CYNGOR BWRDEISTREF SIROL RHONDDA CYNON TAF

RHONNDA CYNON TAF COUNTY BOROUGH

2021 Adroddiad Cynnydd o Ansawdd Aer

Hydref 2021

2021 Air Quality Progress Report

October 2021

Wrth gyflawni Rhan IV o Ddeddf yr Amgylchedd 1995
Rheoli Ansawdd Aer Lleol

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

Mae'r Adroddiad ar Gynnydd 2021 wedi ei baratoi a'i gyhoeddi gan Gyngor Bwrdeistref Sirol Rhondda Cynon Taf yn unol â'i ddyletswyddau o dan Adran IV o Ddeddf yr Amgylchedd 1995. Oni nodir fel arall, barn a sylwadau Cyngor Bwrdeistref Sirol Rhondda Cynon Taf yn unig sy'n cael eu mynegi yn yr Adroddiad ar Gynnydd 2021.

Yn unol â Chynllun y Gymraeg 2021, ystyrir y ddogfen yma'n un dechnegol a fyddai o ddiddordeb i gynulleidfa fach o bobl yn unig, ac felly mae'i chyhoeddi yn y Saesneg. Fodd bynnag, bydd modd gofyn am fersiwn Gymraeg ohoni.

The 2021 Progress Report has been produced and issued by Rhondda Cynon Taff County Borough Council in fulfilment of its duties under Part IV of the Environment Act 1995. Unless otherwise stated all opinions and views contained within the 2021 Progress Report are that of Rhondda Cynon Taff County Borough Council only.

In accordance with Rhondda Cynon Taff's Welsh Language Scheme, the 2021 Progress Report is deemed to be a technical document of limited public interest and has therefore been produced in English. A Welsh version, however, can be made available on request.

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1. Crynodeb Gweithredol: Ansawdd Aer yn Ein Hardal

1.1 Ansawdd Aer yn Rhondda Cynon Taf

To Be Translated

1.2 Camau i Wella Ansawdd Aer

To Be Translated

1.3 Blaenoriaethau a Heriau Lleol

To Be Translated

1.4 Sut i Gymryd Rhan

Mae rhagor o wybodaeth ar ansawdd aer lleol yn Rhondda Cynon Taf, gan gynnwys y canlyniadau monitro diweddaraf, ar gael ar wefan Ansawdd Aer Cymru [1].

2. Executive Summary: Air Quality in Our Area

2.1 Air Quality in Rhondda Cynon Taf

Rhondda Cynon Taff County Borough Council [the Local Authority] recognises poor air quality can affect people's health and that good air quality can be important in improving the length and quality of people's lives, the amenity of their local community and the wider environment.

The law requires the Local Authority to regularly check air quality in its area against Air Quality Objectives [AQO]. In doing so, the Local Authority has identified two air pollutants, Nitrogen Dioxide [NO_2] and Fine Particulate Matter [PM_{10}], as requiring closer examination. The 2021 Annual Air Quality Progress Report contains an assessment of recent monitoring data for NO_2 and PM_{10} as well as a review of newly consented developments, new and ongoing areas of interest and relevant Local Authority policies.

With the emergence of COVID-19 within society, as well as related substantial disruption caused to many previously normal ways of life, it is not surprising that 2020 observes unparalleled changes to local air quality, with substantial reductions in air pollution observed throughout Rhondda Cynon Taf. The effects of this event are both complex and challenging, which have, for now, significantly affected the ability to consider the longer-term aspects of local air quality management. As such the normal scope and practice of the annual air quality progress report has inevitably been amended, with greater future uncertainty acknowledged.

Even with the events of 2020, some long running local air quality trends have remained pertinent and it is still the case that the vast majority of Rhondda Cynon Taf experiences good air quality, which is likely to remain so into the future and potentially continue to improve. Only some small areas associated with busy urban road junctions, the regional road network or specific local sources are likely to be vulnerable to poor air quality. It is believed these vulnerable areas, linked to historically high levels of NO_2, have already been declared Air Quality Management Areas [AQMAs] and in contrast to most locations, the air quality in these vulnerable areas may not improve as rapidly as elsewhere over the long-term.

Currently Rhondda Cynon Taf has sixteen AQMAs, all of which are in respect of breaches of AQOs for NO_2. These AQMAs are of limited size and are distributed throughout the Borough. Although, due to the unprecedented experiences throughout 2020, the majority of these AQMAs experienced air quality that was compliant to the relevant AQOs for NO_2, given future uncertainty it is believed that these AQMAs will remain pertinent, at least for the foreseeable future.

It is possible that during 2020 the impact of Craig Yr Hesg Quarry on local PM_{10} levels may have continued to have been subdued. This change, which has been observed since 2015, may be as a result of ongoing improvements to reduce PM_{10} emissions from Craig Yr Hesg Quarry. Natural changes to locally prevailing weather and possible future changes at Craig Yr Hesg Quarry, means it is difficult to know if future compliance will continue. As such the Local Authority will, continue to monitor PM_{10} levels at Glyncoch, resources and circumstances permitting.

2.2 Actions to Improve Air Quality

It is clear that, without intervention, local air quality within the most vulnerable areas of Rhondda Cynon Taf is unlikely to improve as quickly as possible. To work towards achieving

improved air quality as quickly as reasonably possible, the Local Authority has adopted bespoke Air Quality Action Plans [AQAPs] for each of its sixteen AQMAs. As circumstances can change the Local Authority will regularly undertake reviews of these AQAPs, however, in recognition of the specific challenges posed by the current COVID-19 response the next review of all sixteen AQAPs will now be expected to be completed by the end of 2022 at the earliest.

Due to limited resources, it has not been possible to immediately implement all air quality improvement actions. Whilst accepting that COVID-19 related disruption did, during 2020, limit the planned programme of actions, the Local Authority continues, where possible, to implement or influence the implementation of actions within its AQAPs as well as other actions that may more generally improve local air quality. The type of air quality improvement actions undertaken recently include the opening of the Cynon Valley South Link Road and Welsh Government directed speed reductions along a part of the A470.

Into the future the Local Authority is continuing to progress a range of actions and initiatives. These include the design and implementation of several proposed highway improvement projects to improve 'pinch-points', projects to increase usability and awareness of active travel routes and local sustainable transport options.

In recognising the potential effects of climate change and the 'win win' which may be realised by an holistic approach to environmental issues, the Local Authority continues to advance key local climate change strategies and programmes. This has included, progressing an Electric Vehicle Charging Strategy and an ambitious renewable energy generation programme. To capitalise on the establishing momentum driving forward climate change action, and the importance of the upcoming UN Climate Change Conference of the Parties (COP26), the Local Authority has also launched 'Countdown to COP26' as part of its climate conversation to help raise public awareness of the climate crisis.

Fundamental to the longer-term progression of actions to improve local air quality is the ability to obtain sufficient resources. This can be challenging, especially where general or 'block grant' funding may be relied upon, and invariably requires creative holistic approaches to the advancement of local air quality improvement actions. As a consequence, although multi-agenda benefits are often realised, this approach can also encounter greater uncertainty and longer decision-making processes when trying to advance certain actions.

2.3 Local Priorities and Challenges

The Local Authority recognises that good air quality has significant importance in the delivery of its comprehensive agenda, in doing so it has incorporated this recognition within the 'Places' priority included in its updated Corporate Plan [2]. As such the Local Authority will continue to seek to progress its adopted AQAPs, implement achievable holistic air quality improvement actions, aspire to fulfil expected monitoring and reporting requirements and continue to build-upon close working relationships with various partners and stake-holders.

The Local Authority also recognises a number of challenges to the delivery of good local air quality, most notably: -

- The likely persistence of an environment where currently allocated resources are significantly under pressure and will face continued competition from other priority agendas.

- The uncertainty and unique challenges posed by the necessary COVID-19 response resulting in both disruption to local air quality management duties as well as short-term and potential longer-term structural changes to air quality trends, transport needs and desirability, and public expectations.

- The publication of the Clean Air Plan for Wales [2] and a White Paper on a Clean Air (Wales) Bill [4] may lead to possible statutory changes to the legal framework underpinning the local air quality agenda, which could require reconsideration as to how the Local Authority undertakes and resources its local air quality duties.

- As this Local Authority does not have access to demarcated central government air quality improvement funding possibilities, ongoing adaptation to exploring ways of cooperatively utilising 'block grant' funding can lead to more complex air quality improvement action decision making and potential uncertain implementation.

- Evolving understanding of the likely exceedance of the EU Limit Level for NO_2 associated with some communities in proximity to the A470 trunk road and a strong need for both national, regional and local actions with corresponding partnership working to help improve the situation as quickly as reasonably possible.

- Continued urbanisation and the potential national and local obstacles faced with the rapid adoption of emergent cleaner transport solutions.

2.4 How to Get Involved

Further information on local air quality within Rhondda Cynon Taf, including up-to-date monitoring results, can be obtained from the "Air Quality In Wales" website [1].

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3. Actions to Improve Air Quality

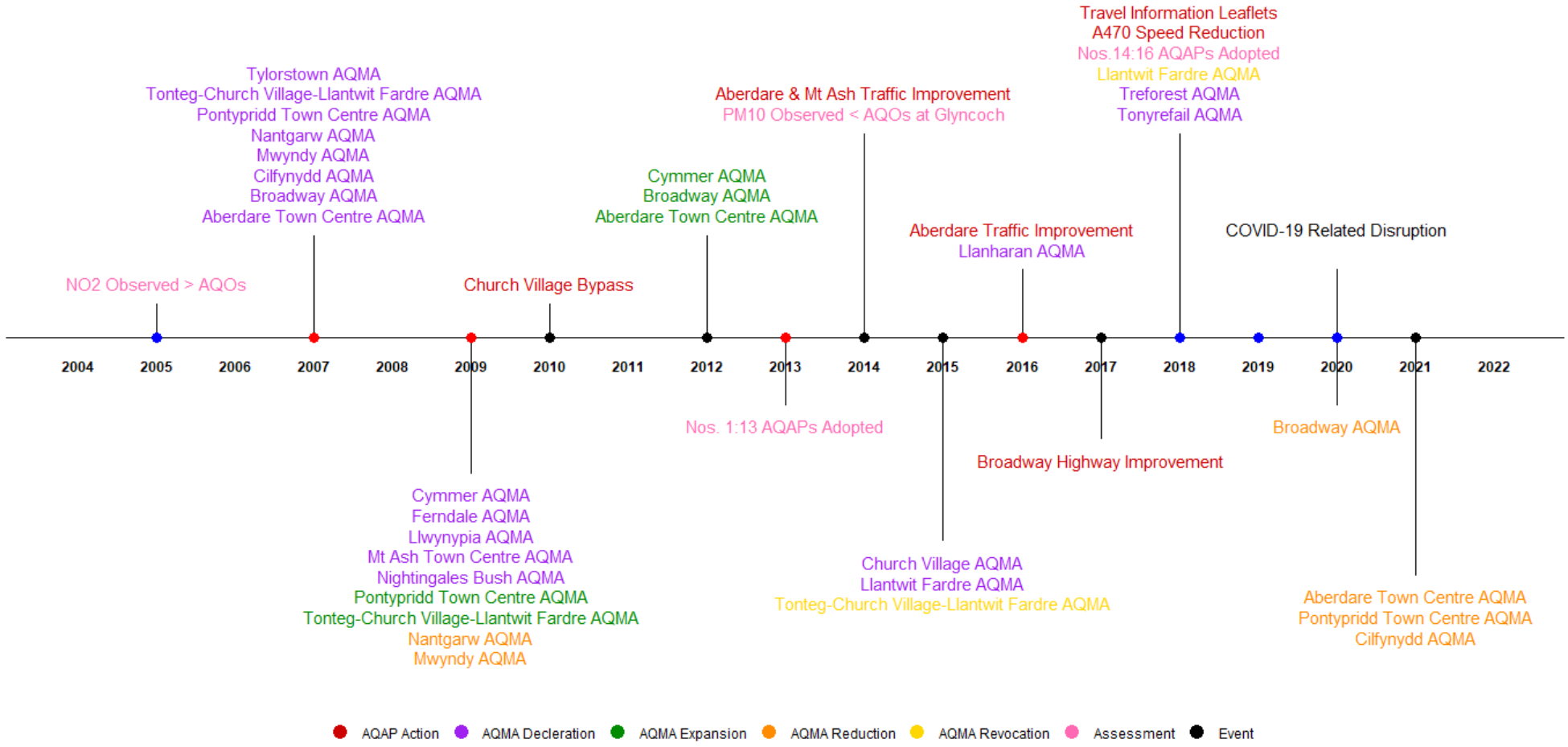
3.1 Previous Work in Relation to Air Quality

Since the late 90s the Local Authority has periodically reviewed local air quality management within Rhondda Cynon Taf and since 2003 has produced an annual report on its latest findings. These reviews often include consideration of the current air quality monitoring results, trends and developments that may influence local air quality management.

In addition, air quality reports have included recommendations about actions that could be taken to enable and support local air quality management. When necessary this has included the identification of locations that may not comply with statutory Air Quality Objectives [AQOs], designated as Air Quality Management Areas [AQMAs], and the assessment of cost-effective actions, adopted within Air Quality Actions Plans [AQAPs], that may be necessary to bring about local air quality improvement.

To provide an illustration of local air quality management in Rhondda Cynon Taf, Figure 3.1 below provides a timeline of recent important events as well as identifying each “poor air quality” year with red circles and each “good air quality year” as blue squares.

Figure 3.1: Timeline of Air Quality Management in Rhondda Cynon Taf



3.2 Air Quality Management Areas

AQMAs are declared when air quality is close to or above a threshold of pollution known as the Air Quality Objective [AQO](see Appendix B). After declaring an AQMA the Local Authority should prepare an AQAP within eighteen months, setting out measures it intends to put in place to improve air quality to at least the AQO, if not even better. AQMAs are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

Within Rhondda Cynon Taf there are several AQMAs of varying sizes and characteristics. The following tables provide additional information with respect of each extant AQMA within Rhondda Cynon Taf. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at the relevant Defra webpage [5]; with maps of extant AQMAs having also been reproduced in Appendix D1 and information on their NO_2 trends in Appendix D2.

Table 3.1 below contains descriptive information on each AQMA, including if the community associated with the AQMA has also been identified by the 'Health and Air Prioritisation Risk Assessment Area Prioritisation' [HAP-RAP] tool [6]. The HAP-RAP tool has been designed by Public Health Wales (see Section 4.5) to identify communities where improvement actions may have the most overall benefit to public health. Having regard to the potential disproportionate impacts of air quality upon deprived communities and the burden reduction approach. In addition, Table 3.1 also indicates if the AQMA lies within a Noise Action Plan Priority Area [NAPPA] identified by Welsh Government [7]. NAPPAs are locations, identified via nose mapping undertaken by Welsh Government, which may experience adverse levels of environmental noise. There are often close relationships between the underlying causes of poor air quality and adverse soundscapes, as a result the presence of NAPPAs may be relevant to local air quality management considerations.

Each AQMA designated within Rhondda Cynon Taf is associated with a breach of a relevant AQO for NO_2.

As each of the AQMAs are inherently influenced by regional and local characteristics that may significantly differ,

Table 3.2 below, contains information on the importance of certain characteristics that are relevant to each AQMA and that may have a cause in or exacerbate the need for the AQMA. These characteristics can be relevant when considering actions that may be cost-effective in achieving future compliance to the relevant AQOs. Recent COVID-19 related events and their potential longer-term implications may have had a substantial relevance to the influences affecting each AQMA. However, this affect may vary depending upon the characteristics of each AQMA. For instance, AQMAs in the south of Rhondda Cynon Taf associated with urban commuter corridors and AQMAs focused on town centres, may have been influenced to a greater degree from 'working from home' arrangements and the temporary closure of non-essential retail. As the implications of recent COVID-19 related events continue to develop it may be the case that, into the future, they become imbedded, change or potentially revert to the previous experience to varying degrees within each AQMA.

Table 3.1: General Information on AQMAs within Rhondda Cynon Taf

RCT Area	AQMA	Relevant AQO(s) for NO_2	Description[1]	No. of Properties[2]	HAP-RAP Priority[3]	NAPPA[4]
Rhondda	Cymmer	1-hour & annual mean	All properties from High St to Trebanog Rd	146	✓	✓
	Ferndale	annual mean	Certain properties from The Strand via High St to Dyffryn St	102	✓	✓
	Llwynypia	annual mean	All properties along Partridge Rd	28	✓	✓
	Tonyrefail	annual mean	Certain properties at Mill St	20	-	-
	Tylorstown	annual mean	Certain properties at East Rd	65	✓	✓
Cynon	Aberdare Town Centre	annual mean	All properties along Cardiff St from Victoria Sq to Cross St	40	-	-
	Mountain Ash Town Centre	annual mean	Certain properties from Oxford St to Ffrwyd Cres and Seymour St	57	✓	-
Taf	Broadway	annual mean	All properties along Broadway	156	-	-
	Church Village[5]	annual mean	Certain properties from Dyffryn Tce. to Main Rd	21	-	-
	Cilfynydd	annual mean	Certain properties from Pontshonnorton Rd to Merthyr Rd	36	-	✓
	Llanharan	annual mean	Certain properties from The Sq to Chapel Rd	7	-	-
	Mwyndy	annual mean	One property at Mwyndy	1	-	✓
	Nantgarw	annual mean	All properties at Graig View	8	-	-
	Nightingales Bush	annual mean	All properties at Nightingales Bush to Pentrebach Rd	11	-	✓
	Pontypridd Town Centre	annual mean	Certain properties along Gelliwastad Rd and Morgan St	52	-	✓
	Treforest	annual mean	Certain properties nearest the A470 at Cardiff St	8	-	✓

Table Notes

(1) AQMA boundary maps and corresponding AQAPs within Rhondda Cynon Taf CBC can be viewed on the relevant Defra webpage [5], with maps of extant AQMAs also reproduced in Appendix D.

(2) The No. of Properties is an estimate utilising relevant GIS information at the time of publication, this number may not reflect the nature of the property, its level of occupancy or changes as a consequence of continued development.

(3) Air Prioritisation Risk Assessment Area Prioritisation [HAP-RAP] tool [6] prioritisation for each community associated with the AQMA. The HAP-RAP tool has been designed (see Section 4.5) to identify communities where improvement actions may have the most overall benefit to public health, with regards to the potential disproportionate impacts of air quality and the burden reduction approach.

(4) AQMA lies within a Noise Action Plan Priority Area [NAPPA] identified by Welsh Government.

(5) A successor to the much larger and now revoked Tonteg – Church Village – Llantwit Fardre A473 Corridor AQMA.

Table 3.2: Information on the Characteristics of each AQMA

Area	AQMA	Traffic Volume	Buses	HGVs	Road Incline	Network Congestion	Road Narrowness	Controlled Traffic	Pedestrian Crossing	Parked Vehicles	Loading Vehicles	In-road Bus Stop	Traffic Calming	Street Canyon	Steep Sided Valley	Dwellings Near Road	COVID-19 Disruption
Rhondda	Cymmer	**	**		***		***	***	*	***	**			***	*	***	**
	Ferndale	**	**				**		*	***	***			***	**	**	***
	Llwynypia	**	**					***						**	*		**
	Tonyrefail	*	*		**		***	***		***		*		***	*	*	**
	Tylorstown	**	**		*		***		*	***		**		***	**	**	**
Cynon	Aberdare Town Centre	**						***	*								***
	Mountain Ash Town Centre	***	*	*	*			***	*					**	*	***	*
Taf	Broadway	**						**	*			*	*				**
	Church Village	**						***				*		**			***
	Cilfynydd	***		*		*				*					*		***
	Llanharan	**					***							**		**	***
	Mwyndy	***		*		*		***									***
	Nantgarw	***		**	***			***							*		***
	Nightingales Bush	***		*		***									*		***
	Pontypridd Town Centre	**	**			*		***	*						*		**
	Treforest	***		*		**										*	***

Table Notes
* = slight importance, ** = moderate importance, *** = substantial importance

3.3 Implementation of Actions to Improve Air Quality

The Local Authority, its partners and other organisations have taken forward a number of actions in pursuit of improving local air quality. However in 2020, due to Storm Denis and COVID-19 related disruption, plus the necessary reprioritisation of resources during this period, many expected actions have been delayed or paused. Nonetheless, details of all actions planned, in progress or completed are set out in Table 3.3 below, with those actions considered to have had or are likely to have the most impact ordered first. A summary of recent relevant actions is also provided directly below.

AQAP measures recently completed are:

- In regard to the Mt Ash Town Centre AQMA, the opening of the Mountain Ash Cross Valley link road south for public use to enable the bypass of some road traffic related journeys away from the AQMA.
- In regard to the Mwyndy AQMA, the publication of the first stage study by Welsh Government into the North West Transport Corridor, which runs from Rhondda Cynon Taff into the city centre via Talbot Green, Llantrisant.
- In regards to the Aberdare Town Centre and Mt Ash Town Centre AQMAs, completion of bus stop upgrades between Aberaman and Abercynon to improve public transport travel desirability.
- In regards to the Broadway, Nightingales Bush, Pontypridd Town Centre and Treforest AQMAs, the permanent instalment and enforcement of 50mph speed restrictions to the A470 between Upper Boat and Pontypridd so as to directly reduce levels of NO_2 from vehicles traversing the relevant section of the A470.
- In regard to the Llanharan AQMA, determination in principal of the preferred route (Route No.2) for the proposed Llanharan Bypass and authority granted to progress to next stage planning and design assessment.
- In regard to the Aberdare AQMA, installation of electric vehicle charging points for dedicated taxi use.
- Determination in principal of the A4119 Coed Ely Dualling Scheme with authority granted to progress to planning and design assessment stages.
- The construction of the Metro Infrastructure Hub at Treforest, to provide future support in the operation of the South Wales Metro.

Due to ongoing COVID-19 related disruption there may be uncertainty as to the expected completion timeframes of various future improvement actions, however, the Local Authority considers the following measures may be potentially completed or progressed over the course of the next reporting year:

- In regards to the Broadway, Church Village, Cilfynydd, Mt Ash Town Centre, Nantgarw, Nightingales Bush, Pontypridd Town Centre and Treforest AQMAs, continued progress in delivery of the South Wales Metro, including the development of a rolling-stock fleet depot at Taff's Well.

- In regard to the Llanharan AQMA, the next stage planning and design assessment of the proposed Llanharan Bypass.

- The installation, on behalf of the Cardiff Capital Region, of further dedicated electrical vehicle charging points for taxis within Rhondda Cynon Taf, including Pontypridd Town Centre and Talbot Green areas.

- The planning and design assessment of A4119 Coed Ely Dualling Scheme.

- Review of 'Hackney Carriage and Private Hire Vehicle Licensing Policy' to consider the setting of minimum vehicle emission standards or proxy standards.

- Removal of the last remaining less efficient diesel 'Pacer' trains from the South Wales Valleys Railway potentially resulting in directly reduced railway emissions as well as possible improvement in the attractiveness of the transport option.

- Simplification of South Wales Valleys Railway fare structure with the potential to reduce certain fares for 33 outer stations, possibly improving the desirability of mass-transit.

- Reintroducing an additional four trains per hour, Monday to Saturday, between Cardiff to Bridgend with the potential to improve capacity and desirability of the railway route via Llanharan and Pontyclun.

AQAPs are reviewed and updated whenever deemed necessary, but normally no less frequently than once every five years, with such updates completed in close consultation with the local communities they are relevant to. The next scheduled review of all the Local Authority's AQAPs had been set for 2020.

Prior to the COVID-19 response, the Local Authority had embarked upon preparatory action to enable an effective review of its AQAPs in 2020. This included the Climate Change Steering Group Local Air Quality Management Report [8] published to support the Local Authority's Climate Change Steering Group discussion [9] on actions that could improve local air quality. This report included a number of potential measures, with their preliminary assessment, that could be considered for consideration as part of the ongoing review and update of the AQAPs. By incorporating this engagement process, involving nominated Local Authority elected members and senior Officers, it was possible to obtain feedback and develop potential working parameters for the planned AQAP review process.

However, due to the current uncertainty associated with the ongoing COVID-19 response a full AQAP review in 2020 would encounter significant challenges. Difficulties would include trying to undertake engagement with relevant stake-holders, potentially affected by or who are otherwise participating in the COVID-19 response. In addition, there are substantial current difficulties in predicting future local air quality trends and attempting to consider the viability of possible improvement actions given both the short-term and potential long-term change in transport related needs and public attitudes.

As such it is considered necessary to delay the completion of the scheduled review of the AQAPs to 2022 at the earliest. Nonetheless the existing AQAPs will be maintained as far as possible during this slightly extended period.

Table 3.3: Progress on Measures to Improve Air Quality

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
1	Electric Vehicle Charging Approach To advance local electric charging infrastructure so as to reduce the practical barriers to the adoption of ELVs	RCT	Promoting Low Emission Transport	Alternative Refuelling Infrastructure to Promote Electric Vehicle Recharging	RCT	2021	2022	TBC	Further development of potential EV strategy. Emphasis of supporting role through available existing policy drivers as the policy area matures.
2	A473/B4595 Corridor Church Village Bypass To relieve traffic from existing local roads	B4595 (inc. Church Village AQMA)	Traffic Management	Strategic Highway Improvements	RCT (RCT+WG)	2008	2010	20% to 36% reduction in NO_2	Construction and operation of new 7km A473, providing relief to B4595. Changes to traffic flow from relief road fully manifested

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
3	South Wales Metro The construction and operation of an integrated metro to relieve traffic congestion from the existing local and regional roads	RCT	Alternatives to private vehicle use	Other	TfW (WG)	Ongoing	Ongoing	TBC	Phase 1 Implementation including bus lane and park & ride improvements associated with existing south wales valley railway lines effectively completed. Core Valley Lines enhancements and frequency enhancements (4tph) with the aim to attract higher patronage and a reduction in car commuting.
4	A470 Speed Reduction Preservation of existing green barriers and reduction in speed limit to 50mph along designated length of the A470	Taf Valley	Traffic Management	Reduction of Speed Limits	WG (WG)	2018	2018	Overall ~2.8µgm^{-3} NO_2 reduction in nearby areas	Permanent speed reduction in combination with fixed enforcement and in-site information dissemination. Possible further expansion of intervention to the south. Significantly reduced NO_2 within nearby AQMAs

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
5	Llanharan Bypass To relieve traffic from the existing local roads	Llanharan	Traffic Management	Strategic Highway Improvements	RCT (RCT+WG)	2019 - 2022	Est 2023	TBC	Preferred route (Route No.2) determined, planning and design phase to support application for development consent [10]. Potential major reduction in NO_2 within AQMA
6	Fee-Charging Public Bus Support Review To consider vehicle emission standards	RCT	Promoting Low Emission Transport	Company Vehicle Procurement	RCT	2020	TBC	TBC	Initial review of current local support mechanisms to consider national policy implications. Expectation of alignment to WG policy of mostly ZEV (Zero Emissions Vehicle) fleet by 2028 or earlier

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
7	Hackney Carriage and Private Hire Vehicle Licensing Policy Review To consider regional vehicle emission standards	RCT	Promoting Low Emission Transport	Taxi Licensing Incentives and Conditions	RCT (CCR)	2020	2022	TBC	Collaborative review supported by evidence provided by CCR commissioned 'cenex' report [11]. Work ongoing to determine viability of regional approach as well as to consider any potential WG intervention Expectation of alignment to WG policy of mostly ZEV fleet by 2028 or earlier
8	Review of Urban 30mph Speed Limit Review to consider WG proposed 30mph to 20mph general urban speed limit	RCT	Traffic Management	20mph Zones	RCT	2020	TBC	TBC	Initial review of current local provisions, adaptation and enforcement with respect to the implications of potential national policy implications. Potential to reduce general emissions where speed engineered restrictions are AQ sensitive

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
9	Review of Local Authority Vehicle Procurement Review To consider Local Authority vehicle emission standards	RCT	Promoting Low Emission Transport	Public Vehicle Procurement	RCT (RCT)	2020	2022	TBC	Initial review concluded that a move to hire, as opposed to owned, fleet will provide greater flexibility as modernisation of the Local Authority takes place. In action trials of LEV (Light Electric Vehicle) and ZEVs progressing. Expectation of alignment to WG policy of mostly ZEV fleet by 2028 or earlier
10	Pontypridd Town Centre Junction (Morgan St & Berw Rd) Improvement Increasing the junction capacity and maximising efficiency	Pontypridd	Traffic Management	Strategic Highway Improvements	RCT	-	2014	-	Works undertaken, with resultant re-programming of traffic light controlled junction to accommodate greater vehicle capacity and junction efficiency Reduction in congestion from traffic queuing within and near Pontypridd Town Centre AQMA

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
11	Aberdare Town Centre Junction (Cardiff Rd & Cross St) Improvement Phase 1 & 2 modification of existing traffic light controlled junction within the AQMA	Aberdare	Traffic Management	Congestion Management	RCT (WG)	2013 & 2015	2014 & 2016	Reduction at Cardiff St (North) of ~1.6% NO_2; increase at Cardiff St (South) of ~0.2% NO_2	Reprogramming to favour traffic flow within the Aberdare AQMA above traffic queuing to enter or cross the AQMA and to enable wait detection and pedestrian use to improve traffic light sequence efficiency.
12	Broadway Junction (A4058) Improvement Increasing the number of carriageways turning right from Broadway onto the A4058	Broadway	Traffic Management	Strategic Highway Improvements	RCT (RCT)	2016	2017	-	Works undertaken, with resultant re-programming of traffic light controlled junction to accommodate the greater vehicle capacity Significant reduction in congestion from traffic queuing within Broadway AQMA

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
13	Mt Ash Town Centre Junctions (New Rd, Oxford St, Bridge St Complex) Improvement Modification of existing traffic light controlled junction within the AQMA	Mt Ash	Traffic Management	Congestion Management	RCT (RCT)	2013	2014	Insignificant change at New Rd and Oxford St	Reprogramming of traffic light controlled junctions to favour traffic flow within the Mt Ash AQMA above traffic queuing to enter or cross the AQMA.
14	Mountain Ash Cross Valley Link (south) To relieve traffic from the existing local roads	Mt Ash	Traffic Management	Strategic Highway Improvements	RCT (RCT+WG)	2018 - 2020	2020	Est. 10.4% reduction in NO_2 south of AQMA	Improvement of existing A4059 Jct and southern bridge completed final phase construction completion expected in late 2020.

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
15	Abercynon and Abercynon Park & Ride to support existing public mass transit relieve traffic congestion from the existing local road infrastructure	Taff Valley	Alternatives to Private Vehicle Use	Rail Based Park & Ride	RCT (RCT+WG)	2018	2019	-	Construction of additional 310 vehicle parking spaces associated with core valley-lines railway station. Expectation of minor reduction to NO_2 within Taff Valley
16	RCT Staff Homeworking Initiative ICT systems to enable wide scale homeworking	RCT	Promoting Travel Alternatives	Encourage / Facilitate Homeworking	RCT (RCT)	2019	2020	Significant uptake in home working in light of COVID-19 disruption	Mass role-out of ICT systems and support to enable as wide as possible uptake by RCT staff, minimising the need for commuting.
17	Aberdare Relief Rd Extension To relieve traffic from the existing local roads	Aberdare	Traffic Management	Strategic Highway Improvements	RCT	2020	TBC	TBC	Preliminary investigation of feasibility and potential options supported by undertaking WelTag Stage 1 assessment.

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
18	Gelli/Treorchy Bypass To relieve traffic from the existing local roads	Rhondda Fawr	Traffic Management	Strategic Highway Improvements	RCT	2019	TBC	TBC	Preliminary investigation of feasibility and potential options supported by undertaking WelTag Stage 1 assessment.
19	Travel Information Leaflets for Ferndale, Pontypridd and Porth Public and active travel advice leaflets relevant to the area.	RCT	Public Information	Via Leaflets	RCT (RCT)	2015	2018	Leaflet uptake by partners and service user gateways strong with positive feedback	Hard and electronic travel and active travel information leaflets reproduced and distributed to service user gateways and other relevant stakeholders [12].
20	Support of National 'Clean Air Day' 2020	RCT	Promoting Travel Alternatives	Other	RCT (RCT)	2020	Ongoing	Limited engagement	Poster displays at some service user gateways. The Council's required response to COVID-19 also impacted on any involvement in Clean Air Day in 2020.

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
21	Tax Incentivised Bicycle Purchase Scheme Government approved salary sacrifice scheme to offer bicycles to RCTCBC employees via "Cycle 2 Work" scheme	RCT	Promoting Travel Alternatives	Promotion of cycling	RCT (indirect)	2015	Ongoing	-	Cycle 2 Work scheme active with employee uptake facilitated via payroll. Advertisement of the scheme via pay slips and RCTCBC intranet. Scheme delivered as part of ongoing staff welfare package
22	Highway Improvement Ely Valley Road Dualing to relieve traffic congestion from the existing local road infrastructure	Tonyrefail	Traffic Management	Strategic Highway Improvements	RCT (RCT+WG)	2019 - 20202	TBC	TBC	Stage 1 + 2 WelTAG complete with Stage 3 WelTAG commissioned with land appropriation discussions commencing. Final design phase expected to be completed by 2020 [13]. Expectation of minor effect on NO_2 within the entirety of Tonyrefail AQM

No.	Measure & Focus	Area of Potential Effect	EU Measure		Lead Authority (Primary Funding Source(s))	Planning & Implementation Phase	Completion	Annual Emission Reduction in the AQMAs & Indicators	Progress & Comment
			Category	Classification					
23	Review of Parking Provision Review to consider WG proposed potential Pavement Parking Restrictions	RCT	Traffic Management	Parking Enforcement on Highway	RCT	2020	TBC	TBC	Initial review of current local provisions, adaptation and enforcement with respect to possible national policy implications Potential to reduce general emissions where current on pavement parking is impeding traffic

4. Air Quality Monitoring Data and Comparisons

4.1 Summary of Monitoring Undertaken in 2020

This subsection sets out the automatic and non-automatic monitoring of air quality undertaken by the Local Authority in respect of its local air quality management duties. It provides details of monitoring locations, both those that were actively monitored in 2020 and other locations where monitoring may have previously taken place or that have recently commenced but results are not available yet. It also provides information on how monitoring is undertaken to ensure the accuracy and reliability of results.

4.1.1 Automatic Monitoring Sites

The Local Authority undertook automatic monitoring at four sites during 2020, with three automatic monitoring locations examining NO_2 and one automatic monitoring location examining PM_{10}. Table 4.1 presents the details of the sites with further information available via the Air Quality in Wales website [1].

At the commencement of 2020, automatic monitoring of PM_{10} at Site No. 63 (Glyncoch Upper Osiris) and Site No. 109 (Glyncoch Lower Osiris) were suspended due to duplication of monitoring effort with Site No. 130 (Glyncoch Upper TEOM FDMS) and the potential restructuring of the automatic PM_{10} monitoring network, in light of the determination of planning certain applications related to Craig Yr Hesg Quarry (see Section 5.3).

A map showing the location of the monitoring sites is provided in Figure 4.1, with higher resolution area specific monitoring site maps included in Appendix D of monitoring sites associated with extant AQMAs. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

4.1.2 Non-Automatic Monitoring Sites

Rhondda Cynon Taf CBC undertook non-automatic (passive) monitoring of NO_2 at fifty sites (utilising fifty-three NO_2 passive diffusion tubes) during 2020.

At the end of 2019 the non-automatic monitoring of NO_2 at Site No. 095 (Park St, Treforest) and Site No. 119 (Park St, Treforest) were discontinued due to sufficient monitoring data having been gathered to demonstrate likely ongoing compliance to the relevant AQO for NO_2, supporting the reduction in geographical area of the Broadway AQMA. In addition, non-automatic monitoring of NO_2 at Site No. 133 (Walter St, Abercynon) was also discontinued due to sufficient monitoring data having been gathered to demonstrate likely ongoing compliance to the relevant AQO for NO_2 and increased understanding of local air quality within the community having been gained.

At the commencement of 2020, non-automatic monitoring of NO_2 at Site No. 135 (Ysgol Evan James, Pontypridd), Site No. 136 (Ystrad St, Pentre) and Site No. 137 (High St, Treorchy) were established so as to periodically re-consider the incremental change in the local urban environment and also to support further community understanding of local air quality.

At the commencement of 2021, non-automatic monitoring of NO_2 at 138 (Berw Rd, Pontypridd) was established so as to reconfirm the extent of the nearby Pontypridd Town Centre AQMA and support community understanding of local air quality.

Table 4.2 presents the details of these sites. A map showing the location of the monitoring sites is provided in Figure 4.2, with higher resolution AQMA specific monitoring site maps included in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the NO_2 passive diffusion tubes are included in Appendix C.

