2016 Air Quality Progess Report for Monmouthshire County Council

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

April 2016

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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 2015 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, and 2015 reports are available on the Councils 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 first year all six monitoring locations the Usk AQMA were below the nitrogen dioxide annual mean objective level.

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

All diffusion tube monitored locations had lower concentrations of nitrogen dioxide in 2016, than in 2015, and the Air Quality Monitoring Station on Hardwick Hill, in Chepstow recorded lower levels of nitrogen dioxide, PM10 and PM2.5 in 2016 than in 2015.

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 also summarises the includes findings of a five-month study undertaken by Natural Resources Wales using their Mobile Monitoring Facility (MMF) at the junction of the A40 and Wyebridge Street, Monmouth between 18th December 2014 and 2 June 2015.

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.

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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 micrograms per cubic metre □g/m3 (milligrammes per cubic metre, mg/m3 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 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2011
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
	266 µg/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 2015. Further detail on each report can be found in the 2015 Updating and Screening Assessment (USA) and previous reports.

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	Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded. Nitrogen Dioxide levels across the County increased sharply in 2012, which lead to Wyebridge Street in Monmouth being close to the objective level, and Merthyr Road in Abergavenny slightly exceeding the objective level. 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.
Progress Report	April 2014	Nitrogen dioxide was still the only pollutant that exceeded the objective level. The two Air Quality Management Areas still exceeded. Nitrogen dioxide levels were lower in 2013 than 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.
Monmouth Six Month Detailed Assessment	September 2014	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 monitoring station for NO2 and PM10, PM2.5 on the pavement of Wyebridge Street.
Updating and Screening Assessment	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.

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 0.17-2.73µg/m^3 and the range for the locations that increased was 0.13-2.47µg/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 0.19-7.76µg/m^3. USK1 increase by 1.30µg/m^3.

With regard to the Air Quality Monitoring Station, there were no exceedences of either of the nitrogen dioxide objective levels, or PM_{10} objective levels, nor of the $PM_{2.5}$ annual mean limit value.

The annual mean nitrogen dioxide level increase to 38.6µg/m^3 in 2014 from 34.5µg/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.

PM_{10} concentration recorded in the Chepstow AQMA indicated that the yearly downward trend was continuing, with decrease from 26 µg/m^3 in 2005 to 19 µg/m^3 in 2013 and 18 µg/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 19µg/m^3 to 14µg/m^3 in 2014. However the lowest concertation was recorded in 2012 at 12µg/m^3, which increased to 14µg/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

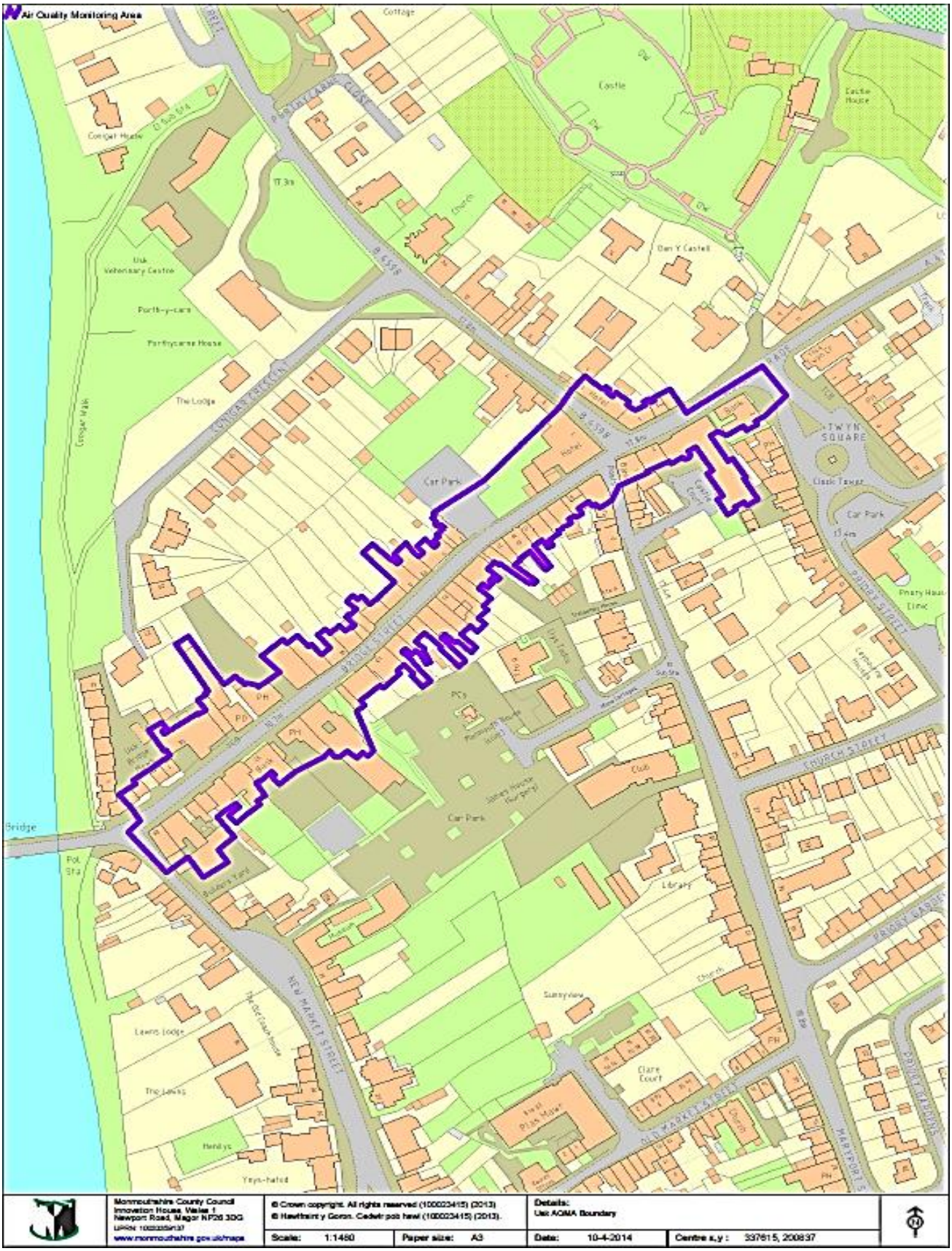
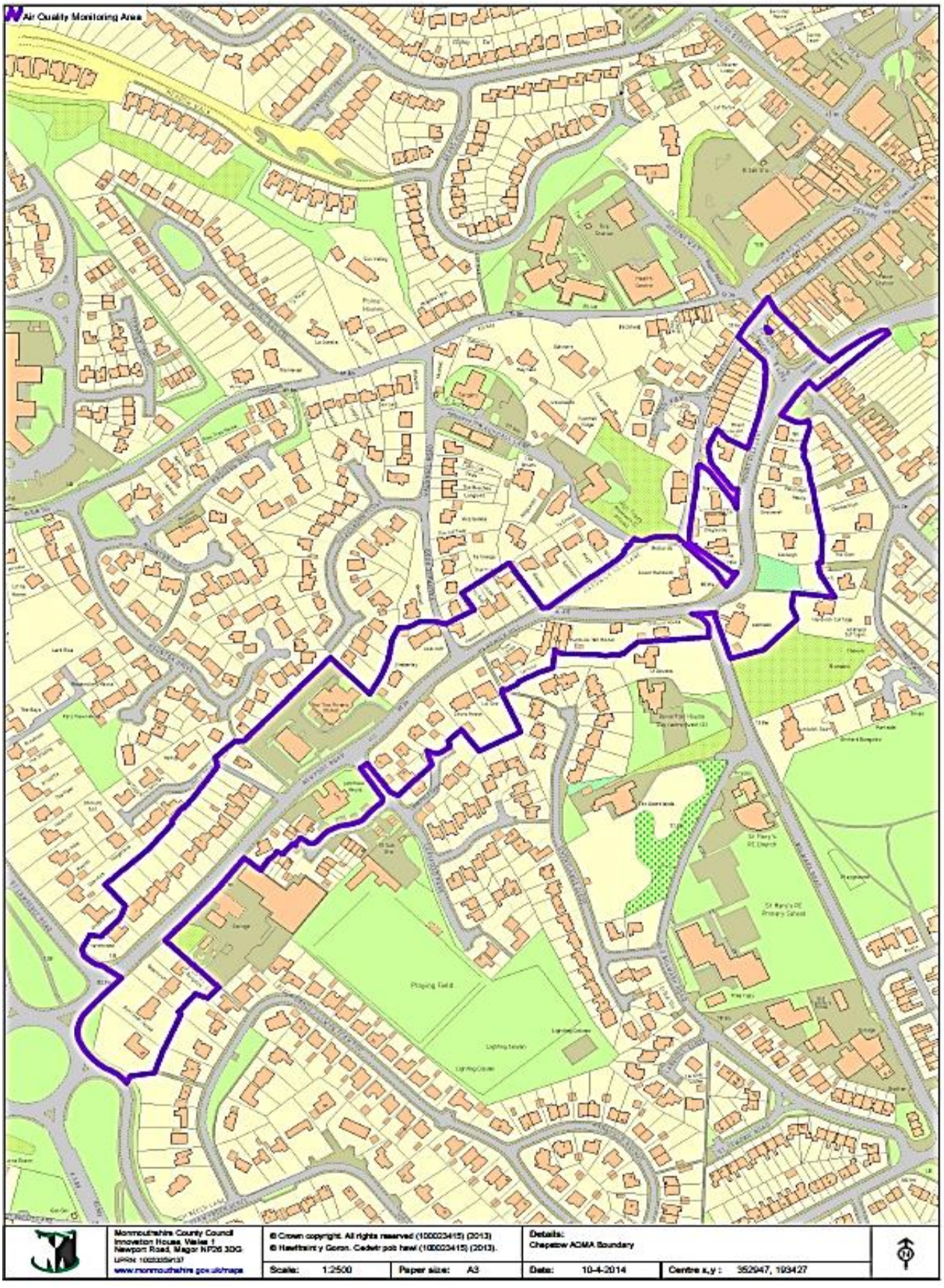


Figure 1.2 Map of Chepstow AQMA Boundary



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, PM_{10}, 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 PM_{10} 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 2015 the NOx analyser and the PM10 and PM2.5 analysers were serviced by Air Monitors, and 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.

In addition Natural Resources Wales (NRW), following application by Monmouthshire County Council located one of their Mobile Monitoring Facilities (MMF) on the pavement on the junction of the A40 and A4136 (Wyebridge Street) in Monmouth. The MMF was set up, calibrated, serviced and monitored by the Environment Agency's Ambient Air Monitoring Team on behalf of NRW.

The MMF was installed to monitor particulates (PM_{10} and $PM_{2.5}$), oxides of nitrogen (NOX), sulphur dioxide (SO_2) and carbon monoxide (CO) between 18th December 2014 and 3 June 2015.

A report was produced by the Environment Agency entitled "Study of Ambient Air Quality at Monmouth (AAM/TR/2015/10). The location of the MMF is shown in Figure 2.4

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} $PM_{2.5}$	Yes	TEOM FDMS	Y	3m	Y
			NO_x NO_2		Chemiluminescence			

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 – 2.9

In 2015 Monmouthshire County Council used 45 nitrogen dioxide diffusion tubes at 40 locations. In addition to the 40 monitoring locations:-

- 1 diffusion tube was used as a travel blank,
- 3 diffusion tubes were co-located with the AQMS to undertake a triplicate co-location study,
- 3 diffusion tubes were co-located with Natural Resources Wales' Mobile Monitoring Facility (MMF) for the five months it was located on the A40 in Monmouth (18th December 2014 – 2nd June 2015).

There were a number of changes to the monitoring network in 2015.

Additions to the network:-

- December 2014 3 tubes used as a co-location study with the MMF on the A40 in Monmouth
- December 2014 1 tube installed at the nearest receptor to the MMF (Design and Technology Block of Monmouth School
- February 2015 3 tubes installed on the junction of Monk Street and Priory Street due to indications from air quality modelling that there could be an exceedence in this area (MM19, MM20 and MM21)

Subtractions from the network:-

- January 2015 2 tubes used in a comparison study with MM1 and MM2 (but at different heights) were removed as the study indicated very little difference.
- January 2015 1 tube (MM8) removed from Wyelands, Old Dixon Road, Monmouth as concentrations were always very similar (but slightly lower) than the concentrations recorded at a neighbouring property (MM9).
- May 2015 1 tube removed (MM5) from Weirhead House, Monmouth School as it had not been possible to get access to the location since November 2014.

- June 2015 3 co-location study tubes removed when the MMF study stopped.

By the end of December 2015 there were a total of 42 diffusion tubes at 39 locations (1 travel blank and 3 co-located with the AQMS), and it is anticipated that the network will remain unchanged in 2016.

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

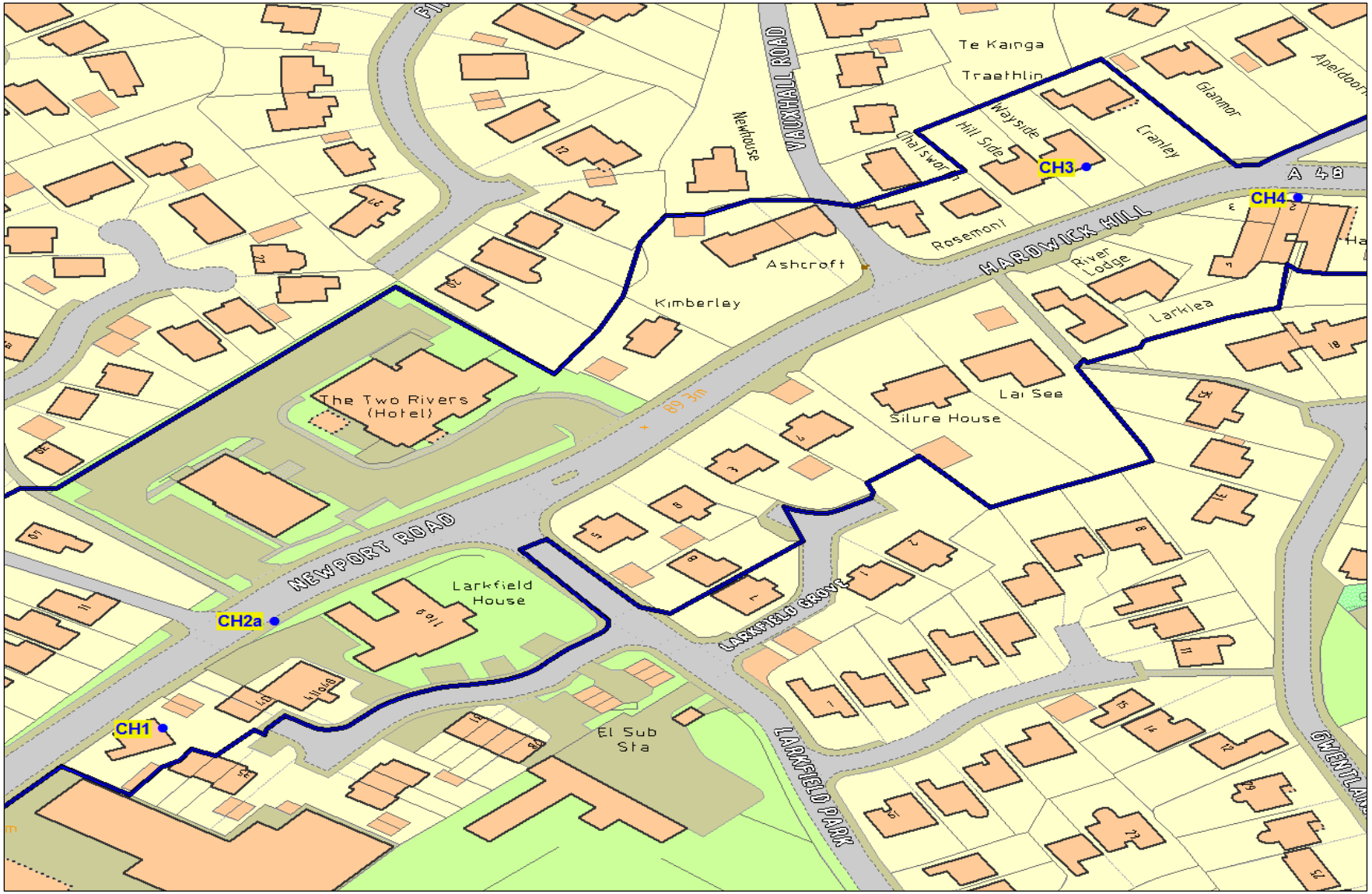


Figure 2.2: Nitrogen Dioxide & AQMS Monitoring Locations - Chepstow AQMA east

Figure 2.3: Nitrogen Dioxide Monitoring Locations - Usk AQMA

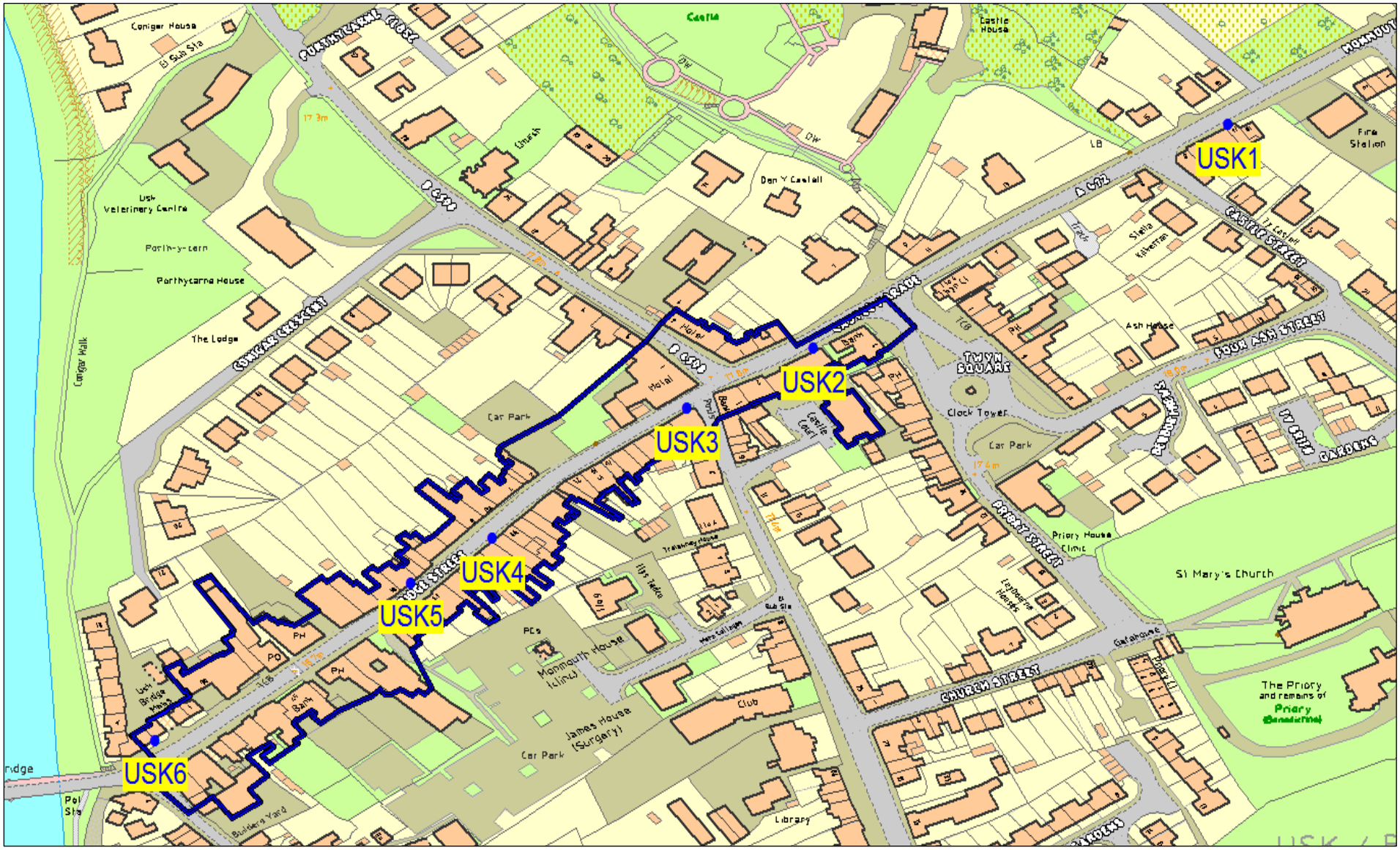


Figure 2.4: Nitrogen Dioxide & MMF Monitoring Locations – Monmouth Boys School, A40/Wyebridge Street junction

