Noise Planning Report

Coleg Sir Gar - Pibwrlwyd Campus

Stantec

Prepared for:
WEPCo

Date:
24 July 2025

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Project/File:
30015-HYD-XX-XX-RP-Y-1004

Stantec Hydrock Limited

Document control sheet

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Client	WEPCo	
Project name	Coleg Sir Gar - Pibwrlwyd Campus	
Title	Noise Planning Report	
Doc ref	30015-HYD-XX-XX-RP-Y-1004	
Project number	30015	
Status	S2	
Date	24 July 2025	

Document production record

Issue number	P01	Name
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Document revision record

Issue number	Status	Date	Revision details
P01	S2	24/07/2025	For information.

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Executive Summary

Stantec are appointed to prepare a noise planning report to accompany the planning application for the proposed development at the Pibwrlwyd Coleg Sir Gar campus in Camarthern.

This document summaries the measured ambient and background noise levels from unattended and attended noise measurements undertaken at the site in July 2024.

An external noise impact assessment has been carried out to determine the likelihood of adverse impact on the nearby noise sensitive receptors due to workshop activities (noise breakout and delivery noise) associated within the development.

An external plant noise impact assessment has been carried out to determine the likelihood of adverse impact on the nearby noise sensitive receptors due to a new modular heat pump compound proposed at the site.

1 Policy & Guidance Documents

1.1 British Standard 4142:2014+A1 2019

British Standard 4142:2014+A1 2019 *'Methods for rating and assessing industrial and commercial sound'* is used to establish the impact of noise sources of an industrial nature on people residing in nearby dwellings.

The assessment method considers the characteristics of the sound, such as tonality, impulsivity and intermittency. Corrections are applied to the specific noise source to account for these characteristics to obtain the 'rating' noise level, where noise generated is tonal (up to 6dB), intermittent or impulsive (up to 9dB), or otherwise 'readily distinctive against the residual acoustic environment' (up to 3dB).

The development will introduce various items of fixed plant, which have the potential to be a permanent source of noise depending on their noise emissions. Therefore, plant rating noise limits at the nearest noise sensitive receptors (NSRs) are proposed relative to measured background noise levels and consideration has been given to whether these limits are practically achievable.

Plant rating noise limits have been set following the methodology contained within BS4142:2014+A1 2019, which defines the relevant parameters as follows:

- Specific noise level $L_{Aeq,T}$: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval;
- Background level, $L_{A90,T}$: The 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T;
- Rating level, $L_{Ar,Tr}$: The equivalent continuous 'A' weighted sound pressure level of the item of plant or process considered (specific sound level), plus relevant adjustments made for any tonal, intermittent, or impulsive characteristics.

The specific noise level with the character correction (if necessary) is known as rating level ($L_{Ar,Tr}$) and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The following is then considered.

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

1.2 Building Bulletin 93 'Acoustic Design of Schools: Performance Standards'

Building Bulletin 93 (hereafter referred to as BB93) sets out indoor ambient noise level (IANL) criteria for a variety of spaces and is a legislative requirement for all new-build and refurbished schools. The IANL includes contributions from:

- External sources outside the building (including, but not limited to, road/rail/air traffic noise and/or noise from industrial and commercial premises).
- Building services (e.g. ventilation systems, plant, drainage, etc.). If a room is naturally ventilated, the IANL is calculated and measured with ventilators or windows open as required to provided ventilation. If a room is mechanically ventilated or cooled, the plant should be assumed to be running at its normal operating duty.

Based on the RIBA Stage 3 development proposals, the IANL criteria relevant to this project are summarised in Table 1.

Table 1: New-Build Performance Standards for Indoor Ambient Noise Levels (IANL)

Room Type	**Upper IANL Limit ($L_{Aeq,30mins}$, dB)**
Low-Sensory/Multi-Sensory Teaching Rooms	30
Standard Teaching Classrooms, Multi-Use Hall, ILS Teaching Rooms, Seminar, Sensory Rooms, ALNCO Office/Meeting	35
Offices, Interview Rooms, Staff Rooms, Beauty Rooms, Treatment Rooms, Salons, Wellbeing Hub, Be Aspirational & Welsh Language Hub, Learning Support Hub, Shop, Gym, Library, CAD/ICT Rooms, HE Study Pods, FE Art Rooms, Mac Suites, Media Room/Animation, HE Study Spaces, Photo Studio, Print, Fine Art Rooms, Board Room, Prayer Room, 1-2-1 Rooms, Workshops	40
Restaurant & Bar, Corridor & Circulation Areas	45
Training/Production Kitchen, Food Prep Rooms, Toilets, Changing Rooms, Plant Rooms, Server Rooms	50

The building envelope and ventilation strategy should be developed to achieve the IANL criteria prescribed by BB93.

2 Environmental Noise Survey

2.1 Site Description

The site is bounded by the A484 to the west and Pibwrlwyd Lane to the south. 4no. new buildings are proposed at the site, as shown in Figure 1.

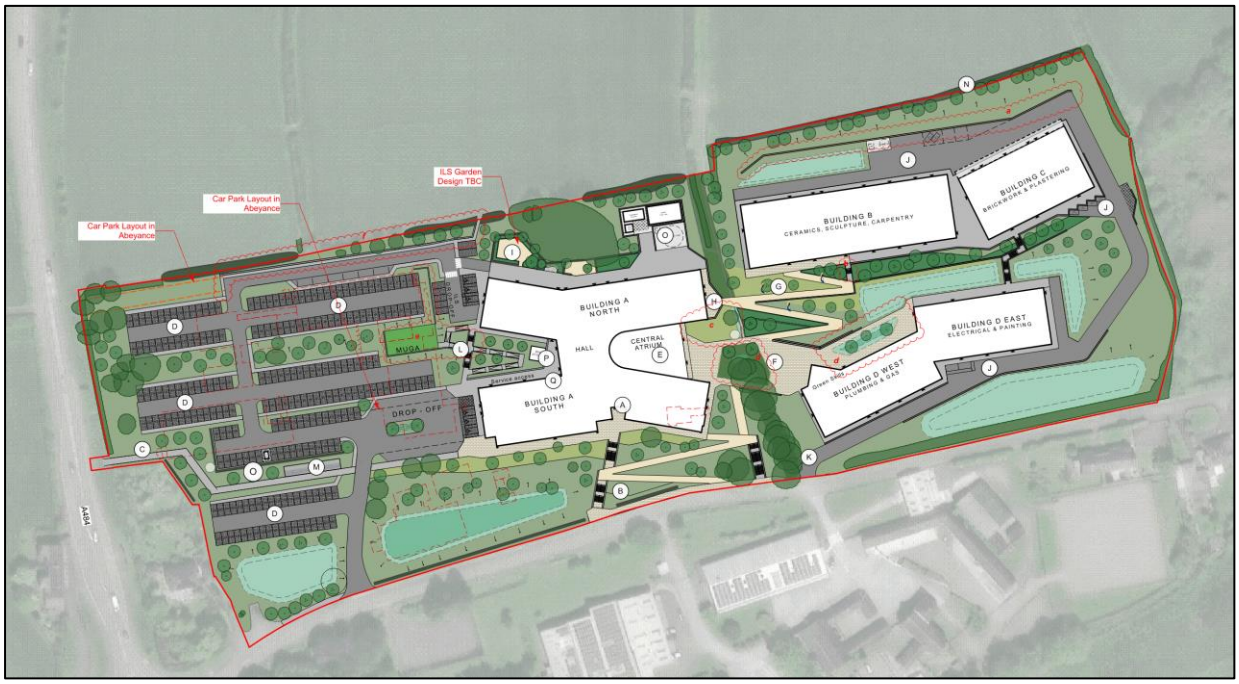


Figure 1: Illustrative Masterplan (CR0301-ALA-ZZ-ZZ-D-L-00001-Illustrative Masterplan-S3-P01)

2.2 Site Survey

Environmental noise measurements were undertaken between 12:00 on 26/07/2024 and 10:00 on 29/07/2024 by unattended noise monitoring equipment.