Table 4.1: Details of Automatic Monitoring Sites in 2020

Site ID	Site Name	Activity		Site Type	Associated AQMA	OS Grid Reference		Pollutants Monitored	Monitoring Technique	Inlet Height (m)	Kerb to Nearest Relevant Exposure(1) (m)	Kerb to Monitor(2) (m)
		Start	End			X	Y					
70	Broadway	2006	Active	Roadside	Broadway	307839	189619	Nitrogen Dioxide	Chemi	2.5	3.1	5.2
120	Pontypridd	2011	Active	Roadside	Pontypridd	307286	190433	Nitrogen Dioxide	Chemi	1.5	2.1	8
130	Upper Garth Avenue FDMS	2014	Active	Industrial	N/A	307861	192046	Particulate Matter PM_{10}	TEOM FDMS	3.5	N/A	N/A
131	Mt Ash	2014	Active	Roadside	Mt Ash	304772	199307	Nitrogen Dioxide	Chemi	1.5	0.5	1

Table Notes:

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

Figure 4.1: Map of Automatic Monitoring Sites in 2020

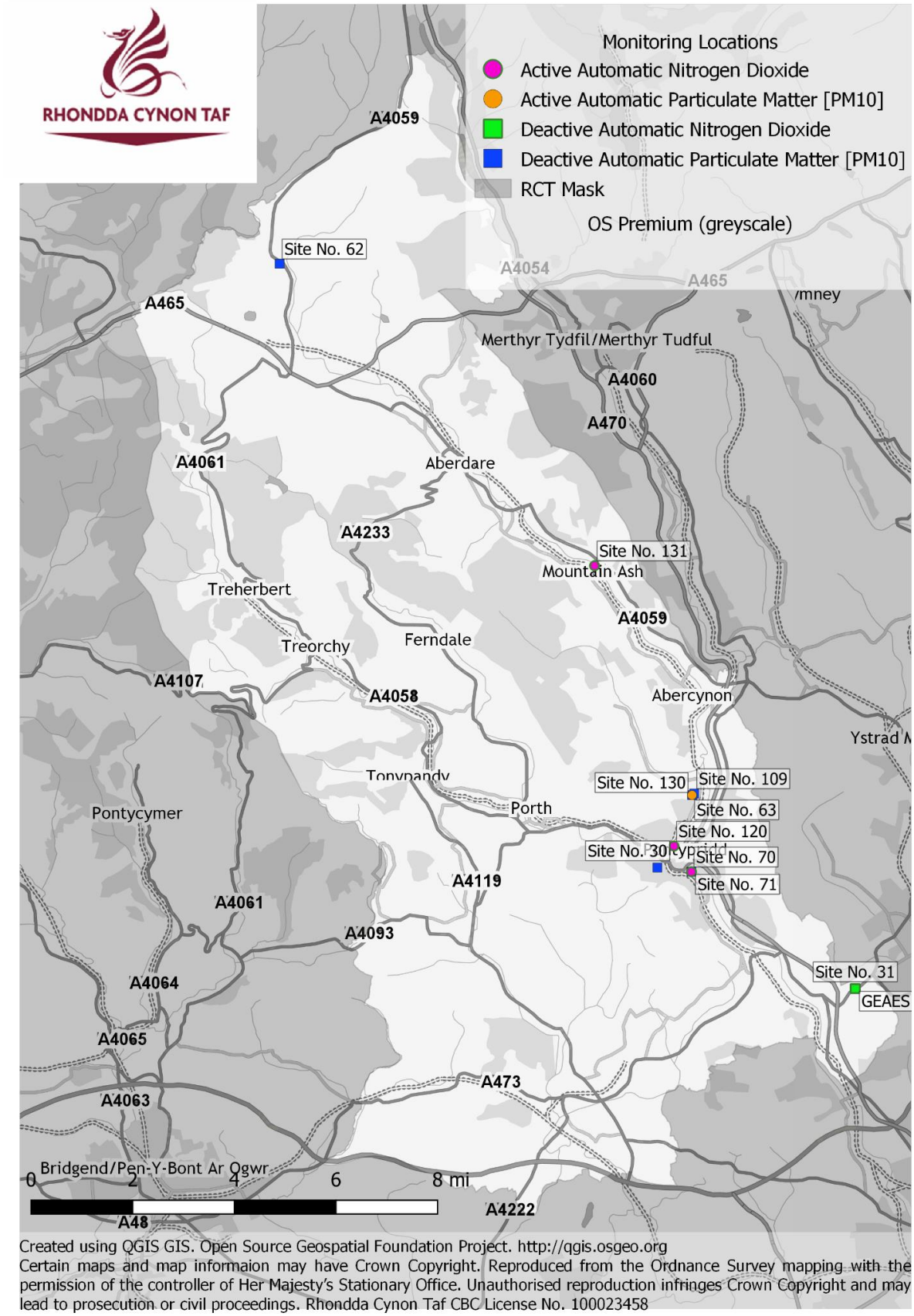


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Table 4.2: Details of Non-Automatic Monitoring Sites in 2020

Site ID	Site Name	Activity		Site Type	Associated AQMA	OS Grid Reference		Site Height (m)	Co-located	Kerb to Nearest Relevant Exposure[(1)] (m)	Kerb to Monitor[(2)] (m)
		Start	End			X	Y				
4	Lanelay Terrace, Maesycoed	2001	Active	Suburban	N/A	306587	189833	3.5	No	2.3	2.3
8	Parc y Nant, Nantgarw	2001	Active	Roadside	Nantgarw	312629	185612	3.5	No	7.4	6.6
21	Woodland Park, Penderyn	2001	Active	Urban Background	N/A	294867	207733	3.5	No	11.8	1.3
37	Lakeside Court, A4119	2003	Active	Roadside	Mwyndy	305442	181579	3.5	No	4.1	2.2
41	East Rd, Tylorstown	2003	Active	Roadside	Tylorstown	300953	195129	3.5	No	1.8	0.6
44	Coronation Terrace, Pontypridd	2003	Active	Roadside	Cilfynydd	308205	191053	3.5	No	3.8	9.2
47	Broadway Co-Sampling	2004	Active	Roadside	Broadway	307839	189619	3.5	Yes	3.1	5.2
48	Broadway Co-Sampling	2004	Active	Roadside	Broadway	307839	189619	3.5	Yes	3.1	5.2
50	Broadway Co-Sampling	2004	Active	Roadside	Broadway	307839	189619	3.5	Yes	3.1	5.2
51	Broadway, Treforest	2005	Active	Roadside	Broadway	307762	189680	3.5	No	5.5	0.5
52	Oxford St, Mountain Ash	2005	Active	Roadside	Mt Ash	304721	199179	3.5	No	1.6	1.6
53	Cardiff St, Aberdare	2005	Active	Roadside	Aberdare	300359	202539	3.5	No	1.8	0.7
55	Cilfynydd Rd, Cilfynydd	2005	Active	Roadside	Cilfynydd	308457	191595	3.5	No	4	2.2
56	Broadway, Treforest	2005	Active	Roadside	Broadway	308236	189344	3.5	No	2	0.8
66	Broadway, Treforest	2006	Active	Roadside	Broadway	307990	189538	3.5	No	2.5	0.7
68	Canon Street, Aberdare	2006	Active	Roadside	Aberdare	300159	202644	3.5	No	2.2	2.2
69	Cardiff St, Aberdare.	2006	Active	Roadside	Aberdare	300485	202437	3.5	No	2.9	2.5
75	Canon/Whitcombe St, Aberdare	2006	Active	Roadside	Aberdare	300217	202645	3.5	No	3	2.7

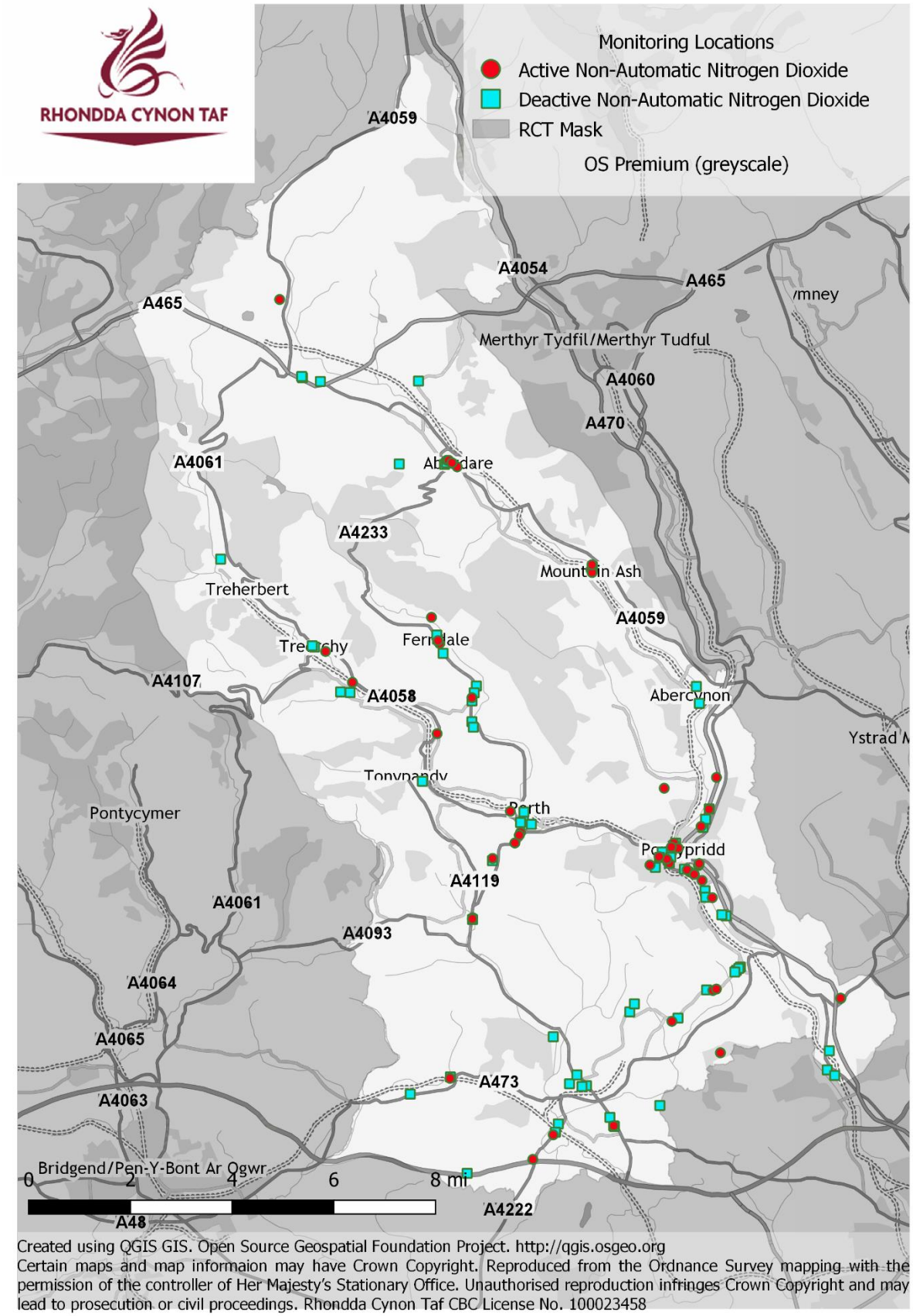
Site ID	Site Name	Activity		Site Type	Associated AQMA	OS Grid Reference		Site Height (m)	Co-located	Kerb to Nearest Relevant Exposure[(1)] (m)	Kerb to Monitor[(2)] (m)
		Start	End			X	Y				
76	Heol-y-Gors, Nantgarw	2006	Active	Roadside	Nantgarw	312620	185619	3.5	No	2.4	2.4
79	High St, Pontypridd	2007	Active	Roadside	Pontypridd	307201	189887	3.5	No	3.7	3.7
80	Morgan St, Pontypridd	2007	Active	Roadside	Pontypridd	307345	190531	3.5	No	3.2	0.5
81	Sardis Bridge Pontypridd	2007	Active	Roadside	Pontypridd	307123	190022	3.5	No	2	2
82	Main Rd, Llantwit Fardre	2007	Active	Roadside	N/A	307281	184886	3.5	No	3.2	1.6
83	Ceridwen Terrace	2007	Active	Roadside	Pontypridd	307481	190369	3.5	No	2.4	2.4
84	Gelliwastad Rd	2007	Active	Roadside	Pontypridd	307264	190403	3.5	No	1.5	1.5
85	Efail Isaf Junction	2007	Active	Roadside	Church Village	308579	185863	3.5	No	2.4	1.7
88	Victoria Square, Aberdare	2007	Active	Roadside	Aberdare	300320	202564	3.5	No	2.2	2.2
90	Cymmer Rd, Dinas	2007	Active	Roadside	N/A	302169	191535	3.5	No	1.5	1.2
91	High St, Cymmer	2007	Active	Roadside	Cymmer	302494	190868	3.5	No	1.5	1.5
93	High Street, Ferndale	2007	Active	Roadside	Ferndale	299931	196843	3.5	No	2.1	2.1
96	Oxford St, Mountain Ash	2008	Active	Roadside	Mt Ash	304757	199091	3.5	No	1.5	1.5
97	New Rd, Mountain Ash	2008	Active	Roadside	Mt Ash	304751	199336	3.5	No	2.9	2.5
101	Long Row, Blaenllechau	2008	Active	Urban Background	N/A	299674	197673	3.5	No	N/A	N/A
103	Ty Mawr Farm, Efail Isaf	2008	Active	Urban Background	N/A	308817	183891	3.5	No	N/A	N/A
105	Greenfield Ave, Glyncoch	2008	Active	Urban Background	N/A	307038	192263	3.5	No	N/A	N/A
106	Partridge Rd, Llwynypia	2008	Active	Roadside	Llwynypia	299851	193991	3.5	No	1.7	1.7
107	High Street, Ferndale	2008	Active	Roadside	Ferndale	299880	196937	3.5	No	1.8	1.8
108	Nightingales Bush, Pontypridd	2008	Active	Roadside	Pontypridd	308101	189853	3.5	No	9.6	3.3
110	Cowbridge Rd	2009	Active	Roadside	Pontyclun	303533	181287	3.5	No	2	1.6

Site ID	Site Name	Activity		Site Type	Associated AQMA	OS Grid Reference		Site Height (m)	Co-located	Kerb to Nearest Relevant Exposure(1) (m)	Kerb to Monitor(2) (m)
		Start	End			X	Y				
111	Bridgend Rd, Llanharan	2009	Active	Roadside	Llanharan	300259	183082	3.5	No	0.5	0.5
113	Mill St, Tonyrefail	2009	Active	Roadside	Tonyrefail	300976	188165	3.5	No	1	0.6
114	Pentrebach Rd	2009	Active	Roadside	Nightingales Bush	308146	189882	3.5	No	5.1	1.7
117	High St, Cymmer	2009	Active	Roadside	Cymmer	302452	190778	3.5	No	1.5	0.6
118	High St, Cymmer	2009	Active	Roadside	Cymmer	302312	190531	3.5	No	3	1.3
122	Mill St, Tonyrefail	2011	Active	Roadside	Tonyrefail	300966	188131	3.5	No	2.6	2
124	Trebanog Rd, Trebanog	2011	Active	Roadside	Cymmer	301606	190042	3.5	No	1.6	1.6
128	Cardiff Rd, Treforest	2013	Active	Roadside	Treforest	308561	188796	3.5	No	1.9	1.5
129	Main Rd, Church Village	2014	Active	Roadside	Church Village	308687	185905	3.5	No	3.2	2.1
132	Cowbridge Rd, Talygarn	2016	Active	Roadside	N/A	302880	180517	3.5	No	23.2	22.5
134	Pontypridd High School, Pontypridd	2019	Active	Other	N/A	308690	192589	3.5	No	33.7	19.8
135	Ysgol Evan James, Pontypridd	2020	Active	Roadside	N/A	306875	190098	3.5	No	6.5	2.1
136	Ystrad Rd, Pentre	2020	Active	Roadside	N/A	297171	195616	3.5	No	1.8	1.8
137	High St, Treorchy	2020	Active	Roadside	N/A	296321	196594	3.5	No	1.9	0.6
138	Berw Rd, Pontypridd	2021	Active	Roadside	Pontypridd	307401	190525	3.5	No	2.1	2.1

Table Notes

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

Figure 4.2: Map of Non-Automatic Monitoring Sites in 2020



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4.2 Air Quality Monitoring Results in 2020

This subsection presents the results of air quality monitoring undertaken in 2020 by the Council with respect to its local air quality management duties. Table 4.3 provides the results for the annual mean NO_2 at all relevant monitoring sites, both automatic and non-automatic, whilst Table 4.4 provides the results of the 1-hour mean NO_2, and associated statistics, at relevant automatic monitoring sites. Whereas, Table 4.5 provides the results of the annual mean PM_{10} and Table 4.6 the results of the 24-hour Mean PM_{10}, and associated statistics, at relevant automatic monitoring sites.

Table 4.3: Annual Mean NO_2 Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
						2016	2017	2018	2019	2020
4	Lanelay Terrace, Maesycoed	Suburban	Non-Automatic	67	67	19.0	15.5	15.2	14.1	10.3
8	Parc y Nant, Nantgarw	Roadside	Non-Automatic	67	67	**46.7**	39.3	37.1	35.8	24.7
21	Woodland Park, Penderyn	Urban Background	Non-Automatic	67	67	8.6	7.1	6.6	5.4	3.9
37	Lakeside Court, A4119	Roadside	Non-Automatic	67	67	**49.6**	**41.0**	37.1	32.3	22.7
41	East Rd, Tylorstown	Roadside	Non-Automatic	67	67	**55.4**	**50.9**	**42.5**	**42.2**	31.0
44	Coronation Tr, Pontypridd	Roadside	Non-Automatic	67	67	**40.5**	37.8	33.2	29.2	21.7
47	Broadway Co-Sampling	Roadside	Non-Automatic	58	58	32.8	28.2	25.8	25.5	20.3
48	Broadway Co-Sampling	Roadside	Non-Automatic	58	58	31.2	28.7	25.4	25.7	19.4
50	Broadway Co-Sampling	Roadside	Non-Automatic	67	67	31.0	29.3	25.4	25.1	18.9
51	Broadway, Treforest	Roadside	Non-Automatic	67	67	**44.9**	**41.9**	34.4	34.5	24.7
52	Oxford St, Mountain Ash	Roadside	Non-Automatic	67	67	**58.3**	**49.1**	**48.1**	**42.2**	32.1
53	Cardiff St, Aberdare	Roadside	Non-Automatic	67	67	**46.6**	39.2	36.0	33.6	24.4
55	Cilfynydd Rd, Cilfynydd	Roadside	Non-Automatic	67	67	-	**62.3**	36.4‡	28.1	21.9
56	Broadway, Treforest	Roadside	Non-Automatic	58	58	**47.7**	39.7	35.9	31.5	26.8

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2016	2017	2018	2019	2020
66	Broadway, Treforest	Roadside	Non-Automatic	58	58	**40.6**	34.9	32.1	33.5	23.2
68	Canon Street, Aberdare	Roadside	Non-Automatic	67	67	**40.7**	35.5	33.1	29.6	21.5
69	Cardiff St, Aberdare.	Roadside	Non-Automatic	67	67	**40.7**	31.6	30.6	27.7	21.3
70	Broadway	Roadside	Automatic	99.6	99.6	32.0	27.8	25.3	25.4	20.4
75	Canon St, Aberdare	Roadside	Non-Automatic	33	33	34.1	31.8	28.1	26.7	21.3‡
76	Heol-y-Gors, Nantgarw	Roadside	Non-Automatic	67	67	37.2	32.0	28.0	28.0	20.8
79	High St, Pontypridd	Roadside	Non-Automatic	67	67	39.1	35.7	32.3	30.0	22.8
80	Morgan St, Pontypridd	Roadside	Non-Automatic	67	67	**41.3**	35.5	30.7	28.8	20.1
81	Sardis Bridge Pontypridd	Roadside	Non-Automatic	67	67	39.6	39.0	31.1	32.7‡	21.4
82	Main Rd, Llantwit Fardre	Roadside	Non-Automatic	67	67	36.7	30.8	28.4	24.9	19.4
83	Ceridwen Terrace	Roadside	Non-Automatic	58	58	39.4	34.8	32.6	31.5	26.4‡
84	Gelliwastad Rd	Roadside	Non-Automatic	67	67	**56.1**	**50.0**	**45.0**	**41.2**	31.4
85	Efail Isaf Junction (West)	Roadside	Non-Automatic	67	67	**48.4**	**41.1**	34.5	30.3	22.7
88	Victoria Sq, Aberdare	Roadside	Non-Automatic	67	67	38.4	34.1	32.0	29.1‡	21.0
90	Cymmer Rd, Dinas	Roadside	Non-Automatic	67	67	39.5	36.9	32.7	31.7	24.3
91	High St, Cymmer	Roadside	Non-Automatic	67	67	**57.4**	**51.5**	**48.4**	**45.6**	37.8
93	High Street, Ferndale	Roadside	Non-Automatic	58	58	**56.4**	**49.3**	**43.8**	**43.3**	29.0
96	Oxford St, Mt Ash	Roadside	Non-Automatic	67	67	**49.4**	**52.1**	39.2	37.1	27.4‡
97	**New Rd, Mt Ash**	Roadside	Non-Automatic	67	67	**61.4**	**56.7**	**47.87‡**	**45.6**	**45.7**
101	Long Row, Blaenllechau	Urban Background	Non-Automatic	58	58	9.4	7.3	6.9	5.7	5.0‡
103	Ty Mawr Farm, Efail Isaf	Urban Background	Non-Automatic	67	67	11.7‡	7.3	8.9	7.9	5.6

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2016	2017	2018	2019	2020
105	Greenfield Ave, Glyncoch	Urban Background	Non-Automatic	67	67	11.2	8.8	9.1	7.5	5.9
106	Partridge Road, Llwynypia	Roadside	Non-Automatic	67	67	**45.9**	**43.5**	36.0	36.0	26.8
107	High St, Ferndale	Roadside	Non-Automatic	67	67	**41.1‡**	35.3	31.5	32.0	22.9
108	Nightingales Bush	Roadside	Non-Automatic	42	42	**50.0**	**54.3‡**	**56.6**	**51.4**	33.7‡
110	Cowbridge Rd	Roadside	Non-Automatic	67	67	36.2	30.0	29.0	30.5	18.6
111	Bridgend Rd, Llanharan	Roadside	Non-Automatic	67	67	-	34.2	36.5	33.1	26.9
113	Mill St, Tonyrefail	Roadside	Non-Automatic	42	42	**43.5**	**40.4‡**	33.9‡	31.4	25.1‡
114	Pentrebach Rd	Roadside	Non-Automatic	67	67	37.8	32.2‡	28.3	25.1	18.4
117	High St, Cymmer	Roadside	Non-Automatic	58	58	**64.6**	**58.8**	**50.2**	**49.7**	35.6
118	**High St, Cymmer**	Roadside	Non-Automatic	67	67	**67.9**	**65.9**	**56.7**	**63.8**	**45.1**
120	Pontypridd	Roadside	Automatic	98.1	98.1	38.6	31.4	31.67	30.2	25.1
122	Mill St, Tonyrefail	Roadside	Non-Automatic	67	67	38.4	33.8	29.2	28.7	22.5
124	Trebanog Rd, Trebanog	Roadside	Non-Automatic	67	67	33.4	29.3	26.7	24.1	17.4
128	Cardiff Rd, Treforest	Roadside	Non-Automatic	67	67	**43.7**	37.6	33.7	29.1	20.8
129	Main Rd, Church Village	Roadside	Non-Automatic	67	67	36.9	28.2	23.9	23.1	18.1‡
131	Mt Ash	Roadside	Automatic	99.6	99.6	**53.2**	**47.7**	**45.0**	**46.6**	34.2
132	Cowbridge Rd, Talygarn	Roadside	Non-Automatic	67	67	**43.4**	35.8	29.5	31.0	19.6‡
134	Pontypridd High School	Other	Non-Automatic	67	67	-	-	-	15.4	13.1‡
135	Ysgol Evan James	Roadside	Non-Automatic	67	67	-	-	-	-	16.7
136	Ystrad Rd, Pentre	Roadside	Non-Automatic	67	67	-	-	-	-	28.1
137	High St, Treorchy	Roadside	Non-Automatic	67	67	-	-	-	-	22.2

Table 4.4: 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (4)				
						2016	2017	2018	2019	2020
70	Broadway	Roadside	Continuous	99.6	99.6	0 (134.0)	0 (101.2)	0 (81.5)	0 (88.9)	0 (72.0)
120	Pontypridd	Roadside	Continuous	98.1	98.1	0 (128.0)	0 (113.31)	0 (109.4)	0 (115.0)	0 (102.0)
131	Mt Ash	Roadside	Continuous	99.6	99.6	7 (182.0)	0 (148.91)	0 (131)	0 (141.3)	0 (124.0)

Table Notes

Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in bold.

Exceedances of the NO2 1-hour mean objective (200µg/m3 not to be exceeded more than 18 times per year) or otherwise NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 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 with means labelled with a ‡ having been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, as their valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

Table 4.5: Annual Mean PM_{10} Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
					2016	2017	2018	2019	2020
130	Garth Ave. TEOM FDMS	Industrial	86.2	86.2	13.45	18.2	25.1	14.4	14.4

Table 4.6: 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > $50\mu g/m^3$ (3) (4)				
					2016	2017	2018	2019	2020
130	Garth Ave. TEOM FDMS	Industrial	86.2	86.2	4 (25.0)	10 (33.8)	13 (48.2)	2 (22.7)	4 (28.7)

Table Notes:

Exceedances of the PM10 annual mean objective of 40µg/m3 are shown in bold.

Exceedances of the PM10 24-hour mean objective (50µg/m3 not to be exceeded more than 35 times per year) 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) Due to local specific influences means have not been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, those means labelled with a δ have been corrected using local TEOM FDMS derived factor

(4) If the period of valid data is less than 85%, the 90.4th percentile of daily means is provided in brackets.

4.3 Comparison of 2020 Monitoring Results with AQOs

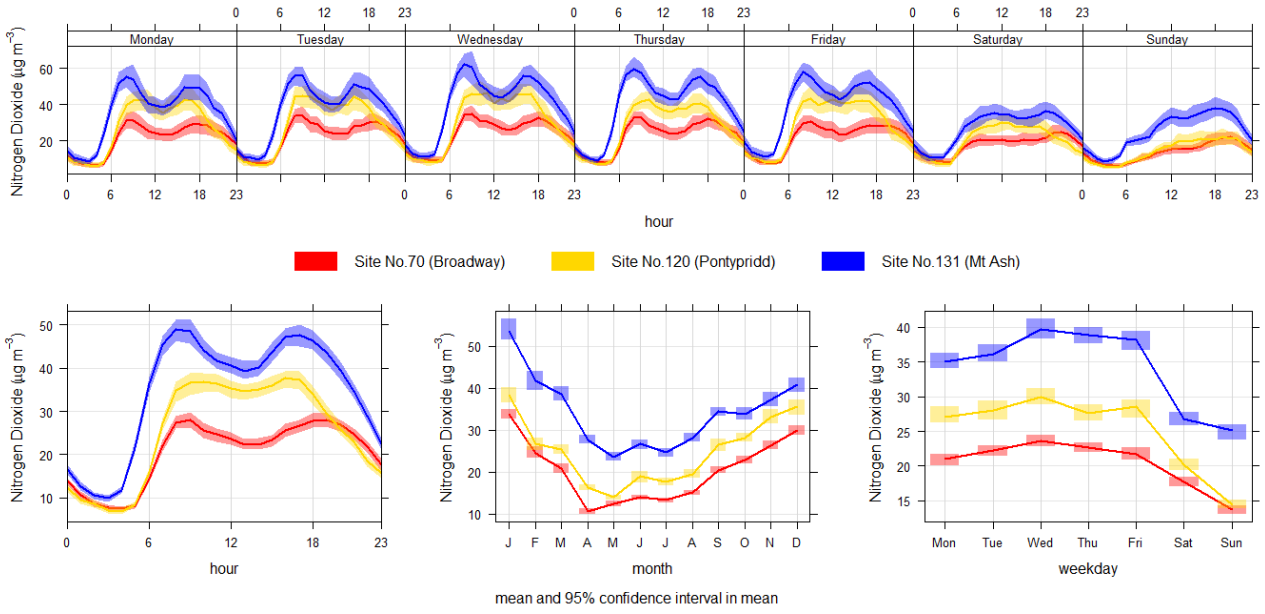
This section details the Local Authority's consideration of air quality monitoring data collected in 2020, its context in relation to previous years and its relation to relevant Air Quality Objectives.

4.3.1 Nitrogen Dioxide [NO_2]

It has been reported [14] that, based on a measured assessment, the South Wales Non-agglomeration Zone, which includes Rhondda Cynon Taf, is compliant with the 1-hour EU Limit Value for NO_2 but is in breach of the annual mean EU Limit Value for NO_2 and is likely to remain in breach beyond 2015. The report notes that the unexpected compliance with the 1-hour EU Limit Value for NO_2 in 2020 has been attributed to "the reduced road traffic flows brought about by the Covid19 pandemic lockdown restrictions". It has also been reported [15] that Rhondda Cynon Taf, in comparison with other Welsh Local Authorities, has been ranked[1] (lower the better) 9th out of 17 for NO_2.

To help consider the relevance and context of the 2020 NO_2 monitoring data it is possible to examine it in a number of ways. Figure 4.3 below contains time variation plots of the 2020 absolute hourly mean NO_2 measurements collected and assessed against time of the day, day of the week and month of the year, for each NO_2 automatic monitoring location in 2020.

Figure 4.3: Time Variation Plot of NO_2 Automatic Monitoring Data in 2020



The time variation plots demonstrate several widely recognised air quality patterns, with all the NO_2 automatic monitoring sites observing similar time variation relationships. For instance, the plots clearly illustrate several relationships that are widely observed within Wales, often underlining the anthropogenic nature of the pollutant and yet also its synergy with naturally occurring cyclical events: -

[1] Although there are currently twenty-two Local Authorities in Wales, some may be ranked equally

- Diurnal Relationship

  This day/night relationship can be observed with the steep relative increases in NO_2 at ~6am and then a more gradual decline at ~6pm. This relationship is closely associated to both human activity, notably commuter linked transportation, giving rise to the NO_2 and its precursors. As well as the natural influence of sunlight on the prevalence of NO_2 with respect to its interaction with day-light dependant associative pollutants.

- Hebdomadal Relationship

  This through-the-week relationship can be strongly correlated to human activity and is often observed as a pronounced reduction in levels of NO_2 on the weekend, particularly Sunday, when transportation and industrial activity may be subdued.

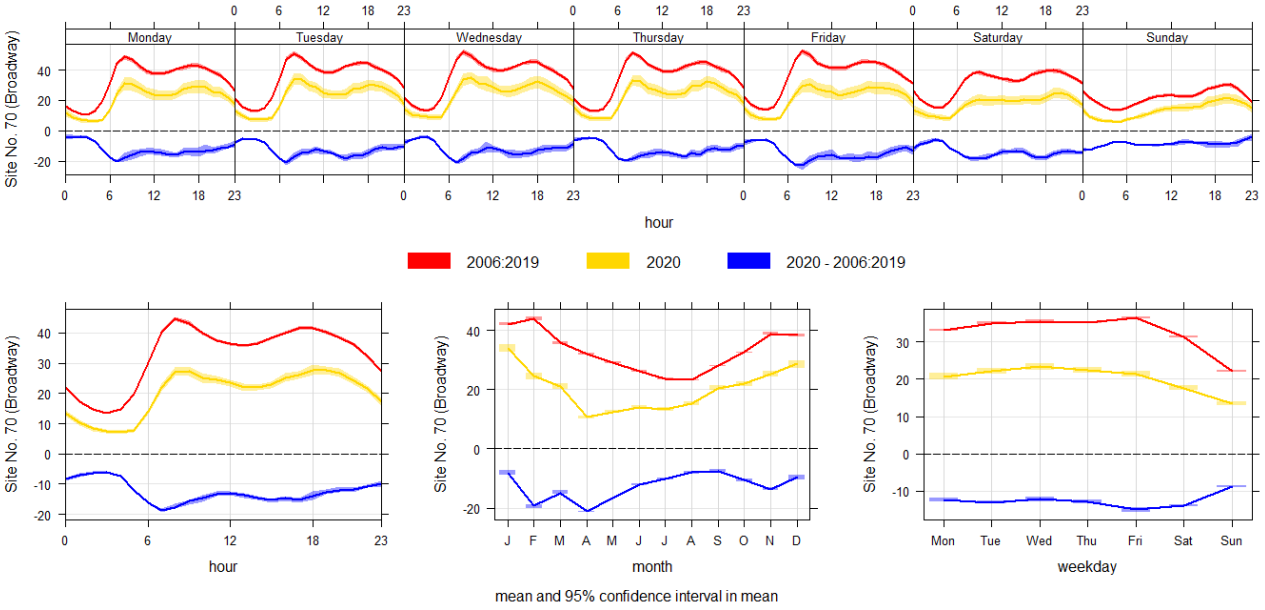
- Biannual Relationship

  This summer/winter relationship can be influenced by human activity, for instance the greater use of domestic heating and vehicle transportation during the winter, resulting in greater emissions of NO_2 and its precursors. Furthermore during the winter, natural phenomena such as weather patterns that are more likely to give rise to conditions that reduce the local dispersion of air pollutants, allowing them to build-up more readily. Whereas, in the summer natural conditions may, at certain times, result in greater levels of tropospheric Ozone [O_3] that can result in reduced NO_2 stability.

Both human factors and natural phenomena can be heavily influenced by changeable weather conditions, which themselves maybe cyclical. These weather conditions can result in significant variability in observed air quality from year to year. For instance, a protracted dry and cold winter may increase the emission of NO_2, and its precursors, from heating activities or increase the likelihood of weather phenomena that may reduce the dispersion of local pollution.

In addition, significant unusual events can influence local air quality either in the short-term or have more longer implications. At Site No. 70 (Broadway) where monitoring data has been consistently collected since 2006 it is also possible to compare the hourly mean monitoring data from 2020 with the recent historic average, between 2006 and 2019. Figure 4.4 provides normalised time variation plots of this comparison and the calculated difference between the current and historic measurements.

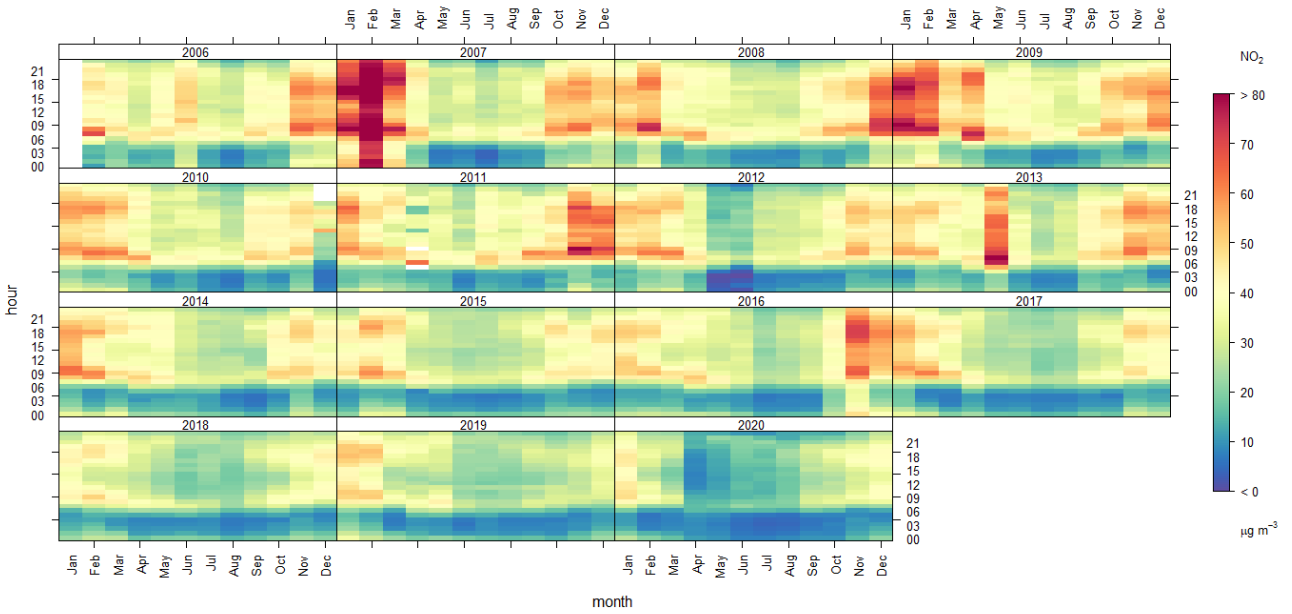
Figure 4.4: Normalised Time Variation Plot of NO_2 at Site No. 70 (Broadway)



The above normalised time variation plots of current and historic NO_2 measurements shows that the pattern associated with the occurrence of NO_2 at Broadway has historically (results from 2006 to 2019) been very consistent (the narrowness of the plotted red line). Although there are similarities between the historic and latest 2020 results (the plotted gold line), it is clear that some significant differences are noticeable. For instance, where a gradual decline in NO_2 has been previously observed through the spring, as diurnal influences take effect, during the spring of 2020 significant stepwise reductions in NO_2 are observed (the steep declines in the plotted gold line between February and April). It is also the case that the more rapid increases in NO_2 historically observed in the autumn and early winter are less evident during 2020 (the smoothing of the plotted gold line in October and November). Also of note is the degree in reduction of levels of NO_2 (the plotted blue line), in 2020 when compared to the historic data. These significant differences to the historic results are most evident with the reduction of NO_2 during the spring of 2020, during the working hours of the day and the working days of the week.

The trend level plot of hourly mean NO_2 at Site No. 70 (Broadway) produced in Figure 4.5 below, is another useful way of examining the temporal relationship of the trend in NO_2 over each year between 2006 and 2020. The trend level plot demonstrates that most years have comparable distributions in the occurrence of NO_2, although certain years (2007, 2009, 2011 & 2013) potentially show emphasised winter periods of elevated levels of NO_2, albeit within the same consistent pattern. On the other hand, 2020 appears distinctly far more muted than the historic record, with NO_2 levels most noticeably depressed (prevalence of blue shades throughout the day in the 2020 plot) during the spring.

Figure 4.5: Trend Level Plot for NO_2 at Site No. 70 (Broadway)



Occasional 'abnormal' air quality years showing particularly elevated or depressed levels of NO_2 may, in part, be the result of regular cyclic variation in weather (with some summers hotter and winters colder than the average), albeit climatic change may make these changes more or less common.

This observed cyclic pattern in air quality can also often be influenced by local human derived events, for instance Bonfire Night resulting in emissions not normally experienced at any other time of year. In addition, routinely observed transient transboundary events in which air pollution can be transported great distances from its source, for instance Saharan sand winds, can have an important influence on locally observed levels of air pollution. Occasionally, certain ad hoc events, for instance the Eyafjallajökull [16], Grímsvötn [17] and Bárðarbunga [18] volcanic eruptions can have a similar influence.

Although is believed that some of the reduction in NO_2 observed during 2020 is likely a continuation of a longer year-on-year trend in locally reducing levels of ambient NO_2 at this monitoring site, as indicated by the less significant night time reduction in NO_2. It is clear that the 2020 levels of NO_2 are both sizeably depressed and show a somewhat divergent pattern than the recent past. It is also the case that similar patterns and dramatic reductions in levels of NO_2 are observed at all the other automatic NO_2 monitoring locations throughout Rhondda Cynon Taf.

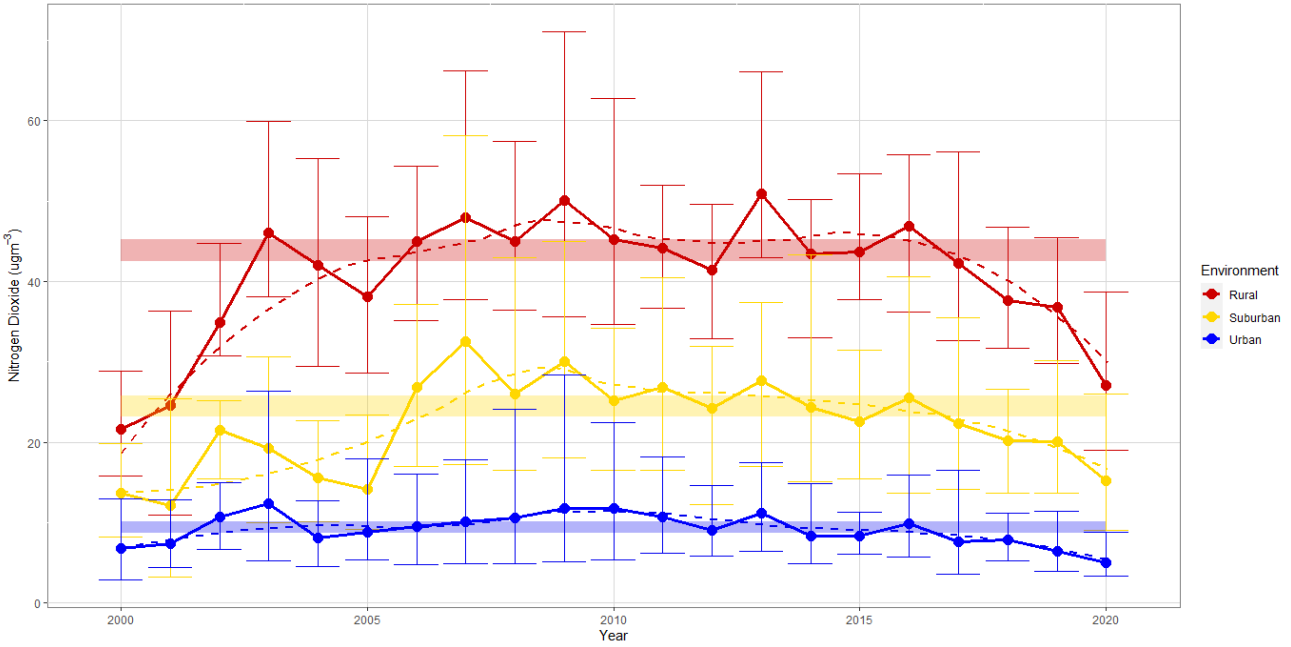
Given the known disruption attributed to COVID-19 with a substantial decrease in local travel and some industrial activity during the spring of 2020 and beyond, it is unsurprising that there is evident strong correlation between the apparent reductions in locally observed NO_2 and the period of most COVID-19 related disruption. As such, it is undoubtable that COVID-19 related disruption has had a major and unprecedented influence on the reduction, plus the duration of reduction, of levels of NO_2 within Rhondda Cynon Taf during 2020.

As any individual monitoring site can be influenced by very local circumstances, it can be of benefit to consider a collection of similar monitoring locations when assessing general influences upon local air quality. It has been possible to collate monitoring data from locations

where monitoring has been maintained for some time and influences from new developments or abnormal events are expected to have been minimal. These locations have been categorised with regards to their representation of the rural[2] environment (isolated and peri-urban residential areas), the suburban[3] environment (residential areas of most townships and the suburbs of strategic towns) and the urban[4] environment (residential areas in close proximity to busy urban roads) within Rhondda Cynon Taf. The rural and suburban environments likely represent the vast majority of Rhondda Cynon Taf, whereas the urban environment tends to be reflective of small parts of various communities that may be more at risk of experiencing elevated levels of NO_2.

Figure 4.6 produces a time plot of the rural (blue), suburban (gold) and urban (red) environments with the respective NO_2 annual mean (solid line with solid dots), the associated trend line[5] (dashed line), the 10-year mean Confidence Interval (shaded zone) and the intra-year monthly mean spread (vertical bars and whiskers). Due to the exceptional nature of 2020, the 10-year mean Confidence Interval (shaded zone) has been determined with respect to the 10-year period from 2009 to 2019.

Figure 4.6: Time Plot of the annual mean for NO_2 at the rural (blue), suburban (gold) and urban (red) environments



As expected the rural environment (solid blue line) shows strong historic consistency with published background levels (2020 published background levels do not take account of likely COVID-19 related disruption) and, as with the suburban environment (solid gold line), demonstrate current and historic levels of NO_2 within most of Rhondda Cynon Taf are well below the 40µgm^{-3} annual mean AQO for NO_2. This understanding is in keeping with

[2] rural or sub-urban locations where there is an absence of local busy roads or industry and it most closely reflects the regional background.
[3] urbanised residential areas at a distance from the kerb of major roads and an absence of local industry.
[4] roadside urban locations within Air Quality Management Areas, often associated with commercial centres or strategic roads, where it is believed that the sources of NO_2 have not markedly changed.
[5] produced by Local Polynomial Regression Fitting with α of 0.5

Rhondda Cynon Taff's layout of linear settlements, which observe a generally suburban character, and interposed with large rural spaces, which would be conducive to reducing general exposure to elevated levels of NO_2. Given that the rural and suburban environments are likely to represent, by area and population, most of Rhondda Cynon Taf, it is very likely that the vast majority will experience levels of NO_2 well below the annual mean AQO for NO_2. However, the urban environment (solid red line) does historically illustrate that where certain circumstances manifest, which are often limited to relatively small specific areas, a risk of elevated levels of NO_2 may become apparent.

