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Monmouthshire County Council

Usk Air Quality Action Plan Update

In fulfillment of Part IV of the Environment Act 1995

Local Air Quality Management

12st January 2023

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1. Introduction

1.1 Air Quality in Usk

Generally, air quality in Monmouthshire is good; however, there are some hotspots of poor air quality close to busy or congested roads. As such, these roads are monitored closely for nitrogen dioxide, which is one of the main pollutants from vehicle emissions.

Two areas in Monmouthshire have exceeded the annual mean national objective level for nitrogen dioxide and have therefore been declared Air Quality Management Areas (AQMA). Both AQMA's have Air Quality Action Plans (AQAP) to address these exceedances. AQMA(s) are seen by local authorities as the focal points to channel resources into the most pressing areas of pollution as a priority.

Both AQMAs were declared due to traffic emissions that resulted in an annual mean of nitrogen dioxide at or above the objective level of $40\mu\text{g}/\text{m}^3$. The objective level had to be achieved by 2005. It was not considered likely that the 1-hour mean objective level of $200\mu\text{g}/\text{m}^3$ (not to be exceeded more than 18 times a year) would be exceeded as measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below $60\mu\text{g}/\text{m}^3$.

The AQMAs are: -

- The A472 along Bridge Street and parts of Castle Parade in Usk,
- The A48 (Hardwick Hill) In Chepstow.

The Usk AQMA was declared in November 2005 and the AQAP was finalised in September 2009.

A summary of AQMAs declared by Monmouthshire County Council can be found in Table 1.1 Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <http://www.monmouthshire.gov.uk/air-quality> and https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=403

Table 1.1 – Declared Air Quality Management Areas

AQMA	Relevant Air Quality Objective(s)	Comments on Air Quality Trend	Description	Action Plan
Bridge Street, Usk	NO ₂ annual mean	There have been improvements in air quality in the AQMA over the last 4 years. There have been no exceedances for 4 years	An area encompassing Bridge Street, from its junction with Newmarket Street up to and including the area around the junction with Castle Parade and Porthycarne Street	http://www.monmouthshire.gov.uk/app/uploads/2013/08/Usk-Action-Plan-Final-September-2009.pdf
Hardwick Hill, Chepstow	NO ₂ annual mean	There have been improvements in air quality in the AQMA over the last 4 years. One location continues to exceed.	An area encompassing properties either side of the A48, between the roundabout with the A466 to the west and extending east just beyond the junction with the B4293 at Hardwick Terrace	http://www.monmouthshire.gov.uk/app/uploads/2013/06/Chepstow-AQAP-Final-31-August-2011.pdf

AMQA boundary maps within Monmouthshire can be viewed at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=403 Usk AQMA Boundary is shown in figure 2.1

During the drafting of the 2009 Action Plan the Usk Air Quality Steering Group was set up as a means of consultation and all relevant stakeholders were invited to the meetings to discuss and have an input into the AQAP.

Since the finalisation of the AQAP the steering group has continued to meet two to three times a year with the purpose of continually reviewing and assessing the plan's measures and the progress made towards achieving them.

The AQAP is a live document and therefore has continued to evolve over time with full input from the steering group. Some of the original actions have been implemented (some have been successful and some have not), some of the actions have evolved as new information has come to light, some have been trailed or modelled, but found to not be feasible to implement fully, or found to have a negative effect on air quality.

During this time air quality monitoring has continued in Usk and in recent years has expanded south of the AQMA into Woodside and a continuous air quality sensor has been installed at Usk primary School, which is north of the AQMA boundary.

This monitoring has shown that there has been a clear improvement in nitrogen dioxide levels since 2012, and there were no exceedances of the objective level between 2015 and 2020.

In 2013, the highest recorded nitrogen dioxide concentration in Usk was $43.1\mu\text{g}/\text{m}^3$ and the highest concentration in 2018 was $32.1\mu\text{g}/\text{m}^3$.

In 2019 Monmouthshire County Council and Usk Town Council made a joint commitment to regenerating the town of Usk and is in the first stages of implementing the Usk and Woodside Improvement Master Plan. This plan is looking at a wide range of issues including traffic and air quality. It is hoped that many of the AQAP measures going forward will be considered and implemented through this Master Plan.

2 2009 Air Quality Action Plan

2.1 Introduction

The original Air Quality Action Plan is still available on Monmouthshire County Councils website and remains relevant. This update should be read alongside the original.

The original AQAP was prepared by Air Quality Consultants Ltd on behalf of Monmouthshire County Council with full input from the Usk Air Quality Steering Group. The Group is made up of relevant officers from MCC (e.g. Environmental Health, Trading Standards, Passenger Transport, Highways and Planning) County Councillors, Town Council, Police, Civic Society and Chamber of Commerce.

In preparing, the 2009 AQAP, and the Further Assessment that supported the plan, Air Quality Consultants undertook Air Quality Modelling to determine the extent of the AQMA and a source apportionment study to identify the emission sources contributing to the nitrogen dioxide concentrations. In addition, they calculated the air quality improvements necessary to meet the objective level and proposed an action plan of 14 measures that were assessed by their cost effectiveness, wider impacts, air quality impact and feasibility.

That work is not replicated in the AQAP 2021 update; however, it is summarised below.