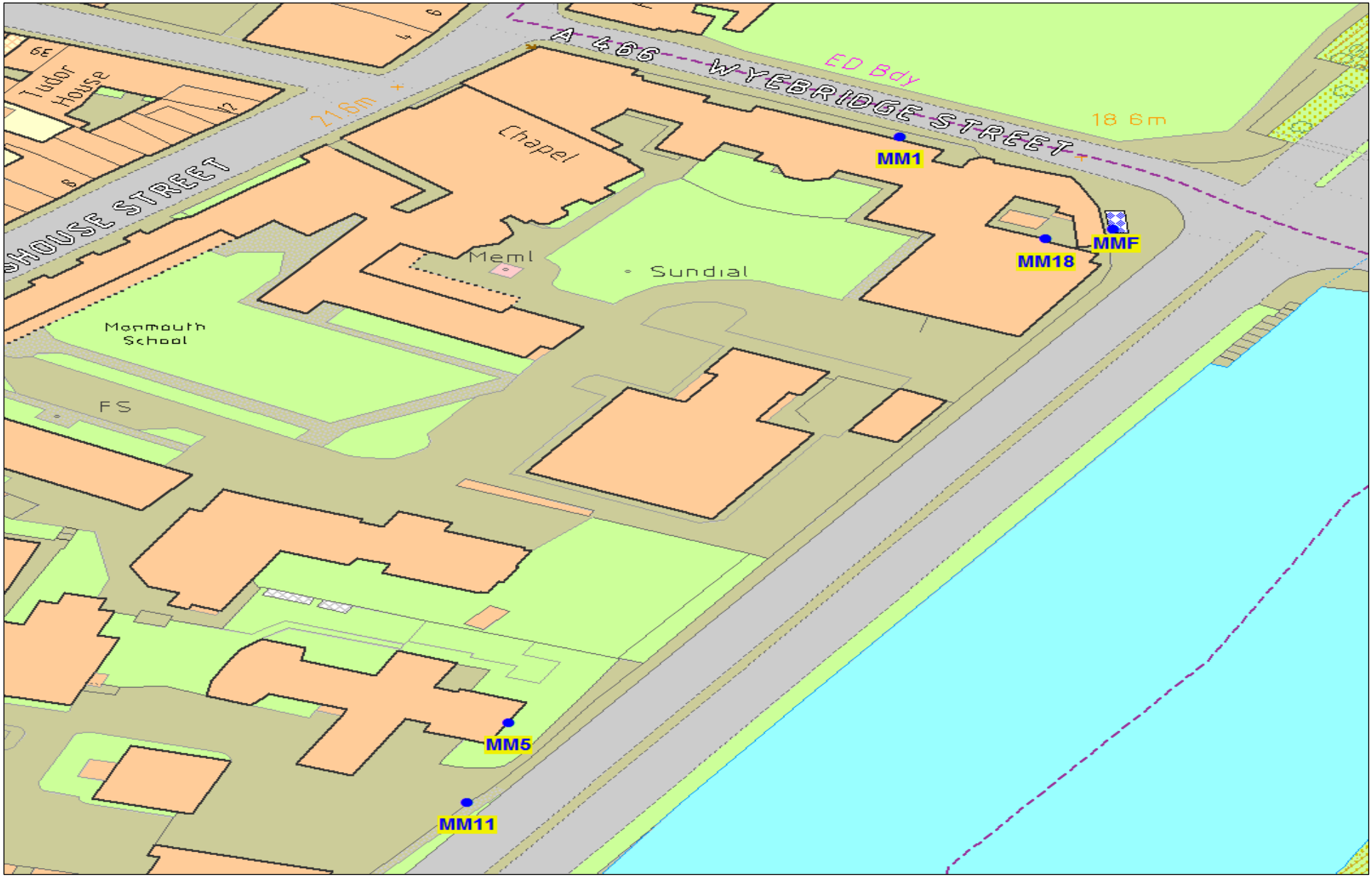


Figure 2.5: Nitrogen Dioxide Monitoring Locations – Monmouth, A40/Wyebridge Street & Riverside Park

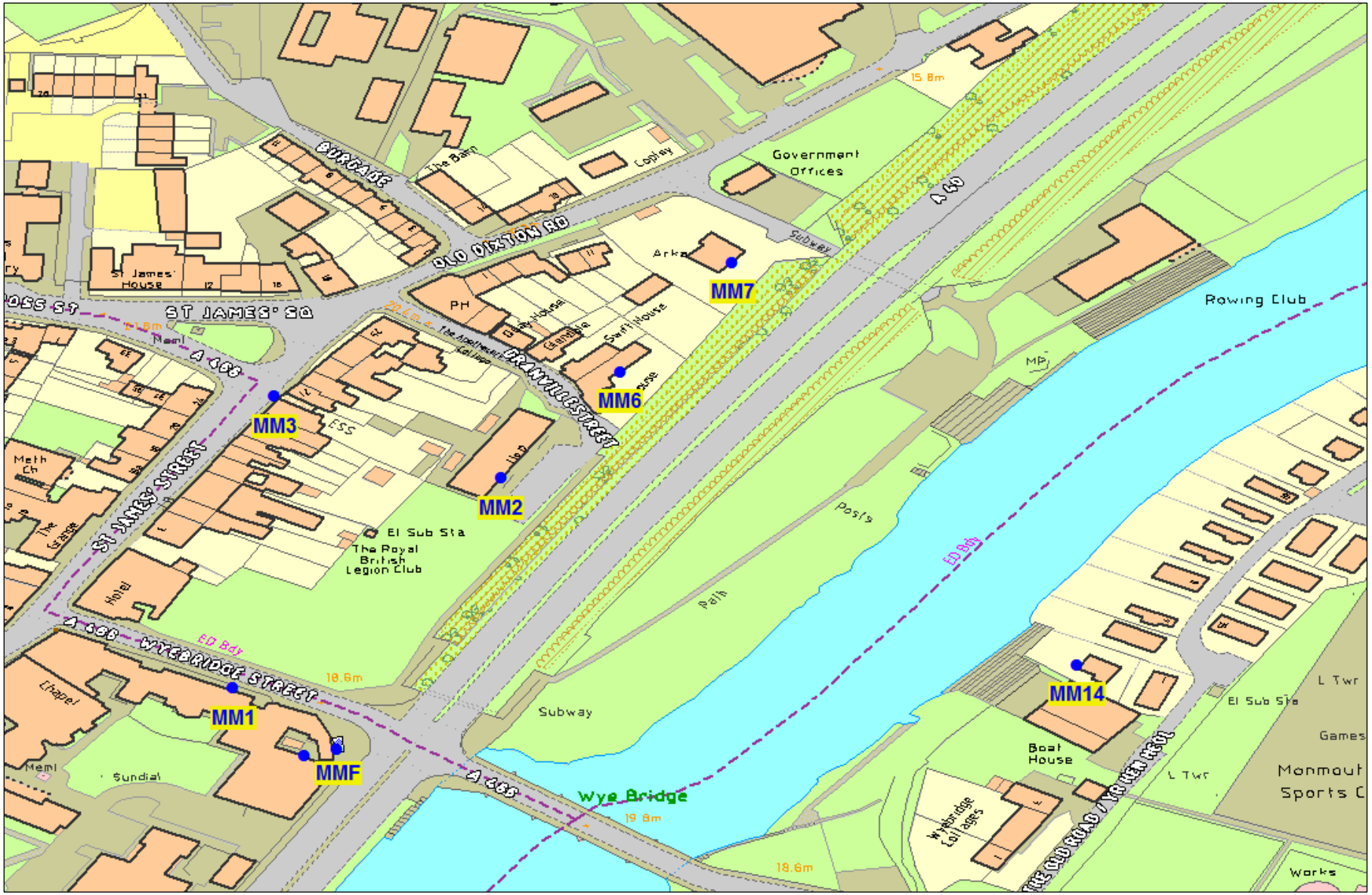


Figure 2.6: Nitrogen Dioxide Monitoring Locations – Monmouth, Monnow Street & Monk Street/Priory Street junction

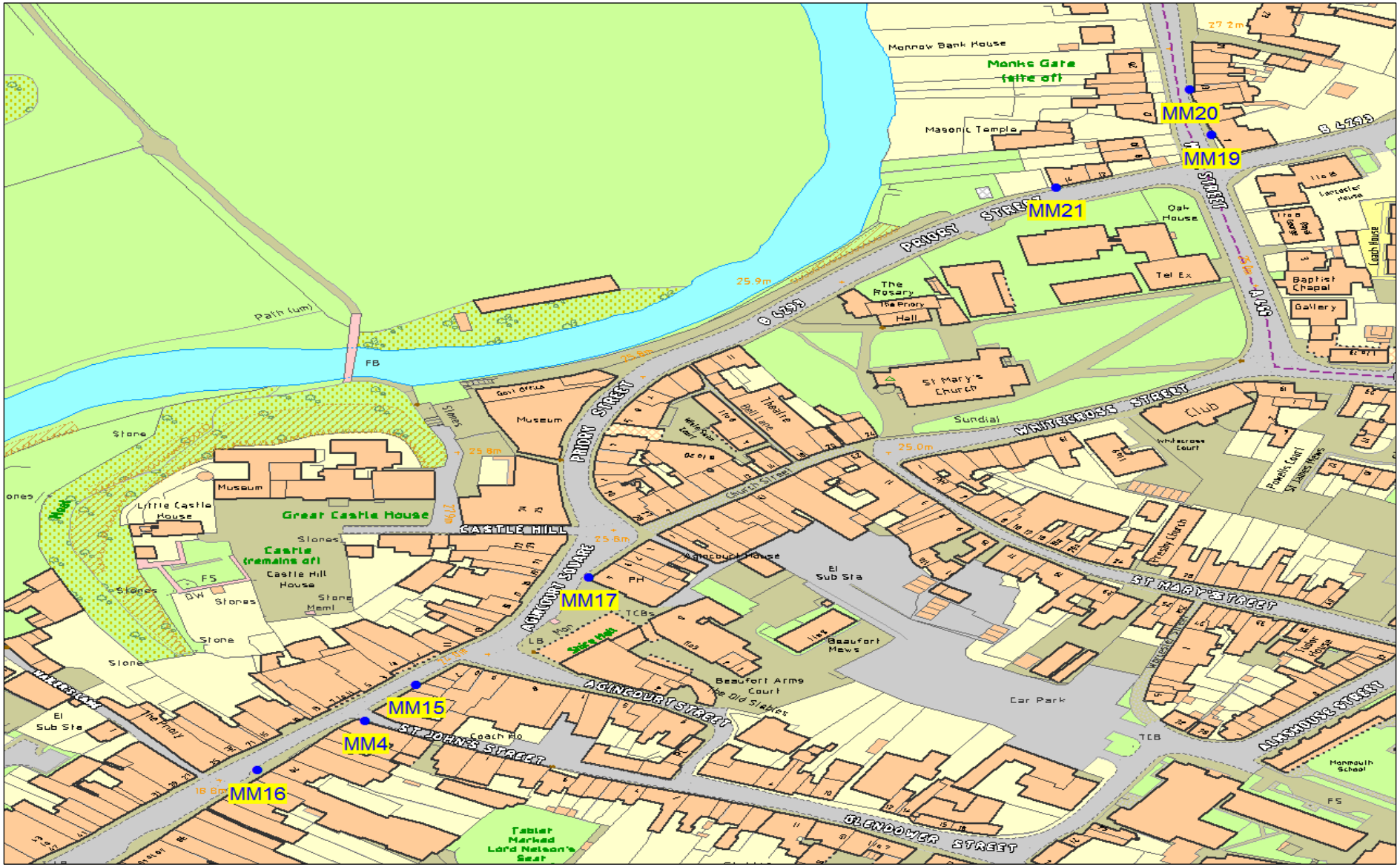


Figure 2.7: Nitrogen Dioxide Monitoring Locations – Monmouth, Old Dixton Road

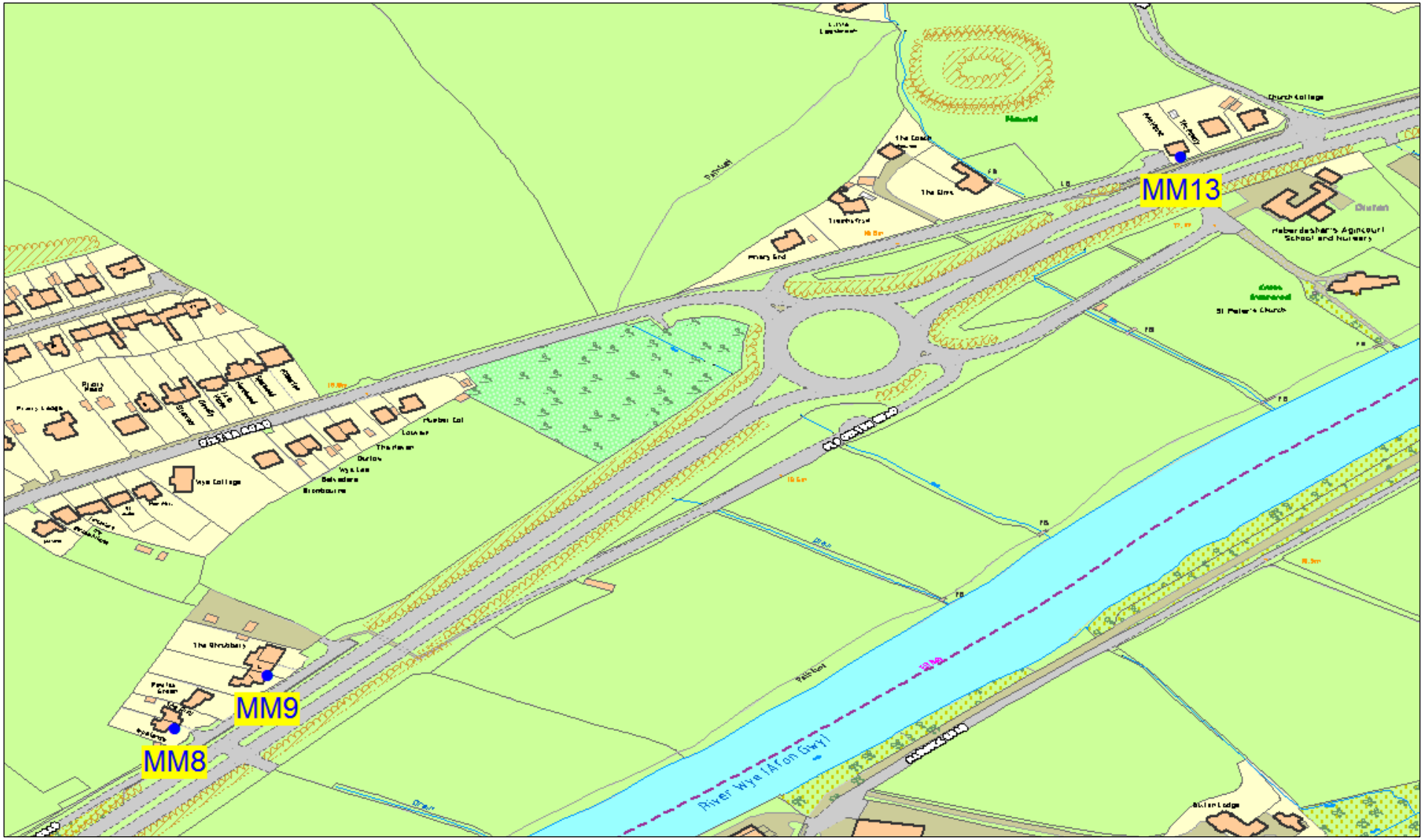


Figure 2.8 Nitrogen Dioxide Monitoring Locations – Abergavenny, South Merthyr Road

