



# 2019 Annual Air Quality Progress Report for Cardiff Council

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

September 2019



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## Executive Summary: Air Quality in Our Area

### 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 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<sub>2</sub>), Particulate Matter (PM<sub>10</sub> & PM<sub>2.5</sub>), Sulphur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO) & Ozone (O<sub>3</sub>).

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."

**Automatic Monitoring Sites-** Cardiff has two automatic air quality monitoring sites located at Frederick Street in the City Centre and on Richard's Terrace, just off Newport Road.

- **Cardiff Frederick Street (Urban Background)**

The site monitors on a 24/7 basis measuring levels of NO<sub>2</sub>, PM<sub>10</sub> & PM<sub>2.5</sub>, SO<sub>2</sub>, CO and O<sub>3</sub> feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

- **Richard's Terrace, Newport Road (Urban Traffic/ Roadside)**

Commissioned in April 2018 site monitors on a 24/7 basis measuring levels of NO<sub>2</sub> & PM<sub>10</sub> at that location, feeding data directly into Defra's Automatic Urban and Rural Network (AURN).

**Non-automatic Monitoring Sites-** In 2018 there were 85 specifically allocated non automatic monitoring sites across Cardiff which monitored levels of nitrogen dioxide (NO<sub>2</sub>). 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<sup>3</sup>**) and 1-hour (**200µg/m<sup>3</sup> not to be exceeded > 18 times per year**) air quality objectives for NO<sub>2</sub>.

For 2018 the NO<sub>2</sub> diffusion tube network was extensively reviewed and amended to improve and encapsulate a wider foot print of the Cardiff Council area. As part of the improvements new monitoring sites were commissioned within the designated AQMAs.

In 2018, 7 NO<sub>2</sub> diffusion tube locations recorded exceedences of the annual average objective set for NO<sub>2</sub> (40µg/m<sup>3</sup>). Of the 7 exceedences, 6 were documented within the already established air quality management areas (AQMA). The remaining exceedence is discussed in **Section 2.2** of this report.

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<sub>2</sub> readings. These sites will need to be closely scrutinised to ensure the annual average objective is not breached in future years. This is discussed in further detail in **Section 2.2**.

There were no recorded exceedences of the 1-hour NO<sub>2</sub> objective at any of the monitoring locations in 2018.

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<sub>2</sub> Air Quality Standard (40ug/m<sup>3</sup>), known to be derived from road transport.

Two AQMAs are primarily focused in Cardiff City Centre: **Cardiff City Centre AQMA**, established 01/04/2013 and **Stephenson Court AQMA**, established 01/12/2010.

North of the City Centre, lies the **Llandaff AQMA** (established 01/04/2013) and to the west of Cardiff is the **Ely Bridge AQMA** (established 01/02/2007).

**Figure 1- Boundary of Cardiff City Centre AQMA**

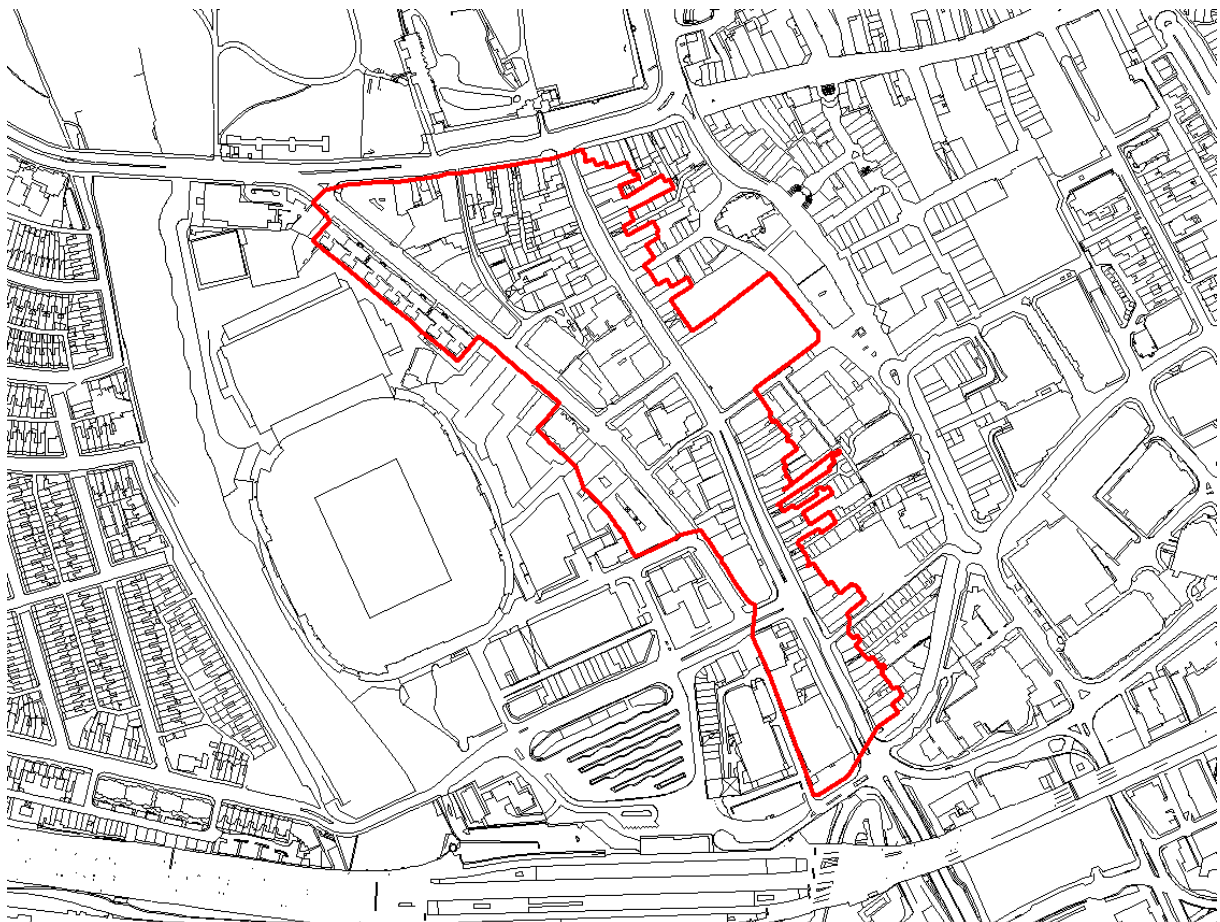


Figure 2- Boundary of Ely Bridge AQMA

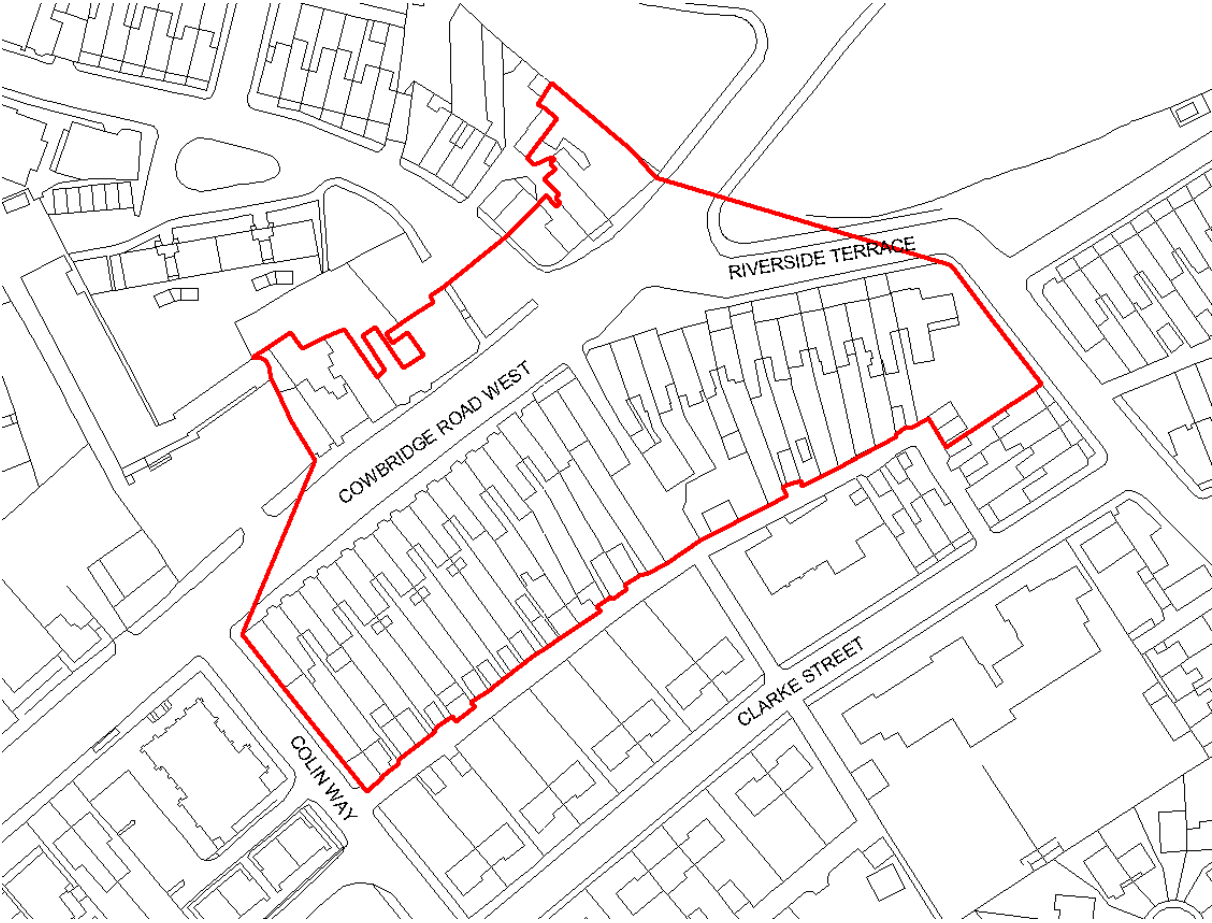
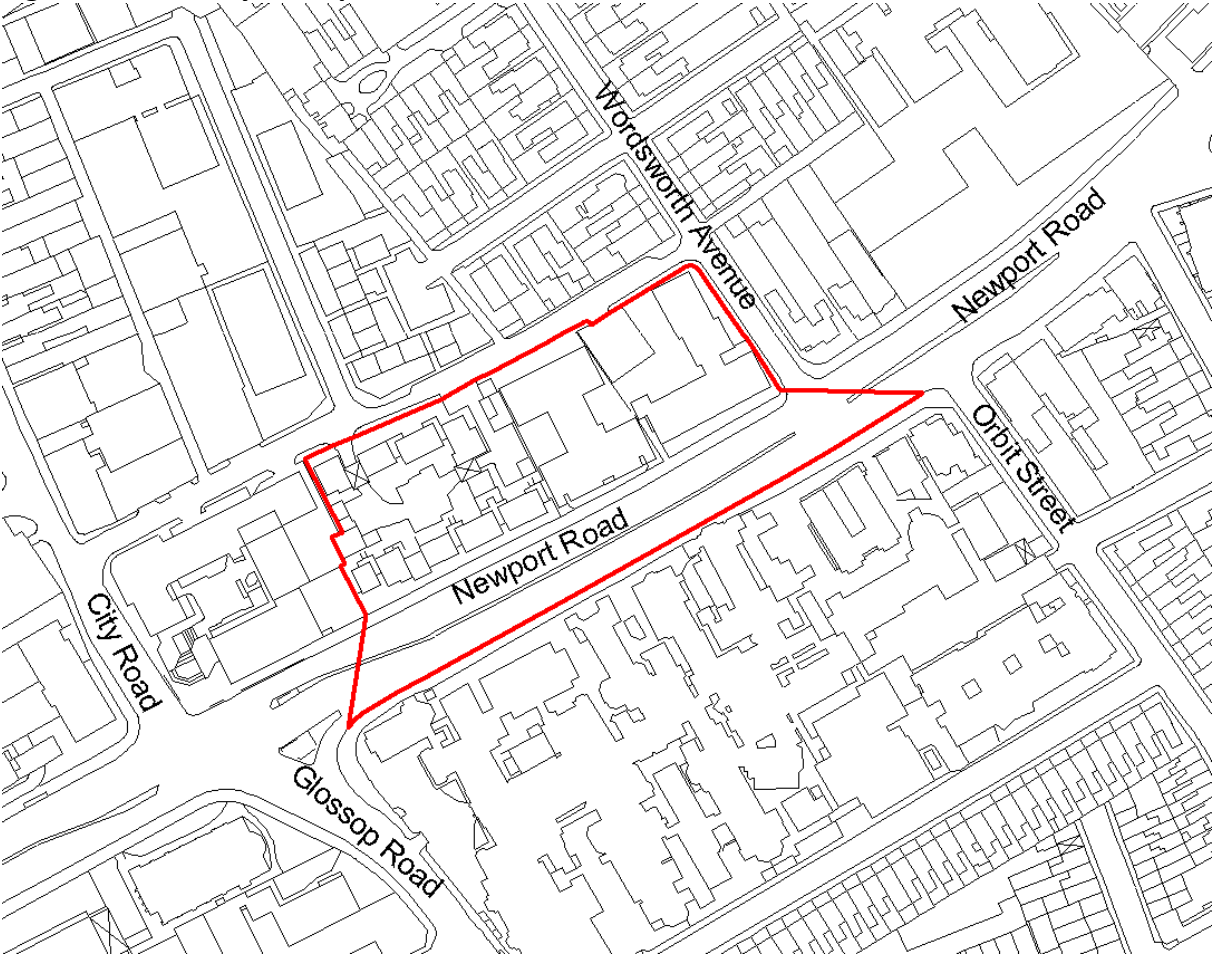


Figure 3- Boundary of Stephenson Court AQMA



**Figure 4- Boundary of Llandaff AQMA**

SRS 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 and it is acknowledged that road traffic emissions (particulate matter (PM) and primary/ secondary nitrogen dioxide (NO<sub>2</sub>)) are the primary contributing factor to poor air quality in Cardiff.

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.

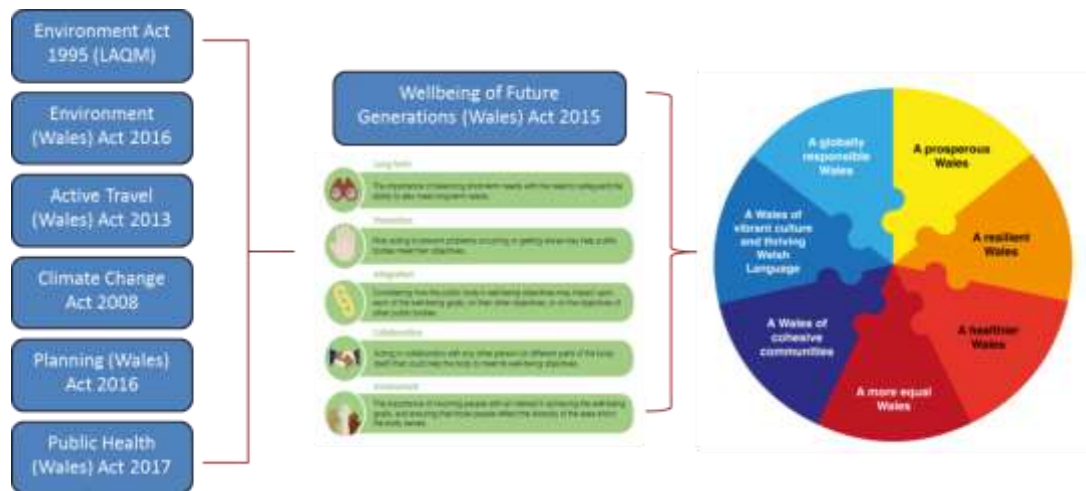


Highlighting this commitment, in 2018, SRS & CC developed a citywide Clean Air Strategy & Action Plan (CASAP) for Cardiff. The strategy coincides with Cardiff's Capital Ambition report and helps to implement and deliver the priorities outlined in the Ambition report with an overarching aim to improve 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<sub>2</sub> 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).

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



**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<sub>2</sub>) 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<sub>2</sub> 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<sub>2</sub> 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 specifies that CC must 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**.

In accordance with the Direction's reporting requirements CC are required to comply with the following schedule and timeframes;

As soon as possible and by 31st March 2018 at the latest the initial scoping proposals:

- Setting out the proposed approach to the feasibility study and including scope of work, governance, resourcing, procurement approach, indicative costs and timings.

As soon as possible and by 30th September 2018 at the latest the Initial Plan:

- Setting out the case for change and identifying, exploring, analysing and developing options for measures that the local authority will implement to deliver compliance in the shortest possible time, with indicative costs for those options.

As soon as possible and by 30th June 2019 at the latest the Final Plan:

- Identifying in detail the preferred option for delivering compliance in the shortest possible time, and including a full business case setting out value for money considerations and implementation arrangements and timings.

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.

In addition to assessing the package of measures, as required by the Government Guidance the Council has assessed the effectiveness of a charging Clean Air Zone (CAZ) in terms of whether compliance could be achieved quicker than the proposed measures.

**Government Guidance is clear that a charging CAZ should only be considered as a preferred option/ implemented if non-charging alternatives have been found to be insufficient to bring about compliance with air quality limits in the shortest possible time.**

The Council's recently 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  $31.9\mu\text{g}/\text{m}^3$  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  $40\mu\text{g}/\text{m}^3$  which further demonstrates that the package of measures will improve local air quality including within existing AQMAs.

As a comparison the results of the modelling undertaken on the CAZ scenarios are summarised as follows:

- **CAZ 1 – Private cars** - achieves compliance on Castle Street-  $32.5\mu\text{g}/\text{m}^3$ ;
- **CAZ 2 – Commercial vehicles** – achieves compliance on Castle Street  $\text{NO}_2$ -  $35.3\mu\text{g}/\text{m}^3$

The results for CAZ 1 and 2 showed that NO<sub>2</sub> concentrations are estimated to be lower than the baseline 2021 scenario at most links, but with CAZ 1 showing small increases on 6 links and CAZ 2 showing increases on 4 links. The largest decrease observed in both CAZ 1 and CAZ 2 is on Castle Street, as might be expected for a measure that is specifically targeting the city centre. Compared to the CASAP measures, **most links showed higher concentrations of NO<sub>2</sub> in the CAZ 1 and 2 scenarios.**

UK Government guidance<sup>1</sup> is clear that a charging CAZ should only be considered as a preferred option if other non-charging measures are not sufficient to bring about compliance in the shortest possible time. In addition Welsh Government Policy<sup>2</sup> states that unless the Council can identify alternative measures to achieve compliance as quickly as a charging clean air zone then Welsh Government may direct the Council to introduce a charging clean air zone. The assessments undertaken to date demonstrate that non-charging measures provide compliance in the same period, as Welsh Government have assessed that a CAZ could take up to 3 years to implement from the start of a feasibility study. The Council's study only commenced in March 2018, and thus the likelihood of a CAZ being implemented by 2021 is considered unlikely.

The modelling undertaken demonstrated that a package of measures achieves compliance in the same period if not sooner than a charging CAZ. Further, as detailed above the implementation of the non-charging measures provides wider air quality improvements across Cardiff as a whole, including within the existing AQMAs.

In line with the requirements of the legal direction and the necessity to achieve legal compliance with the limit values for nitrogen dioxide **in the shortest time possible, Cardiff Council's FBC** outlines the most feasible pathway in order to satisfy the specific criteria, with the viewpoint of generating further long term and widespread air quality improvements. In this instance it has been outlined that a package of non-charging mitigation options would best satisfy Cardiff's concerns and would facilitate a sustainable future. When devising the package of preferred options Cardiff Council ensured that the following key objectives were adhered to;

**Compliant and improved levels of air quality-** The proposed package of mitigation measures does not only achieve compliance in the localised area of exceedance on Castle Street, it is expected that citywide air quality levels will improve, particularly within the established local air quality management areas;

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<sup>1</sup> Joint Air Quality Unit (JAQU) Evidence Based Approach to Setting Clean Air Zone Charges'

<sup>2</sup> <https://gov.wales/sites/default/files/publications/2019-04/tackling-roadside-nitrogen-dioxide-concentrations-in-wales.pdf>

**Improved public health;**

**Improved transport management systems-** Changes in journey patterns due to traffic redistribution without creating new sites of exceedance;

**Reduced vehicle trips and vehicular emissions at the site of exceedance-** The proposed package of measures will lead to less polluting buses and taxis; and

**Overall/ Citywide reduction in vehicular trips generated-** Caused by a greater proportion of low emission, active travel and sustainable transport trips.

Traffic flow management and reductions are a popular theme in the FBC. For example, the City Centre improvement schemes do specifically target the highlighted non-compliant road link and intend to reduce highways capacity for private vehicles, encouraging the use of public and active travel alternatives.