The measurement locations and periods are considered to represent typical daytime noise levels when the building would be under operation, and typical background noise levels for the nearby noise sensitive receptors during daytime & night-time periods.

Additional attended environmental noise measurements were undertaken between 10:55 and 12:55 on 29/07/2024.

The noise monitoring locations are shown in **Figure 2** and summarised in **Table 2** overleaf.

Table 2: Monitoring Location Details

Monitoring Location ID	Description of Noise Monitoring Location
U1	The measurement microphone was installed on a tripod at the north façade of the site. The noise climate consisted of environmental noise and road traffic noise on the A484.
U2	The measurement microphone was installed on a tripod at the south façade of the site. The noise climate consisted of environmental noise and intermittent road traffic noise from Pibwrlwyd Lane.
A1	The measurement microphone was installed on a tripod at the west façade of the site. The noise climate was predominantly controlled by road traffic noise on the A484.
A2	The measurement microphone was installed on a tripod at the south façade of the site. The noise climate was predominantly controlled by road traffic noise on the A484.
A3	The measurement microphone was installed on a tripod at the south façade of the site. The noise climate consisted of environmental noise and intermittent road traffic noise from Pibwrlwyd Lane.

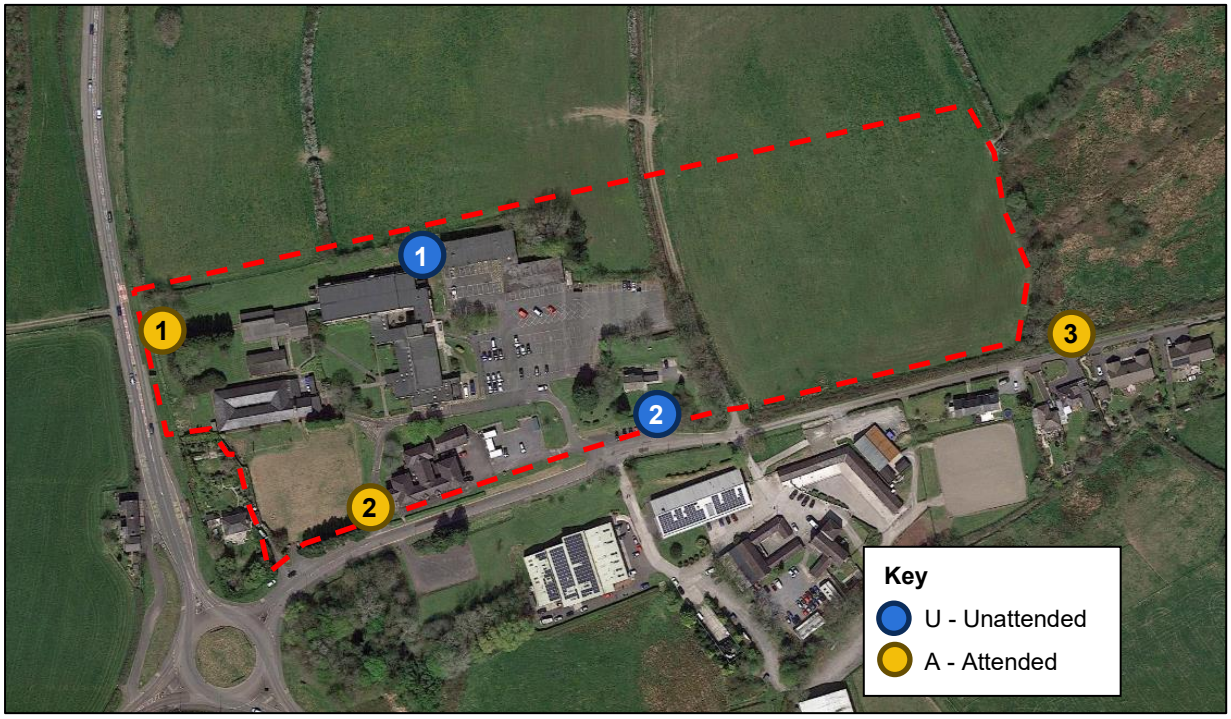


Figure 2: Noise Monitoring Locations

The measurement microphone was located at a height of ~1.5m above local ground at all measurement positions. Measurements were undertaken in accordance with the guidance outlined in the relevant British Standards, BS 4142:2014 and BS 7445-1:2003. The monitoring procedure followed the guidance outlined in BS 7445:2003 Part 1, Section 5.2.3 and section 5.2.2.

Measurements were 'free field', i.e. the microphone was more than 3.5m from reflective elements except the ground. A suitable wind shield was fitted to the monitoring equipment throughout the monitoring period.

Observation and subjective evaluation of noise sources was carried out during the setup and collection of the survey equipment.

It is noted that an uncharacteristic noise event occurred between 11:00 and 13:00 on Sunday 28th July at noise measurement position U1. Based on audio recordings, the noise source is assessed to be a tractor/lawnmower operating at the field directly north of the measurement position, which greatly increased measured noise levels. Measurement results during this period have therefore been excluded from the overall results.

2.3 Personnel

The environmental noise survey was undertaken by Rhodri Owen (Principal Acoustic Consultant) and Paul Gurney (Senior Acoustic Consultant). Rhodri and Paul both hold the IOA Diploma in Acoustics & Noise Control and are corporate members of the Institute of Acoustics (MIOA).

2.4 Noise Monitoring Equipment List

The equipment list is shown in **Table 3**.

Table 3: Equipment List

Monitoring ID	Equipment	Manufacturer	Instrument	Serial No.	Date of Last Laboratory Calibration
U1 & A1	Sound Level Meter	01dB	FUSION	14526	26/04/2024
	Microphone	GRAS	40CD	470800	26/04/2024
	Calibrator	Cirrus	CR:515	96051	19/06/2024
U2, A2 & A3	Sound Level Meter	NTi Audio	XL2-TA	A2A-20607-E0	03/06/2024
	Pre-amp		MA220	10684	03/06/2024
	Microphone		MC230A	A23089	03/06/2024
	Calibrator	Cirrus	CR:515	95714	19/06/2024

The sound level meters used for the noise survey have been verified as conforming to BS EN 61672-1. The acoustic calibrators used conform to BS EN IEC 60942. Equipment calibration certificates can be provided on request. The sound level meters were calibrated to a reference level of 94 dB at 1kHz both prior to, and on completion of, the noise survey period. No significant drift in calibration was noted during the survey (≤ 0.5 dB).

2.5 Weather Conditions

Approximate weather history for Carmarthen can be viewed in Appendix A. Weather conditions on each day are summarised as follows:

- Friday 26th July – dry with a moderate breeze
- Saturday 27th July – dry with a moderate breeze
- Sunday 28th July – dry with a gentle breeze
- Monday 29th July – dry with a gentle breeze

Average recorded wind speeds during the environmental noise measurement process exceeded 5 m/s on Friday 26th and Saturday 27th July. BS 414:2014 provides the following guidance with regards to the acquisition of environmental noise measurements and weather conditions:

> *'An effective windshield should be used to minimize turbulence at the microphone.*
>
> *'NOTE Windshields are generally effective up to wind speeds of 5 m/s' and. 'exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.'*

It is noted that wind speeds during the survey period were not shown to be excessive during the equipment setup, and the microphone positions were not deemed to be particularly exposed to wind.

A review of the audio recordings obtained during the survey period did not indicate that periods of higher wind speeds affected noise measurements. Measurements are therefore considered to be compliant with relevant British Standards and no corrections to the measured noise dataset have been applied.

2.6 Summary of Unattended Noise Survey Results

The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ dB ('A' weighted equivalent continuous sound pressure level), defined as the level of a continuous noise with the same total energy as the actual fluctuating sound over the measurement time periods; it is sometimes referred to as the 'ambient noise level' and can be considered an average
- $L_{A90,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 90% of the measurement period 'T'; it is used to describe the prevailing background sound level within BS4142:2014 +A1 2019
- $L_{A1,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 1% of the measurement period 'T'

A summary of the ambient noise level measurements is presented in **Table 4**. The ambient noise levels (L_{Aeq}) are logarithmically averaged over each period. The full results are provided graphically in Appendix B.

Table 4: Summary of Unattended Ambient ($L_{Aeq,T}$) Measured Noise Levels

Position	Period	Range of Measured Average Ambient Noise Levels, dB $L_{Aeq,30mins}$	Average Ambient Noise Level, dB $L_{Aeq,T}$
U1	Daytime (07:00-23:00)*	38 – 51	45
	Night-time (23:00-07:00)	34 – 49	41
U2	Daytime (07:00-23:00)	40 – 54	49
	Night-time (23:00-07:00)	33 – 51	43

***Note:** Excluding anomalous noise data measured between 11:00 and 13:00 on Sunday 28th July*

A summary of measured maximum noise levels (dB $L_{A1,30mins}$) during daytime hours is shown in **Table 5**.

Table 5: Summary of Measured Maximum Noise Levels

Position	Period	Range of Maximum Discreet Noise Event Levels (BB93), dB $L_{A1,30mins}$
U1	Daytime (07:00-23:00)*	44 – 61
U2	Daytime (07:00-23:00)	47 – 67

***Note:** Excluding anomalous noise data measured between 11:00 and 13:00 on Sunday 28th July*

The typical measured background sound levels are presented in **Table 6**, which are determined by observing the most commonly occurring background sound level (rounded to single figure) during daytime and night-time hours. The background sound level distribution graphs are shown in Appendix C.

Table 6: Typical Measured Daytime & Night-time Background Sound Levels

Position	Period	Typical Measured Background Sound Level
U1	Daytime (07:00-23:00)	36dB $L_{A90,1hr}$
	Night-time (23:00-07:00)	31dB $L_{A90,15min}$
U2	Daytime (07:00-23:00)	39dB $L_{A90,1hr}$
	Night-time (23:00-07:00)	29dB $L_{A90,15min}$

2.7 Summary of Attended Noise Survey Results

The results of the short-term measurements taken in accordance with the Department of Transport's 'Calculation of Road Traffic Noise – Shortened Measurement Procedure' at measurement positions A1, A2 & A3 are summarised in **Table 7**, **Table 8** and **Table 9** respectively. Calculated road traffic noise emissions (based on CRTN methodology) are used to help predict ambient noise levels across the development site.

Table 7: Short-Term Measurement Results at A1

Measurement Position A1	**Measured L_{A10} dB**	**Measured L_{Aeq} dB**	**Measured L_{AFmax} dB**
Sample 1 (29/07/2024 10:55 - 11:55)	66	63	79
Sample 2 (29/07/2024 11:55 - 12:55)	66	63	82
Sample 3 (29/07/2024 12:55 - 13:55)	66	63	82
dB $L_{A10(18hour)}$ (in line with CRTN)	65		

Table 8: Short-Term Measurement Results at A2

Measurement Position A2	**Measured L_{A10} dB**	**Measured L_{Aeq} dB**	**Measured L_{AFmax} dB**
Sample 1 (29/07/2024 11:43 - 11:58)	48	47	67
Sample 2 (29/07/2024 11:58 - 12:13)	50	50	69
Sample 3 (29/07/2024 13:08 - 13:23)	49	50	71
dB $L_{A10(18hour)}$ (in line with CRTN)	48		

Table 9: Short-Term Measurement Results at A3

Measurement Position A2	**Measured L_{A10} dB**	**Measured L_{Aeq} dB**	**Measured L_{AFmax} dB**
Sample 1 (29/07/2024 11:43 - 11:58)	41	41	61
Sample 2 (29/07/2024 11:58 - 12:13)	42	39	58
Sample 3 (29/07/2024 13:08 - 13:23)	40	39	55
dB $L_{A10(18hour)}$ (in line with CRTN)	40		

2.8 Survey Results Discussion

Based on the unattended and attended survey measurements results, the site is deemed feasible for a new college campus development.

External noise levels are relatively low, meaning standard façade constructions (i.e. min. 50dB R_w external wall constructions and min. 30dB R_w double glazing) are deemed sufficient to control noise break-in to noise sensitive spaces and achieve the target BB93 target internal ambient noise level criteria (see Section 1.2) for good acoustic design.

It is understood that a hybrid/mechanical ventilation strategy will be used for non-acoustic reasons. Ventilative openings should be designed to provide a min. sound insulation performance of 30dB $D_{n,e,w}$ to prevent excessive noise intrusion via the ventilative openings.

Due to the relatively low typical measured background sound level at the development site during college operational hours (07:00 – 17:00) hours, noise generating activities and equipment at the site (i.e. noise from workshop activities and noise from new external plant) is modelled and assessed to determine whether an adverse impact is predicted at the nearest noise sensitive receptors, which are identified as being the existing residential houses on Pibwrlwyd Lane.

The predicted rating noise level of the noise generating activities and equipment is assessed in accordance with BS4142 (see Section 1.1) to determine whether any noise mitigation measures are necessary to avoid an adverse impact on the nearby noise sensitive receptors.

3 Workshop External Noise Assessment

The Coleg Sir Gar Pibwrlwyd Campus development includes proposals for 3no. new workshop buildings to be located immediately east of the main campus building. The workshop buildings are to include dedicated teaching spaces for various vocational subjects including (but not limited to) carpentry, plumbing, bricklaying and engineering activities. The following sections assess the predicted impact of activities associated with the new workshop buildings:

1. Breakout noise from the workshops during college operational hours (07:00 – 17:00)
2. Delivery noise associated with the workshops during college operational hours (07:00 – 17:00)

It should be noted that delivery noise is expected to be infrequent (it is understood that deliveries typically occur every two weeks), however a reasonable worst case scenario assessment is prepared to determine the possible noise impact of the workshop activities and delivery noise occurring simultaneously during a worst-case 1-hour period ($L_{Aeq,1hr}$).

3.1 Workshop Breakout Noise Modelling

Noise breakout levels from the proposed workshops in Buildings B, C and D have been modelled within SoundPlan 9.1 based on the internal reverberant noise levels shown in **Table 10**, which represent reasonable worst-case noise levels ($L_{Aeq,1hr}$) within a typical workshop during college operational hours. The reasonable worst-case noise levels are derived from a series of noise measurements previously undertaken at a similar college facility with vocational workshops (e.g. bricklaying, plastering, plumbing).

Table 10: Reasonable Worst-Case Reverberant Noise Levels in Typical Workshop

Workshop Reverberant Noise Level (dB) at Octave Band Frequency (Hz)								**dB(A)**
63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
70	75	80	80	80	75	70	70	83.5

For the purposes of the noise modelling, the external building elements (wall, door, glazing and roller shutter) are assumed to provide the minimum sound insulation performance values shown in Table 11.

Table 11: Assumed Sound Insulation Performance of External Building Elements

External Building Element	**Sound Reduction Index (dB) at Octave Band Frequency (Hz)**								**R_w**
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
Wall	39	42	39	46	53	59	64	64	50
Glazing	17	20	18	27	36	40	35	35	31
Door(s)	4	11	25	33	30	31	35	38	30
Roller Shutter	0	7	13	18	21	17	17	17	19

3.2 Delivery Noise Modelling

In addition to breakout noise from the workshops, external noise emissions due to deliveries have been modelled within SoundPlan 9.1. Delivery vehicles are expected to enter and leave the site via the transport route shown in Figure 3. The delivery vehicle transport route is modelled as a moving point source with a sound power level (SWL) of 109dB(A)* moving at an average speed of 3m/s. For a reasonable worst-case assessment, it is assumed that the delivery vehicles are driving on-site for 5-minutes total during a 1-hour period, therefore an on-time correction of -11dB is applied to the source noise level.

When a delivery vehicle arrives at the site, it is assumed that the driver switches off the engine (i.e. does not idle), and a forklift is used to transport goods between the delivery vehicle and Buildings B, C and D. A forklift is modelled as a moving point source with a sound power level (SWL) of 99dB(A)* moving at an average speed of 1.5m/s. For a reasonable worst-case assessment, it is assumed that the forklift is operational for 10-minutes total during a 1-hour period, therefore an on-time correction of -8dB is applied to the source noise level.

***Note:** Source noise levels based on delivery lorry and forklift sound power level data provided by Transport Scotland, 'Typical Construction Plant and Noise Levels'*

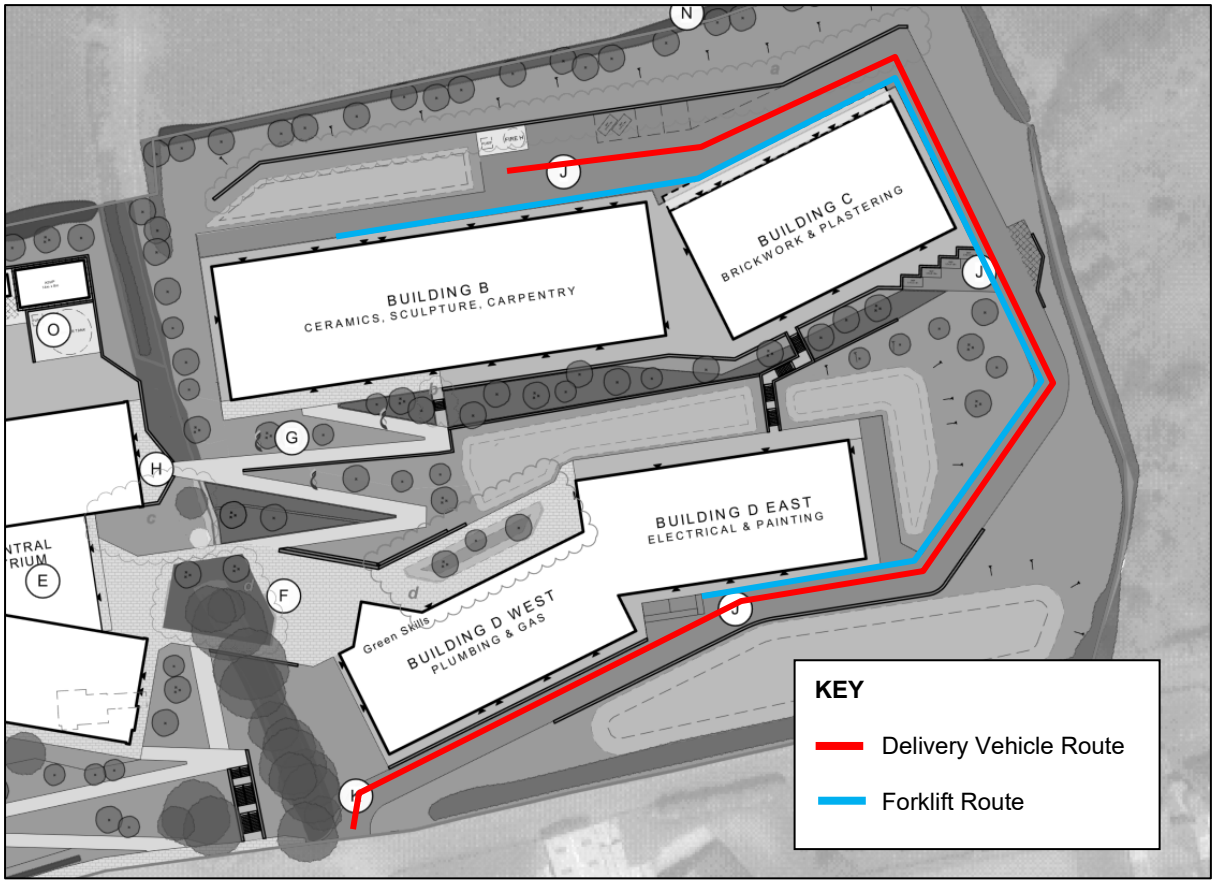


Figure 3: Delivery Vehicle and Forklift Transport Routes

3.3 Noise Modelling Results

Based on the noise modelling methodology and assessment data detailed in the previous sections, external noise levels ($L_{Aeq,1hr}$) have been predicted at the nearest noise sensitive receptors (residential houses on Pibwrlwyd Lane) due to workshop breakout noise and delivery noise at the site during a reasonable worst-case 1-hour period within college operational hours (07:00 – 17:00).

The noise modelling graphic is displayed in Appendix D, and the noise modelling result at the worst-affected noise sensitive receptor is compared against the typical measured daytime background sound level ($L_{A90,1hr}$) at monitoring position U2 in Table 12.

Table 12: Workshop Activities Noise Modelling Results Summary

Worst-Affected Noise Sensitive Receptor	Predicted Façade Noise Level due to On-Site Activity	Typical Measured Daytime Background Sound Level
2 Pibwrlwyd Lane (Residential House)	38dB $L_{Aeq,1hr}$	39dB $L_{A90,1hr}$

3.4 BS4142 Assessment Outcome

Based on the highest predicted façade noise level due to on-site activity, a BS4142 assessment table of workshop breakout noise and delivery noise is presented in Appendix E. To determine the rating noise level at the worst-affected noise sensitive receptor, an acoustic feature correction of +3dB has been applied to account for delivery noise and forklift activity 'being just perceptible' at the nearest noise sensitive receptor. This is to allow for a robust assessment of delivery noise at the site.

The results of the BS4142 assessments indicates that the rating noise level at the worst-affected noise sensitive receptor (2 Pibwrlwyd Lane) is predicted to be 2dB above the typical measured background sound level during daytime hours; this is an indication of the sound having a low adverse impact, depending on context.

The context of the assessment can be summarised as:

New workshop buildings are proposed as part of the redevelopment of Coleg Sir Gar's Pibwrlwyd Campus. The sound climate at existing noise sensitive receptors surrounding the site will likely have included noise from deliveries made to the existing campus. The site location is rural and therefore prevailing ambient and background sound levels are relatively low.

3.5 Discussion

Based on the outcomes of the BS4142 assessment, it is predicted that the rating noise level of activity associated with the workshops (breakout noise and delivery noise) is predicted to be 2dB above the typical background sound level at the nearest noise sensitive receptor window, which is indicative of a low impact on the nearby noise sensitive receptors.

Workshop breakout noise is best mitigated by keeping doors (including roller shutter doors) and external windows closed where possible, particularly when noisy activities occur within the workshop areas. Teaching staff and students should be made aware of good practice noise mitigation and should not generate excessive noise without consideration of the nearby noise sensitive receptors.

It is understood that deliveries typically occur every two weeks, therefore delivery noise is expected to have a low impact on the nearby receptors. To mitigate excessive delivery noise and reduce the likelihood of adverse impact on the nearby receptors, it is recommended that all deliveries to the site should adhere to the 'Quiet Deliveries Good Practice Guidance – Key Principles and Processes for Retailers' guidance document (Department for Transport, April 2014).

3.6 Uncertainty

Uncertainty in the background measurements is considered to be low, as the unattended noise monitors were installed on-site for a long weekend period (12:00 on 26/07/2024 and 10:00 on 29/07/2024), and weather conditions were deemed suitable for noise monitoring for the majority of the measurement period (i.e. average wind speeds less than 5m/s, minimal rain).

The representative daytime and night-time background sound levels were determined by observing the most commonly occurring background sound levels during these time periods ($L_{A90,1hr}$ during daytime, $L_{A90,15mins}$ during night-time), which is deemed to be best practice in determining the 'typical' prevailing background noise at the nearby noise sensitive receptors.

Uncertainty has been limited in the specific sound level calculations by using the noise modelling software SoundPlan 9.1, which has calculated noise levels in-line with the ISO 9613-2: 2024-1 calculation methodology. Reasonable worst-case data based on previous measurements have been used to limit uncertainty within the calculations of on-site activity (i.e. workshop reverberant noise levels and delivery noise) to nearby noise sensitive receptors.

4 External Plant Noise Assessment

4.1 Proposed External Plant Noise Limits

It is proposed to control building services noise emissions to the limits set out in **Table 13** at the nearest Noise-Sensitive Receptors (NSRs). Rating plant noise limits have been set to be 5dB below the typical Background Sound Level at the existing nearby noise-sensitive receptors during daytime and night-time hours. This would constitute a low impact at the identified receptors as is required by BS4142:2014 +A1 2019.

Table 13: Proposed Plant Noise Limits

Receptors	Period	Typical Measured Background Sound Level	Proposed Rating Plant Noise Limit
Existing Residential Properties on Pibwrlwyd Lane	Daytime (07:00 - 23:00)	39dB $L_{A90,1hr}$	≤ 34dB $L_{Ar,1hr}$
	Night-time (23:00 - 07:00)	29dB $L_{A90,15mins}$	≤ 29dB* $L_{Ar,15mins}$

***Note:** Mitigating external plant noise emissions to below 25dB at the nearest receptor during night-time periods may not prove to be efficient or feasible. Therefore, a limit in line with the typical measured background sound level is deemed appropriate - this limit is less likely to result in an adverse impact based on BS 4142:2019.*

The nearest existing receptors are noted to be the residential properties located along Pibwrlwyd Lane, which are located to the southeast of the existing campus. Monitoring position U2 is deemed to be best representative of the noise levels at these existing receptors, and therefore the typical background sound levels measured at this position (shown in **Table 6**) are used to set plant noise limits at these existing properties.

It is also noted that the land to the north of the site has been outlined for residential housing. As planning permission has not yet been approved, noise limits cannot practically be imposed on the proposed residential development site, however the impact of new external plant on this new site is considered and discussed in Section 4.5. As per the ‘Agent of Change’ principle of Planning Policy Wales (2024), it is the responsibility of the housing developer to mitigate against external plant noise emissions at the existing campus site.

4.2 Modular Heat Pump Noise Modelling

It is understood that 5no. Mitsubishi EAHV-M1500YCL(-N) modular heat pump units are proposed within a compound to the north of the site, as shown in Figure 4.

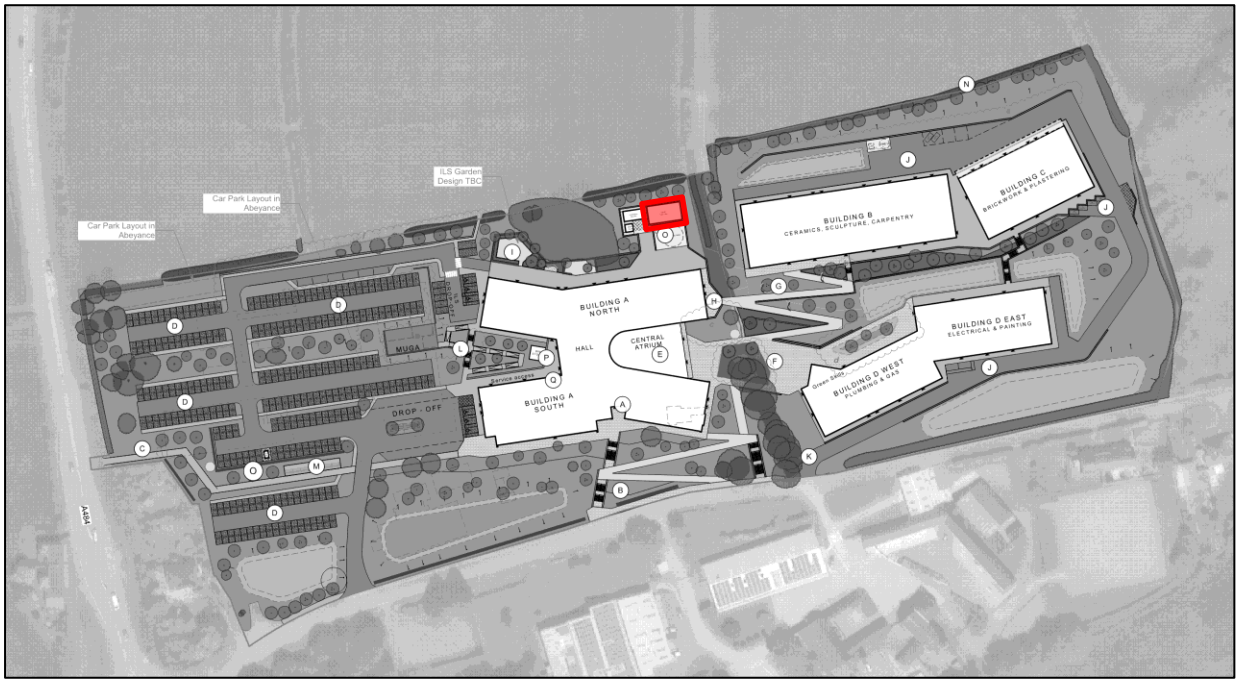


Figure 4: Modular Heat Pump Compound Location

Based on the manufacturer-provided noise data for the unit (SPL@1m: 67-71dBA), the unit sound power levels have been calculated at each centre octave band, which are shown in Table 14.

Table 14: Mitsubishi EAHV-M1500YCL(-N) Sound Power Levels

Sound Power Level (dB) at Centre Octave Band Frequency (Hz)								**dB(A)**
63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
96	91	90	86	84	80	78	62	89.5

The sound power levels shown in Table 14 are used to model the 5no. units within the modular heat pump compound. For a reasonable worst-case assessment, it is assumed that all 5no. units are operating simultaneously for the duration of a 1-hour period. It is understood that the modular heat pump compound will not be operational during night-time hours (23:00 – 07:00).

4.3 Noise Modelling Results

Based on the noise modelling methodology and assessment data detailed in the previous sections, external noise levels ($L_{Aeq,1hr}$) have been predicted at the nearest noise sensitive receptors (residential houses on Pibwrlwyd Lane) due to noise from the modular heat pump compound during a reasonable worst-case 1-hour period within college operational hours (07:00 – 17:00).

The noise modelling graphics are displayed in Appendix D, and the noise modelling result at the worst-affected noise sensitive receptor is compared against the typical measured daytime background sound level ($L_{A90,1hr}$) at monitoring position U2 in **Table 15**.

Table 15: External Plant Noise Modelling Results Summary

Worst-Affected Noise Sensitive Receptor	Predicted Façade Noise Level due to On-Site Activity	Typical Measured Daytime Background Sound Level
2 Pibwrlwyd Lane (Residential House)	25dB $L_{Aeq,1hr}$	39dB $L_{A90,1hr}$

4.4 BS4142 Assessment Outcome

Based on the highest predicted façade noise level due to noise from the modular heat pump compound, a BS4142 assessment of external plant noise is presented in Appendix E. To determine the rating noise level at the worst-affected noise sensitive receptor, an acoustic feature correction of +3dB has been applied to account for sound being 'distinctive against the residual acoustic environment'. This is to allow for a robust assessment of external plant noise at the site.

The rating noise level at the worst-affected noise sensitive receptor (2 Pibwrlwyd Lane) is 11dB below the typical measured background sound level during daytime hours; this is an indication of the sound having a low impact, depending on context.

4.5 Discussion

Based on the results of the BS4142 assessment, external plant noise emissions from the new modular heat pump compound are predicted to achieve the daytime and night-time proposed plant rating noise limits at the existing residential properties on Pibwrlwyd Lane.

As shown in Appendix D, ambient noise levels due to the modular heat pump are expected to range up to 60dB within the land to the north of the site. This is inclusive of noise barrier mitigation in the form of a retaining wall immediately north of the ASHP compound being implemented as part of the development proposals.

Depending on the location of new residential houses and external amenity areas (i.e. gardens), additional mitigation may be required to achieve the British Standard 8233:2014 internal and external ambient noise criteria for residential developments, which are summarised below:

- 35dB $L_{Aeq,16hr}$ internal ambient noise level within habitable rooms (i.e. bedrooms/living rooms) during daytime hours (07:00-23:00)
- 30dB $L_{Aeq,8hr}$ internal ambient noise level within bedrooms during night-time hours (23:00 – 07:00)
- 55dB $L_{Aeq,T}$ external ambient noise level (upper guideline limit) within external amenity areas (i.e. gardens) during daytime hours (07:00 – 23:00)

As per the 'Agent of Change' principle of Planning Policy Wales (2024), it is the responsibility of the housing developer to mitigate noise impact from fixed services plant on the Coleg Sir Gar site.

4.6 Uncertainty

Uncertainty in the background measurements is considered to be low, as the unattended noise monitors were installed on-site for a long weekend period (12:00 on 26/07/2024 and 10:00 on 29/07/2024), and weather conditions were deemed suitable for noise monitoring for the majority of the measurement period (i.e. average wind speeds less than 5m/s, minimal rain).

The representative daytime and night-time background sound levels were determined by observing the most commonly occurring background sound levels during these time periods ($L_{A90,1hr}$ during daytime, $L_{A90,15mins}$ during night-time), which is deemed to be best practice in determining the 'typical' prevailing background noise at the nearby noise sensitive receptors.

Uncertainty has been limited in the specific sound level calculations by using the noise modelling software SoundPlan 9.1, which has calculated noise levels in-line with the ISO 9613-2: 2024-1 calculation methodology. Manufacturer data has been used to limit uncertainty within the calculations of external plant noise to nearby noise sensitive receptors.

5 Conclusion

This document summaries the measured ambient and background noise levels from unattended and attended noise measurements undertaken at the site in July 2024.

An external noise impact assessment has been carried out to determine the likelihood of adverse impact on the nearby noise sensitive receptors due to on-site workshop activities (noise breakout and delivery noise) associated within the development. In-line with BS4142 assessment methodology, workshop activities are predicted to have a low impact on the nearby noise sensitive receptors.

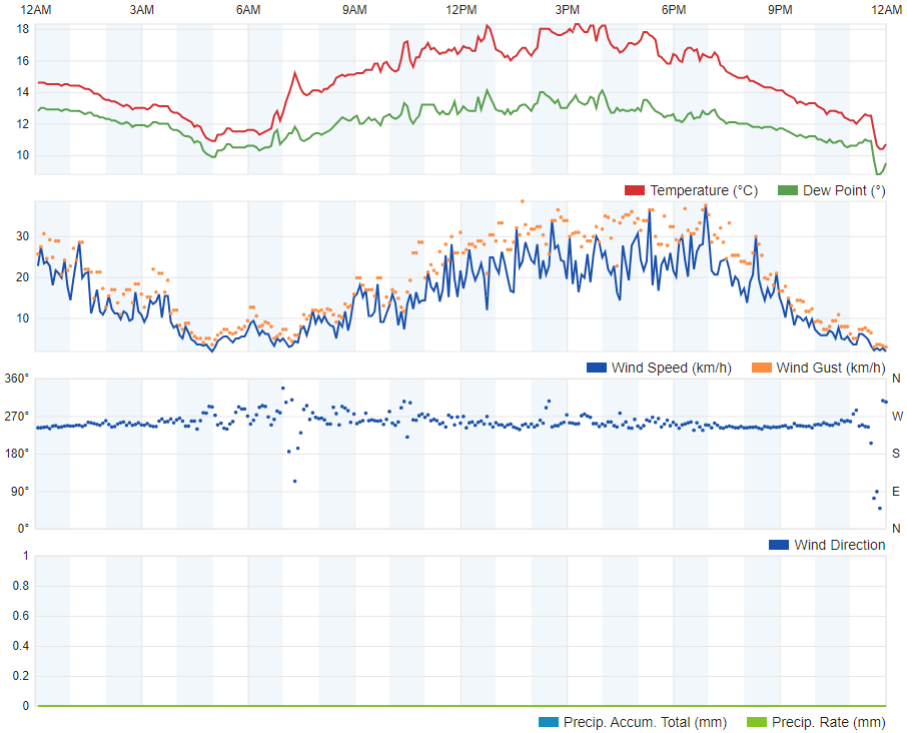
An external plant noise impact assessment has been carried out to determine the likelihood of adverse impact on the nearby noise sensitive receptors due to a new modular heat pump compound proposed at the site. In-line with BS4142 assessment methodology, external plant noise emissions from the new modular heat pump compound are predicted to achieve the proposed external plant noise limits at the nearby noise sensitive receptors.

Appendices

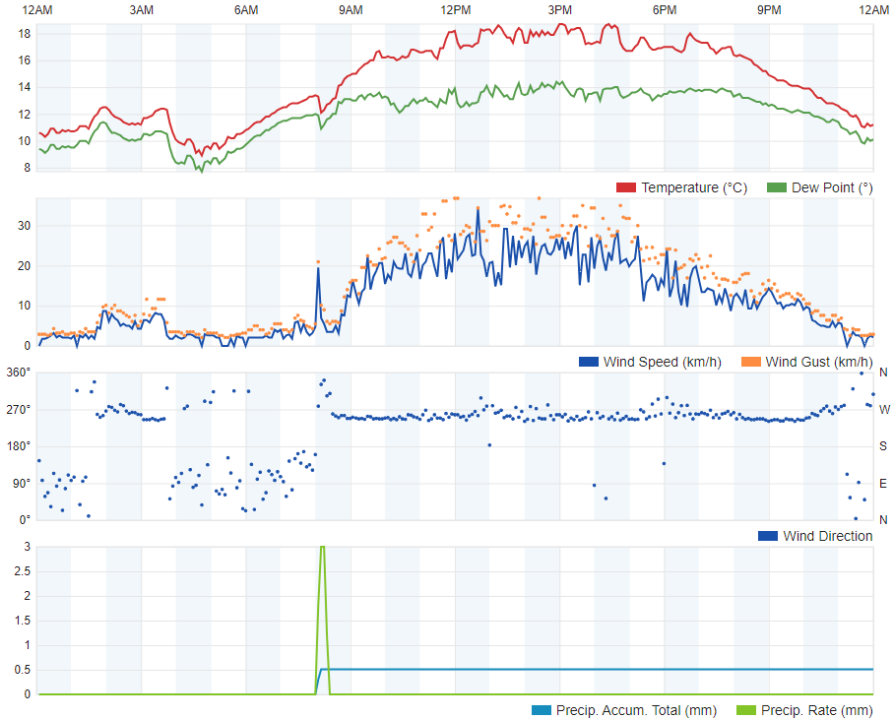
Appendix A Approximate Weather History

From www.wunderground.com - weather station 'ICARMA19' located in Llyswen, Carmarthen

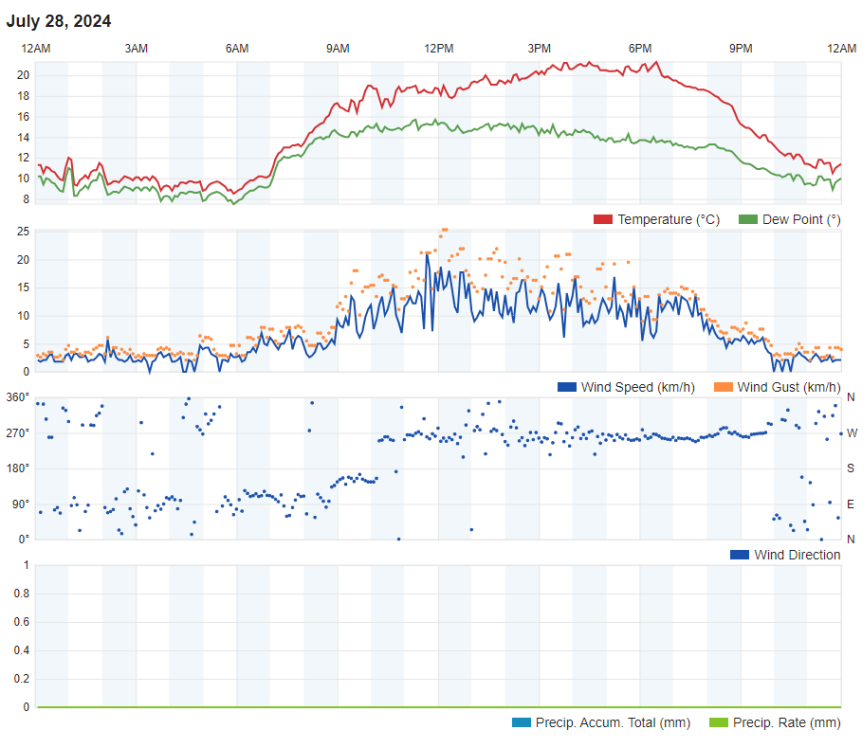
July 26, 2024

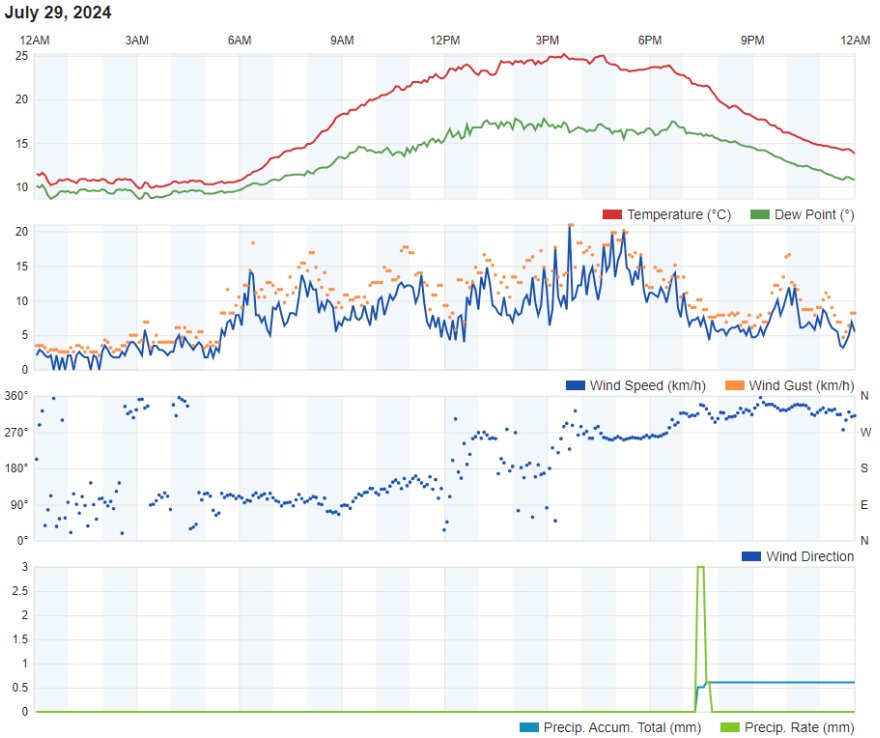


July 27, 2024

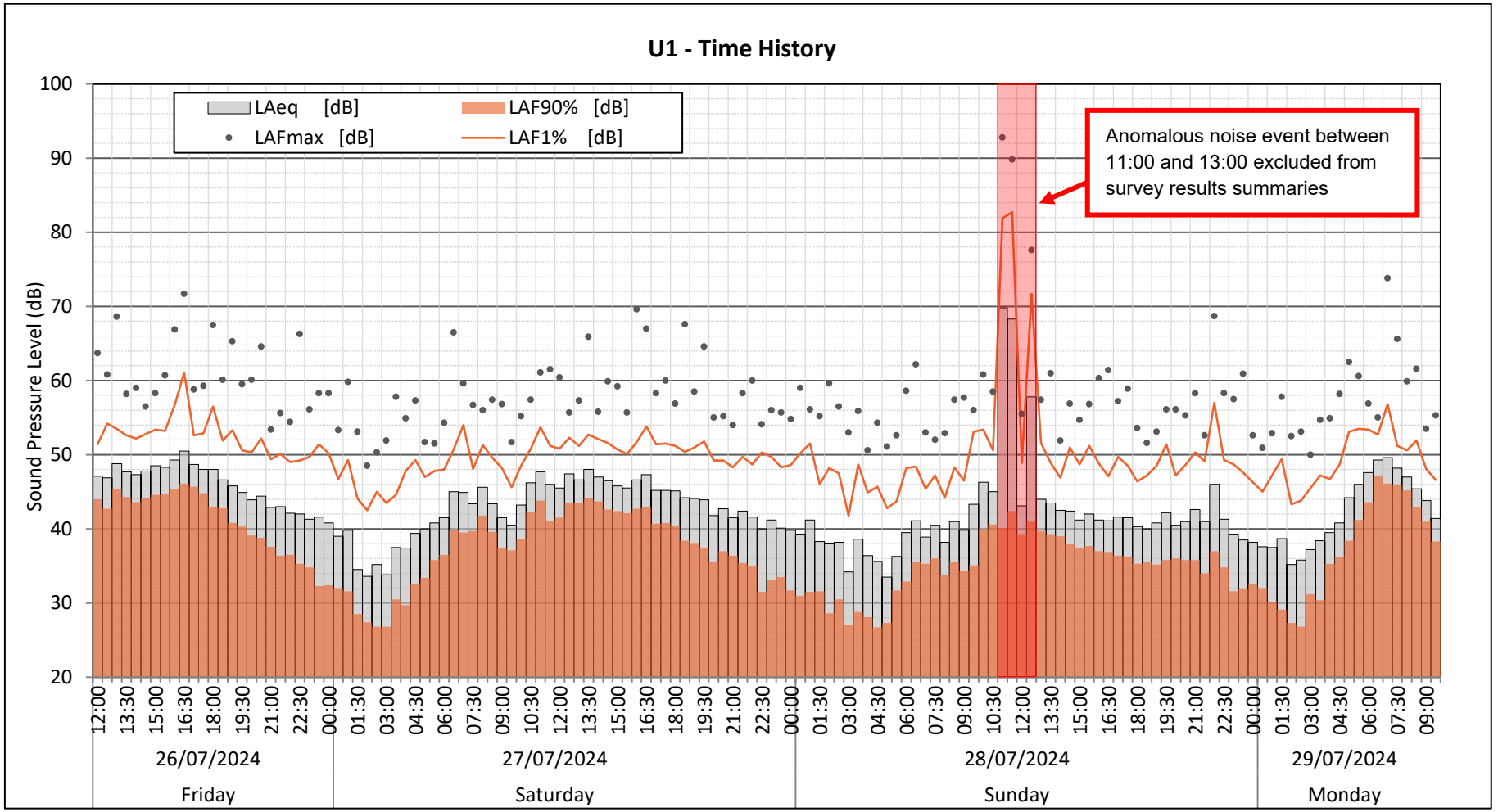