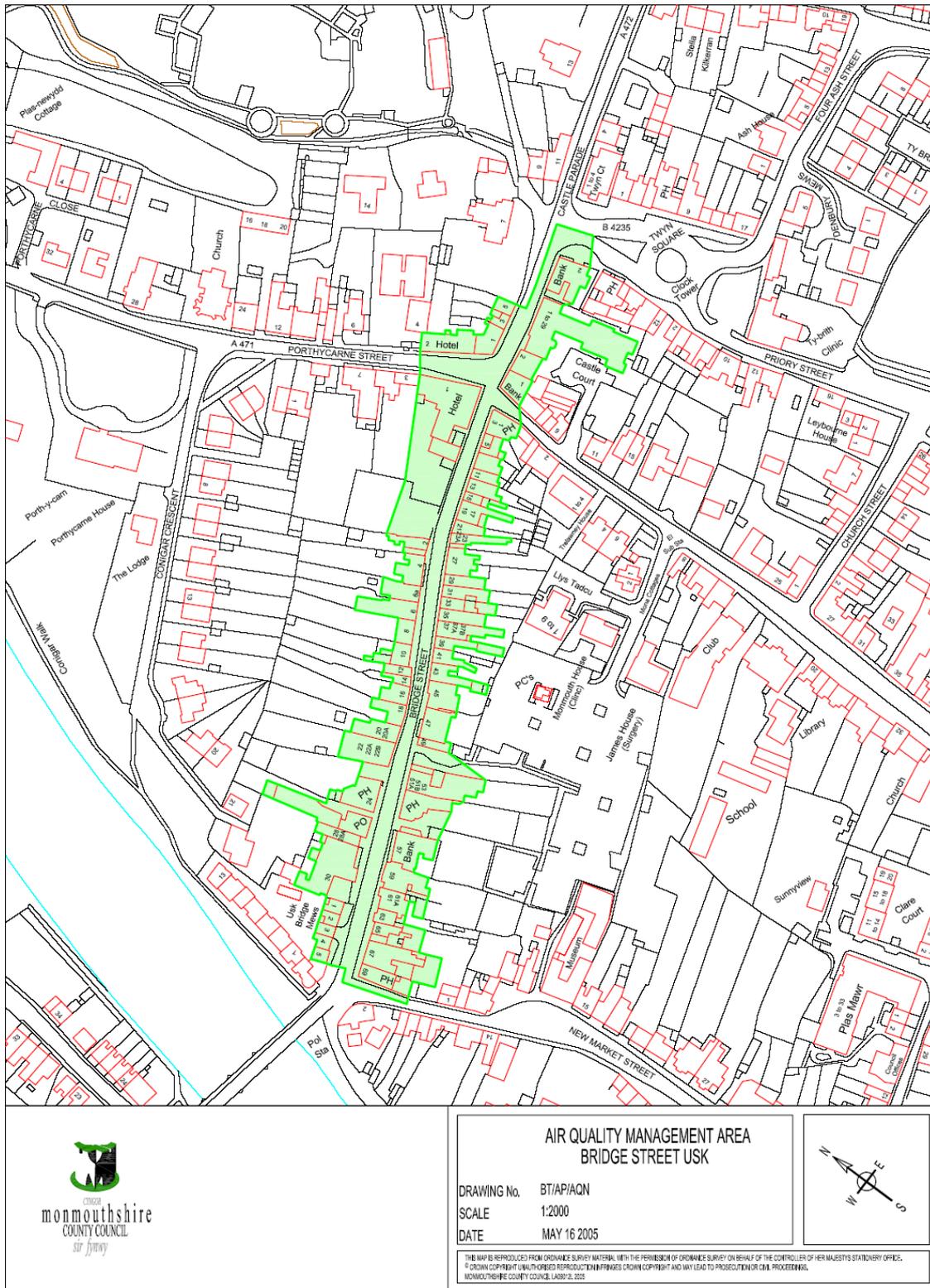
2.2 Usk AQMA Boundary

The results of both diffusion tube monitoring and modelling indicated that the area of likely exceeded of nitrogen dioxide included the A472 in Bridge Street and parts of Castle Parade. The AQMA boundary map is shown in Figure 2.1

Continued monitoring since the AQMA was declared, including expanded monitoring outside the AQMA boundary, has indicated that the original boundary is still valid, as no exceedances have been identified outside of the boundary.

The only monitored exceedances of the annual objective level are limited to a small section of Bridge Street between monitoring Locations USK5 and USK3 (Figure 3.1). Since 2014 the exceedances were limited to USK4 and USK5 and between 2015 and 2020 there were no exceedances.

Figure 2.1 – USK AQMA boundary on Bridge Street



2.2 Source Apportionment

Results from the original Further Assessment and AQAP indicated that the only emission sources contributing to the nitrogen dioxide with the AQMA were traffic emissions, and that there were no localised point source emissions (e.g. industrial), and no area source emissions (e.g. domestic heating) of any significance along Bridge Street. There have been no additional sources introduced since the time of the original AQAP.

Results from the ADMS modelling undertaken for the Further Assessment indicated that at worst case receptors the main sources of nitrogen dioxide were cars and light goods vehicles (LGV), however contribution from heavy goods vehicles (HGV) were also significant. This is summarised in Table 2.1.

Table 2.1 Modelled Annual Mean (2006) Nitrogen Dioxide Concentrations at the Worst-Case Receptors and the Contribution of Each Source to the Total.

Receptor	Background	Car+LGV	HGV	Buses	Total
Annual Mean Concentration ($\mu\text{g}\text{m}^{-3}$)					
79 ¹	9.1	22.6	11.2	0.8	43.8
USK5 ²	9.1	19.1	9.5	0.8	38.4
Percentage Contribution to the Total (%)^a					
Bridge Street AQMA					
79 ¹	20.7	51.7	25.7	1.9	100
USK5 ²	23.5	49.6	24.8	2.0	100

^a contribution based on un-rounded results

¹ The Three Salmons Hotel at the northern junction of Porthycarne Street [A471] and Bridge Street, but as there are no permanent residents it is not classed as a relevant exposure, such as a house or school, but is included in this analysis to indicate worst-case conditions within the AQMA. The data is modelled.

² The location is diffusion tube U2 in the original AQAP. In recent years, it has been relabelled to USK5 (Figure 3.1).

It is located at 16 Bridge Street and due to the proximity of housing, it is considered as being representative of relative exposure. The data is measured.

2.3 Air Quality Improvements Needed

The 2009 AQAP identified the air quality improvements necessary to meet the annual mean nitrogen dioxide objective level of 40µg/m³. This was defined as the difference between the highest predicted concentration within the AQMA in 2006 and the objective level. It considered both nitrogen dioxide and nitrogen oxides and is summarised in Table 2.2

Table 2.2 Improvement in Annual Mean Nitrogen Dioxide Concentrations and in Emissions of Oxides of Nitrogen at the Worst-Case Representative Receptor in 2006¹.

Receptor	Required reduction in annual mean nitrogen dioxide concentration µgm ⁻³)	Required reduction in emissions of oxides of nitrogen from local roads (%)
79 ¹	3.8	17
USK5 ²	0.7	3

¹ this location is not representative of relevant exposure, but is included in the analysis to indicate worst-case conditions within the AQMA.

² representative of relevant exposure – 16 Bridge Street. Labelled as U2 in original AQAP

In 2006 the monitored nitrogen dioxide concentration at USK 5 (previously labelled as U2) was 40.7µg/m³ and the modelled concentration at the Three Salmons Hotel (model Location 79) was 43.8µg/m³. Since 2006, no additional modelling has been undertaken however, USK5 has continued to be monitored and reported in the annual air quality progress reports. In 2007, USK5 increased to its highest concentration of 49µg/m³ but has since reduced to 30.3µg/m³ in 2019 (and was lower again in 2020). In 2019, the worst-case monitoring location was USK3 at 33.3µg/m³. In 2020 the worst-case location was USK5 at 24.3µg/m³.

Currently there is no improvement necessary to achieve the annual nitrogen dioxide objective level of 40 µg/m³. The last year of recorded exceedances was 2014, when USK4 was 40.4 and USK5µg/m³ concentrations was 40.9µg/m³.

¹ These data are slightly different to those that can be derived using the NOx to NO₂ calculator published by Defra (2005). This is because the calculator is based on national default concentration relationships, but these data are derived directly from the model results and use the adjustment factors built into the model verification.

The Further Assessment made predictions at worst-case receptors using future year projection factors applied to modelled 2006 data. These projections identified that nitrogen dioxide concentration would decrease each year, however the objective level would not be achieved until 2009 (see Table 2.3)

Table 2.3 Modelled and Estimated Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$) at the Worst-Case Representative Receptors – based on 2006 data

Receptor	2006	2007 ^a	2008 ^a	2009 ^a	2010 ^a
79 (modelled)	43.8	42.4	40.9	39.3	37.9
USK5 (measured)	40.7	39.4	38.0	36.6	35.2
USK5 (modelled)	38.4	37.2	35.9	34.5	33.3
Statutory Objective for 2005	40				
EU Limit Value for 2010					40

^a Estimated from 2006 measured values using the future year projection factors available on the UK Air Quality Archive.

However measured concentrations since 2006 did not follow this predicted decrease, and in fact concentrations increased at USK5 to $49\mu\text{g}/\text{m}^3$ in 2007, and then remained variable until 2012, then they started to steadily decrease. However, the actual date when the objective level was met did not occur until 2015, eight years later than originally predicted.

It should be noted that this situation was not unique to Usk, as it was a UK wide issue, where the original future year projection factors did not follow the real-world circumstances.