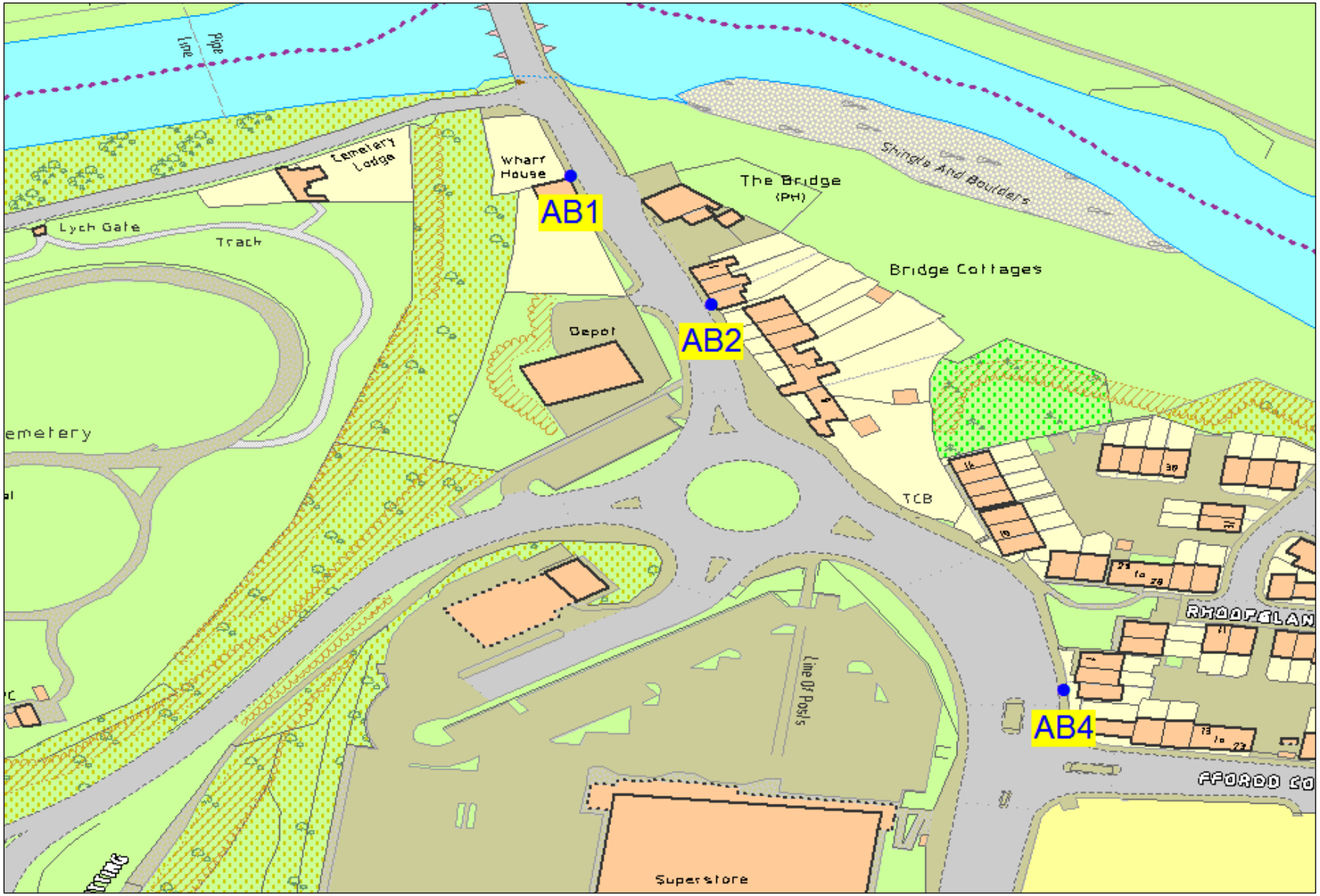


Figure 2.9: Nitrogen Dioxide Monitoring Locations – Abergavenny, North Merthyr Road

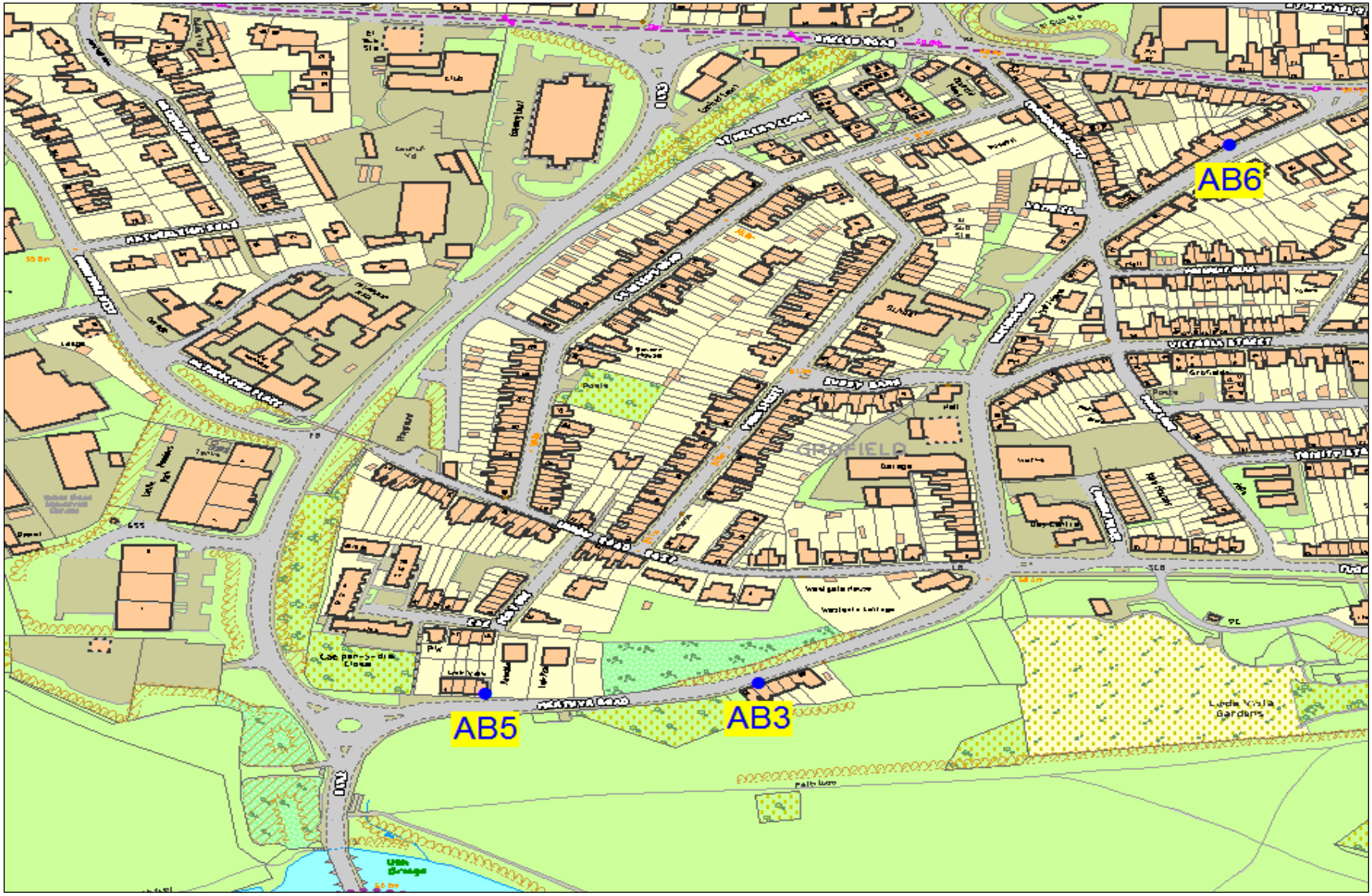


Table 2.2 Details of Non- Automatic Nitrogen Dioxide Monitoring Sites

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
Weirhead House Boarding Complex, Monmouth Boys School, Almshouse Street , Monmouth	MM5	Roadside	SO 510126	1.7	No	Yes 0.15	8	Yes	30/10/2013 – 22/4/2015
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
Wyelands, Old Dixton Road, Monmouth	MM8	Intermediate	SO 514132	2.1	No	Yes 0.17	21	Yes	30/10/2013 – 07/01/2015

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
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
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
Mobile Monitoring Facility Co-location Study (triplicate)	MMF1 MMF2 MMF3	Roadside	SO 51099 12797	2.9	No	No 9.7	8	Yes	29/10/2014 – 27/05/2015

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, 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	04/022015
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
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

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
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
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 (NO_2)

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 2015 was good, with an annual data capture of 98%.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
99%	99%	99%	100%	99%	99%	92%	95%	95%	100%	100%	100%

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/m^3 was exceeded in 2008 and 2011 but met in all other years, including 2015, which recorded 37 µg/m^3. These are shown in Table 2.3.

The hourly mean objective of 200 µg/m^3 not to be exceeded more than 18 times a year, has been met each year since 2005 between 2005 and 2014 there were no recorded hourly exceedences of 200 µg/m^3, however in 2015 there were two exceedences which is shown in Table 2.4 .

The first was on Saturday 24th January 2015 at 6pm, and the second was at 8am on Tuesday 27th January 2015.

Because of these two 1-hour means, the daily mean for Saturday 24th January was 102 µg/m^3, and 97µg/m^3 for Tuesday 27th. These were the highest daily concentrations recorded, and the only two that exceeded 90 µg/m^3.

With regard to the 24th, the proceeding hourly mean was 163 µg/m^3, and the following hourly mean was 173 µg/m^3. Therefore it is possible that there was a very localised, but short lived occurrence at 18:00 that caused the concentrations to reach the highest level ever recorded at the station. The same could be said for Tuesday 27th, as the 7:00am reading was 161 µg/m^3 and the 9:00am concentration was 170 µg/m^3.

In 2015 the breakdown of nitrogen dioxide concentration by hour was:-

- 2 hours at 210 µg/m^3
- 1 hour at 190 µg/m^3
- 1 hour at 180 µg/m^3
- 5 hours between 170 - 179 µg/m^3
- 5 hours between 160 - 169 µg/m^3
- 6 hours between 150 - 169 µg/m^3
- 142 hours between 100-149 µg/m^3
- 1908 hours between 50-99 µg/m^3
- 1192 hours between 41 – 49 µg/m^3
- 5332 hours below 40 µg/m^3
- 166 hours of missing data

The modal value of the data (not including the missing hours) is 32µg/m^3, which occurred 172 hours and the median concentration was 34µg/m^3.

Figure 2.10 shows annual average measurements of nitrogen dioxide and PM_{10} and $PM_{2.5}$ between 2005 and 2015. Figure 2.11 shows the Smooth Trend analysis for the monthly average nitrogen dioxide readings between 2004 and 2015 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 there is an annual fluctuation in nitrogen dioxide concentrations, since monitoring began in September 2004 ranging between 34µg/m^3 and 42µg/m^3. Concentrations increased sharply between 2006 and 2008 from a low of 34µg/m^3 to a high of 42µg/m^3, but then stabilised between 38µg/m^3 and 40µg/m^3 for four years between 2009 and 2012. 2013 saw the first significant drop in concentrations since 2006 with a return to 34.5µg/m^3, however 2014 saw a return to the 2009-2012 levels with a concentration of 38.6µg/m^3, whilst in 2015 the concentration decrease slightly to 37 µg/m^3. However Figure 2.10 does suggest that the annual increase in concentrations between 2006 and 2011 has stopped, and there appears to now be a slight downward trend from 2011's 40µg/m^3 to 2015's 37µg/m^3.

Despite the high concentrations in December 2014 and January 2015, the smooth trend best fit, also indicate a gradual decrease in concentrations since April 2011. It also shows the shows 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 2.12). The Time Variation Analysis is for nitrogen dioxide, PM10 and PM2.5 concentrations measured between 2004 and 2015 (2010 and 2015 for PM2.5) and shows daily, hourly, monthly and weekly trends.

Figure 2.12 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 2.13, which is a Wind/Pollution Rose for 2004 – 2015 and shows how wind direction from the direction of the A48 road to the south west, west and North West of the monitoring station brings much higher concentrations of nitrogen dioxide than the other wind directions.

Time Variation Analysis and pollution rose analysis from the 2015 only data (not presented) shows the same pattern as for the 2004-2015 data, indicating that there have been no changes in source, or direction of pollution in 2015.

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

Site ID	Site Type	Within AQMA	Data Capture (%)		Annual Mean Concentration µg/m^3										
			period of monitoring[a]	2015[b]	2005	2006	2007	2008	2009	2010	2011	2012[c]	2013	2014	2015
AQMA	Roadside	Yes	98	98	36	34.3	36.9	41.9	38	39.0	40.0	39.1 (41.5)	34.5	38.6	37
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 µg/m^3)										
			period of monitoring [a]	2015[b]	2005	2006	2007	2008	2009	2010	2011	2012[d]	2013	2014	2015
AQMS	Roadside	Yes	98	98	0	0	0	0	0	0	0	0 (122)	0	0	2
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 2.10 Trends in Annual Mean nitrogen dioxide, PM_{10} and $PM_{2.5}$ Concentrations 2005-2015

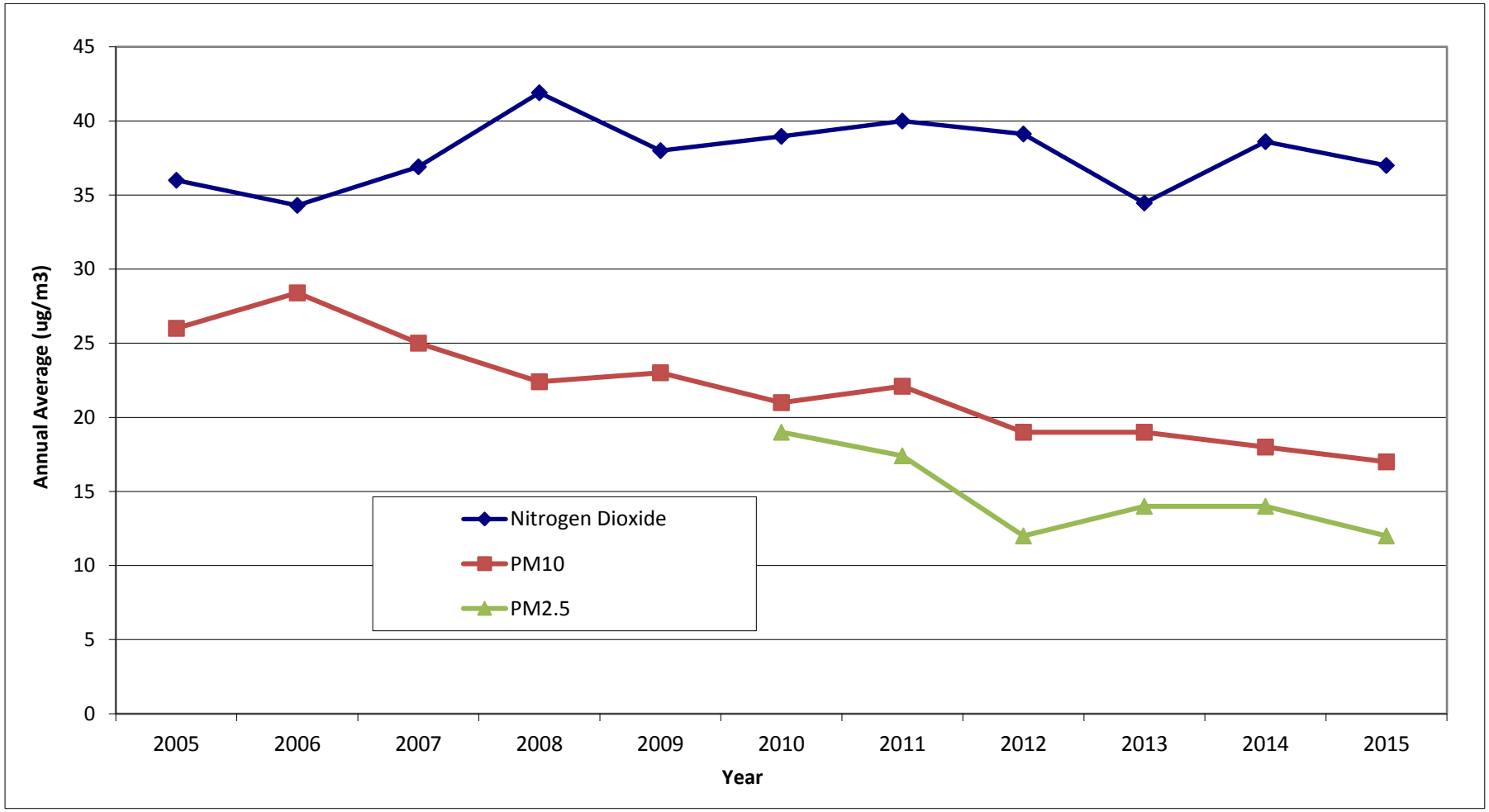


Figure 2.11 Smooth Trend Analysis of average monthly nitrogen dioxide concentration 2004-2015

