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2017 Air Quality Progress Report for Monmouthshire County Council

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

September 2017

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Executive Summary

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

This document is Monmouthshire County Council's Progress Report (PR) for the sixth round (2015-2017) of LAQM Review and Assessments.

The results from the 2016 air quality monitoring undertaken by the Council are presented and sources of air pollution are identified. The PR identifies changes since the last Updating and Screening Assessment in 2015, which could lead to the risk of an air quality objective being exceeded.

The 2011, 2012, 2013, 2014, 2015 and 2016 reports are available on the Council's website.

<http://www.monmouthshire.gov.uk/home/for-businesses/advice-and-legislation/environmental-health-and-pollution/pollution/air-quality/>

This PR confirms that air quality within the Chepstow Air Quality Management Area (AQMA) continues to exceed the nitrogen dioxide annual mean objective level at certain locations, however for the second year all six monitoring locations the Usk AQMA were below the nitrogen dioxide annual mean objective level. There were no recorded exceedences in Monmouth or Abergavenny.

Monmouthshire continues to meet the relevant air quality objectives for all other pollutants.

In 2015 concentrations were lower at all locations (except one) than any other year, however this decrease did not continue into 2016, as concentrations increase slightly at all locations. However 2016 concentrations were still lower than those recorded in 2014 at most locations.

The Air Quality Monitoring Station on Hardwick Hill, in Chepstow recorded lower levels of annual nitrogen dioxide and PM_{2.5} in 2016 than 2015, however PM₁₀ increased by 1µg/m³. In general nitrogen dioxide has continued to decrease since 2011, PM₁₀ has continued to decrease since 2005, and PM_{2.5} has continued to decrease since 2010.

There have been no new industrial installations and no new or substantially altered roads within Monmouthshire.

There are also no new commercial, domestic or fugitive sources of emissions.

The PR summarises progress with both the Chepstow and Usk Action Plans.

No further Detailed Assessments are required at present, although Merthyr Road in Abergavenny and parts of Monmouth will continue to be monitored closely along with the Usk and Chepstow Air Quality Management Areas. Nitrogen Dioxide diffusion tube monitoring has been extended along the southern boundary of the Usk AQMA in 2017.

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1 Introduction

1.1 Description of Local Authority Area

Monmouthshire is located in the south east of Wales, bordering the English Counties of Gloucestershire and Herefordshire, and the Welsh Counties of Powys, Torfaen, Newport and Blaenau-Gwent.

The main towns in Monmouthshire are Monmouth, Chepstow, Usk and Abergavenny. Air quality is generally good in Monmouthshire, although areas in Chepstow and Usk have been identified as having exceedences of the annual mean nitrogen dioxide objective and have subsequently been declared as Air Quality Management Areas (AQMAs). Parts of Abergavenny and Monmouth have been close to exceeding the objective levels and continue to be closely monitored. Traffic is the main source of emissions, both in the AQMAs, and elsewhere in the County.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. 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 likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

For Local Authorities in Wales, Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 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), The Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Wales

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2011
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particulate Matter (PM ₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 1.2 is a chronological summary of previous air quality reports from 2003 until 2016. Further detail on each report can be found in the 2015 Updating and Screening Assessment (USA) and previous reports available on Monmouthshire County Council's website.

A more detailed summary of the outcomes of the sixth round's Updating and Screening Assessment (2015) is provided after the table.

Table 1.2 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. Chepstow and Monmouth monitoring results were marginal and AQMA's not declared
Detailed Assessment (12 months monitoring)	February 2005	AQMA for Usk confirmed. Chepstow and Monmouth did not require an AQMA
Progress Report	May 2005	Confirmed nitrogen dioxide exceedence in Usk. Elsewhere levels were below the objective levels for all pollutants although Hardwick Hill in Chepstow was close
AQMA declared for Bridge Street, Usk	November 2005	The location is shown in Figure 1.1.
Updating and Screening Assessment (Round 3)	March 2006	Exceedences of Nitrogen Dioxide level on Hardwick Hill, Chepstow. Decided to progress straight to declaration of an AQMA
AQMA declared for Hardwick Hill, Chepstow	April 2007	The location is shown in Figure 1.2

Further Assessment for Usk AQMA	April 2007	Confirmed the AQMA should be retained with no changes to the boundary
Further Assessment for Chepstow AQMA	May 2008	One exceedence of ten monitoring locations representing 8 residential properties. Rather than cycle between increasing and decreasing boundaries it was decided to keep the original AQMA boundary
Progress Report	November 2008	NO2 exceedences limited to the two AQMA's.
Updating and Screening Assessment (Round 4)	May 2009	Little changed in source emissions since 2006. A detailed Assessment was not necessary. Additional monitoring undertaken in Magor/Undy along the proposed route of the M4 relief road for 12 months to give a baseline
Usk Air Quality Action Plan	September 2009	Agreed by Welsh Assembly Government on November 2009. 14 proposed measures to improve air quality
Chepstow Action Plan Stakeholder workshop Report	November 2009	Outcomes of two stakeholder workshops with local residents
Progress Report	May 2010	Only the two AQMA's exceeded nitrogen dioxide objective levels. No Detailed Assessment required.
Hardwick Hill, Chepstow Origin & Destination Study	August 2010	Undertaken to support the Action Plan process
Progress Report	June 2011	Nitrogen dioxide is still the only pollutant that exceeds the objective level, and these exceedences are contained in the two declared AQMAs in Usk and Chepstow. It concluded that a Detailed Assessment for air quality within Monmouthshire was not necessary for any pollutant
Chepstow Air Quality Action Plan	August 2011	Accepted by the Welsh Government in September 2011 with 29 proposed measure for improving air quality
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 however levels at

Merthyr Road Abergavenny were close to the objective level. Within the AQMAs there are still exceedences of the nitrogen dioxide objective at Hardwick Hill, Chepstow and Bridge Street, Usk. A Detailed Assessment was not required; however it was decided to increase monitoring on Merthyr Road from one to three locations. These were installed mid-2012.

Further details below

Progress Report	April 2013	<p>Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded.</p> <p>Nitrogen Dioxide levels across the County increased sharply in 2012, which lead to Wyebridge Street in Monmouth being close to the objective level, and Merthyr Road in Abergavenny slightly exceeding the objective level.</p> <p>A Detailed Assessment was not undertaken, as it was decided that the results of the 2013 monitoring would be required to ensure 2012 was not an unusually high year. To support this and in preparation for a potential Detailed Assessment for Merthyr Road, an additional three diffusion tubes were to be installed on Merthyr road (to increase monitoring from one in 2011, to three in 2012, and six in 2013).</p>
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Progress Report	April 2014	<p>Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded.</p> <p>Nitrogen dioxide levels were lower in 2013 than 2012 at all but one location and no location outside the two AQMA's exceeded the objective level. It was decided that a further 13 diffusion tubes were to be installed in Monmouth at the end of 2013 in preparation for the 2014 monitoring year. These were installed to support a more detailed assessment of nitrogen dioxide levels in the town centre and along the A40.</p>
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Monmouth Six Month Detailed Assessment	September 2014	<p>The report provided a summary of monitoring data for the period January–July 2014 and indicated that the annual mean objective was likely to be met at all sites. However, an assessment of two Air Quality Models undertaken for developments under the planning process identified possible exceedences elsewhere in the town. It was decided to install further diffusion tubes at these locations in January 2015, and to liaise with Natural Resources Wales to install an automatic</p>
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monitoring station for NO₂ and PM₁₀, PM_{2.5} on the pavement of Wyebridge Street.

Updating and Screening Assessment (Round 6)

April 2015

The two AQMA's continued to experience exceedences 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 exceedences outside the AQMA's

The full year's monitoring for Monmouth had confirmed the findings of the September 2014 six-month Detailed Assessment.

The USA confirmed that further diffusion tube monitoring was being undertaken in 2015 in Monmouth, and that the NRW's MMF had also been installed in December 2014.

There were no exceedences of nitrogen dioxide in Abergavenny, although two locations were close enough to warrant continued monitoring.

Progress Report

April 2016

Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations decreased at all locations (diffusion tube and automatic analysers). One location exceeded the nitrogen dioxide annual mean in the Chepstow AQMA, there were no other exceedences (including the Usk AQMA). This was the first year Usk did not have a location exceeding the objective level.

NRW's MMF monitoring in Monmouth was also summarised. It did not identify exceedence at a relevant receptor.

Summary of 2015 Updating & Screening Assessment

The nitrogen dioxide diffusion tube results identified that the annual mean objective level was exceeded at four locations in 2014. Two of these locations were within the Chepstow AQMA (CH4 and CH6) and two were within the Usk AQMA (USK4 & USK5). There were no exceedences in Monmouth or Abergavenny, however two locations in Abergavenny (AB1 & AB2) were close to the objective level.

Trends indicate that the generally high nitrogen dioxide concentrations experienced in 2012 at most locations in Monmouthshire were not continued in 2013 or 2014. Apart from USK1 all locations were lower in 2013 and 2014 than 2012.

Of the twenty four locations that had monitoring data for both 2013 and 2014, thirteen locations were lower in 2014 than 2013, nine locations were higher and two were the same. The range for the locations that reduced between 2013 and 2014 was 0.17-2.73 $\mu\text{g}/\text{m}^3$ and the range for the locations that increased was 0.13-2.47 $\mu\text{g}/\text{m}^3$. Of the twenty one locations that were monitored in both 2012 and 2014, twenty were lower in 2014 and one (USK1) was higher. The range of the concentration reductions were between 0.19-7.76 $\mu\text{g}/\text{m}^3$. USK1 increase by 1.30 $\mu\text{g}/\text{m}^3$.

With regard to the Air Quality Monitoring Station, there were no exceedences of either of the nitrogen dioxide objective levels, or PM₁₀ objective levels, nor of the PM_{2.5} annual mean limit value.

The annual mean nitrogen dioxide level increase to 38.6 $\mu\text{g}/\text{m}^3$ in 2014 from 34.5 $\mu\text{g}/\text{m}^3$ in 2012, but was lower than 2011 and 2012. The increase occurred in both the January and February peak and November peak. There were no exceedences of the hourly mean.

PM₁₀ concentration recorded in the Chepstow AQMA indicated that the yearly downward trend was continuing, with decrease from 26 $\mu\text{g}/\text{m}^3$ in 2005 to 19 $\mu\text{g}/\text{m}^3$ in 2013 and 18 $\mu\text{g}/\text{m}^3$ in 2014. There were two exceedences of the 24-hour mean objective level.

PM_{2.5} concentrations indicated a general downward trend from the highest point in 2010 of 19 $\mu\text{g}/\text{m}^3$ to 14 $\mu\text{g}/\text{m}^3$ in 2014. However the lowest concentration was recorded in 2012 at 12 $\mu\text{g}/\text{m}^3$, which increased to 14 $\mu\text{g}/\text{m}^3$ in both 2013 and 2014.

Air Quality Management Areas

Figure 1.1 shows the boundaries of the Usk Air Quality Management Area which extends northeast/southwest through the town centre along Bridge Street, and Figure 1.2 shows the boundaries of the Chepstow Air Quality Management Area, which covers a portion of the A48 trunk road along Hardwick Hill and Newport Road running northeast/southwest, south of the town centre.

Figure 1.1 Map of Usk AQMA Boundary

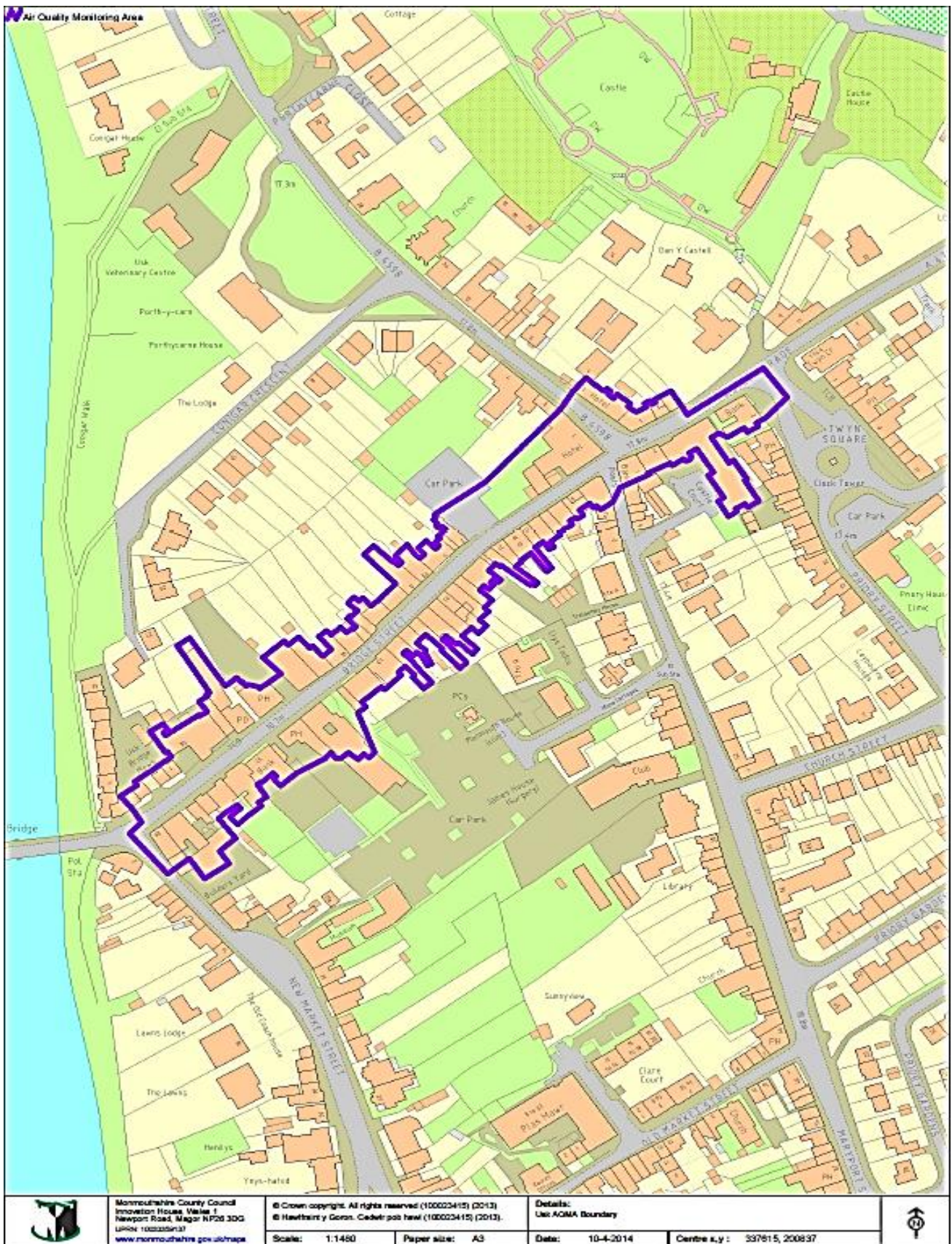
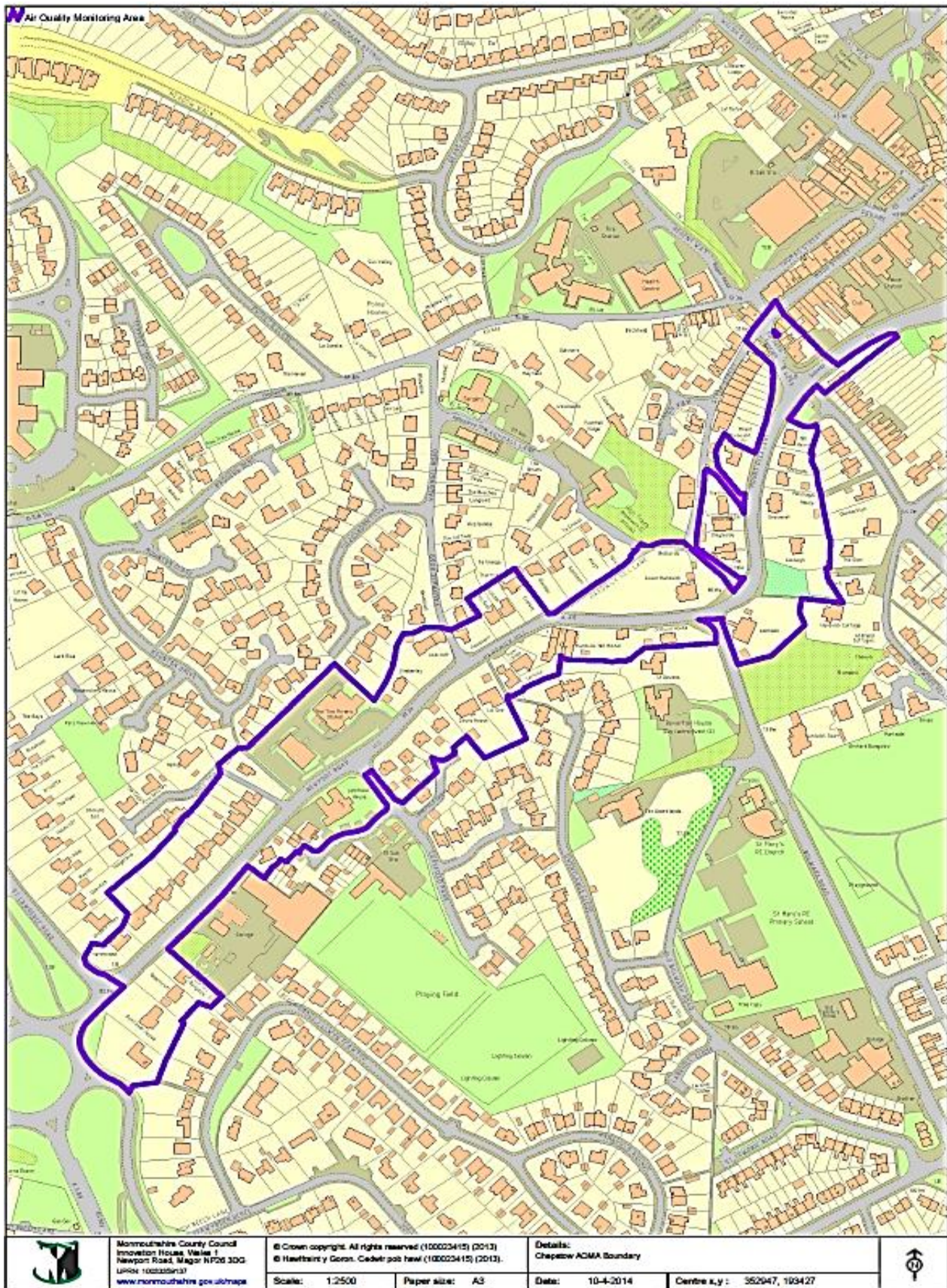


Figure 1.2 Map of Chepstow AQMA Boundary



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Monmouthshire operates automatic analysers in Chepstow at the Air Quality Monitoring Station (AQMS) located on the A48 at Hardwick Hill. The AQMS houses three analysers to measure nitric oxide, nitrogen dioxide, PM₁₀, and PM_{2.5} concentrations. Table 2.1 provides details of the analysers, and the location of the AQMS is shown in Figure 2.2. The AQMS is located within the Chepstow Air Quality Management Area (declared for nitrogen dioxide exceedence) at a roadside location. The automatic monitors became part of the Automatic Urban and Rural Network (AURN) in January 2008.

In February 2010 the PM₁₀ monitor was upgraded to a TEOM-FDMS (Filter Dynamics Measurement System) analyser and a TEOM-FDMS PM_{2.5} analyser was introduced. TEOM-FDMS monitors are accepted as giving results equivalent to the European Gravimetric Standard Method. The analysers in use at the station are Thermo Scientific rp Series. There are two 8500 FDMS units, two 1400A TEOM Sensor Units and two 1400A TEOM Control Units.

The previous nitrogen dioxide analyser (Monitor Labs 9841B chemiluminescence analyser) and Odessa data logger were replaced in January 2012 under the Affiliate Upgrade Compliance Programme to the latest compliant Monitor Europe 20xx series continuous gaseous analyser (ML 2041 NOx Chemiluminescence Analyser).

In 2016 the NOx analyser was serviced by Air Monitors and the PM10 and PM2.5 analysers were serviced by Enviro Technology, and all three were audited by Ricardo-AEA. Services and audits are undertaken twice a year. Monmouthshire County Council undertakes routine LSO (Local Site Operator) duties at the station including regular calibration checks, filter changes, and calibration gas changes.

The data from all three analysers is collected and ratified by Ricardo-AEA on behalf of the Welsh Air Quality Forum (WAQF) and DEFRA and hourly data is published on the WAQF website (<http://www.welshairquality.co.uk>), and on DEFRA's website <http://uk-air.defra.gov.uk/>.

Further QA/QC data is available in Appendix A.

Table 2.1 Details of Automatic Monitoring Site

Site Name	Site Type	OS Grid Reference	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure?	Distance to kerb of nearest road	Worst-case exposure?
A48 Hardwick Hill, Chepstow (AQMS)	Roadside	ST5312893472	PM ₁₀	Yes	TEOM FDMS	Y	3m	Y
			PM _{2.5}		NO _x			

2.1.2 Non-Automatic Monitoring Sites

Non-automatic monitoring undertaken in Monmouthshire uses diffusion tubes to monitor for nitrogen dioxide along the road networks close to sensitive receptors such as schools and houses.