Table 2.4 presents the actual USK5 monitored concentrations between 2006 and 2020

Table 2.4 Monitored Annual Mean Nitrogen Dioxide Concentrations ($\mu\text{g}/\text{m}^3$) at USK5

Receptor	2006	2007	2008	2009	2010	2011	2012	2013
USK5 (measured)	40.7	49.0	45.6	41.9	45.0	39.7	44.6	43.1
	2014	2015	2016	2017	2018	2019	2020	
	40.9	38.2	37.8	35.2	30.0	30.8	24.3	

Concentrations in **BOLD** are exceedances of the annual mean objective level

2.3 2009 Action Plan Measures

A series of potential measures were identified by the consultant and MCC, and put through a number of screening tools and were consulted upon within MCC, the Usk Air Quality Steering Group members, and then the wider public and businesses of Usk. These measures were distilled down into 14 actions and prioritised for action based on air quality impact, cost, feasibility, wider impacts and timescale.

The full process is detailed in the original 2009 Action Plan and the 14 measures taken forward in the 2009 Plan are presented in Table 2.5.

The measures were given a ranking of 1 to 14. Those thought most cost-effective and likely to deliver the most effective solution to the problem in Usk were traffic management measures. Addressing the through-flow of heavy goods vehicles along the A472, together with a consideration of delivery times were the specific measures most likely to deliver improvements.

Table 2.5 Prioritisation of 14 measures – 2009 Action Plan

Ranking of measures (in order of priority)				
Measure	Overall cost-effectiveness	Overall air quality improvement (and time-scale involved)	% people positively affected by option	RANKING
6. Management of on and off-street parking consideration of delivery-time strategy.	Medium (low to medium costs)	Medium (short to medium-term)	Medium (residents & shoppers, not retailers)	1
5. HGV restriction along Bridge Street – To be informed by surveys and subsequent report (see para. 7.4)	Medium (medium costs- mainly to others and not Council)	Medium (medium-term)	High (residents, shoppers)	2
3. Encourage walking as a mode of transport	High (low cost)	Low (short-term)	High (residents, shoppers, retailers)	3
8. Increase the number of public transport services to and from Usk. To include community transport	Low-medium (high costs to others)	Low (medium to long-term)	Low-medium (residents and shoppers)	4
9. Contain indirect emissions from future development and from changes of land use that would generate traffic	High (low costs)	Low (short to medium-term)	Medium-high (residents, shoppers & retailers)	5
15. Travel Awareness campaigns e.g. Green Travel Days etc.	High (low costs)	Low (short to medium-term)	Medium (residents, retailers and shoppers)	6
New – Informed by Steering Group Work with school and others to produce community and school traffic plan	High (possible grant input)	Low (medium term)	Low (residents with emphasis on those with primary school age children)	7
1. Encourage more cycling; implement hierarchy of urban & inter-urban cycle routes	High (low cost)	Low (short-term)	Potentially high (residents, shoppers, retailers)	8
2. Support & promote facilities for cyclists at school and in town centres	High (low cost)	Low (short-term)	Potentially high (residents, shoppers, retailers)	9
13. Car club scheme	High (low-medium costs)	Low (short to medium-term)	Medium (residents and retailers)	10
New – Informed by Steering Group Develop kerb side recycling collections to reduce traffic to civic amenity site	High (costs factored into MCC waste strategy)	Low (short term)	Low (percentage of local residents)	11
14. Flexible home-working, work-time	High (low costs)	Low (short-term)	Low-medium (residents and retailers)	12

7. Implement new 20mph speed limits/ zones	Low-medium (low to medium costs)	Low (medium-term)	Low (some residents only)	13
New – Informed by Steering Group Investigation of altering traffic flows through the town	To be determined	Could be high (long term)	Potentially high to residents, shoppers and businesses in the vicinity	14

2.5 Previous Reports in Relation to Usk Air Quality

Below is a chronological summary of previous air quality reports from 2003 until 2019 that relate to Usk. Further detail on each report can be found in the previous reports available on Monmouthshire County Council's website.

A chronological summary of previous air quality reports

Report Name	Date	Outcome
Updating and Screening Assessment (Round 2)	June 2003	Detailed Assessment required for nitrogen dioxide at four roadside locations. Two in Monmouth, and one each in Usk and Chepstow
Interim Detailed Assessment (9 months monitoring)	November 2004	AQMA required for Bridge Street in Usk.
Detailed Assessment (12 months monitoring)	February 2005	AQMA for Usk confirmed.
Progress Report	May 2005	Confirmed nitrogen dioxide exceedance in Usk.
AQMA declared for Bridge Street, Usk	November 2005	The location is shown in Figure 1
Further Assessment for Usk AQMA	April 2007	Confirmed the AQMA should be retained with no changes to the boundary
Progress Report	November 2008	NO ₂ exceedances limited to the two AQMA's.

Updating and Screening Assessment (Round 4)	May 2009	Little changed in source emissions since 2006
Usk Air Quality Action Plan	September 2009	Agreed by Welsh Assembly Government on November 2009. 14 proposed measures to improve air quality
Progress Report	May 2010	Only the two AQMA's exceeded nitrogen dioxide objective levels. No Detailed Assessment required.
Progress Report	June 2011	Nitrogen dioxide is still the only pollutant that exceeds the objective level, and these exceedances are contained in the two declared AQMAs in Usk and Chepstow.
Updating and Screening Assessment (Round 5)	April 2012	Air quality within Monmouthshire continues to meet the relevant air quality objectives outside of the declared AQMAs Within the AQMAs there are still exceedances of the nitrogen dioxide objective at Hardwick Hill, Chepstow and Bridge Street, Usk.
Progress Report	April 2013	Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded. Nitrogen Dioxide levels across the County increased sharply in 2012.
Progress Report	April 2014	Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded. Nitrogen dioxide levels were lower in 2013 than
Updating and Screening Assessment (Round 6)	April 2015	The two AQMA's continued to experience exceedances of the nitrogen dioxide annual mean at two locations in each town. Concentrations in 2014 were fairly similar to those recorded in 2013 (which had seen a decrease from 2012). There were no exceedances outside the AQMA's

Progress Report 2016	April 2016	Nitrogen dioxide, PM10 and PM2.5 concentrations decreased at all locations in the County and for the first year there were no exceedances in the Usk AQMA.
Progress Report 2017	September 2017	For the second year, all six monitoring locations the Usk AQMA were below the nitrogen dioxide annual mean objective level.
Annual Progress Report 2018	September 2018	Third year with no exceedance in Usk AQMA. Concentrations broadly similar to 2017. Additional monitoring undertaken in Woodside south of Usk AQMA – the highest concentration was 29.6µg/m ³ at WS2
Annual Progress Report 2019	September 2019	Fourth year with no exceedance in Usk AQMA and all locations recorded their lowest concentrations to date. The highest concentration in Usk was 32.1µg/m³ (USK3). The first year in Usk that all locations were more than 10% below the objective level. The highest concentration from the three Woodside locations was 27.1µg/m³ (WS2)
Annual Progress Report 2020	September 2020	2019 was the fifth year with no exceedance in Usk AQMA, and second year with concentrations under 36µg/m ³ (10% of objective level). Generally, concentrations in Usk was similar to those recorded in 2018. The highest concentration in Usk was 33.3µg/m ³ (USK3) and in Woodside 27.8µg/m ³ (WS2)
Annual Progress Report 2021	August 2021	Air Quality improved significantly in 2020, due to the COVID pandemic and lockdowns. The largest decrease was during the March-June 2020 lockdown. This was the sixth year with no exceedances of the NO ₂ objective level and third below 10% of the OL. The highest concentration in Usk was 24.3µg/m ³ (USK 5) and in Woodside – 18.5 µg/m ³ (WS2)
Annual Progress Report 2022	September 2022	Seventh year with no exceedances of nitrogen dioxide objective level and fourth below 10% of the OL. The range was 15.5 - 25ug/m ³ (Usk 6 and Usk 5).

