Llywodraeth Cymru
Welsh Government

Tackling roadside nitrogen dioxide concentrations in Wales

Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations 2017 – Annual Data for NO_2 Concentrations for the Motorway and Trunk Road for 2018 and 2019

March 2020

Mae'r ddogfen yma hefyd ar gael yn Gymraeg.
This document is also available in Welsh.

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Foreword

The Welsh Government is committed to building healthier communities and better environments. Tackling poor air quality is a priority that is reflected in our national strategy – 'Prosperity for All'. In November 2018 we published our Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide (NO_2) concentrations 2017 setting out how we will reduce concentrations of NO_2 around roads where levels are above legal limits.

The plan built on Section 7.6 (Additional Actions in Wales) of the 2017 UK plan for tackling roadside nitrogen dioxide concentrations, setting out how we will comply within the shortest possible time with the limit values for NO_2. These values are set by the Ambient Air Quality Directive (2008/50/EC) and the Air Quality Standards (Wales) Regulations 2010.

This report is to confirm the current levels of NO_2 concentrations on the Welsh Government Motorway and Trunk Road network at the five sites identified in the plan. It provides the data for the calendar year 2018 and 2019 and a narrative with the ongoing issues facing the Welsh Government in relation to the five sites along with ways forward to help lower the NO_2 levels further.

This report should be read in conjunction with the following:

Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide (NO2) concentrations 2017 – Interim Data on NO_2 Concentrations for the Motorway and Trunk Road, published in September 2019:

- Interim data on NO2 concentrations for the motorway and trunk road

Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide (NO_2) concentrations 2017, published in November 2018:

- Air quality plan: roadside nitrogen dioxide

Welsh Government Transport Appraisal Guidance Reports Stages 1, 2 and 3 for Tackling Roadside Nitrogen Dioxide Concentrations on the Motorway and Trunk road Network sites in Wales:

- Tackling roadside nitrogen dioxide concentrations in Wales
- Tackling roadside nitrogen dioxide concentrations in Wales (WelTAG stage 3)

Contents

Appendices

1. Summary of Data on NO_2 Concentrations for the Motorway and Trunk Road

This report provides an updated summary of the NO_2 concentrations recorded at the five sites on the motorway and trunk road network and has been produced to support the commitment to present results as set out in the Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations 2017, published November 2018.

As detailed in the supplemental plan, the five sites where NO_2 concentrations are above the limit level – 40 µg/m^3 set out in the EU Ambient Air Quality Directive (2008/50/EC) and the Air Quality Standards (Wales) Regulations 2010 are:-

1. A494 at Deeside (North Wales Zone);
2. A483 near Wrexham (North Wales Zone);
3. M4 between Junctions 41 and 42 at Port Talbot (Swansea and South Wales Zone);
4. M4 between Junctions 25 and 26 at Newport (South Wales Zone); and
5. A470 between Upper Boat and Pontypridd (South Wales Zone).

50mph speed limits at the above five sites have been in operation since June 2018. In the interim report published in September 2019, a complete annual data set for the 2019 calendar year was not available. This report compares data for the 2018 calendar year to the 2019 calendar year. The data has been adjusted with national bias adjustment factors and an update on the speed data has been included for the five sites.

DEFRA Pollution Climate Mapping Data (PCM) (Modelled information) has been excluded from the report due to this information being theoretical and model based. PCM has been superseded by the on-site, real world data. Previous plots provided in the September 2019 report are still provided on the graphs in the appendices for comparison purposes only.

As previously indicated in the September 2019 report, an update on the Precautionary Retained Measures (PRMs) is also included in this report.

The following data is contained in the appendices to this report:-

- Diffusion Tube Monitoring Data (Roadside information) (Appendix A)
- Continuous reference method monitor Data (Appendix A)
- Interim Speed Data (Appendix B)

A graphical representation of the data is provided in Appendix C.

The following points can be drawn from the data:

- The data indicates that the annual NO_2 concentrations have continued to reduce at the five sites, with concentrations using national bias adjustment factors in the North Wales Zone and on the A494 at Deeside dropping below the limit of 40µg/m³ as set out in the Directive and Regulations. Concentrations using the national bias adjustment factor on the A483 at Wrexham have shown significant reduction and are only slightly above the limit;

- In the South Wales Zone, concentrations on the M4 at Newport still remain relatively high. However, it is noted that in 2019, traffic increased due to the tolls being removed from the Severn Bridges. In future reports it is planned to review traffic volumes alongside the other data;

- The speed data indicates that average speeds are below 50mph for all five sites (September to December 2019), with driver compliance significantly improved in comparison to the data recorded between June 2018 and August 2019. This could be due to the comprehensive signing layouts and Average Speed Cameras now in place. The M4 Newport has spot speed cameras in place as part of the variable speed limit;

- While the average speeds are below 50mph and compliance is much greater, there still remains a certain percentage of drivers exceeding the 50mph at certain times of the day. Further action to promote compliance is planned including the issuing of warning letters;

- Though the trend is decreasing for annual concentrations of NO_2 at all 5 sites, the situation still remains complicated. Air quality is sensitive to a number of issues including the weather/seasonal effects, traffic flows including volume, speeds and fleet mix. Consequently, whilst the A494 Deeside may be compliant, removal of the 50mph speed limit measure is not be considered feasible at this time as there is concern that limits would revert into exceedance;

- With this additional information, the trends remain positive and it appears that the measures that have been implemented are effective in reducing concentrations. Therefore all measures introduced at the five sites will be kept in place until further data is available for review in April 2021 ; and

- The reduction in NO2 concentrations is positive news for the five sites, in particular the A494 Deeside, A483 Wrexham and M4 Port Talbot. The Welsh Ministers continue to work towards delivery of their duty to reduce limit values for nitrogen dioxide in Wales within the shortest possible time in accordance with the Directive and the Welsh Regulations. This includes the continued development and the stakeholder engagement on the PRMs.

A further report will be published in April 2021 on the next set of data for NO_2 annual concentrations for calendar year 2020 adjusted to national bias factors.

Precautionary Retained Measures

Work is ongoing to develop the PRMs at all five sites, involving collection of survey data and further traffic and air quality modelling. The following table includes the sites and PRMs being considered:-

Location	PRM
A494 Deeside	S4 - Air Quality Barriers
A483 Wrexham	S4 - Air Quality Barriers
A470 Pontypridd	S4 - Air Quality Barriers
	S46 - Clean Air Zone
	S27 - Improved car parking
M4 J25-26 Newport	S46 - Clean Air Zone
M4 J41-42 Port Talbot	S16 – Junction closures
	S19 – Variable diversions

The below table provides a summary of the PRMs progress:-

Measure	Update
S4 - Air Quality Barrier (A494 Deeside, A483 Wrexham, A470 Pontypridd)	Early engineering constraints reports have been drawn up for the potential barrier locations; These reports have provided an initial assessment of the potential risks to the delivery of barriers due to the size and existing features in the area; Computational fluid dynamics (CFD) modelling is ongoing to identify the height of barriers required to bring forward compliance with the limit values at roadside properties, taking into account the local topography; Additional air quality and wind data is being collected alongside the A470 to investigate the efficacy of existing vegetation belts in reducing pollution levels.
S46 Clean Air Zone (A470 Pontypridd ,M4 J25-26 Newport)	Current assessments on the impact of the CAZ show that it could be detrimental to both Pontypridd and Newport based on current modelling information and routes available for traffic to use.
S27 improved car parking (A470 Pontypridd)	Surveys of usage at the new Abercynon Park and Ride location have been undertaken on the A470. This site will serve as a proxy for the success of such schemes on the A470. The surveys have shown that use of the site is not currently capacity limited.

	Measures are being identified to improve usage of these sites with reporting in spring 2020.
S16 – Junction closures (M4 J41-42 Port Talbot)	A Welsh Transport Appraisal Guidance (WelTAG) Study has considered options for improvement in the area and the study includes the closure of the slip roads and improved use of the Port Talbot Distributor Road (PDR). This study is currently at WelTAG Stage 1;
S19 – Variable diversions (M4 J41-42 Port Talbot)	Further work is taking place on a WelTAG Study for Stage 2, and further engagement with key stakeholders including Assembly Members, the Local Authority and Police is required on this in the coming months; It is proposed to implement the variable diversions at Port Talbot initially, while discussions on the above WelTAG studies progress. Anecdotal evidence is suggesting drivers use the A48 during peak times to avoid the delays on the M4 without formal signing (using satellite navigation); However, based on discussions regarding the variable diversion around Newport and noting the Police and Local Authority concerns on safety and added congestion on local roads, it is anticipated that key stakeholders at Port Talbot are likely to have significant concerns about this option given the volume of traffic in residential areas and close to schools.

Appendices

Appendix A

Diffusion Tube Monitoring Data

Concentrations of NO_2 at the roadside at each of the five sites have been recorded via a series of triplicate diffusion tubes since mid-December 2017 and the data has been used to help establish the effect that the measures have had on NO_2 concentrations. To help obtain a more accurate picture on concentrations, these tubes were supplemented with continuous reference method analysers in 2019. Data from the analysers at the A483 near Wrexham and A494 at Deeside has been included in this report. Data from all five analysers will be included within subsequent reports.

The table below details the NO_2 concentrations recorded via the diffusion tubes during the calendar year for 2018 and 2019. The data has been averaged for the year and corrected for seasonal variations using national bias adjustment factors. The 2019 concentrations are still provisional. This is because they are currently adjusted with the 2018 national bias adjustment factor as the 2019 is not available at the time or writing. If, when the 2019 factors are available and there is a change in the results presented, an annex to this report will be produced.

Bias adjustment factors are used in adjusting the results that are obtained via diffusion tube methods. Further information on the need for adjustment is available at: https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html

Annual mean NO_2 concentrations for calendar year 2018 and 2019 adjusted with national bias adjustment factors:

Site Type		2018 Annual Mean NO_2 Concentration ($\mu g/m^3$)		2019 Annual Mean NO_2 Concentration ($\mu g/m^3$)	
		Raw	National bias (0.88)	Raw	National bias (0.88)
A483 Wrexham – North Wales	Roadside	57.0	**50.2**	46.5	**40.9**
	Urban Background	18.9	16.6	16.4	14.4
A494 Deeside – North Wales	Roadside	47.9	**42.2**	41.6	36.6
	Urban Background	21.7	19.1	19.9	17.5
A470 Pontypridd – South Wales	Roadside	64.6	**56.8**	54.7	**48.1**
	Urban Background	20.7	18.2	19.9	17.5
	Roadside	72.2	**63.5**	67.3	**59.2**

M4 Newport – South Wales	Urban Background	26.6	23.4	25.2	22.4
M4 Port Talbot - South Wales	Roadside	55.0	**48.4**	48.9	**43.0**
	Urban Background	15.2	13.4	14.2	12.5

Bold *indicates a value that is greater than the relevant national air quality objective.*

Monthly average NO2 concentration recorded at continuous reference method monitors – 1 September 2019 to 31 December 2019

Route	September	October	November	December
A483 Wrexham	17.6µg/m3	33.8µg/m3	35.0µg/m3	19.9 µg/m3
A494 Deeside	24.1µg/m3	39.9µg/m3	42.0µg/m3	28.7 µg/m3

*Note monitors at the other three sites in South Wales are not yet fully operational – data from them will be included in future updates

** Note a full 12 month data set from all site is required before any conclusions can be made.

Appendix B

Interim Speed Data

The 50mph speed limits were initially implemented at four of the five sites in mid-June 2018. The one exception is the M4 at Newport where a 50mph speed limit was set to operate overnight (21:00 to 06:00) via the variable speed limit (VSL) in May 2018. Following publication of the supplemental plan, these 50mph speed limits have remained in force. Again, the one exception is the M4 at Newport where a maximum 50mph speed limit was set to operate at all times via the VSL in February 2019 and is subject to speed monitoring via spot speed cameras.

Speed compliance data at locations with speed camera monitoring – 1st September 2019 to 31st December 2019:

Route	Direction	Average Speed (mph)				Percentage travelling over 50mph			
		Sep	Oct	Nov	Dec	Sep	Oct	Nov	Dec
A494 Deeside (Average Speed Cameras)	EB	47.1	46.4	46.0	49.5	17.0%	12.7%	11.0%	11.9%
	WB	42.3	41.1	42.4	42.7	5.4%	3.7%	4.3%	3.9%
A483 Wrexham (Average Speed Cameras)	NB	46.4	46.6	46.5	N/A*	7.3%	8.2%	7.9%	N/A*
	SB	45.9	45.7	45.6	48.0	6.2%	5.9%	5.5%	5.4%
A470 Upper Boat to Pontypridd (Average Speed Cameras)	NB	45.2	45.2	44.8	45.3	12.1%	6.4%	4.5%	5.9%
	SB	44.3	43.0	42.9	44.4	18.9%	11.9%	4.9%	6.3%
M4 Junction 41 to Junction 42 (Average Speed Cameras)	EB	45.2	45.0	44.1	N/A*	7.8%	5.4%	4.7%	N/A*
	WB	44.4	43.9	43.8	N/A*	4.4%	3.5%	N/A*	N/A*
M4 Junction 25 to Junction 26 (Spot Speed Cameras)**	EB	48.5	48.4	48.4	48.9	N/A*	N/A*	N/A*	N/A*
	WB	45.6	44.6	46.3	46.7	N/A*	N/A*	N/A*	N/A*

*Full dataset for the sites for November and December 2019 not available at this time due to a fault with the camera suppliers IT equipment.

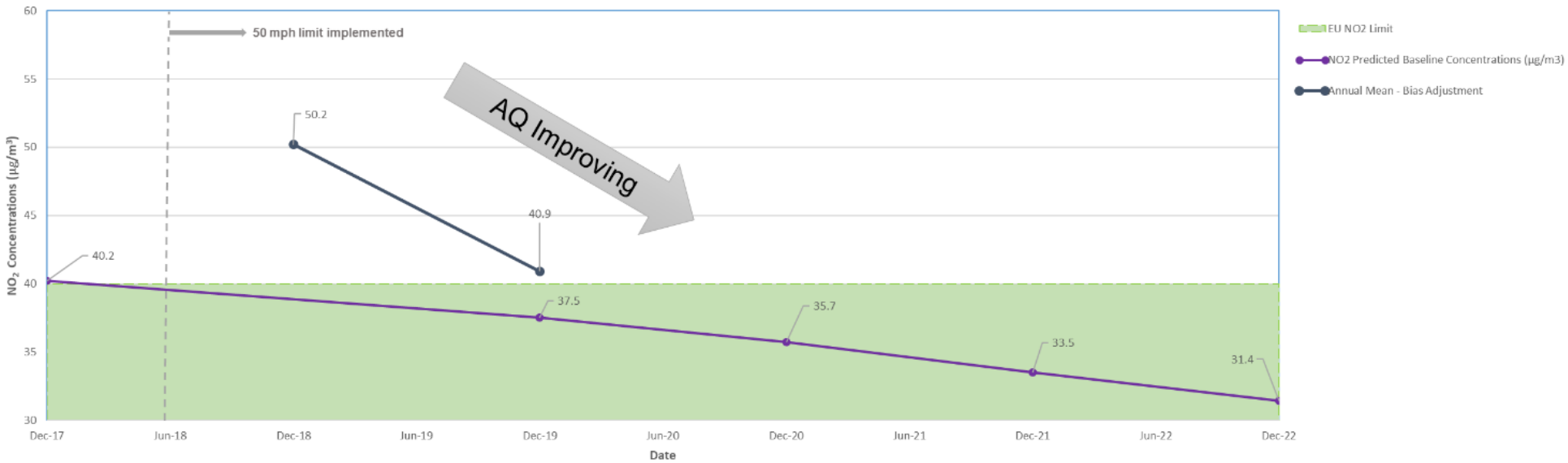
**Average speeds take into account occasions when the variable speed limit may also have been automatically set below 50mph. It is not possible to provide data for those occasions when only a 50mph speed limit was displayed.

Appendix C

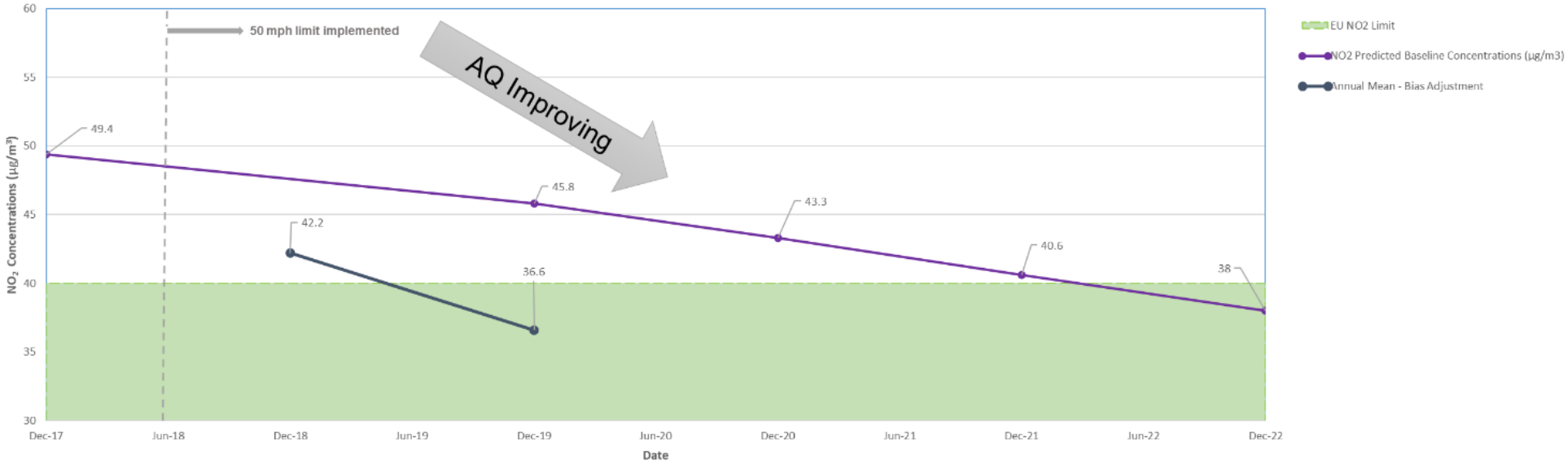
Graphs

The following graphs are showing the various data sets at the five sites:

A483 Wrexham

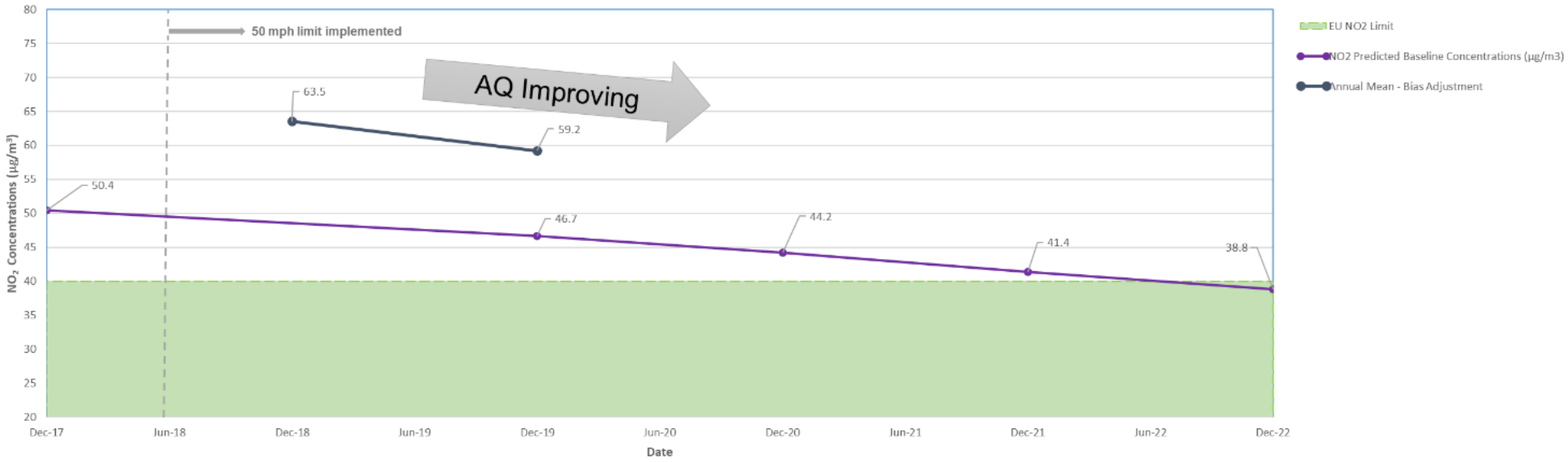


A494 Deeside



A470 Pontypridd

M4 Newport South Wales



M4 Port Talbot South Wales