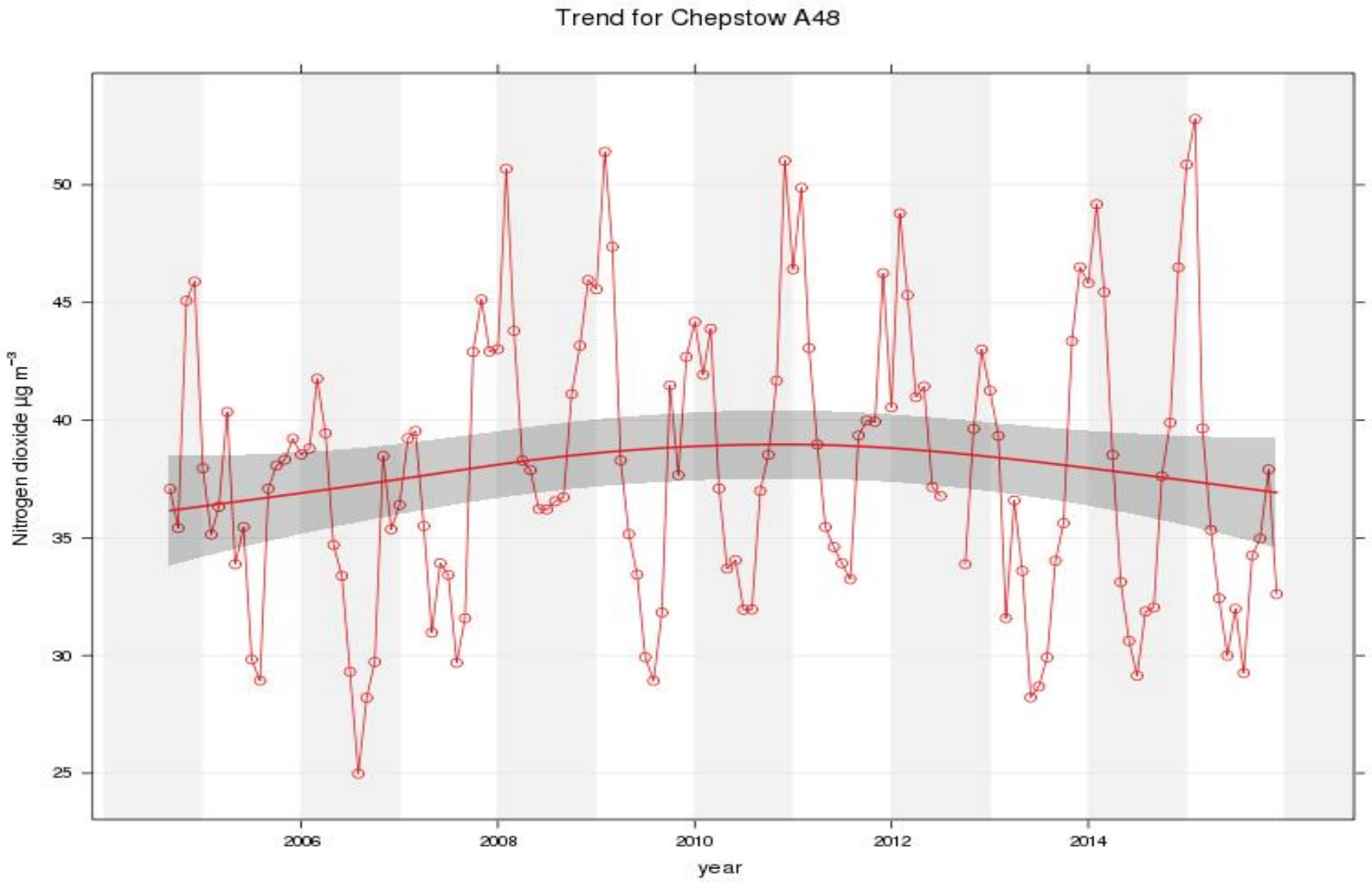


Figure 2.12 Time Variation Analysis of nitrogen dioxide, PM10 and PM2.5 concentrations 2004-2015

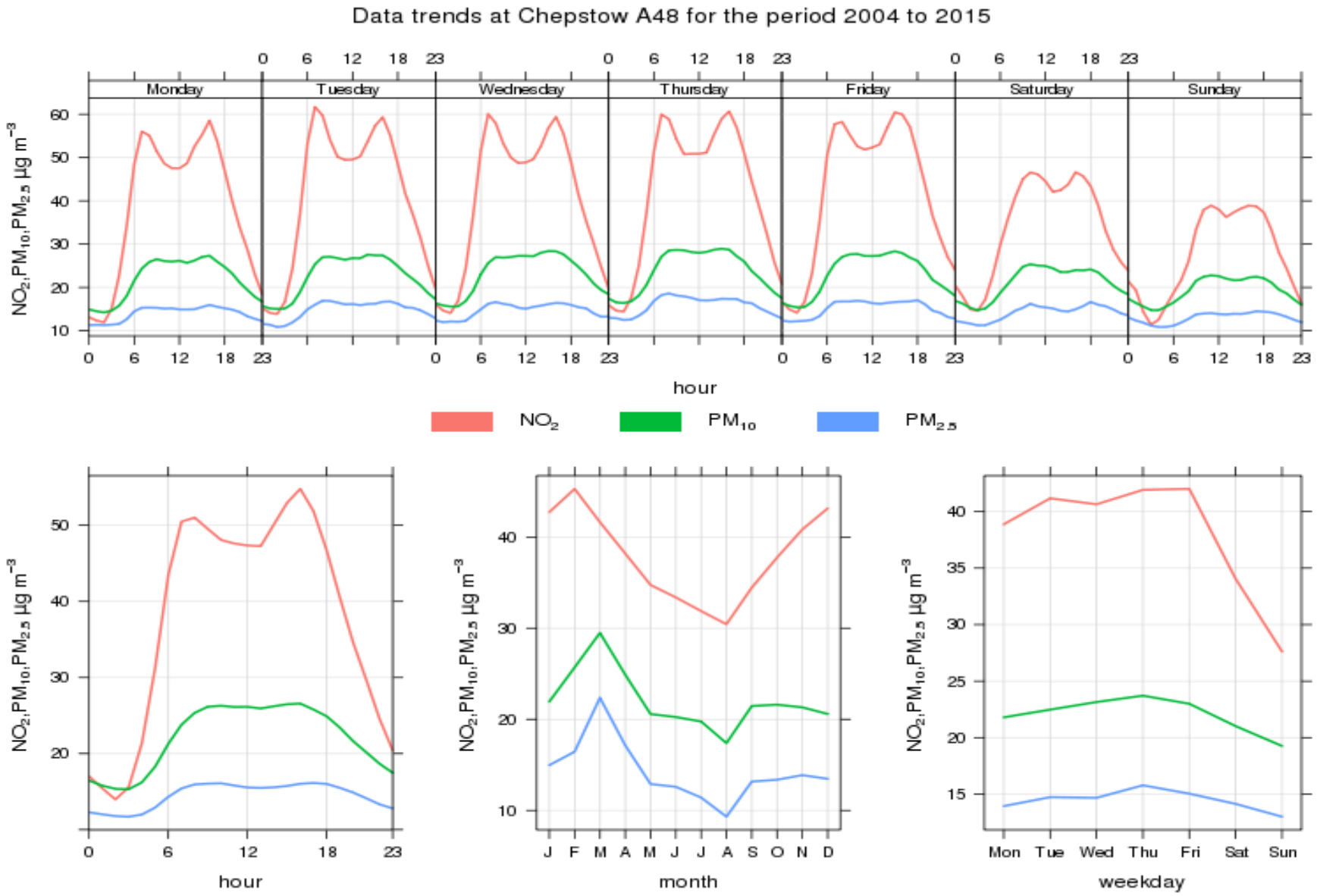
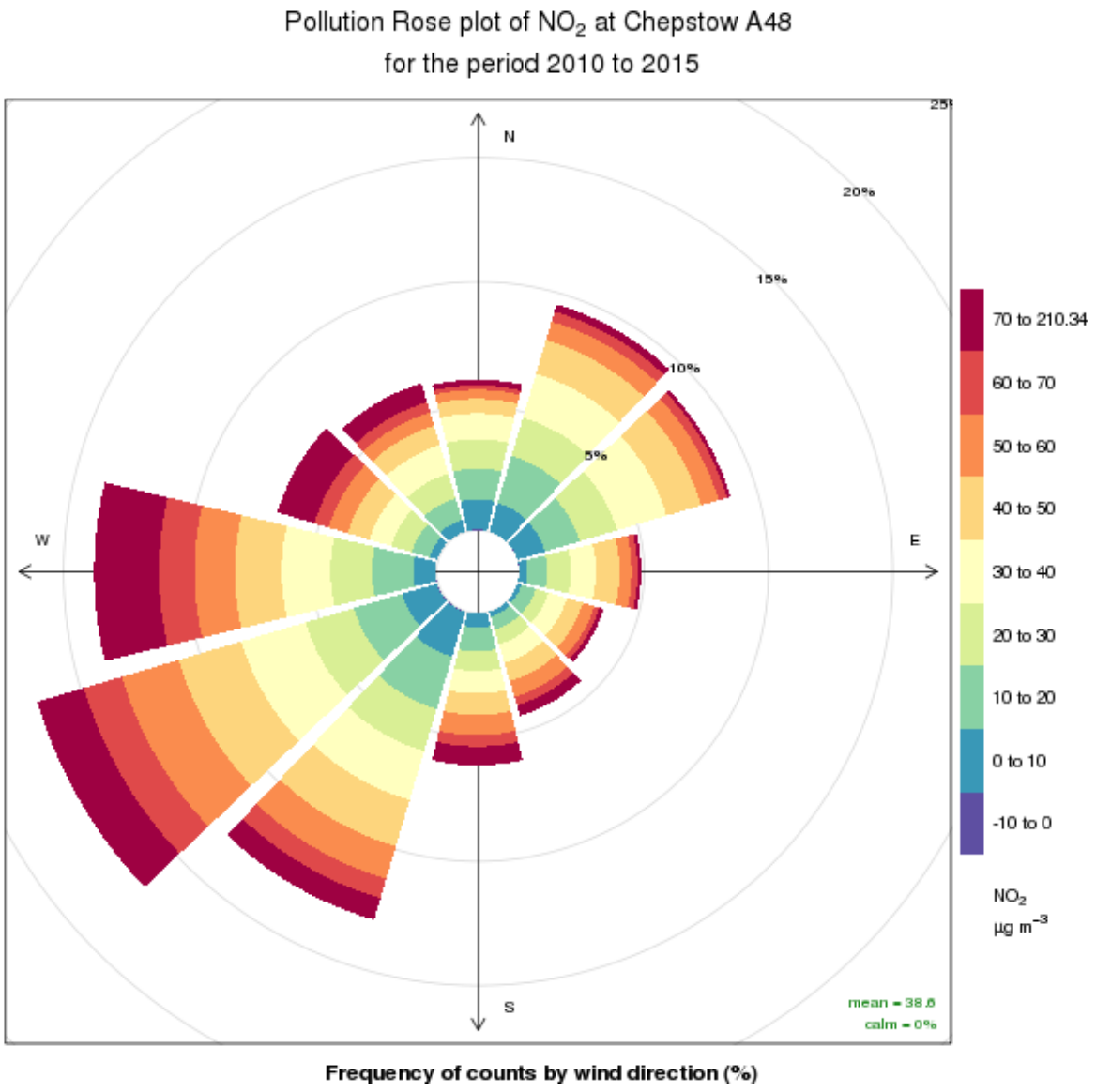


Figure 2.13 Pollution Rose summarising nitrogen dioxide concentrations by wind direction 2010-2015



2.2.1.2 Particulate Matter - PM_{10} & $PM_{2.5}$

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 PM_{10} and $PM_{2.5}$ are monitored using FDMS TEOM analysers.

Data capture for the PM_{10} analyser in 2015 was good, with an annual data capture of 88%. However technical issues at the start of the year meant that there was only 59% data capture in January and 8% in February due to loss of data between 19th January and 26th February when the analyser had to be repaired. However the remainder of the year had good data capture.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
59%	8%	99%	100%	100%	100%	81%	98%	100%	100%	100%	100%

Data capture for the $PM_{2.5}$ analyser in 2015 was better, with an annual data capture of 96%.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
79%	99%	100%	100%	99%	100%	81%	98%	100%	100%	99%	99%

The PM_{10} 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/m^3 as an annual mean; however the Target Value had to be met by 2010, whilst the Limit Value has to be achieved by 2015.

Table 2.5 presents the PM_{10} annual mean concentrations between 2005 and 2015, and Table 2.6 gives the number of exceedences of the PM_{10} 24-hour mean objective level. Table 2.7 gives the $PM_{2.5}$ annual mean concentrations between 2010 and 2015.

The annual mean concentrations for PM_{10} between 2005 and 2015 and $PM_{2.5}$ between 2010 and 2015 are shown alongside the annual mean concentrations for nitrogen dioxide in Figure 2.10

The results confirm that both the annual and 24-hour PM_{10} objectives were achieved between 2007 and 2015; and the annual $PM_{2.5}$ Target Value was achieved between 2010 and 2015.

In 2015 the annual PM_{10} mean was 17µg/m^3 and the annual $PM_{2.5}$ mean was 12µg/m^3.
There were five 24-hour periods when the PM_{10} concentrations were at or over 50µg/m^3 (the objective level allows up to 35 exceedences of 50µg/m^3) on the following days:-

19/3/15	65 µg/m^3	20/3/15	65 µg/m^3	18/3/15	62 µg/m^3
12/3/15	51 µg/m^3	10/4/15	50 µg/m^3		

Figure 2.14 presents a plot of the mean monthly concentrations for PM_{10} between 2005 and 2015 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 2.10, indicate that PM_{10} concentrations have been reducing since a peak in 2006 to the lowest in 2015.

$PM_{2.5}$ concentrations between 2010 and 2015 are presented as annual mean concentrations in Figure 2.10, and Table 2.7 and as a smooth trend analysis in Figure 2.15. They also identify that concentrations have generally reduced from a high of 19 µg/m3 in 2010, to a low of 12 µg/m^3 in 2015. However there was an increase from 12 µg/m^3 in 2012 to 14 µg/m^3 in both 2013 and 2014.

As can be seen from Figure 2.10, both PM10 and PM2.5 show a downward trend in concentrations over time since 2006 for PM_{10} and 2010 for $PM_{2.5}$, despite the nitrogen dioxide increase between 2006 until 2011.

Figure 2.12 presents a comparison of the Time Variation trends for all three pollutants monitored at the AQMS. PM_{10} 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 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 µg/m^3										
			monitoring period[a]	2015[b]		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
A48 Hardwick Hill, Chepstow	Roadside	Yes	88	88	Y	26	28.4	25	26.3 (22.4[c])	23 (22.1[c])	21	22.1	19	19	18	17
Annual Mean Objective						**40**										

Table 2.6: Automatic Monitoring for PM_{10}: 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]	2015[b]		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
A48 Hardwick Hill, Chepstow	Roadside	Yes	88	88	Y	2	5	5	5	0	5	10	3	4	2	5
24-hour Mean Objective						**50 µg/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]	2015[b]		2010	2011	2012	2013	2014	2015
A48 Hardwick Hill, Chepstow	Roadside	Yes	89	89	Y	19	17.4	12	14	14	12
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 2.14 Smooth Trend Analysis for monthly PM_{10} data between 2005 & 2015

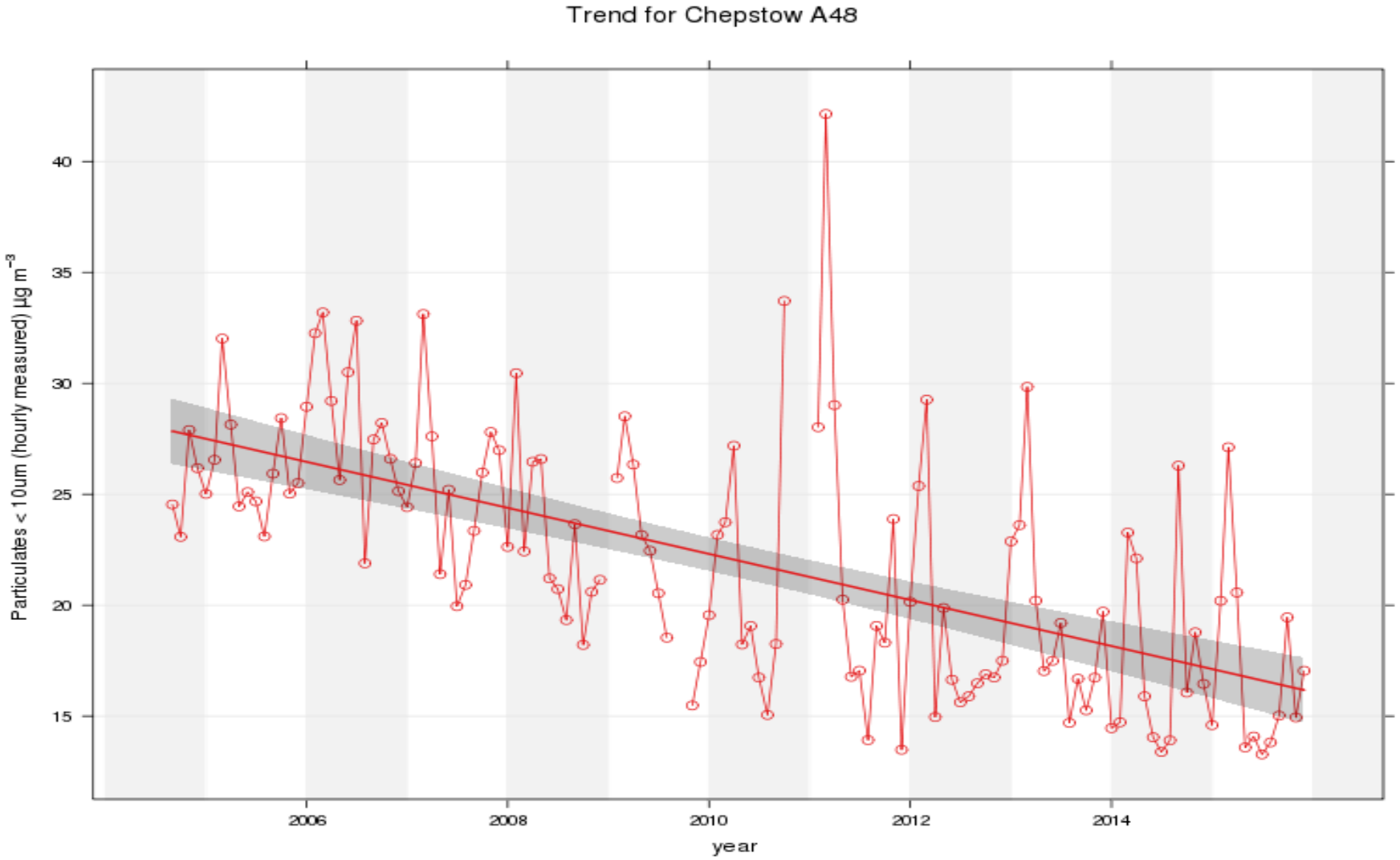


Figure 2.15 Smooth Trend Analysis for monthly $PM_{2.5}$ data between 2010 & 2015

2.2.2 Automatic Monitoring Data – Monmouth A40/Wyebridge Street

2.2.2.1 Summary of Nitrogen Dioxide, PM_{10}, $PM_{2.5}$, Sulphur Dioxide & Carbon Monoxide

Due to concerns raised by local residents, and the findings of a dispersion model submitted for a planning application (further Details are given in the 2015 Updating and Screening Assessment) Monmouthshire County Council applied to Natural Resources Wales (NRW) to undertake monitoring on the pavement of the A40, next to Monmouth School and the traffic light junction of the A4136 (Wyebridge Street) using their Mobile Monitoring Facility (MMF). The location of the MMF is shown in Figure 2.4 and 2.5 and the study was undertaken between the 18th December and 3rd June 2015.