3. Air Quality Monitoring in Usk

3.1 Monitoring between 2006 – 2021

Nitrogen Dioxide has continued to be monitored by diffusion tube in Usk, and from 2017 monitoring was extended west of Usk Bridge into Woodside with three locations around the junction with the bridge. Table 3.1 identifies the monitoring locations, which are shown in figures 3.1 and 3.2.

Table 3.2 and Figure 3.3 present the annual mean concentrations at all Usk and Woodside locations between 2006 and 2021.

As required by Technical Guidance, all diffusion tube annual means have been bias adjusted to the National bias adjustment factor. Further details can be found in each of the annual air quality reports on MCC website for the corresponding year of monitoring.

Table 3.1 Details of Usk Nitrogen Dioxide Diffusion Tube Sites

Site Name	ID	Site Type	OS Grid Ref		Site Height (m)	In AQMA	Relevant Exposure	Distance to receptor (m)	Distance to kerb of nearest road (m)	Worst-case exposure	Date of Installation/removal
			X	Y							
14A Castle Parade, Usk	USK1	Roadside	337860	201039	2.3	No	Yes	0.16	1.6	Yes	04/07/2007
Castle Court, Usk. Rainwater Pipe	USK2	Roadside/ Urban Centre	337710	200936	2.45	Yes	Yes	0.16	1.35	Yes	02/08/2005
White Hart, 5 Bridge Street, Usk Rainwater Pipe	USK3	Roadside/ Urban Centre	337663	200906	2.4	Yes	Yes	0.15	1.3	Yes	02/01/2004
35 Bridge Street, Usk	USK4	Roadside/ Urban Centre	337596	200849	2.5	Yes	Yes	0.15	1.3	Yes	04/11/2003
Lamp Post adjacent to No.16 Bridge Street, Usk	USK5	Roadside/ Urban Centre	337562	200824	2.4	Yes	Yes	0.54	1.2	Yes	04/02/2003
4 Usk Bridge Mews, Usk Rainwater Pipe	USK6	Roadside/ Urban Centre	337473	200755	2.6	Yes	Yes	0.21	4.9	Yes	02/01/2004
13 Woodside, Usk, Rainwater pipe	WS1	Kerbside	337363	200707	2.5	No	Yes	0.15	1	Yes	03/01/2017
19 Woodside, Llanbadoc, Usk, Rainwater pipe	WS2	Roadside	337356	200736	1.8	No	Yes	0.23	2.6	Yes	03/01/2017
22 Woodside, Llanbadoc, Usk, Rainwater pipe	WS3	Roadside	337364	200749	2.5	No	Yes	0	1.5	Yes	03/01/2017

