Swansea Council

2018 Air Quality Progress Report

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 Swansea Council

This report contains the latest air quality monitoring results within the City and County of Swansea. The conclusions reached are that the objectives for benzene, lead and sulphur dioxide will be met and that there is no requirement to proceed further with these pollutants.

Ozone is monitored at four sites within Swansea. Compliance with the 8-hour mean UK objective (not set in regulation) has been seen during 2018 at the Hafod Doas and Morriston Groundhog sites. However, the Cwm Level Park site (12 exceedences) and the St. Thomas DOAS (32 exceedences) have reported exceedences of the objective concentration.

The City and County of Swansea participates in the UK Heavy Metals Monitoring Network and there are two UK Heavy Metal Network funded sites at Coedgwilym Cemetery and Morriston Groundhog. These sites will remain and have confirmed continued and ongoing compliance with the 4th Daughter Directive critical threshold monitoring target value for nickel.

All monitoring sites remain compliant with both the annual mean and daily mean exceedance (35 days permitted) for Particulate matter PM_{10}.

The main pollutant of interest for exceeding the Objective Concentration in Swansea is Nitrogen Dioxide (NO_2), for the annual mean Objective of 40µgm^{-3}. The latest monitoring data, 2018, indicates that concentrations are continuing to decrease from those in 2017 and are following a downward trend over the last five years. There are currently no exceedences of the annual mean NO_2 Objective at locations within Swansea Council.

Swansea Council is currently updating the Draft Air Quality Action Plan, submitted to Welsh Government in 2018, with a view to going out for public consultation in Spring 2020.

Actions to Improve Air Quality

The opening of the Morfa Distributor Road and the implementation of the Nowcaster system within the Hafod area of Swansea has led to reductions in NO_2 being recorded along this road link in 2017 and 2018. Recent junction improvement works carried out on Gower Road, in Sketty, have also potentially had a positive effect upon concentrations of NO_2 recorded.

Swansea Council is looking to test Green Infrastructure works at a site in order to gather data to look at policy development at exposure sites of interest.

Swansea Council takes an active role within the Welsh Air Quality Forum https://airquality.gov.wales/ and is taking part in collaborative discussions with Swansea University to work together towards carrying out research into areas of 'public health interest' for all parties.

Collaborative works have led to Swansea Council being involved in a research project looking at the digital environment in the City Centre; focusing on the collection of Air Quality, Noise and Parking data.

Local Priorities and Challenges

Swansea Council will continue to undertake monitoring at the fixed locations for pollutants reported upon in this report. The assessment of locations for NO_2 diffusion tube monitoring will continue to be carried out, sites returning low concentrations will be closed down in order to allow new sites to be created to enable Swansea Council to enhance their quantitative data.

Swansea Council is working towards publicly consulting upon their draft action plan in 2020 and facing the challenges of working with all interested parties to implement schemes/works to achieve Welsh Government's aims to maintain compliance and further reduce public health exposure.

How to Get Involved

Swansea Council publishes its real-time monitoring data on their website http://swansea.airqualitydata.com/ and data can be downloaded from this site; a review of this site is scheduled.

Also, Swansea Council's data can be viewed and downloaded via the Welsh Air Quality Forum website https://airquality.gov.wales/

Table of Contents

List of Figures

List of Tables

1. Actions to Improve Air Quality

1.1 Previous Work in Relation to Air Quality

The local authority review and assessment process is multi-staged. This Authority carried out its first stage review in 1999. The conclusion reached was to progress to a second and third stage review for Benzene, Particulate Matter (PM_{10}), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2).

In between these stages, the authority had to deal with, and resolve a burning, disused coal spoil tip at the former Brynlliw Colliery site. This absorbed most resources available between 1999 and 2000.

Along with all other local authorities, this authority has completed its stage 2 and stage 3 reviews. The third stage review and assessment concluded that despite the indication that the air quality objective for benzene would not be met that the declaration of an AQMA was not appropriate. Given the fundamental changes proposed to the Lower Swansea Valley's infrastructure and the technical improvements proposed in the reduction in the benzene content in fuel, it was recommended that a further benzene monitoring study be carried out for a period of at least 12 months. During the stage 3 process, it was determined that the authority would not breach the objectives laid down for Particulate Matter (PM_{10}) and Sulphur Dioxide (SO_2).

Section 83(1) of the Environment Act 1995 requires the Authority to designate as Air Quality Management Areas (AQMA's) those areas where it is likely that the standards for any of the identified pollutants would be exceeded. As a result of the detailed work carried out in the authorities' third stage review and assessment it was found that areas of the Hafod were likely to fail the NO_2 annual mean objective of 40$\mu g/m^3$ by the compliance date of 31st December 2005.

On the 12th September 2001 the Authority declared The Hafod Air Quality Management Area (NO_2), cited as the City & County of Swansea (Hafod Air Quality Management Area (NO_2)) Order 2001. The Order came into force on the 14th September 2001. Annexe 1 contains a map indicating the AQMA area.

The Stage 4 review required under Section 84(1) of the Environment Act 1995 confirmed the earlier findings and that the declaration of the Hafod AQMA was

justified as several locations were projected to fail the nitrogen dioxide (NO_2) annual mean objective in 2005.

Section 84 of the Environment Act 1995 requires the formulation of a written plan in pursuit of the achievement of air quality standards and objectives within the designated AQMA and has become known as the “Action Plan”. The City and County of Swansea have undertaken a considerable amount of feasibility and infrastructure work in formulating its Action Plan taking a few years to produce the completed Action Plan in December 2004.

In 2004, the authority commenced works on the second round of review and assessment. In accordance with the policy and technical guidance documents, the second round of review and assessment was carried out in two stages;

- An Updating and Screening Assessment (USA) - intended to identify aspects that have changed since the first round of review and assessment (from 1999 in Swansea's case) and identify those that require further assessment; namely
- A Detailed Assessment of those pollutants that have been identified as requiring further work and investigation

The Updating and Screening Assessment was submitted to the Welsh Assembly Government in July 2004 with a recommendation to proceed to a detailed assessment for nitrogen dioxide at identified narrow congested streets and busy junctions. The USA also concluded that particulate matter PM_{10} should also be investigated using real-time techniques at the identified narrow, congested streets and busy junctions, despite the then 2010 provisional objectives not being set in regulation.

A brief summary of the results and conclusions of the Detailed Assessment into NO_2 levels can also be found within the Progress Report 2004 – section 2.3.2.3 page 95. The Detailed Assessment itself was submitted to the Welsh Assembly Government during December 2005. This assessment concluded that there was no justification in declaring additional AQMA’s. At the time of submission, there was a debate with the auditors and Welsh assembly Government over the bias factor used to correct the nitrogen dioxide passive diffusion tube data. The authority used the bias factor quoted by Harwell Scientifics to correct for tube bias. Whilst the Detailed Assessment report was eventually accepted by the Welsh Assembly Government and the auditors

as a result of the authority providing additional supporting information and justification for the use of the Harwell Scientific bias factor it was agreed that the authority would undertake co-location studies with its chemiluminescent analysers at 3 sites namely, the Swansea AURN on Carmarthen Road, and at the Morfa and Morriston Groundhog sites. This work commenced during December 2006 and was delayed until the Swansea AURN had been relocated and commissioned to prevent any additional uncertainties. The authority has now completed these co-location tasks at all three automatic sites within Swansea and has determined a local bias factor for the correction of the passive nitrogen dioxide diffusion tubes exposed within Swansea during 2008. Further details on this area of work can be found within section 2.1.13

The Progress Report for 2004/05 was submitted for consideration during July 2005.

The infrastructure required for a real-time assessment of PM_{10} in Swansea, is still being developed. The authority have purchased ten Met One E-Type light scattering PM_{10} dust samplers and are in the process of deploying these at the identified narrow, congested roads and busy junctions mentioned within the USA submitted in July 2004 and the Detailed Assessment. Identification of suitable sites is now complete but what has proved time consuming are the practical considerations of the site location itself together with the provision of suitable services i.e. un-metered electricity feeds and suitable mounting points. Significant problems have been, and continue to be encountered with the operation of the EType samplers. It is recognised that these analysers do not have formal UK type approval but due to both the expense and considerable practical considerations of deploying Rupprecht & Patashnick Co., Inc. FDMS/TEOM's, these E Type samplers will provide a more accurate assessment than use of the DMRB screening tool would be able to provide. It is thought that if the technical difficulties being experienced with the equipment can be resolved that the modelling will supplement the data collected by the E Type samplers.

Additional works underway include the collection of real-time classified counts of traffic data via the Vodafone GPRS network together with the construction of an emissions database. It is these latter items, particularly communications problems with the GPRS system that have delayed the modelling capabilities to date. The USA

dated April 2006 was submitted for consideration to the Welsh Assembly Government in July 2006.

The authority undertook a further Progress Report in 2007 which was submitted to the Welsh Assembly and the auditors during July 2007. The same issues arose from this report with the auditors – the rationale behind the bias factor used to correct the passive diffusion tube was again raised despite the report clearly outlining the authorities' reasons for using the bias factor that was used to correct for tube bias. This issue as mentioned above should now have been resolved with the determination of a local Swansea bias factor

Progress Report 2008

The authority submitted its Updating and Screening Assessment 2008 to the Welsh Assembly Government during July 2009. The conclusions of this assessment were that exceedances of the nitrogen dioxide annual mean objective continued to be seen within the existing Hafod Air Quality Management Area along the Neath Road corridor, Cwm Level Road (Brynhyfryd Cross Roads) and Carmarthen Road (Dyfatty area). Additional monitoring within the then Hafod AQMA area around the High Street Railway Station highlighted the potential of exceedance of both the annual mean and 1-hour nitrogen dioxide objectives. Monitoring from outside of the then existing Hafod AQMA identified new areas that were failing the nitrogen dioxide annual mean objective. These areas are along Gower Road in Sketty, along Carmarthen Road within Fforestfach, and at numerous sites within the city centre. The city centre area was treated with caution as at the time of submission, only the minimum 9 months of data was available for analysis. An update on the city centre monitoring for nitrogen dioxide is presented below within section 2.1.2. The authority doubled its passive nitrogen dioxide tube survey during November 2009 from 134 to 274 sites, as a result of new LAQM Technical Guidance (LAQM.TG(09)) and the conclusions reached within the USA 2009 that used the new guidance, that additional initial screening of narrow/congested streets was required where the AADT flow was greater than 5000 vehicles. Monitoring data is presented for the periods available for the 140 additional sites within section 2.1.2.

Following the USA 2009, the authority intended to amend the existing Hafod Air Quality Management Area to include these newly identified areas (Sketty and

Fforestfach) along with the renaming of the declared air quality management area. All declared areas are to be collectively known as The Swansea Air Quality Management Area 2010. However, considerable delays were encountered with the mechanisms of obtaining the necessary Council Order. Details were presented before Council during August 2010. Annexe 2 contains a map indicating the adopted Swansea Air Quality Management Area 2010

Progress Report 2010

The authorities Progress Report 2010 continued to highlight and confirm exceedances of the nitrogen dioxide annual mean objective within the Sketty and Fforestfach areas of Swansea. These areas have now been included within the Swansea Air Quality Management Area 2010.

Progress Report 2011

The authorities Progress Report 2011 continued to highlight and confirm exceedances of the nitrogen dioxide annual mean objective within the Sketty and Fforestfach areas of Swansea. Additionally, other sites outside of the Swansea Air Quality Management Area 2010 in the Mumbles, Uplands, Morriston, Llansamlet and Ynystawe areas were found to be exceeding the nitrogen dioxide annual mean objective. It was stated that further monitoring would be undertaken to confirm such exceedances before any additional AQMS were declared.

Updating and Screening Assessment 2012

The authorities USA 2012 continued to highlight and confirm exceedances of the nitrogen dioxide annual mean objective within the Hafod, Sketty and Fforestfach areas of the Swansea AQMA 2010. Additionally, other sites outside of the Swansea Air Quality Management Area 2010 in the Mumbles, Uplands, Morriston, and St.Thomas areas were found to be exceeding the nitrogen dioxide annual mean objective. It was stated that the authority would consider the amendment of the Swansea Air Quality Management area 2010 and that further monitoring would be undertaken within the areas to confirm such exceedances before any additional AQMS were declared. Additional real-time chemiluminescent monitoring has not been possible. Similarly, no passive diffusion tube monitoring has been possible at first floor level within the Newton Road area of Mumbles

Progress Report 2013

The authorities Progress Report 2013 identified continuing exceedances of the nitrogen dioxide annual mean objective within the existing Swansea AQMA 2010 and also outside of the existing AQMA, notably within the city centre, Mumbles and Fabian Way areas.

It was stated that the authority intended to locate a real-time chemiluminescent analyser within the High Street area of the city centre prior to year-end 2013. This site is not now planned until July 2014.

Details on the various stages completed by the authority in the Local Air Quality Management process are given below within table 2. Brynlliw Colliery remediation is shown for information purposes due to the delays in the LAQM process that this introduced. This was a long-term burning tip which required large scale monitoring and control.

Progress Report 2014

The authorities Progress Report 2014 identified continuing exceedances of the nitrogen dioxide annual mean objective within the existing Swansea AQMA 2010 and also outside of the existing AQMA, notably within the city centre, Mumbles and Fabian Way areas.

It was stated that the authority intended to locate a real-time chemiluminescent analyser within the High Street area during July 2014. This work was completed on schedule with the site becoming operational on the 7th July 2014. The new site is mentioned within chapter 2.1 below with additional details provided within chapter 2.1.13. The available data is presented within chapter 2.1.2.2 Automatic Real Time Nitrogen Dioxide data but no conclusions can be reached at present due to the monitoring period achieved so far.

Details on the various stages completed by the authority in the Local Air Quality Management process are given below within table 2. Brynlliw Colliery remediation is shown for information purposes due to the delays in the LAQM process that this introduced. This was a long-term burning tip which required large scale monitoring and control.

Updating and Screening Assessment 2015

The authorities USA 2015 continued to highlight and confirm exceedances of the nitrogen dioxide annual mean objective within the Hafod, Sketty and Fforestfach areas of the Swansea AQMA 2010. Additionally, other sites outside of the Swansea Air Quality Management Area 2010 in the Mumbles, Uplands, Morriston, and St.Thomas areas were found to be exceeding the nitrogen dioxide annual mean objective. Due to the reductions in nitrogen dioxide annual mean concentrations being witnessed year on year, along Newton road, Mumbles, it was not proposed to declare an AQMA. The authority will work towards the introduction of a Traffic Regulation Order along Newton Road prohibiting delivery vehicles delivering goods during busy periods of the day to restrict congestion along Newton Road. In view of the reductions in annual mean concentrations being measured, concentrations at first floor level above the canopy to flats will not be investigated further.

Due to the wide ranging implications of the City Centre review and likely highway alterations, it was not proposed to declare an AQMA within the city centre until the outcomes and recommendations of the review are known. The review is so wide ranging that the source i.e. the highway network, may be removed from where there are currently receptor locations. Discussions will continue on how best the desired provision of housing within the city centre can be achieved within the overall development proposals both in terms of the air quality implications and also exposure to noise for those residents. These discussions remain ongoing.

Progress Report 2016

This report contains the latest air quality monitoring results within the City and County of Swansea. The conclusions reached are that the objectives for benzene, lead and sulphur dioxide will be met and that there is no requirement to proceed further with these pollutants. However, there is evidence that the annual mean objective for nitrogen dioxide of 40ug/m^3 will continue to be exceeded within the existing Swansea Air Quality Management Area 2010. Latest monitoring undertaken also indicates areas of exceedances of the nitrogen dioxide annual mean objective outside of the Swansea Air Quality Management Area 2010 within city centre area of the authority. However there is currently no relevant exposure. It is therefore proposed to undertake additional nitrogen dioxide monitoring within the city centre area. Several

other areas also exhibit the potential to exceed the annual mean objective as the measured annual means are within the range 37-40 ug/m^3.

Progress Report 2017

This report contains the latest air quality monitoring results within the City and County of Swansea. The conclusions reached are that the objectives for benzene, lead and sulphur dioxide will be met and that there is no requirement to proceed further with these pollutants. However, there is evidence that the annual mean objective for nitrogen dioxide of 40ug/m^3 will continue to be exceeded within the existing Swansea Air Quality Management Area 2010.

Latest monitoring undertaken also indicates areas of exceedances of the nitrogen dioxide annual mean objective outside of the Swansea Air Quality Management Area 2010 within the following areas of the authority:

- Newton Road,
- Fabian Way,
- Vale of Neath Terrace,
- High Street

It was therefore proposed to proceed to a Detailed Assessment for nitrogen dioxide concentrations within these areas. Several other areas also exhibit the potential to exceed the annual mean objective as the measured annual means are within the range 37-40 ug/m^3.

All monitoring sites remain compliant with both the annual mean and daily mean exceedance (35 days permitted) for Particulate matter PM_{10}.

Ozone is monitored at four sites within Swansea. Compliance with the 8-hour mean UK objective (not set in regulation) has been seen during 2016 at all monitoring stations.

Progress Report 2018

This report contains the latest air quality monitoring results within the City and County of Swansea. The conclusions reached are that the objectives for benzene, lead and sulphur dioxide will be met and that there is no requirement to proceed further with these pollutants.

Ozone is monitored at four sites within Swansea. Compliance with the 8-hour mean UK objective (not set in regulation) has been seen during 2017 at all monitoring stations except the St. Thomas DOAS (14 exceedences in total).

The City and County of Swansea participates in the UK Heavy Metals Monitoring Network and there are two UK Heavy Metal Network funded sites at Coedgwilym Cemetery and Morriston Groundhog. These sites will remain and have confirmed continued and ongoing compliance with the 4th Daughter Directive critical threshold monitoring target value for nickel.

All monitoring sites remain compliant with both the annual mean and daily mean exceedance (35 days permitted) for Particulate matter PM_{10}.

The Pollutant currently exceeding the Objective Concentration in Swansea is Nitrogen Dioxide (NO_2), for the annual mean Objective of 40µgm^{-3}. The latest monitoring data, 2017, indicates that concentrations are decreasing from those in 2016 and are following a downward trend over the last five years. There are currently only exceedences of the annual mean NO_2 Objective at locations within existing Air Quality Management Areas (AQMA's https://uk-air.defra.gov.uk/aqma/details?aqma_ref=82#1313) and Swansea Council intends to continue to monitor at these locations.

The opening of the Morfa Distributor Road and the implementation of the Nowcaster system within the Hafod area of Swansea has led to reductions in NO_2 being recorded along this road link in 2017. Recent junction improvement works carried out on Gower Road, in Sketty, have also potentially had effect upon concentrations of NO_2 recorded; further assessment of data will take place with Highways colleagues at this location to better understand potential effects observed.

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). After declaring an AQMA the authority must prepare an Air Quality Action Plan (AQAP) within 18 months setting out measures it intends to put in place to improve air quality to at least the air quality objectives, if not even better. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

A summary of AQMAs declared by Swansea Council can be found in Table 1.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at

https://uk-air.defra.gov.uk/aqma/details?aqma_ref=82

Table 1.1 – Declared Air Quality Management Areas

AQMA	Relevant Air Quality Objective(s)	Comments on Air Quality Trend	Description	Action Plan
Swansea AQMA 2010	• NO_2 annual mean	This year's monitoring results indicates further improvement in air quality compared to previous years.	Elevated annual mean NO2 concentrations at residential properties alongside main arterial routes, which located within Hafod, Sketty and Fforestfach area.	https://www.swansea.gov.uk/media/2640/Air-Quality-Action-Plan/pdf/Swansea_Action_Plan_2004.pdf

AMQA boundary maps within Swansea Council can be viewed at

https://laqm.defra.gov.uk/images/aqma_maps/1489_Swansea%202010%20AQMA.jpg and are included in Appendix C.

1.3 Implementation of Action Plans

Swansea Council has taken forward a number of measures, since the publication of the 2004 Action Plan, in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 1.2. More detail on these measures can be found in the Air Quality Action Plan relating to any designated AQMAs.

Air Quality Action Plans are continuously reviewed and updated whenever deemed necessary, but no less frequently than once every five years. Such updates are completed in close consultation with local communities. Swansea Council submitted a draft Action Plan to Welsh Government in 2018 and given the reduction in concentrations observed over 2017 and 2018, Swansea Council is updating the revised draft action plan and is working towards public consultation by April 2020.

Table 1.2 – Progress on Measures to Improve Air Quality

No.	Measure	Focus	EU Category	EU Classification	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	Nowcaster Model	Pollution reduction by prediction and behaviour change	Traffic Management	Congestion Management and Traffic Reduction	Swansea Council	2004	2017		e.g. 27% Reduction in Road NOx required Neath Road	Model Complete	Upgrade to model forecast for improved accuracy	December 2019	Effects of Nowcaster Model to be verified with traffic flow data and NO_2 Concentrations
2	Nowcaster System	Pollution reduction by prediction and behaviour change	Public information	Via other Mechanisms	Swansea Council	2004	2017		Ongoing assessment of trigger thresholds for VMS	Public Interface being developed and tested for deployment	Updated of datasets behind interface	April 2020	Variable Messaging Signs to be verified and trigger concentrations assessed for effectiveness
3	Nowcaster Model Output Progression	Pollution reduction by prediction and behaviour change	Public Information	Via the Internet and App based technology	Swansea Council	2017	2018/19		CHERISH-DE application accepted Awaiting next stage	Pilot study carried out – Data analysis being carried out by Swansea University	Collaborative working with Swansea University Psychology Department to look at behavioural change approach with messages.	March 2020	

No.	Measure	Focus	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Indicator	Target Annual Emission Reduction in the AQMA	Progress to Date	Progress in Last 12 Months	Estimated Completion Date	Comments Relating to Emission Reductions
4	Collaborative Research Studies	Pollution reduction by prediction and behaviour change	Traffic Management	Congestion Management	Swansea University	2018				Ongoing work stream – has not begun to date as funding applications have been unsuccessful	Application bids for funding with collaborative partners to undertake work looking at behavioural change at congested areas		
5	Morfa Distributor Road	Infrastructure change	Traffic Management	Strategic Highway Improvements	Swansea Council		August 2017		Road Complete		Effects on Traffic Flow to be assessed alongside NO_2 concentration	04/08/2017	Pollutant Concentration reduced and AADT decreased
6	Green infrastructure	Exposure reduction, enhancing greenery	Transport Planning and Infrastructure	Other	Swansea Council		2018-20			Notification that money available via Conservation Green Infrastructure Team. Procurement stage to be completed	Finance has been confirmed and location chosen. Confirmation of Highways involvement required and scheme to be drawn up.	March 2020	

No.	Measure	Focus	EU Category	EU Classification	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
7	UK Prevention Research Partnership Bid	Collaborative Working	Policy Guidance and Development Control	Regional Groups Co-ordinating Programmes to develop Area wide Strategies to reduce emissions and improve air quality	School of Management Bay Campus Swansea University Fabian Bay, Swansea	2017	2018		Expression of interest to apply submitted	Unsuccessful			
8	LDP Policy RP	Policy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Swansea Council		2018		Creation of specific Air Pollution Policy within the LDP	Adopted			
9	Highway Infrastructure Works	Infrastructure	Traffic Management	Strategic Highway Improvements	Swansea Council	2018				Ongoing involvement when schemes required.			
10	Council Vehicle Fleet	Reduced Emission	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Swansea Council					Ongoing	Increase in electric vehicles and newer diesel vehicles within the council fleet		

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

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

Swansea Council undertook automatic (continuous) monitoring at twelve sites during 2018. Table 2.1 presents the details of the sites. National monitoring results are available at https://uk-air.defra.gov.uk/data/ , https://airquality.gov.wales/maps-data/measurements/downloadsubmit-data and http://swansea.airqualitydata.com/

Maps showing the location of the monitoring sites are provided in Figure 2.1. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

Swansea Roadside AURN, Carmarthen Road, Waun Wen

The station is located roadside on Carmarthen Road at Waun Wen. The Annual Average Daily Traffic flow (AADT) for 2018 was 21,432 vehicles. The site is detailed and outlined below and is within the boundary of the Swansea Air Quality Management Area 2010. The site has receptors close by with additional sensitive receptors in close proximity - a Nursing Home and a Primary School are within 100m of the monitoring location.

The station has been given a site classification Roadside, Figure 2.1.1 below is an aerial view of the site and the surrounding locations. The site is located in an open aspect approximately 55m above sea level with direct views over Swansea Bay. It is therefore more exposed to the prevailing south westerly winds than the monitoring sites located on the valley floor (i.e. Morriston and Hafod DOAS). It is thought probable that this site may well sit above any inversions that form within the lower Swansea Valley and therefore, does not experience the elevated concentrations seen at the other monitoring stations during such conditions.

Figure 2.1.1.1 – Aerial view of Swansea Roadside AURN

All equipment is housed within an air-conditioned unit and operated continuously. The equipment comprises of an Advanced Pollution Instrument (API) real-time analyser measuring NO_x with Thermo FDMS units measuring PM_{10} and $PM_{2.5}$ until the 16th November 2011 when they were removed due to their unreliability and were replaced with Met One1020 BAM units on the 28th November 2011. The API gas analyser has been configured so that a daily automatic calibration is carried out (between 00:30 hours and 01:00 hours).

Hourly ratified data for 2018 covering the pollutants Nitrogen Dioxide and Particulate Matter PM_{10} and $PM_{2.5}$ (BAM 1020) have been downloaded from the Air Quality Archive at http://uk-air.defra.gov.uk/data/data_selector . This data has then been imported into the OPSIS Enviman Reporter databases allowing analysis.

Morriston Groundhog

Morriston Groundhog has been operational since September 2000 and is located adjacent to the southbound slip road to the busy A4067 dual carriageway at Morriston Underpass. The Swansea Air Quality Management Area 2010 (former Hafod AQMA) boundary is approximately one mile south of this location. Receptor locations can be found to the right of the station in the form of terraced housing. To the left of the site and on the opposite side of the dual carriageway is Morriston Primary School. The school buildings abut the red brick retaining wall to the northbound Morriston slip road exit. The A4067 carries on for approximately one mile northbound where it meets the M4 motorway at junction 45. The station has been given a site classification Roadside. Figure 2.1.1.2 below is an aerial view of the site and the surrounding locations.

All equipment is housed within an air-conditioned unit and operates continuously. The equipment comprises of Advanced Pollution Instruments (API) real-time analysers measuring O_3, and NO_x .The R&P PM_{10}TEOM was upgraded to a Thermo FDMS PM_{10} unit on the 27th October 2006 with data capture for the FDMS unit commencing at 17:00. This unit had now been replaced by a Met One 1020 BAM PM2.5 unit; data collection commenced 14.01.2016. The API gas analysers have been configured so that a daily automatic calibration is carried out (between 00:30 hours and 01:00 hours).

In June 2017 the site was temporarily removed to enable an upgrade to be carried out, decommissioning occurred on the 9th June 2017. The upgrade included a new enclosure, a new Teleydene real-time chemiluminescent NOx Analyser and a Continuous UV Absorption Ozone Analyser and the reinstall of the PM2.5 BAM1020; the site was operational again on the 27th June 2017.

Figure 2.1.1.2 - Aerial view - Morriston Groundhog

Cwm Level Park, Landore

The authority established a NO_x and Ozone urban background monitoring station at Cwm Level Park, Landore during late November/early December 2008 within the compound of its 30m Meteorological monitoring mast.

All equipment is housed within an air-conditioned unit and operates continuously. The equipment comprises of Advanced Pollution Instruments (API) real-time analysers measuring NO_x and Ozone.

Figure 2.1.1.3 Cwm Level Park Monitoring

A map showing the location of the Cwm Level Park station is given above as Figure 2.1.1.3. The boundary of part of the Swansea Air Quality Management Area 2010 is shown as the black/yellow dashed line.

There are no “major” sources closes by as would be expected with the site classification, with the nearest road being nearly 80m away and having an Annual Average Daily Traffic flow (AADT) during 2018 of 14,040 vehicles. Some light industry / warehouse front the site but are insignificant as a source. Receptor dwellings are within 100m of the site.

The OPSIS Hafod Differential Optical Absorption Spectroscopy (DOAS) Monitoring Station

The OPSIS DOAS open path light source measures the pollutants Nitric Oxide, Nitrogen Dioxide, Ozone and Benzene along a 250-metre section of Neath Road, within the Hafod district of the lower valley area and within the Swansea Air Quality Management Area 2010. These measurements take place at first floor level - a height of approximately 3 metres and less than 0.3m away from the front facade of the terraced dwellings. The DOAS transmitter ❶ is fixed externally to the front wall of a terraced dwelling that fronts onto Neath Road at one end of the open path measurement. The receiver module ❷ is located on the front wall of another dwelling that also fronts onto Neath Road at the other end of the open path measurement length. The receiver focuses the light received and transmits the light via fibre optic cable into a spectra analyser. Figure 2.1.1.4 below shows an aerial photograph of the location of the transmitter and receiver heads. This section of Neath Road has an annual average daily traffic flow (AADT) during 2018 of 11,280 vehicles and forms the “traditional” route up/down the Swansea Valley. The whole length of Neath Road through the Lower valley area is characterised by slow moving traffic through the narrow, congested, B route corridor.

The transmitter emits a light beam from a xenon lamp and contains a range of wavelengths, from ultraviolet to visible. Different pollutant molecules absorb light at different wavelengths along the path between the emitter and receiver. The principle used is based on the Beer-Lambert absorption law; the receiver is connected to the analyser that measures the intensity of the different wavelengths along the entire light path and converts this into concentrations for each of the gaseous pollutants being monitored.

Figure 2.1.1.4 Hafod Opsis DOAS Monitoring

The monitoring location is allowing measurements' running parallel to the carriageway to be made of the above pollutants, as the carriageway is approximately 2 metres away from the front facade of these dwellings. The highway at this location can loosely be referred to as a "street canyon". Valid data capture commenced on the 8th January 2004 at 16:00hrs. The station has been given a site classification Roadside.

The DOAS system returns data in the form of cyclonic means, not always of the same averaging period - the system has been configured to measure each pollutant for a set period of time: 1 minute each for NO and Benzene and 30 seconds each for nitrogen dioxide and ozone. This gives a cycle time of approximately 3 minutes. The system stores the information as a cycle period of measurement for each pollutant within a "logger value" dataset. During the QA/QC processes that have been completed, conditions were imposed on the minimum acceptable light levels and maximum standard deviations of the measurements permitted on the individual cycled means for each pollutant. The validation process produces the same cyclonic means within a separate database. All individual measurement points that have not

met the QA/QC conditions (Appendix C) are replaced with null values within the new dataset. The user can then compile 5 minute means from the validated dataset and undertake analysis.

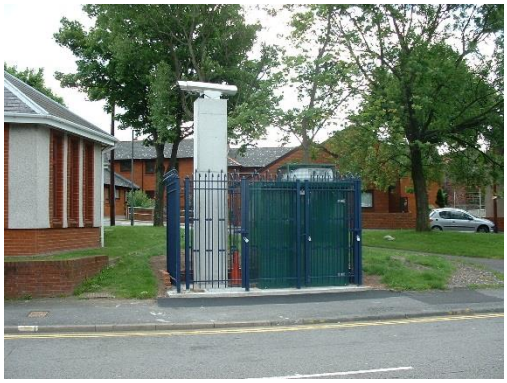
The Opsis St. Thomas Differential Optical Absorption Spectroscopy (DOAS) Monitoring Station

The St. Thomas OPSIS Differential Optical Absorption Spectroscopy (DOAS) was installed during September 2005 along a 280m path length of Pentreguinea Road within the St. Thomas area to measure the pollutants sulphur dioxide, nitrogen dioxide, and ozone. Valid data capture commenced on the 12th September 2005 at 09:30am. This route is intended for use within the Action Plan to attempt traffic management during forecast pollution episodes by diverting traffic from the central Neath Road corridor

Measurements take place at a height of approximately 3-4 metres and less than 2m away from the front facade of the majority of terraced dwellings. The DOAS transmitter ❶ is fixed on top of a concrete column located north of the junction of Kilvey Terrace and Pentreguinea Road as shown in photo 1 below. The receiver module ❷ is located on top of a concrete column and site housing at the other end of the open path measurement length as shown in photo 2 below.

Figure 2.1.1.5 - St Thomas DOAS Transmitter

Figure 2.1.1.6 - St Thomas DOAS Receiver Station



The principle used is based on the Beer-Lambert absorption law; the transmitter emits a light beam from a xenon lamp that contains a range of wavelengths, from ultraviolet to visible. Different pollutant molecules absorb light at different wavelengths along the path between the emitter and receiver. The receiver is connected to the analyser that measures the intensity of the different wavelengths along the entire light path and converts this into concentrations for each of the gaseous pollutants being monitored. The station has been given a site classification Roadside.

The monitoring location is allowing measurements' running parallel to the carriageway to be made of the above pollutants. The location of the open path monitoring can be seen within Figure 2.1.1.7 below. The site of the transmitter lies just outside of the southern boundary of the Swansea Air Quality Management Area 2010.

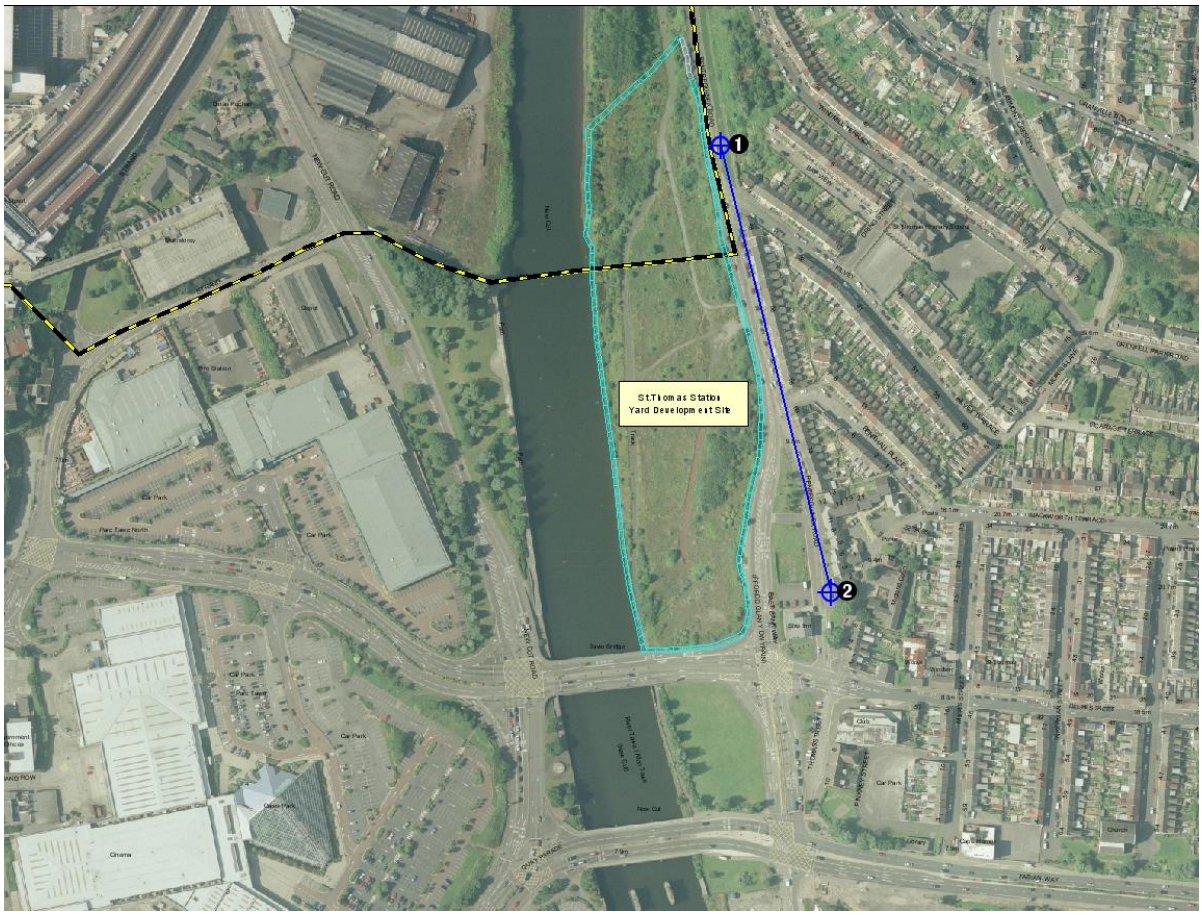


Figure 2.1.1.7 – Aerial View of St. Thomas OPSIS DOAS and surrounding area

The DOAS system returns data in the form of cyclonic means, not always of the same averaging period - the system has been configured to measure each pollutant for a set period of time: 1 minute for Benzene and 30 seconds each for sulphur dioxide, nitrogen dioxide and ozone. This gives a cycle time of approximately 3 minutes. The system stores the information as a cycle period of measurement for each pollutant within a “logger value” dataset. During the QA/QC processes that have been completed by this authority, conditions were imposed on the minimum acceptable light levels and maximum standard deviations of the measurements permitted on the individual cycled means for each pollutant. The validation process produces the same cyclonic means within a separate database.

It should be noted that the data presented here represents the spatial average over the whole of the 280-meter measurement path and not a "point measurement" as seen within other "traditional or conventional" monitoring equipment/locations. It should also be noted that the DOAS methodology of monitoring does not comply with the EU Directive methods of measurement (chemiluminescent for NO_2, UV

fluorescence for SO_2 etc.) at present but the system has achieved MCERTS certification and TUV certification.

Met One EBam PM_{10} (Five units)

The EBam has not demonstrated equivalency with the EU reference gravimetric method whilst the MetOne Bam 1020 PM_{10} at the Swansea AURN has demonstrated equivalency during previous trial undertaken during 2006[1]. Installation and operation of the MetOne EBam has been undertaken in accordance with the Operational manual which can be viewed at http://www.metone.com/ebamdocs/E-BAM_Manual(RevL).pdf.

The Met One Instruments, Inc model E-BAM automatically measures and records airborne PM10 particulate concentration levels using the principle of beta ray attenuation. This method provides a simple determination of concentration in units of milligrams of particulate per cubic meter of air. A small 14C (Carbon 14) element emits a constant source of high-energy electrons known as beta particles. These beta particles are detected and counted by a sensitive scintillation detector. A

vacuum pump pulls a measured amount of dust-laden air through the filter tape, which is positioned between the source and the detector thereby causing an attenuation of the beta particle signal. The degree of attenuation of the beta particle signal is used to determine the mass concentration of particulate matter on the filter tape, and the volumetric concentration of particulate matter in ambient air. In this installation a MetOne approved external pump delivering a flow rate of 16.7 l/min has been included within the site enclosure. The integration of sampling has been set at 1-hour with the tape advancing every 3-hours. Tape life is therefore greater than 3 months with the PM_{10} head being cleaned every month between tape exchanges. The station is serviced and maintained twice yearly by Enviro Technology Services Ltd. In addition, the authority has a 5 day call out response for any on-site equipment problems with Enviro Technology Services Plc.

Fforestfach Cross - Met One EBam PM_{10}

The Fforestfach Cross EBam PM_{10} station was established during late October 2012 to provide a basic screening opinion on PM_{10} concentrations around the busy Fforestfach Cross junction. The A483 Carmarthen Road has junctions with the A4216 Station Road to the south and Ravenhill Road to the north. Relevant receptors exist at numerous dwellings either side of the junctions. Considerable traffic congestion can be seen on all arms of the junction primarily during working hours. The authority also has numerous NO_2 passive diffusion tube locations within this area. The chosen monitoring location is to the north-west of the junction in front of the war memorial on Carmarthen Road and within 19m of a residential property. Location and ease of connection to an electricity supply dictated the final location.

The EBam PM_{10} is similar in operation to the MetOne Bam 1020 deployed at the Swansea AURN approximately 2.3Km away in a south-easterly direction on Carmarthen Road.

A map of the site and surrounding area is given below as figure 2.1.1.8.

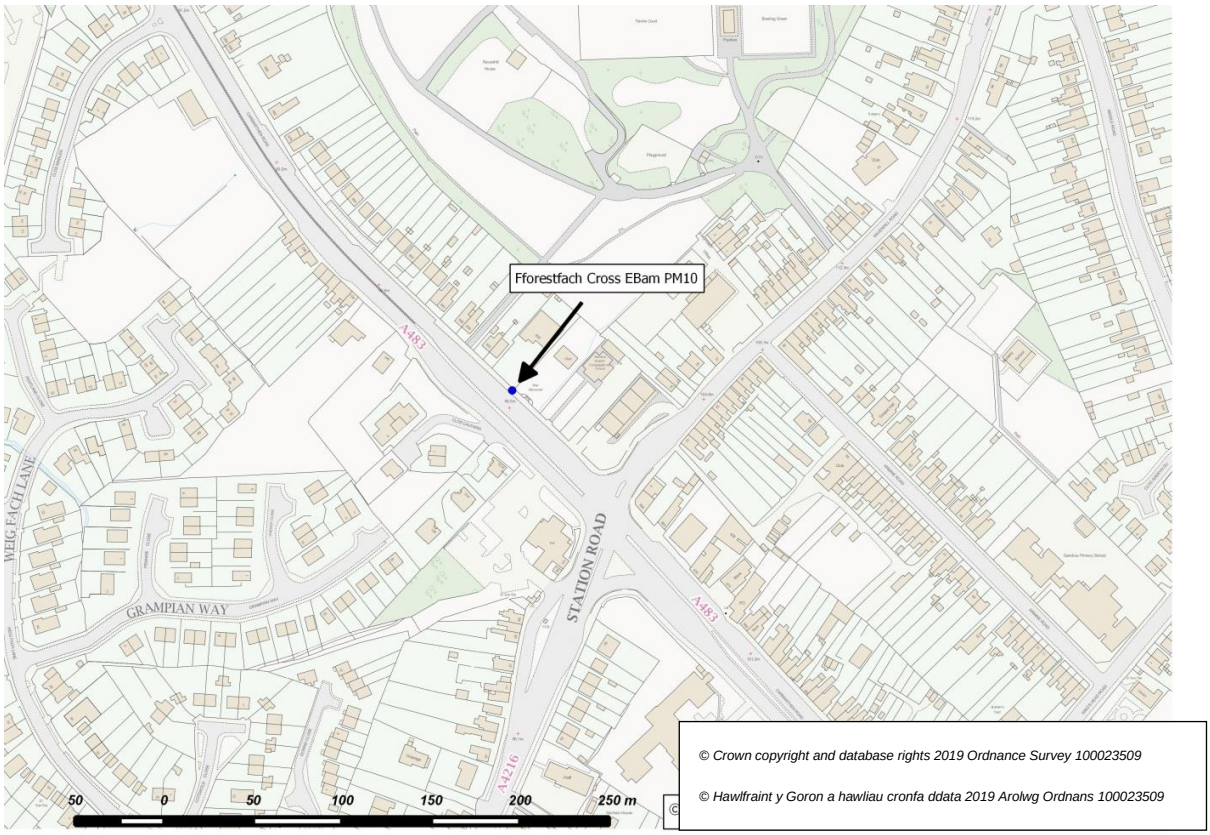


Figure 2.1.1.8 – Fforestfach Cross EBam PM_{10}

Uplands Crescent - Met One EBam PM_{10}

The Uplands Crescent EBam PM_{10} station was established during late October 2012 to provide a basic screening opinion on PM_{10} concentrations along Uplands Crescent which is heavily congested during working hours. The site is located between the signalled controlled junction of Uplands Crescent and Gwydr Square to the west and between the junction of Uplands Crescent with Walter Road/Brynymor Crescent/Eaton Crescent and Mirador Crescent to the east. The authority also has numerous NO_2 passive diffusion tube locations within this area.

Monitoring is undertaken within 11m of residential properties to the north and 17m of residential properties on the opposite side of the road. Location of, and ease of connection to an electricity supply dictated the final location.

A map of the site and surrounding area is given below as figure 2.1.1.9.

Figure 2.1.1.9 – Uplands Crescent EBam PM_{10}

Sketty Cross - Met One EBam PM_{10}

The Sketty Cross EBam PM_{10} station was established during late October 2012 to provide a basic screening opinion on PM_{10} concentrations along the A4118 Gower Road which is heavily congested during working hours. The site is located between the signalled controlled crossroad junction of Gower Road with Dillwyn Road and Vivian Road to the north-east and the mini roundabout “junction” of De-La-Beche Road with Gower Road and Sketty Road. A major comprehensive school along with a Welsh Primary School are located along De-La-Beche Road. A significant number of pupils attending the comprehensive school arrive, and depart, by contract bus. The area is subject to congestion during the am and pm peak periods as the A4118 Gower Road forms the main artery into and out of Swansea City Centre (and further eastern destinations) from the west of Swansea and Gower. GPRS ATC counters have been installed on each arm of the signalled controlled junction of Gower Road with Dillwyn Road and Vivian Road. No ATC provision has been possible as yet along De-La-Beche Road. The authority also has numerous NO_2 passive diffusion tube locations within this area.

Monitoring is undertaken within 13m of residential properties on the opposite side of the road. It proved necessary to locate the EBam outside of a petrol station as to site the EBam within pavements fronting any residential properties proved to problematic. Location of, and ease of connection to an electricity supply therefore dictated the final location.

A map of the site and surrounding area is given below as figure 2.1.1.10

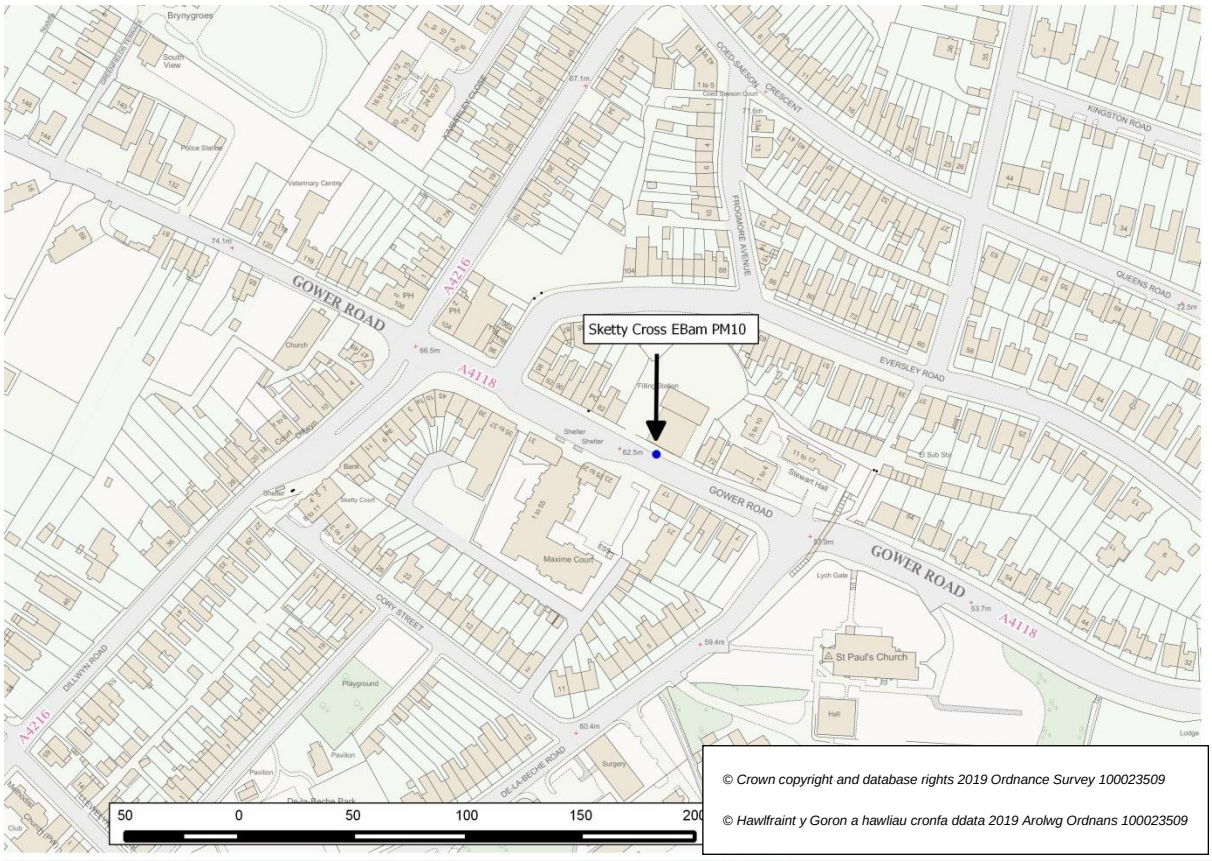


Figure 2.1.1.10 – Gower Road EBam PM_{10}

Westway Quadrant Bus Station - MetOne EBam PM_{10}

The Westway EBam PM_{10} station was established during late August 2012 to provide a basic screening opinion on PM_{10} concentrations along Westway opposite the Quadrant Bus Station. This is the major public transport hub within Swansea with both local and “long-haul” services using the facilities provided. Significant volumes of traffic use Westway but it has not been possible due to budget restraints to install the required number of GPRS ATC’s to cover all of the arms and turning movements. The road infrastructure is complex with additional volumes of traffic being attracted not only by the city centre destinations but also by a major superstore located to the south of the site. It is desirable to also record the movements into and out of the superstore as well as the significant number of bus movements/traffic movements along Westway in order to obtain an accurate picture of the total number of movements. As some sections of highway along Westway are 9 lanes in width a total of 3 GPRS ATCs fitted with dual loop cards has been determined as the minimum

number necessary to capture all of the movements along Westway. At the present moment in time this financial commitment is not possible.

There are receptor locations within approximately 30m of the boundary of the Quadrant Bus Station and within 3m of Westway itself as there are blocks of warden sheltered flat accommodation over 5 or more stories setback off Westway.

A map of the site and surrounding area is given below as figure 2.1.1.11.

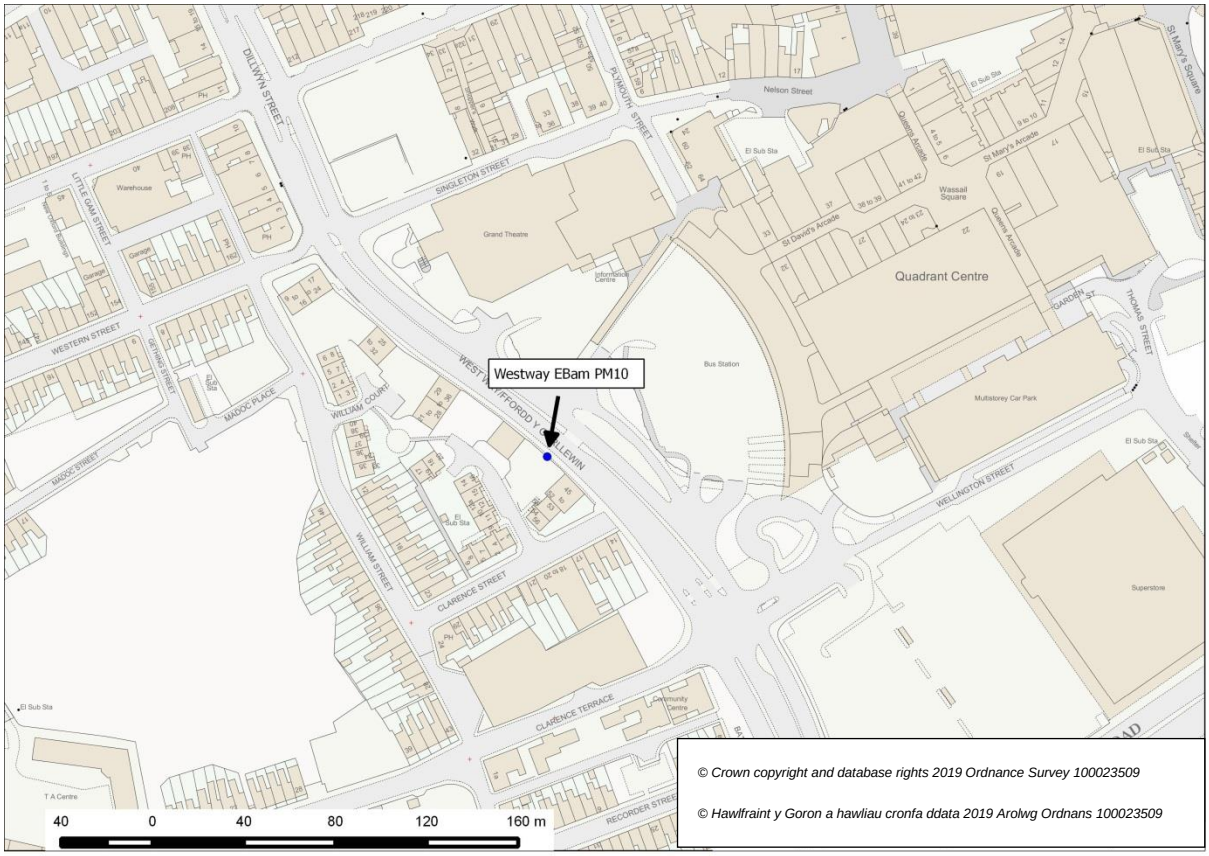


Figure 2.1.1.11 – Westway EBam PM_{10}

SA1 Junction Port Tennant Road - MetOne EBam PM_{10}

The SA1 Port Tennant EBam PM_{10} station was established during late November 2012 to provide a basic screening opinion on PM_{10} concentrations along the A483 Fabian Way at the recently constructed signal controlled SA1 junction with Port Tennant Road. The A483 Fabian Way is a major artery into/from Swansea centre from/to junction 42 of the M4. The authority operate a GPRS ATC (site 20) approximately 200m west of the EBam monitoring location between Quay Parade bridges and the signalled controlled SA1 junction with Fabian Way/Port Tenant Road.

Whilst relatively “free flow” is achieved at the ATC site, traffic queues back from the signal controlled junction in both directions. Therefore, significant stationary traffic queues west past the block of terraced housing on Port Tennant Road (their facades are within 6m of the EBam itself) and also eastwards in front of the newly constructed Mariners Court block of flats that front onto Fabian Way. The authority also has a passive NO_2 monitoring location front façade of the terraced properties on Port Tennant Road and also several within the general vicinity. Unfortunately, due to unit failure this site has been decommissioned as an EBam PM10. However, a new site has been commissioned measuring NOX and PM2.5, data collection commenced in late December 2018 and will reported upon in next year’s Annual Progress Report.

A map of the site and surrounding area is given below as figure 2.1.1.12

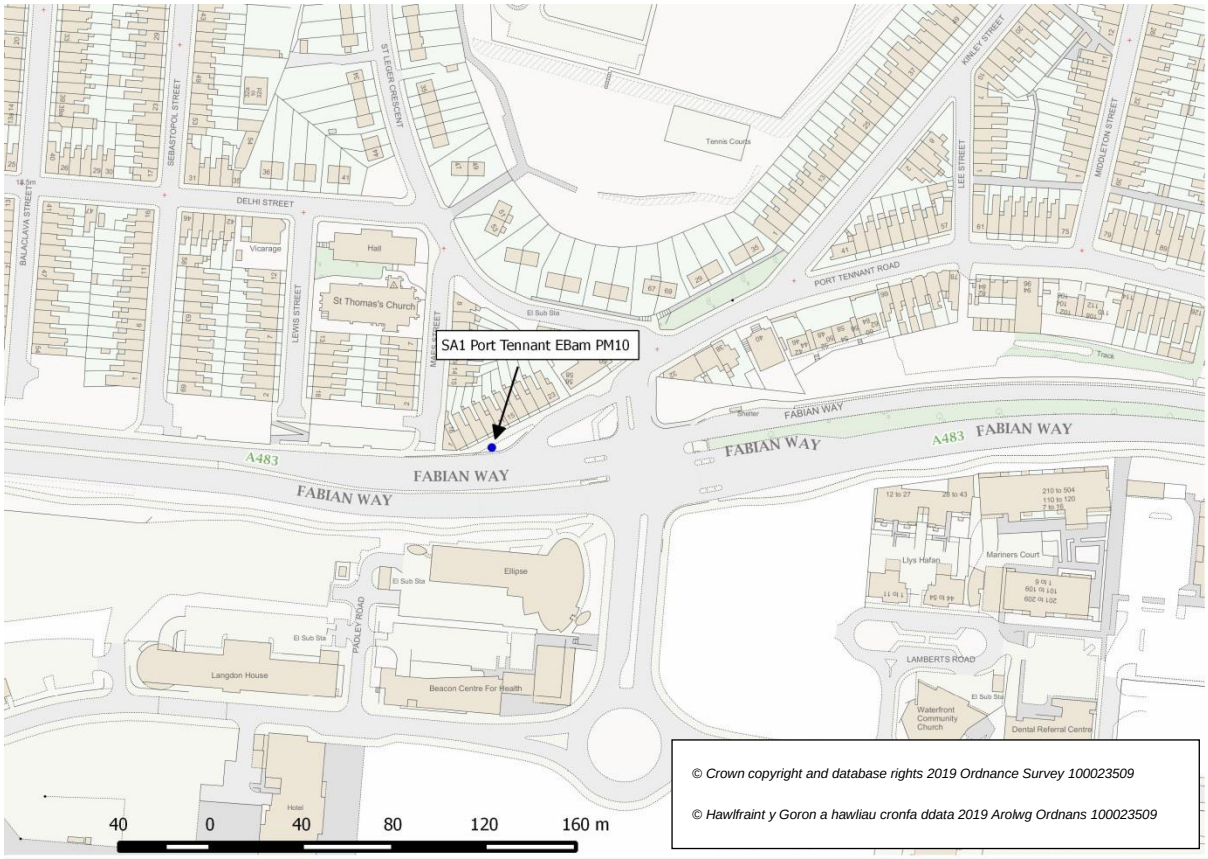


Figure 2.1.1.12 - SA1 Port Tennant EBam PM_{10}

Station Court High Street – Teledyne Chemiluminescent NOx box

The authority has located a real-time chemiluminescent NOx analyser outside a block of flats at Station Court, High Street, Swansea.