The locations of the monitoring are shown in Figures 2.1 – 2.8

In 2016 Monmouthshire County Council monitored nitrogen dioxide at 39 locations and used 42 diffusion tubes.

Three diffusion tubes were co-located with the nitrogen dioxide inlet of the Chepstow Air Quality Monitoring Station to obtain data for the Bias Adjustment Factor study, and one tube was used as a travel blank.

The only change to the diffusion tube monitoring network in 2016, was the removal of the three diffusion tubes used as a triplicate co-location study with Natural Resources Wales's mobile monitoring facility, which had been monitoring on the A40 in Monmouth for the first half of 2015.

Laboratory Analysis Details

Since May 2010 Monmouthshire County Council has used diffusion tubes prepared and analysed by Gradko International Limited using 20% TEA in Water. Information on adjustments (bias adjustment factor – BAF) made to diffusion tube data can be found in Appendix A, along with QA/QC data.

Figure 2.1: Nitrogen Dioxide Monitoring Locations - Chepstow AQMA west



Figure 2.2: Nitrogen Dioxide & AQMS Monitoring Locations - Chepstow AQMA east



Figure 2.3: Nitrogen Dioxide Monitoring Locations - Usk AQMA

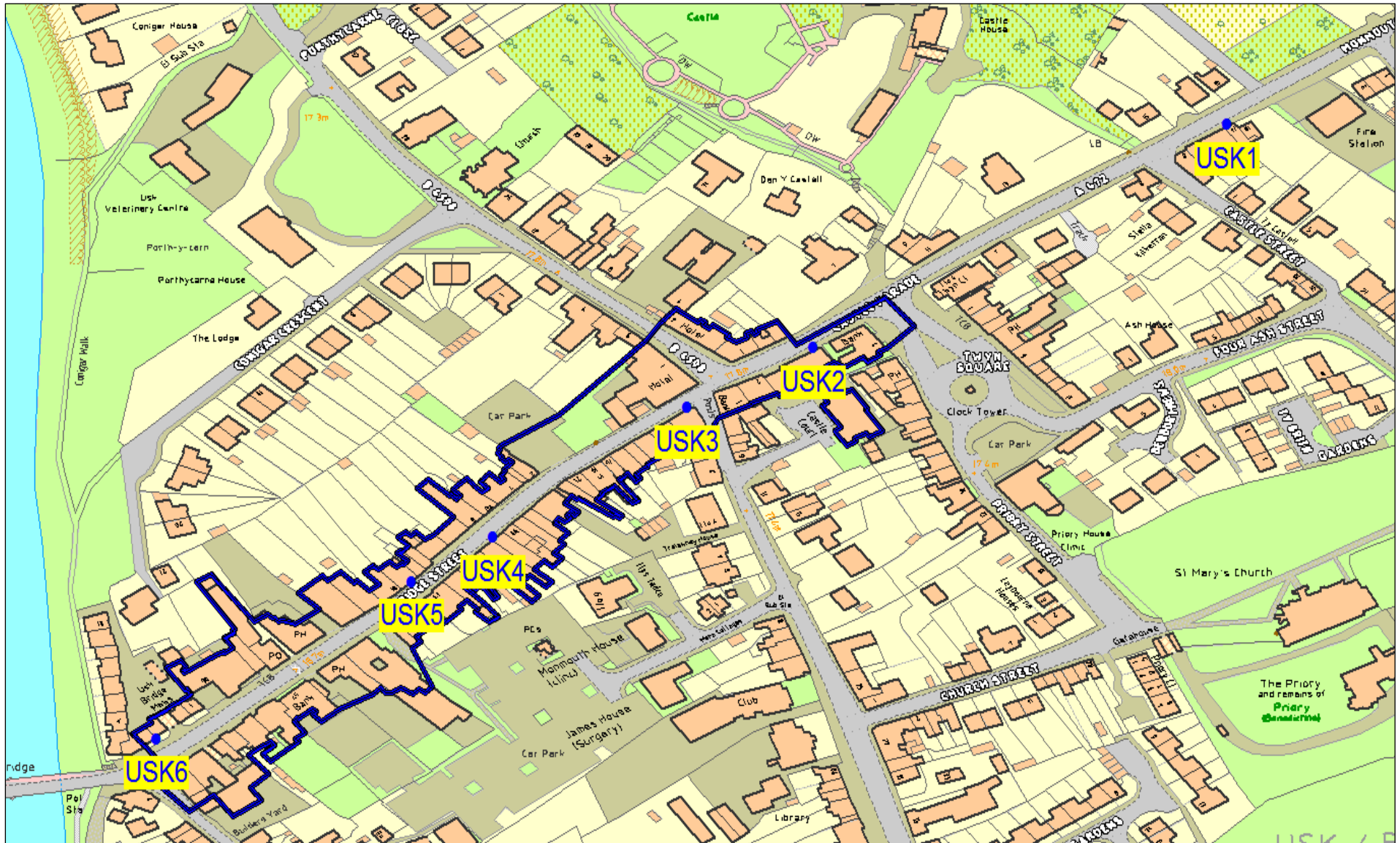


Figure 2.4: Nitrogen Dioxide Monitoring Locations – Monmouth, A40/Wyebridge Street & Riverside Park

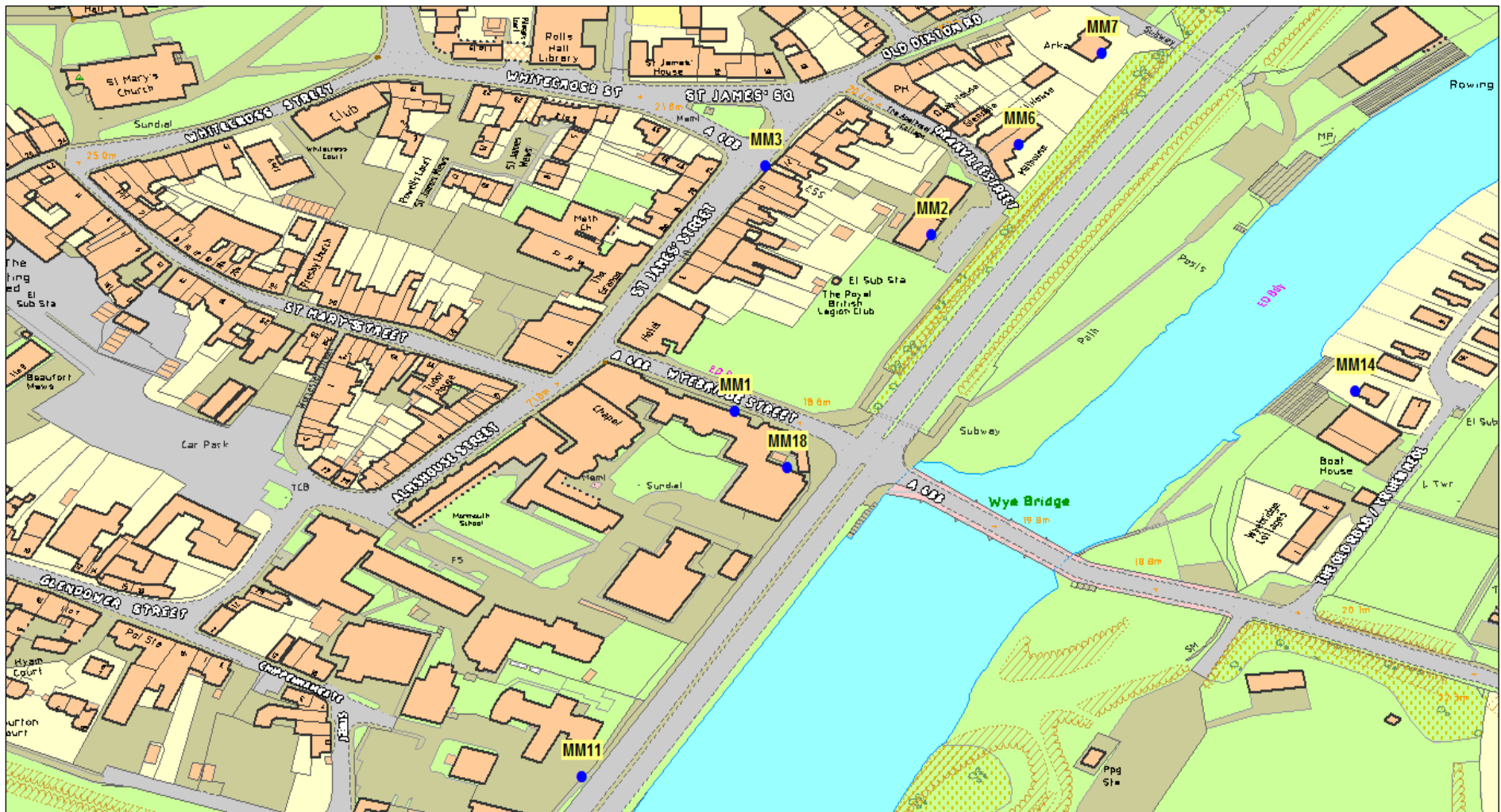


Figure 2.5: Nitrogen Dioxide Monitoring Locations – Monmouth, Monnow Street & Monk Street/Priory Street junction

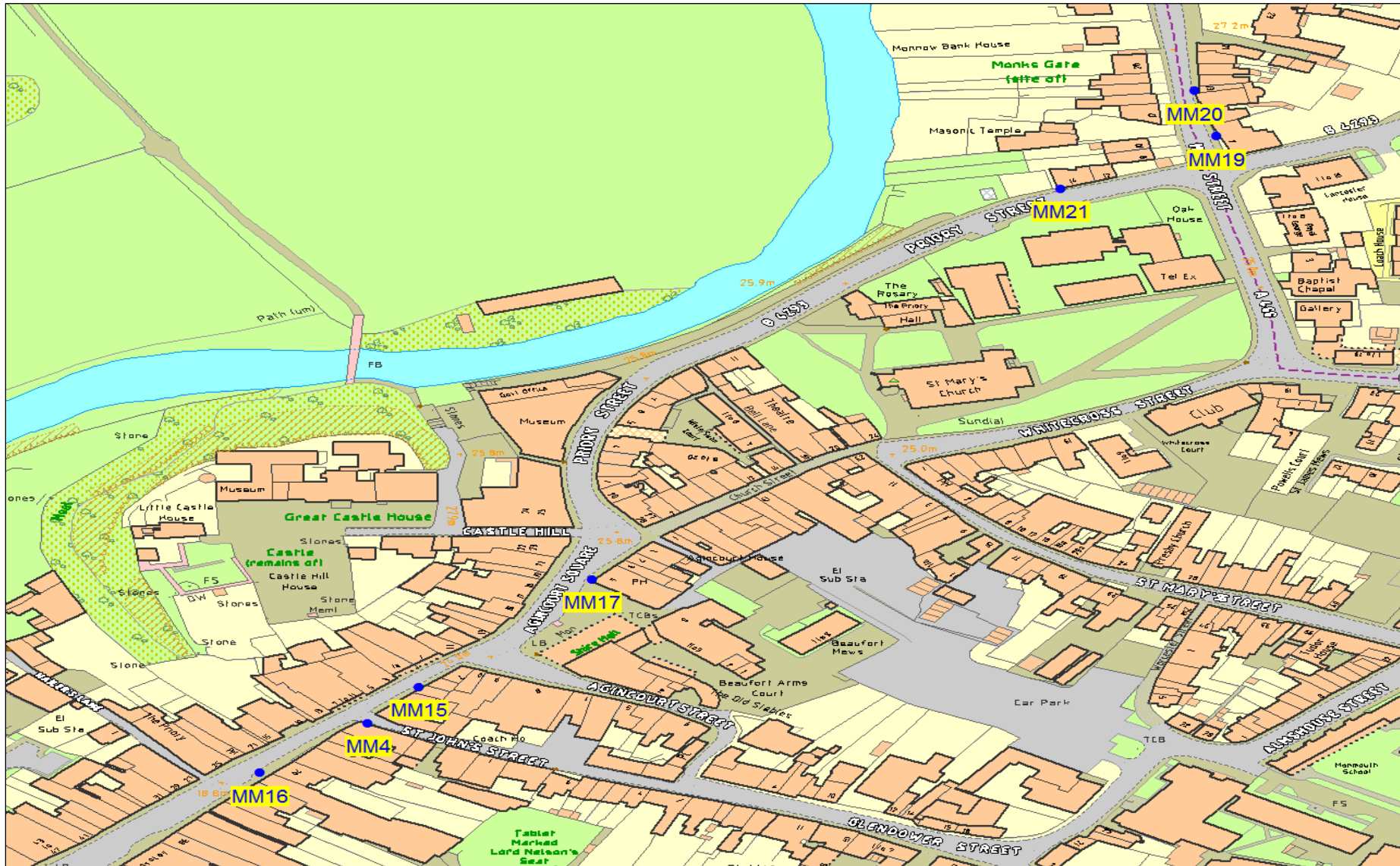


Figure 2.6: Nitrogen Dioxide Monitoring Locations – Monmouth, Old Dixton Road

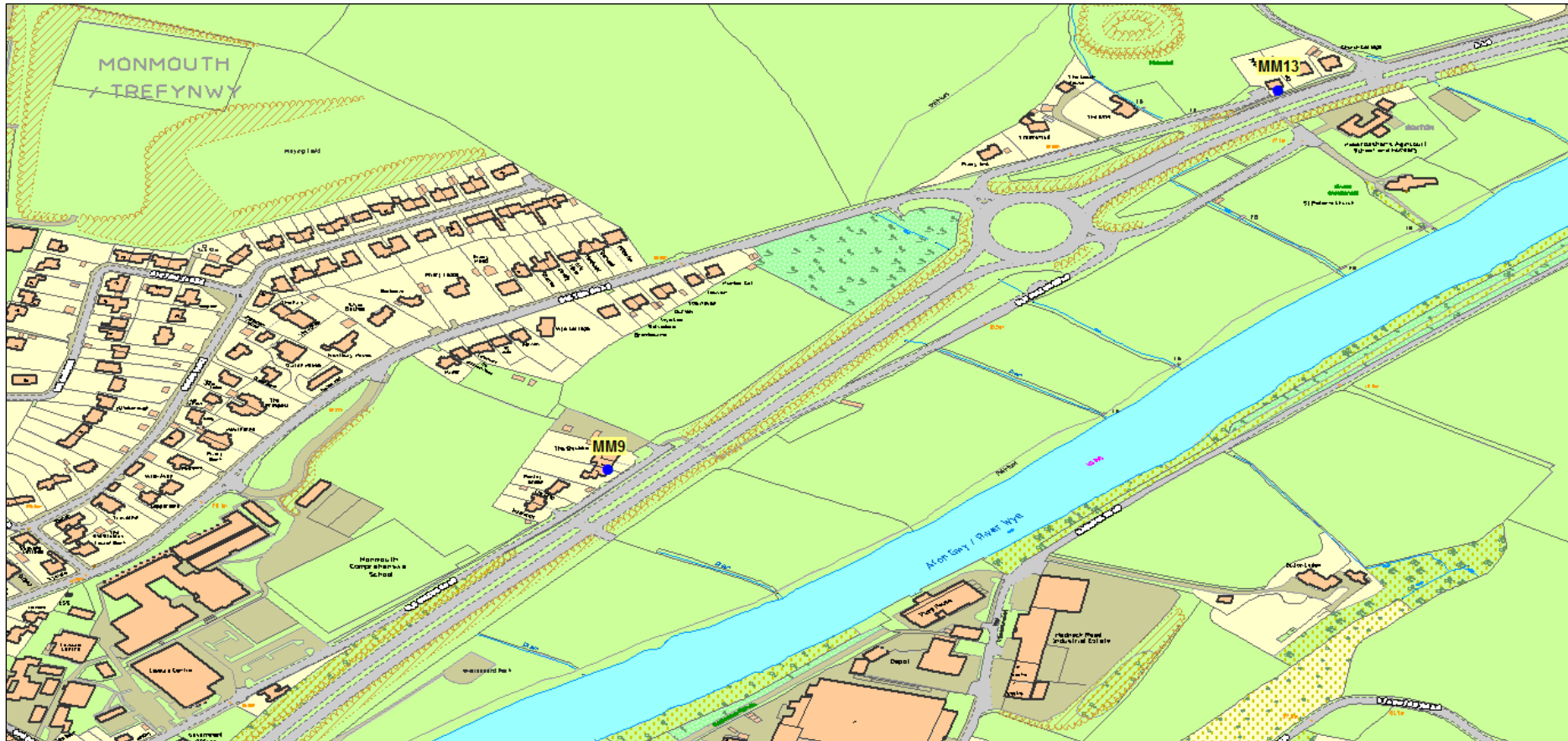


Figure 2.7 Nitrogen Dioxide Monitoring Locations – Abergavenny, South Merthyr Road

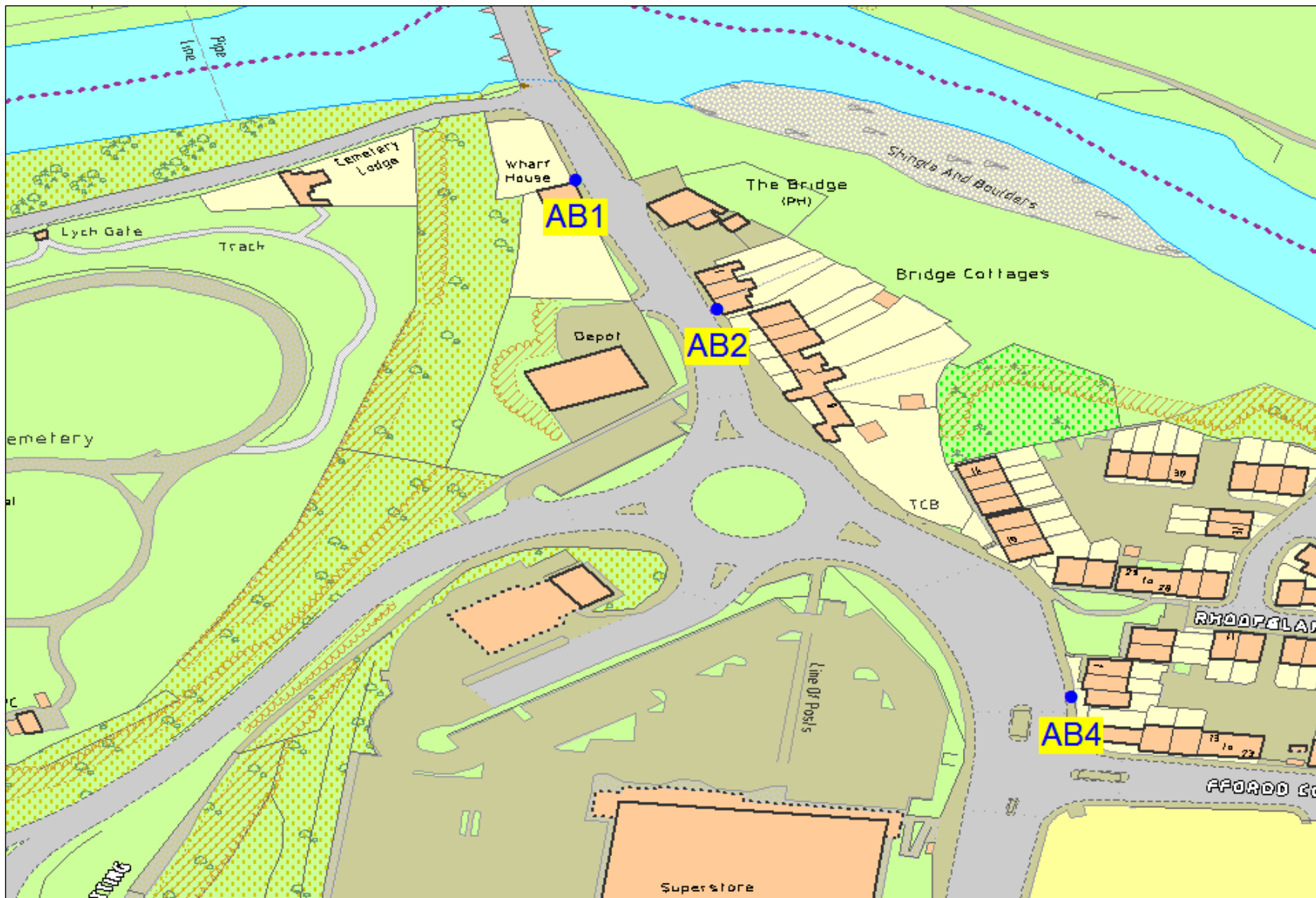


Figure 2.8: Nitrogen Dioxide Monitoring Locations – Abergavenny, North Merthyr Road