Figure 3.1 - Nitrogen Dioxide Monitoring Locations – Bridge Street, Usk

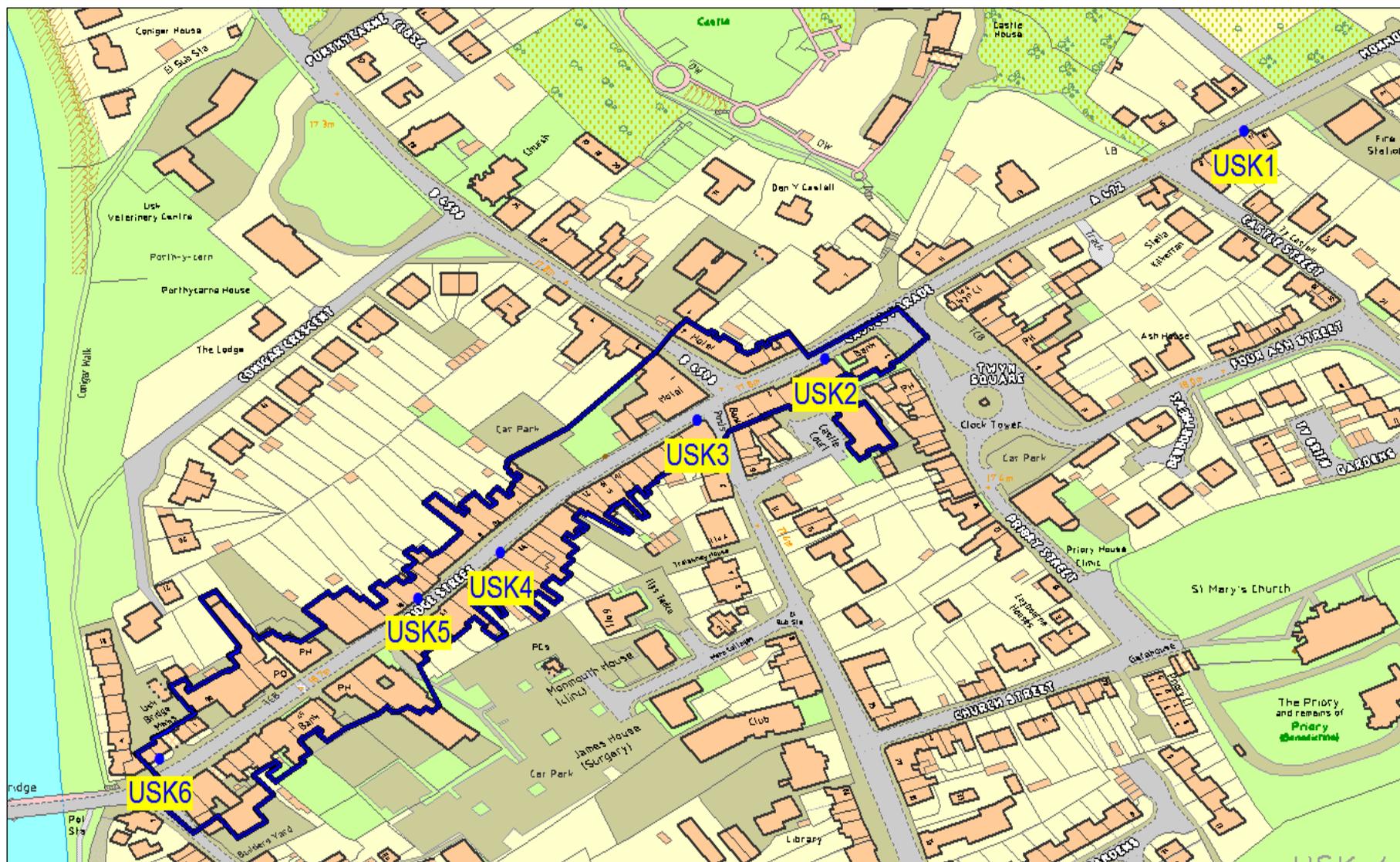


Figure 3.2 - Nitrogen Dioxide Monitoring Locations – Woodside, Usk

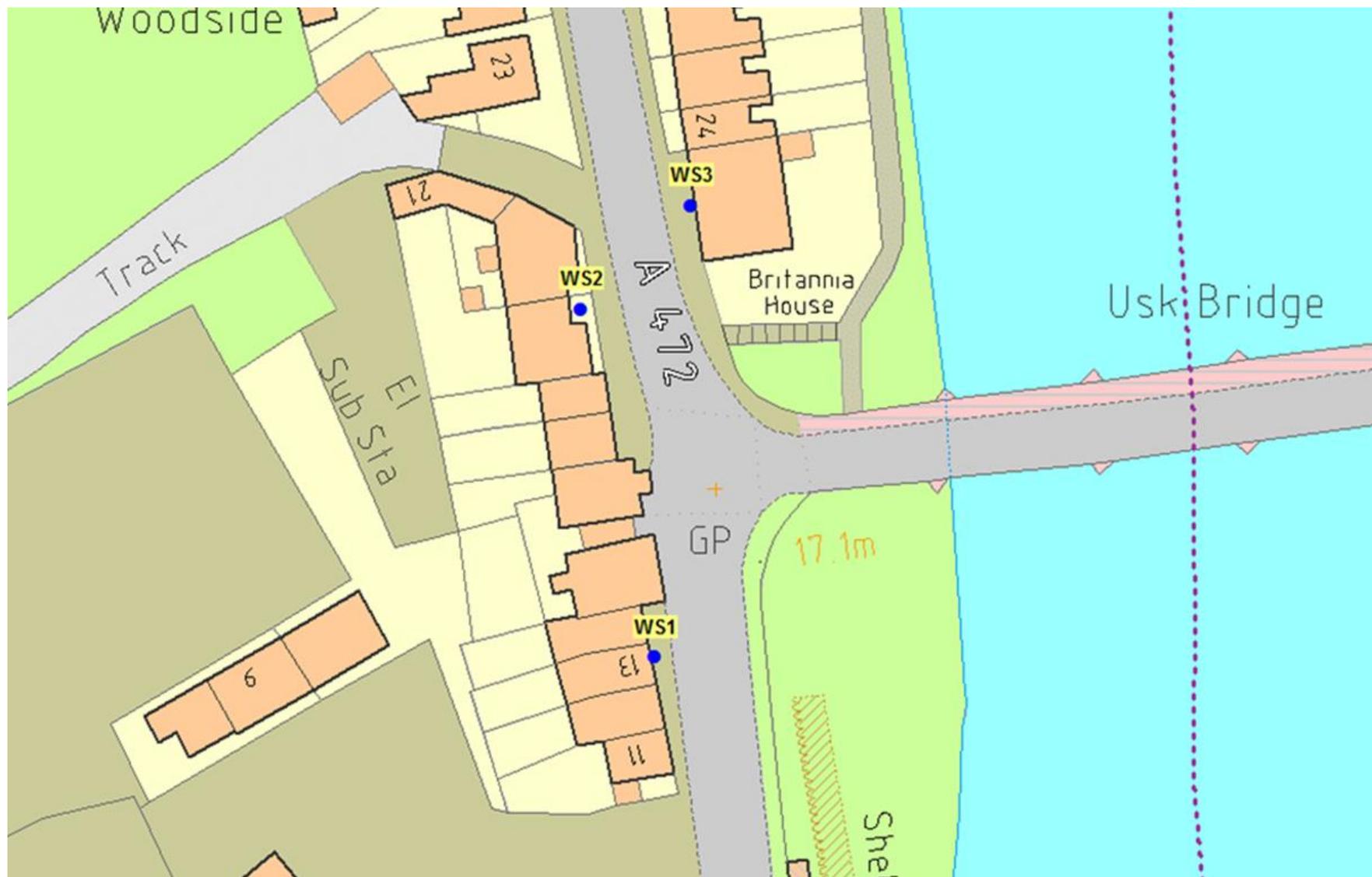


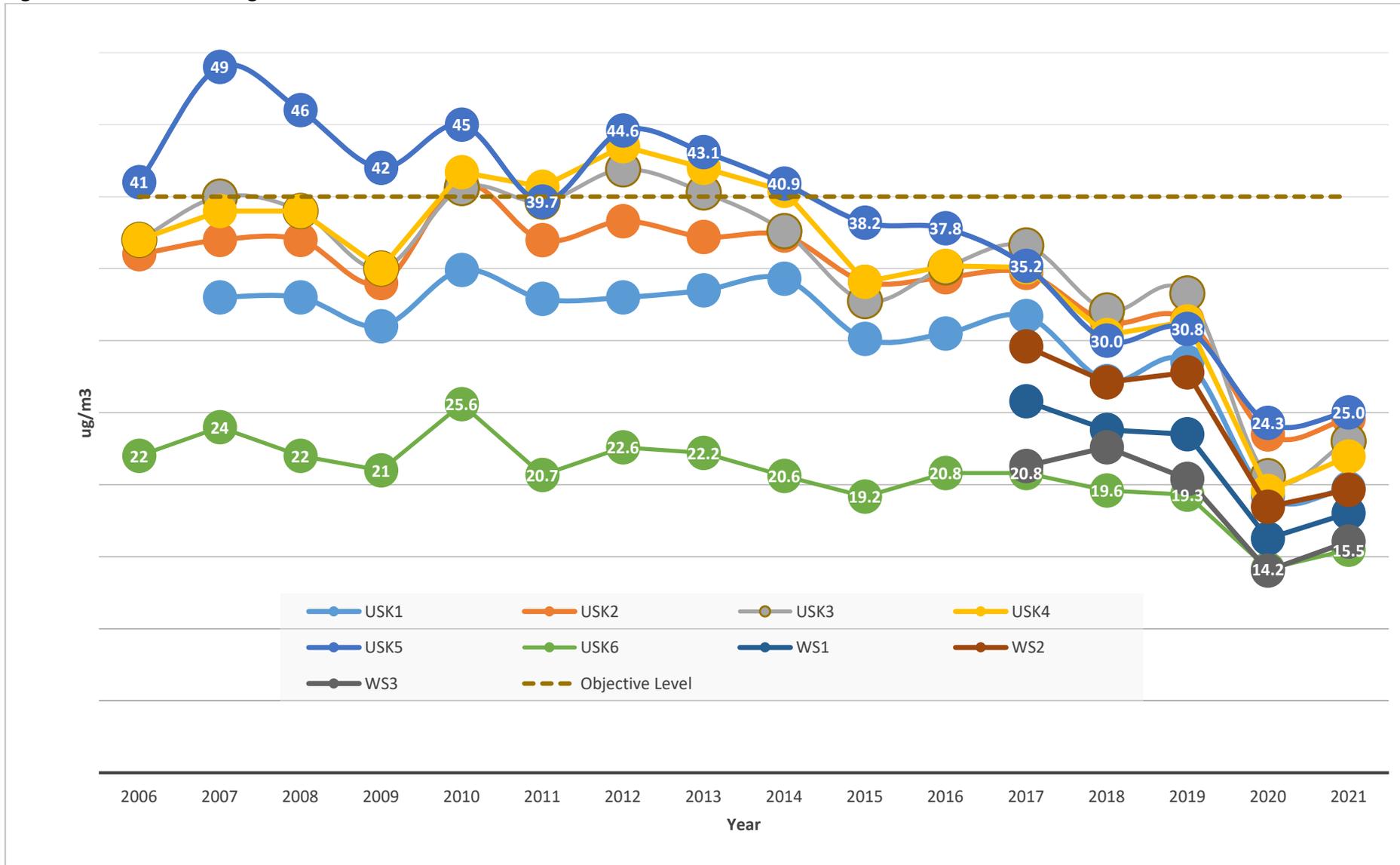
Table 3.2 Nitrogen Dioxide Annual Mean Concentration in Usk 2006-2021