The station has been given a site classification of Roadside[2]. Figure 2.1.1.13 below shows its location in relation to a series of bus stops and the block of flats immediately behind the site. The site is opposite Swansea railway station and is heavily influenced by not only the bus stops but congestion caused by its proximity to signal controlled junctions and mini roundabouts. The site lies within the boundary of the existing Swansea 2010 AQMA. Congestion is noticeable most days during peak periods. The sample inlet can be seen in the photograph to the left top of the site enclosure and is at a height of 1.5m.

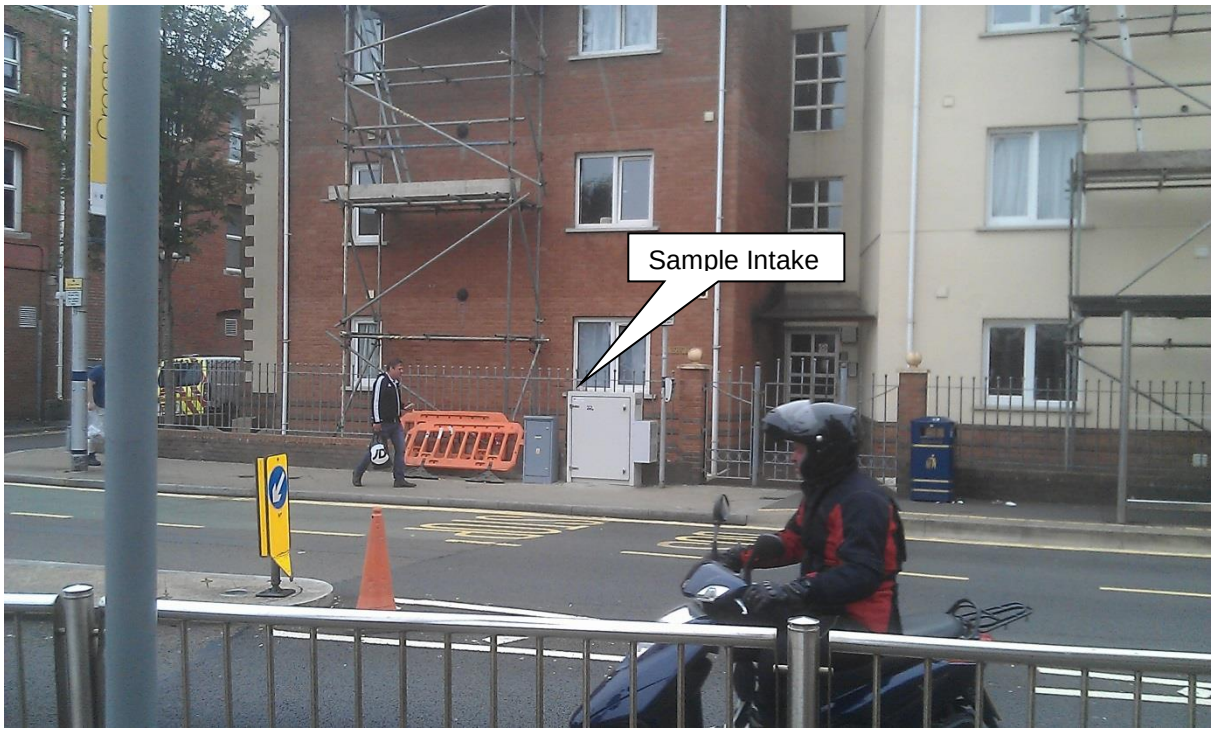


Figure 2.1.1.13 – Station Court, High Street NO_x monitoring site.

All equipment is housed within an air-conditioned unit and operates continuously. The equipment comprises of a Teledyne real-time analyser measuring NO_x . The Teledyne gas analyser has been configured so that a daily automatic calibration is

[2] *Source LAQM.TG(16) Table 7.8 page 7-41*

carried out (between 00:30 hours and 01:00 hours). This calibration data is automatically logged as invalid by the data-logger.

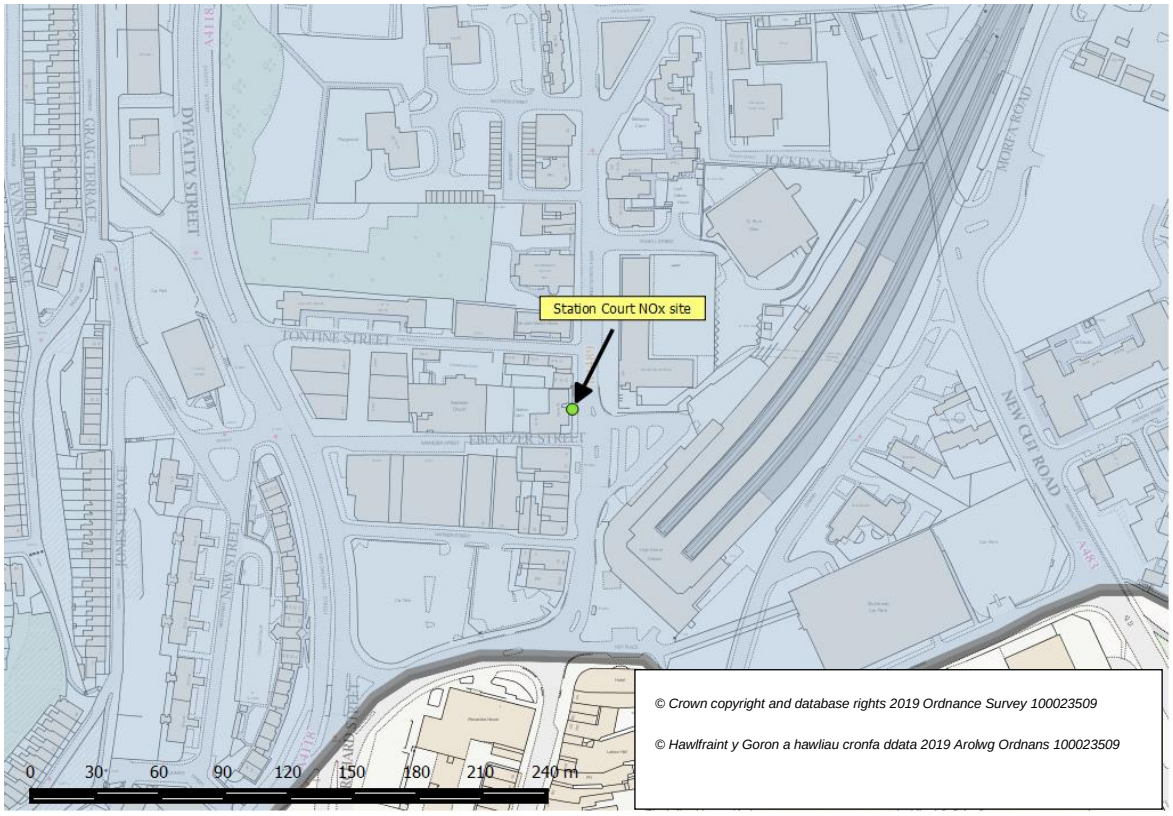


Figure 2.1.1.14 – Station Court High Street, Swansea NOx box

Morfa Road – Teledyne Chemiluminescent NOx box

Swansea Council has added another NOx analyser to its network in 2017 in order to assess the potential exposure at the St Davids Student Accommodation development at the junction of Morfa Road and New Cut Road, at the Southern Boundary of the Hafod area of the Swansea Air Quality Management Area 2010. The analyser is a real-time chemiluminescent NOx analyser and is located at ground level approximately 6.5m from the kerb; the station has been given a site classification of Roadside in line with the site classifications within the 2016 Technical Guidance.

The site was installed on the 28th July 2017.

A map showing the location of the monitoring site is provided in Figure 2.1.1.15 below. Further details on how the monitor is calibrated and how the data has been adjusted are included in Appendix C.

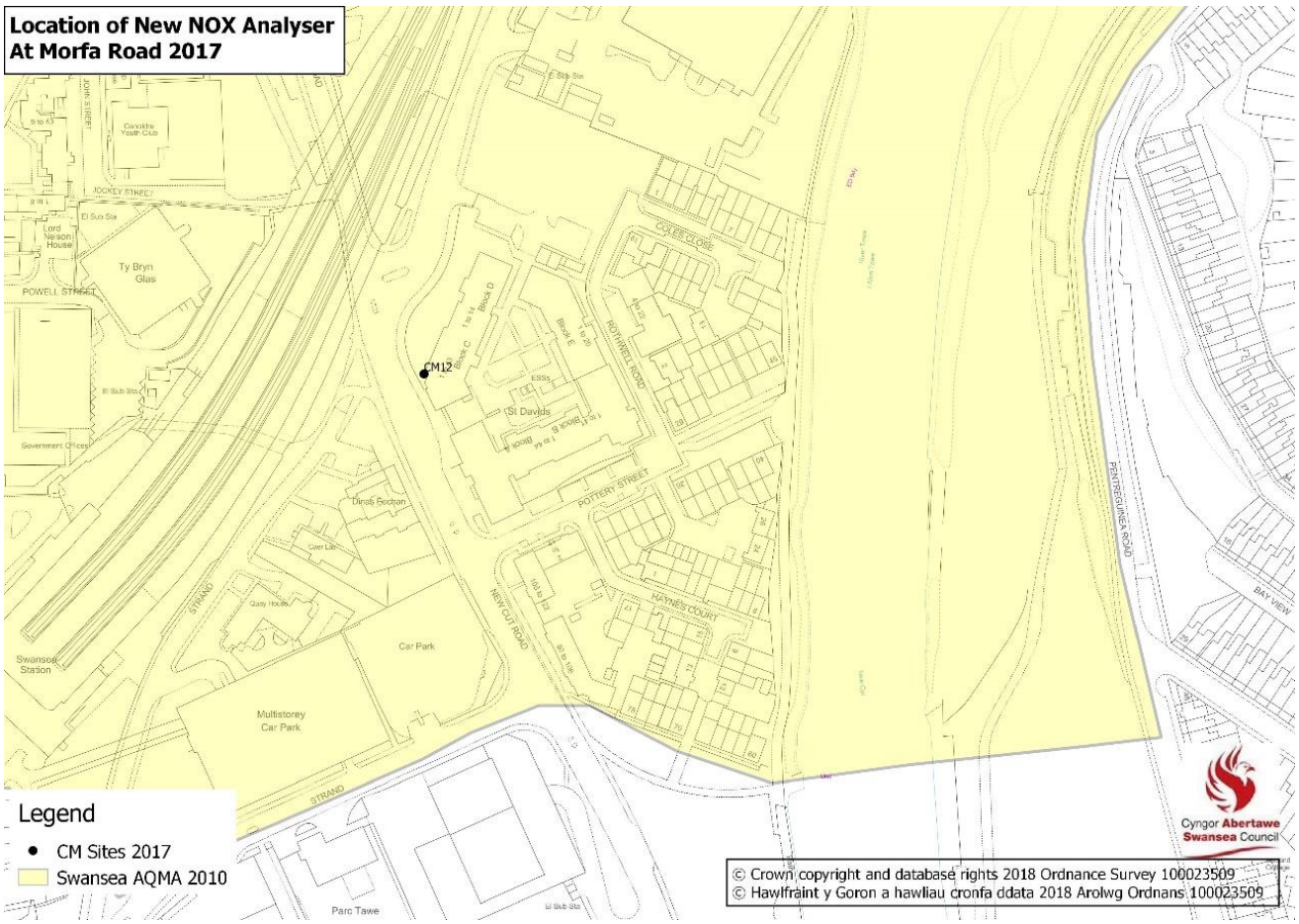


Figure 2.1.1.15 Location of New NOX Analyser at Morfa Road, Swansea (CM12)

Table 2.1 – Details of Automatic Monitoring Sites

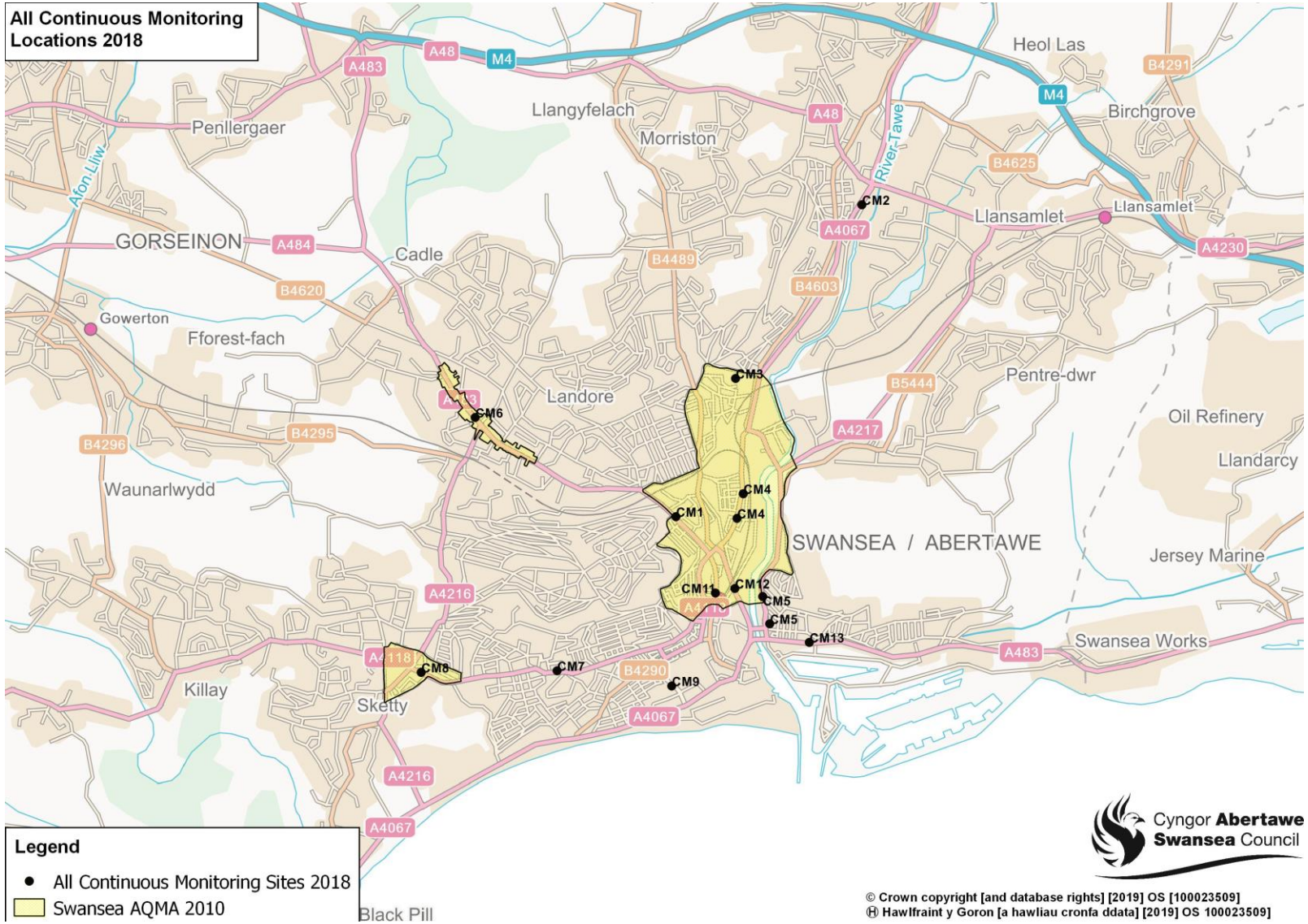
Site ID	Site Name	Site Type	Associated with (Named) AQMA?	OS Grid Reference		Pollutants Monitored	Monitoring Technique	Inlet Height (m)	Distance from monitor to nearest relevant exposure (m) (1)	Distance from Kerb to Nearest Relevant Exposure (m)	Distance from Kerb to Monitor (m)
				X	Y						
CM1	Swansea Roadside AURN	Roadside	Swansea AQMA 2010	265299	194470	NO_2, PM_{10}, $PM_{2.5}$	Chemiluminescence and BAM1020	2.0	16.5	22	4.5
CM2	Morriston Groundhog	Roadside	Swansea AQMA 2010	267210	197674	NO_2, PM_{10} and Ozone	Chemiluminescence, UV Absorption and BAM1020	2.0	22	27	5.0
CM3	Cwm Level Park	Urban Background	Swansea AQMA 2010	265912	195890	NO_2 and Ozone	Chemiluminescence, UV Absorption	1.5			78
CM4	Hafod Doas	Roadside	Swansea AQMA 2010	Transmitter 265927 Receiver 265991	Transmitter 194453 Receiver 194706	NO_2, Ozone and Benzene	Differential Optical Absorption Spectrometry	4.0	0	1.5	1.5
CM5	St Thomas DOAS	Roadside		Transmitter 266191 Receiver 193650	Transmitter 266263 Receiver 193370	NO_2, SO_2, Ozone and Benzene	Differential Optical Absorption Spectrometry	4.0	7.5	0.2	7.3
CM6	Fforestfach Cross	Roadside	Swansea AQMA 2010	263236	195489	PM_{10}	EBam	3.0	22	25	3

Site ID	Site Name	Site Type	Associated with (Named) AQMA?	OS Grid Reference		Pollutants Monitored	Monitoring Technique	Inlet Height (m)	Distance from monitor to nearest relevant exposure (m) (1)	Distance from Kerb to Nearest Relevant Exposure (m)	Distance from Kerb to Monitor (m)
				X	Y						
CM7	Uplands Crescent	Roadside		264078	192888	PM_{10}	EBam	3.0	13	14	1
CM8	Sketty Cross	Roadside	Swansea AQMA 2010	262681	192871	PM_{10}	EBam	3.0	15	16	1
CM9	Westway Quadrant Bus Station	Roadside		265256	192731	PM_{10}	EBam	3.0	13	15	2
CM11	Station Court High Street	Roadside	Swansea AQMA 2010	265705	193686	NO_2	Chemiluminescence	1.5	3	5	2
CM12	Morfa Road	Roadside	Swansea AQMA 2010	265905	193733	NO_2	Chemiluminescence	1.5	0	6	6
CM13	SA1 Junction Port Tennant	Roadside		266670	193179	$PM_{2.5}$ and NO_2	Chemiluminescence and BAM1020	1.5	9	12	3

Notes:

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

Figure 2.1 – Map of Automatic Monitoring Sites https://airquality.gov.wales/



2.1.2 Non-Automatic Monitoring Sites

Swansea Council undertook non-automatic (passive) monitoring of NO_2 at 211 sites during 2018 of which 7 were closed at the end of 2018.

Table 2.2 presents the details of the sites.

Over the years Swansea Council has focused its NO_2 diffusion tube monitoring at roadside locations in-line with the requirements of Box 5.1 of the Local Air Quality Management Technical Guidance (TG16). Wherever possible, passive diffusion tubes are located directly on receptor locations – typically front façade of dwellings, mainly on front down pipes etc. Where this has not been possible, the tubes have been located on the nearest lamppost etc. to the dwelling and concentrations corrected to façade.

Maps showing the location of the monitoring sites are provided in figure 2.1.2.1. Due to the number of passive diffusion tube locations, it is not possible to label the site numbers clearly within figure 2.1.2.1 so additional maps have been provided to show a more detailed view of the monitoring locations.

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

Table 2.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Type	Within AMQA	OS Grid Reference		Site Height (m)	Map showing Site Location
			X	Y		
5	Roadside	Y	262548	192943	3	2.1.2.7
6	Roadside	Y	262612	192995	3	2.1.2.7
7	Roadside	Y	262691	192852	3	2.1.2.7
8	Roadside	Y	262990	195820	3	2.1.2.3
10	Roadside	Y	263219	195513	3	2.1.2.3
11	Roadside	Y	263344	195474	3	2.1.2.3
12	Roadside	Y	263680	195103	3	2.1.2.3
13	Roadside		264830	193066	3	2.1.2.6
14	Roadside		265285	192696	3	2.1.2.6
15	Roadside		265334	192608	3	2.1.2.6
16	Roadside		265339	192534	3	2.1.2.6
18	Roadside	Y	265526	195807	3	2.1.2.4
19	Roadside	Y	265597	194061	3	2.1.2.4
20	Roadside	Y	265594	194175	3	2.1.2.4
22	Roadside	Y	265682	195374	3	2.1.2.4
23	Roadside	Y	265728	195494	3	2.1.2.4
26	Roadside	Y	265876	194318	3	2.1.2.4
27	Roadside	Y	265922	194428	3	2.1.2.4
29	Roadside	Y	265973	195222	3	2.1.2.4
31	Roadside		266153	196003	3	2.1.2.4
32	Roadside		266209	193867	3	2.1.2.4
33	Roadside		266236	193488	3	2.1.2.5
35	Roadside		266314	193298	3	2.1.2.5
36	Roadside		266455	193300	3	2.1.2.5
40	Roadside		266951	198278	3	2.1.2.9
41	Roadside		266953	198085	3	2.1.2.9
43	Roadside		267093	198063	3	2.1.2.9
44	Roadside		267639	199543	3	2.1.2.9
45	Roadside		267661	199451	3	2.1.2.9
48	Roadside		268011	193101	3	2.1.2.5
50	Roadside		268530	197419	3	2.1.2.9
54	Roadside		268693	197416	3	2.1.2.9
55	Roadside		268789	197420	3	2.1.2.9
56 *	Roadside		269306	198661	3	2.1.2.9
58	Roadside		264052	192884	3	2.1.2.6
59	Roadside	Y	265918	194463	3	2.1.2.4
60	Roadside		265036	192931	3	2.1.2.6
61	Roadside		264959	192878	3	2.1.2.6
63	Roadside	Y	262675	192775	3	2.1.2.7
64	Roadside	Y	262719	192840	3	2.1.2.7
65	Roadside	Y	262735	192855	3	2.1.2.7
66	Roadside	Y	262802	192829	3	2.1.2.7
67	Roadside	Y	265903	193683	3	2.1.2.5
68	Roadside		265573	193432	3	2.1.2.5
69	Roadside		265543	193450	3	2.1.2.5
70	Roadside		266649	195435	3	2.1.2.4
71 **	Roadside		266514	195485	3	2.1.2.4
75	Roadside		264072	192869	2	2.1.2.6
83	Roadside	Y	262785	192838	2	2.1.2.7
84	Roadside	Y	262714	192839	2	2.1.2.7
85	Roadside	Y	262702	192847	2	2.1.2.7
86	Roadside	Y	262704	192865	2	2.1.2.7
87	Roadside	Y	262697	192798	2	2.1.2.7
88	Roadside	Y	262605	192916	2	2.1.2.7
89	Roadside	Y	262587	192956	2	2.1.2.7
90	Roadside	Y	262631	192996	2	2.1.2.7
91	Roadside	Y	262534	192950	2	2.1.2.7

Site ID	Site Type	Within AMQA	OS Grid Reference		Site Height (m)	Map showing Site Location
			X	Y		
94	Roadside		263444	195572	2	2.1.2.3
95	Roadside		262815	196090	2	2.1.2.3
96	Roadside		262922	195950	2	2.1.2.3
97	Roadside	Y	262946	195902	2	2.1.2.3
98	Roadside	Y	263142	195548	2	2.1.2.3
99	Roadside	Y	263387	195332	2	2.1.2.3
102	Roadside		266379	193307	2	2.1.2.5
104	Roadside		268538	197389	2	2.1.2.9
107	Roadside		268765	197420	2	2.1.2.9
110	Roadside		267369	199521	2	2.1.2.9
111	Roadside		267705	199426	2	2.1.2.9
114	Roadside		264622	192971	2	2.1.2.6
115	Roadside		265031	193097	2	2.1.2.6
116	Roadside		265192	193138	2	2.1.2.6
117	Roadside		265288	193211	2	2.1.2.6
⊗118	Roadside		265483	193385	2	2.1.2.5
119	Roadside		265522	193390	2	2.1.2.5
120	Roadside		265570	193366	3	2.1.2.5
121	Roadside	Y	265706	193662	2	2.1.2.5
122	Roadside		265694	193505	3	2.1.2.5
123	Roadside		265655	193423	2	2.1.2.5
⊗124	Roadside		265651	193253	2	2.1.2.5
⊗125	Roadside		265641	193162	3	2.1.2.5
⊗126	Roadside		265475	193144	2	2.1.2.5
⊗127	Roadside		265348	193110	2	2.1.2.6
⊗128	Roadside		265297	193085	2	2.1.2.6
⊗129	Roadside		265153	193098	2	2.1.2.6
131	Roadside		265137	192846	2	2.1.2.6
132	Roadside		265229	192753	3	2.1.2.6
⊗134	Roadside		265113	192903	2	2.1.2.6
^135	Roadside	Y	262605	192916	5	2.1.2.7
^136	Roadside	Y	262612	192995	5	2.1.2.7
^137	Roadside	Y	262631	192996	5	2.1.2.7
180	Roadside		259064	197781	3	2.1.2.2
182	Roadside		259050	197790	3	2.1.2.2
197	Roadside		258797	198701	3	2.1.2.2
198	Roadside		258811	198701	3	2.1.2.8
206	Roadside		261565	188211	3	2.1.2.8
207	Roadside		261561	188222	3	2.1.2.8
208	Roadside		261541	188215	3	2.1.2.8
209	Roadside		261534	188198	3	2.1.2.8
210	Roadside		261516	188207	3	2.1.2.8
211	Roadside		261501	188188	3	2.1.2.8
212	Roadside		261486	188200	3	2.1.2.8
213	Roadside		261490	188186	3	2.1.2.4
240	Roadside		266169	195995	3	2.1.2.4
241	Roadside		266159	196013	3	2.1.2.4
242	Roadside		265655	193423	3	2.1.2.4
243	Roadside		265474	194949	3	2.1.2.4
244	Roadside	Y	265466	194930	3	2.1.2.4
245	Roadside	Y	265448	194922	3	2.1.2.4
247	Roadside	Y	265394	194899	3	2.1.2.4
249	Roadside	Y	265326	194871	3	2.1.2.4
251	Roadside	Y	265263	194845	3	2.1.2.4
256	Roadside		264995	194777	3	2.1.2.4
275	Roadside	Y	265658	194856	3	2.1.2.4
276	Roadside	Y	265610	194871	2	2.1.2.4
277	Roadside	Y	265596	194875	2	2.1.2.4
278	Roadside	Y	265573	194882	2	2.1.2.4

Site ID	Site Type	Within AMQA	OS Grid Reference		Site Height (m)	Map showing Site Location
			X	Y		
279	Roadside	Y	265555	194926	2	2.1.2.4
280	Roadside	Y	265542	194980	2	2.1.2.4
281	Roadside	Y	265542	194872	2.5	2.1.2.4
282	Roadside	Y	265540	194840	2.5	2.1.2.4
284	Roadside		265452	195899	2	2.1.2.4
285	Roadside		266955	197415	2	2.1.2.9
286	Roadside		266938	197377	2	2.1.2.9
287	Roadside	Y	265715	193902	2	2.1.2.4
288	Roadside	Y	265698	193878	2	2.1.2.4
289	Roadside	Y	265702	193842	2	2.1.2.4
291	Roadside		267952	193121	2	2.1.2.5
295	Roadside		258998	198698	3	2.1.2.2
296	Roadside		259054	198679	2	2.1.2.2
323	Roadside		266765	193224	2	2.1.2.5
331	Roadside		265741	193545	2	2.1.2.5
333	Roadside		265673	193477	2	2.1.2.5
334	Roadside		265688	193483	2	2.1.2.5
335	Roadside		265682	193461	2	2.1.2.5
336	Roadside		265664	193395	2	2.1.2.5
337	Roadside		265637	193335	2	2.1.2.5
338	Roadside		265651	193331	2	2.1.2.5
339	Roadside		265652	193313	2	2.1.2.5
340	Roadside		265632	193292	2	2.1.2.5
341	Roadside		265635	193224	2	2.1.2.5
342	Roadside		265655	193197	2	2.1.2.5
343	Roadside		265640	193173	2	2.1.2.5
344	Roadside		265658	193169	2	2.1.2.5
345	Roadside		265661	193140	2	2.1.2.5
346	Roadside		265681	193096	2	2.1.2.5
347	Roadside	Y	265562	193518	2	2.1.2.5
348	Roadside	Y	265572	193549	2	2.1.2.5
349	Roadside	Y	265578	193576	2	2.1.2.5
350	Roadside	Y	265577	193606	2	2.1.2.5
351	Roadside		265606	193466	2	2.1.2.5
352	Roadside		265602	193429	2	2.1.2.5
353	Roadside		265596	193389	2	2.1.2.5
354	Roadside		265595	193377	2	2.1.2.5
355	Roadside		265574	193269	2	2.1.2.5
356	Roadside		265471	193359	2	2.1.2.5
357	Roadside		265498	193162	2	2.1.2.5
358	Roadside		265414	193141	2	2.1.2.5
359	Roadside		265396	193111	2	2.1.2.6
362	Roadside		265271	192774	2	2.1.2.6
363	Roadside		265287	192797	2	2.1.2.6
364	Roadside		265301	192814	2	2.1.2.6
365	Roadside		265258	193075	2	2.1.2.6
366	Roadside		265237	193056	2	2.1.2.6
367	Roadside		265189	193044	2	2.1.2.6
368	Roadside		265143	193083	2	2.1.2.6
373	Roadside		258859	196513	2	2.1.2.2
374	Roadside		258824	196435	2	2.1.2.2
375	Roadside		258798	196371	2	2.1.2.2
376	Roadside		258765	196368	2	2.1.2.2
377	Roadside		258763	196317	2	2.1.2.2
378	Roadside		258722	196365	2	2.1.2.2
385	Roadside		267001	198231	2	2.1.2.4
386	Roadside		266698	195334	3	2.1.2.4
387	Roadside		267990	193091	2	2.1.2.5
388	Roadside		267964	193076	2	2.1.2.5

Site ID	Site Type	Within AMQA	OS Grid Reference		Site Height (m)	Map showing Site Location
			X	Y		
389	Roadside		267933	193111	2	2.1.2.5
390	Roadside		267974	193132	2	2.1.2.5
391	Roadside		259467	198509	2	2.1.2.2
393	Roadside	Y	262620	192740	2	2.1.2.7
394	Roadside	Y	262445	192645	2	2.1.2.7
395	Roadside	Y	262413	192630	2	2.1.2.7
396	Roadside	Y	262370	192609	2	2.1.2.7
397	Roadside		265407	197414	2	2.1.2.9
398	Roadside		265584	197442	2	2.1.2.9
399	Roadside		265224	197412	2	2.1.2.9
400	Roadside		265172	197360	2	2.1.2.9
401	Roadside		265243	197312	2	2.1.2.9
402	Roadside	Y	265907	193721	3	2.1.2.4
403	Façade		265115	192895	5	2.1.2.6
404	Roadside		261713	199051	2	2.1.2.2
405	Roadside		267981	193053	2	2.1.2.5
406	Façade	Y	265973	195222	2	2.1.2.4
407	Façade	Y	265539	195664	2	2.1.2.4
408	Roadside		266655	193177	2	2.1.2.5
409	Roadside		265093	192953	2	2.1.2.6
410	Roadside		265156	192992	2	2.1.2.6
411	Roadside		265257	193042	2	2.1.2.6
412	Roadside		258957	196766	2	2.1.2.2
413	Roadside		258950	196721	2	2.1.2.2
414	Façade		262928	194409	2	2.1.2.3
415	Roadside		270242	197671	2	2.1.2.9
416	Roadside		270487	197805	2	2.1.2.9
417	Roadside		270485	197705	2	2.1.2.9
418	Roadside		270449	197600	2	2.1.2.9
419	Roadside		270475	197714	2	2.1.2.9
420	Façade		261784	190385	2	2.1.2.10
421	Roadside		262700	196214	2	2.1.2.3
422	Roadside		260149	195425	2	2.1.2.2
423	Roadside		260136	195411	2	2.1.2.2
424	Roadside	Y	265536	194752	2	2.1.2.4
425	Roadside	Y	265509	194748	2	2.1.2.4