It is the case that air quality will generally fluctuate over time as the significance of various sources and interactions on NO_2 change. For instance, 2007, 2009 and 2013 appear to demonstrate all three environments having respective annual means clearly above the ten-year mean confidence interval (shaded areas), potentially indicating particularly 'poor' air quality years. Examination of the intra-year monthly mean spread after 2010 indicates that those years experiencing comparatively elevated levels of NO_2 may be related to occasions of higher maximum spread (the top of the whisker bar) rather than a lifting of the minimum spread (the bottom of the whisker bar). This could suggest that, post 2010, specific influences upon (for instance weather conditions) rather than the underlying trend in, the sources of NO_2 may be more significant in increasing the likelihood of any one year experiencing comparatively elevated levels of NO_2.

It is also clear that the annual mean NO_2 in 2020, within all three environments, was observed to be dramatically below the relevant ten-year mean Confidence Intervals. In addition, the maximum intra-year monthly mean spread in 2020 is greater when compared to the recent historic norm, possibly as a result of the noticeable lowering of the of the minimum spread (the bottom of the whisker bar) and slight suppression of the higher spread (the top of the whisker bar). Although both 2018 and 2019 have also shown a lowering of the average levels of NO_2 across all environments, the dramatic reduction in levels in 2020, believed to be primarily as a result of COVID-19 related disruption, supports the consideration that 2020 may represent a very unusual 'good' air quality year, with a marked reduction in the levels of NO_2 across all environments when compared to the recent past.

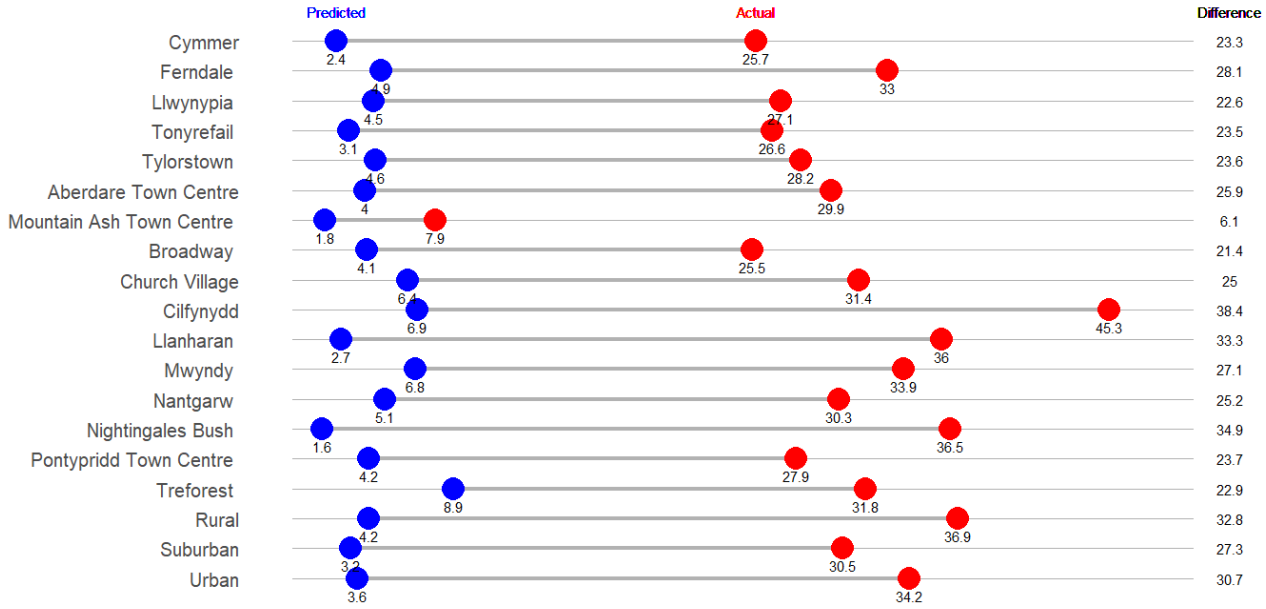
Although it is acknowledged that certain influences may manifest, from time to time, to disrupt the overall trend in NO_2, it is possible to have some regard to this trend (the respective dotted lines). All three environments show an increasing NO_2 annual mean between 2000 and ~2009, with this increase being most pronounced and rapid within the urban environment (red dotted line). Subsequent to 2009 both the rural (blue dotted line) and suburban (gold dotted line) environments have shown a consistent decrease in the NO_2 annual mean. In contrast the urban environment maintained a plateaux period from 2009 to 2016, after which point is has also recently seen an improving trend.

During the recent past the urban and suburban environments have clearly and consistently shown a significant and relatively stable downward trend for over five years. As the urban downward trend is less established, manifesting within the last five years, and potentially influenced by the recent procession of 'good' air quality years, it may yet be too soon to say if the previously identified plateaux period has resolved into a stable downward trend, however, this is heavily implied.

In contrast to the recent trends identified above, 2020 represents a sizeable acceleration in the downward trend at all three environments.

To further understand the dramatic and widescale effect of the change in trend, Figure 4.7 below provides a dumbbell plot of the predicted (blue) percentage reduction in NO_2 if the pre-2020 downward trend had persisted and the actual (red) percentage reduction in NO_2 observed during 2020 at each AQMA and all three environments.

Figure 4.7: Dumbbell Plot of the predicted (blue) and actual (red) percentage downward reduction in the NO_2annual mean for in 2020



During 2020 all of the AQMAs and the three environments observe a significant difference in the predicted percentage reduction in NO_2 in comparison to the actual percentage reduction in NO_2 observed. However some variation within the data can be observed, for instance it may be the case that those AQMAs in the Taff area (Broadway to Treforest) were more likely to observe a slightly greater reduction to those within the Rhondda (Cymmer to Tylorstown) and Cynon (Aberdare Town Centre to Mountain Ash Town Centre) areas. This may be due to the different socio-economic characters of each region, with the less affluent Rhondda and Cynon areas potentially less likely to be affected by sustained COVID-19 interventions such as 'working from home'.

It is also strikingly apparent that the Mountain Ash Town Centre AQMA observes a less noticeable actual reduction in NO_2 in comparison to other AQMAs. This may be because the expected sizeable reduction in traffic volume, during 2020 as a result of certain COVID-19 measures, was still not sufficient enough to reduce the frequency and duration of chronic road congestion often observed within parts of this AQMA.

Conversely Cilfynydd observed a slightly greater actual reduction in NO_2, in comparison to elsewhere. Although other locations (Nightingales Bush and Treforest) associated with the A470 also experienced significant declines in observed levels of NO_2. The reductions at Cilfynydd maybe reflective of this location now being least likely to experience traffic congestion of the A470, as a result of current speed restrictions further south.

To try to assess the observed recent trend, examination can be made of the five year trend, which is considered[6] the minimum time period to examine a trend in NO_2. However, it is acknowledged that the five year trend can be influenced by data outliers or cyclical effects that have a similar or longer timeframe, distorting the trends interpretation if considered in isolation. For instance, it will inevitably capture the recent impact of COVID-19 related disruption during 2020 albeit the continued extent and duration of these effects remaining highly uncertain. Nonetheless, quantification of the respective trends suggests the rural [-6.98% yr^{-1} five-year trend], suburban [-4.93% yr^{-1} five-year trend] and urban [-5.19% yr^{-1} five-year trend] environments within Rhondda Cynon Taf all continue to experience a relatively similar reducing trend in NO_2.

Given the uniformity of the improvement in the five-year trend in NO_2, it is likely its cause may be associated with factors widely experienced throughout Rhondda Cynon Taf over an extended period of time. Although prolonged conducive weather conditions may play a part, given the length of consistent improvement within the rural and suburban environments and a similar experience reported [19] to some extent throughout Wales, human factors are likely to be strongly relevant.

Notwithstanding recent events, it is believed that improvements to the rural and suburban environments are likely being sustained by various national and broader local policies and actions which are having a wide geographical effect, possibly in combination with underlying longer-term cyclic climatic changes. These measures would also be expected to have an impact upon the urban environment but due to local circumstances their effects may have been more muted and slower to properly manifest. Nonetheless, it may be the case that a combination of broader measures in association with recent locally targeted intervention at several AQMAs may have helped to support improvement within the urban environment, albeit this may remain uncertain in the near term at some locations.

It is also unequivocally clear that, as observed in 2020, dramatic interventions that reduce local and regional road traffic and/or their associated emissions of air pollution, will have a marked effect on local air quality. To such an extent that nearly all AQMAs within Rhondda Cynon Taf (apart from the Cymmer and Mountain Ash Town Centre AQMAs) could likely be revoked if the positive impacts observed in 2020 could be fully sustained into the future. However, many of the longer-term implications of recent COVID-19 disruption and its effect on local human behaviour, local transport and air quality remain uncertain. Indications since 2020 have presented a complex picture in which it is expected that road traffic emissions will to some extent rebound in the short-term but, at present, potentially not to the extent as observed prior to 2020.

The impact of such a rebound post 2020 is difficult to predict, due to traffic volume in combination with traffic congestion often being an important driver in the experience of elevated levels of NO_2 but not necessarily having a strictly linear relationship. As such, some AQMAs may be more likely to ‘hold-on’ to the some of the improvements observed in 2020, if certain traffic reducing behavioural changes persist. Whilst some other AQMAs may be more sensitive to relatively minor changes in local traffic volume and may struggle not to return to a pre-2020 air quality experience.

[6] Paragraph 4.14 of LAQM.TG(16)

As emphasised by the above highlighted uncertainties, it is considered the case that, without further targeted intervention, any sustainable overall improvement in the urban environment may be slow to manifest, with a risk of the continued likelihood of occasions of 'poor air quality years' challenging compliance to the relevant AQOs for NO_2 at vulnerable locations.

4.3.2 Comparison with the 1-hour AQO for NO_2

The automatic monitoring data from 2020 demonstrates that Broadway (Site No. 70), Pontypridd (Site No. 120) and Mt Ash (Site No. 131) did not exceed the 1-hour mean AQO for NO_2. Due to the complexity of automatic monitoring, it has not been possible to locate these monitoring instruments at all relevant locations. Fortunately, inference can be drawn from the annual mean, which can be monitored more readily using non-automatic methods, with locations showing an annual mean greater than 60μgm^{-3} potentially likely to be in breach of the 1-hour AQO for NO_2.

As the annual mean for NO_2 can fluctuate from one year to the next, without there necessarily being an underlying change in circumstances, it can be appropriate to examine monitoring sites that have shown an NO_2 annual mean greater than 54μgm^{-3} during the recent past. As these locations may require further consideration to assess if they are at risk of experiencing an annual mean for NO_2 greater than 60μgm^{-3}, in the near future. Table 4.7 below identifies the locations of relevant population where the annual mean for NO_2 was above 54μgm^{-3} at least once between 2016 and 2020.

Table 4.7: Monitoring sites with an annual mean for NO_2 greater than 54μgm^{-3} at least once between 2016 and 2020

Site ID	AQMA	Area	1-hour AQO for NO_2	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
				2016	2017	2018	2019	2020
91	Cymmer	Rhondda	-	**57.4**	**51.5**	**48.4**	**45.6**	37.8
117	Cymmer	Rhondda	✓	**64.6**	**58.8**	**50.2**	**49.7**	35.6
118	Cymmer	Rhondda	✓	**67.9**	**65.9**	**56.7**	**63.8**	**45.1**
93	Ferndale	Rhondda	-	**56.4**	**49.3**	**43.8**	**43.3**	29.0
41	Tylorstown	Rhondda	-	**55.4**	**50.9**	**42.5**	**42.2**	31.0
52	Mt Ash	Cynon	-	**58.3**	**49.1**	**48.1**	**42.2**	32.1
97	Mt Ash	Cynon	-	**61.4**	**56.7**	**47.9‡**	**45.6**	**45.7**
55	Cilfynydd	Taff	-	**-**	**62.3**	36.0‡	**28.1**	21.9
108	Nightingales Bush	Taff	-	**50.0**	**54.3‡**	**56.6**	**51.4**	33.7‡
84	Pontypridd	Taff	-	**56.1**	**50.0**	**45.0**	**41.2**	31.4

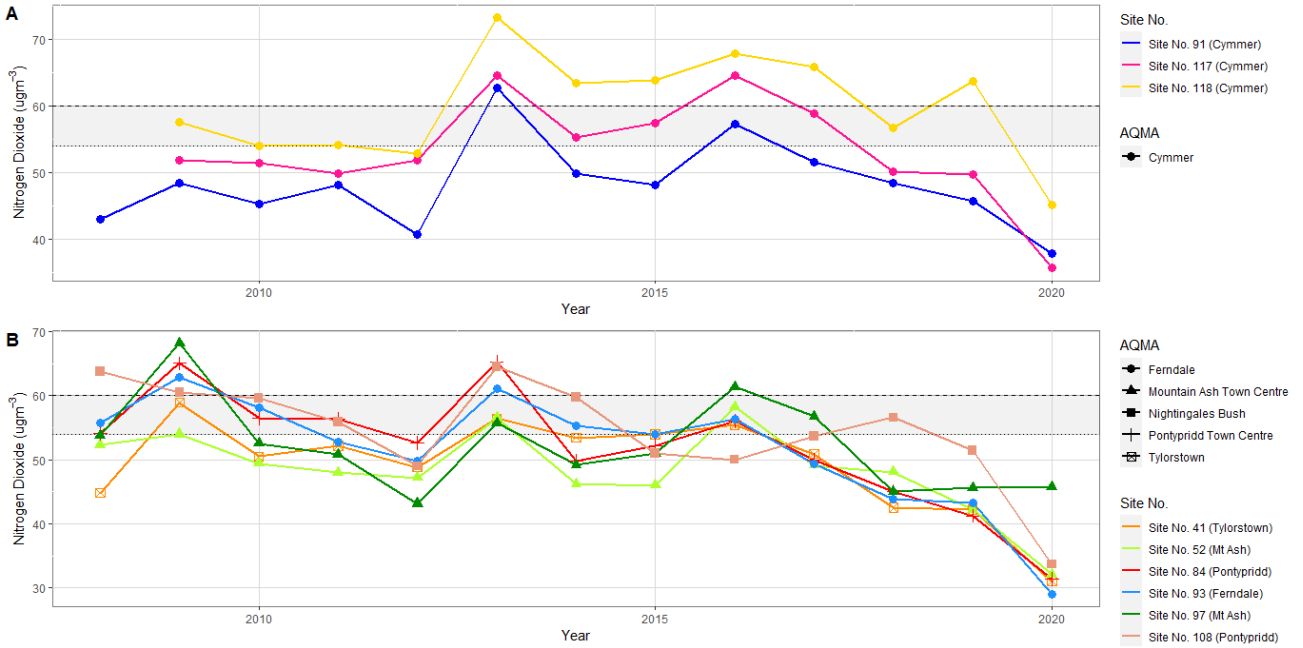
Table Notes

Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in bold.
Exceedances of the NO2 1-hour mean objective (200µg/m3 not to be exceeded more than 18 times per year) or otherwise NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in bold and underlined.

(3) Means for diffusion tubes have been corrected for bias with means labelled with a ‡ having been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, as their valid data capture for the full calendar year is less than 75%. See Appendix C for details.

To consider the context of the identified monitoring sites, Figure 4.8 below displays two time plots of the recent annual means at these locations, as well as the area between 54μgm^{-3} and 60μgm^{-3} shaded in grey. All the identified monitoring sites are within extant AQMAs, with the monitoring sites in Plot A being within an AQMA already declared for a breach of the annual mean and 1-hour mean AQOs for NO_2 and those in Plot B being within an AQMA currently declared for a breach of the annual mean AQO for NO_2 only.

Figure 4.8: Time Plots, with reference lines, of the annual mean for NO_2 at identified monitoring sites, from 2008 to 2020.



Within Rhondda Cynon Taf, it is apparent that in 2020, due to the exceptional circumstances, as discussed in section 4.1.3 above, no locations experienced sufficiently elevated levels of NO_2 that would likely have resulted in a breach of the 1-hour mean AQO for NO_2.

Setting aside the 2020 results, Plot A illustrates that only Site No. 118 (Cymmer) has shown a relatively stable elevated annual mean for NO_2 above 54μgm^{-3} during the recent past, with other locations within the Cymmer AQMA experiencing elevated levels of NO_2 but, since 2016, being below 54μgm^{-3} and as such less likely to risk breaching the 1-hour mean AQO for NO_2. This may indicate that the area within the Cymmer AQMA, likely in breach of the 1-hour mean AQOs for NO_2, is relatively confined, with most of the Cymmer AQMA likely compliant with the 1-hour mean AQOs for NO_2. It is also the case that the significant COVID-19 related disruption and associated traffic reduction observed during 2020 clearly demonstrates that, with such dramatic intervention, it is possible to fully comply with the 1-hour mean AQO for NO_2 throughout the Cymmer AQMA. At present it is not possible to predict if any of the dramatic reductions in NO_2 observed during 2020 will be sustained into the future, as such it is too early to determine if circumstances have sufficiently sustainably changed to warrant reconsideration of the Cymmer AQMA and its reference to the 1-hour mean AQO for NO_2.

As observed in Plot B, all remaining monitoring sites that are within an AQMA declared for a breach of the annual mean AQO for NO_2 only, but that may have experienced an annual mean in NO_2 in proximity to 60μgm^{-3} in the recent past, have an annual mean for NO_2 significantly below 60μgm^{-3} since 2018. In addition, none of these monitoring sites seem to indicate a likelihood of being at risk of breaching the 1-hour AQO for NO_2 in the near future. As such, these AQMAs are considered likely to continue to experience compliance with the 1-hour AQO for NO_2.

4.3.3 Comparison with the annual mean AQO for NO_2

Figure 4.9 displays a map of Rhondda Cynon Taf and the annual mean NO_2 at each active monitoring site in 2020; the smaller size and blueness in hue of each circle indicates a lower annual mean and conversely the larger size and orange to redness in hue of each circle indicates a higher annual mean for NO_2. As expected, the map clearly shows that the varying communities within Rhondda Cynon Taf have experienced differing levels of NO_2 in 2020. This will be for a wide range of reasons both local and regional. For instance, Figure 4.9 highlights the importance of the local and regional arterial road network, the pattern of local urbanisation and regional valley topography in the likelihood of a location experiencing elevated levels of NO_2

Figure 4.9: Map of Rhondda Cynon Taf displaying the annual mean for NO_2, in 2020, at each monitoring site

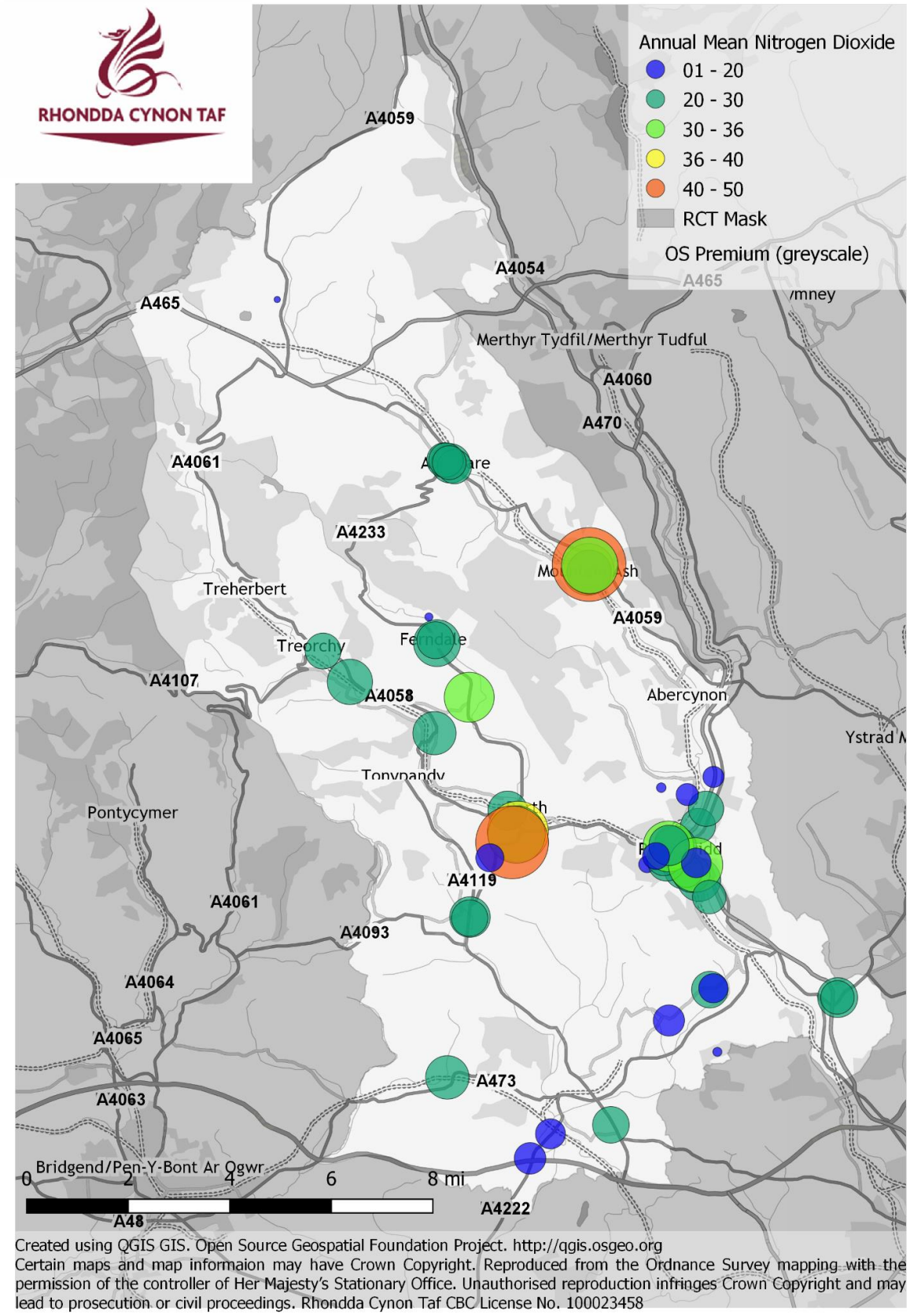


Table 4.8 collates each monitoring site to its region and associated local community; where the community is in bold it is also associated with an AQMA that has been declared for a breach of the annual mean AQO for NO_2 and where underlined the AQMA has in addition been declared for a breach of the 1-hour AQO for NO_2.

Table 4.8: Annual mean NO_2, in 2020, collated to region and each local community

Region	Community	Site No.	2020 Annual Mean
RCT	Background	4	10.3
		21	3.9
		101	5.0‡
		103	5.6
		105	5.9
Rhondda	**Cymmer**	91	37.8
		117	35.6
		118	**45.1**
	Dinas	90	24.3
	Ferndale	93	29.0
		107	22.9
	Pentre	136	28.1
	Tonyrefail	113	25.1‡
		122	22.5
	Trebanog	124	17.4
	Treorchy	137	22.2
	Tylorstown	41	31.0
	Llwynypia	106	26.8
Cynon	**Aberdare**	53	24.4
		68	21.5
		69	21.3
		75	21.3‡
		88	21
	Mountain Ash	52	32.1
		96	27.4‡
		97	**45.7**
		131λ	34.3
Taff	**Broadway**	51	24.7
		56	26.8
		66	23.2
		70λ	20.4
	Church Village	85	22.7
		129	18.1‡
	Cilfynydd	44	21.7
		55	21.9
		134	13.1‡
	Llanharan	111	26.9
	Llantwit Fardre	82	19.4
	Mwyndy	37	22.7
	Nantgarw	8	24.7

Region	Community	Site No.	2020 Annual Mean
		76	20.8
	Nightingales Bush	108	33.7‡
		114	18.4
	Pontyclun	110	18.6
	Pontypridd	79	22.8
		80	20.1
		81	21.4
		83	26.4‡
		84	31.4
		120λ	25.1
		135	16.7
	Talygarn	132	19.6‡
	Treforest	128	20.8

Table Notes

Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in bold.
Exceedances of the NO2 1-hour mean objective (200µg/m3 not to be exceeded more than 18 times per year) or otherwise NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in bold and underlined.

‡ Means for diffusion tubes have been corrected for bias with means labelled with a ‡ having been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, as their valid data capture for the full calendar year is less than 75%. See Appendix C for details.

λ Automatic Monitoring Site

Monitoring has taken place in a number of communities currently not associated with an AQMA. As the annual mean for NO_2 can fluctuate from one year to the next, without there necessarily being an underlying change in circumstances. It may be appropriate to further examine monitoring sites, that are not within an AQMA but have shown an NO_2 annual mean greater than 36µgm^{-3} during the recent past. As these locations may require consideration to assess if they are at risk of experiencing an annual mean for NO_2 greater than 40µgm^{-3}.

The monitoring results, confirm that the annual mean for NO_2 at Dinas, Llantwit Fardre, Pentre, Pontyclun, Talygarn, Trebanog and Treorchy, all being communities not currently associated with an AQMA, was below 36µgm^{-3} in 2020. As illustrated by the time plots in Figure 4.10 below, Dinas, Llantwit Fardre, Pontyclun, Talygarn and Trebanog, have continually experienced relatively low NO_2 annual means over the recent past.

Monitoring has only recently recommenced in Pentre and Treorchy, however, the levels of NO_2 observed at Treorchy is comparable to other areas of RCT that were generally compliant to the annual mean AQO for NO_2 prior to 2020. The levels of NO_2 observed at Pentre were slightly greater and may have the potential to become elevated in the future, potentially above 36µgm^{-3}, as such further monitoring of this location will be necessary to better understand likely future trends.

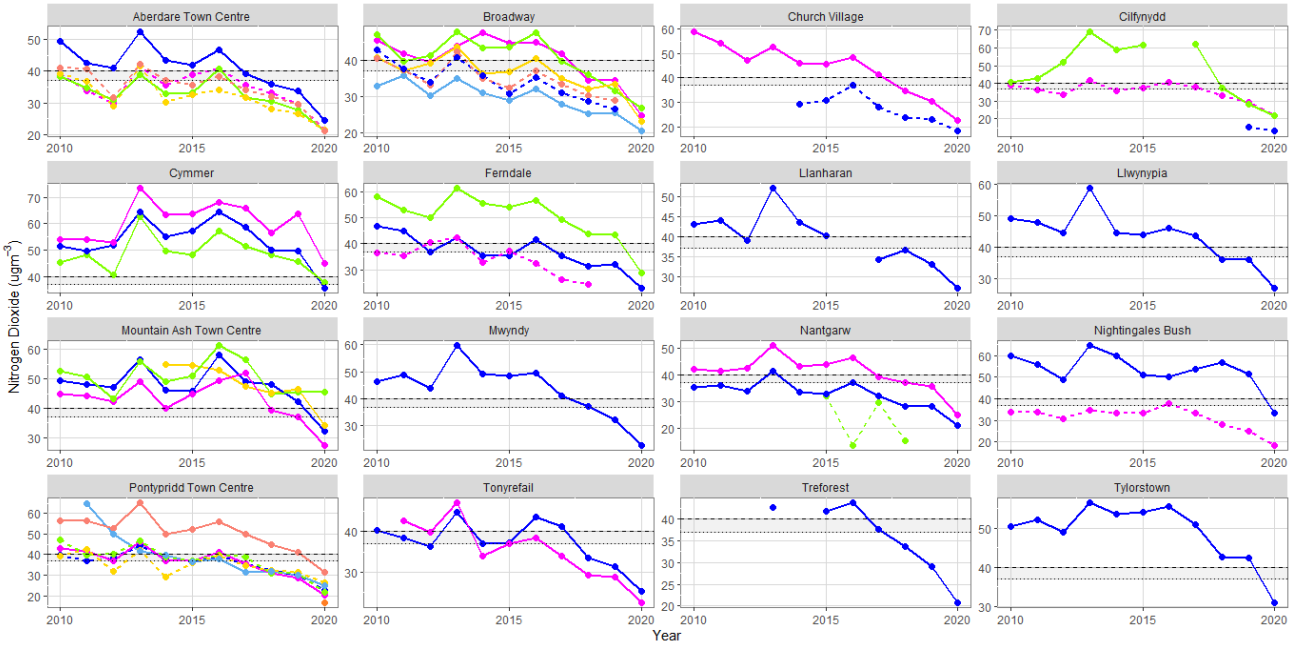
At present, the monitoring data from 2020 within the context of previous years monitoring reinforces the consideration that these areas are still likely to experience relatively low to moderate levels of NO_2 and will be expected, unless circumstances were to dramatically change, to remain compliant with the annual mean AQO for NO_2, in the near future.

Figure 4.10: Time Plots of the annual mean NO_2, from 20210 to 2020, collated to each community not currently associated with an AQMA

It is also possible to consider the 2020 monitoring results observed within the existing AQMAs, which could indicate either a potential deteriorating or improving situation, to determine if circumstances have materially changed. In doing so it is apparent that, in 2020, most monitoring sites did not show a breach of the annual mean AQO for NO_2 and no monitoring site indicated a possible breach of the annual mean AQO for NO_2 beyond the existing AQMA boundaries. It is also again evident that the dramatic reductions in NO_2 observed as a result of COVID-19 related disruption throughout 2020 is observed, to varying extents, universally throughout the AQMAs.

It is acknowledged that due to the often cyclic nature of air quality, some monitoring sites may not always show a breach of the annual mean AQO for NO_2 but the relevant AQMA may still remain at reasonable risk of a breach in the near future. Therefore, where an AQMA, or part thereof, shows compliance to the annual mean AQO for NO_2 in any particular year, it may not mean that this would always be sufficient justification to review the AQMAs designation. Instead consideration must first be made to the likely future sustainability of the compliance. To enable this, it can be helpful to consider the previous year's monitoring results to examine the past consistency of any current improvement, Figure 4.11 below produces time plots of the most recent annual mean NO_2 monitoring results at each monitoring location associated with an AQMA, with solid lines indicating that the monitoring location is within the boundary of the relevant AQMA, dashed lines indicating the monitoring location is outside of but near the relevant AQMA and a dot dahs horizontal reference line indicating the annual mean AQO for NO2 level at 40μgm^{-3}

Figure 4.11: Time Plots of the annual mean NO_2 from 2010 to 2020, collated to each AQMA



The above time plots indicate that during the recent past most AQMAs, at least in part, have observed sustained decreases in the prevalence of NO_2. These decreases are consistent with the latest analysis[7] of the current local trends in NO_2. It is also the case that during 2020 nearly all the AQMAs, with the exception of the Cymmer and Mt Ash Town Centre AQMAs, observed compliance to the annual mean AQO for NO_2. However, given the exceptional circumstance during 2020 and the significant uncertainty about many of the underlying factors that may influence future local air quality trends. At this time it is not considered appropriate to consider the amendment or revocation, due to compliance being achieved based upon 2020 monitoring data, at any extant AQMA within Rhondda Cynon Taf.

4.3.4 Particulate Matter [PM_{10}]

It has been reported [14] that, based upon modelled assessment, the South Wales Non-agglomeration Zone, which includes Rhondda Cynon Taf, is compliant with both the annual mean EU Limit Value for PM_{10} and the 24-hour daily mean EU Limit Value for PM_{10}. It has also been reported [15] that Rhondda Cynon Taf, in comparison with other Welsh Local Authorities, has been ranked[8] (lower the better) 12th out of 17 for PM_{10}.

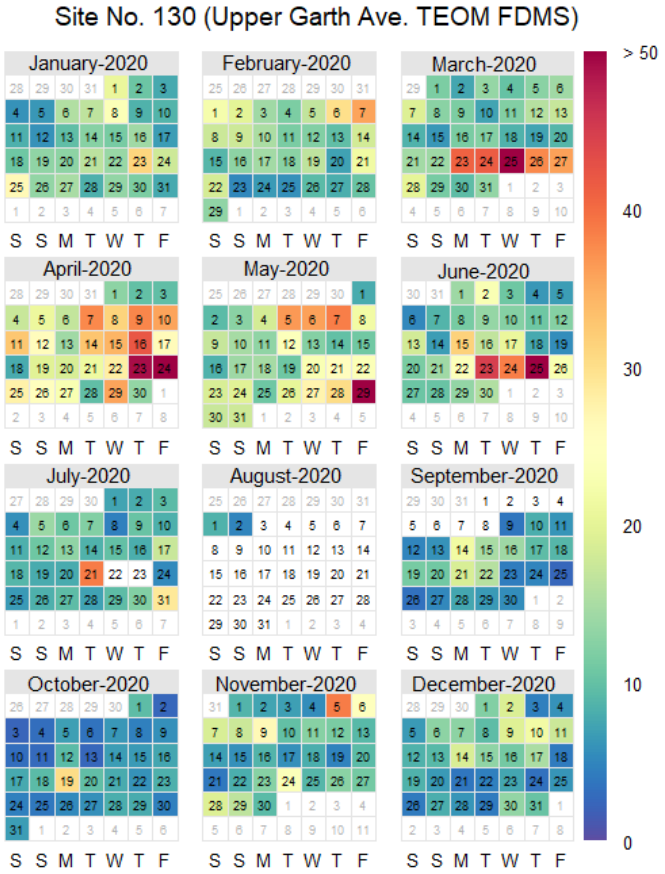
Having previously discontinued monitoring at Site No. 31 (GEAES TEOM), the Local Authority did not monitor PM_{10} within the Rhondda Cynon Taf general urban environment in 2020. However, the Local Authority has undertaken monitoring at Glyncoch, a suburban area within the Taff Valley in close proximity to the active Craig Yr Hesg Quarry, at Site No. 130 (Upper Garth Avenue TEOM FDMS).

To consider the relevance and context of the 2020 PM_{10} monitoring data, it is possible to examine it in a number of ways. Figure 4.12 provides a calendar plot identifying when the

[7] See Section 2.3.1
[8] Although there are currently twenty-two Local Authorities in Wales, some may be ranked equally

24-hour daily means of PM_{10} in 2020 was at its highest at Site No. 130 (Upper Garth Avenue TEOM FDMS).

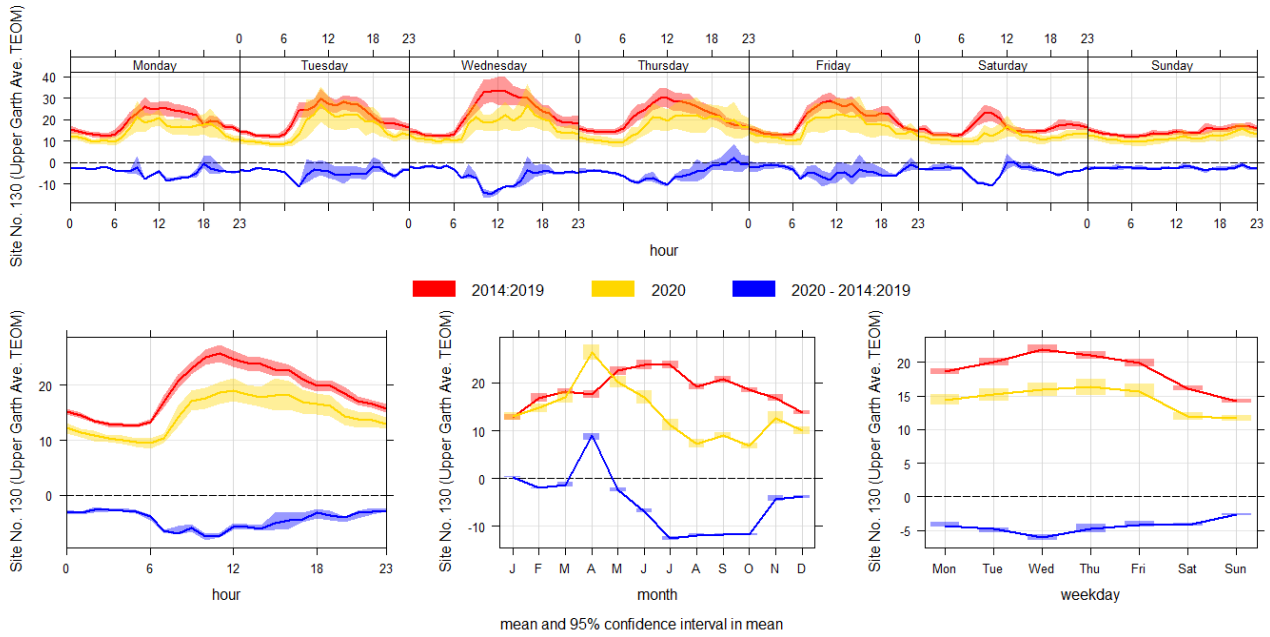
Figure 4.12: Calendar Plot of the 24-hour daily means of PM_{10} at Site No. 130 (Upper Garth Avenue TEOM FDMS) in 2020



The calendar plot illustrates that, in general, occasions of elevated PM_{10} levels at Glyncoch were observed during the spring months, March to June, but it also suggests that occasional elevated levels of PM_{10} can be experienced at any time of year. The calendar plot doesn't indicate wildly varying results but rather that the highest levels of PM_{10} often appear to be clustered to several consecutive days at a time, for instance there are several consecutive elevated days in March, April and June 2020. Also of interest is the regularly observed elevation of PM_{10} levels associated with Bonfire Night on or about the 5th November.

To further appreciate the context of 2020, it is possible to compare the PM_{10} monitoring data with the historic average. Figure 4.13 provides time variation plots of the 2020 PM_{10} monitoring results (gold), the historic aggregated results from 2014 to 2019 (red) and the difference in comparison (blue).

Figure 4.13: Time Variation Plot of PM_{10} measured at Site No. 130 (Upper Garth Avenue TEOM FDMS) in 2014 to 2019 and 2020.



Site No. 130 (Upper Garth Avenue TEOM FDMS) demonstrates consistently elevated levels of PM_{10} during Monday to Friday with significant reductions in the levels of PM_{10} at the weekend (red and gold lines). PM_{10} levels are most elevated between 7am to 5pm, although a consistently strong diurnal and hebdomadal relationship is observed. The historic PM_{10} data (red line) suggests only a slight biannual relationship, although data from 2020 appears to show significant suppression of PM_{10} levels, compared to the recent past, during June to October 2020 (gold line).

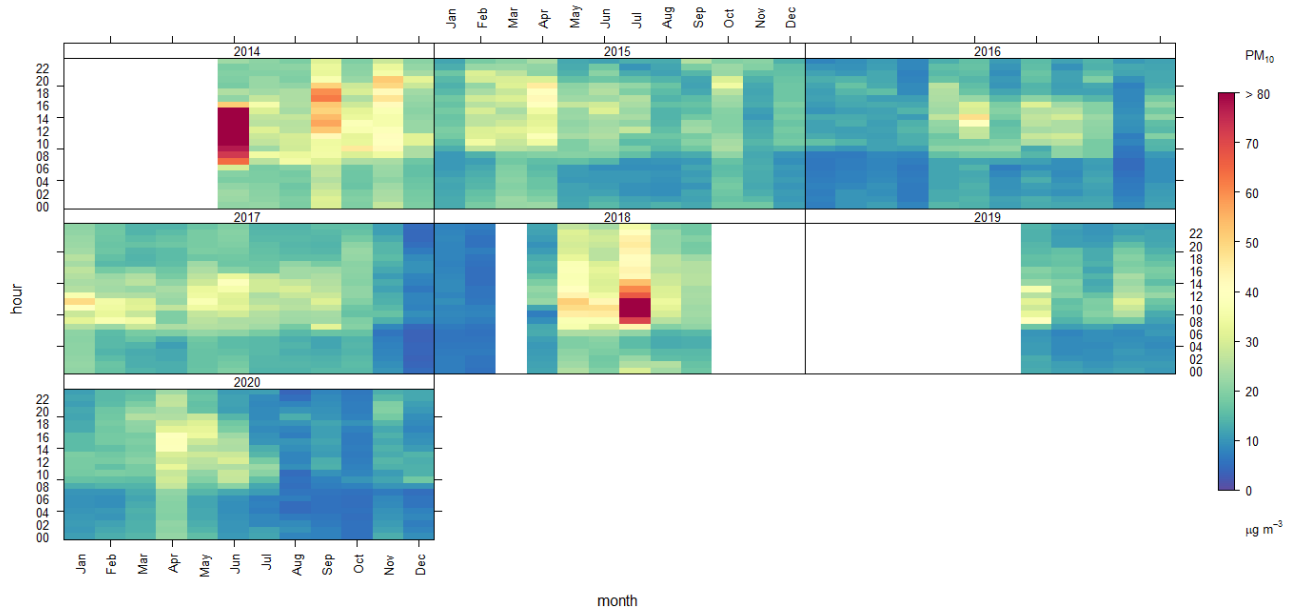
Also of note is the amount of variation in the data set (thickness of the gold line or box) indicating significant variability during 2020. Nonetheless, the general pattern observed in 2020 has some similarity with the historic data, although it is also apparent that the levels of PM_{10} appeared to have reduced in 2020 compared to previous years.