The scheme principles are stated below;

#### **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.

#### **City Centre North (CCN)**

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

### 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.

In order to show transparency on the Council's proposed preferred option a full public consultation on the proposals was undertaken. The Consultation consisted of detailed information on the preferred option through the Council's website. An online survey was developed, which could be accessed from a page on the Council website, which provided the background information on the proposals. This was distributed to members of the Council's Citizens' Panel, consisting of over 5,000 residents across the city, and to a list of key stakeholders.

Public engagement events were also held, giving members of the public an opportunity to ask further details about the scheme from members of the Project team:

- April 13th: Angel Hotel;
- April 20th: Central Library;
- May 4th: Angel Hotel; and
- May 11th: Central Library

After data cleansing to remove any blank or duplicate responses, a total of **1,303** responses were received from the consultation. Overall the responses for the preferred option of non-charging measures were overwhelmingly supported, particular the measures targeted at improving emissions from buses and taxis.

- **96.8%** support the proposal to replace the most polluting diesel buses with electric buses;

- **90.4%** support the proposal to retrofit other polluting buses so they are upgraded to meet the latest emission standards; and
- **80.3%** support the proposed changes to taxi licensing in the city.

Considering that it was only possible to include the high level design principles of the City Centre Schemes within this consultation, the proposals were favourably received with two-thirds of respondents supporting the proposals, and just under a fifth against. Further statutory consultation will be undertaken on the detailed designs of the City Centre Schemes.

Work to facilitate the preferred package of non-charging measures is currently on going, however in order to finalise some of the measures it will be down to Welsh Government to provide the required financial support. The Full Business Case is currently being reviewed by an expert panel where it will be decided if the requested funding is viable.

## **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 Networks

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 three year 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 1<sup>st</sup> quarter of 2020.

### City Centre Transport Networks Improvements

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

### 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.

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 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.

The 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.

In view of the corporate commitment to deliver active travel plans for all schools by April 2022, for 2019 SRS has been 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. The TRO will be 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. Importantly the Council also wish to monitor and outline any direct benefits associated with the TRO, such as impact to ambient air quality levels.

Shared Regulatory Services (SRS) will support this pilot project by providing additional air quality monitoring for a period of 15 months; proposed start date existing in the month of October 2019 and an end date existing in January 2021. This amount of data will ensure that any impacts to air quality levels is well documented. It is proposed that SRS will gather monthly datasets for nitrogen dioxide

(NO<sub>2</sub>) 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.

#### 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>

#### 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
- 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.

Following a public consultation in 2018 works have been commissioned and commenced on Cycleway 1 on Senghennydd 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<sup>3</sup>, with over 150,000 rentals since March 2018. As a result the scheme is set to double with an increase of a further 500 bikes bring the total number of bikes available to 1,000 bikes by the summer of 2019.

### Car-free Day

On Sunday 12<sup>th</sup> 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 12<sup>th</sup> May 2019 would have on the main traffic derived pollutant of concern nitrogen dioxide (NO<sub>2</sub>). It was anticipated that levels of NO<sub>2</sub> 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

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<sup>3</sup> [NextBike In Depth Review 2018](#)

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 20<sup>th</sup> May 2019.

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 19<sup>th</sup> May to Car-Free Day event 12<sup>th</sup> May, the daily average reduction for NO<sub>2</sub> 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<sub>2</sub>).

Although levels do show an increase in NO<sub>2</sub> levels at the site on Lower Cathedral Road, levels are compliant with the appropriate air quality objectives.

### 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 proposes to expand its commitment to 20mph zones and include 3 schemes. These schemes would be supported via funding secured in line with the feasibility study that satisfies the Legal Direction. These schemes are for the physical measures required within the Grangetown 20mph limit area to encourage greater motorist compliance with the new speed limit and improve the pedestrian and cyclist crossing facilities at key locations within the ward.

The 3 schemes applicable to Grangetown are as follows;

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

### 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.

## Clean Vehicles

### 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.

### 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.

### EV Infrastructure

The Council has been successful in obtaining a bid from the Office of Low Emission Vehicles (OLEV) 36 charge points in 21 locations across the city and accessible to the public by 31st March 2019. The Council will aim to submit a further bid in 2019/20 to further increase the network of residential charging points.

The Council has made progress in terms of increasing electric charging infrastructure at four main employment hubs. It has been agreed that in 2019/20 for 8 electric vehicle chargers each at County Hall, Lamby Way, Wilcox House and Coleridge Road (i.e., total of 32 chargers).

In conjunction with this the proposals are in place for the Council to fund the hire lease costs of 56 new EVs in 2019/20 (replacing existing petrol/diesel vehicles) and 37 vehicles in 2020/21.

#### 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.

The policy change will require all new grants and renewals for licensed vehicles to have a maximum age limit of 5 years. In essence this will require all **new** grants/ renewals to meet Euro 6 emission standards.

#### Green Infrastructure

In January 2018, CC collaborated between different departments and produced a successful application bid to utilise funding made available by Welsh Government, known as Green Infrastructure Grant Funding Scheme. The requested funding is being used to enable a project that focusses on the benefits of trees and planting to the city, with a specific emphasis on methods of addressing air quality issues.

The CityTree was expected to be delivered in January 2019 and be incorporated into the City Centre. Unfortunately due to manufacturer delays CC were unable to deliver the structure in line with the Grant Funding Scheme timeframes.

#### Green Walls

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<sub>2</sub> dataset trends.



### **Improved monitoring**

#### Non-automatic monitoring

CC 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.

For 2018, SRS & CC began a monitoring campaign at 9 specific schools across the borough. Cardiff Councillors motioned a review of the current air quality monitoring network established across the borough and it was highlighted that there is 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 last year's Client Earth 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<sub>2</sub>);

- 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

As of the w/c 29<sup>th</sup> January, Shared Regulatory Services (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<sub>2</sub>) 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/m<sup>3</sup>) and 1-hour (200µg/m<sup>3</sup> not to be exceeded > 18 times per year) air quality objectives set for NO<sub>2</sub>. The results of this monitoring are included Section 2.2 of this report.

At the time of writing this report SRS/ CC has expanded its school monitoring capacity for 2019. Funded by a Natural Resources Wales (NRW) as part of Citizen Science, an additional 6 schools have been assigned to the network. NRW have provided sufficient funding to cover the cost of the outlined additional monitoring for one year. The datasets collected will be used as a driver to work with the monitored schools to influence behavioural change and raise awareness to air quality concerns. The schools included;

- Rhiwbeina Primary School
- Thornhill Primary School
- St Monica's CIW Primary School
- Millbank Primary School
- Lansdowne Primary School
- St Mary The Virgin Church in Wales Primary School

In addition to the school monitoring, for 2018, as part of a yearly review SRS has amended and improved the network of diffusion tubes previously assigned in previous years used for the LAQM regime. The amendments include improved monitoring locations to represent the locality of monitoring objectives and implementation of additional sites to AQMAs, such as the Llandaff and Ely Bridge AQMAs.

Automatic monitoring

Towards the end of 2017 discussions were initiated surrounding the implementation of a new automatic NO<sub>x</sub> and PM<sub>10</sub> monitoring station in Cardiff. The newly commissioned site (April 2018) monitors on a 24/7 basis, measuring levels of NO<sub>2</sub> & PM<sub>10</sub> at its site on Richards Terrace just off Newport Road, Cardiff. The site's data feeds directly into Defra's Automatic Urban and Rural Network (AURN). The site is governed by Defra and SRS have been appointed the Local Site Operator (LSO).

Via the already discussed Green Infrastructure (GI) Grant Funding Scheme, the successful funding has also allowed SRS & CC to acquire an indicative real time monitor which will be utilised in an area of strategic planting to illustrate what affects GI has on air quality at a sensitive receptor location. In 2019 the described monitor has been allocated a suitable location in the Danescourt area, Llandaff.

Through available S106 financial contributions, SRS & CC has purchased an indicative real time monitor which is scheduled to be utilised on Newport Road in accordance with the Fitzalan Place student accommodation. The monitor is listed as an AQT420 and details of the monitor can be found at <http://www.et.co.uk/products/air-quality-monitoring/air-quality-sensors/air-quality-transmitter-aqt420>. In addition, again at the time of writing this report it must be noted that SRS/ CC has acquired a AQ Mesh analyser via S106 contributions to support improved air quality monitoring in the Llandaff AQMA. This monitor is yet to be implemented, however it is envisaged that this will take place in the near future.

As part of legal Direction the FBC outlines a proposed evaluation and monitoring programme that will be implemented. It is important to demonstrate the actual effectiveness that the proposed measures will provide in terms of NO<sub>2</sub> and other emission reductions. In order to demonstrate that compliance will be achieved on Castle Street, it is proposed that a real-time monitoring station, equivalent to AURN site standards be established within this City Centre location, ideally on Castle Street. This monitor would complement and enhance existing monitoring capabilities and would give accurate and robust data to assess the effectiveness of the proposed measures.

As part of enhancing the Council's monitoring capabilities and adding to its wider monitoring network, it is also proposed to implement indicative real-time monitors to assess and monitor any displacement effects of the proposed measures on peripheral areas, and in particular the City Centre AQMA.

## **Publications & Policies**

### 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:

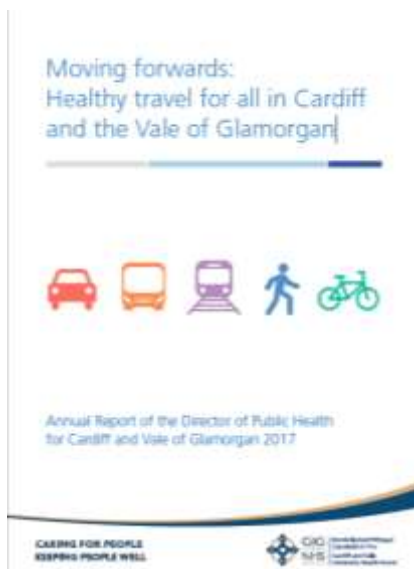
- To provide supporting information and guidance for planners, developers and investors on how our environment and the planning decisions we make, impact on the health and wellbeing of the population.
- To help achieve the Council's vision of addressing health inequalities and become a leading city on 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 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.



### 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.

### Transport and Clean Air Green Paper

Led by CC's Cabinet Member for Transport and Strategic Planning, the referenced Green Paper sets out proposed ideas to improve transport and air quality in our city. In 2018 the document was released for public consultation to engage with Cardiff residents and collaboratively develop ideas in sight of the responses given. General themes and ideas have been pulled from the document, however analysis of the document is yet to be formally produced.

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

## Local Priorities and Challenges

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

-Finalise and deliver the full- business case for the Clean Air Feasibility study that satisfies the requirements of Welsh G and the previously described Formal Direction.

## 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 air quality management and therefore is contactable via the webpage [www.srs.wales/en/Home.aspx](http://www.srs.wales/en/Home.aspx). Hourly and Monthly average monitoring data for pollutants measured is available at <https://airquality.gov.wales/>

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# 1. Actions to Improve Air Quality

## 1.1 Previous Work in Relation to Air Quality

### 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<sub>2</sub>), 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<sub>2</sub>. 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 1<sup>st</sup> December 2000 and the latter on 1<sup>st</sup> 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<sub>10</sub>), there was considerable doubt that the provisional 2010 objectives for PM<sub>10</sub> 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 1<sup>st</sup> 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 1<sup>st</sup> 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<sub>2</sub> 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 1<sup>st</sup> 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 Fair oak 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<sub>2</sub> 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  $40\mu\text{g}/\text{m}^3$  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  $\text{NO}_2$  annual mean objective ( $40\mu\text{g}/\text{m}^3$ ). These sites are predominantly contained within the declared AQMAs. However, there are four monitoring locations (Site IDs 172, 180, 181, 185) which are not located within AQMAs.

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

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

Site 185 is not representative of relevant exposure and does not apply to the annual mean objective set for  $\text{NO}_2$ . Therefore, datasets collected at this monitoring location would apply to the 1-hour objective set for  $\text{NO}_2$  ( **$200\mu\text{g}/\text{m}^3$ , 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<sub>10</sub> 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 90.4<sup>th</sup> 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<sub>2</sub> are generally improving and are now below the national objective of 40µg/m<sup>3</sup> 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<sub>2</sub> standard, SRS on behalf of CC reviewed the non-automatic monitoring network of NO<sub>2</sub> 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<sub>2</sub> Air Quality Standard (40µg/m<sup>3</sup>).

The datasets indicate that the annual average objective for NO<sub>2</sub> 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<sub>2</sub> 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.

## 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 objective (Please 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<sub>2</sub> Air Quality Standard (40ug/m<sup>3</sup>), known to be derived from road transport derived NO<sub>2</sub>.

1. **Cardiff City Centre**- declared 1<sup>st</sup> April 2013
2. **Llandaff**- declared 1<sup>st</sup> April 2013
3. **Stephenson Court**- declared 1s December 2010
4. **Ely Bridge**- declared 1<sup>st</sup> 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<sub>2</sub>).

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.

Based on the legislative requirements SRS on behalf of Cardiff Council has a statutory requirement to produce an Air Quality Action Plan (AQAP) for each identified AQMA within the local authority area. However previous experience in implementing singular actions plans in Cardiff has not proven to be sufficiently successful. The main issue with this particular approach is that the AQAP focuses on introducing local measures to individual road links/ areas, which only targets at improving air quality within the identified AQMA itself.

Whilst such measures have been successful in improving air quality within the individual AQMA (High Street/ St Mary's Street Action Plan) such localised measures can, and have led, to adverse impacts on air quality in surrounding areas and result in more widespread air quality issues. These plans have not looked sufficiently at the primary cause of the problem, this being road traffic derived emissions, resulting in air quality levels being detrimentally increased in neighbouring areas.

As previously discussed, in sight of this way of thinking, in the form of the CAS & Action Plan SRS & CC has considered a holistic approach to address air quality on a citywide basis. Details off all measures completed, in progress or planned are set out in Table 1. More detail on these measures can be found in the CAS & Action Plan document.

**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
<b>Modal Shift &amp; Influencing Travel Choice</b>												
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 prioritises cycling and walking routes over 15 year period.	CC	Ongoing		Cycle trips generated/ questionnaires	Unknown	Public Consultation undertaken		Ongoing	
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	CC & Living Streets Charity	Ongoing		Report updates from Living Streets	Unknown	7 allocated schools in Cardiff supported by CC.	-	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
			Cardiff.									
1.4	School Travel Plans		Cardiff Council's Schools Streets Project and its Traffic Regulation Order (TRO) pilot project.	CC	Ongoing		Monthly average NO <sub>2</sub> levels examined at School property, Inside TRO and Outside TRO zone at residential facades. Questionnaires for school pupils and parents.	Unknown	6 schools assigned to the TRO Zone pilot project.  Orders have been implemented and works are sanctioned to officially start in January 2020. Air Quality monitoring has already commence to gather baseline understanding without TRO Zone in place.		2021	
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.			

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
1.6	Increase awareness of air quality concerns	Public Information	Cardiff 'car-free' day	CC	Completed 2019		Air Quality Measurements.	No target	When comparing Sunday 19th May to Car-Free Day event 12th May, the daily average reduction for NO2 is as follows;  Duke Street/ Castle Street- 16.11% Stephenson Court on Newport Road- 28.15% Westgate Street- 13.62% Lower Cathedral Road- +9.14%			Try to geographically expand and hold car-free days more regularly in Cardiff.
1.7			Tredegaville 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 Tredegaville CIW Primary School. Successfully installed August 2019.			Investigate monthly average diffusion tube results following implementation.
<b>Infrastructure</b>												
2.1	Bus Route Improvement	Transport Planning and Infrastructure	City Centre Improvement Schemes	CC & WG	2018		Weltag stage 1 and 2 Assessments	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably		Submission of Weltag stage 1 outline business case	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
								practicable				
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 at sensitive receptor locations on specified routes	Unknown	Bus lanes have been installed on A470, A4119 & A48. Suggested 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.		Ongoing	
2.4	Cycle Network		Proposed Cycleways.	CC	Ongoing		Cycling trip counts.	3.5% modal shift which aligns with the assumptions derived in the feasibility	Public consultation on proposals for Cycleway 1 St Andrew's Crescent to Senghennydd Road- now closed. Public consultation on		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
								study.	proposals for Cycleway 3 Lloyd George Avenue- now closed.			
2.4	Public transport improvements- interchanges stations and services		New Cardiff Central Interchange development	CC	Ongoing		Detailed AQAs quantifying the level of impact to air quality levels.	To ensure development does not cause any adverse impact and where possible reduce levels to as low as reasonably practicable	Planning application received in 2018 for the central interchange proposal including new bus station. Planning consent granted subject to approval and discharge of conditions.			\$106 funding acquired for the 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 coincides with the Safe Routes to School Programme.	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
									Plans are in place to hopefully expand 20mph limit areas in Grangetown. This is subject to WG funding in line with the Feasibility Study.			
<b>Lower Emission Vehicles</b>												
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 <sub>2</sub> ) monitored by indicative methods by CC at sensitive receptor locations on specified routes	Approximately >2µg/m <sup>3</sup> reductions in NO <sub>2</sub> sensitive receptor locations along Westgate Street	Application received by DfT and deemed successful. Programme roll out expected quarter 1 2020.			
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	The Council has been successful in obtaining a bid from the Office of Low Emission Vehicles (OLEV) 36 charge points in 21 locations across the city and accessible to the public by 31st March 2019. The Council will aim to submit a further bid in	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
										2019/20 to further increase the network of residential charging points.  The Council has made progress in terms of increasing electric charging infrastructure at four main employment hubs. It has been agreed that in 2019/20 for 8 electric vehicle chargers each at County Hall, Lamby Way, Wilcox House and Coleridge Road (i.e., total of 32 chargers).		
3.3	EV recharging		Increase EV optimistic charging points for Cardiff residents/workers.	CC	Ongoing		EV vehicle counts/ EV point usage.	Unknown	The Council has been successful in obtaining a bid from the Office of Low Emission Vehicles (OLEV) 36 charge points in 21 locations across the city and accessible to the public by 31st March 2019. The Council will aim to submit a further bid in 2019/20 to further increase the network of residential charging points.			

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
<b>Policy</b>												
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 <sub>2</sub> ) monitored by indicative methods by CC at sensitive receptor locations	Annual average NO <sub>2</sub> levels to be recorded at <35µg/m <sup>3</sup> 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 %.		Public Consultation ended. Awaiting public protection committee decision.		Ongoing	

## 2. Air Quality Monitoring Data and Comparison with Air Quality Objectives

### 2.1 Summary of Monitoring Undertaken in 2018

#### 2.1.1 Automatic Monitoring Sites

During 2018 monitoring took place at two automatic monitoring sites in Cardiff; DEFRA's Cardiff City Centre, Frederick Street and Newport Road, Cardiff AURN sites.

The Cardiff Centre AURN has been operating since May 1992, whilst the Newport Road site was newly commissioned in April 2018. The stations form part of DEFRA's AURN network.

This sites 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.

Data from the two sites is validated and ratified by Ricardo-AEA and available to download from the Welsh Air Quality Forum database. The site can be accessed here:

*<http://www.welshairquality.co.uk/>*

For 2018, the Cardiff City Centre, Frederick Street Station achieved data capture levels for NO<sub>2</sub> and PM<sub>10</sub> at 71.1% and 91%. The Newport Road site captured levels for NO<sub>2</sub> and PM<sub>10</sub> at 73.5% and 66.5%.

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 28 studies, which appointed Socotec UK Ltd Didcot laboratory, gave a figure of 0.76 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.

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



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



**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?
<b>Cardiff Centre AURN</b>	Urban Background	318416	176525	NO <sub>2</sub>	N	Chemiluminescence	Y (5m)	200m	N
	Urban Background	318416	176525	PM <sub>10</sub> , PM <sub>2.5</sub>	N	TEOM- FDMS	Y (5m)	200m	N
	Urban Background	318416	176525	SO <sub>2</sub>	N	UV Fluorescence	Y (5m)	200m	N
	Urban Background	318416	176525	CO	N	Infra-Red GFC	Y (5m)	200m	N
	Urban Background	318416	176525	O <sub>3</sub>	N	UV Absorption	Y (5m)	200m	N
<b>Cardiff Newport Road AURN</b>	Roadside/ Urban Traffic	320095	177520	NO <sub>2</sub>	N	Chemiluminescence	Y (12m)	4.5m	N
	Roadside/ Urban Traffic	320095	177520	PM <sub>10</sub>	N	Beta Attenuation Monitor with Gravimetric Equivalence	Y (12m)	4.5m	N

### 2.1.2 Non-Automatic Monitoring Sites

SRS on behalf of CC carries out monitoring of ambient air quality for nitrogen dioxide (NO<sub>2</sub>). In 2018, **85** specifically allocated non-automatic monitoring sites in Cardiff monitored levels of nitrogen dioxide (NO<sub>2</sub>). 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<sup>3</sup>) and 1-hour (200µg/m<sup>3</sup> not to be exceeded > 18 times per year)** air quality objectives for NO<sub>2</sub>.