Figure 2.1.2.1 – Map of Non-Automatic Monitoring Sites

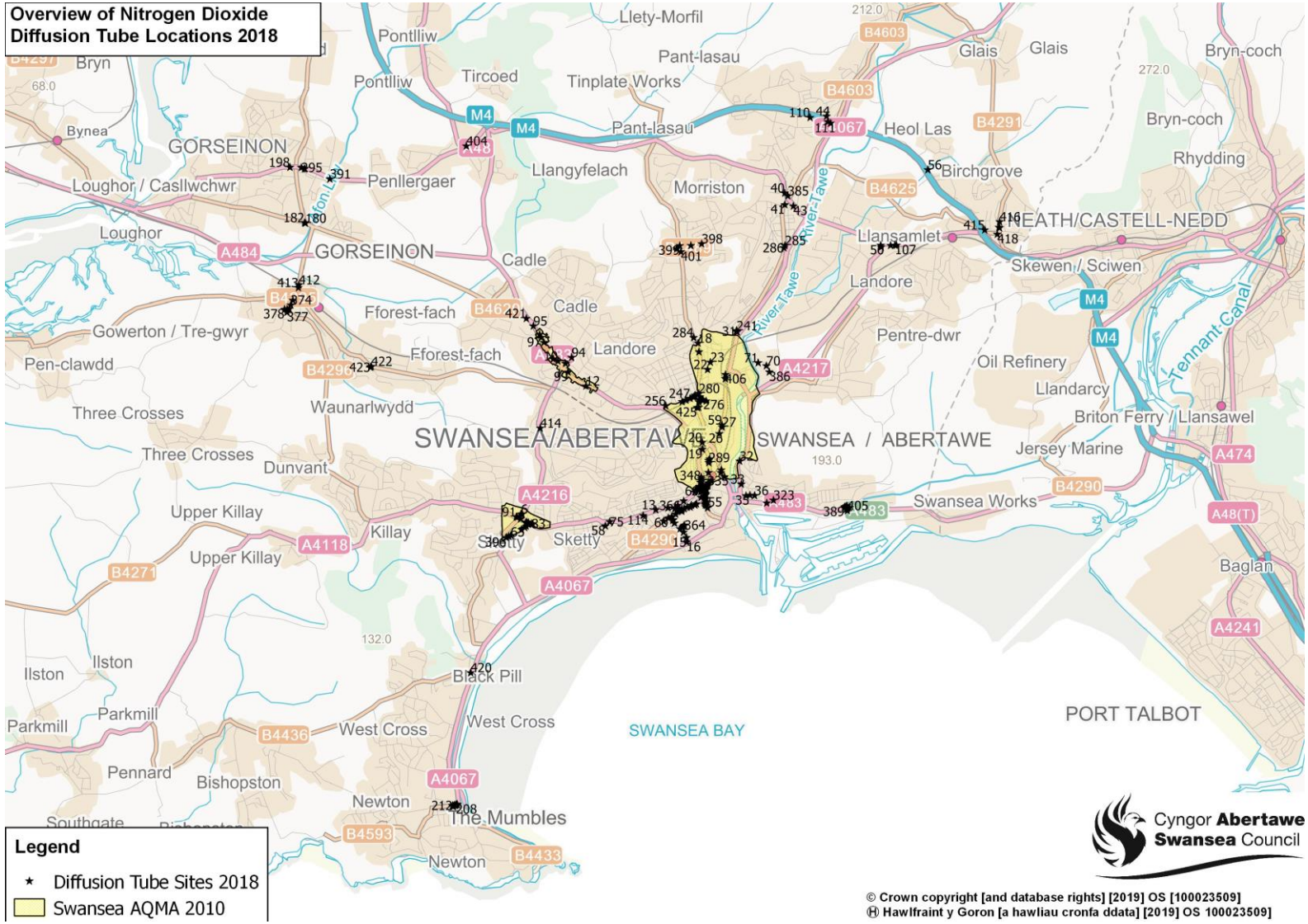


Figure 2.1.2.2 – Map of Non-Automatic Monitoring Sites

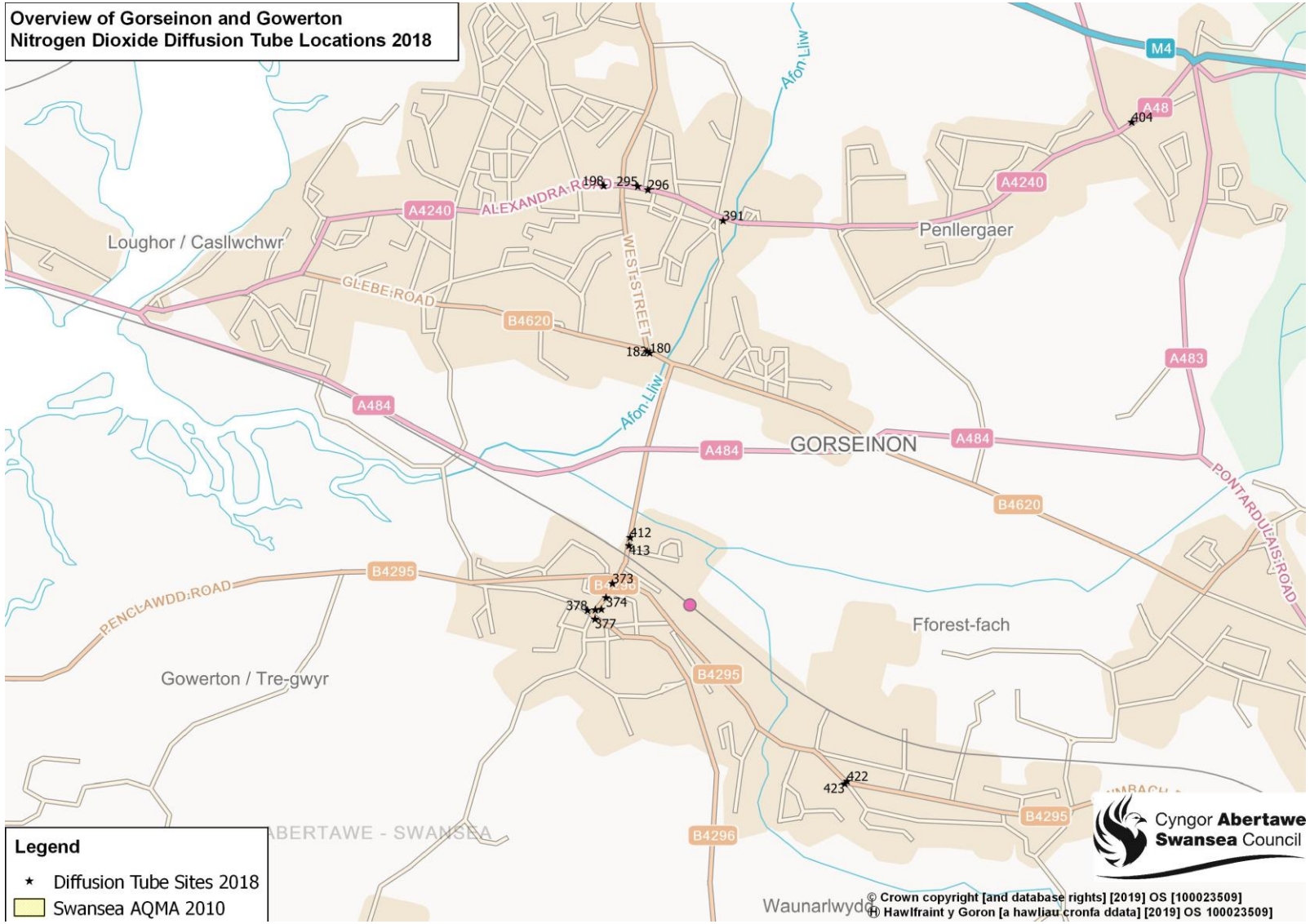


Figure 2.1.2.3 – Map of Non-Automatic Monitoring Sites

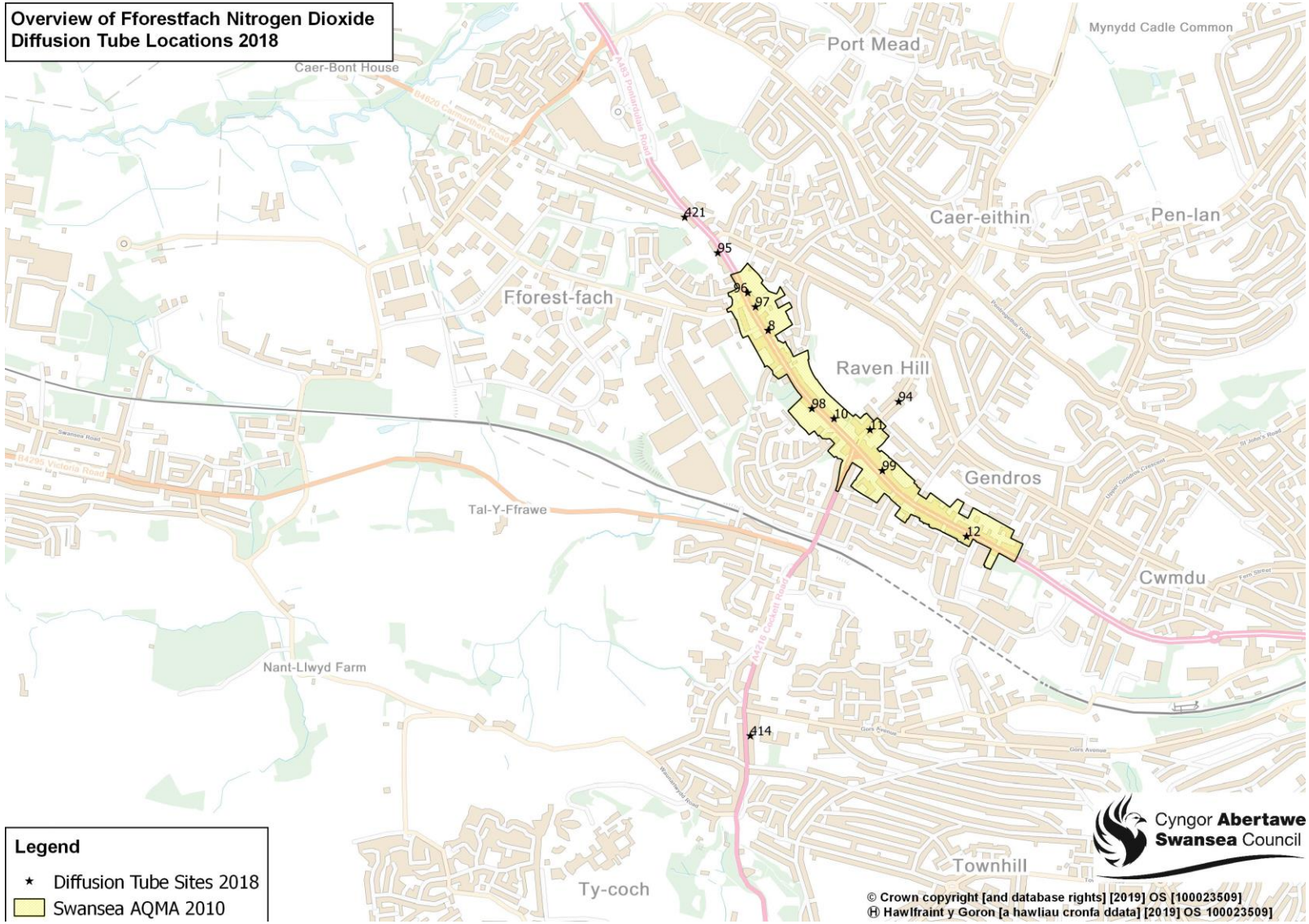


Figure 2.1.2.4 – Map of Non-Automatic Monitoring Sites

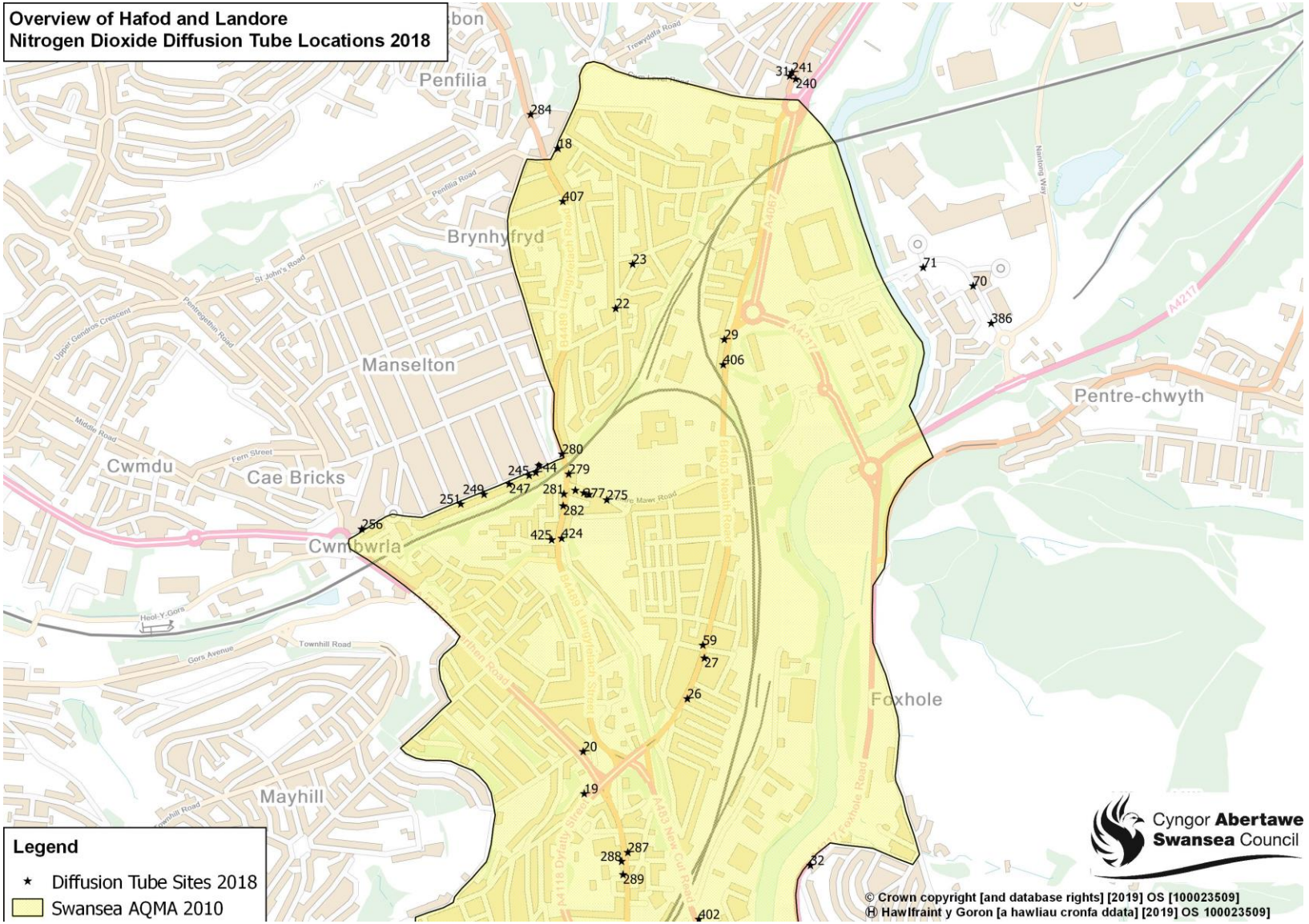


Figure 2.1.2.5 – Map of Non-Automatic Monitoring Sites

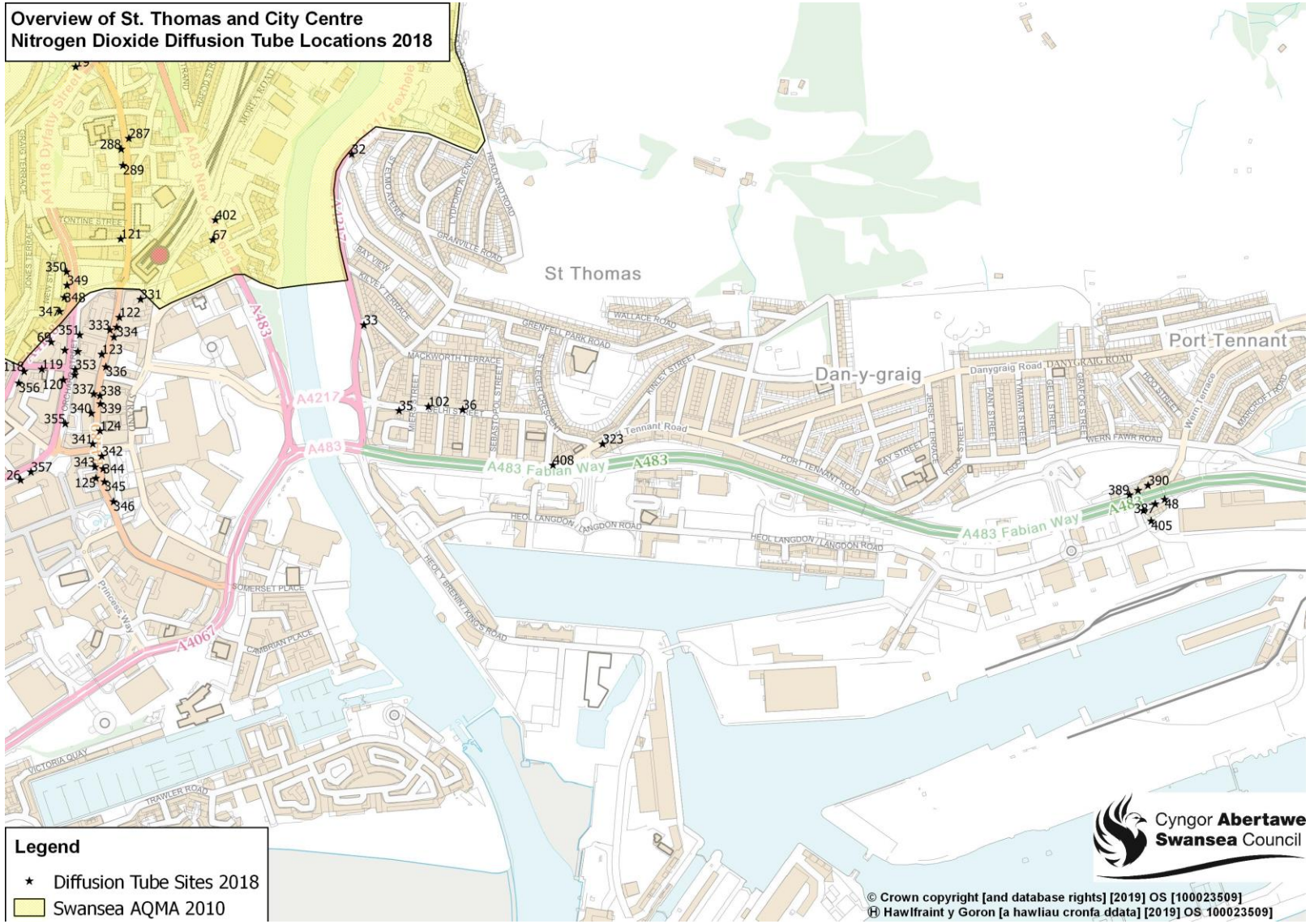


Figure 2.1.2.6 – Map of Non-Automatic Monitoring Sites

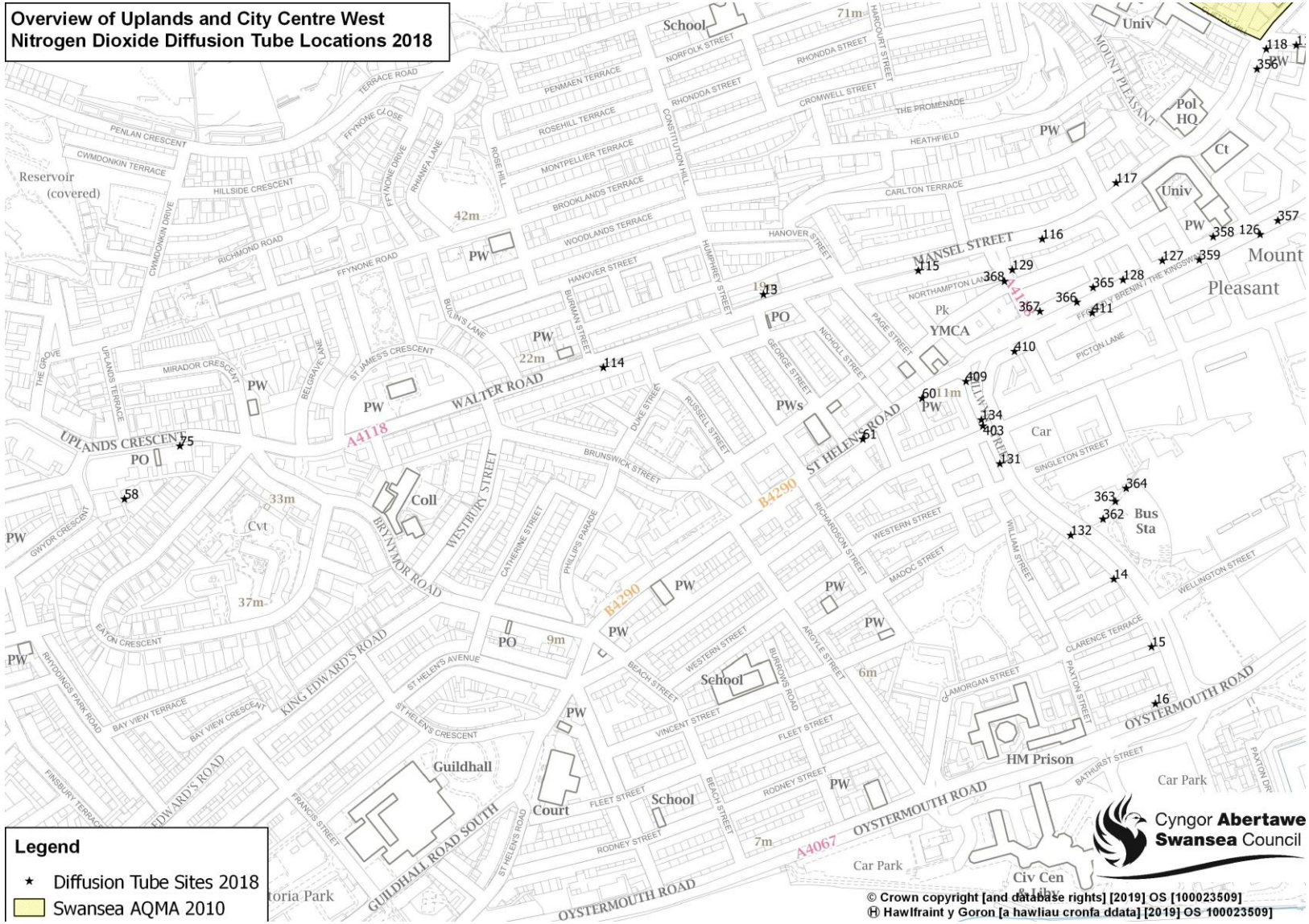


Figure 2.1.2.7 – Map of Non-Automatic Monitoring Sites

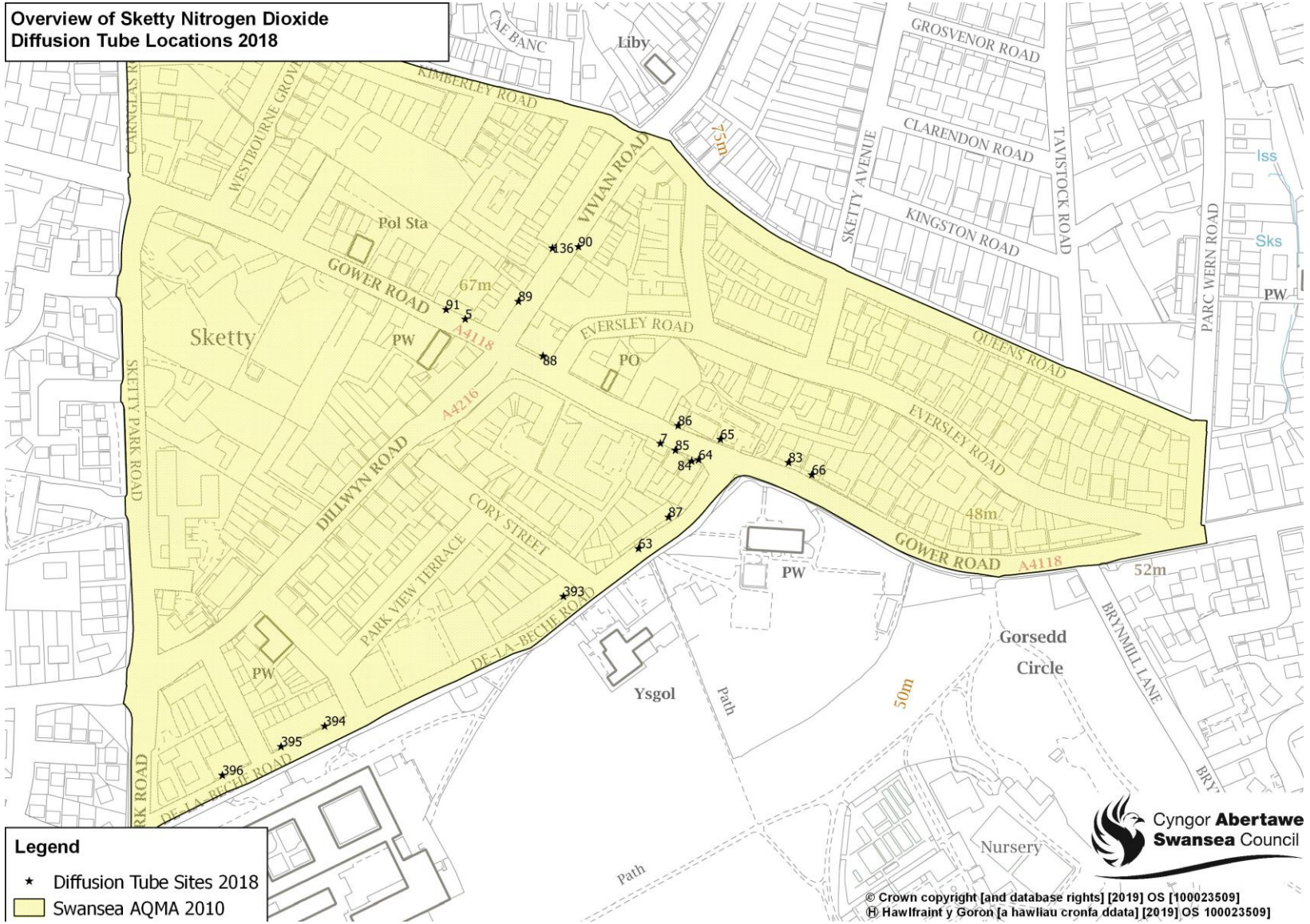


Figure 2.1.2.8 – Map of Non-Automatic Monitoring Sites

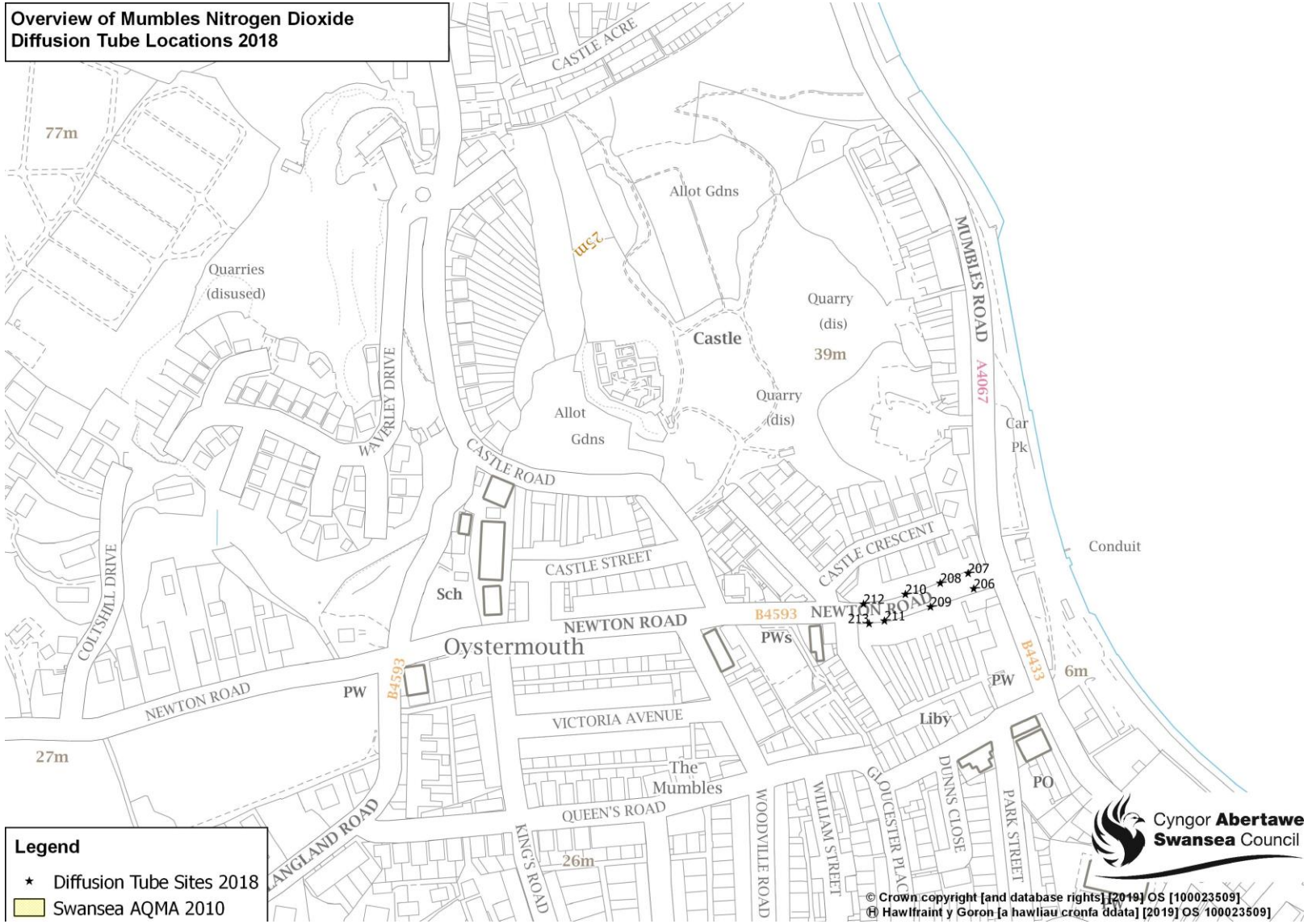


Figure 2.1.2.9 – Map of Non-Automatic Monitoring Sites

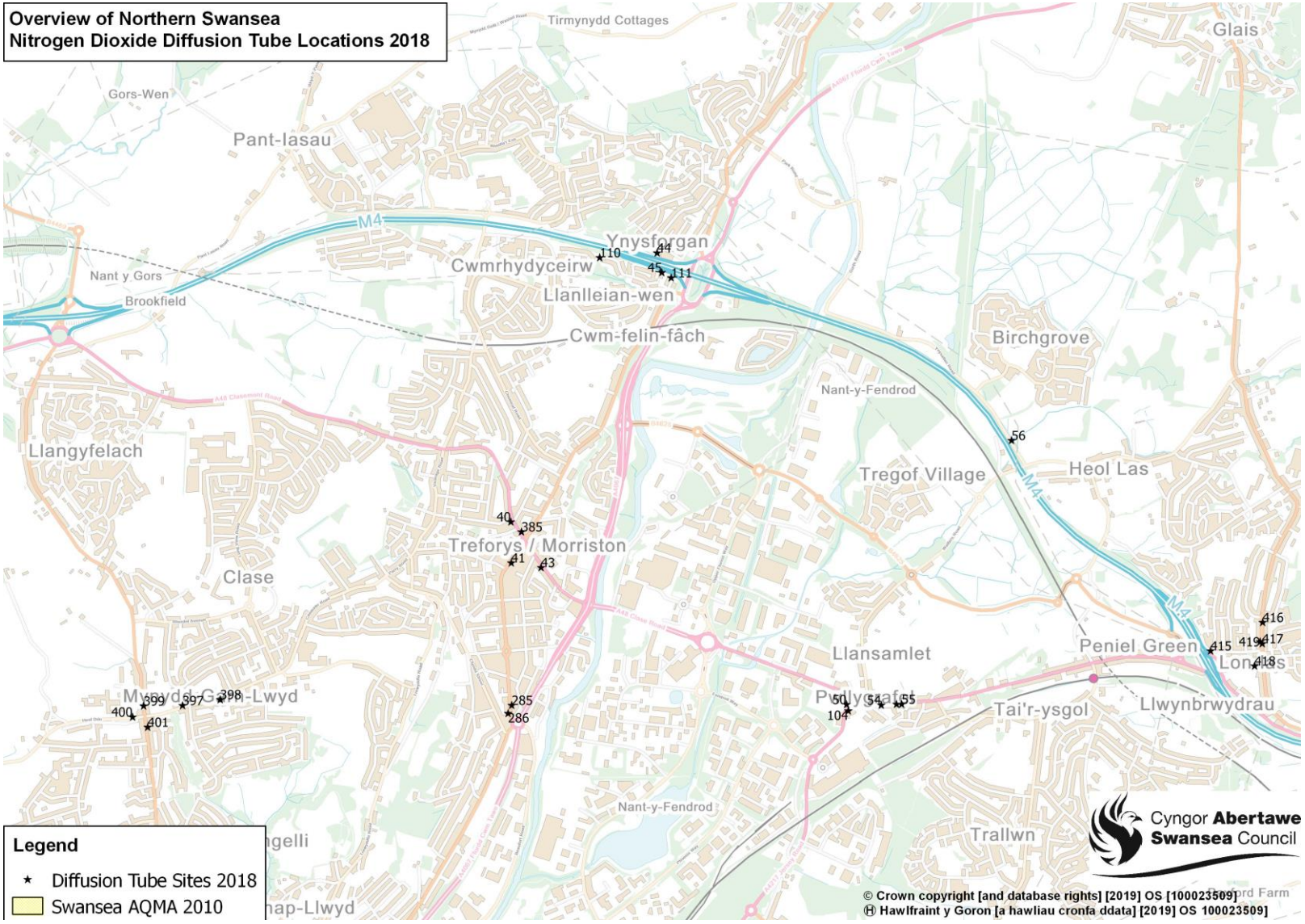
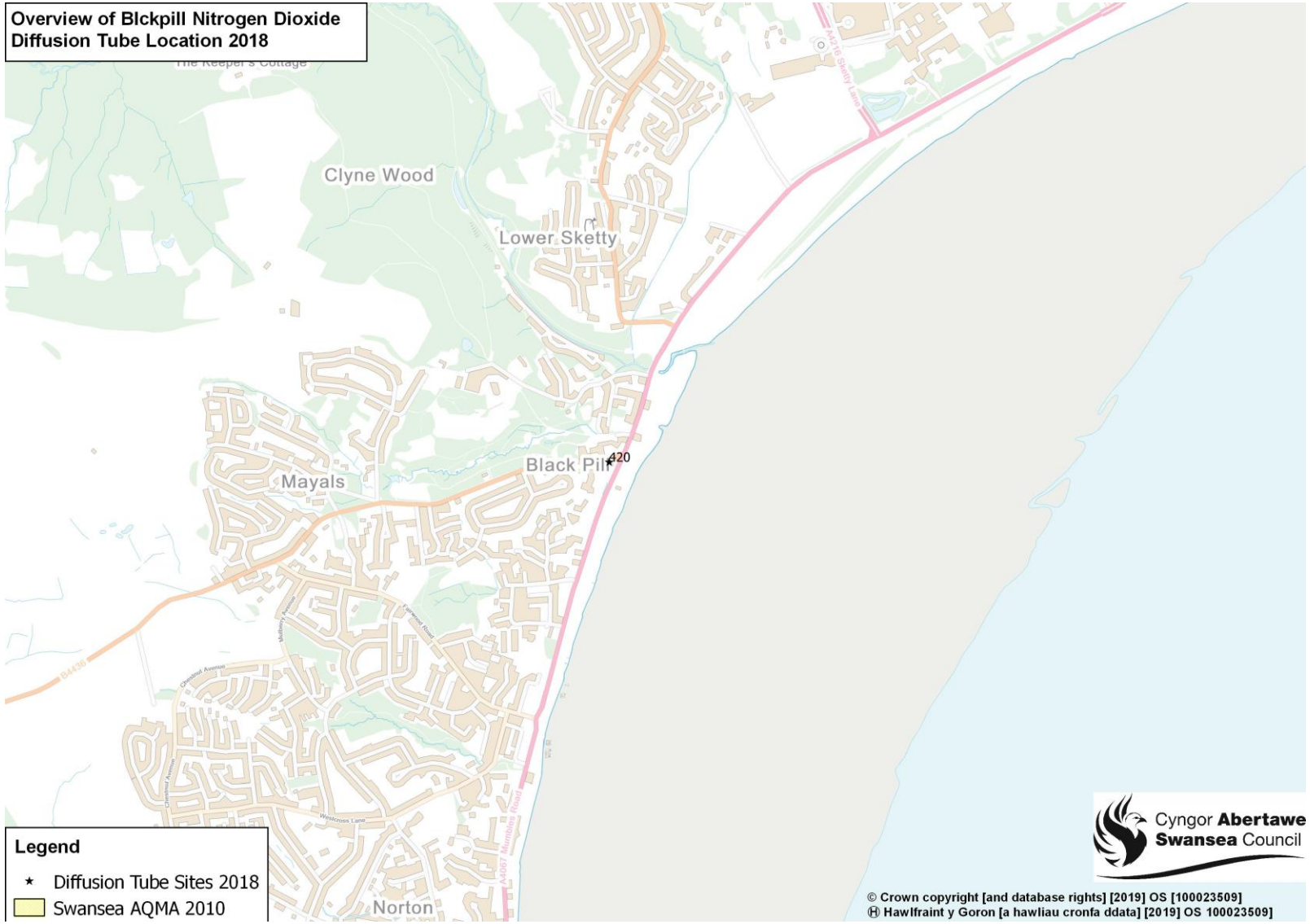


Figure 2.1.2.10 – Map of Non-Automatic Monitoring Sites



2.2 2018 Air Quality Monitoring Results

Table 2.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
				2014	2015	2016	2017	2018
CM1	Roadside	Automatic	98.71	25 (30.76)	23 (27.43)	24.4 (30.37)	20 (24.41)	18.7 (23.50)
CM2	Roadside	Automatic	99.94	21.1 (25.89)	20.5 (25.02)	22.3 (29.69)	20.6 (29.14)	18.1 (23.1)
CM3	Urban Background	Automatic	95.66	17.08	14.75	16.39	13.41	14.46
CM4	Façade	Automatic	99.19	48.99	40.24	45.59	40.04	37.29
CM5	Roadside	Automatic	91.23	35.83	33.71	35.83	32.19	30.30
CM11	Roadside	Automatic	85.41	56.85*	50.9 (54.52)	48.3 (51.76)	44 (47.20)	39 (45.87)
CM12	Roadside	Automatic	77.41	N/A	N/A	N/A	25.73***	26.18
CM13	Roadside	Automatic	3.11%	N/A	N/A	N/A	N/A	27 (34.50)
5	Roadside	Diffusion Tube	100.00	32.46	29.70	31.65	28.35	25.52
6	Roadside	Diffusion Tube	100.00	28.52	26.57	27.58	23.11	21.35
7	Roadside	Diffusion Tube	83.33	**48.66**	**42.69**	**45.84**	**39.05**	34.17
8	Roadside	Diffusion Tube	83.33	**41.76**	**40.36**	**46.59**	34.63	33.62
10	Roadside	Diffusion Tube	100.00	24.97	23.94	24.52	20.80	19.76
11	Roadside	Diffusion Tube	83.33	**37.58**	33.81	**37.19**	30.32	28.42
12	Roadside	Diffusion Tube	100.00	**42.78**	**38.39**	**42.72**	34.80	33.16
13	Roadside	Diffusion Tube	41.67	27.78	25.66	27.40	22.58	21.49
14	Roadside	Diffusion Tube	91.67	24.30	23.86	24.95	19.54	19.98
15	Roadside	Diffusion Tube	100.00	24.45	24.30	26.39	22.10	20.78
16	Roadside	Diffusion Tube	100.00	28.61	26.80	31.35	26.64	23.61
18	Roadside	Diffusion Tube	100.00	**45.85**	**42.07**	**46.38**	**37.06**	36.10
19	Roadside	Diffusion Tube	83.33	**42.61**	**39.14**	**44.11**	**38.29**	36.69
20	Roadside	Diffusion Tube	100.00	**37.74**	35.42	33.73	29.87	29.30
22	Roadside	Diffusion Tube	100.00	31.43	29.91	32.02	26.78	24.76
23	Roadside	Diffusion Tube	41.67	28.49	28.69	30.29	24.27	22.53
26	Roadside	Diffusion Tube	100.00	**38.59**	35.44	38.43	29.54	27.70
27	Roadside	Diffusion Tube	100.00	**39.25**	34.78	36.69	29.33	28.87

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
				2014	2015	2016	2017	2018
29	Roadside	Diffusion Tube	100.00	**47.36**	**48.90**	**48.42**	30.14	24.34
31	Roadside	Diffusion Tube	25.00	31.70	28.42	30.16	25.29	22.25
32	Roadside	Diffusion Tube	100.00	33.38	30.15	33.88	26.73	26.09
33	Roadside	Diffusion Tube	100.00	31.33	29.45	31.69	26.64	25.33
35	Roadside	Diffusion Tube	83.33	32.21	31.35	33.53	27.76	26.95
36	Roadside	Diffusion Tube	91.67	27.49	26.49	29.74	24.85	22.77
40	Roadside	Diffusion Tube	91.67	27.42	24.83	26.17	22.06	20.44
41	Roadside	Diffusion Tube	100.00	35.33	31.89	33.05	26.77	28.09
43	Roadside	Diffusion Tube	100.00	36.22	32.16	34.75	28.62	27.73
44	Roadside	Diffusion Tube	100.00	27.35	26.55	26.08	23.86	20.96
45	Roadside	Diffusion Tube	100.00	30.78	28.19	30.92	23.28	22.89
48	Roadside	Diffusion Tube	91.67	21.72	19.59	22.15	17.44	18.18
50	Roadside	Diffusion Tube	100.00	36.43	33.79	38.03	30.77	28.66
54	Roadside	Diffusion Tube	91.67	33.93	31.38	31.26	26.61	26.31
55	Roadside	Diffusion Tube	100.00	32.31	31.04	31.21	25.92	26.38
56	Roadside	Diffusion Tube	100.00	22.00	22.20	20.7	15.84	27.53
58	Roadside	Diffusion Tube	91.67	29.70	28.50	33.8	27.38	24.62
59	Roadside	Diffusion Tube	100.00	**50.28**	**47.78**	**48.41**	**39.60**	34.99
60	Roadside	Diffusion Tube	100.00	34.21	29.70	30.19	26.39	25.37
61	Roadside	Diffusion Tube	100.00	**38.16**	33.93	36.75	27.92	26.01
63	Roadside	Diffusion Tube	100.00	21.00	19.40	22	16.50	15.77
64	Roadside	Diffusion Tube	41.67	**38.30**	36.10	32.8	26.94	31.11
65	Roadside	Diffusion Tube	100.00	24.77	21.99	25.77	21.45	20.62
66	Roadside	Diffusion Tube	100.00	26.45	26.53	29.48	24.13	20.50
67	Roadside	Diffusion Tube	75.00	35.60	**37.20**	**39.8**	32.41	34.06
68	Roadside	Diffusion Tube	100.00	36.13	34.87	34.99	28.34	25.07
69	Roadside	Diffusion Tube	58.33	**40.30**	35.60	34.9	30.71	33.54
70	Roadside	Diffusion Tube	91.67	24.80	25.60	24.1	20.20	18.07
71	Roadside	Diffusion Tube	91.67	25.00	24.50	26	17.98	16.49
75	Roadside	Diffusion Tube	91.67	**39.99**	34.02	34.53	30.43	28.00
83	Roadside	Diffusion Tube	100.00	27.41	25.97	28.07	22.87	21.35
84	Roadside	Diffusion Tube	100.00	35.13	33.81	33.92	27.53	24.74
85	Roadside	Diffusion Tube	91.67	35.62	35.28	35.78	29.11	26.05
86	Roadside	Diffusion Tube	91.67	25.51	23.97	32.27	22.63	19.11
87	Roadside	Diffusion Tube	91.67	20.80	18.93	20.64	17.10	14.31

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
				2014	2015	2016	2017	2018
88	Roadside	Diffusion Tube	91.67	28.21	28.37	30.67	26.07	22.99
89	Roadside	Diffusion Tube	100.00	20.12	20.09	25.23	18.04	16.98
90	Roadside	Diffusion Tube	100.00	32.61	30.02	31.39	24.54	23.63
91	Roadside	Diffusion Tube	100.00	29.28	27.46	29.04	25.47	25.18
94	Roadside	Diffusion Tube	100.00	28.09	25.66	24.32	22.81	20.98
95	Roadside	Diffusion Tube	75.00	25.23	21.38	24.12	21.19	18.48
96	Roadside	Diffusion Tube	100.00	26.20	25.55	27.99	22.27	20.29
97	Roadside	Diffusion Tube	91.67	31.62	31.44	35.64	28.24	25.98
98	Roadside	Diffusion Tube	83.33	36.21	33.05	34.33	27.34	27.32
99	Roadside	Diffusion Tube	91.67	32.73	28.84	31.04	27.03	23.81
102	Roadside	Diffusion Tube	83.33	27.96	27.87	29.77	26.60	24.15
104	Roadside	Diffusion Tube	100.00	27.70	27.13	26.76	22.05	21.97
107	Roadside	Diffusion Tube	100.00	32.23	29.49	30.83	26.20	24.55
110	Roadside	Diffusion Tube	91.67	25.75	24.67	23.75	20.51	19.70
111	Roadside	Diffusion Tube	58.33	27.15	30.15	30.61	24.61	20.70
114	Roadside	Diffusion Tube	41.67	30.07	27.48	27.47	23.00	22.44
115	Roadside	Diffusion Tube	100.00	**40.40**	35.25	35.09	30.64	28.96
116	Roadside	Diffusion Tube	100.00	**38.73**	35.63	**37.65**	33.13	31.98
117	Roadside	Diffusion Tube	100.00	35.30	33.91	**37.12**	30.09	30.50
118	Roadside	Diffusion Tube	83.33	29.33	28.69	28.96	24.84	25.75
119	Roadside	Diffusion Tube	91.67	34.78	32.05	31.34	27.92	28.33
120	Roadside	Diffusion Tube	33.33	**47.24**	**44.76**	**44.82**	35.72	26.52
121	Roadside	Diffusion Tube	100.00	**52.71**	**47.29**	**48.01**	**38.60**	38.31
122	Roadside	Diffusion Tube	100.00	34.83	30.16	32.09	25.90	28.99
123	Roadside	Diffusion Tube	91.67	**47.00**	**39.54**	**46.44**	36.09	36.60
124	Roadside	Diffusion Tube	83.33	**38.43**	**37.73**	**39.60**	32.41	33.14
125	Roadside	Diffusion Tube	100.00	**37.90**	**37.10**	**38**	32.04	32.26
126	Roadside	Diffusion Tube	91.67	**40.64**	36.91	34.91	27.61	26.10
127	Roadside	Diffusion Tube	100.00	**44.26**	34.70	34.1	26.42	25.49
128	Roadside	Diffusion Tube	91.67	**38.82**	**37.00**	**38.06**	30.64	29.33
129	Roadside	Diffusion Tube	100.00	32.56	32.94	**37.11**	30.40	29.71
131	Roadside	Diffusion Tube	83.33	**44.79**	**44.75**	**42.02**	29.77	30.72
132	Roadside	Diffusion Tube	100.00	27.11	29.66	32.29	26.70	25.84
134	Roadside	Diffusion Tube	100.00	**42.65**	**44.25**	**42.10**	33.47	31.58
135	Roadside	Diffusion Tube	100.00	-	-	29.66	27.16	22.39

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
				2014	2015	2016	2017	2018
136	Roadside	Diffusion Tube	41.67	25.53	27.14	25.18	23.29	21.59
137	Roadside	Diffusion Tube	91.67	32.63	29.19	31.16	24.75	24.90
180	Roadside	Diffusion Tube	100.00	29.67	29.10	30.98	24.43	24.67
182	Roadside	Diffusion Tube	100.00	28.71	27.04	28.48	24.22	20.87
197	Roadside	Diffusion Tube	100.00	34.22	29.69	33.54	28.10	26.63
198	Roadside	Diffusion Tube	83.33	35.56	32.13	33.20	28.22	26.45
206	Roadside	Diffusion Tube	83.33	**42.50**	**38.05**	**41.79**	33.98	30.39
207	Roadside	Diffusion Tube	100.00	32.85	32.16	**37.74**	29.70	27.02
208	Roadside	Diffusion Tube	100.00	35.06	34.28	**37.23**	29.22	28.60
209	Roadside	Diffusion Tube	100.00	**40.72**	35.21	**39.21**	30.51	29.28
210	Roadside	Diffusion Tube	100.00	32.69	29.54	33.33	26.57	25.76
211	Roadside	Diffusion Tube	100.00	33.04	30.98	26.74	26.15	25.55
212	Roadside	Diffusion Tube	100.00	23.93	24.06	29.00	17.75	19.42
213	Roadside	Diffusion Tube	100.00	34.86	30.81	34.88	27.13	25.55
240	Roadside	Diffusion Tube	100.00	31.37	29.30	31.09	26.16	25.44
241	Roadside	Diffusion Tube	91.67	30.31	28.76	30.83	25.31	24.53
242	Roadside	Diffusion Tube	100.00	**40.94**	35.68	**43.29**	32.08	33.20
243	Roadside	Diffusion Tube	100.00	35.75	33.98	**38.88**	32.08	28.57
244	Roadside	Diffusion Tube	91.67	**44.02**	**42.71**	**43.19**	33.95	35.82
245	Roadside	Diffusion Tube	100.00	**42.03**	**39.32**	**42.32**	32.10	33.92
247	Roadside	Diffusion Tube	100.00	35.00	31.80	32.87	25.49	25.98
249	Roadside	Diffusion Tube	100.00	34.95	30.54	31.55	25.69	25.02
251	Roadside	Diffusion Tube	83.33	31.52	30.24	31.56	24.35	24.65
256	Roadside	Diffusion Tube	91.67	**38.21**	**37.18**	**37.86**	32.51	31.73
275	Roadside	Diffusion Tube	100.00	22.60	22.20	22.5	18.20	17.64
276	Roadside	Diffusion Tube	100.00	34.17	31.91	34.64	30.62	25.65
277	Roadside	Diffusion Tube	100.00	36.72	34.17	34.73	29.17	27.61
278	Roadside	Diffusion Tube	100.00	36.15	33.12	35.22	26.61	27.88
279	Roadside	Diffusion Tube	100.00	**49.83**	**43.53**	**47.31**	**41.31**	37.54
280	Roadside	Diffusion Tube	100.00	**41.10**	**37.70**	**38.7**	31.30	31.61
281	Roadside	Diffusion Tube	91.67	33.40	34.50	34.8	28.49	27.58
282	Roadside	Diffusion Tube	100.00	32.10	31.00	33.5	28.27	25.85
284	Roadside	Diffusion Tube	100.00	32.14	29.51	30.51	26.13	24.99
285	Roadside	Diffusion Tube	100.00	32.57	30.90	31.47	26.74	26.52
286	Roadside	Diffusion Tube	100.00	34.35	30.40	32.30	26.89	26.60

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
				2014	2015	2016	2017	2018
287	Roadside	Diffusion Tube	83.33	29.53	28.04	28.84	24.48	24.04
288	Roadside	Diffusion Tube	91.67	31.48	29.69	30.19	23.55	26.84
289	Roadside	Diffusion Tube	100.00	32.95	32.08	33.04	27.70	26.89
291	Roadside	Diffusion Tube	100.00	**39.73**	**38.54**	**41.05**	35.61	32.32
295	Roadside	Diffusion Tube	91.67	30.70	28.50	31.7	26.79	23.69
296	Roadside	Diffusion Tube	100.00	35.59	31.10	36.27	31.25	28.19
323	Roadside	Diffusion Tube	100.00	33.62	30.33	34.30	29.61	26.44
331	Roadside	Diffusion Tube	100.00	-	34.78	36.26	30.62	32.54
333	Roadside	Diffusion Tube	16.67	-	33.20	36.5	28.05	31.72
334	Roadside	Diffusion Tube	91.67	-	29.74	31.68	25.81	27.22
335	Roadside	Diffusion Tube	100.00	-	28.23	29.6	24.12	25.38
336	Roadside	Diffusion Tube	91.67	-	33.97	36.64	30.35	29.99
337	Roadside	Diffusion Tube	100.00	-	35.90	**37.1**	31.60	29.09
338	Roadside	Diffusion Tube	83.33	-	32.80	36.03	29.62	29.90
339	Roadside	Diffusion Tube	100.00	-	**40.39**	**37.76**	30.87	33.14
340	Roadside	Diffusion Tube	100.00	-	**46.67**	**49.03**	**40.98**	41.32
341	Roadside	Diffusion Tube	100.00	-	36.50	40.3	32.56	31.03
342	Roadside	Diffusion Tube	100.00	-	30.00	34.7	27.60	28.73
343	Roadside	Diffusion Tube	100.00	-	34.58	35.15	29.22	26.13
344	Roadside	Diffusion Tube	83.33	-	26.40	31.1	24.94	23.98
345	Roadside	Diffusion Tube	100.00	-	29.50	30.2	24.12	25.06
346	Roadside	Diffusion Tube	100.00	-	34.08	34.27	28.29	29.78
347	Roadside	Diffusion Tube	100.00	-	31.77	36.32	27.49	25.72
348	Roadside	Diffusion Tube	100.00	-	35.90	36.04	28.67	27.96
349	Roadside	Diffusion Tube	100.00	-	33.39	35.65	28.77	26.79
350	Roadside	Diffusion Tube	100.00	-	**38.06**	**39.52**	33.20	31.08
351	Roadside	Diffusion Tube	100.00	-	27.05	27.85	24.26	27.32
352	Roadside	Diffusion Tube	100.00	-	30.95	29.46	24.09	29.79
353	Roadside	Diffusion Tube	83.33	-	29.10	25.8	21.76	25.06
354	Roadside	Diffusion Tube	83.33	-	29.80	28	24.12	27.94
355	Roadside	Diffusion Tube	83.33	-	27.90	27.8	23.83	29.16
356	Roadside	Diffusion Tube	91.67	-	27.50	31.52	25.04	27.45
357	Roadside	Diffusion Tube	50.00	-	28.80	27.6	23.31	33.21
358	Roadside	Diffusion Tube	83.33	-	32.50	30.1	24.05	23.40
359	Roadside	Diffusion Tube	75.00	-	33.70	33.4	25.53	19.44

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
				2014	2015	2016	2017	2018
362	Roadside	Diffusion Tube	91.67	-	36.53	**42.23**	35.13	34.28
363	Roadside	Diffusion Tube	100.00	-	35.28	35.42	28.44	26.96
364	Roadside	Diffusion Tube	83.33	-	34.75	**39.49**	32.55	32.71
365	Roadside	Diffusion Tube	66.67	-	30.40	31.85	23.19	27.47
366	Roadside	Diffusion Tube	66.67	-	31.04	35.42	27.88	31.72
367	Roadside	Diffusion Tube	91.67	-	29.52	32.16	28.77	28.23
368	Roadside	Diffusion Tube	41.67	-	25.80	28.1	23.61	27.81
373	Roadside	Diffusion Tube	100.00	-	-	34.33	28.49	27.25
374	Roadside	Diffusion Tube	41.67	-	-	25.5	19.39	22.27
375	Roadside	Diffusion Tube	100.00	-	-	18.24	14.66	14.42
376	Roadside	Diffusion Tube	100.00	-	-	30.40	25.00	24.83
377	Roadside	Diffusion Tube	100.00	-	-	34.98	29.90	28.24
378	Roadside	Diffusion Tube	41.67	-	-	18	13.91	17.10
385	Roadside	Diffusion Tube	91.67	-	-	25.08	21.82	20.62
386	Roadside	Diffusion Tube	100.00	-	-	26.7	22.87	22.32
387	Roadside	Diffusion Tube	100.00	-	-	19.79	18.14	16.56
388	Roadside	Diffusion Tube	100.00	-	-	18.67	17.16	15.95
389	Roadside	Diffusion Tube	100.00	-	-	**46.12**	**38.37**	35.56
390	Roadside	Diffusion Tube	100.00	-	-	**37.04**	30.83	29.70
391	Roadside	Diffusion Tube	100.00	-	-	27.02	24.32	22.42
393	Roadside	Diffusion Tube	100.00	-	-	16.7	14.28	12.82
394	Roadside	Diffusion Tube	100.00	-	-	16.79	16.17	13.96
395	Roadside	Diffusion Tube	100.00	-	-	17.88	15.84	15.11
396	Roadside	Diffusion Tube	100.00	-	-	21.00	18.41	16.22
397	Roadside	Diffusion Tube	100.00	-	-	-	14.28	13.25
398	Roadside	Diffusion Tube	91.67	-	-	-	11.10	10.58
399	Roadside	Diffusion Tube	100.00	-	-	-	17.46	19.08
400	Roadside	Diffusion Tube	100.00	-	-	-	20.79	18.94
401	Roadside	Diffusion Tube	100.00	-	-	-	22.20	21.46
402	Roadside	Diffusion Tube	75.00	-	-	-	24.42	21.60
403	Façade	Diffusion Tube	83.33	-	-	-	32.12	29.64
404	Roadside	Diffusion Tube	91.67	-	-	-	19.09	19.58
405	Roadside	Diffusion Tube	100.00	-	-	-	10.06	11.30
406	Façade	Diffusion Tube	91.67	-	-	-	33.49	30.88
407	Façade	Diffusion Tube	100.00	-	-	-	20.79	19.38

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
408	Roadside	Diffusion Tube	91.67	-	-	**40.4**	35.89	30.74
409	Roadside	Diffusion Tube	41.67	-	-	-	**46.55****	26.45
410	Roadside	Diffusion Tube	33.33	-	-	-	18.72**	23.26
411	Roadside	Diffusion Tube	33.33	-	-	-	19.68**	22.40
412	Roadside	Diffusion Tube	100.00	-	-	-	21.79	21.47
413	Roadside	Diffusion Tube	100.00	-	-	-	24.36	24.25
414	Façade	Diffusion Tube	66.67					20.34
415	Roadside	Diffusion Tube	58.33					29.58
416	Roadside	Diffusion Tube	58.33					20.28
417	Roadside	Diffusion Tube	58.33					24.52
418	Roadside	Diffusion Tube	50.00					24.62
419	Roadside	Diffusion Tube	58.33					24.43
420	Façade	Diffusion Tube	8.33					33.40
421	Roadside	Diffusion Tube	0.00					-
422	Roadside	Diffusion Tube	8.33					18.09
423	Roadside	Diffusion Tube	8.33					13.64
424	Roadside	Diffusion Tube	16.67					23.25
425	Roadside	Diffusion Tube	16.67					24.12

Notes:

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

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

(1) Data capture for the 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) Means for diffusion tubes have been corrected for bias. All means have been “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.

Figure 2.2.1 – Trends in Annual Mean NO_2 Concentrations

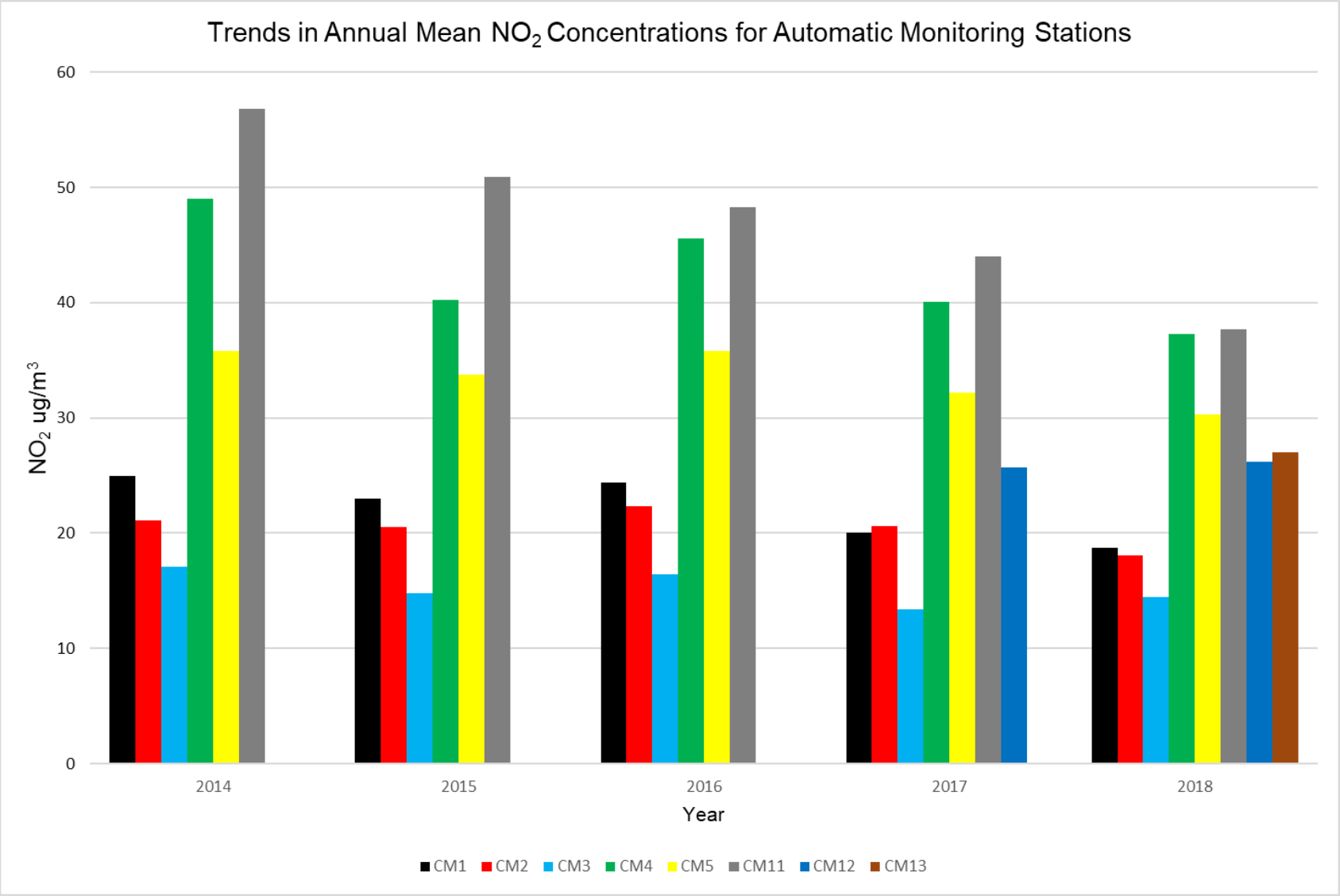


Table 2.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
				2014	2015	2016	2017	2018
CM1	Roadside	Automatic	98.71	0	0	0	0	0
CM2	Roadside	Automatic	99.94	0	0	1	0	0
CM3	Urban Background	Automatic	95.66	0	0	0	0	0
CM4	Façade	Automatic	99.19	1	0	4	1	0
CM5	Roadside	Automatic	91.23	0	0	0	0	0
CM11	Roadside	Automatic	91.18	5 (194.7)	2	1	0	0
CM12	Roadside	Automatic	77.41	-	-	-	0 (69.69)	1 (34.60)
CM13	Roadside	Automatic	3.11%	-	-	-	-	0 (35.69)

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Table 2.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
			2014	2015	2016	2017	2018
CM1	Roadside	96.29	20.29	20.20	19.14	18.9	19.69
CM2	Roadside	-	13.18	-	-	-	-
CM6	Roadside	26.18	19.02	16.25	12.91	10.61	9.9(3)
CM7	Roadside	34.37	17.18	14.76	13.2	11.13	12.46(3)
CM8	Roadside	45.49	18.28	18.72	15.28	11.43	14.65(3)
CM9	Roadside	78.37	17.27	16.62	14.4	9.74	11.39
CM10	Roadside	-	14.49	11.98	11.93	12.11	-

Notes:

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

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

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

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

Figure 2.2.2 – Trends in Annual Mean PM_{10} Concentrations

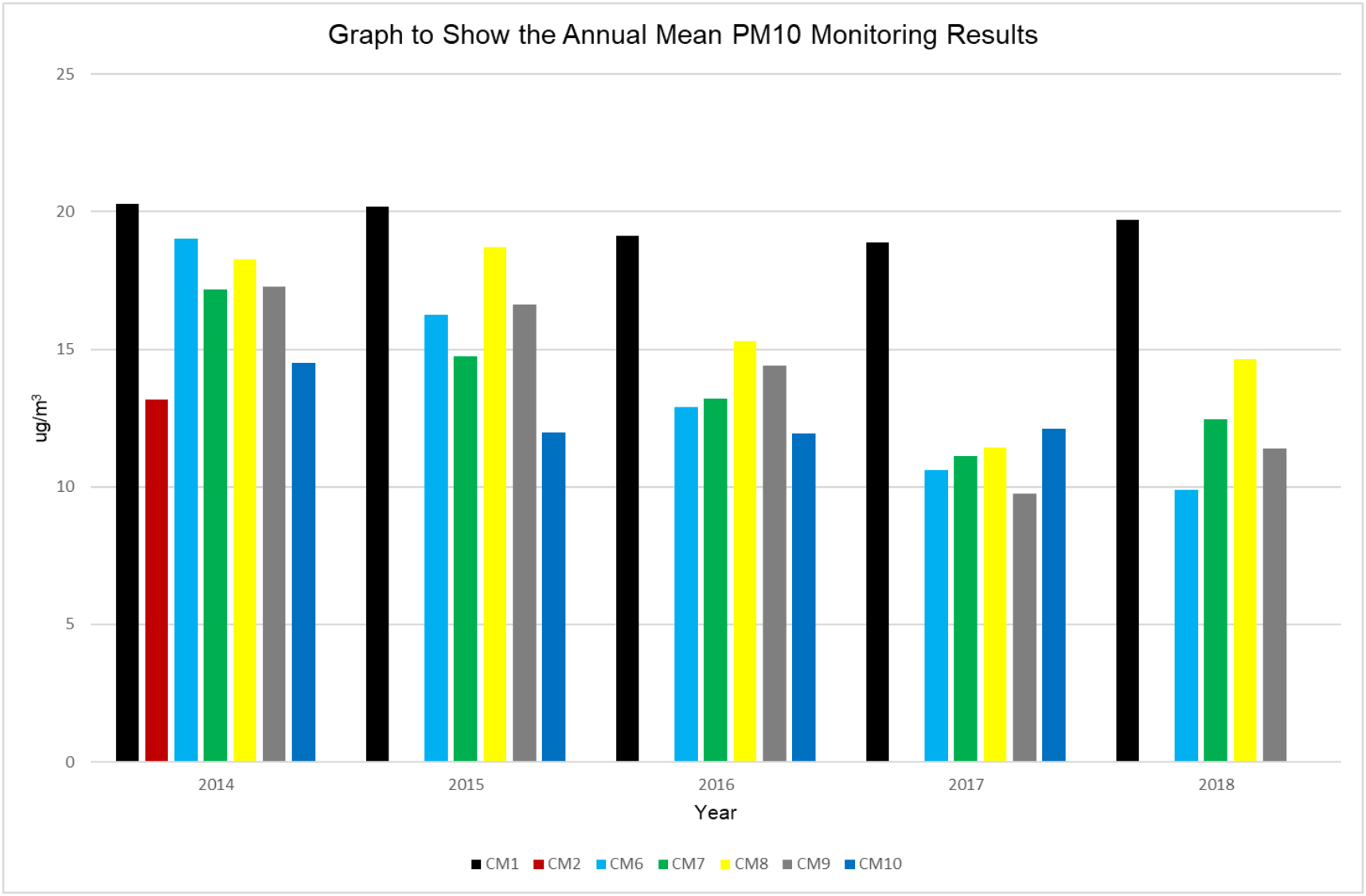


Table 2.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m³ (3)				
			2014	2015	2016	2017	2018
CM1	Roadside	96.29	2	2	0	1	0
CM2	Roadside	-	0	1 (19.7)	-	-	-
CM6	Roadside	26.18	5 (27.9)	1	0	0	0 (15.03)
CM7	Roadside	34.37	1 (25.2)	1	0	0	0 (18.55)
CM8	Roadside	45.49	3	1	1	0	0 (22.63)
CM9	Roadside	78.37	4	2	0	0	0 (17.83)
CM10	Roadside	-	2	0	1	0 (20.08)	0*

Notes:

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

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

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

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

Table 2.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture 2018 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
			2014	2015	2016	2017	2018
CM1	Roadside	95.34	12.8	12.8	13.37	14.6	12.86
CM2	Roadside	98.08	-	-	10.14	9.95	10.86
CM13	Roadside	3.29	-	-	-	-	7.28(3)

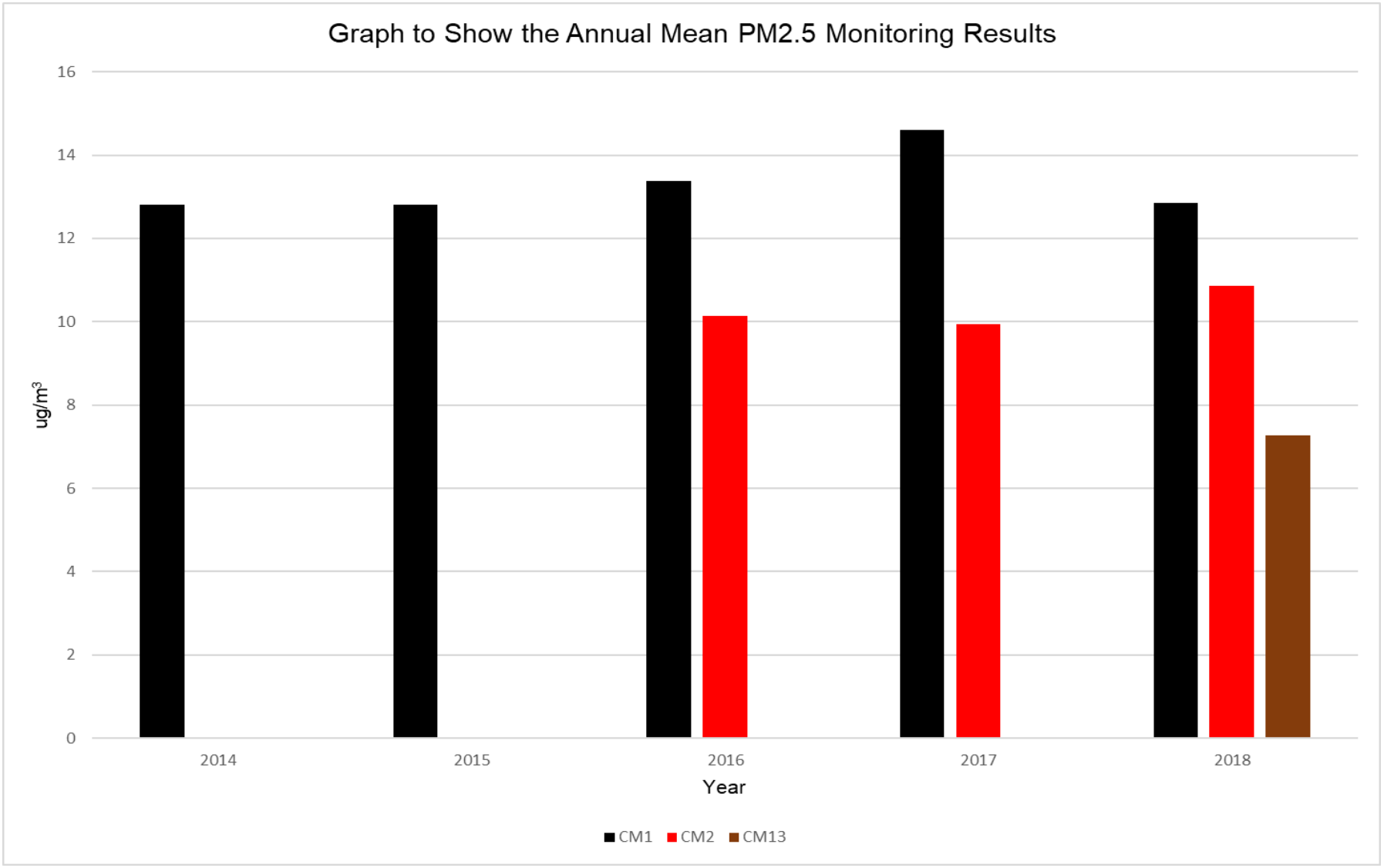
Notes:

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

Figure 2.2.3 – Trends in Annual Mean $PM_{2.5}$ Concentrations



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

2.3.1 Nitrogen Dioxide (NO_2)

Data from the seven continuous monitoring locations are displayed in table 2.3.1.1 below:

Table 2.3.1.1 - Table to show Annual Mean Concentration for continuous monitoring sites.

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%)	NO_2 Annual Mean Concentration (µg/m^3)				
				2014	2015	2016	2017	2018
CM1	Roadside	Automatic	98.71	25 (30.76)	23 (27.43)	24.4 (30.37)	20 (24.41)	18.7 (23.50)
CM2	Roadside	Automatic	99.94	21.1 (25.89)	20.5 (25.02)	22.3 (29.69)	20.6 (29.14)	18.1 (23.1)
CM3	Urban Background	Automatic	95.66	17.08	14.75	16.39	13.41	14.46
CM4	Façade	Automatic	99.19	**48.99**	**40.24**	**45.59**	**40.04**	37.29
CM5	Roadside	Automatic	91.23	35.83	33.71	35.83	32.19	30.30
CM11	Roadside	Automatic	85.41	**56.85***	**50.9 (54.52)**	**48.3 (51.76)**	**44 (47.20)**	39.0 **(45.87)**
CM12	Roadside	Automatic	77.41	N/A	N/A	N/A	25.73	26.18

The data reported for the continuous monitoring sites located within Swansea continue to show a downward trend over the last five years. The increase in annual means in 2016 was discussed in the 2017 Annual Progress Report and is likely due to meteorological conditions (http://www.aqconsultants.co.uk/AQC/media/Reports/NO2-NOx-Trend-Report.pdf) for the year.

All the continuous monitoring locations are reporting compliance with the annual mean and one hour objective concentrations for NO_2.

There are currently no intentions to cease monitoring at any of the locations.

CM4 – Hafod Doas.

2018 is the first year that the monitoring data returned from the Hafod Doas site (CM4) has achieved compliance with the annual mean objective concentration for NO_2.

Figure 2.3.1.1 and figure 2.3.1.2 show the hour mean data for 2017 and 2018 respectively and show the reduction in concentration observed at the location. The Neath Road area of Hafod was highlighted in the beginning of the LAQM works by Swansea Council and led to the declaration of the first AQMA.

Figure 2.3.1.1 – Hourly NO_2 at Hafod Doas 2018

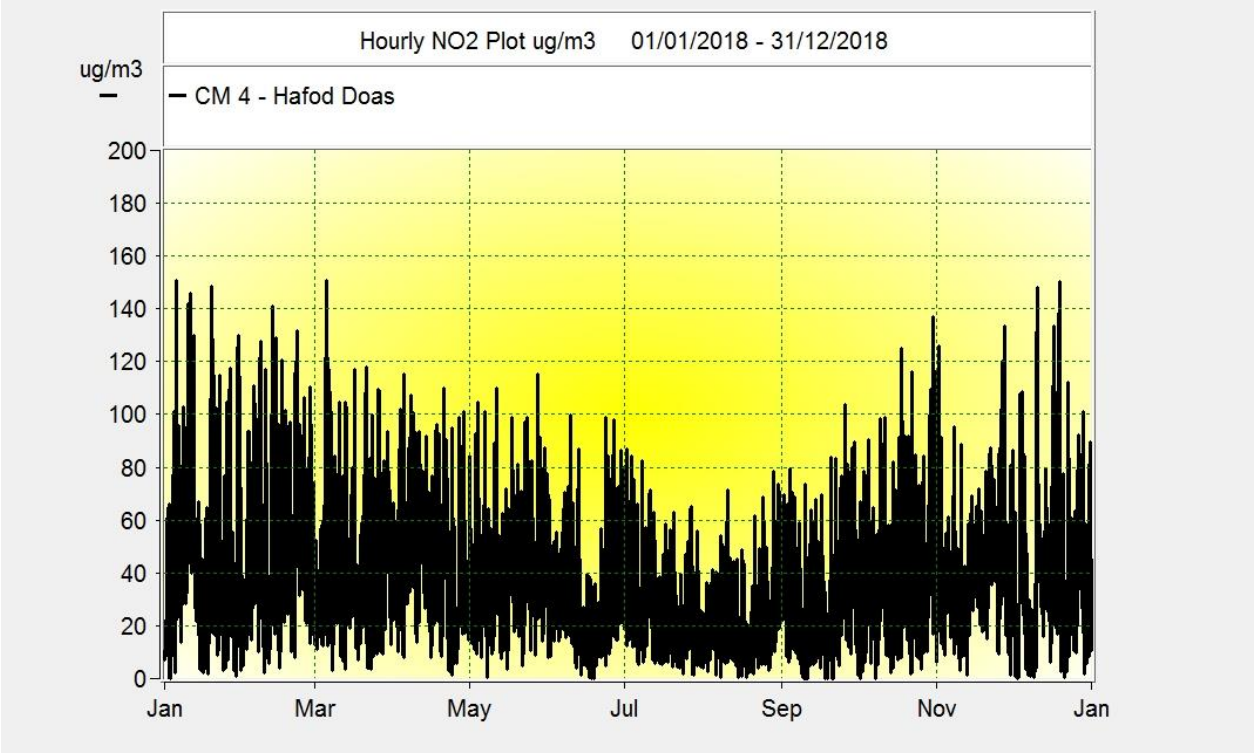
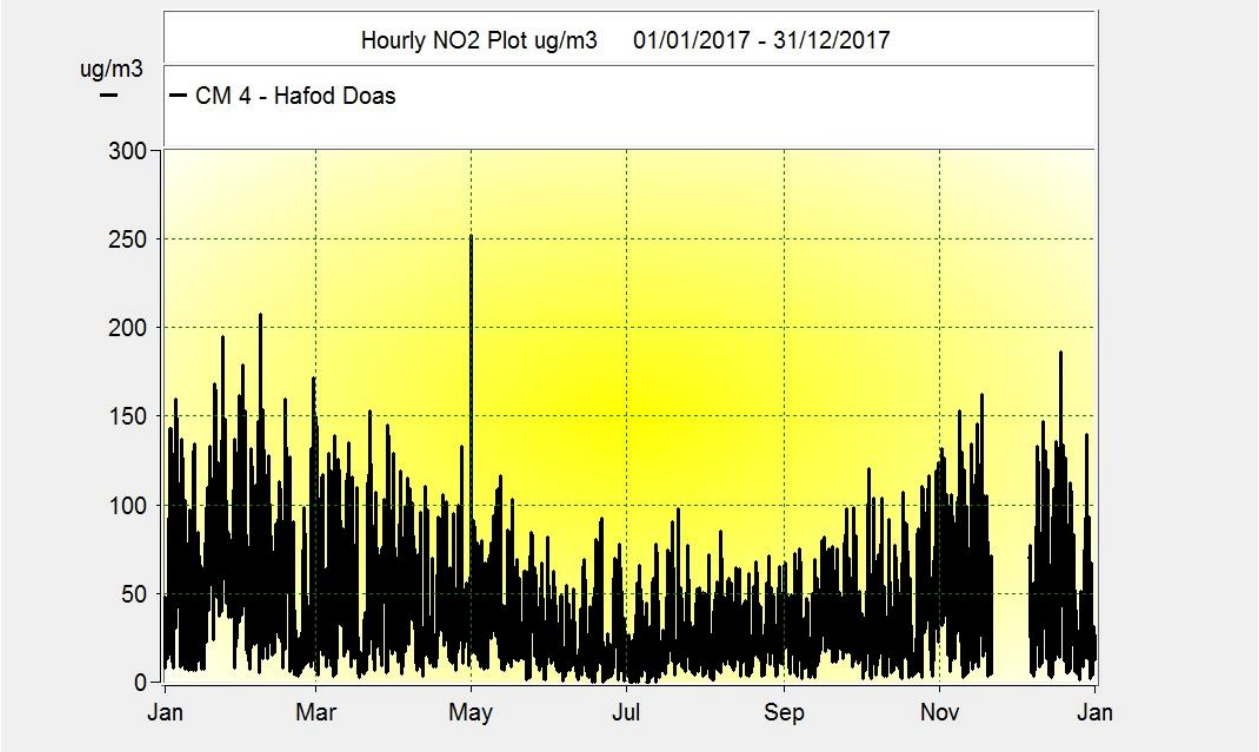


Figure 2.3.1.2 – Hourly NO_2 at Hafod Doas 2017



The likelihood for this reduction in annual mean will be due to the opening of the Morfa Distributor Road (August 2017) and the implementation of the Nowcaster System (October 2017). There are two automatic traffic counters (ATC's) sited on

the Neath Road and subsequent analysis indicates a reduction of approximately 30% in Annualised Average Daily Traffic (AADT) at both locations.