Unlike with NO_2 monitoring data gathered throughout Rhondda Cynon Taf in 2020, PM_{10} monitoring data at Glyncoch shows a more nuanced picture in its relationship with potential COVID-19 related disruption. It appears (blue line) that there is only a minor reduction in observed PM_{10} for the period of 2020 where COVID-19 disruption may have been at its greatest, March to April and November to December. Whereas during the summer of 2020, when COVID-19 disruption may have abated to some extent, the greatest reductions in PM_{10} were observed. It is also possible this summer reduction may in part be as a result of the summer of 2020 being wetter, and hence more conducive in suppressing non-volatile PM_{10} sources, than average.

The trend level plot for PM_{10} at Site No. 130 (Upper Garth Avenue TEOM FDMS) produced in Figure 4.14 below, is a useful way of examining the temporal relationship of the trend in PM_{10} over each year between 2017 and 2020. The trend level plot indicates 2020 may have experienced similar levels of PM_{10} as that experienced during the recent past. Although the recent past can show some variation, possibly as a result of cyclical climatic affects, for instance the sustained dry summer in 2018 or the wetter than normal winter of 2019. Such

cyclical climatic effects can result in some years being more or less prone to elevated levels of PM_{10} when compared to the average.

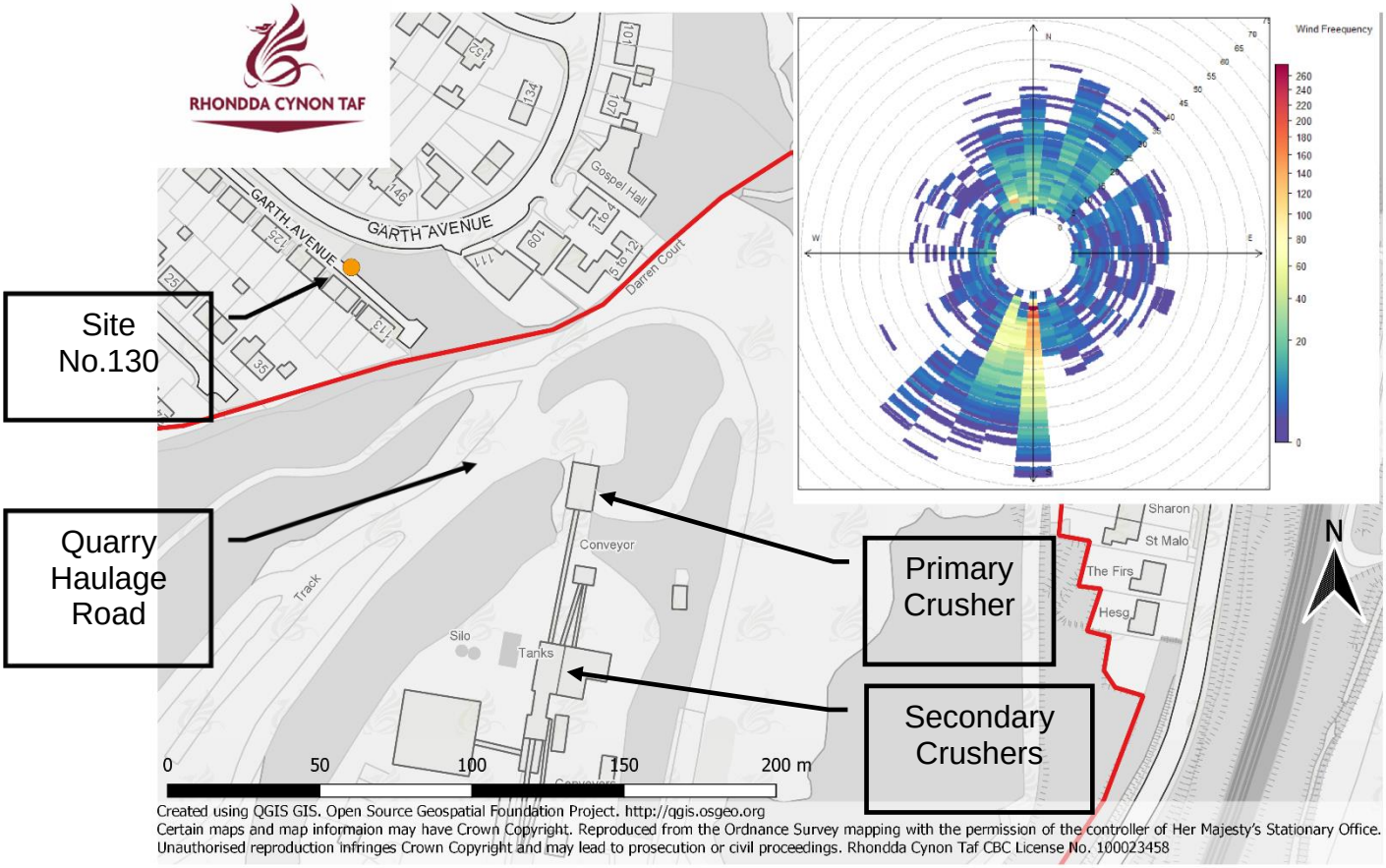
Figure 4.14: Trend Level Plot of PM_{10} measured at Site No. 130 (Upper Garth Avenue TEOM FDMS) from 2014 to 2020



Site No. 130 (Upper Garth Avenue TEOM FDMS) is located within a suburban area comprising a part of the community of Glyncoch which is also in proximity to Craig Yr Hesg Quarry. It is expected that during 2020 regional transport sources of PM_{10}, such as road traffic along the A470, may have been reduced as a consequence of COVID-19 disruption. However, it is understood that the extraction and processing of won sandstone and ancillary roadstone coating activities at the nearby Craig Yr Hesg Quarry was largely uninterrupted. It is also believed that Glyncoch was not subject to any other unexpected influences derived from a significant change in circumstance or transient event. With other localised COVID-19 disruption likely being relatively muted, given the general suburban character of Glyncoch.

It is expected that local influences, including potential sources of PM_{10} from various activities at Craig Yr Hesg Quarry, may have particular relevance to the levels of PM_{10} experienced at Site No. 130 (Upper Garth Avenue TEOM FDMS). To further assist with the consideration of the PM_{10} monitoring data, it has also been possible to obtain weather monitoring data gathered during 2020. This weather data has been sourced from the Craig Yr Hesg Quarry Weather Station, located at the Primary Crusher production building, and is considered likely to be reflective of local weather conditions at the monitoring location. Figure 4.15 below provides an annotated map of the local environment, in respect to Site No. 130 (Upper Garth Avenue TEOM FDMS), and a polar frequency plot of wind speed and direction, observed at Craig Yr Hesg Quarry Weather Station in 2020.

Figure 4.15: Map of Glyncoch and a Polar Frequency Plot of wind speed and direction observed at Craig Yr Hesg Quarry Weather Station in 2020

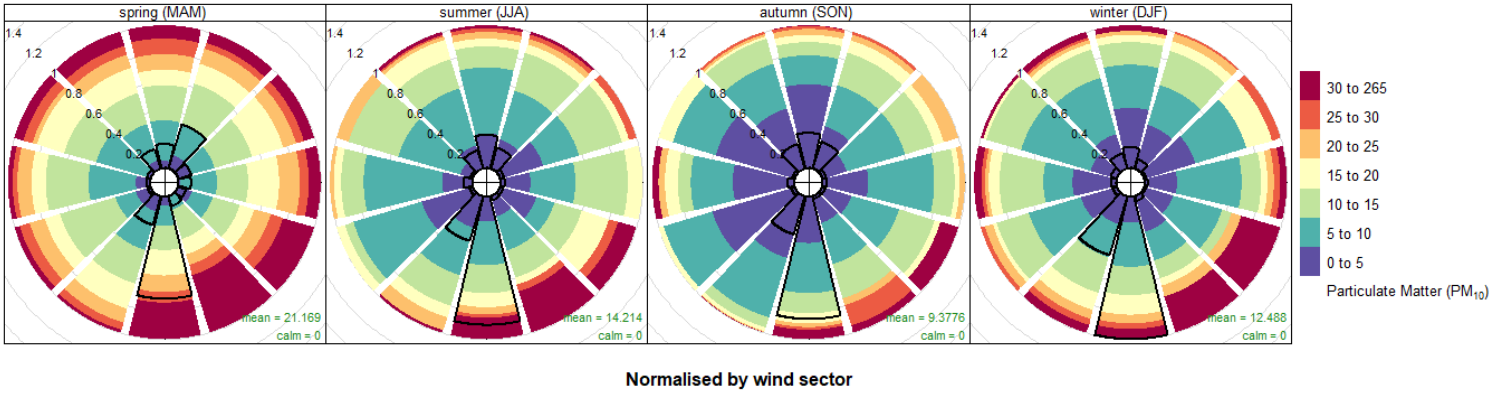


It would seem that, in 2020, relatively slow to moderate strength winds (more intense yellow-red colours towards the centre) from the south to south-southwest predominate (with a discernible influence of moderate strength winds from the north. This is consistent with the accepted situation of often-observed regionally predominant south-west winds adjusting to the locally defining north-south valley topography.

To consider some of the potential influences upon PM_{10} levels monitored at Site No. 130 (Upper Garth Avenue TEOM FDMS). It is possible to consider the relationship between the observed levels of PM_{10} and local wind direction.

Figure 4.16 provides a pollution rose plot, by season and normalised, of the PM_{10} monitoring results and weather data at Glyncoch in 2020.

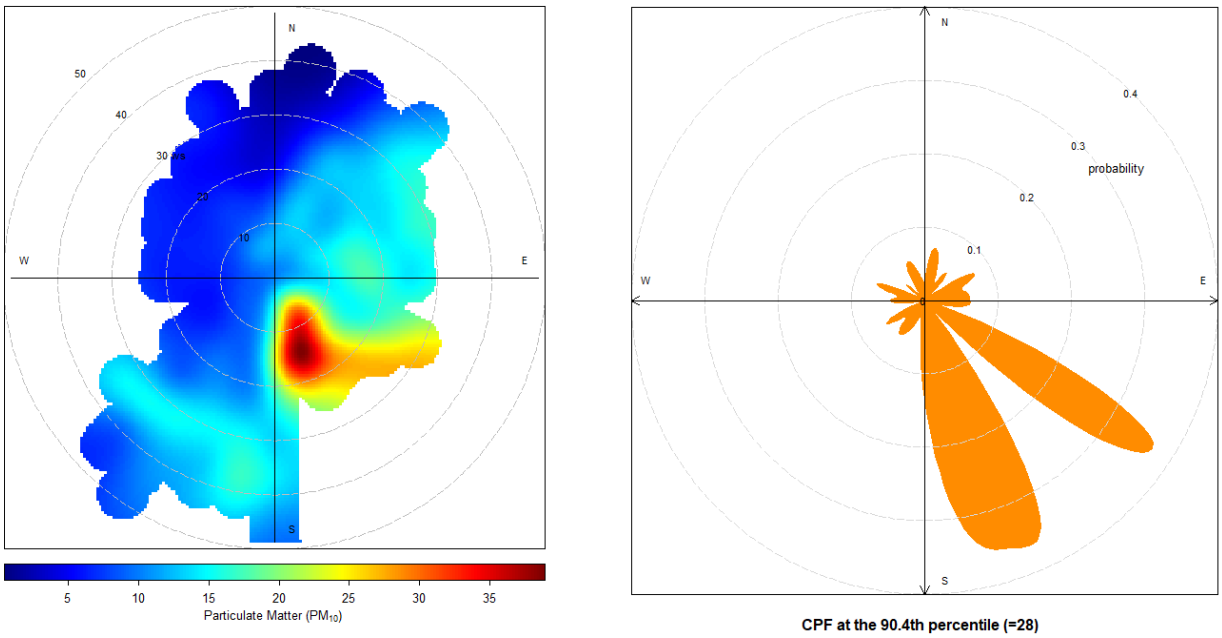
Figure 4.16: Pollution Rose Plot, by season and normalised, of PM_{10} measured at Site No. 130 (Upper Garth Avenue TEOM FDMS)



Although the wind direction at Glyncoch in 2020 was highly dominated by south and south-south-west winds during all seasons . The normalised plot helps to illustrate that the wind directions with the most likely influence, on the general level of PM_{10} observed at the monitoring location, were potentially from the south to south-east (the depth and intensity of red of each segment). Even though winds from the south-east were less prevalent when compared to the dominant wind direction in 2020. It is also apparent that this observed pattern was relatively consistent across seasons.

To consider both wind speed and direction and their association during occasions when PM_{10} levels are observed at their highest at Glyncoch, Figure 4.17 provides a polar frequency plot of all the PM_{10} data from 2020 at Site No. 130 (Upper Garth Avenue TEOM FDMS) and a 90.4th percentile rose plot, of the same data, side by side.

Figure 4.17: Polar Frequency Plot (left) & 90.4th Percentile Rose Plot (right) of PM_{10} measured at Site No. 130 (Upper Garth Avenue TEOM FDMS)



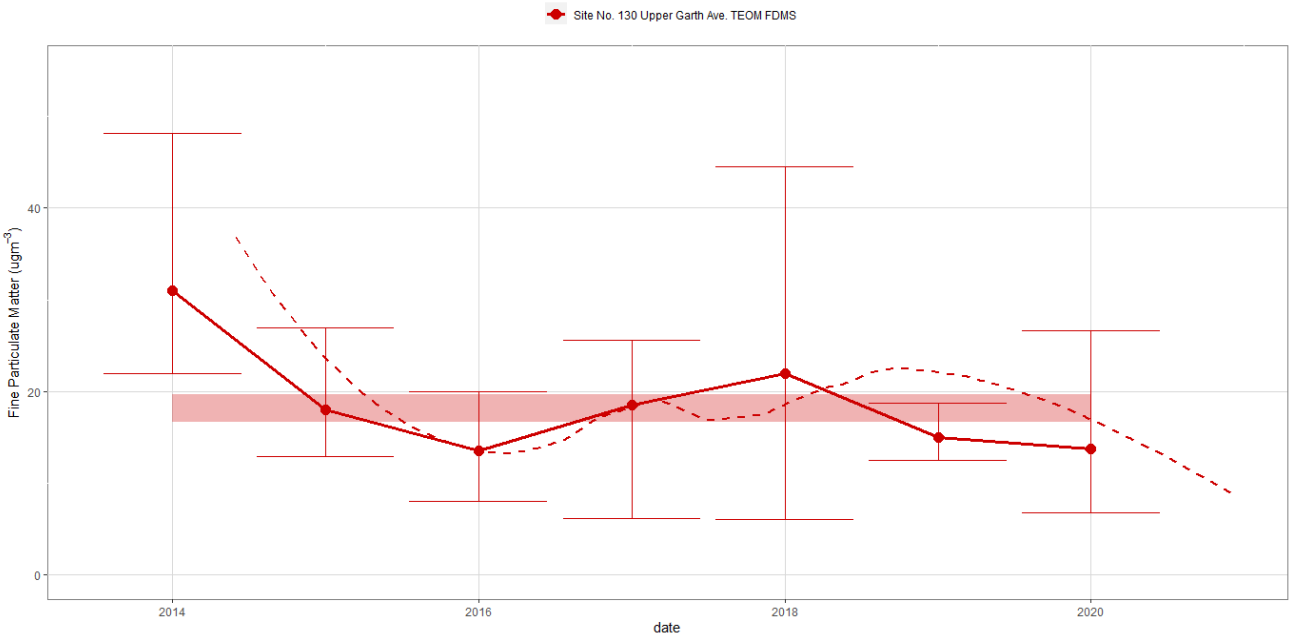
The Polar Frequency Plot (left) clearly indicates that, during 2020, elevated levels of PM_{10} at Site No. 130 (Upper Garth Avenue TEOM FDMS) were most associated with relatively low wind speeds from the south to south-south-east (dark red area close to the centre). In addition, moderate levels of PM_{10} were associated with slow to moderate wind speeds from

the east to north-east and moderate wind speeds from the south-south-west to south-west direction. The 90.4th Percentile Rose Plot (right) also confirms that, in 2020, the very highest levels of PM_{10} were likely to be most associated with winds from the south-south-east.

The above analysis reinforces the now longstanding understanding of the likely significant influences of local sources of PM_{10} at Site No. 130 (Upper Garth Avenue TEOM FDMS). It may also be the case that 2020 experienced conditions, possibly due to a cyclical climate resulting in a wetter than normal summer, which could have inherently decreased the risk of elevated levels of PM_{10}.

In considering the recent levels of PM_{10} at Glynoch it can be useful to have regard to the local PM_{10} trend, however, it should be noted that the assessment of local PM_{10} trends can be fickle, due to the multitude of influences that can impact upon observed PM_{10}, and ideally require long duration data sets. Figure 4.18 produces a time plot of Site No. 130 (Upper Garth Avenue TEOM FDMS) with the PM_{10} annual mean (solid line with solid dots), the associated trend line[9] (dashed red line), the 10-year mean Confidence Interval (shaded red zone) and the intra-year 24-hour daily mean spread (vertical bars and whiskers).

Figure 4.18: Time Plot of the annual mean PM_{10} at Site No. 130 (Upper Garth Avenue TEOM FDMS) from 2014 to 2020



Site No. 130 (Upper Garth Avenue TEOM FDMS) appears to continue to experience a relatively stable annual mean (solid line), albeit the trend appears to be subject to some degree of oscillation. It is also apparent that the 24-hour daily mean spreads (the whiskers) can be subject to significant year to year change, with 2020 showing a comparable 24-hour daily mean spread in comparison to previous years.

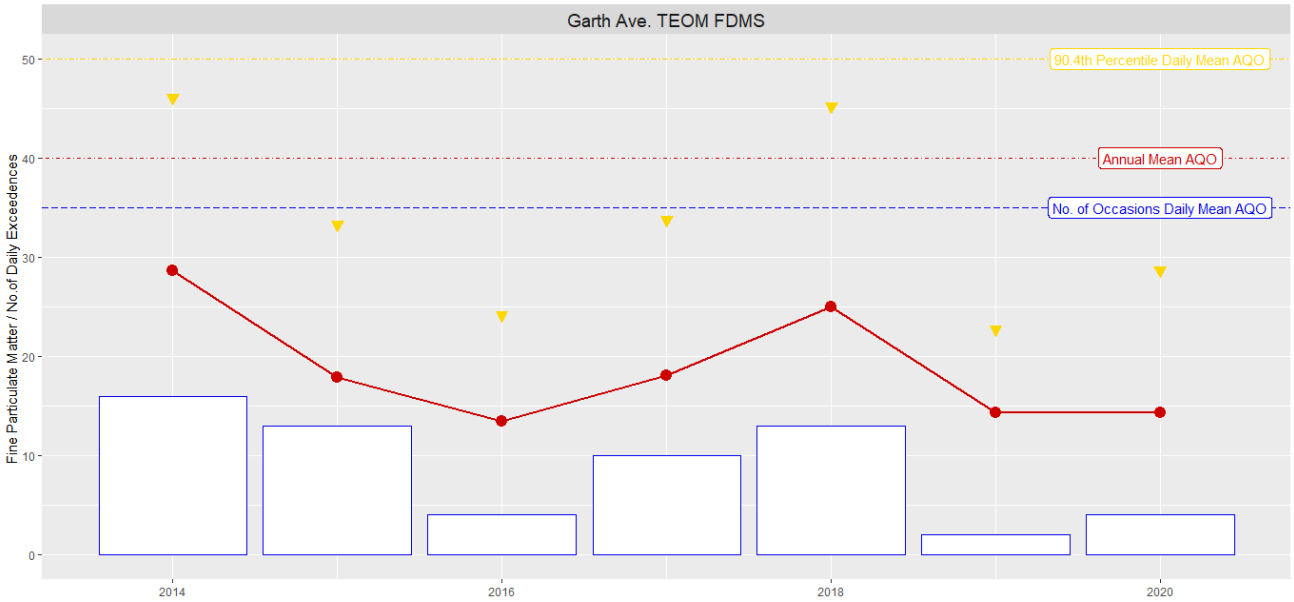
[9] produced by Local Polynomial Regression Fitting with α of 0.5

This potentially demonstrates the strong influence of prevailing weather and climate, and its possible interaction with various sources of PM_{10}, with variability in the 24-hour daily mean spread highlighting the challenges in considering the likely future local trend in PM_{10}.

It is believed that PM_{10} levels at Glyncoch are affected by a combination of PM_{10} sources, both very local, intermediate and at distance from the monitoring location. In addition, environmental influences may affect the transport of PM_{10} to and its dispersion from the monitoring location, influencing the locally experienced levels of PM_{10}. It is known that sources of PM_{10} can be extremely variable, however, the patterns identified at Site No. 130 (Upper Garth Avenue TEOM FDMS) would likely be associated, in the main, to anthropogenic sources. The above analysis, supported by understanding reported in previous reviews, would suggest that the sources of PM_{10} experienced at Garth Avenue are likely to be specific to the locality, repetitive, predominated by an activity largely undertaken during 'working hours'. Furthermore the influence of the activity's emissions is variable, possibly in part due to cyclical climatic conditions affecting its emission and subsequent transportation. This analysis supports the conclusion that Craig Yr Hesg Quarry remains a significant source of locally observed PM_{10}.

It is possible to examine the relationship between the annual mean, the number of occasions the 24-hour daily mean for PM_{10} has exceeded 50μgm^{-3} and the 90.4th percentile. Figure 4.19, provides integrated time and bar plots illustrating the annual mean (the red solid line), the number of occasions the daily mean was greater than 50 μgm^{-3} (the blue edged white bars) and the 90.4th Percentile of 24-hour daily means (gold triangles), with the correspondingly coloured dotted reference lines.

Figure 4.19: Time and Bar plots illustrating PM_{10} results at Site No. 130 (Upper Garth Avenue TEOM FDMS)



Monitored PM_{10} levels at Site No. 130 (Upper Garth Avenue TEOM FDMS) are consistent with the understanding that, at least since 2014, Glyncoch experiences a broadly stable situation, albeit with some inherent fluctuation. As a result it is likely to be compliant to both the annual mean and the 24-hour daily mean AQOs for PM_{10}, often with a clear margin

between the measured results and the associated AQOs. This clear margin is of importance, as it is recognised the monitoring location may not be at the worse-case location.

With monitoring at Site No. 31 (GEAES TEOM) discontinued, there is no continuing long term PM_{10} data set for the Rhondda Cynon Taf urban environment. However, local and national understanding does not suggest a likelihood of a significant change in the occurrence of PM_{10} within Rhondda Cynon Taf. On the basis of the above analysis, it is considered that most areas of Rhondda Cynon Taf are likely to continue to observe low PM_{10} annual means and limited incidences of exceedences of the 24-hour daily mean AQO for PM_{10}. This is likely to be moderately affected by yearly changes in climate and meteorology but as the expected annual mean for PM_{10} is consistently significantly below the annual mean AQO for PM_{10}, it is very unlikely such fluctuations will pose a risk to compliance. Therefore, the risk of breaching the annual mean AQOs for PM_{10} within the general urban environment of Rhondda Cynon Taf is very low.

Although it remains difficult to predict a future trend at Glyncoch it appears that, at present the location remains compliant to the annual mean and the 24-hour daily mean AQOs for PM_{10}. Furthermore, the available evidence may suggest that the levels of PM_{10} have improved in recent years potentially corresponding to known improvements to the control of Particulate Matter emissions from Craig Yr Hesg Quarry. Nonetheless, sustained climatic events, for instance a protracted dry summer period, may threaten continued improvement, as indicated by the 2018 results. Therefore, continued monitoring is necessary to ensure any future changes which have the potential to impact on the local prevalence of PM_{10}, most notably the possible implementation of the proposed extension of Craig Yr Hesg Quarry, can be fully considered.

4.3.5 Particulate Matter [$PM_{2.5}$]

Due to the transboundary nature of $PM_{2.5}$ and, at present, lack of relevant AQO with respect of Local Air Quality Management, the Local Authority did not undertake the monitoring of $PM_{2.5}$ in 2020 and, currently, is not planning to undertake the monitoring of $PM_{2.5}$ in the near future.

The Local Authority continually keeps under review the monitoring it plans to undertake in accordance with its Local Air Quality Management duties. Should circumstances change or a statutory requirement develop, then it may reconsider the appropriateness of $PM_{2.5}$ monitoring in the future, whilst acknowledge any consideration will have to have regard to the availability of resources which may be necessary to facilitate such action.

4.4 Summary of Compliance with AQOs as of 2020

Rhondda Cynon Taf County Borough Council has examined the results from monitoring within its area. Given inherent uncertainties associated with 2020 and concentrations of NO_2 within the sixteen AQMAs are still at risk of exceeding, the relevant AQOs for NO_2. As such, **all sixteen AQMAs should remain**.

The level of NO_2 outside of the current sixteen AQMAs and levels of PM_{10} throughout Rhondda Cynon Taf are likely to be below their relevant AQOs, therefore **no additional action is required at this time**.

5. New Local Developments

The Local Authority is the Highway Authority for all of its area other than for those roads which are the responsibility of Welsh Government, as managed by its South Wales Trunk Road Agent.

The Local Authority is the Regulator of certain provisions, mainly those which are not otherwise regulated, explicitly or by deferment, by Natural Resources Wales, of the Environmental Permitting (England and Wales) Regulations 2016 and the Clean Air Act 1993.

The Local Authority is the Local Planning Authority for all of its area other than that which forms part of the Brecon Beacons National Park Authority, where that Authority is the Local Planning Authority.

5.1 Road Traffic Sources (and Other Transport)

It is believed that there have been no newly built local roads or related transport developments, in 2020, that would likely significantly elevate levels of air pollution within a relevant population.

The Local Authority as the Highway Authority maintains significant road infrastructure throughout its area. Notwithstanding, certain parts of Rhondda Cynon Taf's strategic road network (M4 and A470) is separately managed by the South Wales Trunk Road Agent [SWTRA] on behalf of Welsh Government, so as to facilitate national interconnectivity.

In response to an understanding that parts of the A470 may observe elevated levels of NO_2 that may be non-compliant to the respective EU Limit Values. The Welsh Government determined that specific parts of the A470 should be subject to a reduction in the speed limit from 70mph to 50mph, being assessed as the most cost effective option to improve local air quality.

The intervention was primarily pursued by Welsh Government with the stated aim of working towards achieving compliance to EU Limit Values for NO_2 within the South Wales Non-Agglomeration Zone. However, it is acknowledged that this action, which has affected communities between the Upper Boat & Pontypridd Junctions, could have significant consequences for the closely related Cilfynydd, Nightingales Bush and Treforest AQMAs, as well as more widely in the region. Further details of the area affected and actions taken are available on the Welsh Government website.

Subsequent to the implementation of this action, the Welsh Government has previously acknowledged [3] the possibility that additional areas, between the Tongwynlais & Upper Boat Junctions of the A470, may be at risk of becoming non-compliant with the EU Limit Values for NO_2. It is understood that further investigation may be ongoing and additional measures could be considered to facilitate, as quickly as reasonable, reductions in locally observed NO_2 at these locations.

The impact of this action so far has been preliminarily reviewed [20] on behalf of Welsh Government and its specific implications, with respect to the Cilfynydd, Nightingales Bush and Treforest AQMAs have also been examined, by the Local Authority, within its 2020 Annual Air Quality Progress Report. Prior to 2020, it was estimated that the benefit of the current vehicle speed reductions may equate to a 2.8μgm^{-3} lowering in the level of NO_2 along

the intervention area, with the greatest impact likely to be experienced where the original maximum speed limit was being achieved or where chronic congestion manifested. However, along parts of the A470, often associated with its junctions, the measure may be less impactful due to slower speeds and inherent congestion often still encountered at these points.

With regard to non-trunk roads, the local Highways Authority continues to make significant investment in local transport provision and has published [21] updates on a number of major highways projects which may have an effect on local air quality. Table 5.1 provides some brief details on these schemes and a provisional qualitative assessment of their impact. It is likely that each scheme will, if fully progressed, be subject to assessment as part of the planning process, with future reporting looking to provide additional information should it become available.

Table 5.1: Proposed road schemes which have the potential to impact local air quality

Project	Description	Status	Affected AQMA	Qualitative Impact
Mt Ash Southern Cross-Valley Bypass	New southern bridge crossing the Afon Cynon to the south of Mt Ash Town Centre. Enabling the partial bypass of some traffic from the B4275 to the A4059.	Completed October 2020	Mt Ash	Effect on AQMA not predicted but max 10.4% reduction in NO_2 south of AQMA but potential for 4.8% increase in NO_2 along New Rd south of AQMA (associated with new junction)
Llanharan Bypass	New through road network associated with proposed multi-phase housing development, which will relieve traffic from the existing A473 as it runs through Llanharan centre.	£3.86M allocated to advance ongoing works, including current planning engagement	Llanharan	Potential major improvement within AQMA
Ely Valley Road Dualling	Providing additional carriageways along A4119 north of Royal Glamorgan Hospital, to improve capacity and reduce the likelihood of peak traffic congestion.	£7.81M allocated to advance ongoing works, including acquisition of required land	Tonyrefail	Potential minor improvement within AQMA
Core-Valleylines Railway Park & Ride	Providing additional and improved park & ride capacity at strategic railways stations to increase public transport use. Several Park & ride schemes have already been advanced.	£0.57M allocated to advance further works	Cilfynydd Llanharan Mt Ash Mwyndy Nightingales Bush Treforest	Potential minor to moderate improvement within AQMAs due to reduction in commuter traffic
Gelli/Treorchy Relief Rd	New road network to relieve traffic from Stagg Jct, Treorchy and associated road netwrok within the Rhondda Fawr	Further consideration	Llwynypia	Uncertain impact dependent upon desired scheme

Project	Description	Status	Affected AQMA	Qualitative Impact
A4119 South Corridor Improvement	Improvements to bus infrastructure, junction capacity and traffic management to reduce existing congestion points	Works advanced	Mwyndy	Effects on AQMA unclear but potential moderate improvement within area from Talbot Green to Mwyndy
A465 Cynon Valley Gateway	Extension of Aberdare bypass to the dualled A465 Heads of the Valley road and potential other local road network modifications combined with possible mass transit improvements	£4.03M allocated to advance further works	Aberdare Town Centre	Potential moderate improvement within AQMA and surrounding suburban area.
Porth Town Centre Transport Hub	Providing a transportation hub for local bus and train transport with additional park & ride facilities, including electric vehicle charging points and possible infrastructure to encourage electric bus and taxi uptake.	£3.5M allocated to advance planning and works, expected to commence mid 2021	-	Potential moderate improvement within Porth and minor improvement within wider Rhondda Valleys area.
Bus Priority Package	Designing and upgrading bus stops in the Cynon Valley and Taff areas	£0.24M allocated to advance further works	-	Potential minor improvement within area due greater uptake of public transport.
North West Cardiff Corridor	Investigation and potential delivery of public transport solutions associated with corridor so as to enable transport solutions that support sustainable residential growth within the area	WelTag Stage 1 process complete and Stage 2 scheduled	Mwyndy	Potential improvement within area due greater uptake of public transport.

In addition to the above projects, the Local Authority continues to work closely with the Welsh Government Transport Company and other partner organisations in the development and delivery of the South Wales Metro. Further details of the South Wales Metro and its multi-phased timetable of implementation can be obtained from Transport for Wales "What's Happening in South East Wales" [22]. It is likely that the gradual operation of the South Wales Metro will have a significant impact upon air quality through a large area of Rhondda Cynon Taf and specifically those communities in the Taf Valley associated with the A470.

5.2 Industrial / Fugitive or Uncontrolled Sources / Commercial Sources

Although the degree of industrialisation of Rhondda Cynon Taf has significantly reduced compared to historic levels, there are still a number of industrial premises present which could impact upon local air quality.

Under Regulation 13(1) of the Environmental Permitting (England and Wales) Regulations 2016, the Local Authority can grant Environmental Permits to operate various permitted activities, further details about this regime is available on the Local Authority's website [23]. Table 5.2 identifies that there were no stationary Regulated Facilities, within Rhondda Cynon Taf, which have been granted a new Environmental Permit in 2020. Further details of the Regulated Facilities within Rhondda Cynon Taf are available on the Environmental Permitting Public Register held by the Local Authority, the index of which is also available on its webpage [23].

Table 5.2: New Environmental Permits granted by the Local Authority in 2020

Permit Ref.	Operator	Activity	Relevant Pollutants	Area	Affecting LAQM
Nil	Nil	Nil	Nil	Nil	Nil

The Local Authority will also consider substantial changes to existing Regulated Facilities where that change could increase the potential risk of pollution. During 2020 no existing stationary Regulated Facilities regulated by the Local Authority experienced a substantial change.

The Clean Air Act 1993 requires that the occupiers of premises utilising certain 'furnaces', to notify the Local Authority of their installation or modification, further details about this regime is available on the Local Authority's website [24]. Table 5.3 identifies new or significantly changed relevant furnaces and their chimneys, within Rhondda Cynon Taf, which have been granted consent under the Clean Air Act in 2020.

Table 5.3: New or modified relevant furnaces notified to the Local Authority in 2020

Ref.	Operator	Rating	Fuel	Chimney Height	Relevant Pollutants	Area	Affecting LAQM
640744	Biocatalysts Ltd	732kW	Mains Gas	8.2m	NO_x PM_{10}	Treforest	No

None of the new or modified furnaces are expected to have a significant impact upon local air quality, in relation to its effects on public health, due to their type, size, adopted control measures and distance from existing AQMAs or other vulnerable areas.

5.3 Planning Applications

In accordance with Planning Policy Wales [25] and the Local Development Plan [26], the Local Authority considers air quality a material planning consideration. The Local Authority will, when necessary, take account of the implications of any development upon local air quality during the planning consent decision making process. The Local Authority will attempt to ensure that, if necessary, future developments will negate or mitigate any impacts on local air quality whilst continuing to treat each application for planning consent on its individual merits.

The Local Authority has produced informal guidance criteria [27] used by it to identify, in a consistent and proportional way, applications for proposed developments which could either have the potential to adversely impact upon local air quality or introduce a relevant population to an existing area of potentially poor local air quality. Should a development meet the criteria and it is proportionate to do so, the Local Authority will seek to require an Air Quality Assessment [AQA]. An AQA will objectively examine the air quality implications of the proposed development and provide sufficient information to allow the Local Planning Authority to evaluate the material planning consideration.

During 2018-2019[10] the Local Planning Authority [28] approved 514 new dwellings across a range of consented developments. In addition, 96% of new dwellings and 100% of new employment and retail developments constructed, in 2018-2019, were within 400m of a transport node. Table 5.4 details the planning applications received or pending in 2019-2021 considered as having the potential to impact local air quality management and, where appropriate, an Air Quality Assessment was desired or was otherwise assessed for its air quality impact.

Table 5.4: Planning Applications under consideration or approved in 2020 where an AQA was desired

Application Number	Location	Description	Affecting LAQM or AQMA
15/0666/10	Craig Yr Hesg Quarry, Glyncoch	Western extension to existing quarry to enable the phased extraction of 10 million tonnes of sandstone	Application Refused[11]
21/0720/15	Craig Yr Hesg Quarry, Glyncoch	Continuation of quarrying and related operations for an extended period of six years	Application Initially Refused[12]
19/1081/16	Parc Llanilid, Llanharan	Phase 2 creation of 421 residential units and associated infrastructure	Llanharan

[10] At the time of publication the 2020 annual monitoring report was not available
[11] At the time of writing the refusal is subject to appeal
[12] At the time of writing the application has been refused at first committee and is subject to a final committee decision pending and/or an appeal

The Local Authority continues to engage with the operators of Craig Yr Hesg Quarry to attempt to mitigate any potential impact of the site activities on the surrounding community. It is also acknowledged that the Operator has, over a number of years, undertaken improvement works to on-site particulate matter abatement. In addition the Local Authority, in its position as the Local Mineral Planning Authority, has undertaken a Review of Old Mineral Permissions [ROMP] for Craig Yr Hesg Quarry. The ROMP, accompanied by an Environmental Impact Assessment, has allowed the Local Authority to ensure the most appropriate conditions, at that time, are in place to prevent and mitigate emissions of PM_{10} from the site.

In May 2015 the Local Authority received an application (planning application number 15/0666/10) for mineral development consent, in regard to the proposed phased extension of the existing quarry. The application, which has also been accompanied by an Environmental Impact Assessment, concerns a proposal to extend the current quarrying area and, as a consequence, to extend the lifetime of the mineral extraction activities. At the time of writing, the Local Authority had determined to refuse the proposal and had published its reasoning for said refusal, and it is understood that the applicant has submitted an appeal of the decision to the relevant authority.

In May 2021 the Local Authority received an application (planning application number 21/0720/15) for the continuation of the existing mineral development consent for an additional period of six years beyond the current consented timeframe. The application, which has also been accompanied by an Environmental Impact Assessment, would not change the footprint, location or nature of the activities at Craig Yr Hesg but extend the period they can be worked for. At the time of writing, the Local Authority had determined to refuse the proposal but had not yet published its reasoning for said refusal and the period for an appeal to be made has not yet lapsed.

In October 2019 the Local Authority received an application (planning application number 21/0720/15) for the construction of 421 residential units and associated infrastructure at Parc Llanilid, Llanharan. It is recognised the application could increase traffic volumes though the Llanharan AQMA, although it is not believed it will have an overriding impact upon the current air quality trend within the AQMA.

No other relevant proposed developments have been identified which would be expected to materially affect or be affected by air quality.

5.4 Other Sources

The Local Authority appreciates that certain pollution incidents as well as wide scale bonfire activity, large firework displays and domestic wood burning can have the potential to impact upon local air quality.

Rhondda Cynon Taff routinely experiences a large number of intentional wildfires; in the spring of 2015 a combination of “dry, warm weather conditions and large fuel load on the hillsides (bracken and Purple Moorgrass/Molinia) resulted in over 800 fires in the South Wales Valleys, with the majority occurring in the Rhondda Valley” [29]. In the past, the incidence of intentional wildfires has varied, being dependent upon dry weather aligning with school summer term breaks, with occasions of wide-scale wildfires affecting large areas of the Rhondda and Cynon valleys. They are usually associated with open mountainside

locations which can still arise in close proximity to some residential areas. They can result in large areas of bracken and other vegetation being burnt, in an uncontrolled manner, with significant amounts of black smoke being produced, occasionally for extended periods of time

Although these wildfires are unlikely, in themselves, to pose a risk of compliance to a relevant AQO, the Local Authority considers that the prevalence of intentional wildfires during the summer can, dependent upon circumstances, have a significant short-term effect on local air quality by potentially dramatically elevating local levels of Particulate Matter and Black Carbon. Anecdotal reports suggest these incidents could have a direct effect on public health as well as causing anxiety and concern within the communities affected.

Although, the Local Authority has not got the resources to directly quantify the air quality impact of wildfires within or in proximity to its area, in recognising the potential impact of such wildfires the Local Authority will continue to work with its partners to deter their occurrence. In addition, it will also continue to monitor emerging understanding upon the public health impact of wildfires and, where necessary, will react accordingly.

The Local Authority is not aware of any other pollution incidence that could have significantly affected air quality within its area during 2020.

The Local Authority recognises the impact of bonfires, firework displays and domestic wood burning within its area could have on local air quality. As such it continues to enforce a range of statutory provisions, including building regulations and the statutory nuisance regime, to deter or otherwise minimise these activities where they are shown to cause a significant negative impact.

In recognising that, in certain circumstances, there can be a potential association between the domestic use of solid fuels and fuel poverty. The Local Authority is working to tackle this in a number of ways including raising awareness, signposting eligible households to available grants, encouraging the installation of energy efficiency measures in domestic settings while also encouraging more energy efficient behaviour, maximising the income of low-income households and providing support for vulnerable people.

The Local Authority does not maintain sufficient information to evaluate the likely prevalence or combined impact of the above activities, however, it is believed that at present it is unlikely that they would significantly threaten compliance to a relevant AQO within Rhondda Cynon Taf.

5.5 Summary of Local Developments

Rhondda Cynon Taf County Borough Council confirms that there are no new or newly identified local transport or other developments which may have a single significant impact on air quality within the Local Authority area.

Rhondda Cynon Taff County Borough Council confirms that all the following have been considered:

- Road traffic sources
- Other transport sources

- Industrial sources
- Commercial and domestic sources
- New developments with fugitive or uncontrolled sources.

6. Policies and Strategies Affecting Airborne Pollution

A diverse range of activities and interests can have a material effect on local air quality management, including a number of policy areas where the Local Authority may have adopted formal strategies, polices or positions or otherwise has an interest.

6.1 Clean Air Plan for Wales

The Local Authority welcomes the publication, by Welsh Government, of the Clean Air Plan for Wales. This overarching Plan highlights a number of possible future changes to not only Local Air Quality Management but also more widely as to how air pollution can be locally and nationally improved.

The Local Authority also acknowledges the importance of the publication of a 'white paper' on the Clean Air Bill for Wales by Welsh Government. It is envisaged that the future Clean Air Bill for Wales will likely include a range of new or enhanced measures to help realise the policy objectives outlined within the Clean Air Plan for Wales.