Site ID	NO ₂ Annual Mean Concentration (µg/m ³) ⁽¹⁾															
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
USK1	Not monitored	33.0	32.8	31.1	34.9	32.9	33.0	33.5	34.3	30.1	30.5	31.7	27.2	28.5	19.2	19.7
USK2	36	37.0	37.2	34.4	40.9	37.0	38.3	37.2	37.3	34.1	34.4	34.7	31.3	31.4	23.5	24.6
USK3	37	40.0	38.9	35.3	40.6	39.7	41.9	40.3	37.6	32.8	35.1	36.6	32.1	33.3	20.6	23
USK4	37	39.0	39.0	35.4	41.7	40.7	43.5	42.0	40.4	34.1	35.2	35.1	30.4	31.3	19.6	22
USK5	41	49.0	45.6	41.9	45.0	39.7	44.6	43.1	40.9	38.2	37.8	35.2	30.0	30.8	24.3	25
USK6	22	24.0	21.6	20.9	25.6	20.7	22.6	22.2	20.6	19.2	20.8	20.8	19.6	19.3	14.2	15
WS1												25.8	23.8	23.5	16.3	18
WS2												29.6	27.1	27.8	18.5	19.7
WS3												21.3	22.6	20.4	14.0	16.1

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

(1) As required by Technical Guidance, all diffusion tube annual means have been bias adjusted to the National bias adjustment factor. Further details can be found in the annual progress reports. Un-bias adjusted monthly diffusion tube data can be found in each year's annual report available on MCC website

Figure 3.3 Usk Nitrogen Dioxide Annual Mean Concentrations 2006 – 2021



3.2 Comparison of 2006-2021 Nitrogen Dioxide Monitoring Results with the Air Quality Objectives

Historically there are four monitoring locations which have exceeded the nitrogen dioxide annual mean objective level of 40µg/m³.

- USK2 (Castle Court) 2010
- USK3 (5 Bridge St) 2007, 2010, 2012, 2013
- USK4 (35 Bridge St) 2010, 2011, 2012, 2013, 2014
- USK5 (16 Bridge St) 2007, 2008, 2009, 2010, 2012, 2013, 2014

Since 2014, no locations have exceeded the annual mean objective level.

Annual summary of nitrogen dioxide trends 2007-2021

- 2007 to 2009 – Annual variations but a general decrease
- 2010 – All locations increased to highest concentrations to that date (apart from one). Four locations exceeded the objective level, which is the only year that this occurred. This was the only year that USK2 exceeded.
- 2011 – All locations decreased and only one location exceeded the objective level.
- 2012 – All locations increased. Three locations exceeded the objective level. Two locations were at their highest concentrations. Since 2012 no locations have recorded higher concentrations.
- 2013 – Decrease at all locations except one – hypothesised that 2012 was very high due to poor atmospheric conditions. Three locations exceeded the objective level.
- 2014 – Variation – four locations decreased again, two increased. Two locations exceeded the objective level.
- 2015 – Further decrease at all locations. Generally, the lowest concentrations since 2007 (up until 2015). The first year that there were no exceedances of the objective level.
- 2016 – Slight increase but remain lower than 2007-2014. Second continuous year with no exceedances of the objective level.
- 2017 – Slight increase again, but third continuous year with no exceedances of the objective level. First full year of data for the three Woodside locations, none of which were in exceedance of the objective level.

- 2018 – Decrease at all six Usk locations to lowest concentrations since monitoring began. Fourth continuous year with no exceedances of the objective level. First year with all locations under 10% of the objective level (i.e. under $36\mu\text{g}/\text{m}^3$). Two Woodside locations decreased, and one increased slightly. Important to note that 2 months early 2018 some of the town was closed for gas main works. Different sections were closed at different times, but this resulted in two months of lower concentrations.
- 2019 – Slight increase at most locations over 2018 (six of nine), however increases and decreases were so low it is fair to say concentrations have remained stable for two years, bearing in mind Bridge Street was closed for 2 months in 2018. A town wide average of all locations indicates that the town mean in 2018 and 2019 was $27\mu\text{g}/\text{m}^3$. It was the fifth continuous year with no exceedances of the objective level. Second year with all locations below 10% of the objective level.
- 2020 – Significant decreases in nitrogen dioxide at all nine locations in Usk and Woodside, due to the COVID pandemic. Concentrations in Usk ranged between $14.2\mu\text{g}/\text{m}^3$ and $24.3\mu\text{g}/\text{m}^3$, and in Woodside between $14\mu\text{g}/\text{m}^3$ and $18.5\mu\text{g}/\text{m}^3$. This was the sixth continuous year below $40\mu\text{g}/\text{m}^3$ and third below $36\mu\text{g}/\text{m}^3$.
- 2021 – Slight increase compared to 2020, but lower than 2019. The largest increases were USK 3 and USK4 which both increased by $2.4\mu\text{g}/\text{m}^3$ to 23 and $24\mu\text{g}/\text{m}^3$ respectively. The highest location in 2021 was Usk 5 at $25\mu\text{g}/\text{m}^3$. Historically the highest location in Usk was USK5 in 2007 at $49\mu\text{g}/\text{m}^3$. The lowest concentration in Usk in 2021 was USK 6 at $15.5\mu\text{g}/\text{m}^3$.

Typically, USK5 has been the location with the highest nitrogen dioxide concentrations. It was at its highest concentration in 2007 when it reached $49\mu\text{g}/\text{m}^3$. In 2018, it reached its lowest concentration at $30.0\mu\text{g}/\text{m}^3$ (apart from 2020 and 2021 when it was 24.3 and $25\mu\text{g}/\text{m}^3$) which is a $19\mu\text{g}/\text{m}^3$ decrease in 2018 and most recently (2021) a $24\mu\text{g}/\text{m}^3$ decrease.

In 2017, 2018 and 2019 USK3 became the worst-case location in the town with a 2019 concentration of $33.3\mu\text{g}/\text{m}^3$, compared to USK5 which was $30.8\mu\text{g}/\text{m}^3$ in 2019. In 2020 and 2021 it decreased to the third highest location however, with both USK2 and USK5 recording higher concentrations.

Schools Monitoring Project

In August 2018, Environmental Health installed a continuous air quality sensor at Chepstow Comprehensive School and Usk Primary School, and then at St Mary's Primary School, in Bulwalk Chepstow and Monmouth Comprehensive School in June 2020.

The sensors are the Air Quality Transmitter AQT410 manufactured by Vaisala. They continuously monitor nitrogen dioxide, nitric oxide, ozone, carbon monoxide, air temperature, humidity, and air pressure. The schools have access to the data via a website and a number of educational packages. There is the potential for the data to be used by the school as an educational resource which will help raise awareness of the importance of improved air quality amongst staff, pupils and their parents, and highlight the contributions that each of us can make to improving air quality such as walking to school, switching engines off etc.

Usk R.C Primary School is just outside the eastern boundary of the Chepstow AQMA and the sensor was installed on the north side of the school building to monitor emissions at the classrooms and playground closest to the A472 (Monmouth Road, that becomes Bridge Street).