The Environment Agency (EA) carried out the study on behalf of NRW, and published a report entitled "Study of Ambient Air Quality at Monmouth 18 December 2014 – 3 June 2015".

This Progress Report contains a summary of the findings of the study, the full report can be found on NRW's website and the Air Quality section of Monmouthshire County Council website –
http://www.monmouthshire.gov.uk/air-quality
http://www.monmouthshire.gov.uk/cy/ansawdd-aer-yn-sir-fynwy

Introduction

The purpose of the study was to determine measured levels of particulate (PM_{10} and $PM_{2.5}$), oxides of nitrogen (NOX), sulphur dioxide (SO_2) and carbon monoxide (CO) between the 18 December 2014 and 3 June 2015 (168 days) and compare these levels with the objectives of the UK Air Quality Strategy (AQS), where applicable.

Location

The MMF was located on the junction of the A40 and Wyebridge Street and thus had a road on two sides. The A40 runs from south west to north east of the MMF with the junction with the A466 (Wyebridge Street) to the east. Wyebridge street is almost directly north of the MMF's location. See Figure 2.4 and 2.5 for location maps and figure 2.16 for a photograph of the MMF looking south across Wyebridge Street and towards the A40 junction and traffic lights.

Metrological

Wind speed and direction was measured from a mast installed on top of the MMF. Wind direction was found to be predominantly from the south-west (46%) and north-east (31%). The highest average wind speeds were measured from the south-west.

Figure 2.16 View of MMF looking south across Wyebridge street

Nitrogen Dioxide

The analyser used to measure NO_2 was an automatic chemiluminescent ML 9841B, similar to the analyser used in the Chepstow Air Quality Monitoring Station, and data capture was 97% over the study period of 168 days.

During the study period the 1-hour NO_2 value of 200µg/m^3 was exceeded on one occasion, when it reached 210µg/m^3. If the study period represents a typical year the 200µg/m^3 level would have been exceeded on 2 occasions and therefore as the air quality standard stipulates 200 µg/m^3 must not be

exceeded on more than eighteen occasions, the report concluded that the 1-hour mean objective level would not have been exceeded.

During the study period the average NO_2 concentration was 48.8µg/m^3. If the study period represents a typical year the annual air quality standard of 40µg/m^3 would have been exceeded. However the MMF was located at a roadside monitoring location and therefore does not reflect an exceedence at the nearest sensitive receptor. The nearest receptor is a classroom in the Monmouth School, which is located 9 metres from the MMF and 11 metres from the roadside. A diffusion tube (see Figure 2.4) was located outside the classroom window (MM18), and three diffusion tubes were co-located with the inlet of the MMF's nitrogen dioxide analyser. This would allow comparisons between the MMF analyser, the triplicate diffusion tubes and the concentrations recorded at the classroom.

The precision of the triplicate diffusion tubes co-located with the MMF was good and their study average (un-bias adjusted) was 48.5µg/m^3, which shows good correlation with the automatic analysers average of 48.8µg/m^3.

The nearest relevant receptor (MM18) was found to have an unadjusted study average of 29µg/m^3, and an annual unadjusted average of 29.3µg/m^3, which is a lot lower than both the diffusion tube and automatic analyser concentrations recorded at the roadside MMF, and below the annual mean objective level.

PM_{10} and $PM_{2.5}$

PM_{10} and $PM_{2.5}$ concentrations were measured using a TEOM instrument for 168 days between 18th December 2014 and 3 June 2015. Data capture over this period was 90% and 89% respectively. As the MMF did not use a FDMS TEOM the PM_{10} data was adjusted using the Volatile Correction Model.

The mean PM_{10} concentration over the study period was 25.4µg/m^3. If the assumption is made that the conditions during the monitoring period were representative of the year, then the annual objective level of 40µg/m^3 would not have been exceeded at the roadside location.

The short-term (24-hour – midnight – midnight) mean concentration was greater than 50µg/m^3 on five occasions, with the maximum concentration being 59.3µg/m^3. If the assumption is made that the conditions during the monitoring period were representative of the year, then over the course of the year the 50µg/m^3 level would have been exceeded on thirteen occasions, therefore the short

term objective level of thirty five or more exceedences of 50µg/m^3 would not have been exceeded at the roadside.

The $PM_{2.5}$ study period mean concentration was 11.4µg/m^3, therefore if the assumption is made that the conditions during the monitoring period was representative of the year, the objective of 25µg/m^3 would not have been exceeded at the roadside.

Sulphur Dioxide & Carbon Monoxide

The sulphur dioxide 15-minute, 1-hour and 24 hour means concentrations indicated that there were no exceedences of objective levels. The maximum 15-minute mean was 48.3µg/m^3, 1-hour mean was 34.8µg/m^3, and the 24-hour maximum was 14.1µg/m^3. Please see Table 1.1 for the three objective levels.

The 8-hour rolling mean concentrations for carbon monoxide were below the 10mg/m^3 objective level during the study period, with a maximum recorded 8-hour concentration of 1.69mg/m^3

2.2.3 Non–Automatic Monitoring Data– Nitrogen Dioxide Diffusion Tubes

All passive/non-automatic monitoring undertaken in 2015 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 0.91 Bias Adjustment factor (BAF) calculated on the March 2016 national Bias Adjustment Factor spreadsheet which was based on twenty nine studies, including the Chepstow study. The local BAF (based on the Chepstow AQMS co-location study) was also 0.91 with a 95% confidence interval of the true value being between 0.84-0.97.
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 2015 calendar year was good, with all locations achieving 100% apart from CH9 and AB6, which achieved 92% (eleven months data) and AB4 and USK6 which had 83% (ten months data). In all four locations the diffusion tubes were found to be missing.

In addition MM19, MM20 and MM21 had 92% data capture as they were not installed until 4th February 2016.

Therefore all locations can be used in the analysis of 2015 nitrogen dioxide diffusion tube data, as they achieved more than 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 60µg/m^3 exceedences of the 1-hour mean objective are unlikely (Local Air Quality Management Technical Guidance, TG (09)). As the annual mean at this location was 31.6µg/m^3 in 2014 and 26.4µg/m^3 in 2015, there is confidence that the 1-hour mean objective level was not exceeded.

Use of CH2a and distance correction

CH2a, 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. Therefore CH2a is not considered a location of relevant public exposure for the annual mean objective value, and therefore has to be distance corrected in accordance with Box 2.3 of TG (09).

In 2015 the bias adjusted annual mean at the roadside monitoring location was 38.0µg/m^3, and the distance correction calculation indicated that the concentration at the nearest residential property was 30.9µg/m^3, which is the concentration used in Table 2.8 and 2.9.

The full calculation is given in TG (09) and the 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 2015:	11.13µg/m^3
Measured annual mean NO_2:	38µg/m^3
Predicted annual mean NO_2 at receptor:	30.9µg/m^3

Movement of MM4

The diffusion tube MM4 has 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 in 2014 and 2015.

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.

Co-Location study – Monmouth A40

Diffusion tubes MMF1, MMF2 and MMF3 were used for the triplicate co-location study undertaken with the Mobile Monitoring Facility (MMF) in Monmouth. This study ran from December 2014 until June 2015, therefore there was only five months of full data capture for the calendar year. This is 42% of the calendar year, but 100% of the MMF study period. These diffusion tubes were not installed for the purpose of gathering an annual mean from the location however, they were intended to provide a means of comparing the roadside automatic monitoring data with the diffusion tubes situated at relevant receptors near the MMF.

Table 2.8: Nitrogen Dioxide Diffusion Tube Annual Mean Concentrations - 2015

Site ID	Site Type	Within AQMA	Data Capture 2015 (%)	Data annualised (Y/N)	Annual mean concentration (µg/m^3) (BAF = 0.91)
CH1	Roadside	Yes	100	N	22.5
CH2a	Roadside	Yes	100	N	30.9
CH3	Roadside	Yes	100	N	29.8
CH4	Roadside	Yes	100	N	**51.4**
CH5	Roadside	Yes	100	N	25.9
CH6	Roadside	Yes	100	N	36.8
CH7	Roadside	Yes	100	N	26.9
CH8	Roadside/ urban Centre	No	100	N	28.1
CH9	Roadside	No	92	N	25.5
AQ1-3 mean	Roadside	Yes	100	N	37
MM1	Roadside	No	100	N	32.8
MM2	Intermediate	No	100	N	26.1
MM3	Kerbside	No	100	N	22.9
MM4	Kerbside/ urban centre	No	100	N	26.0
MM6	Intermediate	No	100	N	26.7
MM7	Intermediate	No	100	N	24.3
MM9	Intermediate	No	100	N	21.8
MM11	Roadside	No	100	N	26.4
MM13	Roadside	No	100	N	32.5
MM14	Suburban	No	100	N	14.2
MM15	Roadside/ urban centre	No	100	N	33.1
MM16	Roadside/ urban centre	No	100	N	30.0
MM17	Roadside/ Urban Centre	No	100	N	22.6
MM18	Roadside	No	100	N	26.7
MM19	Roadside	No	92	N	29.3
MM20	Roadside	No	92	N	24.0
MM21	Roadside	No	92	N	32.1

Site ID	Site Type	Within AQMA	Data Capture 2015 (%)	Data annualised (Y/N)	Annual mean concentration (µg/m^3) (BAF = 0.91)
MMF 1-3 mean	Roadside	No	42	N	44.2
AB1	Kerbside	No	100	N	36.1
AB2	Roadside	No	100	N	34.4
AB3	Roadside	No	100	N	26.1
AB4	Roadside	No	83	N	26.5
AB5	Roadside	No	100	N	17.2
AB6	Roadside	No	92	N	22.4
USK1	Roadside/ urban centre	No	100	N	30.1
USK2	Roadside/ urban centre	Yes	100	N	34.1
USK3	Roadside/ urban centre	Yes	100	N	32.8
USK4	Roadside/ urban centre	Yes	100	N	34.1
USK5	Roadside/ urban centre	Yes	100	N	38.2
USK6	Roadside/ urban centre	Yes	83	N	19.2

In **bold**, exceedence of the NO_2 annual mean AQS objective of 40µg/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 2015 (CH4) in the Chepstow AQMA. This is an improvement on 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 2.17 to 2.20 show the annual nitrogen dioxide trends as monitored by diffusion tubes since 2007. Table 2.6 also shows the annual BAF that has been applied for each calendar year.

These trends indicate that the generally high nitrogen dioxide concentrations experienced in 2012 at most locations in Monmouthshire were not continued in 2013 or 2014, and that concentrations again

reduced in 2015 . Apart from USK1 all locations were lower in 2013 and 2014 than 2012, and all locations apart from CH1 were lower in 2015 than 2012, 2013 and 2014.

In 2014 there was no obvious countywide trend over the 2013 concentrations, with thirteen locations decreasing, nine locations increasing, and two staying the same. However there is a reduction in all location, in 2015 apart from CH1.

Table 2.9: Results of Nitrogen Dioxide Diffusion Tubes 2007-2015

Site ID	Site Type	Within AQMA	Annual mean concentration (adjusted for bias) µg/m³								
			2007	2008	2009	2010	2011	2012	2013	2014	2015
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
CH1	Roadside	Yes	20	23.7	21.4	23.5	22.6	25.3	22.4	21.8	22.5
CH2	Roadside	Yes	28	33.0	30.0	31	30.7	32.0	30.4		
CH2a	Roadside	Yes								33.1	30.9
CH3	Roadside	Yes	27	30.7	27	28.7	32.8	35.5	32.7	32.5	29.8
CH4	Roadside	Yes	**49**	**57.2**	**53.9**	**51.5**	**60.1**	**60.3**	**56.0**	**57.7**	**51.4**
CH5	Roadside	Yes	29	31.8	30.2	30.3	30.4	33.2	28.4	26.1	25.9
CH6	Roadside	Yes	37	**40.9**	36	39.2	**40.7**	**42.6**	**41.7**	**40.0**	36.8
CH7	Roadside	Yes	29	31.5	30.2	31.5	30.4	33.7	30.6	28.4	26.9
CH8	Roadside/ urban Centre	No	28[b]	33.1	32	32.5	32.9	35.5	31.1	31.8	28.1
CH9	Roadside	No	25	29.4	27.9	28.7	30.5	30.7	28.1	27.8	25.5
MM1	Roadside	No	39	38.5	37.3	36.6	36.9	39.0	34.1	34.9	32.8
MM2	Intermediate	No	31	31.7	30.1	31.3	31.7	30.2	29.9	30.0	26.1
MM3	Kerbside	No	30	27.8	27.6	30	29.8	27.7	26.3	26.3	22.9
MM4	Kerbside/ urban centre	No	38[b]	37.1	34.6	36.1	34.9	36.7	35.7	29.8	26.0
MM5	Roadside	No								26.0	
MM6	Intermediate	No								31.6	26.7
MM7	Intermediate	No								27.4	24.3

[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) µg/m³								
			2007	2008	2009	2010	2011	2012	2013	2014	2015
MM9	Intermediate	No								24.7	21.8
MM11	Roadside	No								31.6	26.4
MM13	Roadside	No								34.7	32.5
MM14	Suburban	No								14.9	14.2
MM15	Roadside/ urban centre	No								35.2	33.1
MM16	Roadside/ urban centre	No								32.9	30.0
MM17	Roadside/ urban centre	No								24.7	22.6
MM18	Roadside	No									26.7
MM19	Roadside	No									29.3
MM20	Roadside	No									24.0
MM21	Roadside	No									32.1
AB1	Kerbside	No	34[b]	36.5	36	38.6	39.4	**41.4**	37.5	39.3	36.1
AB2	Roadside	No						**43.9**	36.7	39.1	34.4
AB3	Roadside	No						36.8	30.0	29.0	26.1
AB4	Roadside	No							27.6	27.8	26.5
AB5	Roadside	No							21.4	19.8	17.2
AB6	Roadside	No							24.3	23.8	22.4
USK1	Roadside/ urban centre	No	33[b]	32.8	31.1	34.9	32.9	33.0	33.5	34.3	30.1
USK2	Roadside/ urban centre	Yes	37	37.2	34.4	**40.9**	37.0	38.3	37.2	37.3	34.1
USK3	Roadside/ urban centre	Yes	**40**	38.9	35.3	**40.6**	39.7	**41.9**	**40.3**	37.6	32.8
USK4	Roadside/ urban centre	Yes	39	39.0	35.4	**41.7**	**40.7**	**43.5**	**42.0**	**40.4**	34.1
USK5	Roadside/ urban centre	Yes	**49**	**45.6**	**41.9**	**45**	39.7	**44.6**	**43.1**	**40.9**	38.2

Site ID	Site Type	Within AQMA	Annual mean concentration (adjusted for bias) µg/m^3								
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
USK6	Roadside/ urban centre	Yes	24	21.6	20.9	25.6	20.7	22.6	22.2	20.6	19.2

In **bold**, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3
Underlined, highest recorded concentration at location
Red – Increase over proceeding year
Blue – decrease over proceeding year

Figure 2.17 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2015 - Monmouthshire