The Local Authority anticipates that several of the fundamental changes suggested could result in significant operational implications to how it resources and performs its Local Air Quality Management duties. As such the Local Authority will continue to engage with Welsh Government throughout the legislative process and beyond. As further clarity as to any statutory implications becomes apparent, the Local Authority may undertake a review of how it delivers its Local Air Quality Management duties into the future. Any likely significant resource constraints, competing priorities and the potential desire to minimise duplication of work with any future centralised monitoring or management of air quality, will need to be taken in to account.

6.2 Local / Regional Air Quality Strategy

At present the Local Authority has not determined to produce a local air quality strategy and is not a member of any local government produced regional air quality strategy. However, it is expected that the sixteen AQAPs adopted by the Local Authority, and which are now scheduled for review in 2022 to ensure their pertinence, will have a co-ordinating role with regards to the delivery of air quality improvement.

In recognition of the importance of local air quality management the Council's Corporate Plan places air quality as a component of its "Creating Places", one of its three core priorities.

6.3 Air Quality Planning Policies

The Local Authority is the Local Planning Authority for that part of its area not within the Brecon Beacons National Park. In accordance with guidance the Local Authority has adopted a Local Development Plan [26] for the period 2006-2021. The Local Authority has also commenced the process for formulating a future Local Development Plan for the period after 2021. It is currently expected that a revised Local Development Plan 2020-2030 will be deposited by November 2022 and adopted by March 2024. During at least part of the interim period, the existing Local Development Plan 2006-2021 will continue to be the mechanism for determining planning applications.

The Local Development Plan references several policies which are designed to protect the environment and human health. A key policy is "Policy AW10 – Environmental Protection and Public Health", reproduced in Table 6.1, which provides a clear indication on how proposed developments which adversely affect air quality will be catered for.

Table 6.1: "Policy AW 10 Environmental Protection and Public Health"

Development proposals will not be permitted where they would cause or result in an unacceptable risk of harm to health and/or local amenity because of: - 1. Air Pollution 2. Noise Pollution 3. Light Pollution 4. Contamination 5. Landfill Gas 6. Land Instability 7. Water Pollution 8. Flooding 9. Or any other identified risk to public health Unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health and / or impact upon local amenity.

The Local Authority has not yet proposed to adopt any Special Planning Guidance with specific regards to air quality but will continue to strive to harmonise treatment of planning applications and ensure transparency where air quality is a material consideration.

As part of the sustainability monitoring framework put in place to assess the application of the Local Development Plan, a number of air quality indicators have been adopted and are reported upon within the Local Development Plan Annual Monitoring Report [28].

6.4 Local Transport Plans and Strategies

As a result of a Regulatory Order[13] the Local Authority is no longer required to maintain an individual Local Transport Plan.Instead the Local Authority has adopted a regionally collaborative Local Transport Plan [rc-LTP] [30]. The rc-LTP is based upon a number of objectives, several of which are relevant to local air quality management; as shown in Table 6.2.

[13] In accordance with The Transport Wales Act 2006

Table 6.2: Objectives relevant to local air quality management within the rc-LTP

No.	Objectives of the rc-LTP
1	To improve connectivity by sustainable transport between the SE Wales Valleys and the rest of Wales, the UK and Europe.
2	To improve interchange within and between modes of transport
3	To improve the quality, efficiency and reliability of the transport system.
4	To reduce traffic growth, traffic congestion and to make better use of the existing road system
5	To achieve a modal shift towards more sustainable forms of transport for moving people and freight.
6	To reduce significantly carbon emissions from transport.
7	To reduce the impact of the transport system on the local street scene and the natural, built and historic environment.
8	To promote sustainable travel and to make the public more aware of the consequences of their travel choices on climate, the environment and health.

The rc-LTP, which covers the period 2015 to 2020, acknowledges the need for sustainable transport solutions and proposes a number of actions to encourage the use of public transport and modal shift, whilst limiting new major road building. Table 6.3 notes the relevant actions proposed by the rc-LTP which, if delivered within existing funding constraints, could have a potential effect on local air quality management in Rhondda Cynon Taf. In line with guidance, the rc-LTP only has regard to schemes which are deliverable within the Local Authority's remit. The Local Authority has also commenced the process for formulating a future rc-LTP for the period after 2020.

Table 6.3: Proposed actions contained within the rc-LTP

rc-LTP Schemes		Relevant AQMA or area of interest
1	Active Travel Schemes throughout Rhondda Cynon Taf, to improve walking and cycling links to key services and facilities and improve accessibility within and between communities.	All
2	Safe Routes in Communities Schemes throughout Rhondda Cynon Taf, to improve accessibility within communities with a specific focus on providing safe, sustainable routes to schools and school travel plans to encourage a greater use of active modes of travel	All
3	A4059 Aberdare Bypass Extension Scheme to develop an existing road, in parallel with the ongoing dualling of the A465, to maintain access between communities	Hirwaun
4	Bus Priority Schemes to include measures to relieve congestion pinch points along strategic bus corridors, raise kerbs, new information displays and, where feasible, new seating and shelters for public bus users within Rhondda Cynon Taf	All
5	Bus Rapid Transit Schemes to develop, where feasible, improved cross-valley links between key settlements outside Cardiff and	Broadway Cilfynydd Nantgarw

rc-LTP Schemes		Relevant AQMA or area of interest
	Newport, by construction of segregated sections of bus priority road space.	Pontypridd
6	Treforest Estate Station Park and Ride Provision Scheme, to provide a new Park and Ride Facility which could serve a wide catchment area including Tonteg and Church Village.	Broadway Church Village Llantwit Fardre
7	Station Park and Ride Improvement Schemes to improve current provision of park and ride facilities at railway stations within Rhondda Cynon Taf	All
8	Aberdare Bus Station Upgrade Schemes to include new electronic information displays and other changes to improve the desirability of the stations to users	Aberdare
9	Tonypandy Bus Station Upgrade Schemes to include new electronic information displays and other changes to improve the desirability of the stations to users	Ferndale Llwynypia Tylorstown
10	Strategic Transport Corridor Management System A4119 / A473, to include modifying the junction layout and the installation of a new urban traffic control system.	Mwyndy Church Village Llantwit Fardre
11	Mountain Ash Southern Cross Valley Link Road, to provide a bridge forming a cross valley link to divert traffic from the southern B4275 to the A4059	Mountain Ash
12	Mountain Ash Northern Cross Valley Link Road, to provide a cross valley link to divert traffic from the northern B4275 to the A4059	Mountain Ash

In addition to the rc-LTP, the Welsh Government have suggested a number of rail or rail hybrid improvement schemes which could have an effect on local air quality management within Rhondda Cynon Taf; as detailed in Table 6.4.

Table 6.4: Proposed Welsh Government rail or rail hybrid infrastructure projects

Rail Schemes		Relevant AQMA or area of interest
1	Reinstatement of passenger services between Aberdare and Hirwaun	Aberdare
2	Great Western Main Line electrification	Llanharan
3	Core-Valley Lines electrification	Broadway Pontypridd
4	Additional half hourly passenger services between Cardiff and Merthyr Tydfil‡	Pontypridd
5	South Wales Metro (hybrid rail/tram/road)	All

Table Notes
‡ This scheme has been completed

The Local Authority will monitor the impact of these schemes on local air quality and where necessary react accordingly.

The Welsh Government, in acknowledging that certain parts of the national transport network may require additional measures to bring about improvements in air quality as quickly as reasonable, has also adopted a supplemental plan [31] for tackling roadside NO_2. This supplemental plan has regard to a broad number of possible interventions but also specifically addresses targeted action to reduce the levels of NO_2 along certain parts of the A470 trunk road that are within Rhondda Cynon Taf. This has led to the implementation of enforced speed limit reductions and associated information dissemination. The impact so far has been considered in the 2019 Annual Air Quality Progress Report and specific update reports issued by Welsh Government.

Although the intervention has likely had an effect in reducing observed NO_2 levels, it is possible that the Welsh Government may also consider further measures, potentially both within the current targeted area and other parts of the A470, to build upon current effects. Whilst the Local Authority welcomes the Welsh Government action so far, it continues to stress the importance of a close working relationship to ensure any future proposed actions do not have unacceptable adverse consequences on local air quality management elsewhere.

In addition to the specific schemes outlined above it is recognised that certain transport related policy interventions can also have an important role in Local Air Quality Management. Table 6.5 provides an overview of other key policy related development and potential implications to local air quality management.

Table 6.5: Overview of other key policy related developments

Policy	Description
Hackney Carriage (Taxi) & Private Hire Vehicle Fleet	The Local Authority is currently working collaboratively with its partners, both local and regional, in the regulatory delivery of Taxi & Private Hire vehicle emission improvements through best practice, industry support and possible licensing conditions. As an example, SWARCO has been awarded a contract by the Cardiff Capital Region to deliver 34 chargers at 31 sites throughout the Region and funding has also been awarded by the Cardiff Capital Region to implement a 'try before you buy' scheme for low emission wheel chair accessible vehicles.
Local Authority Low or Zero Emission Vehicle Fleet	Proposed requirement for Local Authority early adoption of Zero or Low Emission Vehicles, where practical, as ongoing replacement of existing petrol or diesel powered vehicles. In time this may bring forward vehicle emissions improvements, especially with respect to NOx emissions, emitted by the Local Authority.
Fare-Charging Low or Zero Emission Bus Fleet	Proposed requirement for Operators' early adoption of Zero or Low Emission Vehicles, where practical, as ongoing replacement of existing petrol or diesel powered vehicles. In time this may bring forward vehicle emissions improvements, especially with respect to NOx emissions, produced by Operators. Depending upon support mechanisms this could also have the potential to impact, in the short term, on the viability of some currently marginal bus routes.

Policy	Description
School Bus Transport	Requirement for Operators to ensure full accessibility of vehicles providing the service. This may result in the early phase out of older, potentially more polluting, vehicles which may also not be compatible with modern access standards. Depending upon support mechanisms this could also have the potential to impact, in the short term, on the viability of some school transport provision.
General Urban Road 20mph Speed Limit	Proposed requirement for substantial parts of the urban road network to be reclassified from 30mph to 20mph vehicle speed limit. Although challenging to predict, this may not universally have a significant[14] direct impact on NOx emissions [32] [33], albeit each location will experience its own specific circumstances. However, careful consideration [34] of any engineered street speed reduction measures, especially along streets that may otherwise be vulnerable to elevated levels of NO2, will be necessary to avoid potential adverse side-effects.
Prohibition on Informal Pavement Parking	Proposed requirement to prohibit the informal parking of road vehicles on pavement associated with the Highway. Pavement parking can be particularly prevalent in many communities within Rhondda Cynon Taf due to the legacy of limited off-street parking options and narrow carriageways. Pavement parking can, in certain circumstances, result in localised traffic congestion and an associated increase in NOx emissions, as identified in several AQMAs. Its prohibition may enable smoother traffic flow and subsequently less polluting journeys. Contrastingly should parked cars further encroach the carriageway, as a consequence of not being able to use available pavement, then the likelihood of additional traffic congestion may increase.

In addition to these projects the Local Authority has progressed work on a ‘Strategy for Electric Vehicle (EV) Charging’ within Rhondda Cynon Taf. This has involved the setting-up of an Electric Vehicle Charging and Transportation Working Group, which is expected to take forward the formulation and implementation of the strategy, assisted by the commencement of the “Let's Talk Electric Vehicle Charging” public engagement process.

6.5 Active Travel Plans and Strategies

In accordance to statutory requirements, in 2018 the Local Authority obtained final approval from Welsh Government for a number of maps [35] showing the Active Travel routes within a number of its communities. In doing so the Local Authority has designated eleven ‘Walking Routes’ and nineteen ‘Shared Routes’ as reportable active travel routes. More recently the

[14] Significance, in relation to NO_x emissions, may depend on the composition of Petrol to Diesel vehicles within the local vehicle fleet

Local Authority has embarked upon a formal review of its Active Travel Integrated Network Map with the expectation of depositing an updated version with Welsh Government by September 2021.

In addition, the Local Authority has produced an Active Travel Annual Report [36] and Active Travel Monitoring Report [37], which provides details on identified goals and progress made in promoting the active travel agenda. Further information, on these can be found on the Local Authority "Active Travel and Cycling" webpage [38].

It is expected that the production of the route maps will enable the Local Authority to build upon and improve local infrastructure for walking and cycling. In addition the Local Authority will aim to consider the needs of walkers and cyclists during its decision processes and, where appropriate to do so, make better provision for them. It will also look to promote, where practical, walking and cycling as a mode of transport.

It is envisaged that the potential for collaborative working to further this mutually conducive agenda could deliver local air quality improvement in a "win win" scenario. An example of this approach is the progression of AQAPs actions to improve the provision of information about active and sustainable travel routes associated with Ferndale, Pontypridd and Porth [12].

6.6 Local Authority's Well-being Objectives

In May 2016 the Cwm Taf Public Service Board was launched as a partnership between a number of statutory participants, including Rhondda Cynon Taf CBC as a core member. The Cwm Taf Public Service Board purpose is to facilitate and coordinate the achievement of well-being objectives associated with sustainable development goals introduced by the new statutory framework provided by the Wellbeing of Future Generations (Wales) Act 2015.

To support this agenda, on the 9th March 2017, the Local Authority adopted the following Well-Being Objectives: -

- Building a strong economy
- Promoting independence and positive lives for everyone
- Creating neighbourhoods where people are proud to live and work

Subsequently the Local Authority also agreed that, from May 2018, the Local Authority's priorities will be directed by the Cwm Taff Well-Being Plan which is available on the "Our Cwm Taf" webpage [39]. These priorities have been summarised as: -

- Thriving Communities, to promote safe, confident, strong and thriving communities improving the well-being of residents and visitors and building on our community assets
    - Work with our communities to provide consistent messages, links and signposting to community, public sector and business support within and close to communities;

- Work with and support communities who want to manage and improve their local environment.

- Healthy People, to help people live long and healthy lives and overcome any challenges
    - Collectively promote healthy lifestyles by encouraging “One More Healthy Behaviour” for all staff and citizens;
    - To work together as public services and with our communities to reduce levels of obesity.
- Strong Economy, to grow a strong local economy with sustainable transport that attracts people to live, work and play in Cwm Taf
    - Growth and promotion of tourism using the assets of our beautiful natural environment, heritage and culture for the health, prosperity and benefit of the whole community and alongside the development of the Valleys Landscape Park;
    - To make the most of the investment and return opportunities of the £1.229 billion City Deal locally within Cwm Taf;
    - Further explore the opportunities for sustainable housing and renewable energy developments with associated community funds.

As part of the delivery of these well-being objectives, National Indicators and Milestones have been produced, including one for air quality [40]. It is expected that this will also require consideration of air quality in the form of a broader ‘pollution burden reduction approach’. This currently differs to that of the compliance approach enacted by the current local air quality management regime, which targets levels of air pollution which has exceeded a defined level regardless of the number of people likely to be affected. Instead, the burden reduction approach considers that it can be beneficial to reduce pollution affecting a large number of people regardless of its absolute level. Even if the reduction is a small amount the overall benefit can be great if a large number of people are affected. Nonetheless, it is anticipated that both routes to air quality improvement will act in collaboration where possible.

To enable the evaluation of a burden reduction approach, the Welsh Government has made available rankings [15] of each Local Authority based upon the modelled background concentration for NO_2, PM_{10} and $PM_{2.5}$ for each $1km^2$, referenced to the number of dwelling associated within each km^2. The most recently published data ranks (the lower the ranking the better) Rhondda Cynon Taf as 9 out of 17 for NO_2, 11 out of 13 for PM_{10} and 7 out of 9 for $PM_{2.5}$. Although there are currently twenty-two Local Authorities in Wales, some may be ranked equally.

It is acknowledged, that in a resource limited system it can beneficial to focus actions to maximise the public health benefits of intervention. In considering the pollution burden reduction approach, it is often the case that disadvantaged communities are more likely to observe adverse health inequalities which could benefit from improvements in local air quality. Therefore, given similar population sizes, targeting action at communities which

experience elevated levels of air pollution as well as deprivation would likely deliver greater public health benefit if compared to targeting action only at a more affluent community. This approach may be of even greater importance given the need to prevent negative aspects of COVID-19 related disruption disproportionally affecting the worst off in society.

Collaborative work with Public Health Wales and Cwm Taf Health Board has enabled the consideration of various statistics which best highlight the communities which are most likely to be detrimentally affected by air quality in combination with known air quality data. This has resulted in the Health and Air Pollution Risk Assessment/Area Prioritisation (HAP-RAP) tool, which can help to identify locations where actions to improve air quality may have the greatest benefit to local communities. Provisional use of the HAP-RAP tool has potentially identified two clusters, one based around Mt Ash/Penrhiwceiber and the other based around Cymmer/Ferndale/Llwynypia/Tylorstown, where air quality improvements may well have the greatest benefit to the community. Each current AQMA has been assessed against HAP-RAP prioritisation and where the AQMA and the MSOA (the zones used by HAP-RAP) match this has been highlighted (see Section 1.2).

It will likely become incumbent upon the members of Cwm Taf Public Service Board to consider their service delivery and the potential for positive action to be taken to holistically improve overall air quality. It will also be a requirement for partners to provide annual updates and reviews of progress in furthering achievement of the well-being objectives.

It is uncertain as to the practical extent of interaction between this regime and the current local air quality management regime. As a result the Local Authority will, for the foreseeable future, continue to produce AQAPs as standalone statutory plans as well as separate local air quality management progress reports. This position will be reviewed should future statutory guidance require a harmonised approach to actions and reporting

6.7 Green Infrastructure Plans and Strategies

The Local Authority recognises the importance of green infrastructure to public health and the environment, as well as it being an important potential resource in the improvement of local air quality or protecting communities from elevated levels of air pollutants. At present the Local Authority has adopted a Biodiversity Duty Document and Plan which outlines its goals, and how it will go about trying to achieve them, with respect to local Biodiversity. It has also issued a ‘Nature’s Assets’ report providing an assessment of the many habitats and ecologies within Rhondda Cynon Taf and the importance they may have in tackling a range of environmental concerns.

The Local Authority continues to assess, often novel, ways in which recovery, protection and enhancement of green assets can bring real benefits to a diverse range of policy areas including flood prevention, active travel and climate change. As an example, the Local Authority is actively engaging with the Queen’s Green Canopy Project with the aim to protect existing woodland areas whilst providing an enhanced role for urban tree planting. This may provide distinct opportunities in protecting or bringing forward green infrastructure that may have a role in assisting local air quality management.

The Local Authority also continues to consider the benefits of actions which could improve green infrastructure as part of its other activities. In doing so, the Local Authority will continue

to build upon internal mechanisms to enable knowledge sharing and coordination between ecological & countryside management and local air quality management.

6.8 Climate Change Strategies

With the declaration of a 'Climate Emergency' by Welsh Government, the Local Authority is clear that it must play its' part in taking urgent action. The Local Authority has regard to climate change both by actions it may undertake to reduce its contribution to climate change and also the actions that maybe required to mitigate the impact of climate change upon service delivery. The Local Authority also recognises its dual role in leading and supporting people, business and the wider community in better understanding and contributing to efforts to tackle climate change. In doing so the Local Authority has developed ongoing Climate Commitments, reproduced in Table 6.6 below, and has committed to a target of becoming 'Net Zero' by 2030 across its own estate.

Table 6.6: Local Authority's Climate Commitments

Priorities	
1.	Reducing our carbon footprint in respect of all the Council's activities
2.	Reducing the demand for energy and embedding carbon reduction into everything we do
3.	Using public sector land for green energy generation and/or carbon storage.
4.	Investing in solar energy installations in Council buildings and making sure that all new schools, offices, homes and commercial buildings within the County Borough are built to a Net Zero standard.
5.	Supplying all our buildings and offices with low carbon heat and/or generating our own electricity.
6.	Further developing the use of hydrogen for fuel cells in Council vehicles and buildings.
7.	Ensuring we recycle or reuse 80% of all municipal waste by 2025.
8.	Continuing to locate services closer the people that use, work and visit them.
9.	Procuring a vehicle fleet that is fit for purpose yet has a limited impact on the environment and replacing all our new cars and light goods vehicles with ultra-low emission vehicles.
10.	Taking a sustainable approach to the supplies and services we buy within the Council, from major building projects to eliminating single use plastics, so that we better support the local and green economy.
11.	Reducing staff travel by car by continuing to maximise the use of technology, encouraging active travel and greater use of public transport significantly reducing car commutes and business travel

To help realise its Climate Commitments and encourage others to also commitment to real change, the Local Authority is progressing a comprehensive Climate Change Strategy (2021-2025). Under the direction of the Local Authority's Climate Change Cabinet Steering Group, composed of elected representatives and senior decision-makers, and utilising the "Let's Talk Climate Change RCT" engagement process. The Local Authority has recently concluded a consultation on a 'Draft Climate Change Strategy', the outcome of which is currently being considered so as to determine the next steps to be taken to enable the adoption and implementation of the Climate Change Strategy (2021-2025).

In recognising the importance in improving understanding of Climate Change at the local level, the Local Authority has instigated the Carbon Footprint Project [41]. This has enabled the analysis of the Local Authority's overall emission of relevant Climate Change gasses, having regard to the Greenhouse Gas Protocol, and its apportionment to its various core activities. This ongoing analysis has recently been completed within phase one of the Carbon Footprint Project, with subsequent phases expected to provide targeted 'Insights and Recommendations' for improvement and the ability to review subsequent progress as it is made.

The Local Authority has also progressed a number of thematic areas that are intrinsically linked to or impacted by Climate Change. This has included progressing a number of schemes associated with the "Key Energy Generation Projects" programme.

The "Key Energy Generation Projects" programme has involved the assessment of a number of projects that could help deliver sustainable, localised and renewable energy generation and use. For instance, it has enabled investigatory work into the potential of using Local Authority owned land for the development of major renewable energy projects for both wind and solar generation. It has also facilitated consideration of the novel use of a local heat network based on natural thermal energy, derived from the Taffs Well Thermal Spring, in association with Ffynnon Taf Primary School. In addition, work continues to progress on a Carbon Reduction Programme involving a wide range of proposals focused on reducing current energy demands, such LED Lighting and boiler upgrades, etc. The programme for 2021/22 is valued at over £1.2M and could generate estimated annual savings of 3,112,345 kWh which is the equivalent to ~611 tonnes of CO2 annual savings.

As part of its work programme, the Climate Change Cabinet Steering Group has considered local air quality management. In doing so, it reaffirmed the commitment of the Local Authority to drive positive change and improve local air quality as well as, where appropriate, reduce potentially associated contributions to Climate Change.

The Local Authority recognises the potential synergistic effects local air quality management can have on climate change and vice versa. As such the Local Authority will work to ensure local polices produced to tackle climate change also take account of local air quality management.

The Local Authority acknowledges the establishing momentum driving forward climate change engagement and action, and the importance of the upcoming UN Climate Change Conference of the Parties (COP26). As such the Local Authority has also launched 'Countdown to COP26' as part of its climate conversation to help raise public awareness to the climate crisis.

7. Conclusions and Proposed Actions

7.1 Conclusions from New Monitoring Data

The unique events of 2020 and ongoing COVID-19 related disruption has presented a significant challenge to the undertaking, interpretation and management of local air quality. At times it has not been possible to fully undertake air quality monitoring activities to the degree that would have been normal prior to 2020, however, the Local Authority has attempted to capture important air quality information that may help facilitate the local interpretation of this unprecedented time and its possible implications for the future.

As was the case before 2020, the vast majority of Rhondda Cynon Taf is expected to continue to show relatively low levels of NO_2 well in compliance with the relevant AQOs for NO_2. Although previous assessments had identified a stable, for more than a decade, improving trend within the rural and suburban environments and perhaps more recently an improving trend within the urban environment. COVID-19 related disruption during 2020 has markedly accelerated these improving trends across the board, at least in the short term. Within Rhondda Cynon Taf, monitored NO_2 levels in 2020 fell by unprecedented levels, as road traffic emissions were heavily curtailed at various times.

Prior to 2020, some localised areas within Rhondda Cynon Taf observed elevated levels of NO_2, that were on occasion above or at risk of being above the relevant AQOs for NO_2. In 2020 the majority of these limited areas experienced levels of NO_2 well below the relevant AQOs for NO_2, with only the Cymmer AQMA and Mountain Ash Town Centre AQMA experiencing levels of NO_2 above the annual mean AQO for NO_2.

Although the effect of COVID-19 related disruption has been universally felt, its impact, although significant at all locations, has not been completely uniform. The monitoring data indicates that southern, more affluent, areas of Rhondda Cynon Taf may have experienced greater improvement. Whereas more northern areas, and specifically more deprived areas indicated by HAP-RAP analysis, may have been less influenced. It may be the case that those communities less affected are also communities less likely, due to the nature of prevailing local employment, to utilise 'working at home' arrangements. It may also be the case that, both the Cymmer and Mountain Ash Town Centre AQMAs, experience characteristics that means that even with sizeable reductions in local road traffic, elevated levels of NO_2 may still persist for longer, due to the nature of the pollutant.

Given the changes that have been witnessed in 2020 and ongoing circumstances, there remains considerable uncertainty about the future trend in local air quality. It is possible that short-term disruption could occur into the near future. It is also likely that some of the changes in society, observed in 2020, will have longer lasting consequences. It is expected that some of the significant reductions in NO_2 measured in 2020 within Rhondda Cynon Taf will be reversed, to some extent, in the future as economic activity recovers and various transport related emissions re-establish. However, it is uncertain if patterns of transport needs and behaviour, observed prior to 2020, will fully re-establish or if changed working methods, increased awareness of active travel and possible changes to town centre use will result in a different sustained NO_2 trend within Rhondda Cynon Taf into the future.

Other pollutants of concern such as SO_2 and PM_{10}, which tend to be associated with emissions from heavy industry or large conurbations, are, in general, not considered to be

prominent any longer within Rhondda Cynon Taf. However, long term monitoring has previously identified the area of Glyncoch as experiencing levels of PM_{10} potentially incongruous to other areas of Rhondda Cynon Taf. Glyncoch appears to observe a fluctuating trend in PM_{10} which may indicate the influence of particular local factors. These local factors appear less affected by COVID-19 related disruption during 2020 than has been observed with local levels of NO_2. Although this can pose difficulties in the prediction of the future PM_{10} trend at Glyncoch it appears that, at present, the location remains compliant to the annual mean and the 24-hour daily mean AQOs for PM_{10}.

The available evidence suggests the levels of PM_{10} observed at Glyncoch have improved in recent years, potentially corresponding to known improvements to the control of Particulate Matter emissions from Craig Yr Hesg Quarry. However cyclic climatic events, such as protracted dry summers, may threaten continued improvement. As such it is recognised that maintaining vigilance is necessary to enable continued understanding and to enable assessment of any potential future changes.

In its consideration of local air quality, it has been necessary for the 2020 Air Quality Progress Report to rely upon extensive local air quality monitoring and analysis. The Local Authority will aim to continue as far as possible to preserve its monitoring network and comply with the required reporting regime. However, the impact of continued financial uncertainty as well as the changing regulatory landscape and potential ongoing COVID-19 related disruption will need to be considered and will influence the amount of funding available to carry out future local air quality management duties.

7.2 Conclusions relating to New Local Developments

Although COVID-19 related disruption affected many parts of society and the normal conducting of many Local Authority services, a number of new local developments were continued to be planned and delivered.

The Local Authority considers air quality can be a material planning consideration. As such, the Local Authority will, when necessary, take account of the implications of any development upon local air quality during the planning consent decision making process. Consequently, the Local Authority will attempt to ensure that, if necessary, future developments will negate or mitigate any impacts on local air quality whilst continuing to treat each application for planning consent on its individual merits.

During 2018-2019[15] the Local Planning Authority [28] approved 514 new dwellings across a range of consented developments. In addition, 96% of new dwellings and 100% of new employment and retail developments constructed, in 2018-2019, were within 400m of a transport node. Records also indicate that, in 2020, no new applications for local development were received or granted that would likely unduly impact upon local air quality in a significant way.

In relation to the planning application ‘Craig Yr Hesg Quarry (15/0666/10)’, which sought to enlarge the working area and extend the timeframe for quarrying, at the time of writing the Local Authority had determined to refuse the proposal and had published its reasoning for said refusal, and an appeal against this decision had been made. In addition, a semi-related

[15] At the time of publication the 2020 annual monitoring report was not available

planning application for 'Craig Yr Hesg Quarry (21/0720/15), sought to extend the timeframe for quarrying, at the time of writing the Local Authority had determined to refuse the proposal but had yet to publish its reasoning for said refusal, and the timeframe for an appeal against this decision has not yet lapsed.

To help tackle the non-compliance of the NO_2 EU Limit Value associated with the A470, Welsh Government and its South Wales Trunk Road Agent implemented a major programme of air quality improvement measures. As part of this programme, the designated speed limit of parts of the A470 were reduced from 70mph to 50mph to help reduce vehicle traffic emissions. It remains apparent that this intervention has had a substantial impact, likely the most regionally significant since the completion of the Church Village Bypass, upon reducing local levels of NO_2 and helping to achieve AQO compliance within parts of several associated AQMAs. It may also be the case that, given reported circumstances within and along nearby sections of the A470, further measures may be adopted by Welsh Government to continue progress in reducing local levels of NO_2. In considering possible further measures, the Local Authority would welcome engagement with Welsh Government and its agents.

It is also the case, as can be seen from road infrastructure improvement measures over the last few years at Broadway and Pontypridd Town Centre, that highly localised measures can bring about smaller but still important reductions in local levels of NO_2, helping to achieve compliance to relevant AQOs within these AQMAs. Previous interventions help demonstrate how concerted action at all levels of society and the inclusion, as far as possible, of all parts of the community is vital in bringing about sustained improvement in local air quality.

7.3 Other Conclusions

Local air quality has always been associated with a degree of future uncertainty given the large number of varying national, regional and local factors, that can influence it at any one time. Previously it has been possible to make informed predictions about the possible future experience of local air quality. However, it is acknowledged that it is not currently possible to predict, with any degree of confidence, how the experiences of 2020 will impact future local air quality.

It is possible that, at least, some of the improvement in local air quality observed in 2020 will be retained as new working-practices potentially imbed and become commonplace, as a new interest in active travel pervades and traditional retail activities change. As can be demonstrated by the monitoring data collected, this could sizeably reduce road traffic and associated congestion and bring about wide-spread local air quality improvement. That said it is also possible that a reluctance to utilise public transport during 2020 could continue into the future, which may result in challenges to the viability of current public transport provision and an increase in private road vehicle use. It may also be the case that potential future economic uncertainty results in the deferment in the early adoption of new transport technologies, that would otherwise be expected to sustain continued local air quality improvement.

The Local Authority acknowledges that, especially in this time, many different policies and actions undertaken by it may have a direct or indirect effect on local air quality. The Local Authority will continue to take account, where necessary, of local air quality during any relevant decision making process. It will also aim, wherever possible, to promote policies

and actions which will maintain or be conducive to good air quality and any synergistic effects such actions may have on other service deliveries.

Of particular note are that many issues underlining poor air quality, are also significant in the broader Active Travel, Climate Change, Environmental Noise and Biodiversity Agendas. Effective solutions to improve air quality can supplement efforts in tackling climate change and environmental noise. Close integration with the Active Travel Agenda, Climate Change Agenda and Noise Action Plan Priority Areas will continue to be aspired to in future local air quality management.

With the declaration of a 'Climate Emergency' by Welsh Government and the momentum driving forward climate change engagement and action as demonstrated by the importance of the upcoming UN Climate Change Conference of the Parties (COP26). The Local Authority is clear that it must play its' part in taking urgent action'. In doing so the close relationship between Climate Change and local air quality has been recognised by the Local Authority, in the work programme adopted by its Climate Change Steering Group, enabling wider recognition for local air quality management and supporting an holistic approach to tackling these strategic issues.

Having regard to the Cwm Taf Well Being Plan, and the need to progress its Well Being Objectives, will be of considerable relevance to the role the Local Authority has in implementing local air quality management. This is of particular importance during this uncertain period, in respect of air quality, where the need to safeguard the most vulnerable, who otherwise may be most affected, is paramount. A close working relationship with its Cwm Taf Public Service Board partners will be maintained and promoted as well as holistic working to achieve multi-agenda goals. In doing so it is recognised that an important element in progressing an effective 'pollution burden reduction' approach is the multi-discipline support provided by partners in analysing existing information in new and informative ways so as to enable better policy and action planning, for instance the HAP-RAP Tool.

It is clear that, without intervention, local air quality within the most vulnerable areas of Rhondda Cynon Taf may struggle to improve as quickly as possible given the considerable uncertainty about the potential for future sustained compliance. It is also clear that dramatic interventions, as experienced due to COVID-19 related disruption in 2020, can overwhelmingly affect local air quality for the better, at least in the short term.

The Local Authority has previously adopted an AQAP for each of its AQMAs and to ensure their pertinence had scheduled to review these AQAPs in 2020. Prior to the coronavirus response, the Local Authority had embarked upon preparatory action to enable an effective review of its AQAPs in 2020. However, due to the current uncertainty associated with the ongoing COVID-19 response, future trend in local air quality and the viability of certain traditional interventions, any such AQAP review in 2020 would now encounter notable challenges. As such it is considered necessary to delay the completion of the scheduled review of the AQAPs to 2022 at the earliest. Nonetheless, the existing AQAPs will be progressed as far as possible during this slightly extended period.

Due to the availability of limited resources and competing agendas, it has not been possible to immediately implement all AQAP actions. However, the Local Authority continues, where possible, to implement or influence the implementation of actions within its AQAPs. This has included Welsh Government directed speed reductions along a part of the A470, progress in

planning potential highway improvement projects and advancing a local strategy to support Electric Vehicle infrastructure. In addition, the Local Authority is progressing further actions to improve usability and awareness of active travel routes, plus encouraging use of local sustainable transport options.

Often fundamental to the progression of AQAP actions is the availability of demarcated extremal project funding, it is recognised that the changing nature of relevant Welsh Government's grant frameworks may increase the challenges to obtain sufficient resourcing to enable future AQAP implementation.

The Local Authority is fully committed to openness and transparency in regard to its air quality duties. It will widely disseminate and consult upon the 2020 Air Quality Progress Report with both interested parties and the public.

The Local Authority recognises the exceptional public health related actions associated with the ongoing coronavirus COVID-19 response and the inevitable short-term and potential longer-term changes to how the community's that comprise it, goes about much of their activity. Air Quality in 2020, and potentially beyond, is expected to experience considerable uncertainties and encounter hitherto unforeseen challenges [42]. It is likely that the interpretability of air quality monitoring data in 2020 has been impacted by inevitable disruption to the local monitoring network as well as major changes in influences upon local air quality trends. In addition, the consideration of cost-effective interventions and the implementation of improvement actions may be challenged by possible systemic changes to local transport and the economy as well as reprioritisation of activities undertaken by the Local Authority and its partners. In acknowledging future uncertainty it is also accepted that, where possible, potential future opportunities, as society adjusts to recent experiences, in achieving possible local air quality gains should be capitalised upon. In accepting likely potential limitations, the Local Authority will, resources and circumstances permitting, aim to ensure continuity of local air quality reporting by producing, in accordance with statutory requirements an Air Quality Progress Report in 2021.

7.4 Proposed Actions

- The Local Authority will conduct an encompassing and transparent consultation into the findings of this report and all other key steps, in the local air quality management process being undertaken; with all relevant parties and to respond where necessary to feedback given.

- The Local Authority will continue to progress or encourage the progression of AQAP actions where available resources and circumstances allow, in doing so the Local Authority will, where appropriate, explore the potential for funding to enable AQAP action implementation.

- In acknowledgement of the ongoing coronavirus COVID-19 response and the challenges this may create, the Local Authority will look to delay undertaking a review of its sixteen extant AQAPs, and their associated AQMAs, to the end of 2022 at the earliest.

- The Local Authority recognises the enhanced benefits which can be brought about by collaboratively working, both within the Local Authority as well as with other interested

parties, to deliver a multi-benefit agenda which can directly improve local air quality. The Local Authority will look to build upon existing and new partnerships to deliver coordinated action in the delivery of local air quality management and that of other related agendas.

- The Local Authority will have regard to any noise action planning priority areas within Rhondda Cynon Taf and continue to work with the Welsh Government and its partners to ensure close integration with the environmental noise agenda and aspire to a “win win” solution. In addition, the Local Authority, having regards to its statutory duty, will continue to integrate local air quality management considerations with the adopted Well Being Objectives descried within the Cwm Taf Well-Being Plan.

- The Local Authority will continue to utilise existing resources as effectively and efficiently as possible to provide a greater understanding of the causes of poor air quality and its possible solution. To facilitate this, the Local Authority will periodically review its monitoring programmes in light of available resources and new information and changes in understanding, to aspire to ensure targeted comprehensive assessment of the most at risk locations. Where necessary, and resources permitting, it will consider repurposing or establishing monitoring sites to provide enhanced understanding of any potentially affected area.

- Dependent upon the availability of resources, circumstances and future statutory guidance, in September 2022 the Local Authority will publish an Air Quality Progress Report which will aim to maintain a level of continuity of air quality review and assessment, based on the latest available data.