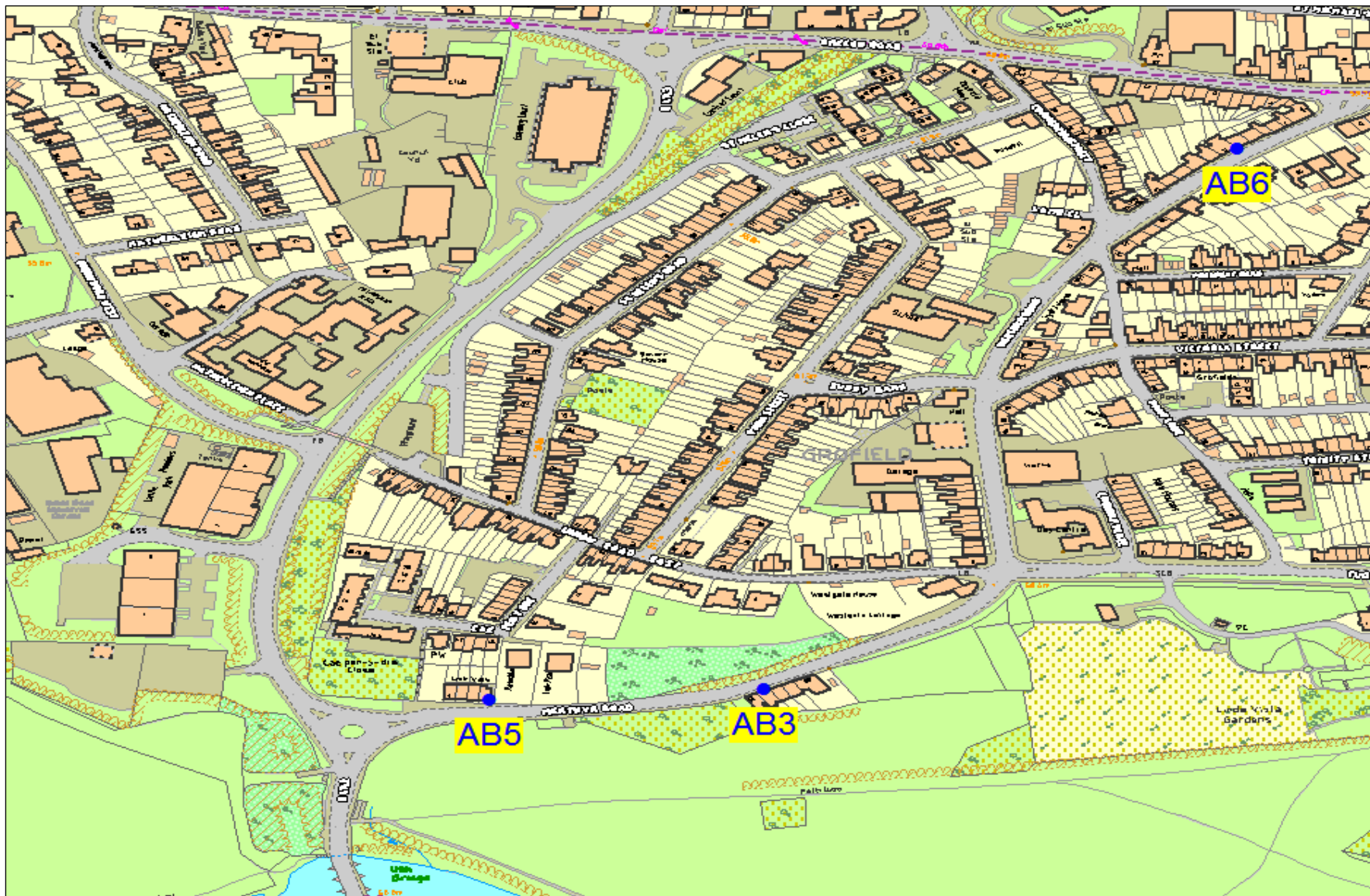


Table 2.2 Details of Non- Automatic Nitrogen Dioxide Monitoring Sites

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
38 Larkfield Park, Chepstow	CH1	Roadside	ST 528933	1.6	Yes	Yes 0.15	10	Yes	30/09/2003
Newport Road Lamppost No. WH70, Nr Larkfield House, Newport Road (A48) Chepstow	CH2a	Roadside	ST 52821 93307	2.45	Yes	No 5.6	1.75	Yes	08/01/2014
36 Wayside, Hardwick Hill (A48) Chepstow	CH3	Roadside	ST 529934	1.7	Yes	Yes 0.18	12	Yes	30/09/2003
2 Hardwick Hill (A48) Chepstow.	CH4	Roadside/	ST 530935	3.1	Yes	Yes 0.59	4	Yes	31/05/2005
1 Ashfield House, Mount Pleasant (A48) Chepstow	CH5	Roadside	ST 531934	1.6	Yes	Yes 0.23	14	Yes	30/01/2006
Rainwater Pipe, Hill House, Hardwick Hill (A48) Chepstow.	CH6	Roadside	ST 531935	2.3	Yes	Yes 0.18	6	Yes	30/09/2003
Rainwater Pipe 2 Hardwick Terrace, Chepstow	CH7	Roadside	ST 53164 93663	2.57	Yes	Yes 0.16	1.5	Yes	29/08/2006
Lamp post, Moor Street, Chepstow	CH8	Kerbside/ Urban Centre	ST 53218 93728	2.75	No	Yes 0.5	1.65	Yes	04/07/2007
Restway Wall, Garden City Way, (A48) Chepstow	CH9	Roadside	ST 531937	1.91	No	Yes 0.18	11	Yes	30/09/2003

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
AQMS Hardwick Hill (A48) Chepstow – Collocated with a continuous Analyser	AQ1 AQ2 AQ3	Roadside	ST 531934	2.9	Yes	Yes 20	4	Yes	02/01/2004
School House, Wyebridge Street, Monmouth – new position	MM1	Roadside	SO 512129	2.7	No	Yes 0.18	3.4	Yes	30/10/2013
Flat 1, Granville Street, Monmouth – new position	MM2	Intermediate	SO 512128	2	No	Yes 0.24	25	Yes	30/10/2013
Lamp post adjacent 21 St. James Square, Monmouth	MM3	Kerbside	SO 510129	2.3	No	Yes 2.4	0.5	Yes	01/05/2004
12a Monnow St. on St. John St. Monmouth	MM4	Kerbside/ Urban Centre	SO 50718 12794	2.8	No	Yes 0.13	1.3	Yes	04/07/2007 Moved 5meters south 02/04/2014
Millhouse, Granville Street, Monmouth	MM6	Intermediate	SO 511129	1.65	No	Yes 0.2	21	Yes	30/10/2013
Arka, Old Dixton Road, Monmouth	MM7	Intermediate	SO 511129	2.3	No	Yes 0.14	23	Yes	30/10/2013
1, The Shrubbery, Old Dixton Road, Monmouth	MM9	Intermediate	SO 514132	2.3	No	Yes 0.24	16	Yes	30/10/2013
Fence of Boys School Playground	MM11	Roadside	SO 510126	3	No	Yes 0.5	4.8	Yes	30/10/2013

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
Pike House, New Dixton Road, Monmouth	MM13	Roadside	SO 518136	1.63	No	Yes 0.19	6.53	Yes	04/12/2013
2 Riverside Park, Mayhill, Monmouth	MM14	Suburban	SO 51277 12822	1.77	No	Yes 0.15	98 – A465 113 – A40	No	06/03/2014
6 Monnow Street (Fancy Freds), Monmouth	MM15	Roadside/ Urban Centre	SO 50729 12811	2.3	No	Yes 0.15	1.5	Yes	02/04/2014
Lampost ME380 Adj 20A Monnow Street, Monmouth	MM16	Roadside/ Urban Centre	SO 50695 12775	2.3	No	Yes 1.35	2.1	Yes	02/04/2014
4 Agincourt Square - The Punch House, Monmouth	MM17	Roadside/ Urban Centre	SO 50779 12868	2.45	No	Yes 0.54	1.7	Yes	02/04/2014
Design & Technology Block Monmouth School, Monmouth	MM18	Roadside	SO 51091 12791	2.1	No	Yes 0.18	13	Yes	29/10/2014
Lamp post, 7 Ty Mawr, Monk Street, Monmouth	MM19	Roadside	SO 50953 13098	2.45	No	Yes 1.5	1.75	Yes	04/02/2015
Lampost ME514, 13 Monk Street, Monmouth	MM20	Kerbside	SO 50947 13122	2.45	No	Yes 1.75	1.05	Yes	04/02/2015
Lamp post ME399, 14 Victoria Place, Priory Street, Monmouth	MM21	Roadside	SO 50910 13071	2.45	No	Yes 0.3	1.45	Yes	04/02/2015

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
Lamp post Merthyr Rd. (A4143), Abergavenny	AB1	Kerbside	SO 29170 13867	2.4	No	Yes 0.35	0.85	Yes	04/07/2007
Back Clinic, 2a Bridge Cottages, Llanfoist, Merthyr Road, Abergavenny, NP7 9LL	AB2	Roadside	SO 29202 13822	2.5	No	Yes 0.23	1.7	Yes	30/05/2012
112 Merthyr Road, Abergavenny, NP7 5DF	AB3	Roadside	SO 29324 14080	2.5	No	Yes 0.25	1.8	Yes	30/05/2012
L/P Adj. 5 Coopers Way, Merthyr Rd, Abergavenny	AB4	Roadside	SO 29275 13686	2.4	No	Yes 2.4	1.55	Yes	02/01/2013
1 Usk View, Merthyr Rd, Abergavenny	AB5	Roadside	SO 29121 14075	1.9	No	Yes 0.13	5	Yes	02/01/2013
L/P No. MB991 Adj. 9 & 11 Merthyr Rd, Abergavenny	AB6	Roadside	SO 29524 14470	2.3	No	Yes 0.5	1.3	Yes	02/01/2013
14A Castle Parade, Usk	USK1	Roadside	SO 37851 01034	2.3	No	Yes 0.16	1.6	Yes	04/07/2007
Castle Court, Usk. Rainwater Pipe	USK2	Roadside/ Urban Centre	SO 376090	2.45	Yes	Yes 0.16	1.35	Yes	02/08/2005
White Hart, 5 Bridge Street, Usk Rainwater Pipe	USK3	Roadside/ Urban Centre	SO 376009	2.4	Yes	Yes 0.15	1.3	Yes	02/01/2004

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
35 Bridge Street, Usk	USK4	Roadside/ Urban Centre	SO 376008	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	SO 375008	2.4	Yes	Yes 0.54	1.2	Yes	04/02/2003
4 Usk Bridge Mews, Usk Rainwater Pipe	USK6	Roadside/ Urban Centre	SO 375008	2.6	Yes	Yes 0.21	4.9	Yes	02/01/2004

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Automatic Monitoring Data – Chepstow A48

2.2.1.1 Nitrogen Dioxide (NO₂)

Data Capture

Data capture for the Chemiluminescence analyser at the Air Quality Monitoring Station (AQMA) situated in the Chepstow Air Quality Management Area on Hardwick Hill, Chepstow in 2016 was good, with an annual data capture of 97%.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
100%	99%	99%	100%	100%	96%	94%	96%	95%	100%	99%	80%

Concentrations

The nitrogen dioxide concentrations measured by the automatic monitor on Hardwick Hill in Chepstow since 2005 show that the annual mean objective level of 40 µg/m³ was exceeded in 2008 and 2011 but met in all other years, including 2016, which recorded 35 µg/m³. These are shown in Table 2.3.

The hourly mean objective (200 µg/m³ not to be exceeded more than 18 times a year), was met each year since 2005.

Between 2005 and 2014 there were no recorded hourly exceedences of 200 µg/m³, however in 2015 there were two hourly exceedences. In 2016 there were again no hourly periods above 200 µg/m³, with the maximum hourly mean recorded at 141µg/m³.

Figure 2.9 presents annual average measurements of nitrogen dioxide and PM₁₀ and PM_{2.5} between 2005 and 2016. Figure 2.10 shows the Smooth Trend analysis for the monthly average nitrogen dioxide readings between 2004 and 2016 as red lines and markers, with a red fitted trend line, and a grey area showing the 95% confidence interval of the trend line fit.

Both figures show that since monitoring began in September 2004, there has been an annual fluctuation in nitrogen dioxide concentrations ranging between 34µg/m³ and 42µg/m³. Concentrations increased sharply between 2006 and 2008 from a low of 34µg/m³ to a high of 42µg/m³, but then stabilised between 38µg/m³ and 40µg/m³ for four years between 2009 and 2012.

There was a large decrease in 2013 when concentrations return to 2006 levels ($34.5\mu\text{g}/\text{m}^3$), however they increased again in 2014 to the 2009-2012 levels with a concentration of $38.6\mu\text{g}/\text{m}^3$.

In 2015 the concentration decreased slightly to $37\mu\text{g}/\text{m}^3$ and decreased again in 2016 to $35\mu\text{g}/\text{m}^3$.

Figure 2.10 suggests that the annual increase in concentrations between 2006 and 2011 has stopped, and there has been a downward trend from 2011's $40\mu\text{g}/\text{m}^3$ to 2016's $35\mu\text{g}/\text{m}^3$.

Figure 2.10 demonstrates that nitrogen dioxide levels are highest at the beginning and end of each year with a dip in the warmer summer months, which is also shown in the Time Variation Analysis (Figure 2.11). The Time Variation Analysis is for nitrogen dioxide, PM10 and PM2.5 concentrations measured between 2004 and 2016 (2010 and 2016 for PM2.5) and shows daily, hourly, monthly and weekly trends.

Figure 2.11 also shows how there is an increase in concentrations at the same time as weekday traffic rush hours, and that week days have higher concentrations than weekends. This confirms that the majority of emissions are from traffic on Hardwick Hill. This fact is further supported by Figure 2.12, which is a Wind/Pollution Rose for 2010 to 2016 and demonstrates how wind direction from the A48 road to the south west, west and north west of the monitoring station corresponds with higher concentrations of nitrogen dioxide than the other wind directions.

Table 2.3: Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA	Data Capture (%)		Annual Mean Concentration $\mu\text{g}/\text{m}^3$											
			period of monitoring ^a	2015 ^b	2005	2006	2007	2008	2009	2010	2011	2012 ^c	2013	2014	2015	2016
AQMA	Roadside	Yes	97	97	36	34.3	36.9	41.9	38	39.0	40.0	39.1 (41.5)	34.5	38.6	37	35
Annual Mean Objective Level					40											

Table 2.4: Automatic Monitoring for Nitrogen Dioxide: Comparison with hourly mean Objective

Site ID	Site Type	Within AQMA?	Data Capture (%)		Number of Exceedences of Hourly Mean ($200 \mu\text{g}/\text{m}^3$)												
			period of monitoring ^a	2015 ^b	2005	2006	2007	2008	2009	2010	2011	2012 ^d	2013	2014	2015	2016	
AQMS	Roadside	Yes	98	98	0	0	0	0	0	0	0	0	0 (122)	0	0	2	0
1-hour Mean Objective					Not to be exceeded more than 18 times/year												

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c As data capture was less than 75% the 2012 annual mean concentration has been “annualised” [as in Box 3.2 of TG\(09\)](#). The un-annualised mean is shown in (brackets). Further information on data used to calculate the annualised mean is shown in Appendix 1 of the 2013 Progress Report

^d As valid data capture for 2012 was below 90% the 99.8th percentile is shown in brackets.

Figure 2.9 Trends in Annual Mean nitrogen dioxide, PM10 and PM2.5 Concentrations 2005-2016

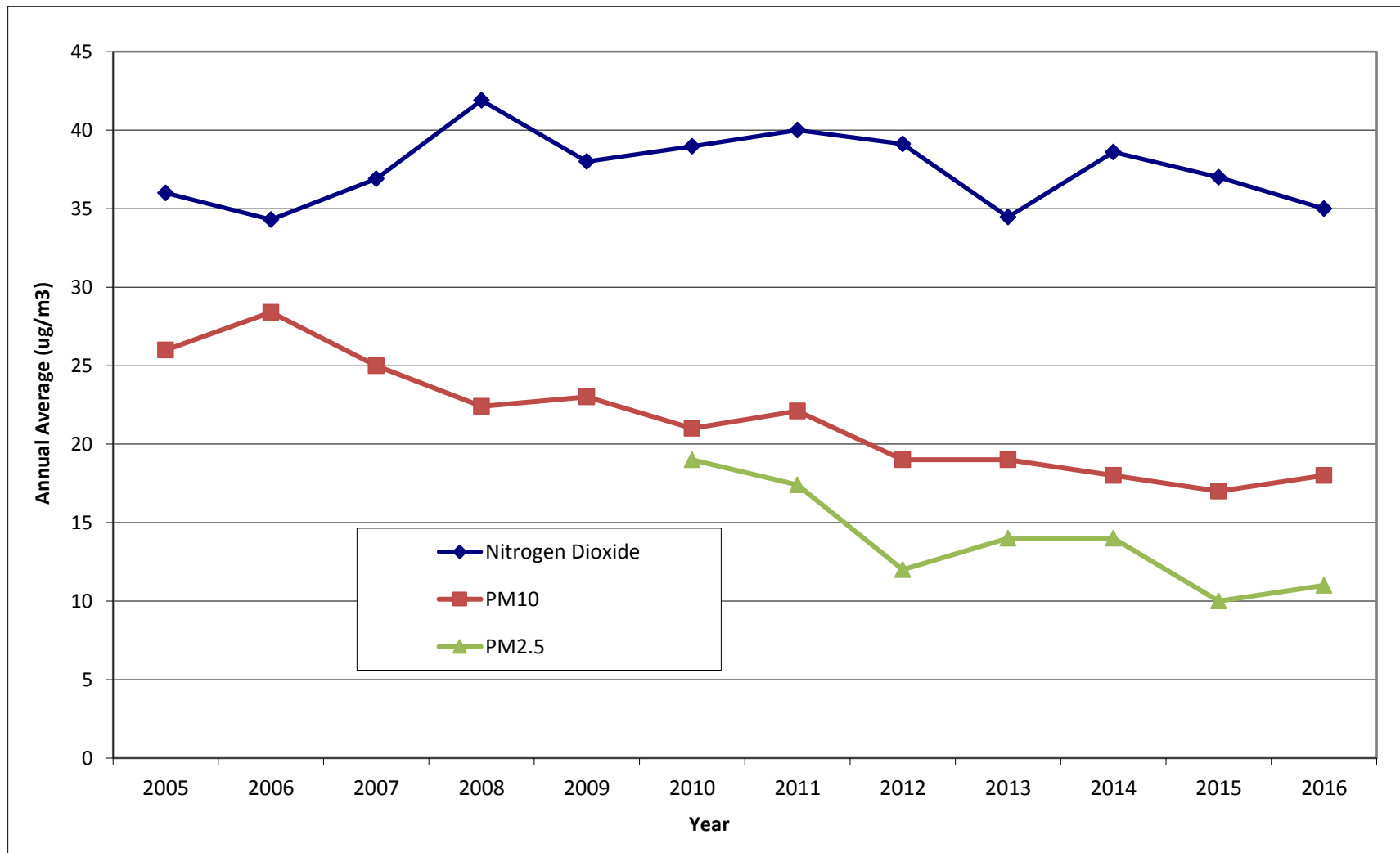


Figure 2.10 Smooth Trend Analysis of average monthly nitrogen dioxide concentration 2004-2016

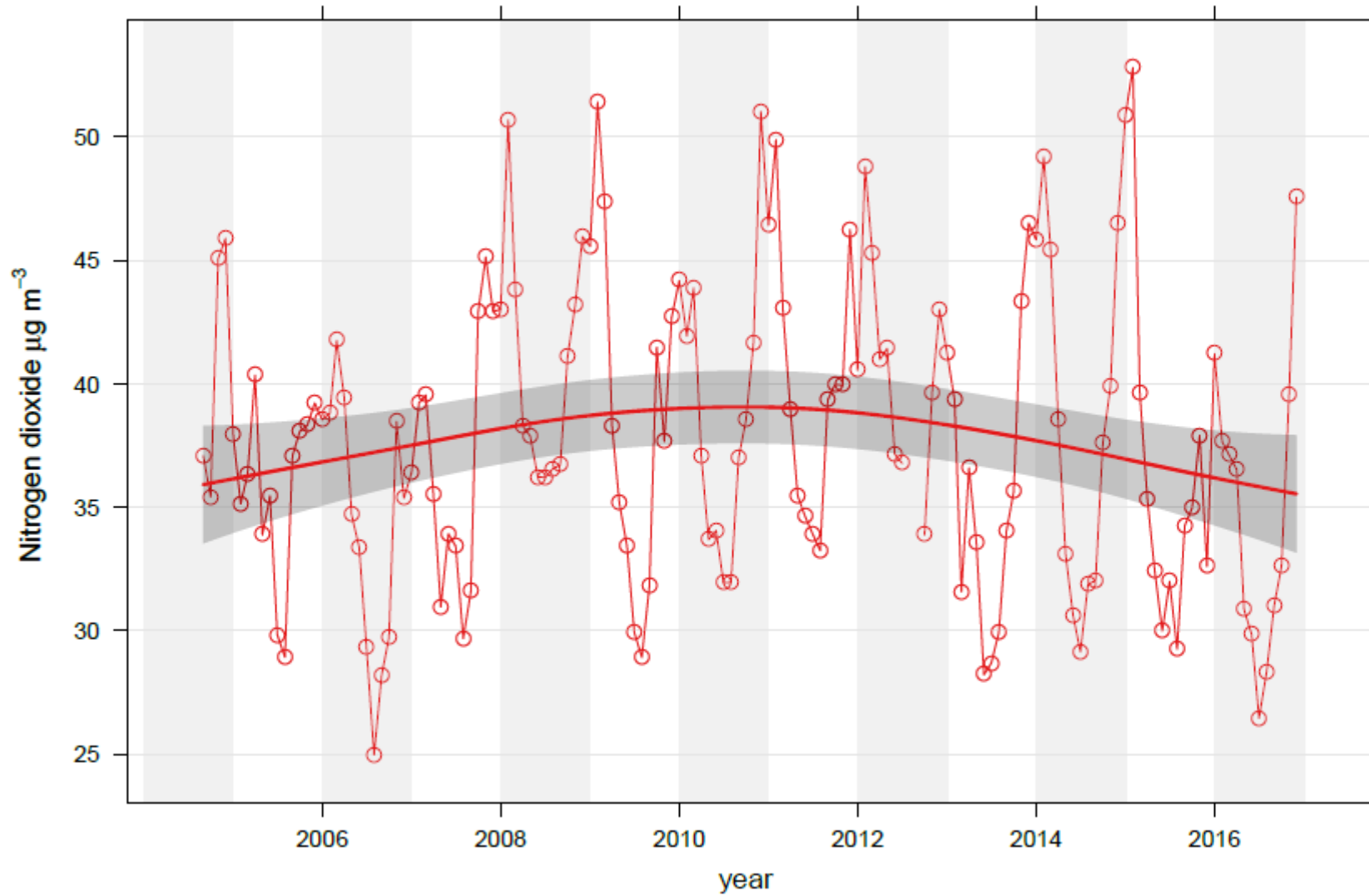


Figure 2.11 Time Variation Analysis of nitrogen dioxide, PM10 and PM2.5 concentrations 2004-2016