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.”

National background concentrations provided by Defra are now utilised for the purpose of bias correcting and annualising data can be obtained via the website link:

<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

The location, site description and data gathered since January 2018 are given in **Table 2**. The data has been gathered over a period of 12 months between January and December 2018, adhering to specific monitoring dates controlled by Defra.

### Laboratory Methods and Analysis of Diffusion Tubes

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

Defra website which is available using the following link; <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Where valid data capture for the year is less than 75% (9 months), where necessary the continuous and NO<sub>2</sub> diffusion tube monitoring data have been “annualised” following the methods as described in Defra’s LAQM (TG16), Boxes 7.9 & 7.10.

Where an exceedance is measured at a monitoring site not representative of public exposure, NO<sub>2</sub> concentration at the nearest relevant exposure has been estimated based on the “NO<sub>2</sub> 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.



Figure 8- Map Showing Location of Diffusion Tubes in and around the Cardiff City Centre AQMA

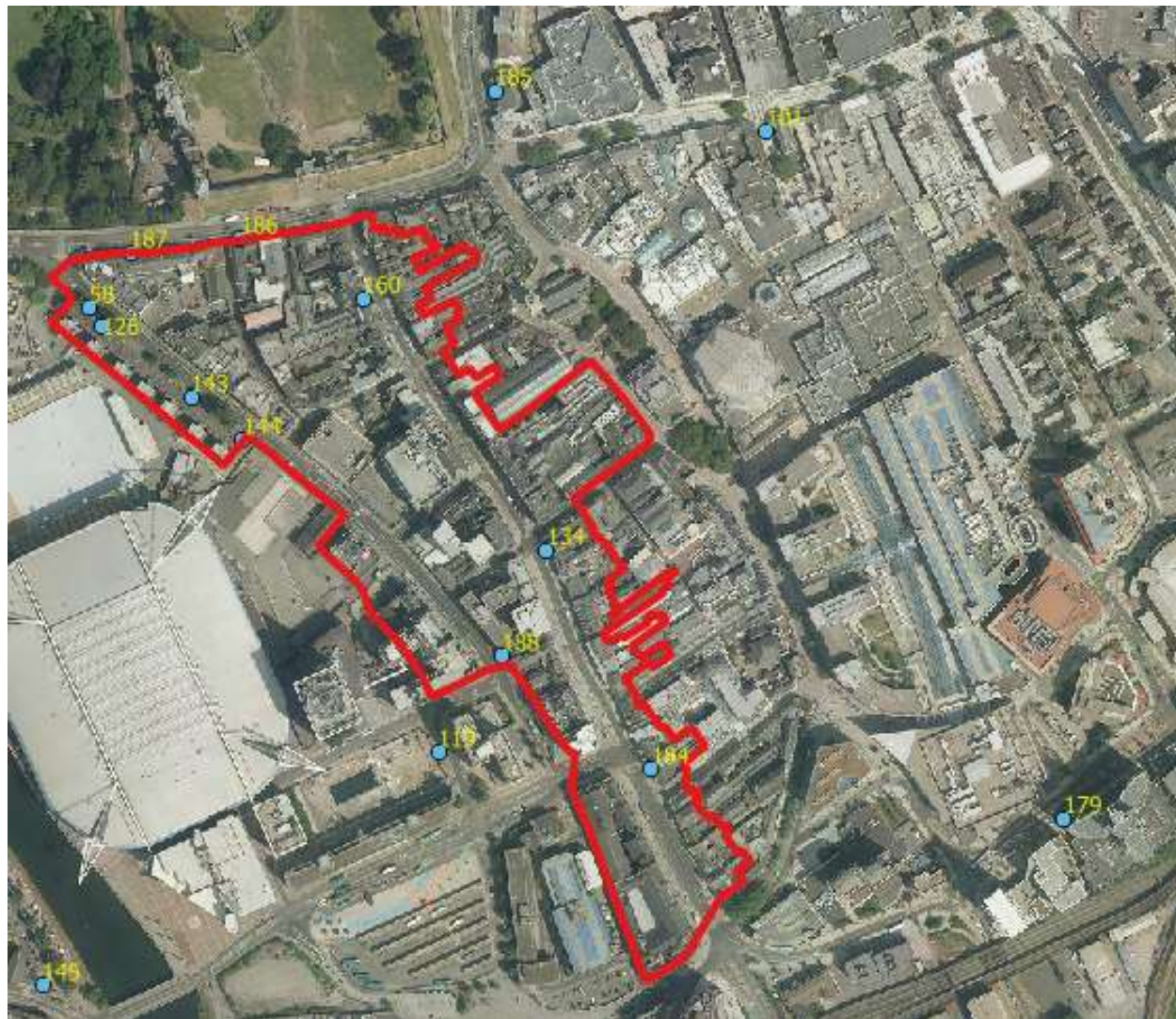


Figure 9- Map Showing Location of Diffusion Tubes in and around the Ely Bridge AQMA



Figure 10- Map Showing Location of Diffusion Tubes in and around the Stephenson Court AQMA



Figure 11- Map Showing Location of Diffusion Tubes in and around the Llandaff AQMA



Figure 12- Map Showing Location of Diffusion Tubes on Cowbridge Road West

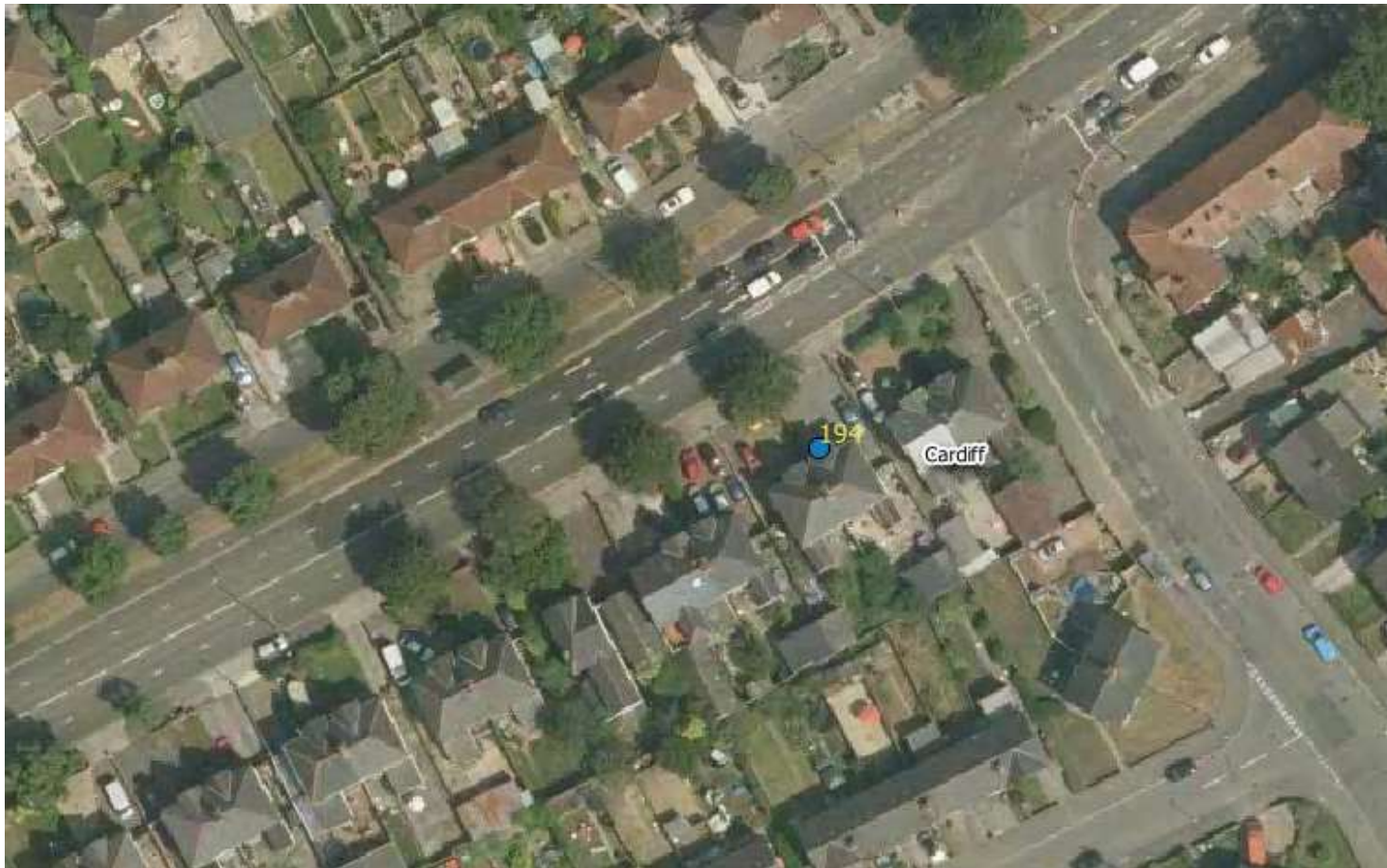


Figure 13- Map Showing Location of Diffusion Tubes in Cathays & Adamsdown area

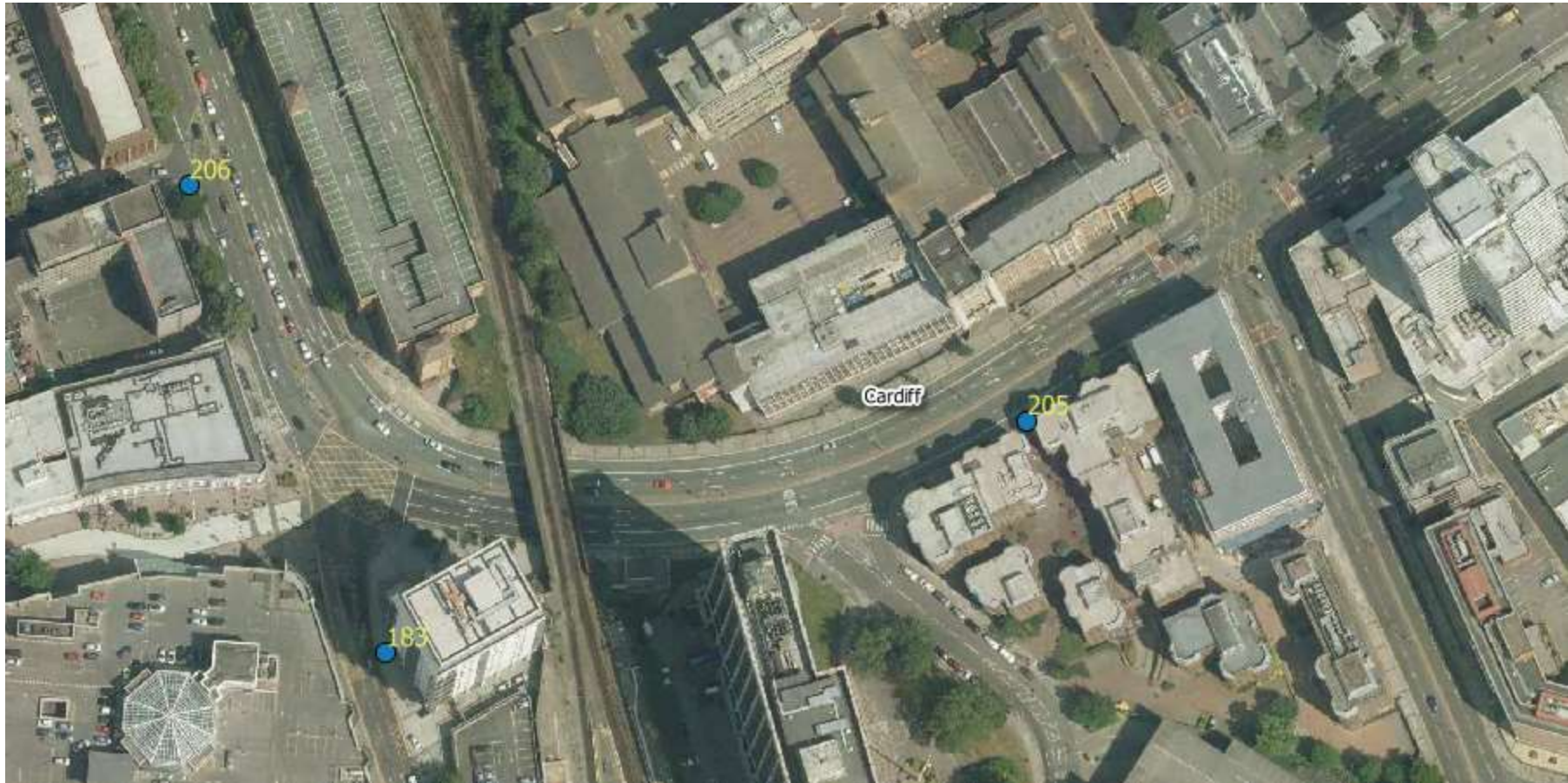


Figure 14- Map Showing Location of Diffusion Tubes in and around Newport Road

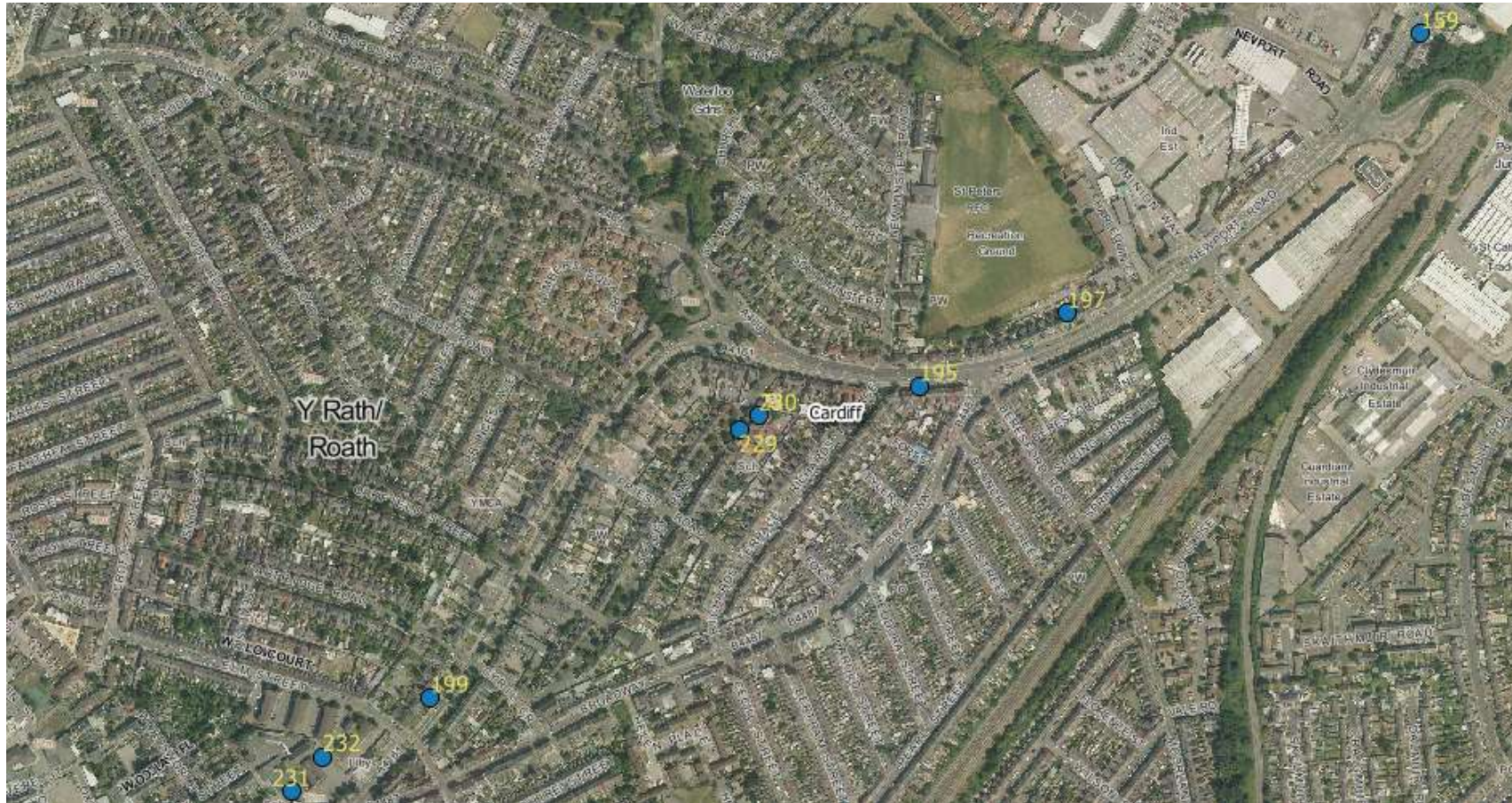


Figure 15- Map Showing Location of Diffusion Tubes in and around Newport Road





Figure 16- Map Showing Location of Diffusion Tubes in Llandaff area



Figure 17- Map Showing Location of Diffusion Tubes in Llandaff & Western Avenue area