Figure 2.3.1.3 – Location of ATC's 6 & 18, Neath Road, Hafod, Swansea.

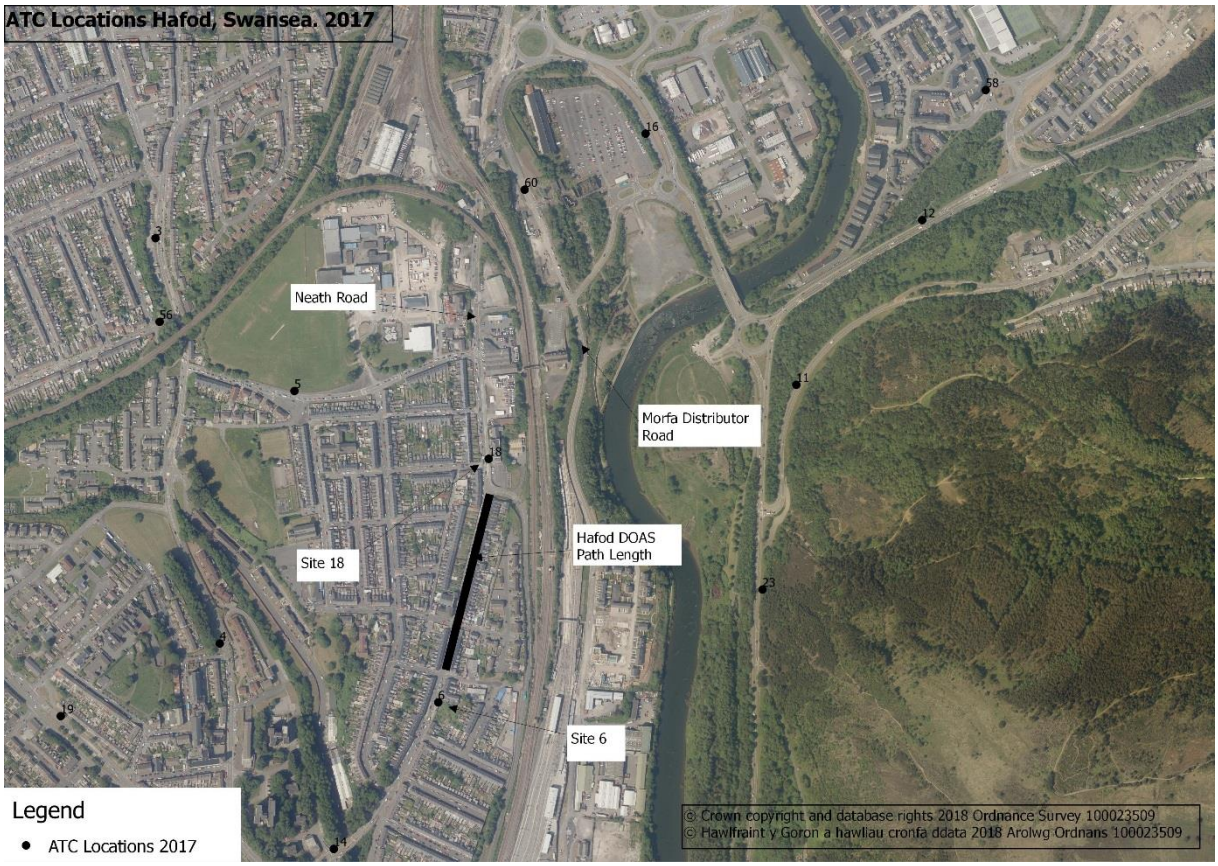


Table 2.3.1.2 shows the AADT traffic flows for 2014, 2015, 2016, 2017 and 2018, along with the percentage difference between 2018 and 2016; two full years of traffic data to compare the AADT with and without the Morfa Distributor Road.

Table 2.3.1.2 - Table to show AADT for ATC 6 & 18

	AADT 2014	AADT 2015	AADT 2016	AADT 2017	AADT 2018	Difference 2018-2016
ATC 6	16272	16152	16152	14184	11616	28.1%
ATC 18	Site Offline	15864	15960	13896	11280	29.3%

The Nowcaster System is currently looking at an hourly threshold concentration of 150ug/m^3 to lead to triggering of the Variable Messaging Signs within Swansea; given the decrease in concentrations observed in 2018 the draft AQAP will look at revising this threshold; the draft AQAP is scheduled to go out for Public Consultation by April 2020.

CM11 – High Street.

The Station Court, High Street site has also shown a downward trend over recent years and has shown compliance with the annual mean objective concentration of 40ug/m^3 for the first time in 2018, albeit at a concentration of 39ug/m^3. This result has been back corrected from the analyser location to be representative of the façade concentration; the NO_2 diffusion tube (Site No.121) is located on the downpipe of the façade behind the station and returned an annual mean concentration of 38.31ug/m^3 for 2018.

Figures 2.3.1.4 and 2.3.1.5 show the hourly NO_2 data measured at the site for 2018 and 2017 respectively. Data will continue to be collect at the site due to a lower data capture for 2018 due to damage to the sample inlet and downtime for analyser repair. Also, given the proximity of the bus stop to the site the one hour concentration will continue to be assessed although there we no exceedences in 2018.

Figure 2.3.1.4 – Hourly NO_2 at High Street 2018

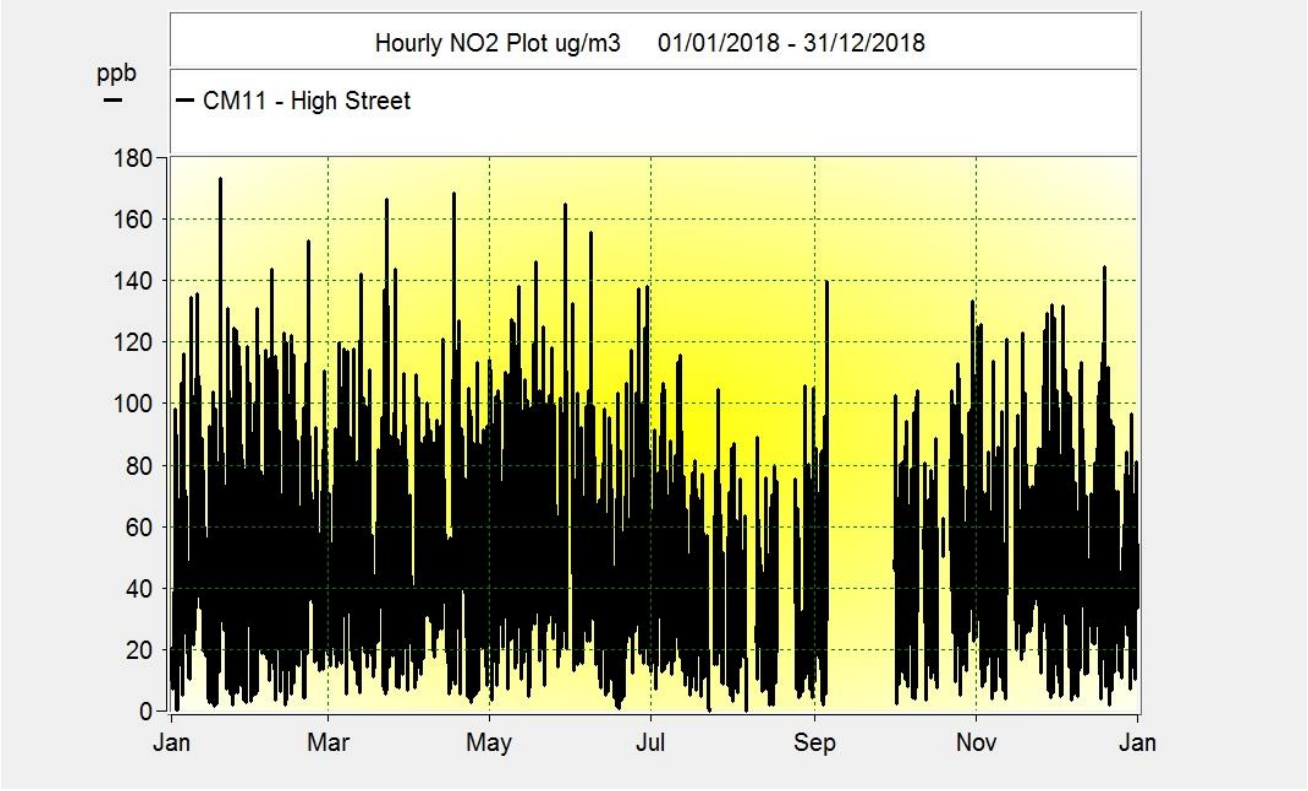
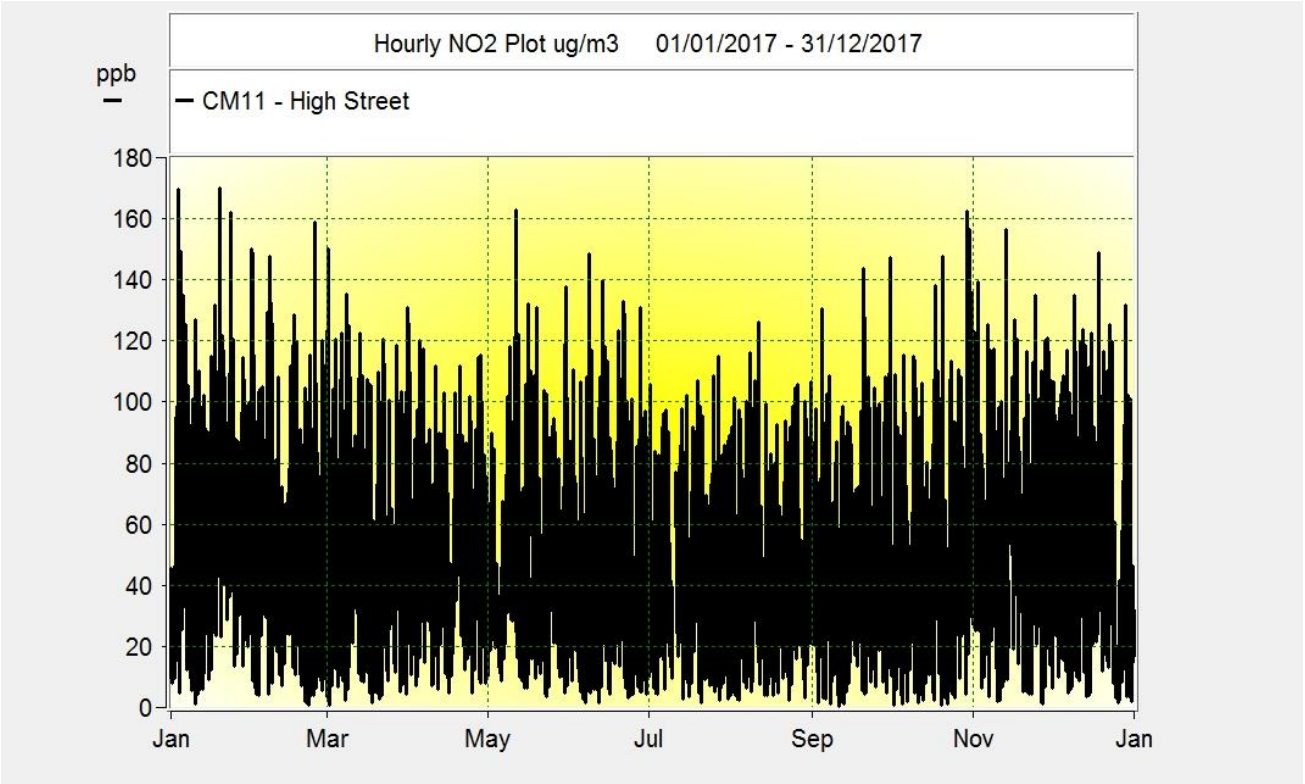


Figure 2.3.1.5 – Hourly NO_2 at High Street 2017



The 2017 Progress Report contained information regarding the planning application to redevelop the Mariner Street Car Park, directly to the South West of CM11, for retail and Student Residential Accommodation; works commenced in 2019 and so will be discussed in next year's annual progress report.

Non-Automatic Monitoring:

Data from the Diffusion Tube monitoring locations are displayed in table 2.3.1.3 below along with a map (figure 2.3.1.6) to show the reduction in the number of Diffusion Tube locations that are exceeding or potentially exceeding the Annual Mean Objective Concentration of 40ug/m^3 for 2018. Currently there is only one site exceeding 40ug/m^3 as an annual mean concentration. However, this site (340) is located on High Street in the city centre and are not representative of a residential exposure; the site was chosen to monitor the one hour exposure given the locality and land use.

There were a total of eight additional sites exceeding 36ug/m^3 as an annual mean in 2018; of which sites 123, 125 and 335 again are sites located to assess the one hour objective concentration.

Sites 18, 19, 121 and 279 are located within the Swansea AQMA 2010 and will be considered within the AQAP consultation planned for April 2020. It is worth noting that concentrations at these locations are all below the concentrations returned in 2017.

Site 340 is not representative of residential exposure and site 409 had been annualised due to the length of exposure but is no longer an active site as the highway infrastructure is changing due to redevelopment of the Kingsway. The effect upon NO_2 concentration of the redevelopment of the Kingsway Highway infrastructure will be commented upon as part of the 2018 data review.

Table 2.3.1.3 – Table to show NO_2 Diffusion Tube Data

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
5	Roadside	Diffusion Tube	100.00	32.46	29.70	31.65	28.35	25.52
6	Roadside	Diffusion Tube	100.00	28.52	26.57	27.58	23.11	21.35
7	Roadside	Diffusion Tube	83.33	**48.66**	**42.69**	**45.84**	**39.05**	34.17
8	Roadside	Diffusion Tube	83.33	**41.76**	**40.36**	**46.59**	34.63	33.62
10	Roadside	Diffusion Tube	100.00	24.97	23.94	24.52	20.80	19.76
11	Roadside	Diffusion Tube	83.33	**37.58**	33.81	**37.19**	30.32	28.42
12	Roadside	Diffusion Tube	100.00	**42.78**	**38.39**	**42.72**	34.80	33.16
13	Roadside	Diffusion Tube	41.67	27.78	25.66	27.40	22.58	21.49
14	Roadside	Diffusion Tube	91.67	24.30	23.86	24.95	19.54	19.98
15	Roadside	Diffusion Tube	100.00	24.45	24.30	26.39	22.10	20.78
16	Roadside	Diffusion Tube	100.00	28.61	26.80	31.35	26.64	23.61
18	Roadside	Diffusion Tube	100.00	**45.85**	**42.07**	**46.38**	**37.06**	36.10
19	Roadside	Diffusion Tube	83.33	**42.61**	**39.14**	**44.11**	**38.29**	36.69
20	Roadside	Diffusion Tube	100.00	**37.74**	35.42	33.73	29.87	29.30
22	Roadside	Diffusion Tube	100.00	31.43	29.91	32.02	26.78	24.76
23	Roadside	Diffusion Tube	41.67	28.49	28.69	30.29	24.27	22.53
26	Roadside	Diffusion Tube	100.00	**38.59**	35.44	38.43	29.54	27.70
27	Roadside	Diffusion Tube	100.00	**39.25**	34.78	36.69	29.33	28.87
29	Roadside	Diffusion Tube	100.00	**47.36**	**48.90**	**48.42**	30.14	24.34
31	Roadside	Diffusion Tube	25.00	31.70	28.42	30.16	25.29	22.25
32	Roadside	Diffusion Tube	100.00	33.38	30.15	33.88	26.73	26.09
33	Roadside	Diffusion Tube	100.00	31.33	29.45	31.69	26.64	25.33
35	Roadside	Diffusion Tube	83.33	32.21	31.35	33.53	27.76	26.95
36	Roadside	Diffusion Tube	91.67	27.49	26.49	29.74	24.85	22.77
40	Roadside	Diffusion Tube	91.67	27.42	24.83	26.17	22.06	20.44
41	Roadside	Diffusion Tube	100.00	35.33	31.89	33.05	26.77	28.09
43	Roadside	Diffusion Tube	100.00	36.22	32.16	34.75	28.62	27.73
44	Roadside	Diffusion Tube	100.00	27.35	26.55	26.08	23.86	20.96
45	Roadside	Diffusion Tube	100.00	30.78	28.19	30.92	23.28	22.89

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
48	Roadside	Diffusion Tube	91.67	21.72	19.59	22.15	17.44	18.18
50	Roadside	Diffusion Tube	100.00	36.43	33.79	38.03	30.77	28.66
54	Roadside	Diffusion Tube	91.67	33.93	31.38	31.26	26.61	26.31
55	Roadside	Diffusion Tube	100.00	32.31	31.04	31.21	25.92	26.38
56	Roadside	Diffusion Tube	100.00	22.00	22.20	20.7	15.84	27.53
58	Roadside	Diffusion Tube	91.67	29.70	28.50	33.8	27.38	24.62
59	Roadside	Diffusion Tube	100.00	**50.28**	**47.78**	**48.41**	**39.60**	34.99
60	Roadside	Diffusion Tube	100.00	34.21	29.70	30.19	26.39	25.37
61	Roadside	Diffusion Tube	100.00	**38.16**	33.93	36.75	27.92	26.01
63	Roadside	Diffusion Tube	100.00	21.00	19.40	22	16.50	15.77
64	Roadside	Diffusion Tube	41.67	**38.30**	36.10	32.8	26.94	31.11
65	Roadside	Diffusion Tube	100.00	24.77	21.99	25.77	21.45	20.62
66	Roadside	Diffusion Tube	100.00	26.45	26.53	29.48	24.13	20.50
67	Roadside	Diffusion Tube	75.00	35.60	**37.20**	**39.8**	32.41	34.06
68	Roadside	Diffusion Tube	100.00	36.13	34.87	34.99	28.34	25.07
69	Roadside	Diffusion Tube	58.33	**40.30**	35.60	34.9	30.71	33.54
70	Roadside	Diffusion Tube	91.67	24.80	25.60	24.1	20.20	18.07
71	Roadside	Diffusion Tube	91.67	25.00	24.50	26	17.98	16.49
75	Roadside	Diffusion Tube	91.67	**39.99**	34.02	34.53	30.43	28.00
83	Roadside	Diffusion Tube	100.00	27.41	25.97	28.07	22.87	21.35
84	Roadside	Diffusion Tube	100.00	35.13	33.81	33.92	27.53	24.74
85	Roadside	Diffusion Tube	91.67	35.62	35.28	35.78	29.11	26.05
86	Roadside	Diffusion Tube	91.67	25.51	23.97	32.27	22.63	19.11
87	Roadside	Diffusion Tube	91.67	20.80	18.93	20.64	17.10	14.31
88	Roadside	Diffusion Tube	91.67	28.21	28.37	30.67	26.07	22.99
89	Roadside	Diffusion Tube	100.00	20.12	20.09	25.23	18.04	16.98
90	Roadside	Diffusion Tube	100.00	32.61	30.02	31.39	24.54	23.63
91	Roadside	Diffusion Tube	100.00	29.28	27.46	29.04	25.47	25.18
94	Roadside	Diffusion Tube	100.00	28.09	25.66	24.32	22.81	20.98
95	Roadside	Diffusion Tube	75.00	25.23	21.38	24.12	21.19	18.48

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
96	Roadside	Diffusion Tube	100.00	26.20	25.55	27.99	22.27	20.29
97	Roadside	Diffusion Tube	91.67	31.62	31.44	35.64	28.24	25.98
98	Roadside	Diffusion Tube	83.33	36.21	33.05	34.33	27.34	27.32
99	Roadside	Diffusion Tube	91.67	32.73	28.84	31.04	27.03	23.81
102	Roadside	Diffusion Tube	83.33	27.96	27.87	29.77	26.60	24.15
104	Roadside	Diffusion Tube	100.00	27.70	27.13	26.76	22.05	21.97
107	Roadside	Diffusion Tube	100.00	32.23	29.49	30.83	26.20	24.55
110	Roadside	Diffusion Tube	91.67	25.75	24.67	23.75	20.51	19.70
111	Roadside	Diffusion Tube	58.33	27.15	30.15	30.61	24.61	20.70
114	Roadside	Diffusion Tube	41.67	30.07	27.48	27.47	23.00	22.44
115	Roadside	Diffusion Tube	100.00	**40.40**	35.25	35.09	30.64	28.96
116	Roadside	Diffusion Tube	100.00	**38.73**	35.63	**37.65**	33.13	31.98
117	Roadside	Diffusion Tube	100.00	35.30	33.91	**37.12**	30.09	30.50
118	Roadside	Diffusion Tube	83.33	29.33	28.69	28.96	24.84	25.75
119	Roadside	Diffusion Tube	91.67	34.78	32.05	31.34	27.92	28.33
120	Roadside	Diffusion Tube	33.33	**47.24**	**44.76**	**44.82**	35.72	26.52
121	Roadside	Diffusion Tube	100.00	**52.71**	**47.29**	**48.01**	**38.60**	38.31
122	Roadside	Diffusion Tube	100.00	34.83	30.16	32.09	25.90	28.99
123	Roadside	Diffusion Tube	91.67	**47.00**	**39.54**	**46.44**	36.09	36.60
124	Roadside	Diffusion Tube	83.33	**38.43**	**37.73**	**39.60**	32.41	33.14
125	Roadside	Diffusion Tube	100.00	**37.90**	**37.10**	**38**	32.04	32.26
126	Roadside	Diffusion Tube	91.67	**40.64**	36.91	34.91	27.61	26.10
127	Roadside	Diffusion Tube	100.00	**44.26**	34.70	34.1	26.42	25.49
128	Roadside	Diffusion Tube	91.67	**38.82**	**37.00**	**38.06**	30.64	29.33
129	Roadside	Diffusion Tube	100.00	32.56	32.94	**37.11**	30.40	29.71
131	Roadside	Diffusion Tube	83.33	**44.79**	**44.75**	**42.02**	29.77	30.72
132	Roadside	Diffusion Tube	100.00	27.11	29.66	32.29	26.70	25.84
134	Roadside	Diffusion Tube	100.00	**42.65**	**44.25**	**42.10**	33.47	31.58
135	Roadside	Diffusion Tube	100.00	-	-	29.66	27.16	22.39
136	Roadside	Diffusion Tube	41.67	25.53	27.14	25.18	23.29	21.59

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
137	Roadside	Diffusion Tube	91.67	32.63	29.19	31.16	24.75	24.90
180	Roadside	Diffusion Tube	100.00	29.67	29.10	30.98	24.43	24.67
182	Roadside	Diffusion Tube	100.00	28.71	27.04	28.48	24.22	20.87
197	Roadside	Diffusion Tube	100.00	34.22	29.69	33.54	28.10	26.63
198	Roadside	Diffusion Tube	83.33	35.56	32.13	33.20	28.22	26.45
206	Roadside	Diffusion Tube	83.33	**42.50**	**38.05**	**41.79**	33.98	30.39
207	Roadside	Diffusion Tube	100.00	32.85	32.16	**37.74**	29.70	27.02
208	Roadside	Diffusion Tube	100.00	35.06	34.28	**37.23**	29.22	28.60
209	Roadside	Diffusion Tube	100.00	**40.72**	35.21	**39.21**	30.51	29.28
210	Roadside	Diffusion Tube	100.00	32.69	29.54	33.33	26.57	25.76
211	Roadside	Diffusion Tube	100.00	33.04	30.98	26.74	26.15	25.55
212	Roadside	Diffusion Tube	100.00	23.93	24.06	29.00	17.75	19.42
213	Roadside	Diffusion Tube	100.00	34.86	30.81	34.88	27.13	25.55
240	Roadside	Diffusion Tube	100.00	31.37	29.30	31.09	26.16	25.44
241	Roadside	Diffusion Tube	91.67	30.31	28.76	30.83	25.31	24.53
242	Roadside	Diffusion Tube	100.00	**40.94**	35.68	**43.29**	32.08	33.20
243	Roadside	Diffusion Tube	100.00	35.75	33.98	**38.88**	32.08	28.57
244	Roadside	Diffusion Tube	91.67	**44.02**	**42.71**	**43.19**	33.95	35.82
245	Roadside	Diffusion Tube	100.00	**42.03**	**39.32**	**42.32**	32.10	33.92
247	Roadside	Diffusion Tube	100.00	35.00	31.80	32.87	25.49	25.98
249	Roadside	Diffusion Tube	100.00	34.95	30.54	31.55	25.69	25.02
251	Roadside	Diffusion Tube	83.33	31.52	30.24	31.56	24.35	24.65
256	Roadside	Diffusion Tube	91.67	**38.21**	**37.18**	**37.86**	32.51	31.73
275	Roadside	Diffusion Tube	100.00	22.60	22.20	22.5	18.20	17.64
276	Roadside	Diffusion Tube	100.00	34.17	31.91	34.64	30.62	25.65
277	Roadside	Diffusion Tube	100.00	36.72	34.17	34.73	29.17	27.61
278	Roadside	Diffusion Tube	100.00	36.15	33.12	35.22	26.61	27.88
279	Roadside	Diffusion Tube	100.00	**49.83**	**43.53**	**47.31**	**41.31**	37.54
280	Roadside	Diffusion Tube	100.00	**41.10**	**37.70**	**38.7**	31.30	31.61
281	Roadside	Diffusion Tube	91.67	33.40	34.50	34.8	28.49	27.58

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
282	Roadside	Diffusion Tube	100.00	32.10	31.00	33.5	28.27	25.85
284	Roadside	Diffusion Tube	100.00	32.14	29.51	30.51	26.13	24.99
285	Roadside	Diffusion Tube	100.00	32.57	30.90	31.47	26.74	26.52
286	Roadside	Diffusion Tube	100.00	34.35	30.40	32.30	26.89	26.60
287	Roadside	Diffusion Tube	83.33	29.53	28.04	28.84	24.48	24.04
288	Roadside	Diffusion Tube	91.67	31.48	29.69	30.19	23.55	26.84
289	Roadside	Diffusion Tube	100.00	32.95	32.08	33.04	27.70	26.89
291	Roadside	Diffusion Tube	100.00	**39.73**	**38.54**	**41.05**	35.61	32.32
295	Roadside	Diffusion Tube	91.67	30.70	28.50	31.7	26.79	25.32
296	Roadside	Diffusion Tube	100.00	35.59	31.10	36.27	31.25	28.19
323	Roadside	Diffusion Tube	100.00	33.62	30.33	34.30	29.61	26.44
331	Roadside	Diffusion Tube	100.00	-	34.78	36.26	30.62	32.54
333	Roadside	Diffusion Tube	16.67	-	33.20	36.5	28.05	31.72
334	Roadside	Diffusion Tube	91.67	-	29.74	31.68	25.81	27.22
335	Roadside	Diffusion Tube	100.00	-	28.23	29.6	24.12	25.38
336	Roadside	Diffusion Tube	91.67	-	33.97	36.64	30.35	29.99
337	Roadside	Diffusion Tube	100.00	-	35.90	**37.1**	31.60	29.09
338	Roadside	Diffusion Tube	83.33	-	32.80	36.03	29.62	29.90
339	Roadside	Diffusion Tube	100.00	-	**40.39**	**37.76**	30.87	33.14
340	Roadside	Diffusion Tube	100.00	-	**46.67**	**49.03**	**40.98**	41.32
341	Roadside	Diffusion Tube	100.00	-	36.50	40.3	32.56	31.03
342	Roadside	Diffusion Tube	100.00	-	30.00	34.7	27.60	28.73
343	Roadside	Diffusion Tube	100.00	-	34.58	35.15	29.22	26.13
344	Roadside	Diffusion Tube	83.33	-	26.40	31.1	24.94	23.98
345	Roadside	Diffusion Tube	100.00	-	29.50	30.2	24.12	25.06
346	Roadside	Diffusion Tube	100.00	-	34.08	34.27	28.29	29.78
347	Roadside	Diffusion Tube	100.00	-	31.77	36.32	27.49	25.72
348	Roadside	Diffusion Tube	100.00	-	35.90	36.04	28.67	27.96
349	Roadside	Diffusion Tube	100.00	-	33.39	35.65	28.77	26.79
350	Roadside	Diffusion Tube	100.00	-	**38.06**	**39.52**	33.20	31.08

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
351	Roadside	Diffusion Tube	100.00	-	27.05	27.85	24.26	27.32
352	Roadside	Diffusion Tube	100.00	-	30.95	29.46	24.09	29.79
353	Roadside	Diffusion Tube	83.33	-	29.10	25.8	21.76	25.06
354	Roadside	Diffusion Tube	83.33	-	29.80	28	24.12	27.94
355	Roadside	Diffusion Tube	83.33	-	27.90	27.8	23.83	29.16
356	Roadside	Diffusion Tube	91.67	-	27.50	31.52	25.04	27.45
357	Roadside	Diffusion Tube	50.00	-	28.80	27.6	23.31	33.21
358	Roadside	Diffusion Tube	83.33	-	32.50	30.1	24.05	23.40
359	Roadside	Diffusion Tube	75.00	-	33.70	33.4	25.53	19.44
362	Roadside	Diffusion Tube	91.67	-	36.53	**42.23**	35.13	34.28
363	Roadside	Diffusion Tube	100.00	-	35.28	35.42	28.44	26.96
364	Roadside	Diffusion Tube	83.33	-	34.75	**39.49**	32.55	32.71
365	Roadside	Diffusion Tube	66.67	-	30.40	31.85	23.19	27.47
366	Roadside	Diffusion Tube	66.67	-	31.04	35.42	27.88	31.72
367	Roadside	Diffusion Tube	91.67	-	29.52	32.16	28.77	28.23
368	Roadside	Diffusion Tube	41.67	-	25.80	28.1	23.61	27.81
373	Roadside	Diffusion Tube	100.00	-	-	34.33	28.49	27.25
374	Roadside	Diffusion Tube	41.67	-	-	25.5	19.39	22.27
375	Roadside	Diffusion Tube	100.00	-	-	18.24	14.66	14.42
376	Roadside	Diffusion Tube	100.00	-	-	30.40	25.00	24.83
377	Roadside	Diffusion Tube	100.00	-	-	34.98	29.90	28.24
378	Roadside	Diffusion Tube	41.67	-	-	18	13.91	17.10
385	Roadside	Diffusion Tube	91.67	-	-	25.08	21.82	20.62
386	Roadside	Diffusion Tube	100.00	-	-	26.7	22.87	22.32
387	Roadside	Diffusion Tube	100.00	-	-	19.79	18.14	16.56
388	Roadside	Diffusion Tube	100.00	-	-	18.67	17.16	15.95
389	Roadside	Diffusion Tube	100.00	-	-	**46.12**	**38.37**	35.56
390	Roadside	Diffusion Tube	100.00	-	-	**37.04**	30.83	29.70
391	Roadside	Diffusion Tube	100.00	-	-	27.02	24.32	22.42
393	Roadside	Diffusion Tube	100.00	-	-	16.7	14.28	12.82

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
394	Roadside	Diffusion Tube	100.00	-	-	16.79	16.17	13.96
395	Roadside	Diffusion Tube	100.00	-	-	17.88	15.84	15.11
396	Roadside	Diffusion Tube	100.00	-	-	21.00	18.41	16.22
397	Roadside	Diffusion Tube	100.00	-	-	-	14.28	13.25
398	Roadside	Diffusion Tube	91.67	-	-	-	11.10	10.58
399	Roadside	Diffusion Tube	100.00	-	-	-	17.46	19.08
400	Roadside	Diffusion Tube	100.00	-	-	-	20.79	18.94
401	Roadside	Diffusion Tube	100.00	-	-	-	22.20	21.46
402	Roadside	Diffusion Tube	75.00	-	-	-	24.42	21.60
403	Façade	Diffusion Tube	83.33	-	-	-	32.12	29.64
404	Roadside	Diffusion Tube	91.67	-	-	-	19.09	19.58
405	Roadside	Diffusion Tube	100.00	-	-	-	10.06	11.30
406	Façade	Diffusion Tube	91.67	-	-	-	33.49	30.88
407	Façade	Diffusion Tube	100.00	-	-	-	20.79	19.38
408	Roadside	Diffusion Tube	91.67	-	-	**40.4**	35.89	30.74
409	Roadside	Diffusion Tube	41.67	-	-	-	**46.55**	26.45
410	Roadside	Diffusion Tube	33.33	-	-	-	18.72	23.26
411	Roadside	Diffusion Tube	33.33	-	-	-	19.68	22.40
412	Roadside	Diffusion Tube	100.00	-	-	-	21.79	21.47
413	Roadside	Diffusion Tube	100.00	-	-	-	24.36	24.25
414	Façade	Diffusion Tube	66.67					20.34
415	Roadside	Diffusion Tube	58.33					29.58
416	Roadside	Diffusion Tube	58.33					20.28
417	Roadside	Diffusion Tube	58.33					24.52
418	Roadside	Diffusion Tube	50.00					24.62
419	Roadside	Diffusion Tube	58.33					24.43
420	Façade	Diffusion Tube	8.33					33.40
421	Roadside	Diffusion Tube	0.00					-
422	Roadside	Diffusion Tube	8.33					18.09
423	Roadside	Diffusion Tube	8.33					13.64

Site ID	Site Type	Monitoring Type	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2014	2015	2016	2017	2018
424	Roadside	Diffusion Tube	16.67					23.25
425	Roadside	Diffusion Tube	16.67					24.12

Notes:

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

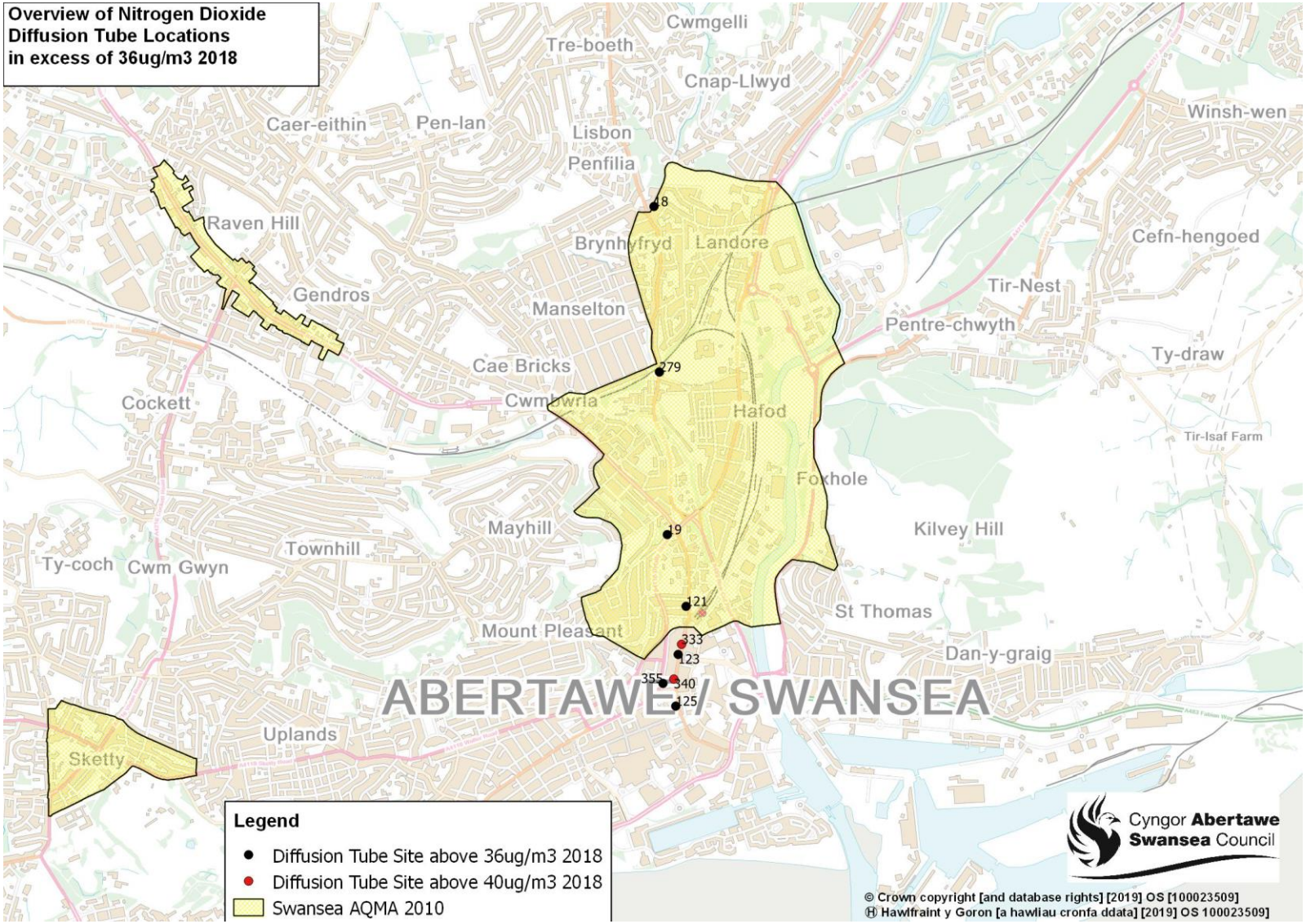
NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) Data capture for the 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) Means for diffusion tubes have been corrected for bias. All means have been "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.

Figure 2.3.1.6 To show Locations of NO_2 Diffusion Tubes exceeding 36ug/m^3



Hafod:

Figure 2.3.1.7 To show NO_2 locations of interest in the Hafod

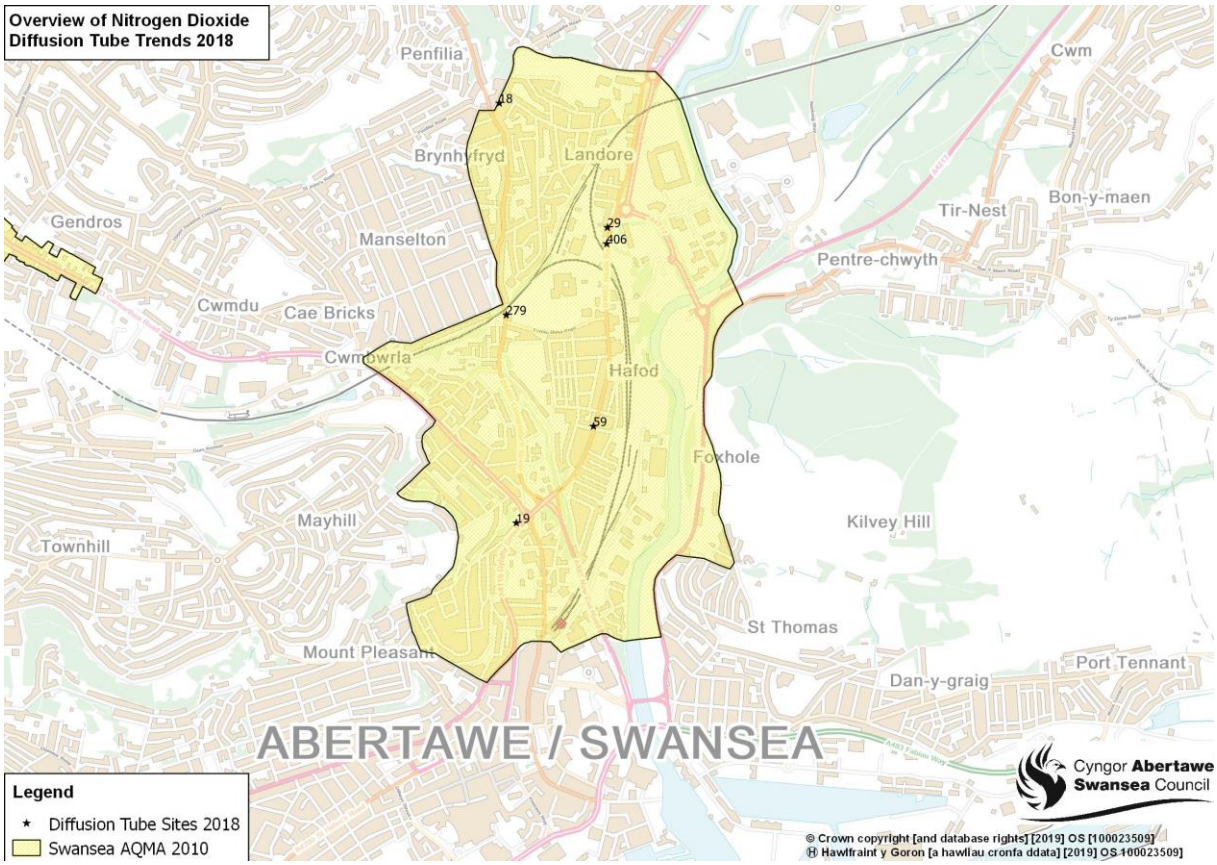
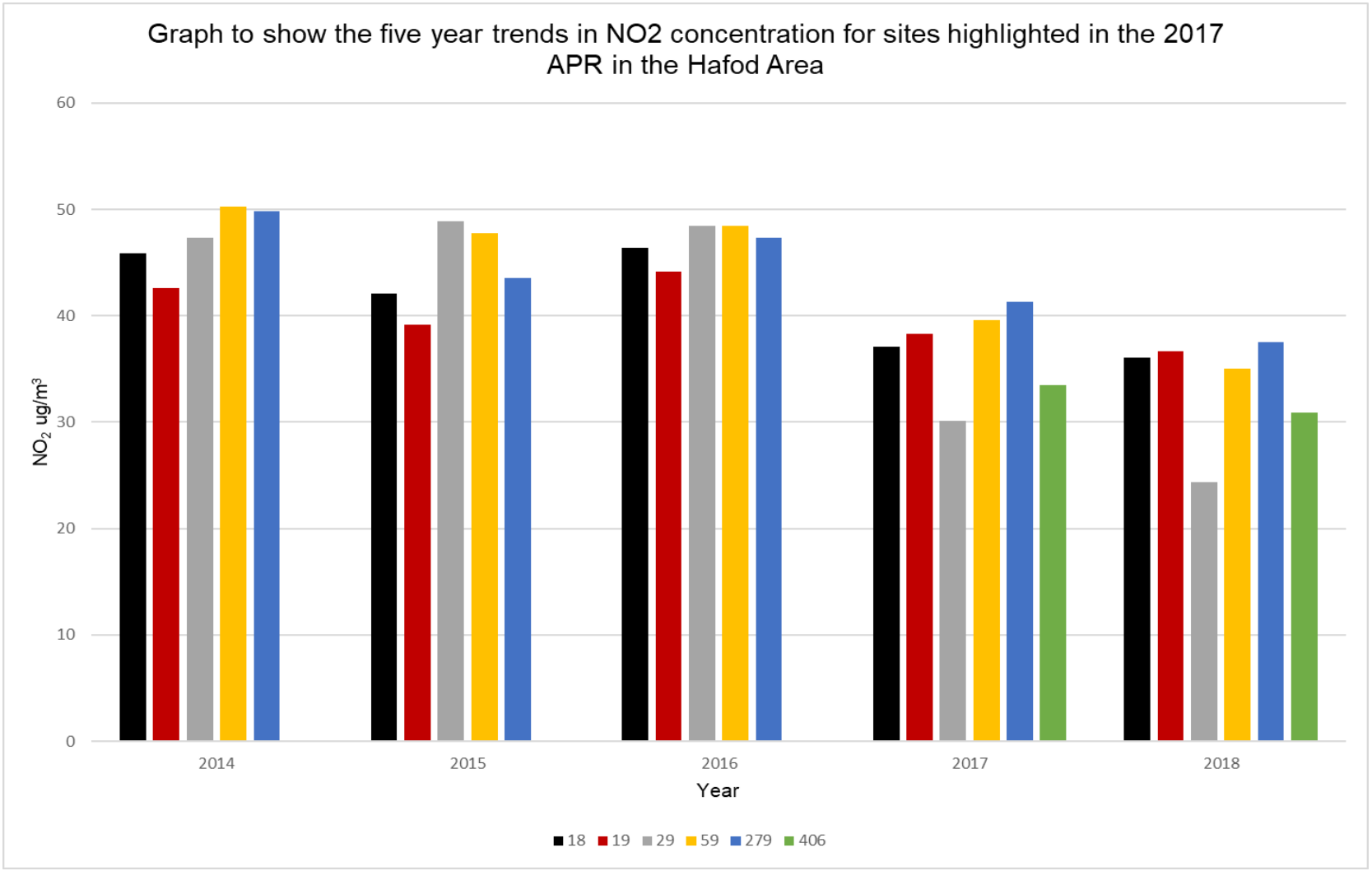


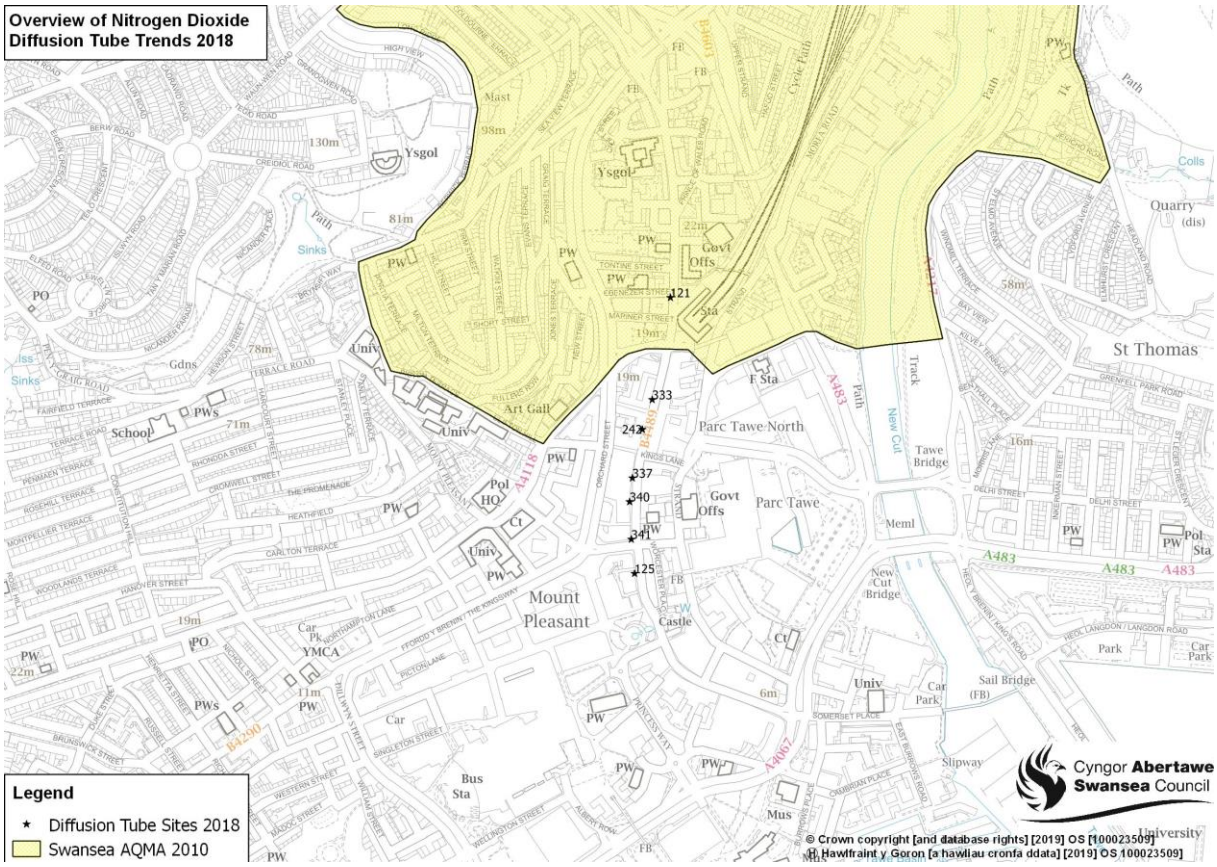
Figure 2.3.1.8 shows an overall downward trend for the selection of diffusion tubes highlighted since 2014. As with the continuous monitoring stations, an increase was observed in Annual Mean concentrations for 2016. For the highlighted sites, there are no sites in exceedence of the Annual Mean Objective Concentration of 40ug/m^3. There are four sites in excess of 36ug/m^3, sites 18, 19, 121 and 279. These sites are located within the Swansea AQMA 2010 and will be subject to the draft Air Quality Action Plan due to go out to public Consultation by April 2020; the consultation has been rescheduled due to the change in concentrations observed.

Figure 2.3.1.8 – Trends in Annual Mean NO_2 Concentrations in the Hafod



High Street:

Figure 2.3.1.9 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend High Street Locations 2018



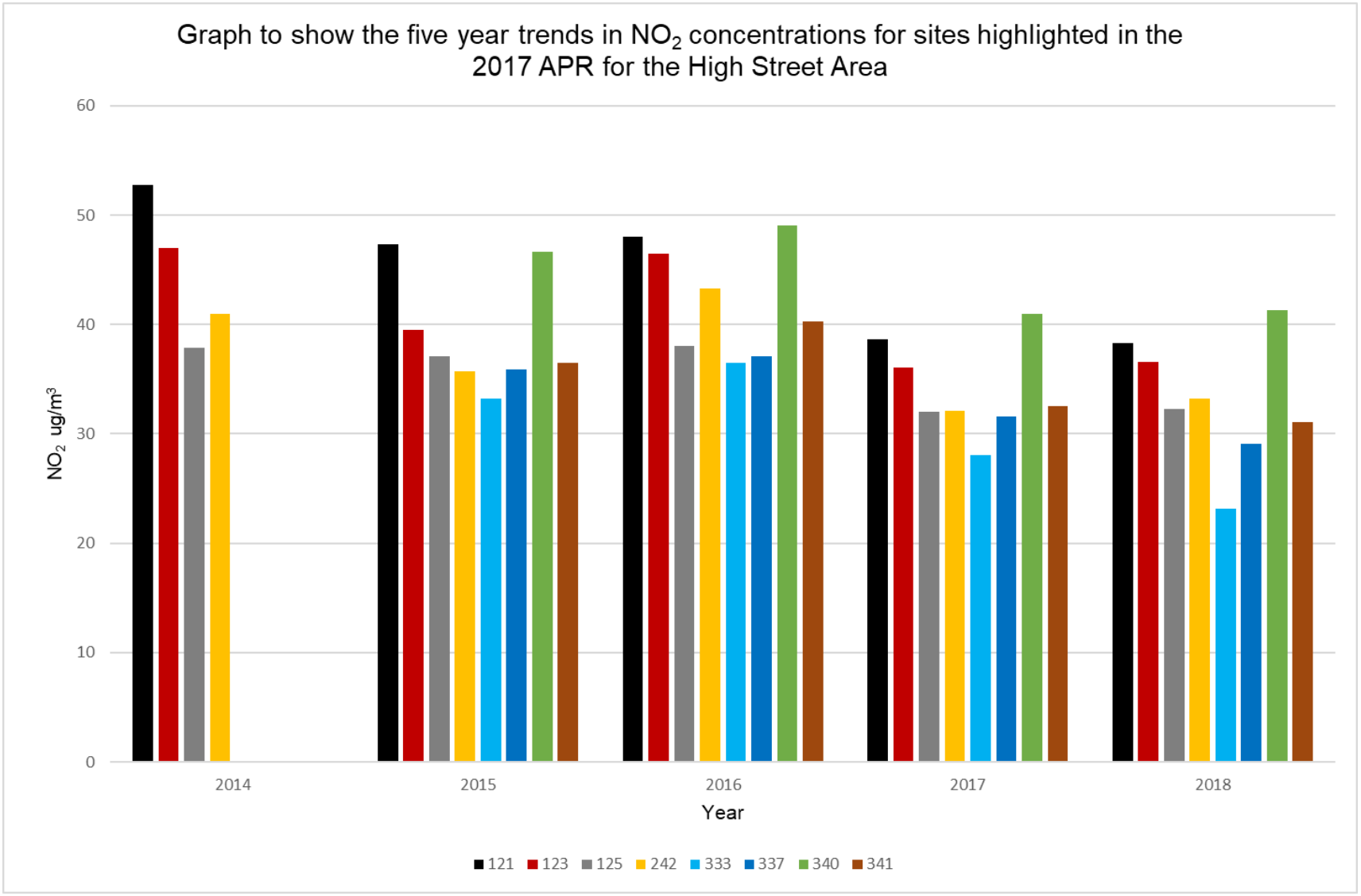
Data for the highlighted sites in figure 2.3.1.9 indicates an overall downward trend, with the exception of the observed climb in data seen across the Authority in 2016. Of the sites presented within figure 2.3.1.9 only sites 121& 242 are relevant residential exposures. Site 121 is located on the façade of the residential block behind the continuous monitor, CM11 – Station Court, High Street. The annual mean indicates compliance at the residential façade in 2018 albeit above 36ug/m^3.

Site 242 is a first floor residential location that has been fluctuating around the Annual Mean Objective concentration for several years. The marked increase observed in 2016 led to logical step of a detailed assessment in the area however, budgetary constraints has led to a delay in acquisition of real-time monitoring equipment. The decrease in the 2017 dataset has reported a large reduction at site 242 and Welsh Government confirmed, in their Appraisal Report for the 2018 APR, that the conclusion to not carry out the Detailed Assessment was supported. However, the area should be continued to be assessed in-line with the annual report requirements, with a view to working towards Welsh Government Policy Objectives to

achieve compliance and further reduce exposure. The site has continued to show compliance in 2018 and whilst equipment has been procured to undertake monitoring infrastructure works have not been able to be completed. There is also an ongoing research collaboration that is looking at the city centre and the intention is to use the High Street location which will include the use of monitoring equipment; this will be referenced within the AQAP consultation scheduled for 2020.

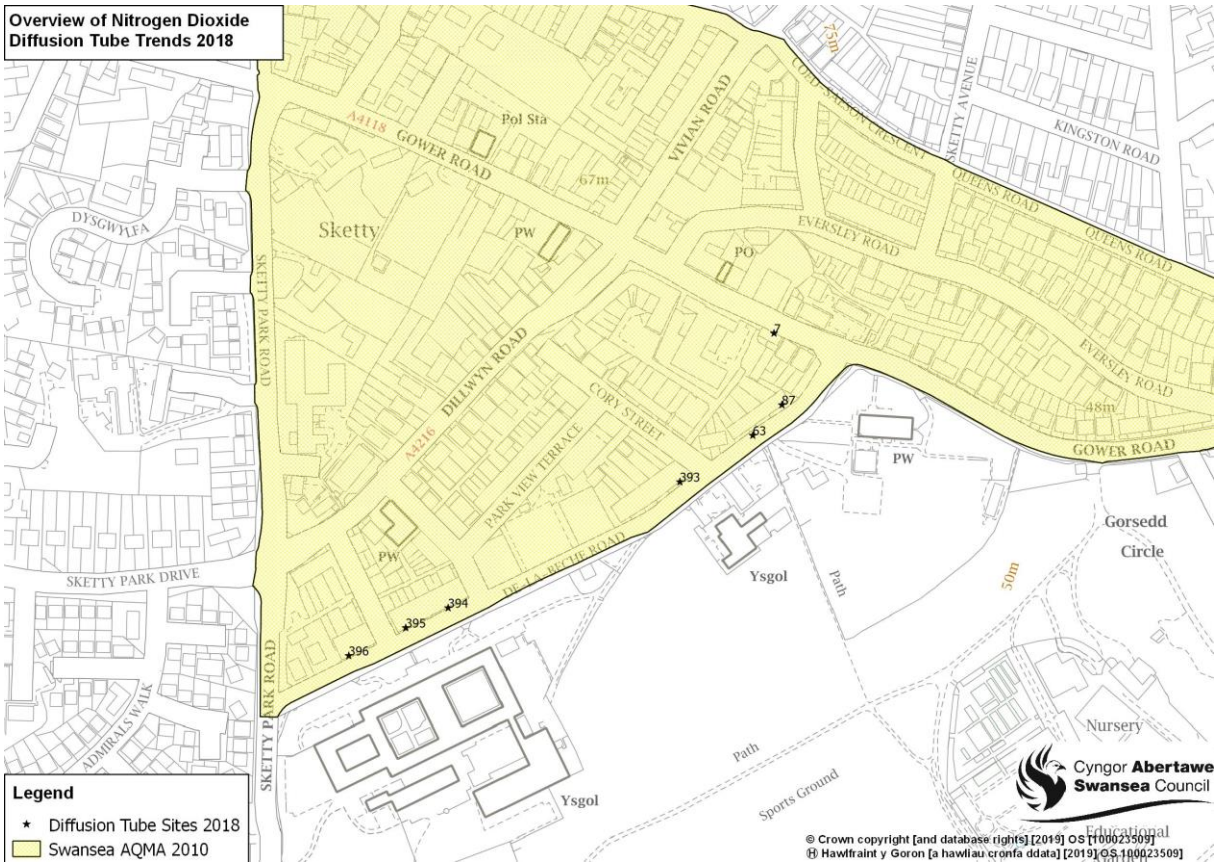
Sites 123, 125, 333, 347, 340 & 341 are representative of 1 hour exposures and so are below the 60ug/m^3 annual mean guidance value that might indicate a relevant exposure risk and so are deemed compliant.