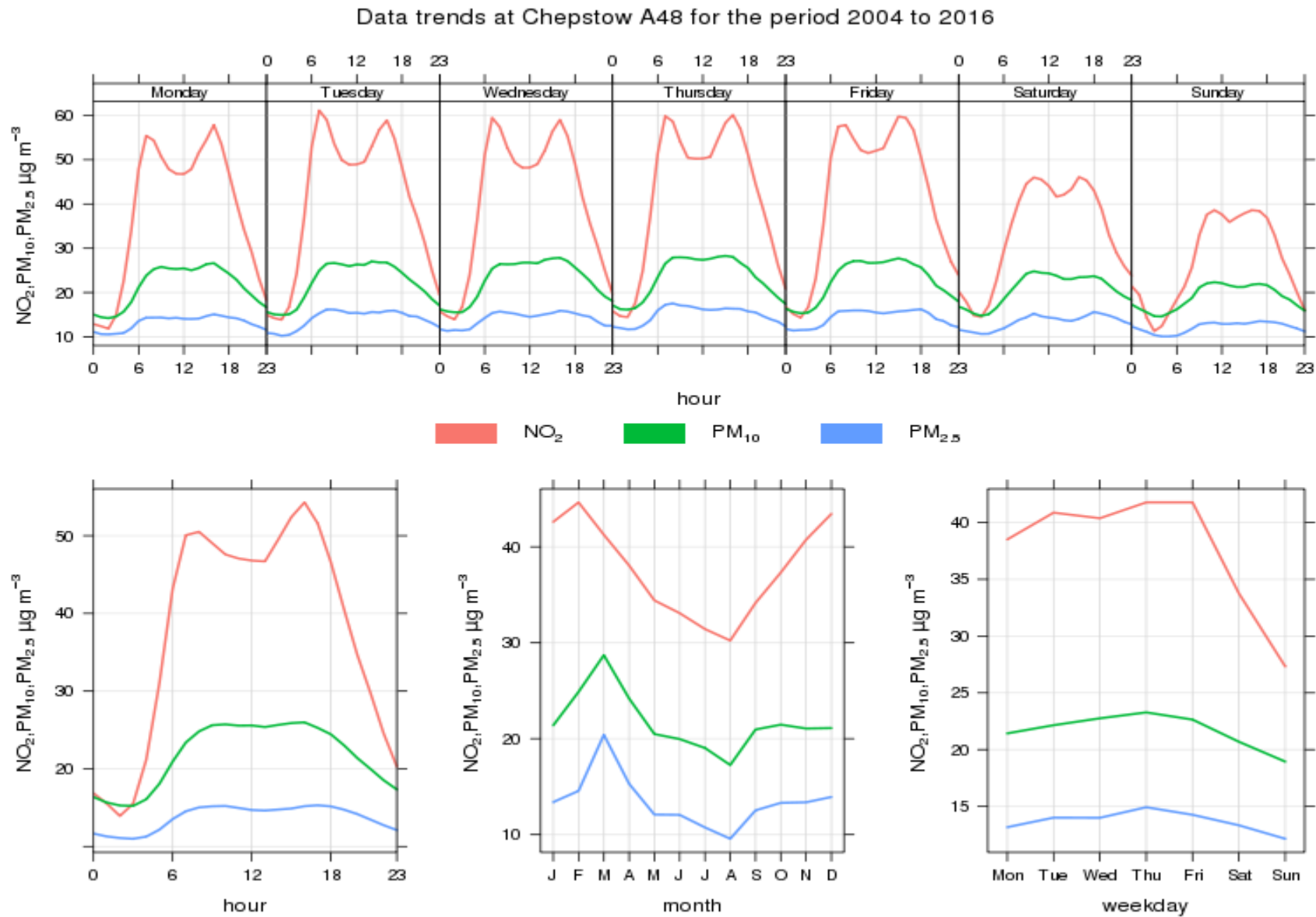
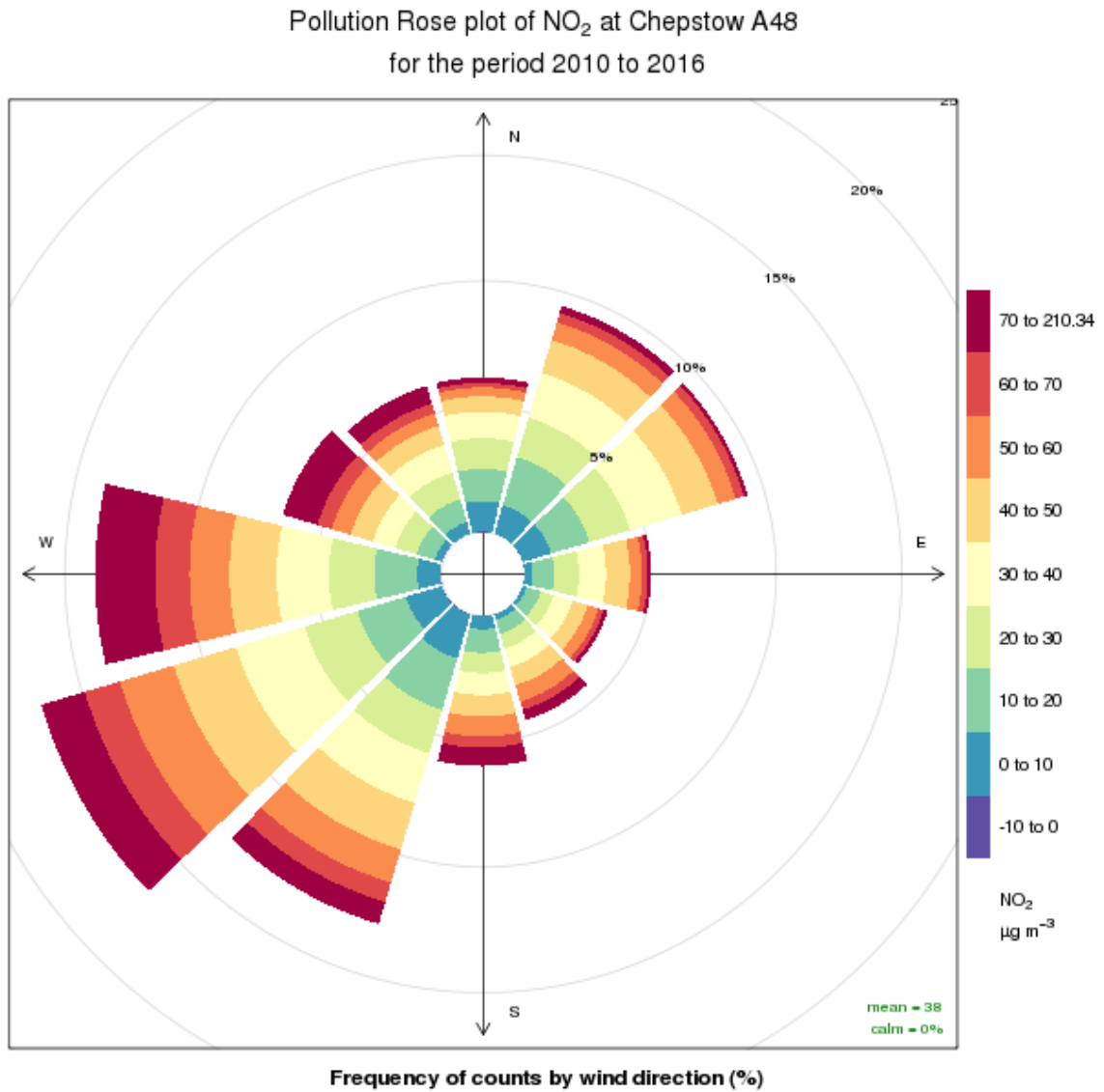


Figure 2.12 Pollution Rose summarising nitrogen dioxide concentrations by wind direction 2010-2016



2.2.1.2 Particulate Matter - PM₁₀ & PM_{2.5}

Particulate Matter monitoring is undertaken at the Chepstow Air Quality Monitoring Station (AQMS) located on Hardwick Hill, Chepstow within the Chepstow Air Quality Management Area. Its location is shown in Figure 2.1. Both PM₁₀ and PM_{2.5} are monitored using FDMS TEOM analysers.

Data capture for the PM₁₀ analyser in 2016 was good, with an annual data capture of 92%. However, following the zero test, undertaken during 15th – 19th January, the analyser became temporarily unstable, therefore all concentrations recorded between 15th January – 1st February, were rejected during the ratification process.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
47%	97%	99%	93%	100%	92%	90%	94%	100%	99%	99%	99%

Data capture for the PM_{2.5} analyser in 2016 was 81%.

All recorded concentrations between 13/6/16 and 15/8/16 were deleted during the quality assurance/ratification process. The data during this period did not follow the profile of other sites in the area, almost certainly due to a leak identified at the service, and it took several days for the instrument to stabilise after service.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
86%	99%	99%	98%	98%	42%	-	53%	100%	100%	98%	100%

The PM₁₀ results for 2009 and 2008 were obtained with a TEOM and corrected using the Volatile Correction Model. The 2007 data and data for 1 January 2010 – 7 February 2010 were corrected using the gravimetric factor of 1.3 for Indicative Gravimetric Equivalent. The results for 8th February 2010 onwards, were obtained using an FDMS; therefore no correction factor was required.

The PM_{2.5} data is available from 8th February 2010 when the FDMS analyser was installed. The PM_{2.5} objective level is included in the UK Air Quality Strategy; however, it is not included in Air Quality Regulations, as it is not thought appropriate for local authorities to assess against them at this time.

The CAFÉ Directive (2008/50) set a National Exposure Reduction Target, a Target Value and a Limit Value for PM_{2.5}. Both Values are 25 µg/m³ as an annual mean; however the Target Value had to be met by 2010, whilst the Limit Value had to be achieved by 2015.

Table 2.5 presents the PM₁₀ annual mean concentrations between 2005 and 2016, and Table 2.6 gives the number of exceedences of the PM₁₀ 24-hour mean objective level. Table 2.7 gives the PM_{2.5} annual mean concentrations between 2010 and 2016.

The annual mean concentrations for PM₁₀ between 2005 and 2016 and PM_{2.5} between 2010 and 2016 are presented alongside the annual mean concentrations for nitrogen dioxide in Figure 2.9

The results confirm that the annual and 24-hour PM₁₀ objectives were achieved between 2007 and 2016; and the annual PM_{2.5} Target Value was achieved between 2010 and 2016.

In 2016 the annual PM₁₀ mean was 18µg/m³ and the annual PM_{2.5} mean was 11µg/m³.

There was one 24-hour period when the PM₁₀ concentrations was over 50µg/m³ (the objective level allows up to 35 exceedences of 50µg/m³). This occurred on 6/12/2016, when the the daily mean concentration reached 53µg/m³

Figure 2.13 presents a plot of the mean monthly concentrations for PM₁₀ between 2005 and 2016 with a smooth trend analysis (bold red line). The grey area shows the 95% confidence interval of the trend line fit. This, along with the annual mean concentrations shown in Table 2.5 and Figure 2.9, indicate that PM₁₀ concentrations have been reducing since a peak in 2006 to the lowest in 2015. In 2016 there was a 1µg/m³ increase (the first increase since 2011), however the number of days over 50µg/m³ decrease from five in 2015 to one in 2016, and the maximum daily mean in 2016 was 53µg/m³ compared to 65µg/m³ in 2015.

PM_{2.5} concentrations between 2010 and 2016 are presented as annual mean concentrations in Figure 2.9, and Table 2.7 and as a smooth trend analysis in Figure 2.14. They also identify that concentrations have generally reduced from a high of 19 µg/m³ in 2010, to a low of 10 µg/m³ in 2015. However there was an increase from 12 µg/m³ in 2012 to 14 µg/m³ in both 2013 and 2014, and (as with PM₁₀) there was a 1µg/m³ increase between 2015 and 2016.

As can be seen from Figure 2.9, both PM₁₀ and PM_{2.5} show a downward trend in concentrations over time since 2006 for PM₁₀ and 2010 for PM_{2.5}, despite the nitrogen dioxide increase between 2006 until 2011.

Figure 2.11 presents a comparison of the Time Variation trends for all three pollutants monitored at the AQMS. PM₁₀ and PM_{2.5} follow the same daily, weekly and monthly trends as nitrogen dioxide; however the twice daily rush hour peaks seen with the gaseous pollutant nitrogen dioxide are not seen as prominently with the particulates, which tend to increase more slowly than nitrogen dioxide, at morning rush hour and remain relatively stable throughout the day, with only a slight dip at midday, until decreasing again after the evening traffic rush hour.

Table 2.5: Automatic Monitoring of PM10: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Data Capture (%)		Confirm Gravimetric Equivalent	Annual Mean Concentration $\mu\text{g}/\text{m}^3$											
			monitoring period ^a	2016 ^b		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A48 Hardwick Hill, Chepstow	Roadside	Yes	92	92	Y	26	28.4	25	26.3 (22.4 ^c)	23 (22.1 ^c)	21	22.1	19	19	18	17	18
Annual Mean Objective						40											

Table 2.6: Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Data Capture (%)		Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean											
			monitoring period ^a	2016 ^b		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A48 Hardwick Hill, Chepstow	Roadside	Yes	92	92	Y	2	5	5	5	0	5	10	3	4	2	5	1
24-hour Mean Objective						50 $\mu\text{g}/\text{m}^3$ Not to be exceeded more than 35 times/year											

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)

^c Values using Volatile Correction Model (<http://www.volatile-correction-model.info>) as reported in the 2011 Progress Report

Table 2.7: Automatic Monitoring for PM_{2.5}: Comparison with annual mean Limit Value

Site ID	Site Type	Within AQMA?	Data Capture (%)		Confirm Gravimetric Equivalent	Annual Mean Concentration µg/m ³						
			monitoring period ^a	2016 ^b		2010	2011	2012	2013	2014	2015	2016
A48 Hardwick Hill, Chepstow	Roadside	Yes	81	81	Y	19	17.4	12	14	14	10	11
Annual Mean Limit Value						25						

^a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

^b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

Figure 2.13 Smooth Trend Analysis for monthly PM10 data between 2005 & 2016

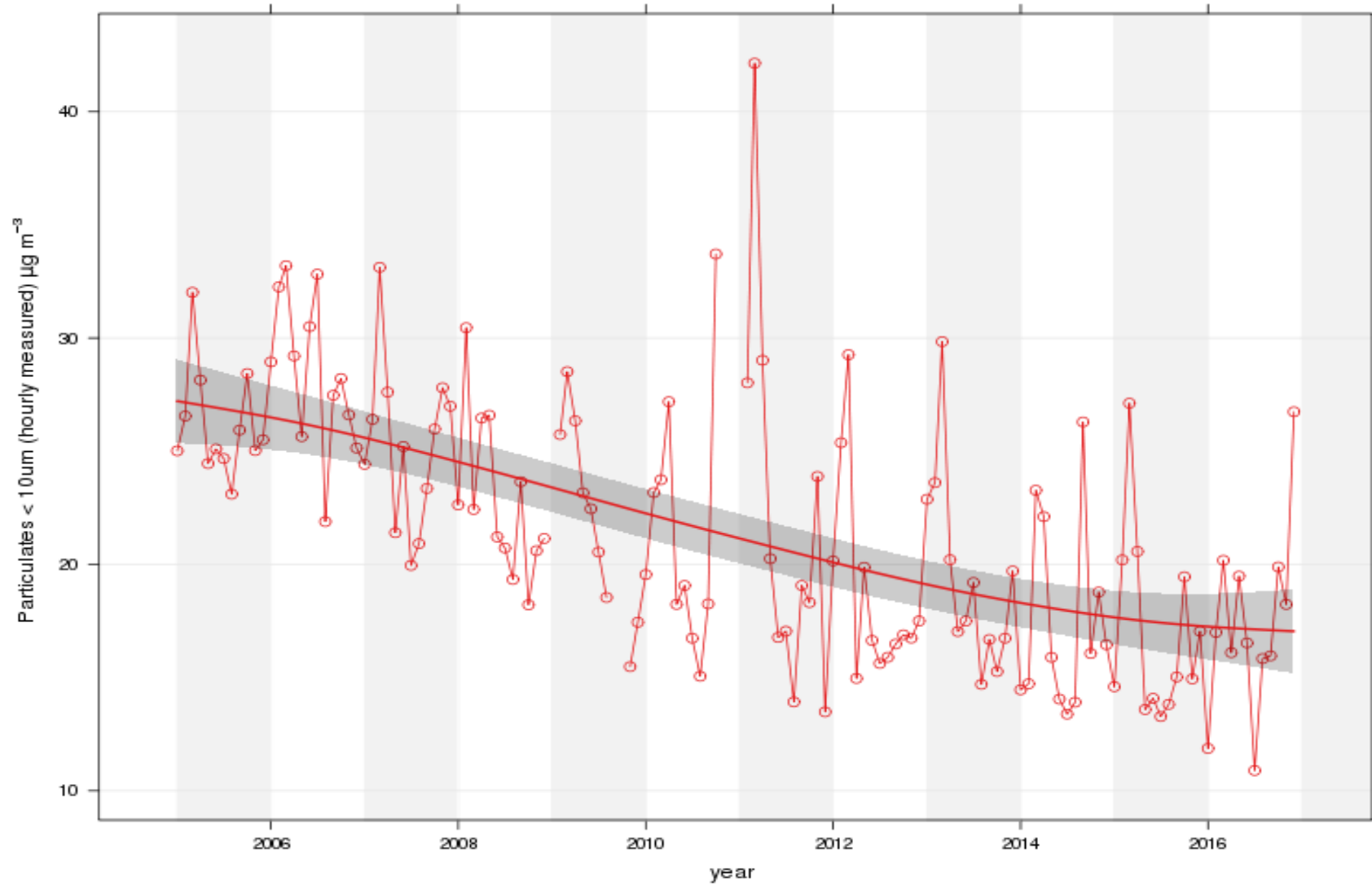
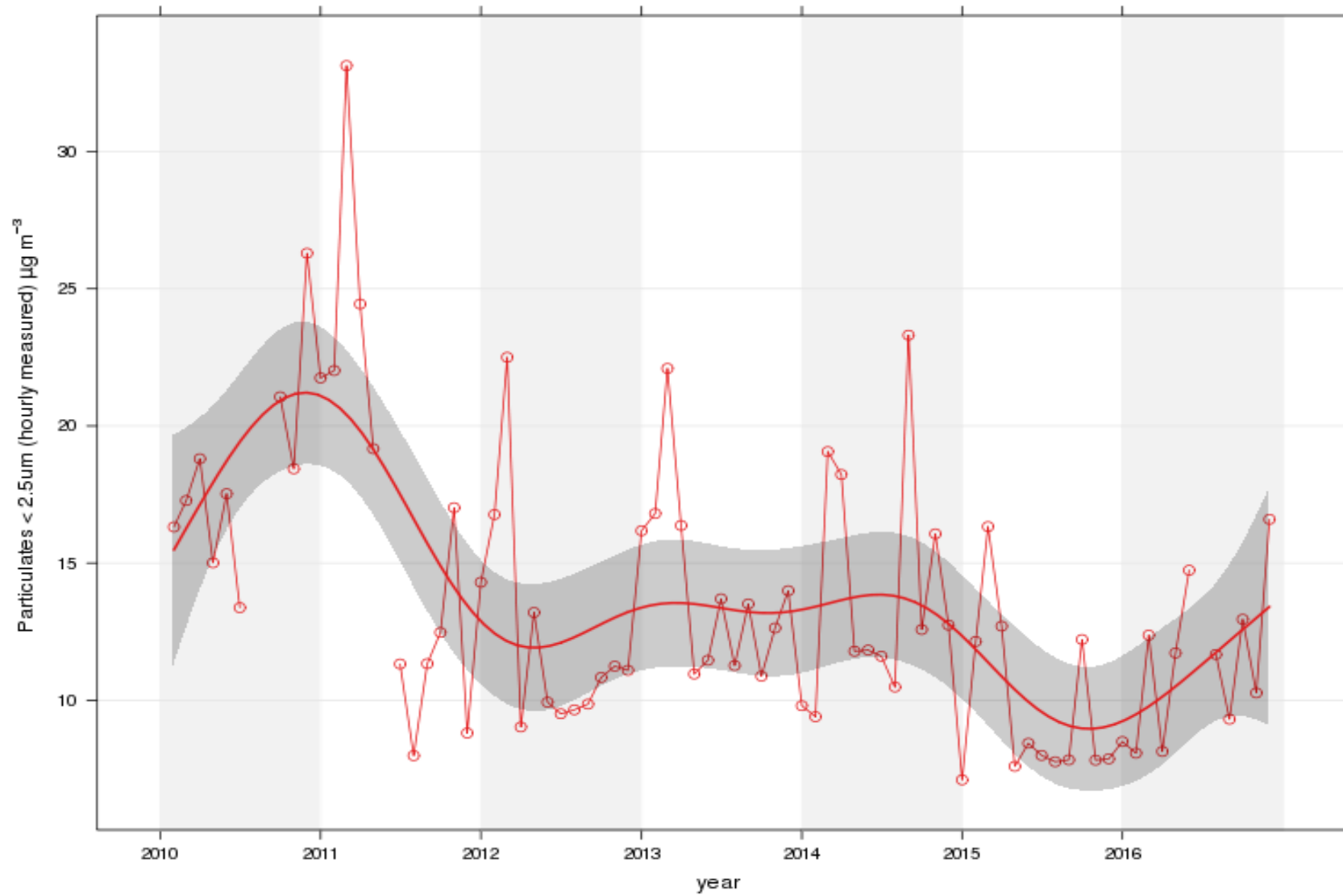


Figure 2.14 Smooth Trend Analysis for monthly PM2.5 data between 2010 & 2016



2.2.2 Non-Automatic Monitoring Data– Nitrogen Dioxide Diffusion Tubes

All passive/non-automatic monitoring undertaken in 2016 was for nitrogen dioxide using passive diffusion tubes.