Table 3.3 – 2018 - 2021 Monthly & Annual Mean Concentrations for NO₂, at AQT410 Sensor – Usk School

Month	Nitrogen dioxide average in µg/m ³			
	2018	2019	2020	2021
January	Not installed	32.7	16.9	21.5
February		30.9	22.1	25.1
March		24.6	24.6	33.0
April		25.5	34.9	42.0
May		30.4	45.9	44.1
June		26.8	39.4	49.0
July		26.5	33.2	22.3
August	Settling	26.1	38.5	34.2
September		25.0	36.4	M
October	30	19.6	30.8	38.5
November	19	16.0	27.5	34.5
December	21	17.8	23.1	32.8
Average	23	25.1	31.1	34.3

4.0 Implementation of 2009 Action Plan

Monmouthshire County Council has taken forward a number of the identified Action Plan Measures since 2009 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 4.1.

Key completed measures in Usk are:

- Implementation of a 20 mile an hour zone through the Usk Air Quality Management Area,
- Enforcement of double yellow line parking,
- Implementation of a Lorry watch scheme to help enforce the Road Traffic Order (RTO), as well as improved signage. The RTO for Usk is a weight based order to prevent Heavy Goods Vehicles (HGV's) entering the town unless they have business in Usk
- Scoping/feasibility of creating a shared space (for vehicles and pedestrians in the Usk AQMA.
- Installation of bike stands on Bridge Street

Key measures that were not successful are:

- Creating of a new Road Traffic Order to prevent HGV's from the Caerleon RTO entering the Usk RTO
- Creating a time based RTO to restrict HGV access to Usk at peak traffic times
- Investigation of altering traffic flows through the town were investigated and modelled, however all options increased congestion and air pollution.

Table 4.1 – Progress on the original 2009 Usk Action Plan Measures to Improve Air Quality

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
6.	Management of on and off-street parking consideration of delivery time strategy	MCC	Complete	n/a	<p>Police in Usk have increased enforcement of on street parking.</p> <p>M.C.C improved car park signage</p> <p>Chamber of Commerce re-established and members of Steering Group.</p> <p>Chamber of Commerce actively engaging with businesses (letters and emails and meetings) to promote non-roadside deliveries</p>	M.C.C. have taken over enforcement of double yellow line parking, in bid to increase enforcement.	Complete, however ongoing work required to continually engage with police, Civil Enforcement Officers and chamber of commerce	Reducing on street parking has improved congestion at peak times.

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
					and/or off-peak deliveries			
5.	HGV Restriction along Bridge Street – to be informed by surveys and subsequent report	MCC	Complete	HGV numbers	<p>There is a RTO in place, but difficult for police to enforce due to its length and proximity to the Caerleon RTO. As such enforcement is minimum and two Caerleon businesses have been allowed to breach the RTO without penalty. In addition, there are local businesses who use HGV's that are exempt. As such the RTO has not been successful in the past.</p> <p>MCC has spent a great deal of time working with the police and local businesses and town council to replace the RTO with a more effective one. First a shortened RTO was proposed, but opposed by local businesses, secondly a time ban (e.g. no HGV's at all in peak traffic times) but was again opposed.</p> <p>It has now been decided to no longer pursue the implementation of new RTO's however the current one is still in place.</p>	<p>Current RTO: -</p> <p>Signage in place</p> <p>Lorry Watch – ongoing</p> <p>All HGV's reported are contacted by MCC officers.</p> <p>This has resulted in a reduction in the number of HGV's using the town as a short cut.</p> <p>Typically once contacted the companies do not offend again.</p>	Emissions reductions if HGVs are taken off the route through Usk. Likely to be the most beneficial measure in terms of reducing emissions and concentrations.	

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
					Work has been undertaken, however, to try to make the exiting RTO more effective - Signage improved (sat nav signs and CCTV signs), and a Lorry Watch Scheme was implemented and run by a consultancy, but has now been taken over by Trading Standards. HGV's in breach of the RTO are recorded by local volunteers to TS, who send warning letters, and if necessary fines to the company.			
3.	Encourage walking as a mode of transport	MCC	On going	n/a	MCC undertaken Active Travel Act duties including identification of walking routes in Usk and improvements to routes.		On going	Unlikely to be significant emissions reductions.
8.	Increase the number of public transport services to and from Usk. include community transport	MCC	Ongoing	Numbers of public transport services	Bus companies report loss of money from routes and require additional MCC funding. Currently MCC priority is to return bus services to previous levels		Ongoing	Unlikely to be significant emissions reductions.
9.	Contain indirect emissions from future development and from changes of land use that would generate traffic	MCC	Ongoing	Numbers of air quality assessments requested	Proactive engagement with Planning authority that may have air quality implications		Ongoing	Could be significant depending on numbers of planning applications.

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
15	Travel Awareness Campaigns	MCC	Ongoing but not specifically targeting Usk at the moment	n/a	None in Usk	n/a	Ongoing	Sustained travel awareness campaigns coupled with improvements to alternatives could reduce car use and therefore reduce emissions.
New	Work with school and others to produce a community and school traffic plan	MCC in partnership	Ongoing	Numbers of Travel Plans in place	A member of the Steering Group is a Governor at Usk School and is proactively engaging with the School to encourage improve parking arrangements and to encourage walking on behalf of the Group.	Air Quality monitoring undertaken at School, coupled with potential education opportunities using the monitoring data. Educating the children should help inform parents of emissions from school drop-offs and encourage alternative.	On-going – Continuous monitoring installed at school in summer 2018, and school taking part in Eco School diffusion tube monitoring education package. Monitoring data from the sensor will be available to the school for teaching purposes via a website. Anti-Idling group set up within MCC	Could potentially provide reductions in emissions at locations close to schools, or at congestion hotspots.

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
							with intentions of promoting anti idling campaigns starting in 2020 and focused on School pick up and drop off times	
1.	Encourage more cycling: implement hierarchy of urban and inter-urban cycle routes	MCC	On-going	Numbers of cyclists	MCC working on Active Travel Act that will include Usk cycle and walking routes	MCC working through the stages of the Active Travel Act. Specific work to create new walking and cycling connections to Coleg Gwent and MCC County Hall, and then South towards Pontypool. – Planning applications made	On-going	Potential reductions in emissions if modal shift from car to cycling.
2.	Support and promote facilities for cyclists at school and in town centres	MCC	On-going	Numbers of cyclists	Provision of cycle racks on Bridge Street	Part of Active Travel Act work	On-going	Potential reductions in emissions if modal shift from car to cycling.

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
13.	Car club scheme	MCC	n/a	n/a	n/a	Not being progressed – unlikely to be effective	n/a	n/a
New	Develop kerbside recycling collections to reduce traffic to civic amenity site	MCC	Complete	n/a	Complete	n/a	n/a	Unlikely to have a major impact on emissions. Included in original Action Plan to reduce number of household trips to Municipal Refuse Site.
14.	Flexible home working, work times etc.	MCC	Ongoing	Number of work-related trips in private single occupancy cars.	Promoted within MCC.	Much greater levels of homeworking within MCC	Ongoing	Due to COVID 19 pandemic from early 2020 - home working is much more prevalent and acceptable for employers. The benefits to the environment have been seen. – especially March – June 2020. MCC has stated that they will encourage more home working and remote meetings
7.	Implement new 20mph speed limits/ zones on Bridge Street	MCC	Complete	n/a	This has now been put in place by MCC in 2018 Modelling undertaken for 20mph – however it showed increased	A Share Space Concept was considered by MCC and a consultant. This work has now been rolled into the	Completed	Traffic studies have shown that vehicles in Usk do not tend to exceed 20mph in the day. However, it is possible that less accelerating and braking up to and down from 30mph might reduce emissions, and a 20mph zone might discourage

