



Adroddiad Cynnydd 2014 ynghylch
Ansawdd Aer ar gyfer
Cyngor Sir Caerfyrddin

Er mwyn cyflawni Rhan IV o
Ddeddf yr Amgylchedd 1995
Rheoli Ansawdd Aer Lleol

Tachwedd, 2014

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Cyfeirnod yr Adroddiad	Adroddiad Cynnydd 2014
Dyddiad	Tachwedd 2014

Crynodeb Gweithredol

Roedd y gwaith ar Ardal Rheoli Ansawdd Aer Llandeilo wedi parhau drwy 2013 a chwblhawyd y prosiect cau'r ffordd am dri mis. Rhoddwyd adroddiad arno yn fewnol a defnyddiwyd y canlyniadau i helpu i hysbysu'r cynigion yn y Cynllun Gweithredu drafft. Prif ganfyddiadau'r prosiect oedd nad yw'r ffordd lleol yn y dref yn addas i fod yn llwybrau dargyfeirio hirdymor o amgylch Stryd Rhosmaen ac, er nad oedd y lefelau NO₂ yn uwch na'r terfyn penodedig o ran ansawdd aer mewn perthynas â'r llwybrau dargyfeirio, roedd effeithiau arwyddocaol eraill a oedd yn cwestiynu dichonoldeb y llwybrau hyn.

Cynhaliwyd ymgynghoriad cyhoeddus ynghylch y Cynllun Gweithredu drafft yn ystod mis Medi 2013 a sefydlwyd canolfannau galw heibio yn Ffair-fach a Llandeilo am gyfnod o wythnos ym mhob lleoliad. Cofnodwyd y sylwadau a dderbyniwyd yn ystod yr ymgynghoriad a, lle bo'n bosibl, maent wedi'u cynnwys yn y Cynllun Gweithredu. Bydd y Cynllun Gweithredu yn cael ei gyflwyno i Lywodraeth Cymru yn yr ychydig wythnosau nesaf.

Cynhaliwyd Aseidiadau Manwl Estynedig mewn perthynas â lleoliadau yn nhrefi Caerfyrddin a Llanelli yn ystod 2013, er mwyn ceisio cadarnhau ffiniau ar gyfer yr ardaloedd lle mae'r lefelau yn uwch na'r terfyn. Adolygwyd canlyniadau'r gwaith hwn a daethpwyd i'r casgliad nad oedd dal yn bosibl nodi ffiniau'r ardaloedd lle mae'r lefelau yn uwch na'r terfyn oherwydd bod yr ardaloedd mor fach ac oherwydd nodweddion y lleoliadau. Rhoddwyd adroddiad ar y gwaith hwn i Lywodraeth Cymru ddechrau 2014, gydag argymhelliad y dylid bwrw ymlaen â dynodi Ardaloedd Rheoli Ansawdd Aer lle bo hynny'n briodol. Mae'r gwaith hwn wedi dechrau, ynghyd ag aseidiadau pellach i gadarnhau'r gostyngiadau angenrheidiol yn y lefelau NO₂ yn ogystal â nifer y derbynyddion.

Cynhaliwyd ymweliadau annisgwyl i wirio cydymffurfiaeth â'r cyfyngiadau ar amserau segura ar gyfer trenau stêm mewn perthynas â Chwmni Rheilffordd Gwili a nodwyd eu bod yn cydymffurfio adeg yr ymweliadau. Yn anffodus, dim ond dau ymweliad y bu'n bosibl eu cynnal.

Ni chynhaliwyd ymarfer monitro PM₁₀ yn ystod y flwyddyn oherwydd teimlwyd ei bod yn fwy buddiol canolbwyntio ar y meysydd gwaith lle gwyddys bod problemau o ran ansawdd aer. Fodd bynnag, os bydd angen am ymarfer PM₁₀, rhoddir hynny ar waith.

Cwblhawyd gwaith ar Ffordd Liniaru'r A477 yn Rhos-goch ym mis Ebrill 2014 ac mae canlyniadau'r ymarfer monitro llwch a gyflawnwyd ar y cyd â'r contractwyr yn cael eu hasesu ar hyn o bryd. Ni chredir bod unrhyw effeithiau arwyddocaol o ran llwch o ganlyniad i'r gwaith adeiladu ond cafwyd rhai canlyniadau uchel. Credir bod y rhain

yn gysylltiedig â halogi'r offer monitro yn ddamweiniol. Rhoddir adroddiad ar y gwaith yn ddiweddarach yn y flwyddyn.

Mae'r Awdurdod wedi prynu uned AQ Mesh i'w defnyddio fel monitor dangosol yn Ardal Rheoli Ansawdd Aer Llandeilo, lle mae'r broblem ar ei gwaethaf. Gobeithir y bydd hyn yn cynorthwyo â'r gwaith ar y Cynllun Gweithredu drwy nodi effeithiau gweithredu rhai o gynigion y Cynllun Gweithredu. Mae'r uned wedi bod yn weithredol ers mis Tachwedd 2013 ac ymddengys ei bod yn eithaf dibynadwy, er y gellir cwestiynu cywirdeb y darlleniadau yn ogystal â rhai o'r tueddiadau o ran yr ymatebion i lygryddion. Mae gwelliannau i'r algorithmau a ddefnyddir gyda'r feddalwedd wedi eu rhoi ar waith a gosodwyd gorchudd rhag yr haul ar yr uned, felly gobeithir y gallai hyder yn y data a geir wella dros amser.

Oherwydd natur dechnegol yr adroddiad canlynol, nid yw ar gael yn Gymraeg ar hyn o bryd. Os hoffech drafod hyn ymhellach, cysylltwch ag laithGymraeg@sirgar.gov.uk

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1 Introduction

1.1 Description of Local Authority Area

Carmarthenshire County Council was formed as a unitary authority in April 1996. The County is one of the largest in Wales, being predominantly rural with the industrial town of Llanelli to the south somewhat of a contrast to other areas of the authority. The population of over 170,000 is concentrated in the towns of Llanelli, Carmarthen, Ammanford, and Llandeilo. Tourism focuses on Carmarthenshire's 70 miles of coastline (including the new Millennium Coastal Park), the Brecon Beacons to the North East and the National Botanic Garden of Wales. The principal features of the County are illustrated in Figure 1.0.

Carmarthenshire shares borders with five other unitary authorities; Pembrokeshire to the West; Ceredigion to the North-West; Powys to the East; Neath Port Talbot to the South- East; and The City and County of Swansea to the South. Figure 1 illustrates the geographical relationship of Carmarthenshire with these other authorities.

Several principal pollution sources, which may be of importance to the assessment of several individual pollutants, may be identified within Carmarthenshire. The locations of industry, principal road traffic routes, busy road junctions and railways are of particular importance.

Figure 1.0 Principal Geographical Features of Carmarthenshire



1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) 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.

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 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
	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

Carmarthenshire County Council's first Air Quality Review and Assessment went to consultation in draft form during the summer of 2001. Assessment was made with reference to the Air Quality Regulations 2000. Only sulphur dioxide and nitrogen dioxide were identified in the Stage 1 assessment as requiring a Stage 2 assessment. The Draft Review concluded that a 3rd stage assessment was not necessary for any pollutant.

In response to consultation comments received from the National Assembly for Wales in respect of nitrogen dioxide levels from road traffic, Carmarthenshire County Council commissioned consultants to undertake a 3rd stage Review and Assessment in respect of nitrogen dioxide levels from road traffic along a particular route.

The final report of the 3rd stage review and assessment was produced in March 2002 and concluded that it was unlikely that nitrogen dioxide levels from road traffic sources would exceed objectives and that there was no need at that time to declare an Air Quality Management Area. It was considered, however, that for future assessments further investigation of street canyon effects would be advisable.

An Updating and Screening Assessment was started in 2003 and submitted to the Welsh Assembly Government in 2004. A number of conclusions were reached but progress on any of the recommendations was delayed until confirmation of guidance. Prioritisation of workloads within Carmarthenshire County Council meant that no further formal documentation was produced until the next Updating and Screening Assessment.

An Updating and Screening Assessment was undertaken in 2006, which included the Progress Report for 2005 (submitted to the Welsh Assembly Government in 2007) and concluded that there was no need to progress to a Detailed Assessment for carbon monoxide, benzene, 1,3 butadiene, lead, nitrogen dioxide, sulphur dioxide or PM₁₀. However the report concluded that a nitrogen dioxide co-location study was

needed to validate the results. Also to reduce the potential for public exposure of sulphur dioxide at the Gwili Railway Station, the Public Protection Department of Carmarthenshire County Council needed to work with the management of the railway company. This has been on-going with a work instruction relating to the idling time of steam engines to be less than 15 minutes when alongside the platform.

The original 2008 Progress Report that was submitted to the Welsh Assembly Government concluded that there had been an increase in the number of tube sites that had exceeded the annual objective. In total, eight sites had failed to meet the objective. This was more than expected and than had been predicted. It was noted that there was a significant change in the tube bias adjustment figure used compared to the previous couple of years. The figure was 0.90.

However, after submission of the report the authority received correspondence from the Welsh Assembly Government that detailed the latest bias adjustment figure had been reviewed and subsequently changed to 0.77. Also, that using the new “NO₂ with Distance from Roads” tool effectively reduced the number of tube sites that failed to meet the annual mean objective. The 2008 report has been amended internally to reflect the changes and provide accurate historical information. The net result of this was that only one relevant tube location was identified as exceeding the air quality objective.

The Updating and Screening Assessment 2009 identified the need to proceed to a Detailed Assessment for NO₂ in Llandeilo, based on the annual mean objective of 40µg/m³ being exceeded for the last two years and that work on the proposed relief road was not likely to begin for at least the next five years. The USA also recommended a full review of the diffusion tube network and assessments for the additional criteria detailed in Technical Guidance (09).

The Progress Report 2010 provided details of the Detailed Assessment that had been set up in Llandeilo, along with providing information on how the diffusion tube network had changed following the review in 2009. Further reviews of the tube network were recommended.

The Llandeilo Detailed Assessment Report 2010 was submitted and accepted by the Welsh Assembly Government in 2010. The report concluded that a public consultation should begin for the proposed designation of an Air Quality Management Area within the town and that a Further Assessment should follow on from the Detailed Assessment. The consultation took place and an Air Quality Management Area Order declared in November 2011.

The Progress Report 2011 provided further details for modifications to the diffusion tube network and proposals for the potential Detailed Assessments that may be required for the towns of Carmarthen and Llanelli.

The 2012 Updating & Screening Assessment Report reviewed the work in Llandeilo since the designation of the AQMA. It reported that an Action Plan was to be developed and this would be achieved by setting up a Steering Group and Action Planning Group. The Action Plan was due to be submitted later in 2013. Included in the USA were the proposal reports for the Detailed Assessments that were to be carried out for the towns of Carmarthen and Llanelli, along with details of further modifications that had taken place with respect to the diffusion tube network in the rest of the county.

The Llandeilo Further Assessment Report was submitted and concluded that the authority was justified in designating an AQMA for the town and that the boundary of the AQMA was appropriate. Source apportionment work was carried out and the necessary reduction in NO₂ identified. The results from the Further Assessment work will be used to assist the development of the Action Plan.

Detailed Assessment Reports for the towns of Carmarthen and Llanelli were submitted and concluded that the monitoring results had not identified the area of exceedence and that more work was needed to identify potential boundaries. Modifications to the Detailed Assessment monitoring networks for both towns were proposed and implemented from January 2013.

The modified Detailed Assessments continued through 2013 for both towns and a review of results established that the areas of exceedence were very localised and

likely to be attributable to the location characteristics. Reports for both of the extended Detailed Assessments were submitted in February 2014 and the conclusions and recommendations accepted by Welsh Government.

Work on the Llandeilo AQMA continued through 2013 with a draft Action Plan being developed encompassing feedback from various stakeholders and a Report of the work, along with the proposals in the draft Action Plan being put out to public consultation in September 2013. Drop-in centres were set up in two locations (Ffairfach and Llandeilo) over a two week period and comments received during the consultation have been used to review the draft Action Plan.

The above details are summarised in Table 1.2 below.

Table 1.2 Summary of LAQM Reporting

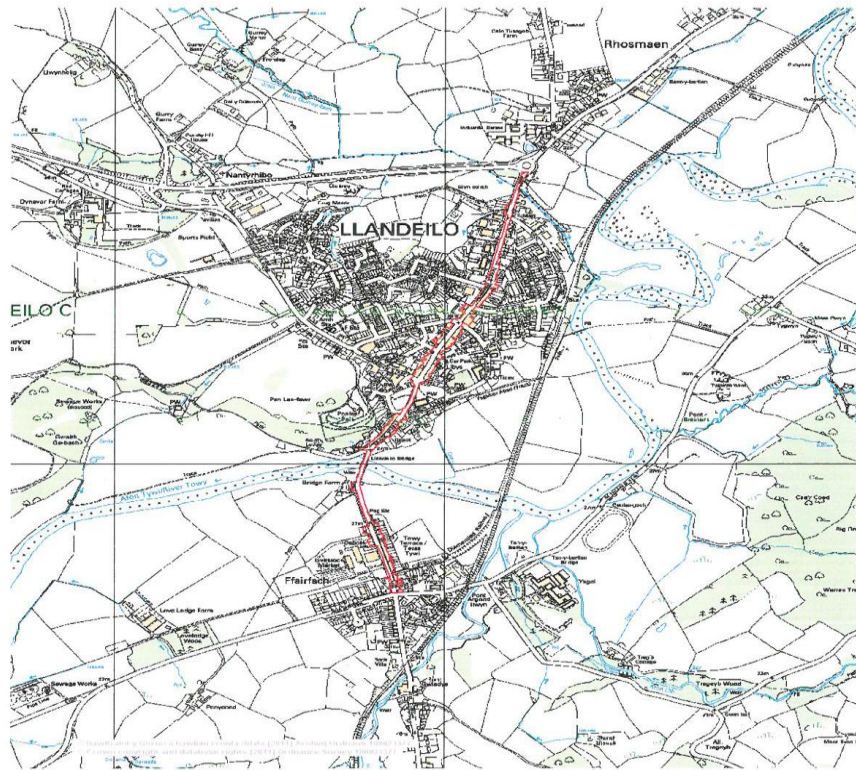
Air Quality Report	Submitted
1 st Air Quality Review (2001)	2002
Updating & Screening Assessment (2003)	2004
Progress Report (2005)	2007
Updating & Screening Assessment (2006)	2007
Progress Report (2008)	2008
Updating & Screening Assessment (2009)	2009
Progress Report (2010)	2010
Llandeilo Detailed Assessment (2010)	2010
Progress Report (2011)	2011
AQMA Declaration (Llandeilo) (11/11/11)	2011
Updating & Screening Assessment (2012)	2012
Llandeilo Further Assessment (2012)	2012
Carmarthen Detailed Assessment (December 2012) + appended Modified DA Network Report (for January 2013)	2013
Llanelli Detailed Assessment (December 2012) + appended Modified DA Network Report (for January 2013)	2013
Draft Action Plan Report for Llandeilo (Public Consultation)	2013
Extended Detailed Assessment Report for Carmarthen	2014
Extended Detailed Assessment Report for Llanelli	2014

Since 2009 the diffusion tube network has been under constant review and this continued to be the case through 2012/13. A review of the Detailed Assessment work for Carmarthen and Llanelli failed to identify boundaries of exceedence and therefore modified Detailed Assessments were proposed. This reviewed all of the associated tube sites and suggested the removal of those not considered relevant due to results being well below the Objective level. There were also suggestions for a few additional sites to try to establish areas of exceedence which are included within this report. The tube sites that were identified for removal are detailed below in Table 1.3.

Table 1.3 – Diffusion Tubes Removed From Detailed Assessment Networks

Diffusion Tube Site	Reason for removal
Llanelli	
Carm/069 Halfway (Llandafen)	Result well below Objective level
Carm/099 Trostre Road	Result well below Objective level
Carm/049 Upper Robinson Street	Result well below Objective level
Carm/102 Bassett terrace (2)	Result well below Objective level
Carm/101 Pembrey Road	Result well below Objective level
Carm/104 Gelli Onn (2)	Result well below Objective level
DAL/11 Hall Street	Result well below Objective level
DAL/13 18 New Road	Result well below Objective level
DAL/05 7 Panteg	Result well below Objective level
DAL/06 10 Panteg	Result well below Objective level
DAL/03 34 Panteg	Result well below Objective level
DAL/01 5 Millfields	Result well below Objective level
DAL/02 (A)(B)(C) 2 Lethri Road	Result well below Objective level
DAL/18 Station Road (Flats)	Result well below Objective level
DAL/19 New Dock Road (Opp Jenkins)	Result well below Objective level
Carmarthen	
DAC/01 10 Morfa Lane	Result well below Objective level
Carm/087 Morfa Lane	Result well below Objective level
DAC/03 St Catherine Street rdbt (N)	Result well below Objective level
Carm/107 Barn Street	Result well below Objective level
Carm/108 Francis Terrace	Result well below Objective level
DAC/07 4 Old Oak Lane	Result well below Objective level
Carm/056 Old Oak rdbt	Result well below Objective level
DAC/09 (A)(B)(C) 108 Priory Street	Result well below Objective level
DAC/10 Priory Street/St Peter's Street	Result well below Objective level
DAC/11 St Peter's Street	Result well below Objective level
Carm/112 Spilman Street	Result well below Objective level
Carm/088 Jobs Well Road X roads	Result well below Objective level

Figure 1.1 Map of Llandeilo AQMA Boundary



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2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Carmarthenshire County Council has no fixed long term automatic monitoring locations within its administrative area.

2.1.2 Non-Automatic Monitoring Sites

The LAQM work in Carmarthenshire was reviewed annually from 2009 through to 2012 with areas of exceedence identified in Llandeilo, Carmarthen and Llanelli. Llandeilo was designated as an AQMA and this led to the Further Assessment and Draft Action Plan work. During Action Planning meetings it was identified that Llandeilo would be subject to a three month road closure of Rhosmaen Street, which forms the basis for the AQMA, as a result of essential utilities work. This formed the basis of a specific project to assess the impact of the road closure and this in turn helped to inform the draft Action Plan work. A report on the work is included in Appendix I.

The Detailed Assessments for the towns of Carmarthen and Llanelli began in January 2012 and reports have already been submitted in respect of these because the work had not identified the areas of exceedence. Proposals to modify the Detailed Assessment networks were submitted and the modifications took effect from the beginning of January 2013. The modified Detailed Assessment work for both towns has been reported and the conclusions and recommendations accepted. Work has started and progressing on the designation of AQMA's for both towns.

Table 2.1 below lists the details for each diffusion tube location that was operational during 2013. The QA/QC data relevant for 2013 is contained in Appendix A. Environmental Scientifics Group (ESG) supplied and analysed the tubes and the bias adjustment used was 0.80, being taken from the LAQM Helpdesk site. The version number of the spread sheet was 03/14.

Please note that maps illustrating the locations of diffusion tube sites have not been included in the section. All current site locations have either previously been identified in other recently submitted reports or are contained in Appendices of this report. The inclusion of maps illustrating 66 tube locations spread across the county would unnecessarily greatly lengthen this report.

Table 2.1 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Carm/089	Ammanford – Tir Y Dail Lane (2)	Kerbside	262804	212204	2.55	NO ₂	N	N	Y (0.50)	0.95	N
Carm/064	Ammanford – Wind Street	Roadside	262936	212285	2.85	NO ₂	N	N	Y (1.00)	2.00	N
Carm/090	High Street (2)	Roadside	263028	212324	2.75	NO ₂	N	N	Y (0.00)	2.95	Y
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DAL/20	19 Stradey Road	Roadside	250270	201328	2.85	NO ₂	N	N	Y (0.00)	1.70	Y

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DAL/21	Denham Avenue	Other	249565	201286	2.95	NO ₂	N	N	N (8.00)	1.75	N
DAL/14	10 Sandy Road	Roadside	249701	200598	2.77	NO ₂	N	N	Y (0.00)	4.92	Y
DAL/15	33 Sandy Road	Roadside	249727	200608	2.53	NO ₂	N	N	Y (0.00)	4.66	Y
Carm/077	Sandy Road (2)	Roadside	249606	200638	2.75	NO ₂	N	N	Y (4.00)	1.70	N
DAL/22	44 Sandy Road (3)	Roadside	249610	200632	2.75	NO ₂	N	N	Y (0.00)	5.55	Y
DAL/16	96 Sandy Road	Roadside	249456	200706	2.68	NO ₂	N	N	Y (0.00)	5.09	Y
DAL/17	131 Sandy Road	Roadside	249463	200724	2.81	NO ₂	N	N	Y (0.00)	5.30	Y

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DAL/07	Nr 13 Felinfoel Road	Kerbside	250717	200818	2.80	NO ₂	N	N	Y (0.50)	0.75	N
DAL/23	50 Felinfoel Road	Roadside	250754	200870	2.90	NO ₂	N	N	Y (0.00)	2.05	Y
DAL/09	Thomas St (Barnardos)	Roadside	250709	200673	2.77	NO ₂	N	N	Y (0.00)	2.66	Y
Carm/104	Thomas Street (2)	Roadside	250719	200689	2.95	NO ₂	N	N	Y (0.00)	1.70	Y
DAL/10	Thomas St (Bridal Shop)	Roadside	250734	200603	2.73	NO ₂	N	N	Y (0.00)	1.62	Y
Carm/069	West End	Kerbside	250458	200603	2.80	NO ₂	N	N	Y (6.00)	0.20	N

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DAL/12	West End (Creative Cakes)	Kerbside	250411	200616	2.81	NO ₂	N	N	Y (1.65)	0.20	N
DAL/04	51 Panteg Road	Roadside	251623	201976	2.80	NO ₂	N	N	Y (0.32)	1.00	N
Carm/114	Panteg Road	Roadside	251665	202013	2.70	NO ₂	N	N	Y (0.36)	1.20	Y
DAL/24	49 Ynyswen, Felinfoel	Roadside	252031	201896	2.85	NO ₂	N	N	Y (0.00)	1.35	Y
Carm/113	Swiss Valley	Roadside	251951	202411	2.85	NO ₂	N	N	Y (0.40)	1.10	Y
DAL/25	33 Swiss Valley (N)	Roadside	251942	202442	2.90	NO ₂	N	N	Y (1.10)	1.80	N
Carmarthen											

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Carm/072	St Catherine St rdbt	Roadside	240688	220057	2.75	NO ₂	N	N	Y (0.25)	3.00	N
DAC/02	15 Park Terrace	Kerbside	240618	220041	3.00	NO ₂	N	N	Y (0.40)	0.95	N
DAC/16	6 Park Terrace	Roadside	240557	220026	2.65	NO ₂	N	N	Y (0.00)	1.35	Y
Carm/001	St Catherine Street	Roadside	240798	220155	2.75	NO ₂	N	N	Y (0.25)	1.70	Y
DAC/04	Water St (Probation Office)	Kerbside	240931	220144	2.80	NO ₂	N	N	Y (0.00)	0.90	N
Carm/084	Water St	Kerbside	240831	220272	2.75	NO ₂	N	N	Y (0.25)	0.90	Y
DAC/05	44 Water St	Roadside	240797	220297	2.68	NO ₂	N	N	Y (0.00)	1.25	Y

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Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Carm/106	St Catherine St (A)	Roadside	240979	220244	2.85	NO ₂	N	N	Y (0.00)	1.40	Y
DAC/06	Glenholme Nursery	Kerbside	241546	220536	2.70	NO ₂	N	N	Y (2.20)	0.77	N
DAC/13	72 Richmond Terrace (2)	Kerbside	241559	220554	2.73	NO ₂	N	N	Y (0.30)	0.95	Y
Carm/109	Richmond Terrace	Kerbside	241596	220563	2.70	NO ₂	N	N	Y (0.20)	0.63	Y
DAC/08	85 Priors Street (E)	Roadside	241876	220565	2.70	NO ₂	N	N	Y (0.44)	1.10	N
DAC/14	50 Priors Street	Roadside	241932	220583	2.90	NO ₂	N	N	Y (0.40)	1.25	Y

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DAC/15	Old Oak rdbt (E)	Roadside	241816	220519	2.90	NO ₂	N	N	Y (1.50)	2.40	N
Carm/111	Church St	Roadside	241539	220179	2.96	NO ₂	N	N	Y (0.73)	2.80	Y
DAC/12	24 Spilman Street	Roadside	241492	220171	2.75	NO ₂	N	N	Y (0.00)	3.00	Y
Carm/126	Johnstown - 2 Jobs Well Road	Roadside	239914	219829	2.75	NO ₂	N	N	Y (0.80)	2.10	Y
A477											
Carm/117	Llanddowror School site	Roadside	225623	214580	2.67	NO ₂	N	N	Y (5.50)	1.00	N
Carm/118	Sporting Chance pub	Roadside	220402	211790	2.36	NO ₂	N	N	Y (0.00)	2.26	Y
Carm/119	St Clears rdbt	Roadside	227215	215872	2.61	NO ₂	N	N	Y (20.00)	1.24	N

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
LLANDEILO											
FA/01	North rdbt (No 8 Rhosmaen Street)	Roadside	263190	222995	2.55	NO ₂	Y	N	Y (1.50)	1.60	N
DA/15	Rhosmaen St (No 15)	Roadside	262848	222170	2.64	NO ₂	Y	N	Y (0.00)	3.10	Y
DA/01	Rhosmaen St (No 69)	Roadside	263076	222596	2.70	NO ₂	Y	N	Y (3.00)	1.25	Y
DA/03	Rhosmaen St (No 87)	Roadside	263021	222503	2.90	NO ₂	Y	N	Y (0.00)	4.35	Y
Carm/013	Rhosmaen Street	Kerbside	263001	222489	2.80	NO ₂	Y	N	Y (2.50)	0.40	N

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DA/05(A), (B) & (C)	Rhosmaen St (Evans Butchers)	Roadside	262982	222445	2.95	NO ₂	Y	N	Y (0.00)	1.50	Y
DA/07	Rhosmaen St (Castle Hotel)	Roadside	262962	222401	2.85	NO ₂	Y	N	Y (0.00)	1.70	Y
Carm/083	Rhosmaen St (2)	Roadside	262959	222396	2.75	NO ₂	Y	N	Y (1.00)	1.45	N
DA/09	Rhosmaen St (No 123)	Roadside	262956	222388	2.90	NO ₂	Y	N	Y (0.00)	1.20	Y
DA/10	Rhosmaen St (No 133)	Kerbside	262933	222345	2.90	NO ₂	Y	N	Y (0.00)	0.75	Y
DA/11	Rhosmaen St (No 74)	Roadside	262920	222337	3.00	NO ₂	Y	N	Y (0.00)	1.70	Y

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DA/12	Stryd Y Brenin	Roadside	262908	222329	2.85	NO ₂	Y	N	Y (0.00)	0.95	Y
FA/02	Carmarthen St (The Wardrobe)	Kerbside	262869	222352	2.72	NO ₂	N	N	Y (0.00)	0.70	N
DA/13	Rhosmaen St (Park area)	Kerbside	262906	222299	2.90	NO ₂	Y	N	Y (4.00)	0.85	N
DA/14	Rhosmaen St (Bin post by bus stop)	Roadside	262902	222250	2.75	NO ₂	Y	N	Y (3.00)	1.15	N
DA/16	Bridge St (N Trust) (S)	Roadside	263150	222762	2.59	NO ₂	Y	N	Y (0.00)	2.30	Y

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
FA/03	40 Towy Terrace, Ffairfach (rdbt)	Roadside	262854	221504	2.70	NO ₂	Y	N	Y (0.00)	3.24	Y
FA/04	Ffairfach Chapel	Roadside	262869	221274	2.75	NO ₂	N	N	Y (0.00)	1.45	Y
FA/05	Cennen Road, Ffairfach (No 43)	Roadside	262903	221105	2.95	NO ₂	N	N	Y (5.00)	0.95	N
FA/06	10 Heol Myrddin, Ffairfach	Kerbside	262780	221469	2.69	NO ₂	N	N	Y (5.00)	0.85	N

Cyngor Sir Caerfyrddin

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
FA/07	Heol Bethlehem (Opp school)	Roadside	262980	221490	2.87	NO ₂	N	N	Y (16.00)	1.45	N

2.2 Comparison of Monitoring Results with Air Quality Objectives

The results of the air quality monitoring carried out during 2013 across Carmarthenshire and how the results compare with the Air Quality Objectives are discussed below. Trend graphs have been included for the main areas of concern and where there are still a limited number of historical sites remaining. Sites with up to three years of data in areas of concern have been included as over time these should develop in to trend graphs.

It should be noted that many of the sites displayed in the graphs were set up to operate from 2010 and it has been acknowledged that this was a year of generally high results. This appears to illustrate a steady decline in readings since then but this may not be a fair reflection in what is actually happening with the air quality across the county.

2.2.1 Nitrogen Dioxide (NO₂)

Automatic Monitoring Data

There are no automatic monitoring sites within Carmarthenshire County Council administrative area.

Diffusion Tube Monitoring Data

There are a number of diffusion tube locations that exceeded the annual mean AQO in 2013 and some that were borderline. This was not surprising since the work has concentrated on areas of concern such as the AQMA in Llandeilo and the extended Detailed Assessments in the towns of Carmarthen and Llanelli. There were not as many exceedences as was expected, particularly in relation to the extended Detailed Assessments. Those sites that have exceeded the AQO are detailed below with the relevant data presented in Tables 2.2 and 2.3 below.

In Llanelli there were two locations that exceeded the AQO which were Thomas Street (Barnardos) and nr 13 Felinfoel Road. Both of these sites exceeded last year. Two other sites were border line at over $38\mu\text{g}/\text{m}^3$, which were Thomas Street (2) and Thomas Street (Bridal Shop). These two sites exceeded last year but have dropped just below the Objective. The work associated with the modified Detailed Assessment, referred to as an Extended Detailed Assessment failed to identify any boundaries of exceedence as reported early in 2014. However work towards designating an AQMA for the general location of exceedence has begun and the continuation of monitoring will serve as the Further Assessment. The necessary additional work that constitutes a Further Assessment will also be carried out.

With respect to Carmarthen, there were three locations that exceeded the AQO and these were Richmond Terrace, 15 Park Terrace and 85 Priory Street (E), all of which exceeded last year. One further site, 6 Park Terrace, was border line at just over $38\mu\text{g}/\text{m}^3$. As with Llanelli, these sites form part of the Extended Detailed Assessment which also failed to identify boundaries of exceedence. It is worth noting that the sites which were identified as borderline last year, namely St Catherine Street, Water Street, 44 Water Street, Church Street and 24 Spilman Street, all had lower results than last year.

It was pleasing to see further reductions of NO_2 for the tube sites that are associated with the Water Street / St Catherine Street junction. Colleagues in Highways

implemented work on a redesigned junction layout that would hopefully improve traffic flow and reduce queue lengths and times. This work seems to have resulted in the desired improvements with all associated diffusion tube sites seeing an annual reduction in NO₂ results to below the borderline level. A small report was written to highlight this work and this is shown in Appendix F.

The highest reading tube in the county was again 85 Priory Street (E) but the annual result was below 60µg/m³ and was actually 58µg/m³. This location experienced a reduction of 7µg/m³ compared to 2012 but there is no obvious reason for this level of reduction.

The results for Llandeilo must be treated with caution this year as the first three months of the year was when the town experienced a full road closure of Rhosmaen Street. The data will therefore not be representative of 'normal' conditions. An attempt to obtain a more accurate set of results for Llandeilo has been made by using annualised data instead of including the first three months of the year. This work is detailed in Appendix G. Much of the work on Llandeilo concentrated on Action Plan work for the AQMA which will hopefully be submitted in the next few weeks.

The data capture for 2013 was generally good with no sites falling below 75% data capture for the main tube network. Therefore it was deemed there was no requirement to annualise data due to lost or spoilt tubes.

Two of the three triplicate diffusion tube sites that were used in 2012 were removed from the network. These were the ones associated with the Detailed Assessments in Carmarthen and Llanelli. Neither of the two sites was located in areas of exceedence and it was considered more appropriate to concentrate on those areas where it was known that levels were likely to breach the AQO. The existing site in Llandeilo (DA/05 – Rhosmaen Street (Evans Butchers)) which has been maintained for the Further Assessment and Action Plan work and been kept in place.

The monthly raw data results for Tables 2.2 and 2.3 are contained in Appendices B to E.

Table 2.2 Results of NO₂ Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration (µg/m ³) - Bias Adjustment factor = 0.80 ^b
Carm/089	Ammanford – Tir Y Dail Lane (2)	Kerbside	N	N	12	26.2
Carm/064	Ammanford – Wind Street	Roadside	N	N	11	27.8
Carm/090	High Street (2)	Roadside	N	N	12	28.1
LLANELLI						
DAL/20	19 Stradey Road	Roadside	N	N	12	22.0
DAL/21	Denham Avenue	Other	N	N	11	12.9
DAL/14	10 Sandy Road	Roadside	N	N	10	25.5

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
DAL/15	33 Sandy Road	Roadside	N	N	12	23.4
Carm/077	Sandy Road (2)	Roadside	N	N	12	37.7
DAL/22	44 Sandy Road (3)	Roadside	N	N	12	31.2
DAL/16	96 Sandy Road	Roadside	N	N	9	21.3
DAL/17	131 Sandy Road	Roadside	N	N	12	22.7
DAL/07	Nr 13 Felinfoel Road	Kerbside	N	N	12	49.1
DAL/23	50 Felinfoel Road	Roadside	N	N	12	24.9
DAL/09	Thomas St (Barnardos)	Roadside	N	N	12	46.5

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
Carm/104	Thomas Street (2)	Roadside	N	N	10	38.5
DAL/10	Thomas St (Bridal Shop)	Roadside	N	N	12	38.1
Carm/069	West End	Kerbside	N	N	10	36.5
DAL/12	West End (Creative Cakes)	Kerbside	N	N	11	29.0
DAL/04	51 Panteg Road	Roadside	N	N	12	34.4
Carm/114	Panteg Road	Roadside	N	N	12	38.0
DAL/24	49 Ynyswen, Felinfoel	Roadside	N	N	12	19.6
Carm/113	Swiss Valley	Roadside	N	N	12	37.7

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
DAL/25	33 Swiss Valley (N)	Roadside	N	N	11	20.1
Carmarthen						
Carm/072	St Catherine St rdbt	Roadside	N	N	11	32.7
DAC/02	15 Park Terrace	Kerbside	N	N	11	43.4
DAC/16	6 Park Terrace	Roadside	N	N	12	39.1
Carm/001	St Catherine Street	Roadside	N	N	12	33.1
DAC/04	Water St (Probation Office)	Kerbside	N	N	11	23.9
Carm/084	Water St	Kerbside	N	N	10	36.4
DAC/05	44 Water St	Roadside	N	N	10	33.9
Carm/106	St Catherine St (A)	Roadside	N	N	11	36.6

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
DAC/06	Glenholme Nursery	Kerbside	N	N	12	30.3
DAC/13	72 Richmond Terrace (2)	Roadside	N	N	12	32.7
Carm/109	Richmond Terrace	Kerbside	N	N	12	40.1
DAC/08	85 Priory Street (E)	Roadside	N	N	12	58.0
DAC/14	50 Priory Street	Roadside	N	N	12	35.3
DAC/15	Old Oak rdbt (E)	Roadside	N	N	12	30.6
Carm/111	Church St	Roadside	N	N	12	34.2
DAC/12	24 Spilman Street	Roadside	N	N	12	35.6

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
Carm/126	Johnstown – 2 Jobs Well Road	Roadside	N	N	12	25.0
A477						
Carm/117	Llanddowror School site	Roadside	N	N	12	31.2
Carm/118	Sporting Chance pub	Roadside	N	N	11	23.7
Carm/119	St Clears rdbt	Roadside	N	N	11	28.8
LLANDEILO						
FA/01	North rdbt (No 8 Rhosmaen Street)	Roadside	Y	N	12	15.6
DA/15	Rhosmaen St (No 15)	Roadside	Y	N	11	24.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
DA/01	Rhosmaen St (No 69)	Roadside	Y	N	12	25.8
DA/03	Rhosmaen St (No 87)	Roadside	Y	N	12	24.6
Carm/013	Rhosmaen Street	Kerbside	Y	N	12	29.8
DA/05(A), (B) & (C)	Rhosmaen St (Evans Butchers)	Roadside	Y	Triplicate	12	32.6
DA/07	Rhosmaen St (Castle Hotel)	Roadside	Y	N	10	35.4
Carm/083	Rhosmaen St (2)	Roadside	Y	N	12	37.9
DA/09	Rhosmaen St (No 123)	Roadside	Y	N	11	38.1
DA/10	Rhosmaen St (No 133)	Kerbside	Y	N	10	35.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
DA/11	Rhosmaen St (No 74)	Roadside	Y	N	12	32.8
DA/12	Stryd Y Brenin	Roadside	Y	N	11	25.4
FA/02	Carmarthen St (The Wardrobe)	Kerbside	N	N	12	13.1
DA/13	Rhosmaen St (Park area)	Kerbside	Y	N	12	33.3
DA/14	Rhosmaen St (Bin post by bus stop)	Roadside	Y	N	11	24.5
DA/16	Bridge St (N Trust) (S)	Roadside	Y	N	12	37.7
FA/03	40 Towy Terrace, Ffairfach (rdbt)	Roadside	Y	N	11	19.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months or %) ^a	2013 Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Bias Adjustment factor = 0.80 ^b
FA/04	Ffairfach Chapel	Roadside	N	N	12	14.7
FA/05	Cennen Road, Ffairfach (No 43)	Roadside	N	N	12	17.9
FA/06	10 Heol Myrddin, Ffaifach	Kerbside	N	N	9	17.1
FA/07	Heol Bethlehem (Opp school)	Roadside	N	N	12	10.9

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

Underlined, annual mean > 60 $\mu\text{g}/\text{m}^3$, indicating a potential exceedence of the NO₂ hourly mean AQS objective

^a Means should be “annualised” as in Box 3.2 of TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if full calendar year data capture is less than 75%

^b If an exceedence is measured at a monitoring site not representative of public exposure, NO₂ concentration at the nearest relevant exposure should be estimated based on the “NO₂ fall-off with distance” calculator (<http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>), and results should be discussed in a specific section. The procedure is also explained in Box 2.3 of Technical Guidance LAQM.TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=30>).

Table 2.3 Results of NO₂ Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m ³) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)
DT1	Roadside	N	64.1	32.6	34.7	40.2	36.9
Carm/089	Kerbside	N	-	32.0	26.4	25.9	26.2
Carm/064	Roadside	N	31.0	31.0	30.9	27.6	27.8
Carm/090	Roadside	N	-	31.0	29.3	30.1	28.1
LLANELLI							
DAL/20	Roadside	N	-	-	-	-	22.0
DAL/21	Other	N	-	-	-	-	12.9
DAL/14	Roadside	N	-	-	-	27.8	25.5
DAL/15	Roadside	N	-	-	-	23.1	23.4
Carm/077	Roadside	N	41.0	43.0	42.6	40.8	37.7
DAL/22	Roadside	N	-	-	-	-	31.2
DAL/16	Roadside	N	-	-	-	22.9	21.3
DAL/17	Roadside	N	-	-	-	21.3	22.7
DAL/07	Kerbside	N	-	-	-	54.2	49.1
DAL/23	Roadside	N	-	-	-	-	24.9
DAL/09	Roadside	N	-	-	-	50.5	46.5

Site ID	Site Type	Within AQMA?	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)
Carm/104	Roadside	N	-	45.0	42.1	39.1	38.5
DAL/10	Roadside	N	-	-	-	42.2	38.1
Carm/069	Kerbside	N	42.0	45.0	42.8	43.4	36.5
DAL/12	Kerbside	N	-	-	-	32.6	29.0
DAL/04	Roadside	N	-	-	-	37.3	34.4
Carm/114	Roadside	N	-	-	38.1	37.7	38.0
DAL/24	Roadside	N	-	-	-	-	19.6
Carm/113	Roadside	N	-	-	40.3	39.6	37.7
DAL/25	Roadside	N	-	-	-	-	20.1
Carmarthen							
Carm/072	Roadside	N	39.0	39.0	38.0	34.4	32.7
DAC/02	Kerbside	N	-	-	-	47.6	43.4
DAC/16	Roadside	N	-	-	-	-	39.1
Carm/001	Roadside	N	36.0	44.0	35.8	36.1	33.1
DAC/04	Kerbside	N	-	-	-	26.5	23.9
Carm/084	Kerbside	N	-	46.0	39.4	38.8	36.4
DAC/05	Roadside	N	-	-	-	38.1	33.9
Carm/106	Roadside	N	-	47.0	42.4	43.6	36.6

Site ID	Site Type	Within AQMA?	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)
DAC/06	Kerbside	N	-	-	-	34.6	30.3
DAC/13	Roadside	N	-	-	-	-	32.7
Carm/109	Kerbside	N	-	-	43.9	42.4	40.1
DAC/08	Roadside	N	-	-	-	<u>65.0</u>	58.0
DAC/14	Roadside	N	-	-	-	-	35.3
DAC/15	Roadside	N	-	-	-	-	30.6
Carm/111	Roadside	N	-	-	37.0	36.6	34.2
DAC/12	Roadside	N	-	-	-	37.2	35.6
Carm/126	Roadside	N	-	-	-	-	25.0
A477							
Carm/117	Roadside	N	-	-	35.2	33.1	31.2
Carm/118	Roadside	N	-	-	27.2	26.8	23.7
Carm/119	Roadside	N	-	-	32.2	30.8	28.8
LLANDEILO							
FA/01	Roadside	Y	-	-	21.1	15.2	15.6
DA/15	Roadside	Y	-	-	28.9	25.8	24.9
DA/01	Roadside	Y	-	31.0	30.3	27.4	25.8
DA/03	Roadside	Y	-	31.0	30.2	27.6	24.6

Site ID	Site Type	Within AQMA?	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$) - Adjusted for Bias ^a				
			2009 (Bias Adjustment Factor = 0.86)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)
Carm/013	Kerbside	Y	41.0	40.0	39.2	35.2	29.8
DA/05(A), (B) & (C)	Roadside	Y	-	44.0	40.7	39.6	32.6
DA/07	Roadside	Y	-	46.0	44.8	44.5	35.4
Carm/083	Roadside	Y	51.0	57.0	48.9	46.3	37.9
DA/09	Roadside	Y	-	54.0	48.6	45.8	38.1
DA/10	Kerbside	Y	-	53.0	44.1	43.9	35.9
DA/11	Roadside	Y	-	49.0	43.0	44.2	32.8
DA/12	Roadside	Y	-	46.0	34.8	29.0	25.4
FA/02	Kerbside	N	-	-	14.4	13.5	13.1
DA/13	Kerbside	Y	-	45.0	42.8	41.0	33.3
DA/14	Roadside	Y	-	31.0	28.9	29.8	24.5
DA/16	Roadside	Y	-	-	37.7	39.0	37.7
FA/03	Roadside	Y	-	-	24.9	20.4	19.9
FA/04	Roadside	N	-	-	18.9	15.7	14.7
FA/05	Roadside	N	-	-	22.8	17.9	17.9
FA/06	Kerbside	N	-	-	-	17.9	17.1
FA/07	Roadside	N	-	-	-	10.9	10.9

In bold, exceedence of the NO₂ annual mean AQS objective of 40µg/m³

Underlined, annual mean > 60µg/m³, indicating a potential exceedence of the NO₂ hourly mean AQS objective

^a Means should be “annualised” as in Box 3.2 of TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), if full calendar year data capture is less than 75%

2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

The diffusion tube network in Carmarthenshire has evolved over the last few years and now centres round some key areas of the county where exceedences of the AQO have been identified. Consequently a lot of the historical data is no longer relevant. However, some of the relocated diffusion tube sites have not been in place for three to four years and therefore trend graphs have been produced for those sites where it is considered there may be some benefit in the near future. The trend graphs shown below are mainly associated with the remaining historical sites left in the network.

Figure 2.4a below shows three sites that are associated with the town of Ammanford. Whilst the results have been consistently below the AQO the sites remain in the network because it is known that the town is due to undergo regeneration works. It is considered prudent to maintain the tubes to identify any potential impacts on the main road network for the town. The trend appears to be downwards but it must be remembered that 2010 was a 'high' results year.

Figure 2.4a Annual Mean NO₂ Trend Graph (Ammanford)

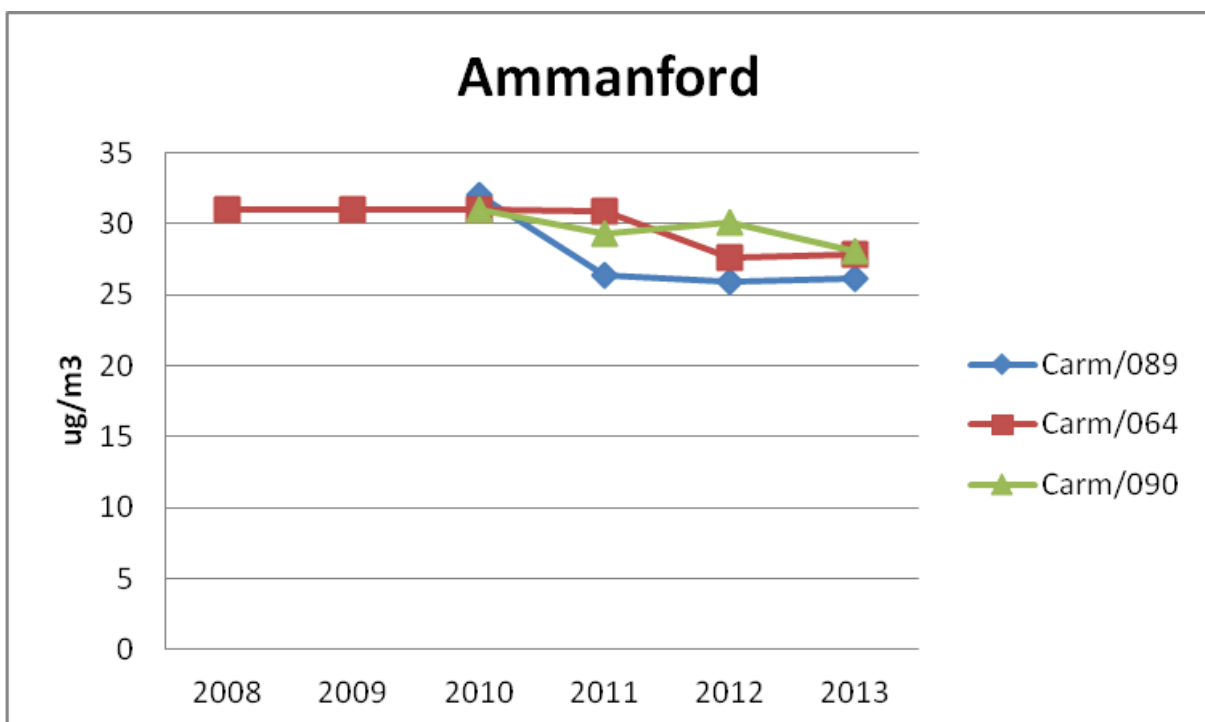
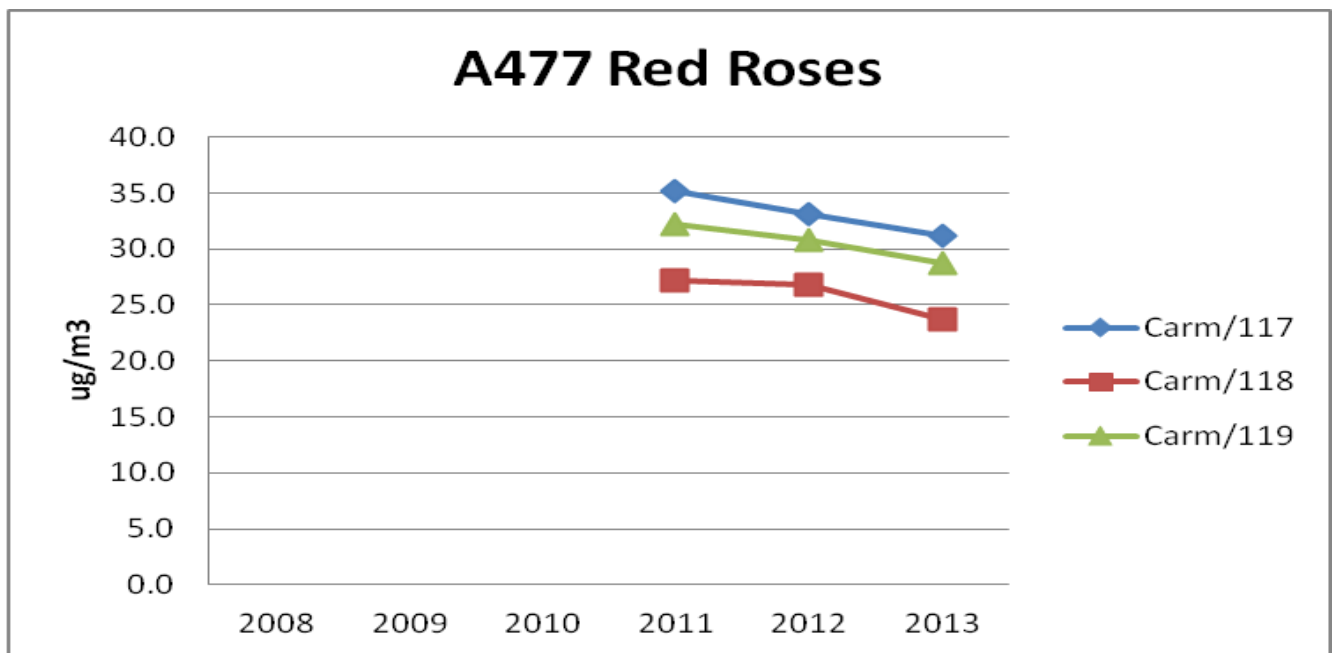


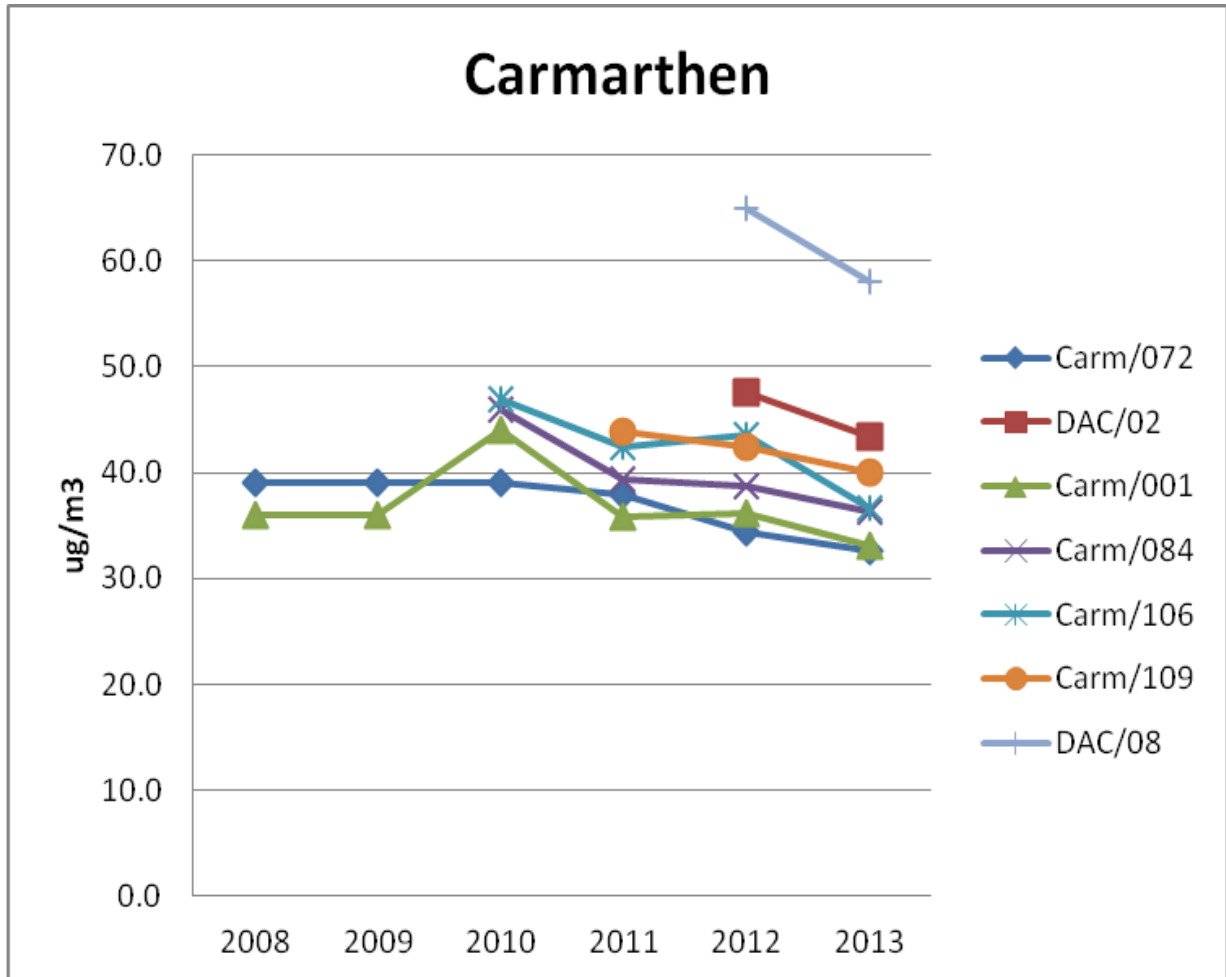
Figure 2.4b below provides the trends for the A477 diffusion tubes that were set up to assess the impact from the Red Roses Relief Road project. The results for the tubes last year was somewhat surprising as it was expected that the results would increase as the project progressed and that there would potentially be significant congestion associated with the works being carried out. However, the impacts on traffic flow were relatively minimal during 2013 and this is perhaps testament to the contractors implementing the project.

Figure 2.4b Annual Mean NO₂ Trend Graph (A477 Red Roses)



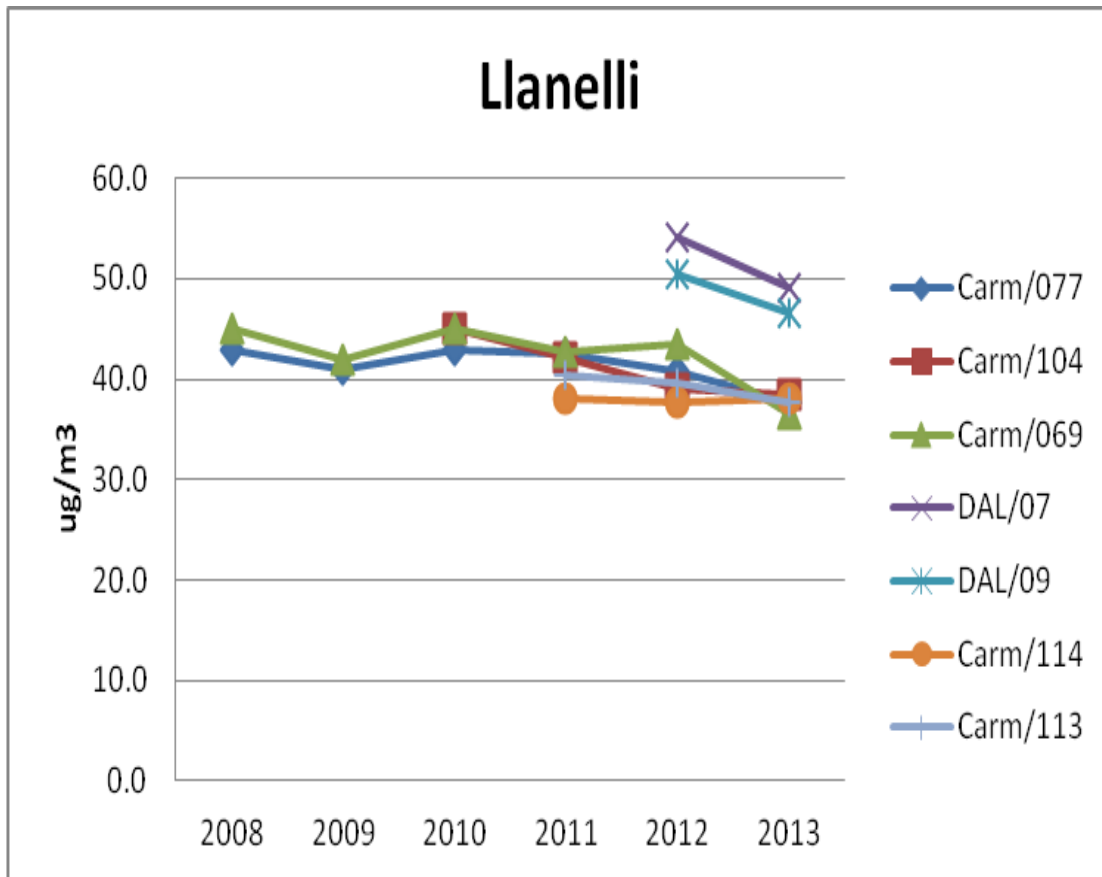
The graph below in Figure 2.4c shows the main diffusion tube sites associated with the town of Carmarthen. The two historical tubes, St Catherine Street rdbt (Carm/072) and St Catherine Street (Carm/001), display a slight downward trend and are below the AQO. However, the two sites associated with the Detailed Assessment, 85 Priory Street (E) (DAC/08) and 15 Park Terrace (DAC/02), are both above the AQO. All of the sites for Carmarthen display a downward trend but this may be misleading as 2013 was an exceptionally wet year.

Figure 2.4c Annual Mean NO₂ Trend Graph (Carmarthen)



There is a relatively similar trend for the town of Llanelli, as illustrated in Figure 2.4d, with the historical tubes displaying a slight downward trend such that they are just below the AQO and the new sites of DAL/07 (nr 13 Felinfoel Road) and DAL/09 (Thomas Street (Barnardos)) being significantly above the AQO. Again, the continued reduction in results for 2013 may be associated with the very wet weather conditions.

Figure 2.4d Annual Mean NO₂ Trend Graph (Llanelli)



Figures 2.4e and 2.4f below both relate to the town of Llandeilo. Figure 2.4e shows the trends for results using the actual data captured for the year, whereas figure 2.4f uses the annualised data to assess what impact the three month road closure data had on the trend graphs. As can be seen, in Figure 2.4e all of the results drop below the Objective Level whereas with the annualised data in Figure 2.4f the graph shows four of the results for 2013 (DA/07, Carm/083, DA/09 and DA/10) are above the Objective Level. This is a better representation of what the situation would have been like had there been no road closure.

Figure 2.4e Annual Mean NO₂ Trend Graph (Llandeilo)

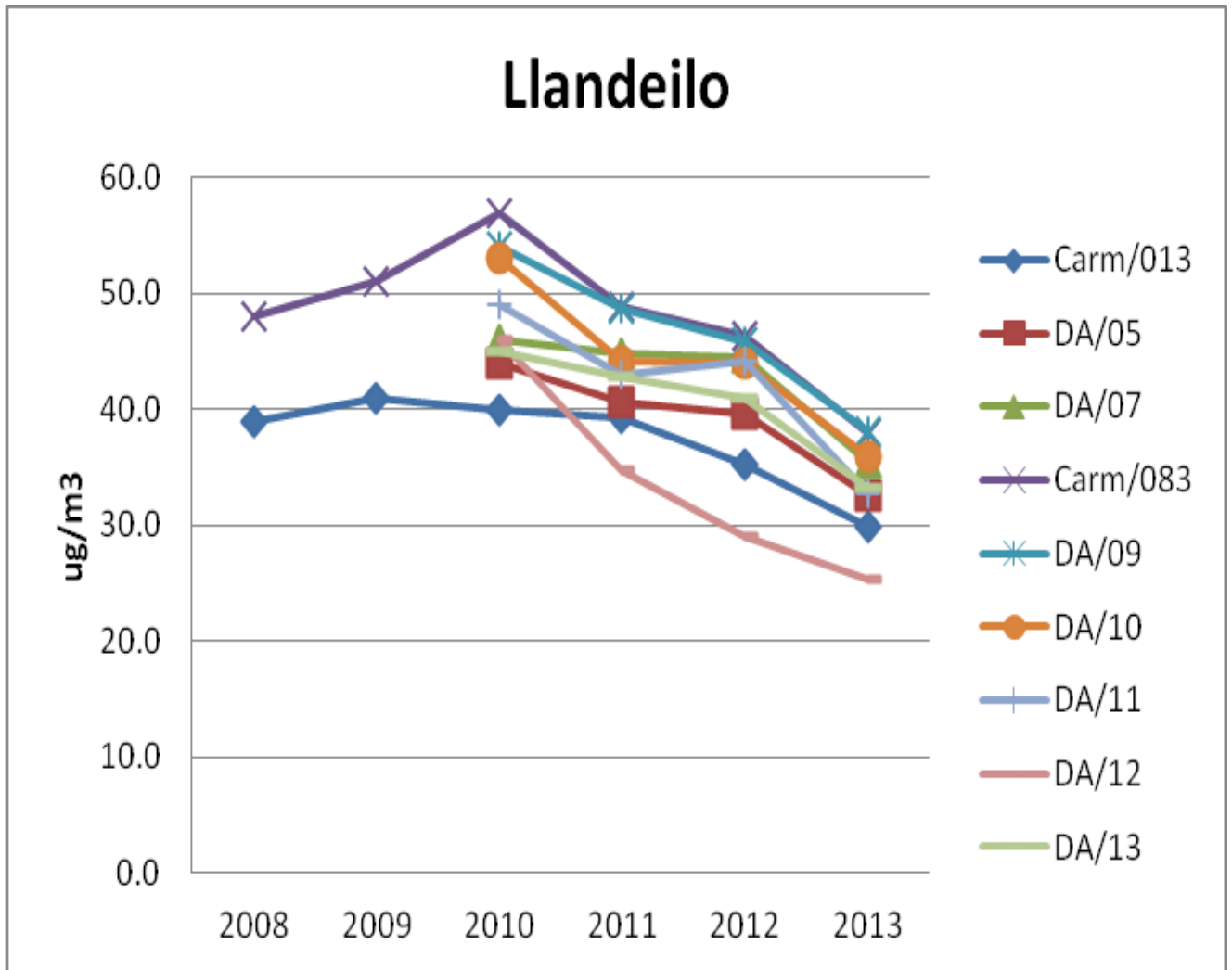
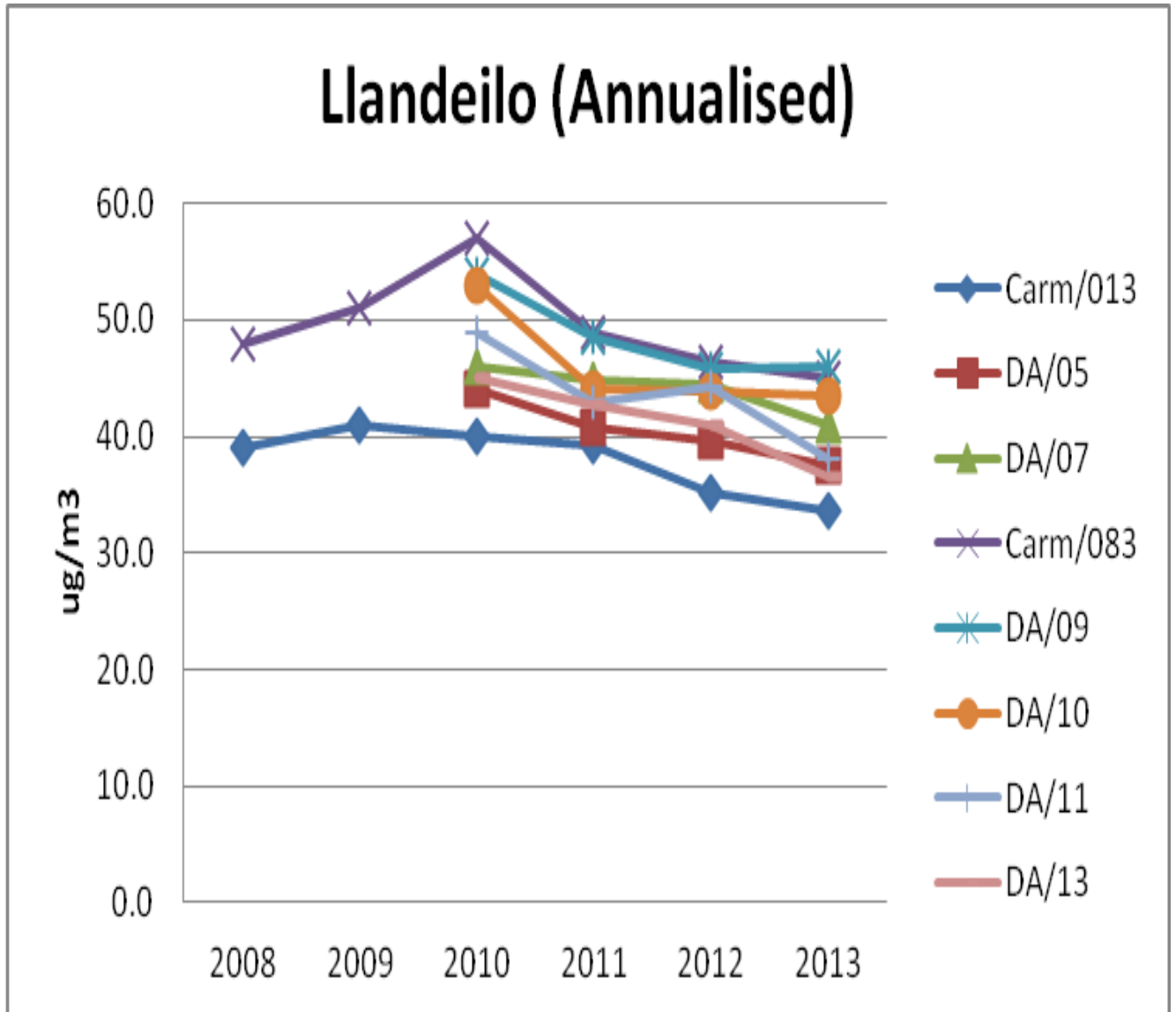


Figure 2.4f Annual Mean NO₂ Trend Graph (Llandeilo) (Annualised 2013 Data)



2.2.2 Particulate Matter (PM₁₀)

Carmarthenshire County Council has no fixed long term automatic PM₁₀ monitoring locations.

In previous years PM₁₀ monitoring exercises have been carried out in various locations across the county where it has been considered there may be a potential issue or in response to complaints about industrial activities. None of the previous surveys have identified any breaches of the PM₁₀ objective levels. Due to the continuing financial constraints it was deemed appropriate to discontinue the annual surveys, unless a specific requirement was identified, and to concentrate on those air quality issues that were known to exist, i.e. traffic related NO₂.

Therefore no PM₁₀ monitoring exercise was carried out during 2013.

The dust survey that has been on-going in relation to the construction of the A477 St Clears to Red Roses Relief Road has come to an end in April 2014. The results from this work will be assessed and reported later in the year with an update from the findings included in the 2015 annual report.

2.2.3 Sulphur Dioxide (SO₂)

There has been no formal monitoring of sulphur dioxide by Carmarthenshire County Council. However, previous assessments and reports identified that there was the potential for exceedence of the 15 minute mean by way of idling steam locomotives at a station in Bronwydd, Carmarthen. The locomotives would regularly idle at the platform for periods of greater than 15 minutes where members of the public would be waiting, within 15 meters of the locomotives.

Discussions with the management of the railway company resulted in an agreed fixed work notice being issued that restricted the waiting time at the platform to less than 10 minutes. This agreement has been in place for a number of years and is still being monitored.

It has been agreed that Carmarthenshire County Council will carry out three unannounced compliance visits to confirm that the requirements of the fixed work notice are being maintained.

Unfortunately it was only possible to perform two compliance visits during 2013. Neither of these identified a breach of the fixed work notice during the visits. The compliance letter associated with these visits can be found in Appendix H.

2.2.4 Benzene

Carmarthenshire County Council does not carry out monitoring for benzene.

2.2.5 Other Pollutants Monitored

There are no requirements for other pollutants to be monitored by Carmarthenshire County Council.

2.2.6 Summary of Compliance with AQS Objectives

Carmarthenshire County Council has measured concentrations of NO₂ above the annual mean objective at relevant locations outside of the Llandeilo AQMA as part of Extended Detailed Assessments for the towns of Carmarthen and Llanelli and has reported on the results. The recommendation is **to proceed to Designating AQMA's** for the relevant areas in each town. **Further Assessments are also to be carried out** to identify the reduction in NO₂ required in order to meet the AQO and to determine the number of receptors for each area of concern.

3 New Local Developments

3.1 Road Traffic Sources

Construction of the A477 Red Roses Relief Road was ongoing through 2013 with sections of the new road brought in to use as part of the tie-in arrangements with the existing carriageways. Whilst traffic light control was in place at the Red Roses and St Clears areas for extended periods, there were no occasions when a full road closure was required to enable works to continue. This was despite plant and equipment having to traverse the existing road. No dust complaints were received throughout the duration of the construction.

The new road was officially opened in April 2014.

3.2 Other Transport Sources

Carmarthenshire County Council confirms there are no new/newly identified non-road transport sources.

3.3 Industrial Sources

There have been a number of changes with the Permitted Activities in Carmarthenshire. There have been three new permits issued for either new operators or those that had been operating without a permit. These were one bulk cement activity, one mobile plant and one Part 1b vapour recovery activity.

It is not considered that any of these activities will have significant impact on local air quality.

3.4 Commercial and Domestic Sources

A small number of planning applications have been received that include the provision to install biomass boiler. Some of these are starting to be implemented. Requests for details of the boilers have been sent out but only a couple have been received to date. This has allowed the biomass boiler register to be started and it is intended that the register will be maintained up to date as much as possible.

3.5 New Developments with Fugitive or Uncontrolled Sources

Carmarthenshire County Council confirms there are no new/newly identified fugitive or uncontrolled sources.

Carmarthenshire 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.

Carmarthenshire 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 Local / Regional Air Quality Strategy

Carmarthenshire County Council has not developed a specific Local Air Quality Strategy. The air quality work is based on the National Strategies for monitoring of air quality and this has been used as the county's Air Quality Plan. The air quality work is constantly being reviewed to ensure it remains relevant and appropriate. The designation of the AQMA in Llandeilo and the setting up of the Steering and Action Planning Groups has helped to forge the links with internal stakeholders.

Additionally, during 2011/12 a regional document was developed between Carmarthenshire, Ceredigion, Powys and Pembrokeshire which was aimed at developers and planners to provide guidance from the air quality perspective on new development. The document is very much based on the Environmental Protection UK guidance document "Development Control: Planning for Air Quality (2010 Update)". The collaborative guidance document was written and agreed between the four authorities and issued in September 2012. It was made available to the Planning Departments of each authority and is used to assist with planning consultations. The document is titled "Mid and West Wales, Air Quality: A Guide for Developers".

The EPUK 2010 document is currently under review and once this review has been completed and the document re-issued then the collaborative guidance document will be reviewed.

5 Planning Applications

There have been a number of planning applications received in the last couple of years for projects that span a number of years and a few more recent applications. Air Quality Assessments have been requested along with Biomass Boiler Information requests to determine whether the developments will result in a negative impact on local air quality. Table 5.1 below summarises these details.

Table 5.1 Planning Applications

Reference	Description	Information Request	Response	Comments	Update
S/15702	Genwen Farm, Bynea	Dust assessment		Awaiting decision	No work
S/18743	Taylor Wimpy Stradey Park	AQA – traffic & construction	Negligible impact	Approved	Work started
S/21597	Land at Mountain Road, Pembrey	AQA – traffic & construction	Condition Dust Plan	Awaiting decision	No work
S/23696	Cross Hands West	AQA - traffic	Negligible impact	Approved	Work started
S/23781	Land south of Cross Hands East Strategic Employment Site	AQA – traffic	Negligible impact	Approved	Work started
W/23782	Land at Cross Hands East	AQA – traffic	Negligible impact	Approved	Work started

	Strategic Employment Site				
W/23866	Carmarthen Western Link Junction	AQA – traffic & construction	Negligible impact	Approved	Little progress
S/25812	Land rear of Denham Avenue, Llanelli (school)	AQA - traffic	Negligible impact	Approved	Work started
E/27510	Ffairfach School, Llandeilo	AQA – traffic, construction & power plant emissions	Negligible impact	Approved	Work started
W/27689	West Wales General Hospital	AQA – Biomass Boiler Info	Negligible impact	Approved	Work started
S/27721	KFC Cross Hands rdbt	AQA – traffic & construction	No impact	Withdrawn	
S/27813	Land off Yspitty Road and Heol Y Bwlch	Petrol station – VR info	May require VR Permit	Refused – Flood risk	
E/28015	Land at Foundry Road, Ammanford	Supermarket with petrol station	May require VR permit	Original refused – resubmission	
W/28099	Plot of land south of Llysonnen	Biomass Boiler info	May require permit	Approval	Little progress

	Road				
W/28331	Talfarn Farm, Llanddowror	Dust Assessment	Condition mitigation	Approved	
W/28900	Skip Solutions, Taybrite Works, Bynea	Dust Assessment	Proposed crusher - permit	Conditional Approval	
W/29036	Site adj Glyn Abbey Golf Club, Trimsaran	Petrol Station	May require permit	Outline Approval	
13/09296	Wood Gasification boiler	Biomass Boiler info	May require permit		Brecon Beacons National Park

6 Air Quality Planning Policies

Carmarthenshire Local Development Plan (LDP) is subject to public examination at the time of writing. The Inspector's report was due in September 2014 and it is anticipated that the Plan will be adopted by the Council in the autumn of 2014. The Plan contains a specific policy on Pollution, (**Policy EP2 Pollution**), which has been subject to iterative amendment and review. A collaborative working approach continues to be nurtured between the Air Quality team and the Authority's Forward Planning Section. The version of the policy which was published for public consultation within the Focused Changes (June 2013) is as follows:

Policy EP2 Pollution

Proposals for development should wherever possible seek to minimise the impacts of pollution. New developments will be required to:

- a) **Ensure that they do not cause a deterioration in local air quality (including through pollutant emissions and public exposure to pollution) and water quality.**
- b) **Ensure that light and noise pollution are where appropriate minimised;**
- c) **Ensure that risks arising from contaminated land are addressed through an appropriate land investigation and assessment of risk and land remediation to ensure its suitability for the proposed use.**

Strategic Objective Supported:
SO4, SO5, SO10 and SO11
<i>This policy should be read in conjunction with other relevant policies and proposals of this LDP.</i>

Reference should also be made however to emerging policy statements as a result of the considerations emanating from the Examination into the Carmarthenshire LDP. In this respect reference should be had to the forthcoming Matters Arising Changes to the LDP (June 2014).

Further information on the preparation of the LDP can be viewed at the following link:

<http://www.carmarthenshire.gov.uk/English/environment/planning/Planning%20Policy%20and%20Development%20Plans/Local%20Development%20Plan/Pages/LocalDevelopmentPlanhome.aspx>

Until the formal adoption of the LDP, the **Unitary Development Plan (UDP)** will remain the adopted development plan for the County in respect of decisions relating to land use. The UDP contains a specific policy covering air quality and pollution within the chapter on “Environmental Quality and Utility Provision”. The policy is detailed below:

UT12 – Pollution

It is the policy of Carmarthenshire County Council that development proposals which would cause air, soil, water, noise or other form of environmental pollution will only be permitted where they do not pose an unacceptable risk to public health, safety and the natural environment, and where they would not unacceptably affect the amenity of the area and neighbouring residents.

Proposals involving a lighting scheme will only be permitted where it would not have an adverse effect on the amenity of residents, vehicular and pedestrian traffic, the character of the area and species.

- To protect the natural environment and species.
- In the interests of amenity.
- In the interests of public health and safety.

Note: Where appropriate, the submission of an air quality assessment may be required under the Air Quality (Wales) Regulations. Consultations will be conducted with relevant agencies including the Environment Agency¹.

¹ Affiliated with Countryside Council for Wales and Forestry Commission Wales and now known as Natural Resources Wales

7 Local Transport Plans and Strategies

The authority historically held a Local Transport Plan; however, this was incorporated in to a Regional Transport Plan which had been established under the direction of the Welsh Government. The region covers the unitary authorities of Neath-Port Talbot, Swansea, Carmarthenshire and Pembrokeshire. The collective name of the authorities was known as the South West Wales Integrated Transport Consortium (SWWITCH).

The Regional Transport Plan, as issued by SWWITCH is now no longer being utilised in the same way since funding for the consortium was removed. It is now expected that local transport plans will be developed but that will still have to have due regard to the regional transport requirements.

The Local Air Quality Management work fed in to the Regional Transport Plan work to aid reviews and development of the strategies but this will now have to be tailored to any local plans and strategies that are developed. At this time it has not be possible to determine when this will take place.

It is known that some of the strategies and projects that were contained in the Regional plan are being pursued locally, particular in respect of road safety and some of the sustainable transport projects. It is hoped that more information will be provided in the next annual report.

The authority is still implementing its own sustainable transport measures and reducing mileage where possible.

8 Climate Change Strategies

Carmarthenshire County Council has continued to implement the objectives contained within the Climate Change Strategy and is working towards more goals to achieve the objectives. The Sustainability team have undergone some change and it has not been possible to obtain specific details relating to project implementation and goals achieved. However, it is hoped that more detail will be provided in the next annual report.

The Climate Change Strategy contains three strategy objectives which are detailed below.

- Promote sustainable development: - by integrating actions to address climate change as a central part of broader mainstream programmes for sustainable development.
- Mitigate the impacts of its (the authorities) activities: - by reducing to the minimum extent possible its emissions of carbon dioxide and other green house gases.
- Adapt to the inevitable effects of climate change: - by recognising the real and potential impacts of climate change and intervening to moderate harm and exploit opportunities.

9 Implementation of Action Plans

A draft Action Plan has been developed in respect of the AQMA for Llandeilo. The draft Plan was subject to public consultation through September and October 2013 which generated comments from local residents, businesses and other interested parties. These comments have informed amendments to the Action Plan which was put before the Environment and Overview Scrutiny Committee in April 2014. The Action Plan is due for submission to Welsh Government in the near future.

9.1 Conclusions from New Monitoring Data

The diffusion tube monitoring in Llandeilo has highlighted the continued breach of the AQO along areas of Rhosmaen Street. Whilst the three month road closure at the beginning of 2013 affected the data such that the bias adjusted annual mean for each dropped below the AQO, the annualised data confirmed that there would have been exceedences in 'normal' conditions.

The Extended Detailed Assessment work in Carmarthen and Llanelli confirmed the existence of new areas of exceedence whilst also establishing that the areas of exceedence were not as extensive as originally thought. In fact no particular boundaries have been established, possibly because the areas of exceedence are actually very limited. However, work will begin on the designation of AQMA's for the areas of exceedence identified through the Extended Detailed Assessment work. The diffusion tube monitoring for these areas is continuing and will be treated as the Further Assessment work.

9.2 Conclusions relating to New Local Developments

Work in relation to assessing the impact from the town centre retail development in Carmarthen has continued. It was reported last year that there were modifications to the traffic light sequencing on the associated roads, along with a junction re-alignment, that have improved traffic flow. A review of the monitoring data associated with this area has identified that the NO₂ levels have dropped to below the AQO for this area. A small report was written in respect of this work and is shown in Appendix F.

The Extended Detailed Assessment work in Llanelli confirmed that the Eastgate development had not impacted significantly on local air quality. However the work did confirm there are breaches of the AQO in the town which are localised, but not likely to be attributable to the development.

9.3 Other Conclusions

The dust monitoring for the A477 Relief Road continued through 2013 and has not identified any major areas of concern. There were again some elevated results however none are thought to be directly related to site activities but more a case of contamination issues.

Sulphur dioxide monitoring work at Gwili Railway station identified compliance with the work order in relation to idling steam engines, although it was only possible to carry out two visits for the year.

9.4 Proposed Actions

The diffusion tube monitoring in Llandeilo will continue and the Action Plan will be issued in the near future. Work will then begin on implementing the Action Plan.

Results from the AQ Mesh pod located in Rhosmaen Street will continue to be analysed and compared to diffusion tube data. The equipment suppliers are introducing upgrades to the algorithms that are used to generate displayed results which will hopefully improve confidence with the data retrieved. It is planned to implement a traffic count survey in the vicinity of the AQ Mesh to cross reference with the air quality data obtained from it.

The Extended Detailed Assessment diffusion tube networks for the towns of Carmarthen and Llanelli will be maintained and the monitored data retrieved will form

the basis of the Further Assessment. Traffic count surveys are being planned for use with the Further Assessment work to help identify source apportionment and the reduction in NO₂ that is required to meet the AQO. Work will begin on designating AQMA's in the towns.

The Authority will continue to check compliance with the steam engine idling times at Gwili Railway station in Bronwydd by way of unannounced visits.

The Authority, working in partnership with other Public Health Wales, Dyfed Powys Police, Local Health Board and other relevant organisations has produced a Joint Strategic Needs Assessment (JSNA) for Carmarthenshire. This work highlighted that the town of Llanelli appeared to be suffering in respect of a range of multiple indices of deprivation and therefore a specific JSNA was commissioned for the town. This identified that certain Lower Super Output Areas (LSOAs) had significantly elevated levels of reported respiratory illness, compared to the Welsh average. Therefore it has been decided to review the specific areas to identify whether there are any sources of air pollution that may be contributing to the elevated reported figures. This work will feed back in to the review of the Llanelli JSNA and make recommendations where possible.

Work will start towards completing aspects for the 2015 Updating and Screening Assessment.

10 References

- Carmarthenshire County Council 2013 Progress Report
- Carmarthenshire County Council 2013 Llandeilo Road Closure Final Report (February 2014)
- Carmarthenshire County Council 2014 Carmarthen Extended Detailed Assessment Report (February 2014)
- Carmarthenshire County Council 2014 Llanelli Extended Detailed Assessment Report (February 2014)
- Carmarthenshire County Council 2014 Carmarthen Water Street Junction Report (February 2014)
- Carmarthenshire County Council Llandeilo Annualised Data (2013) for use with the 2014 Progress Report
- Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users (February 2008) (AEA Environment & Energy)
- Gwili Railway Company Limited Fixed Notice
- Gwili Railway Company Compliance Letter (19/02/14)
- LAQM WASP Rounds 117 – 124 (April 2012 – March 2014) NO₂ Report (LAQM Helpdesk website)
- Technical Guidance LAQM TG (09) (Defra)
- Tube Precision 2014 version 03-14 Final (LAQM Helpdesk website)
- Welsh Air Quality Forum Website – (data acquisition for annualised data calculations)

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Environmental Scientifics Group Limited (ESG) prepares and analyse the diffusion tubes on behalf of Carmarthenshire County Council. The tube preparation method is acetone:triethanolamine, 50:50 mixtures. The bias adjustment factor chosen was 0.80 and taken from the Review and Assessment Helpdesk Database.

Factor from Local Co-location Studies (if available)

Carmarthenshire County Council has not carried out a co-location study.

Discussion of Choice of Factor to Use

The national bias adjustment factor was used because a co-location study has not been carried out locally. The latest version of the tube bias adjustment spread sheet is 03/14, as detailed on the Review and Assessment website. ESG have 28 studies listed for 2013 that gives an overall bias adjustment figure of 0.80.

PM Monitoring Adjustment

Carmarthenshire County Council did not carry out any PM₁₀ monitoring during 2013.

Short-term to Long-term Data adjustment

Table A.1 below details the automatic monitoring sites that were used to generate the Annual and Period mean figures used to obtain the Ratio for use in the Annualised data calculation for the sites in Llandeilo that were affected by the three month road closure at the start of 2013. The Period Mean dates were from April to December for each site that was assessed. The results from the work are illustrated in Figure 2.4f above and reported in Appendix G.

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment

Site	Site Type	Annual Mean ($\mu\text{g}/\text{m}^3$)	Period Mean ($\mu\text{g}/\text{m}^3$)	Ratio
Aston Hill	Rural	4.9236	3.7202	1.3235
Blackwood High Street	Roadside	32.761	31.78	1.0309
Chepstow A48	Roadside	34.532	33.445	1.0325
Fonmon	Rural	11.334	9.9751	1.1362
St Julians Comprehensive	Urban Background	23.0686	20.8212	1.1076
Margam	Urban Background	16.8736	15.4369	1.0931
Taf Broadway	Roadside	31.2816	29.8062	1.045
Average				1.11

The raw data used for calculating the above Annual and Period means was obtained from the Welsh Air Quality Forum website. The raw data sets are considered too large to include within this report.

QA/QC of Diffusion Tube Monitoring

Tube Precision

ESG Didcot using a preparation method of 50% TEA in Acetone had 22 studies in 2013 that were rated at Good.

This information was obtained from the document 'Tube Precision 2014 version 03-14 Final' located on the Defra LAQM Helpdesk website.

WASP Results

The results below are for Environmental Scientifics Group [1].

WASP R117	WASP R118	WASP R119	WASP R120	WASP R121	WASP R122	WASP R123	WASP R124
Apr-Jun 2012	Jul-Sep 2012	Oct-Dec 2012	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	Jan-Mar 2014
100%	100%	100%	100%	100%	100%	100%	

[1] Participant subscribes to two sets of test samples (2 X 4 test samples) in each WASP PT round.

The above details were obtained from the document 'LAQM WASP Rounds 117 – 124 (April 2012 – March 2014) NO₂ Report located on the Defra LAQM Helpdesk website.

Appendix B: Carmarthen Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Carm/072	51.3	44.1	35.7	45.6	28.2	31.4	32.3	33.8	-	43.2	48.8	55.3
DAC/02	76.9	-	48.0	62.5	39.9	44.9	48.7	44.2	51.5	57.2	64.6	58.3
DAC/16	84.5	54.7	54.5	51.1	33.9	40.6	38.4	38.9	46.0	45.2	57.4	41.0
Carm/001	50.1	53.1	43.1	40.8	33.2	32.6	30.5	30.5	41.3	38.5	53.9	48.9
DAC/04	41.2	31.6	27.7	31.8	23.7	24.2	21.0	23.7	30.8	28.6	-	44.7
Carm/084	63.6	-	-	55.8	30.1	37.0	35.9	33.5	48.4	37.9	66.1	47.0
DAC/05	54.6	40.7	36.3	47.0	35.6	39.5	38.7	36.5	-	44.5	50.7	-
Carm/106	56.4	53.4	40.7	48.1	38.6	35.3	35.3	43.8	48.3	47.1	-	56.0
DAC/06	56.6	44.9	34.1	41.7	24.7	31.1	30.1	29.2	32.8	44.7	48.7	35.9
DAC/13	50.1	49.8	37.6	31.4	32.7	34.3	34.8	35.4	39.2	32.8	59.5	53.5
Carm/109	68.7	51.3	43.5	53.2	35.9	43.5	42.3	40.5	51.3	43.1	62.1	66.7
DAC/08	82.5	83.4	69.9	62.0	64.9	62.4	66.1	82.0	76.2	62.6	90.8	67.0
DAC/14	57.6	47.7	26.4	48.4	36.9	34.0	36.6	42.2	38.0	42.3	54.0	65.4
DAC/15	41.9	39.9	28.9	41.6	30.2	30.1	31.4	33.8	35.4	41.3	44.7	60.0
Carm/111	54.3	38.5	45.2	48.0	32.9	33.2	36.9	38.6	39.4	38.6	52.0	55.3
DAC/12	54.6	50.5	38.1	42.1	38.4	35.8	34.8	37.8	43.3	42.4	62.7	52.7
Carm/126	41.4	39.2	32.7	32.3	24.0	25.1	24.5	22.2	30.8	28.2	45.2	29.0

Appendix C: Llanelli Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DAL/20	46.0	31.2	26.1	25.8	19.9	20.6	24.2	19.6	27.2	27.4	30.2	31.2
DAL/21	27.0	20.9	17.2	17.4	10.9	13.2	10.2	10.5	19.4	12.4	18.3	-
DAL/14	45.5	34.6	29.3	28.0	24.5	26.0	32.6	29.8	34.9	33.1	-	-
DAL/15	35.9	39.7	28.5	23.3	26.5	24.4	19.5	24.2	31.1	25.8	49.2	23.2
Carm/077	65.3	47.6	47.1	46.8	37.9	37.2	42.6	39.1	38.3	50.4	59.1	54.4
DAL/22	53.5	42.4	44.9	35.8	29.4	37.2	34.3	30.6	35.7	36.9	45.6	41.8
DAL/16	41.7	35.5	-	27.4	20.4	20.9	24.7	19.6	26.3	23.4	-	-
DAL/17	37.5	39.4	36.8	29.7	20.6	20.9	17.9	19.5	28.2	26.5	40.4	23.3
DAL/07	65.1	68.6	66.4	55.0	52.4	56.1	55.3	58.0	64.4	55.4	85.8	53.7
DAL/23	50.4	33.5	43.7	30.9	21.1	24.8	22.1	20.5	29.0	28.8	38.7	30.0
DAL/09	64.3	62.4	50.3	52.4	60.1	54.4	57.4	55.1	57.0	52.4	68.4	63.4
Carm/104	69.1	59.1	59.7	50.3	38.2	38.5	40.3	36.1	48.0	42.5	-	-
DAL/10	66.4	57.7	63.9	39.7	37.2	40.6	38.6	38.6	48.6	42.3	53.2	44.3
Carm/069	-	49.6	53.1	45.3	35.3	40.7	41.0	42.0	48.4	44.0	57.3	-
DAL/12	60.8	47.7	35.0	29.7	27.8	34.1	25.6	26.8	40.1	35.0	-	35.7
DAL/04	56.2	53.6	43.1	38.4	36.1	35.0	35.6	51.1	40.8	40.6	50.8	35.5
Carm/114	66.9	53.1	51.2	42.9	36.5	37.2	43.7	32.7	44.8	43.0	64.8	52.4
DAL/24	38.1	23.9	34.9	19.4	19.2	20.1	16.1	15.4	26.2	20.9	36.3	23.8
Carm/113	58.7	44.3	51.5	41.5	40.2	44.9	47.8	45.6	48.0	45.3	51.5	45.6
DAL/25	35.0	26.0	29.1	-	18.4	23.0	22.4	20.3	26.6	24.9	28.8	22.1

Appendix D: Llandeilo Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FA/01	26.8	21.1	26.6	15.1	11.1	16.4	13.3	15.3	20.2	17.6	28.0	22.8
DA/15	39.7	-	33.0	26.0	25.0	26.4	26.1	26.2	30.9	29.6	42.1	37.0
DA/01	39.1	35.5	39.8	26.6	25.6	27.4	24.7	27.0	25.8	31.1	46.6	37.1
DA/03	23.2	23.1	27.6	31.8	23.4	24.2	25.3	26.8	30.3	40.2	47.9	45.6
Carm/013	27.3	25.0	27.5	34.2	36.1	33.0	32.5	39.9	45.6	40.3	63.0	43.0
DA/05(A)	30.2	23.7	30.5	44.5	35.4	48.1	41.7	39.5	47.6	46.7	64.2	42.9
DA/05(B)	28.7	19.8	28.9	44.8	37.6	40.5	45.1	38.8	46.4	47.1	63.3	54.7
DA/05(C)	27.6	22.4	25.6	46.0	30.4	38.8	40.4	39.4	45.1	45.8	62.1	51.4
DA/07	26.4	19.2	-	-	41.0	49.9	48.2	43.2	49.6	50.2	62.7	52.1
Carm/083	28.1	19.8	28.8	52.9	46.4	53.4	56.8	44.4	51.6	56.2	81.8	48.3
DA/09	27.1	19.7	30.6	52.6	50.2	-	53.6	41.4	55.6	55.7	84.2	53.4
DA/10	29.7	21.7	29.2	51.2	-	47.2	49.5	39.4	53.1	52.1	75.8	-
DA/11	31.1	22.3	24.3	39.9	45.8	44.6	44.2	46.1	50.8	47.1	51.7	44.6
FA/02	22.9	18.6	20.5	16.9	12.0	10.9	11.4	10.7	14.4	14.9	25.2	18.7
DA/12	55.8	35.7	28.5	30.6	23.3	22.4	20.7	22.8	26.3	36.0	47.6	-
DA/13	42.2	28.9	29.1	38.0	40.1	42.6	44.6	41.1	45.3	46.0	56.1	45.3
DA/14	33.3	-	29.1	26.6	30.0	25.1	27.0	30.7	33.7	30.2	37.3	33.4
DA/16	65.1	68.7	54.9	47.1	44.2	37.3	36.3	36.2	43.9	42.2	48.7	40.7
FA/03	29.3	27.0	31.5	25.9	20.1	22.1	18.7	18.7	25.0	22.5	32.4	-
FA/07	17.8	16.5	21.7	10.0	10.1	11.3	8.9	9.7	12.9	12.2	18.1	14.1
FA/06	-	28.2	29.0	20.8	19.0	18.7	17.3	17.2	23.2	18.7	-	-
FA/04	24.1	19.6	23.3	16.2	14.4	15.1	15.1	15.2	19.8	18.1	24.7	14.8
FA/05	26.6	23.0	26.7	21.1	16.7	17.7	17.7	19.0	21.1	23.1	29.5	25.7

Appendix E: Ammanford and A477 Tube Sites Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Carm/089	45.0	42.1	36.0	29.8	25.9	29.8	24.5	21.4	37.0	23.7	46.0	31.2
Carm/064	38.7	32.9	33.3	36.5	26.7	26.8	27.6	-	39.0	31.2	48.8	41.0
Carm/090	44.7	39.2	23.8	32.6	28.5	30.3	31.1	29.1	42.5	37.6	39.3	42.1
Carm/117	43.6	41.6	41.2	44.7	37.2	41.9	38.5	37.6	39.3	32.5	42.4	26.7
Carm/118	-	33.0	28.9	30.7	29.1	30.1	16.2	33.9	32.8	25.2	42.3	23.3
Carm/119	-	31.7	40.2	38.0	32.3	38.3	38.3	38.9	34.2	33.0	45.4	25.5

Appendix F: 2014 Carmarthen Water Street Junction Report



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

Carmarthen Water Street Junction Report

(February 2014)

Oliver Matthews - Scientific Officer (Air Quality)

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Appendix 1 – Water Street Junction Diffusion Tube Locations

Appendix 2 – Site Photographs

Appendix 3 – Diffusion Tube Site Details

Table 1 – Previous Bias Adjusted Data

1.0 Purpose of Report

This report assesses the impact that re-alignment work of Water Street junction has had on the vicinity in terms of diffusion tube results.

The improvement of the junction was a proactive step taken by Transport and Engineering colleagues in trying to address a traffic congestion problem that had arisen subsequent to a new retail development in the centre of Carmarthen town.

2.0 Background

In 2009 / 2010 work was being carried out on a new retail development within the centre of Carmarthen town which would have an associated multi-storey car park adjacent to it. Due to the location the works caused considerable traffic congestion through the town for the duration of the works. Complaints were received by the authority, and in particular about air quality impacts from the traffic congestion and what the future impacts may be.

It was decided to set up a diffusion tube in close proximity to the multi-storey car park access junction to determine what nitrogen dioxide (NO₂) levels were in the ambient air. The initial results obtained from the second half of 2010 were above the air quality objective and therefore it was decided, as part of more targeted work, to set up further diffusion tube sites within the vicinity.

The new sites would form part of the Detailed Assessment of Carmarthen which began in 2012. However, continuing congestion issues and the effects on the town road network meant that work was required to relieve the pressure on the network and ensure traffic could flow more easily. Work began on a re-design of Water Street junction such that a right turn filter lane to the east of the junction could be reinstated. The alteration to the junction was completed in early 2013.

The diffusion tube locations are detailed on the map shown in Appendix 1, with the specific site details shown in Appendix 3.

3.0 Diffusion Tube Monitoring Results

The bias adjusted tube data obtained for this area of Carmarthen town from 2008 to 2013 are shown in Table 1, below. The tube locations in the area varied over this time period as the development of the retail facility progressed. It should be noted that the data below for 2008 to 2011 relates to diffusion tubes that were prepared and analysed by Bristol Scientific Services using a preparation method of 20% triethanolamine in water. The 2012 and 2013 results are based on diffusion tubes supplied and analysed by Environmental Scientifics Group (Didcot) using a preparation method of 50:50 acetone:triethanolamine mixture. The bias figures are as quoted in the relevant reports submitted.

Table 1 – Previous Bias Adjusted Data

Tube Id	Location	2008	2009	2010	2011	2012	2013
		(0.87)	(0.86)	(0.85)	(0.83)	(0.79)	(0.79)
Carm/072	St Catherine St rdbt	39	39	39	38	34	32
DAC/03	St Catherine St rdbt (N)	-	-	-	-	23	-
Carm/001	St Catherine St	36	36	44	36	36	33
DAC/04	Water St (Probation Office)	-	-	-	-	27	24
Carm/084	Water St	-	-	46	39	39	36
DAC/05	44 Water St	-	-	-	-	38	34
Carm/085	Pentrefelin Street	-	-	22	19	-	-
Carm/086	Waterloo Terrace	-	-	25	22	-	-
Carm/107	Barn Road	-	-	-	32	32	-
Carm/106	St Catherine St (A)	-	-	47	42	44	36
Carm/058	Old Mart Site	31	29	-	-	-	-

4.0 Results Discussion

The slight reduction in the bias figure from 2011 to 2012 is not thought to have had much impact on results. In the case of St Catherine Street roundabout the result did reduce, however for St Catherine Street (A) it went up. All other sites that had remained in use stayed at the same level.

Although there had been a general reduction in NO₂ levels up to 2012 the sites in Water Street were border line and St Catherine Street (A) was still exceeding the annual mean objective of 40µg/m³. However, as can be seen from Table 1 the results in 2013 illustrate a significant reduction such that all sites are below the objective level and sufficiently low to not be considered border line, at this stage. This is a surprising outcome for the 2013 results as the Water Street junction re-alignment works were carried out during the first few months of 2013 with traffic light control in place and greater than normal congestion. It may be that the climatic conditions experienced in 2013 had an impact on the overall annual results.

5.0 Conclusion

The pro-active work carried out by Transport and Engineering colleagues does seem to have made a contribution towards reducing the NO₂ loading in and around the Water Street junction. Whilst it may be too early to determine that the results have reduced and will remain below the objective level, there is no immediate requirement to consider the need to designate an Air Quality Management Area.

The current tube network in the vicinity will remain in place and the results reviewed carefully so see if there has been a genuine drop in annual mean NO₂ results.

Appendix 1- Water Street Junction Diffusion Tube Locations



Appendix 2 – Site Photographs



Carm/001 – St Catherine Street



DAC/04 – Water Street (Probation Office)



DAC/05 – 44 Water Street



Carm/084 – Water Street



Carm/106 – St Catherine Street (A)

Appendix 3 – Diffusion Tube Site Details

Tube No.	Tube Location	Height (m)	Free Air Y/N	Distance from kerb (m)	Vegetation Y/N	Flues Y/N	Distance to receptor (m)
DAC/04	Water St (Probation Office)	2.80	Y	0.90	N	N	Façade
Carm/001	St Catherine St	2.75	Y	1.70	N	N	0.25
Carm/084	Water St	2.75	Y	0.90	N	N	0.25
DAC/05	44 Water St	2.68	Y	1.25	N	N	Façade
Carm/106	St Catherine St (A)	2.85	Y	1.40	N	N	Façade

**Appendix G: Llandeilo Annualised Data (2013) for use with
the 2014 Progress Report**



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

**Llandeilo Annualised Data (2013) for use with the 2014
Progress Report**

(May 2014)

This document contains details for the calculations relating to annualised data that has been included in the 2014 Progress Report to illustrate the impact of the closure of Rhosmaen Street at the start of 2013.

Background

Llandeilo has been designated as an Air Quality Management Area (AQMA) and over the last couple of years a draft Action Plan has been developed. As part of Action Planning proposals were put forward that suggested the use of local diversion routes to remove traffic from the main road (Rhosmaen Street) and therefore ease congestion and hopefully reduce the NO₂ levels. It became known that essential gas main works were required along Rhosmaen Street that would result in a full road closure for a minimum period of three months. The suggested diversion routes were to be used for the duration of the road closure. This led to a monitoring project being developed and implemented that assessed the impact on the diversion routes and the reduction of NO₂ on Rhosmaen Street, and this work has been reported separately.

This report is to assess what impact the road closure, and resultant reduction in NO₂ results, has had on the annual mean data for the tubes affected by the road closure. It is considered important to assess the impacts as the annual data is reported and used for trend graphs which may now be affected and provide a false impression of what the air quality situation is within the AQMA.

The diffusion tube locations that are under consideration as being affected by the road closure are detailed in Table 1 below.

Table 1 – Llandeilo sites affected by road closure

Site Id	Location
DA/01	Rhosmaen Street (No 69)
DA/03	Rhosmaen Street (No 87)
Carm/013	Llandeilo - Rhosmaen Street
DA/05	Rhosmaen Street (Evans Butchers)
DA/07	Rhosmaen Street (Castle Hotel)
Carm/083	Llandeilo - Rhosmaen Street (2)
DA/09	Rhosmaen Street (No 123)
DA/10	Rhosmaen Street (No 133)(Craft Shop)
DA/11	Rhosmaen Street (No 74)(Style)
DA/12	Stryd Y Brenin (Travel Shop)
DA/13	Rhosmaen Street (Park Area)
DA/16	Bridge Street (South)

Annualised Data

Monthly diffusion tube results were obtained for the sites in Llandeilo during 2013, however the first three months (Jan – Feb) for those sites detailed in Table 1 above are not considered to be representative of what would ‘normally’ be expected. All of the sites listed (except DA/01, DA/12 and DA/16) would have had very little traffic passing by them during the three month period, although plant and equipment may have been used in the vicinity of them. The other three sites identified would have either had more traffic passing them or queuing traffic related to traffic controls in place near them.

Using the method provided in Technical Guidance TG (09) it is possible to estimate what the annual mean concentration may have been in ‘normal’ circumstances. This is achieved using 2013 tube data from other locations within the county and averaging the data and attaining a ratio figure for use with the Llandeilo data. The sites used for this exercise were; Ammanford - Tir Y Dail Lane (2) (Carm/089), Ammanford – Wind Street (Carm/064), A477 – Sporting Chance Pub (Carm/118), and A477 – St Clears rdbt (Carm/119).

Table 2a below show the 2013 raw monthly data for the sites along with the Annual mean (Am) and Table 2b provides the raw data for period (Apr – Dec) in 2013, along with the Period Mean. The data capture for Tir Y Dail Lane (2) was 100% and for the other three sites it was 92%.

Table 2a – 2013 raw data (Annual Mean)

Tube Id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (Am)
Carm /089	45.0	42.1	36.0	29.8	25.9	29.8	24.5	21.4	37.0	23.7	46.0	31.2	32.7
Carm /064	38.7	32.9	33.3	36.5	26.7	26.8	27.6	-	39.0	31.2	48.8	41.0	34.8
Carm /118	-	33.0	28.9	30.7	29.1	30.1	16.2	33.9	32.8	25.2	42.3	23.3	29.6
Carm /119	-	31.7	40.2	38.0	32.3	38.3	38.3	38.9	34.2	33.0	45.4	25.5	36.0

Table 2b - 2013 raw data (Apr – Dec) (Period Mean)

Tube Id	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Period Mean (Pm)
Carm /089	29.8	25.9	29.8	24.5	21.4	37.0	23.7	46.0	31.2	29.9
Carm /064	36.5	26.7	26.8	27.6	-	39.0	31.2	48.8	41.0	34.7
Carm /118	30.7	29.1	30.1	16.2	33.9	32.8	25.2	42.3	23.3	29.3
Carm /119	38.0	32.3	38.3	38.3	38.9	34.2	33.0	45.4	25.5	36.0

The ratio figure Ra can be found by dividing the Annual Mean (Am) by the Period Mean (Pm) for each of the sites and then averaging the results. This is illustrated in Table 3 below.

Table 3 – Ratio Figure Ra

Tube Id	Annual Mean (Am)	Period Mean (Pm)	Am/Pm
Carm /089	32.7	29.9	1.09
Carm /064	34.8	34.7	1.00
Carm /118	29.6	29.3	1.01
Carm /119	36.0	36.0	1.00
		Ra =	1.03

The Ra figure can be used with the 2013 Llandeilo tube data for the period April – December in order to estimate the annual mean concentration for each tube site and bias adjusted using 0.80. This is the latest figure from spread sheet 03/14 obtained from the Review and Assessment Helpdesk web site. The monthly raw tube data for Llandeilo is shown in Table 4 below, along with the raw measured mean.

Table 4

Tube Id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
DA/01	39.1	35.5	39.8	26.6	25.6	27.4	24.7	27.0	25.8	31.1	46.6	37.1	32.2
DA/03	23.2	23.1	27.6	31.8	23.4	24.2	25.3	26.8	30.3	40.2	47.9	45.6	30.8
Carm/013	27.3	25.0	27.5	34.2	36.1	33.0	32.5	39.9	45.6	40.3	63.0	43.0	37.3
DA/05	28.8	22.0	28.3	45.1	34.5	42.5	42.4	39.2	46.4	46.5	63.2	49.7	40.7
DA/07	26.4	19.2	-	-	41.0	49.9	48.2	43.2	49.6	50.2	62.7	52.1	44.3
Carm/083	28.1	19.8	28.8	52.9	46.4	53.4	56.8	44.4	51.6	56.2	81.8	48.3	47.4
DA/09	27.1	19.7	30.6	52.6	50.2	-	53.6	41.4	55.6	55.7	84.2	53.4	47.7
DA/10	29.7	21.7	29.2	51.2	-	47.2	49.5	39.4	53.1	52.1	75.8	-	44.9
DA/11	31.1	22.3	24.3	39.9	45.8	44.6	44.2	46.1	50.8	47.1	51.7	44.6	41.0
DA/12	55.8	35.7	28.5	30.6	23.3	22.4	20.7	22.8	26.3	36.0	47.6	-	31.8
DA/13	42.2	28.9	29.1	38.0	40.1	42.6	44.6	41.1	45.3	46.0	56.1	45.3	41.6
DA/16	65.1	68.7	54.9	47.1	44.2	37.3	36.3	36.2	43.9	42.2	48.7	40.7	47.1

Table 4 illustrates that for most of the sites the monthly figures during the first three months were well below those for the rest of the year. This gives an idea of the impact from the road closure. However, site DA/16 (Bridge Street) displays some of the highest results for the year, particularly in the first three months, and this would be due to the fact that a set of traffic lights were located close by for most of the first three months. This resulted in queuing traffic through much of the day.

The data shown below in Table 5a is repeated from Table 4 but for the period April to December. The measured mean over the period is shown in the last column. Then in Table 5b the measured mean is multiplied by the ratio figure of 1.03 obtained from Table 3 above to provide a site mean. The site mean can then be bias adjusted using 0.80 being the latest figure from the Review and Assessment Helpdesk (03/14) and this provides the data post bias in the final column. The final column figures are considered to be more realistic of what the annual mean figure would have been if there had not been the three month road closure at the start of 2013.

Table 5a

Tube Id	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Measured Mean
DA/01	26.6	25.6	27.4	24.7	27.0	25.8	31.1	46.6	37.1	30.2
DA/03	31.8	23.4	24.2	25.3	26.8	30.3	40.2	47.9	45.6	32.8
Carm/013	34.2	36.1	33.0	32.5	39.9	45.6	40.3	63.0	43.0	40.8
DA/05	45.1	34.5	42.5	42.4	39.2	46.4	46.5	63.2	49.7	45.5
DA/07	-	41.0	49.9	48.2	43.2	49.6	50.2	62.7	52.1	49.6
Carm/083	52.9	46.4	53.4	56.8	44.4	51.6	56.2	81.8	48.3	54.6
DA/09	52.6	50.2	-	53.6	41.4	55.6	55.7	84.2	53.4	55.8
DA/10	51.2	-	47.2	49.5	39.4	53.1	52.1	75.8	-	52.6
DA/11	39.9	45.8	44.6	44.2	46.1	50.8	47.1	51.7	44.6	46.1
DA/12	30.6	23.3	22.4	20.7	22.8	26.3	36.0	47.6	-	28.7
DA/13	38.0	40.1	42.6	44.6	41.1	45.3	46.0	56.1	45.3	44.3
DA/16	47.1	44.2	37.3	36.3	36.2	43.9	42.2	48.7	40.7	41.8

Table 5b

Tube Id	2013 Measured Mean (M)	Ra	Site Mean (S) (MxRa)	Adjust Factor (BAF)	Data Post Bias (SxBAF)
DA/01	30.2	1.03	31.1	0.80	24.9
DA/03	32.8	1.03	33.8	0.80	27.0
Carm/013	40.8	1.03	42.0	0.80	33.6
DA/05	45.5	1.03	46.9	0.80	37.5
DA/07	49.6	1.03	51.1	0.80	40.9
Carm/083	54.6	1.03	56.2	0.80	45.0
DA/09	55.8	1.03	57.5	0.80	46.0
DA/10	52.6	1.03	54.2	0.80	43.4
DA/11	46.1	1.03	47.5	0.80	38.0
DA/12	28.7	1.03	29.6	0.80	23.7
DA/13	44.3	1.03	45.6	0.80	36.5
DA/16	41.8	1.03	43.1	0.80	34.5

The Data Post Bias figures in Table 5b above have been included in the 2014 Progress Report to illustrate the impact of the road closure on the trend graphs for Llandeilo.

Trend Graph Data

The data that has been used for trend graphs in Llandeilo since 2009 is shown below in Table 6. The last two columns of the table illustrate the difference in the figures between using the annual mean inclusive of the road closure month's data and then the annualised data generated above.

As can be seen from the data in the table, the results for the 2013 road closure data set do not display any site with an exceedence of the AQO but with the annualised data for 2013 there are four sites that exceed. This would appear to follow the historical pattern within the AQMA.

Table 6

Tube Id	2009	2010	2011	2012	2013 Road Closure	2013 Annualised
BAF	0.86	0.85	0.83	0.79	0.80	0.80
DA/01	-	31.0	30.3	27.4	25.8	24.9
DA/03	-	31.0	30.2	27.6	24.6	27.0
Carm/013	41.0	40.0	39.2	35.2	29.8	33.6
DA/05	-	44.0	40.7	39.6	32.6	37.5
DA/07	-	46.0	44.8	44.5	35.4	40.9
Carm/083	51.0	57.0	48.9	46.3	37.9	45.0
DA/09	-	54.0	48.6	45.8	38.1	46.0
DA/10	-	53.0	44.1	43.9	35.9	43.4
DA/11	-	49.0	43.0	44.2	32.8	38.0
DA/12	-	46.0	34.8	29.0	25.4	23.7
DA/13	-	45.0	42.8	41.0	33.3	36.5
DA/16	-	-	37.7	39.0	37.7	34.5

Cross Check With Automatic Sites

As a way of checking the accuracy of the annualised calculations and the use of local data from diffusion tubes a cross check was carried out using data obtained for automatic monitoring sites located across South Wales. The data was downloaded from the Welsh Air Quality Forum website but is considered too extensive to warrant including in this report. However, the ratio figure obtained from the annual and period means covering the same time periods as used above is shown in Table 7 below.

Table 7

	Annual Mean (Am)	Period Mean (Pm)	Ratio Am/Pm
Powys (Aston Hill)	4.9236	3.7202	1.3235
Caerphilly (Blackwood High Street)	32.761	31.78	1.0309
Chepstow (A48)	34.532	33.445	1.0325
Vale of Glamorgan (Fonmon)	11.334	9.9751	1.1362
Newport (St Julian's Comprehensive)	23.0686	20.8282	1.1076
Port Talbot (Margam)	16.8736	15.4369	1.0931
Rhondda Cynon Taff (Broadway)	31.2816	29.8062	1.0495
Average Ra	-	-	1.11

The Average Ra figure obtained from the automatic monitoring sites is higher than that obtained from the local diffusion tubes. An assessment of the data downloaded from the Welsh Air Quality Forum website highlighted that a number of the automatic sites seemed to have relatively large gaps in the data sets. It can also be seen from Table 7 above that the range of results is relatively wide spread. These factors may have introduced slight bias to the calculations. The use of the higher Ra figure is shown in Table 8 below which also contains the tube Ra bias data. When comparing the difference between the bias adjusted figures for each site the two either side of the 'hot spot' area have just exceeded the AQO. Further comparison back to Table 6 above indicates that perhaps the automatic ratio figure provides a more realistic outcome.

Table 8

Tube Id	2013 Measured Mean (M)	Ra	Site Mean (S) (MxRa)	Adjust Factor (BAF)	Data Post Bias (auto) (SxBAF)	Data Post Bias (tubes) (SxBAF)
DA/01	30.2	1.11	33.5	0.80	26.8	24.9
DA/03	32.8	1.11	36.4	0.80	29.1	27.0
Carm/013	40.8	1.11	45.3	0.80	36.2	33.6
DA/05	45.5	1.11	50.5	0.80	40.4	37.5
DA/07	49.6	1.11	55.1	0.80	44.1	40.9
Carm/083	54.6	1.11	60.6	0.80	48.5	45.0
DA/09	55.8	1.11	61.9	0.80	49.5	46.0
DA/10	52.6	1.11	58.4	0.80	46.7	43.4
DA/11	46.1	1.11	51.2	0.80	41.0	38.0
DA/12	28.7	1.11	31.9	0.80	25.5	23.7
DA/13	44.3	1.11	49.2	0.80	39.4	36.5
DA/16	41.8	1.11	46.4	0.80	37.1	34.5

Appendix H: Gwili Railway Compliance Letter

OJM/LAQM
19th February 2014

Mr Oliver Matthews
01269 598255
01269 591525
Publicprotection@carmarthenshire.gov.uk

Gwili Railway Company Limited
Bronwydd Arms
Carmarthen
Carmarthenshire
SA33 6HT

FAO Mr Jeremy John (Business Administrator)

Dear Mr John,

Re: - The Environment Act 1995
Local Air Quality Management Regulations – sulphur dioxide

I am writing to report the results of the unannounced inspections to assess the locomotive idling periods in respect of the above regulations and the written operating procedures that you have introduced at the station.

A total of two unannounced inspection visits were made, unfortunately it was not possible to do the third visit before the end of last year. The majority of the activity days were on weekends or during holiday periods. I have also confirmed with you that it will not be possible to carry out a third visit before the end of the financial year due to the activity timetable not beginning before the 31st March 2014. The two unannounced visits were on the 19th June and 15th August 2013. I am pleased to inform you that on both occasions the idling time was less than the 15 minute mean objective time frame.

On behalf of the authority I would like to thank you for helping the authority to meet its air quality objectives.

If you have any queries or concerns with regard to any of the above, please do not hesitate to contact me.

Yours sincerely,



Oliver Matthews
Scientific Officers – Public Health Services

Appendix I: 2013 Llandeilo Road Closure Final Report (Feb 2014)



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

**2013 Llandeilo Road Closure
Final Report**

(February 2014)

Oliver Matthews – Scientific Officer (Air Quality)

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1.0 Purpose of Report

This report has been written to assist fulfilling the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for Wales 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 (AQO) 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 air quality objectives. In Carmarthenshire, exceedences of the AQO in Llandeilo resulted in the declaration of an AQMA (Llandeilo AQMA 2011) and the need to produce an Action Plan.

As part of Action Plan work it was proposed that diversion routes could be used to take traffic from Rhosmaen Street and help reduce the traffic pollution loading. During discussions of the Action Plan Group it was identified that a three month road closure of Rhosmaen Street was likely in order to facilitate essential gas main works for the high street. This was seen as an opportunity to monitor the air quality impacts of the diverted traffic on the diversion routes.

This Final Report is very much based on the Interim Report and provides the background to the road closure and presents the full air quality monitoring data up to the completion of the Rhosmaen Street road closure works. The methodologies used are in accordance with guidance as much as possible but taking in to account the limitations of the monitoring project.

2.0 Road Closure Background

Over the last few years there have been a number of occasions when emergency gas main repairs have had to be carried out along the high street in Llandeilo, causing significant disruption to the traffic flow through the town. Wales and West Utilities reviewed their work programme and identified that it would be beneficial to implement a major pipeline replacement project along Rhosmaen Street and in to Bridge Street. This would significantly upgrade the gas main network in the area and hopefully eliminate the need for any further

disruptive gas works for some years. However, the work would require the closure of the main A483(T) trunk road, that bisects the town, for a period of up to three months.

The road closure would require careful planning and community engagement. It would also require an application to be submitted to Welsh Government for the necessary traffic orders to be signed off. The proposed diversion routes for the road closure are shown on the South Wales Trunk Roads Agency (SWTRA, 2012) map detailed in Appendix 1. A traffic count survey (Sky High - Count on Us, 2012) was carried out as part of the planning of the road closure and the data obtained from that survey was used in the Further Assessment work and was utilised for source apportionment and identifying the reduction in NO₂ that was needed to attain the objective level.

3.0 Air Quality Monitoring Project

Due to the short timescales for planning the monitoring project, and the fact that two diversion routes were involved, it was decided to carry out the monitoring using diffusion tubes. This method had been used for the Detailed Assessment and the follow on Further Assessment work. Although there are known limitations when using diffusion tubes it is considered that with sufficient numbers of tubes appropriately sited then the data obtained would be very useful.

The diversion routes are relatively long sections of road with greatly varying characteristics along their length. Therefore the use of diffusion tubes would be beneficial from the aspect of spatial coverage and trying to identify 'hot spots'.

Diffusion tube sites were assessed against the relevant guidance (LAQM TG (09) and, AEA Energy and Environment 2008) and a total of 12 sites identified. The site location criteria check list is shown in Table 1 and the specific site details in Table 2 below.

Table 1 – Diversion Routes Tube Location Criteria Checklist

Tube No.	Tube Location	Free Air Y/N	Vegetation Y/N	Flues Y/N	Consent Required Y/N	Consent Obtained Y/N	Lamp Post No	Comments
LRC/1	12 New Road	Y	N	N	N/A	N/A	112 126	2.20m to parking bay
LRC/2	13 New Road	Y	N	N	Y	Y	N/A	
LRC/3	23 New Road	Y	N	N	N/A	N/A	DP 106	
LRC/4	4 Wellfield Terrace	Y	N	N	N/A	N/A	-	
LRC/5	Carmarthen	Y	N	Y	Y	Y	N/A	Flue not in use

	Road (Cloths Shop)							
LRC/6	George Street (D.A.T.)	Y	N	N	Y	Y	N/A	
LRC/7	Opp 3 George Hill	Y	N	N	N/A	N/A	-	
LRC/8	2 George Hill	Y	N	N	Y	Y	N/A	
LRC/9	2 Church Road	Y	N	N	Y	Y	N/A	
LRC/10	19 Church Road	Y	N	N	Y	Y	N/A	
LRC/11	Crescent Road	Y	Y	N	N/A	N/A	401 3333	Background
LRC/12	Nr 5 Crescent Road	Y	N	N	N/A	N/A	401 3325	

Table 2 – Diversion Routes Tube Location Details

Tube No.	Tube Location	Height (m)	Distance from kerb (m)	Distance to receptor (m)	Location Type	X	Y
LRC/1	12 New Road	3.00	0.90	2.60	Kerbside	262971	222556
LRC/2	13 New Road	2.95	2.70	Facade	Roadside	262928	222534
LRC/3	23 New Road	2.80	1.95	3.00	Roadside	262844	222507
LRC/4	4 Wellfield Terrace	2.85	1.10	2.35	Roadside	262808	222505
LRC/5	Carmarthen Road (Cloths Shop)	2.80	1.45	Facade	Roadside	262800	222383
LRC/6	George Street (D.A.T.)	2.75	0.40	Facade	Kerbside	262809	222363
LRC/7	Opp 3 George Hill	2.85	0.95	0.60	Kerbside	262799	222282
LRC/8	2 George Hill	2.70	0.70	Facade	Kerbside	262813	222270
LRC/9	2 Church Road	2.70	1.10	Facade	Roadside	262894	222195
LRC/10	19 Church Road	2.90	0.50	Facade	Kerbside	262972	222238
LRC/11	Crescent Road	2.95	0.50	30.00	Other	263090	222309
LRC/12	Nr 5 Crescent Road	2.80	1.70	2.10	Roadside	263084	222524

The locations of each of the tube sites are detailed on the maps below in Figures 1 and 2. The diversion route in Figure 1 is the route to the west of Rhosmaen Street and Figure 2 shows the route to the east. Tube location photographs are provided in Appendix 2 and 3.

The road closure was planned to start from the beginning of January 2013 and last until the end of March 2013. In order to ascertain what level of impact there would be from the use of the diversion routes it would be necessary to monitor the air quality before the road closure was implemented. Guidance (AEA Energy and Environment, 2008) recommends that any diffusion tube study should be for a minimum period of six months, and cover three months of the winter period and three months of the summer period (i.e. January to June or July to December). This was not going to be feasible so it was decided to monitor four months (September to December 2012) before the closure and then a further two months (April to

May 2013) after the closure. This would not be strictly in compliance with the guidance but would hopefully provide sufficient data to draw conclusions from the monitoring project.

Figure 1 – West Diversion Route Tube Location Map

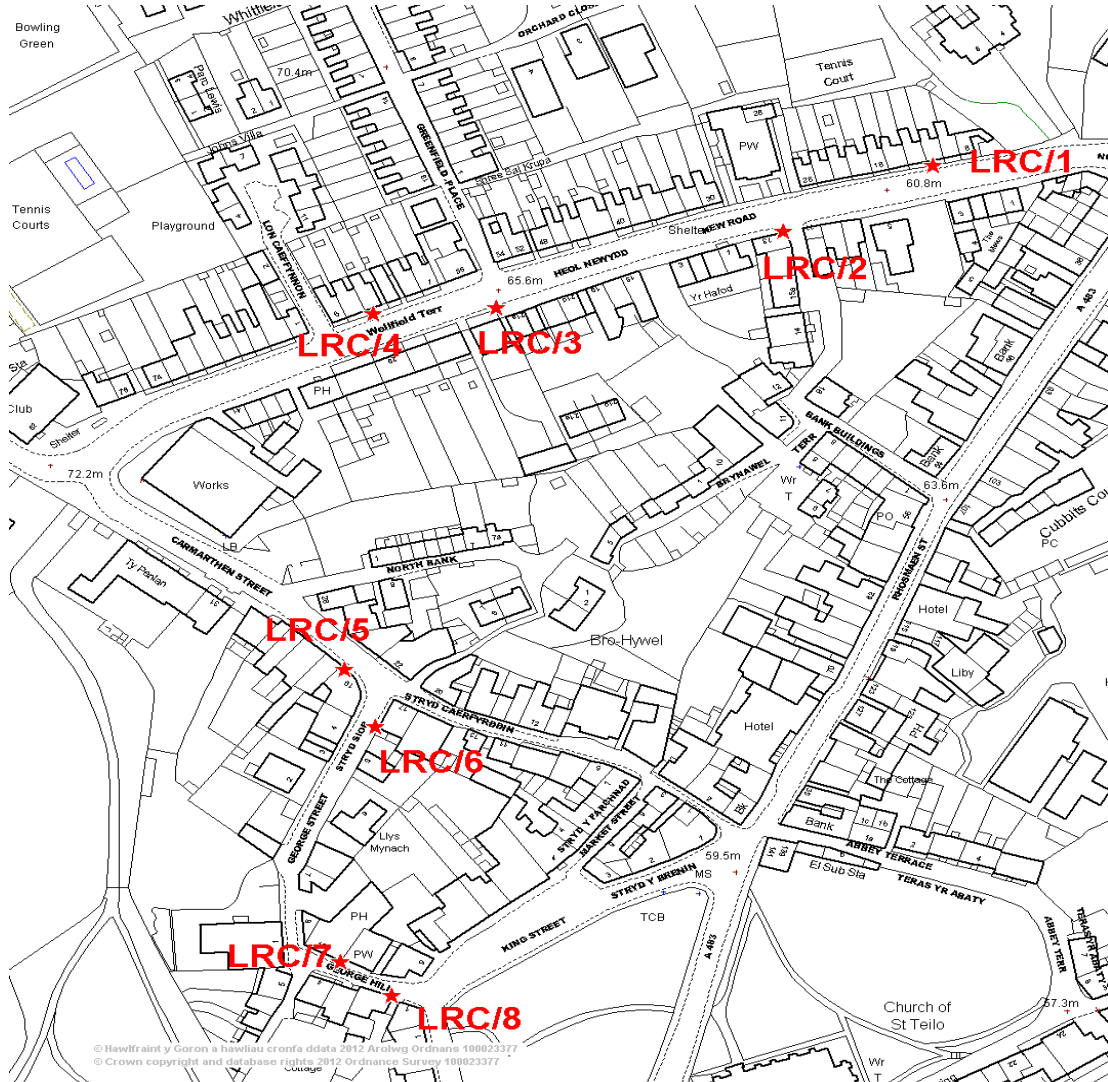
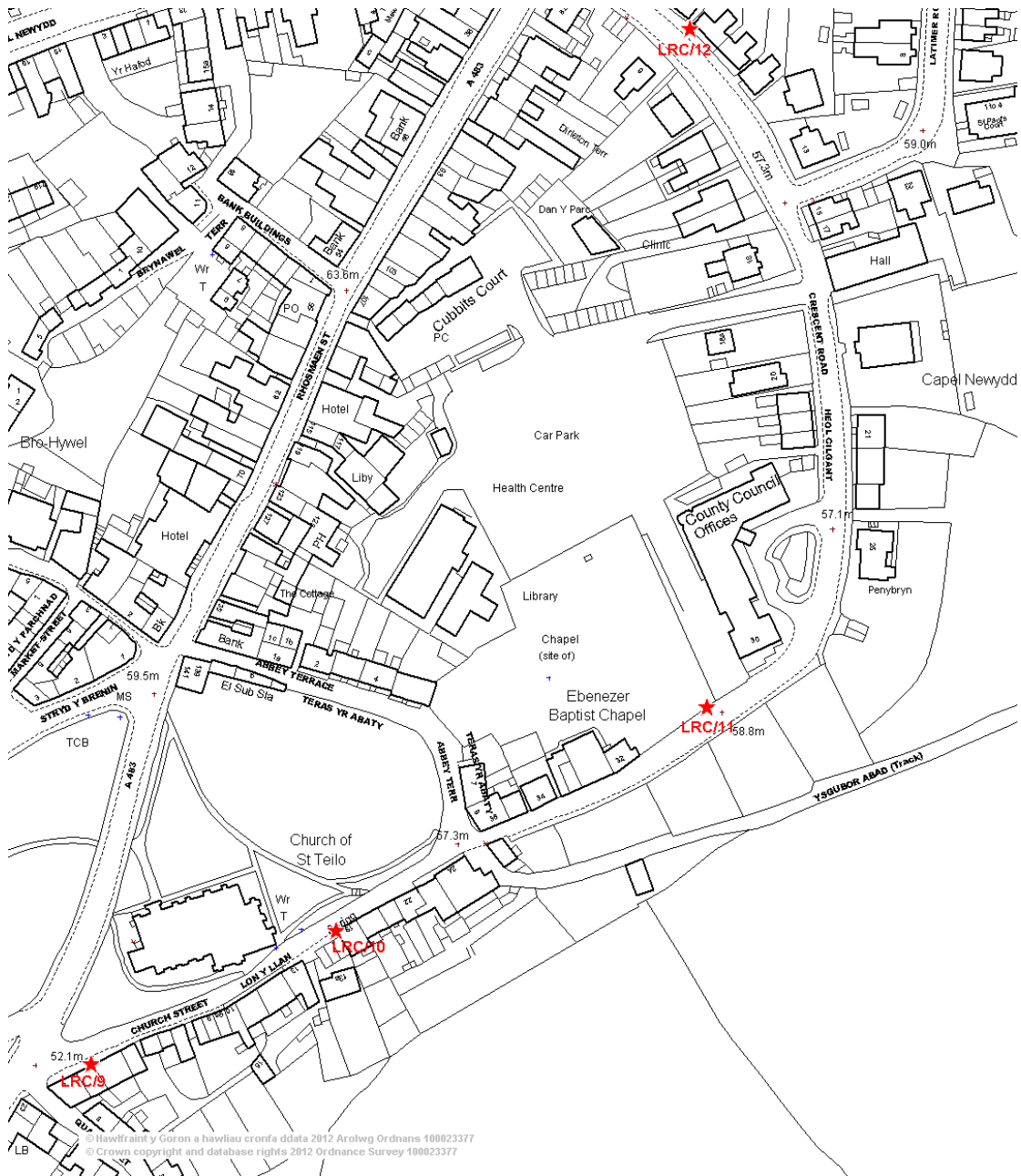


Figure 2 – East Diversion Route Tube Location Map



4.0 Monitoring Results (Sep 2012 to May 2013)

4.1 Diversion Routes Tubes

The results from the diffusion tubes located along the diversion routes covering the pre-closure, closure and post-closure periods are shown in Table 3 below. The figures presented are in $\mu\text{g}/\text{m}^3$ and relate to raw monthly mean data.

Table 3 – Monthly NO₂ Results (Diversion Routes)

Tube Id	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Count
	2012				2013					
LRC/1	14.9	21.3	23.3	23.3	23.2	31.0	29.2	14.5	-	8
LRC/2	-	18.2	25.2	24.2	28.8	26.4	20.9	16.2	-	7
LRC/3	11.3	19.0	21.9	20.6	34.4	24.6	25.6	16.5	10.2	9
LRC/4	-	21.3	21.2	20.9	31.8	28.6	27.7	14.6	-	7
LRC/5	14.2	18.6	-	-	-	-	24.2	15.3	-	4
LRC/6	11.9	-	-	-	31.9	25.2	-	14.3	11.3	5
LRC/7	14.9	27.7	21.9	24.0	34.0	35.2	33.7	20.7	15.8	9
LRC/8	21.9	27.9	29.7	32.2	-	48.7	37.3	21.4	21.0	8
LRC/9	17.1	21.2	25.9	25.0	42.4	47.3	37.0	17.7	55.6	9
LRC/10	8.0	13.3	-	11.9	-	56.2	32.1	10.7	-	6
LRC/11	7.3	10.5	11.7	11.5	28.6	40.7	29.8	10.5	7.4	9
LRC/12	11.8	17.7	19.9	20.7	29.5	37.6	36.7	15.2	12.6	9

As can be seen from Table 3, there are a high number of missing results, which are thought to be related mainly to tube theft. Locations LRC/5 and LRC/6 both suffered significant tube loss. This is unfortunate as they were considered 'key' locations on the western diversion route. This will also mean that averaged results over the three respective time periods for these locations must be treated with caution. The figures in **bold** illustrate where there were some large increases in the measured NO₂ results with locations LRC/10 and LRC/11 exhibiting the greatest increases.

The high result for site LRC/9 in May is unexpected and no reason has been identified for this particular result. This would cause a bias in averaged data for that site based on 'normal' circumstances without the diversions in place.

The figures in bold illustrate where a mean monthly tube result has exceeded the annual mean air quality objective level of $40\mu\text{g}/\text{m}^3$. However, the data should not be used for direct comparison against the objective level but it is possible to compare the averages of the three time periods to assess the impact on the diversion routes from

the road closure. Whilst it is somewhat of a subjective assessment, the level of impact can be quantified by direct comparison of the averaged data sets along with the percentage increase for each tube location. The averaged results and percentage increase figures are in Table 4 below.

Table 4 – Averaged NO₂ Results (Diversion Routes)

Tube Id	Pre-Road Closure Average	Road Closure Average	Post-Road Closure Average	Pre & Post Combined Average	% Increase Pre	% Increase Pre & Post
LRC/1	20.7	27.8	14.5	19.5	34.3	42.6
LRC/2	22.5	25.4	16.2	21.0	12.9	21.0
LRC/3	18.2	28.2	13.4	16.6	54.9	69.9
LRC/4	21.1	29.4	14.6	19.5	39.3	51.0
LRC/5	16.4	24.2	15.3	16.0	47.6	51.3
LRC/6	11.9	28.6	12.8	12.5	140.0	128.8
LRC/7	22.1	34.3	18.3	20.8	55.2	64.9
LRC/8	27.9	43.0	21.2	25.7	54.1	67.3
LRC/9 with May	22.3	43.2	36.7	27.1	89.2	59.4
LRC/9 without May	22.3	43.2	17.7	21.4	93.7	102.0
LRC/10	11.1	32.1	10.7	11.0	189.0	191.8
LRC/11	10.3	33.0	9.0	9.8	220.0	236.7
LRC/12	17.5	34.6	13.9	16.3	97.9	112.3

The average post-closure results are generally lower than the pre-closure results, which is to be expected. The post-closure results are for the months of April and May, where available, and these months would normally have lower results than the winter months covered by the pre-closure period.

This is an important aspect because when the pre and post closure results are combined and averaged they are generally lower than the pre-closure averages. Consequently, when assessing the percentage increase between the closure period and the pre & post periods it turns out that the majority of tube sites exhibit an even greater percentage increase in air quality impact. This then suggests that if the

diffusion tube monitoring had taken place over the full year and encompassed the full summer period, when NO₂ results tend to be lower again, then the percentage increase impact could be significantly higher again.

This does not mean that the NO₂ air quality objective of 40µg/m³ is likely to have been breached at any particular sites, especially when bias adjustment and annual averages are taken in to consideration, but it does mean that the air quality problem was merely being moved to a great extent.

Whilst many of the averaged figures for the road closure period are below the objective level, and have not been bias adjusted, the percentage increase in these particular locations is significant in terms of additional NO₂ loading.

Below are a series of graphs illustrating the data that has been presented in Tables 3 and 4 shown above. Figure 3 shows the raw monthly results and Figure 4 presents the averaged data for the West diversion route. Figures 5 and 6 present the information relating to the East diversion route.

Figure 3 – Monthly Raw NO₂ Results (West Diversion Route)

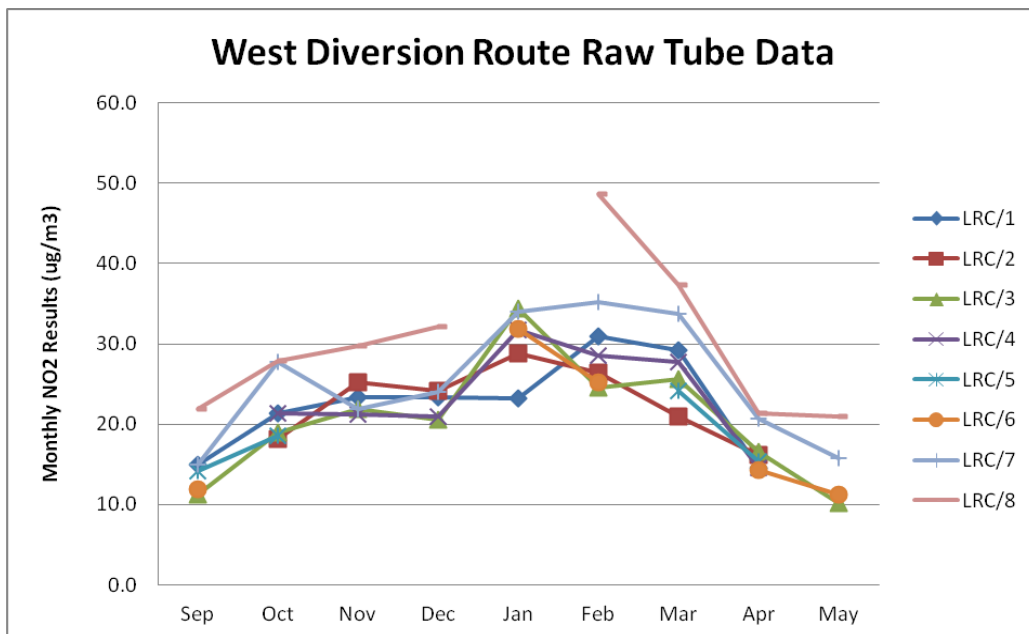


Figure 4 – Averaged Raw NO₂ Results (West Diversion Route)

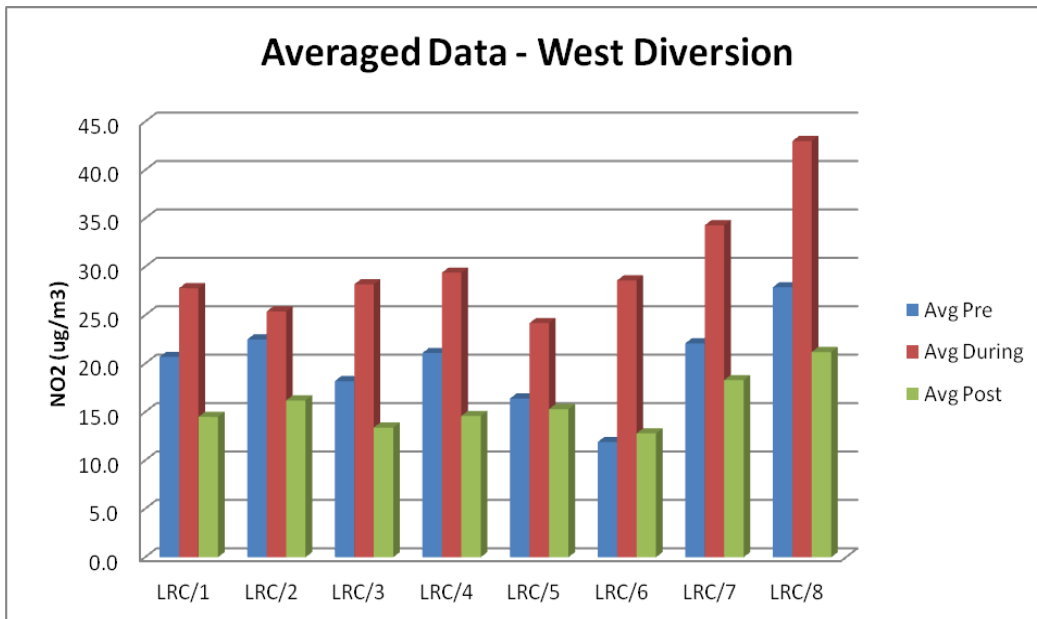


Figure 5 – Monthly Raw NO₂ Results (East Diversion Route)

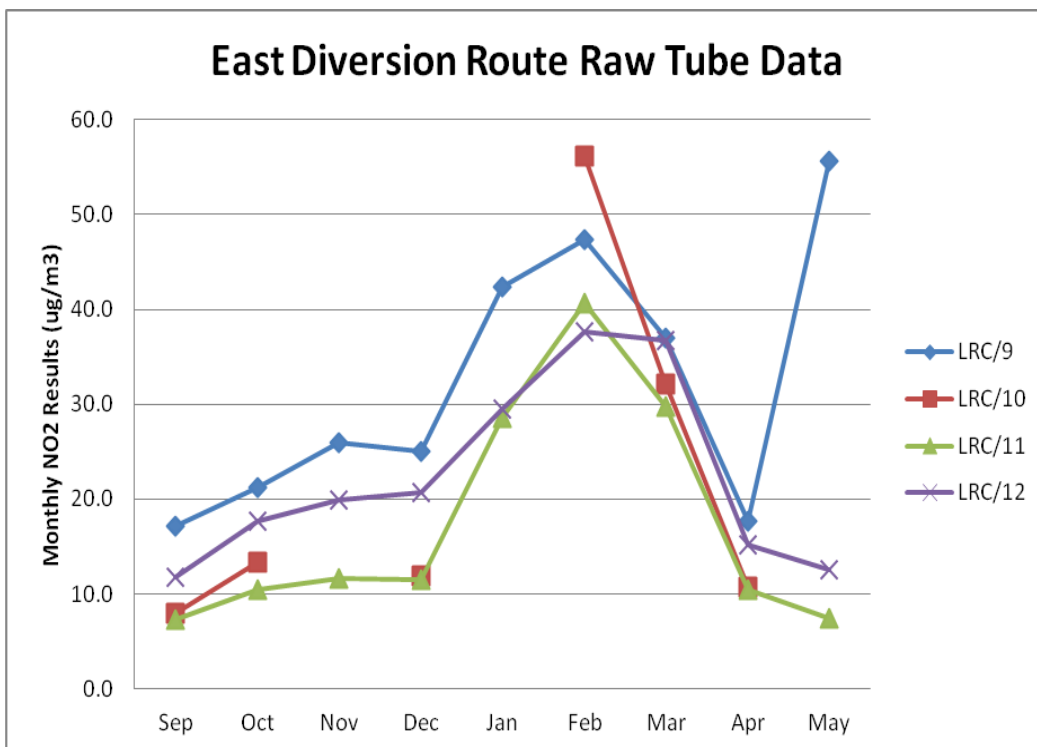
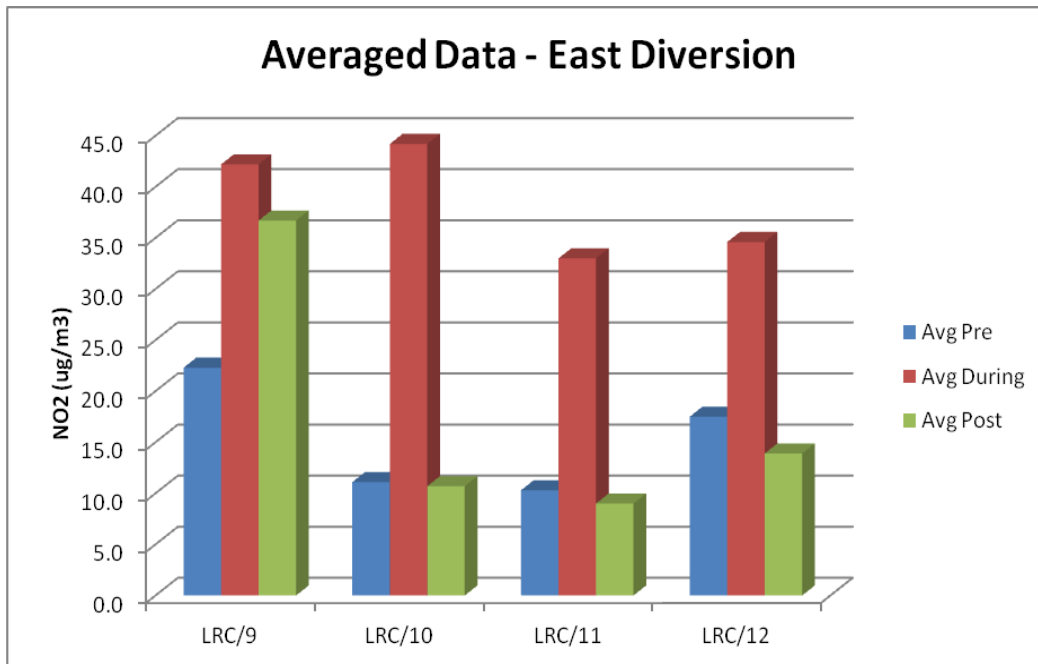
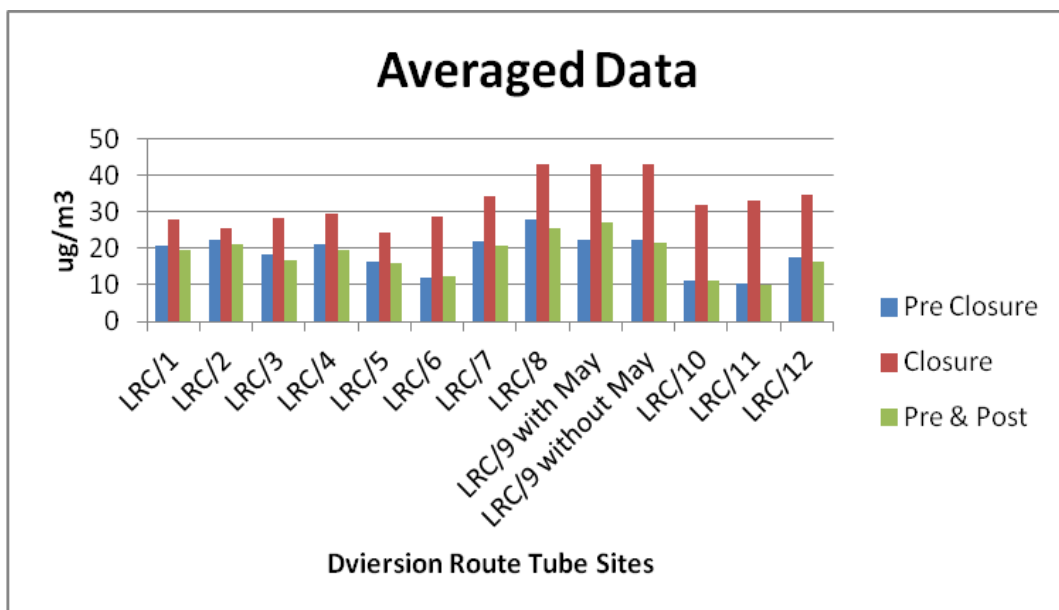


Figure 6 – Averaged Raw NO₂ Results (East Diversion Route)



Taking a step further the averaged data can be combined on one graph, Figure 7 below, and then illustrates that for the majority of the sites the pre and post combined average data is lower than the pre closure averages on their own effectively increasing the 'gap' between the closure average and 'normal' situation.

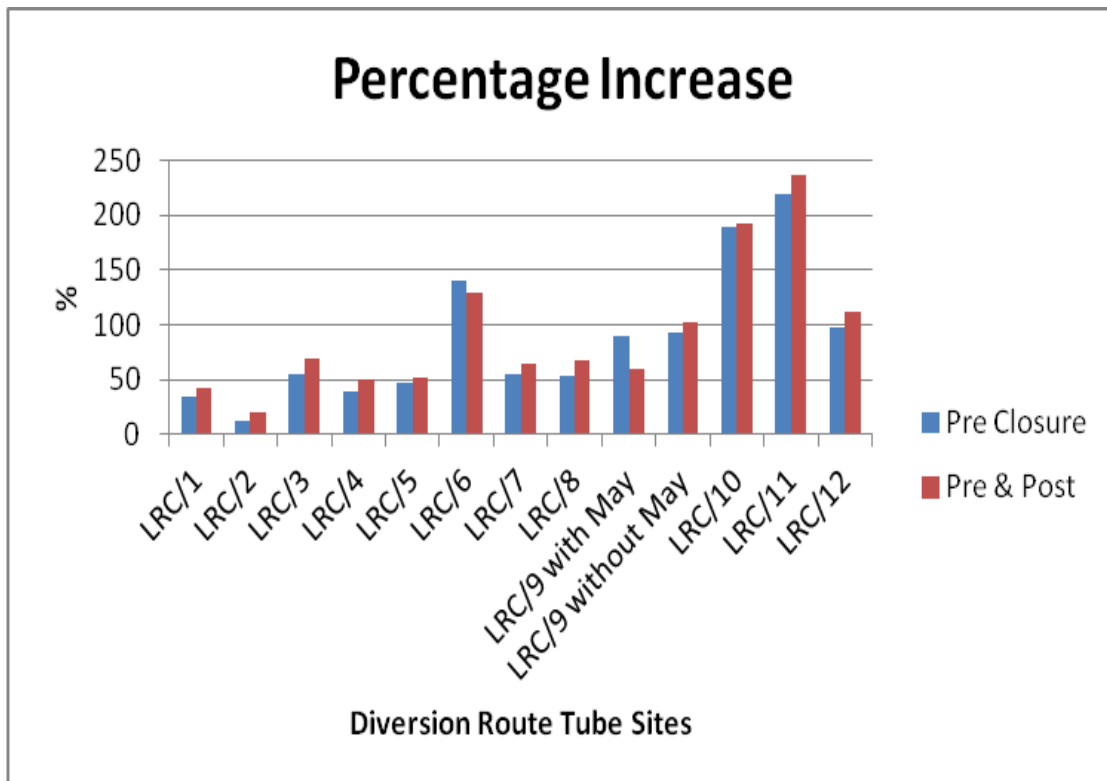
Figure 7 - Averaged NO₂ Results (including Pre & Post)



When the percentage increase data is graphed, as shown in Figure 8 below, it can be seen that the combined pre and post percentage data are generally slightly higher than that for the pre closure data on it's own. This graphically confirms that the

diversion routes suffered greater NO₂ loading than had been considered for the Interim Report. Five of the 12 sites suffered in excess of a 100% increase in NO₂.

Figure 8 – Percentage Increase Results (including Pre and Post)



4.2 Rhosmaen Street Tubes

It is also important to assess the impact on the existing Rhosmaen Street tubes as a result of the road closure. This may provide an indication of what level of reduction in NO₂ may be achieved through the removal of traffic from the high street. It must be remembered that the tubes within the high street section of Rhosmaen Street may be affected by plant and equipment that was operational during the road closure period. It must also be remembered that some existing tube locations, such as Bridge Street and the Park area will be affected by traffic light control as part of the diversion route operations. The data from these particular sites may give an indication of air quality impacts from traffic light control in respect of Action Plan work.

The tube data for the Rhosmaen Street tubes covering the same periods as the road closure tube data is shown below in Table 5. As would be expected, the data

demonstrates a significant decrease at some locations, mainly along the high street, associated with the start of the road closure period. Additionally, some locations, such as the Travel Shop and Bridge Street, demonstrate an increase in levels.

Table 5 – Monthly NO₂ Results (Rhosmaen Street)

Tube Id	Location	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Count
		2012				2013					
DA/01	No 69	31.1	36.9	40.6	38.8	39.1	35.5	39.8	26.6	25.6	9
DA/03	No 89	28.3	37.5	46.5	35.3	23.2	23.1	27.6	31.8	23.4	9
Carm/013	Principality	44.3	43.2	57.3	45.8	27.3	25.0	27.5	34.2	36.1	9
DA/05	Evans Butchers	41.4	56.9	57.2	56.7	28.8	22.0	28.3	45.1	34.5	9
Carm/083	Gallery	42.4	58.8	60.2	61.5	28.1	19.8	28.8	52.9	46.4	9
DA/10	Craft Shop	44.2	60.5	66.5	68.8	29.7	21.7	29.2	51.2	-	8
DA/11	Style Shop	48.5	-	63.5	70.0	31.1	22.3	24.3	39.9	45.8	8
DA/12	Travel Shop	32.0	-	-	55.6	55.8	35.7	28.5	30.6	23.3	7
FA/02	Carmarthen St	12.1	19.8	15.6	26.9	22.9	18.6	20.5	16.9	12.0	9
DA/13	Park area	47.4	57.8	51.0	68.3	42.2	28.9	29.1	38.0	40.1	9
DA/14	Bus Stop (by church)	33.0	39.7	42.7	42.3	33.3	-	29.1	26.6	30.0	8
DA/16	Bridge St	45.6	51.0	70.4	68.2	65.1	68.7	54.9	47.1	44.2	9

The data in Table 5 above was subjected to the same averaging process as for the diversion route data and this is shown in Table 6 below.

Table 6 – Averaged Pre & Post NO₂ Results (Rhosmaen Street)

Tube Id	Pre-Road Closure Average	Road Closure Average	Post Closure Average	Pre & Post Average	% Difference Pre	% Difference Pre & Post
DA/01	36.9	37.3	26.1	33.3	1.1	12.0
DA/03	36.9	23.2	27.6	33.8	-37.1	-31.4
Carm/013	47.7	26.2	35.2	43.5	-45.1	-39.8
DA/05	53.1	25.4	39.8	48.6	-52.2	-47.7
Carm/083	55.7	24.0	49.7	53.7	-56.9	-55.3
DA/10	60.0	25.7	51.2	58.2	-57.2	-55.8

DA/11	60.7	26.7	42.9	53.5	-56.0	-50.1
DA/12	43.8	45.8	27.0	35.4	4.6	29.4
FA/02	18.6	20.8	13.5	16.9	11.8	23.1
DA/13	56.1	35.6	39.1	50.4	-36.5	-29.4
DA/14	39.4	33.3	28.3	35.7	-15.5	-6.7
DA/16	58.8	66.9	45.7	45.9	13.8	45.8

As would be expected for the Rhosmaen Street tubes, the majority of the averaged results for the closure period demonstrate a significant reduction in NO₂ levels. However the results should not necessarily be seen as an indication of what the NO₂ levels would be like along Rhosmaen Street if traffic was to be excluded on a permanent basis. As mentioned previously, plant and equipment was operating along the high street during the closure, as well as a lot of building refurbishment work such as painting. Road re-surfacing work also took place after the gas main replacement work had been completed. These activities would all have contributed to the NO₂ loading at that time.

What is interesting is the inclusion of the post closure data and how this affects the overall impact on the individual sites. The impact on site DA/01 (69 Rhosmaen Street) is actually significantly greater than first appeared from the Interim Report. This site still had all the traffic going past for the whole monitoring period but suffered from queuing traffic at the junction trying to negotiate turning on to the diversion routes. This aspect was not well illustrated in the Interim Report.

It can be seen that the level of improvement in air quality within the high street area of the Rhosmaen Street road closure was perhaps not as good as first thought. Whilst it is acknowledged that all the sites (DA/03 – DA/11) dropped well below the Objective level the size of the reduction is not quite as large as suspected. As with the diversion route data this is due to the use of the post closure data from winter months being utilised providing elevated levels compared to what the annual average would be.

The data in Table 6 does illustrate very well the significant impact on those sites that were subject to either extra traffic flows or traffic light control. For example sites FA/02 and DA/12 had substantially more traffic travelling past the sites resulting in a 23% and 29% increase in NO₂ exposure respectively. The site DA/16 (Bridge Street) where the main traffic light control for the diversion routes was situated suffered a 45% increase in NO₂ exposure. This was reported as 13.8% for the Interim Report.

The actual closure of Rhosmaen Street illustrates that the removal of traffic would result in the NO₂ levels dropping below the 40µg/m³ Objective level, but it also shows that the means to achieve this by using local diversion routes is likely to result in moving the air quality problem and actually exasperating it in other areas. From the Action Planning perspective this will be important information to take account of when developing intervention options.

5.0 Traffic Counts

As part of the planning of the road closure, seven day traffic counts were carried out at various locations along Rhosmaen Street and along the diversion routes. The traffic counts were then repeated at the same locations and for the same duration during the road closure period and these are shown in Appendix 4 (Sky High – Count On Us, 2012 and 2013).

Prior to the implementation of the road closure, the dates and duration of the closure was extensively advertised to warn motorists of the potential delays. In addition, SWTRA arranged for traffic signs to be set up at various locations along approach routes to Llandeilo. These included Pont Abraham roundabout at the end of the M4, Cross Hands roundabout, A40 roundabout north of Llandeilo, A40 Llangadog roundabout and Ffairfach roundabout. Photographs of a couple of the signs are shown in Appendix 5.

To avoid introducing possible anomalies from the traffic data, the full seven day total vehicle count results were used for comparison purposes. The locations of the counters, references and data associated with them are shown in Table 7.

Table 7 – Traffic Data

Ref	Location	Direction	Pre-Closure	Closure	% Change
A	Crescent Road	North	4390	14532	+231.0
		South	9845	24592	+149.8
B	Church Road	East	0	16916	-
		West	4056	30764	+658.5
C	Rhosmaen Street (Park area)	North	31206	14820	-52.5
		South	28142	5733	-79.6
D	Rhosmaen Street (north – New Road)	North	29775	26460	-11.1
		South	30442	32161	+5.6

E	New Road	East	10447	15200	+45.5
		West	7038	7796	+10.8
F	Kings Street	One - Way	12242	25211	+105.9
G	Carmarthen Street	North	8328	16667	+100.1
		South	5876	9183	+56.3

The traffic counter located in position D on Rhosmaen Street is considered as the 'key' location, as the vast majority of traffic travelling through the town in either direction must go past this counter location. Therefore, in terms of comparing the data between the two counter periods this location will confirm if there was any significant difference in the total volumes of traffic that used the road. In essence, it would provide information that may confirm whether road users avoided the route during the closure period and whether this could be attributable to the road signage that had been put in place.

The total volume flow for both directions shows a difference of 1596 vehicles. This equates to 228 vehicles per day or less than 20 vehicles an hour over a 12 hour period. This would not be deemed as a significant variation in the traffic flows between the two survey periods. This would also suggest that the pre notification and road signage had little impact on driver habits and that few, if any, avoided the route during the closure period.

6.0 Combined Traffic and NO₂ Data

In order to gain an overall view of how the diversion routes have been impacted from the changed traffic flow the data from traffic counts and diffusion tube results can be combined.

The easiest way to combine the data is to utilise the percentage change figures that represent the difference between the pre road closure situation and the actual road closure itself. By doing this it is possible to include the 'positive' and 'negative' impacts. However, this is only possible with a limited number of locations. It was more coincidence rather than planning that six of the traffic counter locations were in close proximity to diffusion tube locations. Therefore these sites can be used to compare data sets and then graph the results to gain an idea of the traffic impact and associated air quality impact.

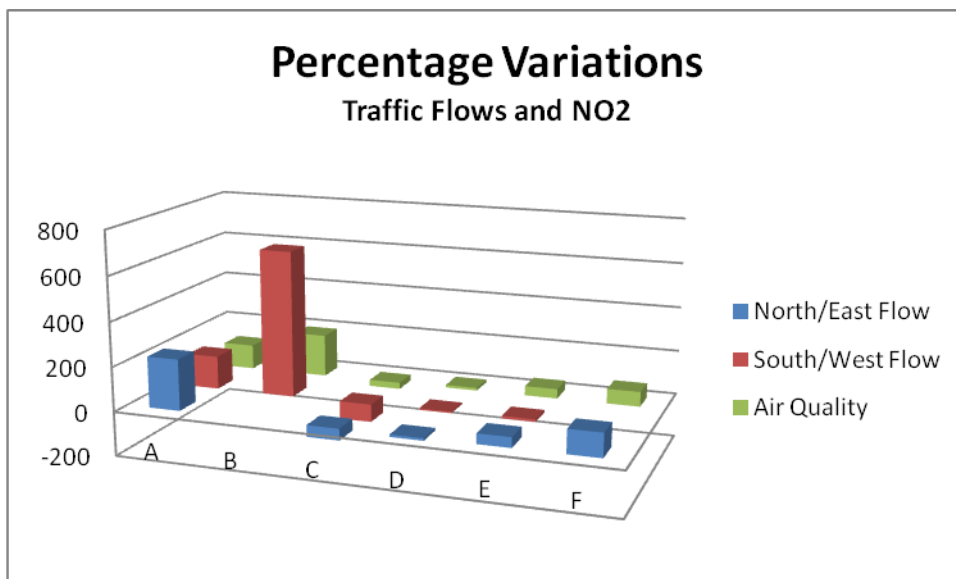
Table 8 below shows the percentage change data that has been derived from data previously presented above and then combined. As would be expected, the largest percentage change in NO₂ results coincides with the largest change in traffic flows. Location

A (LRC/12) received almost a 100% increase in NO₂ loading, and location B (LRC/10) nearly a 200% increase. The data in Table 8 is presented graphically in Figure 9 below.

Table 8 – Combined Traffic and NO₂ Percentage Changes

Location	Percentage Change		
	North/East Flow	South/West Flow	NO ₂
A – (LRC/12)	231	150	112
B – (LRC/10)	-	659	192
C – (DA/13)	-52	-80	-29
D – (DA/01)	-11	6	12
E – (LRC/1)	46	11	43
F – LRC/8)	106	-	67

Figure 9 – Percentage Variations



7.0 Conclusions

This report has assessed the data obtained from the road closure project, along with traffic count data, and analysed the impact of the road closure in terms of looking at the percentage variations from the road closure period compared to the 'normal' situation. It has not specifically dealt with comparisons with any air quality objective limit.

All locations where monitoring has been carried out along the diversion routes were subject to an increase in NO₂, the increases ranged from 13% up to 220% (Table 4). The three locations with the highest increase were Crescent Road, 19 Church Road and Dyfed Archaeological Trust. The latter was based on a limited number of results. The result for 19 Church Road was expected to be a high result as this location is narrow, on a gradient and was subjected to HGV movement in both directions (under traffic light control). Crescent Road was not expected to be high as it was originally used as a 'background' site. A further five sites exhibited greater than 50% negative impact on air quality.

Two of the existing diffusion tube sites (DA/12 and DA/16) exhibited an increase in NO₂ results during the road closure. These are the Travel Shop, located at the junction of Carmarthen Street and Rhosmaen Street, and Bridge Street.

Analysis of the complete data set for the project has highlighted that the diversion routes suffered to a greater extent than had been determined in the Interim Report of May 2013. This confirms that the use of these local diversion routes is only likely to move the problem, albeit that the levels on the diversion routes were below the Objective level.

Following the road closure project information has been received in respect of additional impacts suffered by the diversion routes unrelated to air quality. These were in respect of excessive road surface damage, damage to the church wall along Church Road, damage to a telegraph pole that required extensive repair work along with concerns about congestion and the ability of emergency services to get through the congestion. All of these issues will need to be taken in to account for the purposes of Action Planning and determining the feasibility of potential intervention proposals.

8.0 References

Carmarthenshire County Council - Llandeilo AQMA (CCC, 2011)

Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users (AEA Energy & Environment, 2008)

Llandeilo Road Closure Map (South Wales Trunk Roads Agency, 2012)

Local Air Quality Management Technical Guidance TG (09) (Defra, 2009)

Traffic Counts (17/07/12 – 23/07/12 & 25/07/12 – 31/07/12) – (Sky High – Count On Us)

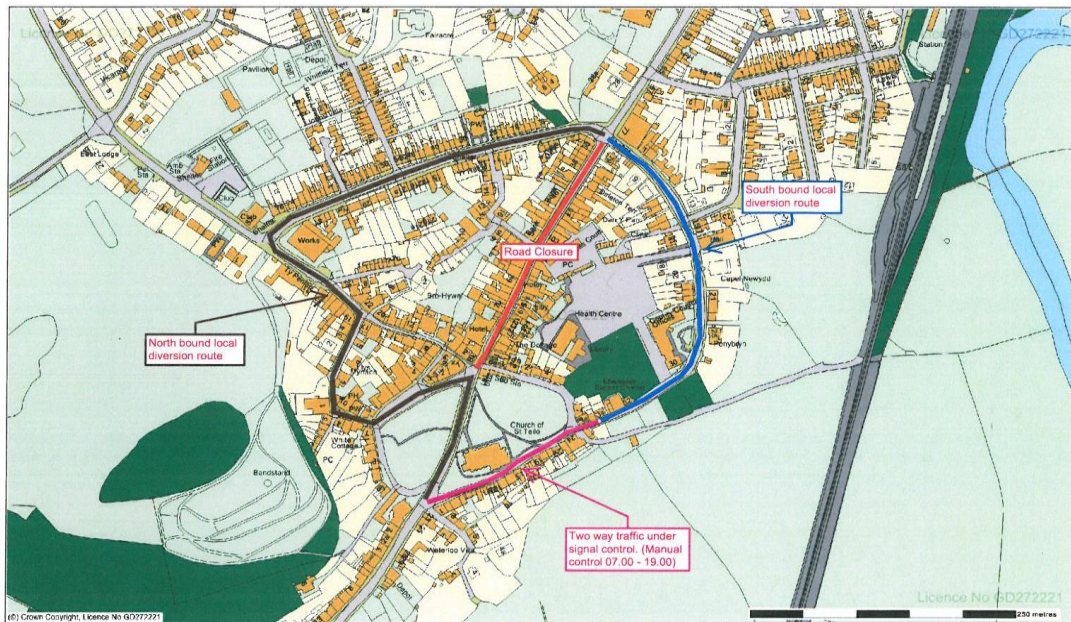
Traffic Counts (19/02/13 – 25/02/13) – (Sky High – Count On Us)

Carmarthenshire County Council – Llandeilo Interim Road Closure Report (May 2013)

Appendix 1 – SWTRA Proposed Diversion Routes

24/01/2012 14:43:30

Llandeilo Road closure



Based upon OS MasterMap with the permission of the controller or Her Majesty's Stationery Office ©

Appendix 2 – West Diversion Route Tube Site Photographs



LRC/1 – 12 New Road



LRC/2 – 13 New Road



LRC/3 – 23 New Road



LRC/4 – 4 Wellfield Terrace



LRC/5 – Carmarthen Road (Clothes Shop)



LRC/6 – George Street (D.A.T.)



LRC/7 – Opp 3 George Hill



LRC/8 – 2 George Hill

Appendix 3 – East Diversion Route Tube Site Photographs



LRC/9 – 2 Church Road



LRC/10 – 19 Church Road

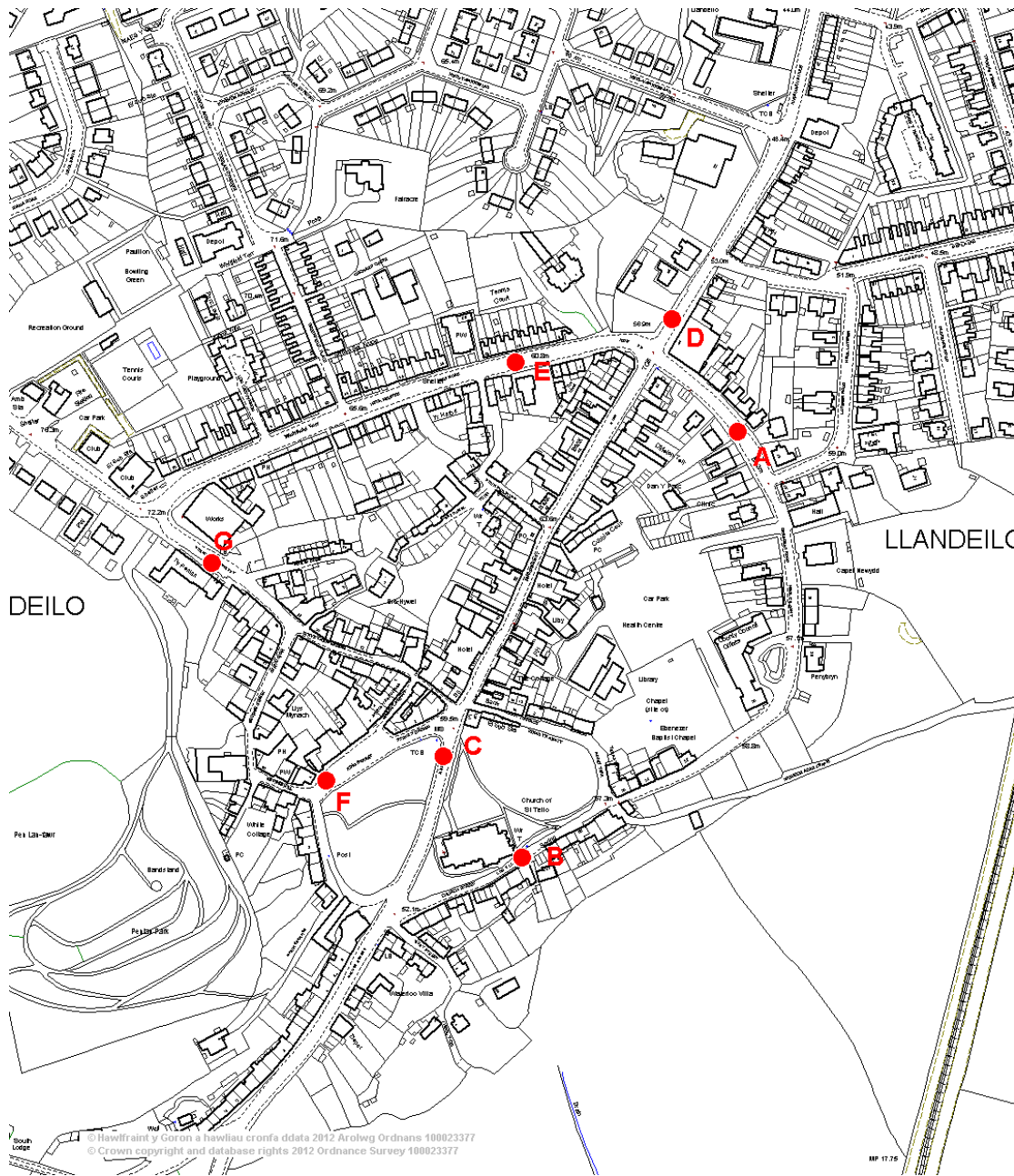


LRC/11 – Crescent Road



LRC/12 – nr 5 Crescent Road

Appendix 4 – Traffic Counter Location Map



Appendix 5 – Road Closure Traffic Sign Photographs



M4 Pont Abraham



Cross Hands