Appendix 1

Environmental Scrutiny Committee Member's Briefing Note on 2020 Cardiff Council Annual Air Quality Progress Report

1. 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.

2. Air Quality in 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), February 2018. The designated monitoring locations are assigned based on relevant exposure and where the certain Air Quality Objective levels for a particular pollutant applies. 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."

3. 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

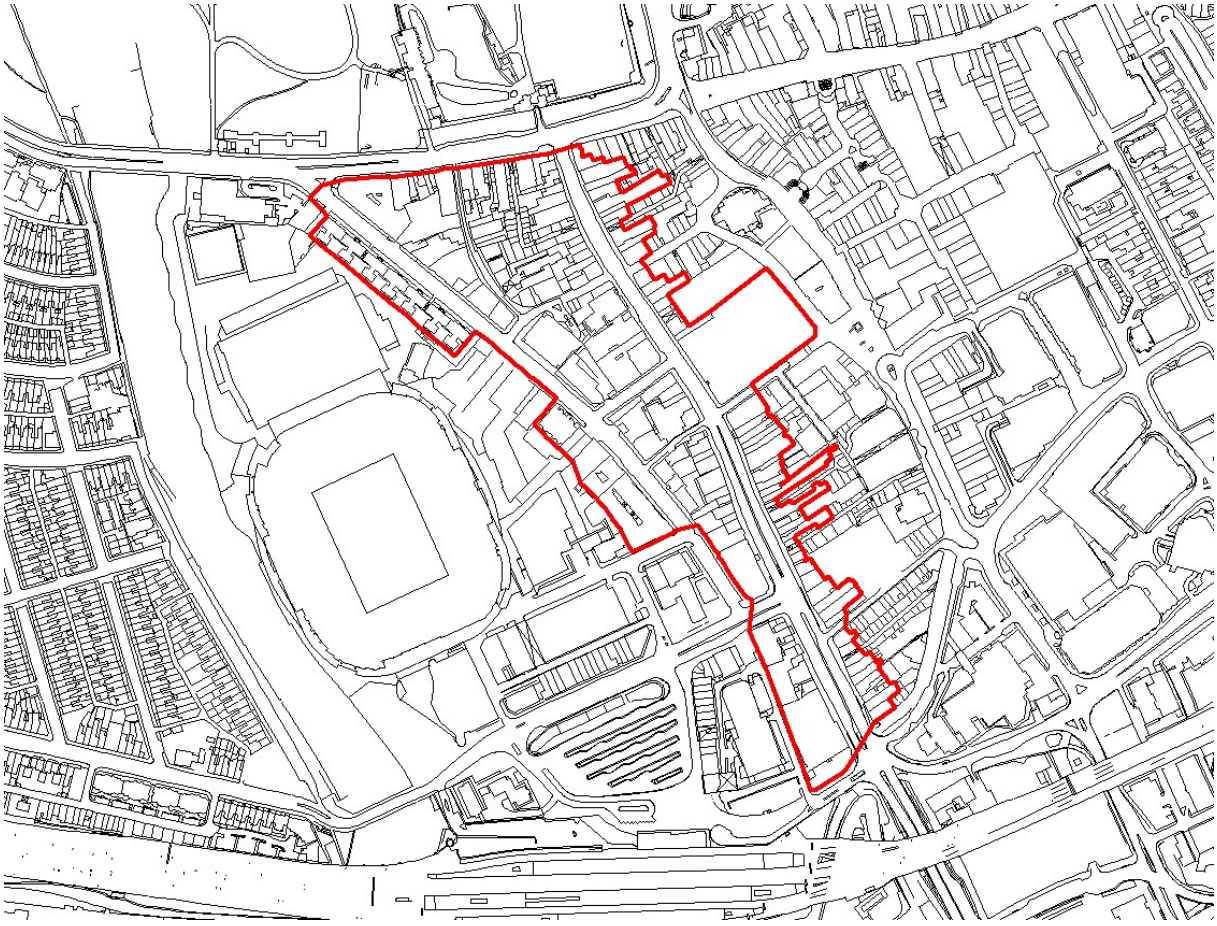

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Figure 2- Boundary of Ely Bridge AQMA

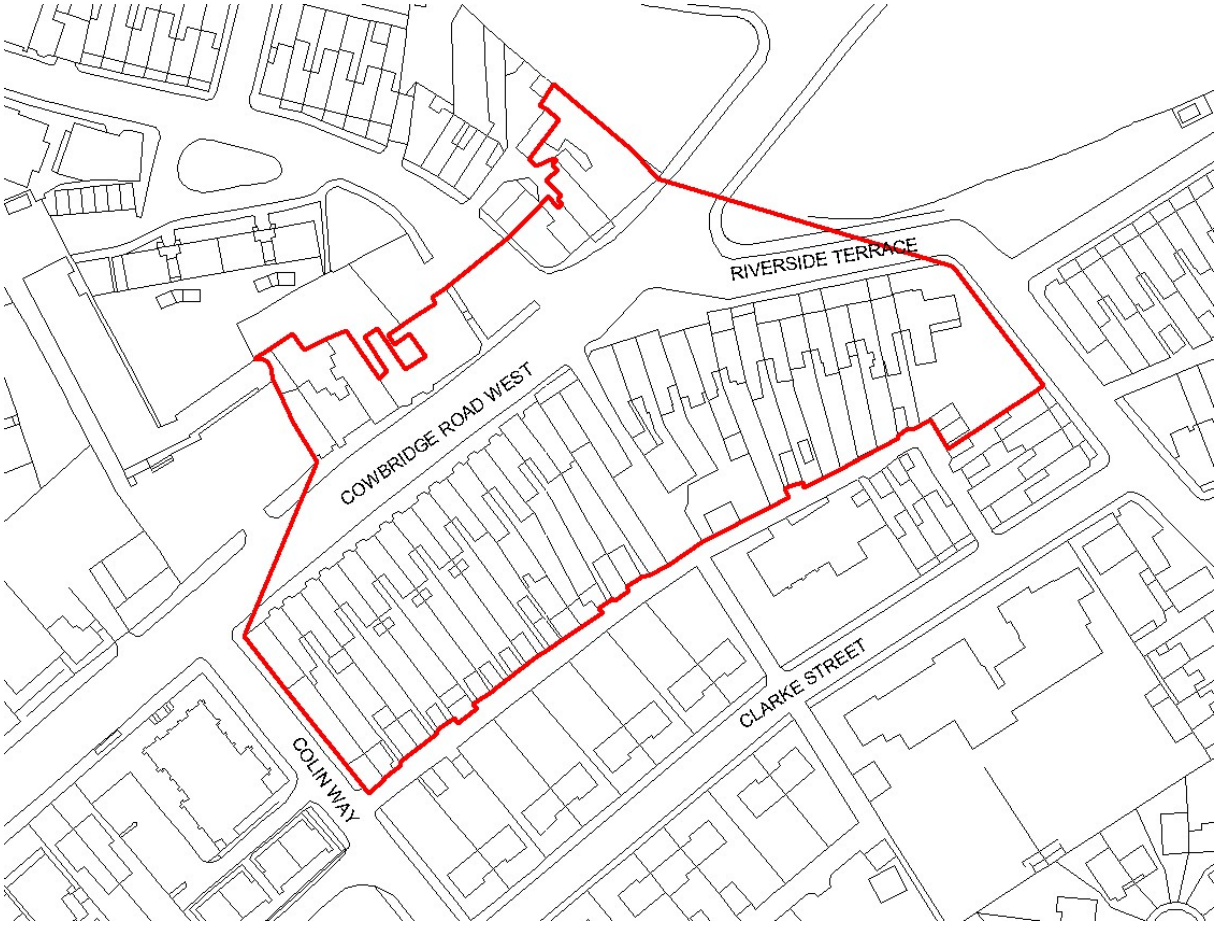


Figure 3- Boundary of Stephenson Court AQMA

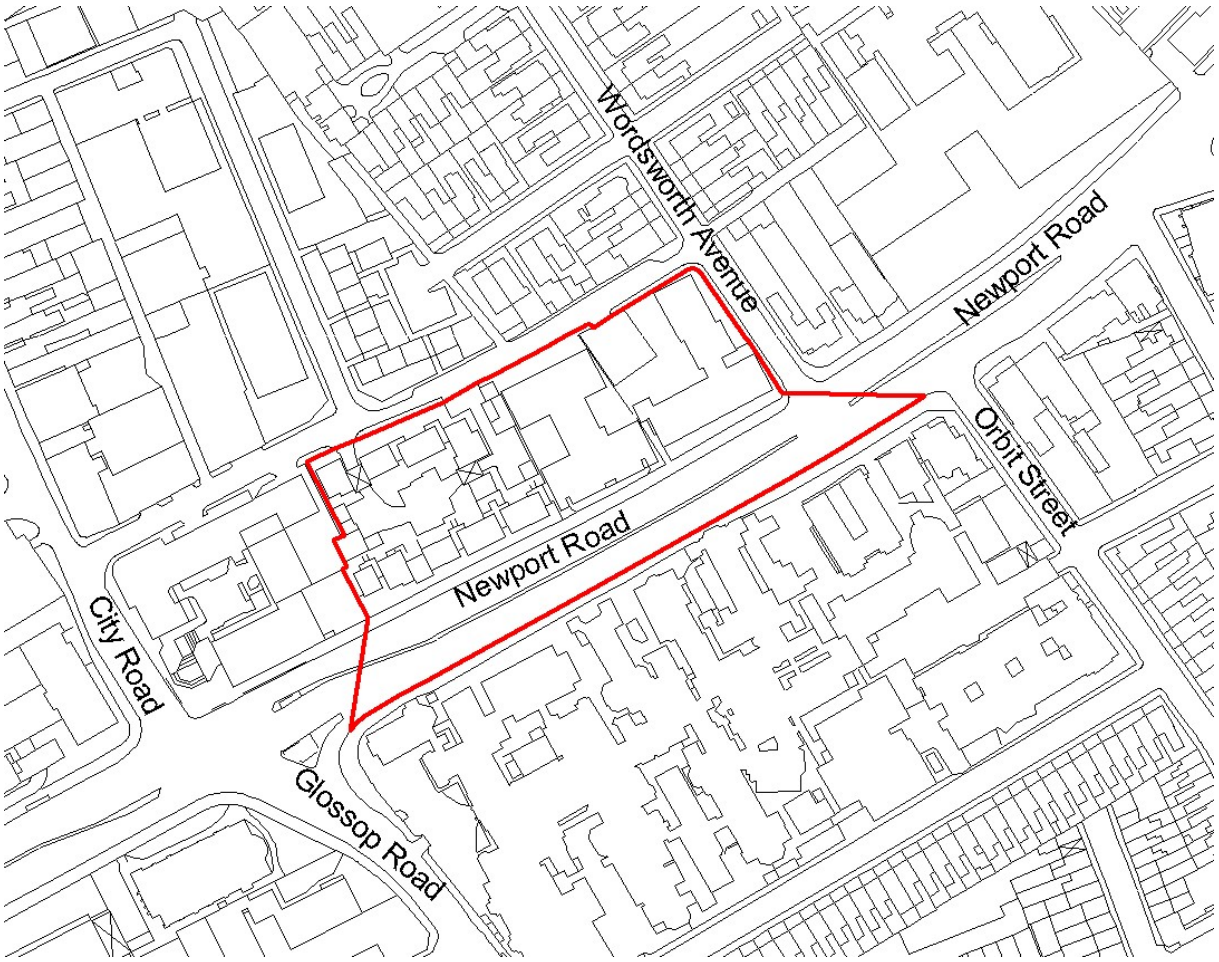
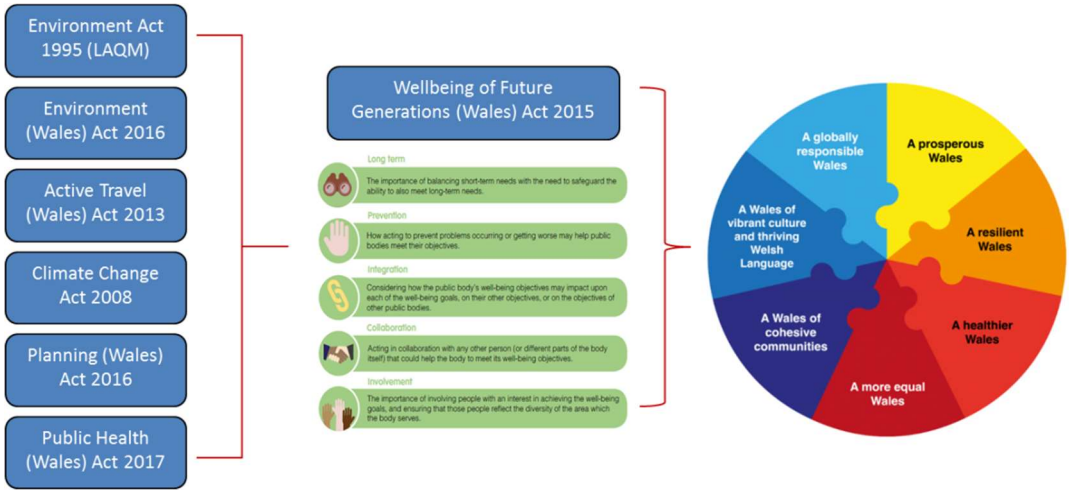


Figure 4- Boundary of Llandaff AQMA

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



3.1 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.

3.2 Air Quality Action Plans

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).

3.3 Welsh Government Legal Direction & Feasibility Study

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.

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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 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 Licensing Policy and Mitigation Scheme;
- City Centre Transportation Improvements; and
- Active Travel Measures.

The FBC demonstrates 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. Work is progressing on the implementation of the measures detailed in the plan. It is noted that the implementation has been impacted by the COVID 19 pandemic, but constant dialogue and ongoing collaboration with Welsh Government officials has been maintained to ensure the Plan remains on course to deliver compliance in the shortest possible time. The 2021 annual progress report will provide full details on the progression of the Clean Air Plan along with the review of 2020 results.

4. Actions to Improve Air Quality

4.1 Improving Bus Networks- 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 envisaged that the roll out of the electric vehicles will begin in the **quarter 1/2 2021**.

Improving Bus Networks- 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 per the agreement from the EU Commission;

The application process for the proposed scheme will be open until 31 December 2020. Financial support will end on 31 March 2021.

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The application procedure, at a minimum will be reviewed with the use of a two staged approach. In the event that the sum of successful applications at stage 2 equates to more than the funding available those applicants will proceed to stage 3.

Applicants will be aware of this approach and therefore will be asked to submit their evidence for stage 3 at the time of their initial submission. In answer to the stage 3 questioning applicants will need to provide additional/ a more detailed understanding for the impacts expectant of their proposed programme of works, in this instance air quality impacts expected.

The weighted average score will only need to be considered if stage 3 assessment is needed.

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.

Successful applicants will need to submit interim progress reports after project inception, currently set at 3 months, with a draft final report issued prior to 31st December 2021 reflecting on the impact of the activities initiated by the grant funding.

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.

The Grant **may not** be spent on:

-Staff costs for managing the project;

-Contributions in kind;

-Payments for activities of a political or exclusively religious nature;

-Depreciation, amortisation or impairment of fixed assets owned by the authority;

-Input VAT reclaimable by the authority from HM Revenue & Customs;

-Interest payments or service charge payments for finance leases;

-Gifts, other than promotional items with a value of no more than £10 in a year to any one person;

-Entertaining (which means anything that would be a taxable benefit to the person being entertained, according to current UK tax regulations); and

-Statutory fines, criminal fines or penalties.

The above scheme went live on the 1st October 2020 and can be viewed using the following link;

https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/clean-air-cardiff/bus-retrofit-scheme/Pages/default.aspx

4.2 City Centre Transport Networks Improvements

CC is currently developing and undertaken detailed appraisals for a number of transport network improvements within the City Centre

4.2.1 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.

4.2.2 City Centre North (CCN)

The main aim of this scheme is to bring Castle Street into Air Quality compliance by 2021.

The Council is considering re-opening Castle Street to buses, taxis and emergency vehicles as a temporary measure while a public consultation is held on the future of the thoroughfare.

The proposed re-opening - which may be ready by mid-November - will help buses and taxis cross east to west and west to east.

This temporary design will seek to ensure that the pop-up cycleway - which will run from Leckwith Road up Newport Road to the junction with Broadway - will be retained throughout the public consultation.

The temporary measure under consideration may include a pavement alongside the shops and bars opposite the castle extended into the road to give a wider walkway for people to socially distance. It could also create an opportunity for hospitality businesses to have more space outside their premises to trade.

Under the proposal, Castle Street could then contain two lanes for buses and taxis to travel east and or west, and the pop-up cycle lane by the castle would remain.

It is anticipated that the proposed scheme could bed-in before the Christmas season begins.

4.2.3 Eastside 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.

4.3 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.

4.4 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.

4.5 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

4.6 School Monitoring and Active Travel Plans

4.6.1 Client Earth School Monitoring in Cardiff

Shared Regulatory Services (SRS) / Cardiff Council (CC) does operate a school monitoring programme. In 2018, SRS & CC began a monitoring campaign at 9 specific schools in Cardiff. Cardiff Councillors motioned a review of the current air quality monitoring network established across Cardiff and it was highlighted as a requirement to monitor local air quality in and around school buildings. It was decided that those schools to be monitored will be those highlighted in Client Earth's 2017 report which discussed potential detrimental air quality impacts at schools in relatively close proximity to major road networks. The report detailed 9 schools within 150m of roads with potentially harmful concentrations of nitrogen dioxide (NO_2);

- Ysgol Mynydd Bychan, Gabalfa
- St Joseph's RC Primary, Gabalfa
- Stacey Primary, Roath
- Tredegarville CIW Primary, Adamsdown
- Cardiff Academy, Roath
- Mount Stuart Primary, Butetown
- St Peter's RC Primary, Roath
- Cathays High School, Cathays
- St Teilo's CIW High School, Llanedeyrn

To note; the Client Earth report distinguished the above listed schools as a potential concern supported by the use of modelled data and not 'actual' monitored data. Therefore, the commitment given to

examine levels at the names school receptors with the use of monitored data can be cross referenced to verify the assumptions provided by the Client Earth 2017 report.

As of the w/c 29th January 2018, SRS on behalf of CC commissioned two air quality monitoring locations at each of the school premises. The monitoring sites monitor levels of nitrogen dioxide (NO_2) using passive diffusion tubes which are collected and replaced on a rolling monthly basis. The results derived from the diffusion tube sampling are then averaged over the year to enable a comparison of the results against the annual average (40µg/m3) and 1-hour (200µg/m3 not to be exceeded > 18 times per year) air quality objectives set for NO_2. Annual datasets (2018 & 2019) gathered at each of the school monitoring sites **recorded annual average levels in compliance with the set air quality standards for NO_2.**

4.6.2 Additional works for school monitoring in Cardiff;

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, in particular 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.

TRO 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.

-Whitchurch High Lower;

-Ysgol Melin Gruffydd;

-Peter Lea Primary;

-Llandaff Church in Wales Primary;

-Pencaeru; and

-Lansdowne Primary

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 since October 2019. 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.

4.7 DRAFT 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

4.7.1 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 **(works are complete for phase 1 of cycleway 1. Second phase is currently out for consultation).**
- Cycleway 2: City Centre to Adamsdown, Newport Road retail parks, Rumney, Llanrumney and St Mellons Business Park
- Cycleway 3: City Centre to Cardiff Bay

- Cycleway 4: City Centre to Llandaff, Danescourt and North West Strategic Development Site
- Cycleway 5: City Centre to Riverside, Ely and Caerau.
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4.7.2 COVID Response Cycleways

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.

4.7.3 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.

4.8 Car-free Day

On Sunday 12th May 2019, CC organised a car-free day event in the city's central area. The event coordinated with the HSBC UK Let's Ride event and on street entertainment.

The summary of air quality monitoring from Car-free Day;

SRS on behalf of CC undertook a study to examine levels of air quality within Cardiff's City Centre in order to quantify the impact that the car-free day event on Sunday 12th May 2019 would have on the main traffic derived pollutant of concern nitrogen dioxide (NO_2). It was anticipated that levels of NO2 would reduce due to the restriction of vehicles and thus the study was undertaken in order to demonstrate and quantify this likely reduction.

Air Monitors Ltd supplied SRS with four near real-time indicative air quality monitors (AQ Mesh Pods). AQ Mesh pods measure gases, in this case nitric oxide, nitrogen dioxide and ozone using electrochemical sensors powered by Lithium batteries. The data from the pod is pushed to a cloud server where it is corrected for temperature, pressure and relative humidity as well as cross gas interference. To verify the performance of the gas sensors the units ran alongside a reference station and local scaling factors were derived and used to characterise the sensors. This then enables direct comparison of the data between the pods and the reference station.

In order to give a detailed understanding for the impact to air quality, levels were recorded before and after car- free day to enable a comprehensive comparison between normal baseline conditions and car-free day. The monitors were cited at their specified locations on Friday 3rd May 2019 and decommissioned on Monday 20th May 2019.

[1] NextBike In Depth Review 2018

The monitors were located at locations situated on specific network routes influenced by the day's event;

Westgate Street

Castle Street/ Duke Street

Stephenson Court, Newport Road

Lower Cathedral Road

When comparing Sunday 19th May to Car-Free Day event 12th May, the daily average reduction for NO_2 is as follows;

Duke Street/ Castle Street- 16.11%

Stephenson Court on Newport Road- 28.15%

Westgate Street- 13.62%

Lower Cathedral Road- +9.14%

The above sites were allocated to understand the possible displacement of traffic movements outside the remit of the Car-Free day area. It must be noted Stephenson Court, Newport Road is already declared as an Air Quality Management Area (AQMA), based upon elevated and exceeding levels of nitrogen dioxide (NO_2).

Although levels do show an increase in NO2 levels at the site on Lower Cathedral Road, levels are compliant with the appropriate air quality objectives.

4.9 20mph Zones

CC introduced a 'signs only' 20 miles per hour (mph) limit in the Cathays/Plasnewydd area in March 2014, as part of a two-year pilot project. Following the pilot, a commitment was made to look at how 20pmh limits might be more widely applied in Cardiff.

The Council proposed to expand its commitment to 20mph zones and include 3 schemes. The 3 schemes proposed were highlighted for the area of Grangetown and detailed the following;

- Avondale Road traffic calming construction;
- Penarth Road Zebra Crossing construction; and
- St Patricks School Safety Zone construction.

All schemes are complete.

4.10 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.

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.

4.11 Clean Vehicles

4.11.1 Sustainable Fuels Strategy

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;

Install more publicly available EV charging points at appropriate locations throughout the city. The Council should identify as a priority, appropriate locations for charging points and begin to engage potential delivery and funding partners from OLEV and the private sector. The Council should also develop an understanding of business models around the potential direct sale of energy through these on-street charging points.

4.11.2 EV Feasibility study

In 2018 Arcadis Consulting (UK) Ltd supported by Zero Carbon Futures (UK) Ltd were commissioned by Cardiff Council to prepare a feasibility study to explore how electrically powered Ultra Low Emission Vehicle (ULEV) charging points could be integrated across the city of Cardiff. As the market share of ULEV is growing and is forecasted to increase significantly over the coming decades, it is critical that the necessary charging infrastructure is provided to facilitate this growth, in order to support a cleaner transport system across Cardiff.

4.11.3 EV Infrastructure

-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 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.

-Initial work by CTS was to ensure 90 Council vehicles were replaced by full EVs by 2021. Impacts from COVID has resulted in a delay to the progression. CTS are intending to review the wider fleet with Welsh Government Energy Service / ULEV. Following this review a revised timetable will be known or the delay period to the original plan. Potentially pushed back by 1 year.

4.12 Green Infrastructure

Cardiff Council's Energy & Sustainability Team, on behalf of Tredegarville CIW Primary School, has successfully applied for a grant under the Landfill Communities Fund to cover the supply and installation of outdoor green walls (these products are sometimes referred to differently e.g. 'living walls' or 'green screens') at Tredegarville CIW Primary School.

Tredegarville CIW Primary School is located in a very urban high rise setting in Cardiff City Centre in relative close proximity to the Stephenson Court AQMA. As a result, the school provides its pupils with very little access to green space. However, the school is enthusiastic about improving this situation through developing the green environment at its site. As Tredegarville CIW Primary falls within the remit of the newly commissioned school monitoring sites for 2018, it will be interesting to see any marked improvements in average NO_2 dataset trends.

4.13 Taxi Licensing Condition Change

SRS & CC is proposing to improve the emission standards of the City's licensed vehicles. Subject to consultation response and Public Protection Committee (PPC) approval, Cardiff Council wishes to implement a taxi licensing policy change to improve emission standards for licensed taxi vehicles in Cardiff. Due to current pandemic, its been decided not to pursue the licensing change with urgency. Discussions and detailed works are ongoing to assess potential funding options that can be made available to drivers to assist with delivering any licensing amendment and support to transition the fleet to ULEVs.

4.14 Publications & Policies

4.14.1 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

4.14.2 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.

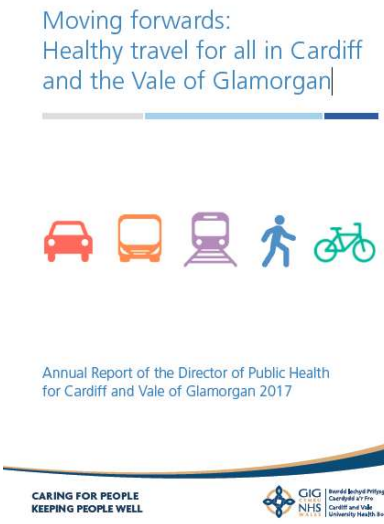
Green Infrastructure (GI) Supplementary Planning Guidance (SPG) (November 2017)

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.



4.14.3 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.

4.14.4 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.

4.14.5 One Planet Cardiff Strategy

An ambitious new plan designed to drive Cardiff towards becoming a carbon neutral city by 2030 has been unveiled by Cardiff Council.

'One Planet Cardiff' sets out the Council's response to the climate change emergency and calls upon businesses and residents to join forces with the council to make the lifestyle changes required, if Wales' capital is to become a truly 'Green' and sustainable city over the next ten years.

Full document available using the following link;

https://www.oneplanetcardiff.co.uk/wp-content/uploads/OPC%20vision%20document%202020%20ENGLISH.pdf

5. Air Quality Monitoring Data and Comparison with Air Quality Objectives

5.1 Summary of Monitoring Undertaken in 2019

5.1.1 Automatic Monitoring Sites

In 2019, Cardiff had three automatic air quality monitoring sites located at Frederick Street in the City Centre, Richard's Terrace, just off Newport Road 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 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

At the time of writing this report, Cardiff Council with the financial support of Welsh Government has commissioned a fourth automated monitoring site, located on Castle Street. The roadside site monitors on a 24/7 basis measuring levels of NO_2, PM_{10} & $PM_{2.5}$ at that location and forms part of the Welsh Automated Monitoring Network. Reporting for this site will be included in future reports.

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.

Figure 6- Location of Cardiff City Centre AURN Monitoring Site (AURN 1)

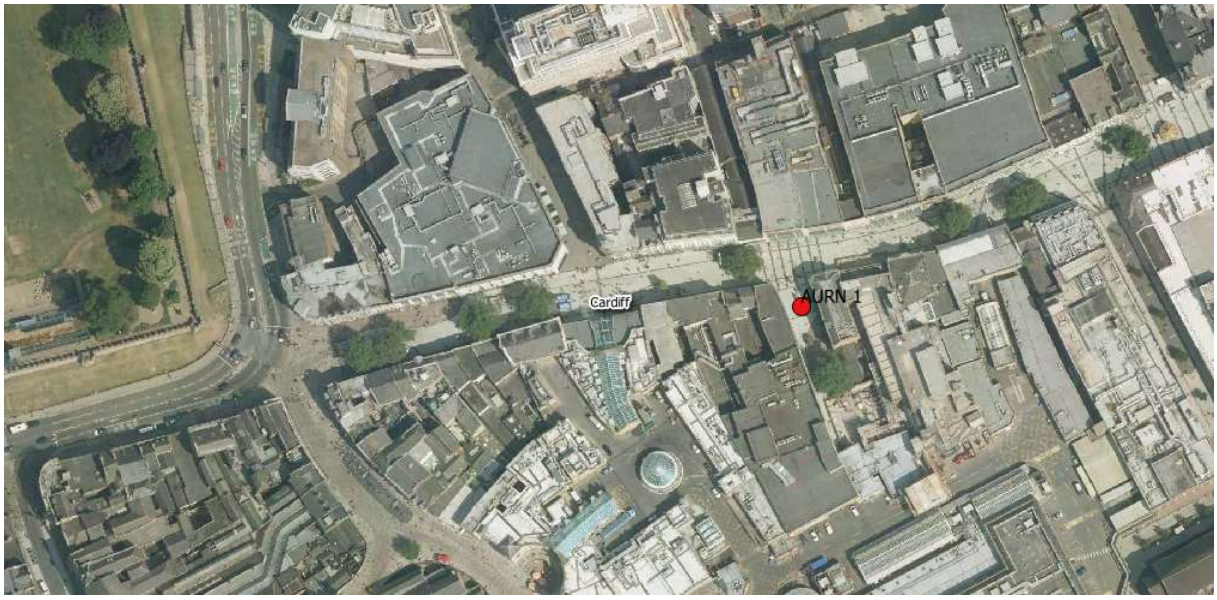


Figure 7- Location of Cardiff Newport Road AURN Monitoring Site (AURN 2)

Appendix 1

5.1.2 Automated NO_2 Results

Table 1- Automatic Annual Mean NO_2 Monitoring Results (2015- 2019)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % (1)	Valid Data Capture 2019 % (2)	Annual Mean Concentration (µg/m³)				
					2015	2016	2017	2018	2019
Cardiff Centre AURN 1	Urban Background	N	100	62.5	27	23	20	20[3]	27[3]
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	99	-	-	-	29[3]	29

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.

Appendix 1

Table 2- Automatic 1-hour Mean NO_2 Monitoring Results (2015- 2019)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % (1)	Valid Data Capture 2019 % (2)	Number of Hourly Means (> 200µg/m³)(3)				
					2015	2016	2017	2018	2019
Cardiff Centre AURN 1	Urban Background	N	100	62.5	0 (14.98)	0	0	0 (84.55)	0 (84)
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	99	-	-	-	0 (98.12)	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.

Appendix 1

5.1.3 Automated PM_{10} Results

Table 3- Results Automatic Annual 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)	PM_{10} Annual Mean Concentration (µg/m^3) [3]				
						2015	2016	2017	2018	2019
Cardiff Centre AURN 1	Urban Background	N	100	67.7	N/A	16	15.1[3]	16	17	15.3[3]
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	96	Y	-	-	-	20.3[3]	19

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.

Appendix 1

Table 4– 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/m^3 [3]				
						2015	2016	2017	2018	2019
Cardiff Centre AURN 1	Urban Background	N	100	67.7	N/A	5 (25.4)	1 (30.52)	2	0	0 (44)
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	96	Y	-	-	-	0 (36)	12

Notes:

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

(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.

Appendix 1

5.1.4 Automated SO_2 Results

Table 5– Automatic SO_2 Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (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	65	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

5.1.5 Automated CO Results

Table 6– 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 2019 (%) (2)	Number of Exceedences
					8-Hour Average Objective (10 µg/m^3)
Cardiff Centre AURN 1	Urban Background	N	100	72	0

5.1.6 Automated O_3 Results

Table 7– Automatic Ozone (O3) Monitoring Results: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	Number of Exceedences
					Number of days where the 8-hour mean >100µg/m^3
Cardiff Centre	Urban Background	N	100	99	5

Appendix 1

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	Number of Exceedences
					Number of days where the 8-hour mean >100µg/m^3
AURN 1					

Appendix 1

Summary Automated Monitoring 2019

Tables 1- 7 illustrate compliance with the relevant air quality standards applicable for the purpose of LAQM in Wales.

5.1.7 Non-Automatic Monitoring Sites

Non-automatic Monitoring Sites- In 2019 there were 100 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.

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 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. 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 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.

For 2019 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 work that required air quality monitoring datasets. Such project work included a Citizen Science project funded by Natural Resources Wales (NRW). Some sites were decommissioned during

the sampling year due to ongoing nearby construction works which caused damage or obstructed the monitoring site.

Summary Non- Automated Monitoring 2019

In 2019, **5** NO_2 diffusion tube locations recorded exceedences of the annual average objective set for NO_2 (40µg/m^3). All 5 exceedences were documented within the already established City Centre air quality management area (AQMA).

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. It is noted that the annual average datasets do highlight monitoring sites established outside the designated AQMA areas with elevated annual average NO_2 readings. These sites will need to be closely scrutinised to ensure the annual average objective is not breached in future years.

At the time of writing this report the summary table which outlines the annual average results for each non-automated monitoring site is still being formatted, however the conclusions remain the same.

Focusing upon the established AQMAs, the figures below highlight annual average NO_2 dataset trends since 2013 recorded at worse-case sensitive receptor locations, thus being residential facades.

Figure 8- Annual Average NO_2 Concentrations (µg/m3) Recorded at Residential Locations in Cardiff City Centre AQMA.

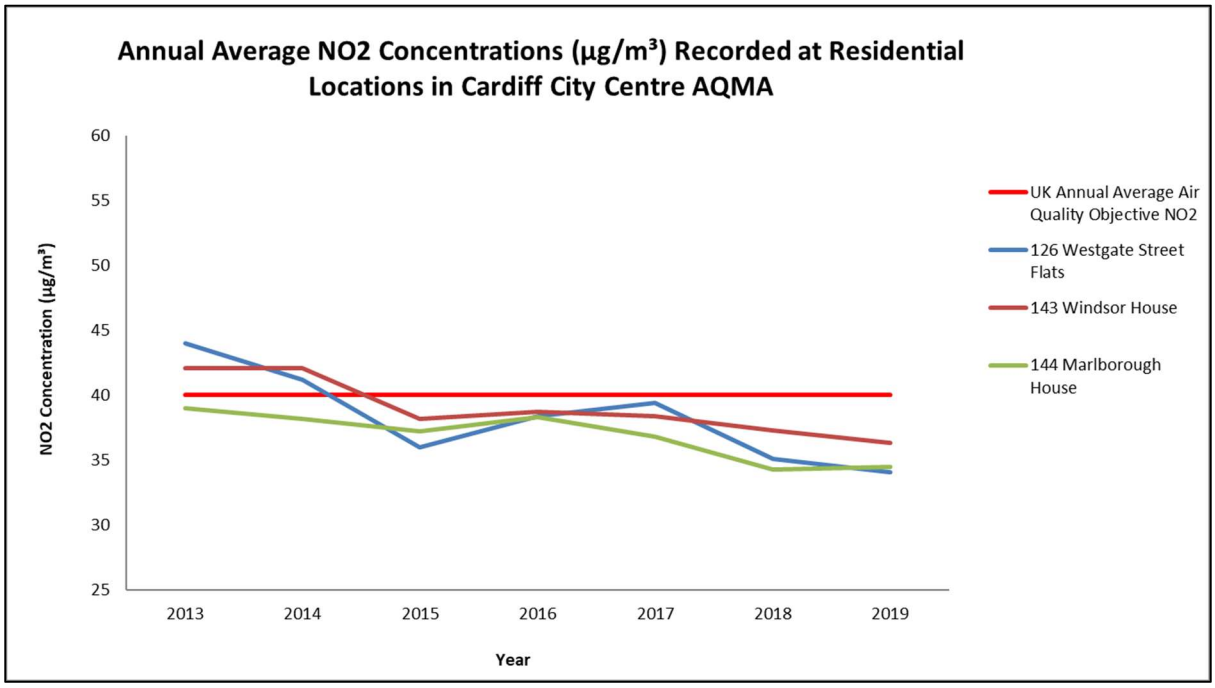


Figure 9- Annual Average NO_2 Concentrations (µg/m3) Recorded at Residential Locations in Stephenson Court, Newport Road AQMA.

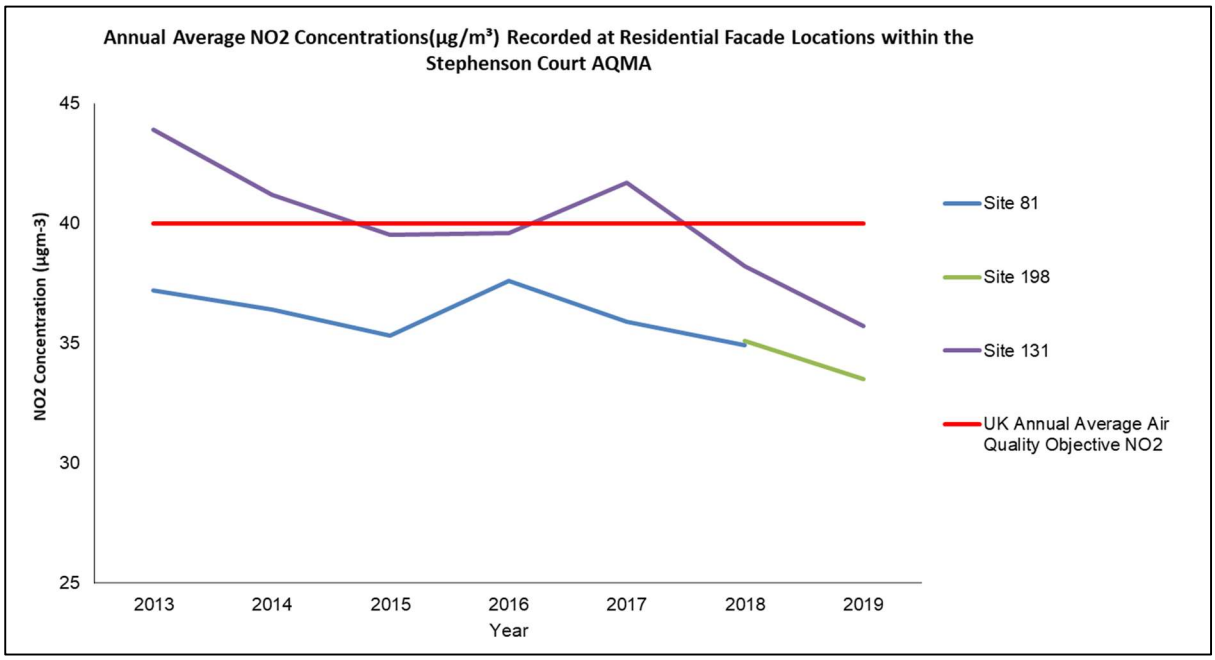


Figure 10- Annual Average NO_2 Concentrations (µg/m3) Recorded at Residential Locations in Llandaff AQMA.

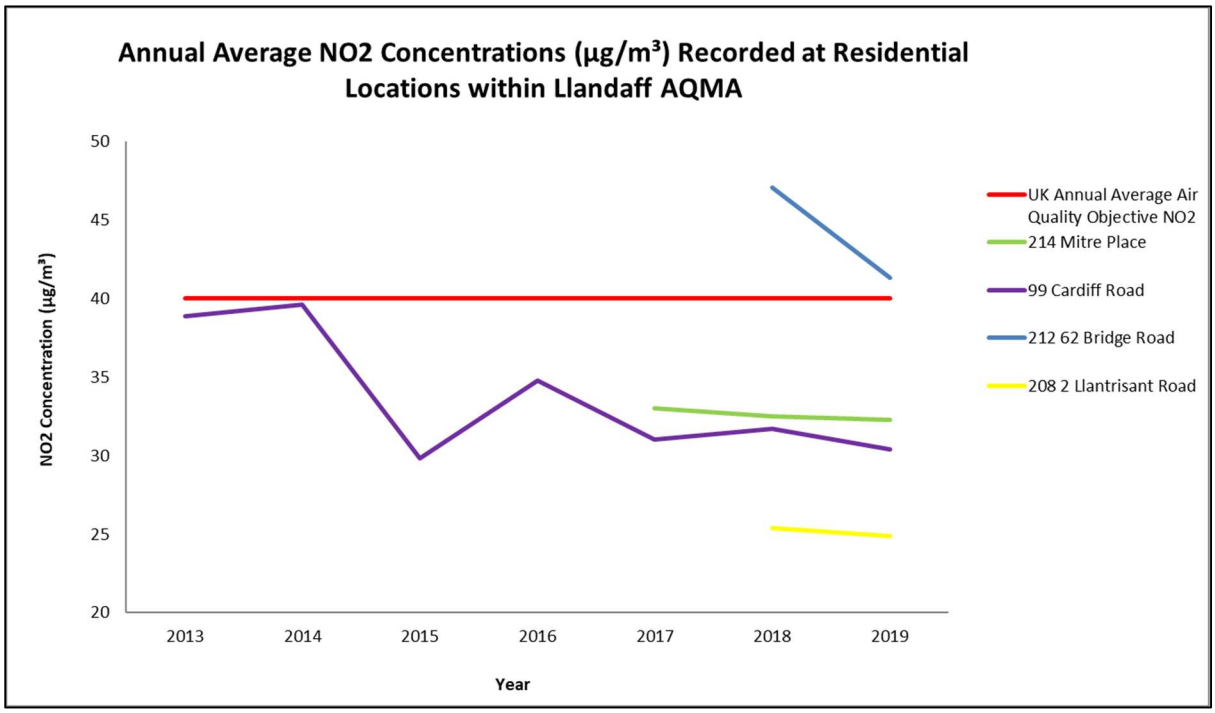
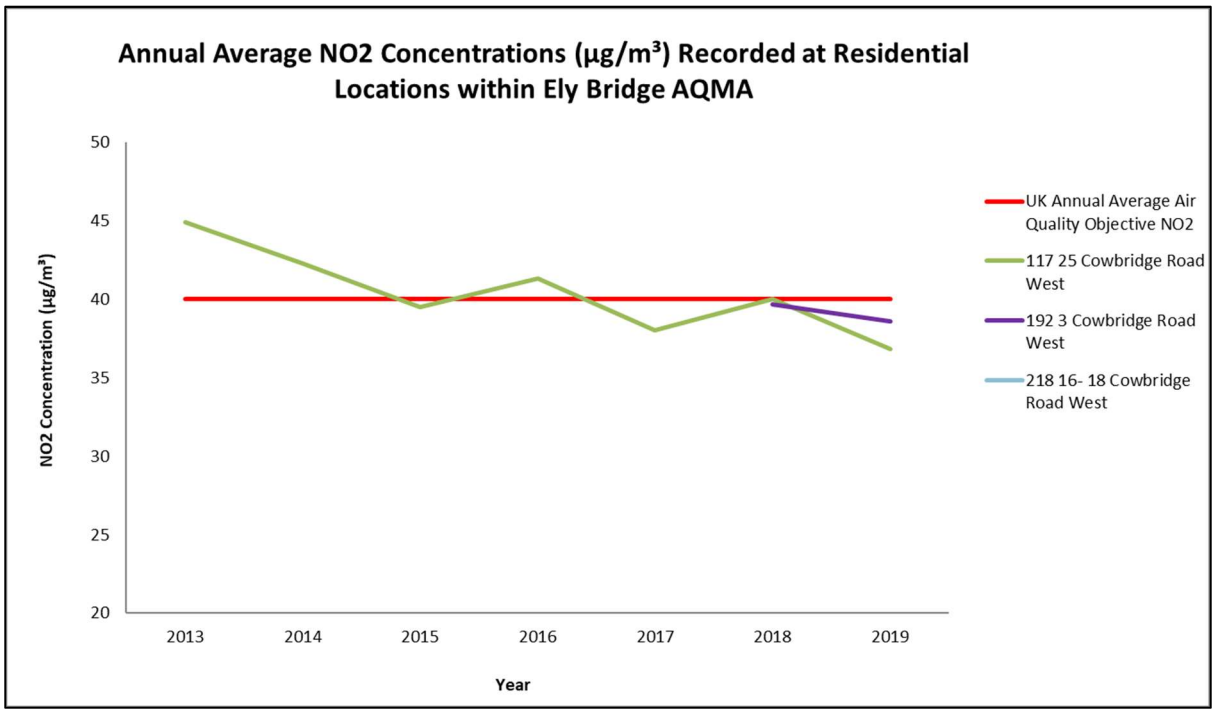


Figure 11- Annual Average NO_2 Concentrations (µg/m3) Recorded at Residential Locations in Ely Bridge AQMA.



For the best part, the figures indicate compliance with the NO_2 air quality standard at all sensitive receptor locations monitored, displaying a somewhat decreasing trendline, albeit one location located

in the Llandaff AQMA. Although compliance is highlighted, the datasets do highlight monitoring sites with elevated readings. Given the commitment of future development and the work currently ongoing to facilitate the package of measures developed as a result of the Legal Direction, Cardiff Council will continue to observe trends at these locations to examine any impacts generated.

6. COVID-19 Impacts

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 will not be available for next year's 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, which will be recorded in the 2021 Annual Progress Report will need to be corrected/ ratified 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 12- Same year Covid comparison (2020)

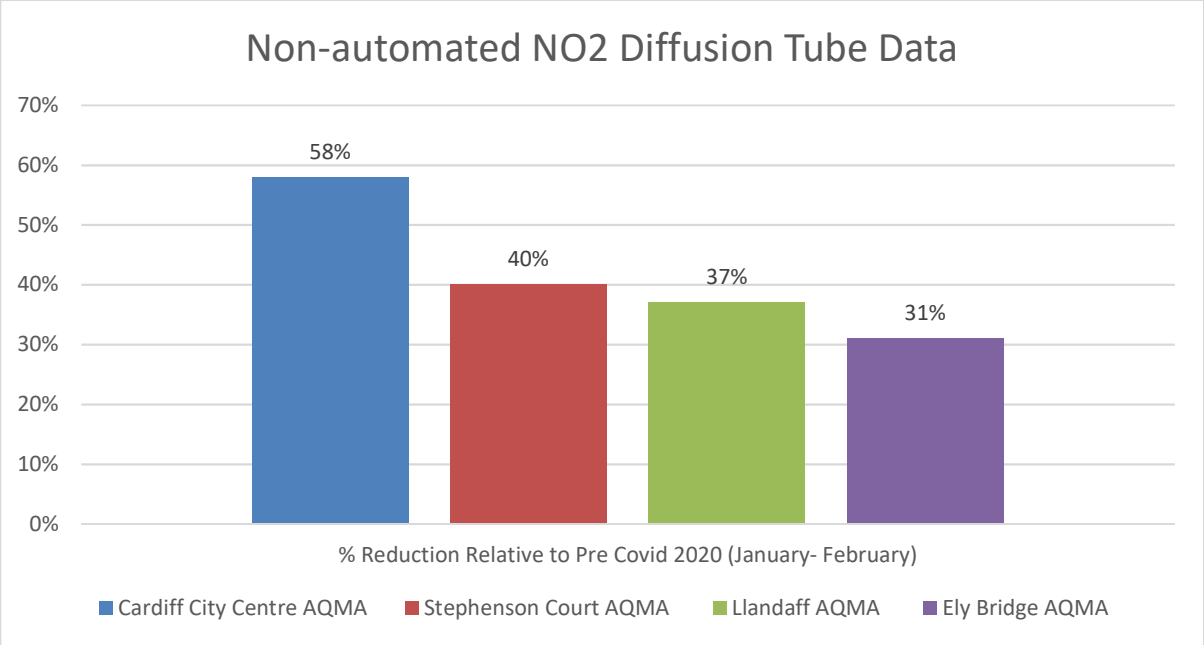


Figure 13- Previous year comparison (2019)