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9. 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 D1: AQMA Boundary Maps

Appendix D2: AQMA Trends

Appendix E: Impact of COVID-19 upon LAQM

10. Appendix A: Monthly Diffusion Tube Monitoring Results

Table A.1: Full Monthly Diffusion Tube Results for 2020

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 (0.81 Factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
4	22.3	14.7	9.1	9.1	9.1	9.1	7.9	9.3	11.5	13.8	23.0	14.4	12.8	10.3	10.3
8	49.8	39.8	18.9	18.9	18.9	18.9	23.6	32.3	31.3	32.6	45.9	35.7	30.6	24.7	24.3
21	8.5	4.1	3.1	3.1	3.1	3.1	3.1	4.4	4.8	5.1	9.9	5.0	4.8	3.9	NA
37	39.2	35.3	20.9	20.9	20.9	20.9	25.6	30.9	28.5	31.5	34.4	27.2	28.0	22.7	21.0
41	55.7	53.7	24.7	24.7	24.7	24.7	35.7	41.1	39.2	50.9	50.5	33.1	38.2	31.0	26.0
44	28.7	33.0	19.7	19.7	19.7	19.7	24.6	28.8	27.5	28.4	37.4	34.3	26.8	21.7	25.2
47	40.4	28.2	16.8	16.8	16.8	16.8	-	20.5	25.7	32.0	32.3	29.8	25.1	20.3	21.9
48	37.8	32.9	16.3	16.3	16.3	16.3	20.4	21.9	-	25.2	34.8	25.3	24.0	19.4	20.9
50	38.3	28.0	16.7	16.7	16.7	16.7	18.6	21.5	24.1	25.3	34.1	23.3	23.3	18.9	20.3
51	49.6	41.3	14.4	14.4	14.4	14.4	30.6	33.3	34.1	33.4	45.8	39.8	30.5	24.7	18.4
52	72.4	54.2	27.5	27.5	27.5	27.5	30.3	37.4	43.5	39.0	48.9	39.7	39.6	32.1	32.1
53	50.8	39.1	22.0	22.0	22.0	22.0	22.5	28.2	27.3	25.3	46.0	34.0	30.1	24.4	21.6
55	39.2	27.3	19.2	19.2	19.2	19.2	23.0	27.1	29.0	29.9	37.4	34.1	27.0	21.9	20.3
56	42.9	40.8	20.7	20.7	20.7	20.7	-	31.5	34.9	37.2	46.5	46.7	33.0	26.8	23.9
66	43.3	36.6	19.0	19.0	19.0	19.0	26.0	29.4	28.5	35.2	-	39.9	28.6	23.2	20.0
68	37.7	31.0	17.6	17.6	17.6	17.6	24.5	23.2	29.9	30.7	35.9	35.4	26.6	21.5	21.5
69	38.7	26.1	18.0	18.0	18.0	18.0	21.1	25.7	29.2	29.0	41.2	32.0	26.3	21.3	20.8

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 (0.81 Factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
75	38.2	30.8	18.9	18.9	18.9	18.9	-	-	31.4	-	39.6	-	27.0	21.3‡	21.0
76	39.3	29.5	18.1	18.1	18.1	18.1	20.0	23.8	23.9	25.3	40.1	33.7	25.7	20.8	20.8
79	44.4	28.2	20.8	20.8	20.8	20.8	22.5	26.3	28.1	32.6	37.0	35.0	28.1	22.8	22.8
80	44.1	35.3	14.7	14.7	14.7	14.7	19.5	20.8	24.1	27.0	38.3	30.3	24.9	20.1	16.4
81	40.7	32.6	16.7	16.7	16.7	16.7	23.8	24.7	27.9	27.2	39.3	34.5	26.5	21.4	21.4
82	33.3	29.1	18.2	18.2	18.2	18.2	17.6	23.7	23.2	25.8	33.0	28.2	23.9	19.4	17.8
83	42.7	35.0	-	-	-	-	-	63.7	25.6	33.1	40.8	28.1	38.4	26.4‡	26.4
84	57.6	48.1	27.0	27.0	27.0	27.0	32.6	35.0	41.1	42.1	54.5	45.8	38.7	31.4	31.4
85	41.1	34.8	19.0	19.0	19.0	19.0	20.6	28.7	28.8	33.2	39.2	33.8	28.0	22.7	21.7
88	38.6	12.3	20.4	20.4	20.4	20.4	20.4	26.6	27.5	28.2	41.8	34.1	25.9	21.0	21.0
90	43.3	39.3	22.1	22.1	22.1	22.1	27.7	28.2	28.8	33.9	36.1	34.9	30.1	24.3	23.6
91	53.1	47.1	39.2	39.2	39.2	39.2	40.4	48.0	44.3	51.5	58.3	60.2	46.6	37.8	37.8
93	44.4	51.6	22.0	22.0	22.0	22.0	36.1	-	39.8	42.2	50.5	41.2	35.8	29.0	29.0
96	49.3	41.9	-	-	-	-	27.1	27.6	36.6	38.3	42.2	39.6	37.8	27.4‡	27.4
97	62.9	155.3	43.8	43.8	43.8	43.8	39.2	44.1	50.5	46.3	57.6	45.6	56.4	45.7	44.3
101	10.8	7.0	-	-	-	-	-	5.4	5.6	5.7	9.4	7.2	7.3	5.0‡	NA
103	9.9	6.9	4.7	4.7	4.7	4.7	5.1	6.2	6.4	11.2	10.8	8.2	7.0	5.6	NA
105	12.3	7.7	4.6	4.6	4.6	4.6	5.3	6.5	7.2	7.3	13.3	9.8	7.3	5.9	NA
106	46.2	48.6	24.6	24.6	24.6	24.6	28.8	30.4	34.9	40.3	40.8	28.6	33.1	26.8	26.8
107	37.9	34.0	22.2	22.2	22.2	22.2	21.7	30.2	28.1	31.6	35.3	31.8	28.3	22.9	22.9

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 (0.81 Factor) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
108	59.0	45.7	-	-	-	-	-	45.1	-	-	60.3	47.8	51.6	33.7‡	27.2
110	32.2	22.6	17.6	17.6	17.6	17.6	16.4	26.1	15.3	37.2	29.2	25.9	22.9	18.6	18.3
111	47.7	43.9	25.0	25.0	25.0	25.0	28.0	33.3	32.6	37.4	38.9	37.4	33.3	26.9	26.9
113	-	39.4	19.9	19.9	19.9	19.9	25.3	26.8	31.2	35.6	--		26.4	25.1‡	23.4
114	39.1	25.4	12.8	12.8	12.8	12.8	18.0	20.5	23.6	25.5	35.6	34.2	22.8	18.4	16.5
117	58.0	-	34.3	34.3	34.3	34.3	40.7	41.9	44.8	54.8	52.8	53.3	44.0	35.6	30.9
118	68.0	67.6	44.0	44.0	44.0	44.0	53.3	53.3	55.8	67.4	63.8	62.6	55.7	45.1	38.5
122	41.9	38.4	18.2	18.2	18.2	18.2	25.5	24.4	28.0	48.5	32.1	22.3	27.8	22.5	21.6
124	27.6	30.2	15.4	15.4	15.4	15.4	20.2	20.2	21.8	25.4	25.8	24.7	21.5	17.4	17.4
128	44.0	26.2	16.8	16.8	16.8	16.8	17.0	24.4	25.9	26.9	36.6	40.2	25.7	20.8	20.3
129	32.4	28.4	-	-	-	-	15.5	22.0	20.2	25.8	28.0	28.3	25.1	18.1‡	17.2
132	31.4	32.8	-	-	-	-	22.3	22.4	21.4	28.0	28.4	29.4	27.0	19.6‡	19.5
134	26.2	14.4	-	-	-	-	10.7	13.8	14.0	18.0	24.9	22.6	18.1	13.1‡	12.3
135	35.3	22.8	12.7	12.7	12.7	12.7	13.8	19.8	20.8	21.8	32.7	29.2	20.6	16.7	14.8
136	48.4	37.4	23.6	23.6	23.6	23.6	32.1	33.2	38.5	38.4	52.7	41.2	34.7	28.1	28.1
137	38.2	27.9	18.6	18.6	18.6	18.6	26.5	22.8	31.1	30.2	43.8	34.4	27.4	22.2	19.1

Table Notes

Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in bold.

Exceedances of the NO2 1-hour mean objective (200µg/m3 not to be exceeded more than 18 times per year) or otherwise NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in bold and underlined.

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

(2) Means for diffusion tubes have been corrected for bias with means labelled with a ‡ having been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16, as their valid data capture for the full calendar year is less than 75%. See Appendix C for details.

11. Appendix B: A Summary of Local Air Quality Management

11.1 Purpose of an Annual Air Quality 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.

11.2 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.

Table B.1: AQOs 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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
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

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

12. Appendix C: Air Quality Monitoring Data QA/QC

Air quality monitoring often produces a large amount of data which, due to its quantity, can be difficult to interpret. Therefore, it is essential to utilise accepted statistical techniques to process and interpret it. In line with current practice the Local Authority has made use of the 'Openair Package' [43], in combination with other packages, within RStudio [44], version 1.2.5042, as operated within the open-source R-Programme [45] computational language for environmental statistical computing and graphics, version 4.0.2. This utility, with the aid of published literature [46], has enabled the Local Authority to undertake verification and validation of the monitoring data as well as various types of descriptive and inferential statistical analysis.

In addition to the statistical analysis and graphical representation mentioned above, the Local Authority has also made use, with the aid of published literature [47], of the GIS package QGIS version 3.20.1 "Odense" [48]. This has enabled the Local Authority to spatially assess and depict air quality monitoring data as well as associated geometries.

12.1 QA/QC of Diffusion Tube Monitoring

In 2020 the Local Authority made use of 54 Nitrogen Dioxide 'Palmes type' passive diffusion tubes. Effort was made to expose them over a period of one month, in accordance with the 2020 Diffusion Tube Monitoring Calendar. However, due to unavoidable COVID-19 related disruption it was not possible for the Local Authority to abide by the published diffusion tube collection periods, at all times in 2020. In the only departure from normal practice, for the period between March and June 2020 a single exposure period was observed.

Collected Nitrogen Dioxide passive diffusion tubes were analysed by SOCOTEC Ltd's Didcot Laboratory using in-house laboratory method HS/WI/1015 issue 15, 20% TEA in water method. The analysis was in accordance with their United Kingdom Accreditation Service [UKAS] schedule, with laboratory performance evaluated via the AIR Proficiency Testing Scheme[16]; achieving the highest rank of "satisfactory" [52].

12.1.1 Diffusion Tube Bias Adjustment Factors

It has been shown that passive diffusion tubes require bias correction in accordance with guidance to maximise their accuracy. The quoted desired accuracy for the measurement of NO_2 is 15%; the use of a bias factor from a suitable co-location study ensures that passive diffusion tube measurements attempt to meet this requirement.

Table C.1 below provides the collated local bias adjustment factors derived and provided by other users of the Nitrogen Dioxide diffusion tube monitoring method and laboratory, used by the Local Authority, as well as a statistically derived overall national bias adjustment factor [49].

[16] Formerly the Workplace Analysis Scheme for Proficiency [WASP]

Table C.1: National Diffusion Tube Bias Adjustment Spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 06/21

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of Sept 2021

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	**Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.**
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method To undo your selection, choose (All) from the pop-up list	Year[2] To undo your selection, choose (All)	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
SOCOTEC Didcot	20% TEA in water	2020	R	Rhondda Cynon Taf CBC	9	29	23	22.9%	G	**0.81**
SOCOTEC Didcot	20% TEA in water	2020	KS	Marylebone Road Intercomparison	11	57	43	32.7%	G	**0.75**
SOCOTEC Didcot	20% TEA in water	2020	R	Fife Council	9	22	13	64.5%	G	**0.61**
SOCOTEC Didcot	20% TEA in water	2020	R	Fife Council	9	22	17	31.4%	G	**0.76**
SOCOTEC Didcot	20% TEA in water	2020	R	South Oxfordshire District Council	11	32	29	13.5%	G	**0.88**
Socotec Didcot	20% TEA in water	2020	R	New Forest DC	9	27	18	46.3%	G	**0.68**
SOCOTEC Didcot	20% TEA in water	2020		**Overall Factor[3] (6 studies)**				**Use**		**0.74**

12.1.2 Factor from Local Co-location Studies

A Local Co-location Bias factor has also been produced, in recent years, by co-locating three passive diffusion tubes at the automatic NO_2 monitoring site located at Site No. 70 (Broadway), for the length of the study period. It is believed that Site No. 70 (Broadway) reflects conditions commonly encountered across Rhondda Cynon Taf. The monitoring site is also maintained to standards observed within the AURN network and annually independently audited by consultants acting on behalf of the WAQF. The data set produced by the local co-location study, in 2020, has been described by the AEA_DifTPAB_vo4.xls spreadsheet [50] as good, with the completed spreadsheet reproduced in Table C.2 below.

Table C.2 – Spreadsheet checking precisions and accuracy of colocation study

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	04/12/2019	08/01/2020	34.3	37.4	40.5	37	3.1	8	7.7	27.52	99.2	Good	Good
2	08/01/2020	05/02/2020	40.4	37.8	38.3	39	1.4	4	3.4	32.53	99.0	Good	Good
3	05/02/2020	04/03/2020	28.2	32.9	28.0	30	2.8	9	6.9	25.77	99.3	Good	Good
4	04/03/2020	01/04/2020								19.80	99.7		Good
5	01/04/2020	29/04/2020								11.04	99.9		Good
6	29/04/2020	03/06/2020								12.36	99.6		Good
7	03/06/2020	01/07/2020								13.89	99.3		Good
8	01/07/2020	29/07/2020		20.4	18.6	20	1.3	7	11.4	12.39	99.7	Good	Good
9	29/07/2020	02/09/2020	20.5	21.9	21.5	21	0.7	3	1.8	16.03	99.9	Good	Good
10	02/09/2020	30/09/2020	25.7		24.1	25	1.1	5	10.2	19.95	99.9	Good	Good
11	30/09/2020	04/11/2020	32.0	25.2	25.3	28	3.9	14	9.7	21.66	99.8	Good	Good
12	04/11/2020	02/12/2020	32.3	34.8	34.1	34	1.3	4	3.2	26.34	99.6	Good	Good
13	02/12/2020	06/01/2021	29.8	25.3	23.3	26	3.3	13	8.3	28.56	99.9	Good	Good
											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

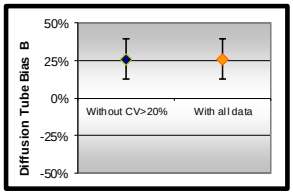
Site Name/ ID:	Tubes 47, 48, 50

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

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.73 - 0.91)
Bias B	23% (10% - 36%)
Diffusion Tubes Mean:	29 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	23 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (21 - 26) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 9 periods of data	
Bias factor A	0.81 (0.73 - 0.91)
Bias B	23% (10% - 36%)
Diffusion Tubes Mean:	29 µgm^{-3}
Mean CV (Precision):	7
Automatic Mean:	23 µgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	23 (21 - 26) 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

12.1.3 Discussion of Choice of Factor to Use

Table C.3 lists the local bias factors [Bias A + B] derived from the local co-location study since 2004, as well as the nationally aggregated mean bias factors [49], and their range, for comparison.

Table C.3– Bias Correction Factors for NO_2 Passive Diffusion Tubes

Year	Local Bias Factor [Bias A]	Local Precision Bias [Bias B]	"Good" Data Description	National Bias	
				Factor	Range
2004	1.04	-	✓	0.91	(0.68 – 1.18)
2005	0.98	-	✓	0.97	(0.79 – 1.27)
2006	1.08	-	✓	0.98	(0.87 – 1.07)
2007	1.10	-9	✓	0.89	(0.74 – 1.00)
2008	1.00	0	✓	0.91	(0.79 – 1.00)
2009	1.11	-10	✓	0.90	(0.62 – 1.28)
2010	1.00	0	✓	0.92	(0.61 – 1.20)
2011	1.06	-6	✓	0.89	(0.62 – 1.12)
2012	0.96	4	✓	0.97	(0.58 – 1.32)
2013	1.07	-6	✓	0.85$^{\lambda}$	(0.75 – 1.07)
2014	0.90	11	✓	0.79$^{\lambda}$	(0.77 – 0.90)
2015	0.96	4	✓	0.81$^{\lambda}$	(0.73 – 0.96)
2016	1.0	0	✓	0.83$^{\lambda}$	(0.74 – 1.00)

Year	Local Bias Factor [Bias A]	Local Precision Bias [Bias B]	"Good" Data Description	National Bias	
				Factor	Range
2017	0.91	10	✓	0.74[λ]	(0.65 – 0.91)
2018	0.95	18	✓	0.74[λ]	(0.59 – 0.91)
2019	0.83	20	✓	0.77	(0.66 – 0.86)
2020	0.81	23	✓	0.74	(0.61 – 0.88)

[λ] it is noted that only two comparative results are available, this very limited number would be expected to increase the uncertainty of the National Bias Factor.

In general terms, it may be considered that a national bias factor may be less influenced by certain types of non-fixed systematic error or otherwise may moderate aberrational errors that could highly influence one-off monitoring studies. However, a local bias factor may more likely reflect particular local climatic and regional influences, potentially improving the accuracy of the bias factor. In addition, the Local Authority has a number of years of local bias factors to draw upon, providing context to any particular year and helping to identify unusual results.

Historically only a very few studies made up the national bias factor, weakening its main advantage and leading to the routine use of the local bias factor. Given the importance of maintaining continuity with previous years and the fact the local bias factor for 2020 is comparable with, in the range of and conservative to the national bias factor it has been determined that use of the local bias factor would ensure the greatest accuracy and interpretability.

Unless specifically stated all passive diffusion tube results have been corrected using the local bias factor [Bias A] for the respective year. NO_2 passive diffusion tube results may quote Bias B for the relevant year in brackets after the recorded result. Users of this data should not re-correct the data.

12.2 Short-Term to Long-Term Data Adjustment

Data Capture is an important element in the interpretation of results. Guidance recommends that 90% data capture over a calendar year is required to facilitate the greatest accuracy in assessment of the concentration of the pollutant. In some instances it has not been possible to reach this threshold; nonetheless, where data capture is still proximal to 90% accurate inference can still be made. Where data capture is significantly less than 90% interpretation may still be possible with the use of mathematical techniques to extrapolate a more robust result. In circumstances where data capture is less than a specified percentage for the technique, the Extrapolated Annual Mean has been derived by interpolation in accordance with the methods detailed within LAQM.TG(16); where undertaken this data manipulation has been recorded in Table C.4 below.

Table C.4 – Short-Term to Long-Term Monitoring Data Adjustment

Site	Average Annualization Factor	Raw Data Annual Mean (µg/m^3)	Data Capture in 2020 (%)	Annualised Annual Mean (µg/m^3)
75	0.979664041	21.8	66.7	21.4

Site	Average Annualization Factor	Raw Data Annual Mean (µg/m^3)	Data Capture in 2020 (%)	Annualised Annual Mean (µg/m^3)
83	0.847040071	31.1	58.3	26.4
96	0.891704922	30.6	66.7	27.3
101	0.847040071	5.9	58.3	5.0
108	0.80394821	41.8	41.7	33.6
113	1.177820667	21.4	75.0	25.2
129	0.891704922	20.3	66.7	18.1
132	0.891704922	21.9	66.7	19.5
134	0.891704922	14.6	66.7	13.1

12.3 NO_2 Fall-off with Distance from the Road

It may not always be possible to measure NO_2 levels at the worst-case relevant population for a range of practical reasons. Wherever possible, the Local Authority has utilised monitoring locations that are representative of exposure, with 80% of the monitoring locations being <2.5m away. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure can be estimated, using the NO_2 fall-off with distance calculator [52], Table C.5 below provides the output of the calculator for 2020 NO_2 monitoring data.

Table C.5 – Short-Term to Long-Term Monitoring Data Adjustment

Site Name/ID	Distance (m)		NO2 Annual Mean Concentration (µg/m3)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
4	2.3	2.3	7.9	10.3	10.3	
8	6.6	7.4	14.5	24.7	24.3	
21	1.3	11.8	4.6	3.9		Error: Measured concentration must be above background concentration.
37	2.2	4.1	11.0	22.7	21.0	
41	0.6	1.8	6.2	31.0	26.0	

44	9.2	3.8	10.7	21.7	25.2	
47	5.2	3.1	9.8	20.3	21.9	
48	5.2	3.1	9.8	19.4	20.9	
50	5.2	3.1	9.8	18.9	20.3	
51	0.5	5.5	9.8	24.7	18.4	
52	1.6	1.6	7.7	32.1	32.1	
53	0.7	1.8	8.5	24.4	21.6	
55	2.2	4.0	10.7	21.9	20.3	
56	0.8	2.0	10.6	26.8	23.9	
66	0.7	2.5	9.8	23.2	20.0	
68	2.2	2.2	8.5	21.5	21.5	
69	2.5	2.9	8.5	21.3	20.8	
70	5.2	3.1	9.8	20.4	22.1	
75	2.7	3.0	8.5	21.3	21.0	
76	2.4	2.4	14.5	20.8	20.8	
79	3.7	3.7	9.8	22.8	22.8	
80	0.5	3.2	8.7	20.1	16.4	

81	2.0	2.0	12.1	21.4	21.4	
82	1.6	3.2	9.3	19.4	17.8	
83	2.4	2.4	12.1	26.4	26.4	
84	1.5	1.5	12.1	31.4	31.4	
85	1.7	2.4	9.5	22.7	21.7	
88	2.2	2.2	8.5	21.0	21.0	
90	1.2	1.5	9.9	24.3	23.6	
91	1.5	1.5	7.8	37.8	37.8	Predicted concentration at Receptor within 10% the AQS objective.
93	2.1	2.1	6.1	29.0	29.0	
96	1.5	1.5	7.7	27.4	27.4	
97	2.5	2.9	7.7	45.7	44.3	Predicted concentration at Receptor above AQS objective.
101	N/A	N/A	6.3	5.0		Error: Measured concentration must be above background concentration.
103	N/A	N/A	7.5	5.6		Error: Measured concentration must be above background concentration.
105	N/A	N/A	7.6	5.9		Error: Measured concentration must be above background concentration.
106	1.7	1.7	8.7	26.8	26.8	
107	1.8	1.8	6.1	22.9	22.9	
108	3.3	9.6	10.6	33.7	27.2	

110	1.6	2.0	12.7	18.6	18.3	
111	0.5	0.5	7.7	26.9	26.9	
113	0.6	1.0	7.3	25.1	23.4	
114	1.7	5.1	10.6	18.4	16.5	
117	0.6	1.5	7.8	35.6	30.9	
118	1.3	3.0	7.8	45.1	38.5	Predicted concentration at Receptor within 10% the AQS objective.
120	8.0	2.1	12.1	25.1	31.1	
122	2.0	2.6	7.3	22.5	21.6	
124	1.6	1.6	6.9	17.4	17.4	
128	1.5	1.9	11.3	20.8	20.3	
129	2.1	3.2	9.5	18.1	17.2	
131	1.0	0.5	7.7	34.2		Predicted concentration at Receptor within 10% the AQS objective.
132	22.5	23.2	12.8	19.6	19.5	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution. Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.
134	19.8	33.7	10.3	13.1	12.3	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution. Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.

135	2.1	6.5	9.8	16.7	14.8	
136	1.8	1.8	7.0	28.1	28.1	
137	0.6	1.9	7.5	22.2	19.1	

12.4 QA/QC of Automatic Monitoring

During 2020, the Local Authority undertook automatic monitoring at four sites, with three automatic monitoring locations examining NO_2 and one automatic monitoring location examining PM_{10}.

The three automatic monitoring sites for NO_2 each made use of a Model 200E Teledyne Chemiluminescence's Nitrogen Oxides Analysers. The instruments are directly owned and controlled by the Local Authority (Site No. 70 (Broadway), Site No. 120 (Pontypridd) & Site No. 131 (Mt Ash)). Each instrument was inspected by a trained officer on a fortnightly basis with the necessary calibration checks conducted. The fortnightly calibrations were conducted using UKAS accredited Nitric Oxide [NO] calibration gas mixtures at a nominal concentration of 500ppb. The calibration method used for the AURN network and validated by external consultants contracted by the Welsh Air Quality Forum [WAQF] was used as far as possible. These fortnightly calibrations were complemented with twice yearly services by the Local Authority's service contract engineers, Enviro Technology. Additionally the station at Site No. 70 (Broadway) was audited on an annual basis by consultants working on behalf of the Welsh Air Quality Forum. All data has been processed, validated and ratified by Officers of the Local Authority in accordance to procedures set out in Guidance.

The Local Authority has also made use of an automatic monitoring analyser for PM_{10}. The Local Authority operated a Thermo Scientific 1405-F Tapered Element Oscillating Mass Balance with Filter Dynamics Measurement System [Site No. 130 (Upper Garth Avenue TEOM FDMS)]. It is directly owned and controlled by the Local Authority and is regularly inspected by a trained officer, with filter changes occurring six-weekly. These six-weekly inspections were complemented by twice yearly services by the Local Authority's service contract engineers, Air Monitors. All data gathered by Site No. 130 (Upper Garth Avenue TEOM FDMS) has been processed, validated and ratified in accordance to procedures, set out in guidance, by Officers of the Local Authority.

12.4.1 PM_{10} Monitoring Adjustment

The Local Authority operates a Thermo Scientific 1405-F Tapered Element Oscillating Mass Balance with Filter Dynamics Measurement System [Site No. 130 (Upper Garth Avenue TEOM FDMS)]. The method used involves sampling at ambient conditions, without the need for mathematical adjustment post data collection, and has been formally considered [51] as an EU equivalent method without correction.

13. Appendix D1: AQMA Boundary Maps

Figure D.1: Aberdare Town Centre Air Quality Management Area

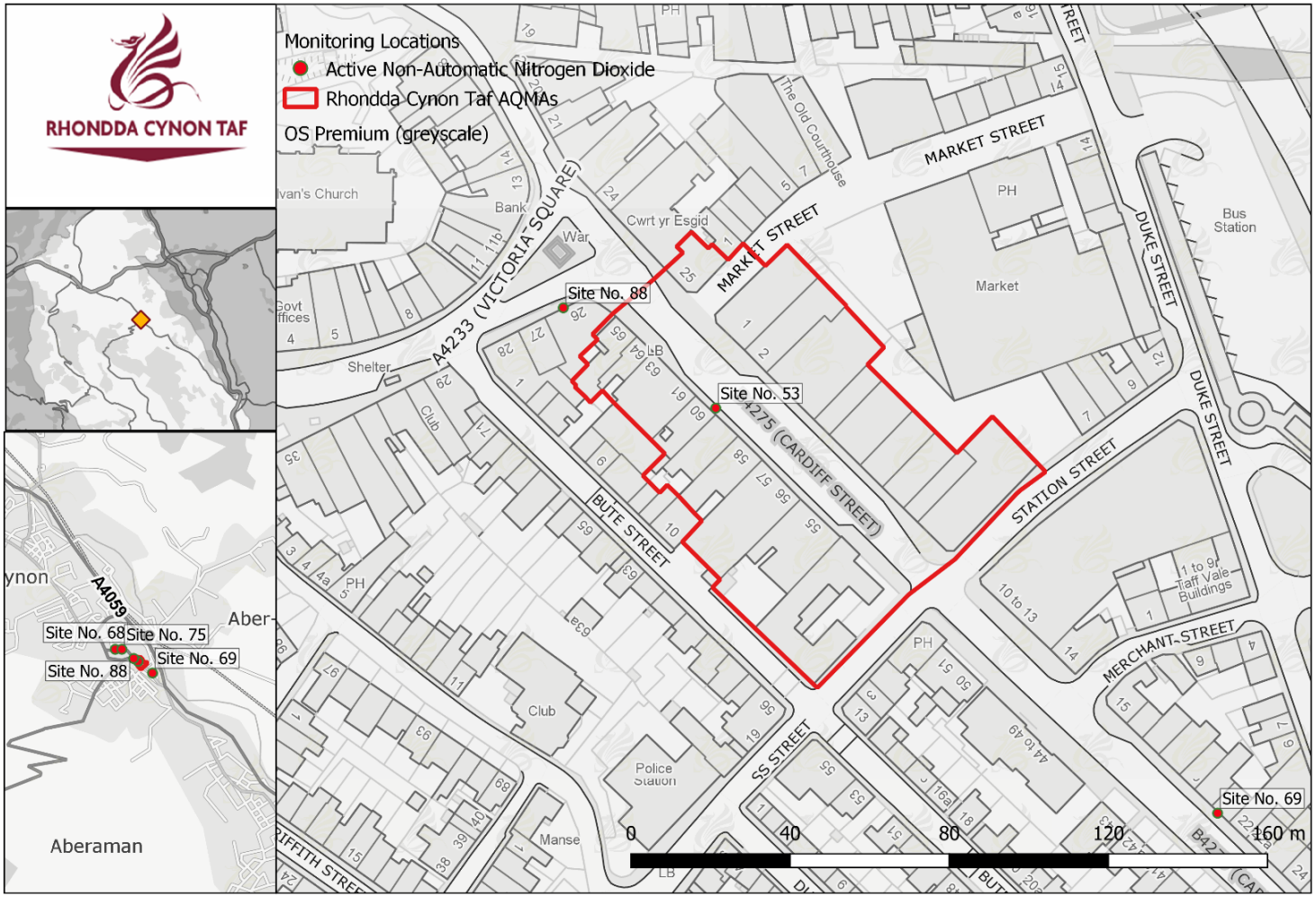


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Figure D.2: Broadway Air Quality Management Area

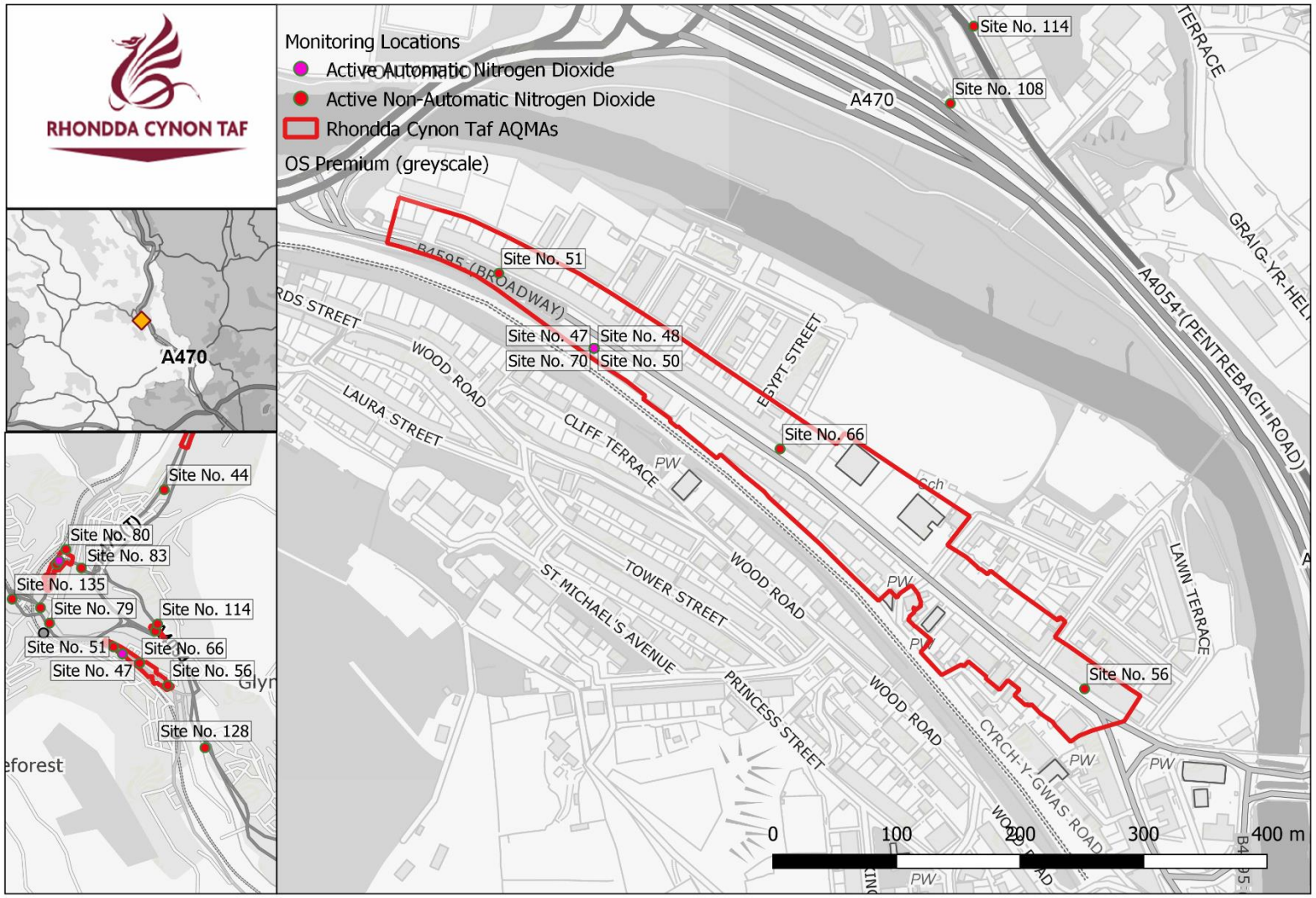

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Figure D.3: Church Village Air Quality Management Area

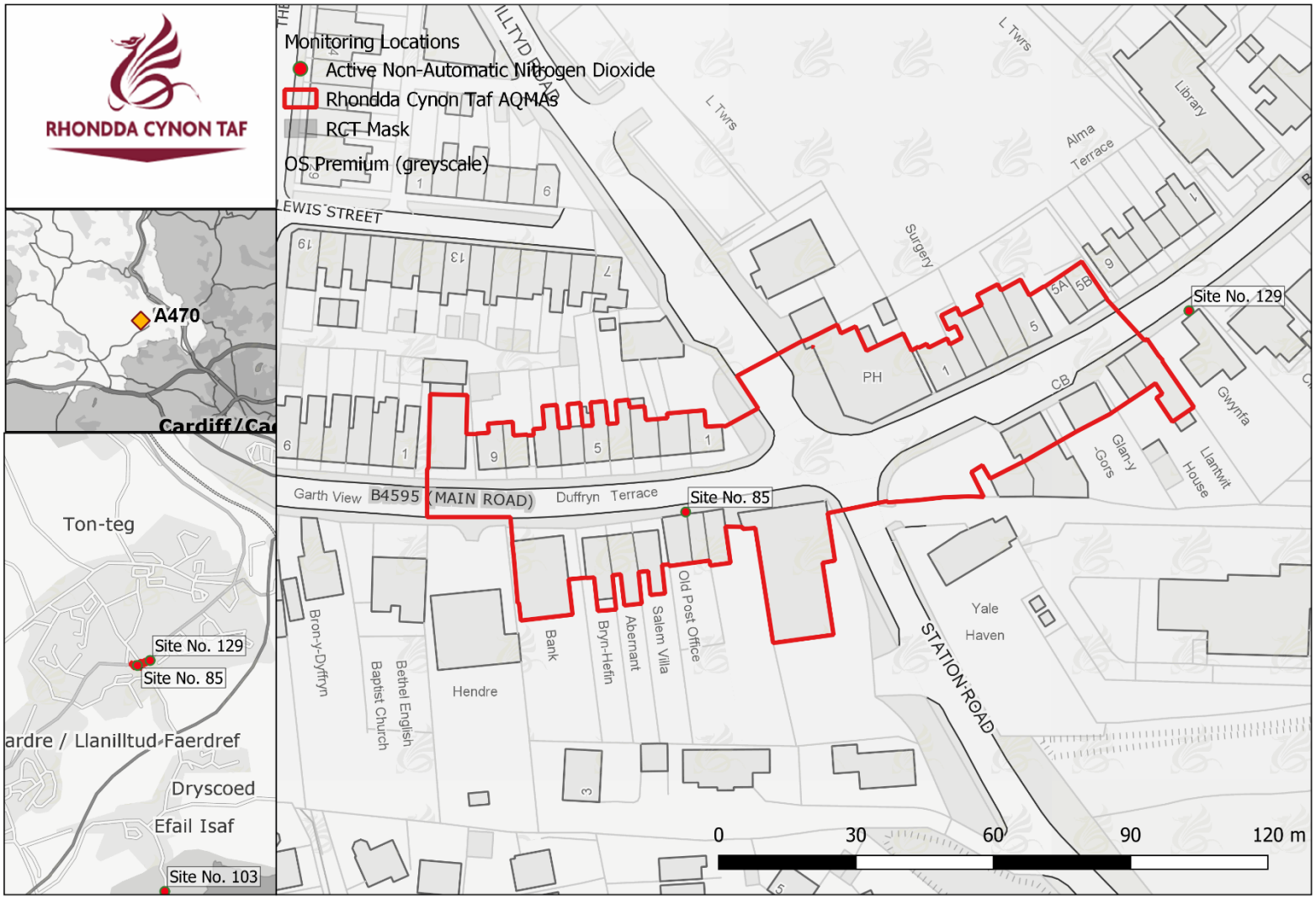

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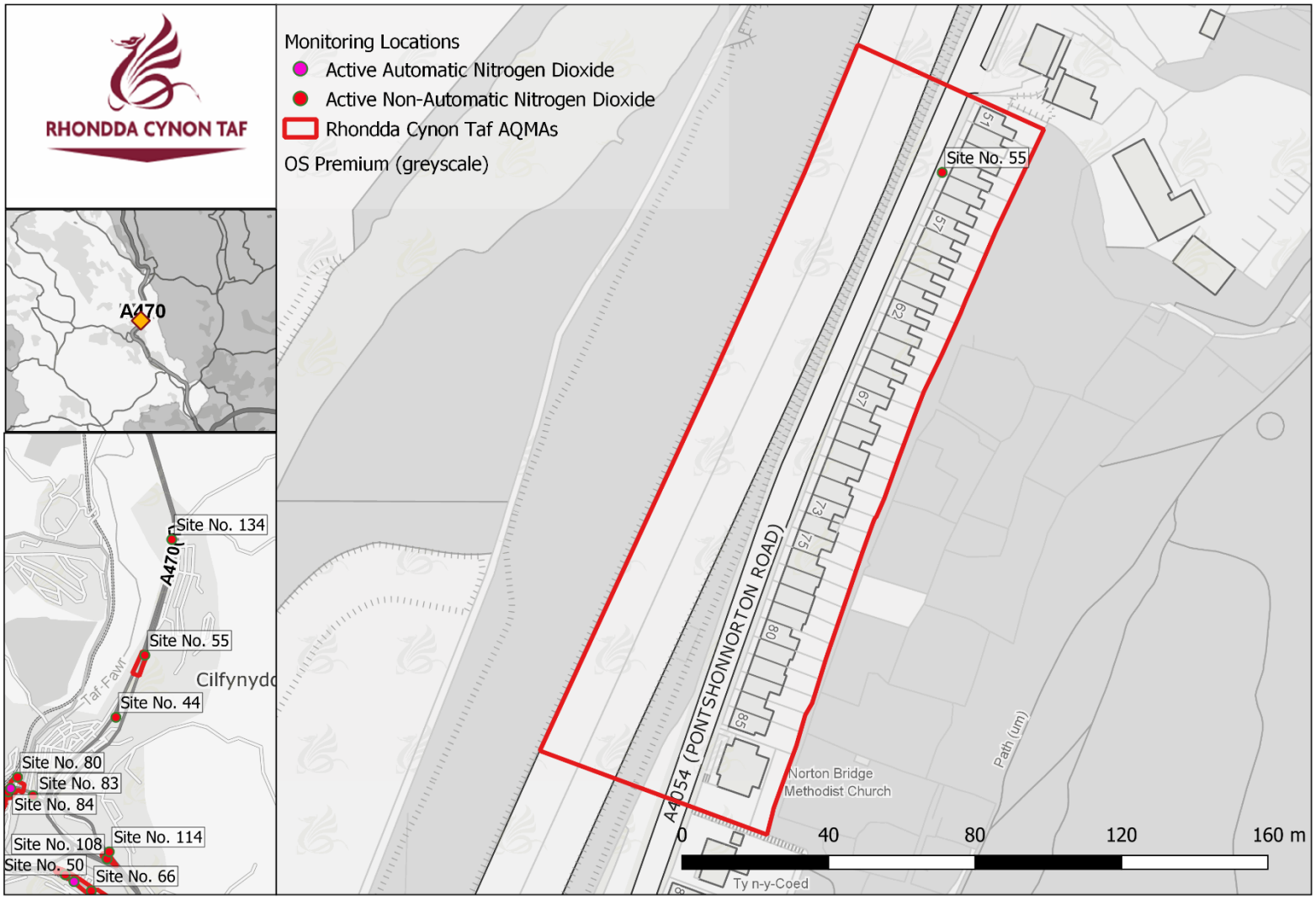
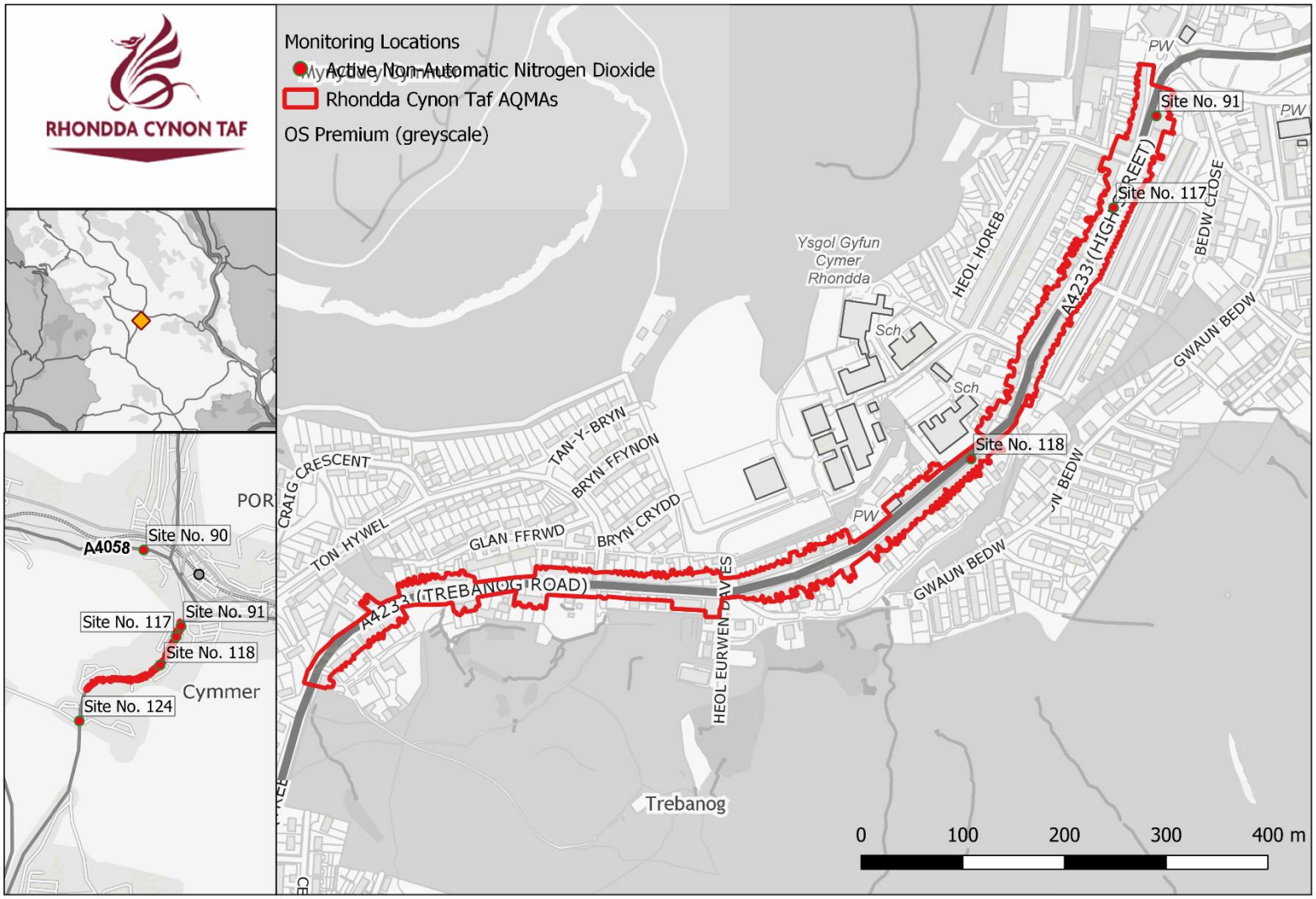
Figure D.4: Cilfynydd Air Quality Management Area