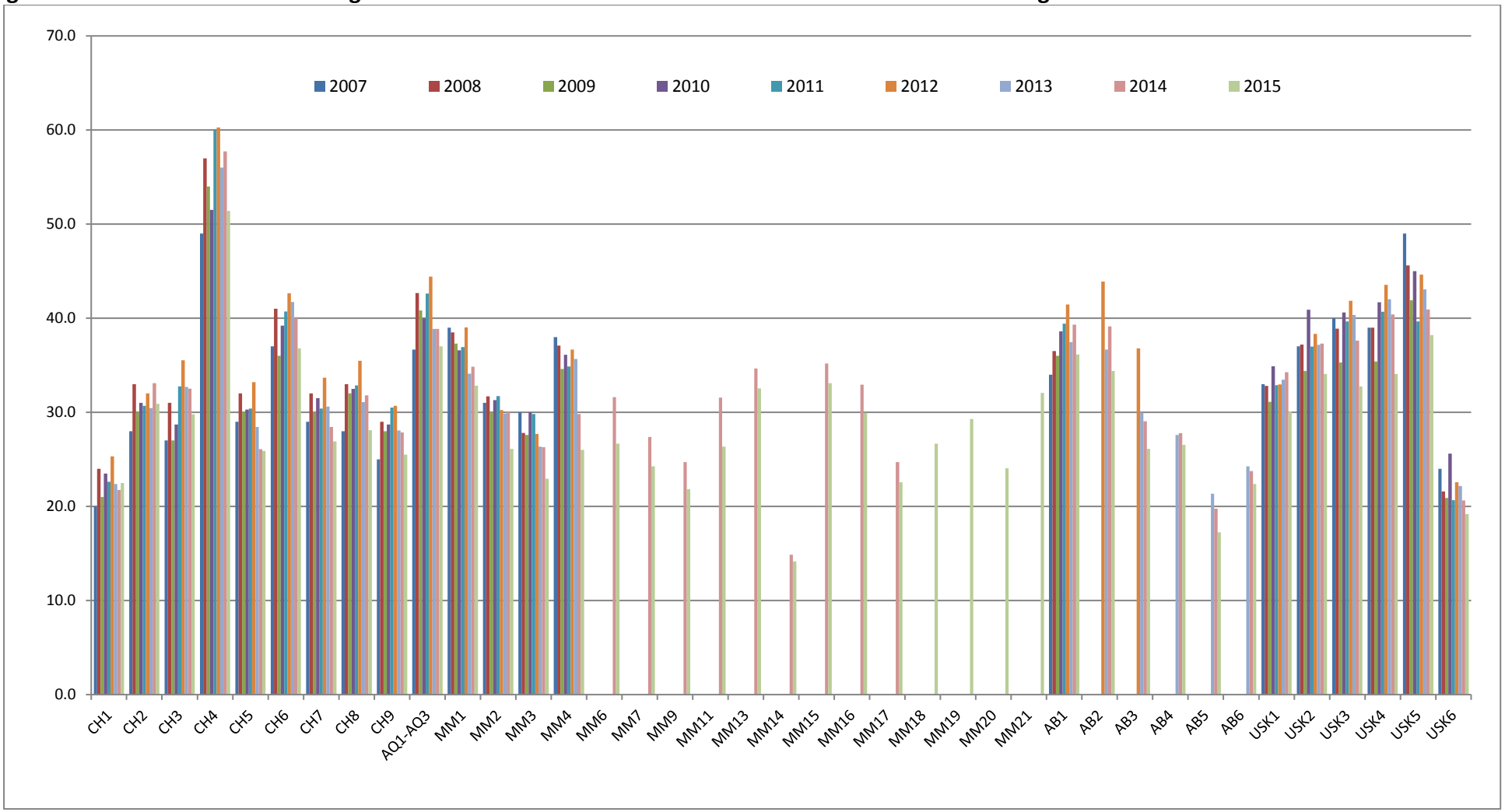


Figure 2.18 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2015 - Chepstow

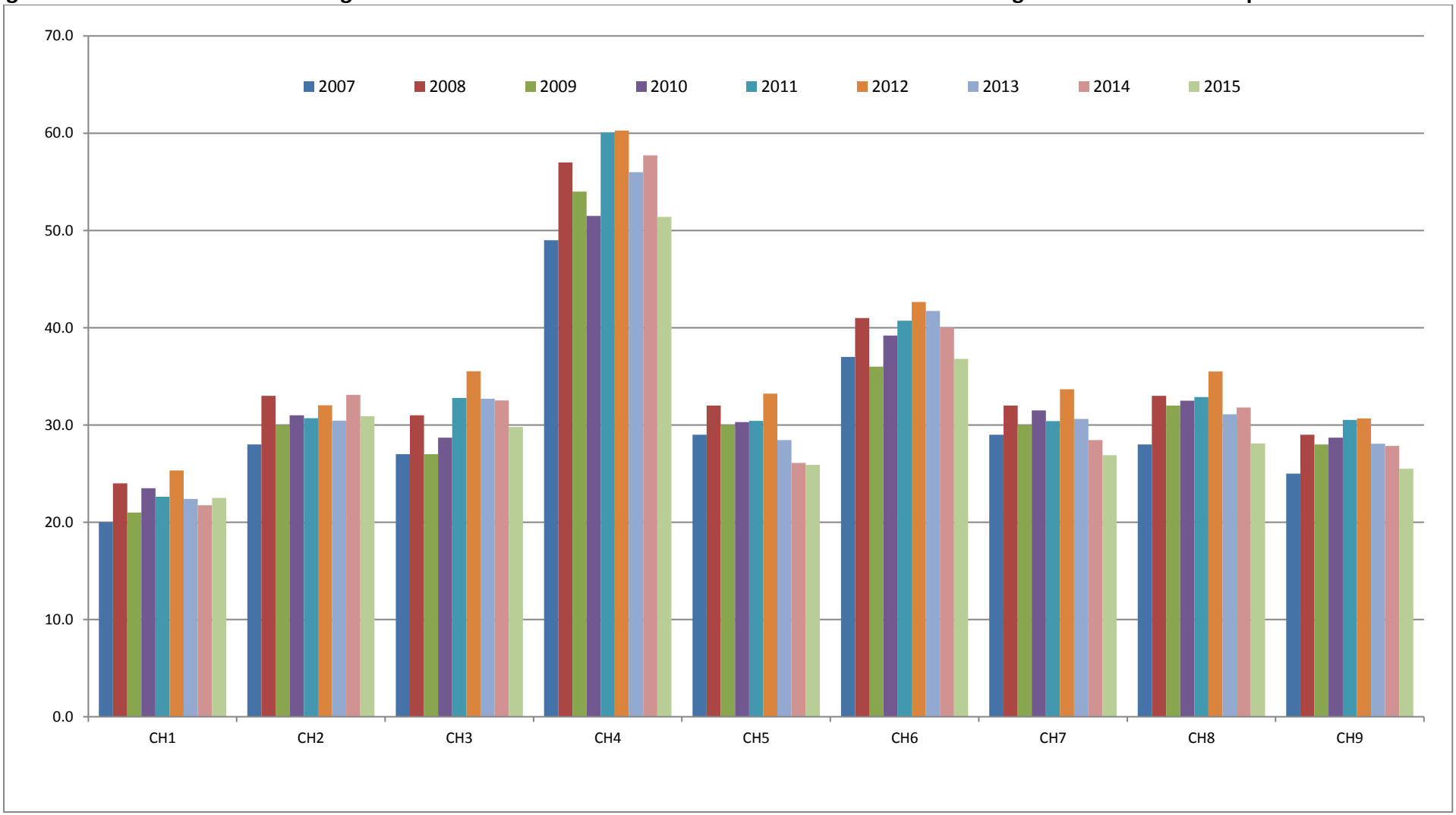


Figure 2.19 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2015 - Monmouth

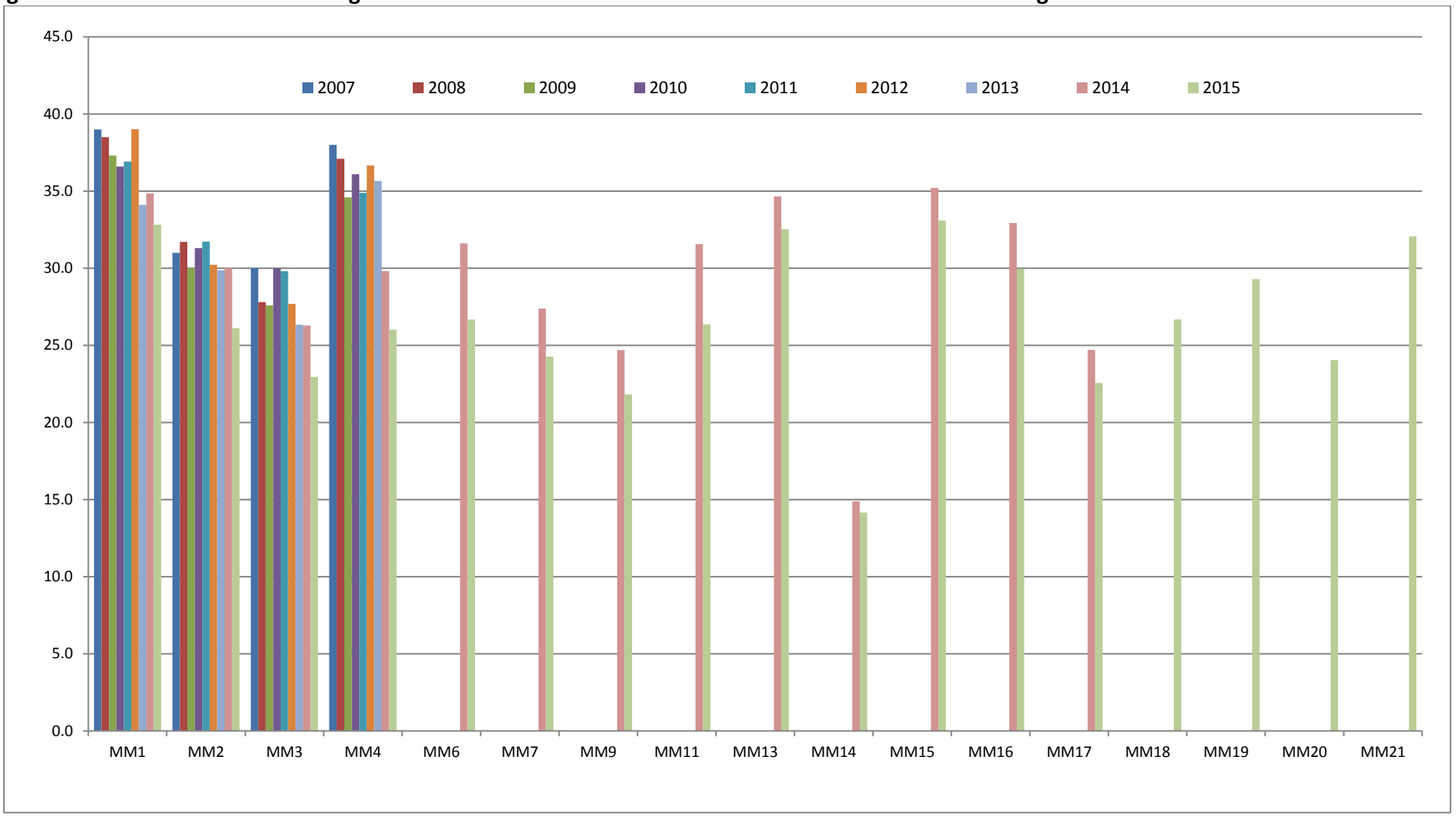


Figure 2.20 Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites 2007-2015 – Abergavenny & Usk

2.2.3.1 Nitrogen Dioxide Monitoring Summary

Chepstow Air Quality Management Area

In Chepstow, concentrations at six locations were lower in 2014 than 2013, two locations were higher, one was the same and one was a new location. However nine of the ten locations were lower in 2015 than 2014, with only CH1 increasing by 0.7µg/m^3 up to 22.5µg/m^3 (Figures 2.18, 2.21 and table 2.9).

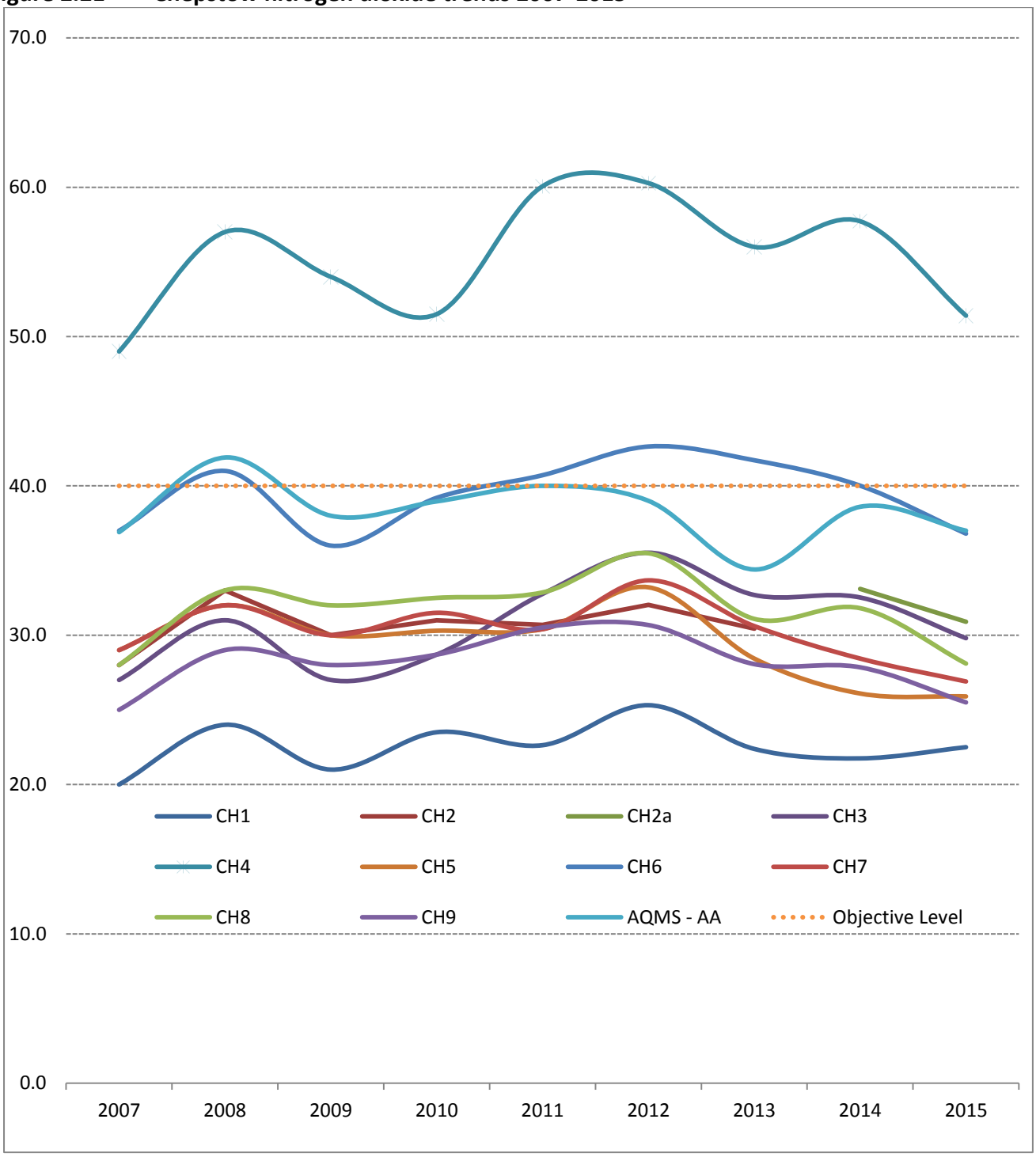
Whilst there were no exceedence of the nitrogen dioxide objective level at the automatic analyser located in the Air Quality Monitoring Station (AQMS) on Hardwick Hill, results of the diffusion tube study show that there was one exceedence of the annual air quality objective within the Chepstow Air Quality Management Area (AQMA) at location CH4. However CH4 concentrations were lower than any other year apart from 2007.

At monitoring location CH4, there had been an increase of 11.3µg/m^3 by 2012, compared to 2007, however by 2014 this had reduced to an 8.7µg/m3 increase. In 2015 there was a reduction of 8.9µg/m^3 compared with the highest recorded levels in 2012, and current concentrations are now 2.4µg/m^3 higher than they were in 2007.

CH6 did not exceed the objective level in 2015, 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 nine years, CH6 has exceeded in five out of nine years, and the automatic analyser at the AQMS has exceeded twice (see table 2.3).

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. 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.

Figure 2.21 Chepstow nitrogen dioxide trends 2007-2015



Traffic counts are undertaken at two points of the A48, west of the AQMA on Mount Pleasant, and on the eastern 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 and 2015 both eastbound (leaving the AQMA) and westbound (entering the AQMA) as below:-

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

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

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

The Mount Pleasant count shows an increase in traffic in 2015 over 2014 in both directions, whilst the Hardwick Hill Count is roughly similar to 2014 in both directions, but increased by more than 1000 AADT over the 2012 count.

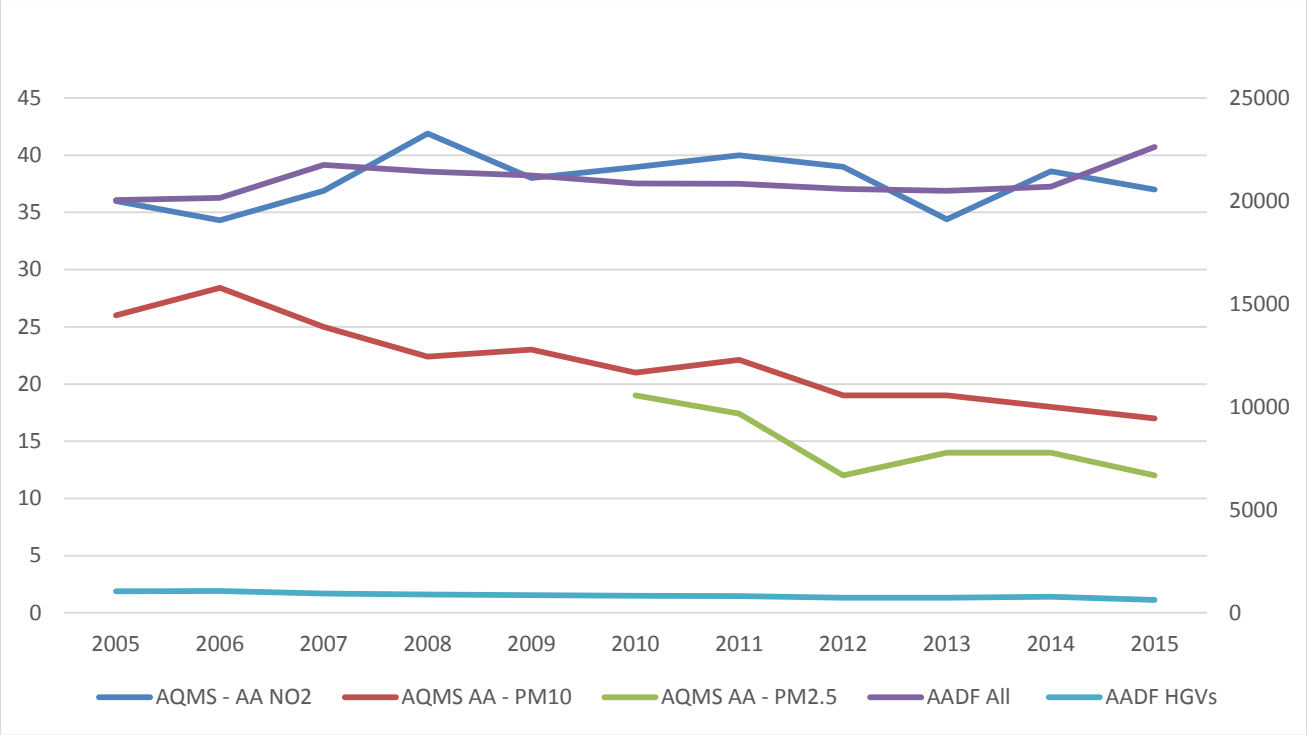
The Annual Average Daily Flow (AADF) (the number of vehicles that will drive on that stretch of road on an average day of the year) data is also available from:-

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 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 PM_{10}, $PM_{2.5}$ 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 PM2.5 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.