Figure 2.3.1.10 – Trends in Annual Mean NO_2 Concentrations



Sketty:

Figure 2.3.1.11 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend Sketty Locations 2018

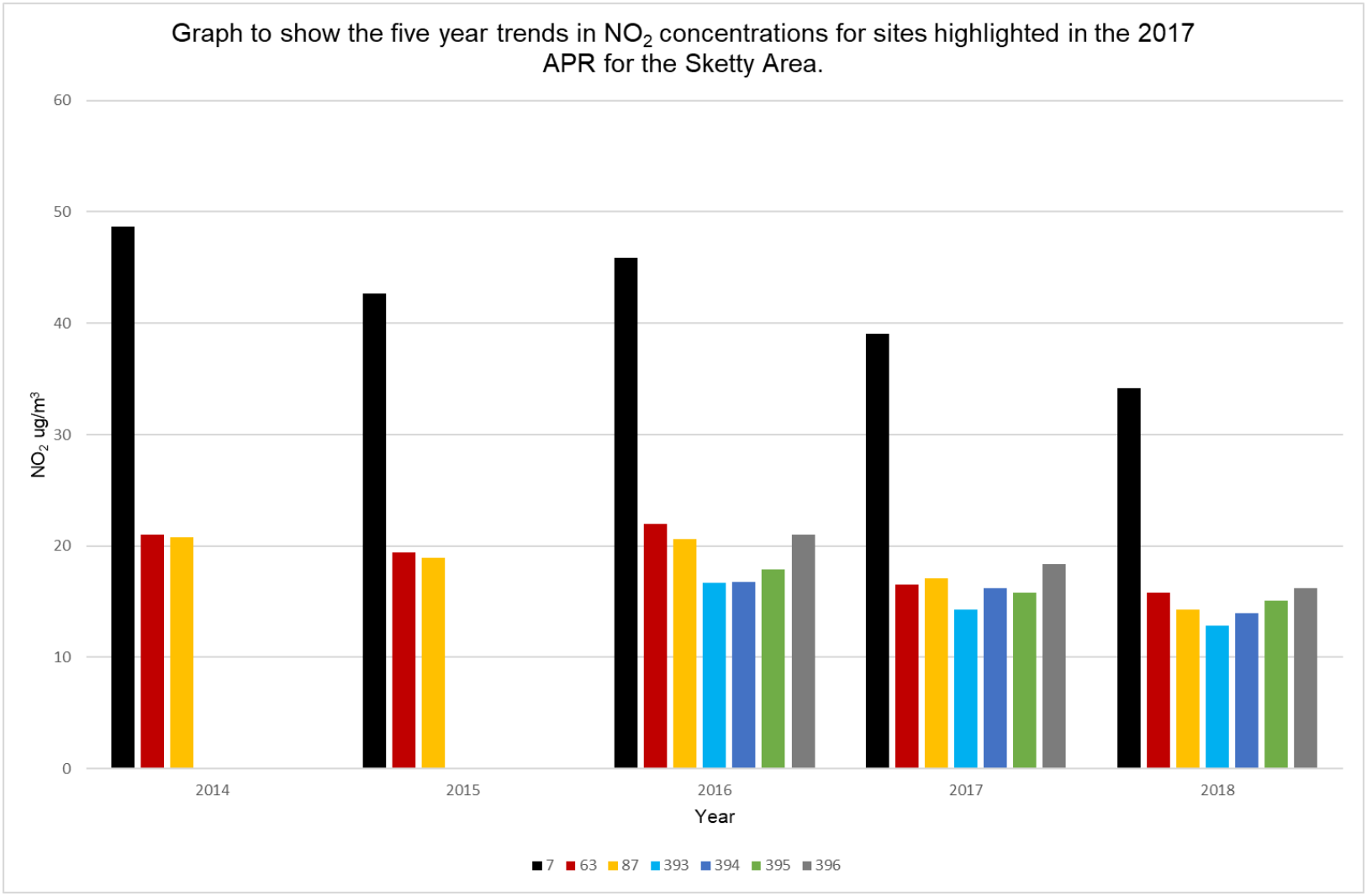


Site 7 has been in exceedance of the Annual Mean Objective concentration for several years. Whilst a downward trend is observed is figure 2.3.1.12, again an increase was observed in 2016. However, in April 2017 junction improvement works were carried out in close proximity to site 7. The mini-roundabout was replaced with a light controlled junction aimed to reduce congestion in the area, to reduce NO_2 concentrations observed and reduce the use of De La Beche Road as a 'Rat Run'.

The site 7 data for 2018, figure 2.3.1.12, indicates continued compliance whilst the spread of diffusion tubes along De La Beche Road also continue to show a reduction in concentration and compliance with the Annual Mean Objective Concentration for the residential exposure.

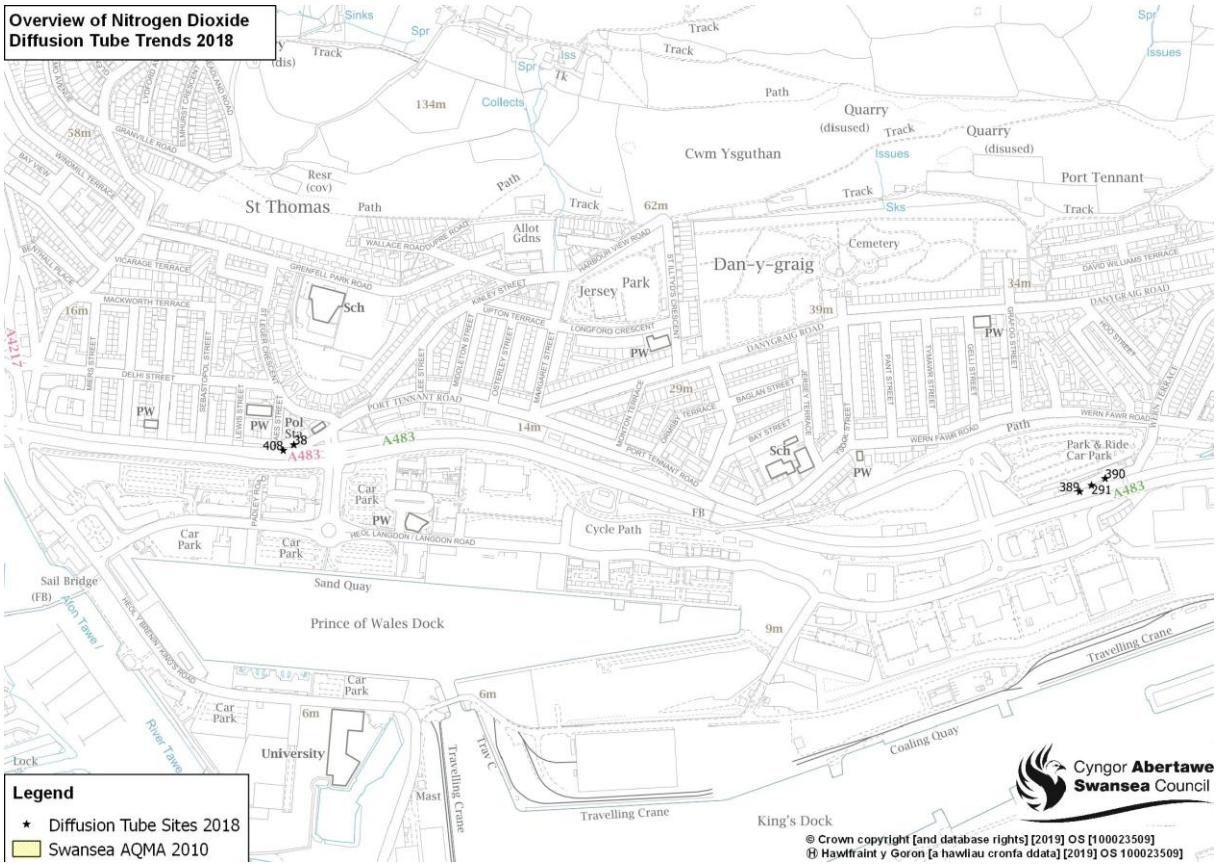
The monitoring sites in Sketty will remain along with the sites on De La Beche Road in order to create a long-term dataset to assess the effects of the new junction upon the surrounding environment.

Figure 2.3.1.12 – Trends in Annual Mean NO_2 Concentrations



St. Thomas:

Figure 2.3.1.13 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend St. Thomas Locations 2018



Site 38 was discontinued in 2016 due to the request of the owner, the site had continued to show compliance with the Annual Mean Objective concentration. The decision was taken to create site 408, figure 2.3.1.13 shows the position of both sites. The results for 2016 indicated a marginal exceedence at site 408, this is located on a Lighting Column approximately 50cm from the façade of the dwelling and so is subject to back correction as set out within the Technical Guidance (TG16) The conclusion within the 2017 Progress Report was to proceed to a detailed assessment for this location however, given the fact that 2016 has been reported as an anomalous year for meteorological conditions, the reduction in concentration observed in 2017 has led to compliance with the Annual Mean Objective. Welsh Government confirmed support for this approach within the appraisal report for the 2018 APR; the site has been maintained and reports continued compliance. Also, in late December 2018 a new NOX and PM2.5 monitoring site has been installed and now collects data, figure 2.3.1.14.

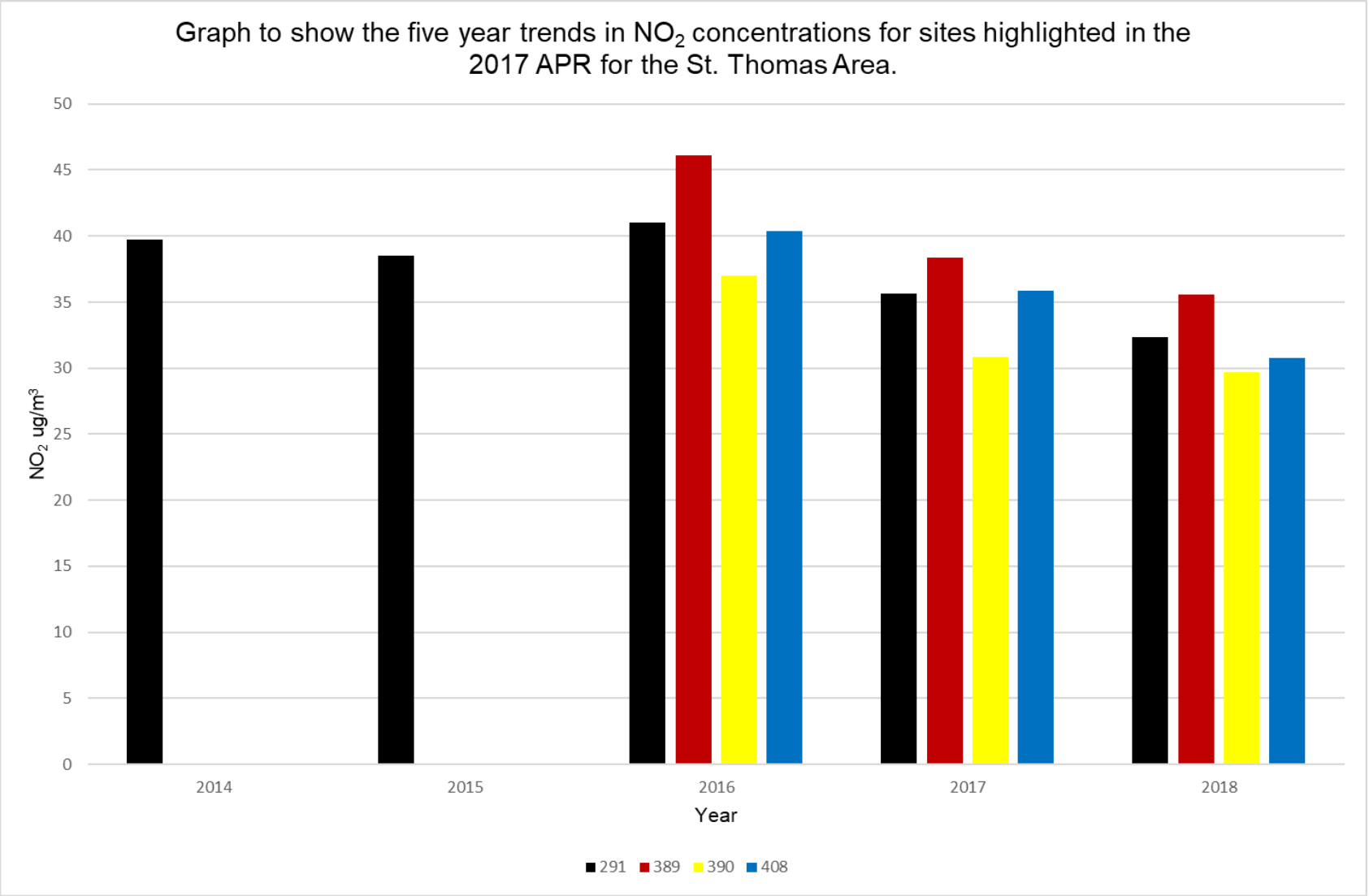
Figure 2.3.1.14 - Picture to show the location of Diffusion Tube sites 38, 408 and the new Continuous Monitoring Site.

Sites 291, 389 and 390 are located on terrace properties further east along Fabian Way, the last premises on Fabian Way on the outbound A483 towards junction 42 of the M4. The location of the sites are shown in Figure 2.3.1.15, site 291 was commissioned in 2011 and has been reported upon in previous reports. Sites 389 and 390 were commissioned in 2016 and an annualised annual mean was reported for 2016. Sites 291 and 389 both reported exceedences of the Annual Mean Objective concentration in 2016 and have been compliant for 2017 and 2018. Given the ongoing work behind the scenes with the draft Air Quality Action Plan and other collaborative work streams that the Local Authority are undertaking the requirement for a detailed assessment, within the 2017 Progress Report, has not be carried out at this time. Again, Welsh Government confirmed support for this approach within the appraisal report for the 2018 APR and Swansea Council will continue to monitor in this location.

Figure 2.3.1.15 Picture to show the location of Diffusion Tube sites 291 and 389

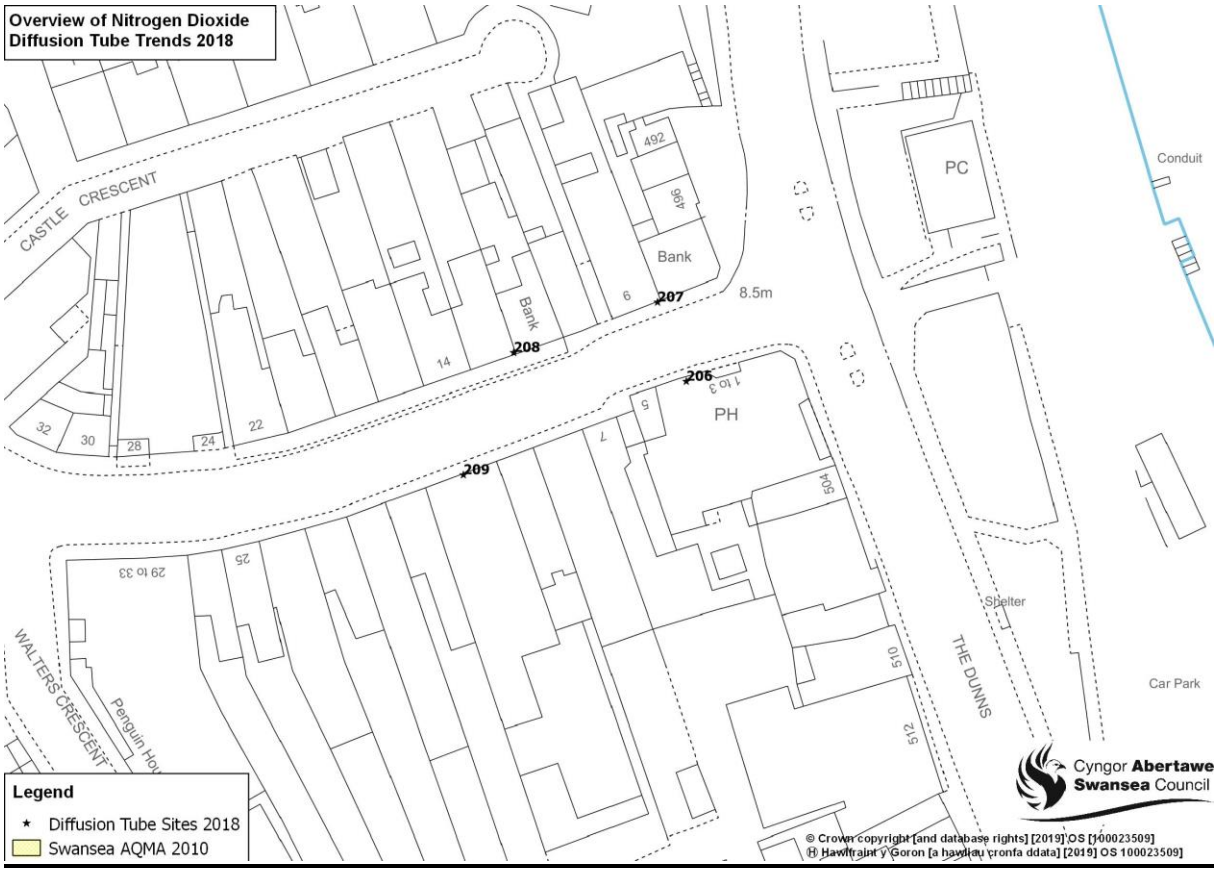
The data for 2018, figure 2.3.1.16, indicates compliance for the four sites with the Annual Mean Objective Concentration for the residential exposure with site 291 continuing with the downward trend in concentration (apart from 2016).

Figure 2.3.1.16 – Trends in Annual Mean NO_2 Concentrations



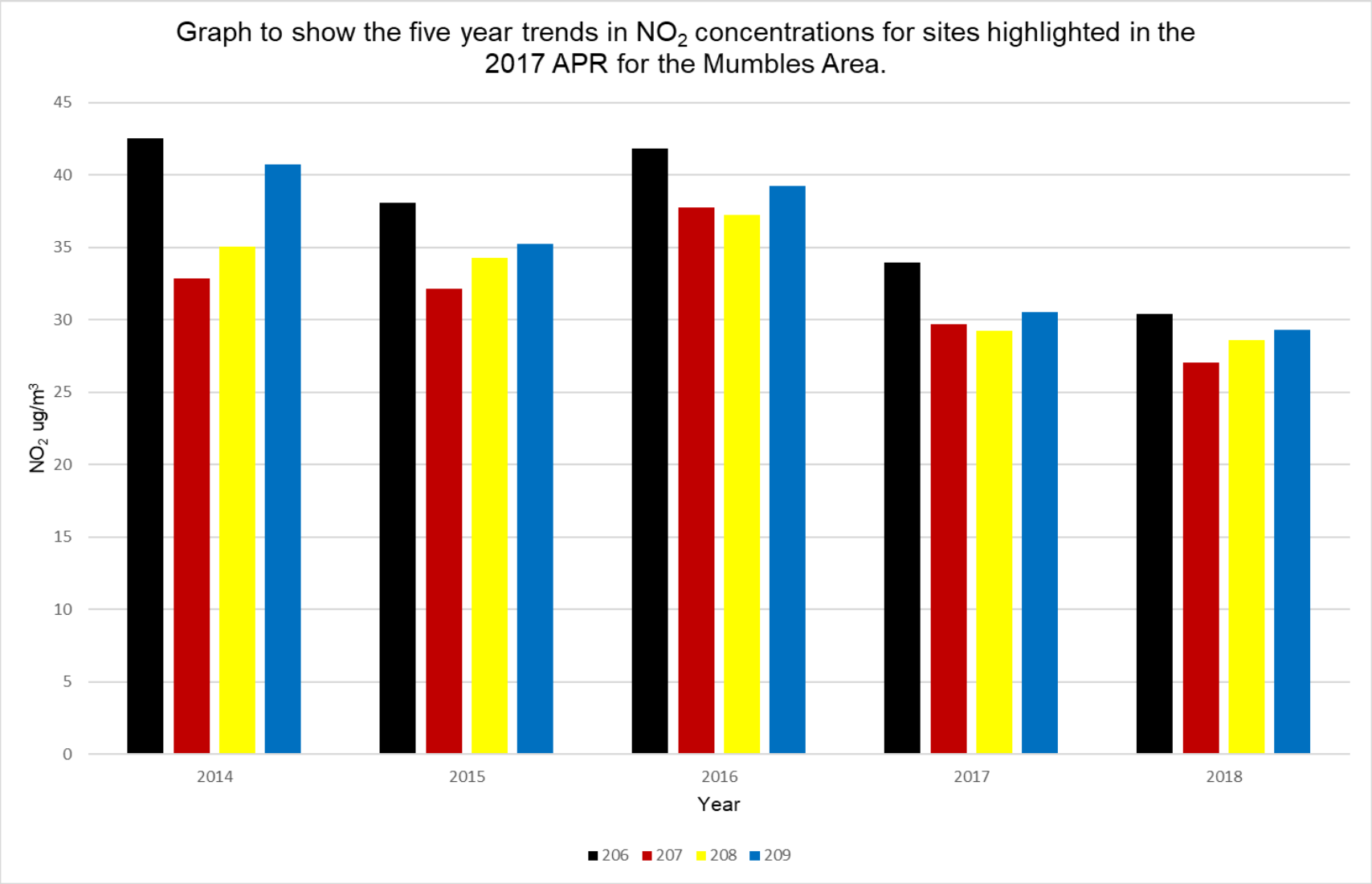
Mumbles:

Figure 2.3.1.17 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend Mumbles Locations 2018



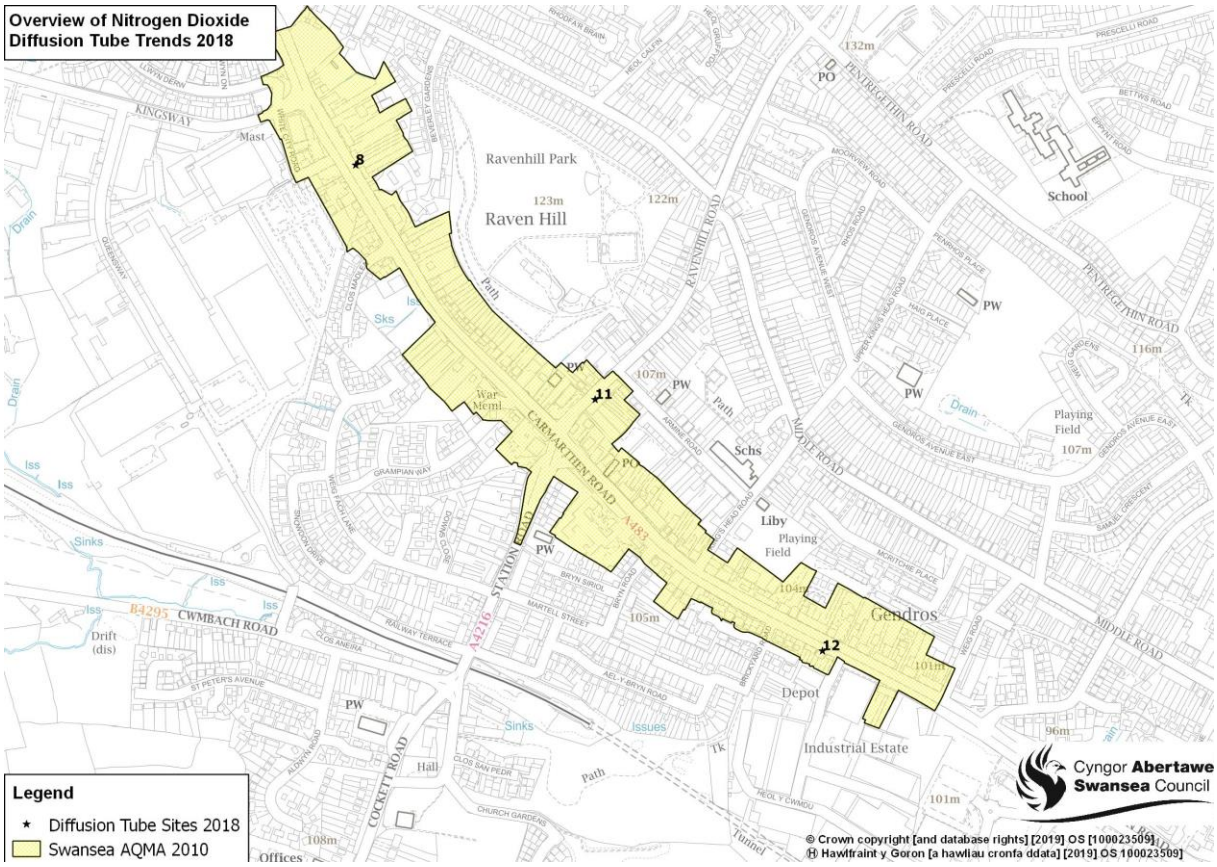
As discussed in previous reports, the situation within Newton Road, Mumbles has continued to improve, figure 2.3.1.18. However, an increase in concentration has been observed for 2016 for the sites being monitored. Site 206 exhibited an exceedence of the annual mean objective however, 2017 data has indicated a large reduction in concentration across the sites. The detailed assessment required by the 2017 Progress Report has not be submitted and Welsh Government confirmed support for this approach within the appraisal report for the 2018 APR. Swansea Council will continue to monitor in this location in 2019 and reassess given the reduction in concentration observed.

Figure 2.3.1.18 – Trends in Annual Mean NO_2 Concentrations



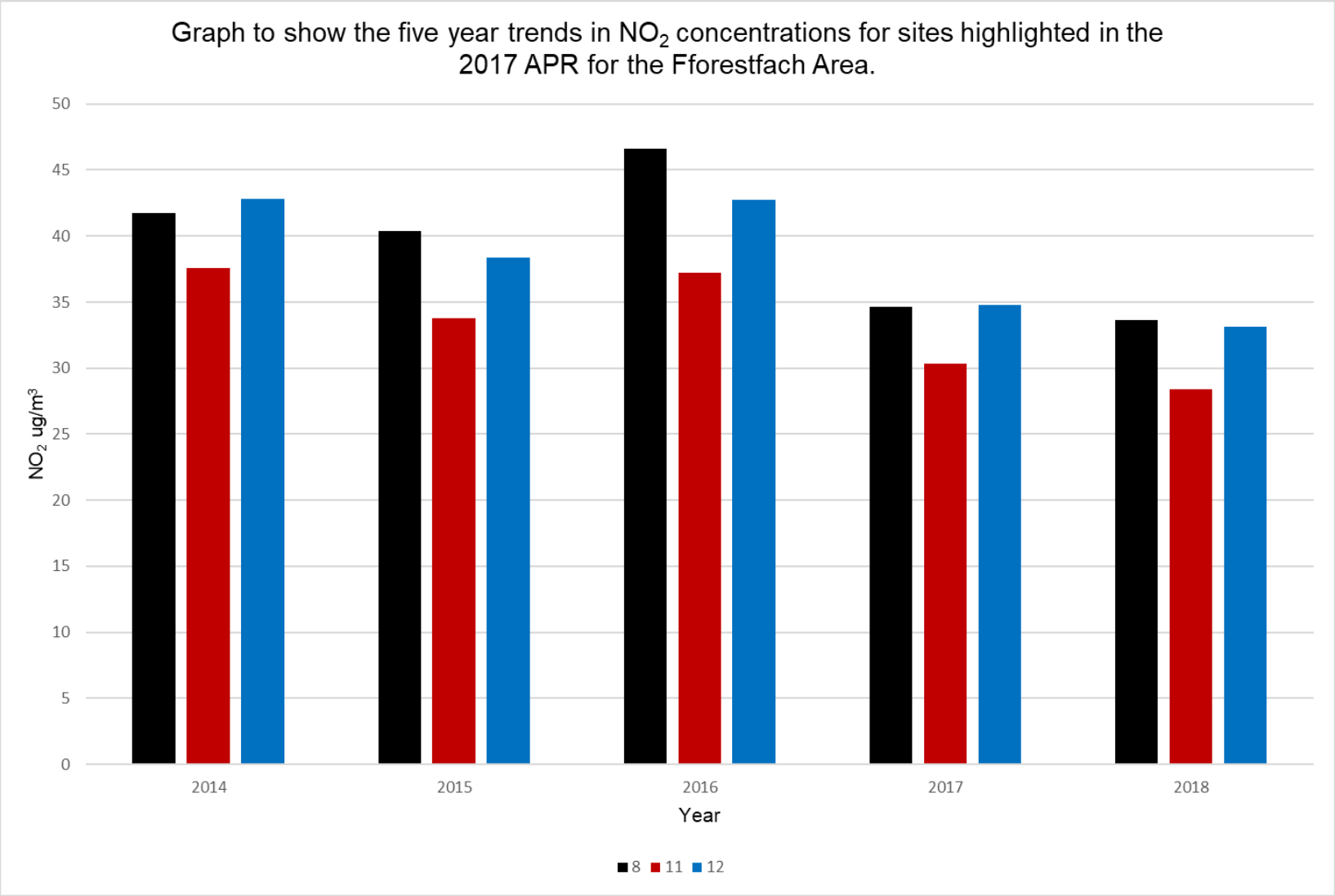
Fforestfach:

Figure 2.3.1.19 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend Fforestfach Locations 2018



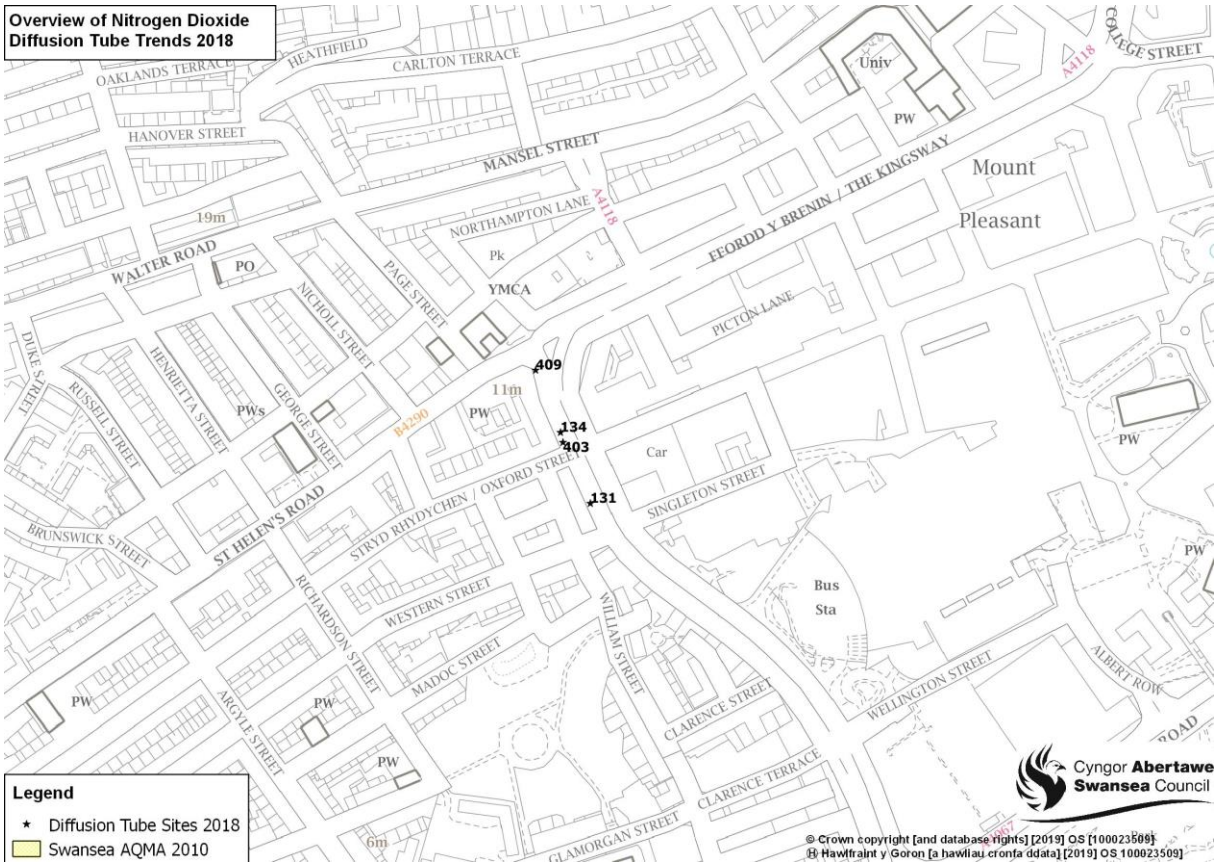
The three sites displayed in figure 2.3.1.19 are currently located within the Swansea AQMA 2010. Figure 2.3.1.20 shows a downward trend occurring over the last five years, with the exception of 2016 and the anomalous meteorological conditions. The AADT for 2018 was 11,784 and in 2017 was 13,128, given the close proximity to the traffic source, this would concur with past comments regarding the effects of meteorological conditions have upon NO_2 concentrations recorded. All sites reported no exceedences of the Annual Mean Objective concentration in 2018 and will continue to be assessed with the potential for restructuring the AQMA boundaries.

Figure 2.3.1.20 – Trends in Annual Mean NO_2 Concentrations



City Centre:

Figure 2.3.1.21 - Map to show Overview of Nitrogen Dioxide Diffusion Tube Trend City Centre Locations 2018

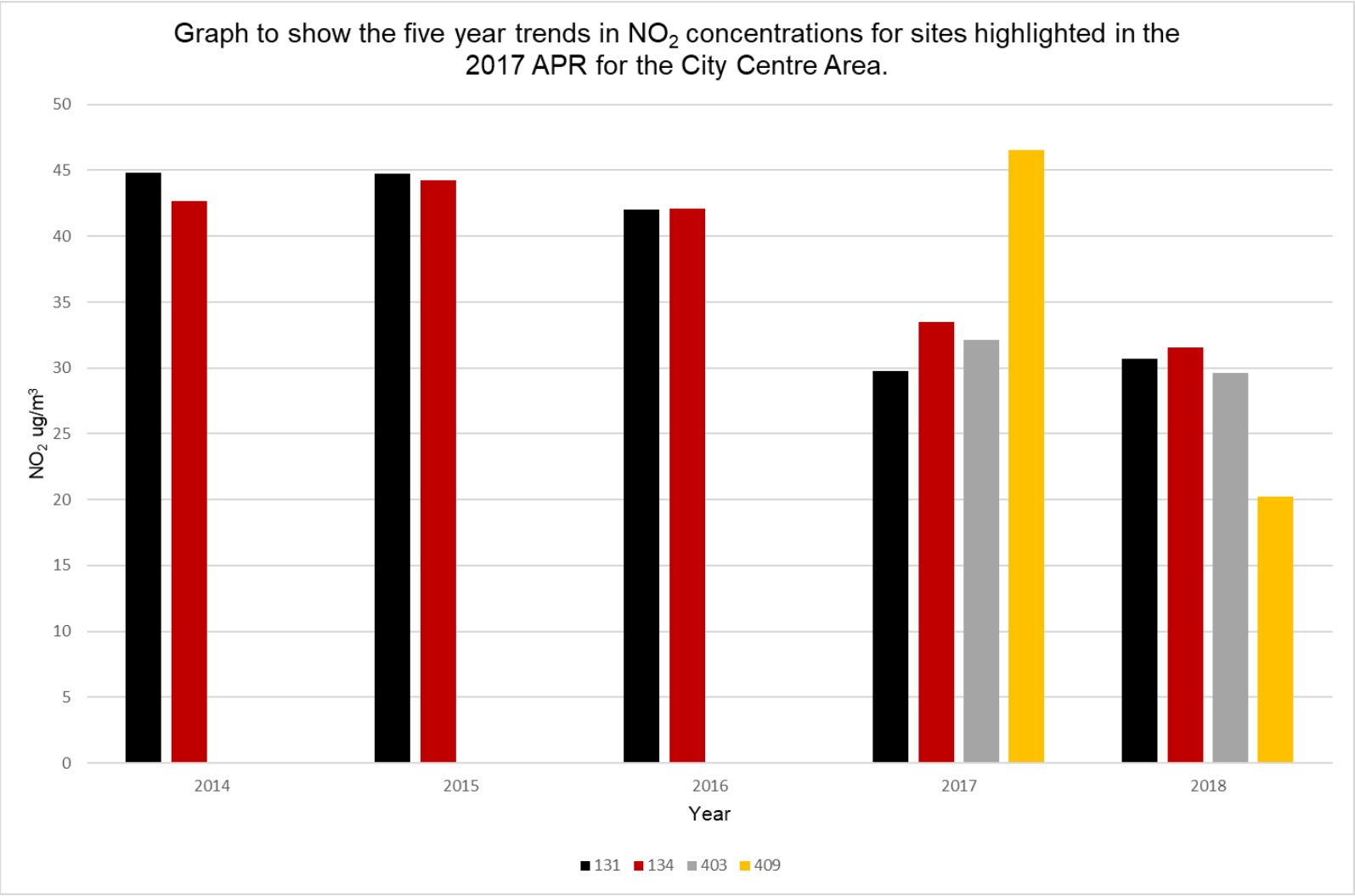


Sites 131 and 134 are located on facades of business premises in order to assess for the one hour exposure Objective Concentration; both sites continue to return results below the indicative threshold of 60ug/m^{-3}. As reported in the 2017 Progress Report, first floor accommodation was discovered above site 134 and so site 403 was commissioned. A different trend can be observed in figure 2.3.1.22 for the dataset in that concentrations have remained relatively stable, over the years reported. However, this area of the City has undergone major highway infrastructure works over the years including the new Bus Station and Kingsway works. Ongoing development works in the area due to continue along the Kingsway but have been completed in the vicinity of the monitoring sites; this reflects to reduction in concentrations reported in 2017 and 2018.

Site 409 was commissioned part way through 2017 to assess the one hour Objective Concentration and has been annualised and back corrected for 2017. Whilst this site is showed an exceedence of the Annual Mean Objective, given that residential accommodation exists further monitoring is intended to be carried out at the location

as only five months of data was returned for 2017. Unfortunately, the infrastructure changes have led to the removal of this site as the traffic lights have been removed and a roundabout implemented instead. Data returned for the area indicates compliance with the objective concentration at first floor height.

Figure 2.3.1.22 – Trends in Annual Mean NO_2 Concentrations



Llangyfelach:

Figure 2.3.1.22 shows sites 397 – 401 that commenced monitoring on the 4th January 2017. These sites were selected in order to answer local resident's queries regarding pollutant concentration at the busy junction of Llangyfelach Road and Mynydd Garnlwydd Road and the potential exposure of school children at peak periods.

Figure 2.3.1.22 - Map to show Diffusion Tube site 397-401.

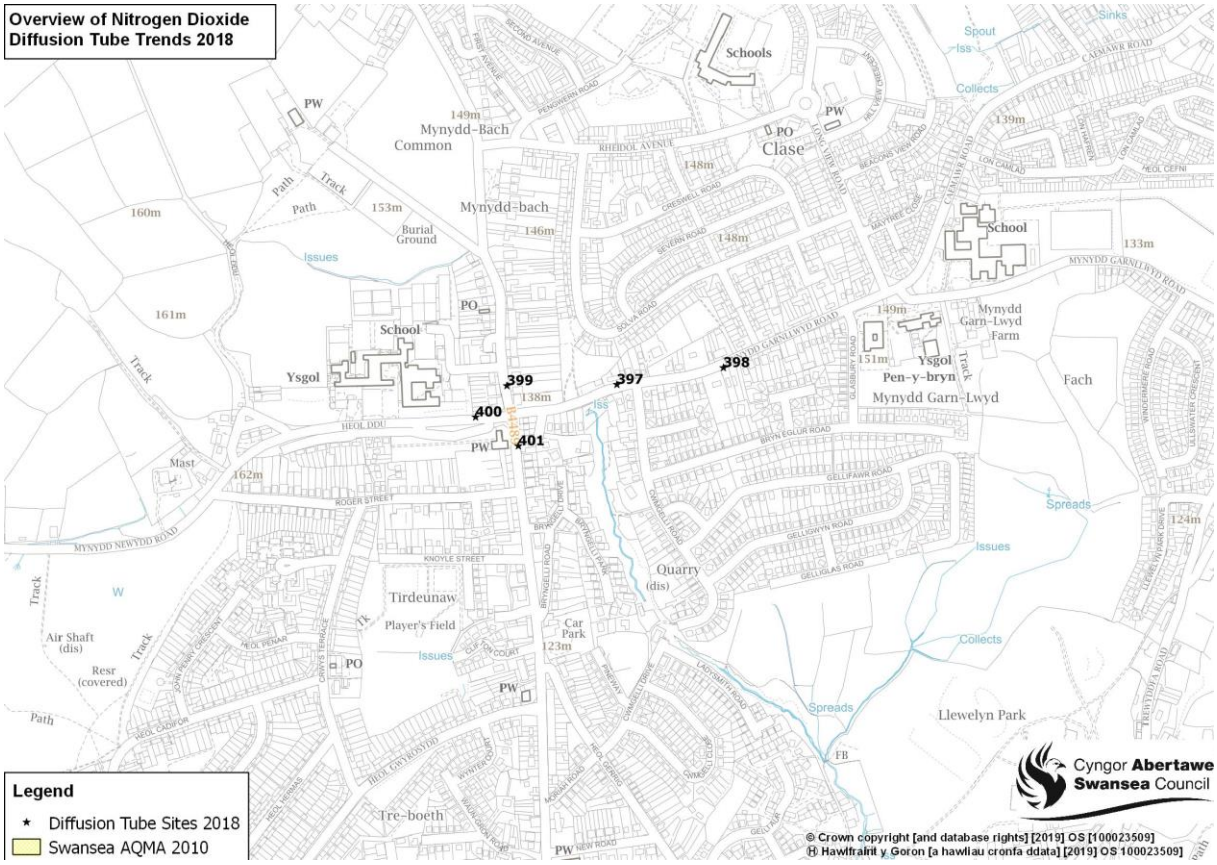
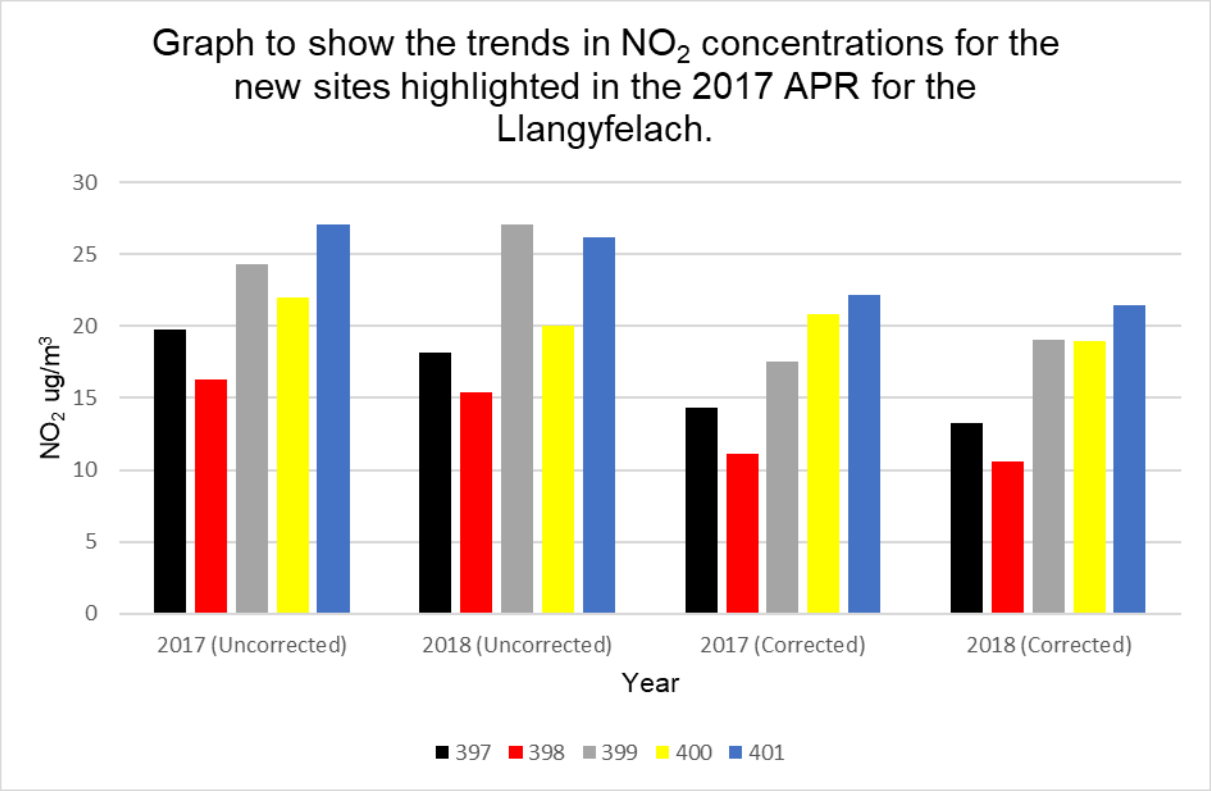


Figure 2.3.1.23 to show the NO_2 ugm^{-3} data for sites 397 – 401 for 2017



The data for these sites is displayed as a distance uncorrected annual mean to assess against the hourly NO_2 objective concentration and as the distance corrected façade annual mean. As the table shows, all sites are in compliance with the objective concentrations. However, site 399 has reported an increase in concentration recorded when all other sites are decreasing, monitoring will continue at this location in 2019 and then be reviewed again.

Penllergaer Primary School:

Figure 2.3.1.24 shows site 404 that commenced monitoring on the 3rd March 2017. This site was selected in order to answer a local Ward Member's query regarding pollutant concentration at the Primary School on Gorseinon Road and the potential exposure of school children at peak periods.

Figure 2.3.1.24 - Map to show Diffusion Tube site 404.

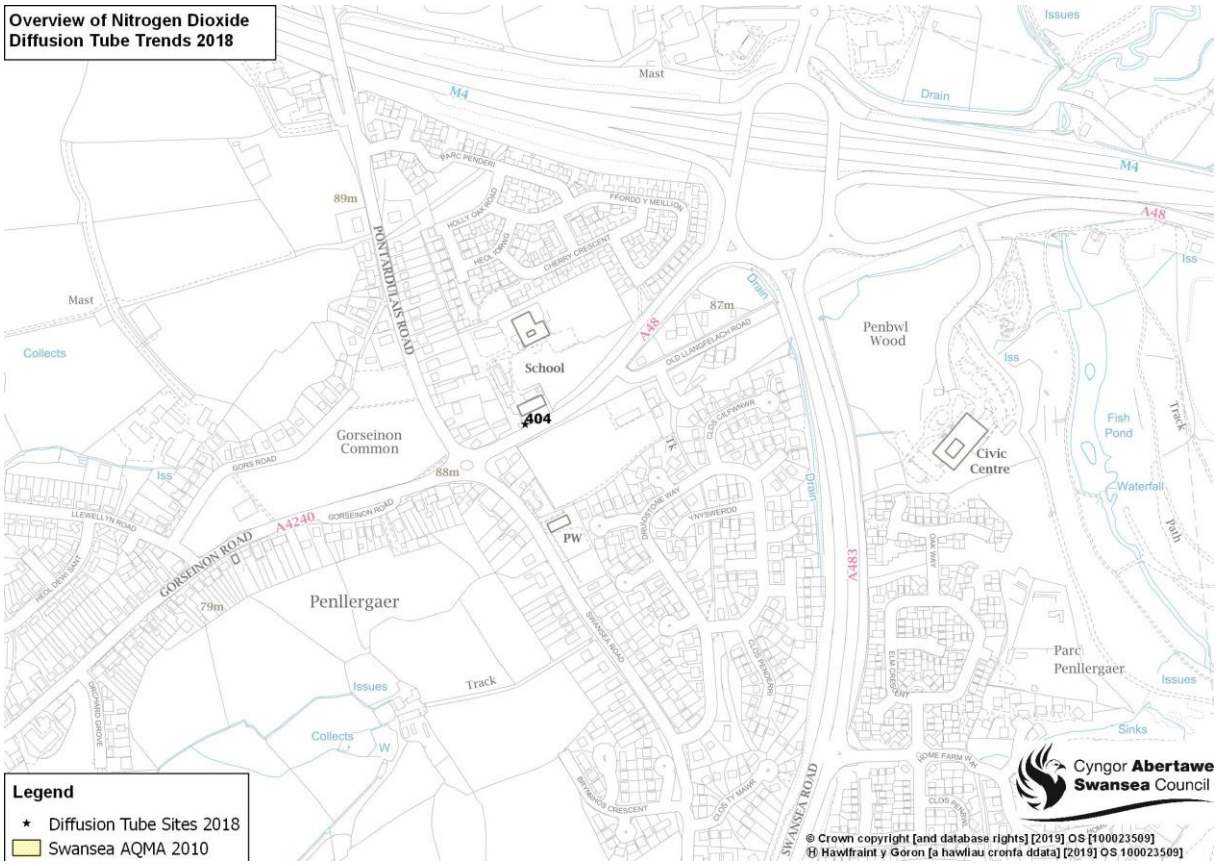
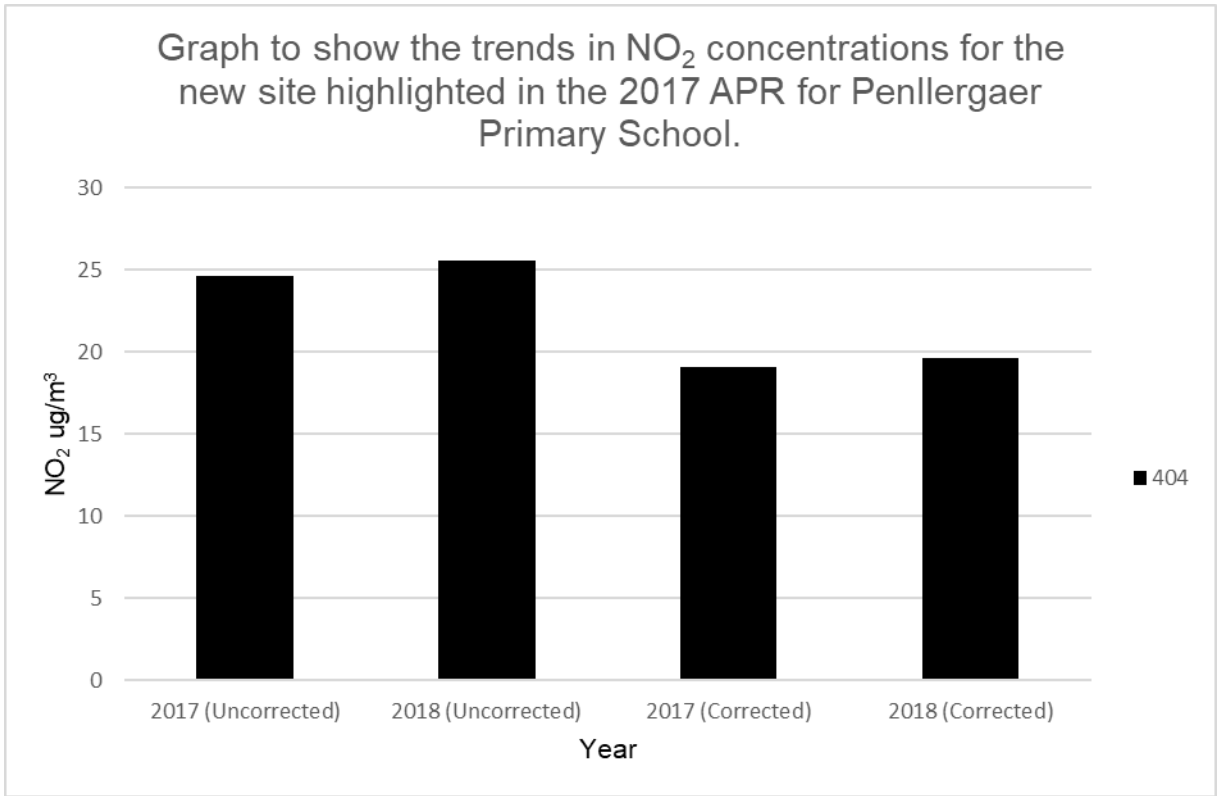


Figure 2.3.1.25 to show the NO_2 ugm^{-3} data for site 404



The data for this site is displayed as a distance uncorrected annual mean to assess against the hourly NO_2 objective concentration and as the distance corrected façade annual mean. As the table shows, the site is in compliance with the objective concentrations; monitoring will continue at this location in 2019 and will then be reassessed.

Gowerton:

Figure 2.3.1.426 shows sites 373 - 378 & the two newer sites 412 - 413. These sites commenced monitoring on the 14th August 2017. This site was selected in order to answer a local Ward Member's query regarding pollutant concentration due to the traffic flow along the B4296.

Figure 2.3.1.26 - Map to show Diffusion Tube sites 373-378 & the two new sites 412-413.

