standard/ objective

Based on monitoring results and further detailed assessments, there are currently four Air Quality Management Areas (AQMAs) declared across Cardiff which have all been declared due to exceedances of the annual mean NO_2 Air Quality Standard (40ug/m^3), known to be predominantly derived from road transport sources.

1. **Cardiff City Centre-** declared 1st April 2013
2. **Llandaff**- declared 1st April 2013
3. **Stephenson Court**- declared 1st December 2010
4. **Ely Bridge**- declared 1st Feb 2007

Figure 1- Boundary of Cardiff City Centre AQMA

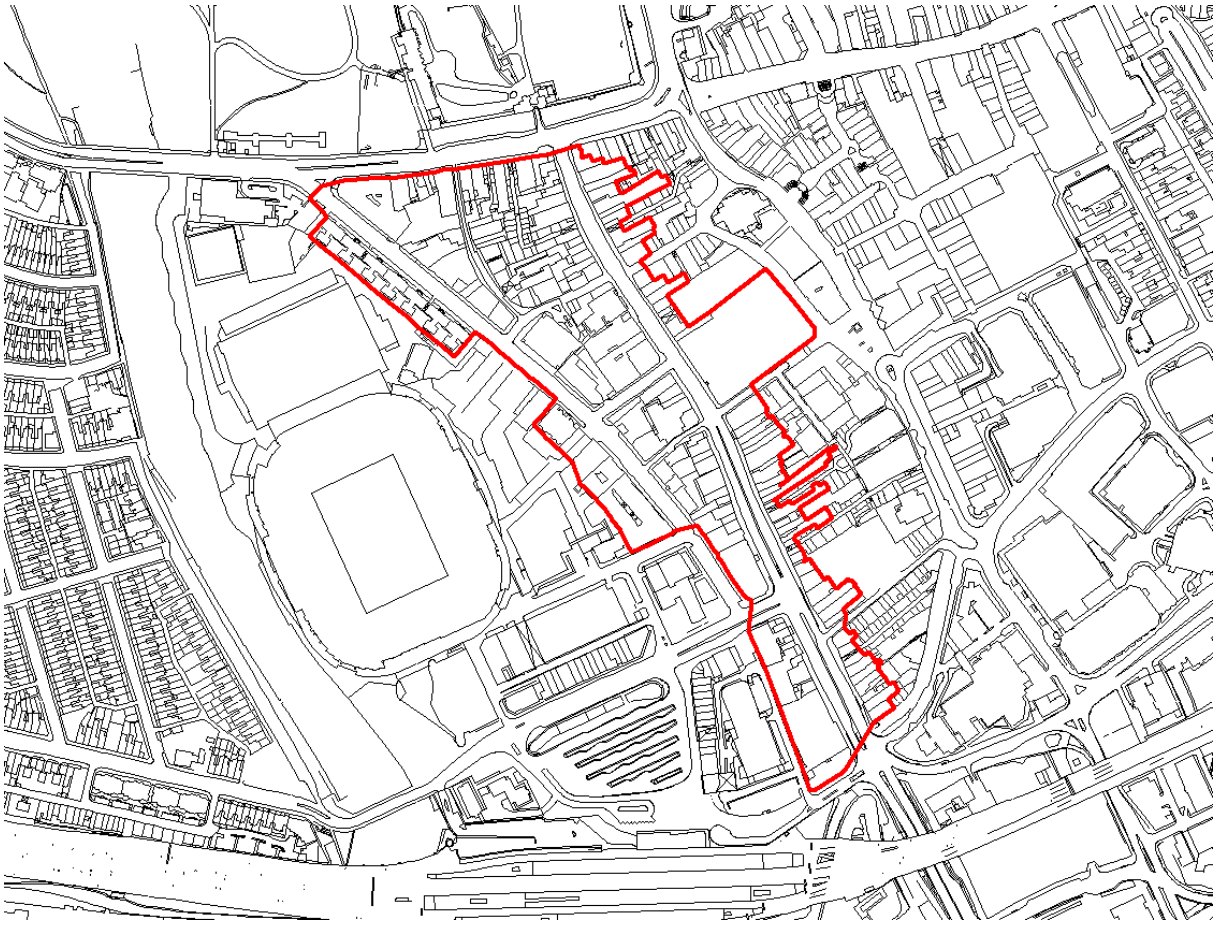


Figure 2- Boundary of Ely Bridge AQMA

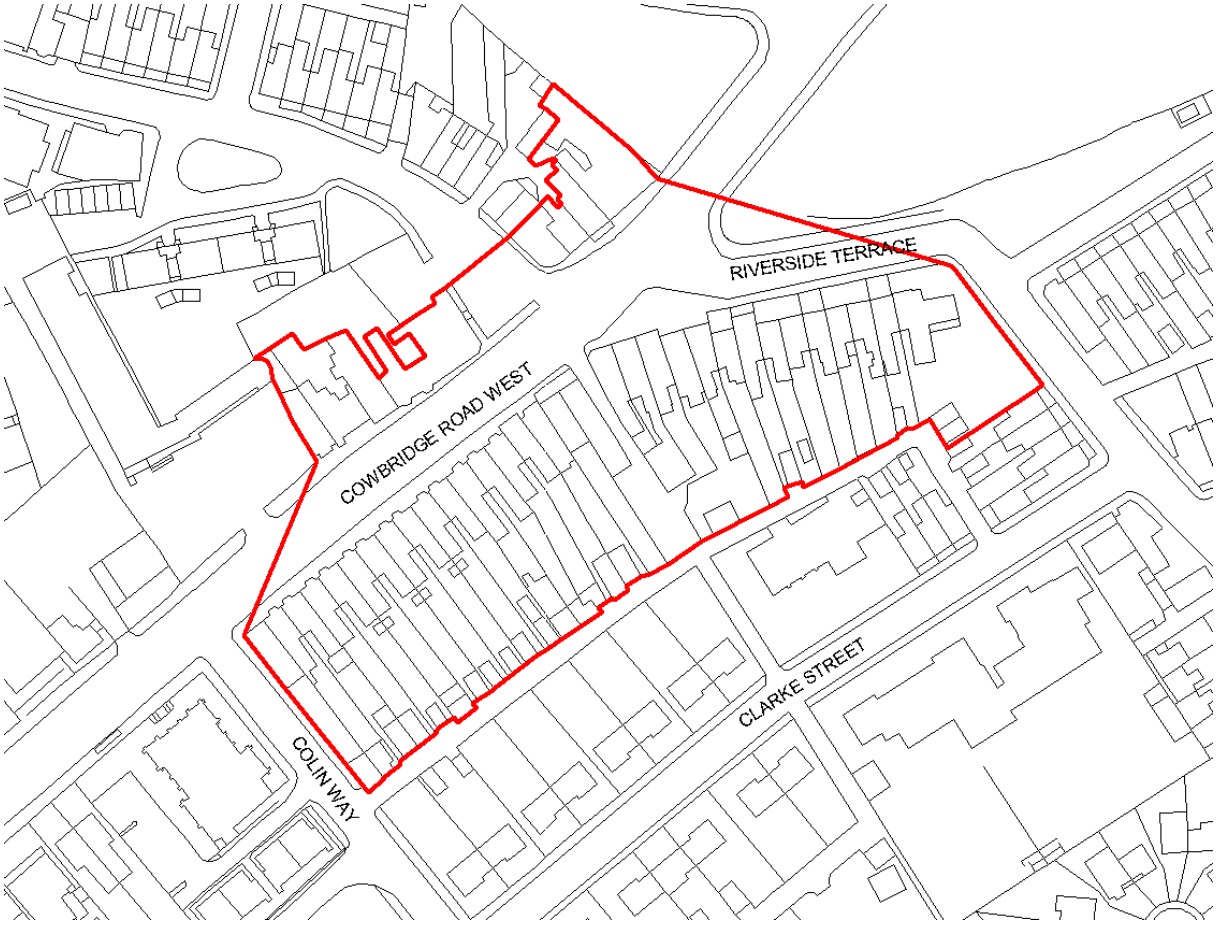


Figure 3- Boundary of Stephenson Court AQMA

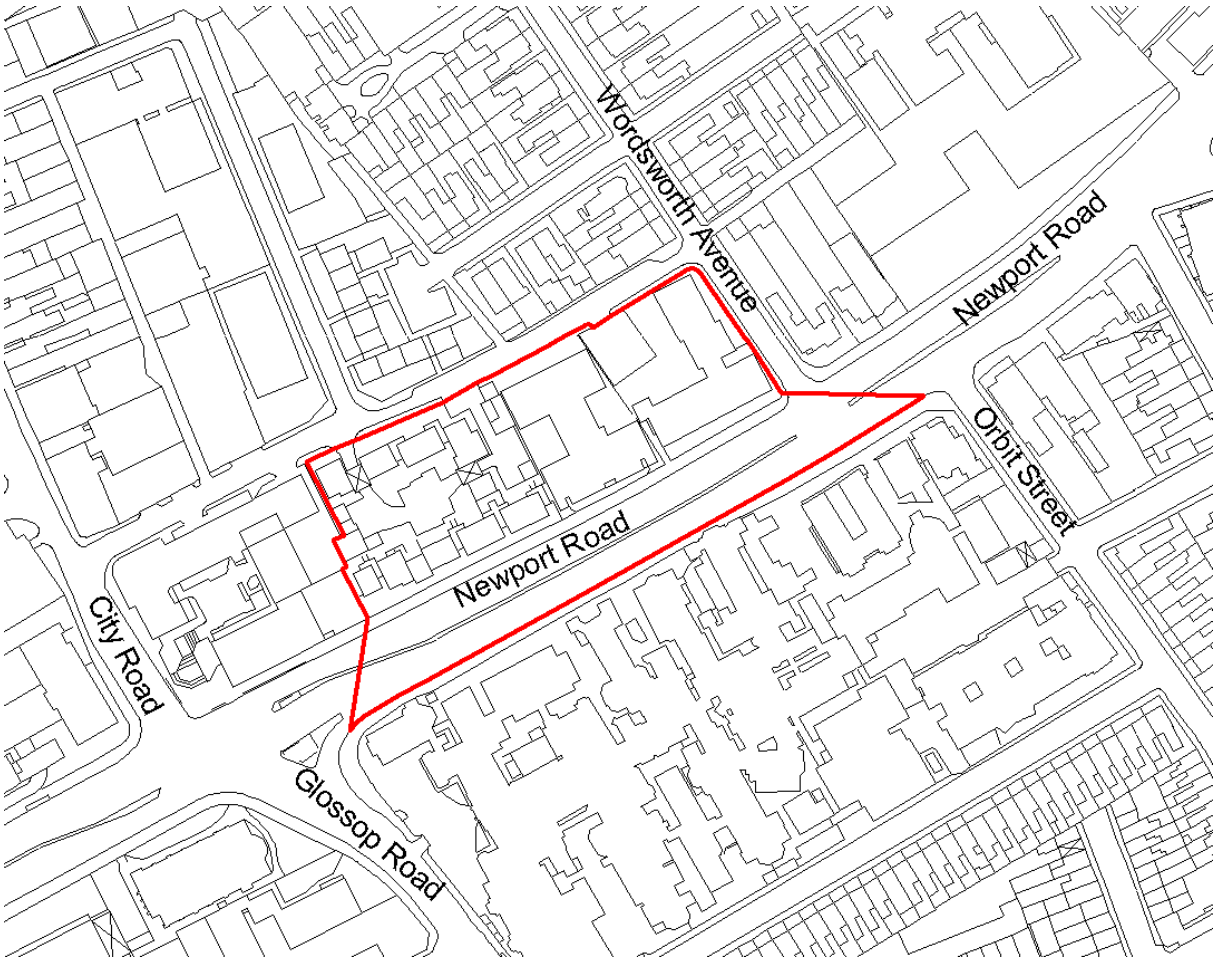
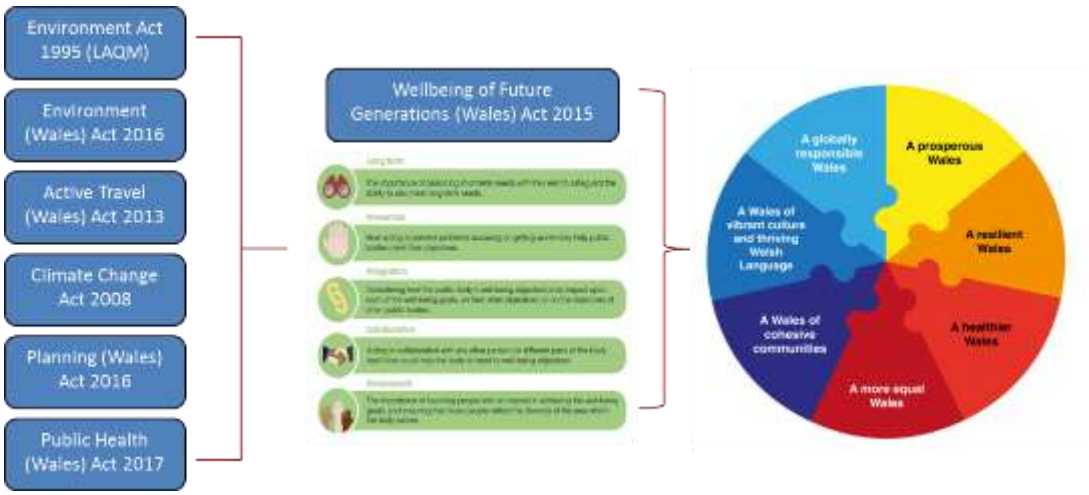


Figure 4- Boundary of Llandaff AQMA

SRS/ 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. The Act places responsibilities on public bodies in Wales to work in new ways (including via Public Services Boards) towards national Well-being goals. Progress is measured against a suite of well-being and Public Health Outcomes Framework indicators; there is one specifically concerned with air pollution.

As Figure 5 illustrates, the Act is the legislative vehicle for "Health in all Policies in Wales" and provides the underpinning principles for all policy and decision making, including economic development, in Wales. Reducing air pollution, health risks and inequalities can help contribute to most, if not all, of the well-being goals. As such, the Act presents excellent opportunities to change policy and practice to enhance air quality management arrangements across Cardiff (and wider).

Figure 5- The Well- being of Future Generations (Wales) Act 2015 Matrix



SRS and CC are very aware of the concerns for air quality impacts. SRS & CC is 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 needs 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 recommended two clear goals:

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

(2) reduce exposure to pollution more widely, so as 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).

Clean Air Plan

In addition to Cardiff's 4 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 exceedence 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 particular reference to the specified 5 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 was 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.

The final plan was approved by the Minister on the 16th December 2019, with grant funding to implement the plan awarded in January 2020. The Council started delivering its Clean Air Plan's package of preferred mitigation measures designed to address air quality concerns for Castle Street, as well as contribute to air quality benefits citywide. The Clean Air Plan's complete delivery has somewhat been impacted by Covid, but is still on target to deliver compliance by the end of 2021 in accordance with Welsh Government timescales.

During the delivery period of the mitigation options, in accordance with the impacts and measures put in place to facilitate the COVID pandemic and subsequent reduced traffic movement on Castle Street, air quality datasets gathered on Castle Street have indicated consistent compliance with the legal air quality limit values set for Nitrogen Dioxide (NO2). With the complete delivery of measures forecasted for the end of 2021, sustained air quality compliance on Castle Street is likely to continue. The current average (2021) NO2 figure is 23 µg/m3 with the legal limit set as 40 µg/m^3.

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.

As set out in the 'Recovery and Renewal: Greener, Fairer, Stronger' report, approved by Cabinet in May 2021, the Covid-19 pandemic has had a unique impact on the city centre and on mobility patterns in the city. In order to create Covid-secure mobility options and environments a series of innovations and adaptations were introduced at pace in the city centre throughout 2020, including:

- Summer 2020: Castle Street was closed to all traffic to accommodate an outdoor dining area, with Station Terrace restricted to bus, taxi and limited access only;
- Autumn 2020: The pavement was extended on Castle Street south, outdoor dining areas were removed and buses, taxis & access vehicles were allowed in; and
- Autumn 2020 – October 2021: A series of Pop up Cycleway were installed in the city centre to replicate those included in the permanent programme, extensions to these cycleways continue to be on site today and will see over 2.5 miles of additional cycleway installed.

The temporary measures established on Castle Street in response to COVID-19 led to a significant improvement in air quality on Castle Street and ensured that compliance with the EU Limit for NO_2 was achieved in advanced of the modelled forecast date within the Clean Air Plan of 2021. Monitoring undertaken from the Castle Street station installed to assess progress of the Clean Air Plan is summarised as follows in

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 measures 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. At the time of this report these works are ongoing and impacts will be monitored and reported in the 2022 Annual Progress Report.

As part of this evidence to support the Cabinet decision further detailed modelling of the City Centre Schemes. Further variable demand modelling (VDM) has been undertaken by transportation consultants, to provide updated transport data to reflect potential mode shift changes/ cancelled journeys as a result of the schemes. This differs from the previous modelling which was fixed demand which meant the model didn't take account of any changes and assumed travel behaviours remained the same. Using the updated VDM traffic data further air quality modelling has been undertaken which demonstrated that further improvements to NO_2 concentrations on Castle Street are now forecasted with a revised compliance figure of **28 µg/m^3** calculated to be achieved by the end of 2021.

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

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

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

The plan and its proposed actions is available at
https://gov.wales/sites/default/files/publications/2020-08/clean-air-plan-for-wales-healthy-air-healthy-wales.pdf

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

Actions to Improve Air Quality

As discussed previously CC currently has 4 established AQMAs within its Borough.

The CASAP encapsulates all established AQMAs in Cardiff and sets out the delivery of how Cardiff is set to tackle air quality concerns on a citywide basis. The document considers an array of mitigation measures that should be considered when trying to improve citywide air quality levels. SRS & CC have collaboratively made progress in examining avenues and mechanisms to assist with bringing strategic measures to fruition and therefore enhancing key areas that will in turn improve air quality.

As outlined the CASAP measures have formulated the foundations for Cardiff's Legal Direction, therefore subject to Welsh Government's final verdict on the submitted Full Business Case, finances may be available to support the some of the CASAP measures.

Public Transport

Improving Bus Emissions

ULEB (Ultra-low emission bus vehicles)

In 2018 SRS along with Cardiff Council's Transport team collaborated with Cardiff Bus company to put forward a successful bid application for the Ultra-Low Emission Bus (ULEB) fund made available by the Department for Transport (DfT).

The proposal draws links between the air quality management areas (AQMAs) identified under the LAQM regime, as well as the issued direction from Welsh Ministers which targets Cardiff on the regional scale highlighting non-conformities in association with European Directives. Therefore linking the two together; due to the heightened profile of air quality and its potential adverse impact on public health, and given Cardiff's Local Air Quality Management scenario, as well as its regional air quality concerns it is imperative that short term measures, such as increasing the uptake of low emission buses are implemented as soon as possible to start the process of achieving compliance with the air quality objectives.

The bid application looks at acquiring a total of 36 electric buses that would be introduced to the Cardiff Bus fleet over a projected 3year cycle. The introduction of the electric buses would form part of a cascade programme whereby Euro 3 standard buses would be offset from the fleet completely, therefore improving the overall fleet composition.

It is programme that the roll out of the electric vehicles will begin in the Quarter 3 of **2021**.

Cardiff Clean Bus Retrofit Programme

Owing to the previously offered Department for Transport's (DfT) Clean Bus Technology Fund.

(CBTF), Cardiff Council's Clean Air Project Team proposes to function as a regulatory entity to manage, regulate and fund such a retro fit scheme with Cardiff based bus operators.

The retro fit programme would see applicable bus vehicles fitted with the necessary upgrades to produce an emissions output equivalent to a Euro VI vehicle.

The proposed bus retrofit scheme has been approved by the EU Commission for a value of 80% aid intensity, requiring successful operators to cover the remaining 20% cost. The total amount of applicable funding is set at £1.8 million.

As outlined in the scheme's application conditional criteria; applicants are required to appoint the use of accredited technology which is compliant with the Clean Vehicle Retrofit Accreditation Scheme (CVRAS)

The buses to be retrofitted can be any pre-Euro VI (6) bus that is expected to be operational on the specified routes for at least five years or for 150,000 miles after the retrofit. Buses are not authorised to be moved to other localities outside the boundary of Cardiff.

The Grant is to reimburse Capital Costs incurred and may be spent on the Accredited Technology and cost of fitting it to the buses, and the cost of and fitting of monitoring equipment. Although this is specified as a reimbursement of Capital Costs, it has been agreed that once the relevant invoices are received by the applicant from their appointed supplier for the necessary retrofit works, following the submission of a grant claim form, Cardiff Council would provide the funding to cover 80% of the invoiced cost.

Following an open application process which ended on the 31st 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. Here £191,920 has been awarded to Cardiff City Transport Services Ltd (Cardiff Bus) to retrofit 20 buses,

and £369,692 has been awarded to Red and White Services Ltd, T/A Stagecoach South Wales to retrofit 29 vehicles.

It is anticipated that both operators will complete the delivery of their intended retrofit schemes by September 2021.

Bus Strategy

The Council has committed to preparing a Bus Strategy which will be informed by public consultation and engagement with key stakeholders. It will set out what is needed in Cardiff to ensure excellent bus services that will address the needs of both current and potential passengers in Cardiff. It will develop high level and strategic options for enhanced bus based public transport in Cardiff, which will inform a package of transport measures and initiatives described as 'Big Moves'. These strategic actions will collectively enable Bus working in a way that is integrated with Metro to become an effective mass public transit system for Cardiff.

City Centre Transport Networks Improvements

The schemes will 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.

City Centre West (CCW)

The main aim of this scheme is to accommodate the new Transport Interchange and Central Square Development, whilst also Improving Air Quality within the City Centre AQMA. This will be achieved through removing through-traffic from Westgate Street and installing a new highway layout that will improve and connect the current bus network with the new Interchange, Central Square, Central Station and the City Centre Enterprise Zone. In addition, the scheme will offer improved safety for pedestrians via improved pedestrian crossing facilities, 20mph speed limits and an improvement to the pedestrian environment outside of the national stadium. The scheme will also install a network of stepped cycle tracks to connect the area with the proposed cycleways on Castle Street and the Taff Trail routes. Works are progressing on site and as of September 2021 work will be commence on the bus gate and transport interchange entrance implementation.

City Centre North (CCN)

The main aim of this scheme is to bring Castle Street into Air Quality compliance by 2021 by installing a two way dedicated cycleway along its length. The installation of the cycle lane and the reduction in highway space will allow for traffic to be reduced by ~29%. Improved pedestrian crossings with countdown timers will also provide safety improvements for pedestrians.

The Covid-19 pandemic had a unique impact on the city centre and on mobility patterns in the city. In order to create Covid-secure mobility options and environments a series of innovations and adaptations were introduced at pace in the city centre throughout 2020, including:

- **Summer 2020**: Castle Street was closed to all traffic to accommodate an outdoor dining area, with Station Terrace restricted to bus, taxi and limited access only.
- **Autumn 2020**: The pavement was extended on Castle Street south, outdoor dining areas were removed and buses, taxis & access vehicles were allowed in.
- **Autumn 2020 – October 2021**: A series of Pop up Cycleway were installed in the city centre to replicate those included in the permanent programme,

extensions to these cycleways continue to be on site today and will see over 2.5 miles of additional cycleway installed

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. This of implementing an interim scheme based on the need to assess any following a full post Covid recovery period could be fully accounted for to ensure that no detrimental impacts in terms of congestion and air quality would result from the Clean Air Scheme. At the time of this report these works are ongoing and impacts will be monitored and reported in the 2022 Annual Progress Report.

City Centre East Phase 1

The main aim of this scheme is to provide a new dynamic for the bus network, whilst connecting cycleway and improving the pedestrian environment outside of Queen Street Station. This will be achieved through providing bus priority measure throughout the Station Terrace and Churchill Way areas that will provide new routes for buses, taking them away from the City Centre AQMA and closer to key areas such as Queen Street Station and the shopping district. The new bus routing system is also key to allowing the Interchange to be accessed from its south entrance, and work effectively on major event days. A cycleway will be installed to connect the east of the city centre with the City Centre Enterprise Zone and join up all the proposed cycleway routes. Pedestrian improvements on Dumfries Place and Station Terrace will also improve safety for pedestrians and improve connections to Queen Street Station and the City Centre Enterprise Zone.

At the time of writing this report returned tenders for the scheme were being reviewed. It is anticipated that site works will commence in late 2021 and thus the impacts of this scheme will be monitored and reported in the 2022 APR.

Park & Ride

Developing new bus park and ride facilities at M4 Junction 33 and other appropriate locations in Cardiff and neighbouring areas to reduce the number of cars driving into the city.

Development of Central Interchange

In 2018 CC planning department received receipt of a full planning application with contains the proposed design and plans for a new central interchange station. Construction works are progressing with an envisaged completion date set for quarter 4 2022.

South East Wales Metro

The Cardiff Capital Region Metro proposed by Welsh Government is likely to comprise a combination of rail-based and bus-based rapid transit routes linked through interchanges and using the same network brand and integrated ticketing system. A commitment has been made by Transport for Wales and the detail surrounding these commitments can be found at;

http://tfw.gov.wales/whats-happening-south-east-wales

Active Travel

School Monitoring and Active Travel Plans

Cardiff Council has a corporate commitment for every school in Cardiff to have an active travel plan by April 2022. Works are ongoing to understand how the Council can best support schools to develop and implement an active travel plan. The aim of an active travel plan is to increase the number of children, parents and staff travelling to school sustainably, particularly increasing walking, cycling and scooting. There are a range of resources, training and programmes available to schools and the ongoing works

will identify what actions the schools need to take and access the relevant initiatives and programmes to implement these actions.

To date 94% of Schools in Cardiff have now received support to develop an active travel plan. Each plan is tailored to the school, their location and their priorities for encouraging active travel. Actions within a plan are often a mix of practical or physical solutions, e.g. new cycle storage, and skills and confidence building, e.g. active travel curriculum resources, (these are aligned to the new curriculum in Wales).

Moving forward the team will continue to support the remaining schools to develop and complete their active travel plans. The team is supporting 40 schools to start the year long Living Streets WOW challenge in September 2021, and we will be trialling our ongoing active travel support for schools based on school clusters'.

Resources are available to view on Keeping Cardiff Moving under the schools tab.

School Streets Project

In view of the corporate commitment to deliver active travel plans for all schools by April 2022, for 2019 SRS was commissioned by Cardiff Council's Transportation, Policy and Strategy Team to assist with Cardiff Council's Schools Streets Project and its Traffic Regulation Order (TRO) pilot project. The pilot project involves the temporary closure of road links surrounding specific schools in Cardiff, 6 in total. This has subsequently grown to 15 schools in December 2020.

The TRO is in effect during the schools' morning and afternoon drop-off and pick-up hours. This project is seen as an excellent opportunity to take action to encourage parents, staff and children to adopt an alternative mode of travel.

Shared Regulatory Services (SRS) have supported this pilot project by providing additional air quality monitoring. SRS gather monthly datasets for nitrogen dioxide (NO_2) using non- automated passive diffusion tubes, undertaken at the schools' premises, inside the TRO zone at a residential façade and outside the TRO zone at a residential façade. This strategic placement of monitoring sites allows the examination of potential displacement impacts as a result of the adopted TRO zone. The datasets gathered to date indicate compliance with the air quality standards for NO_2.

Safe Routes to School

Planning and prioritisation of improvements to Cardiff's walking and cycling network will be undertaken through the Integrated Network Map (INM) as part of our duties as set out under the Active Travel (Wales) Act 2013. The INM was approved by Council's Cabinet in September 2017 and Welsh Ministers in November 2017. The INM can be viewed on the Council website here:www.cardiff.gov.uk/activetravel

In addition, Cardiff Council bids for Welsh Government Safe Routes in the Community Grant on an annual basis. This Grant is used to make changes to the highway environment, such as new zebra crossing facilities etc., and is focussed on creating safer walking and cycling routes to schools.

A new Walking Bus Strategy is currently being developed to provide schools with a further opportunity to promote walking to schools.

Cycling Strategy (2016- 2026) & Integrated Network Map

The Cardiff Cycling Strategy sets out an ambitious vision to double the number of cycling trips by 2026, from a 9.2% modal share in 2015 to 18.4% in 2026.

The Cycling Strategy and INM proposes 5 cycleways which will provide high quality cycle routes, segregated from pedestrians and motor vehicles on busy roads, and will connect strategic development sites, existing residential areas, employment sites, the city centre and Cardiff Bay. These will be supported by a network of secondary routes.

The Integrated Network Map sets out Cardiff Council's 15-year vision to improve cycling and walking routes across the city, in order to meet the requirements of the Active Travel (Wales) Act 2013 to plan for the provision of routes and improvements for active travel.

https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/Walking-and cycling/ActiveTravel/Pages/default.aspx

Cycleways

Cardiff Council are developing proposals for five Cycleways to support and promote cycling for all ages and abilities. The proposed routes will connect communities to major destinations across the city, including the City Centre and Cardiff Bay.

Cycleways will provide continuous routes that are intuitive and comfortable to use and separated from motor vehicles and pedestrians where needed.

The Cycleways will be developed from proposals in the Integrated Network Map which sets out a 15 year plan to improve routes for walking and cycling in the city.

The proposed Cycleway routes are:

- **Cycleway 1**: City Centre to Cathays, University Hospital Wales, Heath High Level and Heath Low Level Rail Stations, and North East Cardiff Strategic Development Site. Phase 1 Stuttgart Strasse to Cathays Terrace has been fully delivered. Phase 2 Cathays Terrace to University Hospital of Wales, Heath has secured funding and a consultation has now been completed on this phase, with works due to start in winter 2021. **Cycleway 2**: City Centre to Adamsdown, Newport Road retail parks, Rumney, Llanrumney and St Mellons Business Park; Some of this has been delivered as part of the Cross City Pop Up route as detailed below
- Cycleway 3: City Centre to Cardiff Bay;
- Cycleway 4: City Centre to Llandaff, Danescourt and North West Strategic Development Site:. Phase 1 between Cowbridge Road and Western Avenue via Sophia Gardens and Pontcanna Fields has been fully delivered and the Council has completed a detailed consultation on the options for Phase 2 which will connect Western Avenue with Llanda˜ village.
- Cycleway 5: City Centre to Riverside, Ely and Caerau. . Cycleway 5 is designed to connect the City Centre with key destinations including Leckwith, Cardiff City Stadium and South West Cardiff. At the time of writing this report the Council is consulting on Cycleway 5.3 which Cycleway 5.3 - Lawrenny Avenue. This route will link from the city centre westwards and its route along Lawrenny Avenue will benefit Fitzalan pupils and staff, and those of Ysgol Pwll Coch. The Lawrenny Avenue section has been prioritised to ensure it will be in place for the opening of the new school with improved crossings for pedestrians and cyclists.

COVID Response Cycleways

In response to COVID two routes - the 'Cross City 'and 'Bay Loop' cycleways were implemented using temporary infrastructure as part of the Council's ongoing COVID Recovery plans:

- **Crosscity Pop Up Cycleway:** Linking the west to the east, the Cross City Route was installed along Leckwith Road, onto Wellington Street, then joining the current cycleway on Castle Street. The cycleway then continues along Boulevarde de Nantes., Dumfries Place onto Newport Road to the junction with Broadway. One lane of traffic will be removed along the route to facilitate the pop up cycleway. Bus lanes will be moved and maintained where possible, bus stops will be access via a bus build out with a zebra crossing
- **Bay Loop:** This route commences from the Magic Roundabout, down East Tyndall Street, onto Tyndall Street, joining a new cycleway running both down and back up Lloyd George Avenue, joining Callaghan Square and ending on Penarth Road.

Nextbike

The Nextbike hire scheme launched in Cardiff in 2018. The scheme is financially funded by Welsh Government and its main objectives are to reduce congestion, free up parking spaces and provide a healthier way to travel around the city. The scheme comprises of 50 docking stations located around Cardiff which facilitate 500 bicycles. To date the scheme has been positively received by members of the public.

Since the introduction of the Nextbike scheme in March 2018, the Cardiff scheme has become the UKs most successful[1]. By the end of summer 2019 the number of bikes available to hire further increased to 1,000.

In 2021 50 e bikes have been introduced to the fleet under the OVO bikes scheme a partnership between OVO Energy and Nextbike.

20mph Zones

The Council is committed to expanding 20mph limits to all residential areas in the city. The Welsh Government plan to legislate to make 20mph the default speed limit in all residential areas in Wales, and Cardiff Council is currently engaged with the Welsh Government on a pilot scheme in Cardiff North to develop the required technical processes and assess potential impacts from the schemes including air quality impacts. The timescale for extending 20mph limits to all residential areas of Cardiff will now be dependent upon the timetable for the new legislation set by the Welsh Government, however this is likely to be in 2023.

Public Service Boards Staff Charter

Working initially through Cardiff Public Services Board, a Healthy Travel Charter for Cardiff has been developed with major public sector employers and was launched in April 2019. Signatories to the Charter make 14 commitments on improving access to active and sustainable travel for staff and visitors to their main sites, and jointly commit to three targets namely:

- Reduce the proportion of commuting journeys made by car;
- Increase the proportion of staff cycling weekly; and
- Increase the proportion of vehicles used for business purposes which are plug-in hybrid or electric.

The Charter was signed by 11 public sector organisations at launch in April 2019, employing over 33,000 staff, with additional public and private sector organisations subsequently invited to sign up to the Charter.

[1] NextBike In Depth Review 2018

Currently it is not possible to fully assess the impacts of the above the measures but it is envisaged that such measures will contribute to wider behavioural changes and incentives to encourage further modal shift or uptake of low emission vehicles which will see improvements in air quality.

Clean Vehicles

Councils Fleet Transition

CC has developed a Sustainable Fuels Strategy to explore the potential to support a move within the city to increased use of sustainable fuels. An independent consultancy specialising in low carbon and fuel cell technologies, were commissioned to undertake a targeted fleet review of Cardiff City Council vehicles.

In the **short term** the following "quick wins" are recommended:

Undertake a managed replacement of Cardiff Council fleet, where cost effective. This would include replacing cars and small vans with EVs, which are expected to save the Council money on a total cost of ownership basis due to lower operating costs;

EV Infrastructure

-Progression of residential EV charging locations has ensured that 15 locations with a total of 18 fast charging points have been installed across the City. In 2020 a second phase of 5 sites with 2 charge points was progressed with completion undertaken in early 2021.

A Pilot project for installation of 6 Rapid Charging stations has been initiated with Osprey Charging and all 6 locations were completed in 2021.

The Council is also installling 22kw fast chargers in 10 Council Car parks, utlising Welsh Government ULEZTF funding. These will be installed in late 2021 early 2022 and full details will be detailed in the 2022 APR.

A further project looking to utilise street lighting columns is due to be implemented in late 2021 with the installation of a further 20 charging locations to be installed. further details will be provided in the 2022 APR.

Green Infrastructure Projects

Dusty Forge and Kitchener Primary School

In 2021 SRS have been appointed to support Cardiff Council's Local Nature Partnership, whereby allocated capital funding has been achieved through Welsh Government's "Local Places for Nature" scheme. Here green "living" walls have been installed at susceptible receptors located in areas of poor air quality, thus Dusty Forge building on Cowbridge Road West and Kitchener Primary School just off Ninian Park Road. The project aims to take action to encourage air quality awareness and outline the importance of utilising green infrastructure as a potential mitigation tool. Importantly the Council wish to monitor and outline any direct benefits associated with the scheme, such as the impact to ambient air quality levels.

Both green walls have been implemented and monitoring continues to be undertaken to examine any direct air quality benefits.

Further funding from the Local Places for Nature scheme has been secured this year (2021/2022) to provide additional green walls under the 'Greening the Public Service Estate' funding stream. As the

name suggests, site selection can now include any public building, not just those under Council ownership. A short-list of potential buildings is currently being compiled.

Improved monitoring

One Planet Cardiff Capital Funding

Although the Clean Air Plan devised a package of mitigation options with the primary objective to achieve legal compliance on Castle Street, via detailed analysis a wider benefit to air quality across the city is expected.

In view of monitoring of the expected outcomes derived by Cardiff's Clean Air Plan, data collection has remained primarily focused on the City Centre and existing Air Quality Management Areas (AQMA). These key areas, through the Clean Air Plan funding have been strengthened with enhanced air quality monitoring techniques, in the form of automated monitoring which allows the collection of air quality datasets (24/7). It is recognised that there would be wider benefits of establishing a broader real time air quality monitoring network across the City, which would further add to the existing network.

This broadened real time air quality monitoring network will strengthen the Council's and public's understanding for Cardiff's air quality by providing appropriate datasets and interpretation via a web based platform/ smart application.

The purpose of the network would be to provide Cardiff with one of the most advanced regulatory monitoring networks for air quality data in Wales and enable the Council to comply with any future legislative changes from Welsh Government in terms of the likely introduction of a Clean Air Act/ Bill for Wales.

The data collected will serve as the foundation stone for research, policy development, health impact analysis and public understanding of air quality more widely across Cardiff. It will enable the Council to assess the impact of interventions that are currently being implemented through the Clean Air Plan and Transport Vision and any future interventions that may be required in other parts of the City to further reduce the impacts on air quality and encourage further modal shift to sustainable forms of transport.

By providing readily accessible real time datasets it is hoped that residents would use this data to make informed decisions on daily travel choices, making use of alternative sustainable modes of transport which will create a positive impact for local air quality levels. Incidentally this will potentially have an indirect CO2 benefit if these behaviours are solidified. Here with a potential increase in sustainable transport modes coincided with fewer journeys made by Cars this will evidently led to reductions in CO2 emissions and support the Council's One Planet Ambitions.

One Planet Cardiff Capital funding has been made available to support the expansion of this network and the aim is to undertake a 2 year pilot project and increase the density of monitors in the city in the region of ~50 units. Following the completion of the pilot project, it will be necessary to undertake a review of the success of the project and assess options on continuation of the monitoring. After the 2 years additional revenue would be needed of approximate £50,000 p.a. to maintain access to the data by the Council

Publications & Policies

Cardiff's Transport White Paper

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 South East 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.

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

Planning for Health and Well-being SPG (November 2017)

This Supplementary Planning Guidance (SPG) supplements policies in the adopted Cardiff Local Development Plan (LDP) relating to health and planning and has been developed jointly between the Council and the Cardiff and Vale University Health Board. This interaction underlines the fact that neither health nor planning considerations are made in isolation.

The purpose of this SPG is:

• To provide supporting information and guidance for planners, developers and investors on how our environment and the planning decisions we make, impact on the health and wellbeing of the population.

• To help achieve the Council's vision of addressing health inequalities and become a leading city on the world stage as set out in the Capital Ambition Document

• To ensure planning decisions contribute to the national and local Well-being Goals set out in the Well-being of Future Generations (Wales) Act 2015.

• To offer guidance for addressing the effect of the built and natural environment on health and well-being as part of a strategic approach to tackling the city's health inequalities and promoting healthy lifestyle options.

• To provide guidance on appropriate locations for health care facilities.

• To be an important material consideration in the determination of planning applications by setting out a range of potential health and well-being related factors that developers should consider when drawing up development proposals.

Green Infrastructure (GI) Supplementary Planning Guidance (SPG) (Nov 2017)

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 green infrastructure approach combines all these elements to achieve a more joined-up approach to the environment. This approach is increasingly being used in Cardiff and across the UK. In Cardiff, planning advice in this area is often provided by a number of officers from across the Council working together as part of an integrated Green Infrastructure Group. This helps provide a more comprehensive approach.

The new document also differs from previous SPGs by providing 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.

Cardiff and Vale University Health Board Report

The report issued in 2017 examines how making active travel alternatives can lead to sustainable improvements in our health and well-being. The report focuses upon Cardiff's air quality concerns and recognises that alternative sustainable transport is a key enabler to improving air quality.

Planning Guidance for the Provision of Electric Vehicle Charging Points

In November 2018, the Council published a guidance document for developers on the provision of charging points in new developments. This document sets out the Council's expectations on the minimum number of electric charging points that should be provided depending on the nature of the development. The expectations are summarised as follows:

Development Type	**Provision**
Houses	**One electric vehicle dedicated charging point** (up to 7kW (32A) where possible) **or installation of passive wiring** to allow future charging point connection per house with garage or driveway.
Flats	**At least 10% of parking bays** should be provide with dedicated electric vehicle weatherproof charging points.
Commercial Car Parks and Community Facilities	**At least 10% of parking bays** should be provided with dedicated electric vehicle weatherproof charging points.
Public Transport Facilities and Taxi Ranks	Charging infrastructure will be required to facilitate the conversion of bus and taxi fleet, using **appropriate technological solutions at suitable locations across the city.**
Future Proofing	Subject to agreement with the Local Planning Authority standard provision may also require **installation of groundwork/passive wiring at the outset** to enable further future installation to match demand.

One Planet Cardiff Strategy

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 its recommendations and action plan.

In producing the 2021 OPC Strategy the Council has now 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 our commitment to work in partnership with city wide stakeholders to determine a pathway to achieve a Carbon Neutral City by 2030

Local Priorities and Challenges

Challenges

Due to the unprecedented circumstances of the COVID pandemic , this has had an impact on the local air quality monitoring and the delivery of the package of measures sanctioned by Cardiff's Clean Air Plan.

Due to constant dialogue and ongoing collaboration with Welsh Government officials, the Plan remains on course to deliver compliance in the shortest possible time. During the COVID-19 pandemic local air quality monitoring has continued in Cardiff, however some non-automated results for a few selected months in 2020 are not available for reporting due to 'lockdown' measures introduced in the month of March 2020. Local Authorities including SRS at the time of the 'lockdown' measures being imposed looked for official clarity to ascertain if the monitoring was classified as essential in view of quietened road networks which may lead to a favourable bias, as well as difficulties faced by analytical laboratories utilised by SRS which had to adapt their working practises which added to postage delays.

Air quality data collection has been deemed as an essential service by Welsh Government, whereby monitoring was resumed for May 2020. The results for 2020 contained within this report have been ratified accordingly to account for the gaps in the annual datasets incurred by the COVID situation. The exclusion of this data will be further discussed, however at this moment in time, results gathered during the COVID pandemic, where it is apparent that road traffic volumes have decreased significantly are perhaps not representative of a true business as usual scenario which could generate a bias/ underestimate of levels.

Some indicative analysis has been undertaken to ascertain what impact the current pandemic has had on air quality levels, especially within the established AQMAs. Comparative exercises have been undertaken to observe a change in levels between certain time periods, for example the same year comparison distinguishing between pre-covid and covid timeframes, and comparison to previous years' results which examines a pre covid time period with that of a covid impacted time period. To note it is not viewed as a preferable indicator to directly compare to previous years' data given influencing meteorological conditions, however the exercise is useful to populate indicative trends/ visualise impacts.

Figure 6 - Same year Covid comparison (2020)

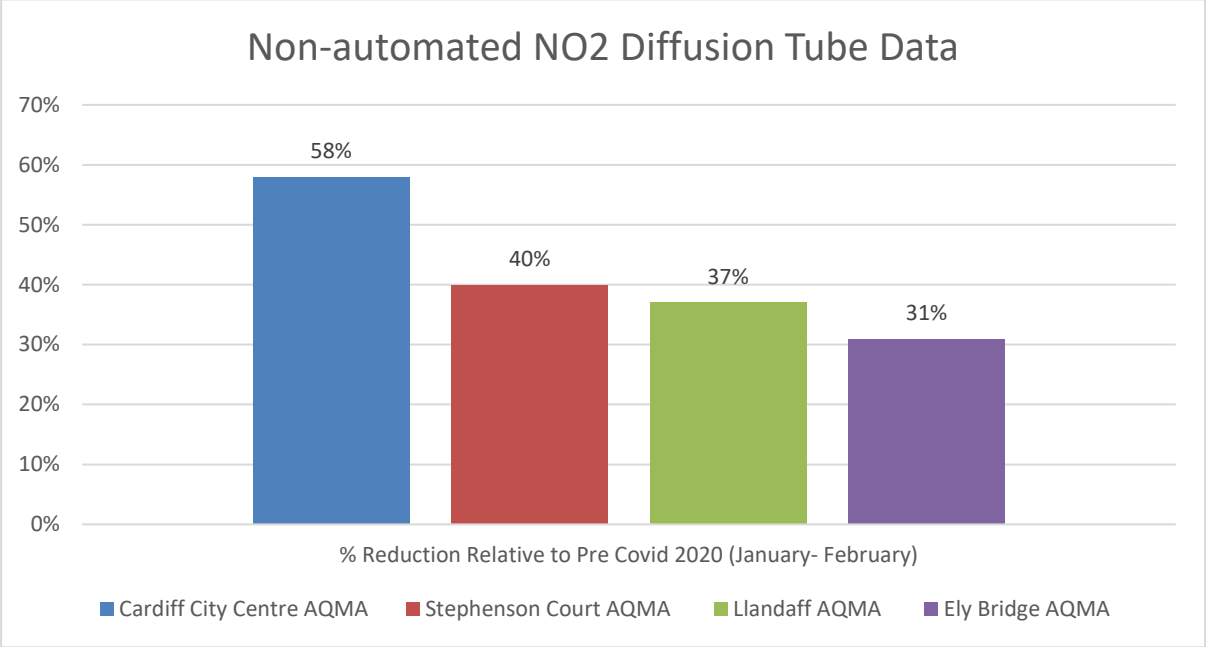
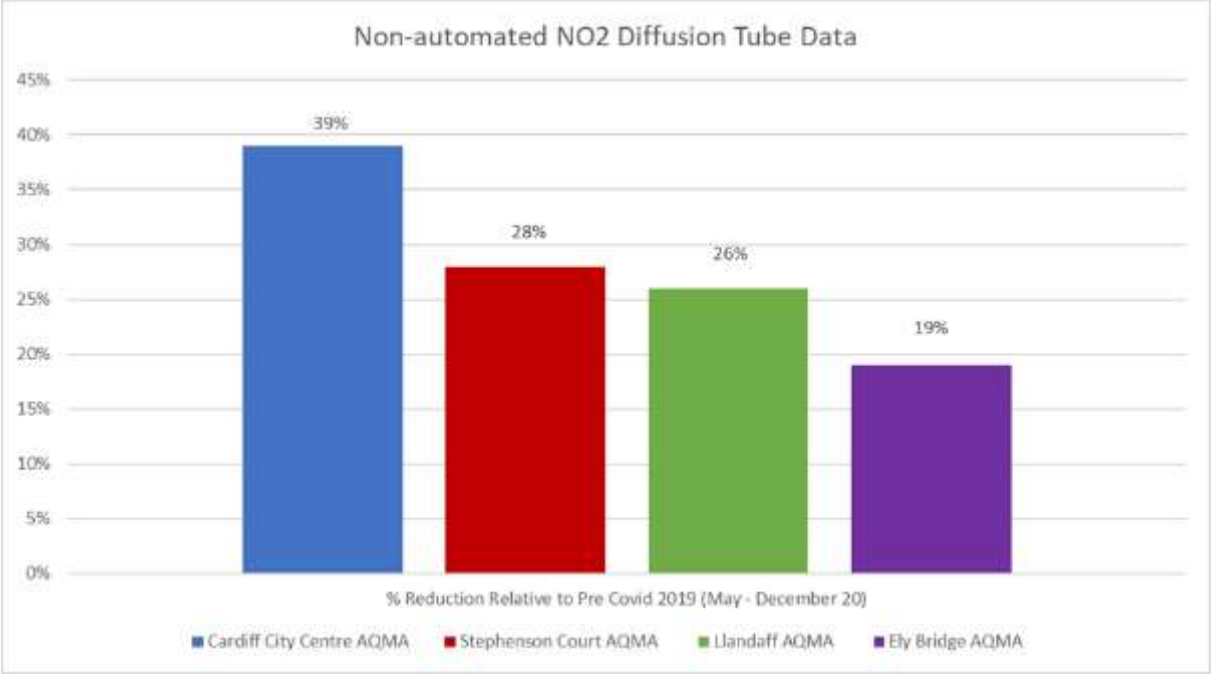


Figure 7- Previous year comparison (2019)



The main priorities for SRS and Cardiff Council in the coming year are;

- Deliver the Clean Air Plan that satisfies the requirements of Welsh Government and the previously described ministerial Direction.
- Once the Clean Air Plan has been delivered to review and update the Clean Air Strategy and Action Plan.
- Implementation of City Wide real time monitoring network.

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 monitoring data for pollutants measured is available at https://airquality.gov.wales/

Table of Contents

Figures

Tables

1 Actions to Improve Air Quality

1.1 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 on the basis of 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 (PM_{10}), there was considerable doubt that the provisional 2010 objectives for PM_{10} would be achieved.

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

Phase 3

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

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

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

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

Phase 4

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

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

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

The 2011 Progress Report highlighted abnormally high NO_2 2010 annual mean concentrations across the Council's monitoring network which could not be attributed to a particular source and evidence was presented to show that this was a regional issue probably associated with a prolonged period of unusually cold weather during November and December 2010. After dialogue with Welsh Assembly Government with regard to the conclusions reached about this data it was concluded that the Council would proceed to Detailed Assessments for the Llandaff and Westgate Street areas of the city and review the situation with regard to other exceedences 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 locations concentrations may have been lower than expected. The 2016 Progress Report showed a number of sites representative of relevant exposure with exceedences of the 40µgm^3 annual mean objective, however these sites and recorded exceedences 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 exceedences of the NO_2 annual mean objective (40µgm^3). These sites are predominantly contained within the declared AQMAs. However, there are four monitoring locations (Site IDs 172, 180, 181, 185) which are not located within AQMAs.

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

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

Site 185 is not representative of relevant exposure and does not apply to the annual mean objective set for NO_2. Therefore, datasets collected at this monitoring location would apply to the 1-hour objective set for NO_2 **(200µg/m3, not to be exceeded more than 18 times per year).**

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

Due to technical issues, Cardiff City Centre's AURN site recorded low data capture for PM_{10} measured by a TEOM- FDMS sampler. The total data capture for the year was 47.1%. As outlined in LAQM (TG16) 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 exceedences 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/m^3).

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

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

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

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

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

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

2019 Annual Progress Report

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

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

2020 Annual Progress Report

The 2020 reported identified that in 2019, out of the 100 diffusion tube monitoring locations, 6 monitoring sites recorded exceedances of the annual average objective set for NO_2 (40 $\mu g/m^3$). All 6 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 9 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 6 schools as part of a citizens science project funded by Natural Resources Wales. Again monitoring at these 6 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.

1.2 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 standard/ objective (See Appendix A)

Based on monitoring results and further detailed assessments, there are currently four Air Quality Management Areas (AQMAs) declared across Cardiff which have all been declared due to exceedances of the annual mean NO_2 Air Quality Standard (40ug/m^3), known to be predominantly derived from road transport sources.

1. **Cardiff City Centre-** declared 1st April 2013
2. **Llandaff**- declared 1st April 2013
3. **Stephenson Court**- declared 1st December 2010

4. **Ely Bridge**- declared 1st Feb 2007

1.3 Implementation of Action Plans

Each of the outlined AQMAs was 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 1– 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	Ongoing	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% modal share in 2015 to 18.4% in 2026. Five cycleways proposed. The INM	CC	Ongoing		Cycle trips generated/ questionnaires	Unknown	Public Consultation undertaken	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
			prioritises cycling and walking routes over 15 year period.								
1.3	School Travel Plans		CC has engaged with 'Living Streets' charity and have developed a 'WOW' (Walk Once a Week) scheme in 7 allocated schools in Cardiff.	CC & Living Streets Charity	Ongoing		Report updates from Living Streets	Unknown	7 allocated schools in Cardiff supported by CC.	Ongoing	
1.4	School Travel Plans		Cardiff Council's Schools Streets Project and its Traffic Regulation	CC	Ongoing		Monthly average NO_2 levels examined at School property, Inside TRO and Outside TRO	Unknown	15 schools assigned to the TRO Zone pilot project.	End of 2021 (Subject to funding, possibly longer)	

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
			Order (TRO) pilot project.				zone at residential facades. Questionnaires for school pupils and parents.				
1.5	Personalised Travel Planning	Promoting Travel Alternatives	Public Service Board Staff Charter.	Public Health Wales/ Vale and Cardiff Health Board	Working initially through Cardiff Public Services Board, a Healthy Travel Charter for Cardiff has been developed with major public sector employers and was launched in April 2019.		Modal shift counts. Number of participating public sector organisations.	Unknown	The Charter was signed by 11 public sector organisations at launch in April 2019, employing over 33,000 staff, with additional public and private sector organisations subsequently invited to sign up to the Charter.		
1.6	Increase awareness of air quality concerns	Public Information	Cardiff 'car-free' day	CC	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%		Try to geographically expand and hold car-free days more regularly in Cardiff.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
									Westgate Street- 13.62% Lower Cathedral Road- +9.14%		
1.7			Tredegarville CIW Primary School "Green Wall" project.	CC	Complete	August 2019	Air quality levels recorded at the school via non-automated principle diffusion tubes.	No target	Successful application under the Landfill Communities Fund to cover the supply and installation of outdoor green walls at Tredegarville CIW Primary School. Successfully installed August 2019.		Investigate monthly average diffusion tube results following implementation.
1.8			Dusty Forge/ Kitchener Primary School	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 elements	CC & WG	2018	2019 (City Centre West Initiated)	FBC	To ensure development does not cause any	All Schemes have been initiated, however due	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
			East side/ City Centre North/ City Centre West)			2020 (city centre north and east initiated)		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.	to the COVID-19 pandemic, schedule of works and final designs are being reviewed.		
2.2	Bus Route Improvement		Improve bus networks and efficiency of the service.	CC	Ongoing		Improvements to air quality levels monitored by indicative methods by CC	Unknown	Bus lanes have been installed on A470, A4119 & A48. Suggested		

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
							at sensitive receptor locations on specified routes.		400m of bus lane ensures each bus with a time advantage of 5 minutes.		
2.3	Public Cycle hire Scheme		Next Bike Hire Scheme	CC & WG	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. 50 E bikes implemented in August 2021	Completed and continues to be expanded and enhanced.	
2.4	Cycle Network		Proposed Cycleways	CC	Ongoing		Cycling trip counts.	3.5% modal shift which aligns with the assumptions derived in the	Cycleway 1 St Andrew's Crescent to Senghennydd Road **(works**	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
								feasibility study.	**are complete for phase 1 of cycleway 1.Phase 2 will be constructed in 21/22** Phase 1 between Cowbridge Road and Western Avenue via Sophia Gardens and Pontcanna Fields has been fully delivered and the Council has completed a detailed consultation on the options for Phase 2 which will		

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
									connect Western Avenue with Llandaff˜ village. report the Council is consulting on Cycleway 5.3 which Cycleway 5.3 - Lawrenny Avenue. This route will link from the city centre westwards and its route along Lawrenny Avenue will benefit Fitzalan pupils and staff, and those of		

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
									Ysgol Pwll Coch **COVID Response** Two routes - the 'Cross City 'and 'Bay Loop' cycleways - are being brought forward as part of the Council's ongoing COVID Recovery plans and are in line with the cycling vision set out in the Council's Transport White Paper.		
2.4	Public transport		New Cardiff Central	CC	Ongoing		Detailed AQAs quantifying the	To ensure development	Planning application received in 2018 for the		S106 funding acquired for the

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
	improvements-interchanges stations and services		Interchange development				level of impact to air quality levels.	does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable	central interchange proposal including new bus station. Planning consent granted subject to approval and discharge of conditions.		amount of £10,000 to enhance air quality monitoring capabilities.
2.5			Cardiff Capital Region Metro - Proposed by WG (Rail and bus based rapid transit routes).	CC & WG	Ongoing			Unknown-supporting AQA will be a likely during the design and application stages	Ongoing	Ongoing	
2.6	20 mph zones	Traffic Management	Implement further speed restrictions and enhance those already established "20mph Zones"	CC	Ongoing		Safety figures & Monthly Average Diffusion tube results.	Unknown	CC has introduced 'signs only' 20mph limits in Cathays and Plasnewydd area. Approach	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
									coincides with the Safe Routes to School Programme. Plans are in place to hopefully expand 20mph limit areas in Grangetown. This is complete.		
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	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
Lower Emission Vehicles											
3.1	Public Vehicle Procurement	Promoting Low Emission Transport	Ultra-Low Emission Bus (ULEB) fund made available by the Department for Transport (DfT).	CC, DfT & Cardiff Bus	Ongoing	Three year rolling programme 2019- 2021	Improvements to air quality levels (NO_2) monitored by indicative methods by CC at sensitive receptor locations on specified routes	Approximately >2µg/m3 reductions in NO_2 sensitive receptor locations along Westgate Street	Application received by DfT and deemed successful. Programme roll out expected quarter 3 2021.		
3.2	Company Vehicle Procurement- Prioritising uptake of low emission vehicles/ EV recharging		Sustainable fuels strategy- assessment of Cardiff Council vehicle fleets	CC	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.	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
									1 E RCV in service with additional 6 vehicles on order. In conjunction with the fleet charging we are currently working on the procurement and orders of as many fleet vehicles as possible		
3.3	EV recharging		Increase EV optimistic charging points for Cardiff residents/ workers.	CC	Ongoing		EV vehicle counts/ EV point usage.	Unknown	Progression of residential EV charging locations has ensured that 10 locations with a total of 18 fast charging points have been installed across the City. Second phase of 5 sites with 1 charge points was being progressed before being impacted by COVID – these		

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
									are now planned for late August/ early September. Pilot project for installation of 6 Rapid Charging stations has been initiated with Enginie. One location has been fully installed with the remaining 5 locations now in final planning stages, and licenses being progressed.		
3.4	Taxi incentive to operate cleaner vehicles		Improve the emission standard profile of Cardiff's licensed Hackney and Private Hire Vehicles. Funding currently allocated to cover operating and maintenance costs over a	CC & WG	Ongoing		Uptake for the funding.	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable	Due to COVID-19, discussions have been initiated to discuss if the allocated grant funding can be best utilised by revising the taxi incentive to a more preferable option.		To achieve greatest air quality improvements zero emission or ULEV classified vehicles need to be incentivised.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date/ Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
			set period for up to 620 vehicles.								
3.5	Cardiff Clean Bus Retrofit Scheme 2020-21	Vehicle Retrofitting programmes	Improve the emissions profile by improving the euro standard composition of bus fleets operated in Cardiff. Via a competitive tender application process, Cardiff Council will administer a retrofit scheme aimed at improving the emission output of bus vehicles	CC & WG	Ongoing		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. Impacts of these buses will be considered as part of 2022 APR		

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
			operated in Cardiff.								
Policy											
4.1	Citywide strategy to reduce emissions and improve air quality	Policy Guidance and Development Control	Cardiff Clean Air Strategy and Action Plan (CASAP)	CC	2018		Recorded Improvements to air quality levels (NO_2) monitored by indicative methods by CC at sensitive receptor locations	Annual average NO_2 levels to be recorded at <35µg/m3 at residential façade locations with specified AQMAs.	Finalised and approved by Cabinet. Submitted to Welsh Government for review.	Ongoing	
4.2	Taxi Licensing Conditions	Promoting Low Emission Transport	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 2022	
4.3	Transport White Paper		The Transport White Paper was launched on 15 January 2020 and lays out an ambitious 10-	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.		

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
			year plan to tackle the climate emergency, reduce congestion and improve air quality.								

2 Air Quality Monitoring Data and Comparison with Air Quality Objectives

2.1 Summary of Monitoring Undertaken in 2020

2.1.1 Automatic Monitoring Sites

In 2020, Cardiff had four automatic air quality monitoring sites located at;

-Frederick Street in the City Centre;

-Richard's Terrace, just off Newport Road;

-Castle Street, Cardiff City Centre; and

-Lakeside Primary School.

Cardiff Frederick Street (Urban Background)- AURN 1

The site was commissioned in May 1992 and monitors on a 24/7 basis measuring levels of NO_2, PM_{10} & $PM_{2.5}$, SO_2, CO and O_3 feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Richard's Terrace, Newport Road (Urban Traffic)- AURN 2

The site monitors on a 24/7 basis measuring levels of NO_2 & PM_{10} at that location, feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

Castle Street, Cardiff City Centre (Roadside)- Site 3

The site was commissioned in October 2020 and monitors on a 24/7 basis measuring levels of NO_2, PM_{10} & $PM_{2.5}$ at that location forming part of the Welsh Automated Monitoring Network.

Both sites AURN 1 & 2 are subject to six-monthly QA/QC audits by AEA, DEFRA's appointed contractor, and calibration gases are all traceable to National Standards. Calibrations have been carried out fortnightly by the appointed contractor.

For 2020, the Cardiff City Centre, Frederick Street Station achieved data capture levels for NO_2 and PM_{10} at 84% and 89%. The Newport Road site captured levels for NO_2 and PM_{10} at 99% and 95%. Given its late commissioning, the Castle Street site captured levels for NO_2 and PM_{10} at 20% and 20%.

Figure 8- Location of Cardiff City Centre AURN Monitoring Site (AURN 1)

Figure 9- Location of Cardiff Newport Road AURN Monitoring Site (AURN 2)

Figure 10- Location of Castle Street, Cardiff City Centre Monitoring Site (Site 3)

Cardiff Lakeside (Urban Background)

The site monitors on a 24/7 basis measuring levels of Polycyclic aromatic hydrocarbons (PAH) at that location, feeding data directly into Defra's PAH Digitel (solid phase) Network. SRS serve as a local site operator to this site, however data interpretation is sanctioned by the consultants Ricardo Energy and Environment Ltd, whereby concentrations are compared to the national air quality objective for B[*a*]P in ambient air, based on an annual mean concentration of 0.25ng/m^3. Details can be found in the UK

Air Quality Strategy (Defra, 2007). Therefore, the purpose of this site and results derived are not corresponded to any of the limit values outlined for the purposes of LAQM in Wales.

Summarised results for various pollutants for the outlined automatic monitoring stations can be found at http://www.welshairquality.co.uk & https://uk-air.defra.gov.uk/interactive-map

Additional Automated Monitors

.In addition to the newly commissioned automated monitoring station on Castle Street, Cardiff Council has acquired the use of 6 near real time indicative air quality analysers. 5 analysers were purchased with the financial support of Welsh Government and the 6th analyser was facilitated by the SRS who had successfully accrued funding via a S106 planning contribution. The analysers have been specifically placed and represent relevant exposure. The analysers continuously monitor for Nitric Oxide, Nitrogen Dioxide & Ozone, PM10 & PM2.5, and do so every 15 minutes (data uploaded every hour). Information regarding the specification of the monitors can be viewed at https://www.aqmesh.com/product/. These monitors do not form part of the regulated Welsh automated monitoring network, but as specified they are an indicative form of monitoring and a useful tool to look at datasets on a high-resolution basis. An online platform to access the available datasets is yet to be finalised with Cardiff Council's webpage development team.

Co-location Study

There are three diffusion tubes co-located at the Cardiff City Centre, Frederick Street station, whereby at the end of year, depending on data capture and precision, a locally derived bias adjustment factor is calculated. Due to insufficient data capture <90% for the Cardiff City Centre AURN, in accordance with Defra's LAQM (TG16), Box 7.11 it is preferable not to perform a co-location study due to concerns associated with the data quality. The National Bias Adjustment Factor supplied by the LAQM Defra website, based on 42 studies, which appointed Socotec UK Ltd Didcot laboratory, gave a figure of 0.75 and so this has been adopted for ratification purposes. In order to provide a conservative approach it was therefore decided to adopt the nationally derived bias adjustment factor as this would give slightly higher concentrations and fundamentally represent a worst case scenario.

Table 2- 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 Centre AURN	Urban Background	318416	176525	NO_2	N	Chemiluminescence	Y (5m)	200m	N
				PM_{10}, $PM_{2.5}$	N	TEOM- FDMS	Y (5m)	200m	N
				SO_2	N	UV Fluorescence	Y (5m)	200m	N
				CO	N	Infra-Red GFC	Y (5m)	200m	N
				O_3	N	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}	N	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
				$PM_{10,}$ $PM_{2.5}$	N	Beta Attenuation Monitor with Gravimetric Equivalence	Y(2m)	2m	Y

2.1.2 Non-Automatic Monitoring Sites

In 2020 there were 92 specifically allocated non automatic monitoring sites across Cardiff which monitored levels of nitrogen dioxide (NO_2). These sites are supported and maintained by SRS on behalf of the CC. The non-automatic sites do not provide live data; instead they consist of diffusion tubes which are placed at each of the sites, collected and replaced on a rolling monthly basis. The results derived from the tube sampling are then averaged over the year to enable a comparison of the results against the annual average **(40µg/m^3)** and 1-hour **(200µg/m^3 not to be exceeded > 18 times per year)** air quality objectives for NO_2.

2.1.2.1 Analysis of Diffusion Tubes

Annual Average- Once erroneous data have been deleted, it is necessary to calculate the annual average. The data need to be annualised, and then bias corrected. In order to do this, firstly the annual average is calculated for all sites.

Annualisation- Where valid data capture for the year is less than 75% (9 months), where necessary the continuous and NO_2 diffusion tube monitoring data have been ''annualised'' following the methods as described in Defra's LAQM (TG16), Boxes 7.9 & 7.10.

Bias Adjustment- After annualisation, the diffusion tubes should be corrected for bias. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. This should not be confused with precision, which is an indication of how similar the results of duplicate or triplicate tubes are to each other. While it is possible to adjust diffusion tube results to account for bias, it is not possible to correct for poor precision. A spreadsheet-based tool has been developed that allows local authorities to easily calculate the bias and precision of their tubes.

There are two bias adjustment figures made available to Local Authorities. Firstly there is the Local Authorities' local bias adjustment figure calculated using a co-location study at a local reference automated site (Frederick Street being the site used in Cardiff), and secondly there is the national bias adjustment factor derived by all individual co-location studies undertaken that utilise the same laboratory and analytical techniques for diffusion tube analysis. It must be decided which factor to use based upon quality assurance and increased certainty.

There are three diffusion tubes co-located at the Cardiff City Centre, Frederick Street station to determine a locally derived bias adjustment factor. The bias adjustment factor applied to Cardiff's 2019 data is 0.75. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 09/20 as appose to the local derived bias adjustment factor. Due to insufficient data capture <90% at the Frederick Street site during 2019, in accordance with Defra's LAQM (TG16), Box 7.11 it is preferable not to perform a co-location study due to concerns associated with the data quality. The National Bias Adjustment Factor supplied by the LAQM Defra website, based on 42 studies, which appointed Socotec UK Ltd Didcot laboratory, gave a figure of 0.75 and so this has been adopted for ratification purposes.

Distance Correction- Where an exceedance is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure has been estimated based on the "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html).The procedure is described in LAQM (TG16), Section 7.77-7.79.

2.1.2.2 Sampling

It is important to site the diffusion tube in an area that is representative of relevant public exposure and therefore corresponds to the annual mean objective. 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 Local Air Quality Management Technical Guidance 16, February 2018. The designated monitoring locations have been assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. The document 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."

In accordance with LAQM TG 16;

The site should be open to the sky, with no overhanging vegetation or buildings. It is important to place diffusion tubes where there is free circulation of air around the tube, but the opposite extreme should also be avoided, i.e. areas of higher than usual turbulence. For this reason, the tube should not be located on the corner of a building. Care should be taken to avoid any very localised sources, sinks of NO2, or disturbances to the airflow. For example, tubes should be mounted greater than 10m from the following:

-Heater flues (particularly low-level balanced flues);

-Bushes or trees overhanging or surrounding the tube location;

-Air conditioning outlets;

-Extractor vents; or

-Underground ventilation shafts.

The location, site description and data gathered since January 2019 are given in **Table 2**. The data has been gathered over a period of 12 months between January and December 2019, adhering to specific monitoring dates controlled by Defra.

2.1.2.3 Laboratory Methods and Analysis of Diffusion Tubes

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

Figure 11- Map Showing Location of Diffusion Tubes in and around the Cardiff City Centre AQMA

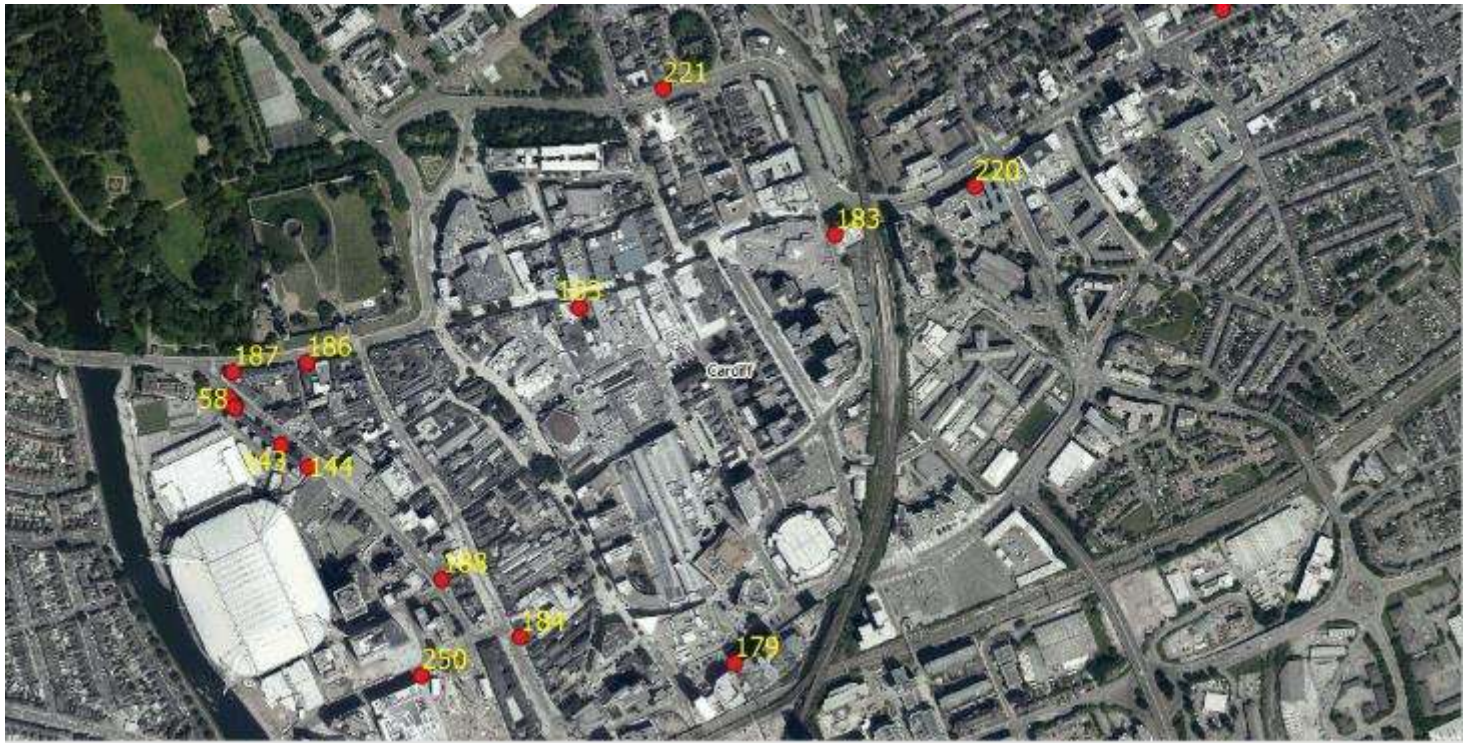


Figure 12- Map Showing Location of Diffusion Tubes in and around the Ely Bridge AQMA

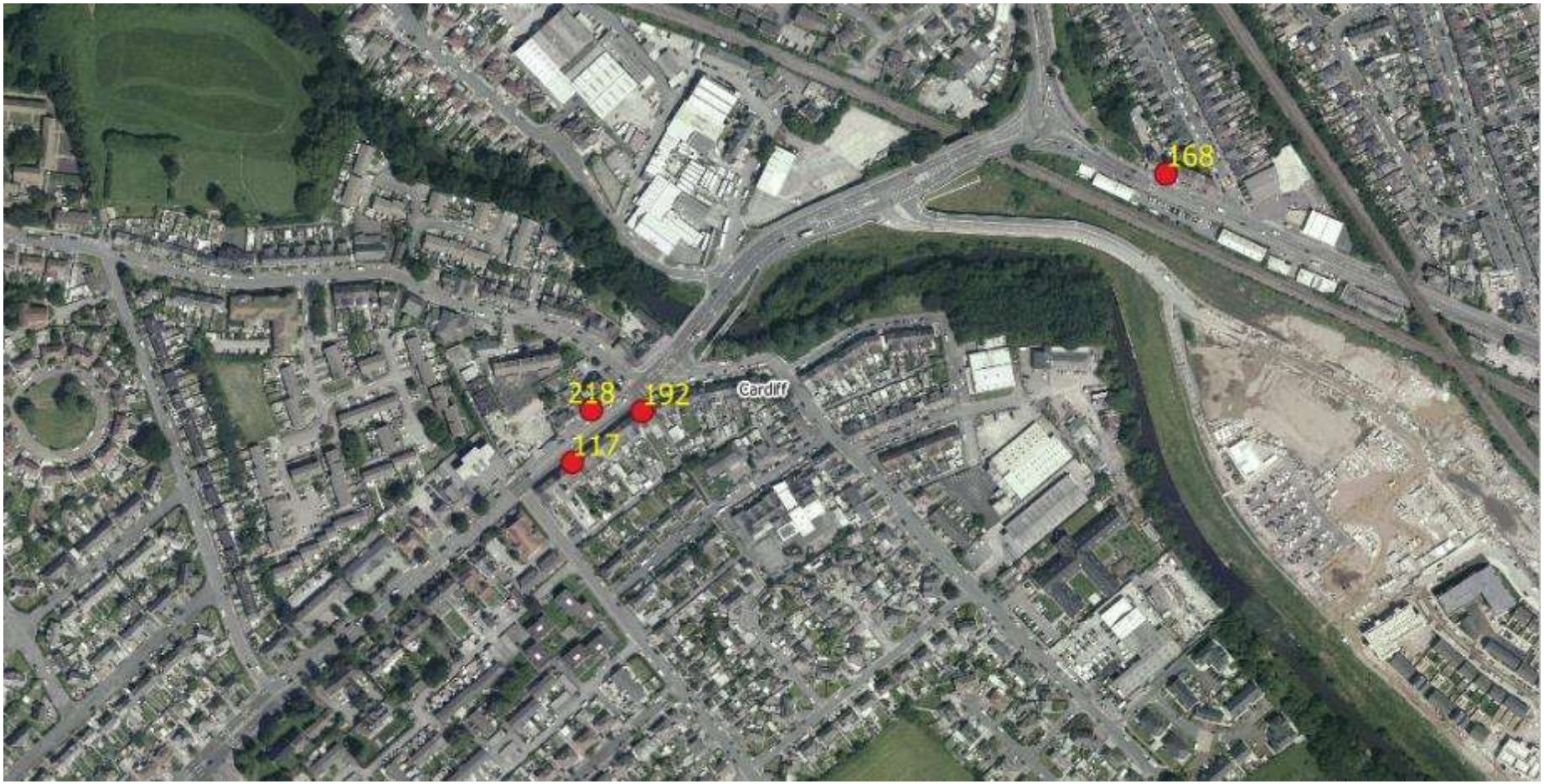

168
218
192
Cardiff
117

Figure 13- Map Showing Location of Diffusion Tubes in and around the Stephenson Court AQMA

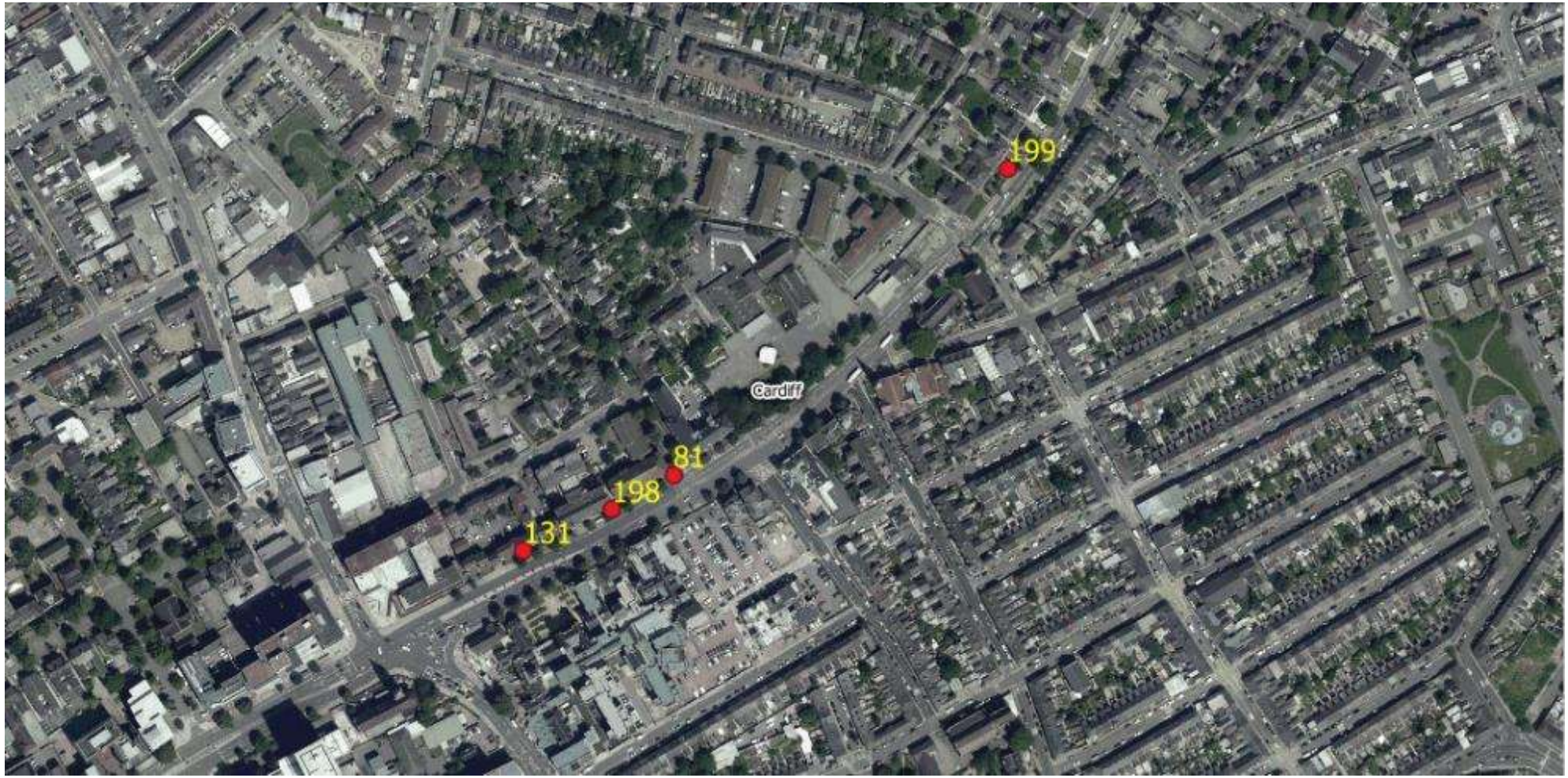


Figure 14- Map Showing Location of Diffusion Tubes in and around the Llandaff AQMA

Figure 15- Map Showing Location of Diffusion Tubes on Cowbridge Road West

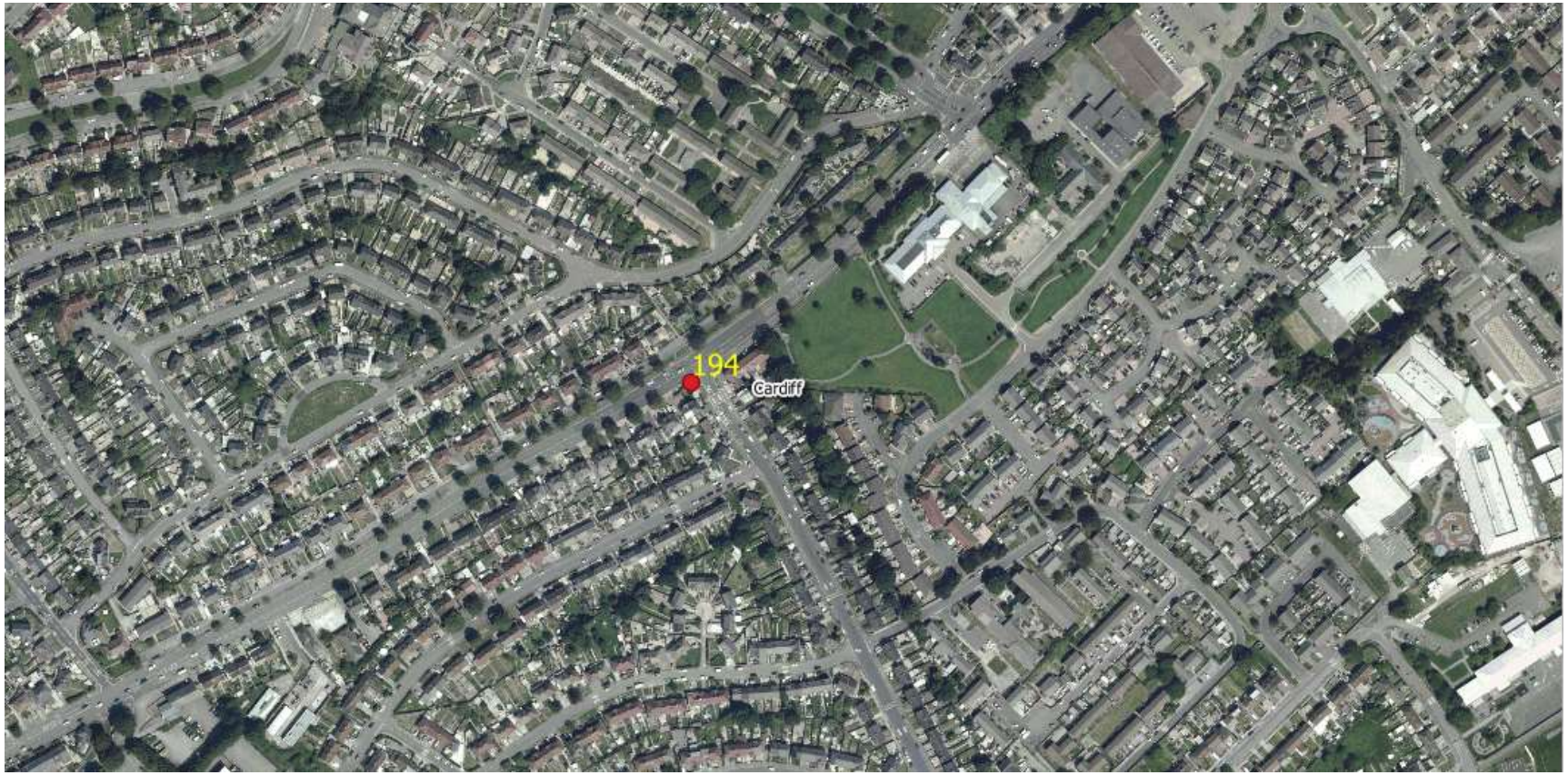


Figure 16- Map Showing Location of Diffusion Tubes in Western Avenue

.

Figure 17- Map Showing Location of Diffusion Tubes in Fairwater

Figure 18- Map Showing Location of Diffusion Tubes in Llandaff and Cardiff Road

Figure 19- Map Showing Location of Diffusion Tubes in Cathays and Gabalfa Areas

Figure 20- Map Showing Location of Diffusion Tube in Riverside

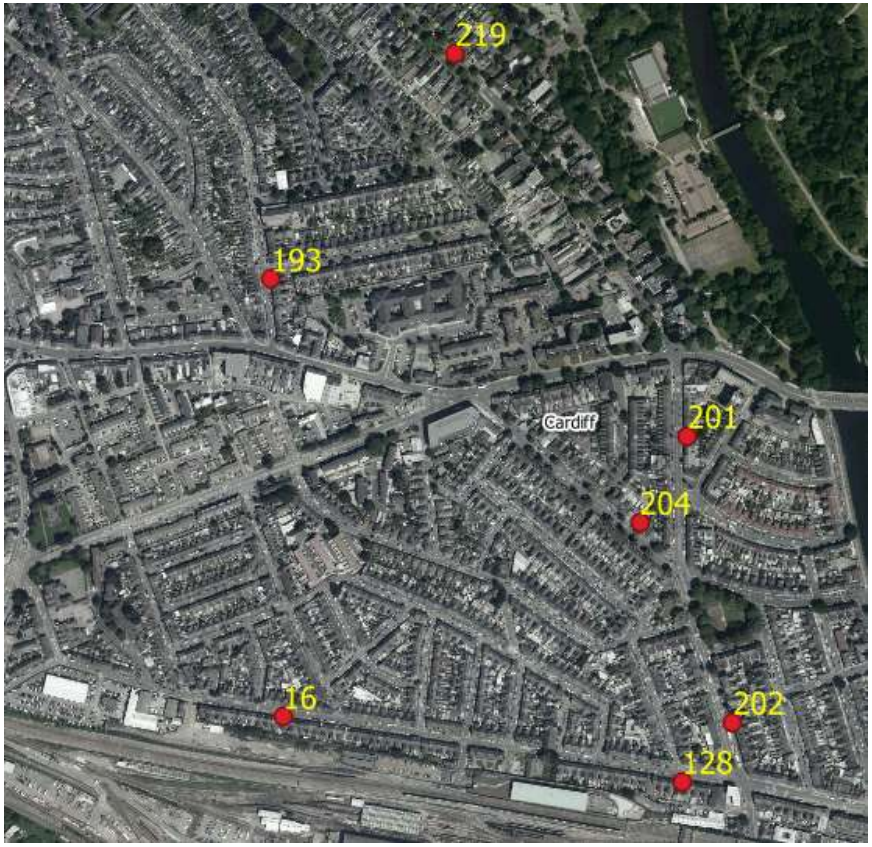


Figure 21- Map Showing Location of Diffusion Tubes in Canton

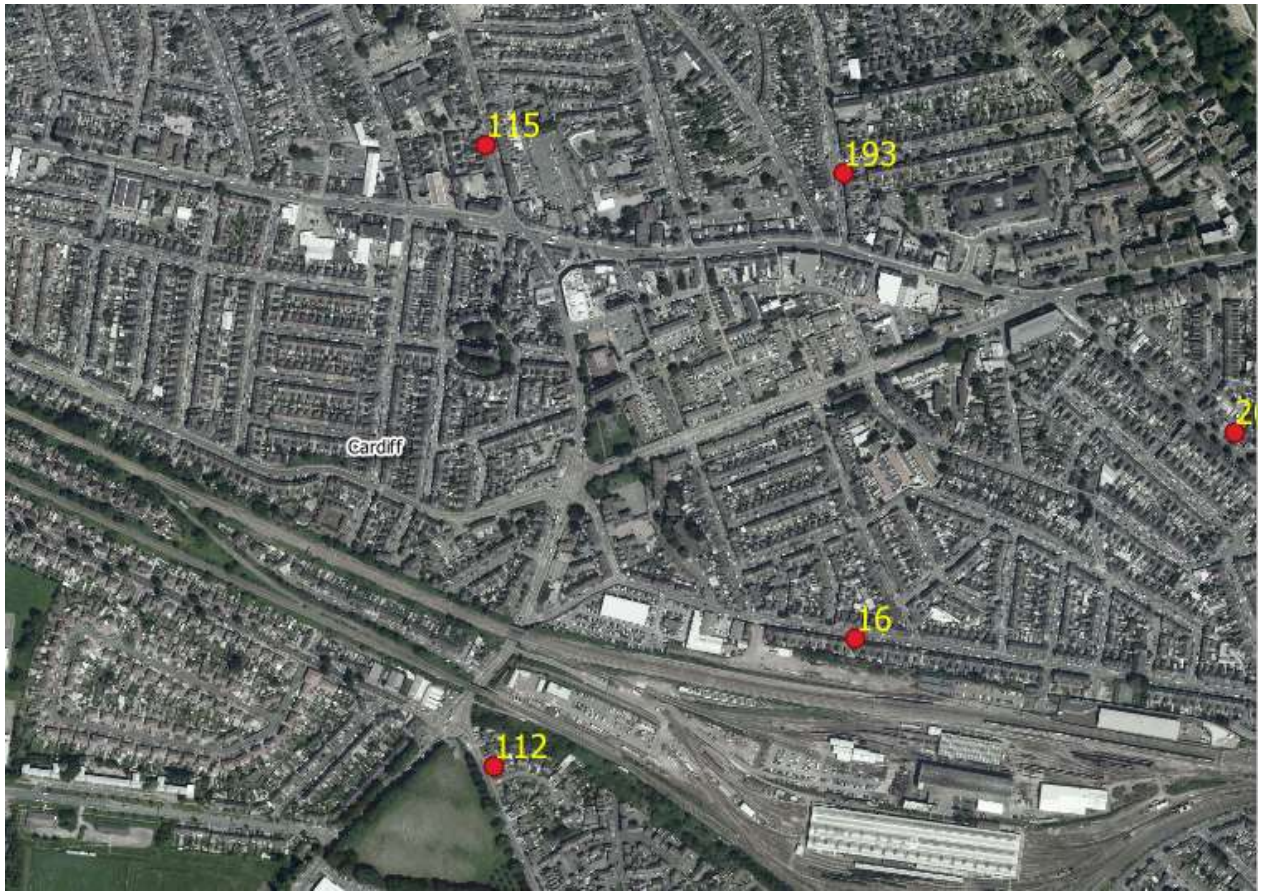


Figure 22- Map Showing Location of Diffusion Tubes in Fairoak Road Area,

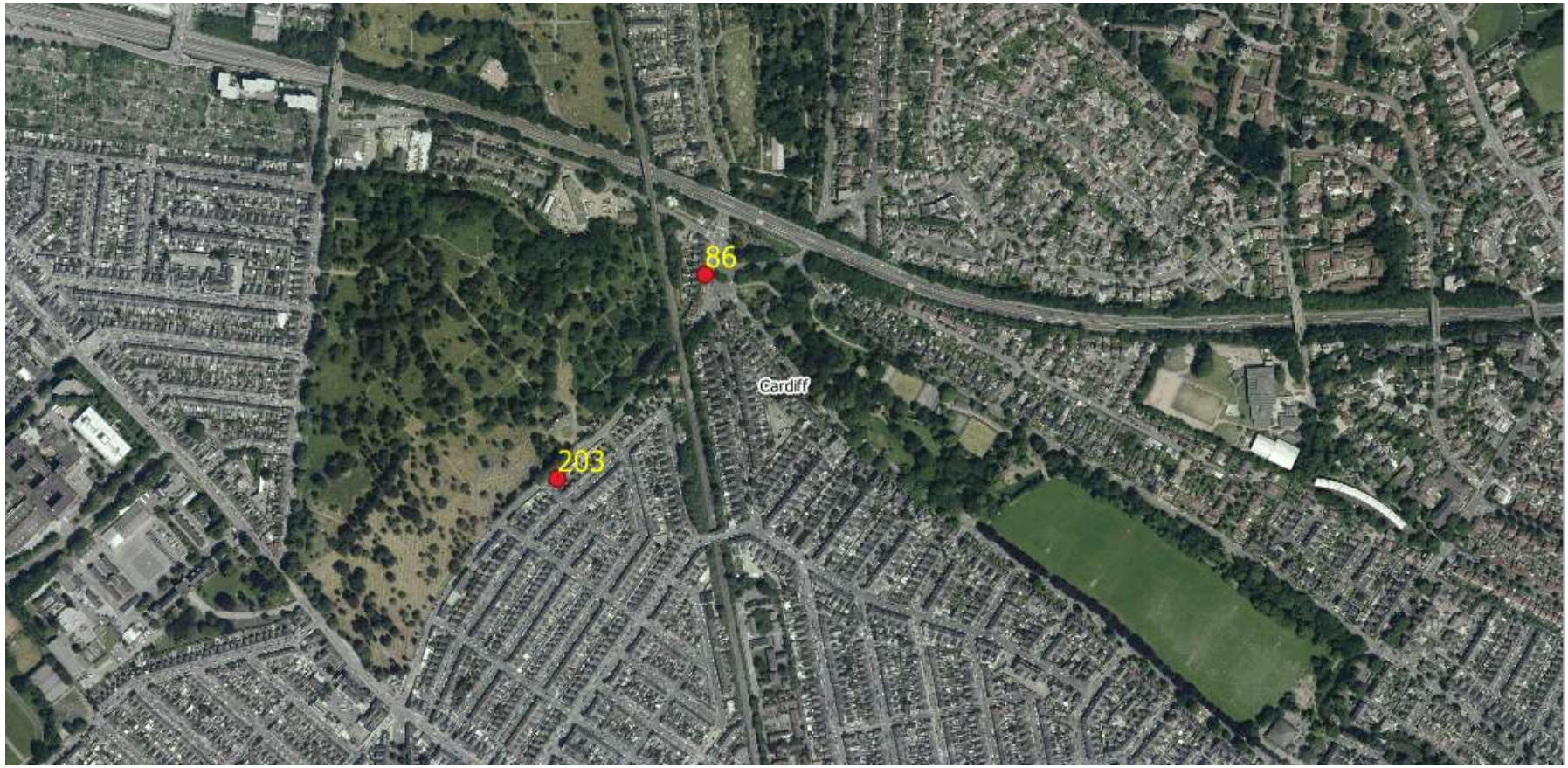


Figure 23- Map Showing Location of Diffusion Tubes in Penylan

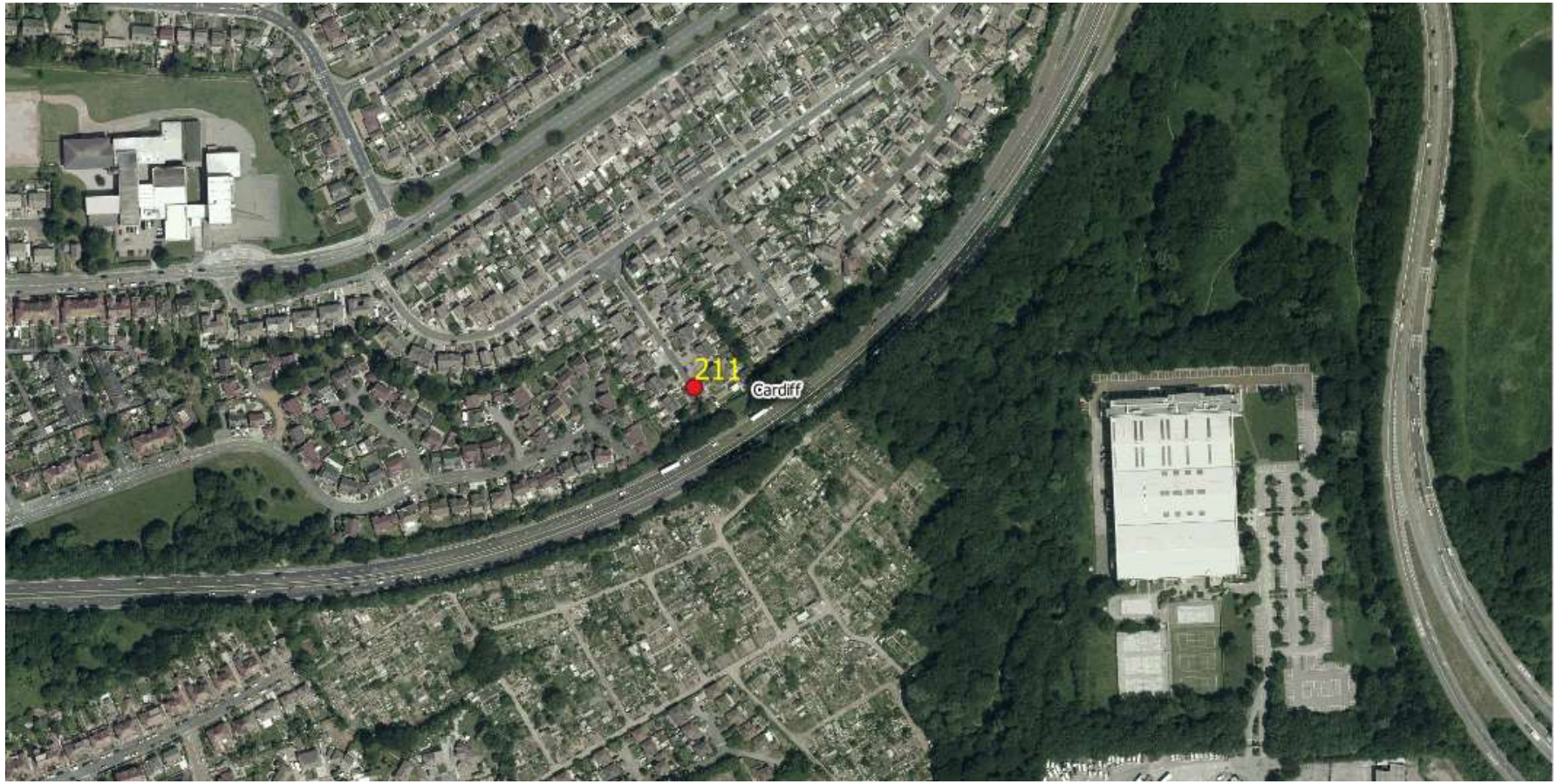


Figure 24- Map Showing Location of Diffusion Tubes in Heath and Caerphilly Road area

Figure 25- Map Showing Location of Diffusion Tubes in Butetown

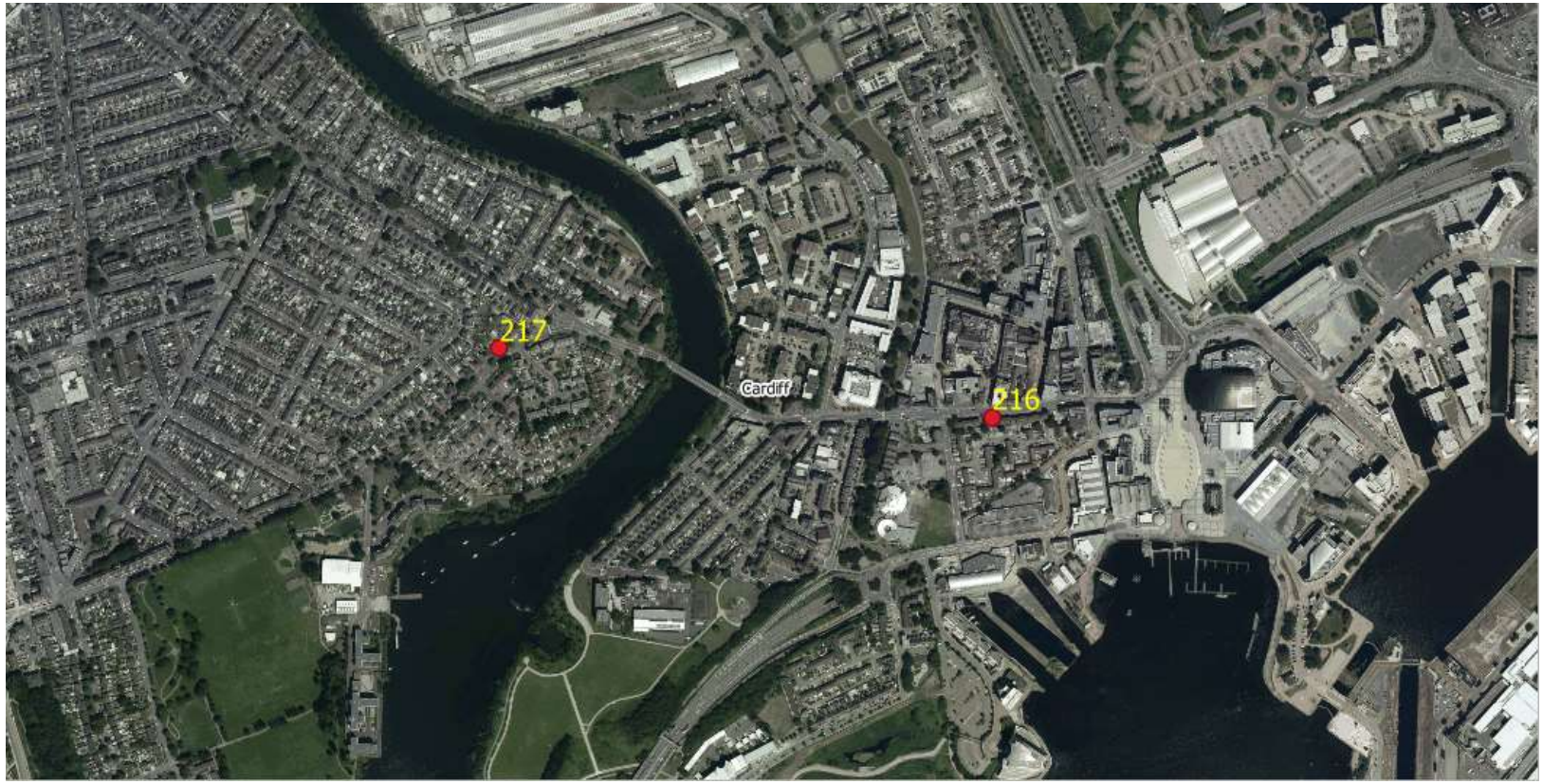


Figure 26- Map Showing Location of Diffusion Tubes around Newport Road

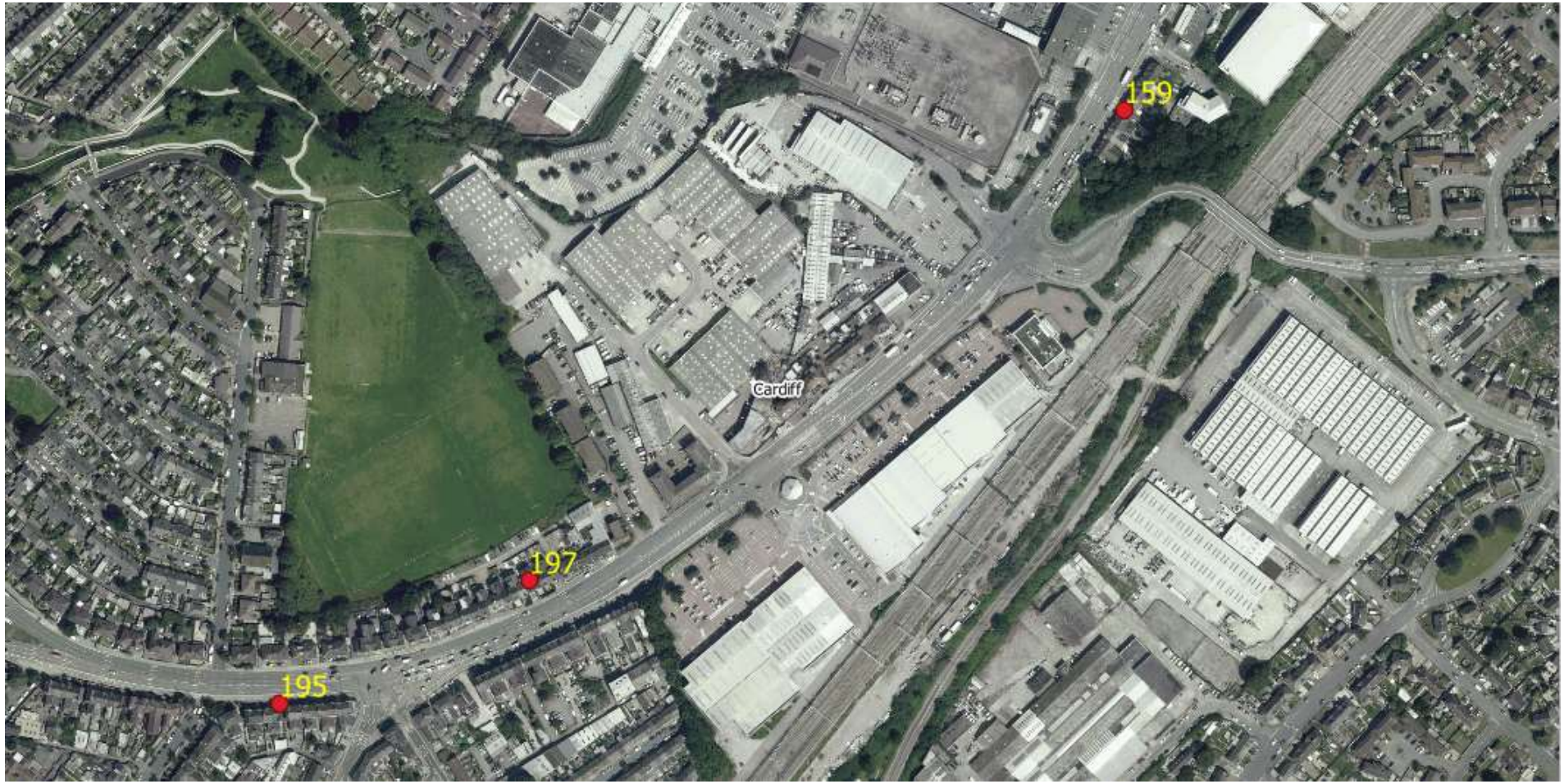


Figure 27- Map Showing Location of Diffusion Tube in Grangetown/ Penarth Rd

Figure 28- Map Showing Location of Diffusion Tubes on Wentloog Road/ Rhymney

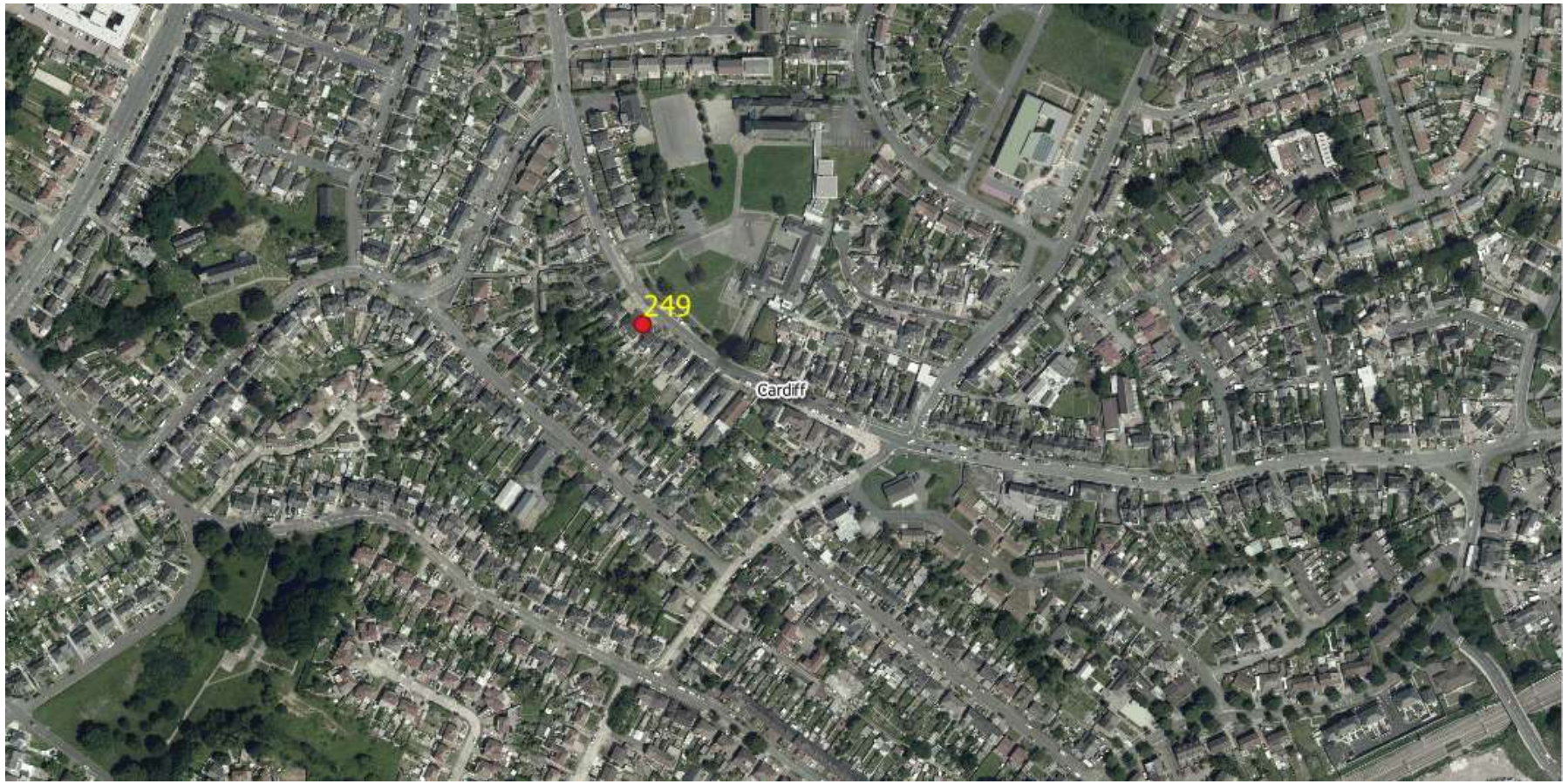


Figure 29- Map Showing Location of Diffusion Tube on Heol Isaf Road, Radyr

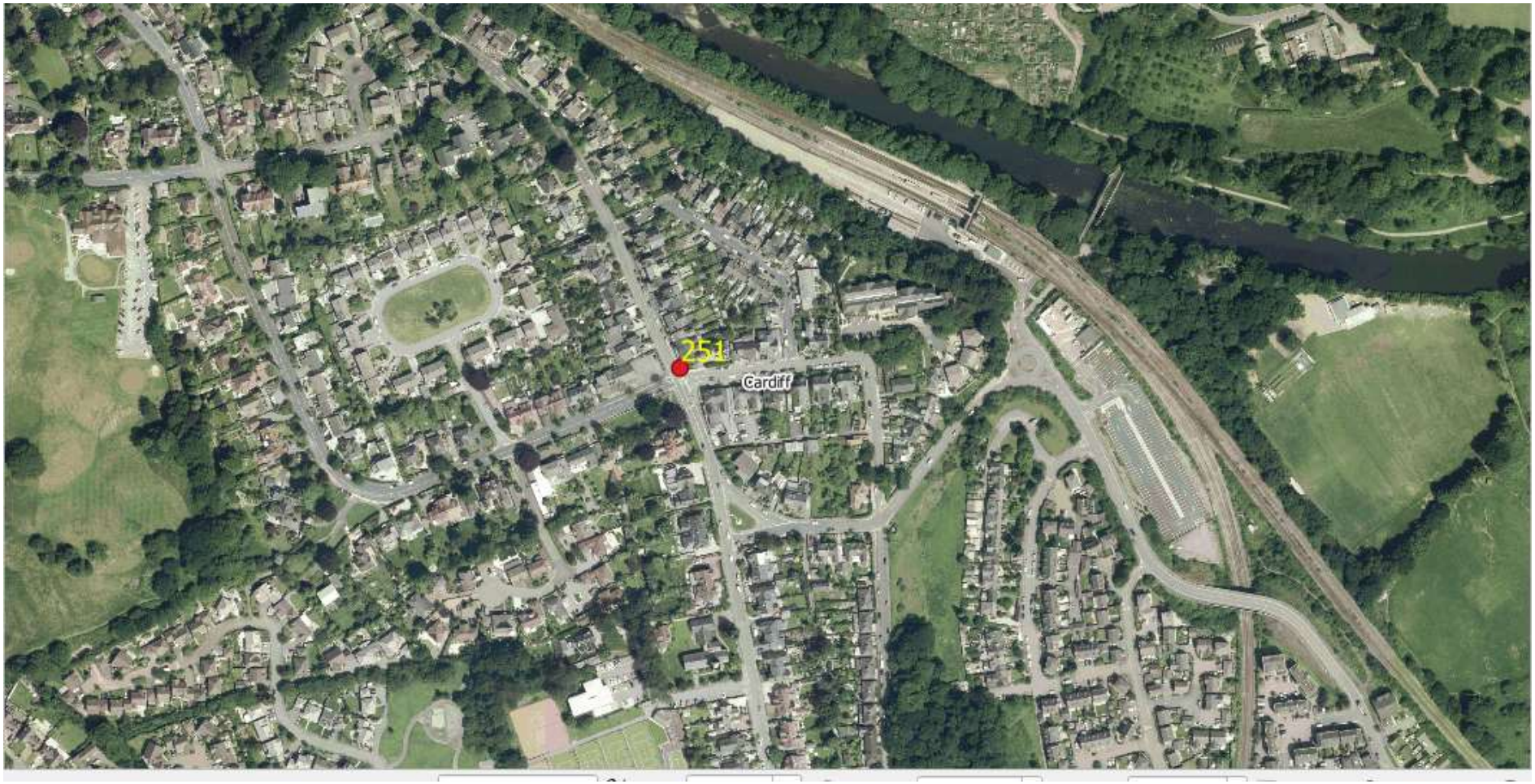


Figure 30- Map Showing Location of Diffusion Tubes in Splott, Willows Avenue

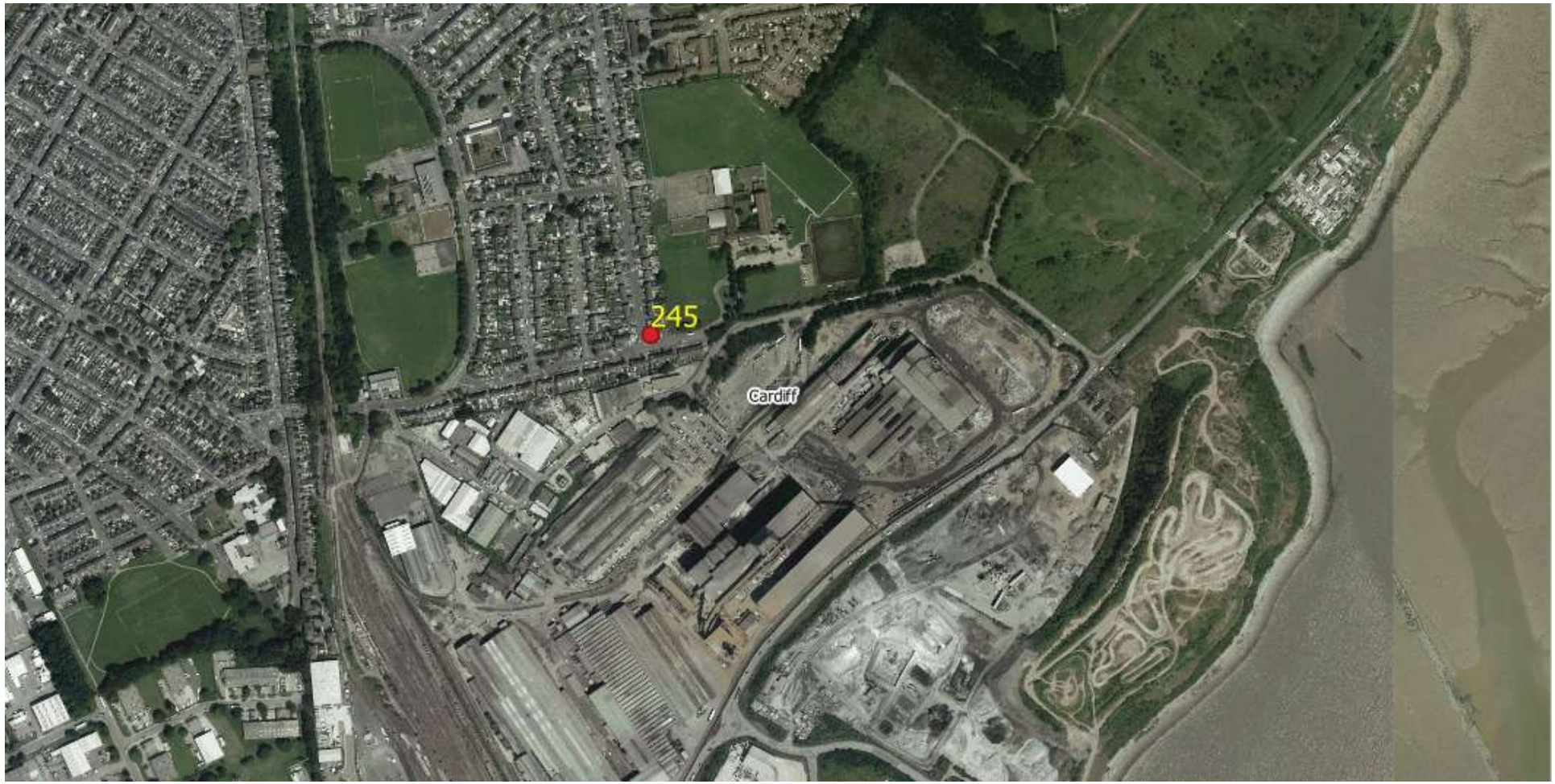


Figure 31 – Map of TRO School monitoring diffusion tube locations within Whitchurch Lower School and Ysgol Melin Gruffyd Primary School

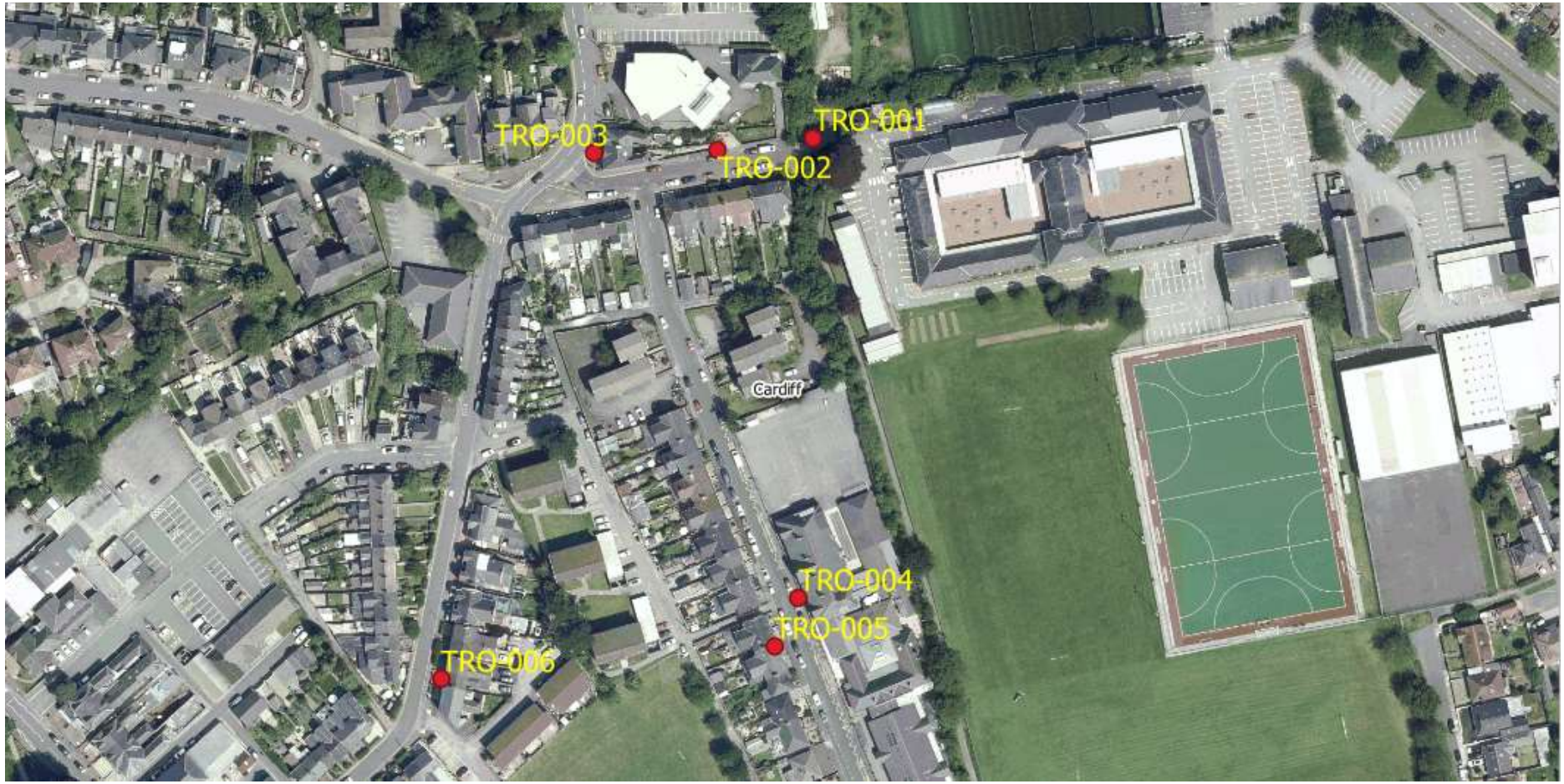


Figure 32 Map of TRO School monitoring diffusion tube locations within Peter Lea Primary School Zone

Figure 33 - Map of TRO School monitoring diffusion tube locations within Llandaff Church in Wales Primary School Zone

Figure 34 Map of TRO School monitoring diffusion tube locations within Pencaeru Primary School Zone

Figure 35 - Map of TRO School monitoring diffusion tube locations within Llansdowne Primary School Zone

Table 3- Details of Non-Automatic Monitoring Sites 2020

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
16	Ninian Park Road	Roadside	317040	176060	1.5	NO_2	N	N	Y (0.05m)	5m	Y
49	Penarth Road	Roadside	317760	175310	1.5	NO_2	N	N	Y (0.05m)	7m	Y
58	Westgate Street	Kerbside	317937	176400	2.5	NO_2	Y	N	N (5m)	0.5m	Y
81	Stephenson Court	Roadside	319387	176980	2.0	NO_2	Y	N	Y (0.05m)	5m	Y
86	19 Fairoak Road	Roadside	318452	178805	1.5	NO_2	N	N	Y 0.10m)	10m	Y
96	Manor Way Junction	Roadside	316601	179653	1.5	NO_2	N	N	Y (0.05m)	5m	Y
98	Western Avenue (premises)	Roadside	314805	177345	1.5	NO_2	N	N	Y (0.05m)	10m	Y
99	Cardiff Road Llandaff	Roadside	315275	178117	1.5	NO_2	Y	N	Y (0.05m)	3m	Y
101	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO_2	N	Y, Triplicate with Tubes 102 & 103	Y (0.10m)	200m	Y
102	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO_2	N	Y, Triplicate with Tubes 101 & 103	Y (0.10m)	200m	Y
103	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO_2	N	Y, Triplicate with Tubes 101 & 102	Y (0.10m)	200m	Y
106	30 Caerphilly Road	Roadside	316851	179520	1.5	NO_2	N	N	Y (0.05m)	5m	Y
112	17 Sloper Road	Roadside	316613	175910	1.5	NO_2	N	N	Y (0.05m)	5m	Y
115	21 Llandaff Road	Roadside	316604	176641	1.5	NO_2	N	N	Y (0.05m)	3m	Y
117	25 Cowbridge Road West	Roadside	314458	176735	2.0	NO_2	Y	N	Y (0.05m)	2m	Y
126	Westgate Street Flats	Roadside	317946	176387	1.5	NO_2	Y	N	Y (0.10m)	5m	Y
128	117 Tudor Street	Roadside	317540	175979	1.5	NO_2	N	N	Y (0.05m)	5m	Y
131	Dragon Court	Roadside	319292	176932	1.75	NO_2	Y	N	Y (0.05m)	5m	Y
143	Windsor House	Roadside	318009	176337	1.5	NO_2	Y	N	Y (0.10m)	6.5m	Y
144	Marlborough House	Roadside	318046	176307	1.5	NO_2	Y	N	Y (0.10m)	6.5m	Y
147	211 Penarth Road	Roadside	317636	175161	1.5	NO_2	N	N	Y (0.10m)	7.0m	Y
148	161 Clare Road	Roadside	317695	175389	1.5	NO_2	N	N	Y (0.05)	5.0m	Y
149	10 Corporation Road	Roadside	317764	175174	1.5	NO_2	N	N	Y (0.05)	4.6m	Y
156	2a/4 Colum Road	Roadside	317997	177412	1.5	NO_2	N	N	Y (0.10m)	5.0m	Y
157	47 Birchgrove Road	Roadside	316605	179703	1.5	NO_2	N	N	Y (0.10m)	8.0m	Y
158	64/66 Cathays Terrace	Roadside	318093	177716	1.5	NO_2	N	N	Y (0.05m)	3.0m	Y
159	IMO façade replacement	Roadside	320709	177918	1.5	NO_2	N	N	Y (0.10m)	4.0m	Y
166	163 Lansdowne Road	Roadside	315950	176424	1.5	NO_2	N	N	Y (0.05m)	5.4m	Y

168	570 Cowbridge Road East	Roadside	314856	176929	1.5	NO_2	N	N	Y (0.05m)	4.8m	Y
174	76 North Road	Kerbside	317508	177868	1.5	NO_2	N	N	Y (0.1m)	1m	Y
179	Altolusso, Bute Terrace	Roadside	318627	176039	2.0	NO_2	N	N	N (5.1m)	2.1m	N
183	Station Terrace	Kerbside	318765	176623	2.0	NO_2	N	N	N (5.5m)	0.5m	Y
184	Hophouse, St Mary Street	Roadside	318335	176074	2.0	NO_2	Y	N	Y (0.05m)	3.0m	Y
186	Dempsey's Public House, Castle Street	Roadside	318044	176449	2.0	NO_2	Y	N	Y (0.05m)	2.90m	Y
187	Angel Hotel	Roadside	317944	176436	2.0	NO_2	Y	N	Y (0.05m)	2.85m	Y
188	Westgate Street (45 Apartments)	Roadside	318229	176154	1.8	NO_2	Y	N	Y (0.05m)	3.30m	Y
190	3 Pearson Street	Kerbside	319056	177343	2.0	NO_2	N	N	Y (0.05m)	0.75m	Y
191	7 Mackintosh Place	Roadside	318724	177776	2.0	NO_2	N	N	Y (0.05m)	3.0m	Y
192	3 Cowbridge Road West	Roadside	314505	176769	2.0	NO_2	Y	N	Y (0.05m)	3.0m	Y
193	24 Kings Road	Roadside	317025	176607	2.0	NO_2	N	N	Y (0.05m)	3.0m	Y
194	115 Cowbridge Road West	Roadside	313870	176212	2.0	NO_2	N	N	Y (0.05m)	12.5m	Y
195	244 Newport Road	Roadside	320147	177523	2.0	NO_2	N	N	Y (0.05m)	6.0m	Y
196	2 Pencisely Road	Roadside	316223	177305	2.0	NO_2	N	N	Y (0.05m)	6.5m	Y
197	GFF 369 Newport Road	Roadside	320313	177605	2.0	NO_2	N	N	Y (0.05m)	6.5m	Y
198	Next Building to Stephenson Court	Roadside	319348	176958	2.0	NO_2	Y	N	Y (0.05m)	4.6m	Y
199	157 Newport Road	Roadside	319599	177174	2.0	NO_2	N	N	Y (0.05m)	12.6m	Y
200	350 Whitchurch Road	Roadside	317038	179073	2.0	NO_2	N	N	Y (0.05m)	3.5m	Y
201	23 Lower Cathedral Road	Roadside	317547	176411	2.0	NO_2	N	N	Y (0.05m)	3m	Y
202	22 Clare Street	Roadside	317604	176053	2.0	NO_2	N	N	Y (0.05m)	3.5m	Y
203	10 Fairoak Road	Roadside	318255	178533	2.0	NO_2	N	N	Y (0.05m)	4.5m	Y
204	53 Neville Street	Roadside	317487	176303	2.0	NO_2	N	N	Y (0.05m)	5m	Y
207	42 Waungron Road	Roadside	314769	177343	2.0	NO_2	N	N	Y (0.05m)	6.8m	Y
208	2 Llantrisant Road,Llandaff	Roadside	315152	178245	2.0	NO_2	Y	N	Y (0.05m)	3m	Y
209	178 North Road	Roadside	317200	178537	2.0	NO_2	N	N	Y (0.05m)	3.5m	Y

210	485 Caerphilly Road	Roadside	316692	181088	2.0	NO_2	N	N	Y (0.05m)	7.5m	Y
211	19 Well Wood Close, Penylan	Roadside	320247	178903	2.0	NO_2	N	N	Y (0.05m)	28m	Y
212	62 Bridge Road	Kerbside	315197	178221	2.0	NO_2	Y	N	Y (0.05m)	1m	Y
213	Birchgrove Village	Roadside	316814	180012	2.0	NO_2	N	N	Y (0.05m)	6.5m	Y
214	Mitre Place,Llandaff	Roadside	315254	178153	2.0	NO_2	Y	N	Y (0.05m)	3.5m	Y
216	Lampost Adjacent to James St Flats	Roadside	318976	174596	2.0	NO_2	N	N	N (6.5m)	1.0m	N
217	7 Avondale Road	Roadside	318312	174688	2.0	NO_2	N	N	Y (0.05m)	6.8m	Y
218	16-18 Cowbridge Road West	Roadside	314471	176770	2.0	NO_2	Y	N	Y (0.05m)	4.2m	Y
219	Pontcanna Inn Lampost	Kerbside	317256	176889	2.0	NO_2	N	N	N (10m)	1m	N
220	Fitzalan Court Newport Road	Kerbside	318955	176689	2.0	NO_2	N	N	N (6.5m)	1m	N
221	Stuttgarter Strasse (New student flats)	Kerbside	318530	176823	2.0	NO_2	N	N	N (8m)	1m	N
223	St Fagans Road, Fairwater	Roadside	313668	177468	2.0	NO_2	N	N	Y (0.05m)	12.2m	Y
224	110 Cardiff Road	Roadside	315714	177738	2.0	NO_2	N	N	Y (0.05m)	4m	Y
243	25 Cardiff Road, Llandaff	Kerbside	315712	177740	1.75	NO_2	Y	N	N (4m)	1m	N
244	25 Bridge Road, Llandaff	Roadside	314910	178789	1.75	NO_2	N	N	Y (0.05m)	4m	Y
245	47 Willows Ave	Urban Background	321006	176584	1.75	NO_2	N	N	N/A	N/A	N
249	Wentloog Road, Rumney	Roadside	321709	179081	1.75	NO_2	N	N	Y (0.05m)	3m	Y
250	Central Square Cardiff, City Centre	Roadside	318201	176022	1.75	NO_2	N	N	N (4m)	2m	N
251	Heol Isaf, Radyr	Roadside	313244	180367	1.75	NO_2	N	N	Y (0.05m)	5.2m	Y
252	Llandaff Cathedral School building	Roadside	315674	177867	1.5	NO_2	N	N	Y (0.05m)	80m	Y
253	Llandaff Cathedral School Perimeter	Kerbside	315694	177789	1.5	NO_2	N	N	N (78m)	2m	Y
TRO-001	Whitchurch High Lower School	Kerbside	315621	180320	1.5	NO_2	N	N	N (4m)	5m	N
TRO-002	Glan-Y-Nant Terrace (inside)	Roadside	315589	180316	1.5	NO_2	N	N	Y (0.05m)	2m	Y
TRO-003	Crossroads of Old Church Rd and Glan-Y-Nant terr (outside)	Kerbside	315548	180315	1.5	NO_2	N	N	N (5m)	2m	N
TRO-004	Ysgol Melin Gruffydd School	Roadside	315620	180360	1.5	NO_2	N	N	Y (0.05m)	2m	Y
TRO-005	34 Glan-Y-Nant Rd (inside)	Roadside	315608	180151	1.5	NO_2	N	N	Y (0.05)	3m	Y
TRO-006	36 Old Church Rd (outside)	Roadside	315497	180140	1.5	NO_2	N	N	Y (0.05m)	2m	Y

TRO-007	Peter Lea Primary	Roadside	313878	178319	1.5	NO_2	N	N	Y (0.05m)	3m	Y
TRO-008	36 Carter Place	Roadside	313894	178331	1.5	NO_2	N	N	Y (0.05m)	4m	Y
TRO-0099	3 Carter Place	Roadsie	314022	178334	1.5	NO_2	N	N	Y (0.05m)	5m	Y
TRO-010	Llandaff Church in Wales Primary	Kerbside	315274	177784	1.5	NO_2	N	N	N (5m)	5m	N
TRO-011	20 Hendre Rd Llandaff	Kerbside	315279	177750	1.5	NO_2	N	N	Y (0.05m)	1m	Y
TRO-012	48 Hendre Rd Llandaff	Roadside	315209	177668	1.5	NO_2	N	N	Y (0.05m)	3m	Y
TRO-013	Pencaeru School	Kerbside	312803	175519	1.5	NO_2	N	N	Y (0.05m)	3m	Y
TRO-014	16 Cyntwell Avenue	Roadside	312809	175496	1.5	NO_2	N	N	Y (0.05m)	4m	Y
TRO-015	6A Cyntwell Avenue	Roadside	312734	175411	1.5	NO_2	N	N	Y (0.05m)	3m	Y
TRO-016	29 Norfolk St	Roadside	315811	176555	1.5	NO_2	N	N	Y (0.05m)	3m	Y
TRO-017	209 Llandowne Rd	Roadside	315801	176492	1.5	NO_2	N	N	Y (0.05m)	4m	Y

Notes:

1. 0.05m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property)

2.2 2020 Air Quality Monitoring Results

Table 4– Non-automatic Annual Mean NO_2 Monitoring Results (2015- 2020)

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
16	Roadside	Diffusion Tube	75	N	27.9	28.9	28.9	27.8	27.3	23.6
49	Roadside	Diffusion Tube	75	N	29.4	30.4	27.7	27.3	28.1	24.5
58	Kerbside	Diffusion Tube	58	Y	48.3	45.3	44.5 [2]	45.8	41.2	30 [2]
81	Roadside	Diffusion Tube	83	Y	35.3	37.6	35.9	34.9	34.4	27.2
86	Roadside	Diffusion Tube	75	N	34.9	35.6	37	33.4	31.7	25.8
96	Roadside	Diffusion Tube	75	N	31.1	36.9	31.8	31.4	29.4	22.2
98	Roadside	Diffusion Tube	75	N	25.4	28.4	26.2	26.1	24.6	20.0
99	Roadside	Diffusion Tube	83	Y	29.8	34.8	31	31.7	30.4	22.8

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
101	Urban Centre	Diffusion Tube	58	N	20.3	23.1	21.3	21.1	NR	14.3 [2]
102	Urban Centre	Diffusion Tube	58	N	21.1	22.5	20.9	20.6	NR	14.7 [2]
103	Urban Centre	Diffusion Tube	58	N	20.7	23.2	21.6	20.7	NR	15.1 [2]
106	Roadside	Diffusion Tube	75	N	29.4	32.2	31.5	27.8	28.3	24.5
112	Roadside	Diffusion Tube	75	N	27.1	29.5	27.4	26.7	25.8	20.7
115	Roadside	Diffusion Tube	75	N	32.5	32.8	32.7	30	30.6	25.3
117	Roadside	Diffusion Tube	42	Y	39.5	41.3	38	40	36.8	30.7 [2]
126	Roadside	Diffusion Tube	75	Y	36.0	38.4	39.4 [2]	35.1	33.3	22.3
128	Roadside	Diffusion Tube	75	N	29.6	31.2	29.8	28.3	29.8	25.0
131	Roadside	Diffusion Tube	83	Y	39.5	39.6	41.7	38.2	35.7	28.8

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
143	Roadside	Diffusion Tube	83	Y	38.2	38.7	38.4 [2]	37.3	35.6	23.5
144	Roadside	Diffusion Tube	75	Y	37.2	38.3	36.8 [2]	34.3	33.9	25.0
147	Roadside	Diffusion Tube	75	N	27.7	28.8	26.2	29.3	26.9	20.5
148	Roadside	Diffusion Tube	75	N	27.5	29.2	27.3	26.6	25.6	21.3
149	Roadside	Diffusion Tube	75	N	33.6	31.2	32.5	31.3	30.1	26.8
156	Roadside	Diffusion Tube	67	N	25.9	29.7	25.7	26.8	24.8	17.4
157	Roadside	Diffusion Tube	75	N	27.2	28.2	28.3	25.1	23.6	19.3
158	Roadside	Diffusion Tube	75	N	25.5	29	26.1	26.2	24.2	17.6
159	Roadside	Diffusion Tube	75	N	34.0	35.5	38.6	35.6	32.2	26.4
166	Roadside	Diffusion Tube	75	N	32.1	33.2	32.1	30.6	31.4	26.3

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
168	Roadside	Diffusion Tube	75	N	24.3	27.7	26.2	26	24.7	21.1
174	Kerbside	Diffusion Tube	75	N	28.7	33.3	27.5	28.2	26.8	17.7
179	Roadside	Diffusion Tube	83	N	-	39.7 [2]	45.4 [2]	43. [2]	33.1 [2]	32.4
183	Kerbside	Diffusion Tube	67	N	-	35.9	31.2	31.1	30.9	23.5 [2]
184	Roadside	Diffusion Tube	67	Y	-	41.4	38.7 [2]	39.9	40.5 [2]	28.3 [2]
186	Roadside	Diffusion Tube	75	Y	-	47.5	47.7 [2]	45.8	42.7	23.1
187	Roadside	Diffusion Tube	58	Y	-	50.7	50.2 [2]	50.8	43.9 [2]	25.7 [2]
188	Roadside	Diffusion Tube	50	Y	-	49.8 [2]	49.8 [2]	52.4 [2]	43.7 [2]	32.5 [2]
190	Kerbside	Diffusion Tube	75	N	-	-	-	23.2	23.4	20.7
191	Roadside	Diffusion Tube	75	N	-	-	-	29.7	27.9	22.5

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
192	Roadside	Diffusion Tube	83	Y	-	-	-	39.7	38.6	30.8
193	Roadside	Diffusion Tube	75	N	-	-	-	18.6	19.3	14.4
194	Roadside	Diffusion Tube	67	N	-	-	-	22	20.4	15.8 [2]
195	Roadside	Diffusion Tube	58	N	-	-	-	31.6	31.2	24.2 [2]
196	Roadside	Diffusion Tube	75	N	-	-	-	24.9	25.2	19.4
197	Roadside	Diffusion Tube	25	N	-	-	-	31	30.6	21.5
198	Roadside	Diffusion Tube	83	Y	-	-	-	35.1	33.5	25.7
199	Roadside	Diffusion Tube	75	N	-	-	-	23.9	25	20.7
200	Roadside	Diffusion Tube	67	N	-	-	-	33.4	31.1	27.4 [2]
201	Roadside	Diffusion Tube	75	N	-	-	-	30.3	28.9	22.1

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
202	Roadside	Diffusion Tube	75	N	-	-	-	27.8	27.6	23.3
203	Roadside	Diffusion Tube	75	N	-	-	-	21.6	20.6	17.2
204	Roadside	Diffusion Tube	75	N	-	-	-	23.3	22.1	18.7
207	Roadside	Diffusion Tube	75	N	-	-	-	21.7	20.6	16.7
208	Roadside	Diffusion Tube	83	N	-	-	-	25.4	24.9	18.9
209	Roadside	Diffusion Tube	67	N	-	-	-	22.7	22.3	15.2 [2]
210	Roadside	Diffusion Tube	75	N	-	-	-	21.7	20.4	16.6
211	Roadside	Diffusion Tube	75	N	-	-	-	21.7	21.8	18.1
212	Kerbside	Diffusion Tube	83	Y	-	-	-	47.1 [2]	41.3	33.4
213	Roadside	Diffusion Tube	0	N	-	-	-	-	24.1	NR

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
214	Roadside	Diffusion Tube	83	Y	-	-	-	-	32.3	24.8
216	Roadside	Diffusion Tube	75	N	-	-	-	-	29.3	22.5
217	Roadside	Diffusion Tube	75	N	-	-	-	-	17.3	15.5
218	Roadside	Diffusion Tube	75	Y	-	-	-	-	35.5	28.2
219	Kerbside	Diffusion Tube	42	N	-	-	-	-	28.3	21.7 [2]
220	Kerbside	Diffusion Tube	33	N	-	-	-	-	38.4 [2]	27.9 [2]
221	Kerbside	Diffusion Tube	58	N	-	-	-	-	NA	30.4 [2]
223	Roadside	Diffusion Tube	75	N	-	-	-	-	14.9	12.8
224	Roadside	Diffusion Tube	67	N	-	-	-	-	23.1 [2]	18.5 [2]
243	Roadside	Diffusion Tube	67	N	-	-	-	-	-	25.7 [2]

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
244	Roadside	Diffusion Tube	75	N	-	-	-	-	-	18.2
245	Roadside	Diffusion Tube	75	N	-	-	-	-	-	14.3
249	Roadside	Diffusion Tube	75	N	-	-	-	-	-	17.3
250	Kerbside	Diffusion Tube	67	N	-	-	-	-	-	26.7 [2]
251	Roadside	Diffusion Tube	75	N	-	-	-	-	-	13.5
252	Roadside	Diffusion Tube	67	N	-	-	-	-	-	13.6 [2]
253	Kerbside	Diffusion Tube	58	N	-	-	-	-	-	19.4 [2]
TRO-001	Roadside	Diffusion Tube	67	N	-	-	-	-	-	10.9 [2]
TRO-002	Roadside	Diffusion Tube	67	N	-	-	-	-	-	12.9 [2]
TRO-003	Kerbside	Diffusion Tube	75	N	-	-	-	-	-	15.6

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) [1]	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 [2]					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
TRO-004	Roadside	Diffusion Tube	50	N	-	-	-	-	-	9.8 [2]
TRO-005	Roadside	Diffusion Tube	75	N	-	-	-	-	-	11.5
TRO-006	Roadside	Diffusion Tube	58	N	-	-	-	-	-	17.0 [2]
TRO-007	Roadside	Diffusion Tube	75	N	-	-	-	-	-	9.4
TRO-008	Roadside	Diffusion Tube	75	N	-	-	-	-	-	8.4
TRO-009	Roadside	Diffusion Tube	75	N	-	-	-	-	-	9.3
TRO-010	Kerbside	Diffusion Tube	67	N	-	-	-	-	-	10.5 [2]
TRO-011	Kerbside	Diffusion Tube	75	N	-	-	-	-	-	12.2
TRO-012	Roadside	Diffusion Tube	75	N	-	-	-	-	-	10.6
TRO-013	Kerbside	Diffusion Tube	58	N	-	-	-	-	-	9.9 [2]

Site ID	Site Type	Monitoring Type	Valid Data Capture 2020 (%) (1)	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3 (2)					
					2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)	2019 (Bias Adjustment Factor = 0.75)	2020 (Bias Adjustment Factor = 0.76)
TRO-014	Roadside	Diffusion Tube	75	N	-	-	-	-	-	14.1
TRO-015	Roadside	Diffusion Tube	75	N	-	-	-	-	-	11.5
TRO-016	Roadside	Diffusion Tube	75	N	-	-	-	-	-	16.9
TRO-017	Roadside	Diffusion Tube	75	N	-	-	-	-	-	21.1

Notes:

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

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

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

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

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

(4) School Monitoring Programme reported over 12-month period (April 2019- March 2020). Result provided is an average for this period.

Table 5– Automatic Annual Mean NO_2 Monitoring Results (2015- 2020)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % (1)	Valid Data Capture 2020 % (2)	Annual Mean Concentration (µg/m³)					
					2015	2016	2017	2018	2019	2020
Cardiff Centre AURN 1	Urban Background	N	100	84	27	23	20	20[3]	27[3]	16
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	99	-	-	-	29[3]	29	19
Cardiff Castle Street	Roadside/ Urban Traffic	N	78	19%						25[4]

Notes:
Exceedances of the Annual Average NO2 objective (40µg/m3) are shown in bold.
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
(3) Data has been "annualised" as per Boxes 7.9 in LAQM.TG16 where valid data capture for the full calendar year is less than 75%. See Appendix C for details.
(4) Data capture for the monitoring period is below 25% at 19.7% and thus it is not applicable to annualise data in this instance.

Table 6– Automatic 1-hour Mean NO_2 Monitoring Results (2015- 2020)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % (1)	Valid Data Capture 2020 % (2)	Number of Hourly Means (> 200µg/m^3)(3)					
					2015	2016	2017	2018	2019	2020
Cardiff Centre AURN 1	Urban Background	N	100	84	0 (14.98)	0	0	0 (84.55)	0 (84)	0
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	99	-	-	-	0 (98.12)	0	0
Cardiff Castle Street	Roadside/ Urban Traffic	N	78	19						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.
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Figure 36– Trends in Annual Mean NO_2 Concentrations Measured at Cardiff Frederick Street AURN (AURN 1) Site

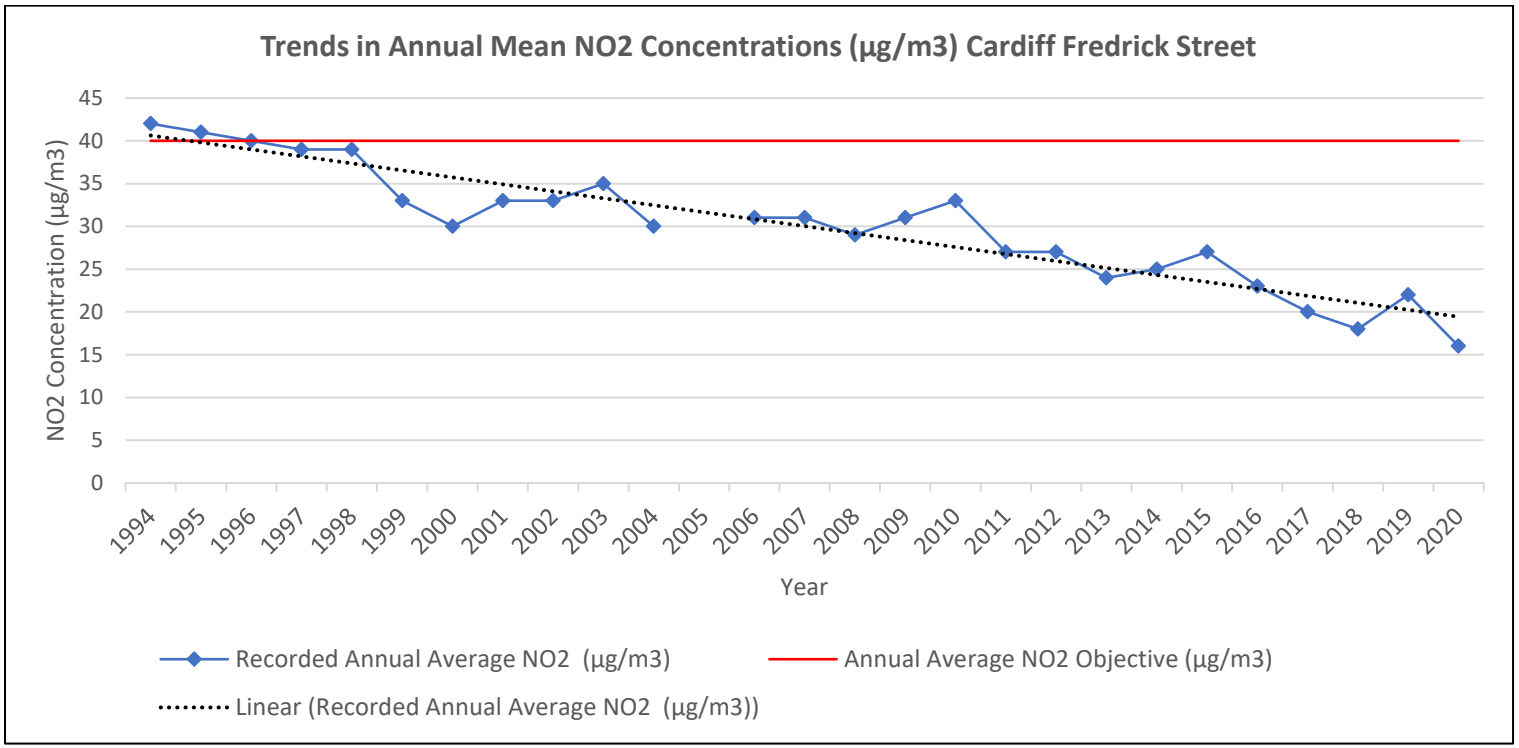


Figure 36 indicates a decreasing trend in annual average NO_2 concentrations in Cardiff's background levels. However, it is noted that the 2019 figures did show a rise in annual average levels.

Table 7– Automatic Annual Mean PM_{10} Monitoring Results (2015- 2020)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020(%) [2]	Confirm Gravimetric Equivalent (Y or N/A)	PM_{10} Annual Mean Concentration (µg/m^3) [3]				
						2016	2017	2018	2019	2020
Cardiff Centre AURN 1	Urban Background	N	100	89	N/A	15.1[3]	16	17	22.1[3]	14
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	95	Y	-	-	20.3[3]	19	17
Cardiff Castle Street	Roadside/ Urban Traffic	N	78	19	Y	-	-	-	-	16[4]

Notes:

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

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

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

(3) Data has been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 where valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Data capture for the monitoring period is below 25% at 19.7% and thus it is not applicable to annualise data in this instance.

Table 8– Automatic 24-Hour Mean PM_{10} Monitoring Results (2015- 2019)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m³ (3)				
						2016	2017	2018	2019	2020
Cardiff Centre AURN 1	Urban Background	N	100	67.7	N/A	1 (30.52)	2	0	0 (44)	0
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	96	Y	-	-	0 (36)	12	0
Cardiff Castle Street	Roadside/ Urban Traffic	N	78	19	Y	-	-	-	-	0

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

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

Figure 37- Trends in Annual Mean PM_{10} Concentrations Measured at Cardiff Frederick Street AURN (AURN 1) Site The displayed datasets indicate a downward trend in Cardiff's background PM_{10} levels.

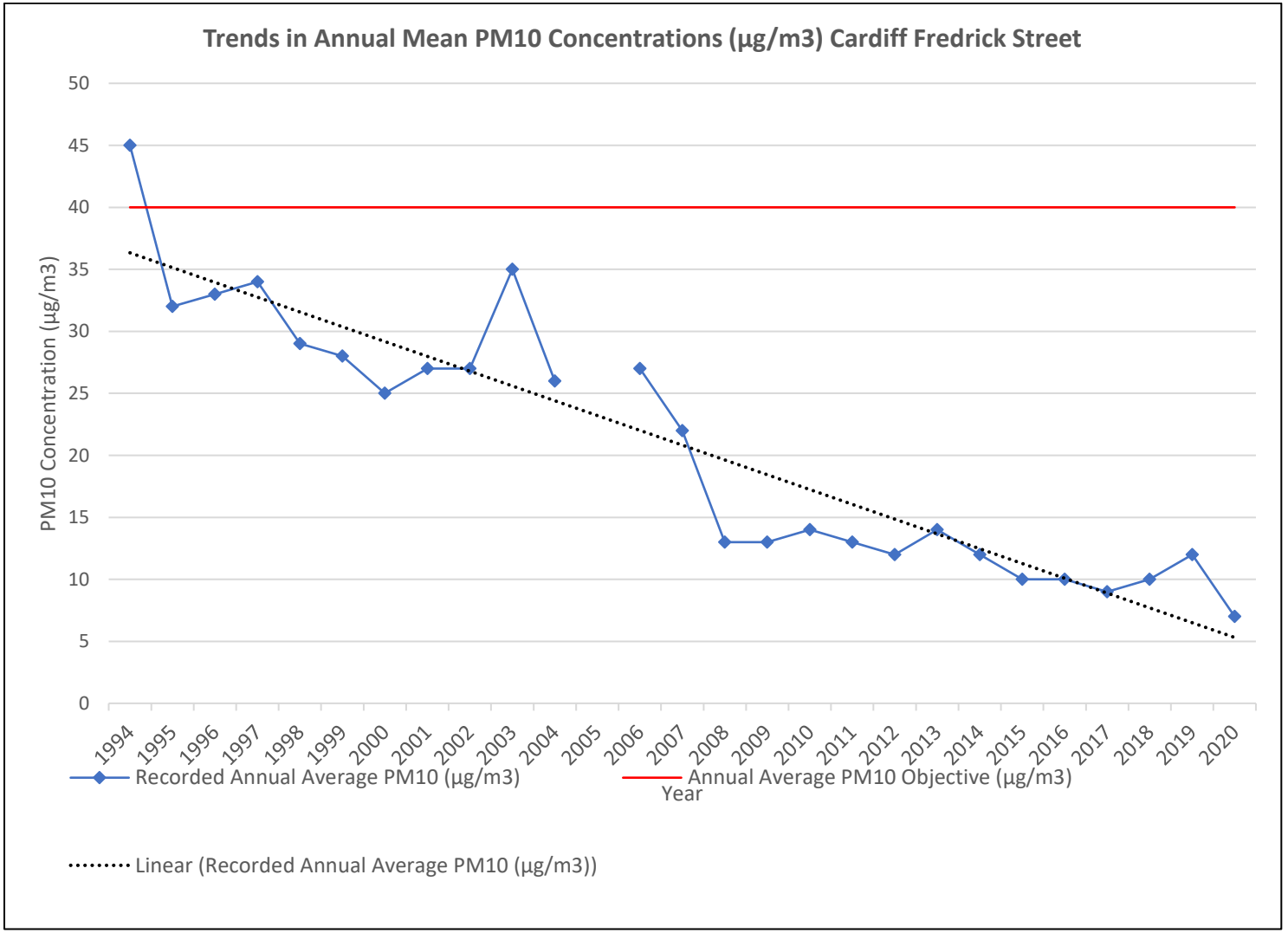


Table 9– Automatic SO_2 Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Number of Exceedences (percentile in bracket μg/m³)		
					15-minute Objective (266 μg/m³)	1-hour Objective (350 μg/m³)	24-hour Objective (125 μg/m³)
Cardiff Centre AURN 1	Urban Background	N	100	89	0	0	0

Notes:

Exceedances of the SO2 mean objectives are shown in **bold.**

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

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

(3) In accordance with LAQM TG(16), due to the fact data capture is <85% it is a requirement to report the 99.9th percentile for 15 minute SO_2, however in this instance it is the 99.9th percentile for 10 minute SO_2.

(4) In accordance with LAQM TG(16), due to the fact data capture is <85% it is a requirement to report the 99.7th percentile for 1 hour SO_2

(5) In accordance with LAQM TG(16), due to the fact data capture is <85% it is a requirement to report the 99.2nd percentile for 24 hour SO_2

Table 10– Automatic Carbon Monoxide (CO) Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Number of Exceedences
					8-Hour Average Objective (10 μg/m³)
Cardiff Centre AURN 1	Urban Background	N	100	69	0

Table 11– Automatic Ozone (O3) Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (2)	Number of Exceedences
					Number of days where the 8-hour mean >100μg/m³
Cardiff Centre AURN 1	Urban Background	N	100	95	0

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

During 2020 monitoring was carried out for nitrogen dioxide (NO_2), particulate matter (PM_{10}), sulphur dioxide (SO_2), carbon monoxide (CO) and ozone (O3). There was no monitoring undertaken for benzene or 1-3-butadiene in line with the requirements of the LAQM regime in Wales.

2.3.1 Nitrogen Dioxide (NO_2)

Nitrogen dioxide was measured during 2020 at 3 sites equipped with an automatic NOx analyser and by a network of 92 diffusion tubes.

In order to ratify the 2020 diffusion tube dataset, a bias adjustment factor of 0.76 was applied to the annual average readings. The factor was derived from the Defra website which gave the average correction factor from 24 co-location studies across the UK, whereby the analytical laboratory and method used was the same as CC. The national bias correction factor was utilized as it would provide results representative of a worst-case scenario. The bias correction factor of 0.76 was obtained from the following website: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

2.3.1.1 Automatic Monitoring Data

NO_2 datasets obtained from the two automatic monitoring sites outlined as (AURN 1 & AURN 2) have been cross referenced to the annual and 1-hour average objectives set for NO_2. The findings summarised in Table 5 **&** Table 6 indicate compliance with both objectives.

2.3.1.2 Non- automated Monitoring Data

The nitrogen dioxide diffusion tube data is summarised in Table 4. The full dataset (raw monthly mean values) is included in Appendix A. All data displayed in Table 4 has been bias adjusted, where necessary annualised in accordance with Box 7.10 of LAQM (TG16) and distance corrected to represent exposure at the nearest sensitive receptor. Evidence of the sites annualised can be seen in Appendix C. The applied bias adjustment factor was 0.76, as described in Appendix C.

Table 4 shows that none of the 92 passive diffusion tube locations recorded a concentration of NO_2 above the 40µg/m^3 annual mean objective set for NO_2 in 2020.

Air quality dataset trends within Cardiff's AQMAs

Figure 38- Trends in Annual Average NO_2 Concentrations Recorded at Façade Locations in City Centre AQMA

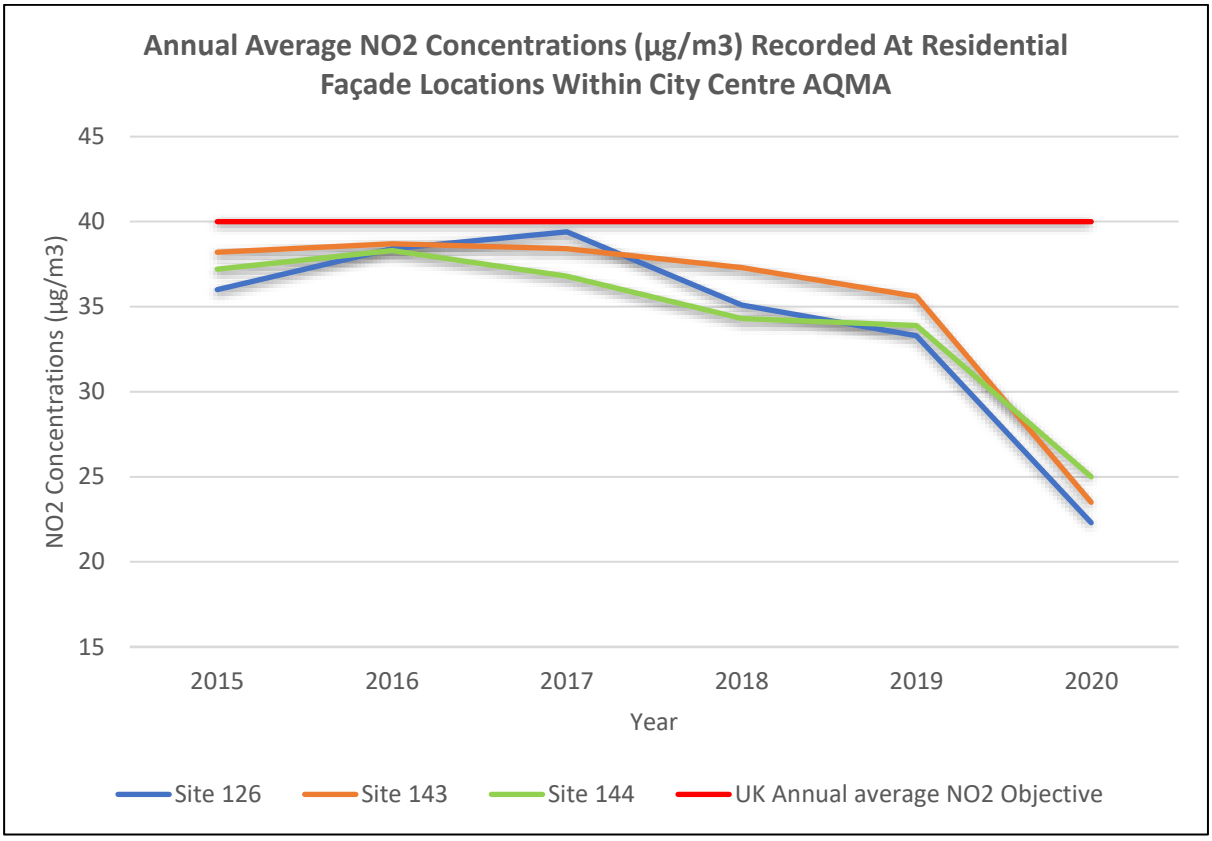
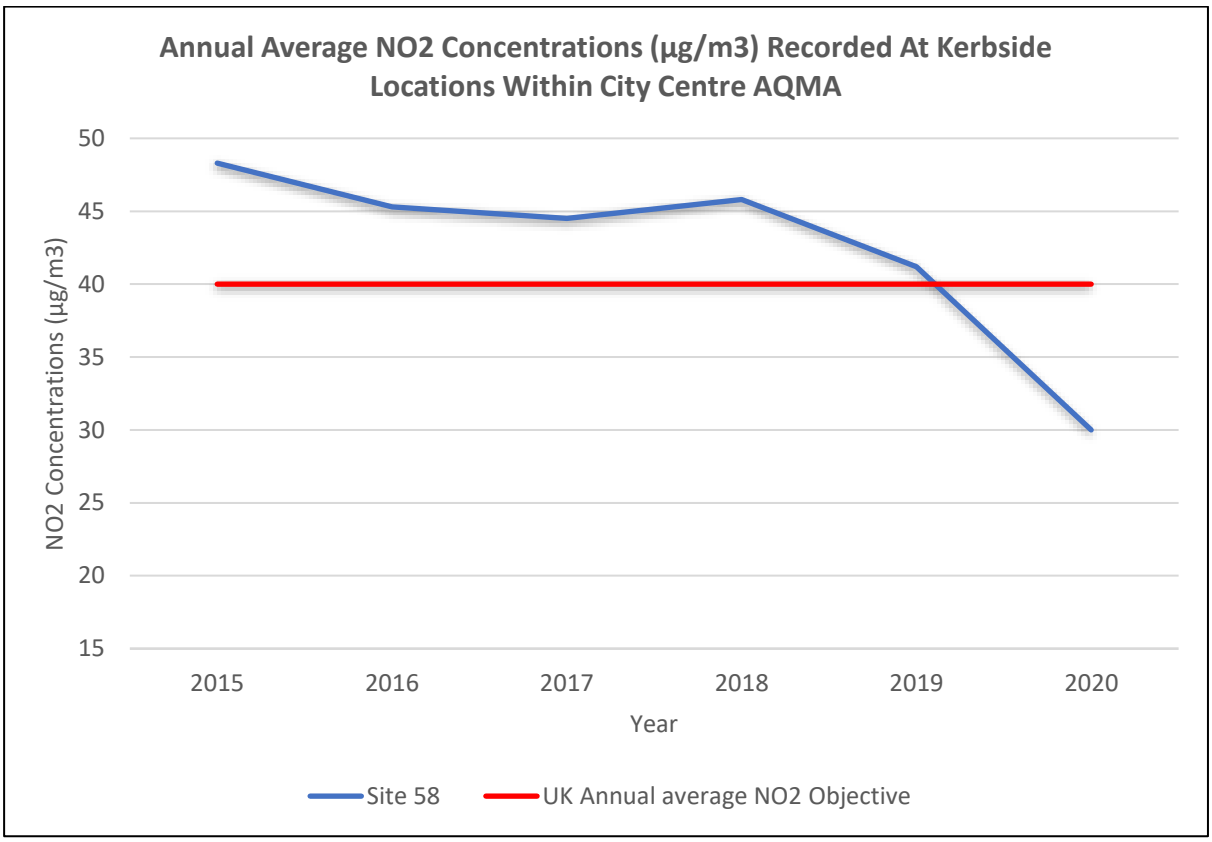


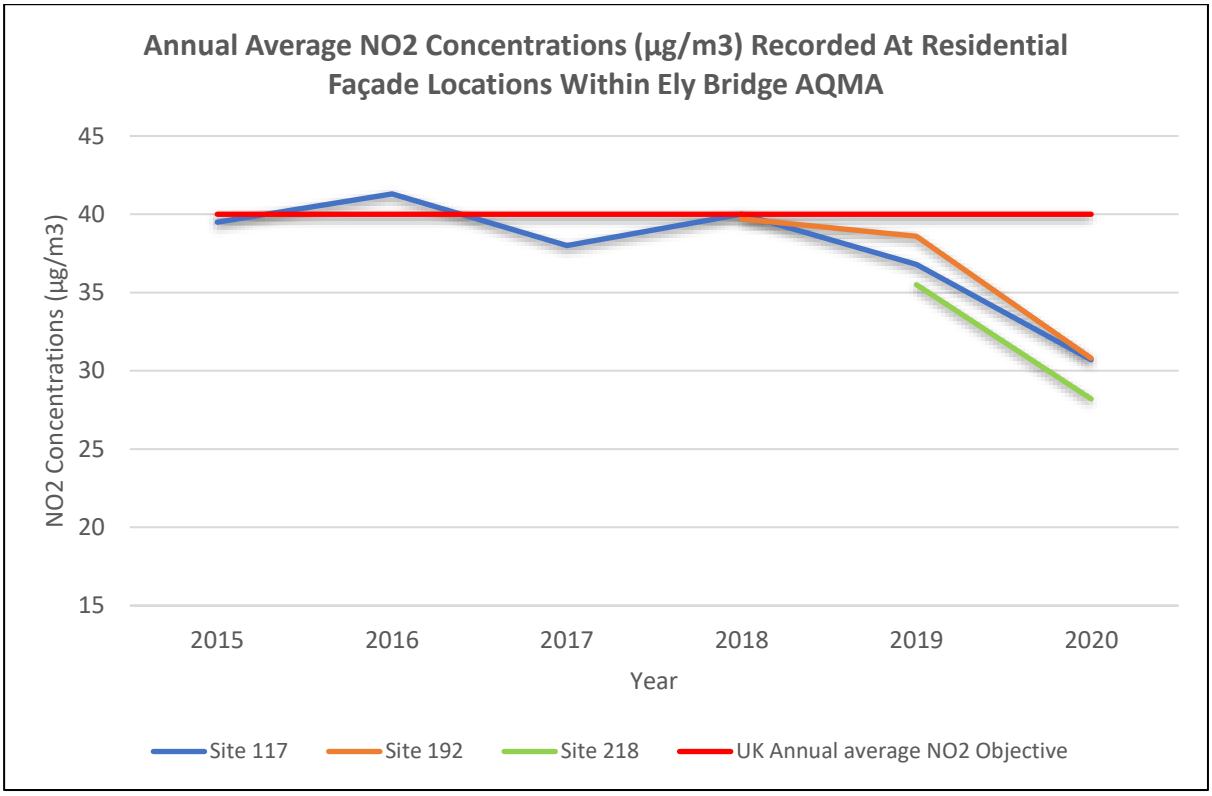
Figure 39- Trends in Annual Average NO_2 Concentrations Recorded at Kerbside Locations in Cardiff City Centre AQMA



Examining Table 4it is apparent that annual average NO_2 datasets in the City Centre, in and around the AQMA, were impacted by the pandemic as each monitoring location demonstrated compliance with the NO2 objective of 40 µg/m^3 as an annual average. The full impacts of the COVID pandemic and the measures implemented by the Council in response, particularly around Castle Street are most evident at the monitoring locations on Castle Street.

Using sites 186 & 187 located on Castle Street levels measured in 2019 pre pandemic were 44 µg/m^3 at both sites. In comparison for 2020 the same locations recorded concentrations of 23 µg/m^3 and 26 µg/m^3, which equates to a reduction of 47% and 41%.

Figure 40- Trends in Annual Average NO_2 Concentrations Recorded at Façade Locations in in Ely Bridge AQMA

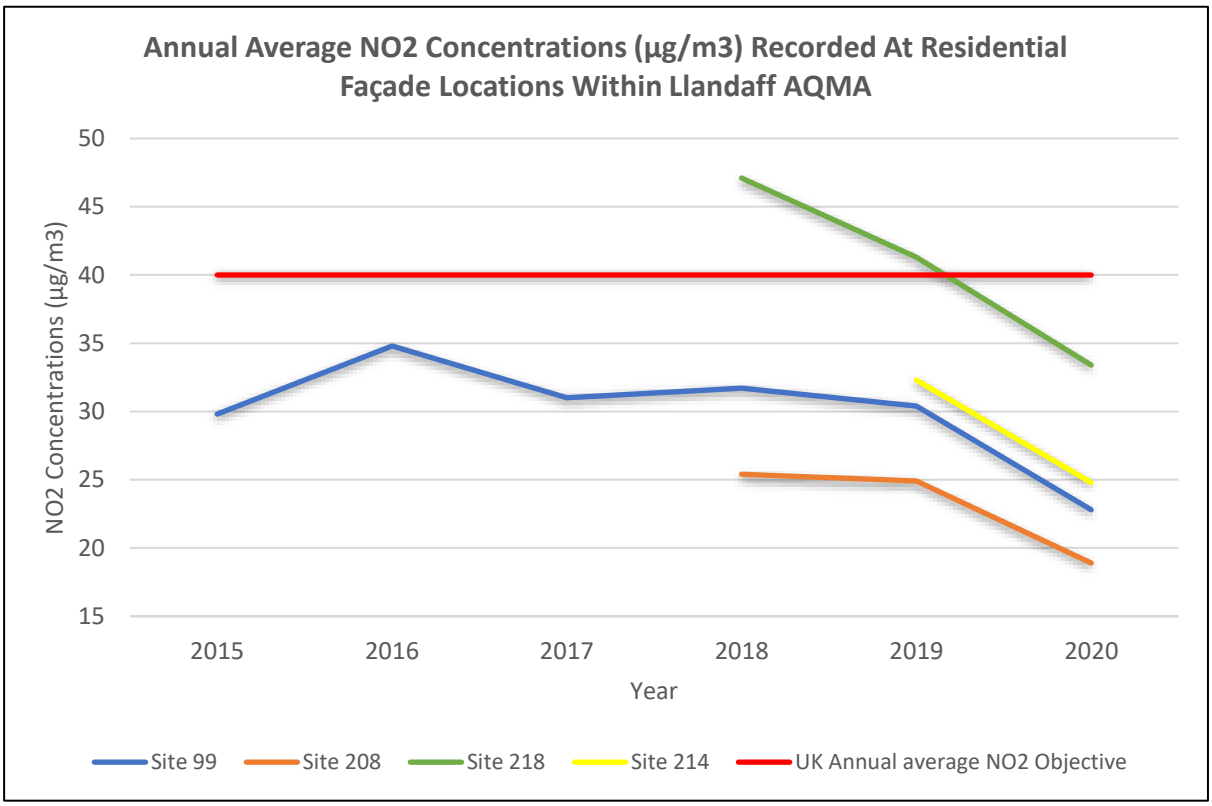


As depicted by

Figure 40 **m**onitoring undertaken within the Ely Bridge AQMA, at the façade of residential properties (Site 117, 192 & 218) recorded annual average levels of NO_2 at 30µg/m^3 or less. Although levels captured are compliant with the air quality objectives, they need to be considered in light of the Covid Pandemic and thus it is considered necessary that the AQMA should remain in place and focussed monitoring has continued into 2021.

.

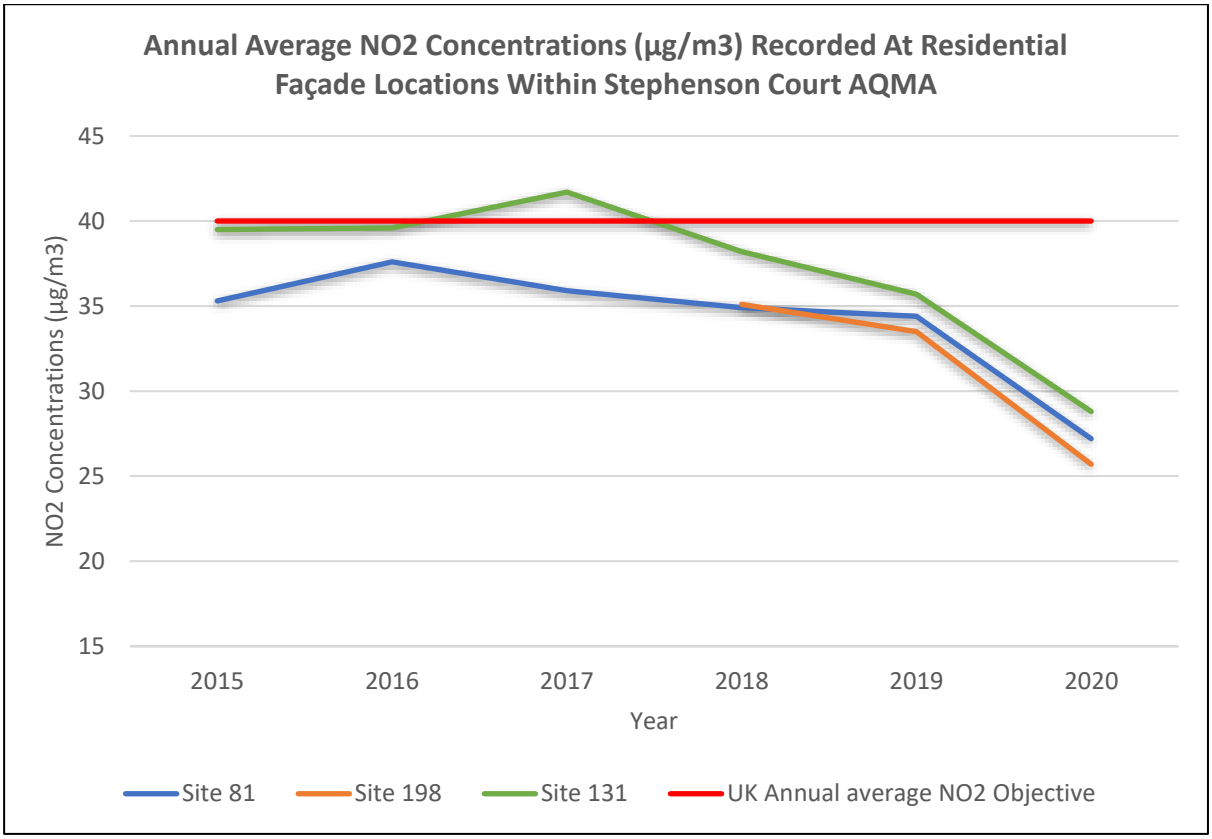
Figure 41- Trends in Annual Average NO_2 Concentrations Recorded at Façade Locations in Llandaff AQMA



Residential monitoring locations within the Llandaff AQMA, all indicate compliance with the annual average objective for NO_2 in 2020. As expected owing to the impacts from COVID all monitoring locations in the AQMA have reduced concentrations. Site 212 which did indicate an exceedance of the annual average objective in 2019 with an annual average reading of 41.3 µg/m^3 recorded a concentration of 33 µg/m^3, a reduction of 20%.

SRS who had successfully accrued funding via a S106 planning contribution, purchased a near real-time indicative air quality monitor (AQ Mesh analyser) which has been installed within the Llandaff AQMA boundary. Unfortunately the device installed suffered significant issues in terms of valid data collection throughout 2020, and officers from SRS are looking to resolve ongoing connectivity issues with the suppler of this device. As such valid data for 2020 is not available.

Figure 42- Trends in Annual Average NO_2 Concentrations Recorded at Residential Façade Locations within the Stephenson Court AQMA.



All three monitoring sites within the Stephenson Court AQMA (Sites, 81, 131 & 198) show compliance with the annual average objective, and no site recorded concentrations >30 µg/m^3. Site 131 recorded the highest concentration of 28 µg/m^3 which in comparison to concentrations recorded in 2019 is a reduction of 22%.

In accordance with LAQM best practise guidance; there are no monitoring sites in the district with annual average concentrations above 60µg/m^3 in 2019. Therefore this indicates it is unlikely that the hourly nitrogen dioxide objective was exceeded.

2.3.2 Particulate Matter (PM_{10})

As described in previous sections, monitoring of PM_{10} has was carried out at the Cardiff Centre, Newport Road AURN monitoring sites (AURN 1 & 2) and Castle Street Monitor. The summary data is given in **Tables 7 and 8**.

The results of the monitoring indicate that recorded PM_{10} concentrations at the Cardiff City Centre and Newport Road AURN monitoring stations and Castle Street monitori station are compliant with both the annual mean (40 µg/m^3) and 24-hour mean (>50 µg/m^3 not to be exceeded more than 18 times per year) AQS objectives set for PM_{10}.

2.3.3 Sulphur Dioxide (SO_2)

Sulphur dioxide was measured at the Cardiff Centre AURN automatic monitoring site during 2019. The site is classified as “Urban Background” and is a relevant location for the 15-minute and 1-hour Objectives. Data for the monitoring is given in Table 9.

There were no exceedences of the set objectives during 2020.

2.3.4 Benzene

No monitoring of Benzene was undertaken by SRS on behalf of Cardiff Council in 2020.

2.3.5 Other Pollutants Measured

During 2020 monitoring for ozone and carbon monoxide was carried out in Cardiff. Details are in the following sections;

Carbon Monoxide

Carbon monoxide was monitored at Cardiff's City Centre AURN site during 2020.

Data capture at for the whole year at Cardiff's City Centre AURN site was 69%. There were no exceedences of the objective. **Table 10** summarises the findings.

There continues to be no risk of the National Air Quality Standard being exceeded.

Ozone

Cardiff Council monitors Ozone due to its potential correlations with other pollutants. In 2020, ozone was measured at the Cardiff City Centre, Frederick Street AURN site. Although Ozone is not included in the Local Air Quality Management system, the results are included in **Table 11** for completeness.

The results are compared with the running 8-hour mean objective as set by the Expert Panel on Air Quality Standards (EPAQs) which states the running 8-hour mean should not exceed 100µg/m3 on more than 10 days per year. There were 0 exceedences of the ozone objective in Cardiff in 2020.

2.4 Summary of Compliance with AQS Objectives as of 2020

Shared Regulatory Services have reviewed the results from the monitoring undertaken across the Cardiff in 2020.

The datasets indicate that the annual average objective for NO_2 was not breached at any monitoring locations inclusive of those within the existing AQMAs.

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.

This is supported by data from Transport Team which demonstrated that traffic across Cardiff overall was reduced by 28% for the year as a whole in 2020 (January-December) relative to 2019 pre-Covid levels. This reduction is even higher when the City Centre is viewed in isolation with a reduction of 38% being measured.

3 New Local Developments

3.1 Road Traffic Sources (& other transport)

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

3.1.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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 2020 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, that have not been adequately considered in previous rounds of Review and Assessment.

3.1.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Datasets collected from improved monitoring locations along Kingsway/ Duke Street/ Castle Street Link area have been compared to the 1-hour objective set for NO_2 due to the fact each site is known for commercial use at ground floor level. Levels are shown to be compliant with the objective.

There are no new locations identified since the Council's 2020 Progress Report was submitted and there is no need to consider this further at this time.

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

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

Other than Westgate Street, there are no roads in Cardiff where buses, coaches and HDVs account for >20% of road traffic, where flow of these vehicles is >2500 and there is relevant exposure within 10m of the kerb.

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

3.1.4 Junctions

Junctions have been fully considered in previous annual reviews and assessments.

SRS on behalf of Cardiff Council can confirm that there are no new/newly identified busy junctions/busy roads where exceedences of either the nitrogen dioxide or PM_{10} objectives are likely.

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

In July 2017 Cardiff saw the completion of the Eastern Bay Link Road which extends the A4232. No further new roads have been constructed since.

3.1.6 Roads with Significantly Changed Traffic Flows

Ratified traffic data has been examined and there are no roads in Cardiff which have experienced traffic flow (AADT) growth of 25% or more in the preceding three years.

There is increasing evidence from the traffic measurements both locally and regionally to suggest that, for economic and other reasons, traffic growth on major routes has stopped year-on-year and may even have declined recently. This has, for example, resulted in a number of air quality assessments submitted with planning applications assuming current levels of road traffic as a worst-case scenario.

It should be noted that Cardiff Council is actively implementing its traffic management policy of a 50:50 modal split, i.e. 50% of journeys being made other than by the private car. This is not just for new developments but also for the local road network as a whole.

The Council is currently considering planning applications for significant housing and mixed used developments at a number of "strategic sites" across the city.

SRS on behalf of Cardiff Council can confirm that there are no new/newly identified roads with significantly changed traffic flows.

3.1.7 Bus and Coach Stations

The 2017 APR outlined planning application (16/02731/MJR). The planning application was subject to approval following the fulfillment of a number planning conditions that accompanied the application with regards to air quality. However, the application was amended and therefore resubmitted as a new application (18/01705/MJR). Cardiff Council awarded planning consent for the proposal, subject to approval and discharge of Conditions attached to the application. In accordance with comments made by responsible officers in relation to air quality matters appropriate Conditions have been set and S106 contributions to enhance monitoring capabilities agreed.

A planning proposal was received in 2018 for the construction of a new sustainable transport hub at the University Hospital of Wales Concourse, Heath (planning application 18/01769/MJR). The application has been granted consent subject to approval and discharge of planning conditions. The supporting air quality assessment examined projected NO_2 & PM_{10} levels in accordance with the short term objectives set for these pollutants; **1- hour mean objective for NO_2 (200µg/m3 not to be exceeded more than 18 times a year)** and **24- hour mean objective for PM_{10} (50µg/m3 not to be exceeded more than 35 times a year).** The assessment concluded that the operational air quality impact of the proposed development will not be significant.

The Transport Interchange in Central Square is due for completion in 2022.

3.1.8 Airports

There are no airports in Cardiff. The nearest airport is Cardiff International which is located approximately 15 miles to the west of Cardiff in The Vale of Glamorgan Council's area.

There are no airports planned or proposed within the Council's area and nowhere to put one.

SRS on behalf of Cardiff Council confirms that there are no airports in the Local Authority area.

3.1.9 Railways (Diesel and Steam Trains)

Cardiff is well-served by passenger rail transport. The main Swansea to London Paddington line is served by Cardiff Central Station. Additionally, there is a network of local-line services running, in the main, to the valleys north of Cardiff.

LAQM.TG(16) suggests that SO_2 emissions from diesel locomotives may be significant if there are outdoor locations where locomotives are regularly stationary for more than 15minutes and where members of the public could be regularly exposed over this period at such locations.

LAQM.TG(16) also requires consideration exposure to nitrogen dioxide within 30m of certain specified railway lines in those areas where the annual mean background concentration is above 25µgm^{-3}.

3.1.9.1 Stationary Trains

Stationary trains have been considered fully in earlier reports with regard to potential exceedences of the sulphur dioxide objective. No potential exceedences were found and nothing has changed in this regard since then. There is no need to further assess this source.

It should be recorded that works are now underway in preparation for the electrification of the main Swansea/Cardiff to London Paddington line. The effects of this on local emissions can be only beneficial.

Discussions with regard to the electrification of the local line network are ongoing.

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

3.1.9.2 Moving Trains

LAQM.TG(09) introduced a new requirement to assess the potential for exceedence of nitrogen dioxide objectives. The assessment criteria are in relation to large numbers of diesel locomotive movements where there is relevant exposure within 30metres of the track in areas where the background annual mean concentration of nitrogen dioxide is above 25µm^{-3}.

This assessment was carried out for the 2009 USA and nothing has changed in the intervening period. There is no need to further assess this source.

It should be recorded that works are now underway in preparation for the electrification of the main Swansea/Cardiff to London Paddington line. The effects of this on local emissions can be only beneficial.

Discussions with regard to the electrification of the local line network are ongoing.

SRS on behalf of Cardiff Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

3.1.10 Ports (Shipping)

The 2012 USA reported:

"Cardiff docks are not a ferry terminal, there is no Ro-Ro usage and no cruise liners use the port. There is some container traffic using the port and the docks handle bulk cargoes such a sand and grain. Coal-handling operations ceased some years ago."

In accordance with LAQM.TG(16) guidance threshold of 5000 movements per annum, with relevant exposure within 250m of the berths and main areas or 15,000 large ship movements per annum, with relevant exposure within 1km of these areas is not close to being approached and the risk of exceedence of the SO_2 objectives is considered very small.

Nothing has changed in this regard since the last 2015 USA report that time and there is no need to consider this source further.

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

3.2 Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

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

As outlined in the 2018 APR; in September 2017, Cardiff Council received a planning proposal (referenced application (17/02130/MJR)) for the construction and operation of a 9.5MW biomass power plant, situated on land at Rover Way, Pengam, Cardiff. Air quality assessments and supporting technical notes have been compiled by certified appointed consultants in support of the application, to which it is concluded that potential impacts associated with the scheme are not significant. It is understood that the planning application for the biomass power plant is only at outline stage and as such detailed design and specification for the plant is yet to be undertaken. The planning application has been granted consent in June 2018 subject to approval for a number of applied conditions, including air quality specific conditions;

Condition
AIR QUALITY ASSESSMENT

Prior to the approval of any reserved matters application for the Biomass Power Plant an Air Quality Assessment (AQA) for the detailed design of the Biomass Plant shall be submitted to and approved in writing by the Local Planning Authority. The AQA shall include an assessment of the impact of the plant emissions and any necessary mitigation measures to ensure the overall impacts of the plant are acceptable. The plant shall be constructed in accordance with the approved details and maintained thereafter.

Reason: To ensure air quality is maintained to satisfactory levels and to avoid any adverse effect upon the integrity of the Severn Estuary European Sites and the Severn Estuary SSSI.

In 2020 an application (**20/01279/MJR**) was received for the extension of the initial planning application. The same AQA condition was placed on the renewal application. This application subject to conditions was approved by the Planning Committed on the 29th January 2021.
Subsequent to this decision the developer in September 2021 has now amended the development

proposals and the Biomass Plant is no longer part of the development with only industrial units being proposed.

In terms of neighbouring authorities and any major proposed industrial installations, as previously declared in the 2017 APR; on the 31st July 2015 the Vale Council approved planning permission for the construction and operation of a biomass gasification facility at Woodham Road, Barry, CF63 4JE (Grid Reference ST 12610 67683). It was noted in the 2017 APR that Natural Resources Wales (NRW) were going through a second round of consultation in regards to a permit application for the proposed operation, submitted by Biomass UK NO.2 Ltd. This second round of consultation was formed as a result of a Section 5 amendment direction sanctioned by NRW; "NRW Schedule 5 notice re Biomass requesting more information" dated 4 May 2017. As part of the amendment a revised air quality assessment (AQA) was submitted in July 2017. Following much dialogue involving comments passed by SRS on behalf of VoGC, NRW granted approval for the sites permit application in February 2018.

In September 2021 Vale of Glamorgan Council agreed that enforcement action would be taken against the site and that a legal enforcement notice **will require the plant and all buildings are removed from the land.** The action was unanimously decided at a meeting of the Authority's Planning Committee after plant owners failed to resolve inconsistencies between the design and what has been built.

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

In the 2017 APR it was outlined that a decision was sought after in regards to the modification of a S106 agreement that accompanies the Viridor Waste Management Facility in Trident Industrial Park, Splott. In July 2017 it was agreed that the S106 be modified and therefore the removal of the obligation that waste may only be acquired from the South East Wales Region.

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

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

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

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

3.2.4 Major Fuel (Petrol) Storage Depots

As reported in the 2012 USA, there is one major fuel (petrol) storage depot in Cardiff in Cardiff Docks which was assessed in previous reports. This installation is subject to an EPR Permit and regulated by the Council. Capacity and throughput at this site has not altered significantly for the worse since the last assessment and no new relevant exposure exists.

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

3.2.5 Petrol Stations

There are no new petrol stations in Cardiff with throughputs greater than 2000m^3 per annum with a busy road nearby where there is relevant exposure within 10m of the pumps.

It is not necessary, therefore, to consider this further.

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

3.2.6 Poultry Farms

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

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

3.3 Commercial and Domestic Sources

3.3.1 Biomass Combustion – Individual Installations

As highlighted in Section 3.2.1 planning consent, subject to the approval of conditions attached has been granted for a 9.5MW biomass power plant on land at Rover Way, Pengam, Cardiff. This has subsequently been withdrawn.

3.3.2 Biomass Combustion – Combined Impacts

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.

SRS on behalf of Cardiff Council can confirm that there are no biomass combustion plants in the Local Authority area.

3.3.3 Other Sources

3.3.4 Domestic Solid-Fuel Burning

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 area 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.

3.4 New Developments with Fugitive or Uncontrolled Sources

There are no new locations where fugitive could occur which have not been covered by previous rounds of review and assessment and no locations where new relevant exposure has been introduced to existing locations.

It is not considered necessary to consider this further at this time.

SRS on behalf of Cardiff Council can confirm that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

3.5 Planning Applications

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

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.

3.5.1 LDP Strategic Sites North West

Since the LDP was adopted, numerous outline planning permissions have been granted in respect of Strategic Sites C and D in the North West of Cardiff. The outline applications submitted in respect of Strategic Site C comprise:

14/02188/MJR – Land South of Pentrebane Rd – approved 13/12/16

> *Up to 290 residential dwellings (C3), open space (including childrens play space), landscaping, sustainable urban drainage, vehicular access, pedestrian and cycle accesses and related infrastructure and engineering works.*

14/02157/MJR – Land North and South of Llantrisant Rd – outline application approved 09/08/2016

> *The development of up to 630 residential dwellings (use class c3, including affordable homes), primary school (use class d1), visitor centre/community centre (use class d1), community centre (use class d1), open space (including children's play spaces), landscaping, sustainable urban drainage, vehicular accesses, bus lanes, pedestrian and cycle accesses and related infrastructure and engineering works.*

14/02733/MJR – North West Cardiff – approved 20/03/2017

> *Outline planning application with all matters reserved apart from strategic access junctions for residential-led mixed use development, to be developed in phases, including preparatory works as necessary including demolition and re-grading of site levels; up to 5,970 residential units (use class c3, including affordable homes); 3 no. Local centres providing residential units, convenience shops and facilities/services (including up to 7,900 sq m in use classes a1-a3) and*

1no. District centre providing residential units, up to 12,000 sq m in use classes a1-a3 including up to two food stores (up to 5,000 sq m gross) with associated parking, up to 15,500 sq m of use class b1(a), b1(b) and b1(c); provision of up to 5,100 sq m of community and healthcare facilities across the district and local centres (use classes d1 and d2); provision for 3no. Primary schools and 1no. Secondary school; open space including allotments; parks; natural and semi natural green space; amenity green spaces; facilities for children and young people; outdoor sports provision including playing pitches; associated infrastructure and engineering works including new vehicular accesses, improvement works to the existing highway network, new roads, footpaths/cycleways, a reserved strategic transport corridor; up to 1 no. Electricity primary-substation and landscaping works (including suds).

16/00106/MJR – Goitre Fach Farm, Llantrisant Rd – approved 27/04/17

Outline planning application (all matters reserved apart from strategic vehicular, cycle and pedestrian access into the site) for the demolition of existing buildings and residential development of up to 300 dwellings on site to include open space (including children's play space), landscaping. Sustainable urban drainage, vehicular access, pedestrian and cycle accesses and related infrastructure and engineering works.

A single outline application has been submitted in respect of Strategic Site D (below), and none to date in respect of Strategic Site E.

14/00852/DCO – Land to the North of M4 Junction 33 – approved 07/09/2017

Comprehensive development of 'Land to the North of Junction 33 of the m4' to create a new community containing: A range of new homes, including houses, apartments and some sheltered accommodation for the elderly (Use Classes C2 and C3), a park and ride facility and transport interchange or hub, community facilities including a new primary school and community centre (Use Class D1), a local centre including shops (Use Class A1), financial and professional (Use Class A2), food and drink (Use Class A3) and a clinic or surgery (Use Class D1), new offices, workshops and research and development facilities (Use Classes B1 with ancillary B2 and B8), a network of open spaces including parkland, footpaths, sports pitches and areas for informal recreation, new roads, parking areas, accesses and paths, other ancillary uses and activities, and requiring; site preparation, the installation or improvement of services and infrastructure; the creation of drainage channels; improvements/ works to the highway network and other ancillary works and activities.

The impact of the above proposals on the environment has been fully considered in the determination of each of the above applications and subsequent related applications. The LDP has two key policies to ensure that the impacts on air quality from developments do not impede on public health or the environment, and these are;

KP18 deals with 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:...(iii). Minimising air pollution from industrial, domestic and road transportation sources and managing air quality;"

EN13, which addresses air, noise, light pollution and contaminated land:

"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."

To comply with the referenced policies, appropriate air quality assessments have been undertaken and submitted as part of the planning applications for the proposed developments. The submitted air quality assessments have been undertaken in line with best practise guidance and consider future air quality levels for the established Llandaff AQMA.

The air quality assessments have captured various scenarios using air quality dispersion modelling software. The impacts of the proposed development and other strategic developments in Cardiff's Local Plan has been assessed alone and in combination in a series of sensitivity tests utilising dispersion modelling software. The assessments indicate that the impact to the Llandaff AQMA will be insignificant when considering both the individual LDP developments and the cumulative impact of the developments.

An Environmental Statement was submitted as part of each outline application mentioned above and provided a comprehensive assessment of the potential impacts of the proposed development, which covered the following topics: Socio Economic, Transportation, Water Resources, Ecology, Landscape & Visual, Noise & Vibration, Air Quality, Heritage, Agriculture and Soils, and Cumulative & Residual effects. Each ES considered both the traffic and air quality impact of the developments, including the impact on the Llandaff Air Quality Management Area during both the construction and operational phases, which was carefully considered in the assessment of the applications.

The Planning Committee report for each outline application summarises the development proposals, the responses of consultee and third party responses, provides an analysis of the impact of the developments – including traffic and air quality impacts, and sets out the planning obligations and conditions considered necessary to manage their impacts and allow the proposals to come forward for development. Furthermore, the applications were approved subject to extensive mitigation in the form of detailed highway improvement works, a suite of transport conditions (encompassing detailed highway improvement works, car and cycle parking, street cross sections, travel plans, traffic monitoring, phasing, construction environmental management plans) and a package of s106 contributions for off-site highway improvement measures. The improvement measures will be phased to support the implementation of the strategic sites and help achieve the LDP city-wide 50:50 modal split target.

Together, the developments will deliver new and improved pedestrian and cyclist routes and facilities, bus priority measures, improved bus services and new routes and stops. Future public transport routes will also be protected. Traffic signal, junction and traffic management improvements will help to manage the flow of traffic on the network and hold queues in appropriate locations outside of AQMAs. A Park & Ride facility was also secured as art of Strategic Site D. The developments include travel plan measures and financial contributions towards air quality monitoring. The Planning Committee report for each application confirmed that the Environmental Statements were taken into consideration in the assessment of the application, that the conclusions were considered sound, and that there were no demonstrable or compelling reasons which indicate sufficient harm to warrant refusal of the application, with all material factors, policy implications and issues raised through consultation satisfactorily addressed.

3.5.2 19/02330/MJR

N OUTLINE APPLICATION (APPEARANCE, LANDSCAPING, LAYOUT AND SCALE RESERVED) FOR A MIXED USE DEVELOPMENT OF UP TO 2,500 NEW HOMES Strategic Site F in the LDP

Application received in late 2019 for mixed use development. An Air Quality assessment was undertaken for both the construction and operational phase of the development. It should be noted that this development has a build programme of some 15 years, owing to the size of the development.
SRS reviewed the Air Quality Chapter of the supporting Environmental Statement, and noted a number of the operational impacts that were outlined by the report, although in general it was concluded that the development would generate a negligible impact.
A number of underlining queries concerning the report and methodologies used around the datasets to assess the impacts were raised and the developer was requested to address these in July 2020. An updated Environmental Impact Assessment was provided in September 2020, and included an updated Air Quality Assessment Chapter, to respond to the comments made by SRS. The revised assessment confirms there is no risk of exceedance of air quality objectives and that the residual effects of emissions to air from construction vehicles and plant on local air quality will be negligible.

At the time of writing this application is still yet to be determined.

3.5.3 20/01110/MJR

Velindre Construction Access Road

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 considered to be 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 a number of concerns raised by local 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).

At the time of writing this report the Council is having ongoing discussions with developer's appointed consultant to ensure the appropriate monitoring units are installed.

4 Polices and Strategies Affecting Airborne Pollution

4.1 Local / Regional Air Quality Strategy

4.1.1 Cardiff's Clean Air Strategy and Action Plan

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 in silo 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.

4.2 Air Quality Planning Policies

4.2.1 Cardiff's Local Development Plan (LDP)

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 take into account 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.

4.2.2 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.

The next stage in the preparation process is consultation on the strategic options (levels of housing and population growth and spatial options for meeting this growth) which is planned for autumn 2021. This will be followed by consultation on the Preferred Strategy which planned for autumn 2022, following consideration by Cabinet and Council in September 2022.

4.2.3 Planning Obligations SPG (January 2017)

This document sets out the Council's approach to planning obligations when considering applications for development. It provides further guidance on how the policies set out in the LDP are to be implemented and will assist in securing the provision of sustainable development across the city.

Poor air quality can impact on people's health / quality of life and local authorities are required to assess air quality in their areas against National Air Quality Standards. Where the need arises as a result of a proposed development, the document confirms that developers will be requested to provide an Air Quality Assessment and, in the event of an adverse assessment, a proposed scheme of mitigation measures. In addition to a scheme of mitigation measures, a financial contribution may be sought towards the site specific monitoring of air quality emissions.