**Figure 18- Map Showing Location of Diffusion Tubes in Cathays & Gabalfa area**



**Figure 19- Map Showing Location of Diffusion Tubes in Riverside area**

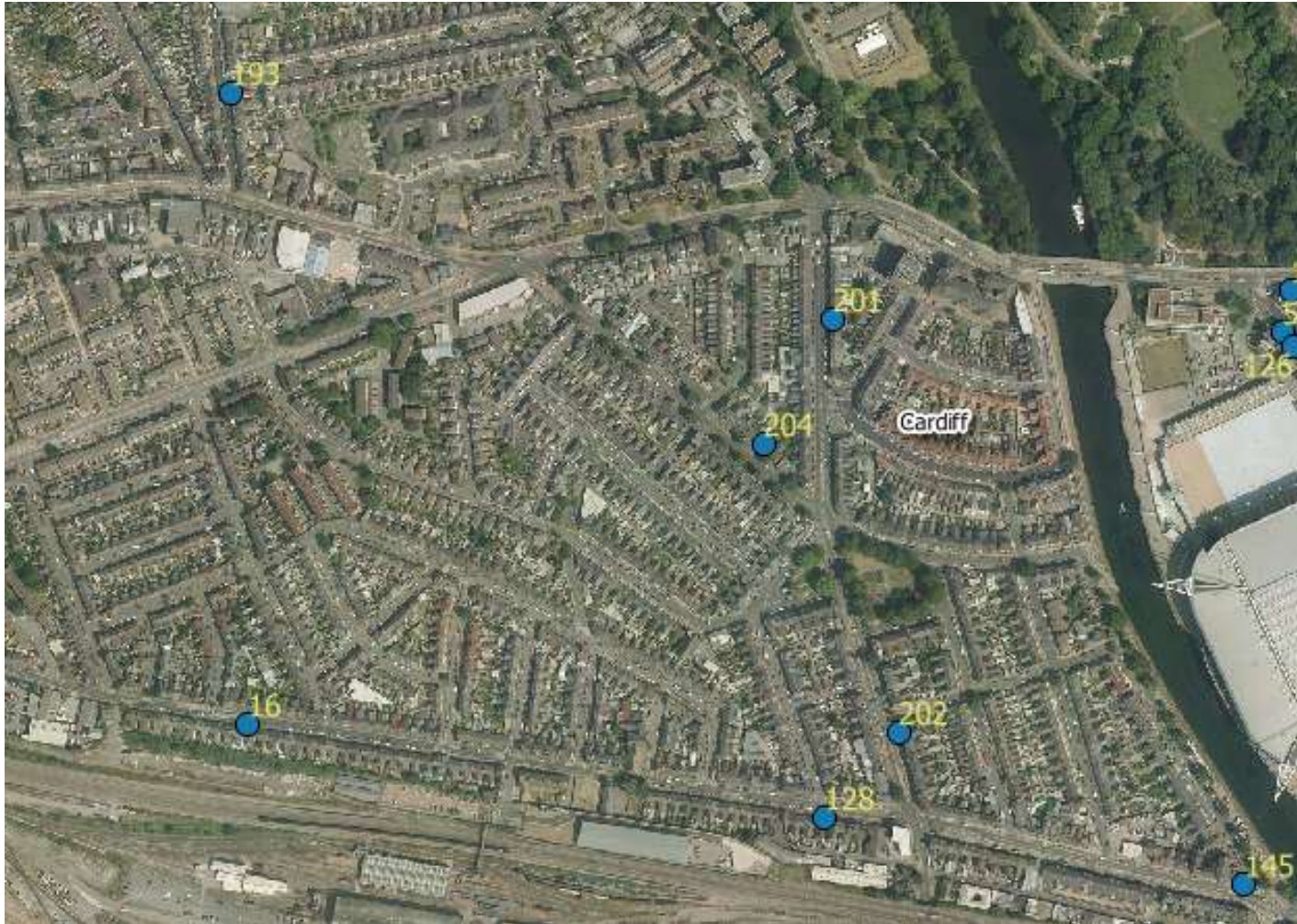


Figure 20- Map Showing Location of Diffusion Tubes in Canton area

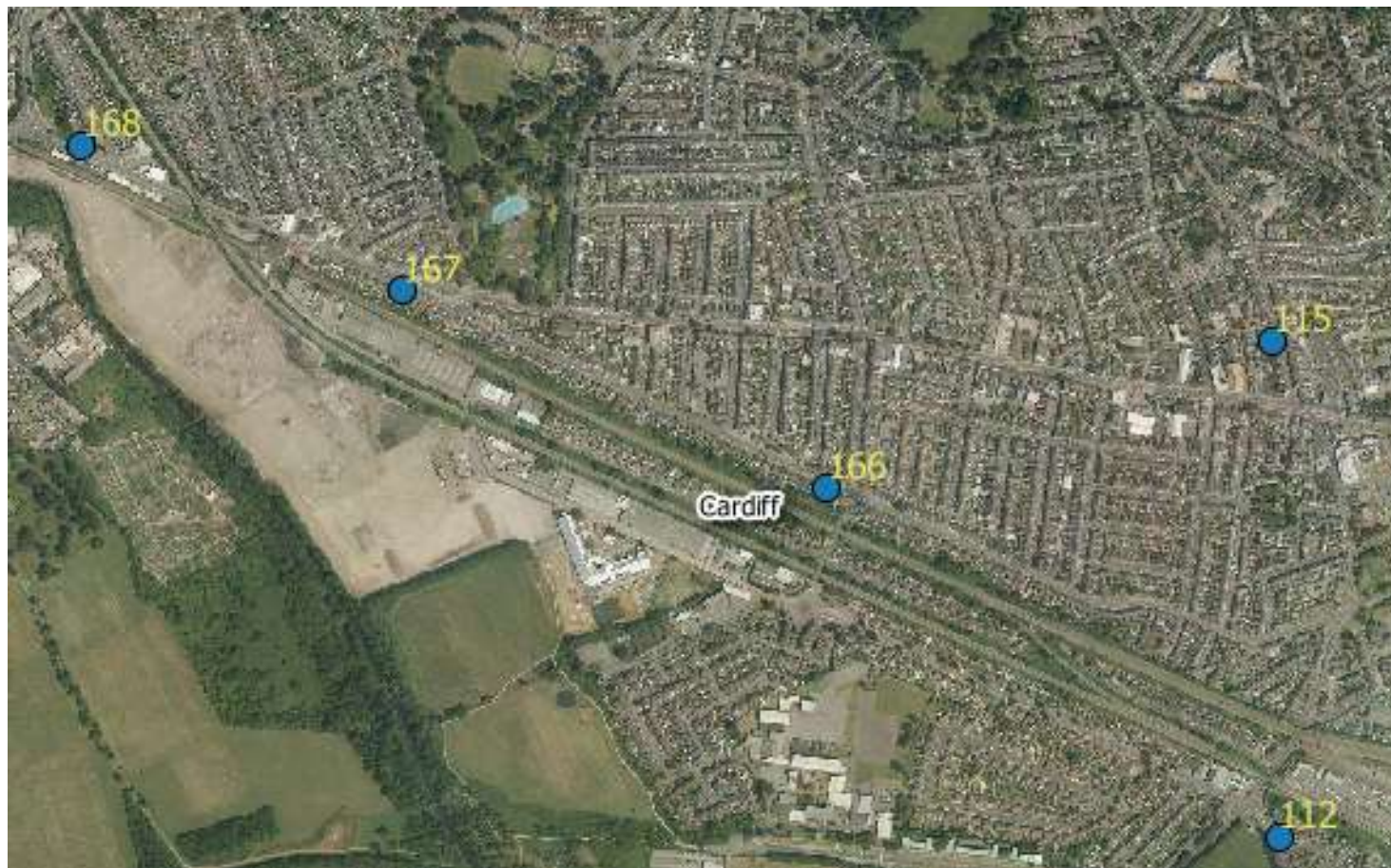


Figure 21- Map Showing Location of Diffusion Tubes in Penylan area



Figure 22- Map Showing Location of Diffusion Tubes near to A48



Figure 23- Map Showing Location of Diffusion Tubes in Heath area

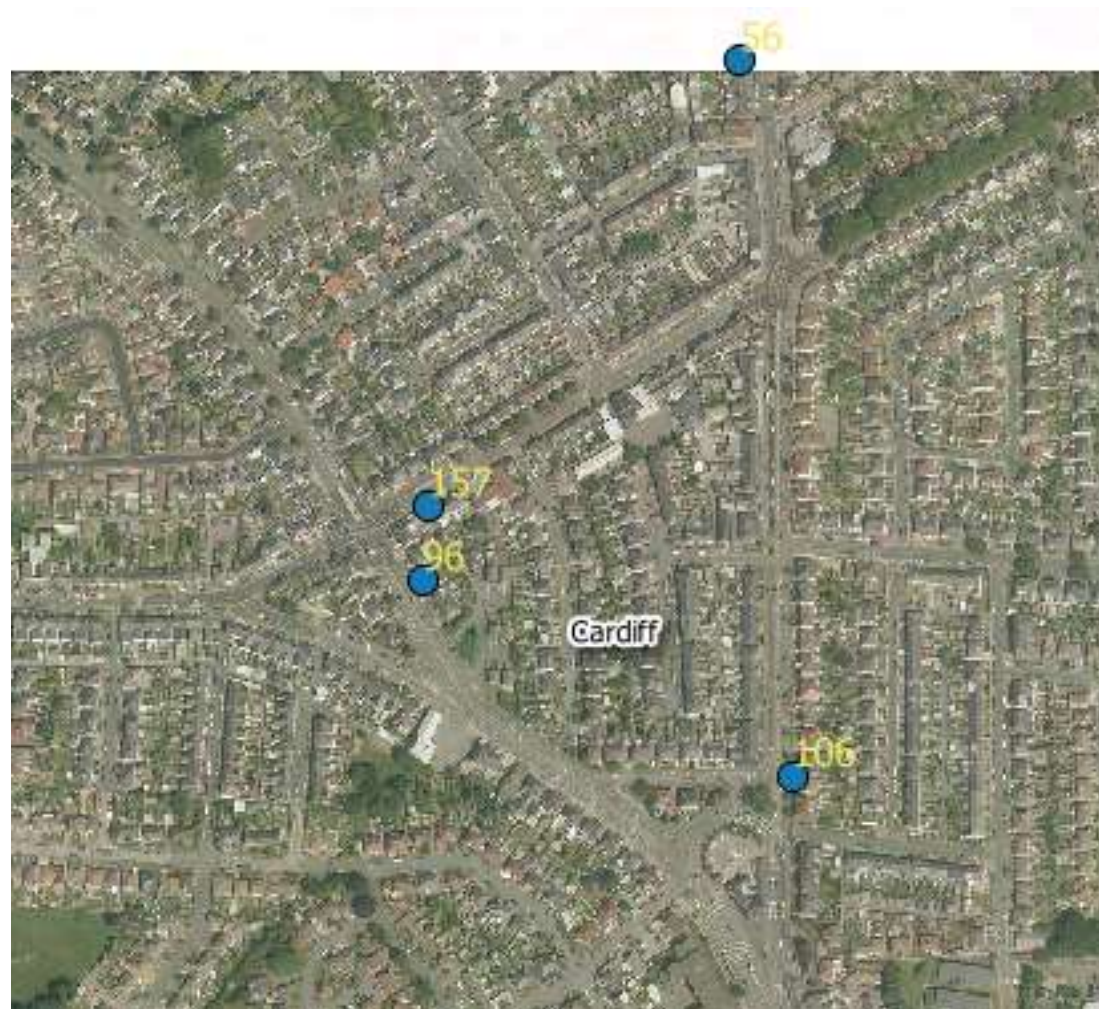




Figure 24- Map Showing Location of Diffusion Tube on James Street



**Figure 25- Map Showing Location of Diffusion Tube in East Tyndall Street, Splott**



Figure 26- Map Showing Location of Diffusion Tubes on Penarth Road area

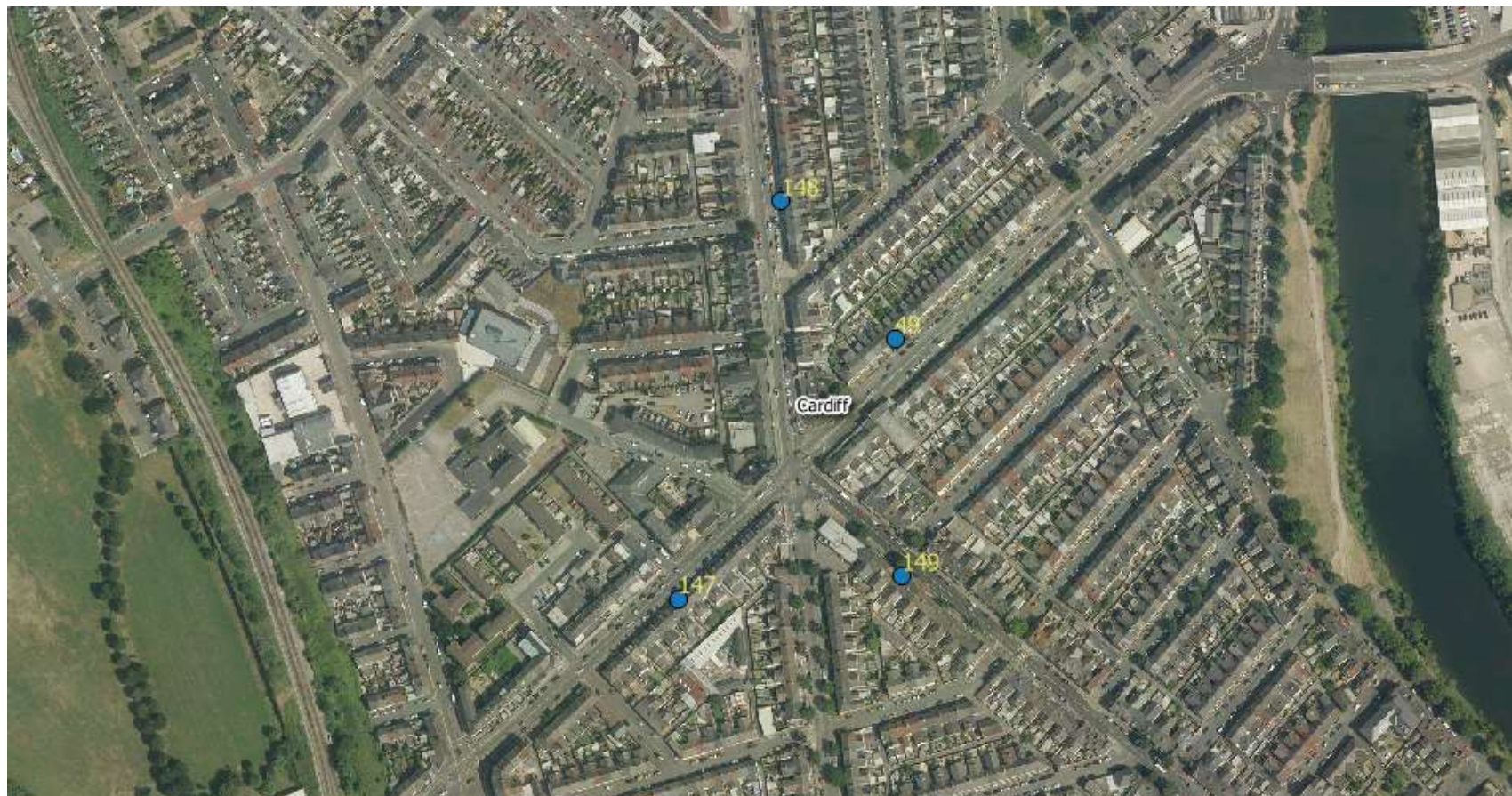
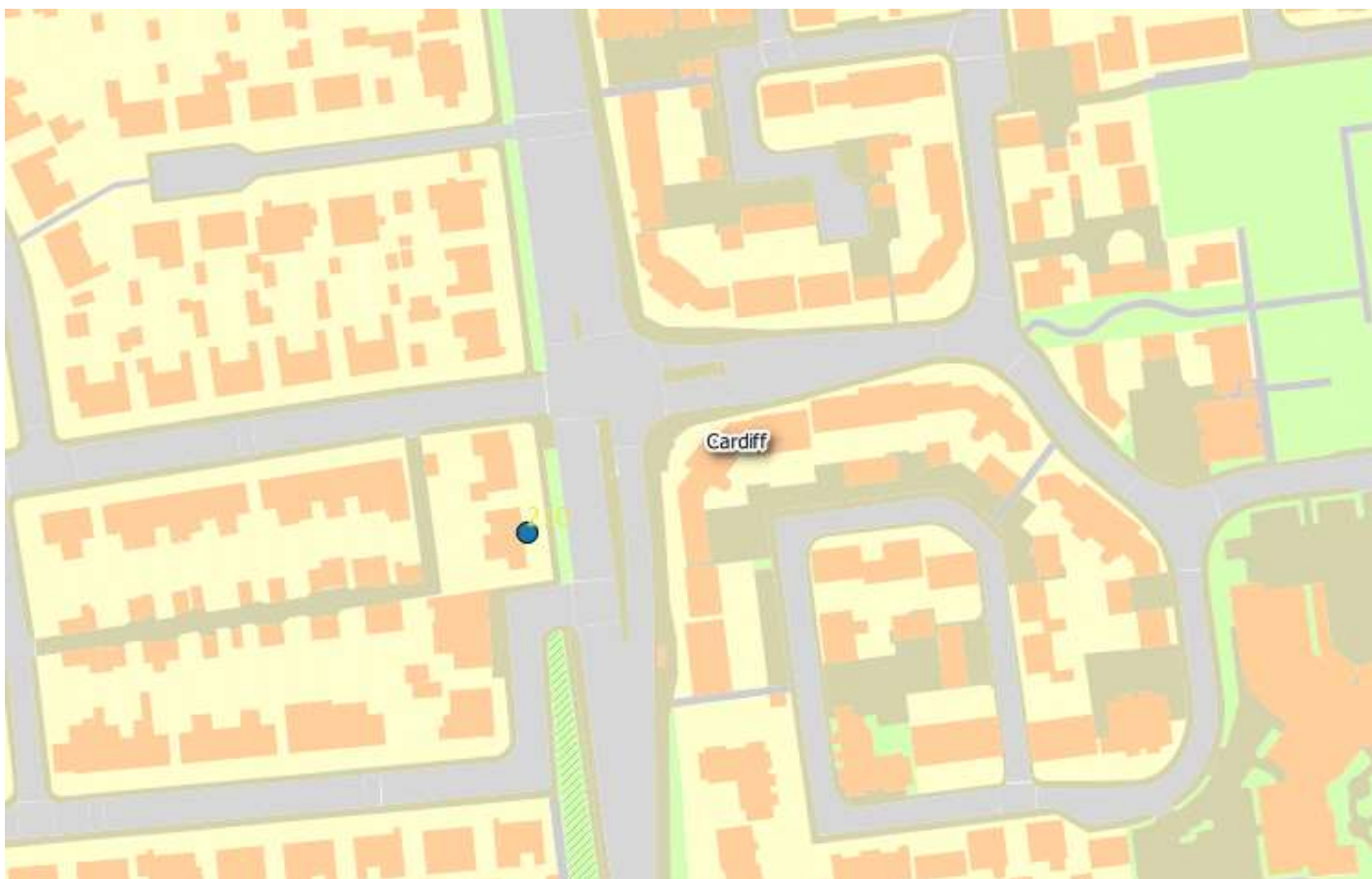