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 2.20 and 2.22, concentrations in Usk decreased at four locations in 2014 compared to 2013, with USK1 and USK 2 increasing, and all locations decreased in 2015. As a result, of the three locations that regularly exceed the objective level (USK3, 4 and 5), only USK4 (40.4µg/m^3) and USK5 (40.9.µg/m^3) exceeded in 2014, and, for the first time since monitoring began, no locations exceeded in 2015. All monitoring locations recorded concentrations lower in 2015 than in any other year.

When considering all location in general, Figure 2.22 indicates that concentrations decreased in the between 2007 and 2009, but increased to levels greater than 2007's in 2010, before decreasing again in 2011. There was a further increase in 2012, but in the three years since concentrations steadily decreased to their present lowest point.

In 2014 until August 2015 an improved CCTV camera was installed on Usk Bridge, which allowed vehicle counts and helped enforcement of the Lorry Watch Scheme.

In 2014 the total vehicles counted passing through the Usk AQMA was 1,602,696 (763,407 westbound and 839,189 eastbound).

Between 1st January 2015 and 31st August 2015 the total number of vehicles was 2,240,773 (1,113,119 westbound and 1,127,654 eastbound). If the monthly average of the eight months (139,140) is multiplied by twelve the estimated annual traffic count in 2015 was 3,361,160 (1,669,679 westbound and (1,691,481 eastbound).
Therefore the data shows that there was an increase in total vehicles in the Usk AQMA of 1,758,564 in 2015 compared to 2014 (more than double). This is probably due to an error in the equipment, as there is DFT data for available for two stretches of the A472 (of which Bridge Street is a part).

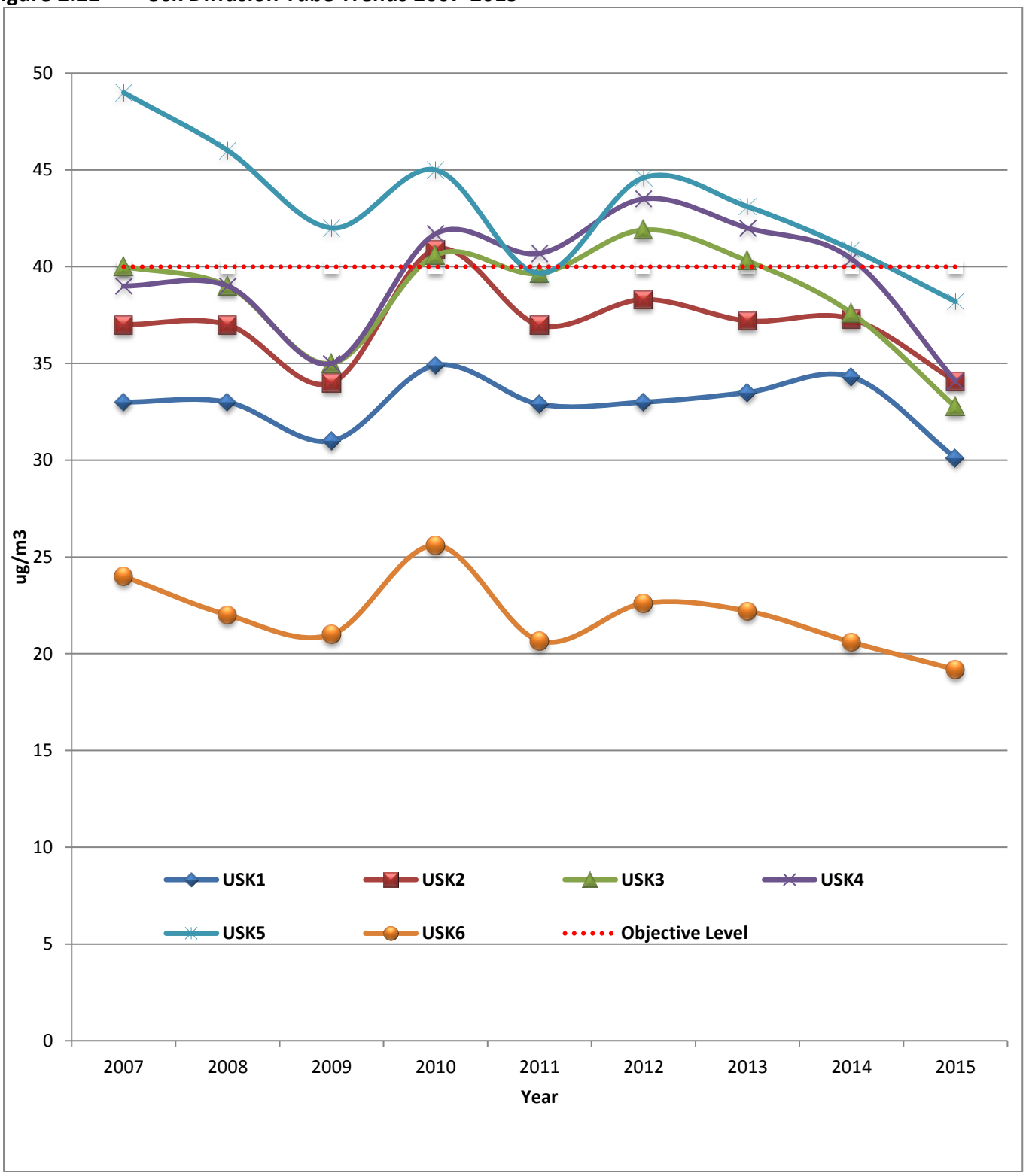
The A4042 to B4598 section (Little Mill to the middle of Bridge Street) shows an AADF in 2014 of 6623 and 6914 for 2015, which is approximately 300 more vehicles a day. Over 365 days this would equal 2,417,395 in 2014 and 2,523610 in 2015, an increase of 106,215.

The B4598 to A449 section recorded AADF in 2014 of 7670, and 7992 in 2015, which again is approximately 300 more vehicles a day in 2015. This would equal 2,807,220 vehicles in 2014 and 2,917,080 in 2015, an increase of 109,860.

On the A4042 to B4598 section HGV's increase from 134 AADF in 2014 to 141 in 2015, but HGV's have been higher in previous years (2001-2004 and 2007-2010) with 2002 recording the highest count at 259 AADF.

The B4598 to A449 section also recorded an HGV increase in 2015 over 2014 from 180 to 190, however HGV's were higher in every year from 2000 until 2012 (217-307), when they dropped to 179 in 2013, increased to 180 in 2014 and again increased to 190 in 2015.

Figure 2.22 Usk Diffusion Tube Trends 2007-2015



Abergavenny

The exceedence noted at AB2 in 2012 (which was based on seven months monitoring and then annualised with a calculation) of 44µg/m^3 dropped to 36.7µg/m^3 in 2013, but increased to 39.1µg/m^3 in 2014, but deceased to its lowest concentration in 2015.

Nitrogen Dioxide concentrations on Merthyr Road (A4143) at location AB1 had been increasing year on year from 34µg/m^3 in 2007 at to a peak concentration in 2012 of 41.4µg/m^3, (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 37.5µg/m^3 before increasing to 39.3µg/m^3 in 2014 and decreasing again in 2015 back to 2008/9 levels of 36.1 µg/m^3.

One of the two additional monitoring locations introduced in 2012 (AB2), exceeded the objective level in 2012 and was higher than AB1. However this was the annualised concentration (which was based on seven months data); however the for the first full year of monitoring in 2013 it was below the objective level at 36.7µg/m^3 and slightly lower than AB1. However in 2014 the concentration increased to 39.1µg/m^3, but again decreased in 2015 to 34.4µg/m^3.

AB3 (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. , 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 superstore roundabout and bridge) however monitoring will continue at the six locations in 2016, 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 2.19, there were no nitrogen dioxide concentrations exceedences in 2015 and all locations were lower than in earlier years.

In 2012, MM1 at Wyebridge Street, Monmouth increased from what appeared to be a relatively stable 36-37µg/m^3 (below the level it had been in 2005 when a Detailed Assessment concluded there was no risk of exceedence), to 39µg/m^3. It was decided to await a further year of data before progressing to a Detailed Assessment. The 2013 concentration for this location of 34.1µg/m^3 indicates 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.

An additional four monitoring locations were installed in 2015, one to compare with the MMF automatic analyser on Wyebridge Street, and three to monitor the Priory Street junction as an air quality impact assessment had modelled the area as being over the objective level.

2.2.4 Sulphur Dioxide (SO_2)

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 and the full report can be read on Monmouthshire County Councils website –

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

No other monitoring of sulphur dioxide was undertaken by Monmouthshire County Council in 2015.

2.2.5 Benzene

No monitoring of benzene was undertaken by Monmouthshire County Council in 2015.

2.2.6 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 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.

2.2.7 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 2016.

There is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

3.1.1 Narrow Congested Streets

The criteria for assessing narrow congested streets are set out in Box 5.3, section A.1 of TG (09). The AQMA in Usk is a narrow congested street, which was assessed in detail in previous rounds of review and assessment. In January 2012 three diffusion tube sites were installed in Raglan High Street as houses are located close to the road and the road gets congested due to vehicle parking on both sides; however twelve months diffusion tube monitoring at three locations identified that the nitrogen dioxide objective level was not in danger of being exceeded.

There are no other locations that have not been considered previously.

Monmouthshire County Council confirms that there are no new/newly identified narrow congested streets that have not been previously considered.

3.1.2 Busy Streets where people may spend one hour or more close to traffic

The criteria for assessing busy streets relevant for the hourly nitrogen dioxide objective are set out in Box 5.3; section A.2 of TG (09). Busy streets where people may spend 1-hour or more close to traffic were considered in the previous Updating and Screening Assessment. One of the diffusion tube sites within the Chepstow AQMA had an annual mean concentration over 60 µg/m^3 in 2011 and 2012, and therefore indicative of an exceedence of the 1 hour nitrogen dioxide objective level. However the nature of this road, being a busy trunk road, is such that people would not spend one hour or more close to traffic, and therefore would not be considered relevant exposure to the 1 hour objective. As such an amendment of the AQMA was not considered necessary. A children's playground, school playground and allotment close to the A40 in Monmouth were identified in 2013 and were been monitored in 2014, however they are not currently at risk of exceedence on the 1-hour nitrogen dioxide objective level (based on annual mean concentrations well below 60µg/m^3). The allotment monitor has been removed, however the playground monitor remains in place in 2015 and 2016.

There are no other new or newly identified busy streets which may be at risk of exceeding the hourly objective.

Monmouthshire County Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.1.3 Roads with a High Flow of Buses and/or HGVs.

The criteria for assessing roads with high flows of buses and/ or HGVs are set out in Box 5.3, section A.3 of TG (09). Roads with a high flow of buses and/or HGVs were considered in previous Updating and Screening Assessments and no such locations identified. Residents of Hardwick Hill and Usk complain of high levels of HGVs and although these locations do not meet the criteria in TG (09), both are declared AQMAs and source apportionment work undertaken at each location has shown a significant proportion of emissions from HGVs.

Monmouthshire County Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.1.4 Junctions

The criteria for assessing junctions are set out in Box 5.3, section A4 of TG (09). Junctions were considered in detail in previous Updating and Screening Assessments and where relevant have been included in Detailed Assessments and subsequent AQMA declarations. Previous monitoring in Monmouth did not identify an exceedence of nitrogen dioxide concentrations at Monk Street/Priory Street in Monmouth, and monitoring locations were therefore removed. However modelling data has indicated a potential exceedence in this area, and therefore diffusion tube monitoring at three locations on this junction was undertaken in 2015, however the nitrogen dioxide objective level was not exceeded. Monitoring will continue in 2016 however.

Monmouthshire County Council confirms that there is a no /newly identified busy junctions/busy roads, however a previously assessed junction is continuing to be re-assessed following the findings of modelling.

3.1.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

The criteria for assessing new roads are set out in Box 5.3, section A.5 of TG (09) and are unchanged from previous rounds of Review and Assessment. There have been no new roads identified within Monmouthshire.

Monmouthshire County Council confirms that there are no new/proposed roads.

3.1.6 Roads with Significantly Changed Traffic Flows

The criteria for assessing roads with significantly changed traffic flows are set out in Box 5.3, section A.6 of TG (09). There are no roads with an increased traffic flow of 25% on roads with more than 10,000 vpd.

Monmouthshire County Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.1.7 Bus and Coach Stations

The criteria for assessing roads with significantly changed traffic flows are set out in Box 5.3, section A.7 of TG (09). Bus and coach stations were considered in previous Updating and Screening Assessments and no such locations identified.

Monmouthshire County Council confirms that there are no relevant bus stations in the Local Authority area.

3.2 Other Transport Sources

3.2.1 Airports

The criteria for assessing airports are set out in Box 5.4, section B.1 of TG (09). Airports were considered in previous Updating and Screening Assessments and no such locations identified.

Monmouthshire County Council confirms that there are no airports in the Local Authority area.

3.2.2 Railways (Diesel and Steam Trains)

Stationary Trains

The criteria for assessing stationary locomotives are set out in Box 5.4, section B.2 of TG (09) (Approach 1). There are no locations in Monmouthshire where trains are stationary for 15 minutes or more, more than three times a day.

Monmouthshire County Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

Moving Trains

The criteria for assessing moving locomotives are set out in Box 5.4, section B.2 of TG(09) (Approach 2). The Paddington to Swansea rail line listed in Table 5.1 of the Technical Guidance LAQM.TG(09) passes through Monmouthshire, however Monmouthshire County Council is not in the list of authorities with annual mean nitrogen dioxide backgrounds above 25µg/m^3 as set out on the Review and Assessment Helpdesk website and therefore this line does not need to be considered.

Monmouthshire County Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

3.2.3 Ports (Shipping)

The criteria for assessing ports are set out in Box 5.4, section B3 of TG(09) and are unchanged from previous rounds of Review and Assessment. There is no shipping activity in Monmouthshire.

> Monmouthshire County Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

3.3 Industrial Sources

3.3.1 Industrial Installations

New or Proposed Installations for which an Air Quality Assessment has been Carried Out

The criteria for assessing industrial installations are set out in Box 5.5, section C.1 of TG(09). There are no new or proposed industrial installations within Monmouthshire since the last Updating and Screening Assessment.

> Monmouthshire County Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been introduced

None of the industrial installations identified in previous Updating and Screening Assessments have substantially increased emissions and no new exposure has been introduced nearby.

> Monmouthshire County Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

New or Significantly Changed Installations with No Previous Air Quality Assessment

The criteria for assessing industrial installations are set out in Box 5.5, section C.1 of TG(09). There are no new or significantly changed industrial installations within Monmouthshire since the last Updating and Screening Assessment.

Monmouthshire County Council confirms that there are no new or significantly changed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

3.3.2 Major Fuel (Petrol) Storage Depots

The criteria for assessing major fuel (petrol) storage depots are set out in Box 5.5, section C.2 of TG(09). Major petrol storage depots were considered in the previous Updating and Screening Assessments and no such locations identified.

There are no major fuel (petrol) storage depots within the Local Authority area.

3.3.3 Petrol Stations

The criteria for assessing petrol stations are set out in Box 5.5, section C.3 of TG(09). There are no petrol stations within Monmouthshire that fulfil the criteria.

Monmouthshire County Council confirms that there are no petrol stations meeting the specified criteria.

3.3.4 Poultry Farms

The criteria for assessing poultry farms are set out in Box 5.5, section C.4 of TG(09). No farms exceeding the relevant criteria (turkey units with greater than 100,000 birds, naturally ventilated units with greater than 200,000 birds or mechanically ventilated units with greater than 400,000) have been identified.

Monmouthshire County Council confirms that there are no poultry farms meeting the specified criteria.

3.4 Commercial and Domestic Sources

3.4.1 Biomass Combustion – Individual Installations

The criteria for assessing biomass combustion (individual installations) are set out in Box 5.8, section D.1 of TG(09). Monmouthshire County Council has not identified any biomass boilers between 50kW and 20MW.

Monmouthshire County Council confirms that there is no biomass combustion plant in the Local Authority area.

3.4.2 Biomass Combustion – Combined Impacts

The criteria for assessing biomass combustion (combined impacts) are set out in Box 5.8, section D.2 of TG(09). The likelihood of areas of combined biomass combustion exceeding the criteria is considered highly unlikely.

Monmouthshire County Council confirms that there is no biomass combustion plant in the Local Authority area.

3.4.3 Domestic Solid-Fuel Burning

The criteria for assessing domestic solid-fuel burning are set out in Box 5.8, section D.2 of TG(09) Monmouthshire County Council has not identified any areas where significant coal burning takes place.

Monmouthshire County Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

3.4.4 Combined Heat and Power (CHP) plant

There is an application in process for a natural gas CHP plant in Monmouth. This is being considered through the planning process and air quality impacts have been considered. The assessments have identified that there will be no breach of objective levels.

Monmouthshire County Council confirms that a CHP plant in the application process is being considered, but air quality impacts are being considered.

3.5 New Developments with Fugitive or Uncontrolled Sources

3.5.1 Fugitive or Uncontrolled Sources

The criteria for assessing fugitive or uncontrolled sources are set out in Box 5.10, section E.1 of TG(09).

There are no new Landfill, Quarries, Unmade haulage roads on industrial sites, Waste transfer stations, or other potential sources of fugitive particulate matter emissions.