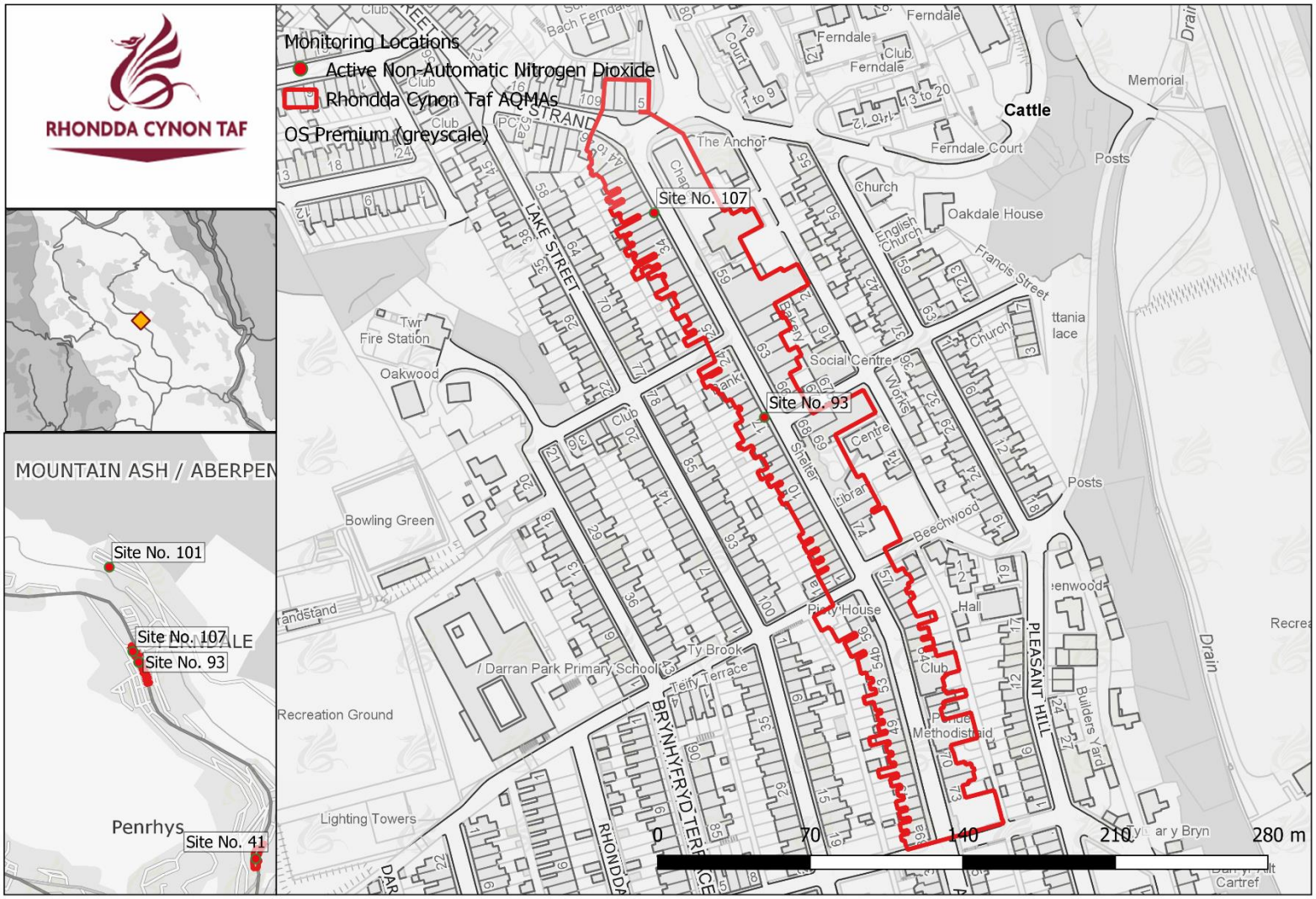
Created using QGIS GIS. Open Source Geospatial Foundation Project. http://qgis.osgeo.org

Figure D.5: Cymmer Air Quality Management Area



Created using QGIS GIS. Open Source Geospatial Foundation Project. http://qgis.osgeo.org

Figure D.6: Ferndale Air Quality Management Area



Created using QGIS GIS. Open Source Geospatial Foundation Project. http://qgis.osgeo.org

Figure D.7: Llanharan Air Quality Management Area

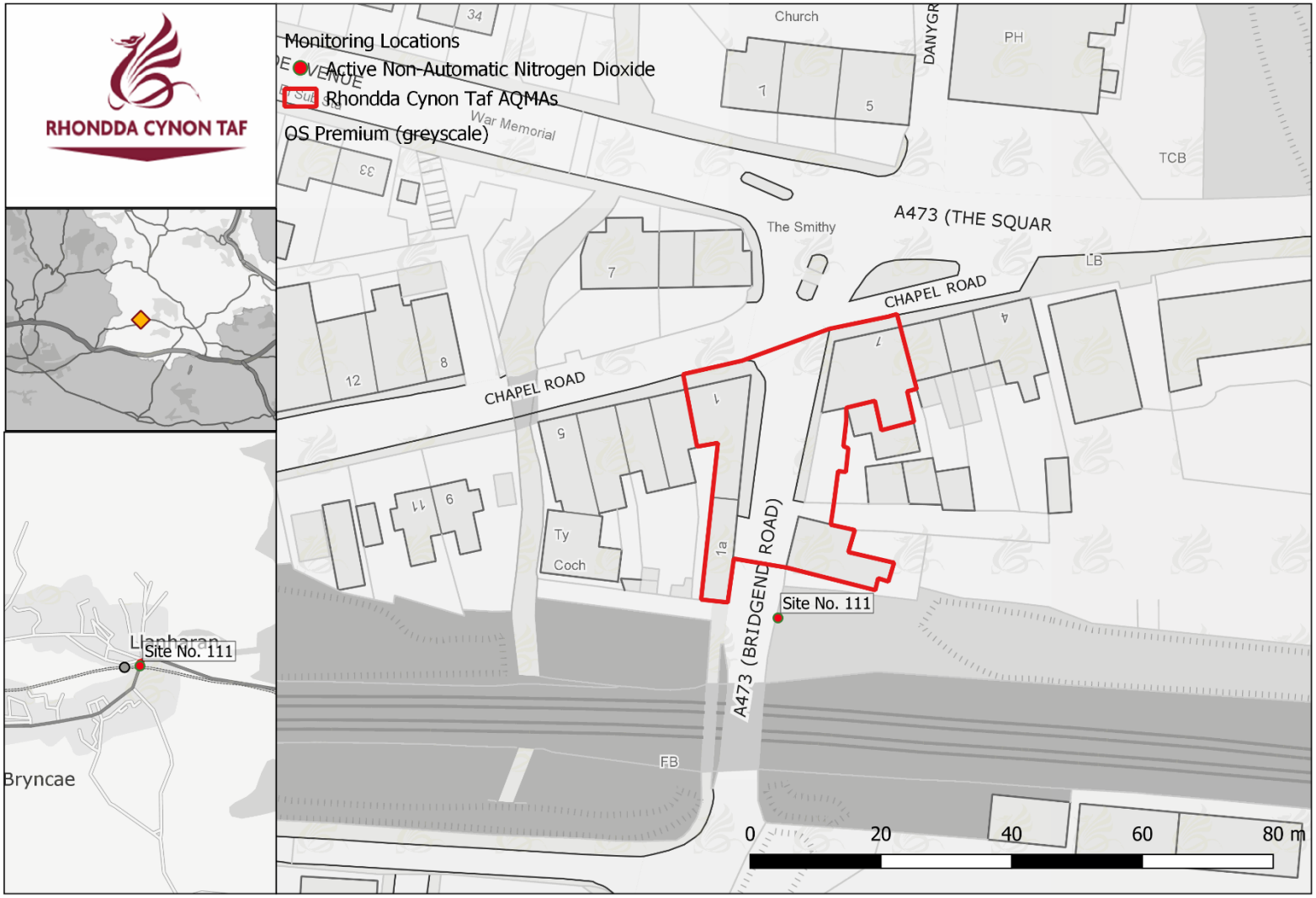


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Figure D.8: Llwynypia Air Quality Management Area

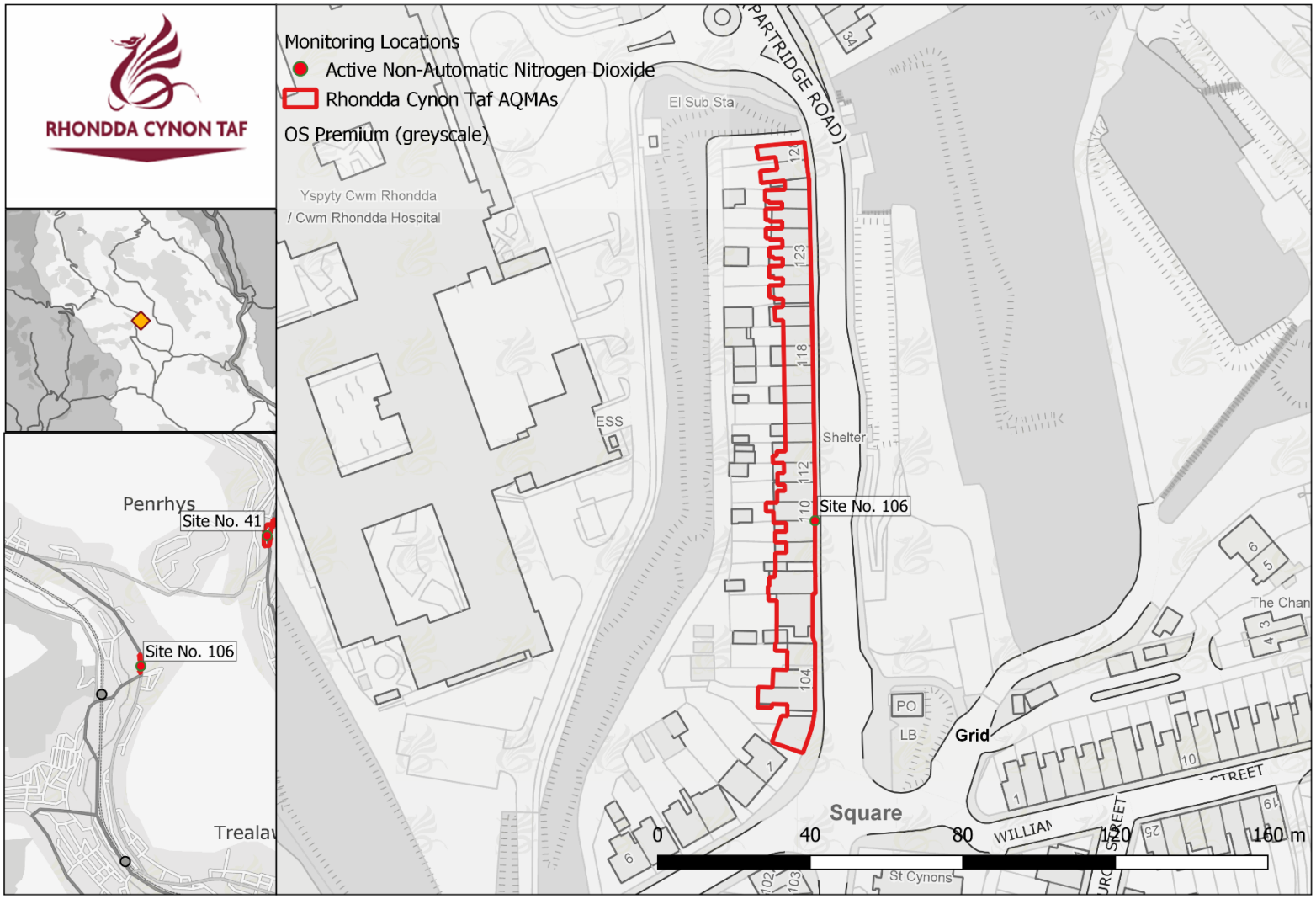

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Figure D.9: Mt Ash Town Centre Air Quality Management Area

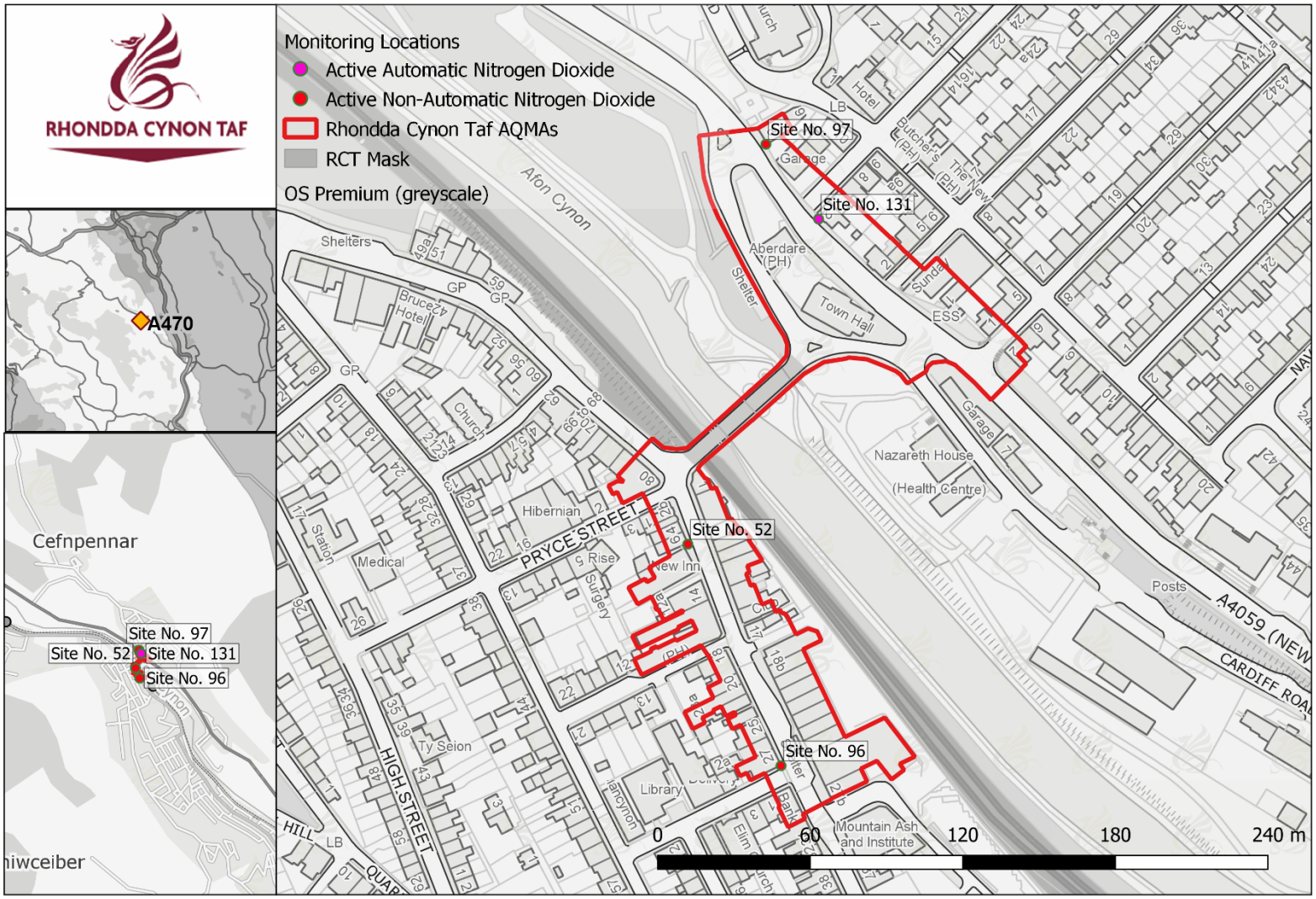

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Figure D.10: Mwyndy Air Quality Management Area

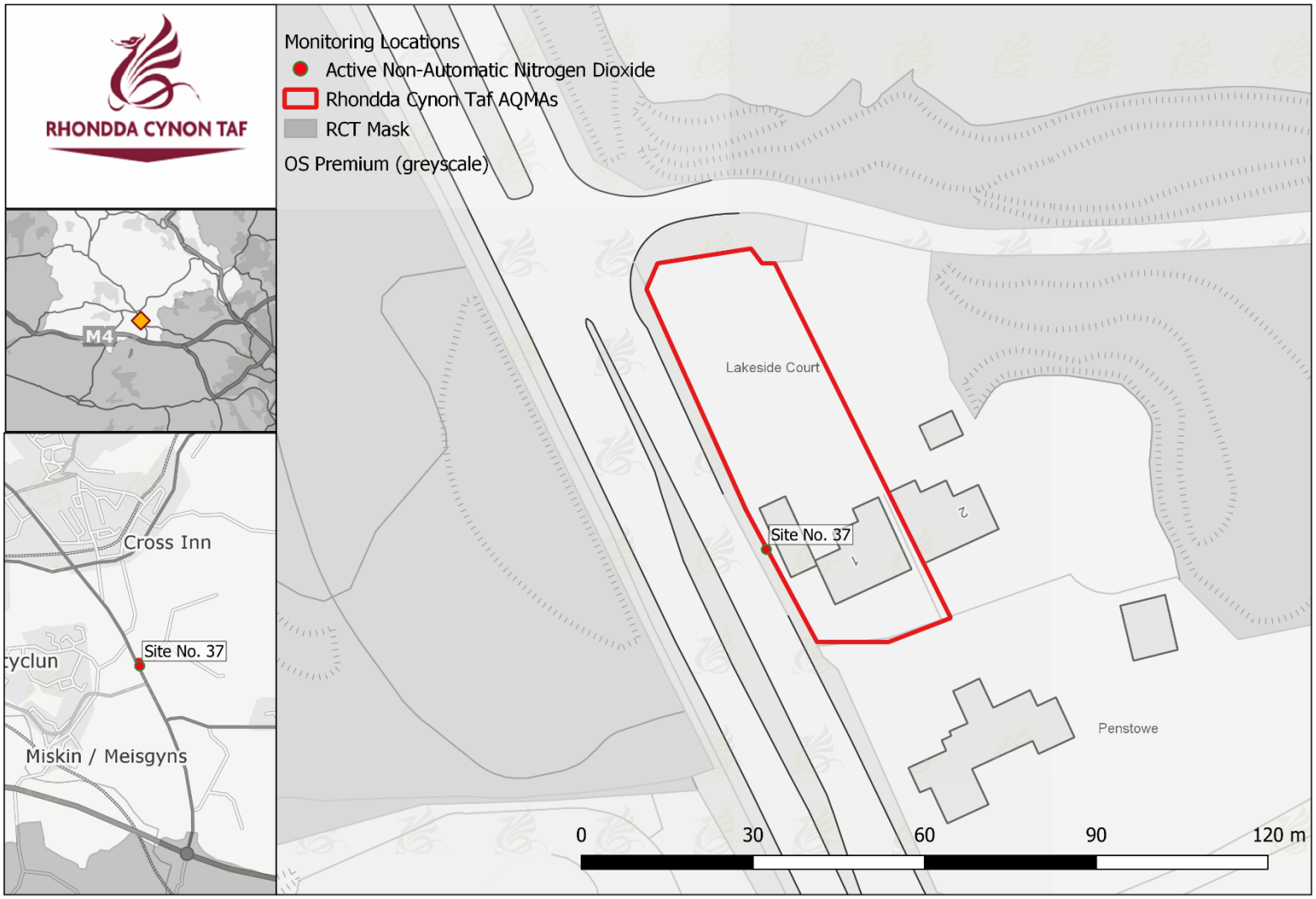

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Figure D.11: Nantgarw Air Quality Management Area

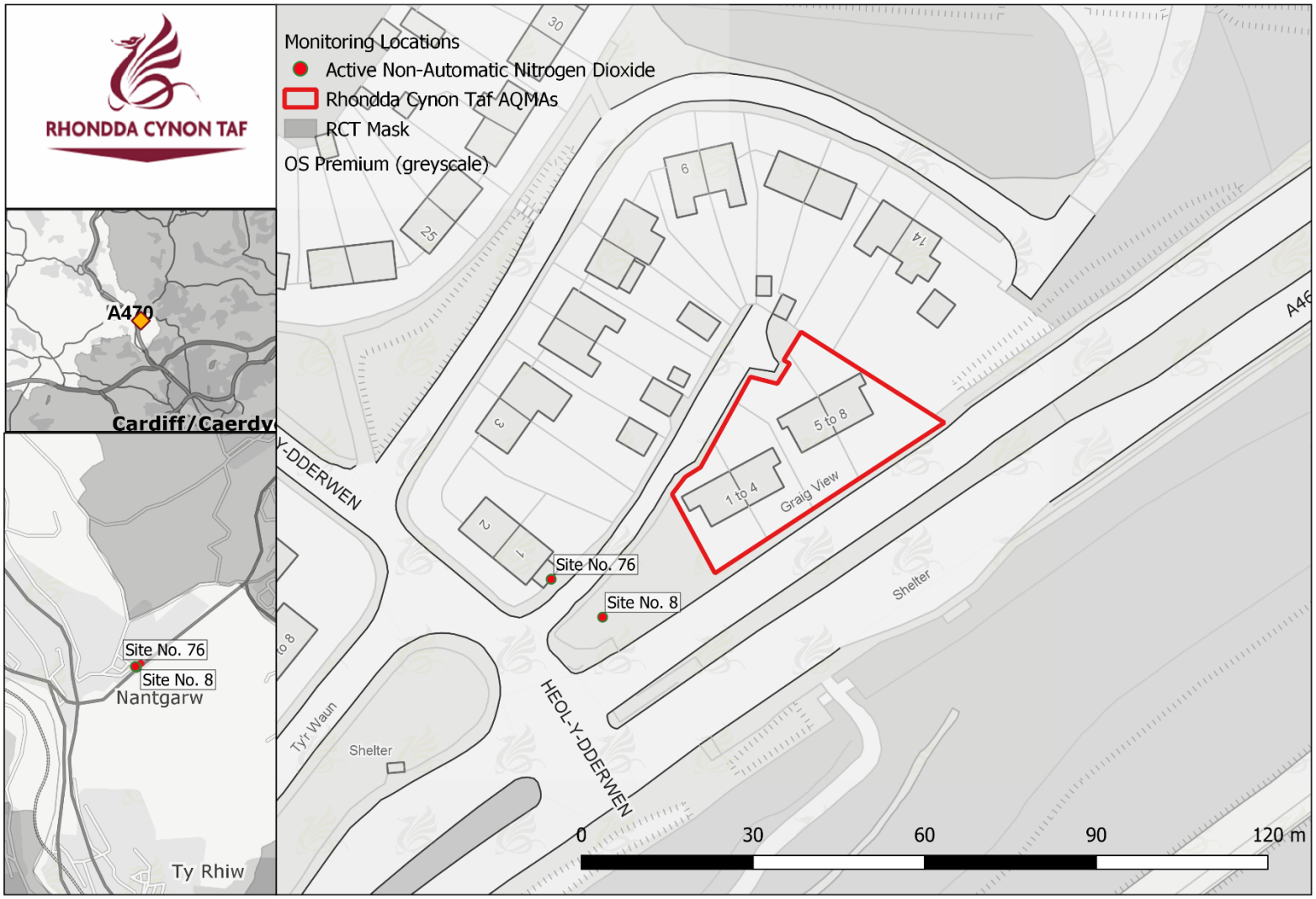

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Figure D.12: Nightingales Bush Air Quality Management Area

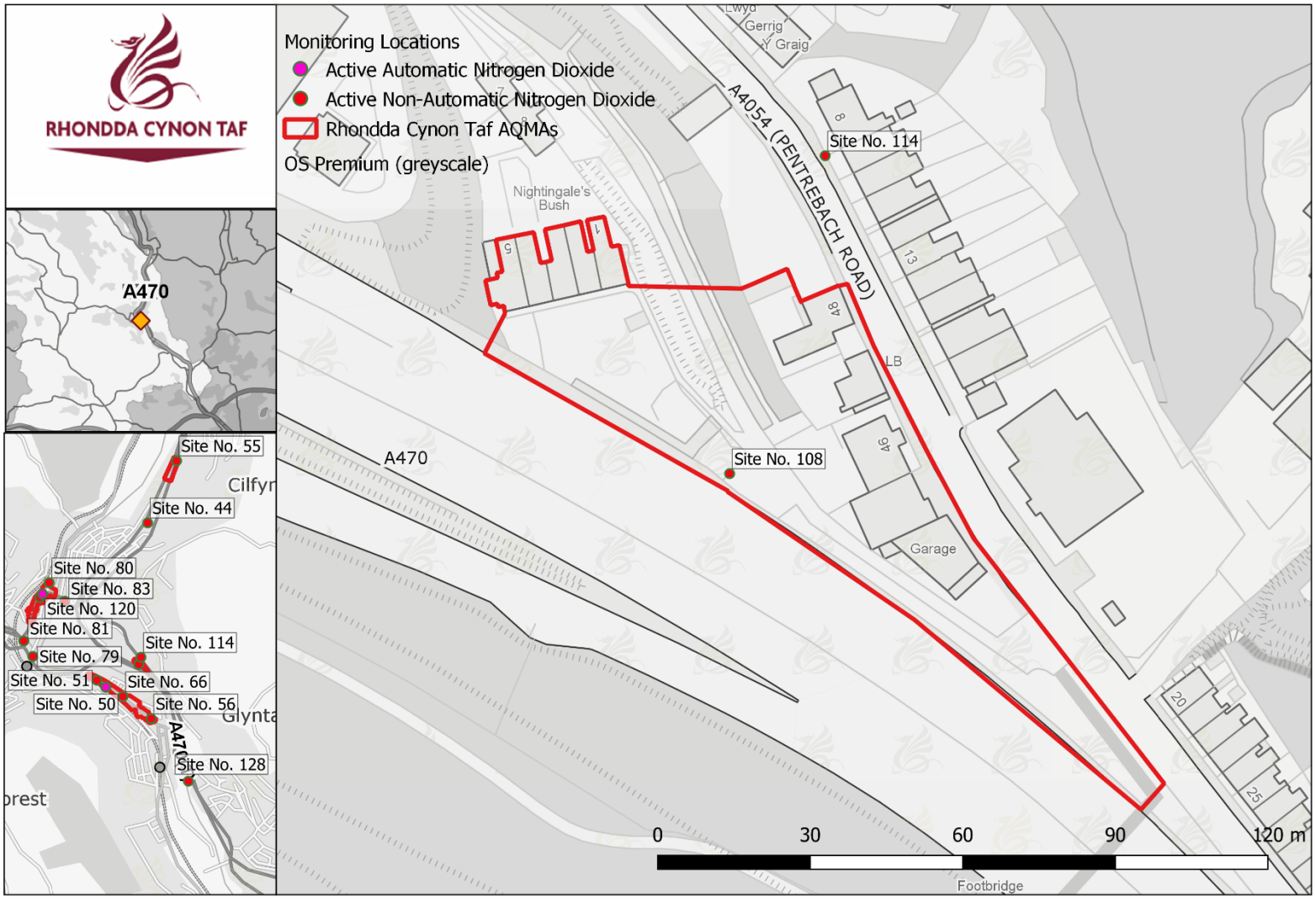

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Figure D.13: Pontypridd Town Centre Air Quality Management Area

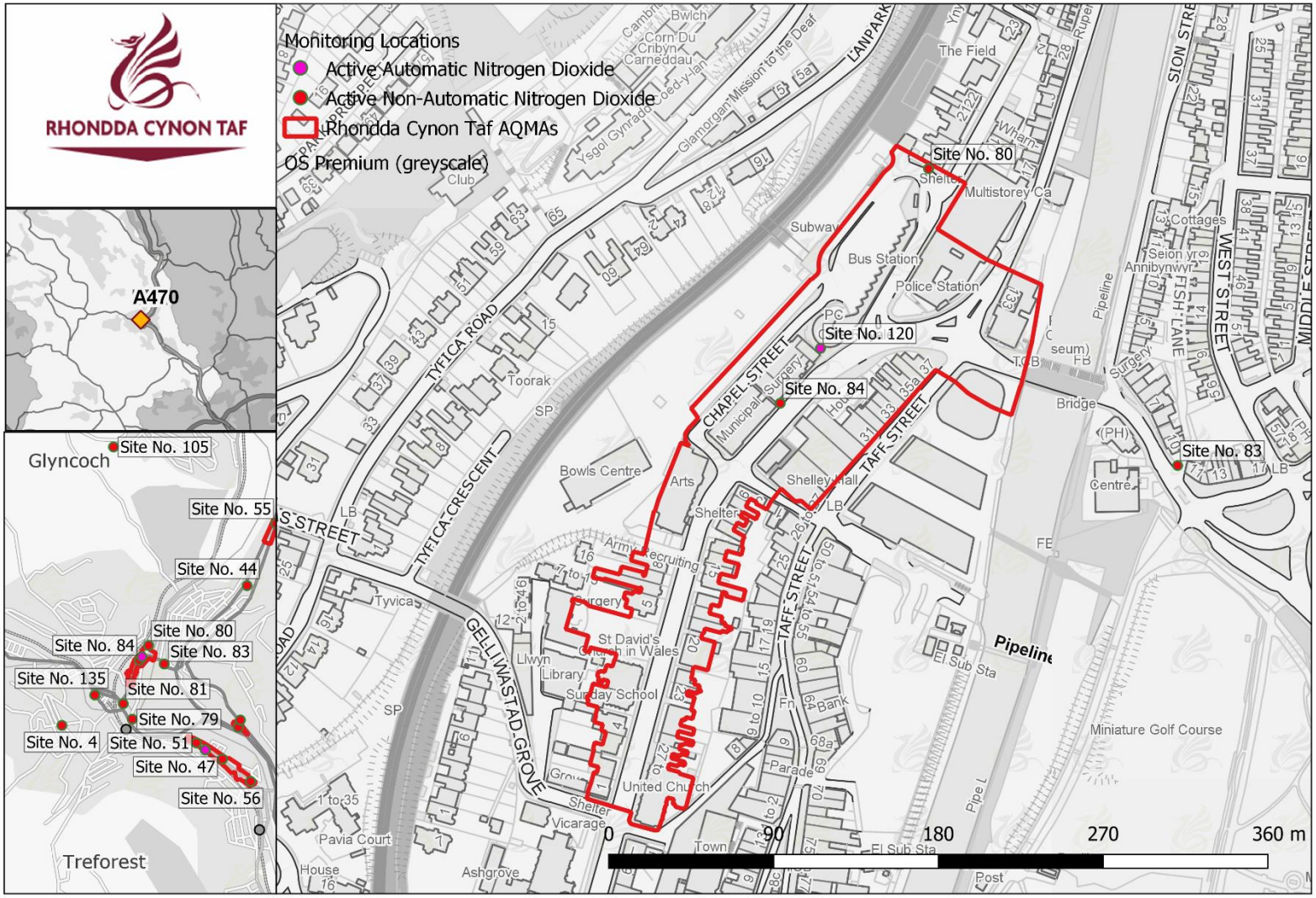

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Figure D.14: Tonyrefail Air Quality Management Area

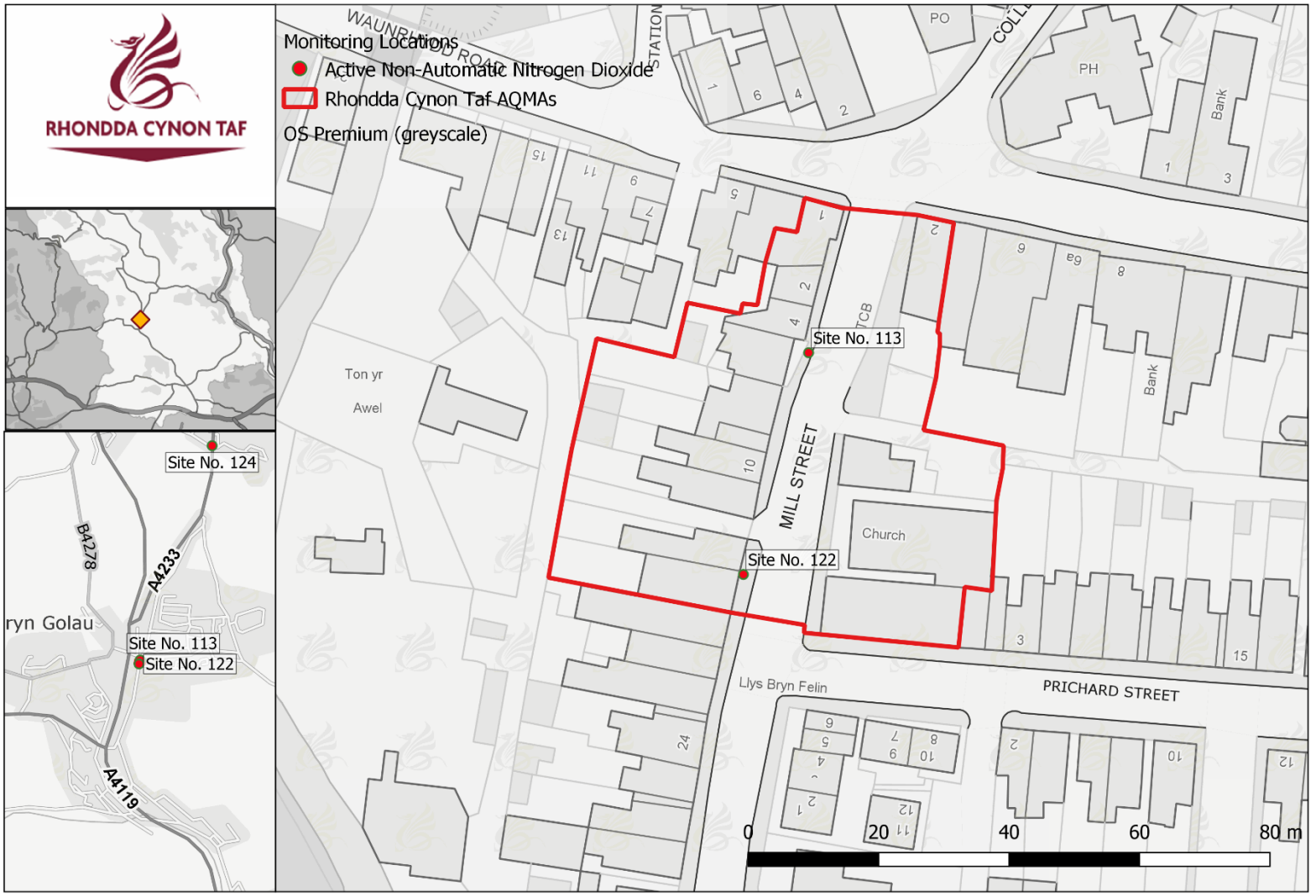

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Figure D.15: Treforest Air Quality Management Area

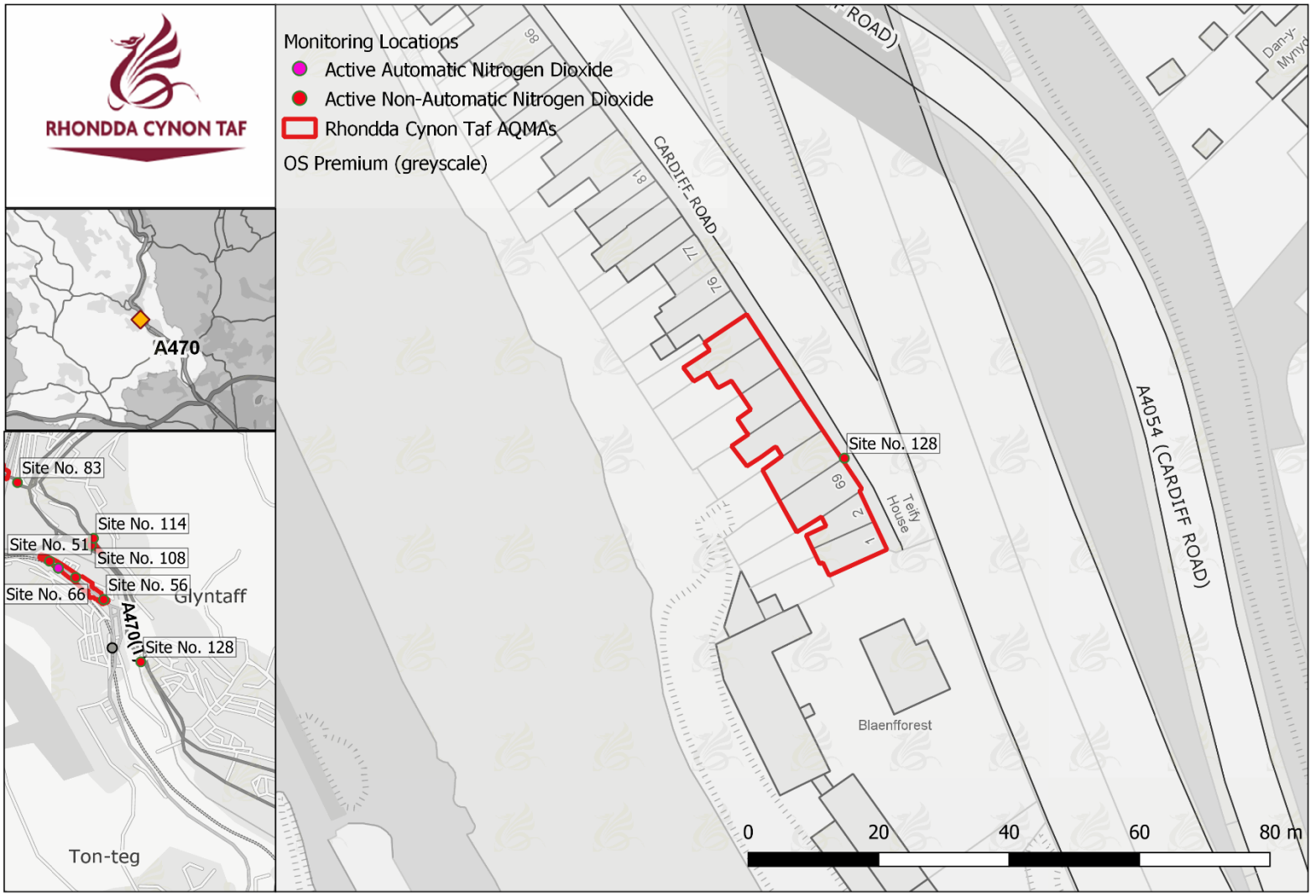

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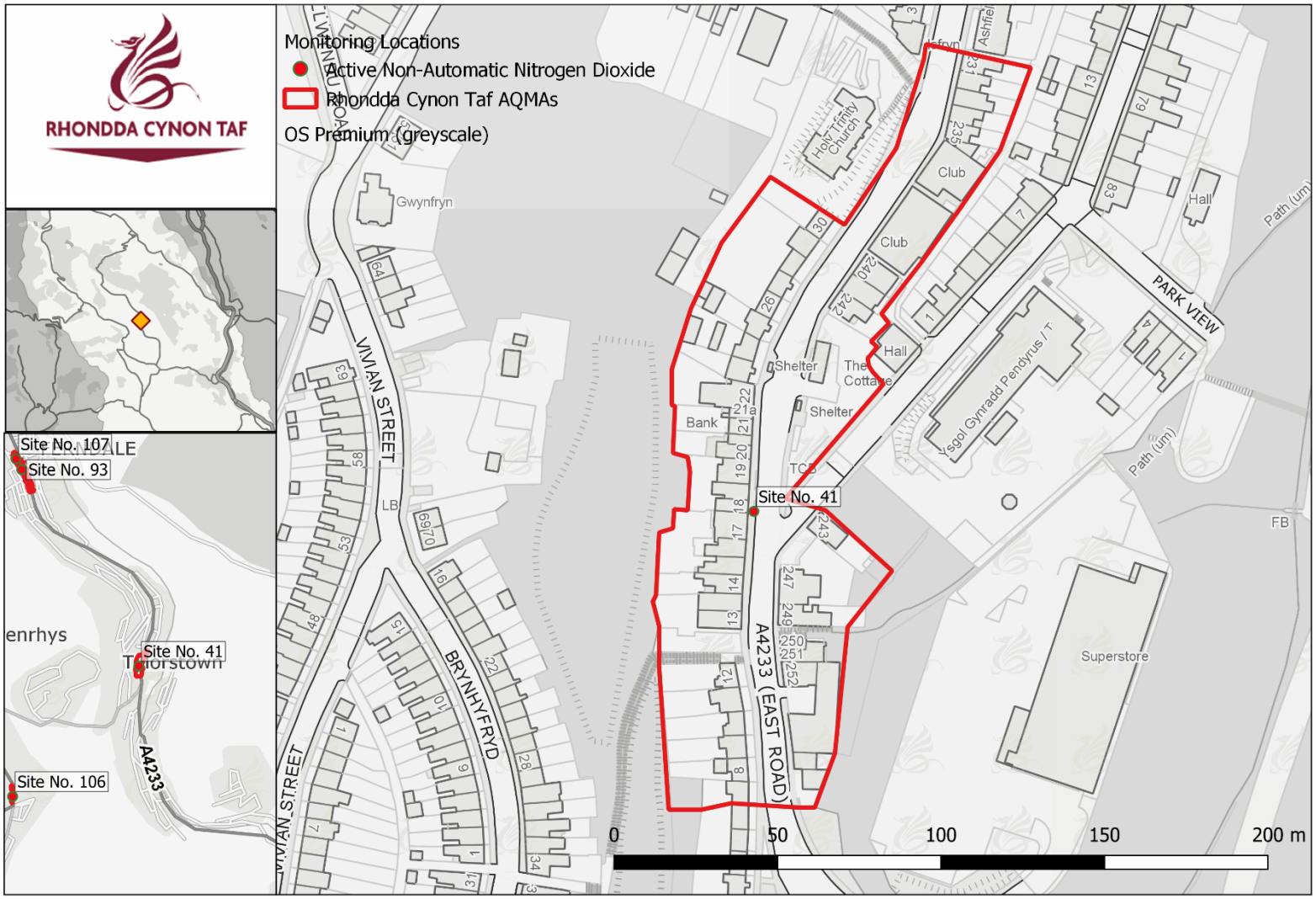
Figure D.16: Tylorstown Air Quality Management Area



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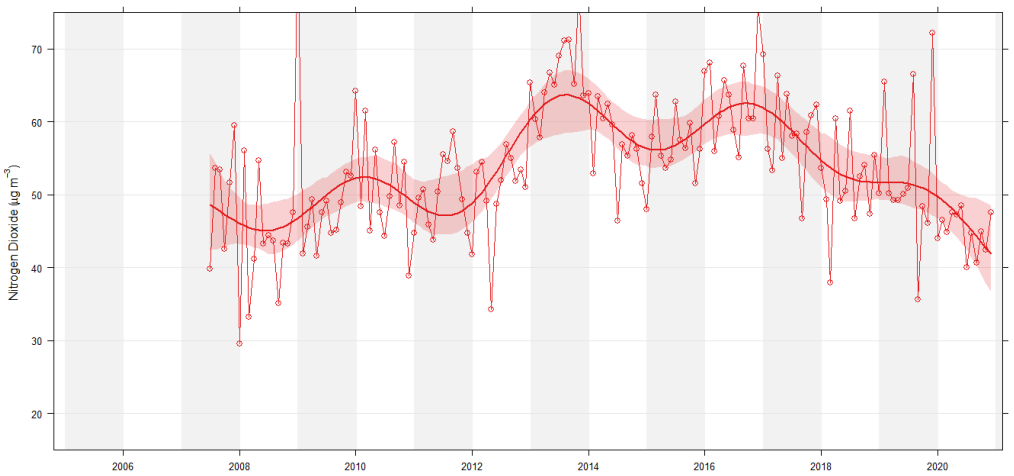
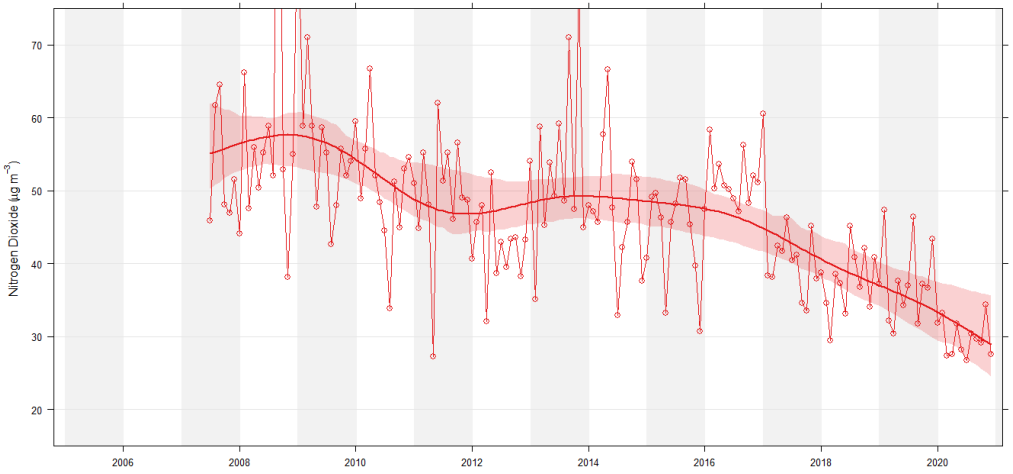
14. Appendix D2: AQMA Trends

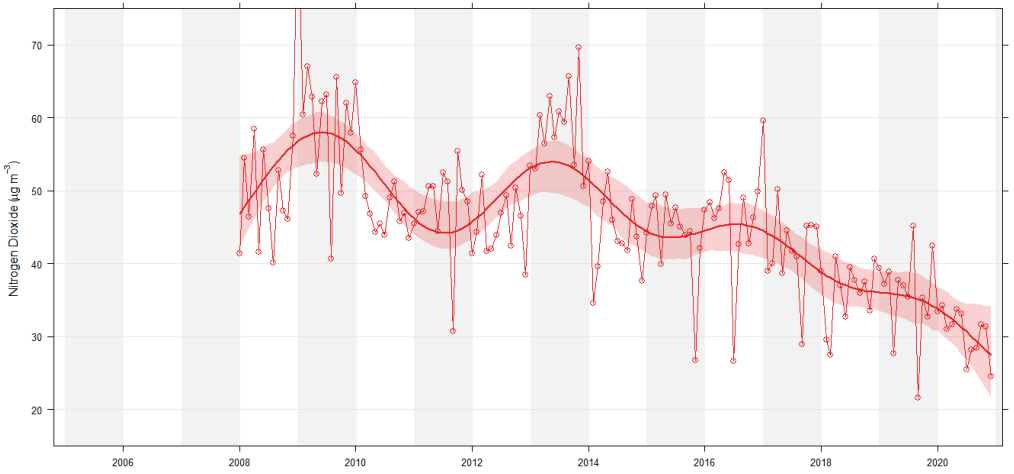
Table 14.1 below contains information on the current trends in NO_2 within each AQMA, including consideration of both the longer-term 15-year trend and a quantification of the nearer-term 5-year trend, which often gives more bearing to recent events which may be more relevant when considering the immediate future. Also provided is an assessment of the likely improvement in levels of NO_2 that may be necessary to achieve compliance to the relevant AQOs for NO_2 as well as, should current trends persist, a projection of when compliance may be achieved.

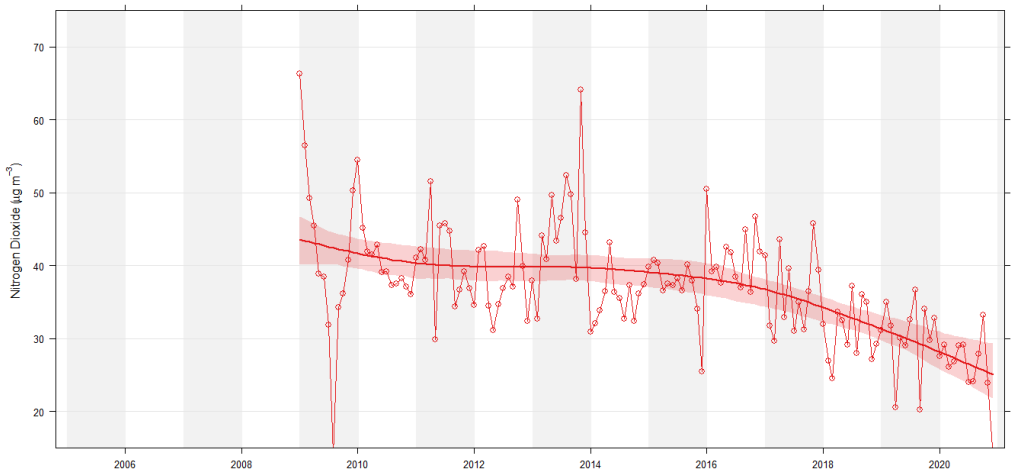
The emergence and response to COVID-19, throughout 2020 and beyond, has resulted in well documented economic, societal disruption and change with resultant dramatic impacts on local air quality. As the near and longer-term implications remain unclear, the understanding normally gained from the near-term 5-year trend, along with future compliance prediction and more generally many of the influences upon local air quality may, at present, be significantly limited. Although reported here to provide continuity and enable the possible inference of what may occur in the future, the relevance of this analysis is significantly curtailed until longer term implications of current events are more fully understood

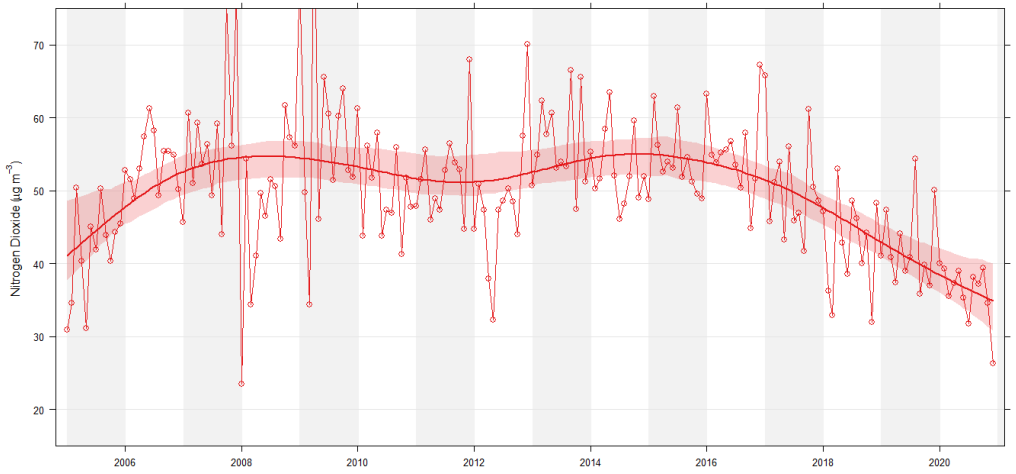
Table 14.1: Trend in NO_2 within each AQMA

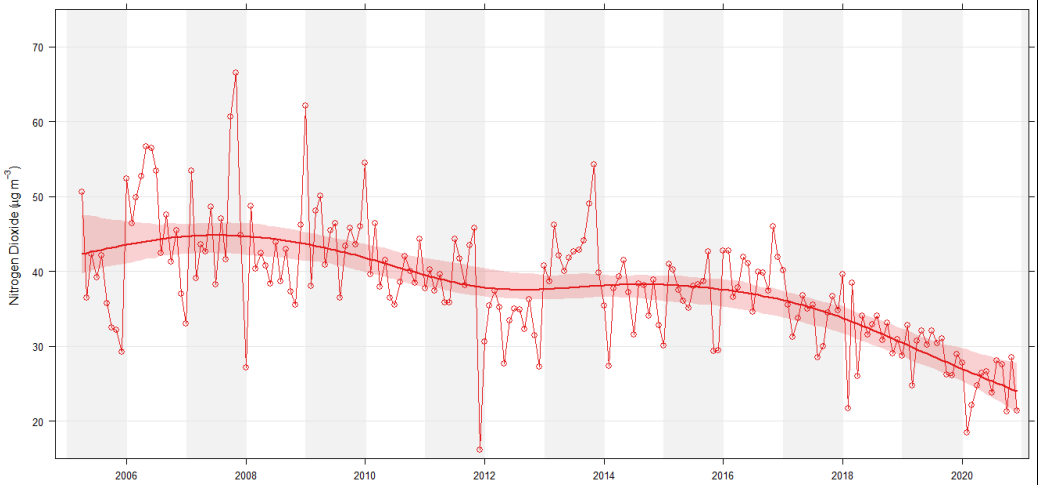
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
Rhondda	Cymmer	29.5	 no clearly established trend	-4.8	8+

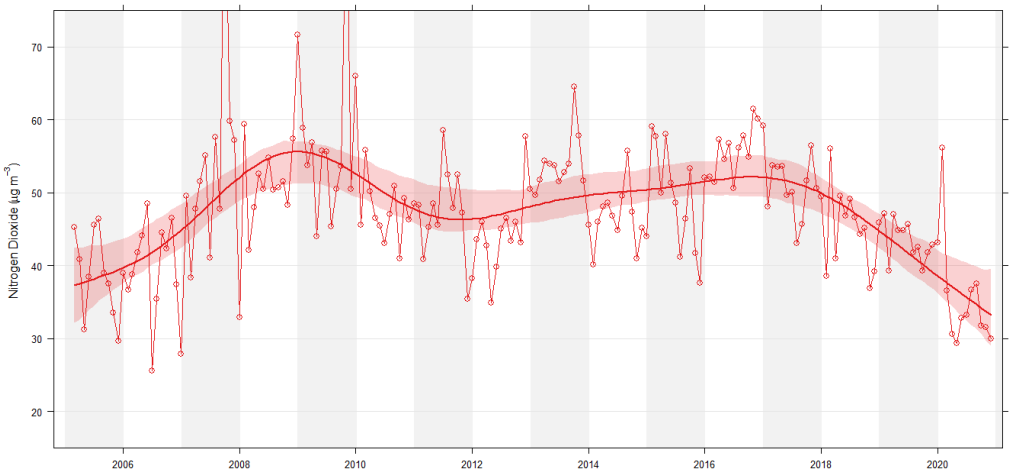
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Ferndale	2.1	 consistent moderate improving trend	-7.2	1+

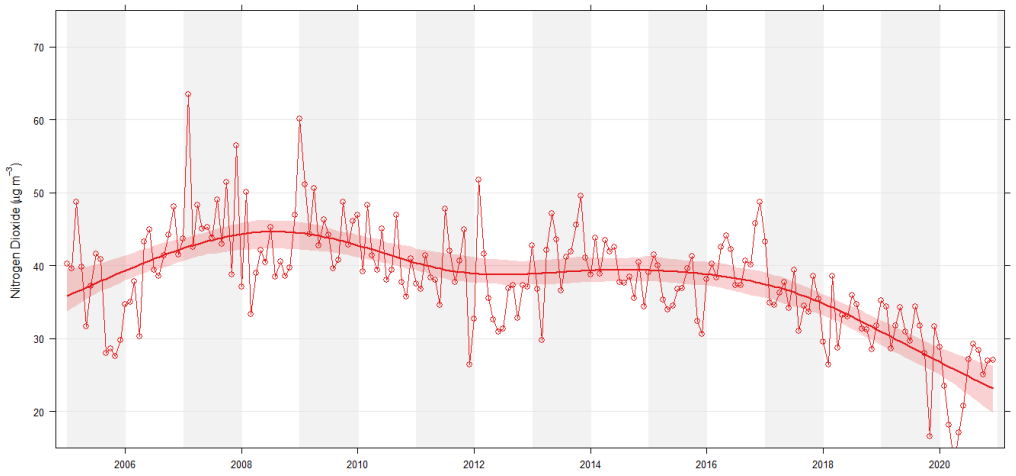
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Llwynypia	NIL	 fluctuating moderate improving trend	-6.5	Near Term

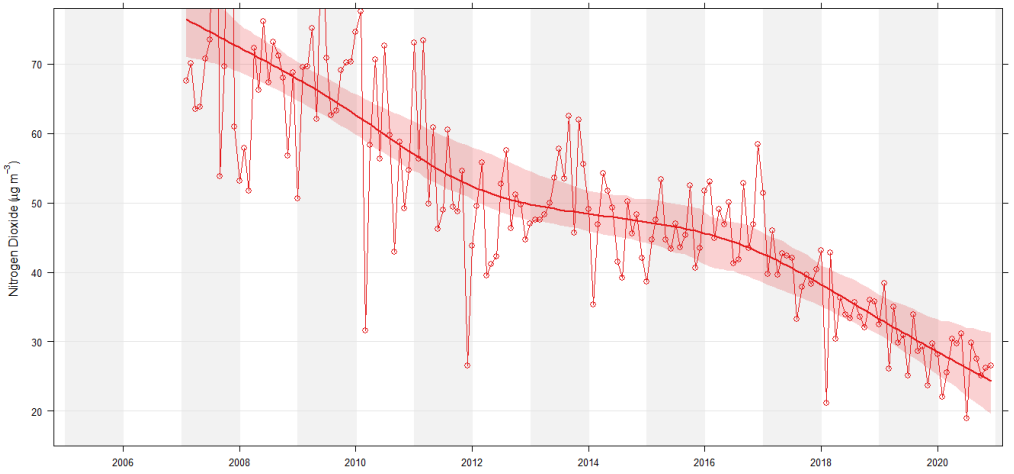
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Tonyrefail	Nil	 consistent moderate improving trend	-6.1	Near Term

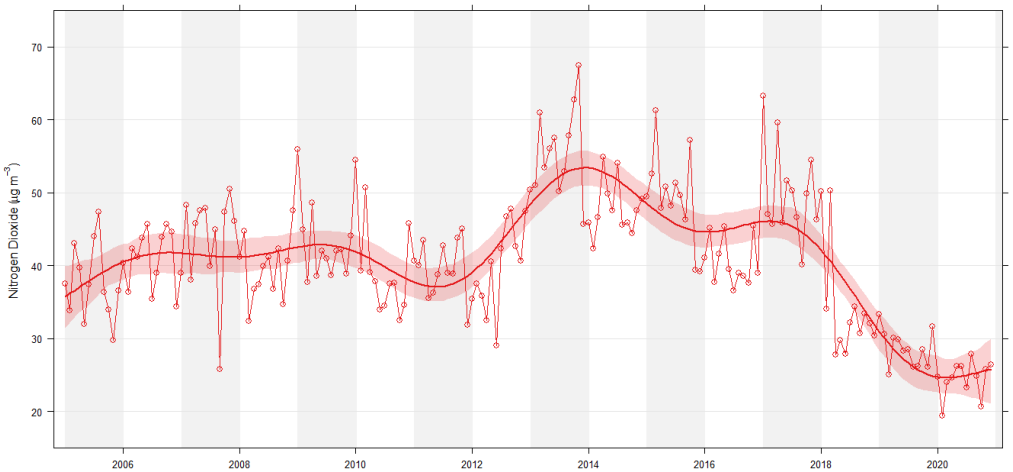
Area	AQMA	Needed Reduction in NO_2 (%)[1]	15-year Trend Graph (μgm^{-3} NO_2)[2]	Calculated 5-year Trend[3] (%)	Predicted Compliance (years) [4]
	Tylorstown	1.0	 no clearly established trend	-6.5	1+

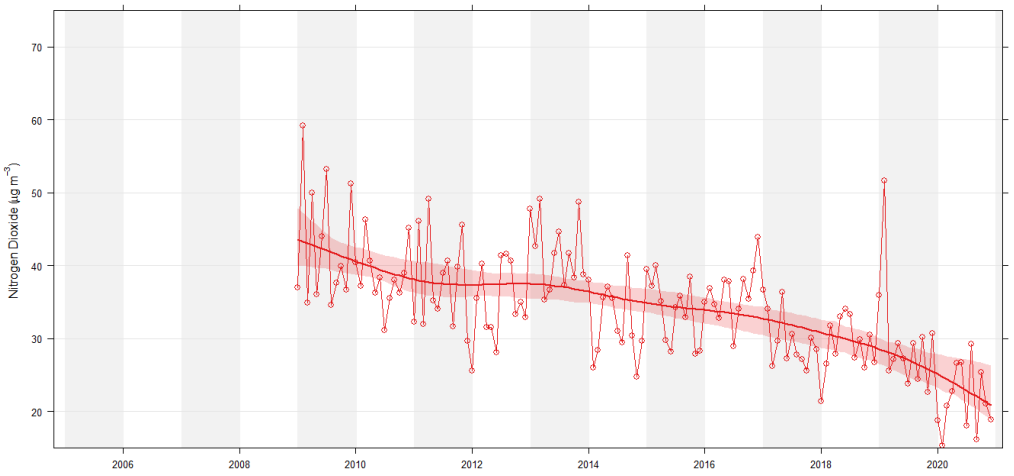
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
Cynon	Aberdare Town Centre	Nil	 consistent moderate improving trend	-7.1	Near Term

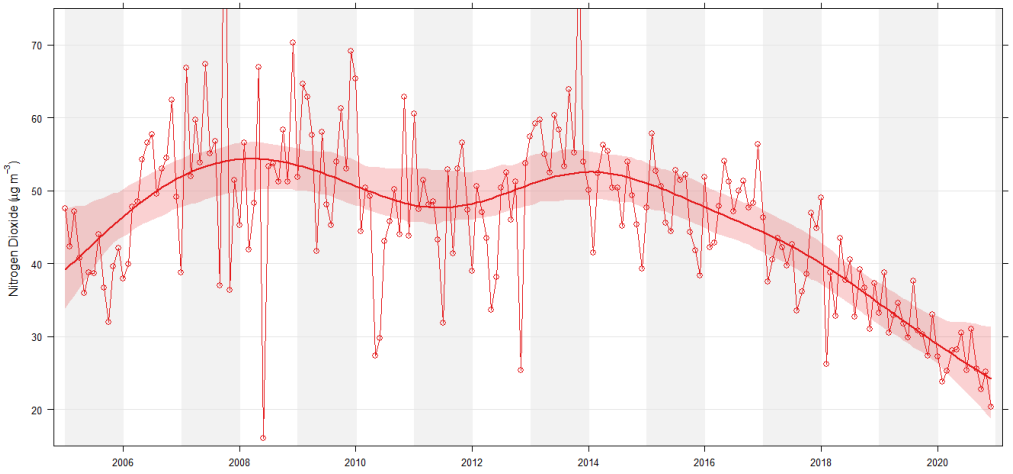
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Mountain Ash Town Centre	17.5%	 no clearly established trend	-6.4	4+

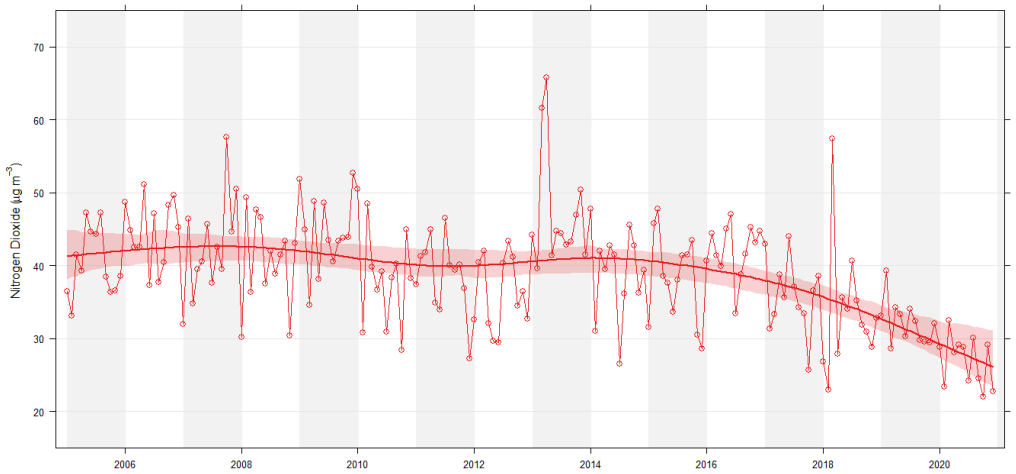
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
Taf	Broadway	NIL	 consistent moderate improving trend	-6.7	Near Term

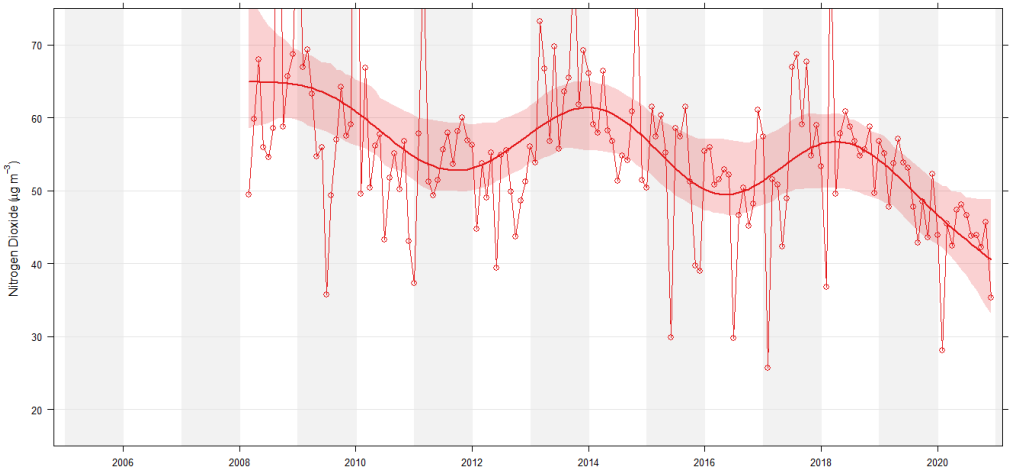
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Church Village	Nil	 consistent strong improving trend	-8.8	Near Term

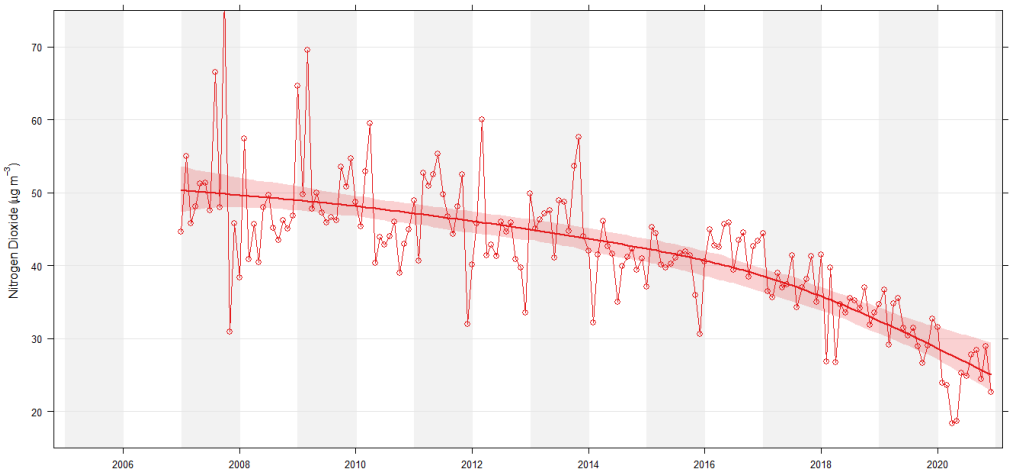
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Cilfynydd	Nil	 no clearly established longer term trend albeit probable strong improving trend since A470 intervention	-9.3	Near Term

Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Llanharan	Nil	 consistent moderate improving trend	-7.7	Near Term

Area	AQMA	Needed Reduction in NO_2 (%)[1]	15-year Trend Graph (μgm^{-3} NO_2)[2]	Calculated 5-year Trend[3] (%)	Predicted Compliance (years) [4]
	Mwyndy	Nil	 fluctuating strong improving trend	-9.1	Near Term

Area	AQMA	Needed Reduction in NO_2 (%)[1]	15-year Trend Graph (μgm^{-3} NO_2)[2]	Calculated 5-year Trend[3] (%)	Predicted Compliance (years) [4]
	Nantgarw	Nil	 consistent moderate improving trend	-6.8	Near Term

Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Nightingales Bush	19.9	 no clearly established trend	-2.6	5+

Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Pontypridd Town Centre	2.0	 consistent strong improving trend	-7.1	1+

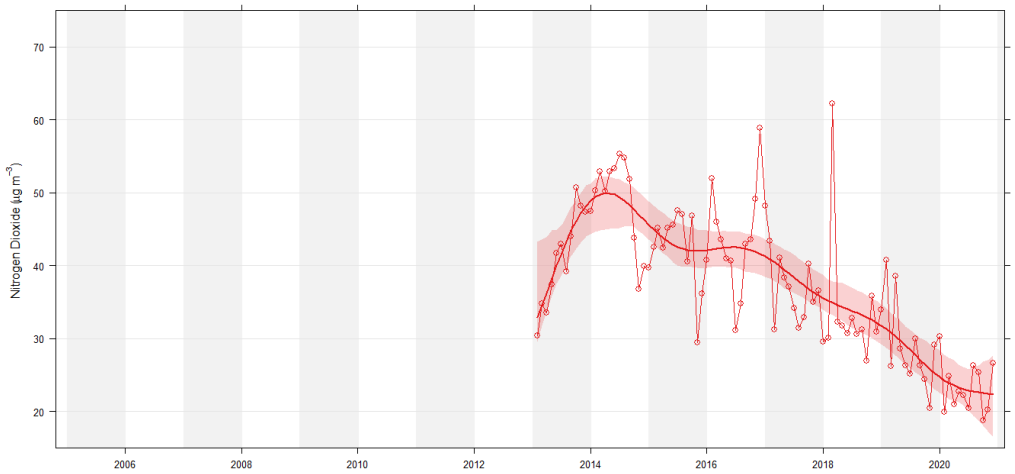
Area	AQMA	Needed Reduction in NO_2 (%)(1)	15-year Trend Graph (μgm^{-3} NO_2)(2)	Calculated 5-year Trend(3) (%)	Predicted Compliance (years) (4)
	Treforest	Nil	 consistent strong improving trend	-9.9	Near Term

Table Notes

(1) The required reduction in NO2 determined on the three-year average at the worst case location within the AQMA. Due to the complex relationship between NO2 and its precursors and sources, this is not a measure of the level of intervention required but rather a comparative indicator between AQMAs.

(2) Trend analysis is indicative for comparison only and as an average may not be reflective of all areas within the respective AQMA.

(3) Projected compliance periods are indicative only and do not necessarily take account of inherent uncertainties and future variables which may result in different real compliance periods.

15. Appendix E: Impact of COVID-19 upon LAQM

The COVID-19 pandemic has impacted air quality at local, regional and national scales and presented an unprecedented challenge to the Local Authority in undertaking its' local air quality management duties. This section outlines the impact of COVID-19 on air quality in Rhondda Cynon Taf during 2020. Further detail on air quality impacts at the national scale can be viewed through the Reports & Seminars section of airquality.gov.wales.

15.1 Impacts of COVID-19 on Air Quality within Rhondda Cynon Taf

Given the known disruption attributed to COVID-19 and the emergency response to it, with a substantial decrease in local travel and some industrial activity during the spring of 2020 and potentially reduced local travel throughout the latter half of the year. It is unsurprising that there is evident strong correlation between the apparent reductions in locally observed NO_2 and the period of most COVID-19 related disruption. As such, it is undoubtable that COVID-19 related disruption has had a major and unprecedented influence on the reduction, and duration of reduction, of levels of NO_2 within Rhondda Cynon Taf.

During 2020 all of the AQMAs and the rural, suburban and urban environments observe a significant difference in the predicted (based on the trend in NO_2 prior to 2020) percentage reduction in NO_2 in comparison to the actual percentage reduction in NO_2 observed. However some variation within the data can be observed, for instance it may be the case that those AQMAs in the Taff area (Broadway to Treforest) were more likely to observe a slightly greater reduction to those within the Rhondda (Cymmer to Tylorstown) and Cynon (Aberdare Town Centre to Mountain Ash Town Centre) areas. This may be due to the different socio-economic characters of each region, with the less affluent Rhondda and Cynon areas potentially less likely to be affected by sustained COVID-19 interventions such as 'working from home'.

It is also strikingly apparent that the Mountain Ash Town Centre AQMA observes a less noticeable actual reduction in NO_2 in comparison to other AQMAs. This may be because the expected sizeable reduction in traffic volume, during 2020 as a result of certain COVID-19 measures, was still not sufficient enough to reduce the frequency and duration of chronic road congestion often observed within parts of this AQMA.

Conversely Cilfynydd observed a slightly greater actual reduction in NO_2, in comparison to elsewhere. Although other locations (Nightingales Bush and Treforest) associated with the A470 also experienced significant declines in observed levels of NO_2. The reductions at Cilfynydd maybe reflective of this location now being least likely to experience traffic congestion of the A470, as a result of current speed restrictions further south.

Unlike with NO_2 monitoring data gathered throughout Rhondda Cynon Taf in 2020, PM_{10} monitoring data at Glyncoch shows a more nuanced picture in its relationship with potential COVID-19 related disruption. It appears that there is only a minor reduction in observed PM_{10} for the period of 2020 where COVID-19 disruption may have been at its greatest, March to April and November to December. Whereas during the summer of 2020, when COVID-19 disruption may have abated to some extent, the greatest reductions in PM_{10} were observed. It is also possible this summer reduction may in part be as a result of the summer of 2020 being wetter, and hence more conducive in suppressing non-volatile PM_{10} sources, than average.

It is expected that during 2020 regional transport sources of PM_{10}, such as road traffic along the A470, may have been reduced as a consequence of COVID-19 disruption. However, it is understood that the extraction and processing of won sandstone and ancillary roadstone

coating activities at the nearby Craig Yr Hesg Quarry was largely uninterrupted. With other localised COVID-19 disruption likely being relatively muted, given the general suburban character of Glyncoch.

15.2 Opportunities Presented by COVID-19 upon LAQM within Rhondda Cynon Taf

It is also unequivocally clear that, as observed in 2020, dramatic interventions that reduce local and regional road traffic and/or their associated emissions of air pollution, will have a marked effect on local air quality. To such an extent that nearly all AQMAs within Rhondda Cynon Taf (apart from the Cymmer and Mountain Ash Town Centre AQMAs) could likely be revoked if the positive impacts observed in 2020 could be fully sustained into the future. However, many of the longer-term implications of recent COVID-19 disruption and its effect on local human behaviour, local transport and air quality remain uncertain. Indications since 2020 have presented a complex picture in which it is expected that road traffic emissions will to some extent rebound in the short-term but, at present, potentially not to the extent as observed prior to 2020.

The impact of such a rebound post 2020 is difficult to predict, due to traffic volume in combination with traffic congestion often being an important driver in the experience of elevated levels of NO_2 but not necessarily having a strictly linear relationship. As such, some AQMAs may be more likely to 'hold-on' to the some of the improvements observed in 2020, if certain traffic reducing behavioural changes persist. Whilst some other AQMAs that may be more sensitive to relatively minor changes in local traffic volume may struggle not to return to a pre-2020 air quality experience.

15.3 Challenges and Constraints Imposed by COVID-19 upon LAQM within Rhondda Cynon Taf

The unique events of 2020 and ongoing COVID-19 related disruption has presented a significant challenge to the undertaking, interpretation and management of local air quality.

Air Quality in 2020, and potentially beyond, is expected to experience considerable uncertainties and encounter hitherto unforeseen challenges [42]. It is likely that the interpretability of air quality monitoring data in 2020 has been impacted by inevitable disruption to the local monitoring network as well as major changes in influences upon local air quality trends. In addition, the consideration of cost-effective interventions and the implementation of improvement actions may be challenged by possible systemic changes to local transport and the economy as well as reprioritisation of activities undertaken by the Local Authority and its partners. In acknowledging future uncertainty it is also accepted that, where possible, potential future opportunities, as society adjusts to recent experiences, in achieving possible local air quality gains should be capitalised upon

In acknowledgement of the ongoing coronavirus COVID-19 response and the challenges this may create, the Local Authority will look to delay undertaking a review of its sixteen extant AQAPs, and their associated AQMAs, to the end of 2022 at the earliest.

Table E.1 below provides an impact matrix of COVID-19 related disruption on various local air quality management tasks undertaken by the Local Authority.

Table E.1: Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	-	-	-
Automatic Monitoring – QA/QC Regime	-	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	-	-
Passive Monitoring – Data Capture (%)	More than 75% data capture	-	-	-
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	-	-	-
Passive Monitoring – Adherence to Changeover Dates	-	-	-	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	-	-	-
AQAP – Measure Implementation	-	--	Long delay (>6 months) in development of a new AQAP, but is on-going	-
AQAP – New AQAP Development	-	-	-	Limited progression in development of a new AQAP

16. Glossary of Terms

Abbreviation	Description
4th Stage Further Assessment	A review of all evidence and reasoning for an AQMA to be completed 12 months after the declaration is made. The assessment also requires identification of the sources of the pollutant which has triggered the AQMA and the reductions required for compliance.
Accuracy	A measure of how well a set of data fits the "true" value.
Air Quality Action Plan [AQAP]	A cost effective plan devised by a Local Authority to improve air quality.
Air Quality Management Areas [AQMA]	An area which a Local Authority has designated for action, based upon predicted or measured breach of an Air Quality Objective.
Air Quality Objective [AQO]	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups.
Annual mean	The average of the concentrations measured for the pollutant in one year. In the case of an AQO this is for a calendar year.
National Background Concentrations	The level of the pollutant predicted to be present using advanced modelling at a national level. Background concentrations added to local contribution (dependent upon unique local factors) is the total concentration
Benzene [C6H6]	A liquid compound of Carbon and Hydrogen forming a stable aromatic "ring" structure. Mainly occurs due to the evaporation of petroleum.
1,3–Butadiene [C4H6]	A gaseous compound of Carbon and Hydrogen forming a simple conjugated diene. Produced for specific industrial processes and as a by-product in the combustion of petroleum.
Carbon Monoxide [CO]	A gaseous compound of Carbon and Oxygen normally formed by the incomplete combustion of Carbon with Oxygen in an atmosphere with a deficiency of Oxygen.
Climate Change	Is the effect on the statistical distribution of weather over a period of time and caused by the increase in the mean temperature of the Earth's near surface and oceans, triggered by the anthropogenic emission of greenhouse gasses.
Concentration	The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, microgrammes per cubic metre, $\mu g/m^3$) or a volume of gaseous pollutant per unit volume of air (parts per billion, ppb).
Confidence level	The degree of certainty at which the true value will be in a predicted range.
Coronavirus	SARS-CoV-2 virus and its variants
COVID-19	An infectious disease caused by the SARS-CoV-2 virus

Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department of the Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
Exceedence	A period of time where the concentration of the pollutant is greater than the appropriate Air Quality Objective.
Fine Particulate Matter [PM_{10}]	An atmosphere of regular and/or irregular particles with a significant probability of having a diameter of 10µm and less. They are produced from a large variety of natural and anthropogenic sources.
Kurtosis	An index of the sharpness of the peaks in a data set
Lead [Pb]	A solid elemental metal. Lead is second only to Iron among the most widely used metals, having a broad range of manufacturing and construction uses. Historically also used as an anti-knocking agent in petroleum, however, its use has now been phased out in the United Kingdom.
Metrological effects	Effects of seasonal variations on the atmosphere. These effects can include temperature, atmospheric turbulence, prevalence of sunlight, etc and is often referred to as Winter or Summer Smog.
Modeling	The use of advanced stochastic simulations to predict a future variable, for instance the concentration of a pollutant in ambient air.
Monitoring Data	Data gained from monitoring using various scientific apparatus
Nitrogen Dioxide [NO_2]	A gaseous compound of Nitrogen and Oxygen normally formed by the oxidation of Nitric Oxide with Oxygen in the air
Nitrogen Oxides [NO_x]	A generic term for all gaseous compounds of Nitrogen and Oxygen and normally comprising of Nitric Oxide and Nitrogen Dioxide
Nitric Oxide [NO]	An unstable gaseous compound of Nitrogen and Oxygen normally formed by the incomplete oxidation of Nitrogen with Oxygen in the air.
n^{th} Percentile	A value that is the rank at a particular point in a collection of data. For example, the 99.8^{th} percentile of values for a year is the value that 99.8% of all the data in the year fall below, or equal.
Precision	A statistical definition of how closely readings within a range are to one another.
Progress Report	An annual report undertaken when no Updating and Screening Assessment is taking place. The Progress Report publishes the latest monitoring data for all pollutants of concern.
$\mu g/m^3$	Micrograms per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Updating and Screening Assessment [USA]	A 2nd Stage air quality report produced every three years providing a pollutant and scenario based examination of the quality of air in the County Brought, last produced in 2012.
Ratification (Monitoring)	A critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
Running Mean	A mean composed of overlapping time periods. For instance, an 8-hour running mean is calculated every hour, and averages the values for eight hours. The period of averaging is stepped forward by one hour for each value.
Skewness	The bias to asymmetry of a data set
Sulphur Dioxide [SO_2]	A gaseous compound of Sulphur and Oxygen normally formed by the oxidation of Sulphur with Oxygen in combustion processes.
Stage 3 Detailed Assessment	A geographical examination, targeted in an area expected to be at risk, of a pollutant and its exceedence of an AQO.
Stage 4 Further Assessment	A review of previous review and assessment findings for an Air Quality Management Area to provide confirmation of the need for the declaration and source apportionment.
TEA	Triethanolamine. Used as an absorbant for NO_2 in Palmes type passive diffusion tubes.
Transboundary effects	The effects caused by the long distance transportation of air pollutants, typically across national borders. Examples are the Saharan dust episodes and the Central Europe particle episodes.
Validation (Monitoring)	Screening monitoring data by visual examination for spurious and unusual measurements (see also ratification).
Validation (Modeling)	The general comparison of modeled results against monitoring data carried out by the model developer to ensure the model is “fit for purpose”.
Verification (Modeling)	A comparison of modeled results versus monitoring results at relevant local locations.
WG	Welsh Government