Figure 27- Map Showing Location of Diffusion Tube on Caerphilly Road, Llanishen



**Table 3- Details of Non-Automatic Monitoring Sites 2018**

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 <sub>2</sub>	N	N	Y (0.05m)	5m	Y
33	Mitre Place	Kerbside	315248	178165	3.0	NO <sub>2</sub>	Y	N	N (20m)	1m	Y
49	Penarth Road	Roadside	317760	175310	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	7m	Y
56	Birchgrove Village	Roadside	316814	180005	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	8m	Y
58	Westgate Street	Kerbside	317937	176400	2.5	NO <sub>2</sub>	Y	N	N (5m)	0.5m	Y
81	Stephenson Court	Roadside	319387	176980	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	5m	Y
86	19 Fair oak Road	Roadside	318452	178805	1.5	NO <sub>2</sub>	N	N	Y 0.10m)	10m	Y
96	Manor Way Junction	Roadside	316601	179653	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	5m	Y
98	Western Avenue (premises)	Roadside	314805	177345	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	10m	Y
99	Cardiff Road Llandaff	Roadside	315275	178117	1.5	NO <sub>2</sub>	Y	N	Y (0.05m)	3m	Y
101	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO <sub>2</sub>	N	Y, Triplicate with Tubes 102 & 103	Y (0.10m)	200m	Y
102	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO <sub>2</sub>	N	Y, Triplicate with Tubes 101 & 103	Y (0.10m)	200m	Y
103	Cardiff Centre AURN	Urban Centre	318416	176525	3.0	NO <sub>2</sub>	N	Y, Triplicate with Tubes 101 & 102	Y (0.10m)	200m	Y
106	30 Caerphilly Road	Roadside	316851	179520	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	5m	Y
112	17 Sloper Road	Roadside	316613	175910	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	5m	Y
115	21 Llandaff Road	Roadside	316604	176641	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	3m	Y
117	25 Cowbridge Road West	Roadside	314458	176735	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	2m	Y
119	Havelock Street	Kerbside	318184	176086	2.0	NO <sub>2</sub>	N	N	N	1m	Y
126	Westgate Street Flats	Roadside	317946	176387	1.5	NO <sub>2</sub>	Y	N	Y (0.10m)	5m	Y
128	117 Tudor Street	Roadside	317540	175979	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	5m	Y
131	Dragon Court	Roadside	319292	176932	1.75	NO <sub>2</sub>	Y	N	Y (0.05m)	5m	Y
134	Sandringham Hotel	Roadside	318261	176229	2.0	NO <sub>2</sub>	Y	N	N (3m)	5m	Y
143	Windsor House	Roadside	318009	176337	1.5	NO <sub>2</sub>	Y	N	Y (0.10m)	6.5m	Y
144	Marlborough House	Roadside	318046	176307	1.5	NO <sub>2</sub>	Y	N	Y (0.10m)	6.5m	Y
145	Tudor Street Flats	Roadside	317904	175921	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	4.5m	Y
147	211 Penarth Road	Roadside	317636	175161	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	7.0m	Y
148	161 Clare Road	Roadside	317695	175389	1.5	NO <sub>2</sub>	N	N	Y (0.05)	5.0m	Y
149	10 Corporation Road	Roadside	317764	175174	1.5	NO <sub>2</sub>	N	N	Y (0.05)	4.6m	Y
152	James Street	Roadside	319003	174596	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	6.0m	Y
153	Magic Roundabout	Roadside	319491	176183	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	12.5m	Y
156	2a/4 Colum Road	Roadside	317997	177412	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	5.0m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with 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?
157	47 Birchgrove Road	Roadside	316605	179703	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	8.0m	Y
158	64/66 Cathays Terrace	Roadside	318093	177716	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	3.0m	Y
159	IMO façade replacement	Roadside	320709	177918	1.5	NO <sub>2</sub>	N	N	Y (0.10m)	4.0m	Y
160	High Street Zizzi	Urban Centre	318131	176407	2.0	NO <sub>2</sub>	Y	N	Y (0.10m)	65m	Y
166	163 Lansdowne Road	Roadside	315950	176424	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	5.4m	Y
167	359 Lansdowne Road	Roadside	315326	176714	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	6.1m	Y
168	570 Cowbridge Road East	Roadside	314856	176929	1.5	NO <sub>2</sub>	N	N	Y (0.05m)	4.8m	Y
174	76 North Road	Kerbside	317508	177868	1.5	NO <sub>2</sub>	N	N	Y (0.1m)	1m	Y
179	Altolusso, Bute Terrace	Roadside	318627	176039	2.0	NO <sub>2</sub>	N	N	N (5.1m)	2.1m	N
183	Station Terrace	Kerbside	318765	176623	2.0	NO <sub>2</sub>	N	N	N (5.5m)	0.5m	Y
184	Hophouse, St Mary Street	Roadside	318335	176074	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	3.0m	Y
185	Northgate House, Duke Street	Roadside	318224	176554	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	9.65m	Y
186	Dempsey's Public House, Castle Street	Roadside	318044	176449	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	2.90m	Y
187	Angel Hotel	Roadside	317944	176436	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	2.85m	Y
188	Westgate Street (45 Apartments)	Roadside	318229	176154	1.8	NO <sub>2</sub>	Y	N	Y (0.05m)	3.30m	Y
190	3 Pearson Street	Kerbside	319056	177343	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	0.75m	Y
191	7 Mackintosh Place	Roadside	318724	177776	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.0m	Y
192	3 Cowbridge Road West	Roadside	314505	176769	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	3.0m	Y
193	24 Kings Road	Roadside	317025	176607	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.0m	Y
194	115 Cowbridge Road West	Roadside	313870	176212	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	12.5m	Y
195	244 Newport Road	Roadside	320147	177523	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	6.0m	Y
196	2 Pencisely Road	Roadside	316223	177305	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	6.5m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with 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?
197	GFF 369 Newport Road	Roadside	320313	177605	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	6.5m	Y
198	Next Building to Stephenson Court	Roadside	319348	176958	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	4.6m	Y
199	157 Newport Road	Roadside	319599	177174	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	12.6m	Y
200	350 Whitchurch Road	Roadside	317038	179073	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.5m	Y
201	23 Lower Cathedral Road	Roadside	317547	176411	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3m	Y
202	22 Clare Street	Roadside	317604	176053	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.5m	Y
203	10 Fair oak Road	Roadside	318255	178533	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	4.5m	Y
204	53 Neville Street	Roadside	317487	176303	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	5m	Y
205	Fitzalan Court, Newport Road	Kerbside	318931	176683	2.0	NO <sub>2</sub>	N	N	N (4m)	1m	N
206	Windsor House, Windsor Lane	Kerbside	318714	176744	2.0	NO <sub>2</sub>	N	N	N (3.5m)	1m	N
207	42 Waungron Road	Roadside	314769	177343	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	6.8m	Y
208	2 Llantrisant Road	Roadside	315152	178245	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3m	Y
209	178 North Road	Roadside	317200	178537	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.5m	Y
210	485 Caerphilly Road	Roadside	316692	181088	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	7.5m	Y
211	19 Well Wood Close, Penylan	Roadside	320247	178903	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	28m	Y
212	62 Bridge Road	Kerbside	315197	178221	2.0	NO <sub>2</sub>	Y	N	Y (0.05m)	1m	Y
225	Mount Stuart Primary Rear Entrance	Other	318825	174435	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	50.0m	Y
226	Mount Stuart Primary Classroom	Other	318821	174433	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	51.0m	Y
227	Tredegaville Primary Reception	Other	319227	176802	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	42.0m	Y
228	Tredegaville Primary Playground	Roadside	319251	176821	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	10.4m	Y
229	Stacey Primary playground	Other	319945	177474	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	70.0m	Y
230	Stacey Primary Outside reception	Other	319967	177490	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	72.0m	Y
231	St Peter Primary playground	Other	319443	177069	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	53.0m	Y
232	St Peter Primary near entrance	Other	319478	177108	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	35.0m	Y
233	Cardiff Academy Front Entrance	Other	319103	176922	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	35.0m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with 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?
234	Cardiff Academy rear entrance	Other	319109	176914	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	35.0m	Y
235	St Joseph's RC Primary playground	Other	317158	178800	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	47.0m	Y
236	St Joseph's RC Primary rear entrance	Other	317111	178786	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	67.0m	Y
237	Ysgol Myndd Bychan Entrance	Roadside	317551	178724	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.0m	Y
238	Ysgol Myndd Bychan Playground	Roadside	317572	178731	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	3.0m	Y
239	St Teilos School near entrance	Other	320592	179940	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	96.0m	Y
240	St Teilos School rear playground	Other	320578	179786	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	70.0m	Y
241	Cathays High School North road facing	Roadside	317307	178374	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	11.0m	Y
242	Cathays High School rear entrance	Roadside	317396	178474	2.0	NO <sub>2</sub>	N	N	Y (0.05m)	7.0m	Y

**Notes:**

1. 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property)



## 2.2 2018 Air Quality Monitoring Results

**Table 4– Non-automatic Annual Mean NO<sub>2</sub> Monitoring Results (2014- 2018)**

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m <sup>3(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
16	Roadside	Diffusion Tube	100.0	N	32.4	27.86	28.9	28.9	27.8
33	Kerbside	Diffusion Tube	100.0	Y	<b>51.2</b>	<b>46.94</b>	<b>47.6</b>	33.0	32.5
49	Roadside	Diffusion Tube	100.0	N	32.6	29.35	30.4	27.7	27.3
56	Roadside	Diffusion Tube	100.0	N	35.8	29.64	32.5	27.8	23.8
58	Kerbside	Diffusion Tube	91.7	Y	<b>51.2</b>	<b>48.25</b>	<b>45.3</b>	<b>44.5<sup>2</sup></b>	<b>45.8</b>
81	Roadside	Diffusion Tube	100.0	Y	36.4	35.29	37.6	35.9	34.9
86	Roadside	Diffusion Tube	100.0	N	38.9	34.85	35.6	37.0	33.4
96	Roadside	Diffusion Tube	100.0	N	34.4	31.05	36.9	31.8	31.4
98	Roadside	Diffusion Tube	100.0	N	29.8	25.44	28.4	26.2	26.1
99	Roadside	Diffusion Tube	100.0	Y	39.6	29.84	34.8	31.0	31.7

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m <sup>3(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
101	Urban Centre	Diffusion Tube	66.7	N	24.4	20.28	23.1	21.3	21.1
102	Urban Centre	Diffusion Tube	66.7	N	24.2	21.06	22.5	20.9	20.6
103	Urban Centre	Diffusion Tube	66.7	N	24.4	20.72	23.2	21.6	20.7
106	Roadside	Diffusion Tube	100.0	N	34.9	29.41	32.2	31.5	27.8
112	Roadside	Diffusion Tube	100.0	N	28.8	27.06	29.5	27.4	26.7
115	Roadside	Diffusion Tube	100.0	N	36.3	32.47	32.8	32.7	30.0
117	Roadside	Diffusion Tube	91.7	Y	<b>42.3</b>	39.54	<b>41.3</b>	38.0	<b>40.0</b>
119	Kerbside	Diffusion Tube	100.0	N	32.0	27.65	29.9	33.2 <sup>2</sup>	37.6
126	Roadside	Diffusion Tube	100.0	Y	<b>41.2</b>	36.00	38.4	39.4 <sup>2</sup>	35.1
128	Roadside	Diffusion Tube	100.0	N	36.5	29.57	31.2	29.8	28.3
131	Roadside	Diffusion Tube	100.0	Y	<b>41.2</b>	39.48	39.6	<b>41.7</b>	38.2
134	Roadside	Diffusion Tube	50.0	Y	34.5	32.07	38.2 <sup>a</sup>	37.3 <sup>2</sup>	36.7 <sup>2</sup>

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m <sup>3(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
143	Roadside	Diffusion Tube	100.0	Y	42.1	38.16	38.7	38.4 <sup>2</sup>	37.3
144	Roadside	Diffusion Tube	100.0	Y	38.2	37.22	38.3	36.8 <sup>2</sup>	34.3
145	Roadside	Diffusion Tube	91.7	N	32.6	29.90	29.9	29.6	28.7
147	Roadside	Diffusion Tube	100.0	N	31.3	27.70	28.8	26.2	29.3
148	Roadside	Diffusion Tube	100.0	N	29.1	27.53	29.2	27.3	26.6
149	Roadside	Diffusion Tube	100.0	N	33.2	33.56	31.2	32.5	31.3
152	Roadside	Diffusion Tube	50.0	N	29.7	27.60	29.3	28.9	30.2 <sup>2</sup>
153	Roadside	Diffusion Tube	100.0	N	33.2	28.99	30.1	30.6	25.0
156	Roadside	Diffusion Tube	100.0	N	31.4	25.92	29.7	25.7	26.8
157	Roadside	Diffusion Tube	100.0	N	29.7	27.16	28.2	28.3	25.1
158	Roadside	Diffusion Tube	83.3	N	29.1	25.50	29.0	26.1	26.2
159	Roadside	Diffusion Tube	100.0	N	39.2	33.96	35.5	38.6	35.6

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m <sup>3(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
160	Urban Centre	Diffusion Tube	91.7	Y	28.3	27.03	31.7	28.1 <sup>2</sup>	27.0
166	Roadside	Diffusion Tube	91.7	N	36.6	32.05	33.2	32.1	30.6
167	Roadside	Diffusion Tube	91.7	N	31.5	28.26	29.8	26.9	27.8
168	Roadside	Diffusion Tube	100.0	N	27.7	24.26	27.7	26.2	26.0
174	Kerbside	Diffusion Tube	100.0	N	33.9	28.65	33.3	27.5	28.2
179	Roadside	Diffusion Tube	75.0	N	-	-	39.7 <sup>2</sup>	<b>45.4<sup>2</sup></b>	<b>43.2</b>
183	Kerbside	Diffusion Tube	75.0	N	-	-	35.9	31.2	31.1
184	Roadside	Diffusion Tube	83.3	Y	-	-	<b>41.4</b>	38.7 <sup>2</sup>	39.9
185	Roadside	Diffusion Tube	91.7	N	-	-	37.1	28.6 <sup>2</sup>	32.9
186	Roadside	Diffusion Tube	100.0	Y	-	-	<b>47.5</b>	<b>47.7<sup>2</sup></b>	<b>45.8</b>
187	Roadside	Diffusion Tube	75.0	Y	-	-	<b>50.7</b>	<b>50.2<sup>2</sup></b>	<b>50.8</b>
188	Roadside	Diffusion Tube	66.7	Y	-	-	<b>49.8<sup>2</sup></b>	<b>49.8<sup>2</sup></b>	<b>52.4<sup>2</sup></b>

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ <sup>(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
190	Kerbside	Diffusion Tube	75.0	N	-	-	-	-	23.2
191	Roadside	Diffusion Tube	100.0	N	-	-	-	-	29.7
192	Roadside	Diffusion Tube	100.0	Y	-	-	-	-	39.7
193	Roadside	Diffusion Tube	100.0	N	-	-	-	-	18.6
194	Roadside	Diffusion Tube	100.0	N	-	-	-	-	22.0
195	Roadside	Diffusion Tube	100.0	N	-	-	-	-	31.6
196	Roadside	Diffusion Tube	100.0	N	-	-	-	-	24.9
197	Roadside	Diffusion Tube	91.7	N	-	-	-	-	31.0
198	Roadside	Diffusion Tube	100.0	Y	-	-	-	-	35.1
199	Roadside	Diffusion Tube	100.0	N	-	-	-	-	23.9
200	Roadside	Diffusion Tube	91.7	N	-	-	-	-	33.4
201	Roadside	Diffusion Tube	100.0	N	-	-	-	-	30.3

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m <sup>3(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
202	Roadside	Diffusion Tube	100.0	N	-	-	-	-	27.8
203	Roadside	Diffusion Tube	100.0	N	-	-	-	-	21.6
204	Roadside	Diffusion Tube	100.0	N	-	-	-	-	23.3
205	Kerbside	Diffusion Tube	50.0	N	-	-	-	-	36.1 <sup>2</sup>
206	Kerbside	Diffusion Tube	41.7	N	-	-	-	-	38.7 <sup>2</sup>
207	Roadside	Diffusion Tube	100.0	N	-	-	-	-	21.7
208	Roadside	Diffusion Tube	100.0	N	-	-	-	-	25.4
209	Roadside	Diffusion Tube	100.0	N	-	-	-	-	22.7
210	Roadside	Diffusion Tube	100.0	N	-	-	-	-	21.7
211	Roadside	Diffusion Tube	100.0	N	-	-	-	-	21.7
212	Kerbside	Diffusion Tube	41.7	Y	-	-	-	-	<b>47.1<sup>2</sup></b>
225	Other	Diffusion Tube	92	N	-	-	-	-	16.9

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ <sup>(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
226	Other	Diffusion Tube	92	N	-	-	-	-	18.5
227	Other	Diffusion Tube	75	N	-	-	-	-	21.8
228	Roadside	Diffusion Tube	75	N	-	-	-	-	26.1
229	Other	Diffusion Tube	75	N	-	-	-	-	18.0
230	Other	Diffusion Tube	92	N	-	-	-	-	18.2
231	Other	Diffusion Tube	75	N	-	-	-	-	20.4
232	Other	Diffusion Tube	75	N	-	-	-	-	19.9
233	Other	Diffusion Tube	83	N	-	-	-	-	24.5
234	Other	Diffusion Tube	92	N	-	-	-	-	20.0
235	Other	Diffusion Tube	67	N	-	-	-	-	21.6 <sup>2</sup>
236	Other	Diffusion Tube	58	N	-	-	-	-	18.8 <sup>2</sup>
237	Roadside	Diffusion Tube	83	N	-	-	-	-	21.2

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) <sup>(1)</sup>	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$ <sup>(2)</sup>				
					2014 (Bias Adjustment Factor = 0.84)	2015 (Bias Adjustment Factor = 0.79)	2016 (Bias Adjustment Factor = 0.78)	2017 (Bias Adjustment Factor = 0.77)	2018 (Bias Adjustment Factor = 0.76)
238	Roadside	Diffusion Tube	50	N	-	-	-	-	17.7 <sup>2</sup>
239	Other	Diffusion Tube	75	N	-	-	-	-	19.3
240	Other	Diffusion Tube	58	N	-	-	-	-	18.5 <sup>2</sup>
241	Roadside	Diffusion Tube	92	N	-	-	-	-	18.3
242	Roadside	Diffusion Tube	83	N	-	-	-	-	16.4

**Notes:**

Exceedances of the NO<sub>2</sub> annual mean objective of 40 $\mu\text{g}/\text{m}^3$  are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60 $\mu\text{g}/\text{m}^3$ , indicating a potential exceedance of the NO<sub>2</sub> 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 NO<sub>2</sub> concentrations with Distance from the Road”



**Table 5– Automatic Annual Mean NO<sub>2</sub> Monitoring Results (2014- 2018)**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % <sup>(1)</sup>	Valid Data Capture 2018 % <sup>(2)</sup>	Annual Mean Concentration (µg/m <sup>3</sup> )				
					2014	2015	2016	2017	2018
Cardiff Centre AURN 1	Urban Background	N	100	71.1	25	27	23	20	20 <sup>3</sup>
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	73.5	-	-	-	-	29 <sup>3</sup>

Notes:

Exceedances of the Annual Average NO<sub>2</sub> objective (40µg/m<sup>3</sup>) are shown in bold.

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

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

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

**Table 6– Automatic 1-hour Mean NO<sub>2</sub> Monitoring Results (2014- 2018)**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % <sup>(1)</sup>	Valid Data Capture 2018 % <sup>(2)</sup>	Number of Hourly Means (> 200µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2014	2015	2016	2017	2018
Cardiff Centre AURN 1	Urban Background	N	100	71.1	0	0 (14.98)	0	0	0 (84.55)
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	73.5	-	-	-	-	0 (98.12)

Notes:

Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> 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 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

Figure 28– Trends in Annual Mean NO<sub>2</sub> Concentrations Measured at Cardiff Frederick Street AURN (AURN 1) Site

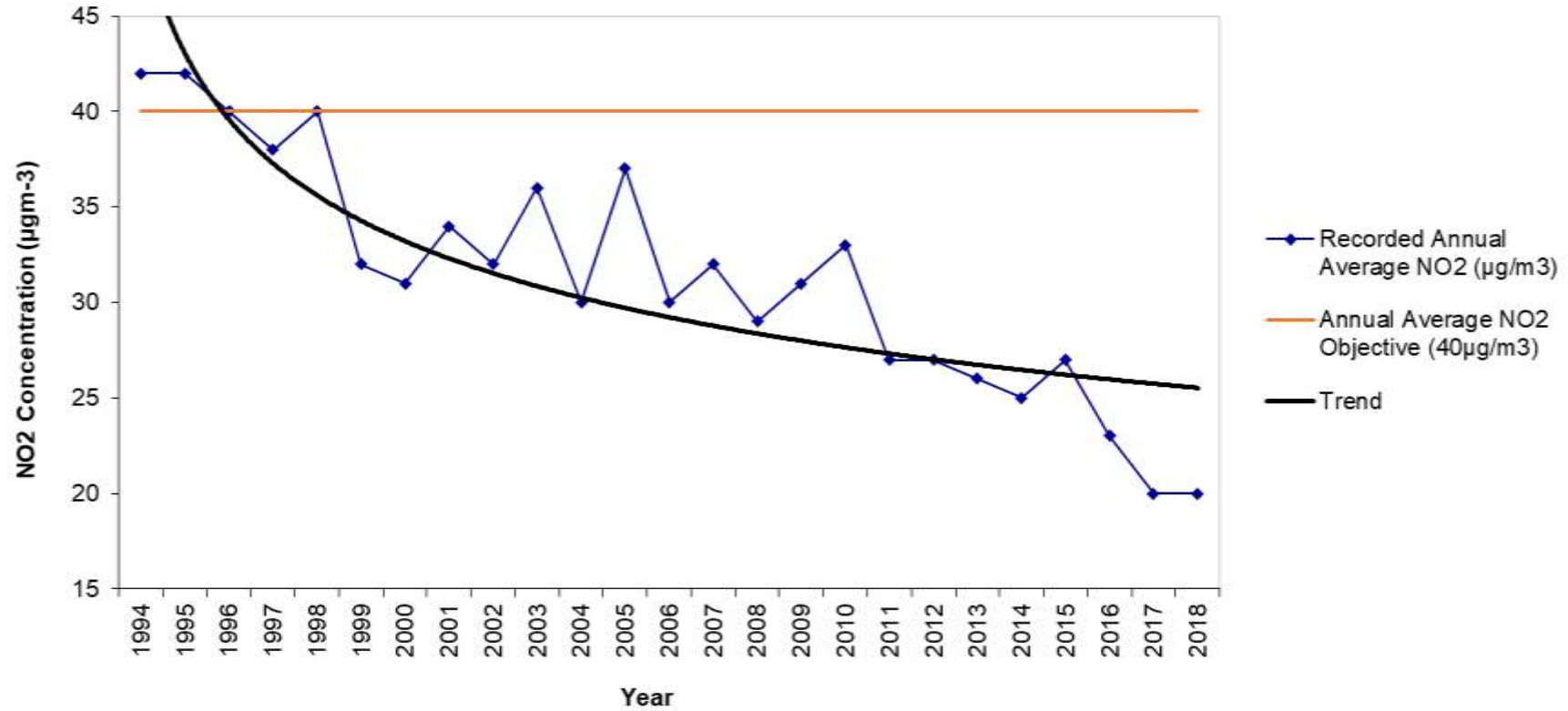


Figure 28 indicates a decreasing trend in annual average NO<sub>2</sub> concentrations in Cardiff’s background levels. It must be noted that annual average levels have remained at their lowest since 2017 consistently recording levels of 20µg/m<sup>3</sup> in 2017 & 2018.

**Table 7– Automatic Annual Mean PM<sub>10</sub> Monitoring Results (2014- 2018)**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	Confirm Gravimetric Equivalent (Y or N/A)	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
						2014	2015	2016	2017	2018
Cardiff Centre AURN 1	Urban Background	N	100	88.9	N/A	16	16	15.1 <sup>(3)</sup>	16	17
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	66.5	Y	-	-	-	-	20.3 <sup>3</sup>

**Notes:**

Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> 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.

**Table 8– Automatic 24-Hour Mean PM<sub>10</sub> Monitoring Results (2014- 2018)**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
						2014	2015	2016	2017	2018
Cardiff Centre AURN 1	Urban Background	N	100	88.9	N/A	4	5 (25.4)	1 (30.52)	2	0
Cardiff Newport Road AURN 2	Roadside/ Urban Traffic	N	100	66.5	Y	-	-	-	-	0 (36)

**Notes:**

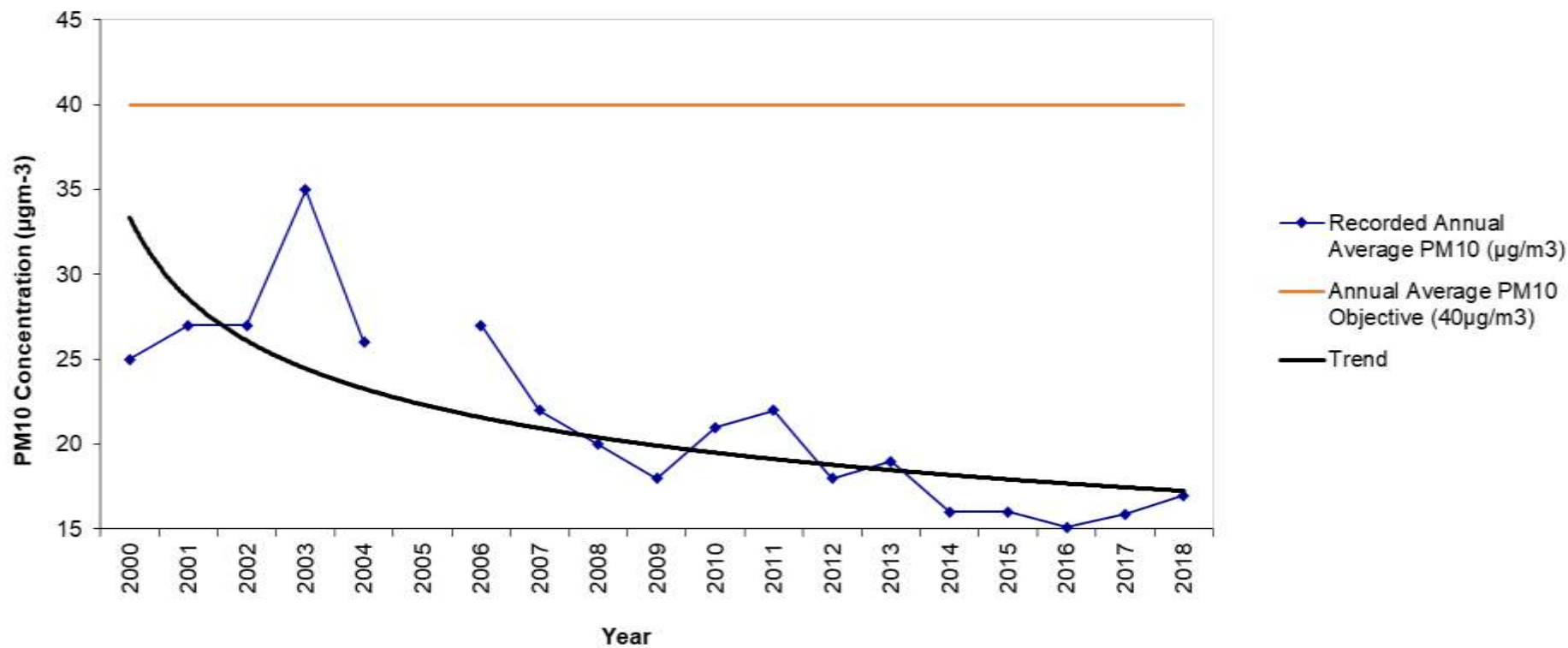
Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

(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 90.4<sup>th</sup> percentile of 24-hour means is provided in brackets.

Figure 29- Trends in Annual Mean PM<sub>10</sub> Concentrations Measured at Cardiff Frederick Street AURN (AURN 1) Site



The displayed datasets indicate a downward trend in Cardiff's background PM<sub>10</sub> levels.

**Table 9– Automatic SO<sub>2</sub> Monitoring Results: Comparison with Objectives**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	Number of Exceedences (percentile in bracket µg/m <sup>3</sup> )		
					15-minute Objective (266 µg/m <sup>3</sup> )	1-hour Objective (350 µg/m <sup>3</sup> )	24-hour Objective (125 µg/m <sup>3</sup> )
Cardiff Centre AURN 1	Urban Background	N	100	71	0	0	0

**Notes:**

Exceedences of the SO<sub>2</sub> 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 99.9<sup>th</sup> percentile for 15 minute SO<sub>2</sub>, however in this instance it is the 99.9<sup>th</sup> percentile for 10 minute SO<sub>2</sub>.

(4) In accordance with LAQM TG(16), due to the fact data capture is <85% it is a requirement to report the 99.7<sup>th</sup> percentile for 1 hour SO<sub>2</sub>

(5) In accordance with LAQM TG(16), due to the fact data capture is <85% it is a requirement to report the 99.2<sup>nd</sup> percentile for 24 hour SO<sub>2</sub>

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	Number of Exceedences
					8-Hour Average Objective (10 µg/m <sup>3</sup> )
Cardiff Centre AURN 1	Urban Background	N	100	99	0

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

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2018 (%) <sup>(2)</sup>	Number of Exceedences
					Number of days where the 8-hour mean >100µg/m <sup>3</sup>
Cardiff Centre AURN 1	Urban Background	N	100	99	13



## 2.3 Comparison of 2018 Monitoring Results with Previous Years and the Air Quality Objectives

During 2018 monitoring was carried out for nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO) and ozone (O<sub>3</sub>). There was no monitoring undertaken for benzene or 1-3-butadiene.

### 2.3.1 Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen dioxide was measured during 2018 at two sites equipped with an automatic NO<sub>x</sub> analyser and by a network of 87 passive diffusion tubes.

In order to ratify the 2018 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 28 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>

#### Automatic Monitoring Data

Monitoring of NO<sub>2</sub> has continued to be carried out at the Cardiff City Centre Frederick AURN site. As previously discussed, April 2018 saw an additional AURN site implemented on Richard's Terrace just off Newport Road, Cardiff.

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<sub>2</sub>. The findings summarised in **Table 5 & 6** indicate compliance with both objectives.

#### 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 and where necessary annualised in accordance with Box 7.10 of LAQM (TG16). Evidence of the sites annualised can be seen in Appendix C. The applied bias adjustment factor was 0.76, as described in Appendix C.

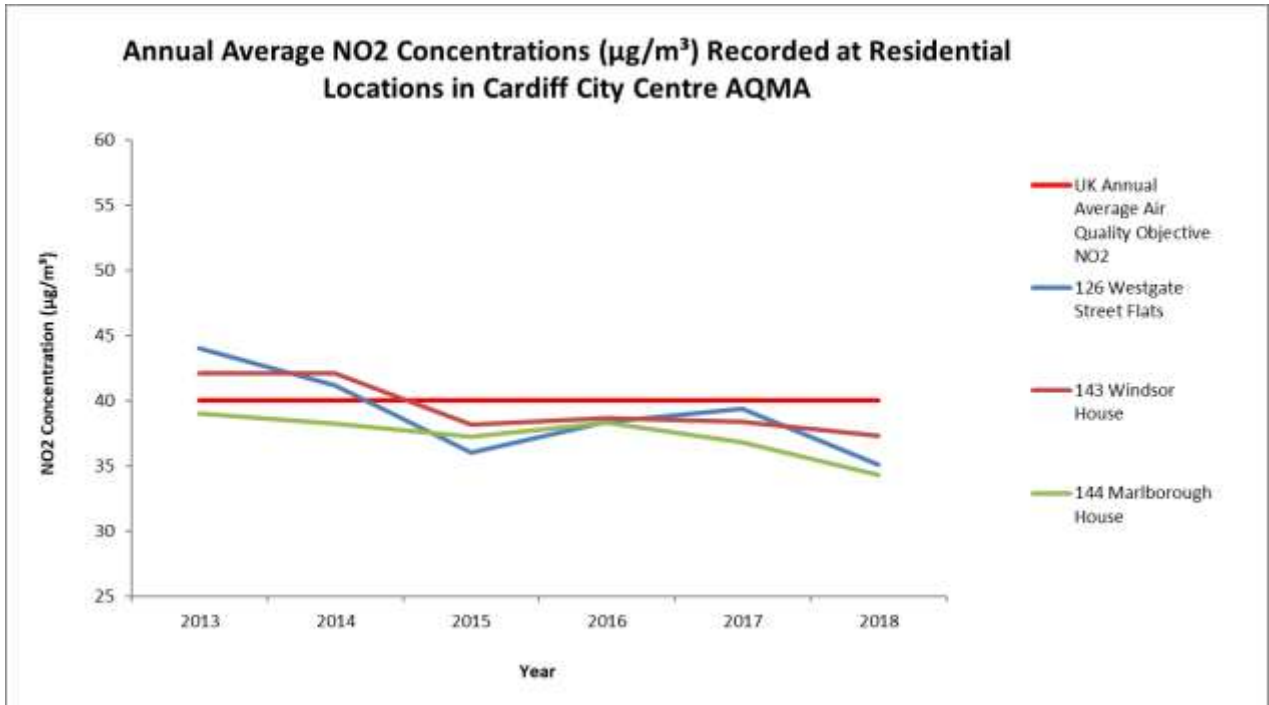
**Table 4** shows that 7 of the 87 passive diffusion tubes recorded a concentration of NO<sub>2</sub> above the 40µg/m<sup>3</sup> annual mean Objective in 2018. Of these 7 sites, 6 are inside one of the four established AQMAs.

Site 179 is not located within an AQMA where the measured annual average concentration of NO<sub>2</sub> was above the 40µg/m<sup>3</sup> annual mean objective in 2018. However, there is reasoning for these recorded exceedences;

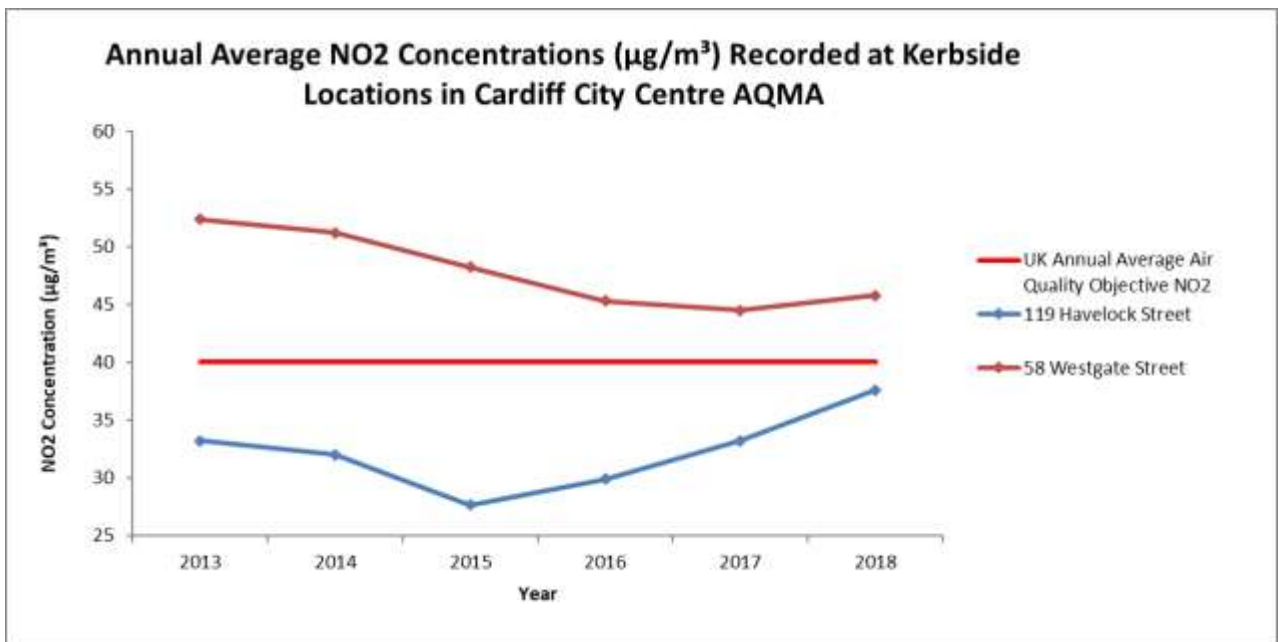
Site 179 is representative of the short-term 1-hour NO<sub>2</sub> objective **only** due to its commercial nature.

**Air quality dataset trends within Cardiff's AQMAs**

**Figure 30- Trends in Annual Average NO<sub>2</sub> Concentrations Recorded at Façade Locations in City Centre AQMA (Westgate Street)**



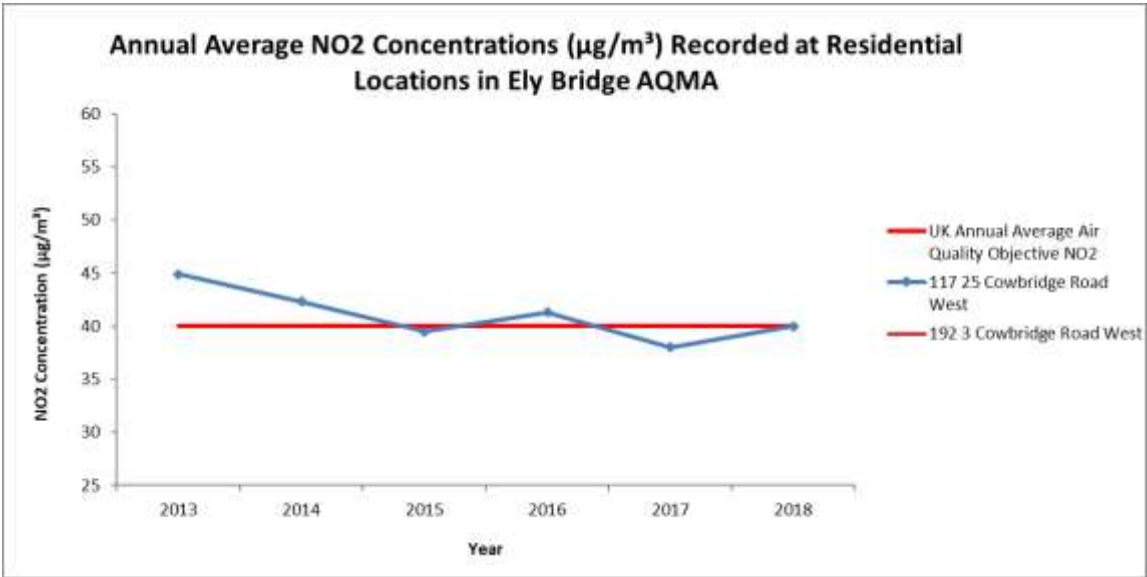
**Figure 31- Trends in Annual Average NO<sub>2</sub> Concentrations Recorded at Kerbside Locations in Cardiff City Centre AQMA**



Examining **Table 4** it is apparent that annual average NO<sub>2</sub> datasets in the City Centre, in and around the AQMA, continue to be elevated in 2018 showing little evidence of improvement from the 2017 datasets. Annual levels of NO<sub>2</sub> at residential accommodation on Westgate Street (Sites 126, 143 &

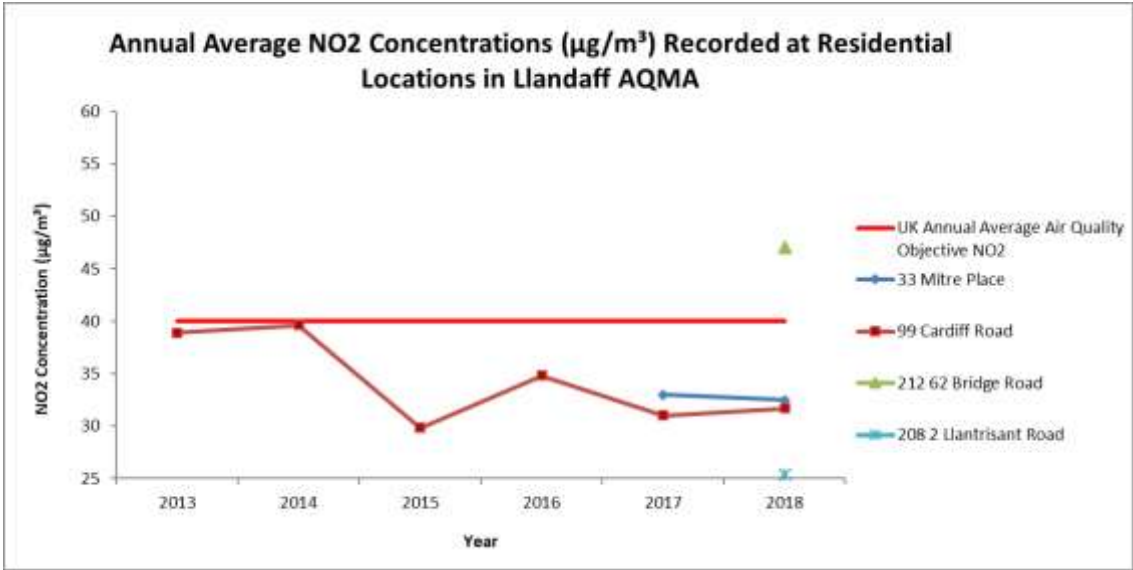
144) are approaching the objective with concentrations  $>37\mu\text{g}/\text{m}^3$ . **Figure 31** represents kerbside monitoring locations used to examine traffic flow patterns and associated air quality levels. The graph shows little improvement in levels, in fact an increase in levels has been recorded at both monitoring sites (58 & 119).

**Figure 32- Trends in Annual Average NO<sub>2</sub> Concentrations Recorded at Façade Locations in City Centre AQMA (Westgate Street)**



As depicted by **Figure 32** monitoring undertaken in 2018 within the Ely Bridge AQMA, at the façade of residential properties (Site 117 & 192) indicates elevated and exceeding annual average levels NO<sub>2</sub>.

**Figure 33- Trends in Annual Average NO<sub>2</sub> Concentrations Recorded at Façade Locations in Llandaff AQMA**

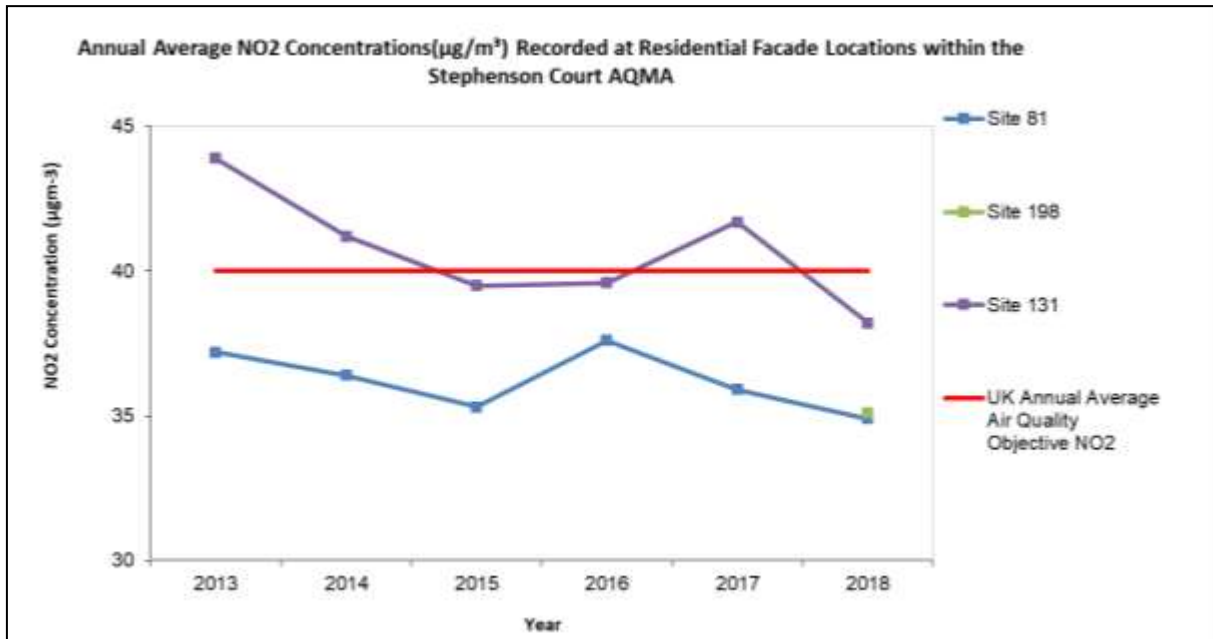


Residential monitoring locations within the Llandaff AQMA, in general indicate compliance with the annual average objective. Site 212 does indicate an exceedance of the annual average objective, however it must be noted that data capture at this location was low for 2018, therefore this result does not necessarily represent a true understanding for annual average levels at this location.

In an effort to reassure local residents, as referenced in the 2018 APR, officers have explored the idea of improving monitoring capabilities in the Llandaff AQMA by investing in an automated monitoring system. At the time of writing this report, via a S106 contribution in accordance with relevant planning applications in the vicinity of the Llandaff AQMA, a near real-time indicative air quality monitor (AQ Mesh Pod) has been purchased to be installed within the Llandaff AQMA boundary.

**Please note** In 2017 Site 33 was relocated to the residential façade of the occupied old police station, this being the position whereby previous years’ distance correction calculations was undertaken to. By relocating the monitoring station to the façade of the old police station, thus representing worse-case exposure as an increased level of certainty can be associated with the annual average result as no further correction via the use of the “fall-off” calculator is necessary. It could be argued that the site’s location change would require a new site ID, however in this instance it was felt necessary to keep the ID the same and clearly show the difference between NO<sub>2</sub> datasets at the kerbside and façade location.

**Figure 34- Trends in Annual Average NO<sub>2</sub> 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, however results remain elevated, particularly at Site 131 which is encroaching on the UK objective.

In accordance with LAQM best practise guidance; there are no monitoring sites in the district with annual average concentrations above 60µg/m<sup>3</sup> in 2018. Therefore this indicates it is unlikely that the hourly nitrogen dioxide objective was exceeded.

### 2.3.2 Particulate Matter (PM<sub>10</sub>)

As described in previous sections, monitoring of PM<sub>10</sub> has been carried out at the Cardiff Centre and Newport Road AURN monitoring sites and the summary data is given in **Tables 7 and 8**.

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

### 2.3.3 Sulphur Dioxide (SO<sub>2</sub>)

Sulphur dioxide was measured at the Cardiff Centre AURN automatic monitoring site during 2018.

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 2018.

### 2.3.4 Benzene

No monitoring of Benzene was undertaken by SRS on behalf of Cardiff Council in 2018.

### 2.3.5 Other Pollutants Measured

During 2018 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 & Newport Road AURN sites during 2018.

Data capture at for the whole year at Cardiff's City Centre & Newport Road AURN sites was 88.9% and 66.5%. 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 2018, 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/m<sup>3</sup> on more than 10 days per year. There are thirteen exceedences of the ozone objective in Cardiff in 2018.

## **2.4 Summary of Compliance with AQS Objectives as of 2018**

Shared Regulatory Services have reviewed the results from the monitoring undertaken across the Cardiff in 2018.

The datasets indicate that the annual average objective for NO<sub>2</sub> was breached at monitoring locations outside of the existing AQMAs (Site 179).

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

The 1-hour objective for NO<sub>2</sub> need only apply to site 179.



## **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 2018 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<sub>2</sub> 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 2018 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<sub>10</sub> 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.

### **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 in 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. The application has been granted consent subject to approval and discharge of planning conditions. The supporting air quality assessment examined projected NO<sub>2</sub> & PM<sub>10</sub> levels in accordance with the short term objectives set for these pollutants; **1-hour mean objective for NO<sub>2</sub> (200µg/m<sup>3</sup> not to be exceeded more than 18 times a year)** and **24-hour mean objective for PM<sub>10</sub> (50µg/m<sup>3</sup> 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.

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.

### 3.1.8 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<sub>2</sub> 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<sup>-3</sup>.

### **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.

### **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<sup>-3</sup>.

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.

### **3.1.9 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 as 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 exceedance of the SO<sub>2</sub> 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 terms of neighbouring authorities and any major proposed industrial installations, as previously declared in the 2017 APR; on the 31<sup>st</sup> 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.

SRS on behalf of Cardiff Council has assessed new/proposed industrial installations, and concluded that no further air quality analysis via a detailed air quality assessment is necessary.

### **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. This is the Chevron Terminal located 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<sup>3</sup> 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. Updates of the development will be included in the 2020 APR for Cardiff.

### **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 part 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 Central Business District**

In 2018 a resubmitted planning application (18/01705/MJR) was received for review. The proposed application outlines its intent;

**ERECTION OF A TRANSPORT INTERCHANGE WITH AN ASSOCIATED CONCOURSE AND ANCILLARY RETAIL/COMMERCIAL UNITS (USE CLASSES A1/A2/A3), 305 RESIDENTIAL APARTMENTS (USE CLASS C3), 10,318 SQ M (GIA) OFFICE FLOORSFACE (USE CLASS B1), A 249-SPACE CAR PARK, PUBLIC REALM AND RELATED INFRASTRUCTURE AND ENGINEERING WORKS | SITE OF FORMER MARLAND HOUSE AND NCP CAR PARK, CENTRAL SQUARE, CARDIFF**

In terms of the operational phase three scenarios were examined in detail;

**1 Baseline scenario for 2016**, which describes the existing local road network and baseline air quality;

**2 Do-Minimum (DM) scenarios for 2021 and 2024**, which describe the local road network in 2021 and 2024 without the proposed development;

**3 Do-Something (DS) scenarios for 2021 and 2024**, which describes the local road network in those assessment years with the proposed development in place.

Officers acknowledged the findings detailed in the report and were satisfied by the methods and approach used to derive the findings. The Air Quality Assessment (AQA) was undertaken to a high standard and the very conservative approach adopted within the modelling is deemed best practise allowing worst-case scenarios to be portrayed. The main outcomes to be drawn from the report that are perceived as a concern are;

1. Following a qualitative assessment, a medium risk has been identified with respect to dust and emissions as a result of construction phase activities. The report states ***“Without mitigation, the construction phase activities have the potential to result in minor adverse effects on dust-sensitive receptors and human health given the scale and likely duration of construction.”*** It is considered that the that construction phase impacts would be negligible with appropriate mitigation measures in place in the form of a suitable Construction Environmental Management Plan which would need to be submitted and approved prior to the development proceeding.

2. Following the completion of the development for a projected year of 2021, the 2021 DS scenario indicates that air quality levels in terms of annual mean Nitrogen Dioxide (NO<sub>2</sub>) are **predicted to lead to minor/ moderate adverse impacts at nine identified receptor locations**. Two of the nine identified receptors are projected to exceed the NO<sub>2</sub> annual average objective (40µg/m<sup>3</sup>) in the 2021 DS scenario. Although the remaining seven receptors are not anticipated to exceed the NO<sub>2</sub> annual average objective for a 2021 DS scenario air quality at these locations will be worsened by the proposed development. As highlighted by the sensitivity tests undertaken, even with the implementation of the proposed mitigation schemes such as the replacement of up to 25% of the bus fleet with zero emission equivalent, annual mean NO<sub>2</sub> levels will continue to be elevated and exceed the National Air Quality Objective Standard of 40µg/m<sup>3</sup>, therefore the Cardiff City Centre AQMA would need to remain.

The points were addressed and an agreement was reached. The application has been approved subject to approval and discharge of appropriate Conditions;

**16. Construction Environmental Management Plan:** Prior to commencement of development a Construction Environmental Management Plan (CEMP) shall be submitted to and approved by the Local Planning Authority to include details of construction traffic routes, site hoardings, site access, wheel washing facilities, storage of plant and materials, parking of contractors vehicles, details of how noise, dust and dirt emissions will be controlled, and how pollution risks to controlled waters will be managed during the works, and a scheme for recycling/ disposing of waste resulting from demolition and construction works. The plan shall also include details for managing crowd movements to and from Central Station on event days and for the provision of all temporary signage as and when access and egress to the station is affected by the works. The demolition works and construction of the development shall be managed strictly in accordance with the scheme so approved.

Reason: In the interests of highway safety and public amenity and to prevent pollution of the water environment.

**23. Plan of Operation of the bus station:** Prior to occupation of the bus station a plan of operation for the bus station shall be submitted to and approved in writing by the LPA. The plan of operation shall detail the number and frequency of services using the bus station and specify those services

accessing and exiting the bus station via Westgate Street, and those services accessing and exiting the bus station via Saunders Road. The bus station shall be operated in accordance with the approved plan of operation unless otherwise agreed in writing with the Local Planning Authority.

Reason: To control the number and frequency of services using the bus station in the interests of public safety and amenity.

**24. Increase in Bus Movements:** Any significant long-term increase in the number and/ or frequency of bus services using the bus station in relation to the approved plan of operation shall be accompanied by an air quality assessment (details of the extent and scope of the assessment to be agreed with the Council) that demonstrates that there is no significant adverse impact on air quality arising from buses using the bus station on Westgate Street and at the Westgate Street/ Castle Street junction, within the bus station, or on the Saunders Road access.

Reason: To control potential air pollution arising from an increase in bus movements to and from the bus station in the interests of public safety and amenity.

In addition to the set conditions a S106 contribution for the value of £10,000 has been agreed with the developer to support additional air quality monitoring resources.

#### **18/00735/MJR**

**FULL PLANNING APPLICATION FOR AN OFFICE BUILDING PROVIDING BUSINESS (USE CLASS B1) FLOORSPACE, WITH ANCILLARY GYM (USE CLASS D2), MARKETPLACE / RETAIL (USE CLASS A1) AND FOOD AND DRINK (USE CLASS A3) USES; A MULTI-STOREY CAR PARK (SUI GENERIS) WITH ANCILLARY RETAIL (USE CLASS A1); AND PUBLIC REALM, ACCESS, DRAINAGE AND OTHER INFRASTRUCTURE WORKS REQUIRED FOR THE DELIVERY OF CENTRAL QUAY (PHASE 1) | BRAINS BREWERY, CRAWSHAY STREET, BUTETOWN, CARDIFF, CF10 5DS**

The supporting Air Quality Assessment (AQA) carried out for proposal considered the construction and operational phase impacts of the proposed development.

For operational purposes the modelling accounts for 4 scenarios, which focus around 'Do-Something' & 'Do- Nothing' scenarios, which also include best and worse-case projections, involving the control over emissions factors used;

#### **Baseline**

-Model A: A baseline using 2016 traffic data and 2016 emission factors (EF).



-Model B: A baseline using 2021 traffic data and 2021 EF.

#### **Future development**

-Model C: A future baseline for 2021, including Phase 1 development flows (2016 EF)

-Model D: A future baseline for 2021, including Phase 1 development flows (2021 EF)

The findings of the assessment have been agreed.

The proposal has been granted outline planning consent subject to approval and discharge of Conditions set.

### **3.5.3 Angel Hotel (18/01877/MJR)**

#### **DEMOLITION OF CONCERT HALL EXTENSION AND NEW 4 STOREY EXTENSION IN THE COURTYARD TO PROVIDE ADDITIONAL GUEST ROOMS AND CONFERENCE HALL | ANGEL HOTEL, CASTLE STREET, CITY CENTRE, CARDIFF, CF10 1SZ**

Supporting air quality assessment concluded the main outcomes;

1. The operational impact of the Proposed Development on existing and future receptors is predicted to be “negligible”
2. For the construction phase, the most important consideration is dust. Without appropriate mitigation, the development is considered to be *Medium Risk* for nuisance dust soiling effects, *Low Risk* for PM10 health effects and to be of Negligible Risk to ecological receptors, in the absence of mitigation.

The proposal has been granted outline planning consent subject to approval and discharge of Conditions set.

### **3.5.4 UHW Sustainable Transport Hub (18/01769/MJR)**

#### **CONSTRUCTION OF NEW SUSTAINABLE TRANSPORT HUB, INCLUDING NEW BUS ACCESS POINT, BIKE STORAGE, BRIDGE LINK WITH PEDESTRIAN WALKWAYS /CANOPY, AND SMALL RETAIL AND CAFE HUB AREA | UNIVERSITY HOSPITAL OF WALES CONCOURSE, KING GEORGE V DRIVE EAST, HEATH**

See **Section 3.1.7** for more information.

### **3.5.5 Rover Way Biomass Power Plant (17/02130/MJR)**

#### **17/02130/MJR | THE REMOVAL OF FILL MATERIAL AND THE CONSTRUCTION OF A BIOMASS POWER PLANT (UP TO 9.5MW) AND A MAXIMUM OF 130,000 SQ. FT. OF INDUSTRIAL ACCOMMODATION (B8 USE CLASS), NEW ACCESS ROADS AND ASSOCIATED LANDSCAPING WORKS | LAND AT ROVER WAY, PENGAM**

Please see **Section 3.2.1** for more information.

### 3.5.6 Longcross House (17/02902/MJR))

#### DEMOLITION OF EXISTING LONGCROSS HOUSE AND THE CONSTRUCTION OF 35 AFFORDABLE RESIDENTIAL UNITS | LONGCROSS HOUSE, LONGCROSS STREET, ADAMSDOWN, CARDIFF, CF24 0JW

The supporting air quality assessment demonstrated that forecasted air quality levels (annual average NO<sub>2</sub>) at sensitive receptor locations at the development site will comply with national air quality objectives, however these levels are not considered to be 'safe' levels due to the minimal head room between the modelled and the national air quality objectives. This suggests potential long term health risks for future residents of the development as they will be made susceptible to the quantified concerning air quality levels. Without the guarantee of sufficient mitigation measures future residents occupying the proposed development will be made susceptible to poor air quality.

As outlined, the development is a car free development and therefore will not burden the network with additional vehicle movements, however the development will introduce sensitive receptors to an area of considered poor air quality. To protect the amenity of future residents the following condition has been implemented;

12. Unless otherwise agreed with the Local Planning Authority, prior to the commencement of any development, an Air Quality Technical Note, demonstrating reductions in annual mean NO<sub>2</sub> levels, along with details of those mitigation technologies and measures required to achieve reductions below **40µg/m<sup>3</sup>**, shall be submitted to and approved in writing by the Local Planning Authority. The approved technologies and measures shall be implemented prior to the beneficial occupation of the building and thereafter retained and maintained.

Reason: To assess air quality and agree any mitigation measures that may be required to safeguard the amenity of nearby residents in the area, in accordance with policy EN13 of the adopted Cardiff local Development Plan (2006 - 2026).

The proposal has been granted outline planning consent subject to approval and discharge of Conditions set.

## 4. Polices and Strategies Affecting Airborne Pollution

### 4.1 Local / Regional Air Quality Strategy

#### 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

Cardiff's Local Development Plan (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;

**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:*

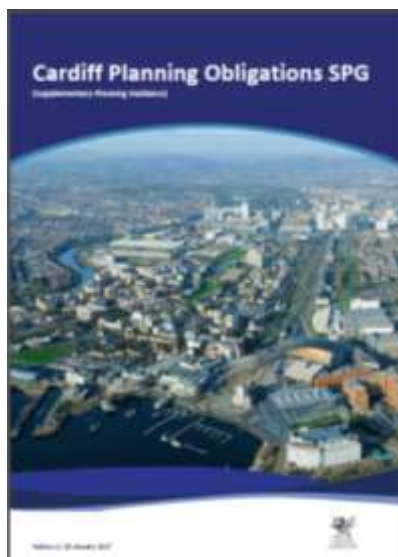
- i. Identifying sites for new health facilities, reflecting the spatial distribution of need, ensuring they are accessible and have the potential to be shared by different service providers; and*
- ii. Ensuring that they provide a physical and built environment that supports interconnectivity, active 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.

In addition to the measures identified directly in the LDP the Council has recently prepared Supplementary Planning Guidance (SPG) which supports and provides additional guidance on the policy aims of the LDP which will have benefits on Air Quality in Cardiff.

## Planning Obligations (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](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 split 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).

## 4.4 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 **Figure 35**. 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 35**, the Cycling Strategy and INM 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 35- Integrated Network Map**



**Figure 36- Map of Cardiff's Cycleways Proposal**

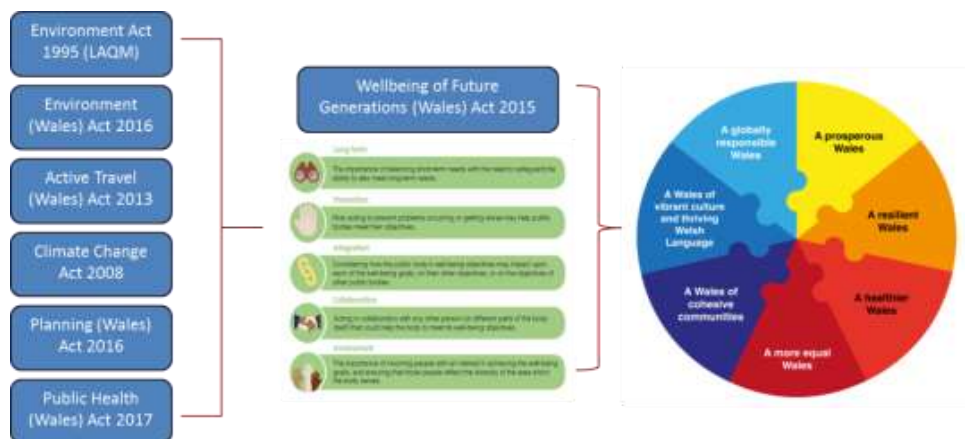


## 4.4 Local Authorities Well-being Objectives

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 the earlier **Figure 5**, there are seven national well-being goals that form the basis of the Act and five ways of working which support the goals.

**Figure 5- 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.

### 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<sup>4</sup>, which sets out the Cardiff PSB's priorities for action over the next 5 years, and beyond. The Plan contains Well-being Objectives, high-level priorities that the Cardiff PSB have identified as being most important. It also contains 'Commitments,' or practical steps that the city's public services, together, will deliver over the next 5 years. The Well-Being Plan has set out Well-Being Objectives as follows:



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

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

Improving levels of NO<sub>2</sub> and particulate matter (PM<sub>10, 2.5</sub>) 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

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<sup>4</sup> [Cardiff Well-Being Plan 2018-2023](#)

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

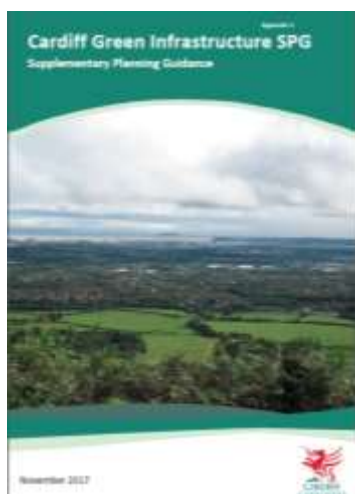
#### Green Infrastructure

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

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 2018 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<sub>2</sub> Air Quality Standard (40µg/m<sup>3</sup>).

### **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**

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

### **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 Feasibility Study work;
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 examined;
3. Continue to drive Air Quality as a major aspect to be considered during any planning applications, most importantly Cardiff Central Development; and
4. Submit an Annual Progress Report (APR) in 2020.

## References

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7. The County Council of the City and County of Cardiff (Ely Bridge Air Quality Management (NO<sub>2</sub>)) Order 2007
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33. Cardiff Council 2014 Detailed Assessment for Fair oak Road Roundabout
34. Cardiff Council 2014 Progress Report
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40. Cardiff Council 2018 Progress Report



## 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 & 13– Full Monthly Diffusion Tube Results for 2018

WAQF Number 2018	Cardiff Council	Site ID	Site Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave	Biased Adjusted	DC	Annualized	City Centre	Stephenson Court AGM	Landfill North AGM	City Redge
CCC-036	16	Ninian Park Road		44.4	35.2	38.1	36.7	32.4	28	29.8	30.6	33.3	39.5	46.1	44.1	36.5	27.8	100.0	27.8				
CCC-054	33	Mitre Place		60.3	35.7	45.2	41.8	40.6	38.9	41.1	36.6	37.9	47.3	42.8	44.9	42.8	32.5	100.0	32.5				
CCC-083	49	Penarth Road		35.7	37.9	35.3	33.7	37.4	30.3	36.7	32	38.9	43	32.6	37.4	35.9	27.3	100.0	27.3				
CCC-090	56	Birchgrove Village		39.3	34.4	30.6	30.3	26.9	18.4	28.9	24.4	35.5	36.4	34.3	36.7	31.3	23.8	100.0	23.8				
CCC-092	58	Westgate Street		71	65.1	56.9	63	62.9	52.1	62.2	53.8	55.6	54.8	65	60.2	45.8	91.7	45.8					
CCC-115	81	Stephenson Court		43.9	47.7	47.3	42.4	47.4	39.2	46.4	39.4	54.4	49.9	40.4	52.7	45.9	34.9	100.0	34.9				
CCC-120	86	19 Fair Oak Road		56.1	47.4	42.2	42.1	40.8	30.7	42.9	36.3	49	42.3	45.9	51.2	43.9	33.4	100.0	33.4				
CCC-130	96	Manor Way Junction		48.2	50.1	46.3	42.3	39.7	34.8	34.3	28.2	35.6	45	44.3	46.3	41.3	31.4	100.0	31.4				
CCC-132	98	Western Avenue (premises)		39.7	39	38.3	24.9	32.7	36.1	26.4	24.5	31.1	38	42.5	38.9	34.3	26.1	100.0	26.1				
CCC-133	99	Cardiff Road Landfill		43.4	49.8	43.2	45.5	45.6	50	30.2	25.3	32.2	46	44.8	44.4	41.7	31.7	100.0	31.7				
CCC-135	101	Cardiff AURN		37.9	30.7	31.2	23.3	23.6	20.3	18.3				36.4		27.7	21.1	100.0	21.1				
CCC-136	102	Cardiff AURN		33.8	31.7	29.7	25.5	21.8	21	18				35.3		27.1	20.6	100.0	20.6				
CCC-137	103	Cardiff AURN		34.9	27.3	30.4	26.6	23	20.6	17.1				37.9		27.2	20.7	100.0	20.7				
CCC-140	106	30 Caerphilly Road		44.8	38	36.9	35.4	30.9	24.5	33.2	30.2	39.4	44.3	45.3	36.8	36.6	27.8	100.0	27.8				
CCC-146	112	17 Sloper Road		40.3	40.4	39.1	34.3	24.6	29.1	30.6	26.1	34.7	42.5	33.4	36.3	35.1	36.7	100.0	36.7				
CCC-149	115	21 Landfall Road		47	38.3	41.4	39.9	32.2	29.1	38.6	34.5	40.7	44.4	40.1	46.8	39.4	30.0	100.0	30.0				
CCC-151	117	25 Cowbridge Road West		53.7	60	59.9	56.2	56.3	45.2	37.3	44.5	51.6	56.9	57.9	52.7	40.0	91.7	40.0					
CCC-153	119	Havlock Street		47.2	54.1	50.8	48.2	52.4	49.6	48.7	40.9	51.5	50.7	49.6	50.1	49.5	37.6	100.0	37.6				
CCC-160	126	Westgate Street Flats		53.3	34.8	50.1	50.6	47.6	40.9	46.9	41.3	46.2	42.1	51.7	48.4	46.2	35.1	100.0	35.1				
CCC-162	128	117 Tudor Street		44.2	31.5	41.1	39.2	36.9	32.4	33.7	30	35.2	41.8	45.3	35	37.2	28.3	100.0	28.3				
CCC-165	131	Dragon Court		60.9	50	48.4	50.5	50.6	44.5	47.1	44.1	59	51.3	41.8	65	50.3	38.2	100.0	38.2				
CCC-168	134	Sandringham Hotel		49.9	52.9	47.4		36	36.4					61.4	47.3	36.0	100.0	36.0					
CCC-177	143	Windsor House		54.5	46.7	53.5	48	47	42.1	50.2	45.3	51.2	49.1	52.2	49.4	49.1	37.3	100.0	37.3				
CCC-178	144	Marlborough House		54.1	49.1	44	47.1	40.6	37.8	43.7	40.2	48.6	44.9	48.5	42.8	45.1	34.3	100.0	34.3				
CCC-179	145	Tudor Street Flats		49.9	42.7	40	36.3	33.9	32.4	30.6	29.2	35.7	42.3		41.9	37.7	28.7	100.0	28.7				
CCC-181	147	211 Penarth Road		39.9	38.7	35.2	38.2	38.4	40.1	28.3	23.8	31.7	44.8	46.3	57.9	38.6	29.3	100.0	29.3				
CCC-182	148	161 Clare Road		29.2	40.4	40.1	35.9	38.7	41.2	28.5	25.9	33.3	43.7	29.9	32.7	35.0	26.6	100.0	26.6				
CCC-183	149	10 Corporation Road		48.2	43.9	37.9	42.7	41.5	33.2	39.9	35.9	41.2	48	39.9	41.8	41.2	31.3	100.0	31.3				
CCC-186	152	James Street		41.8	39.3	41.8	38.7	38.5	36						39.4	29.9	40.0	100.0	40.0				
CCC-187	153	Magic Roundabout		41.5	37.8	33.9	30.4	29.6	26.8	26.3	26.4	39.4	38.4	28.4	36.6	33.0	25.0	100.0	25.0				
CCC-190	156	2a/4 Colum Road		39.5	40.3	41.6	34.3	36.2	40.4	20.2	18.2	32.2	42	41.4	37.3	35.3	26.8	100.0	26.8				
CCC-191	157	47 Birchgrove Road		42.8	37.8	35.2	28.9	29.6	23.5	29.1	26.3	32.7	37.2	36.7	38.3	33.1	25.1	100.0	25.1				
CCC-192	158	64/66 Cathays Terrace		39.8	38	36.2	34.4		21.9	20.8	31.8	39.7	42.3	39.4	34.4	26.2	83.3	26.2					
CCC-193	159	IMO facade replacement		60.5	50.3	47.7	52.9	40.5	39.6	38.8	23.4	41.3	49.1	46.2	71.4	46.8	35.6	100.0	35.6				
CCC-194	160	High Street Zizzi		45.5	36.2	34.8	24.3	31.1		28.6	29	37.5	37.7	42.2	44.4	35.6	27.0	91.7	27.0				
CCC-200	166	163 Lansdowne Road		39.7	44.1	42.5	44.5	38	32.2	41.8	34.5	36.9	44.4		44.4	40.3	30.6	91.7	30.6				
CCC-201	167	359 Lansdowne Road		43.3	39.8	41.2	36.8	34.5	30.3	33.1	28.8	34	38.9		42.3	36.6	27.8	91.7	27.8				
CCC-202	168	570 Cowbridge Road East		38.1	37.7	35.6	32.8	32.3	31.6	29.8	26.2	29.2	38.5	41.6	37.2	34.2	26.0	100.0	26.0				
CCC-208	174	76 North Road		36.5	44.6	43.1	42.3	35.5	38.8	25	22.8	37.5	45.6	31.9	42.1	37.1	28.2	100.0	28.2				
CCC-213	179	Albion, Bute Terrace		73.9		51.2		57.5	57		41.6	65.4	60.8	43	61.7	56.9	43.2	75.0	43.2				
CCC-217	183	Station Terrace		47.2	35.6	42.1	45.6	47.3			27.4	37.8	44.4	63.7		40.9	31.1	75.0	31.1				
CCC-218	184	Hophouses, St Mary Street		55.7	52.8	55.1	53	47.8	47.4		53.2	54.2	53	61.4	52.5	39.9	83.3	39.9					
CCC-219	185	Northgate House, Duke Street		46.3	45.1	44.2	48.7	43.2	47.3		28.7	38	49.1	59.8	47.7	43.3	32.9	91.7	32.9				
CCC-220	186	Dempsey's Public House, Castle Street		65.2	62.3	63.8	64.2	62.6	55.7	60	51.8	58.1	58.2	55	66.1	60.3	45.8	100.0	45.8				
CCC-221	187	Angel Hotel		74.1	68.4	67.2	68.2	67.7	60.4		62.3			73.2	61.4	66.9	50.8	75.0	50.8				
CCC-222	188	Westgate Street (45 Apartments)		70.1		64	69	66.6	65.4	59		64.7			67	65.7	50.8	100.0	50.8				
CCC-223	190	3 Pearson Street			36.6	33.2	28.9	27.4	19.3		23.6	35.3		32.6	37.3	30.5	23.2	75.0	23.2				
CCC-224	191	7 Mackintosh Place		45	36.2	37.3	49.1	35.9	27	35.6	32.4	44.1	38.4	46.5	41.1	39.1	29.7	100.0	29.7				
CCC-225	192	3 Cowbridge Road West		59	42.9	54.1	56.7	56.3	51.4	49	39.9	49.2	55.7	57	55.8	52.3	39.7	100.0	39.7				
CCC-226	193	24 Kings Road		30.7	28.8	27.6	23.7	20.8	16.2	16.8	16.8	22.3	28.1	27.3	35	24.5	18.6	100.0	18.6				
CCC-227	194	115 Cowbridge Road West		35.1	33.9	31.4	26.2	28.5	30.4	21.5	18.2	26.2	34.2	31	31.2	29.0	22.0	100.0	22.0				
CCC-228	195	244 Newport Road		48	47.2	43	31.7	44.2	37.5	41.2	35.5	41.4	38.9	43.6	47	41.6	31.6	100.0	31.6				
CCC-229	196	2 Pencirely Road		39.1	38.1	37.1	31.8	30.9	28.7	22.4	22.2	28.2	38.9	36.6	38.7	32.7	24.9	100.0	24.9				
CCC-230	197	GFF 369 Newport Road		50.5	48	38.4	39	37.4	33.1	37.2	35.5	47	44.4	38.2		40.8	31.0	91.7	31.0				
CCC-231	198	Next Building to Stephenson Court		54.5	47.8	46.9	45.8	46.8	38.8	44.3	38.8	52.1	47.7	41.1	49.5	45.2	35.1	100.0	35.1				
CCC-232	199	157 Newport Road		36.9	38.3	32	32.5	29.6	25.4	24.8	24	37.7	34.4	26	36	31.5	23.9	100.0	23.9				
CCC-233	200	350 Whitchurch Road		54.3	46.6	47.3	45.2	41.5	41.6	33.3	32.7		50.2	40.3	50.6	44.0	33.4	91.7	33.4				
CCC-234	201	23 Lower Cathedral Road		44.5	45.1	44.5	35.4	43	35.8	30.1	26.3	36.6	47.8	48	40.6	39.8	30.3	100.0	30.3				
CCC-235	202	22 Clare Street		42.1	40	36.8	41.1	36.8	37.4	27.4	27.1	31.3	32.8	43.2	42.8	36.6	27.8	100.0	27.8				
CCC-236	203	10 Fair Oak Road		34.1	34.1	28.5	27.7	27.9	22.6	18.3	18	30.6	31.2	33.4	33.9	28.4	21.6	100.0	21.6				
CCC-237	204	53 Neville Street		37.7	35.2	34.4	28.9	28.3	29.9	20.7	19.1	28.1	36.7	34.5	35.1	30.7	23.3	100.0	23.3				
CCC-238	205	Fitzalan Court, Newport Road		60.3	60.3	64								57.5	65.9	67	60.8	46.3	100.0	46.3			
CCC-239	206	Windsor House, Windsor Lane		72.9	62.4	61.2								61.4	72.3	66.0	50.2	100.0	50.2				
CCC-240	207	42 Waungton Road		33	31.8	31.5	29.8																

MONTHLY LEVELS OF NITROGEN DIOXIDE CARDIFF SCHOOLS 2018

RESULTS EXPRESSED IN MICROGRAMMES/CUBIC METRE (NR = NO RESULT)																								
Sample Number	Site ID	Nitrogen Dioxide Sites, Cardiff Schools	Grid Ref	Class	Distance of measurement from (m)	Distance from kerb to receptor	Relevant Exposure time	Background Concentration if necessary	20/01/2018 - 28/02/2018	29/02/2018 - 28/03/2018	29/03/2018 - 28/04/2018	29/04/2018 - 28/05/2018	29/05/2018 - 28/06/2018	29/06/2018 - 28/07/2018	29/07/2018 - 28/08/2018	29/08/2018 - 28/09/2018	29/09/2018 - 28/10/2018	29/10/2018 - 28/11/2018	29/11/2018 - 28/12/2018	AVERAGE SINEC JAN 18	Bias Corrected (Correction Factor 0.75)	Annualised & Bias Corrected	Percentage of Data Capture	
VOGL18BN151	225	Mount Stuart PS Rear Entrance	318825 174435		50.00	50.00	0.00		26.8	27.7	19.8	12.6	18.9	18.3	16.3	22.2	25.4	28.8	27.5	22.2	16.9	16.9	100	
VOGL18BN152	226	Mount Stuart PS Classroom	318821 174433		61.00	61.00	0.00		28.1	29.4	21.2	21.9	20.5	18.8	17.1	23.6	27.5	30.8	29.4	24.4	18.5	18.5	100	
VOGL18BN153	227	Tredgarville Primary Reception	319227 176802		42.00	42.00	0.00		33.7	32.5	26.6	21.4	20			24	33.7	31.1	35.3	28.7	21.8	21.8	85	
VOGL18BN154	228	Tredgarville Primary Playground	319251 176823		19.40	19.40	0.00		37.8	40.5	34.4	27.5	25.5			30.9	35.7	36.8	40.5	34.4	26.1	26.1	82	
VOGL18BN155	229	Stacey Primary playground	319867 177490		70.00	70.00	0.00		30.3	26.1	22.5	17.2	17.5			19.3	28.6	25.2	26.4	23.7	18.0	18.0	85	
VOGL18BN156	230	Stacey Primary Outside reception	319845 177474		72.00	72.00	0.00		31.2	29.3	21.1	17.4	17	18.2	16.6	21.2	31.8	28.9	30.3	23.9	18.2	18.2	100	
VOGL18BN157	231	St Peter Primary playground	319443 177069		53.00	53.00	0.00		30	29.3	24	20.2	18.8			23.3	30.7	33.8	31.8	26.9	20.4	20.4	85	
VOGL18BN158	232	St Peter Primary rear entrance	319476 177108		55.00	55.00	0.00		27.9	26.2	23.3	19.5	18.2			23.3	31.2	32.2	33.7	26.2	19.8	19.8	82	
VOGL18BN159	233	Cardiff Acad front	319103 176922		35.00	35.00	0.00		37.5	35.6	30.7	25.8	22.9		24.1	30.5	36.7	35.6	43.2	32.3	24.5	24.5	91	
VOGL18BN1510	234	Cardiff Acad rear	319109 176914		35.00	35.00	0.00		33.9	30.7	26.4	18.7	19.4	18.4	18.2	23.4	32.2	33.4	35.3	26.4	20.0	20.0	100	
VOGL18BN1511	235	St Josephs RC Primary playground	317158 178800		47.00	47.00	0.00		31.9	24.1	22.4	20.8	17.1			22.2	32.9		59.5	28.9	21.8	21.8	73	
VOGL18BN1512	236	St Josephs RC Primary rear entrance	317111 178786		67.00	67.00	0.00		31.3	25.7	22	19.1	15			21.9	30.6			23.7	18.6	18.6	85	
VOGL18BN1513	237	Ysgol Myndd Bychan Entrance	317551 178724		3.00	3.00	0.00		41.3	31.2	30.6	20.7	23.2	15.2	14.9	28.3	39.4			34.6	27.9	21.2	21.2	91
VOGL18BN1514	238	Ysgol Myndd Bychan Playground	317572 178723		3.00	3.00	0.00		28.8	28.6	20.9	18.1	15.9						29.4	23.6	17.8	17.7	85	
VOGL18BN1515	239	St Tello School rear entrance	320592 179940		96.00	96.00	0.00		31.4	32.3	24.7		19	19.2	15.5	19.7	33.9			32.7	25.4	19.3	19.3	82
VOGL18BN1516	240	St Tello School rear playground	320578 179786		70.00	70.00	0.00		28.8					15.0	17.5	20.1	32.3	29.5	32.4	25.1	19.1	19.5	85	
VOGL18BN1517	241	Cathays HS North road facing	317307 178374		11.00	11.00	0.00		32.6	26.4	24.2	18.5	16.5	20.6	19.5	23	29.9	21.9	31.1	24.0	18.3	18.3	100	
VOGL18BN1518	242	Cathays HS Near entrance	317296 178474		7.00	7.00	0.00		28	26	19.8	16.3	12.6			15.3	19.3	25.2	26.7	26.2	21.6	16.4	16.4	91

Notes:

Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 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 microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

**Table 14– 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 <sup>3</sup>	Running annual mean	31.12.2003
	5.00 µg/m <sup>3</sup>	Annual mean	31.12.2011
1,3-butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m <sup>3</sup>	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m <sup>3</sup>	Annual mean	31.12.2004
	0.25 µg/m <sup>3</sup>	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m <sup>3</sup>	Annual mean	31.12.2005
Particulate matter (PM <sub>10</sub> ) (gravimetric)	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m <sup>3</sup>	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m <sup>3</sup> , 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 06/19) was used to obtain an overall adjustment factor of 0.76 from the input data shown in the following screenshot. This overall factor is based on 28 co-location studies where the tube preparation method and analysis laboratory used were the same as those used by CC.

Figure 37: National Diffusion Tube Bias Adjustment Factor Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet				Spreadsheet Version Number: 06/19						
Follow the steps below in the correct order to show the results of relevant co-location studies				This spreadsheet will be updated at the end of September 2019						
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods				Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet						
This spreadsheet will be updated every few months, the factors may therefore be subject to change. This should not discourage their immediate use										
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners ACCOIL and the National Physical Laboratory				Spreadsheet maintained by the National Physical Laboratory. Original compiled by All Quality Consultants Ltd.						
Step 1:	Step 2:	Step 3:	Step 4:							
Identify the Laboratory that Analyzes Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor* shown in blue at the foot of the final column.							
If a laboratory is not listed, we have no data for that laboratory	A preparation method is shown, we have no data for that method at the moment	If you are not sure, you have no data	If you have your own co-location study then see footnote*. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMhelpdesk@uk.bureauveritas.com or 0800 0127963							
Analysed By	Method	Year	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dn) (µg/m <sup>3</sup> )	Automatic Monitor Mean Conc. (Cm) (µg/m <sup>3</sup> )	Bias (B)	Tube Precision	Bias Adjustment Factor (A) (Cm/Dn)
Socotec Didcot	50% TEA in acetone	2018	K5	Manselton Road Intercomparison	12	95	65	11.3%	G	0.70
Socotec Didcot	50% TEA in acetone	2018	B	Grassham Borough Council	12	37	30	22.7%	G	0.82
Socotec Didcot	50% TEA in acetone	2018	B	Grassham Borough Council	12	28	24	18.0%	G	0.84
Socotec Didcot	50% TEA in acetone	2018	L8	North Lincolnshire Council	12	24	16	53.5%	G	0.65
Socotec Didcot	50% TEA in acetone	2018	R	Sevenson Council	12	33	24	29.2%	G	0.72
Socotec Didcot	50% TEA in acetone	2018	L8B	Sevenson Council	10	11	16	27.4%	G	0.61
Socotec Didcot	50% TEA in acetone	2018	B	Sevenson District Council	12	34	25	24.8%	G	0.74
Socotec Didcot	50% TEA in acetone	2018	B	Metham County Borough Council	11	21	18	16.7%	G	0.86
<b>Overall Factor* (28 studies)</b>								<b>Blue</b>	<b>0.76</b>	

### Discussion of Choice of Factor to use

The bias adjustment factor applied to all 2018 data is 0.76. The applied bias adjustment factor has been calculated using the national diffusion tube bias adjustment factor spreadsheet version 06/19. 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 28 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

Both AURN stations had poor data capture for NO<sub>2</sub> in 2018 (AURN 1 71.1% & AURN 2 73.5%). In addition AURN 2 Station also suffered with poor data capture for PM<sub>10</sub> (66.5%). As a result, the finalised NO<sub>2</sub> & PM<sub>10</sub> figures presented in this report from each monitor 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 15- Long term AURN site used for calculation of NO<sub>2</sub> annualisation ratio for Cardiff City Centre AURN 1**

Site	Site Type	Annual Mean (µg/m <sup>3</sup> )	Period Mean (µg/m <sup>3</sup> )	Ratio
Cwmbran AURN	Urban Background	13.25	11.92	1.11
Average Ratio				1.11

**Table 16- Long term AURN site used for calculation of NO<sub>2</sub> annualisation ratio for Cardiff Newport Road AURN 2**

Site	Site Type	Annual Mean (µg/m <sup>3</sup> )	Period Mean (µg/m <sup>3</sup> )	Ratio
Cwmbran AURN	Urban Background	13.25	12.45	1.06
Average Ratio				1.06

**Table 17- Long term AURN sites used for calculation of PM<sub>10</sub> annualisation ratio for Cardiff Newport Road AURN 2**

Site	Site Type	Annual Mean (µg/m <sup>3</sup> )	Period Mean (µg/m <sup>3</sup> )	Ratio
Cardiff City Centre AURN	Urban Background	1	16.03	1.08
Average Ratio				1.08

### Diffusion Tubes Adjustment

The annual average nitrogen dioxide (NO<sub>2</sub>) datasets obtained via the use of passive diffusion tubes during January to December 2018 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<sub>2</sub> data, a long-term AURN urban background continuous monitoring site within a distance of approximately 50 miles from Cardiff was selected.

**Table 18- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 134**

Site	Site Type	Annual Mean (µg/m <sup>3</sup> )	Period Mean (µg/m <sup>3</sup> )	Ratio
Cwmbran AURN	Urban Background	12.85	12.6	1.02

**Table 19– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 152**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	12.74	1.01

**Table 20– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 188**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	12.26	1.05

**Table 21– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 205**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	16.45	0.78

**Table 22– Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 206**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	16.69	0.77

**Table 23- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 212**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	12.87	1.00

**Table 24- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 235**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	13.04	0.99

**Table 25- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 236**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	12.29	1.05

**Table 26- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 238**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	13.02	0.99



**Table 27- Long term AURN site used for calculation of nitrogen dioxide annualisation ratio for Diffusion Tube 240**

Site	Site Type	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	Period Mean ( $\mu\text{g}/\text{m}^3$ )	Ratio
Cwmbran AURN	Urban Background	12.85	13.22	0.97

### 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 <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide