Llywodraeth Cymru / Welsh Government

A487 New Dyfi Bridge

Environmental Statement - Volume 3: Appendix 12.2

Baseline Noise Survey Results

Final Issue | 19 January 2016

Appendix 12.2 Baseline noise survey results

Measurement procedure

Site location

The surveys were undertaken to determine the existing noise climate around the proposed A487 improvement scheme and the surrounding residential areas. Noise measurements were taken by Ray Houghton and Neil Allso of Arup on 27 and 28 January 2016.

Measurement locations

The measurement locations were chosen to record typical ambient noise levels at representative noise sensitive receptors around the proposed Scheme. The nine measurement positions are shown in Figure 1. The approximate Scheme alignment is shown by a dashed red line.

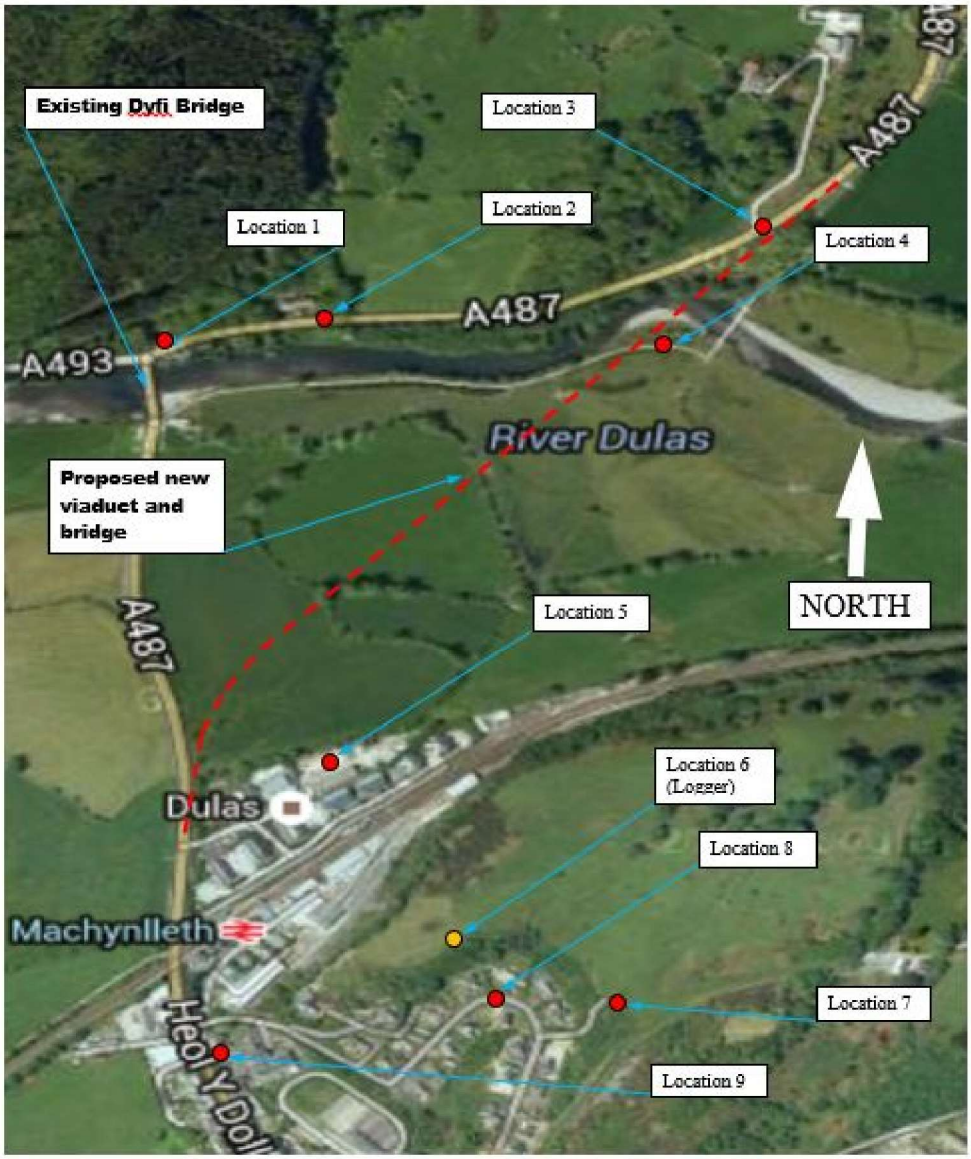

Figure 1: Baseline noise measurement locations

There were nine measurement locations, summarised as follows:

- Location 1 (attended) – on the north side of the proposed road scheme, in line with the front façade of "Corris House" on the A487;
- Location 2 (attended) – on the north boundary of the proposed road scheme, on a driveway leading to a row of houses set in to the hillside (Ffridd Farm) next to the A487;
- Location 3 (attended) – on the north side of the proposed road scheme, located just to the edge of a farm access driveway approx. 5m from the edge of the A487;
- Location 4 (attended) – on the north side of the proposed road scheme, on the pavement running parallel to the River (Afon Dyfi) leading to the millennium foot bridge;
- Location 5 (attended) – on the south side of the proposed road scheme, located in the car park of the dis-used Powys UK garden centre, approximately 35m east from the edge of the existing A487;
- Location 6 (unattended logger) – on the top of the hill overlooking Machynlleth and River (Afon Dyfi) and its flood planes to the east /west;
- Location 7 (attended) – on the hillside overlooking Machynlleth and River (Afon Dyfi) and its flood planes to the east;
- Location 8 (attended) – on the pavement next to No.5 Ffordd Mynydd, Griffiths Road, Machynlleth.
- Location 9 (attended) – on the grass bank next to the car park of the Mid Wales Storage Centre Limited facility approximately 3m east from the edge of the A487.

Attended survey period

Attended noise surveys were carried out to establish the baseline noise levels at the measurement locations at the following times:

- daytime (inter-peak) between 10:56 and 15:00 on 28th January 2016;
- late evening between 21:10 and 22:08 on 27th January 2016.

Survey methodology

The measurements were made with the measurement microphone mounted using a tripod 1.2m – 1.5m above ground level under acoustically free field conditions (i.e. at least 3.5m from any acoustically reflecting surface other than the ground).

The measurement locations were chosen to provide typical ambient noise levels at representative noise sensitive receptors around the site of the proposed development.

The weather conditions during the survey were within the limits specified in BS7445-1:2003. The weather was mainly fine with some low cloud cover, some very light rain showers were noted during some of the survey periods. The maximum wind speed recorded gusted no greater than 5.2m/s and was generally from the north.

Attended survey method

For the attended noise survey, the sound level meters were set to record noise levels over 10 minute periods during the daytime between 11:00 - 15:00 at all locations. In addition two 15 minute samples during the evening between 21:00 - 22:00, at location 2 (north) and location 8 (south).For each noise measurement, the noise climate, wind speed and direction, and the measured noise levels were all recorded and noted. The meter was set to automatically store the L_{Aeq}, L_{Amin}, L_{Amax}, L_{A10} and L_{A90} indices. Measurements were made with a fast (0.125s) time constant.

Unattended survey method

For the unattended noise survey, the Rion NL-32 logging meter was set up at location 6 and set to record noise levels over 15 minute intervals for 24 hours. The meter was set to automatically store the L_{Aeq}, L_{A10}, L_{A90} and $L_{Amax,F}$ indices. Measurements were made with a fast (0.125s) time constant. The loggers ran from 17:33 on 27th January 2016 until 17:03 on 28th January 2016.

Measurement equipment

Measurements were carried out using equipment as detailed in Table 1. The sound level meters and microphones are Type 1, conforming to BS EN 61672-1: 2003. The calibration of the sound level meters, pre-amplifier and microphone chains were checked before and after use, to confirm that there was no significant drift in meter response at the calibrator frequency and level. All Arup's sound level meters are regularly calibrated and this calibration is traceable to international standards.

Measurement Equipment	Manufacturer	Type Number	Serial Number
Precision Class 1 noise logging sound level meter (kit-A)	Norsonic	NOR 140	1403425
½" diameter pre-polarised condenser microphone	Norsonic	NOR 1225	98510
Pre-amplifier	Norsonic	NOR 1209	12578
TClass 1 sound pressure calibrator	Norsonic	Nor 1251	33849
Precision Class 1 noise logging sound level meter (kit C)	Norsonic	NOR 140	1403429
½" diameter pre-polarised condenser microphone	Norsonic	NOR 1225	98521

Measurement Equipment	Manufacturer	Type Number	Serial Number
Pre-amplifier	Norsonic	NOR 1209	12625
Class 1 sound pressure calibrator	Rion	NC-74	35173564
Precision Class 1 noise logging sound level meter (kit C)	Rion	RION NL-32	00282489
½" diameter pre-polarised condenser microphone	Rion	RION UC-53A	309514
Pre-amplifier	Rion	RION NH-21	19740
Class 1 sound pressure calibrator	Rion	NC-74	35173549
Kestrel 5500 weather station (Kit B)	Kestrel	5500	2119012

Table 1: Measurement equipment used for the survey

Measurement observations

During the daytime measurements it was noted that traffic noise from Heol Y Doll (A487) and the A493, dominates the whole area.

Location 6 (unattended) was on the top of the hill overlooking Machynlleth and River (Afon Dyfi) and its floodplains to the east /west. The logger was situated to the south of the proposed Scheme, near to the rear gardens of No.5 Ffordd Mynydd Griffiths road. From this position, the land slopes steeply down to the northwest, towards the train station and also slopes steeply down in the direction of Fford Mynydd Griffiths housing estate (see location map at Figure 1). From location 6 there is a clear line of sight to the rear façades of the houses fronting onto Ffordd Mynydd Griffiths road. During the daytime, traffic noise from the A487, and local car movements within the housing estate, dominates this location. It was also noted that during the night time the A487 is clearly audible at this location.

Measurement results

Figure 2 shows the logged noise levels as a time history for the 24 hour unattended noise survey at location 6. The summary results of the L_{Aeq} and L_{A90}

attended measurements for all locations are shown in Table 2, Table 3 and Table 4.

Measurements locations are as shown in Figure 1.

Measurements results

Noise survey results summary

Measured noise levels at all locations are summarised in Table 2 to 4 below.

Location	Sound level, dB (free field)		
	Range of $L_{A10,10min}$	Lowest $L_{A90,10min}$	Range of $L_{Aeq,10min}$
1	70-72	57	64-69
2	75-78	55	68-70
3	73-75	51-52	67
4	58-62	49	54-68
5	59-62	48	56-60
6 (unattended)*	51-66	42	48-62
7	55-61	46	53-58
8	52-54	43	50-51
9	69-71	49	65-68

Table 2: Summary of measured daytime (10:00 – 17:00) noise levels

*noise levels are sampled over 15 min periods

Location	Sound level, dB (free field)		
	Range of $L_{A10,15min}$	Lowest $L_{A90,15min}$	Range of $L_{Aeq,15min}$
2	47	45	52
6 (unattended)*	40-43	33	38-40
8	44	36	41

Table 3: Summary of measured evening (20:00-22:00) noise levels

*noise levels are sampled over 15 min periods

Location	Sound level, dB (free field)		
	Range of $L_{A10,15min}$	Lowest $L_{A90,15min}$	Range of $L_{Aeq,15min}$
6 (unattended)*	34-46	31	33-44

Table 4: Summary of measured night-time (00:00-07:00) noise levels

*noise levels are sampled over 15 min periods

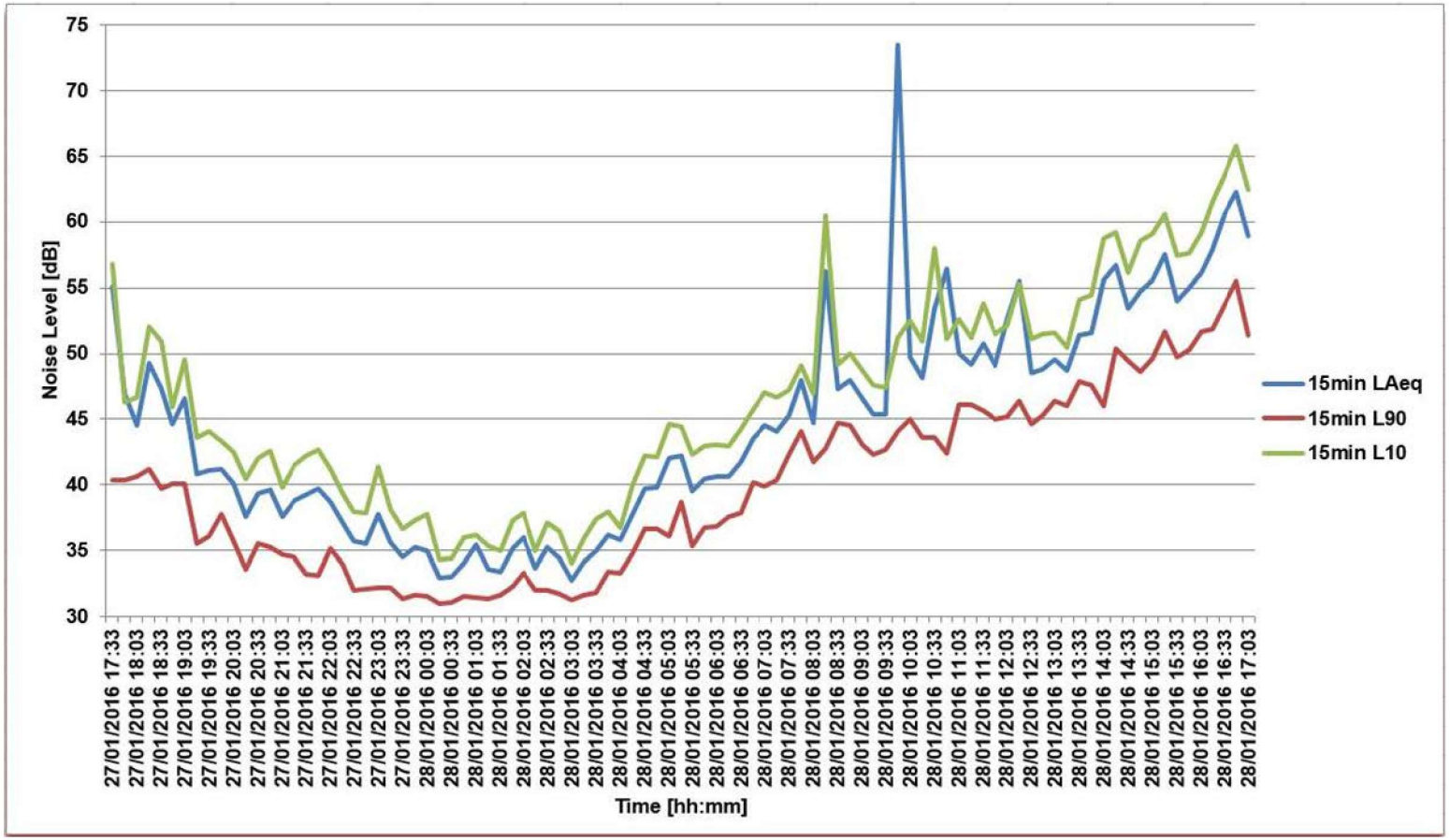

Figure 2: Unattended measurement results at location 6 (GPS 50° 57' 04" N 2° 37' 17" W)
NB: The large L_{Aeq} spike was likely to have arisen from fighter jet flyover

Full survey results at attended survey locations

Survey locations

Location 1 – (attended) on the north side of the road scheme, in line with the front façade of "Corris House" on the A487, just after the T-junction at the north end of the bridge. The land slopes up to the east and west from this location (see Figure 1). From location 1 there is a clear line of sight across the bridge and the flood plain. During the daytime measurements, traffic noise from the A487 and A493 dominates this location. The river (Afon Dyfi) to the south was just audible during the day time. It was also noted that during the quietest evening period, the river was clearly audible at this location.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.2016	11.06	11.16	9.2	9.2	2	SE	69.2	93.1	50.8	72.1	57.3	A487 traffic noise dominant. A491 traffic also audible.
28.01.2016	12.33	14.43	8	8	3	SE	64.3	80.6	50.8	70.3	58.2	A487 traffic noise dominant. A491 traffic also audible.
28.01.2016	14.15	14.25	4	4	2	SE	68.7	93.6	49.6	73.4	59.9	A487 traffic noise dominant. A491 traffic also audible.

Table 5: Attended measurement results at location 1 (GPS N52° 36' 055" W 035° 51' 33.5")

Location 2 – (attended) – on the north boundary of the road scheme, on a driveway leading to a row of houses set in to the hill side (Ffridd Farm). The road slopes down to the west and rises up to the east (see Figure 1). From location 2 there is a clear line of sight south to the flood plains. During the daytime measurements traffic noise arising from the A487 dominates this location. The river to the south is just audible during day time measurements. It was also noted that during the quietest night time period that the river is clearly audible at this location.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
27.01.2016	21:58	22:13	5	5	0	-	51.8	75.3	43.9	46.5	44.8	DMU train pass by on local branch line. Location dominated by fast flowing River (Afon Dyfi) and Birdsong (Crows)
28.01.2016	11.23	11.33	9	9	3	SE	67.9	87.9	47.0	75.4	55.5	A487 traffic noise dominant. River (Afon Dyfi) also contributed to overall noise climate.
28.01.2016	12.50	13.00	7	7	4.1	SE	67.9	81.0	48.6	75.1	56.6	A487 traffic noise dominant. River (Afon Dyfi) also contributed to overall noise climate.
28.01.2016	14.30	14.40	4	4	2.6	SE	69.8	85.5	50.1	78.8	58.2	A487 traffic noise dominant. River (Afon Dyfi) also contributed to overall noise climate.

Table 6: Attended measurement results at location 2 (GPS 52° 36' 63" N 03° 51' 25" W)

Location 3 – (attended) on the north side of the road scheme, located just to the edge of a farm access about 5m from the main road. The land slopes down to the west and rises slightly up to the north east in the direction of the A487 (see Figure 1). From location 3 there is a view through a few trees across the river flood plain. During the daytime period, traffic noise from the A487 dominated the noise climate at this location.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.2016	11.41	11.51	9	9	2.3	SE	67.0	90.3	45.2	73.8	51.6	The A487 road traffic dominates the noise climate at this location. Distant train pass-by audible.
28.01.2016	13.15	13.25	5	5	3	SE	66.9	82.3	42.2	74.7	51.2	The A487road traffic dominates the noise climate at this location.
28.01.2016	14.45	14.55	7	5.8	3	SE	67.2	80.7	44.3	75.4	51.4	The A487road traffic dominates the noise climate at this location

Table 7: Attended measurement results at location 3 (GPS 52° 36' 13" N 03° 50' 9" W)

Location 4 – (attended) – on the north side of the road scheme, on the pavement running parallel to the river and leading to the millennium foot bridge. The A487 is elevated above the river level (see Figure 1). During the daytime period the noise climate and character was mainly dominated to the river (Afon Dyfi).

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.2016	12.01	12.16	8	8	5	SE	*68.0	*99.4	46.7	61.6	52.8	Dominant noise source was from the fast flowing River (Afon Dyfi), with some contribution from the A487. *low flyby from a Typhoon Eurofighter.
28.01.2016	13.43	13.53	3.2	3.3	4.4	SE	55.4	68.7	47.3	60.5	52.9	Dominant noise source was from the fast flowing River (Afon Dyfi) with some contribution from the A487.
28.01.2016	14:50	15:00	5	5	4.9	N	54.1	65.8	46.6	57.7	48.8	Dominant noise source was from the fast flowing River (Afon Dyfi), with some contribution from the A487. Helicopter pass by over the river.

Table 8: Attended measurement results at location 4 (GPS 52° 36' 05" N 03° 50' 9" W)

Location 5 – (attended) – on the south side of the road scheme, located in the car park of the dis-used Powys UK garden centre. Approximately 35m east from the edge of the A487, the land slopes gently down to the north and rises up south in the direction of Machynlleth (see Figure 1). From location 5 there is a clear line of sight to the railway line to the east. During the daytime period, traffic noise from A487 dominated the noise climate at this location.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.16	11.13	11.23	3.5	3	3.9	NE	55.6	68.3	44.9	59.0	47.6	The A487 dominates the noise climate at this location.
28.01.16	12.27	12.37	3	3	4.8	N	*59.7	*86.4	44.7	59.0	48.3	The A487 dominates the noise climate at this location. *Distant flight of hawk training fighter audible during measurement period.
28.01.16	13.42	13.52	3	3	5.0	N	58.3	69.8	45.7	62.2	50.5	The A487 dominates the noise climate at this location.

Table 9: Attended measurement results at location 5 (GPS 52° 35' 47" N 03° 51' 17" W)

Location 7 – (attended) – on the hillside overlooking Machynlleth and the River (Afon Dyfi) and its floodplain to the east. The ground slopes steeply down to the south west and steeply up to the north east (see Figure 1). During the daytime period, the main noise source was observed to be local traffic using Ffordd Mynydd Griffiths road and Heol Y Doll Road (A487) at the bottom of the valley. During the evening period the A487 was the dominant noise source.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.16	11.33	11.43	3	3	5.1	N	52.6	69.5	42.9	54.5	45.9	Traffic using the local Ffordd Mynydd Griffiths road was the dominant noise sources at this location. Traffic using the A487 and A491 was just audible. No trains audible from this location.
28.01.16	12.44	12.54	3	3	3.1	N	53.2	70.2	40.1	55.8	48.1	Traffic using the local Ffordd Mynydd Griffiths road was the dominant noise source at this location. Traffic using the A487 and A491 was just audible. No trains audible from this location.
28.01.16	14.03	14.13	3	3	3.9	N	*57.5	*77.7	42.8	*60.8	47.1	Traffic using the local Ffordd Mynydd Griffiths road was the dominant noise source at this location. Traffic using the A487 and A491 was just audible. No trains audible from this location. Loud Jet fighter flybys in nearby valleys affected noise levels marked with *

Table 10: Attended measurement results at location 7 (GPS 52° 35' 39" N 03° 50' 58" W)

Location 8 – (attended) – on the pavement next to No.5 Ffordd Mynydd Griffiths road. The ground slopes down to the east and up to the north. All the housing is terraced in to the hillside (see Figure 1). During the daytime period, the main noise source was observed to be from local traffic using Ffordd Mynydd Griffiths road. During the evening period the A487 was audible.

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
27.01.16	21.10	21.25	5.5	5	2.9	NW	41.1	63.7	33.8	44.1	35.9	Occasional traffic using A487. Distant traffic and other non-descript noise sources prevailed during this period.
28.01.16	11.49	11.59	3	3	4.9	N	51.4	71.2	39.9	54.0	43.3	Dominant noise source arising from Heol Y Doll (A487) to north and south.
28.01.16	13.01	13.11	3	3	3.5	N	49.7	69.5	43.5	51.6	45.3	Dominant noise source arising from Heol Y Doll (A487) to north and south.
28.01.16	14.24	14.34	3	3	3.5	N	*58.8	*78.9	*47.3	*60.4	*50.6	Loud Jet fighters in nearby valleys affected noise levels marked with *. Traffic noise audible from Heol Y Doll (A487) to north and south.

Table 11: Attended measurement results at location 8 (GPS 52° 35' 37" N 03° 51' 04" W)

Location 9 – (attended) – on a grass bank next to the car park at Mid Wales Storage Centre Limited, approximately 3m east of the edge of the A487. The ground slopes down to the north and up into Machynlleth (see Figure 1). During the daytime period, the main noise source was from traffic using Heol Y Doll Road (A487).

Date	Time		Temperature, °C		Wind		Noise Level, dB (A)					Comments
	Start	Finish	Start	Finish	Speed (ms^{-1})	Direction	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}	
28.01.16	10.56	11.06	4	3.5	2.5	NE	65.3	79.5	44.0	69.3	49.0	Dominated by traffic noise from Heol Y Doll (A487) heading in and out of Machynlleth.
28.01.16	12.10	12.20	3.5	3.5	3.8	N	68.2	89.0	42.0	70.9	54.7	Dominated by traffic noise from Heol Y Doll (A487) heading in and out of Machynlleth.
28.01.16	13.19	13.29	3	3	5.2	N	66.6	83.6	53.2	69.6	56.9	Dominated by traffic noise from Heol Y Doll (A487) heading in and out of Machynlleth.

Table 12: Attended measurement results at location 9 (GPS 52° 35' 38" N 03° 51' 17" W)