The nitrogen dioxide diffusion tube annual mean data is presented Table 2.8, along with details of each monitoring location. The full dataset showing the monthly mean values and un-bias adjusted annual mean is included in [Appendix B](#).

The annual mean data given in Table 2.8 has been bias adjusted using the 0.92 Bias Adjustment factor (BAF) calculated on the June 2017 national Bias Adjustment Factor spreadsheet which was based on twenty seven studies, including the Chepstow study. The local BAF (based on the Chepstow AQMS co-location study) was 0.86 with a 95% confidence interval of the true value being between 0.79 - 0.93. Details of the BAF are given in [Appendix A](#).

Data capture

Data capture for all of the locations that were in the monitoring programme for the full 2016 calendar year was generally good. The locations that did not achieve 100% data capture were:-

- MM2 – 83% (10 months data collected). May's tube read $18\mu\text{g}/\text{m}^3$, which was $8\mu\text{g}/\text{m}^3$ lower than the next lowest concentration, and was therefore not included in the annual mean. If it had been used the result would have had a minimal impact by reducing the annual mean from $26.5\mu\text{g}/\text{m}^3$ to $25.6\mu\text{g}/\text{m}^3$. In addition The December tube had been removed.
- MM7 - 92% (11 months data collected). The concentration for the May tube was $4.66\mu\text{g}/\text{m}^3$, which was $20\mu\text{g}/\text{m}^3$ lower than the next lowest concentration, and was not included in the annual mean calculation.
- MM11 – 92% (11 months data collected). The February tube had been removed.
- AB6 - 92% (11 months data collected). The May tube had been removed.
- USK4 – 92% (11 months data collected). January's tube contained water droplets and the lab reported the results as compromised. The reported concentration was $112.43\mu\text{g}/\text{m}^3$

Therefore all locations can be used in the analysis of 2016 nitrogen dioxide diffusion tube data, as they achieved more than 75% (nine months) data capture.

Comparison with the nitrogen dioxide annual mean objective level

The majority of the diffusion tubes are located next to relevant receptors for comparison with the nitrogen dioxide annual mean objective level. Therefore they are all located on the façade (or as close as possible e.g. a nearby lamp post) of a house, care home or school/boarding house), and therefore after the BAF is applied, can be used directly for this purpose.

However two of the locations are not suitable for this use, namely MM11, which is located at a roadside near a school playground, and CH2_a, which is located kerbside and 5.6 metres away from the nearest house. These are discussed further below.

Use of MM11 as indicator of exceedence of 1-hour mean objective level

MM11 is located on the fence of the Monmouth School playground and near a public playground. This tube's purpose is to give an indication on the likelihood of exceedence of the 1-hour objective level, as it is likely members of the public will spend 1 hour or more at these locations on a regular basis. Research has shown that if the annual mean is less than $60\mu\text{g}/\text{m}^3$ exceedences of the 1-hour mean objective are unlikely (Local Air Quality Management Technical Guidance, TG (16)).

There are three year's annual mean data for this location - 2014, 2015 and 2016, and all have recorded concentrations under $60\mu\text{g}/\text{m}^3$ ($31.6\mu\text{g}/\text{m}^3$, $26.4\mu\text{g}/\text{m}^3$ and $30.2\mu\text{g}/\text{m}^3$), therefore there is confidence that the 1-hour mean objective level has not been exceeded.

Use of CH2a and distance correction

CH2_a, is located on a lamp post 1.75 meter from the kerbside of the A48 in the Chepstow Air Quality Management Area, however the nearest receptor (a block of flats) are located 5.6 meters from the same kerbside. CH2_a is not considered a location of relevant public exposure for the annual mean objective value, and therefore has to be distance corrected in accordance paragraph 7.78 of of TG (16).

In 2016 the un-adjusted annual mean at the kerbside monitoring location was $42.1\mu\text{g}/\text{m}^3$, and the distance correction calculation indicated that the concentration at the nearest residential property was $33.7\mu\text{g}/\text{m}^3$.

When the bias adjustment factor was applied the final annual concentration was calculated to be $31\mu\text{g}/\text{m}^3$.

Data used in the calculation is shown below:-

Distance from kerb the measurement was made:	1.75m
Distance from kerb of receptor:	5.6m
Annual mean background NO ₂ concentration for 2016:	$10.18\mu\text{g}/\text{m}^3$
Measured annual mean NO ₂ :	$42.1\mu\text{g}/\text{m}^3$
Predicted annual mean NO ₂ at receptor:	$33.7\mu\text{g}/\text{m}^3$
Predicted annual mean NO ₂ after bias adjustment factor (0.92)	$31\mu\text{g}/\text{m}^3$

Movement of MM4

The diffusion tube MM4 had been located at the No Entry Sign on the junction of Monnow Street and St Johns Street since 04/07/2007, however it was moved to the opposite side of St John Street (5 meters south) on 02/04/2014 as the shop it had previously been next to did not have any residential accommodation above it, whereas the new location has a flat above it. It was therefore considered a better location to assess relevant exposure to a receptor.

In addition a new monitoring location (MM15) was installed at the same time and was situated to monitor the narrowest part of Monnow Street. Therefore both Monnow Street and St John's Street as it enters Monnow Street are now monitored. Therefore the concentrations recorded at MM4 before 2014, are not directly comparable to those recorded from 2014 onwards.

Co-location study – Chepstow A48

Diffusion tubes AQ1, AQ2 and AQ3 are triplicate co-location study tubes, located on top of the Chepstow Automatic monitoring Station (AQMS), used to derive the local bias adjustment factor and feed into the national bias adjustment factor.

Table 2.8: Nitrogen Dioxide Diffusion Tube Annual Mean Concentrations - 2016

Site ID	Site Type	Within AQMA	Data Capture 2016 (%)	Data annualised (Y/N)	Annual mean concentration ($\mu\text{g}/\text{m}^3$) (BAF = 0.92)
CH1	Roadside	Yes	100	N	22.9
CH2a	Roadside	Yes	100	N	31.0
CH3	Roadside	Yes	100	N	31.1
CH4	Roadside	Yes	100	N	53.2
CH5	Roadside	Yes	100	N	26.7
CH6	Roadside	Yes	100	N	37.6
CH7	Roadside	Yes	100	N	27.9
CH8	Roadside/ urban Centre	No	100	N	27.7
CH9	Roadside	No	92	N	27.2
AQ1-3 mean	Roadside	Yes	100	N	40.5
MM1	Roadside	No	100	N	33.1
MM2	Intermediate	No	83	N	26.5
MM3	Kerbside	No	100	N	23.4
MM4	Kerbside/ urban centre	No	100	N	26.4
MM6	Intermediate	No	100	N	28.0
MM7	Intermediate	No	92	N	25.3
MM9	Intermediate	No	100	N	23.2
MM11	Roadside	No	92	N	30.2
MM13	Roadside	No	100	N	32.1
MM14	Suburban	No	100	N	15.1
MM15	Roadside/ urban centre	No	100	N	33.7
MM16	Roadside/ urban centre	No	100	N	30.6
MM17	Roadside/ Urban Centre	No	100	N	24.5
MM18	Roadside	No	100	N	28.1
MM19	Roadside	No	100	N	31.2
MM20	Roadside	No	100	N	28.0
MM21	Roadside	No	100	N	34.6

Site ID	Site Type	Within AQMA	Data Capture 2016 (%)	Data annualised (Y/N)	Annual mean concentration ($\mu\text{g}/\text{m}^3$) (BAF = 0.92)
AB1	Kerbside	No	100	N	38.4
AB2	Roadside	No	100	N	35.0
AB3	Roadside	No	100	N	26.8
AB4	Roadside	No	100	N	26.4
AB5	Roadside	No	100	N	19.4
AB6	Roadside	No	92	N	22.4
USK1	Roadside/ urban centre	No	100	N	30.5
USK2	Roadside/ urban centre	Yes	100	N	34.4
USK3	Roadside/ urban centre	Yes	100	N	35.1
USK4	Roadside/ urban centre	Yes	92	N	35.2
USK5	Roadside/ urban centre	Yes	92	N	37.8
USK6	Roadside/ urban centre	Yes	100	N	20.8

In **bold**, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$ at a relevant receptor

The nitrogen dioxide results measured by diffusion tubes show that the annual mean objective was exceeded at one location in 2016 (CH4) in the Chepstow AQMA. In 2015, CH4 was also the only exceedence, whilst in 2014 where there were two of exceedences within the Chepstow AQMA (CH4 and CH6) and two within the Usk AQMA (USK4 & USK5).

Table 2.9 and Figures 2.15 to 2.18 show the annual nitrogen dioxide trends as monitored by diffusion tubes since 2007. Table 2.9 also shows the annual BAF that has been applied for each calendar year.

These trends indicate that there were high nitrogen dioxide concentrations in 2012 at most locations in Monmouthshire but that they decreased in 2013, 2014, and 2015. Concentrations in 2016 increased slightly at the majority of locations compared to 2015, but generally were lower than 2012-2014.

Table 2.9: Results of Nitrogen Dioxide Diffusion Tubes 2007-2016

Site ID	Site Type	Within AQMA	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Annual Bias Adjustment Factor			0.84/ 0.699) ^a	0.85	0.84	0.88	0.89	0.94	0.95	0.91	0.91	0.92
CH1	Roadside	Yes	20	23.7	21.4	23.5	22.6	<u>25.3</u>	22.4	21.8	22.5	22.9
CH2 07-13 CH2a 14-16	Roadside	Yes	28	<u>33.0</u>	30.0	31	30.7	32.0	30.4	33.1	30.9	31.0
CH3	Roadside	Yes	27	30.7	27	28.7	32.8	<u>35.5</u>	32.7	32.5	29.8	31.1
CH4	Roadside	Yes	49	57.2	53.9	51.5	60.1	<u>60.3</u>	56.0	57.7	51.4	53.2
CH5	Roadside	Yes	29	31.8	30.2	30.3	30.4	<u>33.2</u>	28.4	26.1	25.9	26.7
CH6	Roadside	Yes	37	40.9	36	39.2	40.7	<u>42.6</u>	41.7	40.0	36.8	37.6
CH7	Roadside	Yes	29	31.5	30.2	31.5	30.4	<u>33.7</u>	30.6	28.4	26.9	27.9
CH8	Roadside/ urban Centre	No	28 ^b	33.1	32	32.5	32.9	<u>35.5</u>	31.1	31.8	28.1	27.7
CH9	Roadside	No	25	29.4	27.9	28.7	30.5	<u>30.7</u>	28.1	27.8	25.5	27.2
MM1	Roadside	No	<u>39</u>	38.5	37.3	36.6	36.9	<u>39.0</u>	34.1	34.9	32.8	33.1
MM2	Intermediate	No	31	<u>31.7</u>	30.1	31.3	<u>31.7</u>	30.2	29.9	30.0	26.1	26.5
MM3	Kerbside	No	<u>30</u>	27.8	27.6	<u>30</u>	29.8	27.7	26.3	26.3	22.9	23.4

^a 2007 BAF of 0.84 applied for tubes in Monmouth, Usk and Abergavenny (BAF derived from automatic monitors at Chepstow, Newport and Cardiff). BAF of 0.699 applied for tubes in Chepstow (BAF derived from the co-location study with the Chepstow automatic monitor).

^b Measured concentrations between July and December 2007, adjusted to annual mean - factor 0.957

Site ID	Site Type	Within AQMA	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
MM4	Kerbside/ urban centre	No	<u>38^b</u>	37.1	34.6	36.1	34.9	36.7	35.7	<u>29.8</u>	26.0	26.4
MM6	Intermediate	No								<u>31.6</u>	26.7	28.0
MM7	Intermediate	No								<u>27.4</u>	24.3	25.3
MM9	Intermediate	No								<u>24.7</u>	21.8	23.2
MM11	Roadside	No								<u>31.6</u>	26.4	30.2
MM13	Roadside	No								<u>34.7</u>	32.5	32.1
MM14	Suburban	No								14.9	14.2	<u>15.1</u>
MM15	Roadside/ urban centre	No								<u>35.2</u>	33.1	33.7
MM16	Roadside/ urban centre	No								<u>32.9</u>	30.0	30.6
MM17	Roadside/ urban centre	No								<u>24.7</u>	22.6	24.5
MM18	Roadside	No									26.7	<u>28.1</u>
MM19	Roadside	No									29.3	<u>31.2</u>
MM20	Roadside	No									24.0	<u>28.0</u>
MM21	Roadside	No									32.1	<u>34.6</u>
AB1	Kerbside	No	34 ^b	36.5	36	38.6	39.4	<u>41.4</u>	37.5	39.3	36.1	38.4
AB2	Roadside	No						<u>43.9</u>	36.7	39.1	34.4	35.0

Site ID	Site Type	Within AQMA	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
AB3	Roadside	No							<u>36.8</u>	30.0	29.0	26.1	26.8
AB4	Roadside	No								27.6	27.8	26.5	26.4
AB5	Roadside	No								<u>21.4</u>	19.8	17.2	19.4
AB6	Roadside	No								<u>24.3</u>	23.8	22.4	22.4
USK1	Roadside/ urban centre	No	33 ^b	32.8	31.1	<u>34.9</u>	32.9	33.0	33.5	34.3	30.1	30.5	
USK2	Roadside/ urban centre	Yes	37	37.2	34.4	<u>40.9</u>	37.0	38.3	37.2	37.3	34.1	34.4	
USK3	Roadside/ urban centre	Yes	40	38.9	35.3	40.6	39.7	<u>41.9</u>	40.3	37.6	32.8	35.1	
USK4	Roadside/ urban centre	Yes	39	39.0	35.4	41.7	40.7	<u>43.5</u>	42.0	40.4	34.1	35.2	
USK5	Roadside/ urban centre	Yes	<u>49</u>	45.6	41.9	45	39.7	44.6	43.1	40.9	38.2	37.8	
USK6	Roadside/ urban centre	Yes	24	21.6	20.9	<u>25.6</u>	20.7	22.6	22.2	20.6	19.2	20.8	

In **bold**, exceedance of the NO₂ annual mean AQS objective of 40 $\mu\text{g}/\text{m}^3$

Underlined, highest recorded concentration at location

Red – Increase over preceding year

Blue – decrease over preceding year

Figure 2.15 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2016- Monmouthshire

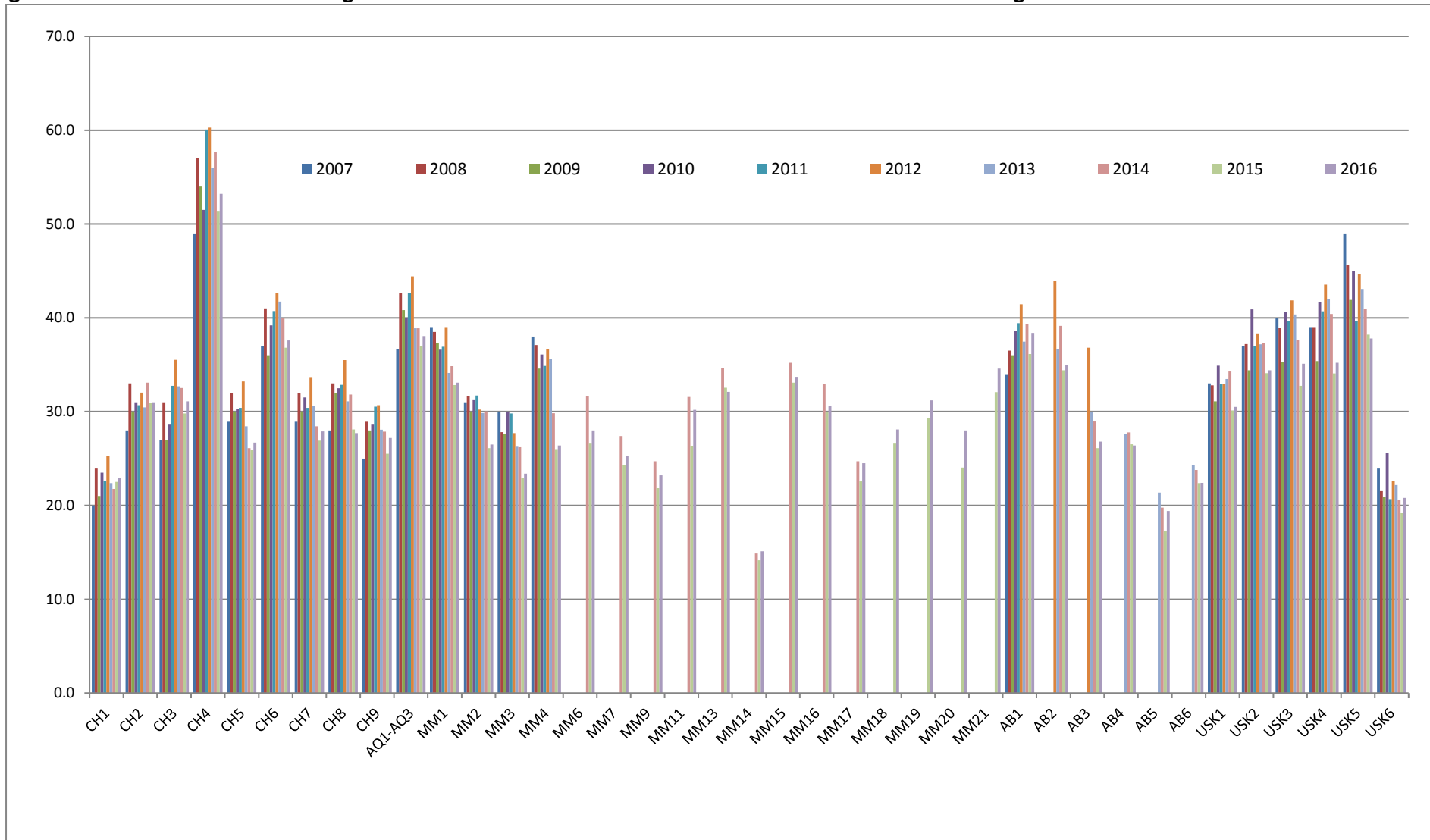


Figure 2.16 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2016 – Chepstow

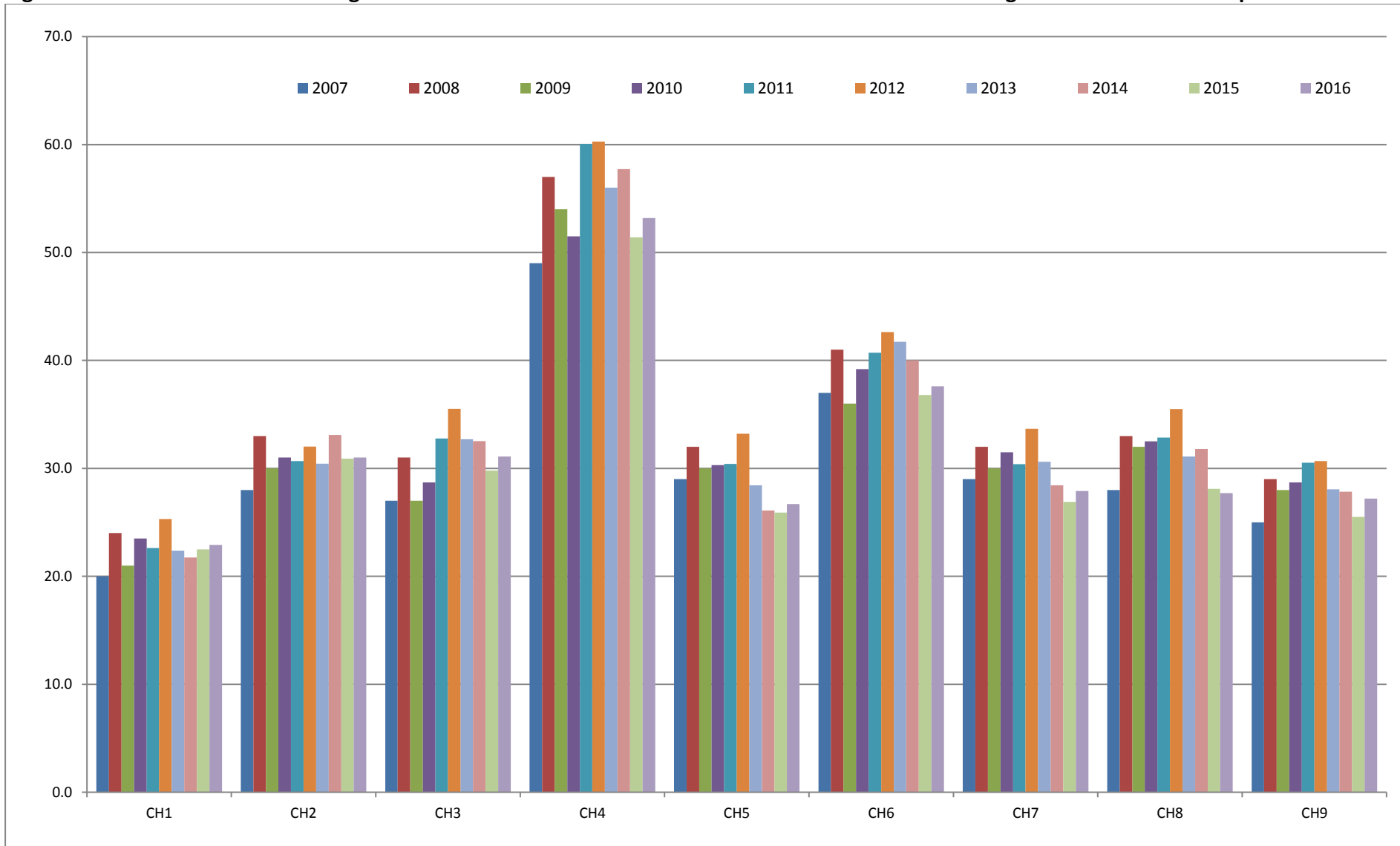


Figure 2.17 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2016 - Monmouth

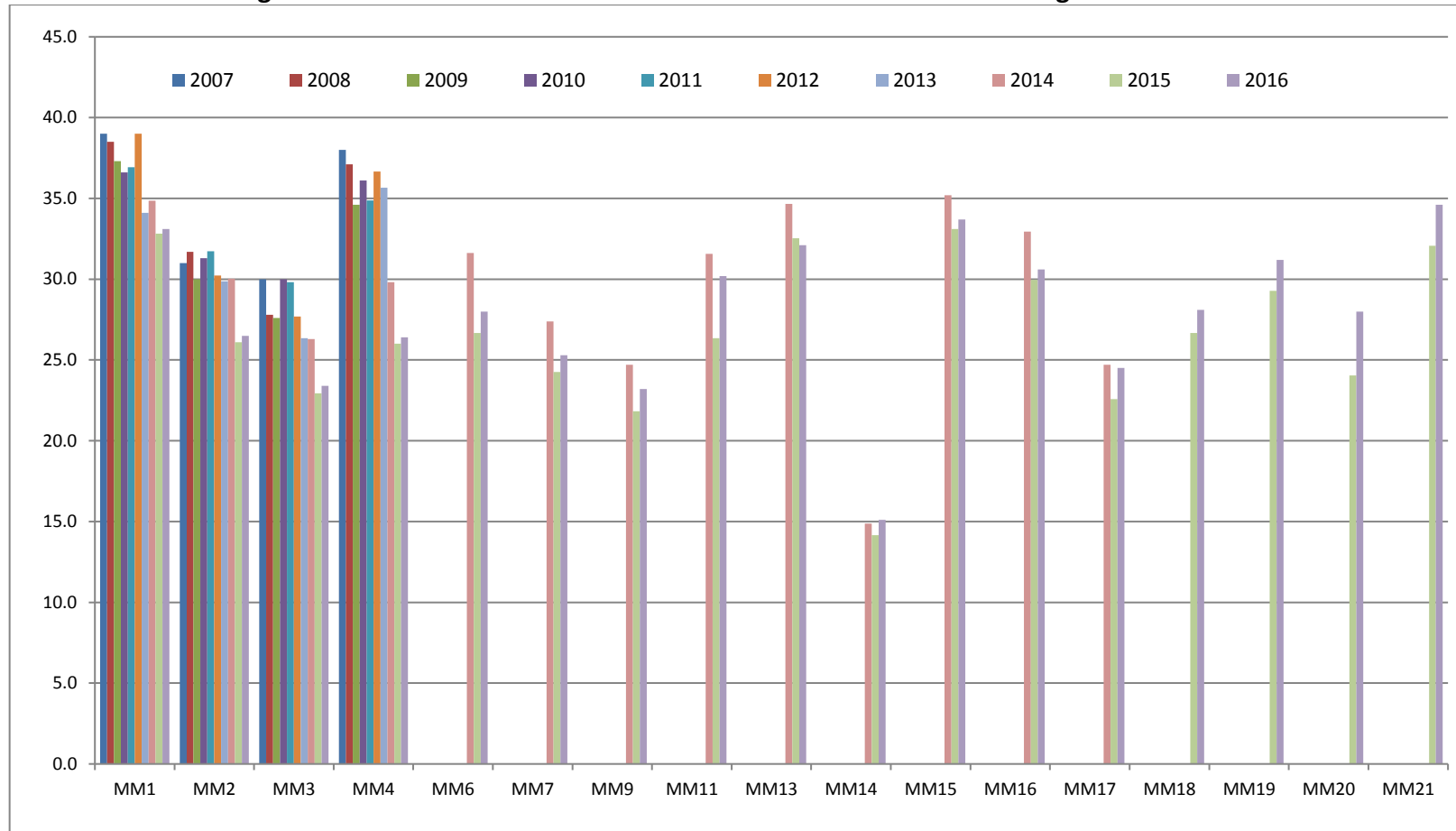
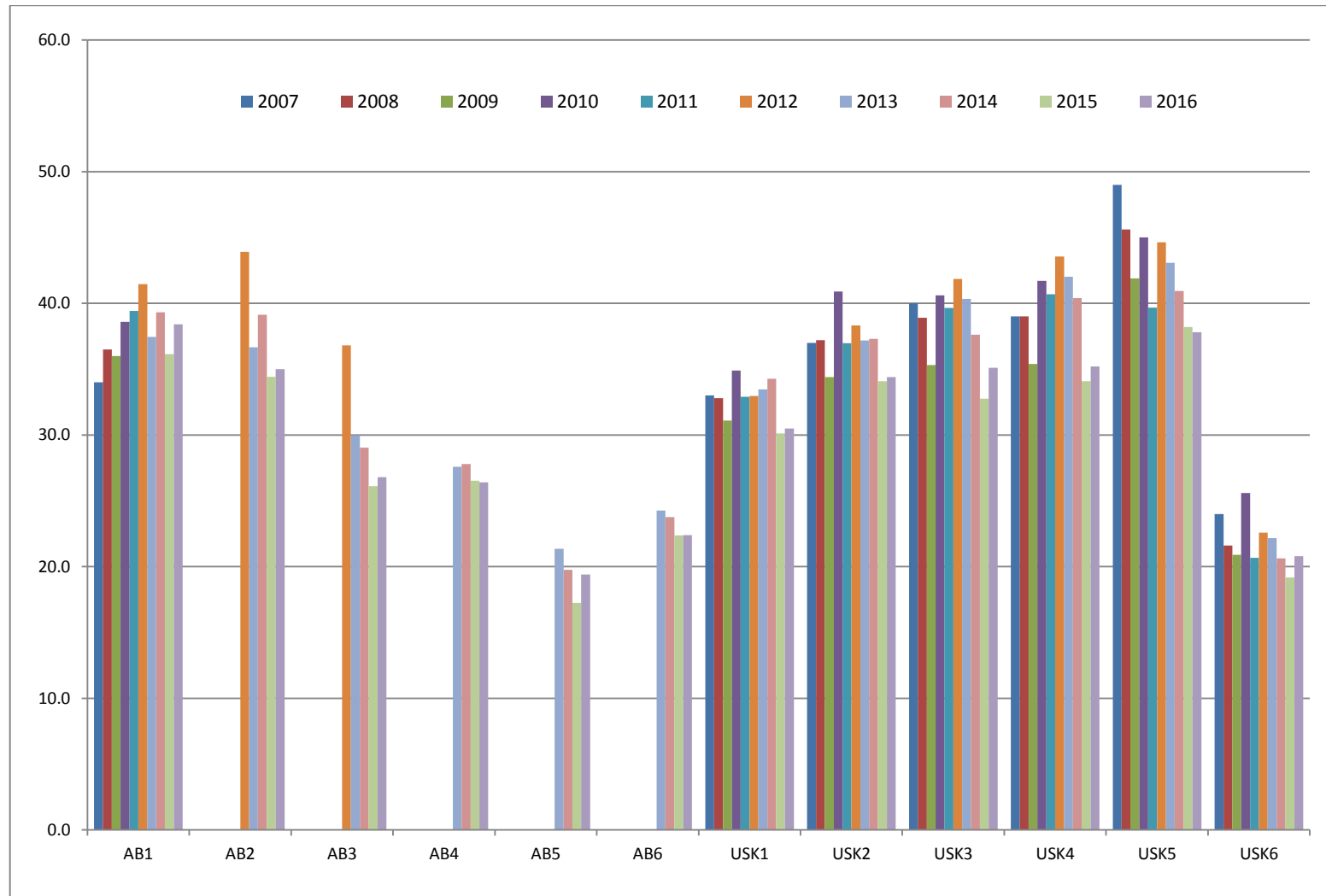


Figure 2.18 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2016 – Abergavenny & Usk



2.2.2.1 Nitrogen Dioxide Monitoring Summary

Chepstow Air Quality Management Area

Nitrogen dioxide concentrations increased slightly in 2016 compared to 2015, however since 2012, there has been a general decrease at all locations. The increase in 2016, was marginal and did not result in any additional exceedences over 2015, with CH4 being the only location that has exceeded since 2014, however CH4 has decreased steadily since 2011.

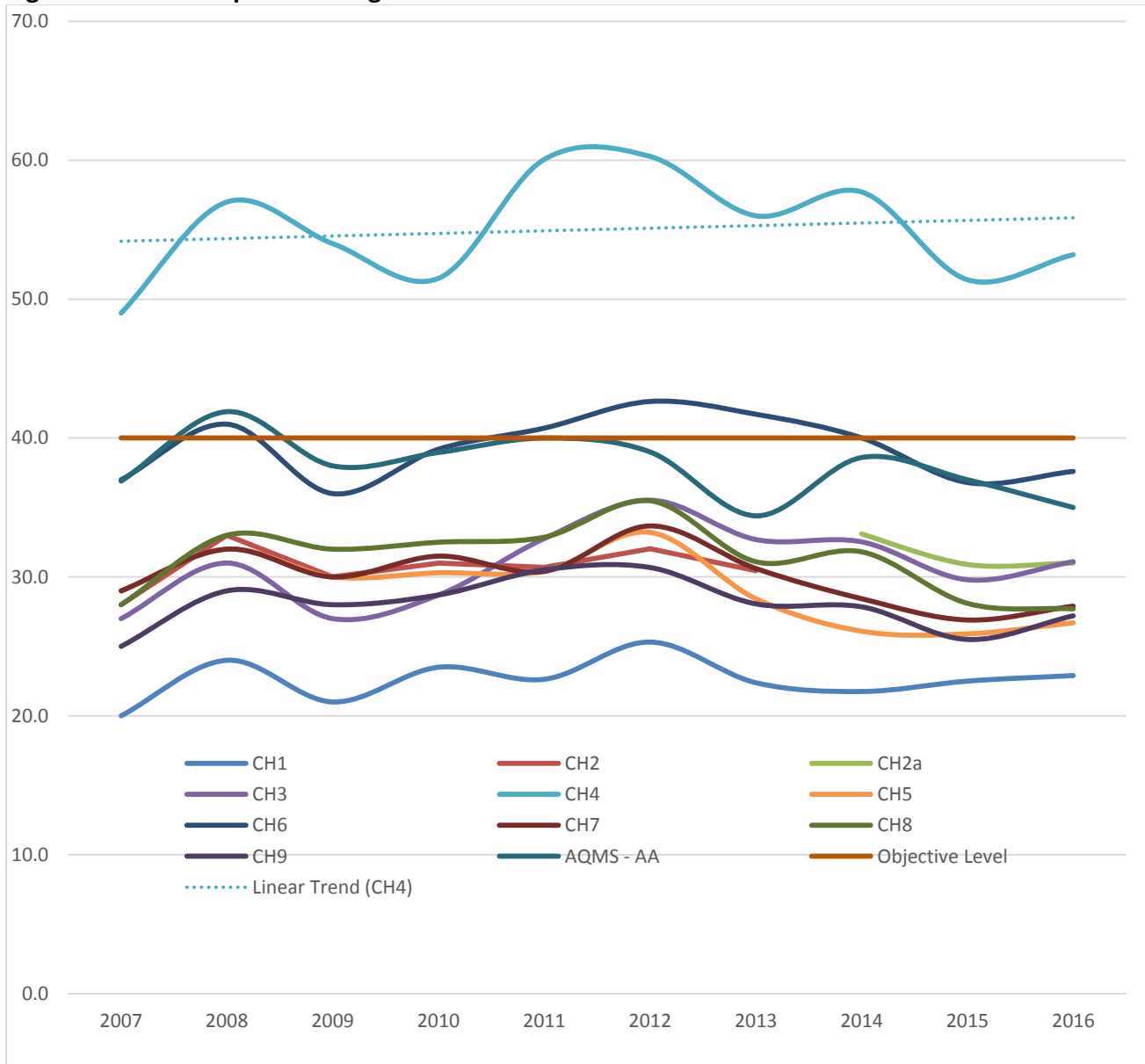
There was no exceedence of the nitrogen dioxide objective level at the automatic analyser located in the Air Quality Monitoring Station (AQMS) on Hardwick Hill.

At monitoring location CH4, there had been an increase of $11.3\mu\text{g}/\text{m}^3$ by 2012, compared to 2007, however by 2014 this had reduced to an $8.7\mu\text{g}/\text{m}^3$ increase. In 2015 there was a reduction of $8.9\mu\text{g}/\text{m}^3$ compared with the highest recorded levels in 2012. However in 2016 concentrations were still $4.2\mu\text{g}/\text{m}^3$ higher than they were in 2007.

CH6 did not exceed the objective level in 2016, but is one of the three locations (along with CH4 and the AQMS) that has exceeded in the past. Since 2007 CH4 has exceeded all ten years, CH6 has exceeded in five out of nine years, and the automatic analyser at the AQMS has exceeded twice (see table 2.3). All three locations are located around the junction with Bulwark, which not is one of the steepest parts of Hardwick Hill, but also experiences regular congestion from vehicles waiting the turn into and out of Bulwark. In addition queuing from the Highbeech Roundabout can sometime extend back down Hardwick Hill to the Bulwark Junction.

Generally there was an increase in nitrogen dioxide levels between 2007 and 2012 in Chepstow. In 2012 eight of the ten monitoring locations (this includes the automatic analyser) recorded the highest levels since 2007. The trend line for CH4 shown in Figure 2.19 shows a gradual increase since 2007, however, since 2012, there has been a general decrease in concentrations at all locations. In the main the concentrations recorded in Chepstow in 2015 were the lowest since 2008, but did increase slightly in 2016

Figure 2.19 Chepstow nitrogen dioxide trends 2007-2016



Traffic counts are undertaken at two points of the A48, east of the AQMA on Mount Pleasant, and on the western end of Hardwick Hill by the High Beech Roundabout.

The Mount Pleasant data is available for the AADT (Annual Average Daily Traffic) for 2007, 2012, 2013, 2014, 2015 and 2016 both eastbound (leaving the AQMA) and westbound (entering the AQMA) as below:-

Month	2007	2012	2013	2014	2015	2016
Total – East Bound	7919	7329	7561	7780	8690	8150
Total Westbound	9192	8296	8613	8758	9522	9034
Both Directions	17111	15625	16174	16538	18212	17184

The Hardwick Hill data is available for the AADT for 2012, 2014, 2015 and 2016 for both eastbound (entering the AQMA) and westbound (leaving the AQMA) as below:-

Month	2007	2012	2013	2014	2015	2016
Total – East Bound		9905		10890	10851	10974
Total Westbound		9328		9775	9721	9769
Both Directions		19233		20665	20572	20743

The Mount Pleasant count shows an increase in traffic in 2015 over 2014 in both directions, and a decrease in 2016, whilst the Hardwick Hill Count is roughly similar in 2014, 2015 and 2016 in both directions. Both locations have approximately 1500 additional vehicles a day in 2016 than in 2012, which was the lowest year included in the data set.

The Annual Average Daily Flow (AADF) (the number of vehicles that will drive on that stretch of road on an average day of the year) data is also available from:-

<http://www.dft.gov.uk/traffic-counts/download.php>

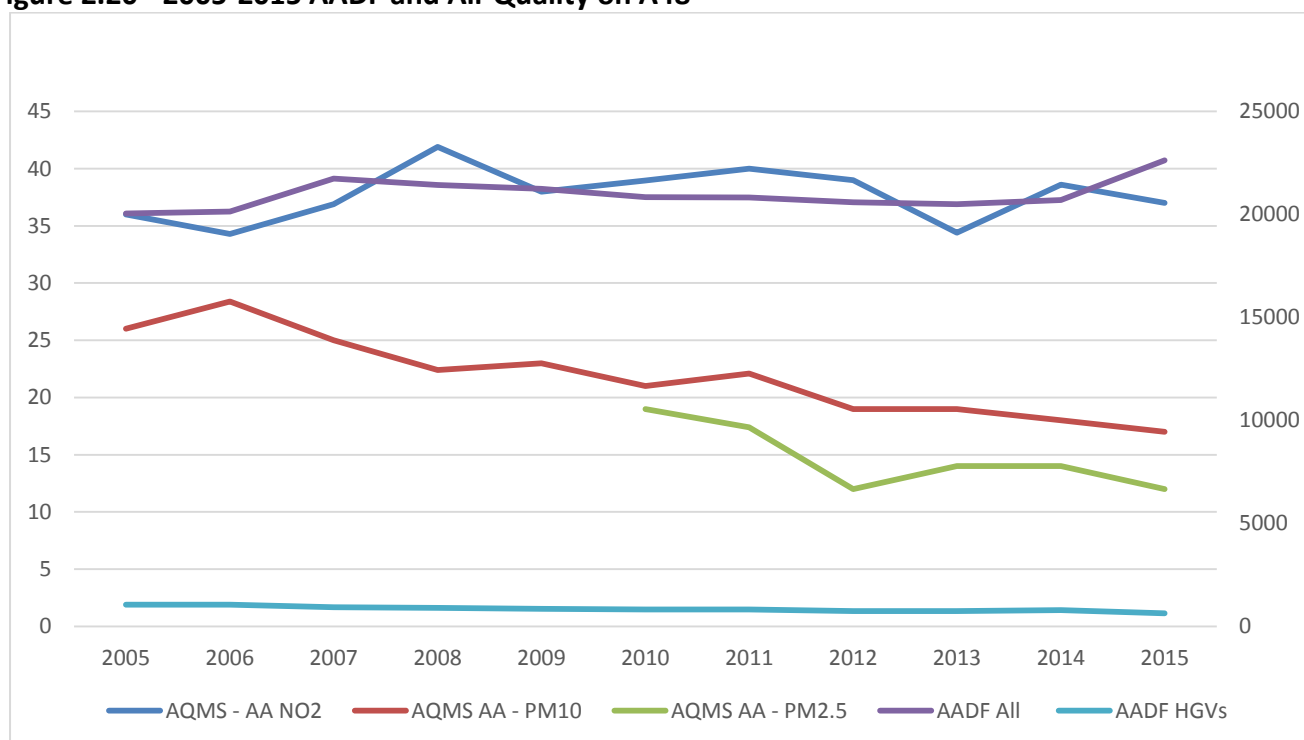
This data gives the AADF for the A48 between the English Border and the A466 (High Beech Roundabout), and is broken down into vehicle type between 2000 and 2015 as summarised below.