In respect of Transportation and Highways, the SPG confirms the Council will maximise opportunities for trips generated by new development to be made by walking, cycling and public transport and seek to ensure that the highway network is able to accommodate road traffic movements associated with new development in a safe and efficient manner. The following guidance is covered:

- developments requiring the provision of a Transport Statement or Transport Assessment;
- the provision of on-site infrastructure necessary to serve the development;
- the provision of or contribution towards offsite highway works, public transport infrastructure/ facilities provision and local interventions where the need arise;

- integrating public transport; and
- travel plans detailing a long term management and monitoring strategy for the delivery of sustainable transport objectives through positive action.

Planning obligations SPG is available at;
https://www.cardiff.gov.uk/ENG/resident/Planning/Planning-Policy/Supplementary-Planning-Guidance/Documents/Cardiff%20Planning%20Obligations%20SPG%20-%20Edition%201%20(26th%20January%202017).pdf

4.3 Local Transport Plans and Strategies

Cardiff is growing and changing, and this brings more journeys and more pressures on Cardiff's transport network. Reducing the number of car journeys made in the city, and promoting the use of active and sustainable modes of travel, are central to Cardiff Council's Transport Strategy and in improving air quality in the city. The LDP sets the target of achieving a 50:50 modal split – this means that 50% of all journeys need to be made by sustainable transport by 2026 in order to accommodate the future development set out in the LDP. Our policies set out in the LDP support the need to secure significant improvements to the public transport and active travel networks in combination with new developments.

Cardiff's Local Transport Plan (LTP) was approved by the Welsh Government in May 2015. The LTP sets out our main transport infrastructure proposals which will support this significant modal shift. The Local Transport Plan recognises the need to improve air quality. Its programme prioritises:

- development of active travel networks to increase walking and cycling for local journeys
- the provision of cycling infrastructure
- the bus network
- reduced speed limits
- reducing congestion
- improving transport efficiency and reliability
- bus based park and ride.

The Council has published an Annual Progress Report for Transport each year since 2002. These are available here:
http://www.keepingcardiffmoving.co.uk/your-sustainable-travel-city

Challenges

Cardiff Council is committed to achieving a 50:50 modal spilt by 2026, as set out in Cardiff's Local Development Plan (LDP) 2006- 2026. However, there are a number of challenges that Cardiff faces in order to meet the 50:50 modal split;

- **Future Growth** - Cardiff's LDP provides for 41,000 new homes and 40,000 new jobs in Cardiff by 2026. It is envisaged that this level of growth will generate a (net) road traffic increase by 32% and so existing pressures on Cardiff's transport network will be intensified. A significant shift is required from car use to sustainable travel;

- **Inbound Commuting Traffic** - 38% of Cardiff's workforce travel to Cardiff from outside the county area. This commuting workforce from outside the county area has seen a 10% increase 2004 - 2014. Figures from the Census conducted in 2011 suggest that between 76% - 84% of the commuting workforce travel by car;

- **Health -** There is an urgent need to encourage healthy and active lifestyles in Cardiff; only 25% of Cardiff residents meet physical activity guidelines and 53% are obese or overweight (Welsh Health Survey 2010 and 2011). Social isolation and loneliness is another major need in our local population;

- **Sustainable and Active Travel Availability** - Areas poorly served by sustainable transport modes often have high levels of car ownership and become heavily reliant on the car for daily travel. The quality of the public transport network is major challenge for Cardiff; Ask Cardiff Surveys outlined a 4% decrease in daily bus use between 2007 and 2014. Across the UK over the last 5 years the cost of running a car has decreased by 5% while the cost of the bus has increased by 14% (Department for Transport). There is also a need for cycling and walking improvements in Cardiff. Levels of cycling are continuing to increase but 82% of Cardiff residents think cycling safety needs to be improved (Bike Life 2015).

4.3.1 Cardiff's Transport White Paper

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 South East 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.

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

4.4 Active Travel Plans and Strategies

In September 2014, the Welsh Government introduced the Active Travel (Wales) Act. This measure legally requires Welsh local authorities to map and plan suitable routes for Active Travel within certain areas, as designated by the Welsh Government.

The Cardiff Cycling Strategy sets out an ambitious vision to double the number of cycling trips by 2026, from a 9.2% modal share in 2015 to 18.4% in 2026. In order to achieve this vision, it will be necessary to develop a comprehensive network of cycling infrastructure which is suitable for use by people of all ages and abilities, and to work with key partners from employers, retail and schools to ensure that appropriate cycling facilities are provided at destinations and to promote cycling.

Infrastructure improvements for walking and cycling are planned and prioritised through the Integrated Network Map (INM) as detailed in **.** The INM defines a network of walking routes and cycling routes and a schedule of schemes to improve this network of routes over a 15 year period. In accordance with the requirements of the Active Travel Act, the INM will be submitted to the Welsh Ministers for approval in November 2017 and updated every 3 years.

As displayed by Figure 43 and Figure 44**,** the INM and Cycling Strategy sets out proposals for new cycleways which will provide high quality cycle routes, segregated from pedestrians and motor vehicles on busy roads, and will connect strategic development sites, existing residential areas, employment sites, the city centre and Cardiff Bay. These will be supported by a network of secondary routes.

Figure 43 - Integrated Network Map

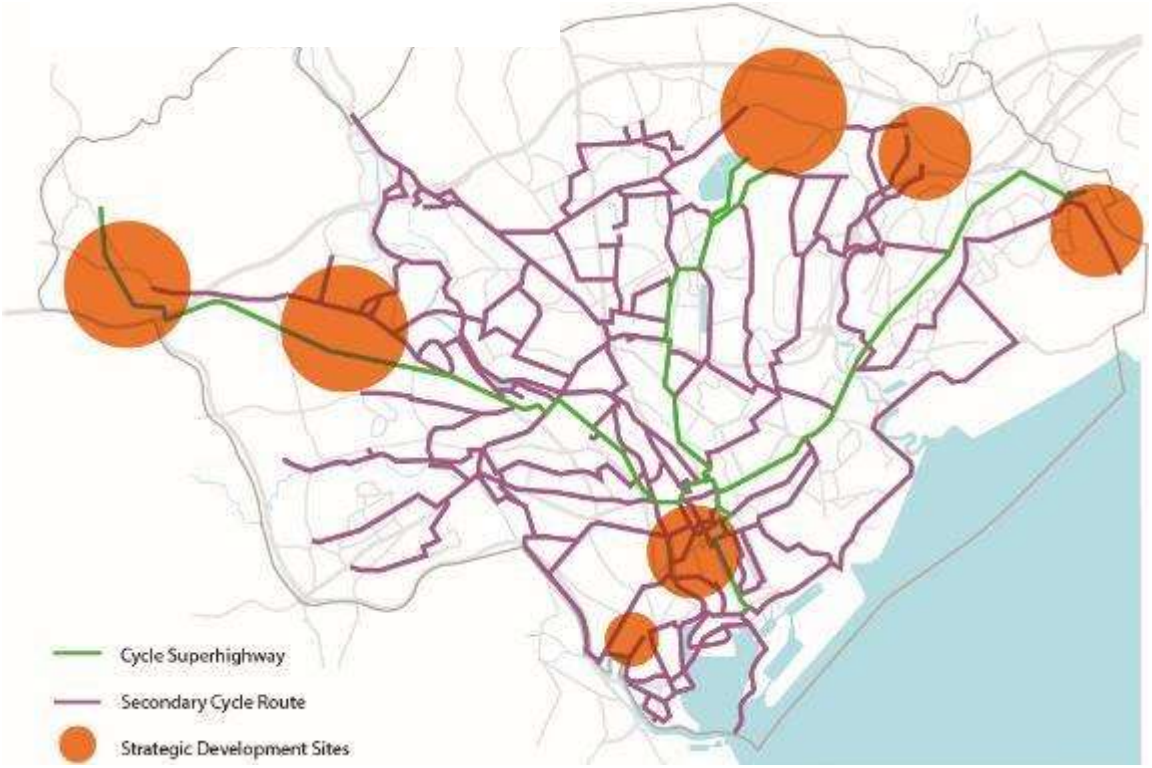


Figure 44- Map of Cardiff's Cycleways Proposal

4.4 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.

As highlighted in Figure 45, there are seven national well-being goals that form the basis of the Act and five ways of working which support the goals.

Figure 45 The Well- being of Future Generations (Wales) Act 2015 Matrix

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.

4.4.1 Cardiff Well-Being Plan 2018-2023

Under the WFG Act the Cardiff Public Services Board (PSB) has produced its Well-Being Plan for 2018-2023[2], 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

[2] Cardiff Well-Being Plan 2018-2023

- **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.'*

4.5 Green Infrastructure Plans and Strategies

Outlined in Cardiff's Local Development Plan (LDP) 2006- 2021, 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

4.6 Climate Change Strategies

4.6.1 One Planet Cardiff Strategy

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 its recommendations and action plan and this is being reported to Cabinet on the 14th October 2021 for approval.

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/

4.6.2 Local Development Plan

Outlined in Cardiff's Local Development Plan (LDP) 2006- 2021, Policy **KP15** focuses upon Climate Change.

Policy KP15

Climate Change

A core function of the Plan is to ensure that all development in the city is sustainable, taking full account of the implications of reducing resource use and addressing climate change. This Policy provides a framework for sustainable growth by promoting development that mitigates the causes of climate change and which is able to adapt to its likely effects. This long-term approach is vital if Cardiff is to realise the economic, environmental and social objectives set out in the Vision.

To mitigate the effects of climate change and adapt to its impacts, development proposals should take into account the following factors:

- **Reducing carbon emissions;**
- **Protecting and increasing carbon sinks;**
- **Adapting to the implications of climate change at both a strategic and detailed design level;**
- **Promoting energy efficiency and increasing the supply renewable energy; and**
- **Avoiding areas susceptible to flood risk in the first instance in accordance with the sequential approach set out in national guidance; and**

- **Preventing development that increases flood risk.**

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

Monitoring data for 2020 indicates 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.

Therefore monitoring within the AQMAs has continued in 2021, 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.

5.2 Conclusions relating to New Local Developments/ Sources

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

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

5.3 Other Conclusions

The implementation of COVID measures in the City Centre has accelerated the Council's achievement of compliance with limit values for NO_2 under the Ambient Air Quality Directive, on Castle Street. At the time of writing this report further amendments to the highways arrangements on Castle Street are being implemented and monitoring conitunes to take place to assess ongoing impacts of these works on compliance.

5.4 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. Continue to drive Air Quality as a major aspect to be considered during any planning applications, most importantly Cardiff Central Development;
4. Submit an Annual Progress Report (APR) in 2022; and
5. Update the existing Clean Air Strategy and Action Plan to represent most recent actions in 2022/23.

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(16).* London: DEFRA (February 2018).

Welsh Government, Local Air Quality Management in Wales, Policy Guidance, June 2017.

Cardiff Council 2020 Progress Report

Cardiff Council Clean Air Plan 2019

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 A: Monthly Diffusion Tube Monitoring Results

Table 12– Full Monthly Diffusion Tube Results for 2020

WAQF Number 2020	Council	Site Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE	Biased Adjusted	DC	Annualised
CCC-036	16	167 Ninian Park Road	48.5	28.9				23.7	17.4	23.3	28.5	29.6	38.1	37.7	30.6	**23.3**	**75.0**	23.3
CCC-083	49	Penarth Road	47.2	30				19.1	23.2	26	38.8	28.6	34.5	38.6	31.8	**24.2**	**75.0**	24.2
CCC-092	58	Westgate Street	70.7	60.2			26.8	22.3			30.4		43.4	46.6	42.9	**32.6**	**58.3**	30.0
CCC-115	81	Stephenson Court	50.9	38.1			22.6	23.4	23.9	35.7	30.9	38.1	46.2	43.6	35.3	**26.9**	**83.3**	26.9
CCC-120	86	19 Fairoak Road	50.1	43.4				22.9	23.2	31.8	28.3	35	41	26.4	33.6	**25.5**	**75.0**	25.5
CCC-130	96	Manor Way Junction	48.5	25.3				19.8	16.8	25.1	20.8	27	39.3	36.8	28.8	**21.9**	**75.0**	21.9
CCC-132	98	Western Avenue (premises)	33.3	22.2				19	15.6	22.1	24.6	25.6	34.3	36.9	26.0	**19.7**	**75.0**	19.7
CCC-133	99	Cardiff Road Llandaff	41.1	22.1			26.2	22.3	14.3	29.5	29.9	29.8	40.1	41.4	29.7	**22.5**	**83.3**	22.5
CCC-135	101	Cardiff AURN						9.8	8.1	14.5	17.5	13.8	28.6	31.5	17.7	**13.4**	**58.3**	14.3
CCC-136	102	Cardiff AURN						9.1	7.6	13.3	20	16.6	30.2	30	18.1	**13.8**	**58.3**	14.7
CCC-137	103	Cardiff AURN						9.4	8.3	14.3	19.6	16	30.4	32.5	18.6	**14.2**	**58.3**	15.1
CCC-140	106	30 Caerphilly Road	51.9	32.2				19.2	17.1	25.2	27.4	29.2	43.3	40.9	31.8	**24.2**	**75.0**	24.2
CCC-146	112	17 Sloper Road	38.9	22.7				17.5	15.1	21.1	30.8	27.7	34.6	33.4	26.9	**20.4**	**75.0**	20.4
CCC-149	115	21 Llandaff Road	48.4	31.5				24.1	21.3	19.2	34.8	32.3	43.5	40.3	32.8	**24.9**	**75.0**	24.9
CCC-151	117	25 Cowbridge Road West	56.2	36.2			36.6	33.2						49.7	42.4	**32.2**	**41.7**	30.3
CCC-160	126	Westgate Street Flats	52.6	32.8			22.3	17.6	12.6		26	23.8	33.7	38.7	28.9	**22.0**	**75.0**	22.0
CCC-162	128	117 Tudor Street	49	34.7				23.4	19.5	24.8	31.3	32.2	41.5	36.1	32.5	**24.7**	**75.0**	24.7
CCC-163	131	Fitzalan Court	57.1	40			24	25.3	27.2	40.6	36.4	36.7	42.4	44.3	37.4	**28.4**	**83.3**	28.4
CCC-177	143	Windsor House	45.1	41.7			24.7	19.2	15.6	22.7	29.3	27.5	37.7	41.2	30.5	**23.2**	**83.3**	23.2
CCC-178	144	Marlborough House	42	46.9			30.6	21.6		23.1	30.3	27.1	36.4	34.6	32.5	**24.7**	**75.0**	24.7
CCC-181	147	211 Penarth Road	33.3	23.2				14	12.2	24.5	29.7	26.6	38.7	37.6	26.6	**20.2**	**75.0**	20.2
CCC-182	148	161 Clare Road	37.5	21.6				20.7	14.9	25.9	31	24.1	35.7	37.7	27.7	**21.0**	**75.0**	21.0
CCC-183	149	10 Corporation Road	49.8	35				24.1	22.1	27.2	36.4	33	43.4	41.7	34.7	**26.4**	**75.0**	26.4
CCC-190	156	2a/4 Colum Road	33.7	19.6				15.2	9.7	19.9	23.3	22.4	32.7		22.1	**16.8**	**66.7**	17.2
CCC-191	157	47 Birchgrove Road	39.8	26.4				13.9	14.8	20	24.3	23.4	29.8	32.7	25.0	**19.0**	**75.0**	19.0
1	158	64/ 66 Cathays Terrace	40.2	21.8				14.8	9.9	17.6	21.6	20.1	28.3	30.9	22.8	**17.3**	**75.0**	17.3
CCC-193	159	IMO façade replacement	49.7	30.6				26.2	18.7	37.2	30.5	31.7	43.4	40.4	34.3	**26.0**	**75.0**	26.0
CCC-200	166	163 Lansdowne Road	50.9	32.7				24.1	19.2	28.1	33.7	34.5	43.3	40.6	34.1	**25.9**	**75.0**	25.9
CCC-202	168	570 Cowbridge Road East	37.3	20.9				20.6	17.4	22.6	29.8	28.7	33.9	36	27.5	**20.9**	**75.0**	20.9
CCC-208	174	76 North Road	38.6	20.1				13.5	11.2	18.2	21.7	20.4	31.5	31.7	23.0	**17.5**	**75.0**	17.5
CCC-213	179	Atoluso, Bute Terrace	56.4	40.2			22.9	25.4	25.5	41	50.9	49.7	59.3	49.7	42.1	**32.0**	**83.3**	32.0
CCC-217	183	Station Terrace	47.3	28.3			18.5			26.5	32.4	33.2	43.4	37.9	33.4	**25.4**	**66.7**	23.3
CCC-218	184	Hophouse, St Mary Street	62.3	33.7			23.9	19.2			39.4	37.5	51.9	49.5	39.7	**30.2**	**66.7**	28.3
CCC-220	186	Dempsey's Public House, Castle Street	68.6	51.9				18.9	9.2	14.3	18.8	18.4	31.5	38.8	30.0	**22.8**	**75.0**	22.8
CCC-221	187	Angel Hotel	80.7				30.6	22.9			22.6	23.1	33.2	41.1	36.3	**27.6**	**58.3**	25.7
CCC-222	188	Westgate Street (45 Apartments)		52.2			33.2	27.5	20.6		40.8	35.3			34.9	**26.5**	**50.0**	32.5
CCC-223	190	3 Pearson Street	34.5	28.4				17.4	15	24.3	21.9	26.6	37.5	36.1	26.9	**20.4**	**75.0**	20.4
CCC-224	191	7 Mackintosh Place	36	31.2				19	16.7	28.3	24.8	27	42.1	38	29.2	**22.2**	**75.0**	22.2
CCC-225	192	3 Cowbridge Road West	61.4	40.6			34.8	30.8	25.4	36.7	41.5	40.8	40.9	47.1	40.0	**30.4**	**83.3**	30.4
CCC-226	193	24 Kings Road	29.1	16.9				9.2	8.7	11.8	16.9	19	27.4	28.9	18.7	**14.2**	**75.0**	14.2
CCC-227	194	115 Cowbridge Road West	25.6	18.1				14.9	13.2		23.1	22	28	26.8	21.5	**16.3**	**66.7**	15.6
CCC-228	195	244 Newport Road	54.3	31.1				22.4	17			30.3	39.6	37.6	33.2	**25.2**	**58.3**	23.9
CCC-229	196	2 Pencisely Road	41.4	24.1				17.3	13.6	20.7	25.4	25.8	24.4	34.6	25.3	**19.2**	**75.0**	19.2
CCC-230	197	GFF 369 Newport Road	43.3									23	37.6		34.6	**26.3**	**25.0**	21.2
CCC-231	198	Next Building to Stephenson Court	47.7	36.9			24.4	21.5	22.9	34.1	32	35.3	40.6	38.1	33.4	**25.3**	**83.3**	25.3
CCC-232	199	157 Newport Road	40.1	28.1				16.3	15.4	22.2	22.5	27.2	35.5	34.9	26.9	**20.5**	**75.0**	20.5
CCC-233	200	350 Whitchurch Road	48.9	32.7				23.1	22.4	29.1	40.5	36.7	43.8		34.7	**26.3**	**66.7**	27.0
CCC-234	201	23 Lower Cathedral Road	47.6	25.5				18.8	13	23.5	26.6	28.5	37	38.2	28.7	**21.8**	**75.0**	21.8
CCC-235	202	22 Clare Street	47.1	27.9				24.2	15	25	29	29.3	38.8	35.8	30.2	**23.0**	**75.0**	23.0
CCC-236	203	10 Fairoak Road	36.9	20.4				13.7	11.4	17.8	17.2	17	28.1	38.9	22.4	**17.0**	**75.0**	17.0
CCC-237	204	53 Neville Street	36.5	21				18	10.9	19.9	22.4	24.1	32	34.2	24.3	**18.5**	**75.0**	18.5
CCC-240	207	42 Waungron Road	33.6	16.1				14.9	11.2	17.3	21.4	22.6	30	28.5	21.7	**16.5**	**75.0**	16.5
CCC-241	208	2 Llantrisant Road	41.8	27.3			14	15.9	14.4	20.7	25.5	24.9	34.3	27.2	24.6	**18.7**	**83.3**	18.7
CCC-242	209	178 North Road	33.4	20					9.1	14.7	19.7	18.4	29.4	23.9	21.1	**16.0**	**66.7**	15.0
CCC-243	210	485 Caerphilly Road	33.5	21.8				14.5	12.4	16.9	20.1	19.3	30.5	24.5	21.5	**16.3**	**75.0**	16.3
CCC-244	211	19 Well Wood Close, Penylan	38.7	18.8				17.5	10.9	21.2	18.5	21.5	34.6	29.6	23.5	**17.8**	**75.0**	17.8
CCC-245	212	62 Bridge Road	62.3	37.7			35	36	24.3	42.7	46	43.3	58.1	48	43.3	**32.9**	**83.3**	32.9
CCC-266	213	Birchgrove Village	40.2	27.7											34.0	**25.8**	**16.7**	25.8
CCC-267	214	Mitre Place	45.7	34.2			23.1	27.7	22.4	28.2	32.7	32.5	39.8	35.9	32.2	**24.5**	**83.3**	24.5
CCC-269	216	Lamppost Adjacent to James St Flats	47.3	14.6				21.3	16.5	25.6	31.6	28.9	41.3	36.1	29.2	**22.2**	**75.0**	22.2
CCC-270	217	7 Avondale Road	27.6	29				12.4	7.7	14.5	18.9	17.5	28.4	25.2	20.1	**15.3**	**75.0**	15.3
CCC-271	218	16-18 Cowbridge Road West	45.4	36.5			28.6	27.3	27.4		41.8	35.7	42.8	44.4	36.7	**27.9**	**75.0**	27.9
CCC-272	219	Pontcanna Inn Lamppost	44.2	25.6								27.4	39	36.2	34.5	**26.2**	**41.7**	21.4
CCC-273	220	Fitzalan Court Newport Road	65.1					12.7					53.2	46.2	44.3	**33.7**	**33.3**	27.6
CCC-274	221	Stuttgarter Strasse (New student flats)	70.1	46.3				25.2	24.5		38.1		47.8	44.8	42.4	**32.2**	**58.3**	30.0
CCC-276	223	St Fagans Road, Fairwater	22.4	11.6				9.8	21.5	11.6	15.2	15.7	21.9	19.6	16.6	**12.6**	**75.0**	12.6
CCC-277	224	110 Cardiff Road	36.4	25.2				15.2	12.6	18.9	24.7	23		33	23.6	**18.0**	**66.7**	18.2
CCC-278	243	25 Cardiff Road	38.8	22.3					24.4	33.5	39.5	38.2	48.4	38.8	35.5	**27.0**	**66.7**	25.3
CCC-279	244	25 Bridge Road	37	23.1				15.2	14.4	18.3	24.5	21.6	29.8	29.4	23.7	**18.0**	**75.0**	18.0
CCC-280	245	47 Willows Ave	24.4	19.4				11.8	9.6	15.1	15.7	19.5	27.1	25.1	18.6	**14.2**	**75.0**	14.2
CCC-283	249	Wentloog Road, Rumney	39.5	22.9				13.9	9.9	18.2	19.1	20.5	31.9	26.2	22.5	**17.1**	**75.0**	17.1
CCC-284	250	Central Square Cardiff, City Centre	47.4	41.5					19.8	27.3	32	33.4	48.4	46.4	37.0	**28.1**	**66.7**	26.7
CCC-275	251	Heol Isaf, Radyr	27.8	19.4				11.1	8.2	12.9	15.4	15.6	21	26.3	17.5	**13.3**	**75.0**	13.3
CCC-286	252	Llandaff Cathedral School		14.5				10.2	11.7	11.8	15.6	16.9	28.5	27.6	17.1	**13.0**	**66.7**	13.4
CCC-287	253	Llandaff Cathedral School		25.5				18.3		18.2	21.2	24	36.5	37	25.8	**19.6**	**58.3**	19.2

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 nearest relevant public exposure.

Appendix B: A Summary of Local Air Quality Management

Purpose of an Annual Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment Act 1995 and associated government guidance. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are being achieved. Where exceedances occur, or are likely to occur, the local authority must then declare an Air Quality Management Area (AQMA) and prepare a **DRAFT** Air Quality Action Plan (AQAP) within 18 months, setting out measures it intends to put in place to improve air quality in pursuit of the air quality objectives. The AQAP must be **formally** adopted prior to 24 months has elapsed. Action plans should then be reviewed and updated where necessary at least every 5 years.

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

Air Quality Objectives

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in **Table 13.**

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 exceedences in each year that are permitted (where applicable).

Table 13– Air Quality Objectives Included in Regulations for the Purpose of LAQM in Wales

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2011
1,3-butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Appendix C: Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors

A database of bias adjustment factors determined from Local Authority co-location studies throughout the UK has been collated by the LAQM Helpdesk. The National Diffusion Tube Bias Adjustment Factor Spreadsheet (Version 07/21) was used to obtain an overall adjustment factor of 0.75 from the input data shown in the following screenshot. This overall factor is based on 42 co-location studies where the tube preparation method and analysis laboratory used were the same as those used by CC.

Discussion of Choice of Factor to use

The bias adjustment factor applied to all 2020 data is 0.76. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 07/21. Due to insufficient data capture <90%, in accordance with Defra's LAQM (TG16), Box 7.11 it is preferable not to perform a co-location study due to concerns associated with the data quality. The National Bias Adjustment Factor supplied by the LAQM Defra website, based on 24 studies, which appointed Socotec UK Ltd Didcot laboratory, gave a figure of 0.76 and so this has been adopted for ratification purposes.

Short-Term to Long-Term Data Adjustment

AMS Adjustment

AURN station 1 (City Centre, Frederick Street) suffered poor data capture for NO_2 & PM_{10} in 2020 (62.5% & 67.7%). As a result, the finalised NO_2 & PM_{10} figures presented in this report for the AURN 1 monitoring site have been annualised according to the methods presented in Box 7.9 of LAQM (TG16). A Long-term AURN urban background continuous monitoring site within a distance of approximately 50 miles from Cardiff was selected for the purposes of this procedure.

Table 14- Long term AURN site used for calculation of NO_2 annualisation ratio for Cardiff City Centre AURN 1

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	19.9	16.22	1.23
Average Ratio				1.23

Table 15- Long term AURN site used for calculation of PM_{10} annualisation ratio for Cardiff City Centre AURN 1

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.3	16.11	0.95
Average Ratio				0.95

Diffusion Tubes Adjustment

The annual average nitrogen dioxide (NO_2) datasets obtained via the use of passive diffusion tubes during January to December 2020 were annualised via the method described in Box 7.10 of LAQM TG(16). Due to potential quality issues surrounding Cardiff's City Centre AURN 1 NO_2 data, a long-term AURN urban background continuous monitoring site within a distance of approximately 50 miles from Cardiff was selected.

Table 16– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 58

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	16.5	0.91

Table 17– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 101

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	14.26	1.05

Table 18– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 102

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	14.26	1.05

Table 19– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 103

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	14.26	1.05

Table 20– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 183

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	16.4	0.91

Table 21- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 184

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	16.18	0.93

Table 22- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 187

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	16.33	0.92

Table 23- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 188

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	12.4	1.21

Table 24- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 250

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	15.00	16.04	0.94

Table 25 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 117

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.6	0.94

Table 26 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 156

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	14.29	1.09

Table 27 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 183

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.98	0.92

Table 28 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 194

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.38	0.95

Table 29 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 195

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.49	0.95

Table 30 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 197

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	18.2	0.81

Table 31 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 200

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	14.29	1.03

Table 32 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 209

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.61	0.94

Table 33 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 219

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	17.92	0.82

Table 34 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 220

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	17.9	0.82

Table 35 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 221

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.77	0.93

Table 36 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 224

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	14.44	1.02

Table 37 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 243

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.61	0.94

Table 38 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 252

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	14.21	1.03

Table 39 Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 253

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3)	Ratio
St Julians School Newport AURN	Urban Background	14.66	15.00	0.95

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

.

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'
AQA	Air Quality Assessment
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)
CC	Cardiff Council
CASAP	Clean Air Strategy and Action Plan
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