Action Plan Measure No.	Measure	Lead authority	Implementation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
					emissions, as it created additional queuing. Therefore, implemented without road obstacles that could increase congestion.	Strategic Vision Plan for Usk	On-going – early stages of viability work	<p>certain vehicles, who could take a faster road.</p> <p>2018 was the first full year of 20mph, and emissions in Usk were recorded at an all-time low (however this occurred Countywide), this continued into 2019 with only a slight increase in emissions.</p> <p>In addition, it is possible that this will be the first step in making Usk town centre a more pedestrian orientated place, rather than a vehicle through route. Options are being looked into to create a Shared Space.</p>
New	Investigation of altering traffic flows through the town	MCC	Complete	n/a	<p>Considered again in 2014 and modelled for a number of options. Each option, however, increased congestion and emissions.</p> <p>It was considered again as part of the Master Plan 'but no longer considered a feasible option following consultation</p>		Will not be progressed	Increased emissions

5.0 Usk Air Quality Action Plan 2023 and The Future for Air Quality Improvements in Usk

The 2009 Action Plan has had some success at reducing traffic overall, reducing HGV's, improving traffic flow. Air quality has improved significantly, and it has been five years since the last exceedance of the annual objective level.

However, as all the actions have now been considered, and either implemented and completed, implemented and are ongoing, or been scoped or tried and been unsuccessful, it is time to move forward and to put in place a framework that will continue to improve air quality.

The Usk & Woodside Improvement Master Plan will be an integral framework for air quality improvements in the town.

This is a strategic vision for Usk that will outline the future of the town and is being worked on jointly by Monmouthshire County Council and Usk Town Council.

The 2009 Air Quality Action Plan measures are included in the Master Plan, to bring about holistic improvements to the town that will include reduction of traffic, encouragement of a more pedestrianised town centre, improved digital integration and as a result improved air quality and a safer and more health town.

The framework will direct change in the town over the next five years and beyond and will be based on extensive engagement with key stake holders and the wider community. It is currently on its 4th Draft and has already gone through a number of consultations.

The Air Quality Steering Group have fed into the strategy and many of the key air quality improvement goals will be included.

Some of the key themes of the Strategy are:-

- Action for Future Generations

Rethink and evolve thinking around localised energy production, the local environment and the way people travel.

- Business: Proudly Independent
Recasting Usk as a specialist independent town by supporting local businesses
- Reclaiming Usk's streets and spaces
Reversing decades of car orientated practices and returning Usk to a place for people not cars. For example, Twyn Square to become a public space to provide a place to meet, gather and showcase Usk. Trialling innovating street designs for Bridge Street to make it safer, more walkable, more attractive and to help improve air quality.
- Environment and botanics
Capitalise on Usk's rural setting and identity as the Town of Flowers to provide wider benefits

To integrate the original 2009 Action Plan and the Usk Town Improvement Master Plan the Action Plan has been updated to a 2023 version as shown in Table 5.1.

The Action Plan was written in consultation with the Usk Air Quality Steering Group, that meets twice a year to review and update on progress of the Action Plan Measures.

Ranking is based on a combination of items that must be delivered first before further actions can be delivered, cost effectiveness, air quality improvement the action will deliver (and timescale for it to be realised) and the number of people positively affected).

MCC in consultation with the Steering Group, and Welsh Government will look to revoke the Air Quality Management Area if the objective level remains below $36\mu\text{g}/\text{m}^3$ for six or seven consecutive years. This increase over the five years mentioned in LAQM.PG(W)16 is to take account of the reduced traffic associated with the 2020 and 2021 COVID 19 lockdowns.

If this occurs and the AQMA is revoked the AQAP could form the basis of a local air quality strategy to emphasis the council's role in delivering cleaner air and to ensure air quality issues maintain a high profile locally. It is Lilley that diffusion tube monitoring will remain in place, to ensure that if pollution does increase it can be identified early.

Table 5.1 – Usk Air Quality Action Plan 2023

Ranking of measures (in order of priority)				
Measure	Overall cost-effectiveness	Overall air quality improvement (and time-scale involved)	% people positively affected by option	RANKING
Procurement of ANPR traffic data and commission of parking survey to help inform future actions	Medium (medium cost)	No direct improvement but will help inform further actions	High – residents, shoppers, retailers	1
Traffic Enforcement Both 20mph zones by police and double yellow line parking by MCC Civic Enforcement Officers	Medium (low to medium costs)	Medium (this will be an ongoing action)	Medium (residents & shoppers, not retailers)	2
Town wide parking strategy Traffic Regulation Orders to restrict parking or limit waiting and improve pedestrian amenity and traffic flow. Improve carparks and introduce EVC points, consider residents parking permits and carpark charging or time restrictions	Medium to High – dependant on range of measures	Medium – approx. 12 months	Medium (residents)	3
Improved Public transport – additional bus routes to Pontypool & Abergavenny	Medium	Medium (1-5 years)	Medium (workers, shoppers, visitors residents)	4
HGV Lorry Watch to continue with letter warnings and enforcement by MCC	High (low costs – Volunteer spotters and enforcement by MCC)	Medium (medium-term)	High (residents, shoppers, retailers)	5
Improving Active Travel, including connecting Coleg Gwent campus, MCC offices (e.g. utilising the former railway line as a high-quality pedestrian cycle route) and Usk Island to the town and the two Sustrans routes (423 and 42). Improvement of Sustrans routes Create an active travel hub in Twyn Square	High (low cost)	Low (1-5 years)	High (residents, shoppers, retailers, visitors)	6
Increase the number of public transport services to and from Usk. To include community transport	Low-medium (high costs to others)	Low (medium to long-term)	Low-medium (residents and shoppers)	7

Contain indirect emissions from future development and from changes of land use that would generate traffic	High (low costs)	Low (short to medium-term)	Medium-high (residents, shoppers & retailers)	8
Bike Hire Scheme from Coleg Gwent	medium (low costs)	Low- medium dependant on uptake (12 months)	Medium (college students, MCC Staff, visitors)	9
Work with school and others to produce community and school traffic plan – School Air Quality Sensor to help with this	High (possible grant input)	Low (medium term)	Low (residents with emphasis on those with primary school age children)	10
Support & promote facilities for cyclists at school and in town centres	High (low cost)	Low (short-term)	Potentially high (residents, shoppers, retailers)	11
Public Realm improvements to Twyn Square (e.g. remove roundabout, restrict traffic, widen pavements, provide café/pub outside seating areas, improve green infrastructure)	High (medium-high costs)	Medium (1-5 years)	Medium (residents retailers, shoppers & visitors)	12
Pedestrian priority interventions for Bridge Street to reduce traffic, and encourage shoppers	High (High costs)	High (1-5 years)	High (residents, retailers, shoppers, visitors)	13
Implement new 20mph speed limits/ zones – Bridge Street Zone has been completed, other zones in the town could be beneficial)	Low-medium (low to medium costs)	Low (medium-term)	Low (some residents only)	14
River Usk Pedestrian Bridge (part of Active Travel) First – assess strategic need as part of active travel strategy. If case undertake feasibility assessment & determine location, costs, funding, design.	Medium (high cost)	Medium (1-5 years)	Potentially high to residents, shoppers and businesses in the vicinity	15

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
MCC	Monmouthshire County Council
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide
WG	Welsh Government