This data has not been updated for the 2017 Progress report as the AADF on the above website has altered all the data from 2000 onwards. Currently the data on the website has changed all the traffic counts from 2000 – 2016 to much lower levels (by approximately 10,000 AADF less each year).

This summary shows that whilst overall vehicle numbers were higher in 2015 over any other year, the number of HGV's was lower than any other year. The data also shows a large jump in pedal cycles in 2015 from under 10 to 37.

When plotted against the PM₁₀, PM_{2.5} and nitrogen dioxide concentrations between 2007 and 2015 there does not appear to be a strong correlation between increasing/decreasing traffic with emission concentrations. PM₁₀ and PM_{2.5} concentrations have steadily decreased, whilst nitrogen dioxide concentrations have varied. HGV numbers have steadily decreased, as have total vehicles numbers but to a less extent, but they did increase in 2015.

Figure 2.20 - 2005-2015 AADF and Air Quality on A48



AADF Year	Road	Pedal Cycles	Motorcycles	Cars & Taxis	Buses & Coaches	LGVs	All HGVs	All Motor Vehicles
2000	A48	28	161	14137	197	1924	1048	17467
2001	A48	18	218	16465	219	1853	961	19716
2002	A48	9	249	17076	179	1945	1057	20506

2003	A48	8	279	16837	160	2120	1100	20496
2004	A48	7	246	16870	149	2101	1098	20464
2005	A48	5	249	16449	146	2155	1048	20047
2006	A48	9	259	16498	144	2191	1055	20147
2007	A48	6	237	18461	250	1867	934	21749
2008	A48	6	221	18111	252	1954	889	21427
2009	A48	6	209	17822	246	2116	854	21247
2010	A48	6	192	17447	258	2126	821	20844
2011	A48	7	204	17359	258	2192	818	20831
2012	A48	7	184	17285	277	2105	741	20593
2013	A48	7	184	17187	261	2129	736	20497
2014	A48	6	196	17009	277	2424	786	20693
2015	A48	37	273	19301	188	2232	631	22625

Usk Air Quality Management Area

As can be seen from Table 2.9 and Figures 2.18 and Figure 2.21, concentrations in Usk decreased at four locations in 2014 compared to 2013, with USK1 and USK 2 increasing. All locations decreased in 2015 to below the objective level the first year on record.

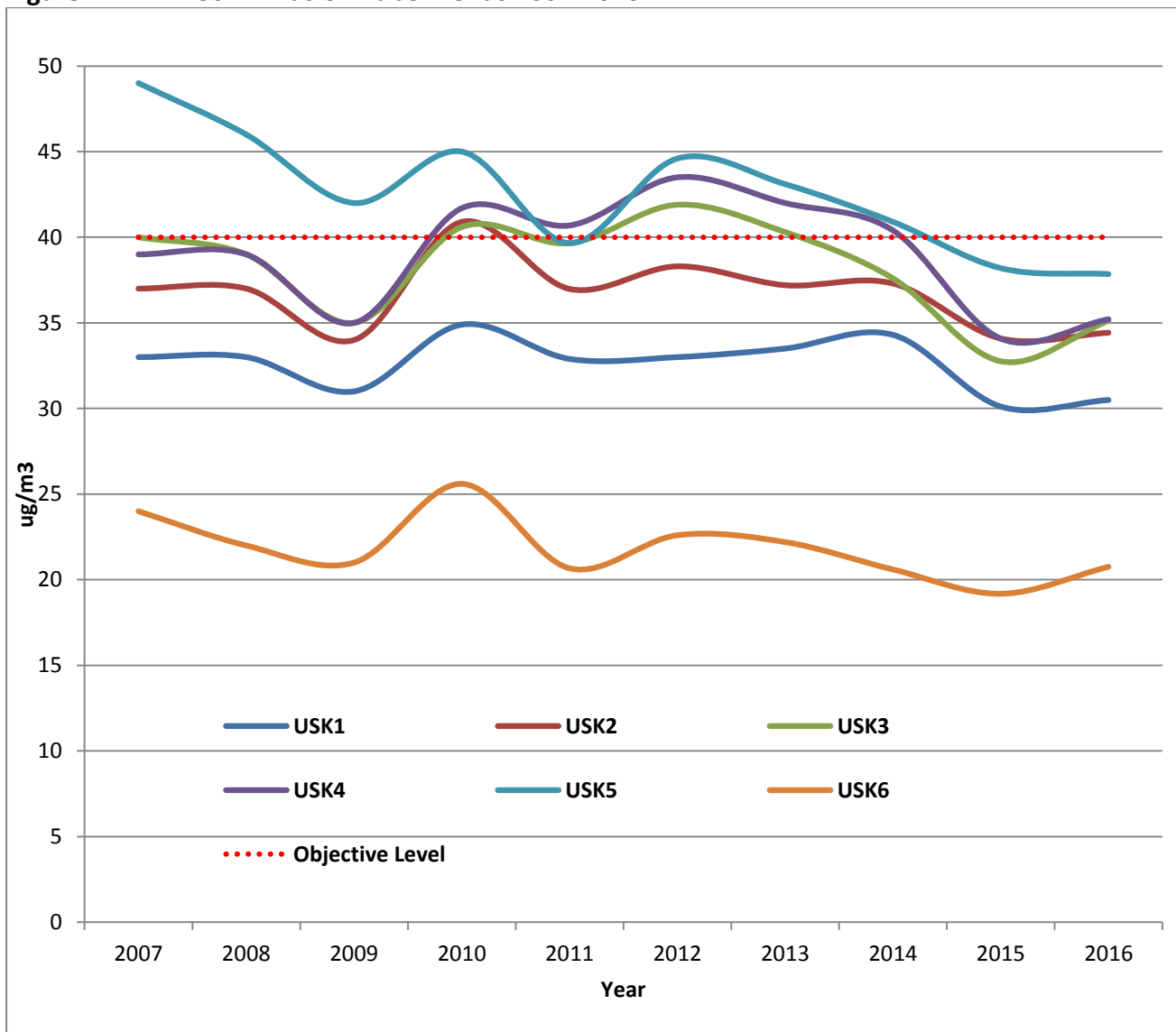
In 2016 all locations except USK 5 increased slightly, whilst USK 5 decreased slightly. All six locations did remain below the objective level for the second year running, and USK5 (the location with the highest concentration) recorded an all-time low of 37.8µg/m³.

The last year of exceedence and the number of years (out of total of 10) of exceedence for each location is:-

- USK1 Never 0
- USK2 2010 1
- USK3 2013 4
- USK4 2014 5
- USK5 2014 7
- USK6 Never 0

When considering all locations in general, Figure 2.21 indicates that concentrations decreased between 2007 and 2009, but increased to levels greater than 2007's in 2010, before decreasing again in 2011. There was an increase in 2012, but then three years of decrease until 2015. There was a slight increase in 2016.

Figure 2.21 Usk Diffusion Tube Trends 2007-2016



Abergavenny

Nitrogen Dioxide concentrations on Merthyr Road (A4143) at location AB1 had been increasing year on year from 34µg/m³ in 2007 at to a peak concentration in 2012 of 41.4µg/m³, (which was the first year where the annual objective was exceeded). As a result of the annual increases two further

diffusion tube monitoring locations were introduced in June 2012, and a further three in January 2013.

However in 2013 there were no exceedences of the objective level on Merthyr Road, and AB1 dropped to $37.5\mu\text{g}/\text{m}^3$ before increasing to $39.3\mu\text{g}/\text{m}^3$ in 2014 and decreasing again in 2015 back to 2008/9 levels of $36.1\mu\text{g}/\text{m}^3$. However in 2016 the concentration increased once again to $38.4\mu\text{g}/\text{m}^3$.

The exceedence noted at AB2 in its first year of 2012 (which was based on seven months monitoring and then annualised with a calculation) of $44\mu\text{g}/\text{m}^3$ has not occurred since, however concentrations have fluctuated each year. In 2013 they dropped to $36.7\mu\text{g}/\text{m}^3$, increased to $39.1\mu\text{g}/\text{m}^3$ in 2014, decreased to its lowest concentration in 2015 of $34.4\mu\text{g}/\text{m}^3$, and once again increased in 2016 to $35\mu\text{g}/\text{m}^3$.

AB3 (also installed in 2012), and AB4, AB5 and AB6 (installed in 2013), were all below the objective level in 2013 and 2014, and all decreased further in 2015, and remain stable in 2016. , which could indicate that if concentrations in the area do increase in the future any exceedences would be limited to the area between AB1 and AB2 (see figure 2.8 – between the A465 roundabout and Merthyr Road Bridge) however monitoring will continue at the six locations in 2017, due to the four fairly large housing developments that have been granted in the locality in recent years.

Monmouth

As can be seen from Figure 2.17, there were no nitrogen dioxide concentrations exceedences in 2016 and all locations were lower in 2015 than in earlier years, but increased slightly (as did most areas of Monmouthshire), in 2016 apart from MM13 which decreased slightly for the third year in a row.

In 2012, MM1 at Wyebridge Street, Monmouth increased from what appeared to be a relatively stable $36\text{--}37\mu\text{g}/\text{m}^3$ (below the level it had been in 2005 when a Detailed Assessment concluded there was no risk of exceedence), to $39\mu\text{g}/\text{m}^3$. It was decided to await a further year of data before progressing to a Detailed Assessment. The 2013 the concentration at this location was $34.1\mu\text{g}/\text{m}^3$ which again indicated that a Detailed Assessment was not required, however following concerns raised by a local action group, further monitoring was undertaken along the A40 in Monmouth in

November 2013 and concentrations from these additional locations were analysed in July 2014 to determine if they indicate a risk of exceedence in 2014. This report indicated that none of the monitoring locations were going to exceed the objective level. This was supported with the full twelve month monitoring data as reported in the 2015 annual report.

An additional four monitoring locations were installed in 2015, one (MM18) at a classroom in Monmouth School (just off the A40/Wyebridge Street junction), and three to monitor the Priory Street junction (MM19, MM20, MM21) as an air quality impact assessment submitted for a development application, had modelled the area as being over the objective level.

MM18, has remained below $30\mu\text{g}/\text{m}^3$ for the two years, but increased from 26.7 to $28.1\mu\text{g}/\text{m}^3$ between 2015 and 2016.

The Priory Street junction tubes have all indicated that there has not been an exceedence at the junction, in the two years they have been in place. Of the three MM21 has recorded the highest concentration in each year, $32.1\mu\text{g}/\text{m}^3$ in 2015 and $34.6\mu\text{g}/\text{m}^3$ in 2016.

2.2.3 Sulphur Dioxide (SO₂)

No monitoring of sulphur dioxide was undertaken by Monmouthshire County Council in 2016.

Sulphur dioxide monitoring was undertaken between 20th January 2015 and 3rd June 2015 at the junction of the A40 and Wyebridge Street in Monmouth with Natural Resources Wales Mobile Monitoring Facility. There was no breach of the objective levels.

A summary is presented in Section 2.2.2.1 of the 2016 Progress Report and the full report can be read on Monmouthshire County Councils website –

<http://www.monmouthshire.gov.uk/air-quality>

2.2.4 Benzene

No monitoring of benzene was undertaken by Monmouthshire County Council in 2016.

2.2.5 Other Pollutants Monitored

Carbon Monoxide monitoring was undertaken between 20th January 2015 and 3rd June 2015 at the junction of the A40 and Wyebridge Street in Monmouth with Natural Resources Wales Mobile Monitoring Facility. There was no breach of the objective level.

A summary is presented in Section 2.2.2.1 of the 2016 Progress Report and the full report can be read on Monmouthshire County Councils website –

<http://www.monmouthshire.gov.uk/air-quality>

There have been no other pollutants monitored within Monmouthshire. Previous Updating and Screening Assessments and Progress Reports have identified minimal risk of exceeding the relevant air quality objectives, and therefore monitoring of benzene, 1, 3-Butadiene, carbon monoxide, lead and sulphur dioxide is not undertaken in Monmouthshire on a regular basis.

2.2.6 Summary of Compliance with AQS Objectives

Monmouthshire County Council has examined the results from monitoring in the County.

Concentrations within The Chepstow AQMA still exceed the objective for nitrogen dioxide, but there was no recorded exceedence in the Usk AQMA. However both will remain until a number of years of data showing compliance have been obtained.

There were no exceedences outside the AQMA's, although due to the near exceedence of nitrogen dioxide in Abergavenny in 2014 and the near exceedence in Monmouth in 2012 the additional monitoring locations will remain throughout 2017.

There is no need to proceed to a Detailed Assessment.

3 New Local Developments

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

Monmouthshire County 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.**

4 Implementation of Action Plans

4.1 Chepstow Air Quality Action Plan

The Chepstow Action Plan was finalised by Monmouthshire County Council Cabinet in August 2011 and accepted by the Welsh Government in September 2011. The completion of the Action Plan was delayed whilst an Origin and Destination Study was undertaken in 2010. The study identified that 54% of HGVs on the A48 are through trips and therefore do not necessarily need to travel through the AQMA and that around 100 more HGVs per day are travelling westbound, than eastbound which indicates that they are avoiding the Severn Bridge Toll. Westbound is uphill through the AQMA and the side of the road with relevant exposure to the highest nitrogen dioxide concentrations within the AQMA.

The Chepstow Air Quality Steering Group was reconvened in 2013, and meetings are held 2-4 times a year. Members are invited who could help progress the actions of the Action Plan. These include:-

- M.C.C Environmental Health, Traffic & Development, Development Control, Chepstow Area Services, Sustainable Development & Transport Policy
- M.C.C County Councillor
- Chepstow Town Councillor
- South Wales Trunk Road Agency
- Transition Chepstow
- Friends of the Earth
- Chepstow Chamber of Commerce
- Gloucester Council Traffic Management
- Forest of Dean Council Environmental Health.
- Gwent Police
- Welsh Government Transport Section
-

During the meetings the Action Plan measures are discussed to chart progress with achieving them.

De-trunking the A48 to bring it into M.C.C. ownership, so that a weight restriction can be applied, and therefore prevent unauthorised HGV's (i.e. those using the A48 as a through road and to avoid the Severn Bridge Toll), was discussed at length during the meetings. Currently M.C.C. is not inclined

to adopt the road unless a By-Pass road was first built. In addition it was the opinion of both M.C.C. and Gloucester Traffic & Development sections that bringing in an enforceable weight based RTO for the road would be very difficult if not impossible anyway due to the number of exemptions that would be required.

The Toll at the Severn Bridge has been identified as a contributing factor to air quality exceedences on the A48, Hardwick Hill, as a number of HGV's use the route to avoid paying the toll into Wales. It was agreed at the meeting that petitioning to remove the Toll in 2017 was a priority. It has been announced that the Toll will be removed in December 2018, and WG intend to commission traffic measuring studies before, in early 2018 and after in 2019 to determine if the removal has had an impact on reducing HGV traffic.

A MOVA system south of the AQMA at a busy junction to Tesco Superstore, Industrial Units and the Railway Station was installed in 2012. Anecdotal evidence suggests that this should have a positive impact on emissions in the AQMA as it will hold vehicles up out of the area and therefore should allow Hardwick Hill some time to clear vehicles and therefore reduce congestion.

Funding has been made available to improve facilities at Chepstow Railway Station for parking and buses. In addition the Transport section is lobbying for additional trains and will work to connect bus routes with train times. Further issues such as School Walking Buses, car sharing, park and ride, public transport integration, cycling facilities should all be taken forward by M.C.C's Transport Policy section.

The redesign of High Beech Roundabout is currently on hold due to cost.

A Park and Ride service is in negotiation with Chepstow Racecourse. This should reduce numbers of vehicles travelling up and down Hardwick Hill on days when the Park and Ride is operating, thus reducing emissions within the AQMA.

In 2013/2014 The Welsh Government commissioned a Public Consultation to request views from local residents on options for air quality and safety improvements to the A48.

From this five options were considered by Welsh Government: - A bypass, prohibition of right turn into and out of Bulwark junction, re-alignment of Tesco junction traffic signal, prohibition of HGV's or incorporate a toll, and change to High Beech Roundabout such as filter lane from A48 to A465.

Welsh Government took two of these suggestions forward (Bulwark junction and High Beech Roundabout) into a detail design stage in 2014, with the intention of bidding to undertake the works next financial year. In addition they intend to bid to undertake a detailed design for the HGV prohibition and Tesco traffic signals next financial year.

The detailed design has been completed and a phased approach has been decided upon, as it is the only option that does not make air quality worse.

The first phase will be to make improvements to the Station Road junction in conjunction with the Mabey Bridge development. Once completed Bulwark junction and High Beech Roundabout options will be implemented.

The full report is available on Welsh Government website

<http://gov.wales/topics/transport/roads/schemes/a48/?lang=en>

Since the report, it is possible that the development proposed for Mabey Bridge, would reduce the house numbers to below the level that would have required the developer to fund the Station Road junction improvements. Therefore it is possible Welsh Government would have to bid for funding to pay for these improvements. The High Beech Roundabout improvements are currently not going ahead, due to cost, and the Bulwark Junction changes are not going ahead, due to potential for making air quality worse, or shifting the problem elsewhere.

Further information is given in Table 5.1

4.2 Usk Air Quality Action Plan

The Usk Action Plan was finalised in 2009, with the main action being to reduce HGV use in Usk through both restrictions and voluntary actions. The Usk HGV group was been set up, which is a partnership driven by the Town Council, with representatives from Monmouthshire County Council, Gwent Police and Usk Town Council.

The Usk Air Quality Steering Group was reconvened in 2012, and holds 2-4 meetings a year, with members invited who could help progress the actions of the Action Plan. These include:-

- M.C.C Environmental Health, Traffic & Development, Development Control, Usk Area Services, Trading Standards
- Sustainable Development & Transport Policy
- M.C.C County Councillor
- Usk Town Councillor
- Usk Civic Society
- Usk Chamber of Commerce
- Newport City Council Environmental Health.
- Gwent Police

The measures in the Action Plan are discussed to assess progress.

The management of on street parking was identified as an issue causing congestion on Bridge Street, with particular retail shops identified as causing issues with delivery vehicles. Gwent Police and the Chamber of Commerce have approach the retailers.

Gwent Police have increased their intervention in Bridge Street to prevent on street parking and reported that the situation has now greatly improved.

The Chamber of Commerce are engaging with local businesses to encourage off-peak deliveries and where possible to arrange deliveries to the rear of the shops, rather than on Bridge Street.

Usk Town Council members have developed an information leaflet in conjunction with Gwent Police, to leave on vehicles that are park on double yellow lines on Bridge Street.

Transport Policy agreed to look into improving signage towards the free car parking to help prevent on-street parking.

A Lorry Watch scheme to enforce the weight restriction RTO on Bridge Street has been in place for four years through funding provided by M.C.C. Where breaches of the order are identified by local residents, M.C.C. follows up the investigation and has issued warning letters where appropriate.

Gwent Police, have under taken a number of pro-active enforcement days, but are not sure that they would get a successful prosecution due to the length of the order. Therefore they are currently only warning “illegal” HGV drivers.

A number of attempts have been made to revise the RTO to shorten it, but it has not been possible. Also an attempt was made to introduce a time of day RTO (prohibiting HGV’s at rush hours). Neither option has been palatable to the Town Council or local businesses, due to potential for loss of trade.

However signage has been improved to deter HGVs from traveling through Usk unless necessary.

Cycle racks have been installed on Bridge Street to support and promote facilities for cyclists.

Further details are given in Table 5.2

Table 5.1 **Chepstow Action Plan Progress**

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
1.	Chepstow integrated Transport Strategy	MCC	n/a	n/a	No progress	No progress	n/a	n/a
2.	Limit HGV weight or emissions	Welsh Government	n/a	n/a	No progress as A48 still a trunk road and considered not appropriate	Considered in 2013 public consultation	n/a	n/a
3.	Amend MOVA at Tesco (Upper Street) traffic lights	Welsh Government	n/a	n/a	Completed	Completed	April 2012	Anecdotal evidence suggests less congestion on Hardwick Hill
4.	Encourage car sharing	MCC	Ongoing	None	No specific progress	No specific progress	Ongoing	n/a
5.	Monitor developments in adjoining areas	MCC	Ongoing	Number of air quality assessment asked for	Good working relationship with planners. Also liaise with Forest of Dean regularly	Good working relationship with planners. Also liaise with Forest of Dean regularly	Ongoing	Could be potential emissions reductions in the long term (or at least reductions on increases).
6.	Improve Council integration on planning issues	MCC	Ongoing	Consultation between departments	Good working relationship with planners.	Good working relationship with planners.	Ongoing	Could be potential emissions reductions in the long term (or at least reductions on increases).
7.	Education of HGV operators	MCC	Ongoing	n/a	None specifically for Chepstow	None specifically for Chepstow	Ongoing	Could be potential emissions reductions with eco driving techniques.

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
8.	Improve cross boundary working	MCC	Ongoing	n/a	MCC Env Health sits on Forest of Dean AQ Steering Committee	Good integration with Forest of Dean	Ongoing	Could be potential emissions reductions in the long term (or at least reductions on increases).
9.	Include LDP Policy covering air quality	MCC	Complete	n/a	Policy in the LDP.	Policy in the LDP.	Complete	In the long term could be significant if affects major developments.
10.	Redesign High Beech Roundabout	Welsh Government in partnership with MCC	n/a	Completion of roundabout improvements	Discussions in relation to new development. Contributions being secured through planning process. This will be implemented as a phased program of works including Station Road junction improvement and Bulwark junction improvement	On hold due to costs	Several years after Station Road improvements to allow monitoring and improvements in car engines	Localised improvements round the Roundabout. Potential improvements on the A48 assuming reduced queuing times.
11.	Target schools Traffic	MCC in partnership	Ongoing	Number of Travel Plans in place	None specifically in Chepstow	n/a	Unclear	Could potentially provide reductions in emissions at locations close to schools, or at congestion hotspots.
12.	Promote Sustainable transport as part of new developments	MCC	Ongoing	n/a	General improvements as part of planning process	General improvements as part of planning process	Ongoing	Could be potential emissions reductions in the long term (or at least reductions on increases).

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.	Promote town centre developments	MCC	n/a	n/a	1 town centre development with planning permission, and 1 in the LDP	1 town centre development with planning permission still under construction, and 1 in the LDP	n/a	n/a
14.	Rail Park and Ride	MCC	n/a	n/a	On-going – Funding applied for & P&R from racecourse complete	Improvements made to the carpark to enable additional parking and room for busses	n/a	Park and Ride on race course likely to cause some emissions reductions on Hardwick Hill.
15.	Support the climate change and sustainable energy strategy	MCC	n/a	n/a	General support, particularly for transport measures	No specific progress	Ongoing	Unlikely to be significant.
16.	Travel Plans	MCC	Ongoing	Numbers of Travel Plans in place	No specific progress in Chepstow	n/a	Ongoing	Unlikely to be significant unless resources put into Travel Planning.
17.	Bypass	Welsh Government	n/a	n/a	Not being progressed	n/a	n/a	n/a
18.	Improve bus services	MCC	Ongoing	Bus patronage	C5 service used to serve Chepstow Rail Station has been re-timed, enabling greater integration with Gloucester and Newport bound rail services.	none	Ongoing	Some improvements if modal shift from car to bus and train.
19.	Improve public transport integration	MCC	Ongoing	Bus and train patronage	As above		Ongoing	Some emissions improvements if modal

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
								shift from car to bus and train
20.	Origin and Destination survey	MCC	2011	Survey undertaken	Complete	Completed in 2011	n/a	n/a
21.	Provide information for residents	MCC	Ongoing	n/a	Very little funding, no specific progress	n/a	Ongoing	n/a
22.	Target HGVs using unsuitable satnav routes	MCC	Not progressed	n/a	Included in 2013 public consultation however Welsh Government considered it in Detail Design stage in 2015/16 and will not progress at this time	No specific progress	n/a	n/a
23.	Improve rail services to the town	Network Rail/MCC	Ongoing	Numbers of train passengers	From May 24 2011, 14 more Cross Country trains a day will stop at Chepstow to gauge customer demand for a more frequent service.	No update	Ongoing	Potential emissions reductions if modal shift from car to train
24.	Upgrade the railway station	Network Rail/MCC	Not progressed	n/a	Improved parking and bus drop of space		n/a	n/a
25.	Improve cycling facilities	MCC	Not progressed	n/a	No specific progress in Chepstow	No specific progress in Chepstow	n/a	n/a
26.	Bus Park and Ride/ Share	MCC	On-going	Numbers of people using P&R	P&R set up from Chepstow Race Course		n/a	Park and Ride on race course likely to cause some emissions

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
								reductions on Hardwick Hill
27.	Distribution hub	MCC	Not progressed	n/a	Considered unsuitable for Chepstow	Not progressed	n/a	n/a
28.	Lobby for change in toll system at Severn Bridge	MCC/ Welsh Government	On-going	n/a	Lobbying on-going	Announcement of toll removal in December 2018	December 2018	n/a
29.	Promote Rail Freight	MCC/ Network Rail	Not progressed	n/a	No specific progress in Chepstow	No specific progress in Chepstow	n/a	n/a

Table 5.2 Usk Action Plan Progress

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	n/a	n/a	Police in Usk have increased enforcement of on	Chamber of Commerce re-established and members of Steering Group.	Ongoing.	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
					street parking. M.C.C to look into improving car park signage	Chamber of Commerce actively engaging with businesses (letters and emails and meetings) to promote non-roadside deliveries and/or off-peak deliveries.		
5.	HGV Restriction along Bridge Street – to be informed by surveys and subsequent report	MCC	On going	HGV numbers	Number of measures to be implemented. Signage improved (sat nav signs and CCTV signs). Numerous attempts by MCC to change the current RTO to shorten it, and introduce time bans.	Lorry Watch Scheme continuing. Local businesses not in support of HGV restrictions Therefore no longer actively being progressed by MCC. The current HGV RTO is still in effect, but hard for police to enforce due to its length and as it is adjacent to the Caerleon RTO	On going	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
3.	Encourage walking as a mode of transport	MCC	On going but nothing specific to Usk	n/a	None in Usk	n/a	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	No relevant development in Usk	n/a	Ongoing	Could be significant in the future.
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	None specifically in Usk	A member of the Steering Group is a Governor at Usk School and is proactively	On-going	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
						engaging with the School to encourage improve parking arrangements and to encourage walking on behalf of the Group.		
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	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.
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.

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
14.	Flexible home working, work times etc.	MCC	Ongoing	Number of work related trips in private single occupancy cars.	Not progressed other than within MCC itself	Much greater levels of homeworking within MCC	Ongoing	Unlikely to have a major impact on emissions. Anecdotally MCC staff seem to be travelling further since new scheme brought in.
7.	Implement new 20mph speed limits/ zones	MCC	In progress	n/a	This is now being put in place by MCC	Modelling undertaken for 20mph – however it showed increased emissions, as it created additional queuing. Will now be trialled without road obstacles that could increase congestion. Trial was not undertaken as expected in 2016 or 2017 to date	Trail was due to be undertaken in 2016. No update on when the trial will be implemented yet, however the cabinet report has been written.	n/a
New	Investigation of altering traffic flows through the town	MCC		n/a	Considered again in 2014 and modelled for a number of options. Each option, however, increased congestion and emissions.		Will not be progressed	Increased emissions

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

This Progress Report identified one exceedence of the nitrogen dioxide annual mean objective level in Monmouthshire in 2016. This exceedence was on Hardwick Hill, Chepstow which is one of the two declared AQMAs. There were no other exceedences of nitrogen dioxide in Monmouthshire, including in the Usk AQMA.

There were no exceedences of PM₁₀ or PM_{2.5} in Chepstow.

5.2 Conclusions relating to New Local Development

The development of approximately 400 houses and retail area at the Mabey Bridge site adjacent to the Chepstow AQMA has the potential to increase emissions if not mitigated, and this is currently in discussion with the developer, M.C.C. and Welsh Government.

5.3 Other Conclusions

The two Air Quality Action Plans will continue to be progressed through regular meetings of the Air Quality Steering Groups.

5.4 Proposed Actions

No changes are proposed to the two AQMAs. Extended monitoring will continue in Abergavenny and Monmouth. Action plan Steering Group meetings will continue to be held to attempt to achieve progress with the proposed measures and identify additional measures to improve air quality.

The Air Quality Report will be completed in 2018.

6 References

Environment Agency (2015) Study of Ambient Air Quality at Monmouth 18 December 2014 – 2 June 2015

Defra (2016) Local Air Quality Management: Technical Guidance.TG(16).

Welsh Government (2017) Local air quality management in Wales Policy guidance PG(W)(17)

Monmouthshire County Council (2007) Further Assessment of Air Quality in Usk.

Monmouthshire County Council (2003) Updating and Screening Assessment.

Monmouthshire County Council (2004) Interim Detailed Assessment.

Monmouthshire County Council (2005a) Detailed Assessment.

Monmouthshire County Council (2005b) Progress Report.

Monmouthshire County Council (2006) Updating and Screening Assessment.

Monmouthshire County Council (2008a) Further Assessment of Air Quality in Chepstow.

Monmouthshire County Council (2008b) Progress Report.

Monmouthshire County Council (2009) Updating and Screening Assessment.

Monmouthshire County Council (2010) Progress Report.

Monmouthshire County Council (2012) Updating and Screening Assessment

Monmouthshire County Council (2013) Progress Report

Monmouthshire County Council (2014) Progress Report

Monmouthshire County Council (2015) Updating and Screening Assessment

Monmouthshire County Council (2016) Progress Report

Appendix A: QA: QC Data

Nitrogen Dioxide Diffusion Tube Bias Adjustment Factors

Factor from Local Co-location Studies

The triplicate co-location study undertaken with the Chepstow Air Quality Monitoring Station showed good precision in each of the twelve months.

A local bias adjustment factor (BAF) has been calculated for the Hardwick Hill, Chepstow automatic site based on data from 11 months. December was not included as the data capture was 74%, and the study requires at least 75% data capture in the study period.

The calculations are shown in Table A1

Table A1: Local Bias Adjustment Factor

Triplicate Diffusion Tube mean	39
Automatic Monitor	34
Bias Adjustment Factor	0.86
With 95% confidence interval	0.79-0.93

National Diffusion Tube Bias Adjustment Factors

Monmouthshire County Council uses Gradko International Ltd. for the supply and analysis of diffusion tubes. The preparation method is 20% TEA in Water. The national bias adjustment factor for Gradko 20% TEA in Water for 2016 was 0.92, given in the June 2017 spreadsheet, and based on 27 co-location studies.

<http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Discussion of Choice of Factor to Use

The national bias adjustment factor was 0.92, whilst the local bias adjustment factor was 0.86. The national factor was used, as it included 27 studies of good precision, and is higher (and therefore provides higher concentrations) than the local factor. Also 0.92 is within the 95% confidence interval range for the local study.

Particulate Matter Monitoring Adjustment

The particulate monitoring equipment is TEOM FDMS and the results therefore do not require adjustment.

QA/QC of automatic monitoring

The PM10 automatic monitor and Nitrogen Dioxide analyser has been part of the Automatic Urban and Rural Network (AURN) since January 2008.

The PM10 analyser was upgraded to a FDMS TEOM analyser in February 2010. At the same time a PM_{2.5} TEOM FDMS analyser was installed and became part of the AURN. The nitrogen dioxide Chemiluminescence analyser was upgraded to a ML 2041 NO_x Chemiluminescence Analyser in January 2012.

The nitrogen dioxide analyser and the Particulate Matter analysers are serviced by Air Monitors Ltd. Both are on a six-monthly service schedule. Automatic calibrations take place daily and a manual calibration check and filter change is carried out every 4 weeks. Ricardo-AEA undertake a 6 monthly audit of the site.

The data is collected and ratified by Ricardo-AEA Technology on behalf of the Welsh Air Quality Forum (WAQF).

QA/QC of diffusion tube monitoring

Monmouthshire County Council uses Gradko for the diffusion tube supply and analysis. Gradko is assessed as part of the AIR-PT/WASP (Workplace Analysis Scheme for Proficiency) operated by the Health and Safety Laboratory (HSL) and demonstrated satisfactory performance for 100% of the results submitted in each round in 2016, as reported at the linked website :-

<https://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>

A travel blank tube accompanies the exposed tubes and is kept in a refrigerator during the exposure period and Gradko keep an unexposed laboratory blank. The nitrogen dioxide concentrations

reported in this report are not blank subtracted however. The travel blank concentrations for 2016 were:-

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
0.21	0.14	0.29	0.01	0.22	0.03	0.10	0.21	0.09	0.21	0.12	0.07

Short-term to Long-term Data adjustment

Automatic Nitrogen Dioxide Annualisation

All automatic monitoring had data capture of greater than 75%, therefore Annualisation (using a calculation to adjust the short term data to long term data) is not required.

Diffusion Tube Nitrogen Dioxide Annualisation

Diffusion tube Annualisation has not been undertaken in 2016.

All tubes that were intended to be exposed for a calendar year had data capture of greater than 75% and therefore Annualisation is not required.

Appendix B: Monthly Nitrogen Dioxide Diffusion Tube Data for 2016

Table A2: Monthly diffusion tube nitrogen dioxide monitoring results (2016)

Location	Gradko	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	BAF	Final
38 Larkfield Park Chepstow	CH1	31.85	27.39	27.55	20.48	22.33	19.59	15.78	18.41	21.24	26.14	28.12	39.26	24.8	0.92	22.9
Lamppost No. WH70, Newport Road, Chepstow	CH2a	48.55	44.23	44.04	38.92	41.23	37.52	26.91	37.86	35.78	46.27	42.69	61.51	33.7	0.92	31.0
36 Wayside - Hardwick Hill Chepstow	CH3	44.24	34.70	35.25	32.96	34.93	28.74	20.25	33.16	27.16	30.36	34.28	50.16	33.8	0.92	31.1
2 Hardwick Hill - Chepstow	CH4	64.22	55.49	58.23	55.74	58.10	58.63	46.99	64.61	60.73	48.75	53.01	69.96	57.9	0.92	53.2
1 Ashfield House - Mount Pleasant	CH5	36.71	33.01	27.34	24.58	25.02	21.43	20.21	26.46	28.02	25.71	34.89	45.01	29.0	0.92	26.7
Hill House -Mount Pleasant Chepstow	CH6	43.27	44.53	46.90	42.08	40.14	33.29	20.34	31.48	33.45	45.80	51.18	58.52	40.9	0.92	37.6
2 Hardwick Terrace - Chepstow	CH7	34.86	29.23	34.19	27.59	32.11	29.11	15.36	23.44	27.79	32.60	33.94	44.14	30.4	0.92	27.9
Lamp post - Moor Street Chepstow	CH8	37.08	32.48	30.35	27.56	29.87	29.23	15.80	26.99	26.73	29.22	34.28	41.16	30.1	0.92	27.7
Restway Wall - Garden City Way	CH9	31.05	32.04	31.11	26.51	30.24	28.21	16.98	28.35	27.34	31.08	32.89	39.03	29.6	0.92	27.2
AQMS - Hardwick Hill Chepstow 1	AQ1	51.42	41.05	39.26	40.00	43.11	40.54	25.85	37.75	34.22	41.08	41.20	51.74	40.6	0.92	37.4
AQMS - Hardwick Hill Chepstow 2	AQ2	49.96	42.85	40.77	39.38	43.75	35.10	29.99	39.00	33.93	36.04	40.86	56.52	40.7	0.92	37.4
AQMS - Hardwick Hill Chepstow 3	AQ3	49.93	46.20	36.70	39.47	40.78	36.49	22.40	38.50	35.05	42.87	41.09	52.88	40.2	0.92	37.0
School House - Wyebridge St Monmouth	MM1	42.50	38.33	36.36	33.00	34.96	32.65	23.38	37.12	26.37	40.47	39.74	46.85	36.0	0.92	33.1
Flat 1 - Granville St Monmouth	MM2	29.92	29.49	32.48	26.25	Note 3	28.35	16.61	27.88	29.62	31.32	35.86	M	28.8	0.92	26.5
Lamppost ME 145 - 21 St James Sq. Monmouth	MM3	27.59	29.57	26.92	24.39	26.38	22.94	15.28	20.46	23.21	27.40	28.29	32.42	25.4	0.92	23.4
12A Monnow Street on St Johns Street, Monmouth	MM4	30.85	29.68	30.80	25.29	27.29	24.61	17.32	24.44	28.90	31.17	34.68	38.77	28.6	0.92	26.4
Millhouse, Granville Street, Monmouth	MM6	33.54	33.81	31.64	28.78	34.33	30.61	15.28	29.20	29.22	32.76	31.03	34.66	30.4	0.92	28.0
Arka, Old Dixton Road, Monmouth	MM7	32.76	30.44	30.47	24.97	Note 2	26.02	14.02	24.56	23.93	27.92	30.23	36.82	27.5	0.92	25.3
1, The Shrubbery, Old Dixton Road, Monmouth	MM9	27.66	25.60	25.74	22.91	24.40	25.21	11.89	22.63	24.04	29.71	28.30	34.94	25.3	0.92	23.2
Fence of Boys School Playground	MM11	25.87	M	39.92	29.95	35.69	38.60	13.25	27.72	29.95	43.05	37.69	39.46	32.8	0.92	30.2
Pike House, New Dixton Road, Monmouth	MM13	41.91	37.90	33.19	27.37	34.60	33.94	18.70	30.58	37.09	39.82	39.04	44.63	34.9	0.92	32.1
2 Riverside Park, Mayhill, Monmouth	MM14	18.58	18.06	17.28	14.38	15.37	14.32	9.50	13.09	14.54	16.06	21.55	23.95	16.4	0.92	15.1
6 Monnow Street/Fancy Fred's, Monmouth	MM15	38.38	33.43	37.55	35.39	39.39	38.73	16.59	35.20	36.11	42.54	42.11	44.31	36.6	0.92	33.7
Lamppost ME380 Adj 20A Monnow Street, Monmouth	MM16	38.27	35.56	36.41	30.41	35.85	33.38	20.01	29.60	28.00	36.34	38.37	36.67	33.2	0.92	30.6
4 Agincourt Square - The Punch House	MM17	28.80	28.38	28.75	23.39	27.15	26.20	14.50	21.01	24.06	32.18	31.83	33.92	26.7	0.92	24.5
Monmouth School D&T Block	MM18	32.30	32.10	33.22	29.29	31.57	29.76	16.60	29.98	29.23	33.22	36.88	32.43	30.5	0.92	28.1
Lamp post, 7 Ty Mawr, Monk Street, Monmouth	MM19	32.42	36.31	40.55	31.00	37.17	35.20	17.32	27.64	30.94	38.96	37.23	42.50	33.9	0.92	31.2

Lamppost ME514,13 Monk Street, Monmouth	MM20	30.68	30.38	32.48	25.54	31.36	27.59	14.67	26.21	28.36	39.33	39.00	38.98	30.4	0.92	28.0
Lamp post ME399,14 Victoria Place, Priory Street, Monmouth	MM21	32.10	39.11	42.36	34.26	40.74	37.14	17.31	34.20	32.63	47.84	51.15	42.28	37.6	0.92	34.6
Lamppost MC178- Merthyr Rd, Abergavenny	AB1	43.79	49.75	41.49	38.61	41.99	30.86	18.97	43.25	43.72	44.96	48.87	54.98	41.8	0.92	38.4
Back Clinic, 2a Bridge Cottages, Merthyr Rd Aber	AB2	43.55	45.91	38.60	33.19	36.98	36.87	17.62	35.22	35.78	38.89	42.10	51.30	38.0	0.92	35.0
112 Merthyr Road, Abergavenny	AB3	29.09	30.57	29.22	24.24	30.86	28.94	13.73	29.98	27.46	31.93	35.83	38.08	29.2	0.92	26.8
L/P Adj. 5 Coopers Way, Merthyr Rd, Abergavenny	AB4	31.08	33.81	30.57	23.96	28.29	23.66	13.94	24.31	29.19	31.11	35.94	39.00	28.7	0.92	26.4
1 Usk View, Merthyr Rd, Abergavenny	AB5	23.64	23.05	24.14	17.71	20.42	17.86	11.81	19.38	19.48	21.08	25.76	28.60	21.1	0.92	19.4
L/P No. MB991 ADJ., 9&11 Merthyr Rd, Abergavenny	AB6	28.94	27.40	26.94	22.97	M	23.45	10.94	20.62	22.76	26.01	27.06	30.37	24.3	0.92	22.4
14A Castle Parade - Usk	USK1	36.89	36.60	34.14	30.23	32.95	32.45	17.94	29.16	31.59	33.59	38.91	43.35	33.1	0.92	30.5
Castle Court - Usk	USK2	43.27	41.86	35.92	35.06	37.84	39.16	18.13	35.13	37.71	42.24	35.03	47.68	37.4	0.92	34.4
White Hart - 5 Bridge St Usk	USK3	38.97	39.18	37.21	35.89	32.64	38.67	22.31	35.69	36.02	46.20	47.67	47.59	38.2	0.92	35.1
35 Bridge St - Usk	USK4	Note 1	43.10	38.40	31.69	38.29	38.87	19.21	32.98	35.83	42.97	47.76	51.93	38.3	0.92	35.2
Lamp Post MA 556 - 16 Bridge St Usk	USK5	37.08	46.51	43.11	37.46	M	40.90	17.59	37.35	40.07	43.80	51.66	57.00	41.1	0.92	37.8
4 Usk Bridge Mews - Usk	USK6	26.37	25.64	23.65	20.49	21.04	18.09	13.07	18.19	19.95	25.89	28.23	30.12	22.6	0.92	20.8

Monthly data is not Bias Adjusted. Final Average has been bias adjusted using the 0.92 BAF

M = Tube Missing

Note 1 Usk 4 in January contained water droplets and results were compromised - recorded value of 112.43 - not entered as clearly incorrect

Note 2 MM7 in May read 4.66. No lab note, and officers did not report anything unusual with the tube, however value is clearly incorrect and therefore not entered

Note 3 MM2 in May read 18. No lab note, and officers did not report anything unusual with the tube, however value is probably incorrect and therefore not entered