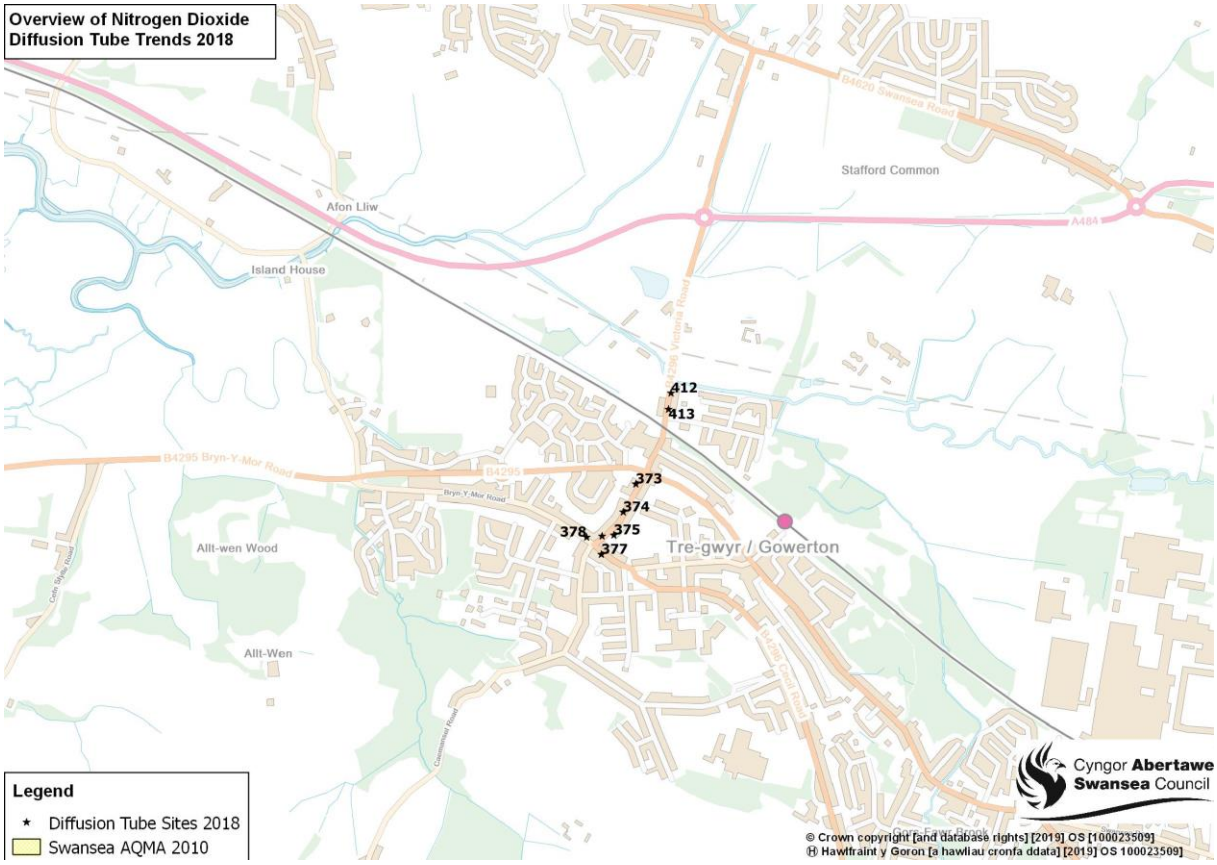
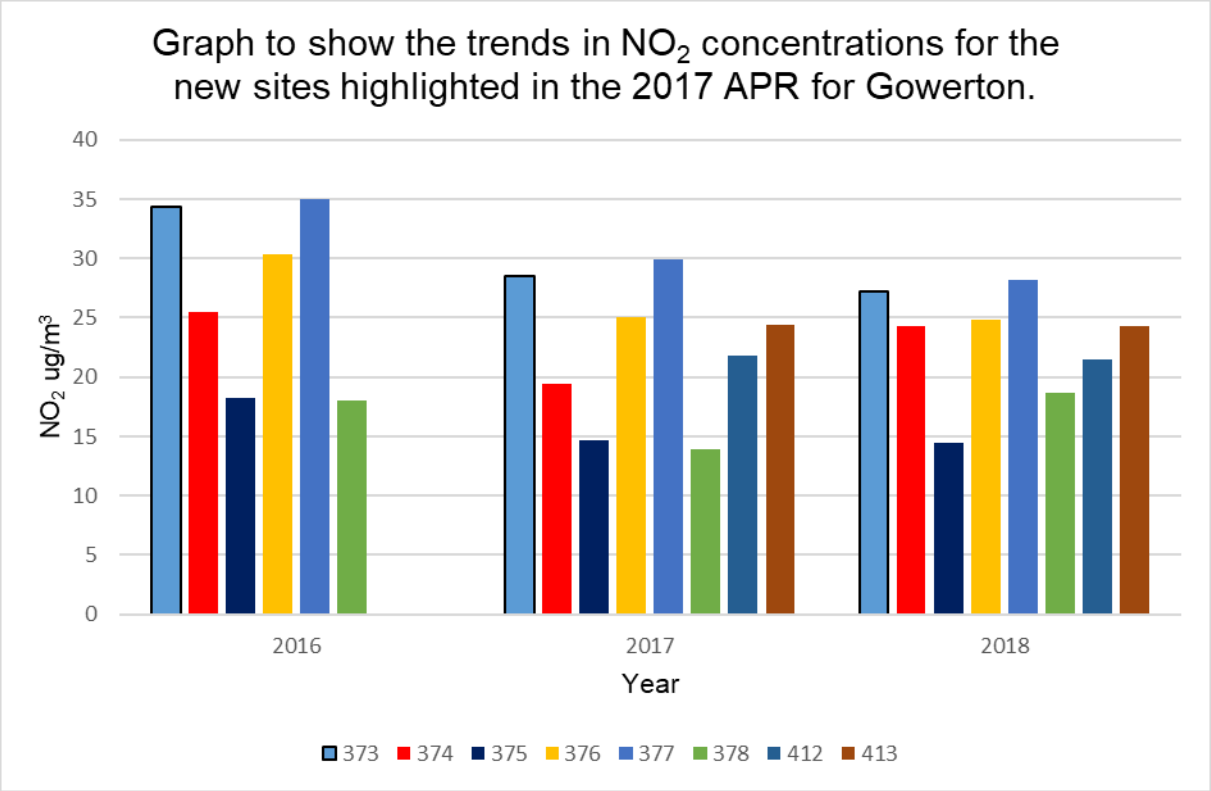


Figure 2.3.1.27 to show the NO_2 ug/m^3 data for Gowerton Sites for 2017



The data returned for these sites indicates compliance with both the annual and the hourly objective concentrations.

Bevans Row:

Figure 2.3.1.28 shows sites located along Bevans Row, Port Tennant, Swansea. The newer site (405) commenced monitoring on the 30th March 2017. This site was selected in order to answer local resident's queries regarding pollutant concentrations due to the traffic flow along the A483 , Fabian Way, the access to the industrial Estate at the rear and the concern regarding a diesel generator in use at a mobile food vendor behind the properties; this generator has now been removed but monitoring has continued to gather data as the industrial unit to the rear is increasing in use.

Figure 2.3.1.28 - Map to show Diffusion Tube sites 48, 387 388 & 405

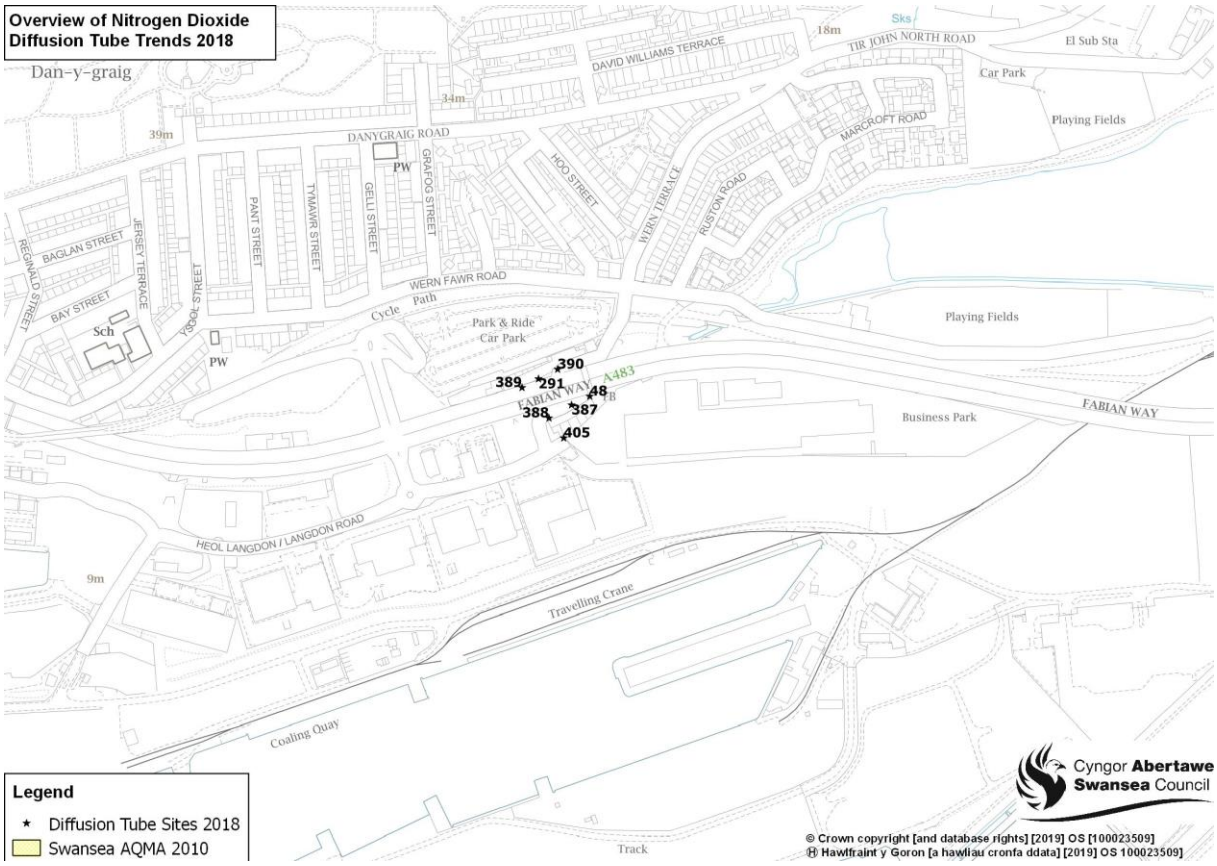
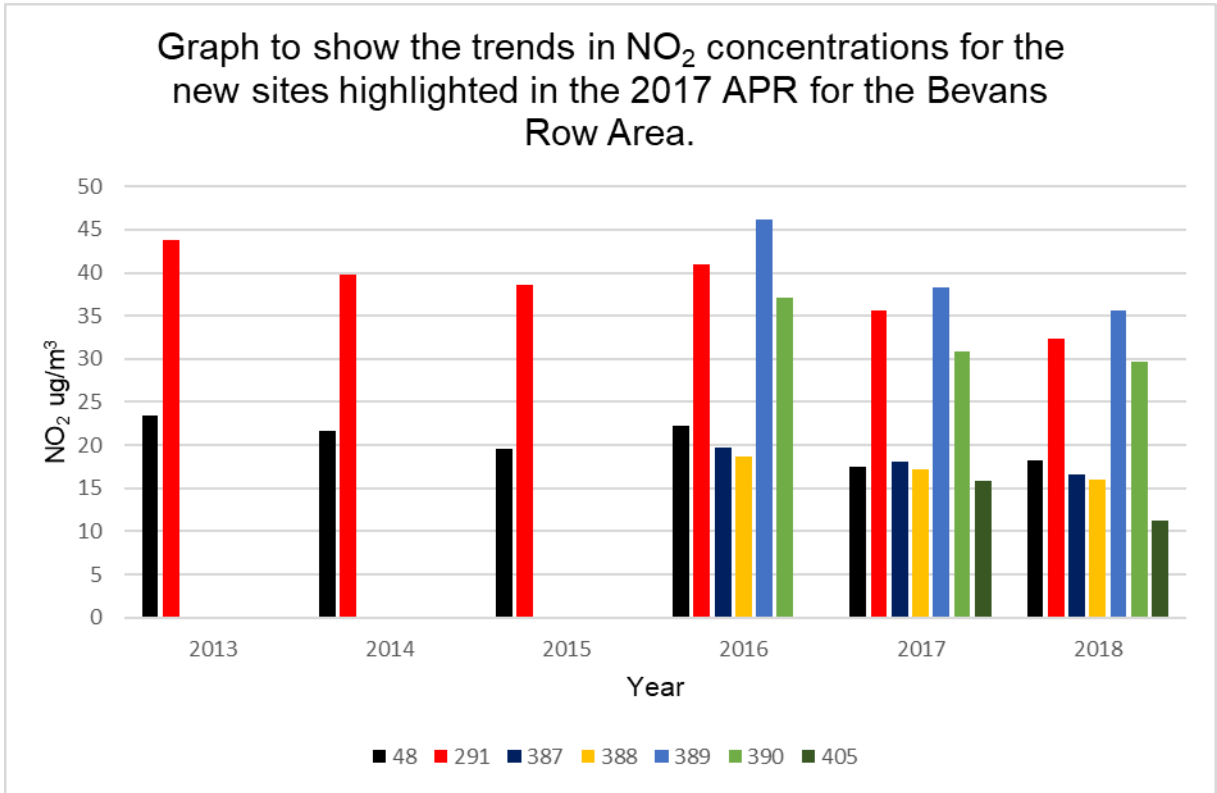


Figure 2.3.1.29 to show the NO_2 ugm^{-3} data for Bevans Row Sites for 2018



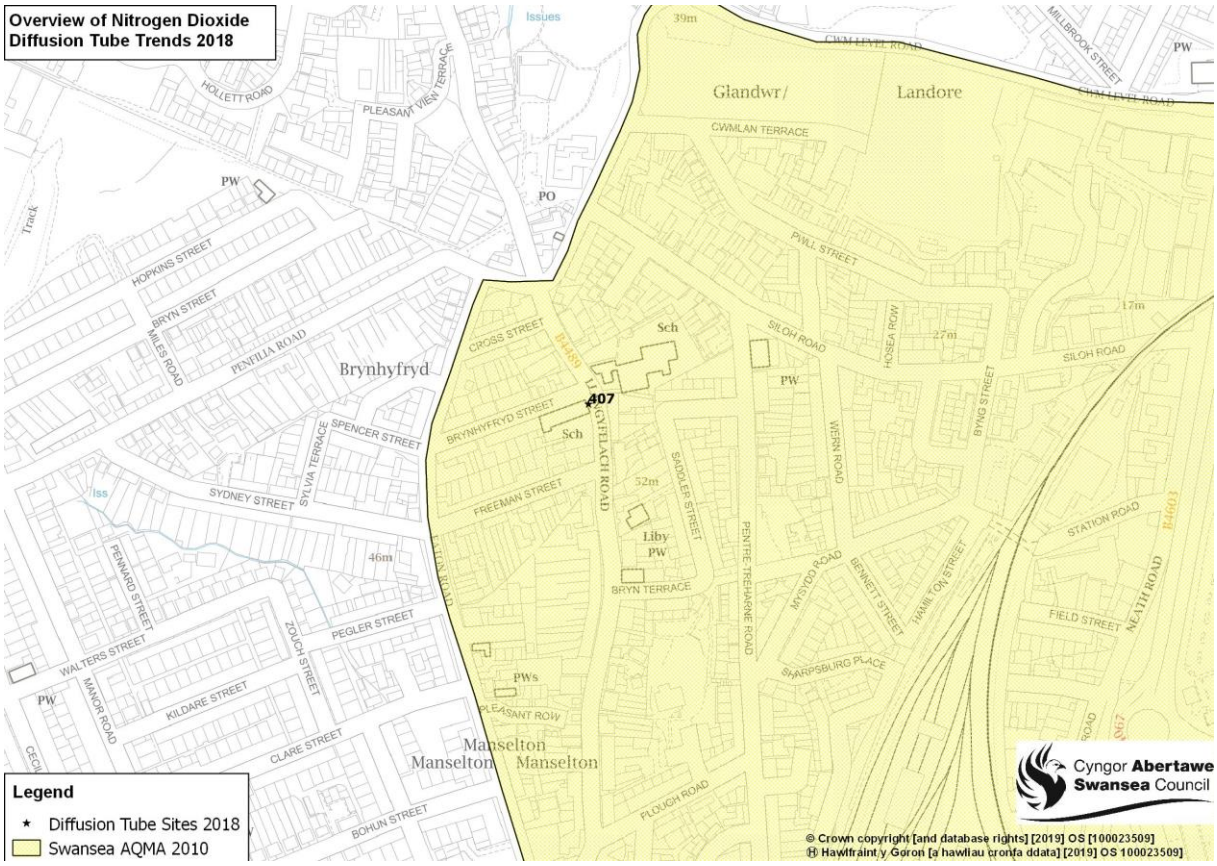
Whilst the data for sites 291, 389 & 390 have been displayed in the table above they have been commented upon in an earlier section regarding the St. Thomas area; the paragraph below has been repeated here for completeness.

Sites 291, 389 and 390 are located on terrace properties further east along Fabian Way, the last premises on Fabian Way on the outbound A483 towards junction 42 of the M4. The location of the sites are shown in Figure 2.3.1.15, site 291 was commissioned in 2011 and has been reported upon in previous reports. Sites 389 and 390 were commissioned in 2016 and an annualised annual mean was reported for 2016. Sites 291 and 389 both reported exceedences of the Annual Mean Objective concentration in 2016 and have been compliant for 2017 and 2018. Given the ongoing work behind the scenes with the draft Air Quality Action Plan and other collaborative work streams that the Local Authority are undertaking the requirement for a detailed assessment, within the 2017 Progress Report, has not be carried out at this time. Again, Welsh Government confirmed support for this approach within the appraisal report for the 2018 APR and Swansea Council will continue to monitor in this location in 2019.

Brynhyfryd Primary School:

Figure 2.3.1.30 shows the new site located outside Brynhyfryd Infants School, Llangyfelach Road, Swansea. The B4489 is a busy section of road with an AADT of 12,744 in 2018; this data is obtained from the ATC located on Llangyfelach Road approximately 600m to the south. Brynhyfryd Junior School is located opposite the site as well but is set further back from the highway and so the monitoring location chosen was felt to be representative of both the annual mean and hourly Objective concentration. This site was set up in order to respond to queries raised by Friends of the Earth regarding pollutant concentrations due to a short survey they carried to in the area.

Figure 2.3.1.30 - Map to show Diffusion Tube Site 407



Monitoring at the site commenced in April 2017 and achieved 75% exposure for 2017; the annual mean returned was 20.79ugm^{-3}. The site achieved 100% exposure for 2018 and reported an annual mean concentration of 19.38ugm^{-3}. This site has been established to look at both the annual and hourly exposure, as a located on the façade of a primary school. Data will continue to be collected here and further monitoring studies are looking at being developed with collaborative partners to further assess the exposure in this area.

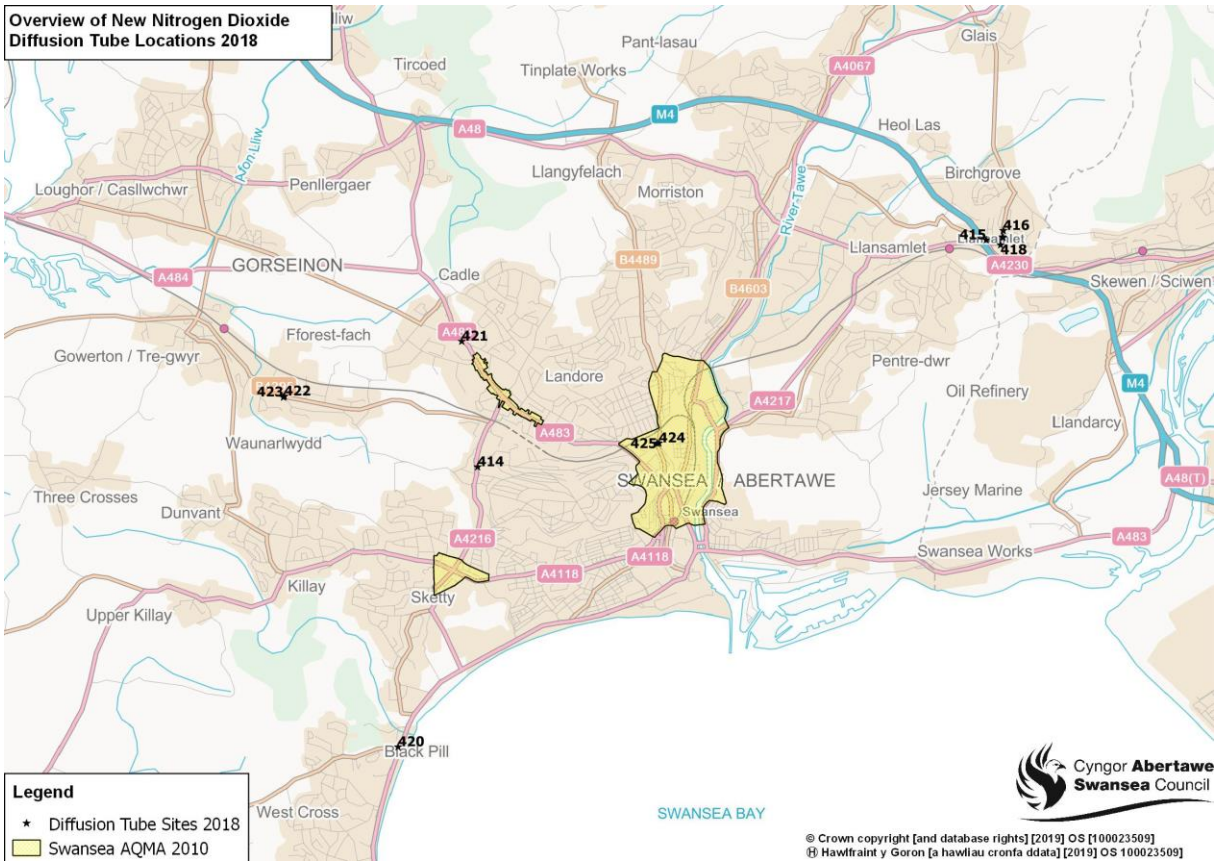
New NO_2 Diffusion Tube Sites:

During 2018 the Pollution Control was approached by Local Ward Members, Environmental Groups and Members of the Public and asked whether we could carry out any diffusion tube monitoring in the following areas:

- Birchgrove
- Waunarlwydd Primary School
- Fforestfach
- Cockett
- Blackpill

Along with these locations, additional sites were set up on Llangyfelach Road to assess the effects of infrastructure changes carried out within the AQMA.

Figure 2.3.1.31 shows the locations across the Local Authority



Birchgrove:

Figure 2.3.1.32 shows sites 415 – 419, monitoring commenced on the 7th June 2018. These sites were selected after discussions with local residents around their concerns relating to a planning application for a Drive Through Coffee outlet and a residential development in the area; the residents' concerns included air quality.

Figure 2.3.1.32 - Map to show Diffusion Tube Sites in Birchgrove

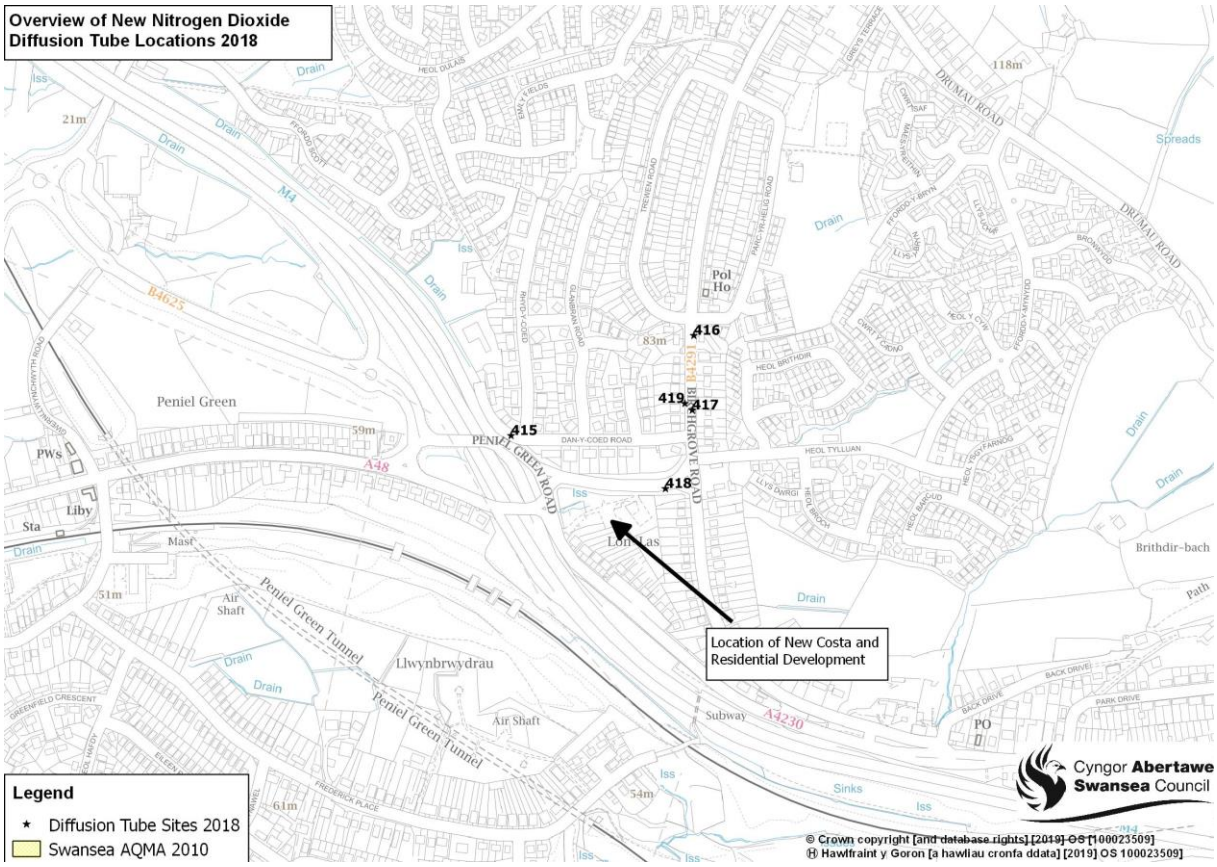


Table 2.3.1.4 shows the annualised NO_2 (ugm^{-3}) data for sites 415-419 for 2018

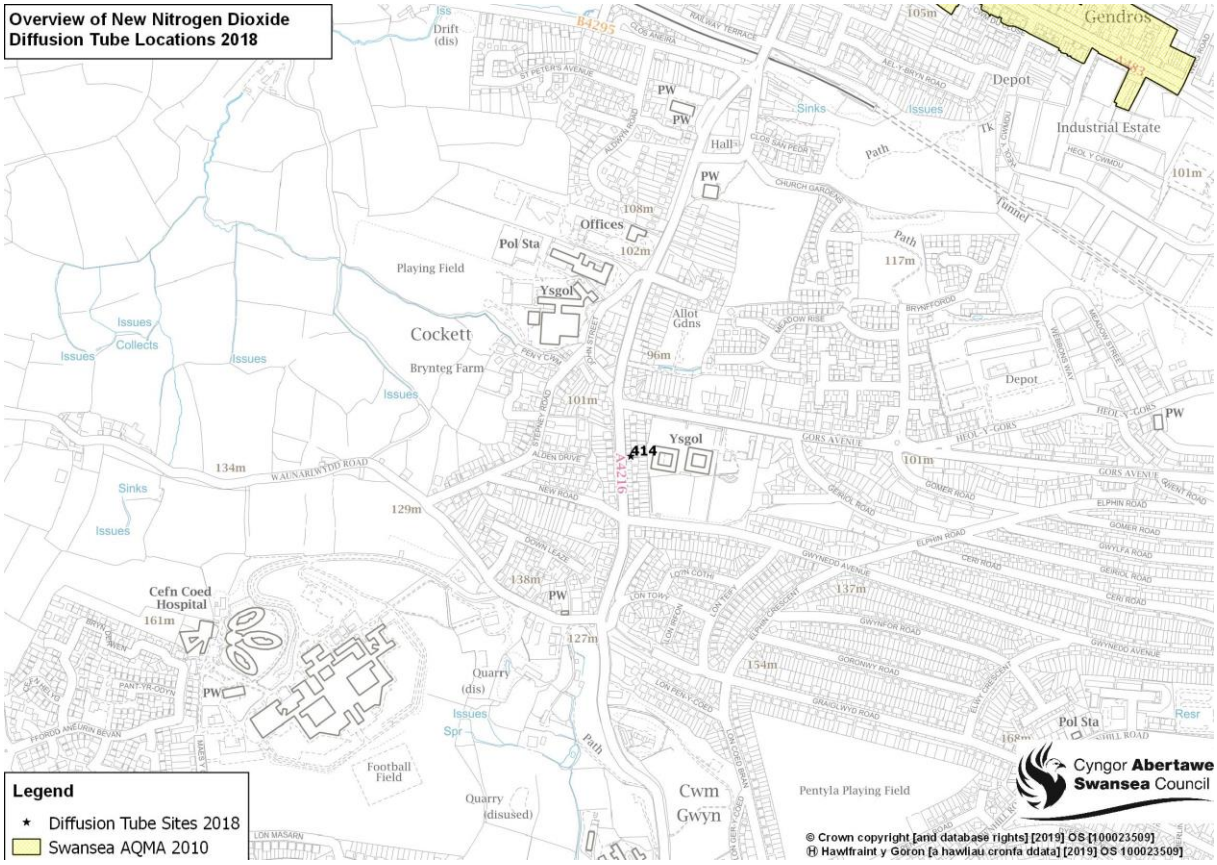
	415	416	417	418	419
2018	29.58	20.28	24.52	24.62	24.43
2018 (Distance Corrected to Façade)	18.5	16.2	19.08	17.42	21.53

The data returned for 2018 indicates compliance with the annual mean objective, the development works have commenced and so monitoring will continue in the area for the foreseeable future.

Cockett:

Site 414 commenced monitoring on the 27th March 2018 after correspondence was received form the local ward member regarding a residents concern regarding air quality due to the busy road (A4216). ATC 27 is located on the A4216 (Cockett Road) and returned an AADT for 2018 of 21,504. The annualised annual mean for 2018 was 20.34ugm^{-3}, given the distance from the kerb to the façade of the property this result is not unexpected.

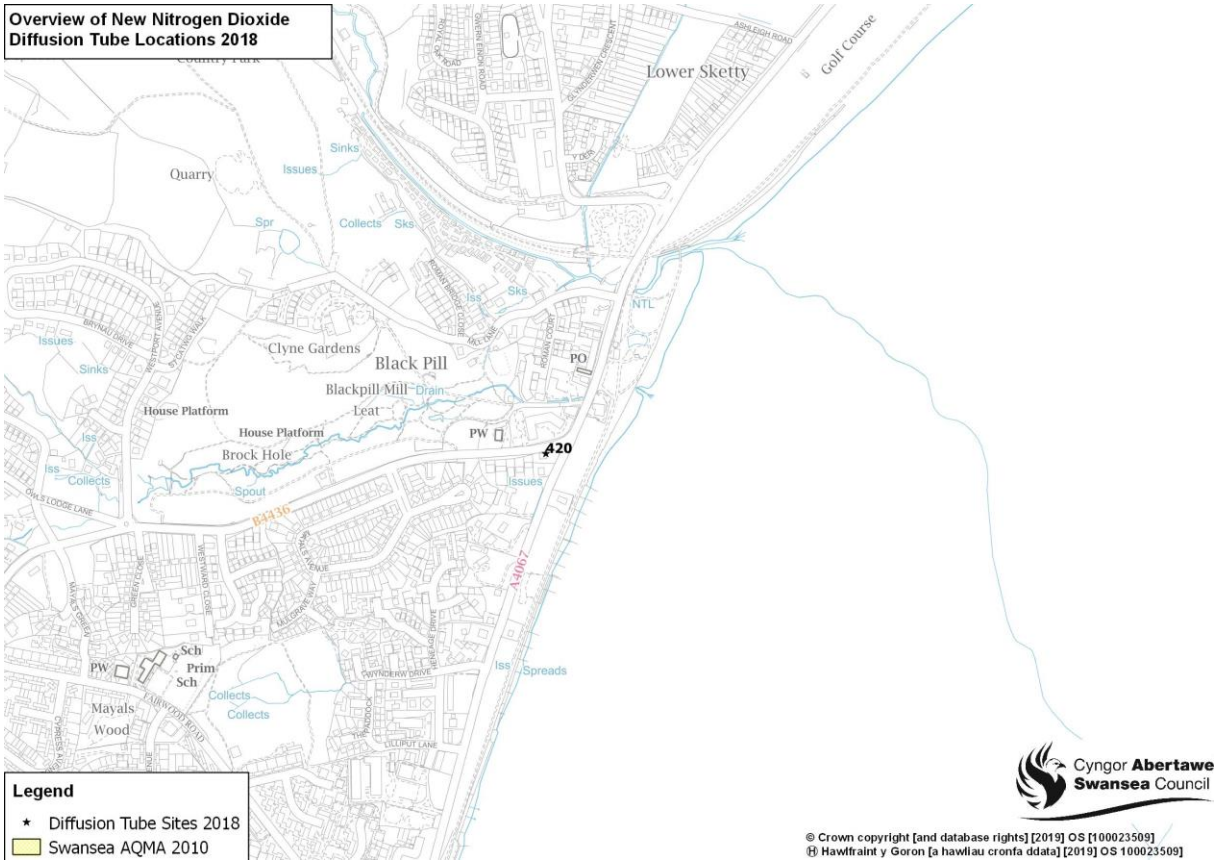
Figure 2.3.1.33 - Map to show Diffusion Tube Site 414



Mayals:

Site 420 commenced monitoring on the 6th December 2018, on the downpipe of the property. The site was set after communication with the home owner regarding their concerns about air quality at the busy junction of the A4067. ATC 51 (A4067) is located to the east of the junction and records an AADT of 32,568 for 2018. The annualised concentration returned for 2018 was 33.40ugm^{-3}. Monitoring will continue in 2019 to obtain a more accurate result.

Figure 2.3.1.34 - Map to show Diffusion Tube Site 420



Waunarlwydd:

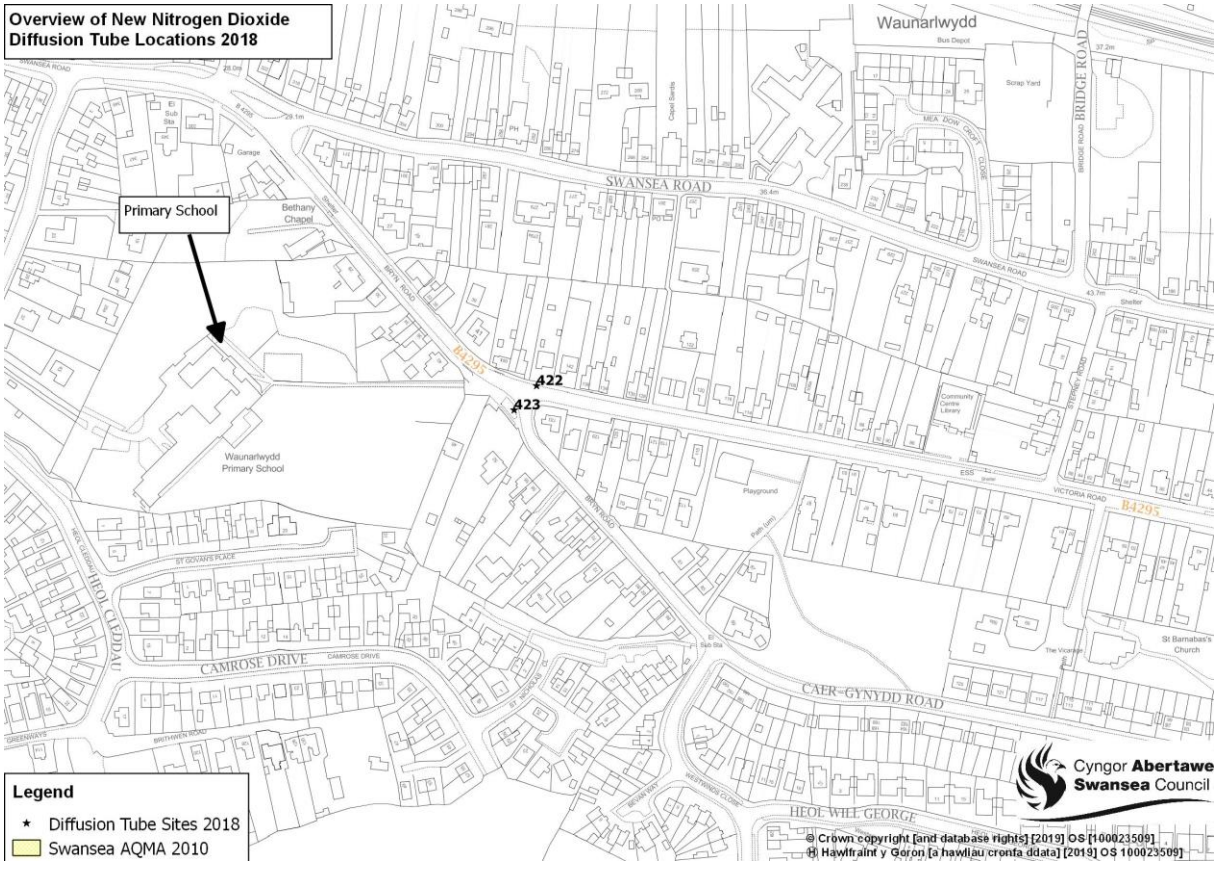
Sites 422 and 423 commenced monitoring on the 6th December 2018. These locations were created due to a request from a local ward member regarding air quality and the local primary school. The data presented below in table 2.3.1.3 displays the annualised distance uncorrected concentration to assess for the one hour exposure concentration and the distance corrected concentration to assess for the annual mean exposure at the nearest façade.

Table 2.3.1.5 shows the annualised concentrations for 2018, both uncorrected and corrected distance.

	422	423
Uncorrected 2018	24.45	18.43
Corrected 2018	13.53	8.64

Monitoring will continue in 2019 to obtain a more accurate result.

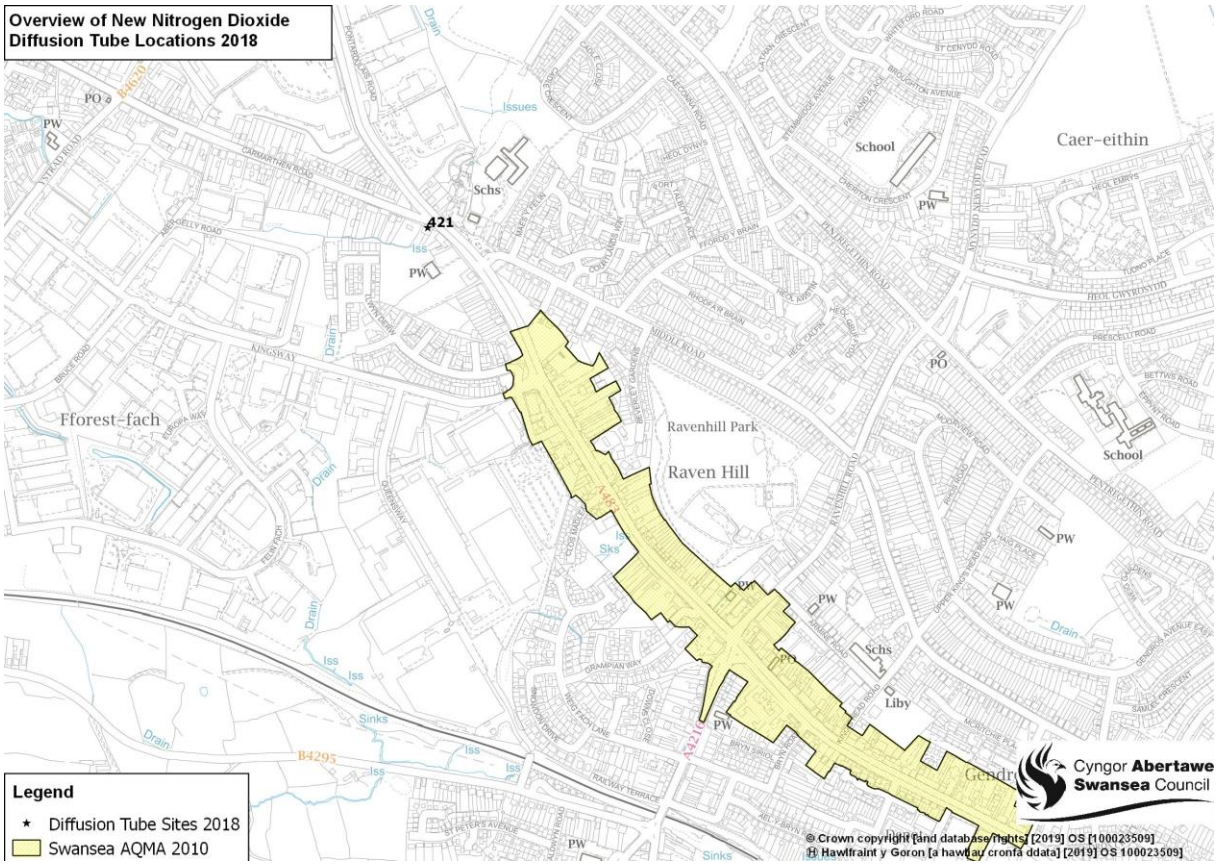
Figure 2.3.1.35 - Map to show Diffusion Tube Sites 422 and 423



Fforestfach:

Site 421 commenced monitoring on the 6th December 2018 after discussions with local residents regarding their concerns about air quality due to the close proximity of the A483, Carmarthen Road. ATC's 25 and 44 recorded traffic flows on the A483 and returned an AADT of 25,228 for 2018. Unfortunately the first month of exposure returned no result as the diffusion tube was missing; monitoring will continue in 2019.

Figure 2.3.1.36 - Map to show Diffusion Tube Site 421



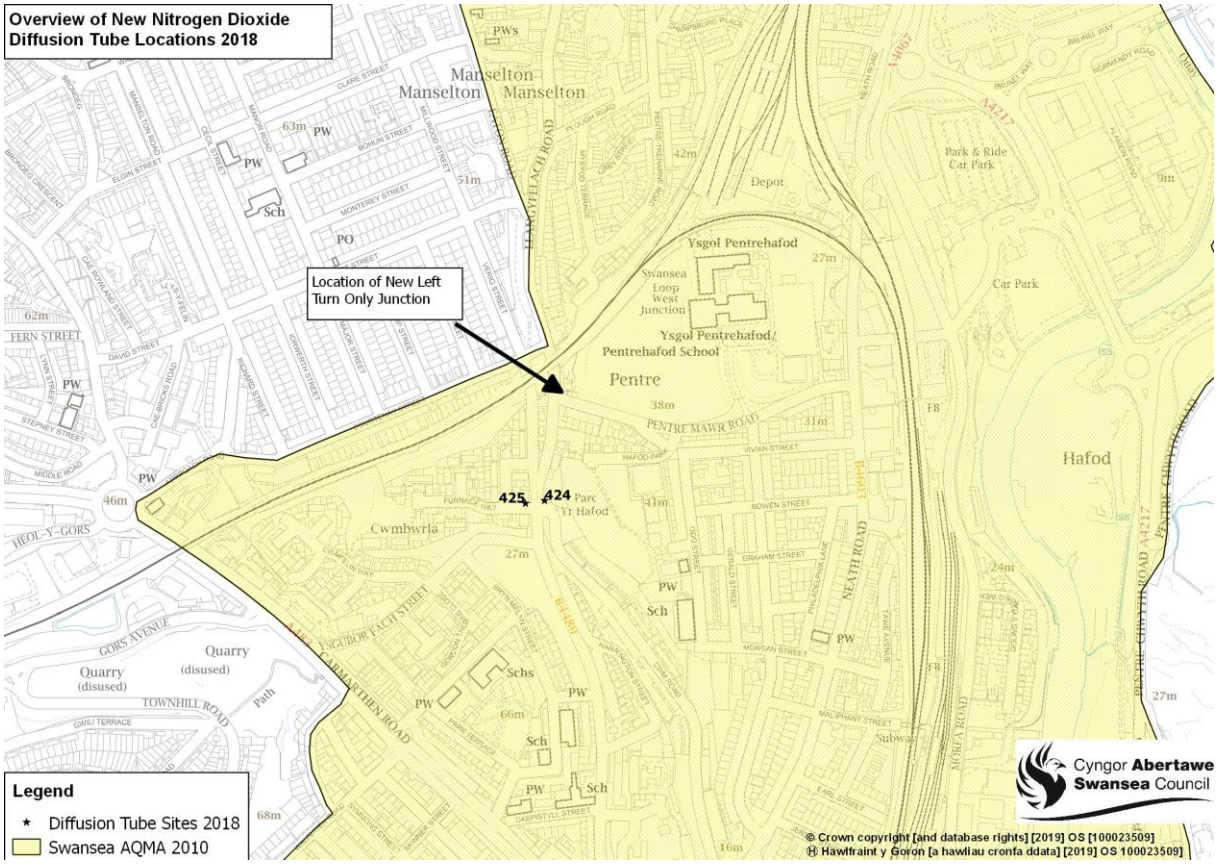
Landore:

Sites 424 and 425 commenced monitoring on the 31st October 2018. The sites were created due to an highway infrastructure change on Pentremawr Road, the junction was altered allow a 'left turn' only onto Llangyfelach Road. Given that the area is within the Swansea AQMA 2010 and a route used by children attending local schools data is reported as both uncorrected and corrected distance. Monitoring will be carried out at these locations for the foreseeable future.

Table 2.3.1.6 shows the annualised concentrations for 2018, both uncorrected and corrected distance.

	424	425
Uncorrected 2018	31.42	32.60
Corrected 2018	14.26	19.59

Figure 2.3.1.37 - Map to show Diffusion Tube Site 407



2.3.2 Particulate Matter (PM_{10})

The Met One Bam 1020 PM_{10} has taken part in UK equivalency trials and has been deemed to be compliant with the EU reference gravimetric method subject to correction for slope by dividing the data by 1.2 or multiplying the data by 0.833 as set out in section 7.151 in the Technical Guidance (TG16).
Each hour, a small 14C (carbon-14) element emits a constant source of high-energy electrons (known as beta rays) through a spot of clean filter tape. These beta rays are detected and counted by a sensitive scintillation detector to determine a zero reading. The BAM-1020 automatically advances this spot of tape to the sample nozzle, where a vacuum pump then pulls a measured and controlled amount of dust-laden air (16.7l/min) through the filter tape, loading it with ambient dust. At the end of the hour this dirty spot is placed back between the beta source and the detector thereby causing an attenuation of the beta ray signal which is used to determine the mass of the particulate matter on the filter tape and the volumetric concentration of particulate matter in ambient air.

Data collected from the BAM 1020 PM_{10} unit has an integration period of 1-hour. Hourly ratified Particulate Matter PM_{10} data for 2018 has been downloaded from the Air Quality Archive at http://uk-air.defra.gov.uk/data/data_selector for the Swansea AURN.

These hourly data have then been imported into the OPSIS Enviman Reporter databases allowing analysis and graphical presentation. The calculated hourly mean mass concentration data have then been further processed by the software package Opsis Enviman Reporter. In order to calculate the 24-hour mean a minimum of 75% (i.e. 18 out of 24) of the calculated hourly means were specified to be present.

For several years, the authority has indicated that it would undertake a basic PM_{10} screening exercise at some of the busier traffic junctions. MetOne EBams have been deployed at five sites during late 2012. Data for 2014-2018 are reported here. It is important to again highlight, that the MetOne EBam has not demonstrated equivalency with the EU reference gravimetric method. However, as the intention is only to provide an ongoing screening assessment, their use is judged to be appropriate.

The 90.4th percentile's of the daily means of measurements made during 2014-2018 are presented in bold within brackets in table 2.6 where appropriate. The data capture were low at the four functioning Ebam sites, namely Carmarthen Road, Uplands Crescent, Sketty and Westway (Port Tennant Ebam has been switched off due to unit failure and has the site has been upgraded to a PM2.5 Bam1020 and a Teledyne NOx analyser). The datasets from Carmarthen Road, Uplands Crescent and Sketty have been annualised in accordance with the Technical Guidance. **However, LAQM.TG(16) amends this required data capture rate to 85% with the requirement that the 90.4th percentile be presented should data capture for the year fall below the required 85%.**

All data for sites measuring PM10 concentrations can be seen in tables 2.5 and 2.6. There are no exceedences of the PM10 objective concentrations for 2018.

2.3.3 Particulate Matter ($PM_{2.5}$)

The Met One Bam $PM_{2.5}$ (smart Bam) is heated and has been determined to show equivalency to the EU reference method during recent trials without the need for the application of a correction factor.

Each hour, a small 14C (carbon-14) element emits a constant source of high-energy electrons (known as beta rays) through a spot of clean filter tape. These beta rays are detected and counted by a sensitive scintillation detector to determine a zero reading. The BAM-1020 automatically advances this spot of tape to the sample nozzle, where a vacuum pump then pulls a measured and controlled amount of dust-laden air through the filter tape, loading it with ambient dust. At the end of the hour this dirty spot is placed back between the beta source and the detector thereby causing an attenuation of the beta ray signal which is used to determine the mass of the particulate matter on the filter tape and the volumetric concentration of particulate matter in ambient air.

Data collected from the BAM 1020 $PM_{2.5}$ unit has an integration period of 1-hour. Hourly ratified Particulate Matter $PM_{2.5}$ data for 2018 has been downloaded from the Air Quality Archive at http://uk-air.defra.gov.uk/data/data_selector for the Swansea AURN.

The data collected from the Morriston Groundhog BAM 1020 $PM_{2.5}$ unit has been downloaded from the Welsh Air Quality Forum https://airquality.gov.wales/maps-data/measurements/downloadsubmit-data for the Morriston Groundhog site.
The data is displayed is table 2.7.

2.3.4 Other Pollutants Monitored

Benzene:

Benzene is measured in real-time at two roadside sites in Swansea with Opsis DOAS instruments. Section 2.1 above outline the systems in operation at the Hafod (along Neath Road) and at St. Thomas (Pentreguinea Road) sites.

Annual means for benzene and the underlying data capture for 2014-2018 are provided below within table 2.3.4.1

Table 2.3.4.1 to show Benzene Concentrations 2014-2018

Site ID	Location	Within AQMA	Data Capt. 2014 %	Data Capt. 2015 %	Data Capt. 2016 %	Data Capt. 2017 %	Data Capt. 2018 %	Annual mean concentrations (µg/m³)				
								2014	2015	2016	2017	2018
CM4	Hafod DOAS	Y	70%	73%	63%	95%	85%	2.01	2.33	2.63	1.58	2.19
CM5	St.Thomas DOAS	N	74%	70%	93%	98%	91%	2.56	2.20	2.75	1.48	2.75

Significant data has been lost at these sites in previous years due to operational issues and also building renovation works in the case of the Hafod site. Analysis of the data for 2018 has produced data capture rates at and above the assumed / recommended 85% required for other pollutants within LAQM.TG(16). No mention is made within LAQM.TG(16) of a specific required annual data capture rate for benzene. However, previous poor data capture rate can partly be explained by the validation rules outlined within section 2.1 together with some periods of measurement cycles being close to the “limit of detection” resulting in a high standard deviation of the measurement and thus rejection if the standard deviation is more than the concentration measured. Discussions with Opsis have led to amendment of the validation rules previously applied in that data is no now longer required to be greater than twice the standard deviation of the measurement; data capture for both sites would be less than 50%. Given the low concentrations being recorded and that

concentrations are close to the limit of detection data provided for 2018, in Table 2.3.4.1, has had the light limit threshold applied.

Sulphur Dioxide (SO_2):

SO_2 is now only monitored at one location within Swansea - the St. Thomas DOAS. St. Thomas is ideally placed for this monitoring, being in close proximity to Swansea Docks with the Tata Steelworks to the south-east across Swansea Bay. This has been the traditional dominant source of SO_2 seen within Swansea since measurement of SO_2 commenced during the late 1970's.

The derived 5-minute means have been compiled into 15-minute averages by the software package OPSIS Enviman Reporter. In order to compile a valid hourly mean, a minimum of 3, 15-minute means were specified. Data capture of less than 75% for the hour therefore excludes that hour from any analysis. The derived hourly means have then been used to calculate both the hourly and 24-hour objectives. In order to calculate the 24-hour mean a minimum of 75% (i.e. 18 out of 24) of the ratified hourly means were specified to be present[3]

The data capture rates are presented within table 2.3.4.2 and, where applicable, the percentile value corresponding to the objective exceedance value is given should the data capture rate fall below 85%[4]. Under LAQM.TG(16) data capture requirement was 85%

Table 2.3.4.2 – Results of Automatic Monitoring for SO_2: Comparison with Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture 2017 % [b]	Number of: [c]		
				15-minute Means > 266µg/m^3	1-hour Means > 350µg/m^3	24-hour Means > 125µg/m^3
CM5	Roadside	N	92%	0	0	0

There are no exceedences of the Objective Concentrations at this site.

Ozone (O_3):

Whilst the objective for ozone has not been set in regulation as yet as it is seen as a national rather than local authority problem, details have been included here of the measurements made during 2018. The long term objective for ozone mentioned within the Air Quality Strategy 2007 (vol 2) (chapter 1 section 1.3.5 page 62) was for the 8-hour means not to exceed 100μg/m^3 on more than 10 occasions with a compliance date of 31st December 2005. LAQM.TG(16) makes no reference to ozone monitoring so the approach adopted within previous reporting cycles is adopted within this report. In addition the LAQM Policy Guidance for Wales (June 2017) also makes no specific reference to ozone monitoring.

Measurements are undertaken with Advanced Pollution Instrumentation (API) real-time O_3 analysers at the Cwm Level Park and Morriston Groundhog sites with the DOAS technique providing the measurements from the St Thomas and Hafod sites. The O_3 analyser from the Swansea AURN was decommissioned on the 27th November 2008 and relocated at Cwm Level Park.

Ratified datasets have been downloaded from http://www.welshairquality.co.uk/data_and_statistics.php in relation to the ozone monitoring undertaken at the Morriston Groundhog and Cwm Level Park sites. Data ratification procedures undertaken at the Hafod and St Thomas DOAS sites are described in more detail within section 2.1

Hourly means have been used to calculate the 8-hour means. In order to form a valid 8-hour mean 75% of the hourly means were required to be present i.e. 6 out of every 8.

Table 2.3.4.3 To show Max 8-Hour Mean (ugm^{-3}) at Morriston Groundhog

Morriston Groundhog	Max 8-hour Mean (μg/m^3)	Data capture (at 8 hour integration)	Exceedances of 8-hour objective 100μg/m^3 (10 permitted)
2002	109.50	83.3%	3
2003	169.25	95.71%	28
2004	142.75	98%	23
2005	113.00	97.6%	1
2006	152.20	98.8 %	15
2007	114	98%	4
2008	120.75	88.43%	3
2009	103.25	89.04%	2
2010	103.5	94.34%	1
2011	104.25	90.78%	2
2012	126.50	97.63%	5
2013	111.00	93.42%	1
2014	103.25	95.71%	1
2015	105	91.51%	2
2016	110.63	98.72%	2
2017	100.88	90.05%	1
2018	112.8	88.7%	7

Table 2.3.4.4 To show Max 8-Hour Mean (ugm^{-3}) at Cwm Level Park

Cwm Level Park	Max 8-hour Mean (μg/m^3)	Data capture	Exceedances of 8-hour objective 100μg/m^3 (10 permitted)
2009	100.75	92.6%	1
2010	106.5	98.26%	1
2011	112.0	98.63	5
2012	130.25	96.17%	5
2013	124.75	98.54%	23
2014	115.25	98.54%	5
2015	108.50	97.81%	1
2016	116.75	92.62%	2
2017	115.13	95.98	2
2018	118.00	99.1%	12

Table 2.3.4.5 To show Max 8-Hour Mean (ugm^{-3}) at Hafod DOAS

Hafod DOAS	Max 8-hour Mean (μg/m^3)	Data capture %	Exceedances of 8-hour objective 100μg/m^3 (10 permitted)
2006	95.95	53.7%	0
2007	87.36	82.3%	0
2008	98.96	38.5%	0
2009	118.49	94.70%	50
2010	115.53	95.98%	6
2011	102.19	99.91%	2
2012	141.71	99.6%	13
2013	112.60	99.1%	9
2014	124.70	85.57%	12
2015	127.46	98.71%	4
2016	85.58	99.27%	0
2017	106.24	95.62	1
2018	103	99.87	2

Table 2.3.4.6 To show Max 8-Hour Mean (ugm^{-3}) at St Thomas DOAS

St Thomas DOAS	Max 8-hour Mean (μg/m^3)	Data capture	Exceedances of 8-hour objective 100μg/m^3 (10 permitted)
2006	150.6	94.9%	47
2007	106.4	98.7%	10
2008	127.9	99.9%	91
2009	118.93	99.4%	48
2010	120.45	99.36%	37
2011	108.90	99.54%	9
2012	116.42	98.63%	4
2013	113.76	99.7%	22
2014	115.38	98.45%	4
2015	102.49	99%	2
2016	101.50	98.91%	1
2017	111.94	100%	14
2018	133.10	92.7%	32

Compliance during 2018 has been achieved at the Hafod and Morriston monitoring locations. However, Cwm Level Park and St Thomas have exceeded the 10 permitted 8-hour exceedances.

Heavy Metals Monitoring

The Department of Environment, Food and Rural Affairs (DEFRA) is funding a monitoring study to determine ambient concentrations of lead, cadmium, arsenic, mercury and nickel in the vicinity of a wide-variety of industrial processes.

The City and County of Swansea were requested to participate in this study from its inception during 1999/2000 due to the nickel refinery at Vale (Formerly Vale INCO/ INCO Europe) being located within the authority's area at Clydach. Full details on this monitoring program can be found within section 2 above which outlines the overall monitoring program and sites chosen.

Several years of monitoring data are available and can be viewed within previous LAQM Reporting undertaken online at http://www.swansea.gov.uk/article/2850/Local-air-quality-management-reports

During August 2007, Vale INCO Europe commenced an abatement improvement program with the installation of particulate bag filters on the main high stack discharge point. Additional factors should be taken into account when viewing the monitoring data. Due to the economic downturn, Vale have operated in previous years or so at a reduced capacity primarily operating on one kiln. Whilst both the improved abatement techniques and reduced capacity are clearly seen within the data from the four monitoring stations within the City & County of Swansea's area, colleagues from Neath Port Talbot Borough Council have identified previously unrecognised local, and now deemed significant sources of nickel within Pontardawe. These sources within Pontardawe were previously being masked and have only now come to light due to the increased monitoring and analysis undertaken within the Swansea valley into ambient levels of nickel. This additional work is in part being driven by the Nickel in South Wales Review Group whose membership includes the Welsh Assembly Government (Policy and Technical Services Division), DEFRA, Environment Agency Wales, Ricardo AEA, National Physics Laboratory together with the relevant operators and local authorities.

Annexe 1 of the Directive details the target values for arsenic, cadmium, nickel and benzo (a) pyrene and, for ease of reference these are repeated below as table 2.3.4.7.

Pollutant	Target value ng/m^{-3}
Arsenic	6
Cadmium	5
Nickel	20
Benzo(a)pyrene	1

Table 2.3.4.7 - Target Values 4th Daughter Directive - Heavy Metals Monitoring

Significant changes have occurred to the heavy metals monitoring network within Swansea during 2013 and the early part of 2014. Due to recurring issues with the equipment deployed at the Glais School site and the imposed budget restrictions the authority is operating under, monitoring ceased at Glais School on the 1st April 2013. In addition, whilst the equipment remains operational at YGG Gellionnen, a decision has been taken that due to the costs of the heavy metals analysis previously funded by the authority that monitoring would cease in January 2014. Whilst regrettable, this decision at least enabled a full year of monitoring to be completed at YGG Gellionnen.

As previously mentioned, the full monthly datasets from each of the four heavy metal monitoring locations within the authority's area have been fully reported within previous reporting.

Nickel annual mean data for the **Coed-Gwilym Cemetery site** and the **Morriston Groundhog** site during 2018 is presented below within table 2.3.4.8 which, for completeness also details the nickel annual mean results from Glais and YGG Gellionnen stations during 2002 – 2013/14. All results are expressed in ng/m^{-3}

Table 2.3.4.8 to show Nickel Concentration

Year	* Glais Primary School	Coed-Gwilym Cemetery	** YGG Gellionnen	Morriston Groundhog

2002	**28.91**	-	-	-
2003	18.14	-	-	-
2004	**33.83**	-	-	-
2005	19.62	-	-	-
2006	**26.13**	-	-	-
2007	**28.04**	**37.31**	-	18.3
2008	10.34	19.61	10.99	7.6
2009	4.64	16.0	19.22	9.34
2010	7.0	10.48	15.0	15.28
2011	6.34	10.91	10.0	9.75
2012	6.79	8.51	6.04	5.64
2013	* 4.15	7.78	** 7.53	6.51
2014	-	12.39	-	9.38
2015	-	12.94	-	7.35
2016	-	10	-	5.9
2017	-	8.5	-	5.8
2018	-	12	-	8.6

** Site ceased monitoring April 2013*

*** Site ceased monitoring January 2014*

From the data available within table 2.3.4.8 it is clear that nickel compliance has been achieved at all UK Network monitoring sites during 2018 and at all sites since 2008.

Annual mean data between 2008 and 2018 for **arsenic (As) and cadmium (Cd)** are presented below within table 2.3.4.9. All results are expressed in ng/m^{-3}

Table 2.3.4.9 to show Arsenic and Cadmium Concentration

Year	Glais Primary	Coed-Gwilym	YGG Gellionnen	Morriston Groundhog

	School		Cemetery					
	As	Cd	As	Cd	As	Cd	As	Cd
2008	0.64	0.22	0.49	0.17	0.34	0.21	0.51	0.30
2009	0.52	0.15	0.61	0.20	0.59	0.16	0.87	0.30
2010	0.58	0.19	0.76	0.19	0.60	0.18	0.88	0.30
2011	0.50	0.23	0.50	0.17	0.44	0.19	0.78	0.33
2012	0.57	0.21	0.44	0.18	0.34	0.16	0.61	0.37
2013	*0.60	*0.19	0.62	0.22	0.52	0.24	0.83	0.51
2014	-	-	0.64	0.26	-	-	0.78	0.47
2015	-	-	0.53	0.14	-	-	0.65	0.27
2016	-	-	0.57	0.21	-	-	0.74	0.32
2017	-	-	0.56	0.28	-	-	0.81	0.43
2018	-	-	0.63	0.32	-	-	0.83	0.5

*** Data capture 19%**

From table 2.3.4.9 above, it is clear that annual mean concentrations for arsenic and cadmium at all monitoring locations fall well below the 4th Daughter Directive Target Values.

Annual mean data from all monitoring stations between 2008 and 2018 for **lead** is presented within table 2.3.4.10 below**. All results are expressed in ng/m^{-3}**

Table 2.3.4.10 to show Lead Concentration

Year	Glais Primary School ❷	Coed-Gwilym Cemetery ❸	YGG Gellionnen ❹	Morriston Groundhog ❺
2008	10.21	8.0	9.04	20.5
2009	7.27	10.2	10.06	17.4
2010	9.1	8.4	8.4	18.1
2011	9.95	7.88	8.38	21.40
2012	10.0	6.20	6.0	11.6
2013	* 14.09	10.47	8.15	15.38
2014	-	9.2	-	16.71
2015	-	6.0	-	13.86
2016	-	5.9	-	11
2017	-	5.3	-	9.4
2018	-	5.3	-	11

***** Data capture 19%

From the data available within table 2.3.4.10, it is clear that annual mean concentrations for lead at all monitoring locations fall well below the 0.25ug/m^3 required under the Air Quality (Amendment) (Wales) Regulations 2002 to be achieved by the 31st December 2008

PAH data analysis/ratification from the monitoring site within the compound of the 30m meteorological mast at Cwm Level Park, Landore has continued throughout

2018. Results of all compounds measured from 2007 to December 2018 can be found by following link at:
https://uk-air.defra.gov.uk/data/exceedence?f_group_id=19&action=exceedence&go=Step+1 - select the year i.e. 2018 and the pollutant of interest from the drop down list – each pollutant is displayed individually. The ability to download the monthly data exists via the “Download this data as CSV” link at the bottom right of the data table on display.

2.4 Summary of Compliance with AQS Objectives as of 2018

Swansea Council has examined the results from monitoring in its area. Concentrations in some areas have been found to be close to the Objectives, therefore monitoring will continue and assessment carried out before deciding on whether further action is necessary.

3. New Local Developments

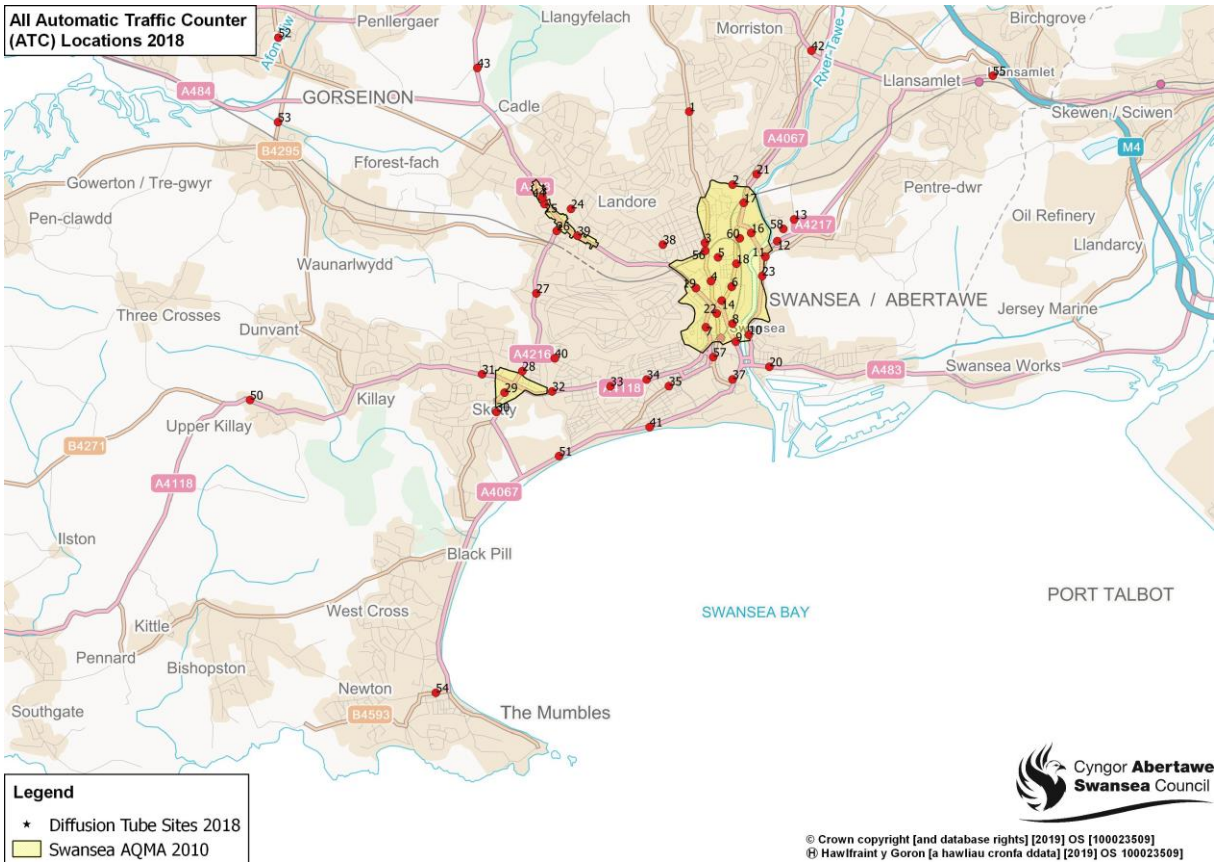
3.1 Road Traffic Sources (and Other Transport)

The authority operates 52 GPRS traffic counters that have been configured to produce a vehicle classification split into the EUR 6 basic categories as detailed below within table 3.1.1. These tend to be within the lower Swansea Valley area in and around the Swansea AQMA 2010 but the last deployment has seen this provision expand into other areas, mainly around some of the busier major traffic junctions.

Table 3.1.1 – Table to show EUR 6 Basic Categories

Vehicle class:	Description
0	Unclassified vehicles
1	Motorcycles
2	Cars or light Vans
3	Cars or light Vans with Trailer
4	Heavy Van, Mini bus, L/M/HGV
5	Articulated lorry, HGV+Trailer
6	Bus

Figure 3.1.1 shows the locations for the traffic counters in Swansea.



Data from the ATC network has been analysed for the years 2006 – 2018 for the EUR6 classification employed that are required to produce the composition of flow; tables 3.1.2-3.1.6 below set out the basic statistics for the last four years and compares the percentage increase or decrease with 2018.

Table 3.1.2 to Show EUR6 Classification, AADT & AWDT for 2015

2015	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	AADT	AWDT
Site 1	0	0.8	94.1	0.2	4.4	0.2	0.2	**11424**	**12144**
Site 2	0	0.7	92.3	0.2	6.6	0	0.2	**14112**	**15144**
Site 3	0	1.6	92.4	0	6	0	0	**13296**	**14160**
Site 4	0	0.7	94.4	0	4.9	0	0	**10368**	**11064**
Site 5	0	1	92.7	0	6	0.3	0	**7224**	**7704**
Site 6	0	1.3	90.3	0.1	7.6	0.4	0.1	**16152**	**17040**
Site 7	0	0.8	93.8	0.1	4.8	0.1	0.4	**20520**	**22008**
Site 8	0	2.2	67.4	1.1	27.2	1.1	1.1	**2208**	**2832**
Site 9	0	0.7	91.9	0.2	6.5	0.4	0.4	**13320**	**14184**
Site 10	0	0.6	93.2	0.3	4.5	0.2	1.1	**21192**	**22536**
Site 11	0	0.6	88.4	0	7.5	0	3.5	**4152**	**4368**
Site 12	4.8	0.7	89.1	0.1	4.7	0.1	0.4	**19872**	**21384**
Site 13	0	0.6	93.9	0.2	4.7	0.2	0.4	**11832**	**13320**
Site 14	0	1	92	0.1	6	0.1	0.7	**16416**	**17280**
Site 15	0	0.8	92	0.1	6.1	0.3	0.7	**21312**	**22752**
Site 16	0	0.7	93.4	0.1	5.3	0.2	0.4	**26424**	**27936**
Site 17	0	0.7	92.9	0.2	5.9	0.2	0.2	**29424**	**31152**
Site 18	0	1.1	90.9	0.8	6.1	0.5	0.8	**15864**	**16752**
Site 19	0	0.9	90.1	0.1	5.7	0.2	3	**20328**	**21144**
Site 20	0	1	93.2	0.2	4.2	0.4	1	**32640**	**34512**
Site 21	0	0.7	91.6	0.2	7.1	0.2	0.3	**30840**	**33000**
Site 22	0	0.5	87.5	0	5.5	0.2	6.4	**10560**	**10632**
Site 23	0	0.5	92.8	0.1	5	0.2	1.3	**22104**	**23520**
Site 24	0	2.3	90.3	0	6.3	0.3	0.8	**9192**	**9816**
Site 25	0	0.9	91.2	0.2	6.5	0.4	0.9	**13320**	**14088**
Site 26	0	0.4	92.3	0.2	6.4	0.2	0.4	**22248**	**23616**
Site 27	0	0.3	93.5	0.7	4.8	0.2	0.4	**21528**	**23016**
Site 28	0	0.4	93.5	0.6	5	0.2	0.4	**12552**	**13344**
*Site 29	0	0.6	92.4	0	5.2	0.3	1.5	**7920**	**8472**
Site 30	0	0.9	93.3	0.2	4.5	0.2	0.8	**20328**	**21768**
Site 31	0	0.7	93.6	0.2	5	0.2	0.3	**13968**	**14496**
Site 32	0	0.5	94	0.2	4.4	0	0.9	**15264**	**16176**
Site 33	0	0.6	93.3	0.1	4.7	0.2	1	**20736**	**21744**
Site 34	0	0.4	93.6	1.2	4.2	0.1	0.4	**16392**	**17448**
Site 35	0	1.2	91.7	0	5.4	0.4	1.2	**11928**	**12480**
Site 36	-	-	-	-	-	-	-	-	-
Site 37	0	2	86.8	0.8	7.5	1.3	1.6	**42888**	**44880**
Site 38	0	0.5	90.9	1.1	6.1	0.3	1.1	**8952**	**9600**
Site 39	0	1.2	92.9	0.1	4.7	0.3	0.9	**22536**	**23640**
Site 40	0	0.8	94.3	0	4.4	0	0.5	**9312**	**9912**
Site 41	0	0.4	96.5	0.3	3.1	0.2	0.4	**26808**	**28608**
Site 42	0	0.8	92.8	0.2	5.2	0.2	0.9	**15624**	**16728**
Site 43	0	1.2	90.7	0.5	6	1.1	0.5	**30216**	**32856**
Site 44	0	0.9	91.1	0.2	6.5	0.4	0.9	**12912**	**13728**
Site 50	0	1.4	94	0.7	3.6	0	0.4	**6720**	**6768**
Site 51	0	0.7	93.4	0.1	4.5	0.3	1	**32544**	**34872**
Site 52	0	0.6	93.5	0.2	4.2	0.2	1.3	**11424**	**12144**
Site 53	0	0.6	93.8	0.4	4.7	0.1	0.3	**22152**	**23424**
Site 54	0	2.8	89.7	0.2	6.4	0.2	0.7	**10440**	**10872**
Site 55	0	0.6	90.3	0.2	7.1	1.2	0.6	**20616**	**22104**
Site 56	0	0.5	93.5	0	6.1	0	0	**5136**	**5520**
Site 57	0	1.6	87.4	0	6.6	0.3	4.1	**7632**	**7392**

Table 3.1.3 to Show EUR6 Classification, AADT & AWDT for 2016

2016	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	AADT	AWDT
Site 1	0	1.7	93.4	0.2	4.4	0.2	0.2	**11544**	**12312**
Site 2	0	0.7	92	0.2	7	0	0.2	**14088**	**15168**
Site 3	0	1.1	92.8	0	6.1	0	0	**13440**	**14328**
Site 4	0	0.7	94.3	0	5	0	0	**10488**	**11160**
Site 5	0	1	92.5	0	6.2	0.3	0	**7392**	**7896**
Site 6	0	1.5	89.6	0.1	7.9	0.4	0.1	**16152**	**17016**
Site 7	4.1	0.7	89.6	0.1	5	0.1	0.4	**20040**	**21504**
Site 8	0	2.2	68.1	0	27.5	1.1	1.1	**2208**	**2832**
Site 9	0	0.7	91.8	0.2	6.4	0.3	0.5	**13824**	**14668**
Site 10	0	0.3	93.5	0.3	4.6	0.2	1	**21360**	**22752**
Site 11	0	0.6	88.1	0	7.9	0	3.4	**4248**	**4464**
Site 12	0	0.7	93.3	0.1	5.2	0.2	0.4	**20112**	**21696**
Site 13	0	0.6	93.8	0.2	4.8	0.2	0.4	**11952**	**13440**
Site 14	0	1	91.4	0.3	6.2	0.3	0.7	**16536**	**17400**
Site 15	0	0.8	92.1	0.1	6	0.1	0.8	**22224**	**23688**
Site 16	0	0.6	93.4	0.1	5.5	0.2	0.2	**26592**	**28248**
Site 17	0	0.6	92.8	0.2	6.1	0.2	0.2	**29688**	**31512**
Site 18	0	1.4	90.4	0.5	6.2	0.3	1.1	**15960**	**16848**
Site 19	0	0.8	90.5	0.1	5.7	0.2	2.7	**21192**	**22056**
Site 20	0	1	93.1	0.2	4.1	0.4	1.2	**34776**	**36864**
Site 21	0	0.7	91.4	0.2	7.3	0.2	0.3	**30720**	**32904**
Site 22	0	0.6	87.4	0.2	5.4	0.2	6.1	**11064**	**11112**
Site 23	9	0.4	82.3	0.1	7.1	0.2	0.9	**21984**	**23376**
Site 24	0	2.1	90.3	0	6.5	0.3	0.8	**9168**	**9816**
Site 25	0	0.9	90.9	0.2	6.8	0.5	0.7	**13368**	**14088**
Site 26	0	0.3	92.2	0.2	6.7	0.2	0.4	**22344**	**23736**
Site 27	0	0.4	93.1	0.8	5.1	0.2	0.4	**21744**	**23256**
Site 28	0	0.3	93.2	0.5	5.2	0.3	0.5	**8832**	**9360**
*Site 29	0	1	86.7	0.3	10.1	0.3	1.8	**9528**	**10200**
Site 30	0	0.9	92.8	0.1	5	0.2	0.9	**20352**	**21792**
Site 31	0	0.7	93.6	0.2	5	0.2	0.3	**13992**	**14544**
Site 32	0	0.3	93.8	0.2	4.6	0	1.1	**14784**	**15672**
Site 33	0	0.6	93	0.1	4.9	0.1	1.2	**19488**	**20568**
Site 34	0	0.4	93	1.2.	4.6	0.1	0.6	**16056**	**17064**
Site 35	0	1.2	91.2	0.2	5.7	0.4	1.4	**12192**	**12840**
Site 36	-	-	-	-	-	-	-	-	-
Site 37	0	1.8	86.9	0.9	7.6	1.2	1.6	**44424**	**46632**
Site 38	0	0.5	90.9	1	6.1	0.3	1.3	**9456**	**10176**
Site 39	0	1	93.2	0.1	4.7	0.3	0.7	**21696**	**22728**
Site 40	0	0.8	94.1	0	4.6	0	0.5	**9312**	**9936**
Site 41	0	0.5	95.4	0.3	3.2	0.2	0.5	**30120**	**32112**
Site 42	0	0.8	92.7	0.2	5.3	0.2	0.9	**15336**	**16368**
Site 43	0	1.2	90.7	0.5	5.9	1.2	0.5	**30768**	**33432**
Site 44	0	0.9	91.2	0.2	6.6	0.4	0.7	**13056**	**13848**
Site 50	0	1.4	94.0	0.7	3.5	0.0	0.4	**6792**	**6888**
Site 51	0	0.7	92.8	0.1	4.8	0.1	1.3	**32880**	**35232**
Site 52	0	0.7	93.2	0.2	4.4	0.2	1.3	**10896**	**11616**
Site 53	0	0.6	93.5	0.5	5	0.1	0.3	**21048**	**22224**
Site 54	0	2.4	90.3	0.2	6.2	0.2	0.7	**10944**	**11352**
Site 55	2.8	0.7	85.3	0.5	8	2	0.7	**19536**	**20928**
Site 56	0	0.5	93.4	0	6.1	0	0	**4752**	**5088**
Site 57	0	1.7	87.1	0	6.6	0.3	4.3	**8400**	**8208**
Site 58	0.2	1.8	94.4	0	3.2	0.2	0.2	**13344**	**13752**

Table 3.1.4 to Show EUR6 Classification, AADT & AWDT for 2017

2017	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	AADT	AWDT
Site 1	0	0.8	94.1	0.2	4.4	0.2	0.2	**11304**	**12096**
Site 2	0	0.7	91.8	0.2	0.1	0	0.2	**14160**	**15240**
Site 3	0	1.1	92.5	0	6.2	0	0.2	**13152**	**14064**
Site 4	0	0.7	94	0	5	0	0.2	**10104**	**10800**
Site 5	0	1	92	0	6.7	0.3	0	**7200**	**7752**
Site 6	0	1.5	89.7	0.2	7.8	0.7	0.2	**14184**	**14904**
Site 7	0	0.7	93.7	0.1	5.1	0.1	0.2	**19344**	**20808**
Site 8	0	1.2	77	0	20.5	0.6	0.6	**3888**	**4392**
Site 9	0	0.7	91.6	0.2	6.6	0.5	0.5	**14616**	**15624**
Site 10	0	4.6	89.5	0.4	4.6	0.2	0.7	**19920**	**21312**
Site 11	0	0.6	88.8	0	7.9	0	2.8	**4296**	**4512**
Site 12	0	0.6	93.4	0.1	5.4	0.2	0.2	**19920**	**21552**
Site 13	0	0.4	94.1	0	4.9	0.2	0.4	**11856**	**13368**
Site 14	0	1	91.5	0.2	6.2	0.3	0.8	**14640**	**15360**
Site 15	-	-	-	-	-	-	-	**-**	
Site 16	0	0.6	93.2	0.1	5.7	0.2	0.2	**26328**	**27960**
Site 17	0	0.6	92.7	0.2	6.2	0.2	0.2	**29808**	**31560**
Site 18	0	1.2	90.1	0.7	6.4	0.3	1.2	**13896**	**14640**
Site 19	0	0.8	90.2	0.1	6.1	0.2	2.6	**21336**	**22320**
Site 20	0	1	93.2	0.2	4.1	0.4	1.2	**24704**	**36792**
Site 21	0	0.6	91.2	0.2	7.5	0.2	0.4	**30888**	**33072**
Site 22	6	0.7	81.8	0	5.8	0.2	5.6	**10824**	**10872**
Site 23	0	0.4	88	0.5	9.8	0.4	0.9	**20448**	**21840**
Site 24	0	2.2	90.1	0	6.7	0.3	0.8	**8904**	**9528**
Site 25	0	0.7	91.5	0.2	6.7	0.4	0.5	**13344**	**14136**
Site 26	18.8	0.3	74.7	0.2	5.4	0.2	0.4	**23712**	**25152**
Site 27	0	0.5	93	0.8	5.1	0.2	0.5	**21240**	**22680**
Site 28	0.3	0.7	92.1	0.3	5.9	0	0.7	**7248**	**7680**
Site 29	0	0.7	79.8	0.2	17.1	0.5	1.7	**9936**	**10656**
Site 30	0	0.9	92.6	0.1	5	0.2	1.1	**19584**	**21024**
Site 31	0	0.6	93.3	0.2	5.2	0.3	0.5	**15360**	**16104**
Site 32	0	0.5	93.1	0.2	4.7	0.2	1.3	**14208**	**15120**
Site 33	0	0.8	92.3	0.2	5.2	0.2	1.3	**14400**	**15192**
Site 34	0	0.5	92.6	1.4	4.7	0.2	0.6	**15216**	**16200**
Site 35	21.9	1	71.9	0	4.3	0.2	0.7	**10008**	**10608**
Site 36	-	-	-	-	-	-	-	-	-
Site 37	0	1.9	86.4	0.9	7.9	1.3	1.5	**44400**	**46728**
Site 38	0.2	0.9	93	0.2	4.7	0.4	0.6	**12720**	**13344**
Site 39	0.2	1	93.2	0.1	4.7	0.3	0.7	**21696**	**22728**
Site 40	0	0.8	94	0	4.7	0	0.5	**9192**	**9792**
Site 41	0	0.4	95.3	0.3	3.2	0.2	0.6	**30384**	**32520**
Site 42	0	0.8	92.5	0.2	5.6	0.2	0.8	**15096**	**16152**
Site 43	0	1.1	90.8	0.5	6	1.2	0.5	**31056**	**33744**
Site 44	0	0.7	91.4	0.2	6.8	0.4	0.5	**13128**	**14040**
Site 50	0	1.4	93.8	0.7	3.8	0.0	0.3	**6912**	**7008**
Site 51	0	0.7	92.5	0.1	5.1	0.1	14	**32928**	**35616**
Site 52	0	0.7	93.2	0.2	4.4	0.2	1.3	**11016**	**11784**
Site 53	0	0.5	93.5	0.4	5.1	0.1	0.3	**22152**	**23520**
Site 54	0	2.5	89.8	0.2	6.5	0.2	0.7	**10632**	**11040**
Site 55	1.8	0.6	86.5	0.6	8.8	1.2	0.6	**20520**	**21984**
Site 56	0	0.5	93	0	6.5	0	0	**4464**	**4800**
Site 57	0	1.5	87	0	6.9	0.3	4.2	**8016**	**7848**
Site 58	0.2	1.6	94.5	0	3.4	0.2	0.2	**13440**	**13872**
Site 60	0.0	0.9	91.9	0	7.2	0	0	**2688**	**2832**

Table 3.1.5 to Show EUR6 Classification, AADT & AWDT for 2018

2018	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	AADT	AWDT
Site 1	0	0.7	94.3	0.2	4.1	0.2	0.4	**10992**	**11688**
Site 2	0	0.9	91.5	0.2	7.3	0	0.2	**14040**	**15096**
Site 3	0	0.8	92.6	0	6.6	0	0	**12744**	**13536**
Site 4	0	0.5	94.1	0	5.4	0	0	**9720**	**10272**
Site 5	0	1	92.4	0	6.6	0	0	**4752**	**5112**
Site 6	0	1.4	89.7	0.2	7.9	0.6	0.2	**11616**	**12216**
Site 7	0	0.7	93.3	0.1	5.4	0.1	0.3	**17640**	**18840**
Site 8	0	0.8	75.3	0.3	22.5	0.5	0.5	**8832**	**9552**
Site 9	0	0.7	91.8	0.1	6.3	0.4	0.6	**16728**	**17856**
Site 10	0	2.9	90.9	0.4	4.7	0.3	0.9	**19080**	**20400**
Site 11	0	0.6	88.7	0	7.9	0	2.8	**4248**	**4464**
Site 12	0	0.6	93.3	0.1	5.5	0.2	0.2	**19968**	**21576**
Site 13	0.7	0.4	93.9	0	4.9	0.4	0.4	**6456**	**7200**
Site 14	0	1	91.4	0.2	6.2	0.2	1	**12000**	**12600**
Site 15									
Site 16	8.8	0.6	84.8	0.1	5.3	0.2	0.2	**25584**	**27240**
Site 17	0	0.6	92.4	0.2	6.5	0.2	0.2	**30648**	**32664**
Site 18	0	0.9	90	0.6	6.4	0.4	1.7	**11280**	**11880**
Site 19	24.5	0.6	68.5	0.1	4.6	0.2	1.6	**21432**	**22392**
Site 20	4.7	0.7	87.9	0.2	4.9	0.5	1.1	**24865**	**26424**
Site 21	0	0.6	90.9	0.2	7.7	0.2	0.4	**31416**	**33696**
Site 22	41.1	0.3	51.4	0	3.9	0	3.3	**7968**	**7992**
Site 23	0	0.2	80.4	1.1	16.8	0.5	1	**19944**	**21360**
Site 24	0	2.2	90.2	0	6.8	0	0.8	**8880**	**9456**
Site 25	0.4	0.7	90.8	0.2	7	0.4	0.5	**13344**	**14136**
Site 26	14.9	0.4	78.1	0.1	6	0.2	0.4	**20112**	**21240**
Site 27	0	0.3	93	0.7	5.4	0.2	0.4	**21504**	**22896**
Site 28	0	0.6	91.7	0.2	6.7	0.2	0.6	**12144**	**12960**
Site 29	0	0.5	79.4	0.2	17.8	0.2	1.8	**10392**	**11136**
Site 30	0	0.7	92.6	0.1	5.1	0.2	1.2	**20208**	**21648**
Site 31	0	0.6	93.4	0.2	5.2	0.3	0.3	**15384**	**16152**
Site 32	0	0.4	93.2	0.2	4.7	0	1.5	**12696**	**13392**
Site 33	0	1	92	0.1	5.3	0.2	1.4	**19512**	**20424**
Site 34	0	0.6	92.2	1.2	5	0.2	0.8	**15456**	**16368**
Site 35	0	1.2	91.7	0	5.3	0.2	1.6	**10368**	**10848**
Site 36									
Site 37	0	1.8	86.5	0.9	8	1.2	1.5	**45624**	**48000**
Site 38	0	0.5	90.6	1	6.6	0.3	1	**9480**	**10200**
Site 39	0	0.9	93.3	0.1	4.9	0.3	0.5	**22080**	**23208**
Site 40	0	0.8	93.8	0	4.9	0	0.5	**9288**	**9912**
Site 41	0	0.4	95.4	0.3	3.2	0.2	0.5	**31008**	**33240**
Site 42	0	0.6	92.7	0	5.6	0.3	0.8	**15120**	**16176**
Site 43	0	1	90.8	0.5	6.2	1.2	0.5	**31176**	**33816**
Site 44	0	0.8	90.9	0.2	7.1	0.4	0.6	**11784**	**12552**
Site 50	0	1.4	93.6	0.7	3.9	0	0.4	**6792**	**6840**
Site 51	0	0.7	92.3	0.1	5.2	0.1	1.5	**32568**	**35064**
Site 52	0	0.5	92.9	0.3	4.7	0.3	1.3	**9120**	**9768**
Site 53	4.9	0.5	88.8	0.4	5	0	0.3	**22584**	**23808**
Site 54	0	2.5	89.5	0	6.8	0.2	0.9	**10512**	**10896**
Site 55	1.7	0.5	86.6	0.5	8.9	1.3	0.5	**18672**	**19944**
Site 56	0	0.5	92.9	0	6.6	0	0	**4752**	**5088**
Site 57	0	1.9	85.1	0	7.7	0.6	4.6	**7728**	**7512**
Site 58	0	1.6	94.4	0	3.6	0.2	0.2	**13344**	**13776**
Site 60	0	0.6	91.2	0	7.6	0.3	0.3	**8184**	**8712**

Table 3.1.6 to Show % Difference AADT 2018 over previous years.

Site	AADT 2015	AADT 2016	AADT 2017	AADT 2018	% Diff 2018 over 2015	% Diff 2018 over 2016	% Diff 2018 over 2017
1	11424	11544	11304	10992	-3.78	-4.78	-2.76
2	14112	14088	14160	14040	-0.51	-0.34	-0.85
3	13296	13440	13152	12744	-4.15	-5.18	-3.10
4	10368	10488	10104	9720	-6.25	-7.32	-3.80
5	7224	7392	7200	4752	-34.22	-35.71	-34.00
6	16152	16152	14184	11616	-28.08	-28.08	-18.10
7	20520	20040	19344	17640	-14.04	-11.98	-8.81
8	2208	2208	3888	8832	300.00	300.00	127.16
9	13320	13824	14616	16728	25.59	21.01	14.45
10	21192	21360	19920	19080	-9.97	-10.67	-4.22
11	4152	4248	4296	4248	2.31	0.00	-1.12
12	19872	20112	19920	19968	0.48	-0.72	0.24
13	11832	11952	11856	6456	-45.44	-45.98	-45.55
14	16416	16536	14640	12000	-26.90	-27.43	-18.03
15	21312	22224	-	-	-	-	-
16	26424	26592	26328	25584	-3.18	-3.79	-2.83
17	29424	29688	29808	30648	4.16	3.23	2.82
18	15864	15960	13896	11280	-28.90	-29.32	-18.83
19	20328	21192	21336	21432	5.43	1.13	0.45
20	32640	34776	34704	24865	-23.82	-28.50	-28.35
21	30840	30720	30888	31416	1.87	2.27	1.71
22	10560	11064	10824	7968	-24.55	-27.98	-26.39
23	22104	21984	20448	19944	-9.77	-9.28	-2.46
24	9192	9168	8904	8880	-3.39	-3.14	-0.27
25	13320	13368	13344	13344	0.18	-0.18	0.00
26	22248	22344	23712	20112	-9.60	-9.99	-15.18
27	21528	21744	21240	21504	-0.11	-1.10	1.24
28	12552	8832	7248	12144	-3.25	37.50	67.55
29	7920	9528	9936	10392	31.21	9.07	4.59
30	20328	20352	19584	20208	-0.59	-0.71	3.19
31	13968	13992	15360	15384	10.14	9.95	0.16
32	15264	14784	14208	12696	-16.82	-14.12	-10.64
33	20736	19488	14400	19512	-5.90	0.12	35.50
34	16392	16056	15216	15456	-5.71	-3.74	1.58
35	11928	12192	10008	10368	-13.08	-14.96	3.60
37	42888	44424	44400	45624	6.38	2.70	2.76
38	8952	9456	9480	9480	5.90	0.25	0.00
39	22536	21696	12720	22080	-2.02	1.77	73.58
40	9312	9312	9192	9288	-0.26	-0.26	1.04
41	26808	30120	30384	31008	15.67	2.95	2.05
42	15624	15336	15096	15120	-3.23	-1.41	0.16
43	30216	30768	31056	31176	3.18	1.33	0.39
44	12912	13056	13128	11784	-8.74	-9.74	-10.24
50	6720	6792	6912	6792	1.07	0.00	-1.74
51	32544	32880	32928	32568	0.07	-0.95	-1.09
52	11424	10896	11016	9120	-20.17	-16.30	-17.21
53	22152	21048	22152	22584	1.95	7.30	1.95
54	10440	10944	10632	10512	0.69	-3.95	-1.13
55	20616	19536	20520	18672	-9.43	-4.42	-9.01
56	5136	4752	4464	4752	-7.48	0.00	6.45
57	7632	8400	8016	7728	1.26	-8.00	-3.59
58	-	13344	13440	13344	-	0.00	-0.71
60	-	-	2688	8184	-	-	204.46
*calculation not carried out due to data collection issues at the site							

Table 7.1 – Screening Assessment of Road Traffic Sources (LAQM TG 16) advises that roads with significantly changed traffic flows should be assessed via a monitoring survey and/or dispersion modelling. Table 3.1.6, above, indicates three ATC sites that have shown an increase in AADT greater than 25% in 2018; Sites 8, 28, 33, 39 and 60. Sites 8 and 60, although a greater than 25% increase occurred the road links are below 10,000 AADT; the increase can be attributed to the first full year of traffic data collected since the opening of the Morfa Distributor Road (reported in the APR 2018). Sites 28, 33 and 39 show an increase in AADT due to site faults in and show the calculated AADT is not a true representation of the site flow.

3.2 Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

There have been no new Industrial Installations installed since the last assessment.

There are no new potential sources of fugitive or uncontrolled particulate matter since the last assessment.

Whilst the level of peer reviewed research into the effects of solid fuel burning is increasing the Smoke Control Areas of Swansea remain unchanged and Swansea Council will continue to monitor the level of complaints etc. received and investigate accordingly; domestic wood burners are referenced in section 3.4

3.3 Planning Applications

Table 3.1.1 to show the planning applications received in 2018 that could be of possible interest with regard to the Air Quality Objective concentrations.

Table 3.3.1 to show the planning applications received in 2018.

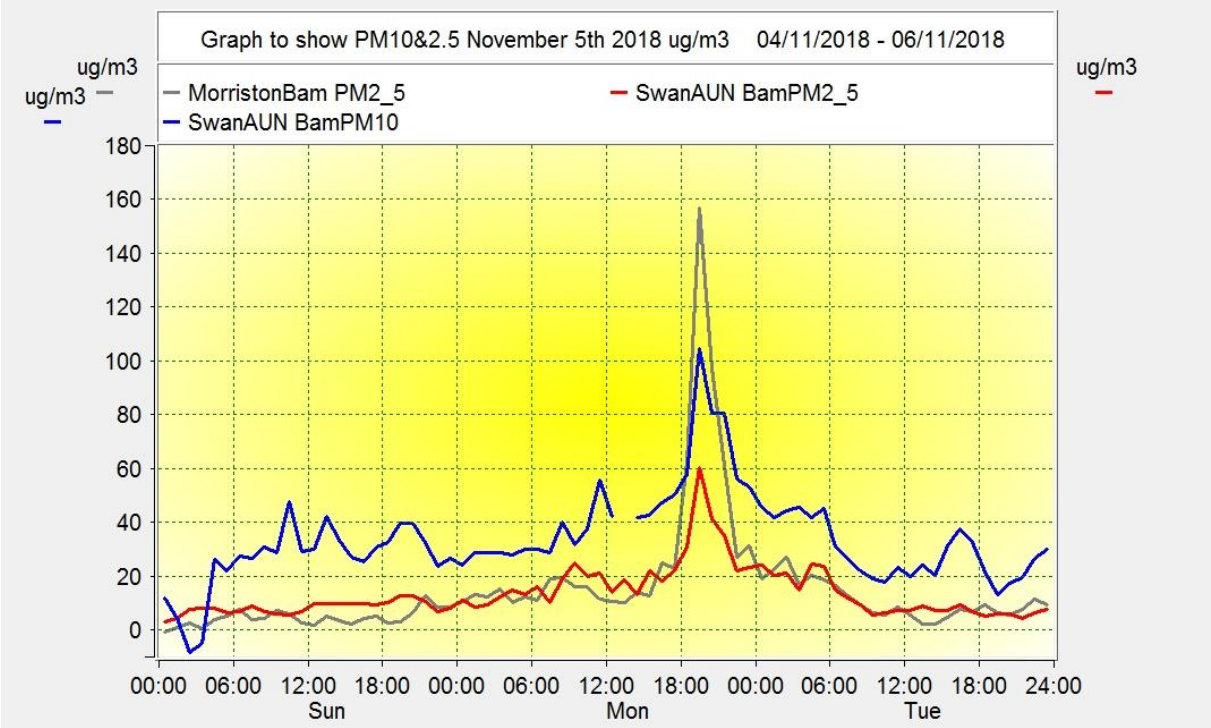
App Ref No.	Location	Description
2017/1822/OUT	Land West Of Llangyfelach Road Tirdeunaw Swansea	Outline planning application (with all matters reserved apart from strategic access junctions) for residential led mixed use development, to be developed in phases, including: Ground preparation works as necessary, including the regrading of site levels, up to 1950 no. dwellings (Use Class C3, including affordable homes) of which 1160 no. units would be developed within the LDP Plan period, the creation of a link road, local centre provision of a primary school, community facilities, Public Open Space including facilities for children, and areas of landscaping (including sustainable drainage systems), outdoor sports provision including playing pitches, associated services, infrastructure and engineering works including new vehicular access, improvements to the existing highway network, new roads, footpaths / cycleways, and ancillary works.
2018/1618/OUT	Felindre Urban Village Land North West Of M4 J46 Porth Felindre Gateway Northern Section Llangyfelach Swansea	Outline planning application (with all matters reserved) for mixed-use development comprising residential development (up to 800 dwellings, including affordable housing), primary school, local centre (village hall (Class D1) and retail space (Class A1) with flats above), recreational facilities including sports pavilion (Class D2), open space, improvements to existing road bridges, habitat enhancement and management, and all associated building and engineering operations and landscaping.
2018/2020	Land At Abergelli Farm Felindre Swansea SA5 7NN	Installation of a gas connection in the form of a new above ground installation and underground gas pipeline to bring natural gas from the National Gas Transmission system to the Abergelli Power Station, including access, associated engineering operations and landscaping
2018/2021/FUL	Land At Abergelli Farm Felindre Swansea SA5 7NN	Installation of an electrical connection in the form of a new 400kV underground cable to export power from the Abergelli Power Station to the National Grid Electricity Transmission System at the Swansea North Substation, including associated engineering operations and

		landscaping
2018/2238/FUL	Plots 7B 8 And 9 Felindre Business Park Ffordd Parc Felindre Llangyfelach Swansea	Erection of part single storey, part two storey industrial/warehouse unit and ancillary office space, circulation and parking, landscaping and associated works

3.4 Other Sources

During Bonfire night, Particulate Monitors in Swansea often record elevated concentrations as a result of Firework displays in the city. Figure 3.4.1 shows the peaks recorded for 2018.

Figure 3.4.1. – Graph to Show PM10 & PM2.5 On 5th November 2018



Swansea Council's Building Control team also record the HETAS documentation that is received after an approved installer has carried out an installation. The detail recorded by the Building Control team refers to the number of notifications received, the information can be seen in table 3.4.1.

Table 3.4.1 to show Number of HETAS Notifications received 2014-2018

Year	Number of Notifications
2014	445
2015	450
2016	425
2017	390
2018	312

As the information in table 3.4.1 shows the number of notifications received over the last few years has been relatively consistent however, a decline has been observed in the last two years. Given the research work ongoing into the effects of wood burning Swansea Council will continue to monitor PM concentrations and keep up to date with research as and when it is published.

In the 2018 APR, Planning Application 2017/1429/FUL. Former Cape Horner Public House. Miers Street, St Thomas, Swansea. SA1 8BZ, was highlighted for further consideration; the application was refused in March 2018.

Swansea Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4. Policies and Strategies Affecting Airborne Pollution

4.1 Local / Regional Air Quality Strategy

Non-applicable

4.2 Air Quality Planning Policies

The Swansea Local Development Plan (LDP) was adopted on the 28th February 2019. Under the provisions of the Planning (Wales) Act, the LDP forms the statutory development plan for Swansea Council. It will be used as the primary material consideration to inform decisions on planning applications and development proposals. Within the LDP are the following policies regarding Air, Noise and Light Pollution:

Table 4.2.1 – RP1. Safeguarding Public Health and Natural Resources

RP 1: Safeguarding Public Health and Natural Resources Development will not be permitted that would result in significant risk to: life; human health and wellbeing; property; controlled waters; or the natural and historic environment, particularly in respect of: i. Air, noise or light pollution; ii. Flood risk; iii. The quality or quantity of water resources; iv. Land contamination; v. Land instability or subsidence; vi. Sustainable development of mineral resources; and vii. Sustainable waste management. Development will not be permitted if judged to have a significant adverse effect on the integrity of any European Designated Sites, either alone or in combination with other plans or projects

Table 4.2.2 – RP2. Noise Pollution

RP 2: Noise Pollution
Where development could lead to exposure to a source of noise pollution it must be demonstrated that appropriate mitigation measures will be implemented, and incorporated into the design of the development to minimise the effects on existing and future occupants. Noise sensitive developments will not be permitted unless effective and appropriate mitigation is carried out to prevent exposure to existing noise generating uses. Development will not be permitted if it would cause, or result in, a significant increase in levels of environmental noise in an identified Noise Action Planning Priority Area, or would have unacceptable impacts on an identified Quiet Area or the characteristics of tranquillity that led to the designation of a Quiet Area.

Table 4.2.3 – RP3. Air and Light Pollution

RP 3: Air and Light Pollution
Where development could lead to exposure to a source of air or light pollution it must be demonstrated that appropriate mitigation measures will be implemented, and incorporated into the design of the development to minimise the effects on existing and future occupants.

4.3 Local Transport Plans and Strategies

LAQM.TG(16) paragraphs 4.30 – 4.31 indicates guidance on the inclusion within Progress Reports to those measures within the Local Transport Plan (LTP) that specifically relate to bringing about air quality improvements. Within Wales, the LPT had been replaced with the Regional Transport Plan (RTP). The South West Wales Integrated Transport Consortium (SWWITCH) was one of the four transport consortia in Wales which were required to produce a Regional Transport Plan. The SWWITCH consortia region relevant to the City & County of Swansea included a partnership with the neighbouring authorities of Neath Port Talbot County Borough Council, Carmarthenshire County Council and Pembrokeshire County Council. Unfortunately, the Welsh Assembly withdrew funding for the consortia from the end of the 2013/14 financial year. All staff had been redeployed following the withdrawal of funding. However, the Welsh Assembly Government reverted back to Local Transport Plans

for 2015-2020. The new Local Transport Plan was adopted in January 2015. Details of the adopted plan can be found at http://www.swansea.gov.uk/localtransportplan
An annual progress report was submitted to the Welsh Government in January 2016, details of which are reproduced within Appendix B.

4.4 Active Travel Plans and Strategies

The Active Travel (Wales) Act (2013) places a legal duty upon local authorities in Wales to map, plan for and promote active travel journeys.
The Active Travel (Wales) Act is a landmark piece of Welsh legislation brought forward in 2013 which aims to make it easier for people to walk and cycle in Wales, specifically to promote walking and cycling as viable modes of transport for everyday journeys such as to the shops, work or college.
The Integrated Network Map - *Approved by the Welsh Government in February 2018*. This map show the routes which the Council intends to deliver over the next fifteen years (up to 2033) https://www.swansea.gov.uk/media/25625/Integrated-Network-Map-Consultation-Report/pdf/Integrated_Network_Map_Consultation_Report_-_October_2017_3.pdf .
The Existing Route Map and Integrated Network Map will be reviewed and updated periodically in conformity to the requirements of the Act.
The Council also prepares annual reports which are submitted to the Welsh Government to monitor the costs and use of Active Travel within the City & County of Swansea. These reports can also be found in the downloads section https://www.swansea.gov.uk/activetravelact

4.5 Local Authorities Well-being Objectives

The Swansea Public Services Board Assessment of Local Well-being 2017 included Outcome F1: The Natural Environment is Healthy and Resilient. Table 4.5.1 shows the summary.

Table 4.5.1 – Outcome F1

F1: The natural environment is healthy and resilient

Evidence:	State of Natural Resources Report (SoNaRR) [NRW]
	Swansea Local Biodiversity Action Plan [SBP]
	The State of Nature report 2016 [RSPB]
	LANDMAP [NRW]
	RIGS (Geological/Geomorphological Sites) audit [CCS]
	Open Spaces Assessment [CCS]
	AONB Management Plan [CCS]
	Percentage of water bodies achieving good or high overall status (NI45) [NRW]
	Swansea Air Quality Progress Report 2016 and air quality data [CCS]
	Tawe Trial Community Consultation Project Report [SEF]
	Swansea Environment Strategy Progress Review 2016 [SEF]
Well-being score and summary:	**5** - Certain aspects of our natural environment are in a positive situation but the continuing loss of biodiversity and accessible greenspace, along with the ecological status of our waterbodies and poor air quality in some areas, give serious cause for concern as these are likely to have an adverse impact on everyone's well-being. Ecosystem services need to be recognised and utilised more effectively and sustainably to ensure wellbeing can be improved now and sustained in the future.
Note: Public Consultation (Feb-17)	• The consultation draft suggested that the score should be a 5. The average score given by the public was 5. • The main issue cited within this driver was the protection of green spaces and natural assets.

https://www.swansea.gov.uk/media/19869/Swansea-Public-Services-Board---Assessment-of-Local-Well-being-2017/pdf/Final_Swansea_PSB_Well-being_Assessment_2017.pdf

Swansea Council's Corporate Plan 2018-2022 sets out the priorities:

- **Safeguarding** people from harm - so that our citizens are free from harm and exploitation
- Improving **Education and Skills** - so that every child and young person in Swansea gains the skills and qualifications they need to succeed in life
- Transforming our **Economy and Infrastructure** - so that Swansea has a thriving mixed use City Centre and a local economy that will support the prosperity of our citizens

- **Tackling Poverty** - so that every person in Swansea can achieve his or her potential
- Maintaining and enhancing Swansea's **natural resources and biodiversity -** so that we maintain and enhance biodiversity, reduce our carbon footprint, improve our knowledge and understanding of our natural environment and benefit health and well-being
- **Transformation and Future Council** development - so that we and the services that we provide are sustainable and fit for the future.

Air quality, pollution and green infrastructure are referenced within the Transforming our Economy and Infrastructure and Maintaining and Enhancing Swansea's Natural Resources and Biodiversity https://www.swansea.gov.uk/corporateimprovementplan

4.6 Green Infrastructure Plans and Strategies

The Swansea Local Development Plan (LDP) was adopted on the 28th February 2019. Under the provisions of the Planning (Wales) Act, the LDP forms the statutory development plan for Swansea Council. It will be used as the primary material consideration to inform decisions on planning applications and development proposals ER 2.

Table 4.6.1 – Strategic Green Infrastructure Network

ER 2: Strategic Green Infrastructure Network Green Infrastructure will be provided through the protection and enhancement of existing green spaces that afford valuable ecosystem services. Development that compromises the integrity of such green spaces, and therefore that of the overall Green Infrastructure network, will not be permitted. Development will be required to take opportunities to maintain and enhance the extent, quality and connectivity of the County's multi-functional Green Infrastructure network, and where appropriate:

i. Create new interconnected areas of Green Infrastructure between the proposed site and the existing strategic network;

ii. Fill gaps in the existing network to improve connectivity;

and

iii. In instances where loss of Green Infrastructure is unavoidable, provide mitigation and compensation for the lost assets.

4.7 Climate Change Strategies

Climate change was highlighted in the Swansea Environment Strategy: Time to Change, which was published by Swansea Environmental Forum (SEF) in 2006.

In 2008, both carbon management and climate change adaptation were chosen by SEF as two of the five issues which it believed were too difficult to progress without greater prioritisation and wider collaboration. In 2010, SEF initiated a carbon management task to develop proposals for a new project which would seek to measure and reduce the carbon footprint for Swansea, and promote low carbon initiatives.

The Low Carbon Swansea project was established in 2011 with the following aim:

To develop a coordinated, integrated and sustainable approach to reducing carbon emissions across all sectors in the City and County of Swansea area

The Project's primary goal was to see a measurable reduction of carbon emissions level to or exceeding national targets. The Project outputs included:

- the establishment of a new carbon management partnership that meets on a regular basis;
- an audit of existing low carbon activity in Swansea;
- a new energy or carbon management action plan for Swansea;
- a programme of seminars, training workshops and public events to raise awareness of climate change, to increase understanding of the opportunities for and benefits of reducing carbon emissions and to encourage greater collaboration towards a Low Carbon Swansea;
- a significant increase in the number of low carbon projects and carbon reduction activities in Swansea and
- a notable increase in inward investment for carbon reduction initiatives in Swansea.

The initiative was adopted as a Swansea Local Service Board project and received grants from Environment Agency Wales (now Natural Resources Wales) and the

Welsh Government (EU-funding), which enabled SEF to employ a project manager for two years from April 2012. A Low Carbon Swansea Partnership was formed, initially involving representatives of LSB bodies and other major public sector organisations. Early on, the partners provided data for a carbon foot printing baseline study, which was commissioned in collaboration with Carbon Trust Wales.

The core activity of the partnership is the organisation of networking and training events (usually held on a quarterly basis) to facilitate information exchange and encourage collaboration between organisations. Low Carbon Swansea has also helped initiate working groups of its members to explore the promotion and expansion of electric vehicles in Swansea, support travel planning and to explore opportunities for district heating schemes in the area.

A second tranche of data was collected from partners in 2014 and an independent project evaluation undertaken (available from the website). As the grant funding drew to an end, key members of the partnership contributed funding as an interim measure to support a transition of the project to a membership funded initiative. Since April 2015, the project has been fully funded through membership fees and event sponsorship. The membership of the network was widened in 2014 to include large commercial organisations and subsequently opened-up fully to all organisations across a wider regional base. In 2016, it became Low Carbon Swansea Bay.

Swansea Environmental Forum continues to support the Low Carbon Swansea network and take the lead in encouraging collaboration between organisations and different sectors to address carbon management and climate change issues.

Climate change has is now included with Outcome F: People Have Good Places to Live, Work and Visit of Swansea's Assessment of Local Well-being 2017. The Primary driver F3: People live in resilient and environmentally sustainable communities includes the secondary driver F3.3: Improve resilience to climate change. The document can be accessed by the following link http://www.swansea.gov.uk/media/19869/Swansea-Public-Services-Board---Assessment-of-Local-Well-being-2017/pdf/Final_Swansea_PSB_Well-being_Assessment_2017.pdf

Swansea Council's LDP submission document also includes policy and proposals regarding Climate Change.

ER 1: Climate Change

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

i. Reducing carbon emissions;
ii. Protecting and increasing carbon sinks;
iii. Adapting to the implications of climate change at both a strategic and detailed design level;
iv. Promoting energy and resource efficiency and increasing the supply of renewable and low carbon energy;
v. Avoiding unnecessary flood risk by assessing the implications of development proposals within areas susceptible to flooding and preventing development that unacceptably increases flood risk;
and
vi. Maintaining ecological resilience.

The full document can be accessed via the following link
https://www.swansea.gov.uk/media/32947/Swansea-LDP-2010-2025/pdf/SWANSEA_LDP_2010-2025_ENG_WEB.pdf

5. Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

Data has revealed that exceedences of the annual mean Objective Concentration for NO_2 have not been recorded in Swansea in 2018. The exceedences at site 340 is not deemed appropriate for the annual mean exposure and is not in exceedence of the hourly mean Objective Concentration. The four Diffusion Tube sites that are in excess of 36µgm^{-3} are located within the existing AQMA and will continue to be addressed within the Action Plan.

Data, for 2018, continues to indicate a downward and Swansea Council will continue to monitor NO_2 diffusion tube sites in excess of 30µgm^{-3} along with the real-time monitors within the network in 2019.

5.2 Conclusions relating to New Local Developments

The application 2017/1429/FUL for the 'Former Cape Horner Public House Miers Street St Thomas Swansea SA1 8BZ' had been commented upon by Swansea Council and was refused at Planning Committee in March 2018.

All applications received with potential impacts on Air Quality will be considered in line with current Planning Polices and LDP policies.

5.3 Proposed Actions

The 2018 dataset has indicated that there are no non-compliant monitoring sites for the annual mean objective concentration for NO_2 in Swansea. Given the downward trend shown over the last few years Swansea Council will be looking forward to potentially reviewing AQMA boundaries over the next few years.

In the 2018 APR, Swansea Council had stated that they will be preparing their Air Quality Action Plan for public consultation in by April 2019. However, due to workloads and reducing concentrations, Swansea Council has decided to reschedule the consultation for Spring 2020.

References

i. City & County of Swansea Progress Report 2006
ii. City & County of Swansea Updating & Screening Assessment 2006
iii. City & County of Swansea Progress Report 2007
iv. City & County of Swansea Progress Report 2008
v. City & County of Swansea Updating and Screening Assessment 2009
vi. City & County of Swansea Progress Report 2009
vii. City & County of Swansea Progress Report 2010
viii. City & County of Swansea Progress Report 2011
ix. City & County of Swansea Updating and Screening Assessment 2012
x. City & County of Swansea Progress Report 2013
xi. City & County of Swansea Progress Report 2014
xii. City and County of Swansea Updating and Screening Assessment 2015
xiii. City & County of Swansea Progress Report 2016
xiv. City & County of Swansea Progress Report 2017
xv. City & County of Swansea Progress Report 2018
xvi. Technical Guidance LAQM.TG(16)
xvii. Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138)
xviii. Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298)
xix. Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the 1-hour mean AQS Objective AEAT/ENV/R/264 Issue 1 May 2008

Appendices

Appendix A: Monthly Diffusion Tube Monitoring Results

Appendix B: A Summary of Local Air Quality Management

Appendix C: Air Quality Monitoring Data QA/QC

Appendix D: AQMA Boundary Maps

Appendix A: Monthly Diffusion Tube Monitoring Results

Table A.1 – Full Monthly Diffusion Tube Results for 2018

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
5	40.60	44.30	38.50	32.80	36.70	31.40	26.60	24.40	33.30	38.60	38.80	39.40	34.45	25.52	
6	37.60	34.70	29.90	29.60	29.10	26.10	24.20	22.90	29.20	30.40	28.90	33.30	39.66	21.35	
7	54.80	54.20	51.80	45.40	47.60	45.60	45.30	40.50	44.50	44.90			47.46	34.17	
8			57.10	56.80	54.90	51.70	49.80	41.30	50.90	60.80		54.20	53.06	33.62	
10	29.50	32.80	29.50	29.30	26.40	21.40	18.70	19.30	22.10	41.50	30.90	28.00	27.45	19.76	
11	40.50	42.40	38.20	43.30	39.70	37.30	32.90		34.10	41.50	44.80		39.47	28.42	
12	40.30	48.20	49.30	45.20	49.90	44.50	44.50	38.10	45.00	48.00	46.10	53.50	46.05	33.16	
13	29.60	37.20	35.90	32.50	27.50								32.54	21.49	
14	31.00	34.70	35.20	27.40		21.70	17.60	15.50	22.20	32.60	33.40	33.90	27.75	19.98	
15	32.70	36.30	30.70	29.50	31.80	24.00	20.70	18.20	24.10	34.80	32.00	31.60	28.87	20.78	
16	37.80	39.70	38.20	32.00	33.90	26.20	22.90	23.80	29.40	36.60	36.50	36.50	32.79	23.61	
18	54.90	55.50	61.40	54.30	56.50	56.30	39.30	34.80	40.20	46.90	58.60	42.90	50.13	36.10	
19	60.30	59.50	56.90	46.70	55.00	48.50	45.20	39.90	47.20			50.40	50.96	36.69	
20	47.10	47.20	46.10	41.10	38.30	35.40	22.40	29.40	35.00	43.50	52.60	50.20	40.69	29.30	
22	50.20	37.80	36.90	31.60	29.90	27.70	28.30	26.20	33.90	33.20	35.00	41.90	34.38	24.76	
23	42.50	37.90	34.60	29.50	26.10								34.12	22.53	
26	47.60	45.60	40.90	38.30	39.90	38.20	30.70	28.20	30.00	39.70	45.10	37.50	**38.48**	27.70	
27	46.00	44.40	48.20	44.20	41.80	35.60	31.20	27.40	31.50	45.10	39.90	45.90	40.10	28.87	
29	42.10	28.00	31.80	48.70	34.30	31.60	25.70	24.70	29.20	38.00	34.20	37.40	33.81	24.34	

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
31	39.70	36.70	32.50										36.30	22.25	
32	30.30	40.40	36.80	37.60	39.00	32.60	32.30	30.50	37.40	40.30	38.10	39.50	36.23	26.09	
33	38.00	35.00	32.70	43.10	34.00	28.00	27.30	28.60	36.80	42.70	34.30	41.60	35.17	25.33	
35	45.80	44.00	38.80	38.10	36.20	31.30	33.90	32.10	31.20	42.90			**37.43**	26.95	
36	40.10	32.30	33.40	31.70	27.00	21.70	23.10	26.70	32.60	36.80		42.40	31.62	22.77	
40	31.10	31.10	33.40	28.90	24.70	22.60		20.80	26.60	29.60	31.10	32.40	28.39	20.44	
41	40.90	42.90	44.10	41.10	42.30	38.30	30.20	25.80	31.90	41.40	48.40	40.80	**39.01**	28.09	
43	48.60	43.40	43.20	37.80	37.50	30.30	30.30	26.00	38.50	41.00	39.50	46.00	**38.51**	27.73	
44	38.40	29.10	31.30	27.30	25.80	21.70	24.10	26.30	28.40	26.00	34.30	36.70	29.12	20.96	
45	32.00	43.30	40.00	30.60	25.70	29.00	22.90	24.10	28.50	39.30	33.70	32.40	31.79	22.89	
48	27.00	30.50	25.70	25.80	22.00		16.90	18.20	24.50	24.70	31.40	31.00	25.25	18.18	
50	52.30	39.90	44.90	40.70	39.40	31.40	33.40	32.10	34.20	42.50	41.20	45.70	**39.81**	28.66	
54	43.50	37.90	40.20	38.10	37.90	31.20	32.00	29.10	34.70	36.20	41.20		36.55	26.31	
55	47.00	40.40	39.80	37.80	36.80	31.00	29.10	27.60	34.50	35.90	38.60	41.20	36.64	26.38	
56	55.50	40.30	36.70	34.20	35.20	30.10	35.00	33.60	37.40	36.70	39.40	44.80	**38.24**	27.53	**14.54**
58	52.70	52.30	48.00	38.50	25.10	30.80	30.50	30.60	41.10	45.70		41.90	**39.75**	24.62	**24.62**
59	50.50	51.90	57.20	37.40	50.40	41.60	43.30	41.00	47.90	57.30	54.00	50.70	48.60	34.99	
60	38.40	32.70	45.50	33.40	39.60	35.00	25.30	21.60	29.40	36.30	46.20	39.40	35.23	25.37	
61	36.30	42.60	44.40	32.00	36.60	35.70	33.20	19.70	29.90	37.90	44.20	41.00	36.13	26.01	
63	30.60	37.30	25.30	25.00	25.90	27.30	20.30	17.50	23.40	29.00	27.80	29.20	26.55	15.77	**15.77**
64	55.40	51.80	51.90	41.20		35.30							47.12	31.11	**22.03**
65	32.30	34.30	31.40	29.20	27.10	24.40	23.20	20.00	23.60	30.60	32.50	35.00	28.63	20.62	
66	37.90	33.50	26.30	27.90	24.00	21.70	22.00	22.30	31.30	31.80	28.70	34.20	28.47	20.50	
67	50.30	47.70	47.90	52.80			42.00	41.70	45.60	119.90		60.90	56.53	34.06	**34.06**

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
68	35.00	36.10	34.20	33.30	36.50	33.50	27.10	27.90	29.30	39.90	43.10	42.00	34.82	25.07	
69	47.30	55.60	55.80	52.50	53.10	41.40	38.10						49.11	33.54	**28.94**
70	37.85		32.90	27.90	29.20	26.30	23.40	25.20	28.70	33.20	32.80	31.90	29.94	18.07	**18.07**
71	41.50	33.10	28.80	25.80	24.10	23.10	19.00	21.00		30.10	28.50	40.20	28.65	16.49	**20.63**
75	45.00	42.50	42.50	39.00	33.70	35.80	33.50	31.20	35.20		43.20	46.20	**38.89**	28.00	
83	32.60	35.50	33.10	30.60	27.20	25.50	22.50	21.80	28.70	34.70	30.70	32.90	29.65	21.35	
84	44.90	36.30	33.70	32.10	29.50	28.80	29.40	28.50	35.30	35.00	37.60	41.20	34.36	24.74	
85	39.40	39.90	36.40	36.10	35.10	31.40	33.50	31.30	36.40	36.80	41.70		36.18	26.05	
86		29.90	33.60	27.20	23.80	20.00	19.70	18.90	24.50	29.50	34.10	30.70	26.54	19.11	
87	18.90	26.20	21.90	20.80	21.20	18.70	14.50	13.10	17.80	21.10		24.50	19.88	14.31	
88	41.60		33.10	32.80	32.30	26.50	24.60	24.10	29.30	38.00	30.20	38.70	31.93	22.99	
89	24.10	29.60	26.80	22.60	24.50	21.20	19.40	17.60	21.20	21.60	28.50	25.90	23.58	16.98	
90	34.40	35.30	41.50	30.50	40.30	32.80	25.40	20.80	23.60	34.20	39.50	35.60	32.82	23.63	
91	37.80	38.30	36.60	32.80	31.10	28.10	23.30	22.80	28.40	37.00	37.90	65.60	34.97	25.18	
94	27.10	37.50	33.80	25.60	30.50	25.10	24.10	22.90	30.20	32.50	27.90	32.40	29.13	20.98	
95		26.50			23.50	22.80	18.00	19.60	24.60	31.10	31.20	33.70	25.67	18.48	
96	32.10	34.40	29.40	24.50	26.90	25.00	22.00	22.00	25.40	30.90	32.20	33.30	28.17	20.29	
97		42.10	41.40	32.50	40.60	36.00	26.60	28.40	33.30	40.90	40.70	34.40	36.08	25.98	
98	41.10	40.40		35.90	38.30	33.40	29.30	29.50		43.00	41.80	46.70	**37.94**	27.32	
99	40.00	43.20	36.20	29.70	30.20	24.40	23.90	25.40	31.90	39.30		39.60	33.07	23.81	
102	46.60	38.60			29.10	24.70	23.00	27.00	33.00	37.10	33.20	43.10	33.54	24.15	
104	29.90	41.20	36.40	34.40	32.90	27.00	21.10	21.50	25.90	31.70	31.90	32.30	30.52	21.97	
107	40.00	35.20	43.60	35.10	32.60	29.30	27.20	24.80	29.80	31.60	40.20	39.80	34.10	24.55	
110	34.30	31.90	31.40	24.20	28.30	23.10	22.00	20.50	26.80	27.80	30.60		27.35	19.70	

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
111	20.30	43.10	37.80	31.70	27.40	28.20	23.70						30.31	20.70	
114	29.00	37.40	34.60	33.80	35.10								33.98	22.44	
115	43.00	41.60	44.50	45.00	44.10	39.80	35.90	26.70	30.10	39.60	44.60	47.70	40.22	28.96	
116	48.30	42.70	48.30	48.20	49.60	49.20	42.70	34.30	36.00	38.90	48.40	46.40	44.42	31.98	
117	44.40	48.00	43.60	42.00	40.10	40.40	32.10	28.00	40.00	47.60	46.60	55.50	42.36	30.50	
118	31.60	34.60	40.10	37.50	34.80	30.60	30.80			36.30	38.60	42.80	35.77	25.75	
119	38.90	41.10	39.90	40.10	40.20	34.00	33.20		33.50	39.00	46.50	46.40	**39.35**	28.33	
120	46.50	37.00	43.90	37.90									41.33	26.52	
121	55.80	54.60	54.50	53.50	58.70	48.50	50.10	41.70	50.90	54.00	59.70	56.50	53.21	38.31	
122	33.50	42.10	39.90	40.30	49.40	42.60	33.80	29.50	36.90	44.00	45.50	45.70	40.27	28.99	
123		56.30	47.80	44.40	53.80	49.90	47.10	40.40	48.40	58.50	58.10	54.40	50.83	36.60	
124	46.00	49.40	51.50	46.10	50.60	43.60	77.20	1.40		50.60	43.90		46.03	33.14	
125	57.00	55.20	38.70	49.70	63.10	58.50	54.10	45.90	53.20	58.70	52.90	57.30	53.69	32.26	**32.26**
126	37.30	34.20	41.30	37.70	38.30	34.80	30.70	25.10	33.60	38.30	47.40		36.25	26.10	
127	52.90	59.10	43.90	47.10	49.40	41.90	41.70	40.50	57.00	60.60	37.60	43.50	47.93	25.49	**25.49**
128	47.40	47.80	46.60	38.20	39.20	37.30	35.40	29.40		45.70	40.70	40.40	40.74	29.33	
129	44.30	46.60	50.80	40.00	49.30	37.60	35.30	27.30	36.80	47.80	36.60	42.80	41.27	29.71	
131	51.80	46.20	38.00	41.00	41.30	41.50	35.40		41.50	44.70	45.30		42.67	30.72	
132	38.20	43.90	37.40	39.10	37.20	31.30	29.10	21.80	29.40	42.50	39.70	41.00	35.88	25.84	
134	48.40	48.90	46.40	41.60	48.30	38.80	40.50	34.60	44.70	45.00	42.00	47.10	43.86	31.58	
135	31.90	34.20	32.90	26.50	30.60	25.40	24.70	24.70	32.00	38.40	34.60	37.20	31.09	22.39	
136	36.30	37.90	32.50	28.80	28.00								32.70	21.59	
137	33.60	50.20	39.30	37.90	32.60	31.50	26.20	20.20		33.90	37.70	37.30	34.58	24.90	
180	39.60	47.30	27.80	36.40	34.20	32.70	28.00	27.00	29.80	33.20	35.30	39.80	34.26	24.67	

Site ID	NO_2 Mean Concentrations (µg/m^3)														
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													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
182	32.90	43.60	25.30	30.50	29.20	28.90	26.20	24.30	27.40	34.50	7.80	37.20	28.98	20.87	
197	42.60	46.40	30.70	37.10	36.90	34.80	29.90	28.10	33.10	35.10	42.50	46.60	36.98	26.63	
198	39.90			40.40	35.00	32.30	32.40	29.30	30.80	38.60	44.30	44.40	36.74	26.45	
206	50.40	44.00			44.70	43.20	37.20	36.00	42.00	41.00	41.00	42.60	42.21	30.39	
207	40.40	44.50	41.40	34.40	37.80	37.90	32.90	31.10	39.00	40.70	31.80	38.40	**37.53**	27.02	
208	45.20	46.70	36.50	40.00	41.80	38.80	33.10	32.80	41.40	44.00	35.60	40.80	**39.72**	28.60	
209	42.00	42.80	46.20	47.60	44.00	36.90	35.20	33.90	34.60	42.20	38.10	44.50	40.67	29.28	
210	37.80	42.90	42.50	37.90	37.00	34.40	30.10	26.60	36.70	36.90	31.10	35.50	35.78	25.76	
211	36.40	39.20	41.10	41.80	39.10	30.00	29.50	26.80	31.80	35.10	34.40	40.60	35.48	25.55	
212	28.90	31.30	30.60	30.80	29.40	25.30	19.50	19.40	24.10	31.10	26.10	27.20	26.97	19.42	
213	39.60	42.40	38.50	33.50	39.10	36.40	29.90	19.60	29.20	37.50	38.50	41.70	35.49	25.55	
240	30.40	41.80	39.80	36.70	37.00	36.40	27.10	23.80	29.90	37.20	43.20	40.70	35.33	25.44	
241	39.50	38.80	32.60	32.20	37.30	33.60	27.60	26.30	29.90	39.00	37.90		34.06	24.53	
242	49.80	51.30	42.80	45.30	51.00	49.90	44.20	38.00	44.80	48.40	41.30	46.60	46.12	33.20	
243	52.00	46.50	43.30	35.90	40.00	33.60	33.50	34.70	40.50	42.20	37.20	36.80	**39.68**	28.57	
244	53.20	48.40		53.10	50.10	50.60	48.00	40.80	41.20	47.60	58.50	55.80	49.75	35.82	
245	46.70	49.30	51.10	46.00	52.60	50.10	41.10	35.90	41.20	45.00	53.20	53.10	47.11	33.92	
247	44.80	39.30	43.50	27.50	37.10	34.10	28.20	25.70	30.60	33.60	43.40	45.20	36.08	25.98	
249	41.60	39.90	39.60	31.40	35.80	34.30	26.20	24.30	31.20	32.80	40.70	39.20	34.75	25.02	
251	36.80	40.20	39.50		31.80		24.70	24.30	29.30	34.10	39.30	42.30	34.23	24.65	
256	55.60	47.20	37.90	42.10	40.00	37.00	35.60		45.50	48.50	45.70	49.60	44.06	31.73	
275	38.20	32.60	32.00	28.80	24.10	22.80	20.90	18.70	25.30	29.50	26.20	33.30	27.70	17.64	**17.64**
276	40.60	37.20	39.50	33.90	26.40	35.00	34.40	28.70	33.10	37.80	41.60	39.30	35.62	25.65	
277	40.50	38.70	40.40	43.20	39.70	36.40	36.80	29.80	35.50	40.40	39.50	39.20	**38.34**	27.61	

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													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
278	34.40	42.50	39.10	41.20	43.00	42.80	37.80	31.00	34.10	34.60	41.70	42.50	**38.72**	27.88	
279	56.50	59.30	62.90	51.60	49.20	51.10	47.10	40.40	46.10	56.40	49.90	55.20	52.14	37.54	
280	47.70	53.00	57.80	58.20	50.50	53.30	40.50	32.20	37.90	53.70	54.60	47.00	48.87	31.61	**31.61**
281	49.40	52.50	54.40	44.10	40.50	41.20	33.80		38.40	45.30	48.80	51.40	45.44	27.58	**27.58**
282	51.50	42.10	41.80	40.20	43.60	39.60	36.70	31.80	40.90	46.70	44.70	49.00	42.38	25.85	**25.85**
284	32.40	39.20	34.50	30.90	38.60	36.60	32.30	26.90	31.50	40.70	38.00	34.90	34.71	24.99	
285	44.90	45.90	31.80	37.10	35.20	32.20	24.10	25.90	29.70	42.30	45.30	47.60	36.83	26.52	
286	45.20	40.50	40.50	36.10	33.00	28.80	28.10	27.30	32.10	40.10	47.10	44.50	36.94	26.60	
287		41.00	36.00	35.10	34.30	30.40	26.60	22.80	29.80	38.90	39.00		33.39	24.04	
288	42.90	42.00	39.80	37.00	35.50	32.50	29.50	26.80		40.30	39.50	44.30	**37.28**	26.84	
289	44.20	43.90	33.80	39.30	42.20	38.10	31.10	28.90	34.50	43.90	30.70	37.50	**37.34**	26.89	
291	46.80	44.10	38.90	46.60	44.20	48.40	38.10	41.50	48.50	44.10	42.70	54.70	44.88	32.32	
295	47.60	48.70	25.80	27.80	32.00	32.00	30.20	29.60	35.80	38.00	39.30		35.16	25.32	**23.69**
296	50.60	49.40	31.80	38.40	37.30	35.50	30.00	32.00	34.20	38.90	43.70	48.10	**39.16**	28.19	
323	36.20	42.80	34.40	42.30	36.70	36.70	32.50	30.40	31.00	37.20	35.30	45.20	36.73	26.44	
331	46.20	42.80	46.60	42.80	48.10	46.60	41.00	35.30	39.50	46.00	56.70	50.80	45.20	32.54	
333	55.80	57.00											56.40	31.72	**23.18**
334	37.20	38.20	36.50	37.70	46.50	42.00	31.30	25.80	33.90	43.80	43.00		**37.81**	27.22	
335	32.60	35.60	33.10	35.50	43.00	39.60	32.70	26.70	31.90	40.10	31.90	40.30	35.25	25.38	
336	45.20	44.20	45.20	42.90	45.30	46.60	34.60	29.70	34.20	43.90	46.40		41.65	29.99	
337	53.70	44.60	43.20	39.70	57.80	53.60	46.20	43.30	48.40	49.40	54.60	59.00	49.46	29.09	**29.09**
338	41.00		45.30	43.60	41.40	39.00	33.60		37.40	47.40	48.00	38.60	41.53	29.90	
339	41.80	47.50	48.50	33.70	52.60	46.60	38.40	34.90	41.80	53.60	58.70	54.30	46.03	33.14	
340	58.80	53.20	49.10	53.50	62.00	62.30	57.10	48.00	61.50	62.00	60.20	60.90	57.38	41.32	**37.3**

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													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
341	53.00	45.70	43.10	44.40	54.10	44.00	40.20	40.60	52.40	54.50	54.70	53.70	48.37	31.03	**31.03**
342	44.90	48.20	48.40	50.80	56.60	49.20	44.50	36.60	40.40	53.90	59.50	52.50	48.79	28.73	**28.73**
343	39.90	41.30	34.10	31.20	27.70	36.00	32.60	26.90	40.00	45.10	38.90	41.80	36.29	26.13	
344	37.90	40.30	52.70	47.50		41.50	38.00	26.90	41.80	52.20		45.00	42.38	23.98	**23.98**
345	40.60	52.40	50.60	44.80	51.00	39.70	36.40	29.60	39.80	57.00	45.40	47.00	44.53	25.06	**25.06**
346	40.90	47.10	45.70	39.60	39.30	36.50	31.00	27.90	41.30	55.20	45.50	46.40	41.37	29.78	
347	39.00	37.90	36.60	31.50	36.90	34.90	28.30	27.90	36.20	42.40	34.10	42.90	35.72	25.72	
348	43.30	43.10	38.80	41.80	39.20	35.70	35.00	32.40	38.50	40.00	43.00	35.20	**38.83**	27.96	
349	42.90	42.40	33.30	29.10	39.50	33.00	36.40	35.70	37.80	42.10	37.60	36.70	**37.21**	26.79	
350	49.10	43.50	39.00	39.40	45.70	44.40	41.70	37.30	41.20	42.90	47.50	46.30	43.17	31.08	
351	38.10	37.40	40.00	39.30	40.70	37.00	31.00	23.80	29.60	42.70	50.50	45.20	**37.94**	27.32	
352	36.80	41.80	50.30	46.90	47.60	40.90	35.80	26.20	34.70	47.50	46.60	41.40	41.38	29.79	
353	39.40	47.90	51.00	35.50	59.40	56.70	47.40	39.40	45.30	60.20			48.22	25.06	**25.06**
354	48.50	56.00	51.00	48.30	51.30	49.40	41.60	36.40	47.40	55.20			48.51	27.94	**27.94**
355	50.80	55.50	61.80	45.10	66.20	61.00	53.30	39.50	46.30	65.70			54.52	29.16	**29.16**
356	38.10	39.00	37.60	35.20	37.20	30.90	63.60	23.80	29.60	37.10	47.30		**38.13**	27.45	
357	48.50	46.10	51.10	39.70	59.20	51.30							49.32	33.21	**23.18**
358	49.00	44.50	48.30		42.10	41.10	39.20		49.00	48.20	34.60	43.30	43.93	23.40	**23.40**
359	40.10	39.20	34.70	37.80		33.90	29.00	26.30	36.20	34.90			34.68	19.44	**19.44**
362	55.20	48.90	51.20	50.80	56.40	46.90	45.70	37.80	39.90		46.10	44.80	47.61	34.28	
363	41.20	44.20	43.70	30.60	43.30	33.80	32.70	27.80	32.30	42.90	36.50	40.40	**37.45**	26.96	
364	50.90	47.70	45.50	44.20	47.60	39.30	40.60			46.10	45.70	46.70	45.43	32.71	
365	37.50	33.40		35.90	32.60	28.90	61.30	25.80	36.10				36.44	27.47	
366	46.20		38.30	40.90	42.00	39.90	36.30	27.00	48.20				**39.85**	31.72	

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
367	42.50	40.20	32.10	40.10	39.80	38.30	32.50		41.20	42.70	39.50	42.40	**39.21**	28.23	
368	48.90	49.20	40.90	46.00		25.60							42.12	27.81	**20.08**
373	45.90	51.80	31.00	36.60	37.40	33.70	34.50	28.90	36.00	45.80	35.10	37.50	**37.85**	27.25	
374	33.60	44.20	29.40	29.20	32.20								33.72	22.27	**17.5**
375	22.20	32.40	17.80	19.10	18.10	16.40	13.10	13.10	17.40	23.50	24.30	22.90	20.03	14.42	
376	33.80	46.60	27.50	33.50	35.90	33.00	30.10	24.30	31.60	40.30	37.70	39.50	34.48	24.83	
377	45.80	53.70	29.30	40.20	39.80	35.20	34.30	29.50	36.50	39.20	42.20	44.90	**39.22**	28.24	
378	27.60	40.60	20.10	21.00	20.20								25.90	17.10	**13.68**
385	34.30	34.50	28.50	30.10	32.60	24.00	22.10	20.50	24.60	32.90	30.90		28.64	20.62	
386	42.20	35.80	36.10	33.70	34.20	29.40	28.50	29.60	34.20	36.20	38.40	42.70	35.08	22.32	**22.32**
387	30.40	29.70	25.40	23.60	19.30	14.80	14.90	15.80	21.80	22.00	26.00	32.30	23.00	16.56	
388	30.90	26.60	23.00	22.20	18.40	14.20	16.20	13.90	22.20	22.00	26.30	30.00	22.16	15.95	
389	55.80	52.80	51.30	53.00	55.40	50.20	43.40	42.90	48.80	54.80	47.70	36.55	49.39	35.56	
390	55.00	45.50	40.60	43.10	38.60	36.00	32.30	32.00	40.20	42.70	42.80	46.20	41.25	29.70	
391	34.90	42.20	25.50	25.60	32.00	28.30	28.00	24.80	29.60	30.80	35.70	36.20	31.13	22.42	
393	27.10	25.30	25.80	21.40	21.30	19.50	15.20	13.60	20.70	25.00	24.50	25.70	22.09	12.82	**12.82**
394	22.80	24.00	21.50	21.00	20.10	15.10	14.50	8.40	20.00	22.50	20.30	22.50	19.39	13.96	
395	25.30	27.00	22.40	18.00	19.70	14.90	13.40	13.10	19.80	25.50	26.60	26.10	20.98	15.11	
396	24.60	23.40	24.10	22.90	21.80	19.40	17.40	17.50	22.70	26.90	24.00	25.60	22.52	16.22	
397	29.80	28.60	28.70	26.00	22.50	18.10	17.20	17.10	24.20	27.00	31.40	31.90	25.21	13.25	**13.25**
398	26.60	26.60	23.90	19.90	20.80	19.10	16.60	16.10	20.00	18.90	26.70		21.38	10.58	**10.58**
399	38.90	42.00	43.20	40.30	33.90	38.60	30.20	25.90	26.90	40.70	50.10	40.20	**37.58**	19.08	**19.08**
400	26.20	34.40	30.30	28.70	27.70	23.20	22.30	18.10	22.10	27.60	37.70	34.60	27.74	18.94	**18.94**
401	42.70	39.50	36.80	40.30	38.40	35.90	27.50	25.10	29.70	42.20	39.50	38.40	36.33	21.46	**21.46**

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.72) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
402	38.50	49.10	42.90	40.20	40.50	31.60		29.80		1.10		45.80	35.50	21.60	**21.60**
403	49.30	44.60	43.80	44.20	43.80	38.60	35.20	34.50	41.50		36.20		41.17	29.64	
404	34.20	49.70	33.70	38.00	37.10	31.50	30.90	26.80	31.80	37.30	39.30		35.48	19.58	**19.58**
405	27.10	23.00	18.90	20.50	17.20	13.00	15.90	15.30	18.90	19.80	23.40	21.50	19.54	11.30	**11.30**
406	53.40	43.80	49.10	35.90	46.40	39.50	37.30	34.40	38.40	43.90	49.70		42.89	30.88	
407	34.70	28.90	28.70	27.30	24.20	23.60	21.80	18.10	23.40	29.40	29.70	33.20	26.92	19.38	
408	42.90	52.70	50.60	46.50	41.80	40.00	35.60	39.30	44.90		43.40	53.00	44.61	30.74	**30.74**
409			29.40	44.20	46.40	45.00	41.10						41.22	26.45	**20.23**
410	39.80	42.70	25.50	37.00									36.25	23.26	**19.08**
411	36.50	31.70	38.60	32.80									34.90	22.40	**18.79**
412	32.50	41.80	23.30	35.20	27.30	23.90	25.10	22.20	25.20	36.80	28.40	36.20	29.82	21.47	
413	31.30	53.70	28.50	28.00	35.60	33.80	28.20	23.10	26.30	41.20	36.70	37.70	33.68	24.25	
414				29.30	28.80	26.20	19.20	17.80	22.80	29.80		26.80	25.09	20.34	
415						31.70	34.80	29.50	37.10	39.40	38.00	45.20	36.53	29.58	**18.5**
416						20.20	20.10	20.90	23.60	27.30	30.20	33.00	25.04	20.28	**16.2**
417						27.80	25.00	24.40	29.40	30.70	35.20	39.50	30.29	24.52	**19.08**
418						24.90	25.90	26.60	31.40	36.40	30.10		29.22	24.62	**17.42**
419						28.30	27.90	23.60	27.20	34.70	29.80	39.70	30.17	24.43	**21.53**
420												24.70	24.70	33.40	
421														-	Missing
422												27.60	27.60	18.09	**13.53**
423												20.80	20.80	13.64	**8.64**
424											32.30	37.00	34.65	23.25	**14.26**
425											32.00	39.90	35.95	24.12	**19.59**

Notes:

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

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

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

(2) Distance corrected to nearest relevant public exposure.

Table A.2 – Distance Correction Diffusion Tube Information for 2018

Site ID	Distance of Measurement Site from Kerb	Distance of Receptor from Kerb	NO_2 Background Map Concentration (2018 dataset) ug/m^3	Measured 2018 Annual Mean ug/m^3 UnCorrected for bias
8	2.5	4.5	9.52	53.06
*56	2	*166	14.31	38.24
58	4	8	11.17	39.75
63	2	6	8.64	26.55
**64	1	5.5	8.64	42.05
67	2	5	13.76	56.53
**69	2	4	13.76	45.33
70	2	7	13.31	29.94
**71	2	**10	13.31	28.65
125	1	3	13.76	53.69
127	0.5	4	13.76	47.93
275	1	3	13.11	27.7
280	1	2	13.11	48.87
281	1	3	13.11	45.44
282	1	3	13.11	42.38
295	1	1.5	7.88	35.16
**333	0.5	4	13.76	42.87
337	1	3.5	13.76	49.46
340	3	5	13.76	57.38
341	1.5	3	13.76	48.37
342	1	3.5	13.76	48.79
344	0.5	3	13.76	42.38
345	0.5	3	13.76	44.53
353	0.5	4.5	13.76	48.22
354	1	4	13.76	48.51
355	0.5	3.5	13.76	54.52
**357	0.5	5	13.76	44.88
358	1	6.5	13.76	43.93
359	0.5	4	13.76	34.68
**368	0.5	5	13.76	37.59
**374	0.5	2	6.44	30.09
**378	1	3.5	6.44	23.11
386	1.5	3.5	13.31	35.08
393	1.5	6.5	8.64	22.09

397	1	8.5	9.38	25.21
398	1.5	19	9.38	21.38
399	1.5	9	9.38	37.58
400	5	6.5	9.38	27.74
401	1.5	4.5	9.38	36.33
402	1	3.5	13.76	35.5
404	5	17	12.85	35.48
405	1	18.5	13.07	19.54
408	1.5	2	13.57	44.61
**409	0.5	3	11.75	35.75
**410	1	3.5	11.75	31.44
**411	1	3.5	13.76	30.26
**415	0.5	16.5	16.94	39.97
**416	0.5	7	16.94	27.4
**417	0.5	5	16.94	33.14
**418	1.5	19	16.94	33.28
**419	2.5	5.5	16.94	33.02
**422	0.5	3	6.51	24.45
**423	2	20	6.51	18.43
**424	1	23	13.11	31.42
**425	1	4	13.11	32.6

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 an Air Quality Action Plan (AQAP) within 18 months of declaration setting out the measures it intends to put in place in pursuit of the objectives. Action plans 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 B.1.

The table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrams per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table B.1 – 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	
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2010
	40µg/m^3	Annual mean	31.12.2010
Sulphur dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	16.25µg/m^3	Running annual mean	31.12.2003
	5µg/m^3	Annual mean	31 12 2010
1,3 Butadiene	2.25µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0mg/m^3	Maximum Daily Running 8-Hour mean	31.12.2003
Lead	0.25µg/m^3	Annual Mean	31.12.2008

Appendix C: Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factors

Swansea Council employs the services of SOCOTEC, formerly ESG Didcot for our diffusion tubes. The method used is 50% TEA in acetone and the Bias factor for 2018 was 0.77 (spreadsheet version 09/19).

Factor from Local Co-location Studies

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	10/01/2018	31/01/2018	41.3	28.5	40.9	37	7.3	20	18.1	27.62	99.4	Poor Precision	Good
2	31/01/2018	07/03/2018	37.3	39.2	41	39	1.9	5	4.6	30.91	96.19	Good	Good
3	07/03/2018	29/03/2018	37.1	33.1	37.9	36	2.6	7	6.4	26.4	99.81	Good	Good
4	29/03/2018	02/05/2018	35.2	31.3	35.8	34	2.4	7	6.1	25.63	99.88	Good	Good
5	02/05/2018	07/06/2018	31.1	34.9	30.3	32	2.5	8	6.1	25.10	99.77	Good	Good
6	07/06/2018	03/07/2018	27.7	28.5	28	28	0.4	1	1.0	21.25	99.68	Good	Good
7	03/07/2018	02/08/2018	24.3	25.5	24.2	25	0.7	3	1.8	13.71	99.44	Good	Good
8	02/08/2018	06/09/2018	24.3	24	23.8	24	0.3	1	0.6	14.25	99.76	Good	Good
9	06/09/2018	04/10/2018	28	29.4	28.8	29	0.7	2	1.7	18.80	95.68	Good	Good
10	04/10/2018	31/10/2018	34.1	32.6	35.1	34	1.3	4	3.1	24.42	99.38	Good	Good
11	31/10/2018	05/12/2018	43.6		35.1	39	6.0	15	54.0	27.53	99.88	Good	Good
12	05/12/2018	09/01/2019	41.3	41.8	37.4	40	2.4	6	6.0	30.11	96.43	Good	Good
13													
											Overall survey -->	Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

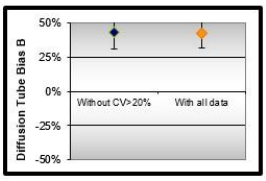
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Swansea AURN 2017

Precision	11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.72 (0.66 - 0.78)
Bias B	40% (28% - 51%)
Diffusion Tubes Mean:	33 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	23 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	24 (22 - 26) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.72 (0.67 - 0.78)
Bias B	39% (28% - 50%)
Diffusion Tubes Mean:	33 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	24 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	24 (22 - 26) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

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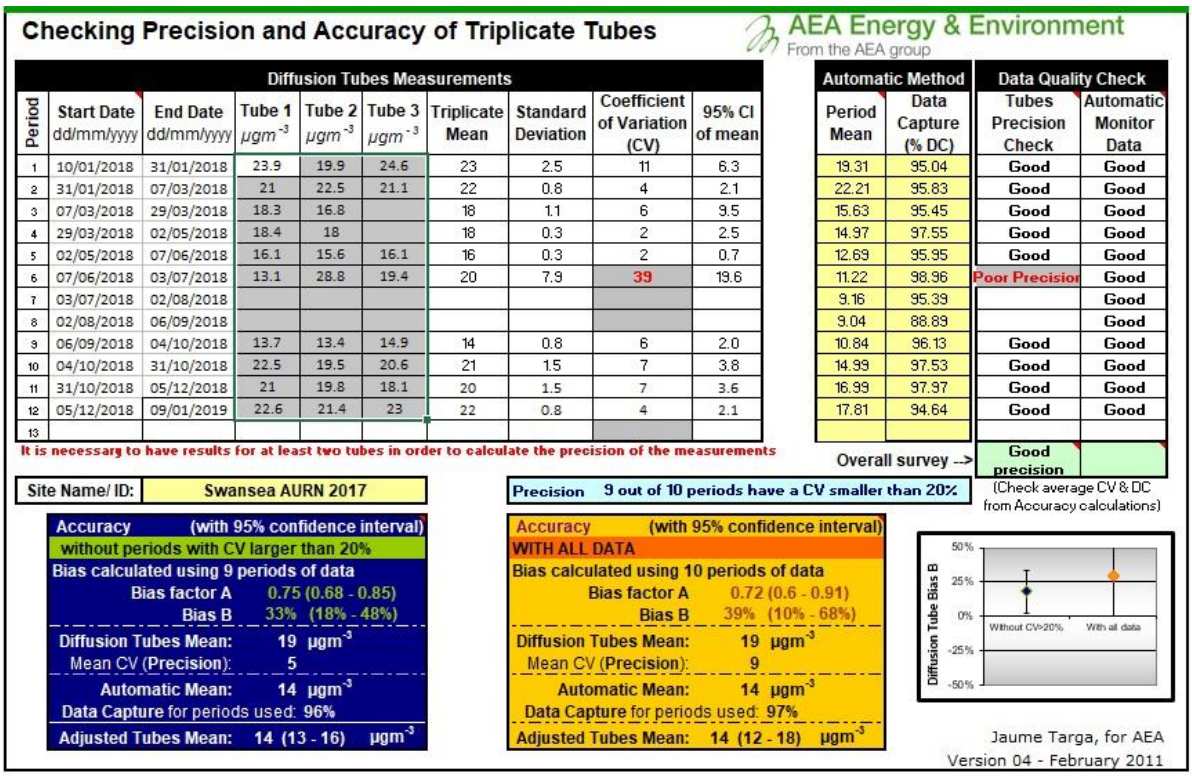


Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	10/01/2018	31/01/2018	23.9	19.9	24.6	23	2.5	11	6.3
2	31/01/2018	07/03/2018	21	22.5	21.1	22	0.8	4	2.1
3	07/03/2018	29/03/2018	18.3	16.8		18	1.1	6	9.5
4	29/03/2018	02/05/2018	18.4	18		18	0.3	2	2.5
5	02/05/2018	07/06/2018	16.1	15.6	16.1	16	0.3	2	0.7
6	07/06/2018	03/07/2018	13.1	28.8	19.4	20	7.9	39	19.6
7	03/07/2018	02/08/2018							
8	02/08/2018	06/09/2018							
9	06/09/2018	04/10/2018	13.7	13.4	14.9	14	0.8	6	2.0
10	04/10/2018	31/10/2018	22.5	19.5	20.6	21	1.5	7	3.8
11	31/10/2018	05/12/2018	21	19.8	18.1	20	1.5	7	3.6
12	05/12/2018	09/01/2019	22.6	21.4	23	22	0.8	4	2.1
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
19.31	95.04	Good	Good
22.21	95.83	Good	Good
15.63	95.45	Good	Good
14.97	97.55	Good	Good
12.69	95.95	Good	Good
11.22	98.96	Poor Precision	Good
9.16	95.39		Good
9.04	88.89		Good
10.84	96.13	Good	Good
14.99	97.53	Good	Good
16.99	97.97	Good	Good
17.81	94.64	Good	Good
	Overall survey -->	Good precision	

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Swansea AURN 2017

Precision 9 out of 10 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 9 periods of data
Bias factor A 0.75 (0.68 - 0.85)
Bias B 33% (18% - 48%)
Diffusion Tubes Mean: 19 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 14 µgm^{-3}
Data Capture for periods used: 96%
Adjusted Tubes Mean: 14 (13 - 16) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A 0.72 (0.6 - 0.91)
Bias B 39% (10% - 68%)
Diffusion Tubes Mean: 19 µgm^{-3}
Mean CV (Precision): 9
Automatic Mean: 14 µgm^{-3}
Data Capture for periods used: 97%
Adjusted Tubes Mean: 14 (12 - 18) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Discussion of Choice of Factor to Use

Swansea Council has been carrying out a local tri-location study for many years. The locally derived bias factor has been utilised in the reports since it began and so, for consistency of approach, the factor will continue to be used.

PM Monitoring Adjustment

The MetOne PM10 units are indicative measurements and no adjustment factors have been applied.

The Bam1020 PM10 data reported in the document has been ratified as part of the AURN network and so Swansea Council has not applied any factors to the dataset.

The Bam1020 PM2.5 data is reported from a SMART Bam and so no offset is applied.

QA/QC of Automatic Monitoring

AURN

This calibration data is automatically logged as invalid by the analyser. In addition officers from this authority performed routine fortnightly manual calibrations. The analyser is subjected zero cylinder generated zero air to assess the analyser's response to zero air. The analyser is also subjected to traceable calibration gases at a known concentration and the response of the analyser recorded. All manual calibration data is then forwarded to Ricardo to perform data management procedures. The data is then further subjected to full network QA/QC procedure's undertaken by Ricardo on behalf of the Department of Environment, Food and Rural Affairs (DEFRA). The station is serviced and maintained twice yearly by Enviro Technology Services Plc. In addition, the authority has a 5 day call out response for any on-site equipment problems with Enviro Technology Services Plc. All equipment on site is fully audited twice yearly by Ricardo together with the calibration gases stored on site

Morriston

This calibration data is automatically logged as invalid by the data-logger. In addition officers from this authority perform routine fortnightly manual calibrations. The analysers are subjected to scrubbed internal generated zero air to assess the analyser's response to zero air. The analysers are also subjected to traceable calibration gases at a known concentration and the response of the analyser and data-logger is recorded. All manual calibration data is recorded as invalid data by the data-logger and is removed from any subsequent analysis.

The station is operated and calibrated in accordance with the UK National Network Local Site Operators manual. The station is serviced and maintained twice yearly by Enviro Technology Services Ltd. In addition, the authority has a 5 day call out response for any on-site equipment problems with Enviro Technology Services Plc. Since the awarding of the contract by the Welsh Assembly Government to Ricardo (formally AEA Energy & Environment) to run the Welsh Air Quality Forum in April 2004, all equipment on site will be fully audited yearly by Ricardo AEA together with the calibration gases stored on site. The L40 span gas cylinders are replaced on a regular basis and are to a certified and traceable standard.

Cwm Level

The API gas analysers have been configured so that a daily automatic calibration is carried out (between 00:30 hours and 01:00 hours). This calibration data is automatically logged as invalid by the data-logger. In addition officers from this authority perform routine monthly manual calibrations. The analysers are subjected to scrubbed internal generated zero air to assess the analyser's response to zero air.

The NO_x analyser is subjected to traceable calibration gas at a known concentration and the response of the analyser and data-logger is recorded. The internal span calibration is used with the ozone analyser. All manual calibration data is recorded as invalid data by the data-logger and is removed from any subsequent analysis.

The station is operated and calibrated in accordance with the UK National Network Local Site Operators manual. The station is serviced and maintained twice yearly by Enviro Technology Services Ltd. In addition, the authority has a 5 day call out response for any on-site equipment problems with Enviro Technology Services Plc. Since the awarding of the contract by the Welsh Assembly Government to Ricardo to run the Welsh Air Quality Forum in April 2004, all equipment on site will be fully audited yearly by Ricardo AEA, together with an audit of the calibration gases stored on site. Data is re-scaled by Ricardo following the authority supplying routine monthly calibration reports. The L10 span gas cylinders (NO) will be replaced on a regular basis and are to a certified and traceable standard.

Hafod

- **QA/QC for NO, Nitrogen Dioxide and Ozone**

If (C1 >0 and C3 > 10) then result: = C1 else result: = C0

C0 – Null value

C1 – Pollutant Concentration

C2 – Standard Deviation of pollutant

C3 – Light Level of pollutant

- **QA/QC for Benzene**

If (C1 >0 and C3 > 40) then result: = C1 else result: = C0

C0 – Null value

C1 – Pollutant Concentration

C2 – Standard Deviation of pollutant

C3 – Light Level of pollutant

It should be noted that the data presented here represents the spatial average over the whole of the 250-meter measurement path and not a "point measurement" as seen within other "traditional or conventional" monitoring equipment/locations. It should also be noted that the DOAS methodology of monitoring does not comply with the EU Directive methods of measurement (chemiluminescent for NO_2, UV fluorescence for SO_2 etc.) at present but the system has achieved MCERTS certification and TUV certification.

The station is now subject to Xenon lamp changes on a quarterly basis, with zero and span calibrations now taking place on an annual basis. These works are undertaken by Enviro Technology Plc, the UK distributor for Opsis of Sweden

St Thomas DOAS

All individual measurement points that have not met the QA/QC conditions (detailed below) are replaced with null values within the new dataset. The user can then compile 5 minute means from the validated dataset and undertake analysis.

- **QA/QC for SO_2, Nitrogen Dioxide and Ozone**

If (C1 >0 and C3 > 10) then result: = C1 else result: = C0

C0 – Null value

C1 – Pollutant Concentration

C2 – Standard Deviation of pollutant

C3 – Light Level of pollutant

- **QA/QC for Benzene**

If (C1 >0 and C3 > 40) then result: = C1 else result: = C0

C0 – Null value

C1 – Pollutant Concentration

C2 – Standard Deviation of pollutant

C3 – Light Level of pollutant

The station is subject to Xenon lamp changes on a 6 monthly basis with zero and span calibrations now taking place on a yearly basis. These works are undertaken by Enviro Technology Plc, the UK distributor for Opsis of Sweden. The frequency of lamp change differs to that of the Hafod DOAS as this station does not measure the NO channel and as such does not suffer the drop off/degradation in lamp intensity during the 5th and 6th months of operation. Changing the Xenon lamps every 6 months does not invoke any data issue concerns at this site.

<u>High Street</u>

In addition officers from this authority perform routine fortnightly manual calibrations. The analyser is subjected to scrubbed internal generated zero air to assess the analyser's response to zero air. The NO_x analyser is subjected to traceable calibration gas at a known concentration and the response of the analyser and data-logger is recorded. All manual calibration data is recorded as invalid data by the data-logger and is removed from any subsequent analysis.

The station is operated and calibrated in accordance with the UK National Network Local Site Operators manual. The station is serviced and maintained twice yearly by Enviro Technology Services Ltd. In addition, the authority has a 5 day call out response for any on-site equipment problems with Enviro Technology Services Plc. At present, the data is collected by the Welsh Air Quality Forum but it does not form part of the QA/QC contract with Ricardo. The L10 span gas cylinder (NO) will be replaced on a regular basis and is to a certified and traceable standard.

QA/QC of Diffusion Tube Monitoring

LAQM Helpdesk – August 2019

Summary of Laboratory Performance in AIR NO_2 Proficiency Testing Scheme (September 2017 – August 2019).

Reports are prepared by LGC for BV/NPL on behalf of Defra and the Devolved Administrations.

Background

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combined two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

AIR offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in ambient indoor, stack and workplace air. One such sample is the AIR NO_2 test sample type that is distributed to participants in a quarterly basis.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the web-pages at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html. This information will be updated on a quarterly basis following completion of each AIR PT round.

Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the AIR PT scheme. Laboratory performance in AIR PT is also assessed, by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London.

The information is used to help the laboratories to identify if they have problems and may assist devising measures to improve their performance and forms part of work for Defra and the Devolved Administrations under the Local Air Quality Management Services Contract.

AIR NO_2 PT Scheme overview

Purpose of scheme

The AIR PT scheme uses laboratory spiked Palmes type diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis and continues the format used in the preceding WASP PT scheme. Such tubes are not designed to test other parts of the measurement system e.g. sampling. Every quarter, roughly January, April, July and October each year, each laboratory receives four diffusion tubes doped with an amount of nitrite, known to LGC Standards, but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The masses of nitrite on the spiked tubes are different each quarter, and reflect the typical analytical range encountered in actual NO_2 ambient monitoring in the UK.

LAQM Helpdesk – August 2019

Preparation of test samples

Diffusion tubes are spiked using a working nitrite solution prepared from a stock solution. The concentration of this stock solution is initially assayed using a titrimetric procedure. All steps in the subsequent test sample production process, involving gravimetric and volumetric considerations, are undertaken using calibrated instruments employing traceable standards. As an additional cross check, 12 spiked Palmes tubes are picked at random from each spike loading level and submitted to a third party laboratory which is accredited to ISO 17025 to undertake this analysis using an ion chromatographic procedure.

In summary, the tube spiking precision is calculated to be better than 0.5 %, expressed as a standard deviation, and this is derived from repeat gravimetric checking of the pipette device used to spike the test samples. The calculated spike values, derived from titrimetric, gravimetric and volumetric considerations, are found to be typically within ± 3 % of results obtained by the third party laboratory using an ion chromatographic analytical procedure.

Scheme operation

The participants analyse the test samples and report the results to LGC Standards via their on-line PORTAL data management system. LGC Standards assign a performance score to each laboratory's result, based on how far their results deviate from the assigned values for each test samples. The assigned values are best estimates of the levels of nitrite doped onto the test sample tubes and are calculated from the median of participant results, after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. At the completion of the round, laboratories receive a report detailing how they have performed and how their results relate to those of their peers.

Performance scoring

The z-score system is used by LGC to assess the performance of laboratories participating in the AIR PT NO_2 scheme.

The Z_{score}, may be defined as:

$$Z_{score} = \frac{\left(x_{lab} - \bar{x}_{assigned}\right)}{\sigma_{SDPA}}$$

Where:

x_{lab} = participant result from a laboratory

$\bar{x}_{assigned}$ = assigned value

σ_{SDPA} = standard deviation for performance assessment (currently set at 7.5 % of $\bar{x}_{assigned}$)

LAQM Helpdesk – August 2019

Performance score interpretation

A Z_{score} is interpreted as described below:

$|Z_{score}| \leq 2$ indicates satisfactory laboratory performance

$2.0 < |Z_{score}| < 3$ indicates questionable (warning) laboratory performance

$|Z_{score}| \geq 3$ indicates unsatisfactory (action) laboratory performance

As a general rule of thumb, provided that a laboratory does not have systematic sources of bias in their laboratory measurement system, then on average, 19 out of every 20 z-scores should be $\leq \pm 2$. In this scheme each laboratory receives 4 test samples per round and therefore submits 4 z-scores per round. Hence over 5 rounds laboratories would receive 20 test samples and report 20 z-scores.

Assessing the performance of a laboratory

End users that avail of analytical services from laboratories should satisfy themselves that such laboratories meet their requirements. A number of factors ideally need to be considered including

- Expertise and skills of staff within the laboratory?
- Does the laboratory follow accepted measurement standards, guidance?
- Does the laboratory operate a robust internal quality control system?
- Is the laboratory third party accredited to relevant standards such as ISO 17025?
- Does the laboratory successfully participate in relevant external proficiency testing schemes?
- How good is their customer care (communication, turnaround times, pricing etc)?

Participation therefore, in an external proficiency-testing scheme such as AIR PT, represents but one factor in such considerations.

Participation in a single round of an external proficiency-testing scheme represents a "snap-shot" in time of a laboratory's analytical quality. It is more informative therefore to consider performance over a number of rounds.

Following on from above, therefore over a rolling five round AIR PT window, one would expect that 95 % of laboratory results should be $\leq \pm 2$. If this percentage is substantially lower than 95 % for a particular laboratory, within this five round window, then one can conclude that the laboratory in question has significant sources of error within their analytical procedure.

A summary of the performance, for each laboratory participating in the AIR PT scheme, is provided in Table 1. This table shows the percentage of results where the absolute z-score, for each laboratory, was less than or equal to 2, i.e. those results which have been assessed as satisfactory.

LAQM Helpdesk – August 2019

Contacts

Further **specific** information on the LGC AIR NO_2 PT scheme is available from LGC proficiency testing on 0161 7622500 or by email at customerservices@lgcgroup.com.

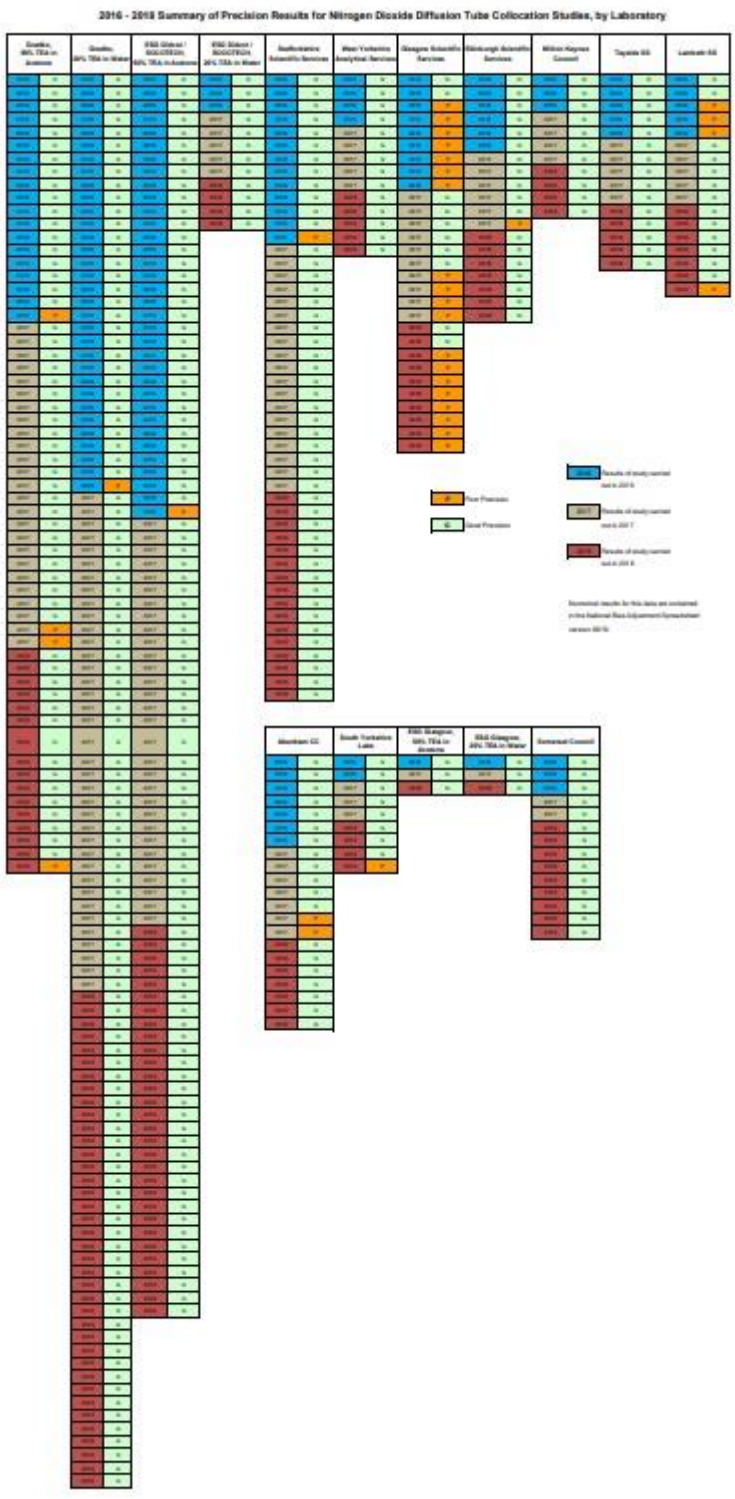
For **general** questions about the scheme within the context of wider LAQM activities please contact Nick Martin at NPL on 0208 943 7088 or nick.martin@npl.co.uk.

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR0022, 24, 25, 27, 28, 30, 31 and 33

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

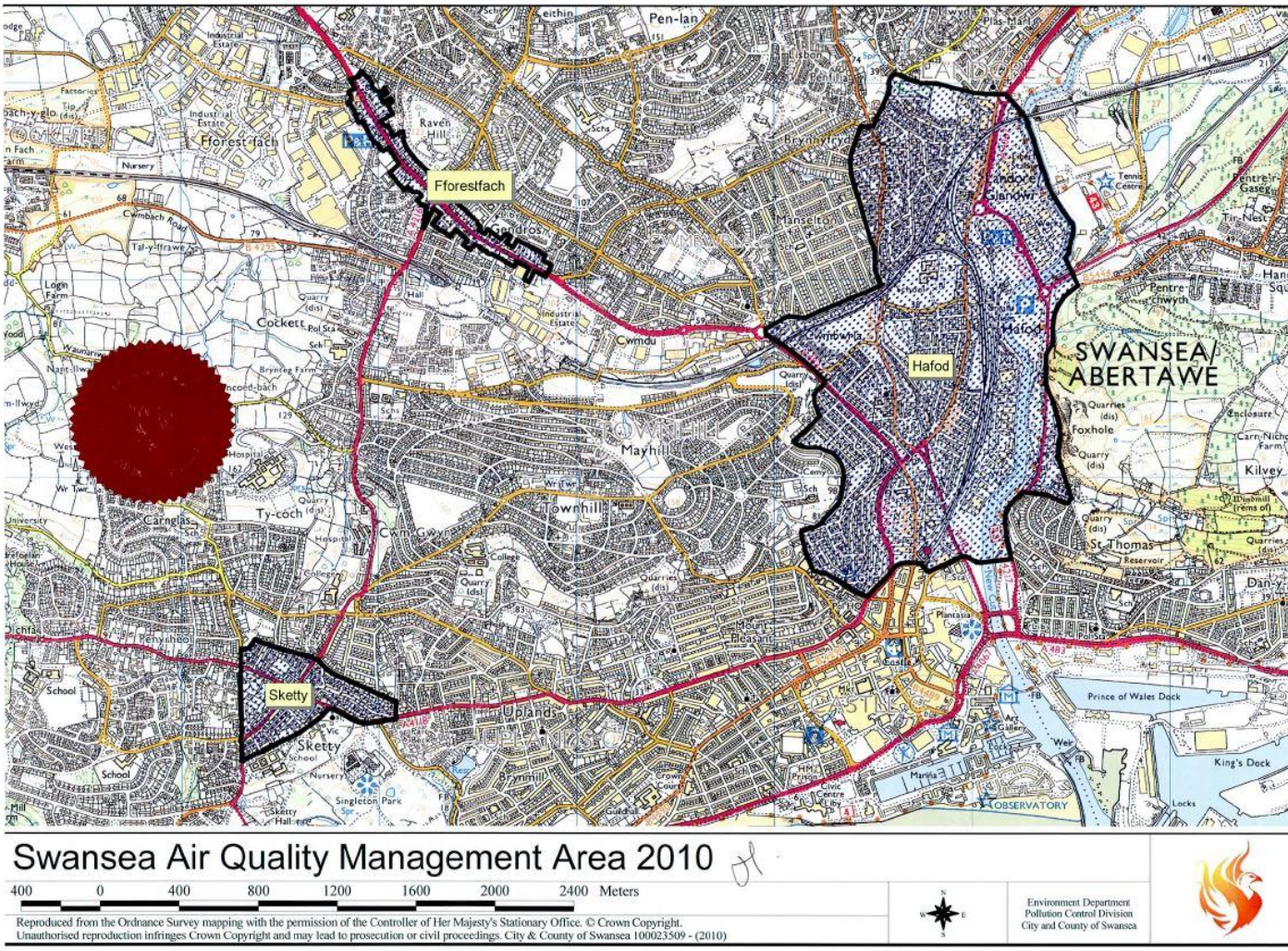
AIR PT Round	AIR PT AR022	AIR PT AR024	AIR PT AR025	AIR PT AR027	AIR PT AR028	AIR PT AR030	AIR PT AR031	AIR PT AR033
Round conducted in the period	September – October 2017	January – February 2018	April – May 2018	July – August 2018	September – October 2018	January – February 2019	April – May 2019	July – August 2019
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	75 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	NR [2]	100 %
SOCOTEC	100 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	87.5 % [1]	100 % [1]	100 % [1]
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	100 %	50 %	100 %	100 %	100 %	100 %
Gradko International [1]	100 % [1]	100 % [1]	100 %	100 %	100 %	75 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	100 %	NR [2]	NR [2]	NR [2]	25 %	50 %	100 %	50 %
Milton Keynes Council	75 %	100 %	75 %	100 %	100 %	100 %	100 %	50 %
Northampton Borough Council	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	75 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	100 %	50 %	100 %	100 %	100 %	100 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	100 %	50 %	75 %	100 %	100 %	100 %	100 %	100 %

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.


2016 - 2018 Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies, by Laboratory

Appendix D: AQMA Boundary Maps

Figure D.1 – Swansea AQMA 2010



Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide