



2015 Updating and Screening Assessment for Carmarthenshire County Council

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

(June, 2015)

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Executive Summary

The Action Plan for the Llandeilo AQMA was finalised in 2014 and issued along with the Action Plan Report that details the development of the Action Plan. Work on some aspects of Phase 1 of the Action Plan had already begun before the Plan was issued and the remaining Phase 1 proposals will be investigated during 2015/16.

The work on the Extended Detailed Assessments for locations within the towns of Carmarthen and Llanelli has continued through 2014 with the designation process having begun and hopefully will result in the issue of AQMA Orders for both towns by the end of 2015. Monitoring in relation to the proposed AQMA's will continue.

Unannounced visits to check on the compliance with restricted steam locomotive idling times for Gwili Railway Company were carried out and identified compliance at the time of the visits.

A PM₁₀ monitoring exercise was carried out during the year relating to complaints of alleged dust nuisance in the vicinity of Pinged poultry farms. The monitoring exercise was carried out over a three month period and the results did not identify any breach of the air quality objective that would be attributable to the poultry farms.

The A477 Red Roses Relief Road was opened in April 2014 and has improved the transport route to the west of the county. Results of the NO₂ diffusion tube results have been assessed and reported as an appendix to this report.

A review of air quality in Llanelli was carried out as part of the Llanelli Joint Strategic Needs Assessment work and was fed back for the review of the JSNA document, the outcome of which is currently awaited.

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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 180,000 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.

The principal pollution sources relate to traffic emissions and this is where the air quality work is concentrated. However, industrial sources are kept under review along with the working practices at Gwili Railway Station.

Figure 1.0 Principal Geographical Features of Carmarthenshire



1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **Wales** are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), The Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m ³	Running annual mean	31.12.2003
	5.00 µg/m ³	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m ³	Running 8-hour mean	31.12.2003
Lead	0.5 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
Particles (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 was 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

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consultation have been used to review the draft Action Plan. The Llandeilo AQMA Boundary map is detailed below in Figure 1.1.

In 2014 the Action Plan was finalised and published with work continuing on the Phase 1 proposals. The designation process for the AQMA's in the towns of Carmarthen and Llanelli has begun with reports being submitted to the various council committees for approval. It is hoped this will be completed by the end of 2015 with the AQMA Orders being issued.

The above details are summarised in Table 1.2 below.

Table 1.2 Summary of LAQM Reporting

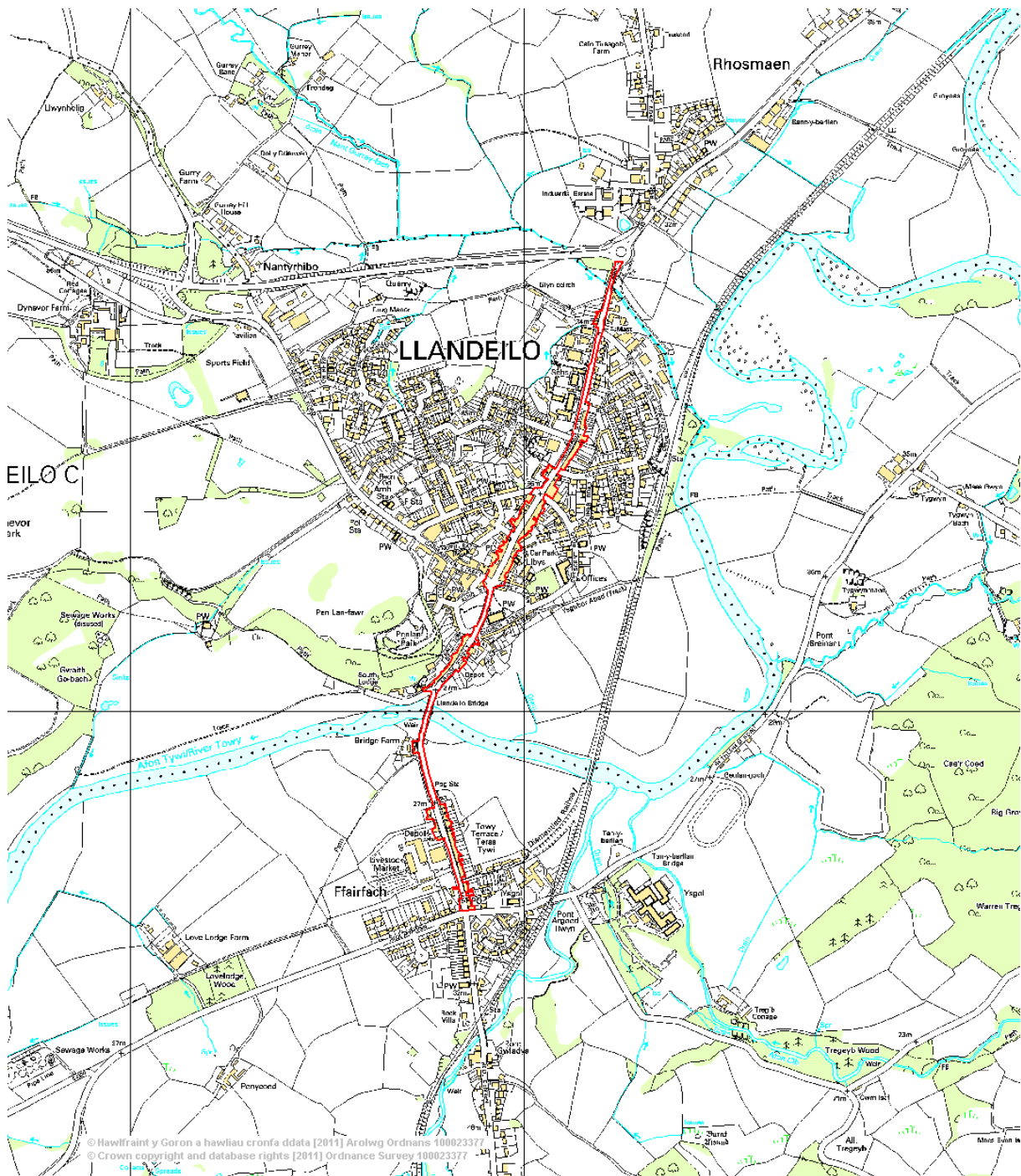
Air Quality Report	Submitted
1 st Air Quality Review (2001)	2002
Updating & Screening Assessment (2003)	2004
Progress Report (2005)	2007
Updating & Screening Assessment (2006)	2007
Progress Report (2008)	2008
Updating & Screening Assessment (2009)	2009
Progress Report (2010)	2010
Llandeilo Detailed Assessment (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
Progress Report (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
Llandeilo Action Plan Report	2014
Llandeilo Action Plan	2014
Progress Report (2014)	2014

Since 2009 the diffusion tube network has been under constant review and this continued to be the case through 2014. The Extended Detailed Assessment work for Carmarthen and Llanelli failed to identify boundaries of exceedence but it was clear that there was a requirement to designate AQMA's. There were no significant

changes to the tube network, however, at the request of residents in Sandy Road (Llanelli) an additional two tube sites were set up to start monitoring from July 2014.

The sites are DAL/26 – 123 Sandy Road, and DAL/27 – Sandy Road (4).

Figure 1.1 Map of Llandeilo AQMA Boundary



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 has been reviewed annually since 2009 with areas of exceedence identified in Llandeilo, Carmarthen and Llanelli. Llandeilo was designated as an AQMA and this led to the Further Assessment and an Action Plan being issued in 2014.

The Detailed Assessments for the towns of Carmarthen and Llanelli began in January 2012 and reports have already been submitted in respect of these and further reports from an extended Detailed Assessment in both towns because the work had not identified the areas of exceedence. Despite distinct boundaries of exceedence not being identified it was recognised that it would be appropriate to proceed with designating AQMA's for both towns. This work has now begun.

Table 2.1 below lists the details for each diffusion tube location that was operational during 2014. The QA/QC data relevant for 2014 is contained in Appendix A. Environmental Scientifics Group (ESG) supplied and analysed the tubes and the bias adjustment used was 0.81, being taken from the LAQM Helpdesk site. The version number of the spread sheet was 03/15.

Please note that maps illustrating the locations of most of the 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 exception to this is the two new tube sites that have been located along Sandy Road in Llanelli. Figure 2.1 below illustrates the locations of the eight diffusion tubes associated with Sandy Road, which includes the two new sites. The inclusion of maps illustrating the rest of the tube locations spread across the county would unnecessarily greatly lengthen this report.

Figure 2.1 Map of Sandy Road (Llanelli) Diffusion Tube Sites

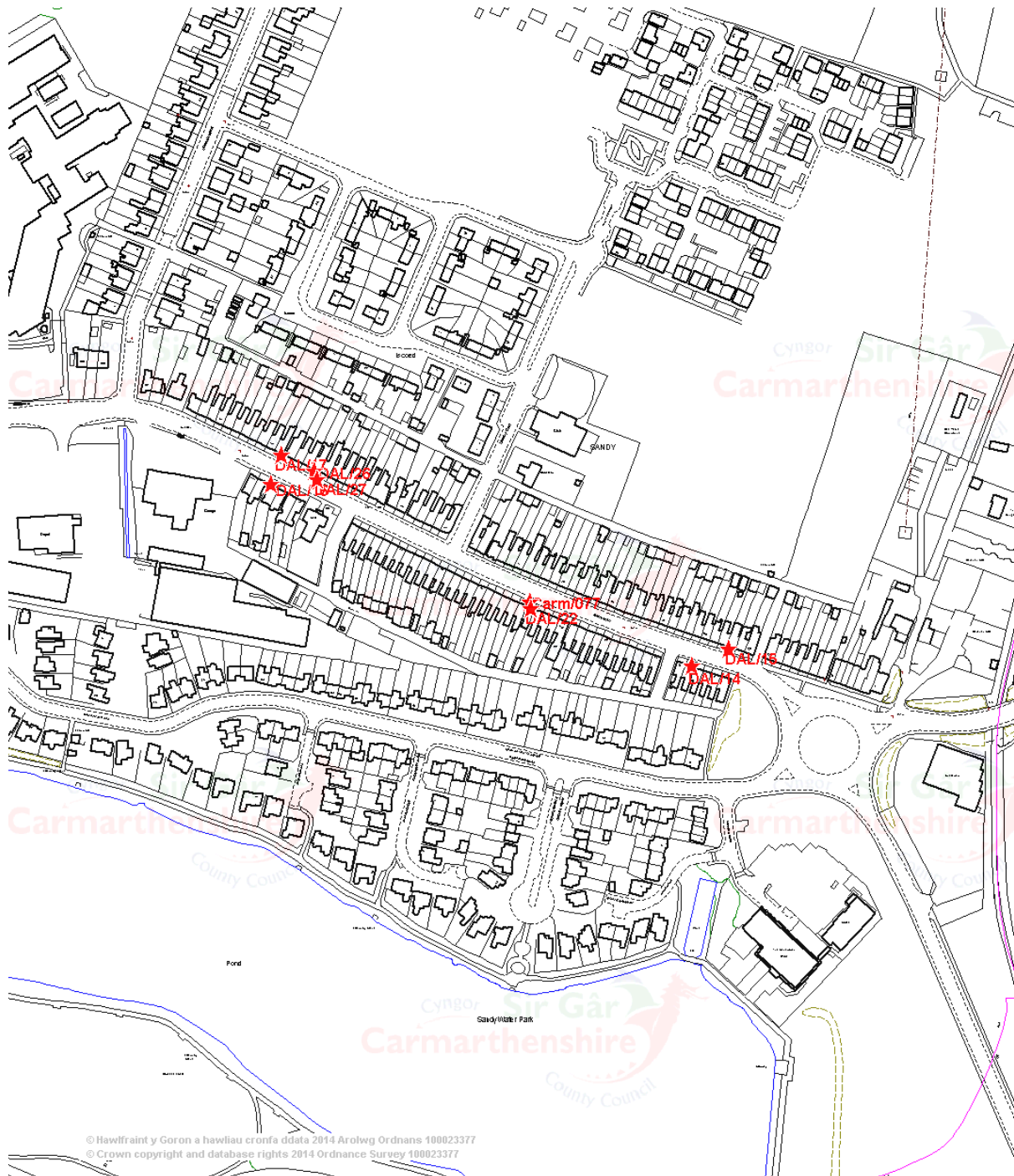


Table 2.1 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Carm/089 – Ammanford Tir Y Dail Lane (2)	Kerbside	262804	212204	NO ₂	N	N	Y (0.50)	0.95	N
Carm/064 - Ammanford – Wind Street	Roadside	262936	212285	NO ₂	N	N	Y (1.00)	2.00	N
Carm/090 – Ammanford High St (2)	Roadside	263028	212324	NO ₂	N	N	Y (0.00)	2.95	Y
LLANELLI									
DAL/20 - 19 Stradey Rd	Roadside	250270	201328	NO ₂	N	N	Y (0.00)	1.70	Y
DAL/21 – Denham Av	Other	249565	201286	NO ₂	N	N	N (8.00)	1.75	N
DAL/14 – 10 Sandy Road	Roadside	249701	200598	NO ₂	N	N	Y (0.00)	4.92	Y
DAL/15 – 33 Sandy Road	Roadside	249727	200608	NO ₂	N	N	Y (0.00)	4.66	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Carm/077 – Sandy Rd (2)	Roadside	249606	200638	NO ₂	N	N	Y (4.00)	1.70	N
DAL/22 – 44 Sandy Rd (3)	Roadside	249610	200632	NO ₂	N	N	Y (0.00)	5.55	Y
DAL/26 – 123 Sandy Road	Roadside	249483	200713	NO ₂	N	N	Y (0.00)	7.45	Y
DAL/27 – Sandy Rd (4)	Roadside	249483	200709	NO ₂	N	N	Y (4.20)	3.25	N
DAL/16 – 96 Sandy Road	Roadside	249456	200706	NO ₂	N	N	Y (0.00)	5.09	Y
DAL/17 – 131 Sandy Road	Roadside	249463	200724	NO ₂	N	N	Y (0.00)	5.30	Y
DAL/07 – nr 13 Felinfoel Road	Kerbside	250717	200818	NO ₂	N	N	Y (0.50)	0.75	N
DAL/23 – 50 Felinfoel Rd	Roadside	250754	200870	NO ₂	N	N	Y (0.00)	2.05	Y
DAL/09 – Thomas St (Barnardos)	Roadside	250709	200673	NO ₂	N	N	Y (0.00)	2.66	Y
Carm/104 –	Roadside	250719	200689	NO ₂	N	N	Y (0.00)	1.70	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Thomas St (2)									
DAL/10 – Thomas St (Bridal Shop)	Roadside	250734	200603	NO ₂	N	N	Y (0.00)	1.62	Y
Carm/069 – West End	Kerbside	250458	200603	NO ₂	N	N	Y (6.00)	0.20	N
DAL/12 – West End (Creative Cakes)	Kerbside	250411	200616	NO ₂	N	N	Y (1.65)	0.20	N
DAL/04 – 51 Panteg Road	Roadside	251623	201976	NO ₂	N	N	Y (0.32)	1.00	N
Carm/114 – Panteg Road	Roadside	251665	202013	NO ₂	N	N	Y (0.36)	1.20	Y
DAL/24 – 49 Ynyswen, Felinfoel	Roadside	252031	201896	NO ₂	N	N	Y (0.00)	1.35	Y
Carm/113 – Swiss Valley	Roadside	251951	202411	NO ₂	N	N	Y (0.40)	1.10	Y
DAL/25 – 33 Swiss Valley	Roadside	251942	202442	NO ₂	N	N	Y (1.10)	1.80	N

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
(N)									
Carmarthen									
Carm/072 – St Catherine St rdbt	Roadside	240688	220057	NO ₂	N	N	Y (0.25)	3.00	N
DAC/02 – 15 Park Terrace	Kerbside	240618	220041	NO ₂	N	N	Y (0.40)	0.95	N
DAC/16 – 6 Park Terrace	Roadside	240557	220026	NO ₂	N	N	Y (0.00)	1.35	Y
Carm/001 – St Catherine St	Roadside	240798	220155	NO ₂	N	N	Y (0.25)	1.70	Y
DAC/04 – Water Street (Probation Office)	Kerbside	240931	220144	NO ₂	N	N	Y (0.00)	0.90	N
Carm/084 – Water Street	Kerbside	240831	220272	NO ₂	N	N	Y (0.25)	0.90	Y
DAC/05 – 44 Water Street	Roadside	240797	220297	NO ₂	N	N	Y (0.00)	1.25	Y
Carm/106 – St Catherine St	Roadside	240979	220244	NO ₂	N	N	Y (0.00)	1.40	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
(A)									
DAC/06 – Glenholme Nursery	Kerbside	241546	220536	NO ₂	N	N	Y (2.20)	0.77	N
DAC/13 – 72 Richmond Terrace (2)	Kerbside	241559	220554	NO ₂	N	N	Y (0.30)	0.95	Y
Carm/109 – Richmond Terrace	Kerbside	241596	220563	NO ₂	N	N	Y (0.20)	0.63	Y
DAC/08 – 85 Priory Street (E)	Roadside	241876	220565	NO ₂	N	N	Y (0.44)	1.10	N
DAC/14 – 50 Priory Street	Roadside	241932	220583	NO ₂	N	N	Y (0.40)	1.25	Y
DAC/15 – Old Oak rdbt (E)	Roadside	241816	220519	NO ₂	N	N	Y (1.50)	2.40	N
Carm/111 – Church St	Roadside	241539	220179	NO ₂	N	N	Y (0.73)	2.80	Y
DAC/12 – 24 Spilman St	Roadside	241492	220171	NO ₂	N	N	Y (0.00)	3.00	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Carm/126 – Johnstown – 2 Jobswell Road	Roadside	239914	219829	NO ₂	N	N	Y (0.80)	2.10	Y
A477									
Carm/117 – Llanddowror School site	Roadside	225623	214580	NO ₂	N	N	Y (5.50)	1.00	N
Carm/118 – Sporting Chance Pub	Roadside	220402	211790	NO ₂	N	N	Y (0.00)	2.26	Y
Carm/119 – St Clears rdbt	Roadside	227215	215872	NO ₂	N	N	Y (20.00)	1.24	N
LLANDEILO									
FA/01 – North rdbt (8 Rhosmaen St)	Roadside	263190	222995	NO ₂	Y	N	Y (1.50)	1.60	N
DA/15 – Rhosmaen St (No 15)	Roadside	262848	222170	NO ₂	Y	N	Y (0.00)	3.10	Y
DA/01 – Rhosmaen St	Roadside	263076	222596	NO ₂	Y	N	Y (3.00)	1.25	Y

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Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
(No 69)									
DA/03 – Rhosmaen St (N0 87)	Roadside	263021	222503	NO ₂	Y	N	Y (0.00)	4.35	Y
Carm/013 – Rhosmaen St	Kerbside	263001	222489	NO ₂	Y	N	Y (2.50)	0.40	N
DA/05(A), (B) & (C) - Rhosmaen St (Evans Butchers)	Roadside	262982	222445	NO ₂	Y	N	Y (0.00)	1.50	Y
DA/07 – Rhosmaen St (Castle Hotel)	Roadside	262962	222401	NO ₂	Y	N	Y (0.00)	1.70	Y
Carm/083 – Rhosmaen St (2)	Roadside	262959	222396	NO ₂	Y	N	Y (1.00)	1.45	N
DA/09 – Rhosmaen St (No 123)	Roadside	262956	222388	NO ₂	Y	N	Y (0.00)	1.20	Y
DA/10 –	Kerbside	262933	222345	NO ₂	Y	N	Y (0.00)	0.75	Y

Carmarthenshire County Council

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Rhosmaen St (No 133)									
DA/11 – Rhosmaen St (No 74)	Roadside	262920	222337	NO ₂	Y	N	Y (0.00)	1.70	Y
DA/12 – Stryd Y Brenin	Roadside	262908	222329	NO ₂	Y	N	Y (0.00)	0.95	Y
FA/02 – Carmarthen St (The Wardrobe)	Kerbside	262869	222352	NO ₂	N	N	Y (0.00)	0.70	N
DA/13 – Rhosmaen St (Park area)	Kerbside	262906	222299	NO ₂	Y	N	Y (4.00)	0.85	N
DA/14 – Rhosmaen St (Bin post by bus stop)	Roadside	262902	222250	NO ₂	Y	N	Y (3.00)	1.15	N
DA/16 – Bridge St (N Trust) (S)	Roadside	263150	222762	NO ₂	Y	N	Y (0.00)	2.30	Y

Carmarthenshire County Council

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
FA/03 – 40 Towy Terrace (rdbt)	Roadside	262854	221504	NO ₂	Y	N	Y (0.00)	3.24	Y
FA/04 – Ffairfach Chapel	Roadside	262869	221274	NO ₂	N	N	Y (0.00)	1.45	Y
FA/05 – Cennen Road, Ffairfach (No 43)	Roadside	262903	221105	NO ₂	N	N	Y (5.00)	0.95	N
FA/06 – 10 Heol Myrddin, Ffairfach	Kerbside	262780	221469	NO ₂	N	N	Y (5.00)	0.85	N
FA/07 – Heol Bethlehem (Opp School)	Roadside	262980	221490	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 2014 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

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 2014 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. Those sites that have exceeded the AQO are detailed below with the relevant data presented in Tables 2.2 and 2.3 below.

Two of the sites in Llanelli exceeded the AQO which were Thomas Street (Barnardos) and nr 13 Felinfoel Road. Both of these sites have exceeded in the last three years. Thomas Street (2) was border line at over $38\mu\text{g}/\text{m}^3$, as it was last year and in 2012 and Sandy Road (2) was just below $40\mu\text{g}/\text{m}^3$. Two additional tube sites were introduced on Sandy Road due to public concern about air quality in the area. These sites were set up and became operational from July 2014. Work has begun on designating an AQMA within the town and monitoring will continue and serve as the Further Assessment.

In 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 and in 2012. The 6 Park Terrace site was border line at just below $40\mu\text{g}/\text{m}^3$ and St Catherine Street (A) site was just below $38\mu\text{g}/\text{m}^3$. The sites associated with Water Street junction, namely St Catherine Street, Water Street, 44 Water Street and Water Street (Probation Office) all had results below the objective, suggesting that the junction improvements works have remained as a positive impact for air quality as well. Work has begun on designating an AQMA within the town and monitoring will continue and serve as the Further Assessment.

The highest reading tube in the county was for the third year running 85 Priory Street (E). The annual result was $55\mu\text{g}/\text{m}^3$ which is slightly lower than last year.

Two of the A477 tube locations (Sporting Chance Pub and Llanddowror School site) displayed a significant decrease in annual mean results. This coincides with the fact that the A477 St Clears to Red Roses Relief Road was opened in April 2014. The results are likely to drop further with a full 12 months of data from 2015, however the tube sites were removed from the network at the end of 2014 and allocated for use in respect to the proposed Burry Port developments. A small report has been written to detail the A477 monitoring work and is shown in Appendix F.

Llandeilo had four sites which breached the AQO (Castle Hotel, Rhosmaen Street (2), No 123 and No 133) and one site which was border line at just below $40\mu\text{g}/\text{m}^3$

(No 74 Style Shop). The Action Plan has now been issued and work will concentrate on Phase 1 of the Plan.

The data capture for 2014 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. However the new sites on Sandy Road were only operational for six months and one site only achieved 5 months data capture. Therefore the data for these sites was annualised and the details relating to this can be found in Appendix G.

Two sites in the diffusion tube network were corrected for distance and these were Sandy Road (2) (Carm/077) and Sandy Road (4) (DAL/27). Both these locations are adjacent to the highway whilst the relevant receptor locations are some metres back from the highway. Additionally both locations have other tubes located within 'close' proximity but placed at facades of properties. These are effectively operating as parallel sites and help to identify the drop off over distance. The data assists with illustrating that the NO₂ levels along Sandy Road are below the Objective Level. However, the authority is very conscious that Sandy Road is a long section of road with relatively high traffic volumes and also relatively large numbers of school children and college students whom walk alongside the road to access the local schools and Coleg Sir Gar. Details relating to the distance calculations are contained in Appendix H.

There is one triplicate tube site which is in Llandeilo (DA/05 – Rhosmaen Street (Evans Butchers)) and which will be maintained for the continued monitoring and assessment of Action Plan work.

The monthly raw data results for Table 2.2 and the 2014 data for Table 2.3 are contained in Appendices B to E.

Table 2.2 Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/089	Ammanford – Tir Y Dail Lane (2)	Kerbside	N	N	12	N/A	N/A	24.3
Carm/064	Ammanford – Wind Street	Roadside	N	N	12	N/A	N	25.3
Carm/090	High Street (2)	Roadside	N	N	12	N/A	N/A	28.5
LLANELLI								
DAL/20	19 Stradey Road	Roadside	N	N	12	N/A	N/A	20.3
DAL/21	Denham Avenue	Other	N	N	11	N/A	N	11.7
DAL/14	10 Sandy Road	Roadside	N	N	11	N/A	N/A	28.0
DAL/15	33 Sandy Road	Roadside	N	N	12	N/A	N/A	21.5

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/077	Sandy Road (2)	Roadside	N	N	12	N/A	Y	37.9
DAL/22	44 Sandy Road (3)	Roadside	N	N	12	N/A	N/A	30.4
DAL/26	123 Sandy Rd	Roadside	N	N	6	Y	N/A	21.5
DAL/27	Sandy Rd (4)	Roadside	N	N	5	Y	Y	27.1
DAL/16	96 Sandy Road	Roadside	N	N	9	N/A	N/A	18.0
DAL/17	131 Sandy Road	Roadside	N	N	12	N/A	N/A	19.5
DAL/07	Nr 13 Felinfoel Road	Kerbside	N	N	10	N/A	N	50.6
DAL/23	50 Felinfoel Road	Roadside	N	N	12	N/A	N/A	23.7
DAL/09	Thomas St (Barnardos)	Roadside	N	N	12	N/A	N/A	44.8

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/104	Thomas Street (2)	Roadside	N	N	11	N/A	N/A	38.6
DAL/10	Thomas St (Bridal Shop)	Roadside	N	N	9	N/A	N/A	35.8
Carm/069	West End	Kerbside	N	N	11	N/A	N	36.0
DAL/12	West End (Creative Cakes)	Kerbside	N	N	11	N/A	N	30.9
DAL/04	51 Panteg Road	Roadside	N	N	12	N/A	N	32.4
Carm/114	Panteg Road	Roadside	N	N	12	N/A	N	33.8
DAL/24	49 Ynyswen, Felinfoel	Roadside	N	N	12	N/A	N/A	17.7
Carm/113	Swiss Valley	Roadside	N	N	10	N/A	N	35.1
DAL/25	33 Swiss Valley (N)	Roadside	N	N	11	N/A	N	17.9
Carmarthen								

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/072	St Catherine St rdbt	Roadside	N	N	11	N/A	N	30.9
DAC/02	15 Park Terrace	Kerbside	N	N	11	N/A	N/A	43.5
DAC/16	6 Park Terrace	Roadside	N	N	12	N/A	N/A	39.7
Carm/001	St Catherine Street	Roadside	N	N	12	N/A	N	30.5
DAC/04	Water St (Probation Office)	Kerbside	N	N	10	N/A	N/A	23.7
Carm/084	Water St	Kerbside	N	N	12	N/A	N	36.5
DAC/05	44 Water St	Roadside	N	N	10	N/A	N/A	34.7
Carm/106	St Catherine St (A)	Roadside	N	N	12	N/A	N/A	37.9
DAC/06	Glenholme Nursery	Kerbside	N	N	12	N/A	N	32.6
DAC/13	72 Richmond Terrace (2)	Roadside	N	N	12	N/A	N	33.5

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/109	Richmond Terrace	Kerbside	N	N	12	N/A	N	40.9
DAC/08	85 Priory Street (E)	Roadside	N	N	11	N/A	N	55.5
DAC/14	50 Priory Street	Roadside	N	N	12	N/A	N	35.4
DAC/15	Old Oak rdbt (E)	Roadside	N	N	12	N/A	N	30.1
Carm/111	Church St	Roadside	N	N	12	N/A	N	33.7
DAC/12	24 Spilman Street	Roadside	N	N	12	N/A	N/A	34.4
Carm/126	Johnstown – 2 Jobs Well Road	Roadside	N	N	11	N/A	N	22.7
A477								
Carm/117	Llanddowror School site	Roadside	N	N	11	N/A	N	14.3

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
Carm/118	Sporting Chance pub	Roadside	N	N	11	N/A	N/A	11.2
Carm/119	St Clears rdbt	Roadside	N	N	12	N/A	N	29.4
LLANDEILO								
FA/01	North rdbt (No 8 Rhosmaen Street)	Roadside	Y	N	12	N/A	N	15.3
DA/15	Rhosmaen St (No 15)	Roadside	Y	N	12	N/A	N/A	24.0
DA/01	Rhosmaen St (No 69)	Roadside	Y	N	12	N/A	N	25.5
DA/03	Rhosmaen St (No 87)	Roadside	Y	N	12	N/A	N/A	26.4
Carm/013	Rhosmaen Street	Kerbside	Y	N	12	N/A	N	33.2
DA/05(A), (B) & (C)	Rhosmaen St (Evans Butchers)	Roadside	Y	Triplicate	12	N/A	N/A	37.5

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
DA/07	Rhosmaen St (Castle Hotel)	Roadside	Y	N	12	N/A	N/A	43.3
Carm/083	Rhosmaen St (2)	Roadside	Y	N	12	N/A	N	46.7
DA/09	Rhosmaen St (No 123)	Roadside	Y	N	12	N/A	N/A	46.4
DA/10	Rhosmaen St (No 133)	Kerbside	Y	N	9	N/A	N/A	41.7
DA/11	Rhosmaen St (No 74)	Roadside	Y	N	12	N/A	N/A	39.5
DA/12	Stryd Y Brenin	Roadside	Y	N	11	N/A	N/A	25.9
FA/02	Carmarthen St (The Wardrobe)	Kerbside	N	N	11	N/A	N/A	12.1
DA/13	Rhosmaen St (Park area)	Kerbside	Y	N	12	N/A	N	35.8

Carmarthenshire County Council

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.81)
								2014 ($\mu\text{g}/\text{m}^3$)
DA/14	Rhosmaen St (Bin post by bus stop)	Roadside	Y	N	11	N/A	N	22.8
DA/16	Bridge St (N Trust) (S)	Roadside	Y	N	12	N/A	N/A	33.8
FA/03	40 Towy Terrace, Ffairfach (rdbt)	Roadside	Y	N	11	N/A	N/A	18.7
FA/04	Ffairfach Chapel	Roadside	N	N	12	N/A	N/A	14.1
FA/05	Cennen Road, Ffairfach (No 43)	Roadside	N	N	11	N/A	N	16.4
FA/06	10 Heol Myrddin, Ffaifach	Kerbside	N	N	10	N/A	N	16.9
FA/07	Heol Bethlehem (Opp school)	Roadside	N	N	11	N/A	N	10.0

Table 2.3 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81)
Carm/089	Kerbside	N	32.0	26.4	25.9	26.2	24.3
Carm/064	Roadside	N	31.0	30.9	27.6	27.8	25.3
Carm/090	Roadside	N	31.0	29.3	30.1	28.1	28.5
LLANELLI							
DAL/20	Roadside	N	-	-	-	22.0	20.3
DAL/21	Other	N	-	-	-	12.9	11.7
DAL/14	Roadside	N	-	-	27.8	25.5	28.1
DAL/15	Roadside	N	-	-	23.1	23.4	21.5
Carm/077	Roadside	N	43.0	42.6	40.8	37.7	37.9
DAL/22	Roadside	N	-	-	-	31.2	30.4
DAL/26	Roadside	N	-	-	-	-	21.5
DAL/27	Roadside	N	-	-	-	-	27.1
DAL/16	Roadside	N	-	-	22.9	21.3	18.0
DAL/17	Roadside	N	-	-	21.3	22.7	19.5
DAL/07	Kerbside	N	-	-	54.2	49.1	50.6
DAL/23	Roadside	N	-	-	-	24.9	23.7
DAL/09	Roadside	N	-	-	50.5	46.5	44.8
Carm/104	Roadside	N	45.0	42.1	39.1	38.5	38.6

Carmarthenshire County Council

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81)
DAL/10	Roadside	N	-	-	42.2	38.1	35.8
Carm/069	Kerbside	N	45.0	42.8	43.4	36.5	36.0
DAL/12	Kerbside	N	-	-	32.6	29.0	30.9
DAL/04	Roadside	N	-	-	37.3	34.4	32.4
Carm/114	Roadside	N	-	38.1	37.7	38.0	33.8
DAL/24	Roadside	N	-	-	-	19.6	17.7
Carm/113	Roadside	N	-	40.3	39.6	37.7	35.1
DAL/25	Roadside	N	-	-	-	20.1	17.9
Carmarthen							
Carm/072	Roadside	N	39.0	38.0	34.4	32.7	30.9
DAC/02	Kerbside	N	-	-	47.6	43.4	43.5
DAC/16	Roadside	N	-	-	-	39.1	39.7
Carm/001	Roadside	N	44.0	35.8	36.1	33.1	30.5
DAC/04	Kerbside	N	-	-	26.5	23.9	23.7
Carm/084	Kerbside	N	46.0	39.4	38.8	36.4	36.5
DAC/05	Roadside	N	-	-	38.1	33.9	34.7
Carm/106	Roadside	N	47.0	42.4	43.6	36.6	37.9
DAC/06	Kerbside	N	-	-	34.6	30.3	32.6
DAC/13	Roadside	N	-	-	-	32.7	33.5
Carm/109	Kerbside	N	-	43.9	42.4	40.1	40.9

Carmarthenshire County Council

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81)
DAC/08	Roadside	N	-	-	65.0	58.0	55.5
DAC/14	Roadside	N	-	-	-	35.3	35.4
DAC/15	Roadside	N	-	-	-	30.6	30.1
Carm/111	Roadside	N	-	37.0	36.6	34.2	33.7
DAC/12	Roadside	N	-	-	37.2	35.6	34.4
Carm/126	Roadside	N	-	-	-	25.0	22.7
A477							
Carm/117	Roadside	N	-	35.2	33.1	31.2	14.3
Carm/118	Roadside	N	-	27.2	26.8	23.7	11.2
Carm/119	Roadside	N	-	32.2	30.8	28.8	29.4
LLANDEILO							
FA/01	Roadside	Y	-	21.1	15.2	15.6	15.3
DA/15	Roadside	Y	-	28.9	25.8	24.9	24.0
DA/01	Roadside	Y	31.0	30.3	27.4	25.8	25.5
DA/03	Roadside	Y	31.0	30.2	27.6	24.6	26.4
Carm/013	Kerbside	Y	40.0	39.2	35.2	29.8	33.2
DA/05(A), (B) & (C)	Roadside	Y	44.0	40.7	39.6	32.6	37.5
DA/07	Roadside	Y	46.0	44.8	44.5	35.4	43.3
Carm/083	Roadside	Y	57.0	48.9	46.3	37.9	46.7

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.83)	2012 (Bias Adjustment Factor = 0.79)	2013 (Bias Adjustment Factor = 0.80)	2014 (Bias Adjustment Factor = 0.81)
DA/09	Roadside	Y	54.0	48.6	45.8	38.1	46.4
DA/10	Kerbside	Y	53.0	44.1	43.9	35.9	41.7
DA/11	Roadside	Y	49.0	43.0	44.2	32.8	39.5
DA/12	Roadside	Y	46.0	34.8	29.0	25.4	25.9
FA/02	Kerbside	N	-	14.4	13.5	13.1	12.1
DA/13	Kerbside	Y	45.0	42.8	41.0	33.3	35.8
DA/14	Roadside	Y	31.0	28.9	29.8	24.5	22.8
DA/16	Roadside	Y	-	37.7	39.0	37.7	33.8
FA/03	Roadside	Y	-	24.9	20.4	19.9	18.7
FA/04	Roadside	N	-	18.9	15.7	14.7	14.1
FA/05	Roadside	N	-	22.8	17.9	17.9	16.4
FA/06	Kerbside	N	-	-	17.9	17.1	16.9
FA/07	Roadside	N	-	-	10.9	10.9	10.0

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. The trend graphs shown below relate mainly to those areas of the county where monitoring is concentrated and in relation to either known areas of concern or looking at areas where significant development has been proposed but not yet implemented.

Figure 2.2a 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 slightly downwards but this is only with a limited number of year's data.

Figure 2.2a Annual Mean NO₂ Trend Graph (Ammanford)

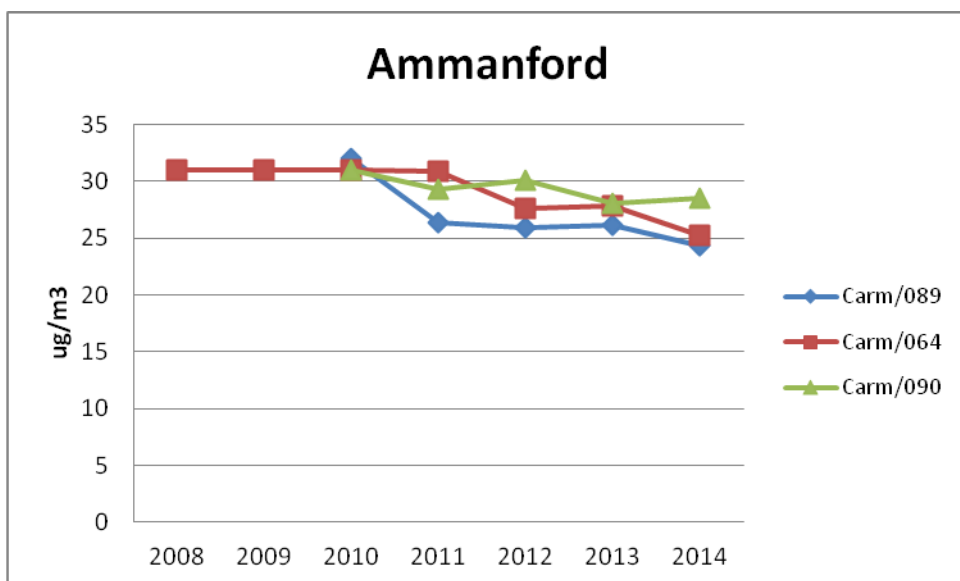
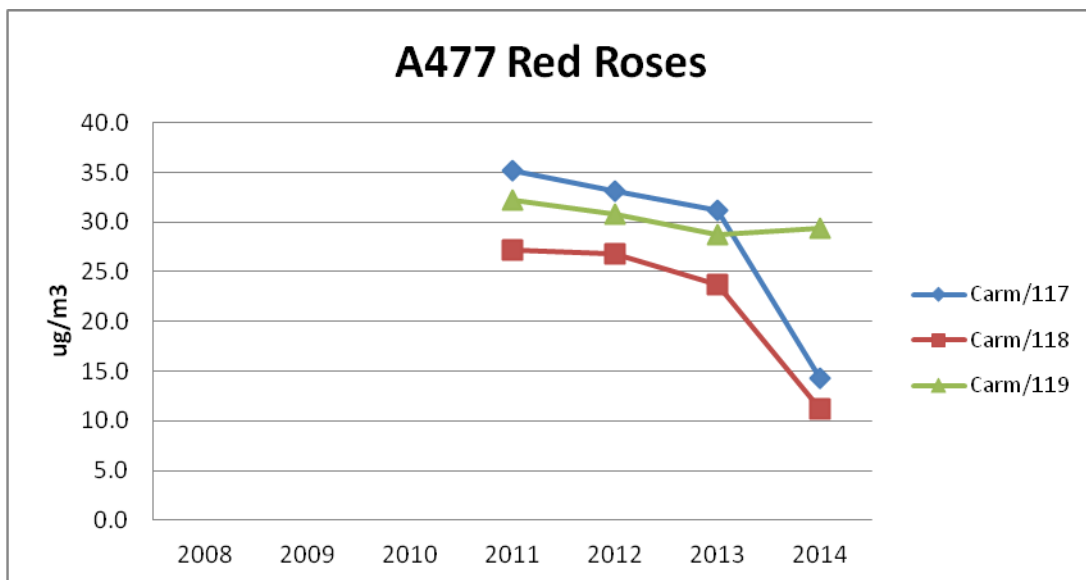


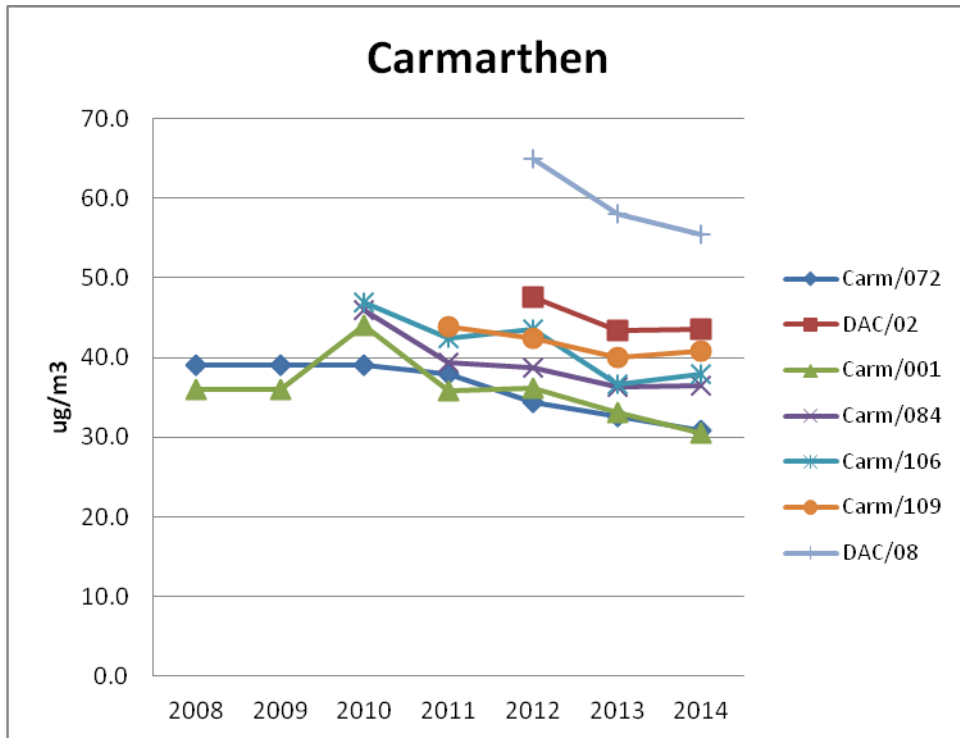
Figure 2.2b below provides the trends for the A477 diffusion tubes that were set up to assess the impact from the Red Roses Relief Road project. The results for 2013 were somewhat surprising as it was expected that the results would increase as the project progressed and that there would potentially be significant congestion associated with the works being carried out. However, the impact on traffic flow was relatively minimal during both 2013 and 2014 and this is perhaps testament to the contractors implementing the project. The significant drop off in results last year for sites Carm/117 and Carm/118 are due to the opening of the relief road.

Figure 2.2b Annual Mean NO₂ Trend Graph (A477 Red Roses)



The graph below in Figure 2.2c 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), continue to display a slight downward trend, as has 85 Priory Street (E) (DAC/08). Both Carm/072 and Carm/001 are below the AQO, whilst DAC/08 remains above the AQO. Two other sites associated with the Detailed Assessment, 15 Park Terrace (DAC/02) and Richmond Terrace (Carm/109), are both above the AQO.

Figure 2.2c Annual Mean NO₂ Trend Graph (Carmarthen)



The main tube sites for the town of Llanelli are shown in Figure 2.2d. The two tube sites that are above the AQO again are DAL/07 (nr 13 Felinfoel Road) and DAL/09 (Thomas Street (Barnardos)). It should be noted that the result for Sandy Road 2 (Carm/077) in the graph has not been modified using the distance calculator, unlike the results provided in Tables 2.2 and 2.3 respectively.

Figure 2.2d Annual Mean NO₂ Trend Graph(Llanelli)

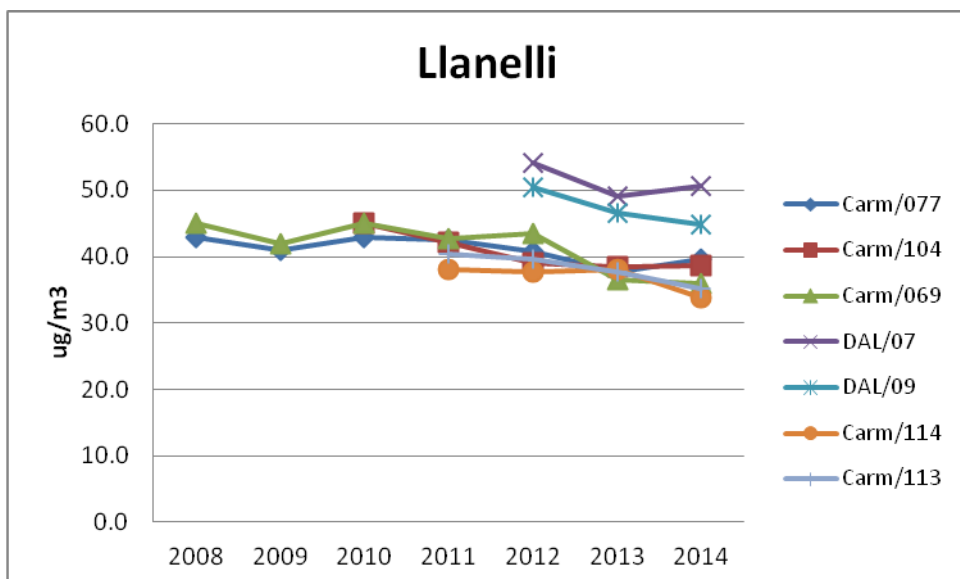
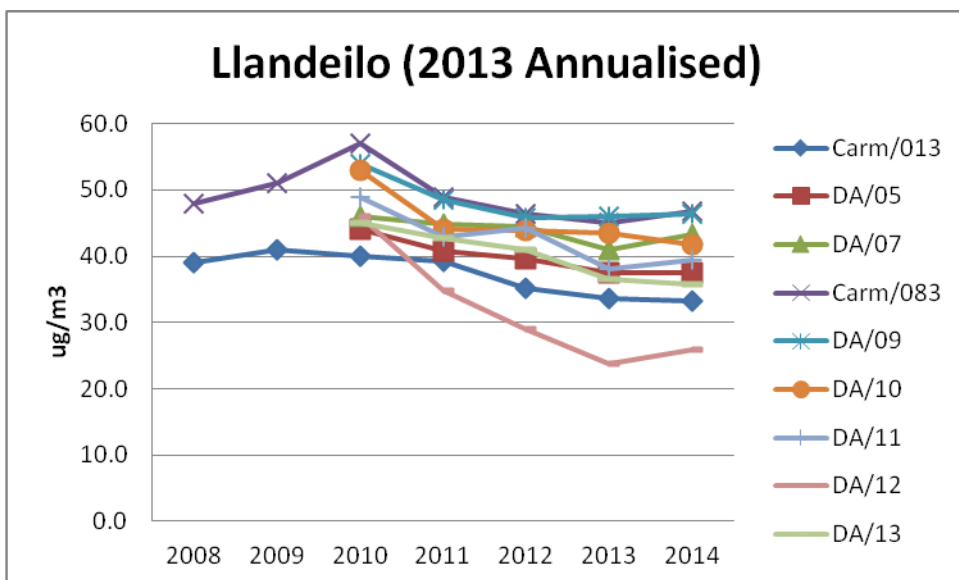


Figure 2.2e relates to the town of Llandeilo and illustrates there are still exceedences of the AQO, with all of the relevant sites being located in the 'hot spot' along Rhosmaen Street. The graph uses the annualised data for 2013 that was generated for the 2014 Progress Report. This has 'smoothed' the data and provides a more realistic illustration of the trend. The large reduction in results for site DA/12 is unexplained, although there has been a slight increase for last year at this particular tube location.

Figure 2.2e Annual Mean NO₂ Trend Graph (Llandeilo)



2.2.2 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.

Whilst there was no PM₁₀ monitoring exercise carried out during 2013, there were a number of complaints received in relation to a group of poultry farms located in the hamlet of Pinged near Pembrey. This resulted in a request for a PM₁₀ monitoring exercise to be carried out. A three month study was carried out in the late summer / early autumn of 2014 but no exceedences of the Objective were identified, that could be attributable to the poultry farms. The report relating to this monitoring exercise can be found in Appendix I.

The dust survey that was performed in relation to the construction of the A477 St Clears to Red Roses Relief Road came to an end in April 2014 when the road was officially opened. Unfortunately, due to a lack of time and resource it has not been possible to formally report this work and the results obtained. However, a review of the results from the survey could not identify any relevant results that were considered to have been excessively high and potentially would have given rise to complaint. Indeed, there were no complaints received by the authority in relation to dust for the duration of the project. There were a limited number of samples that displayed high results however these were linked to circumstances such as spoilt samples, dust gauge being knocked over in close proximity to earth works and crushing in very close proximity to the dust gauge. An attempt will be made to report the results from this study during 2015.

2.2.3 Sulphur Dioxide

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.

Three compliance visits were carried out during 2014 and none 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 J.

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 nitrogen dioxide above the annual mean objective at relevant locations outside of the Llandeilo AQMA, has carried out Detailed Assessments, and **will need to proceed to designating Air Quality Management Areas for the towns of Carmarthen and Llanelli.**

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Carmarthenshire County Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

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

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

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

3.4 Junctions

Carmarthenshire County Council confirms that there are no new/newly identified busy junctions/busy roads.

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

In 2014 work began on the new Cross Hands Link Road that is associated with the Cross Hands East Strategic Employment site with the road joining Black Lion Road and Heol Parc Mawr on the Cross Hands Industrial Estate. As part of the planning process an Environmental Statement was submitted and supported by an Air Quality Assessment (AQA) the details of which were reported in the document titled “Carmarthenshire County Council (Jacobs), Cross Hands East Strategic Employment Site, Environmental Statement, Volume 1: Main Text, Final Sept 2010. The conclusions from the AQA were that there would be negligible impact on air quality from the proposed link road development. The Planning Reference number is S/23782.

Carmarthenshire County Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG (09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

With the continued improvement in air quality work in the county a review of annual traffic data held on the Department for Transport (DfT) website was carried out. The data is being used for various reasons, one of which for preparation for this USA.

The review of data identified that there had been no significant increase in traffic volumes for those roads that have been historically monitored. The four highest increase in traffic volumes were as detailed below.

Count Reference	Location	% increase
40516	A40 Carmarthen B&Q rdbt	14
50607	A40 St Clears rdbt	8
73235	M4 east of Jnc 48	2
73249	Whitland by-pass	16

None of the above locations have relevant exposure.

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

3.7 Bus and Coach Stations

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

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

Previous assessments and reports identified a potential for exceedence of the 15 minute mean objective of $266\mu\text{g}/\text{m}^3$ for sulphur dioxide caused by the idling of steam locomotives at the platform of the Gwili Railway Company station at Bronwydd, Carmarthen. The relevant exposure would be to members of the public who would be standing on the platform and within 15 meters of the idling locomotive.

Officers of Carmarthenshire County Council continue to monitor compliance with the fixed work instruction agreed with the Gwili Railway Company in respect of train idling times through unannounced visits to the site.

Results of the unannounced visits can be found in Appendix J.

4.2.1 Stationary Trains

There have been site visits to check compliance with the agreed fixed work instruction that steam locomotives shall not idle at the Gwili Station platform for longer than 10 minutes at a time. To date, a breach of this agreed work instruction has not been witnessed.

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

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

5 Industrial Sources

5.1 Industrial Installations

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

An application was received for a proposed Photovoltaic Solar Array and Energy Recovery Centre with an accompanying Environmental Statement supported by an Air Quality Assessment (AQA). The document reference for the AQA is Entran Environmental & Transportation, Clean Power Properties, Proposed Photovoltaic Solar Array & Energy Recovery Centre, New Lodge Farm, Pontardulais Road, Cwmgwili, Cross Hands, Carmarthenshire, Environmental Statement: Volume 1, Main Text. The conclusion of the AQ was that there would be negligible impact on air quality from the construction and operation of the proposed development. The Planning Reference number for the application is S/29559. The development, if granted planning consent, will require an Environmental Permit that would be issued by Natural Resources Wales in accordance with the Environmental Permitting (England and Wales) Regulations 2010 (as amended).

It was noted late last year that a new installation was being built for a back-up electricity generation plant (storage facility) in the Dafen area of Llanelli. On investigation it was identified that the facility had been granted planning consent some years earlier but was not passed on for comment during the consultation stage. There was very little detail in respect of the potential impact on air quality, although the application stated that it was envisaged the plant would not operate for more than 100 hours per annum. However the planning consent was not conditioned with any restriction to the hours of operation. The plant comprises of six 1.6MW generators served by six 18.5m stacks. The planning reference number for the application was S/27352.

In trying to assess the potential impact from such facilities it seems there is a lack of guidance. Also when looking to determine the best means for monitoring any potential impact from this type of activity the various monitoring techniques are very limited in their applicability. For example, the use of diffusion tubes is unlikely to pick

up elevated emissions over what are envisaged to be short operating cycles. A fixed location for automatic monitoring equipment would be restricted by prevailing wind directions, and for the majority of the time be monitoring possibly needlessly, therefore cost prohibitive. Therefore it would be very helpful if some guidance were made available for future rounds of Review and Assessment that would assist with determining potential air quality impacts from such plant.

Carmarthenshire County Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

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

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

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

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

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

5.4 Poultry Farms

There are no individual poultry farms that meet the specified criteria within the local authority area. However, complaints have been received for a number of years in relation to a group of farms in the Pinged area towards the south of the county. An elevated level of complaints were received during 2013/14 which led to an air quality monitoring exercise being carried out to determine whether there was an particulate emissions affecting the locality. The monitoring did not identify any breaches of the air quality objective.

The report detailing this work can be found in Appendix I.

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Three separate biomass boiler planning consents were granted in 2014 (where relevant plant specification details have been provided), one for a hotel in Llandovery, one for a Creamery in Newcastle Emlyn and one for West Wales General Hospital in Carmarthen. All three installations are to be fed with pelletised virgin wood and the boilers compliant with the Renewable Heat Incentive (RHI) Scheme. Biomass Boiler Information forms were requested to be completed by all three applicants with the quality of the returned information quite variable.

The details supplied in respect of the boilers were checked against the guidance provided in Section D.1a of Chapter 5, TG (09) and for all three boilers the background adjusted emission rate was lower than the threshold emission rates obtained from the nomogram graphs. The details relating to the checks can be found in Appendix K.

Carmarthenshire County Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

There have been a number of biomass boiler plant installed over the last few years but they are spread across the county. None are within the Llandeilo AQMA and none have been installed within the potential new AQMA's identified for the towns of Carmarthen and Llanelli. It has been very difficult to maintain and update the register for installations due to time and resource, and sometimes the lack of feed back from applicants. However, efforts will be made to get the register up to date and careful

attention will be paid to future installations, their locations and proximity to existing plant in order to identify potential combined impacts.

It has also been noted there has been a significant increase in the number of requests from members of the public enquiring about smoke free zones and regulatory controls for log burners. It is apparent that more multi-fuel stoves are being installed in domestic premises for burning both wood and coal, and indeed, the number of coal merchants in the county has increased. However, it is not considered that this is having a significant impact on local air quality at this stage.

Carmarthenshire County Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

As detailed in Section 6.2 above, it is noted there has been an increase in domestic solid-fuel burning but at this stage it is not considered there is a significant negative impact on local air quality.

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

7 Fugitive or Uncontrolled Sources

Although the authority no longer carries out an annual particulate monitoring exercise, specific projects will be implemented when a potential problem is identified such as the complaints about the Pinged poultry farms detailed in Section 5.4 above.

Carmarthenshire County Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area at this time but will investigate should a source be identified.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The diffusion tube monitoring in Llandeilo has highlighted the continued breach of the AQO along areas of Rhosmaen Street. The results were generally higher than last the previous year, which was affected by the road closure, but the data was 'smoothed' with the use of annualised data. The AQMA Action Plan has been issued and work has begun on Phase 1 of the Action Plan.

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 has begun on the designation of AQMA's for both towns with proposed AQMA boundary maps developed. Public consultation on the proposed boundaries will take place once the Committee Reports have been through the various Council Meetings. The diffusion tube monitoring for these areas is continuing and will be treated as the Further Assessment work.

8.2 Conclusions from Assessment of Sources

The junction improvement work at Water Street and St Catherine Street in Carmarthen appears to have maintained an improvement in air quality with results remaining below the objective.

The Extended Detailed Assessment work in Llanelli and Carmarthen has confirmed breaches of the AQO and established that it is associated with traffic emissions. Although there has been substantial development in both towns over the last few years none of the developments on their own are likely to be direct cause of the

exceedences. It would also be difficult to establish a link to the combined impacts of the developments, although some will be contributory.

All other sources that have been reviewed are not considered to be significantly contributing towards breaches, or potential breaches of AQO's and therefore do not require Detailed Assessments.

8.3 Proposed Actions

The Updating and Screening Assessment has not identified the need to proceed to a Detailed Assessment at any other locations in the county, or for any other pollutants.

The diffusion tube monitoring in Llandeilo will continue and work on Phase 1 of the Action Plan will be progressed.

Results from the AQ Mesh pod located in Rhosmaen Street will continue to be analysed and compared to diffusion tube data. Performance of the equipment will be assessed as the equipment suppliers continue to implement upgrades to the algorithms that are used to generate displayed results which will hopefully improve confidence with the data retrieved.

The designation of AQMA's for Carmarthen and Llanelli will continue with the Order hopefully being issued by the end of 2015, following the public consultation on the boundaries.

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 Llanelli Joint Strategic Needs Assessment identified that certain Lower Super Output Areas (LSOAs) had significantly elevated levels of reported respiratory illness, compared to the Welsh average, as detailed in the 2014 Progress Report. It was decided to review the specific areas to identify whether there are any sources of air

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pollution that may be contributing to the elevated reported figures. This work was carried out last year and concluded there were no identifiable sources that were likely to be responsible for the elevated reported figures. The Review reports were fed back in to the review of the Llanelli JSNA and the outcome of the review work is awaited. Depending on the outcome, further involvement with with work stream may be required.

Work will start towards completing aspects for the 2016 Progress Report.

9 References

- Carmarthenshire County Council 2012 Updating & Screening Assessment
- Carmarthenshire County Council 2014 Progress Report
- 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 Pinged Poultry Farms – PM₁₀ Monitoring Report (November 2014)
- Carmarthenshire County Council 2015 A477 Relief Road NO₂ Improvement Report (February 2015)
- Carmarthenshire County Council 2015 Sandy Road Annualised Data (2014) for use with 2015 Updating & Screening Assessment (April 2015)
- 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 (05/09/14)
- LAQM PT Summary - WASP PT 121 – 124 and AIR PT AR001,3,4 and 6 (LAQM Helpdesk website)
- Technical Guidance LAQM TG (09) (Defra)
- Tube Precision 2015 version 03-15 Final (LAQM Helpdesk website)
- Welsh Air Quality Forum Website – (data acquisition for annualised data calculations)
- .

Appendices

Appendix A: QA/QC Data

Factor from Local Co-location Studies (if available)

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

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 0.81 and taken from the Review and Assessment Helpdesk Database. The version number of the database was 03/15.

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 03/15, as detailed on the Review and Assessment website. ESG have 22 studies listed for 2014 that gives an overall bias adjustment figure of 0.81.

PM Monitoring Adjustment

The Partisol PM₁₀ Monitor used by Carmarthenshire County Council is not classed as a TEOM or BAM and therefore no adjustments are made to the monitoring data. However, data obtained from the PM₁₀ survey carried out during 2014 was annualised and the methodology and results can be seen in Section 3.3 of the monitoring report contained in Appendix I.

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 Sandy Road (Llanelli) that were set up to start monitoring from July onwards in 2014. The Period Mean dates were from July to December and the results are reported in Appendix G.

Site	Site Type	Annual Mean	Period Mean	Ratio
Powys (Aston Hill)	Rural	4.49	4.66	0.96
Caerphilly (Blackwood High Street)	Roadside	32.80	30.80	1.06
Newport (St Julians Comprehensive)	Urban Background	21.70	21.60	1.00
Port Talbot (Margam)	Urban Background	17.30	16.80	1.03
Rhondda Cynon Taff (Broadway)	Roadside	31.40	28.90	1.08
			Average	1.03

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 13 studies in 2014 that were rated at Good.

This information was obtained from the document 'Tube Precision 2015 version 03-15 Final' located on the Defra LAQM Helpdesk website.

WASP / AIR PT Results

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

WASP R121	WASP R122	WASP R123	WASP R124	AIR PT AR001	AIR PT AR003	AIR PT AR004	AIR PT AR006
Apr–Jun 2013	Jul-Sep 2013	Oct-Dec 2013	Jan-Mar 2014	Apr– May 2014	Jul-Aug 2014	Oct-Nov 2014	Jan-Feb 2015
100%	100%	100%	100%	100%	100%	100%	87.5%

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

The above details were obtained from the document 'LAQM PT Summary - WASP PT 121 – 124 and AIR PT AR001,3,4 and 6 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	53.8	45.5	43.2	38.3	26.0	28.1	27.3	30.6	35.0	46.7	45.6	-
DAC/02	-	57.2	57.5	59.6	43.1	38.8	43.8	37.8	60.1	57.5	73.5	62.2
DAC/16	64.2	53.8	56.7	51.8	42.4	29.1	35.1	33.3	55.8	47.9	66.0	52.7
Carm/001	50.0	41.3	37.1	29.3	32.7	25.0	26.4	28.4	38.4	42.7	54.4	46.7
DAC/04	35.2	-	-	27.9	21.5	19.5	25.1	24.5	29.1	29.7	40.3	40.1
Carm/084	55.1	47.1	48.6	43.2	37.0	35.7	34.6	26.9	52.8	49.4	60.2	49.4
DAC/05	57.4	-	42.2	47.9	38.9	24.9	39.0	33.1	42.2	-	47.8	55.2
Carm/106	57.5	50.9	43.6	45.4	43.7	24.2	35.1	40.4	40.1	52.0	57.5	71.5
DAC/06	52.3	45.5	44.9	39.6	29.5	18.7	26.4	32.0	42.0	43.7	59.7	49.2
DAC/13	54.3	40.5	46.2	36.8	36.5	24.6	37.6	35.5	37.6	37.5	51.4	58.4
Carm/109	56.1	66.4	46.2	50.0	35.1	31.4	42.1	32.8	62.9	53.0	68.2	62.1
DAC/08	-	81.1	69.2	75.1	66.3	48.9	48.1	54.9	67.4	65.2	86.7	91.4
DAC/14	51.4	62.8	42.5	42.5	35.4	28.6	34.2	34.5	38.9	49.4	52.7	51.9
DAC/15	43.5	50.2	40.8	32.3	35.1	19.5	29.8	29.1	30.4	48.3	41.4	45.8
Carm/111	57.2	44.2	44.5	42.4	36.4	26.5	33.4	28.1	40.0	49.3	53.8	43.9
DAC/12	53.9	44.2	37.4	44.3	31.6	31.4	36.7	34.4	41.2	46.7	50.0	57.2
Carm/126	38.5	-	30.6	29.5	23.4	15.2	17.8	21.0	30.0	28.0	42.2	31.6

Appendix C: Llanelli Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DAL/20	34.4	26.1	29.7	23.4	18.9	17.3	19.9	17.6	25.0	28.9	30.6	29.5
DAL/21	19.6	-	16.3	15.0	11.3	7.7	10.3	8.9	15.7	15.2	22.5	15.8
DAL/14	43.7	-	37.8	38.0	32.6	29.4	28.7	28.8	32.5	30.3	40.8	37.8
DAL/15	28.2	21.7	28.3	31.7	20.2	20.0	23.2	23.7	28.3	24.2	39.1	29.8
Carm/077	62.8	46.8	58.0	55.5	46.3	27.9	40.1	35.2	48.8	53.1	58.4	55.7
DAL/22	48.2	36.9	38.5	41.6	33.0	28.9	31.8	29.7	38.0	41.5	42.3	39.6
DAL/26	-	-	-	-	-	-	17.6	21.0	30.7	22.4	38.0	29.6
DAL/27	-	-	-	-	-	-	23.0	22.1	36.8	27.8	52.4	-
DAL/16	31.3	-	32.9	27.0	-	14.0	19.8	13.6	27.9	-	11.7	22.1
DAL/17	30.9	20.9	30.9	24.0	20.5	10.0	20.1	20.2	25.1	22.8	34.0	29.8
DAL/07	67.8	-	70.4	68.7	-	53.7	57.2	35.3	68.6	61.4	78.1	62.9
DAL/23	40.1	28.9	35.4	32.4	27.7	18.3	22.1	15.9	36.9	30.0	34.3	28.7
DAL/09	73.4	64.0	51.3	55.2	47.0	43.4	41.1	57.8	45.8	57.8	58.4	68.0
Carm/104	61.6	-	50.3	53.5	36.3	37.4	38.2	30.9	55.1	44.4	68.2	48.1
DAL/10	-	-	42.8	41.6	36.5	-	36.3	32.4	46.9	45.0	65.3	50.7
Carm/069	58.3	-	53.6	48.6	37.8	23.9	39.4	37.3	46.4	48.6	40.6	54.2
DAL/12	54.0	-	47.7	39.1	29.9	24.8	25.7	23.7	41.9	40.2	50.2	42.1
DAL/04	48.6	44.2	37.7	35.8	33.5	33.5	34.5	35.1	42.2	43.0	43.0	48.1
Carm/114	57.7	43.0	36.9	39.8	34.9	31.9	32.4	36.9	44.1	45.3	48.5	49.2
DAL/24	30.3	17.1	23.8	23.0	18.5	15.9	17.1	12.9	24.8	20.4	34.0	24.4
Carm/113	48.6	39.1	-	-	45.8	38.3	40.9	36.4	47.2	42.2	54.7	39.9
DAL/25	22.8	-	28.1	21.3	22.6	16.5	20.4	17.9	21.5	22.5	32.0	17.0

Appendix D: Llandeilo Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FA/01	22.9	18.9	17.6	17.4	16.0	14.5	14.0	13.4	19.7	21.9	30.2	20.4
DA/15	41.0	32.9	30.1	34.1	25.2	19.2	22.6	21.5	29.8	31.0	44.2	24.0
DA/01	40.1	33.5	34.1	33.4	29.0	25.0	21.8	24.7	33.0	32.8	33.5	37.5
DA/03	45.3	35.6	34.7	33.9	29.4	19.9	26.0	24.4	32.1	40.0	35.0	35.1
Carm/013	49.0	52.8	41.0	41.6	40.3	28.2	33.3	33.8	43.1	39.9	38.3	50.3
DA/05(A)	53.5	42.1	54.9	52.2	41.8	29.8	33.9	34.8	52.6	53.3	63.0	49.7
DA/05(B)	54.4	50.1	-	51.3	41.7	31.2	37.8	31.2	50.1	52.2	62.1	50.2
DA/05(C)	56.1	47.5	42.9	49.9	41.8	35.2	38.0	33.0	48.5	48.0	57.1	47.3
DA/07	55.1	55.3	53.8	57.4	51.1	35.4	47.0	44.5	62.8	56.6	69.0	53.3
Carm/083	65.7	58.3	58.0	63.2	53.1	53.8	47.5	40.4	66.9	59.7	76.0	49.4
DA/09	61.4	50.0	57.2	61.9	46.0	53.0	52.7	38.5	67.3	66.4	72.9	59.9
DA/10	-	-	58.8	59.5	51.5	36.4	44.2	36.2	65.0	51.8	-	59.9
DA/11	44.7	48.0	44.7	48.1	48.5	43.1	45.3	38.5	53.8	60.5	56.0	54.0
FA/02	19.9	-	17.0	13.0	11.8	9.2	11.7	11.9	14.0	15.1	21.9	18.6
DA/12	38.0	-	40.2	33.0	23.1	16.5	19.1	23.1	29.7	39.1	41.8	47.9
DA/13	36.8	44.8	50.9	49.3	45.4	37.5	37.8	30.0	48.8	53.9	55.8	39.3
DA/14	27.2	-	26.4	25.6	25.4	19.7	25.1	22.7	30.4	33.9	39.4	34.3
DA/16	43.1	37.2	43.6	43.4	38.1	35.6	41.3	33.0	42.2	44.9	50.2	47.8
FA/03	27.7	20.1	25.9	25.0	19.9	19.2	19.8	15.8	24.4	24.1	31.7	-
FA/07	14.6	-	14.2	13.3	10.6	7.1	9.8	7.8	12.3	12.3	19.6	14.3
FA/06	24.3	-	23.5	19.7	17.1	15.1	19.7	16.5	22.3	21.6	29.8	-
FA/04	23.3	19.2	17.4	18.3	14.7	11.3	14.3	12.3	17.0	18.5	22.7	20.3
FA/05	22.8	-	23.4	22.4	17.0	11.2	17.7	13.3	20.1	23.6	29.2	21.6

Appendix E: Ammanford and A477 Monthly Raw Data

Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Carm/089	39.9	23.9	35.0	28.0	25.2	25.6	24.8	19.6	32.1	27.8	44.0	34.0
Carm/064	43.5	35.1	34.6	30.5	22.8	19.9	22.2	21.0	30.6	34.5	43.4	36.9
Carm/090	44.5	42.5	34.4	38.1	29.5	23.4	29.9	24.1	33.8	37.4	42.9	41.2
Carm/117	37.4	-	40.0	27.9	8.9	8.7	10.5	9.4	12.5	10.8	16.0	12.0
Carm/118	26.1	18.6	31.8	17.6	6.5	6.6	8.6	8.7	10.3	9.0	-	8.7
Carm/119	45.1	30.4	35.9	37.1	32.2	28.2	38.2	33.5	44.1	37.6	46.4	26.7

Appendix F: A477 Relief Road NO₂ Improvement Report



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

A477 Relief Road NO₂ Improvement Report

(February 2015)

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1.0 Purpose of Report

This report reviews the data associated with diffusion tubes that were set up in order to ascertain what improvement in NO₂ emissions associated with traffic may be achieved from the construction of the A477 St Clears to Red Roses Relief Road. Whilst the construction of the relief road was primarily to improve the quality of the trunk route, along with improved road safety, it was recognised that the villages of Llanddowror and Red Roses were likely to benefit from improved air quality and reduced traffic noise.

2.0 Background

Construction of the relief road was anticipated to take about two years but prior knowledge of the project allowed diffusion tubes to be deployed a complete year prior to any major work beginning. The data obtained from this first year would hopefully provide the current level of NO₂ emissions and it was decided that three tube locations would be used.

The first location chosen was directly outside the old school site in the village of Llanddowror which was a pinch point along the route. The road narrows significantly at this location such that it is very difficult for two HGV to pass each other, one generally has to stop to give way to the other. This causes congestion and stop start traffic flow.

The second location was on the Sporting Chance pub which is located at a busy cross road junction in the village of Red Roses. Vehicles wanting to join or cross the A477 generally have to wait some considerable time because of the volume of traffic that utilise the road. Whilst this is quite a 'wide open' location it was considered there was a potential for an air quality issue to exist and for the Air Quality Objective (AQO) of 40 $\mu\text{g} / \text{m}^3$ to be breached.

The third site was to be close to St Clears roundabout, just west of the service station. This site was chosen as a busy location that would allow comparison of before and after but with no relative change in traffic flow as all vehicles would be passing the location irrespective of the chosen route of the relief road. The only impact for this location would be a full road closure of the route to enable the relief road to be merged in with the existing carriageways.

Table 1 below details the diffusion tube locations associated with this project and which were assessed against the technical guidance TG (09) requirements. Location maps and photos of the three sites are shown in Appendix 1 and 2.

Table 1 – Diffusion Tube Location Checklist

Tube Location	Free Air Y/N	Vegetation Y/N	Flues Y/N	Consent Required Y/N	Consent Obtained Y/N	Lamp Post No.
Llanddowror School Site	Y	N	N	N	N/A	505 36
Sporting Chance Pub	Y	N	N	Y	Y	-
St Clears roundabout	Y	N	N	N	N/A	505 25

The specific site details relating to the above tube locations are shown in Table 2 below, and all three sites were set up to run from January 2011. The sites are deemed as roadside locations.

Table 2 – Diffusion Tube Site Details

Tube Location	Tube Id	Height (m)	Distance from kerb (m)	Distance to receptor (m)	X	Y
Llanddowror School Site	Carm /117	2.67	1.00	5.50	225623	214580
Sporting Chance Pub	Carm /118	2.36	2.26	0.00	220402	211790
St Clears roundabout	Carm /119	2.61	1.24	20.00	227215	215872

3.0 Diffusion Tube Results

Because the three diffusion tube locations are completely different in nature and their locations have been chosen for specific reasons the results are presented relative to the individual sites and are not being compared. Results have been obtained covering the period beginning January 2011 up to December 2014. This provides a year before any major work had started on the relief road, the whole period of construction, up to April 2014 when the relief road came in to use, and up to the end of 2014.

Table 3a below shows the raw monthly data for the Llanddowror School Site (Carm/117) along with the Annual mean and the bias adjustment factor (BAF) used for reporting purposes.

Table 3a – Raw Monthly Data (Carm/117)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (Am)	BAF
2011	48.9	44.4	46.7	52.4	37.3	36.8	41.1	41.1	34.6	44.0	44.0	38.1	35.2	0.83
2012	41.0	44.8	46.0	43.0	48.9	33.3	30.7	37.1	38.1	45.5	56.7	37.1	33.1	0.79
2013	43.6	41.6	41.2	44.7	37.2	41.9	38.5	37.6	39.3	32.5	42.4	26.7	31.2	0.80
2014	37.4	37.4	40.0	27.9	8.9	8.7	10.5	9.4	12.5	10.8	16.0	12.0	14.1	0.80

The figures in bold, in the table above, represent monthly raw data that have exceeded the AQO, but that do not get reported as a monthly figure. It can be seen that the annual mean for this location did not exceed the AQO. However a significant drop in monthly results was observed after April 2014, with the data highlighted in yellow representing a period of when traffic light control was in operation in very close proximity to the diffusion tube location with long periods of queuing traffic. Interestingly the results for this period were somewhat lower than the corresponding period in the previous three years.

Table 3b below provides the monthly data for the Sporting Chance Pub (Carm/118) location.

Table 3b – Raw Monthly Data (Carm/118)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (Am)	BAF
2011	37.3	31.2	40.5	42.7	25.5	29.8	39.8	39.6	25.2	32.2	31.7	17.4	27.2	0.83
2012	23.3	39.0	38.8	40.0	35.4	30.2	33.3	34.8	33.5	35.3	34.1	30.0	26.8	0.79
2013	-	33.0	28.9	30.7	29.1	30.1	-	33.9	32.8	25.2	42.3	23.3	23.7	0.80
2014	26.1	18.6	31.8	17.6	6.5	6.6	8.6	8.7	10.3	9.0	-	8.7	11.1	0.80

A significantly less number of the monthly results for this location, at the Sporting Chance Pub, are above the AQO and this is a contributory factor to the lower annual mean figures obtained. The 'wide open' location will also have contributed to these lower results.

Table 3c below provides data for the St Clears roundabout (Carm/119) tube site.

Table 3c – Raw Monthly Data (Carm/119)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (Am)	BAF
2011	47.2	42.4	48.8	48.1	29.9	34.9	35.4	36.6	32.4	41.1	43.7	25.1	32.2	0.83
2012	39.7	44.0	45.0	39.6	36.2	29.8	27.8	39.7	33.8	49.9	39.2	43.3	30.8	0.79
2013	-	31.7	40.2	38.0	32.3	38.3	38.3	38.9	34.2	33.0	45.4	25.5	28.8	0.80
2014	45.1	30.4	35.9	37.1	32.2	28.2	38.2	33.5	44.1	37.6	46.4	26.7	29.0	0.80

The data above shows that on a monthly basis there were quite a few occasions when the AQO was exceeded, however the annual mean was not. Notably the data does not illustrate the large drop in monthly readings after April 2014, as the other two sites have. This is because this location has not been 'bypassed' in any way, although carriageway improvements have been implemented along with slight widening of the road width to the east of this location. Again the yellow highlighted data represents a period of when traffic light control was in operation in very close proximity to the diffusion tube location with long periods of queuing traffic. Interestingly the monthly results for this period do not indicate that this congestion period had any significant impact, with the results slightly lower than previous years during this period.

4.0 Annualised Data

The data for 2014 effectively covers two very different periods for sites Carm/117 and Carm/118, and it would normally be appropriate to annualise the data in order to obtain a best estimate of the annual mean for the different periods. However, for the purposes of this report it is considered sufficient to provide a graphical presentation of the results to illustrate the impact that the relief road has had at the locations in question.

5.0 Results Presented Graphically

5.1 Llanddowror School Site (Carm/117)

Figure 5.1a below shows the significant drop in monthly diffusion tube results from May 2014 onwards, which coincides when the A477 Relief Road was opened.

Figure 5.1a

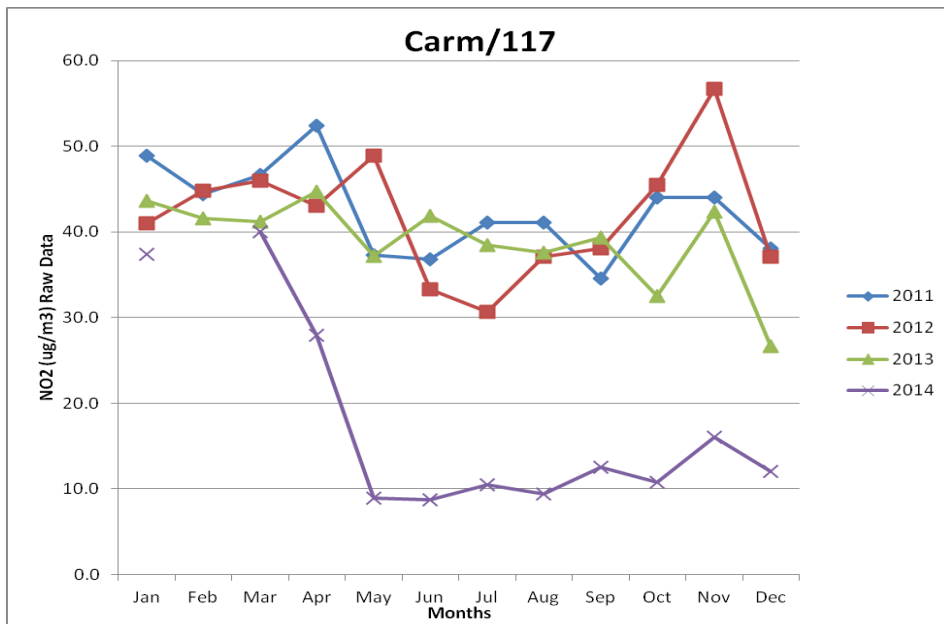
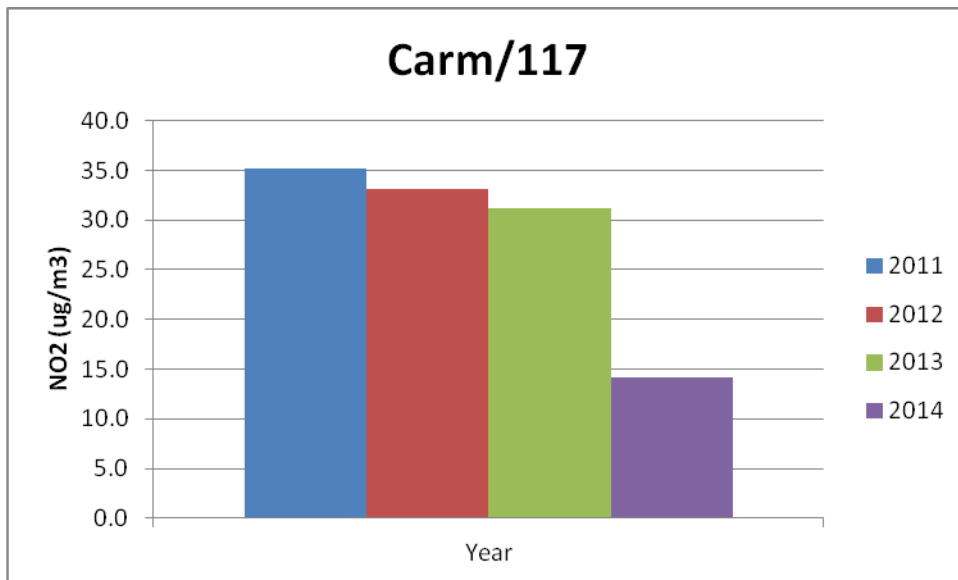


Figure 5.1b



Similarly Figure 5.1b above shows the reduction in the annual mean result after bias adjustment but also including the higher readings for the period January to April 2014 in the annual result for that year. As a very basic comparison, there has been greater than 50% reduction in NO₂ result from 2013 to 2014.

5.2 Sporting Chance Pub (Carm/118)

As with the site at Carm/117, this location displays a significant drop in monthly results after April 2014 coinciding with the opening of the relief road.

Figure 5.2a

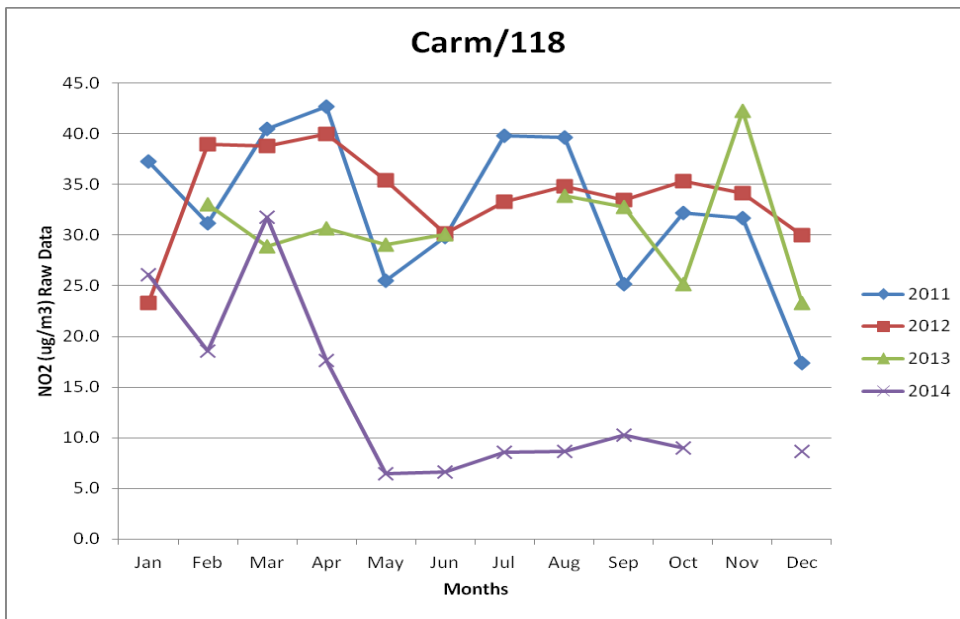
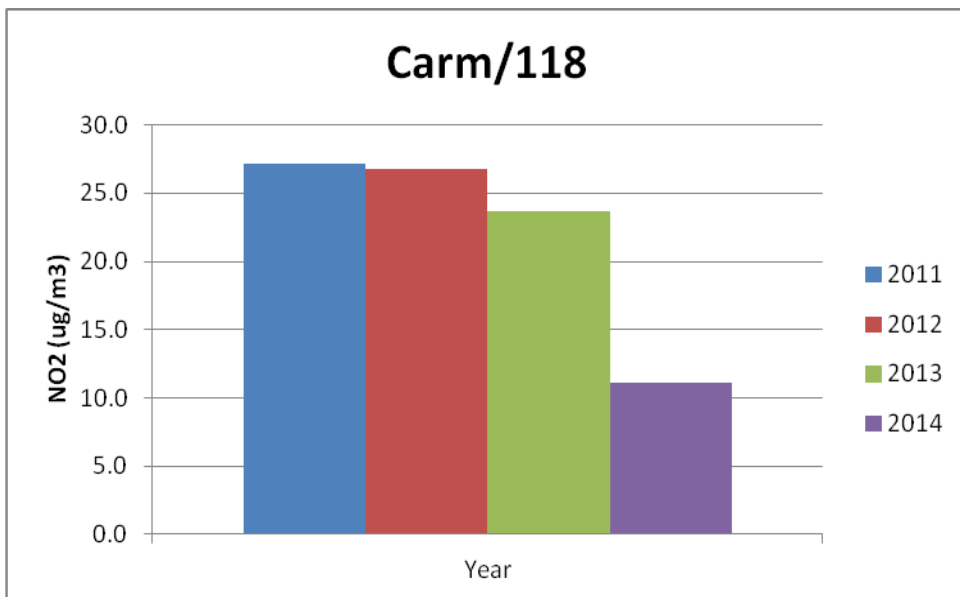


Figure 5.2b



Again, the graph above illustrates a significant drop in the annual mean result for 2014, being less than 50% of the annual result for 2013, but still including the higher results for the first quarter of the year.

5.3 St Clears roundabout (Carm/119)

For this location it is obvious to see there has not been any significant change in the monthly results from year to year and no evidence of a significantly different trend for the first quarter of 2014.

Figure 5.3a

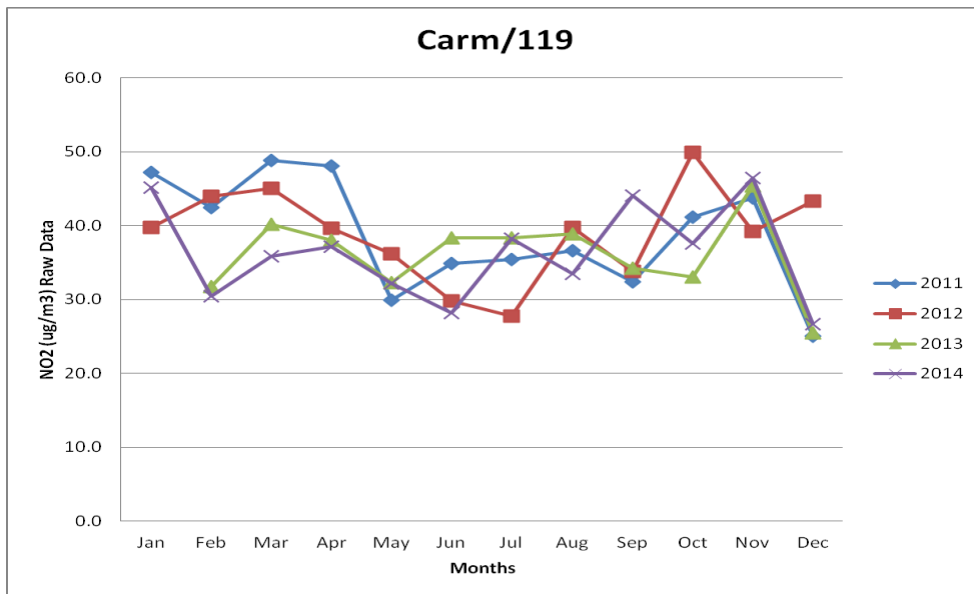
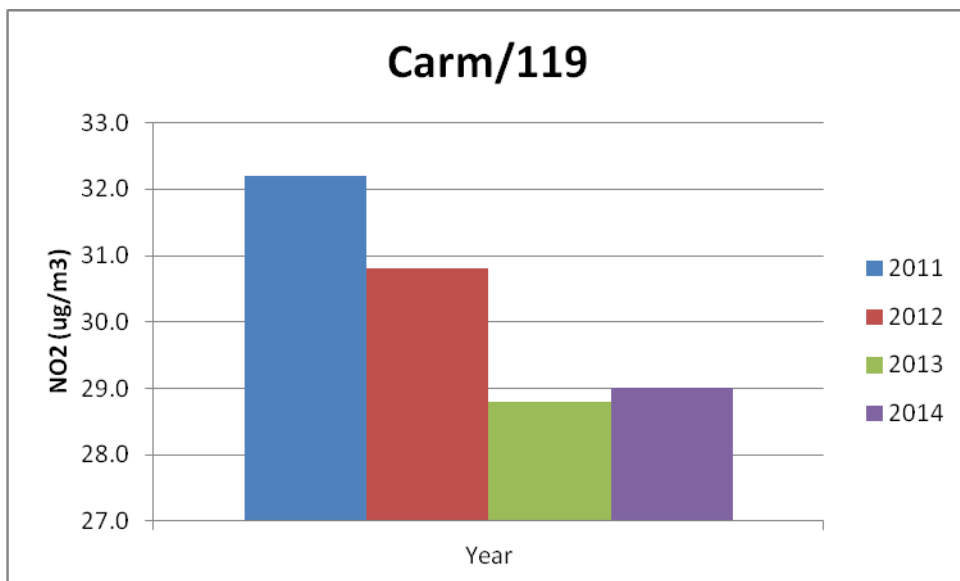


Figure 5.3b



This location has not demonstrated the same reduction in 2014 as the other two sites. In fact the 2014 result is slightly higher than the 2013, and both these years are somewhat lower than the previous two years of 2011 and 2012. This aspect is unexplained and does not appear to coincide with work on the relief road and the timings of road improvement work.

6.0 Results Discussion and Conclusion

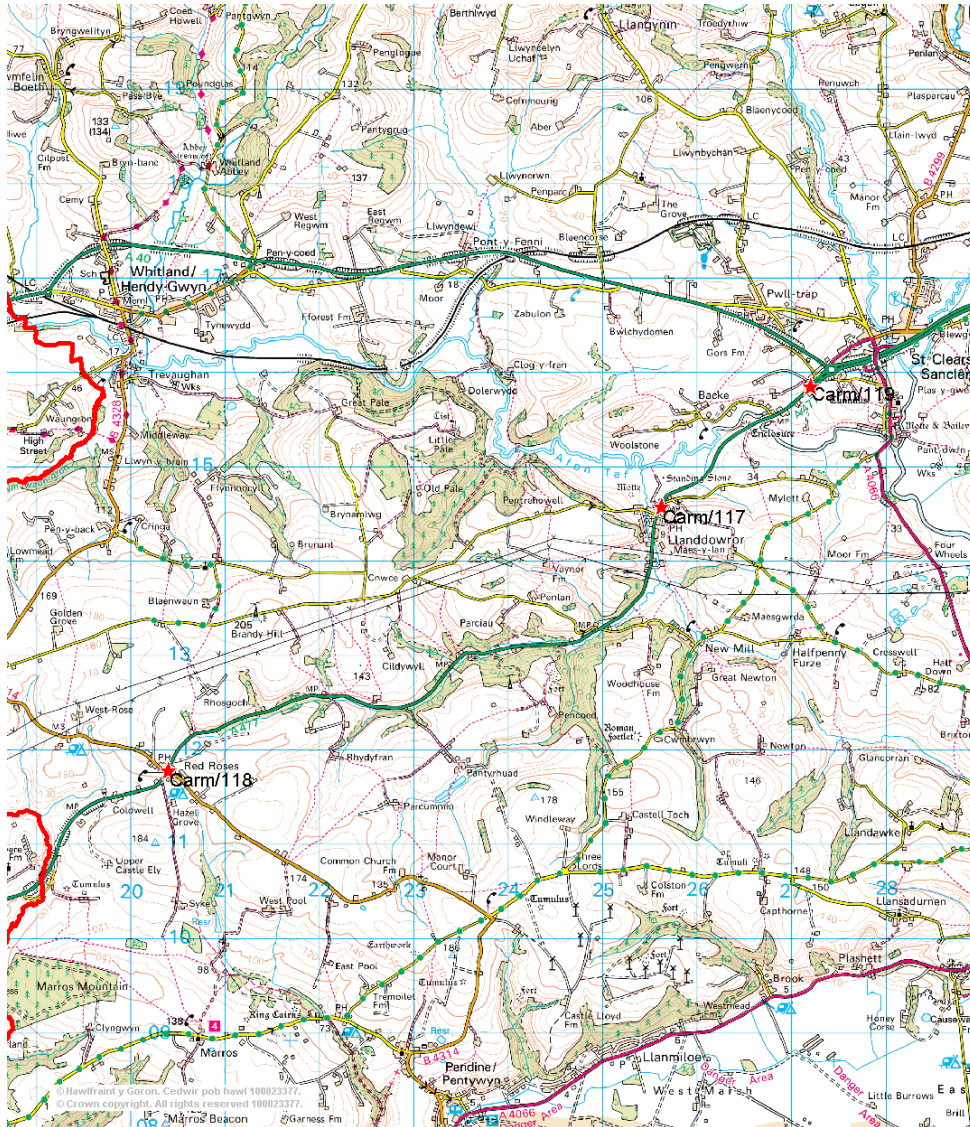
The above presentation of results illustrates the level of air quality improvement that appears to have been achieved from the construction of the A477 Relief Road and the fact that the majority of traffic has been diverted away from the villages of Llanddowror and Red Roses. Whilst there has not previously been a breach of the Air Quality Objective at the monitoring locations there has been about a 50% improvement since the relief road was opened (based on less than a full year of data).

The site at St Clear's roundabout has remained at approximately the previous levels, which is to be expected as all vehicles using the A477 route from the roundabout have to pass this point.

There will have been the added benefit of reduced traffic noise levels for the villages of Llanddowror and Red Roses, and for residents whom live along the old route. Road safety will also have improved and the number of road accidents will hopefully greatly reduce.

Appendix 1 – Diffusion Tube Location Map

Locations for Carm/117, Carm/118 and Carm/119



Appendix 2 – Site Photographs

Carm/117



Carm/118



Carm/119



**Appendix G: Sandy Road Annualised Data (2014) for use
with 2015 USA**



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

**Sandy Road Annualised Data (2014) for use with the 2015
Updating & Screening Assessment**

(April 2015)

This document contains details for the calculations relating to annualised data that has been included in the 2015 Updating & Screening Assessment Report to obtain a more accurate prediction of what the annual results for two new sites on Sandy Road would have been for 2014.

Background

Sandy Road in Llanelli has been subject to diffusion tube monitoring for a number of years with results that exceeded the Objective level for a couple of years. However, a review of the tube locations, against criteria in Technical Guidance TG (09) and Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance (AEA Energy & Environment, Feb 2008) revealed that the locations were not the most relevant and appropriate. Therefore new tube sites were set up on the facades of properties along Sandy Road. The results obtained from these sites are somewhat below the Objective.

However, the area around Sandy Road, and to an extent, many other areas of Llanelli have undergone development and traffic volumes have been increasing. The local Residents Association have raised concerns for a number of years and have been requesting more monitoring. A further request was made in early 2014 for two additional sites because of a proposed junction alteration that was felt may impact significantly on the traffic flow along the road. Therefore two additional tube sites were set up to be operational from the beginning of July 2014.

Due to there only being six months of data it is considered appropriate to annualise the data in order to obtain a better idea of what the annual mean figure may have been. The diffusion tube locations that are being annualised are detailed in Table 1 below.

Table 1 – New Sandy Road Tube Sites

Site Id	Location
DAL/26	Llanelli – 123 Sandy Road
DAL/27	Llanelli – Sandy Road (4)

Annualised Data

Using the method provided in Technical Guidance TG (09) it is possible to estimate what the annual mean concentration may have been had there been 12 months of data capture for the two new tube sites. This is achieved using 2014 tube data from other locations within the county and averaging the data and attaining a ratio figure for use with the new Sandy Road tube site data. The sites used for this exercise were; Ammanford - Tir Y Dail Lane (2) (Carm/089), Ammanford – Wind Street (Carm/064), Johnstown – 2 Jobs Well Road (Carm/126), and Llanelli – 49 Ynyswen, Felinfoel (DAL/24).

Table 2a below show the 2014 raw monthly data for the sites along with the Annual mean (Am) and Table 2b provides the raw data for period (Jul – Dec) in 2014, along with the Period Mean. The data capture for Tir Y Dail Lane (2), Wind Street and 49 Ynyswen was 100%, whilst 2 Jobswell Road was 92%.

Table 2a – 2014 raw data (Annual Mean)

Tube Id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (Am)
Carm /089	39.9	23.9	35.0	28.0	25.2	25.6	24.8	19.6	32.1	27.8	44.0	34.0	30.0
Carm /064	43.5	35.1	34.6	30.5	22.8	19.9	22.2	21.0	30.6	34.8	43.4	36.9	31.3
Carm /126	38.5	-	30.6	29.5	23.4	15.2	17.8	21.0	30.0	28.0	42.2	31.6	28.0
DAL/24	30.3	17.1	23.8	23.0	18.5	15.9	17.1	12.9	24.8	20.4	34.0	24.4	21.9

Table 2b - 2014 raw data (Jul – Dec)(Period Mean)

Tube Id	Jul	Aug	Sept	Oct	Nov	Dec	Period Mean (Pm)
Carm/089	24.8	19.6	32.1	27.8	44.0	34.0	30.4
Carm/064	22.2	21.0	30.6	34.8	43.4	36.9	31.5
Carm/126	17.8	21.0	30.0	28.0	42.2	31.6	28.4
DAL/24	17.1	12.9	24.8	20.4	34.0	24.4	22.3

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	30.0	30.4	0.99
Carm/064	31.3	31.5	0.99
Carm/126	28.0	28.4	0.99
DAL/24	21.9	22.3	0.98
		Ra=	0.99

The Ra figure can be used with the 2014 Sandy Road tube data for the period July – December in order to estimate the annual mean concentration for both the new tube sites and bias adjusted using 0.81. This is the latest figure from spread sheet 03/15 obtained from the Review and Assessment Helpdesk web site. The monthly raw tube data from July to December for the new tube sites is shown in Table 4 below, along with the raw measured mean.

Table 4

Tube Id	Jul	Aug	Sep	Oct	Nov	Dec	Mean
DAL/26	17.6	21.0	30.7	22.4	38.0	29.6	26.7
DAL/27	23.0	22.1	36.8	27.8	52.4	-	32.4

Table 5 below shows the measured mean multiplied by the ratio figure of 0.99 obtained from Table 3 above to provide a site mean. The site mean can then be bias adjusted using 0.81 being the latest figure from the Review and Assessment Helpdesk (03/15) 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 been 12 months of data capture.

Table 5

Tube Id	2014 Measured Mean (M)	Ra	Site Mean (S) (MxRa)	Adjust Factor (BAF)	Data Post Bias (SxBAF)
DAL/26	26.7	0.99	26.43	0.81	21.4
DAL/27	32.4	0.99	32.08	0.81	26.0

Table 6 shows the difference between the annualised and non-annualised results for the two new tube sites in Sandy Road. The Data Post Bias figures in Table 5 above have been included in the 2015 Updating & Screening Assessment Report.

Table 6

Tube Id	2014 Non-Annualised	2014 Annualised
DAL/26	22.2	21.4
DAL/27	25.4	26.0

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)	4.49	4.66	0.96
Caerphilly (Blackwood High Street)	32.80	30.80	1.06
Newport (St Julian's Comprehensive)	21.70	21.60	1.00
Port Talbot (Margam)	17.30	16.80	1.03
Rhondda Cynon Taff (Broadway)	31.40	28.90	1.08
Average Ra	-	-	1.03

The Average Ra figure obtained from the automatic monitoring sites is slightly higher than that obtained from the local diffusion tubes but not thought to be significant. The use of the higher Ra figure is shown in Table 8 below which also contains the tube Ra bias data.

Table 8

Tube Id	2014 Measured Mean (M)	Ra	Site Mean (S) (MxRa)	Adjust Factor (BAF)	Data Post Bias (auto) (SxBAF)	Data Post Bias (tubes) (SxBAF)
DAL/26	26.7	1.03	27.5	0.81	22.3	21.4
DAL/27	32.4	1.03	33.4	0.81	27.0	26.0

The difference between the results in the two 'Data Post Bias' columns in Table 8 above illustrate there is very little difference between the tube data and automatic monitoring data after it has been annualised.

However, the important aspect is that neither of the tube sites has exceeded the air quality objective.

Appendix H: Distance Calculations



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

Sandy Road NO₂ Distance Calculator Data (2014) for use with the 2015 Updating & Screening Assessment

(May 2015)

This document contains details for the calculations relating to predicting the drop off over distance for NO₂ in relation to two tubes on Sandy Road in Llanelli. The data has been included in the 2015 Updating & Screening Assessment Report to obtain a more accurate prediction of what the annual results for the two sites on Sandy Road would have been for 2014.

Background

Sandy Road in Llanelli has been subject to diffusion tube monitoring for a number of years with results that exceeded the Objective level for a couple of years. However, a review of the tube locations, against criteria in Technical Guidance TG (09) and Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance (AEA Energy & Environment, Feb 2008) revealed that the locations were not the most relevant and appropriate. Therefore new tube sites were set up on the facades of properties along Sandy Road. The results obtained from these sites are somewhat below the Objective.

However, the area around Sandy Road, and to an extent, many other areas of Llanelli have undergone development and traffic volumes have been increasing. The local Residents Association have raised concerns for a number of years and have been requesting more monitoring. Whilst more monitoring sites have been set up there are two 'kerbside' sites, one historical and one new, that are located close to the highway. This can provide elevated results compared to those on property facades, and can also lead to annual mean results above the Objective leading to claims that an AQMA should be designated.

It is deemed prudent to use the distance calculator to compare the predicted results for the two sites with those results obtained for the two closest sites that are located on property facades. The on-line LAQM Helpdesk distance calculator tool (Issue 4) has been used to generate the predicted results.

The two 'kerbside' diffusion tube locations that are being assessed are detailed in Table 1a below, and Table 1b details the two nearest tubes located on property facades.

Table 1a – Sandy Road 'Kerbside' Tube Sites

Site Id	Location
Carm/077	Llanelli – Sandy Road (2)
DAL/27	Llanelli – Sandy Road (4)

Table 1b – Sandy Road Facade Tube Sites

Site Id	Location
DAL/22	Llanelli – 44 Sandy Road (re Sandy Road (2))
DAL/26	Llanelli – 123 Sandy Road (re Sandy Road (4))

The calculator tool requires certain details relating to the site location, annual mean background concentrations (obtained from the Helpdesk 2014 updated Background Maps based on 2011 Background Maps), and the annual mean for the sites in question. This will then provide a predicted annual concentration at the receptor location (property) in question.

Tables 2a and 2b below show the details that were used and the predicted result at the bottom of each table for sites Carm/077 and DAL/27 respectively.

Table 2a – Carm/077 Calculator Details Submitted

How far from the Kerb was your measurement made (in metres)?	1.7
How far from the Kerb is your receptor (in metres)?	5.7
What is the local annual mean background NO ₂ concentration (in ug/m ³)?	8.17
What is your measured annual mean NO ₂ concentration (in ug/m ³)?	49.05
The predicted annual mean NO ₂ concentration (in ug/m ³) at your receptor	37.9

Table 2b – DAL/27 Calculator Details Submitted

How far from the Kerb was your measurement made (in metres)?	3.25
How far from the Kerb is your receptor (in metres)?	7.45
What is the local annual mean background NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	8.17
What is your measured annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$)?	32.4
The predicted annual mean NO ₂ concentration (in $\mu\text{g}/\text{m}^3$) at your receptor	27.1

A comparison of results for the two ‘kerbside’ sites along with the two facade locations is shown in Table 3 below. The table also includes the bias adjusted data and the annualised data for the new tube locations on Sandy Road, which were only in place for six months of 2014. The annualised data method and calculations are in a separate report that is appended to the 2015 Updating and Screening Assessment Report.

Table 3 – Comparison of Data

Site	Raw Data	Bias Adjusted (0.81)	Distance Calculated	Annualised Data
Carm/077	49.05	39.73	37.9	-
DAL/22	37.50	30.38	-	-
DAL/26	26.6	21.5	-	21.4
DAL/27	32.4	26.3	27.1	26.0

The comparison of data in the table appears to show good agreement between the bias adjusted data and the annualised data for sites DAL/26 and DAL/27. The distance calculated results for both Carm/077 and DAL/27 also show good agreement with the results obtained for the facade tube sites of DAL/22 and DAL/26, respectively. However, the predicted result is not exactly the same and this will be for a number of reasons, such as slightly different monitoring locations, meteorological conditions that can alter over very short distances, changes in pollutant emission chemical mixtures received at the various sites and differences in local site conditions relating to building heights, road gradients, building dimensions, effects of building facades etc.. It should also be noted that the tool was developed from data based on a limited number of studies which were carried out quite a number of years ago. The pollutant chemistry of vehicle emissions, along with the

background concentrations will have changed considerably since the studies were performed. So this appears to show a discrepancy between the measured and calculated results.

Cross Check With Mathematical Calculation

As a way of checking the accuracy of the on-line calculator tool the method provided in Box 2.3 of Technical Guidance TG (09) was used. The guidance provides the following calculation:

$$C_z = ((C_y - C_b) / (-0.5476 \times \ln(D_y) + 2.7171)) \times (-0.5476 \times \ln(D_z) + 2.7171) + C_b$$

Where:

C_z is the total predicted concentration ($\mu\text{g}/\text{m}^3$) at distance D_z ;

C_y is the total measured concentration ($\mu\text{g}/\text{m}^3$) at distance D_y ;

C_b is the background concentration ($\mu\text{g}/\text{m}^3$);

D_y is the distance from the kerb at which concentrations were measured; and

D_z is the distance from the kerb (m) at which concentrations are to be predicted.

$\ln(D)$ is the natural log of the number D.

So for tube location Carm/077;

$$C_z = ((49.05 - 8.17) / (-0.5476 \times \ln(1.7) + 2.7171)) \times (-0.5476 \times \ln(5.7) + 2.7171) + 8.17$$

$$C_z = \mathbf{37.896 \mu\text{g}/\text{m}^3}$$

and, for tube location DAL/27:

$$C_z = ((31.34 - 8.17) / (-0.5476 \times \ln(3.25) + 2.7171)) \times (-0.5476 \times \ln(7.45) + 2.7171) + 8.17$$

$$C_z = \mathbf{26.26 \mu\text{g}/\text{m}^3}$$

The calculations are very close to the results obtained using the on-line calculator tool which gives confidence to the results.

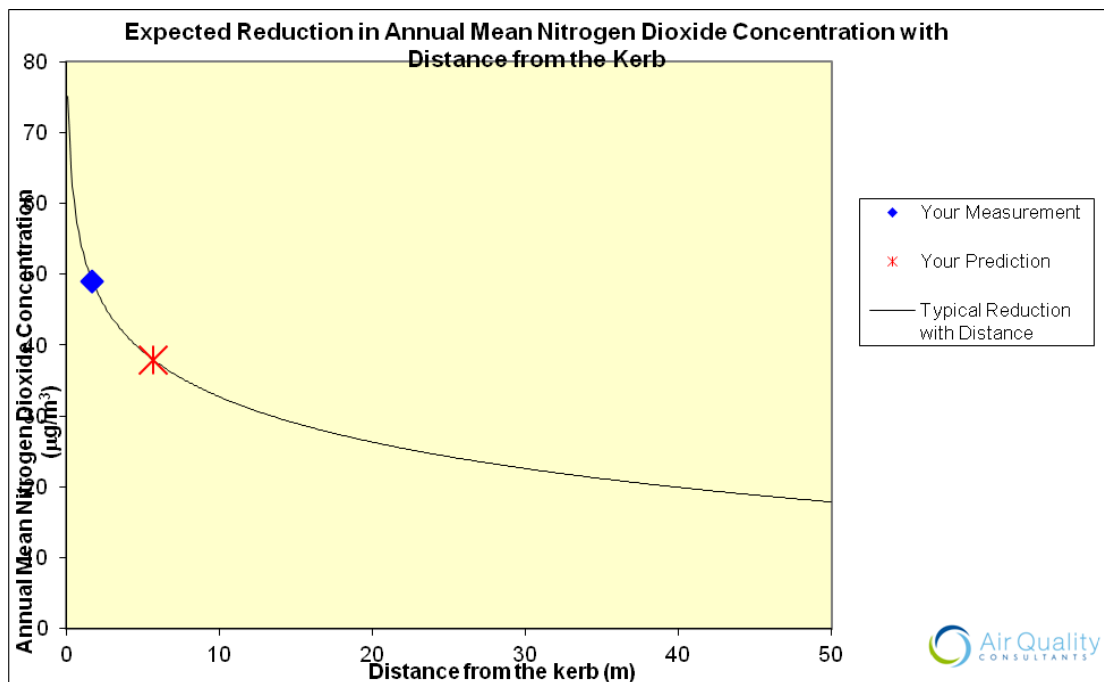
Conclusions

The results appear to illustrate that the facades of properties to the south side of Sandy Road (DAL/22) are exposed to higher concentrations of NO₂ as opposed to the facades on the north side (DAL/26), however geographical location of the tube sites need to be taken in to consideration. Site DAL/22 is located close to the centre of Sandy Road and almost opposite Iscoed Road junction, whereas DAL/26 lies to the western portion of Sandy Road somewhere close to halfway between DAL/22 and the end of the canyon section of Sandy Road to the west. It is also interesting to note that there is a 1.75m difference in the distance from the road between the two site locations, with DAL/26 being further away.

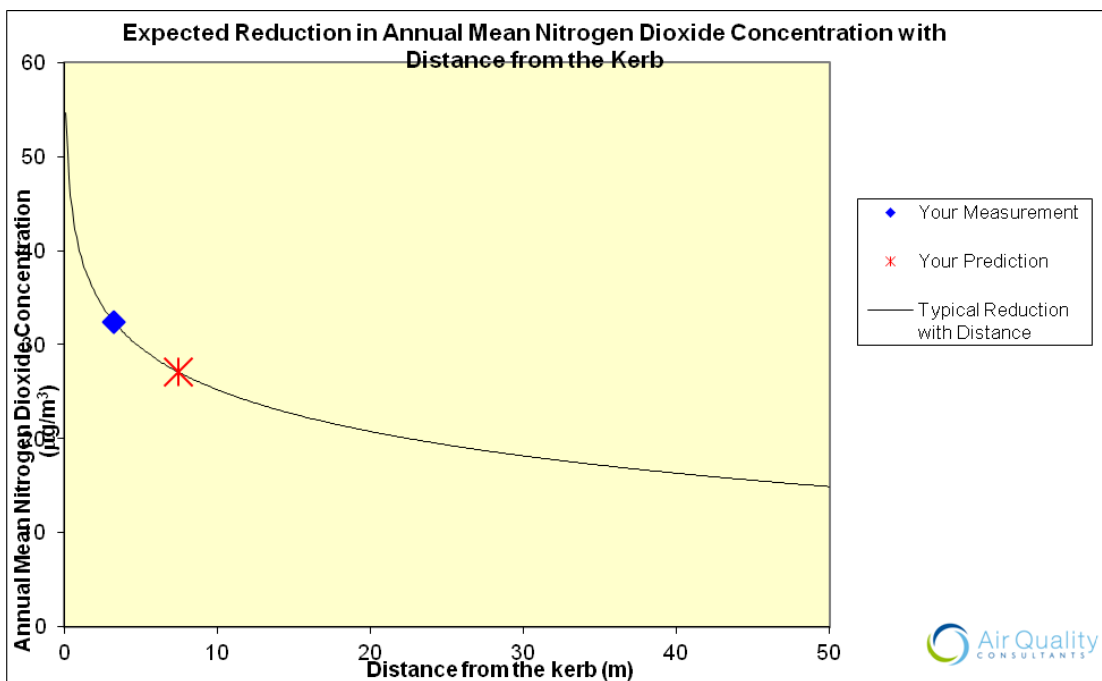
There may be merit in establishing tube sites on the facades of properties but on the opposite side of the road to DAL/22 and DAL/26 respectively.

For completeness, the graphs from the on-line calculator tool for sites Carm/077 and DAL/27 are shown below.

Carm/077



DAL/27



**Appendix I: 2014 Pinged Poultry Farms – PM10 Monitoring
Report (Nov 2014)**



Report on the Monitoring of particulate matter (PM10) at Lletrog Bach in
the vicinity of Pinged Poultry Sites, Carmarthenshire.

Written By:

Oliver Matthews
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Public Health Services, Pollution Team

Date:

(November 2014)

1.0 Introduction

1.1 The National Air Quality objectives were adopted in the UK as part of the Air Quality Strategy published by the Government in January 2000. The EU Air Quality Standards in relation to particulate matter (Objectives for the purposes of Local Air Quality Management) are:

- $50\mu\text{g}/\text{m}^3$ 24 hour mean (daily limit values)
- Not to be exceeded more than 35 times a year
- Annual limit value $40\mu\text{g}/\text{m}^3$
- Both to be met by 2005.

1.2 Although particulates have not been highlighted as requiring detailed assessment following the conclusion of Carmarthenshire County Council's review and assessment of Air Quality, and its Updating and Screening Assessment Report of 2012, there are several locations within the county where residential properties are located within several hundred meters of industrial processes, quarries or opencast mining. Carmarthenshire County Council has committed to undertake annual particulate monitoring at locations where particulates could conceivably be a problem. In 2014 complaints with regard to the activities at Pinged Poultry sites were received. There have been alleged issues with the operation of the sites for a long time ranging from noise, dust, odours, traffic, fires and various other complaints which are outside the remit of the Public Health Services team. The dust and odour complaints seemed to be of greatest concern at this time with questions asked about the potential health impacts from the dust.

1.3 The poultry sites are all located to the north east and east edges of Pinged which is a small hamlet in the south of the county not far from Pembrey. The main business relates to the rearing of turkeys which is carried out on a cyclic basis with a full shed clean out after each rearing cycle. There are four sites in total (Poplar Tree Farm, Woodland Farm, Oak Tree Farm and Sycamore Farm) with varying number of sheds on each site. The sites are listed as different businesses therefore the aggregation rule under the Environmental Permitting (England and Wales) Regulations 2010 does not apply and consequently none of the sites require a Permit.

1.4 Meetings were held with local residents to discuss the complaints and the issues surrounding them. It was agreed that an air quality monitoring exercise would be carried out to determine what levels of dust may be generated from the activities at the poultry sheds. It was also agreed that the monitoring period would cover a changeover period which is when it is alleged that dust levels are at their worst.

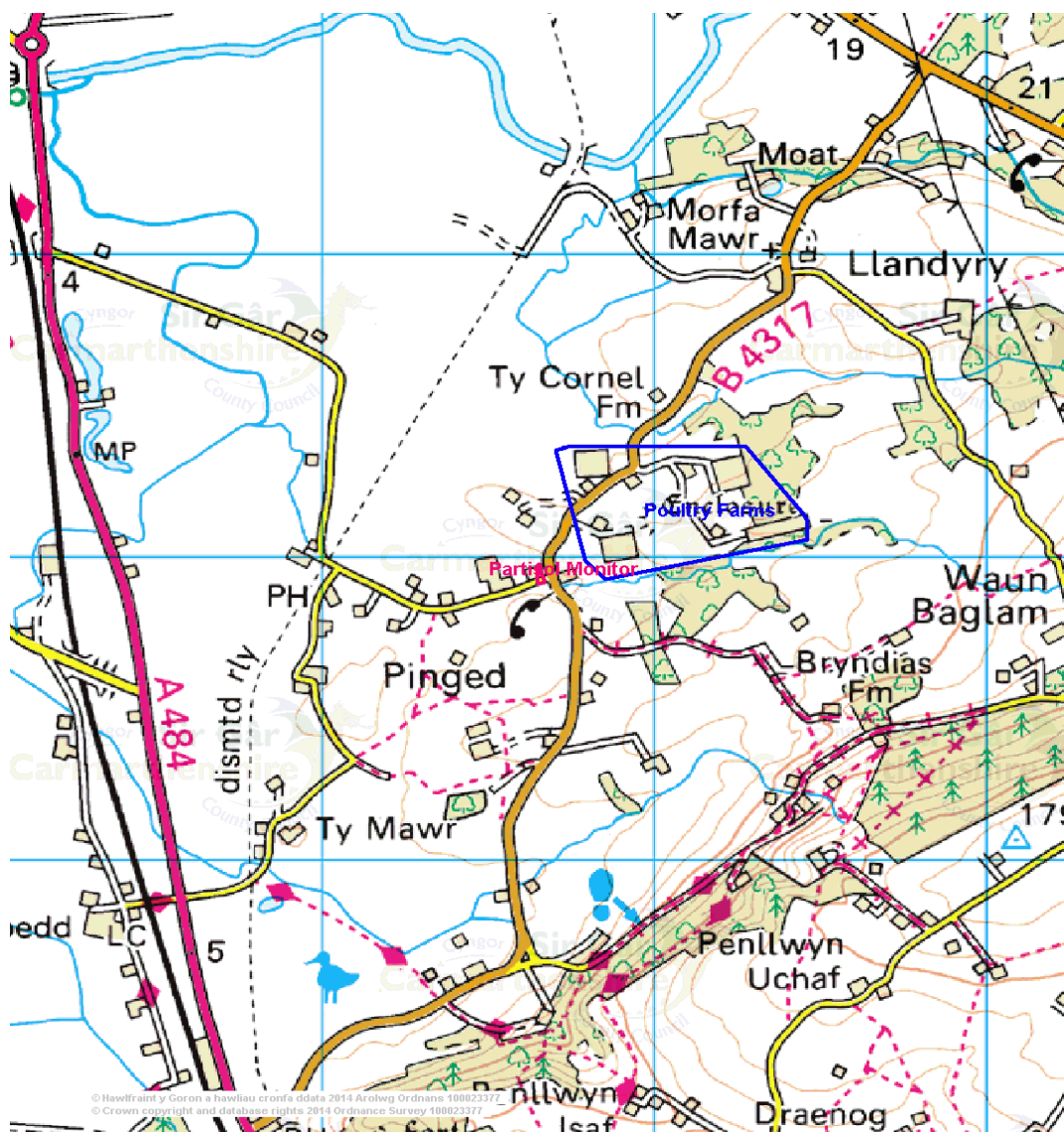
A number of monitoring locations were discussed but they all had aspects of their locality that meant it would not be feasible to monitor from them. Eventually a location was found within the back garden of a local resident.

The receptor site chosen was Lletrog Bach which is located approximately 185m west from the nearest point to the closest poultry farm. The B4317 road is situated between the monitoring location and the poultry farms.

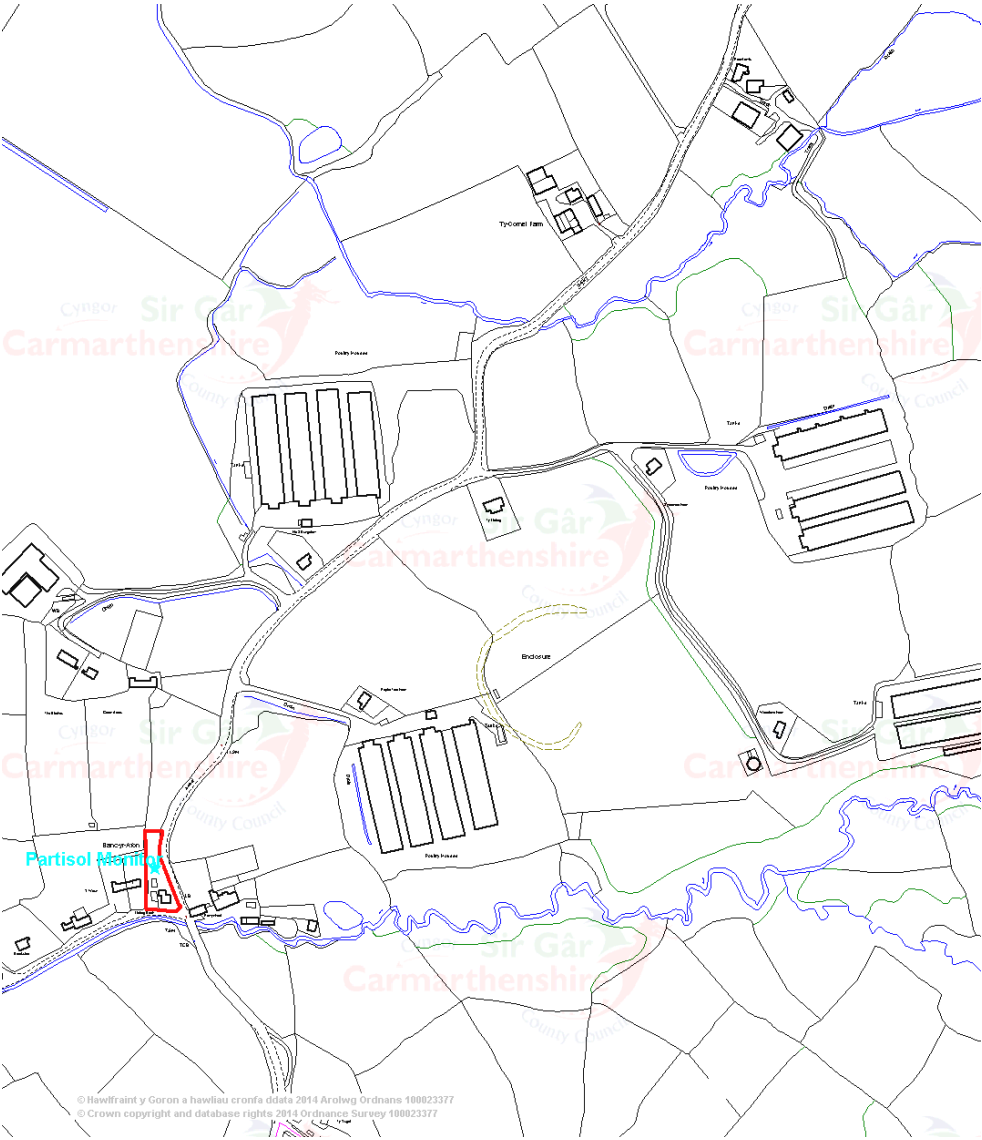
The actual monitoring location is highlighted on the site location map, site plan and monitor location plans detailed below.

Site Location Map

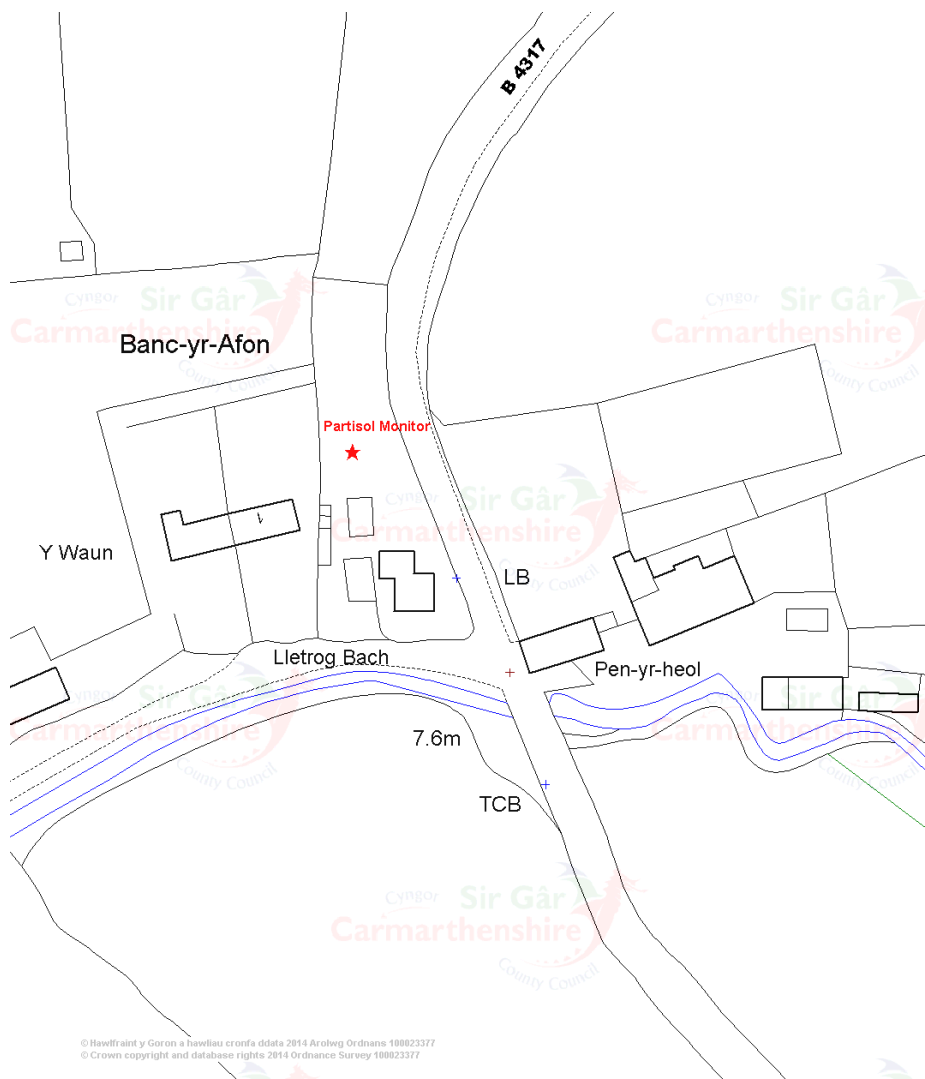
NGR 243063 E 204181 N (Centre of the four poultry farms)



Site Plan



Monitor Location



1.5 The poultry farms are located in a rural area with approximately forty residential and agricultural properties within about 1000m of the sites. There is significant local concern about health impacts from the dust and other debris alleged to be coming from the sheds, particularly when they are being cleaned out after each rearing cycle.

2.0 Monitoring Methodology

2.1 The study used a Ruppert and Pataschnick Partisol-Plus 2025 sequential sampler to sample for PM₁₀ Particulates (illustrated below).

PM10 Partisol Sequential Air Sampler



The Partisol – Plus 2025 has an automatic filter changing system, which collects particulate matter of 10µm in diameter onto 47mm diameter quartz fibre filters. A capacity of up to 16 filters can be stored in the re-usable cassette magazines. The filters are pre-conditioned for 48 hours before weighing in an air conditioned weighing room with a temperature of 20 ±1°C. The filters are weighed pre and post exposure, and the mass of material collected over the monitoring period (24h) is calculated. The filters were also examined for pinholes and other imperfections prior to sampling.

2.2 The Sequential sampler was operated in accordance with the manual. It does not require calibration however it was necessary to check the flow rate and also clean the sample inlet head before sampling. The Sampler also recorded filter data and total sample flow and it made automatic corrections for ambient temperature and pressure.

2.3 The study ran from 4th July 2014 until 29th September 2014, a period of three months (88 days). However, there was a complete power failure on the 30th August resulting in failed filter changeovers which meant that two days data loss occurred. Therefore, the reported data set has been reduced by 2 days and the assessment is based on 86 days of sampling.

3.0 Results

3.1 The following table provides a list of results for each filter in $\mu\text{g}/\text{m}^3$

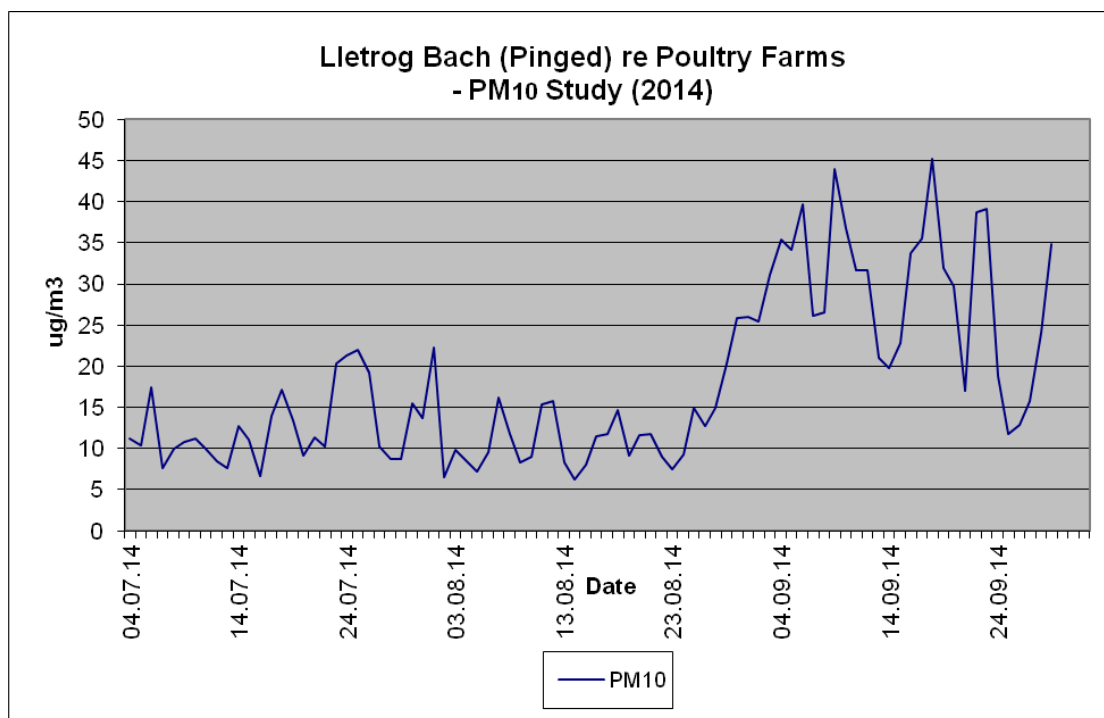
Lletrog Bach, in the vicinity of Pinged Poultry Farms (2014)

Monitoring Dates	Filter No.	Internal Filter No.	Filter mass	Mass after exposure	Mass on filter	$\mu\text{g}/\text{m}^3$
04.07.14	76/1087	E0169234	160.889	161.159	0.270	11.25
05.07.14	76/1088	E0169233	158.540	158.788	0.248	10.33
06.07.14	76/1089	E0169232	160.171	160.589	0.418	17.42
07.07.14	76/1090	E0169231	160.019	160.203	0.184	7.67
08.07.14	76/1091	E0169230	161.109	161.349	0.240	10.00
09.07.14	76/1092	E0169229	160.384	160.642	0.258	10.75
10.07.14	76/1093	E0169228	161.319	161.587	0.268	11.17
11.07.14	76/1094	E0169227	160.290	160.529	0.239	9.96
12.07.14	76/1095	E0169226	162.095	162.299	0.204	8.50
13.07.14	76/1096	E0169225	161.282	161.466	0.184	7.67
14.07.14	76/1097	E0169224	160.846	161.152	0.306	12.75
15.07.14	76/1098	E0169223	161.335	161.601	0.266	11.08
16.07.14	76/1099	E0169222	160.441	160.601	0.160	6.67
17.07.14	76/1100	E0169221	161.077	161.412	0.335	13.96
18.07.14	76/1101	E0169220	160.384	160.797	0.413	17.21
19.07.14	76/1102	E0169596	160.590	160.911	0.321	13.38
20.07.14	76/1103	E0169595	158.292	158.511	0.219	9.13
21.07.14	76/1104	E0169594	160.530	160.794	0.264	11.28
22.07.14	76/1105	E0169593	160.887	161.134	0.247	10.29
23.07.14	76/1106	E0169592	160.489	160.976	0.487	20.29
24.07.14	76/1107	E0169591	160.734	161.244	0.510	21.25
25.07.14	76/1108	E0169590	161.545	162.062	0.517	22.00
26.07.14	76/1109	E0169589	160.195	160.657	0.462	19.25
27.07.14	76/1110	E0169588	161.576	161.821	0.245	10.21
28.07.14	76/1111	E0169587	160.519	160.728	0.209	8.71
29.07.14	76/1112	E0169586	161.569	161.778	0.209	8.71
30.07.14	76/1113	E0169585	161.931	162.304	0.373	15.54
31.07.14	76/1114	E0169584	162.976	163.306	0.330	13.75
01.08.14	76/1115	E0169583	160.895	161.428	0.533	22.21
02.08.14	76/1117	E0169851	82.639	82.797	0.158	6.58
03.08.14	76/1118	E0169850	77.946	78.183	0.237	9.88
04.08.14	76/1119	E0169849	83.941	84.144	0.203	8.46
05.08.14	76/1120	E0169848	83.142	83.316	0.174	7.25
06.08.14	76/1121	E0169847	83.714	83.944	0.230	9.58
07.08.14	76/1122	E0169846	84.197	84.585	0.388	16.17
08.08.14	76/1123	E0169845	82.309	82.593	0.284	11.83
19.08.14	76/1124	E0169844	81.653	81.835	0.182	8.35
10.08.14	76/1125	E0169843	82.627	82.842	0.215	8.96
11.08.14	76/1126	E0169842	85.537	85.883	0.346	15.38
12.08.14	76/1127	E0169841	80.512	80.891	0.379	15.79
13.08.14	76/1128	E0169840	80.363	80.562	0.199	8.29
14.08.14	76/1129	E0169839	82.111	82.260	0.149	6.21

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Monitoring Dates	Filter No.	Internal Filter No.	Filter mass	Mass after exposure	Mass on filter	ug/m3
15.08.14	76/1130	E0169838	85.624	85.816	0.192	8.00
16.08.14	76/1132	E0170174	160.271	160.548	0.277	11.54
17.08.14	76/1133	E0170173	159.787	160.069	0.282	11.75
18.08.14	76/1134	E0170172	161.347	161.699	0.352	14.67
19.08.14	76/1135	E0170171	161.284	161.503	0.219	9.13
20.08.14	76/1136	E0170170	152.546	152.825	0.279	11.63
21.08.14	76/1137	E0170169	160.996	161.278	0.282	11.75
22.08.14	76/1138	E0170168	158.599	158.815	0.216	9.00
23.08.14	76/1139	E0170167	160.792	160.973	0.181	7.54
24.08.14	76/1140	E0170166	159.834	160.058	0.224	9.33
25.08.14	76/1141	E0170165	160.748	161.105	0.357	14.88
26.08.14	76/1142	E0170164	160.138	160.445	0.307	12.79
27.08.14	76/1143	E0170163	160.760	161.118	0.358	14.92
28.08.14	76/1144	E0170162	160.115	160.602	0.487	20.29
29.08.14	76/1145	E0170161	158.849	159.123	0.274	10.6
01.09.14	76/1149	E0170497	151.182	151.497	0.315	26.03
02.09.14	76/1150	E0170496	149.244	149.856	0.612	25.50
03.09.14	76/1151	E0170495	149.950	150.695	0.745	31.17
04.09.14	76/1152	E0170494	150.377	151.225	0.848	35.33
05.09.14	76/1153	E0170493	151.194	152.014	0.820	34.17
06.09.14	76/1154	E0170492	150.571	151.524	0.953	39.71
07.09.14	76/1155	E0170491	149.596	150.223	0.627	26.13
08.09.14	76/1156	E0170490	150.017	150.655	0.638	26.58
09.09.14	76/1157	E0170489	151.764	152.819	1.055	43.96
10.09.14	76/1158	E0170488	151.028	151.745	0.717	36.77
11.09.14	76/1159	E0170487	150.672	151.433	0.761	31.71
12.09.14	76/1160	E0170486	149.859	150.620	0.761	31.71
13.09.14	76/1161	E0170485	149.249	149.669	0.420	21.00
14.09.14	76/1147	E0170499	148.868	149.343	0.475	19.79
15.09.14	76/1162	E0170979	153.922	154.468	0.546	22.75
16.09.14	76/1163	E0170978	153.433	154.219	0.786	33.73
17.09.14	76/1164	E0170977	154.633	155.486	0.853	35.54
18.09.14	76/1165	E0170976	153.339	154.393	1.054	45.24
19.09.14	76/1166	E0170975	153.413	154.178	0.765	31.88
20.09.14	76/1167	E0170974	153.276	153.891	0.615	29.71
21.09.14	76/1168	E0170973	154.246	154.656	0.410	17.08
22.09.14	76/1169	E0170972	153.239	154.169	0.930	38.75
23.09.14	76/1170	E0170971	153.776	154.714	0.938	39.08
24.09.14	76/1171	E0170970	152.756	153.206	0.450	18.75
25.09.14	76/1172	E0170969	153.288	153.571	0.283	11.79
26.09.14	76/1173	E0170968	152.918	153.213	0.295	12.88
27.09.14	76/1174	E0170967	155.321	155.700	0.379	15.79
28.09.14	76/1175	E0170966	153.517	154.094	0.577	24.04
29.09.14	76/1176	E0170965	154.784	155.621	0.837	34.88
					Average	17.90

The results listed above are graphically represented below.



3.2 A simple assessment of the weather conditions during the study period indicated that there were periods of heavy rainfall and also some episodes of high winds but mainly dry and sunny weather prevailed. There were two days (9th and 18th of September) when elevated readings were recorded above the 40 $\mu\text{g}/\text{m}^3$ annual limit value, shown in red text in the table above. There were also three days when results were recorded at just below the annual limit value and these were the 6th, 22nd and 23rd September, illustrated in orange text in the above table.

The elevated results are considered to be attributable to significant insect loading that was experienced during September, which coincides with the generally higher readings for that month on the above graph. A photograph of the insect loading is shown below illustrating how many insects had found their way in to the bottle filter prior to the sampling head inlet of the Partisol. It was noted on the filter returns form that the magazines had been contaminated with large numbers of insects which were likely to impact on the results.

These elevated results will have impacted on the average for the monitoring period. If the five 'high' results are removed from the data set then the monitoring average drops to 16.46 $\mu\text{g}/\text{m}^3$ which is a reduction of approximately 1.5 $\mu\text{g}/\text{m}^3$.

There are no significant peak results that are considered to be attributed to operations at the poultry farm sites.



3.3 The monitoring period was for three months and therefore it was considered beneficial to annualise the data to gain more confidence with the results. The methodology provided in the LAQM Technical Guidance TG(09) was followed, however, it was decided to use the data from nine of the automatic sites across south Wales to achieve the best average possible. Most of these sites were used for the previous PM10 survey carried out during 2012.

The PM10 data was obtained from the Welsh Air Quality Forum website and the annual and period means obtained, and then the ratio calculated for each site before calculating the average ratio (Ra) to be used as the adjustment factor. The data is shown below.

Site	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
Cardiff Centre	15.58713	12.86746	1.21136
Newport- St Julians Comp	14.36223	13.04611	1.100883
Port Talbot – Theodore Road	16.56955	16.10037	1.029141
Port Talbot – Margam	19.18541	17.7508	1.08082
Port Talbot – Dyffryn School	17.75467	16.01855	1.108382
Port Talbot – Docks	16.97256	14.65746	1.157947
Port Talbot Road	20.83243	15.07206	1.382189
Port Talbot – Twll-yn-y-Wal Park	19.81928	19.25415	1.029351
Swansea – Morryston Roadside	12.34769	9.33013	1.323013
		Avg Ra =	1.158121

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The average of the monitoring results can then be multiplied by the adjustment factor to obtain the annualised annual mean.

Therefore;

$$17.9 \times 1.158121 = 20.73 \mu\text{g}/\text{m}^3$$

This figure is slightly higher than that obtained for the average monitoring result but still only half of the annual limit value. If the average ratio figure is multiplied by the highest daily result obtained on the 18th September 2014 this gives;

$$45.24 \times 1.158121 = 52.39 \mu\text{g}/\text{m}^3$$

This is only just above the 24 hour mean daily limit value, and based on a result that was subject to insect contamination.

3.4 The results obtained for the month of September may have led to a bias in the average data for the whole monitoring period. Therefore the results for just July and August have been subjected to the same data analysis as carried out in Section 3.3 above. The average for the reduced monitoring period is $12.25\mu\text{g}/\text{m}^3$.

Using the Welsh Air Quality Forum data provides the following details for just the period July to August.

Site	Annual Mean (Am)	Period Mean (Pm)	Ratio (Am/Pm)
Cardiff Centre	15.58713	8.173955	1.906926
Newport- St Julians Comp	14.36223	9.563636	1.501754
Port Talbot – Theodore Road	16.56955	12.25785	1.35175
Port Talbot – Margam	19.18541	15.87937	1.208197
Port Talbot – Dyffryn School	17.75467	14.34416	1.237763
Port Talbot – Docks	16.97256	12.01663	1.412423
Port Talbot Road	20.83243	12.51324	1.664831
Port Talbot – Twll-yn-y-Wal Park	19.81928	17.66766	1.121783
Swansea – Morrision Roadside	12.34769	6.200297	1.991468
		Avg Ra =	1.488544

If the average of the monitoring results for the July to August period is now multiplied by the adjustment factor from the reduced period average Ra the annualised annual mean result is;

$$12.25 \times 1.488544 = 18.23 \mu\text{g}/\text{m}^3$$

Interestingly the result is not significantly lower than that obtained for the full monitoring period, the difference being about $2.0\mu\text{g}/\text{m}^3$.

3.5 Both the monitoring data average and the annualised averages were compared to the total background figure provided from the background maps on the Defra Helpdesk web site (2010 – 2030 maps). The figure obtained for the nearest 1 x 1km was $11.55\mu\text{g}/\text{m}^3$, which is somewhat lower than the average monitoring result and the annualised average results.

3.6 As far as it is known the operation of the poultry farms over the monitoring period was as usual with no abnormal events and no operational changes that would have influenced the emissions from the activities.

It is known that between the 1st and 10th August 2014 both Poplar Farm and Oak Tree Farm went through changeover cycles that involve catching, mucking out, shed washing and re-stocking processes. These particular activities are considered to be the worst element of rearing cycles for the potential to release emissions to the atmosphere. There were no daily results during this changeover cycle that were above $20\mu\text{g}/\text{m}^3$, and therefore not above the period average. This would suggest that the changeover cycle did not have a significant adverse impact at the monitoring location.

4.0 Conclusion

4.1 The analysis of the filters demonstrate that of the 86 days of sampling that is being reported, there were **no** exceedences of the $50\mu\text{g}/\text{m}^3$ 24 hour mean (daily limit values). The first objective states that $50\mu\text{g}/\text{m}^3$ 24 hour mean (daily limit values) must not be exceeded on more than 35 occasions during the year. The monitoring period was for only three months and therefore to increase the level of certainty a longer monitoring period could be undertaken. However, although it was only a three month monitoring period, the results indicate that it is unlikely that the first objective would have been breached.

4.2 The second objective states that an annual limit value of $40\mu\text{g}/\text{m}^3$ shall not be exceeded. The mathematical average of results obtained for the 86 days of sampling being reported provides a level of $17.90\mu\text{g}/\text{m}^3$. Although there were two results that exceeded the limit and three that were very close, all five results are thought to have been contaminated with insects. If these results are excluded, there were no other exceedences of this annual limit value suggesting that the objective was met. As with the first objective the level of uncertainty could be increased with a longer monitoring period. A sampling period covering the whole year would have provided better data to determine the annual mean. However, the main purpose of the survey was to gather data for determining whether there was any significant adverse impact from the operation of the poultry farms, and in particular in relation to the changeover cycles.

4.3 The annualised data allowed comparison with the monitored data which was not significantly different. Caution needs to be exercised due to the limitations of a three month study but the use of nine automatic monitoring sites for obtaining averages is in excess of that required by the Technical Guidance TG (09). Comparison with the predicted background data from the Helpdesk website identified that the monitored data was higher than the figure from the website by about $8.0\mu\text{g}/\text{m}^3$. This may be due to the limitations of the modelled data supplied by the website or because there is some air quality impact from the operations of the poultry farms. There may also be contributions from passing traffic, vegetation within the area and localised sources of particulate matter such as back garden poultry sources. Applying the adjustment factor on the highest daily result from the monitoring period still only resulted in a very slight breach of the air quality objective (based on a contaminated sample). Overall, the results indicate that the operation of the poultry farms do not appear to have had any significant impact on the location where the monitoring was carried out.

4.4 The air quality limit values that results have been assessed against are based on health impact levels, but set at conservative levels to take account of vulnerable members of public. The results obtained from the monitoring study are, on average, about half of the limit values and therefore are unlikely to be contributing significant adverse health impacts to the residents of Pinged.

Appendix J: Gwili Railway Compliance Letter

OJM/LAQM
5th September 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 three unannounced inspection visits were made which were carried out during the 21st May, 11th June and 13th August 2014. I am pleased to inform you that on all three 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
Environmental Health Practitioner
Public Health Services

Appendix K: Biomass Boiler Emission Cross Check (for use in 2015 USA)



Carmarthenshire County Council

Environment Act 1995

Local Air Quality Management

2014 Biomass Boiler Emissions Cross Check (for use with the 2015 Updating & Screening Assessment)

(May 2015)

This document contains details for the calculations relating to cross checking potential emissions from biomass boiler plant that have been consented for planning and installed in Carmarthenshire during 2014. The boiler plant all have approval under the Renewable Heat Incentive (RHI) Scheme and are certified to specific emission levels under full capacity. The cross checks have been carried out using the equations and methodology provided in Section 5.0 of the Technical Guidance TG (09).

Castle Hotel (Llandovery)

Table 1 below provides the details for the recently installed biomass boiler at Castle Hotel, Llandovery.

Table 1 – Castle Hotel

Planning Number	E/30304	
Grid Reference	276 694 / 234 299	
Stack Height	6.0m	
Stack Diameter	180mm	
Boiler Rating	65 KWth	
Emission Specification	PM ₁₀	9.0 g/GJ
	NOx	9.5 g/GJ
Background Concentration	Row 636 on spreadsheets	
PM ₁₀ (2014) (μ g/m ³)	11.7	
PM _{2.5} (2011) (μ g/m ³)	8.3	
NOx (2011) (μ g/m ³)	9.0	
NO ₂ (2011) (μ g/m ³)	7.1	

The emission specification data needs to be converted to grammes per second for use with the formula provided in the guidance, therefore:

For PM₁₀ – $9.0 \times 65 \times 10^{-6} = 0.000585\text{g/s}$

For NOx – $9.5 \times 65 \times 10^{-6} = 0.0006175\text{g/s}$

To calculate the PM₁₀ background adjusted emission rate in order to identify a likely exceedence of the 24-hour mean objective the following formula is used:

$E_A = E / (32 - G)$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in $\mu\text{g}/\text{m}^3$

$32\ \mu\text{g}/\text{m}^3$ represents the annual average concentration at which, given a typical distribution of concentrations, the 90th percentile of 24-hour means will exceed the objective.

So,

$$E_A = 0.000585 / (32 - 11.7\ \mu\text{g}/\text{m}^3) = 0.000029$$

Using Figure 5.19 from TG (09) with the above data provides a threshold emission rate of 0.0020, which is above background adjusted emission rate. However, for this particular installation the building is higher than the stack height.

To calculate the NO_2 background adjusted emission rate (using NO_x) in order to identify a likely exceedence of the annual mean objective the following formula is used:

$$E_A = E / (40 - G)$$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in $\mu\text{g}/\text{m}^3$

$40\ \mu\text{g}/\text{m}^3$ is the annual average objective

So,

$$E_A = 0.0006175 / (40 - 9.0\ \mu\text{g}/\text{m}^3) = 0.0000199$$

Using Figure 5.20 from TG (09) with the above data provides a threshold emission rate of 0.0055, which is above background adjusted emission rate. However, for this particular installation the building is higher than the stack height.

Creamery (Newcastle Emlyn)

Table 2 below provides the details for the recently installed biomass boiler at the Creamery, Newcastle Emlyn.

Table 2 – Creamery

Planning Number	W/29863	
Grid Reference	231 560 / 240 173	
Stack Height	28.0m	
Stack Diameter	400mm (assumed)	
Boiler Rating	999 KWth	
Emission Specification	PM ₁₀	30.0 g/GJ
	NOx	150.0 g/GJ
Background Concentration	Row 249 on spreadsheets	
PM ₁₀ (2014) (μ g/m ³)	12.9	
PM _{2.5} (2011) (μ g/m ³)	8.6	
NOx (2011) (μ g/m ³)	7.7	
NO ₂ (2011) (μ g/m ³)	6.1	

The emission specification data needs to be converted to grammes per second for use with the formula provided in the guidance, therefore:

$$\text{For PM}_{10} - 30.0 \times 999 \times 10^{-6} = 0.02997\text{g/s}$$

$$\text{For NO}_x - 150.0 \times 999 \times 10^{-6} = 0.1499\text{g/s}$$

To calculate the PM₁₀ background adjusted emission rate in order to identify a likely exceedence of the 24-hour mean objective the following formula is used:

$$E_A = E / (32 - G)$$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in μ g/m³

32 μ g/m³ represents the annual average concentration at which, given a typical distribution of concentrations, the 90th percentile of 24-hour means will exceed the objective.

So,

$$E_A = 0.02997 / (32 - 12.9 \mu\text{g}/\text{m}^3) = 0.00157$$

Using Figure 5.19 from TG (09) with the above data provides a threshold emission rate of 0.055, which is above background adjusted emission rate.

To calculate the NO₂ background adjusted emission rate (using NO_x) in order to identify a likely exceedence of the annual mean objective the following formula is used:

$$E_A = E / (40 - G)$$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in $\mu\text{g}/\text{m}^3$

40 $\mu\text{g}/\text{m}^3$ is the annual average objective

So,

$$E_A = 0.1499 / (40 - 7.7 \mu\text{g}/\text{m}^3) = 0.00464$$

Using Figure 5.20 from TG (09) with the above data provides a threshold emission rate of 0.050, which is above background adjusted emission rate.

West Wales General Hospital (Carmarthen)

Table 3 below provides the details for the recently installed biomass boiler at West Wales General Hospital, Carmarthen.

Table 3 – West Wales General Hospital

Planning Number	W/27689	
Grid Reference	242 917 / 221 424	
Stack Height	26.6 m	
Stack Diameter	350mm	
Boiler Rating	990 KWth	
Emission Specification	PM ₁₀	0.045 g/s
	NOx	0.046 g/s
Background Concentration	Row 1435 on spreadsheets	
PM ₁₀ (2014) (μ g/m ³)	12.8	
PM _{2.5} (2011) (μ g/m ³)	8.8	
NOx (2011) (μ g/m ³)	10.9	
NO ₂ (2011) (μ g/m ³)	8.5	

To calculate the PM₁₀ background adjusted emission rate in order to identify a likely exceedence of the 24-hour mean objective the following formula is used:

$$E_A = E / (32 - G)$$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in μ g/m³

32 μ g/m³ represents the annual average concentration at which, given a typical distribution of concentrations, the 90th percentile of 24-hour means will exceed the objective.

So,

$$E_A = 0.045 / (32 - 12.8 \mu \text{g/m}^3) = 0.00234$$

Using Figure 5.19 from TG (09) with the above data provides a threshold emission rate of 0.045, which is above background adjusted emission rate.

To calculate the NO₂ background adjusted emission rate (using NO_x) in order to identify a likely exceedance of the annual mean objective the following formula is used:

$$E_A = E / (40 - G)$$

Where E_A is the background adjusted emission rate

E is the emission rate in g/s for the plant operating at capacity, and

G is the annual average background concentration in $\mu\text{g}/\text{m}^3$

40 $\mu\text{g}/\text{m}^3$ is the annual average objective

So,

$$E_A = 0.046 / (40 - 10.9 \mu\text{g}/\text{m}^3) = 0.00158$$

Using Figure 5.20 from TG (09) with the above data provides a threshold emission rate of 0.105, which is above background adjusted emission rate.

For all three of the biomass boiler plant above, the background adjusted emission rate is below the threshold emission rate and therefore it is not deemed necessary to proceed to a Detailed Assessment for these installations. Although the data for the Castle Hotel is treated with caution due to the stack height being lower than the building.

Conclusion

The results were as expected, due to the fact that all three boiler plant have approval under the Renewable Heat Incentive (RHI) Scheme and so should meet the necessary emission standards.