Monmouthshire County Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

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 Planning Applications

In 2010, 150 houses were built on Merthyr Road in Abergavenny between 200m-250m south of the locations that are near the nitrogen dioxide objective level, and there are a further 83 properties being built on an adjacent site. In Figure 2.8 the monitoring location AB4 is next to the 2010 development.

There is also a further development sites for 65 properties currently being built in Llanfoist approximately 0.5 km south.

Air Quality Impact Assessments were not undertaken as part of the planning process.

Therefore, as the bridge where AB1 and AB2 are located south of, is currently the only nearby vehicle bridge over the River Usk and into Abergavenny, it is possible that nitrogen dioxide levels will continue to increase.

A Section 106 agreement has been proposed for the 83 house development to build a new footbridge over the River Usk, into Abergavenny, which might help mitigate increases in vehicle emissions.

Redevelopment of the Fairfield Mabey/Mabey Bridge factor site just south of the Chepstow Air Quality Management Area is in the Local Development Plan for 400 houses and retail. This will impact traffic emissions on Hardwick Hill, although Section 106 funding would be sort to help mitigate this. Currently it is planned to use this money to reduce queuing at the Hardwick Roundabout leading out of the AQMA.

5 Implementation of Action Plans

5.1 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 with members 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

Meeting have been held on 21/3/13, 12/9/13, 20/11/13, 26/3/14, 22/10/14, 16/09/15 and 19/05/16. A meeting was cancelled on 25/6/14 whilst the group awaited a report undertaken for Welsh Government for potential air quality improvements for the A48 and a meeting planned for 28/1/15 was postponed whilst the group awaited Detailed Design Reports from Welsh Government for air quality improvements to the A48 for the Bulwark Road junction and High Beech Roundabout.

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.

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.

Throughout the summer months the Chepstow Town centre is closed to vehicles one Saturday each month to enable festivals and other activities to be held. This would in turn encourage local residents to walk into and around the town rather than driving.

The redesign of High Beech Roundabout is still in the design stage as part of the Fairfield Mabey redevelopment. The most likely solution at present will involve the use of traffic signals such as a

MOVA system. The purpose will be to reduce queuing times at the roundabout at the top of Hardwick Hill, as at peak travel times this causes congestion back to the monitoring location CH4, which has the highest concentrations of nitrogen dioxide.

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 approached 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

Further information is given in Table 5.1

5.2 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 has 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 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
- Newport City Council Environmental Health.
- Gwent Police

To date there have been nine meeting held on 13/11/12, 10/06/13, 4/12/13, 8/5/14, 11/9/14, 3/12/14, 11/3/15, 22/4/15, 20/5/15, 9/7/15, 15/10/15, 18/2/16. 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 representative agreed to 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 suggestion was made to make the smaller car parks that are closer to Bridge Street time limited, to prevent commuters and car sharers using them to park all day, and free up space for shopper who would otherwise park outside the shops. The larger car parks would remain unrestricted.

A Lorry Watch scheme to enforce the weight restriction RTO on Bridge Street has been in place for three 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. Gwent Police have agreed to enforce the current RTO, but the Town Council have requested that they not do this as local businesses on a nearby industrial site would be adversely effected.
As a result a proposal is currently in motion to introduce a time restricted RTO, where HGV’s would not be able to use bridge Street at peak traffic times in the morning and evening.

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

In addition, signage has been improved to deter HGVs from traveling through Usk unless necessary.

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	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).
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, 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	Improvements made to the carpark to enable	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
					from racecourse complete	additional parking and room for busses		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 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	No specific progress	Included in 2013 public consultation however Welsh	n/a	n/a

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
						Government considered it in Detail Design stage in 2015/16 and will not progress at this time		
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 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, but no progress	n/a	n/a	n/a

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
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 street parking. M.C.C to look into improving car park signage and time limiting	Chamber of Commerce re-established and members of Steering Group. Chamber of Commerce actively engaging with businesses (letters and emails and meetings) to promote non-roadside deliveries	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
					parking in smaller carparks Delivery time Strategy not being progressed due to no Chamber of Commerce	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. Traffic Order for Usk currently being tightened up (consulting on consolidated order). Signage improved (sat nav	Lorry Watch Scheme continuing. Consideration of total HGV ban at peak hours in morning and afternoon. This is actively being progressed by MCC Highways section.	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	Implement ation Phase	Indicator	Progress to date	Progress in the last 12 months	Estimated Completion Date	Comments relating to emissions reductions
					signs and CCTV signs)			
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 developme nt 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	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	On-going	Could potentially provide reductions in emissions at

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
	community and school traffic plan					School and is proactively engaging with the School to encourage improve parking arrangements and to encourage walking on behalf of the Group.		locations close to schools, or at congestion hotspots.
1.	Encourage more cycling: implement hierarchy of urban and inter-urban cycle routes	MCC	On-going	Numbers of cyclists	None specifically in Usk	n/a	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	None specifically in Usk	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.
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.

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
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.	Trail due to be undertaken in 2016	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

6 Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

This Progress Report identified that exceedences of nitrogen dioxide annual mean objective level on Hardwick Hill, Chepstow which is one of the two declared AQMAs. There were no exceedences of PM_{10} or $PM_{2.5}$ in Chepstow, or Monmouth (based on a limited study, and no exceedence of nitrogen dioxide in the Usk AQMA, Monmouth or Abergavenny.

Monitoring location AB1, Merthyr Rd (A4143), Abergavenny had a concentration in 2011 of 39.4 $\mu g/m^3$, and 42.8$\mu g/m^3$ in 2012, however only 37.5$\mu g/m^3$ in 2013 but increased to 39.3$\mu g/m^3$ in 2014. Concentrations at monitoring location AB1 (Merthyr Road Abergavenny) had been gradually increasing since 2007 with a sharp increase between 2010 and 2012. There was a 150 house residential development built in 2010 and there is a further 83 house development and 65 house development being built therefore it is possible the increase in traffic in the area will increase nitrogen dioxide emissions further. However concentrations of nitrogen dioxide did decrease to the lowest level since 2007 in 2015.

As a result of the year on year increases at this location further diffusion tubes were installed in 2012 and 2013 at worst case relevant locations, to support a potential future Detailed Assessment. As levels did not exceed in 2013 and 2014 and decreased in 2015 a Detailed Assessment is not proposed at this time, however the extended monitoring will continue.

This site is likely to be influence in 2016 by the National Eisteddfod in July and August 2016.

In 2012 there was a near exceedence of the nitrogen dioxide annual mean concentration at one location in Monmouth which, based on historic trends, was unusually high. Additional monitoring was undertaken along the A40 in support of a potential Detailed Assessment, however the concentrations in 2013 were below the objective level and thus a Detailed Assessment was not necessary. The nine additional tubes were evaluated in July 2014 after six months of data had been collected and that determined that a Detailed Assessment would not be necessary, this was confirmed following analysis of the full twelve month data. The July 2014 assessment, did identify potential exceedences (based on modelling) at the Monk Street/Priory Street Junction, therefore

three further monitoring locations were established in 2015. All location in Monmouth were below their respective objective levels in 2015, including the Monk Street/Priory Street junction, however monitoring will continue in 2016.

6.2 Conclusions from Assessment of Sources

Two further residential developments on Merthyr Road, Abergavenny have the potential to increase emissions. Extended monitoring on Merthyr Road will continue.

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.

6.3 Other Conclusions

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

6.4 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 Progress Report will be completed in 2017.

7 References

Defra (2009) *Review & Assessment: Technical Guidance LAQM.TG(09)*, Defra.

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

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Monmouthshire County Council (2005b) *Progress Report*.

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Monmouthshire County Council (2008b) *Progress Report*.

Monmouthshire County Council (2009) *Updating and Screening Assessment*.

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Monmouthshire County Council (2013) Progress Report

Monmouthshire County Council (2014) Progress Report

Monmouthshire County Council (2015) Updating and Screening Assessment

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

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 all 12 months.

The calculations are shown in Table A1

Table A1: Local Bias Adjustment Factor

Triplicate Diffusion Tube mean	40.7
Automatic Monitor	37
Bias Adjustment Factor	0.91
With 95% confidence interval	0.84-0.97

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 tubes, is 0.91, given in the March 2016 spreadsheet, and based on 29 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 and the local bias adjustment factors were both 0.91.

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 NOx 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 2015, as reported in the linked document :-

http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-1-12-(April-2014-February-2016)-NO2-report.pdf

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 2015 were:-

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
0.14	0.13	0.20	0.07	0.11	0.11	0.09	0.12	0.11	0.16	0.13	0.13

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 2015.

All tubes that were intended to be exposed for a calendar year (i.e. not the MMF tunes used in the MMF co-location) had data capture of greater than 75% and therefore Annualisation is not required.

Appendix B: Monthly Nitrogen Dioxide Diffusion Tube Data for 2015

Table A2: Monthly diffusion tube nitrogen dioxide monitoring results (2015)

		Gradko - 20% TEA in Water														Final Average	Triplicate Avg	% Data Capture
Location	Gradko	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	BAF			
38 Larkfield Prk Chepstow	CH1	29.36	26.28	25.35	23.44	20.64	29.57	21.98	20.98	21.92	25.48	28.67	23.60	24.8	0.91	22.5		100
Lampost No. WH70, Newport Road, Chepstow	CH2a	41.20	40.72	39.15	44.74	40.87	46.11	35.89	39.42	41.70	45.66	45.06	40.99	41.8	0.91	38.0	**30.9**	100
36 Wayside - Hardwick Hill Chepstow	CH3	39.05	33.98	34.00	30.62	33.43	31.28	34.93	31.68	30.24	28.44	28.72	36.93	32.8	0.91	29.8		100
2 Hardwick Hill - Chepstow	CH4	58.77	59.23	50.02	52.05	60.08	57.90	66.53	51.30	57.24	48.55	50.88	65.60	56.5	0.91	51.4		100
1 Ashfield House - Mount Pleasant	CH5	35.85	31.88	27.54	21.24	27.89	24.12	26.68	27.40	28.49	28.80	33.64	27.77	28.4	0.91	25.9		100
Hill House -Mount Pleasant Chepstow	CH6	45.90	43.54	44.45	38.23	40.54	35.88	36.36	34.78	38.11	42.43	38.86	46.19	40.4	0.91	36.8		100
2 Hardwick Terrace - Chepstow	CH7	28.40	38.48	32.58	31.88	26.60	25.57	24.15	27.79	27.03	31.35	29.55	31.81	29.6	0.91	26.9		100
Lamp post - Moor Street Chepstow	CH8	34.75	33.19	32.83	33.49	28.02	27.70	27.16	28.34	29.49	30.95	30.82	33.49	30.9	0.91	28.1		100
Restway Wall - Garden City Way	CH9	30.63	30.29	28.33	29.00	26.40	26.93	28.51	27.91	21.02	M	29.23	29.67	28.0	0.91	25.5		92
AQMS - Hardwick Hill Chepstow 1	AQ1	51.41	51.80	41.70	36.39	37.97	39.19	41.52	35.75	38.19	38.59	35.82	41.49	40.8	0.91	37.1	37.0	100
AQMS - Hardwick Hill Chepstow 2	AQ2	47.22	43.00	39.91	38.98	41.10	38.21	42.16	36.21	39.57	38.92	46.32	38.62	40.9	0.91	37.2		100
AQMS - Hardwick Hill Chepstow 3	AQ3	45.64	39.95	47.73	37.20	42.02	37.67	39.44	37.90	40.83	38.90	38.57	38.50	40.4	0.91	36.7		100
School House - Wyebridge St Monmouth	MM1	35.41	41.21	31.08	36.02	30.55	32.49	34.43	37.34	35.65	37.81	42.00	38.84	36.1	0.91	32.8		100
Flat 1 - Granville St Monmouth	MM2	28.76	30.51	26.29	29.61	26.06	25.74	25.21	30.91	29.40	34.10	30.09	27.58	28.7	0.91	26.1		100
Lamppost ME 145 - 21 St James Sq Monmouth	MM3	30.02	28.38	25.78	23.73	21.30	21.21	21.19	24.26	27.58	28.43	24.27	26.39	25.2	0.91	22.9		100
12A Monnow Street on St Johns Street, Monmouth	MM4	38.01	29.33	30.43	27.58	26.87	26.38	28.41	27.53	29.20	29.85	28.22	21.22	28.6	0.91	26.0		100
Millhouse, Granville Street, Monmouth	MM6	30.93	30.77	27.40	29.54	27.52	23.76	26.92	31.86	29.84	31.23	30.36	31.54	29.3	0.91	26.7		100

Arka, Old Dixton Road, Monmouth	MM7	26.58	29.27	26.74	26.41	23.58	20.92	24.92	28.41	27.35	27.81	28.40	29.59	26.7	0.91	24.3		100
1, The Shrubbery, Old Dixton Road, Monmouth	MM9	24.23	27.50	23.75	21.14	19.12	21.28	23.22	23.58	27.16	26.82	26.53	23.50	24.0	0.91	21.8		100
Fence of Boys School Playground	MM11	26.69	24.02	32.40	38.39	25.18	27.23	23.36	29.19	37.37	37.23	24.05	22.41	29.0	0.91	26.4		100
Pike House, New Dixton Road, Monmouth	MM13	35.92	33.56	31.31	30.96	35.26	30.34	38.24	38.64	32.97	33.36	42.46	46.05	35.8	0.91	32.5		100
2 Riverside Park, Mayhill, Monmouth	MM14	20.27	19.77	18.11	16.12	13.60	11.98	13.09	13.18	16.64	16.28	14.94	12.70	15.6	0.91	14.2		100
6 Monnow Street/Fancy Freds, Monmouth	MM15	36.56	39.25	37.57	34.07	35.81	33.06	35.41	36.51	37.82	40.06	32.65	37.69	36.4	0.91	33.1		100
Lampost ME380 Adj 20A Monnow Street, Monmouth	MM16	34.73	30.71	34.03	33.86	29.50	27.86	31.04	33.32	35.02	34.32	35.75	34.93	32.9	0.91	30.0		100
4 Agincourt Square - The Punch House	MM17	27.17	25.66	27.36	25.51	22.18	20.89	19.52	22.71	27.59	30.91	26.34	21.80	24.8	0.91	22.6		100
Monmouth School D&T Block	MM18	29.20	32.21	27.59	29.03	27.24	26.37	28.40	29.84	32.46	31.50	29.41	28.45	29.3	0.91	26.7		100
Lamp post, 7 Ty Mawr, Monk Street, Monmouth	MM19	N/A	34.47	34.16	32.98	29.32	29.74	28.62	28.81	35.27	41.40	30.68	28.58	32.2	0.91	29.3		92
Lampost ME514,13 Monk Street, Monmouth	MM20	N/A	29.73	32.11	26.62	24.19	22.96	21.06	24.18	30.24	28.98	25.22	25.31	26.4	0.91	24.0		92
Lamp post ME399,14 Victoria Place, Priory Street, Monmouth	MM21	N/A	39.23	36.93	40.90	31.16	29.72	33.38	32.01	41.05	41.50	34.07	27.71	35.2	0.91	32.1		92
Lamppost MC178- Merthyr Rd, Abergavenny	AB1	44.70	41.78	40.94	38.10	35.33	35.72	34.52	36.63	40.45	42.56	34.72	51.20	39.7	0.91	36.1		100
Back Clinic, 2a Bridge Cottages, Merthy Rd Aber	AB2	45.30	43.49	38.45	34.91	34.86	30.42	38.03	36.88	36.65	41.72	36.18	36.82	37.8	0.91	34.4		100
112 Merthyr Road, Abergavenny	AB3	29.40	29.48	28.77	28.85	26.87	24.37	27.97	27.80	30.80	34.66	24.47	30.90	28.7	0.91	26.1		100
L/P Adj. 5 Coopers Way, Merthyr Rd, Abergavenny	AB4	28.16	M	58.90	26.25	24.23	23.12	24.57	26.10	26.54	M	25.38	28.25	29.1	0.91	26.5		83
1 Usk View, Merthyr Rd, Abergavenny	AB5	21.34	23.12	22.53	20.90	17.67	16.82	7.41	16.86	17.89	22.72	18.68	21.52	19.0	0.91	17.2		100
L/P No. MB991 ADJ,. 9&11 Merthyr Rd, Abergavenny	AB6	28.40	28.10	25.64	21.03	21.58	19.11	20.40	M	26.15	30.28	24.60	25.21	24.6	0.91	22.4		92
14A Castle Parade - Usk	USK1	36.28	39.05	33.03	30.41	32.31	27.13	28.77	29.77	36.46	37.79	34.67	31.47	33.1	0.91	30.1		100
Castle Court - Usk	USK2	38.64	39.06	37.95	38.91	37.86	31.30	34.23	35.65	36.91	40.43	36.24	42.32	37.5	0.91	34.1		100
White Hart - 5 Bridge St Usk	USK3	40.41	36.93	34.82	34.27	37.18	32.12	31.73	36.38	36.47	37.85	35.22	38.61	36.0	0.91	32.8		100
35 Bridge St - Usk	USK4	41.03	39.14	41.31	36.27	35.80	30.65	32.49	36.21	38.47	41.44	37.29	39.34	37.5	0.91	34.1		100

Lamp Post MA 556 - 16 Bridge St Usk	USK5	48.60	43.79	43.33	42.38	42.18	32.75	35.29	41.02	45.28	45.76	43.55	39.77	42.0	0.91	38.2		100
4 Usk Bridge Mews - Usk	USK6	25.80	M	M	22.96	21.04	18.78	17.68	18.93	20.95	26.08	20.53	18.04	21.1	0.91	19.2		83
Travel Blank	TB	0.14	0.13	0.20	0.07	0.11	0.11	0.09	0.12	0.11	0.16	0.13	0.13	0.1				100

Monthly data is not Bias Adjusted. Final Average has been bias adjusted using the 0.91 BAF
M = Tube Missing
UD = Tube found to be turned upside down, probably as a result of vandalism, which results in very low concentrations. These have been omitted from the results so as not to skew the annual mean downwards.
N/A = not applicable