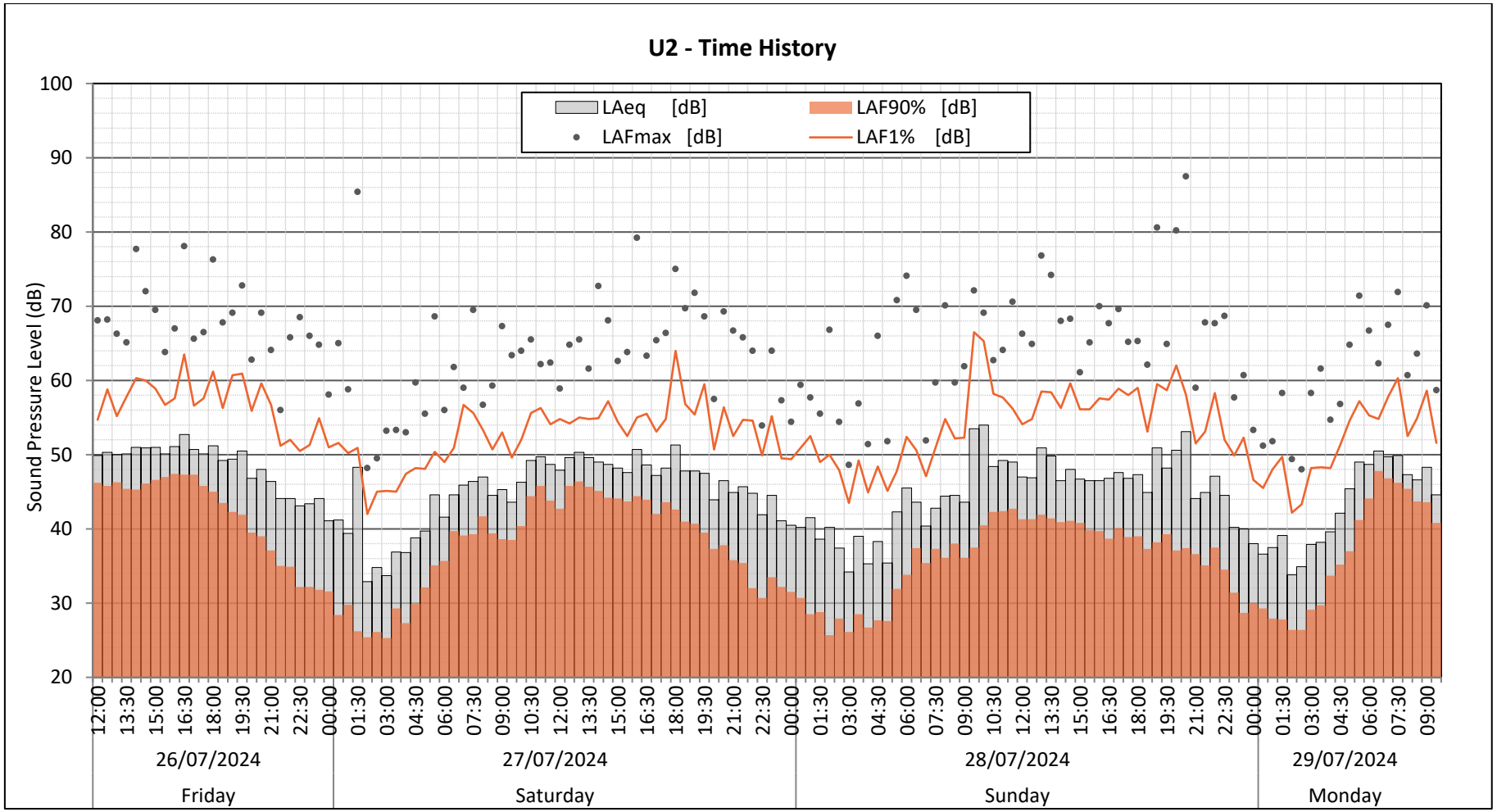
From www.wunderground.com - weather station 'ICARMA19' located in Llyswen, Carmarthen



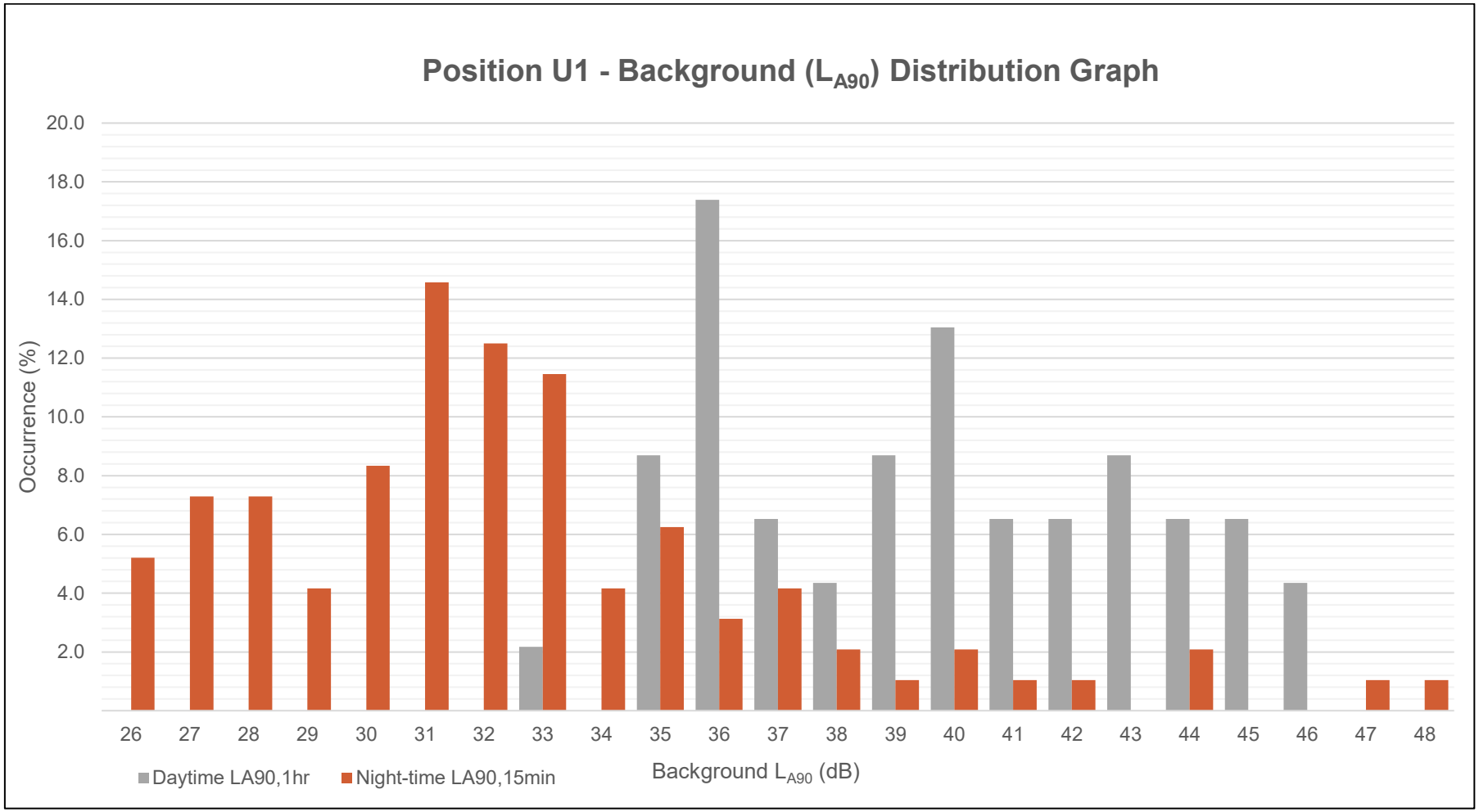


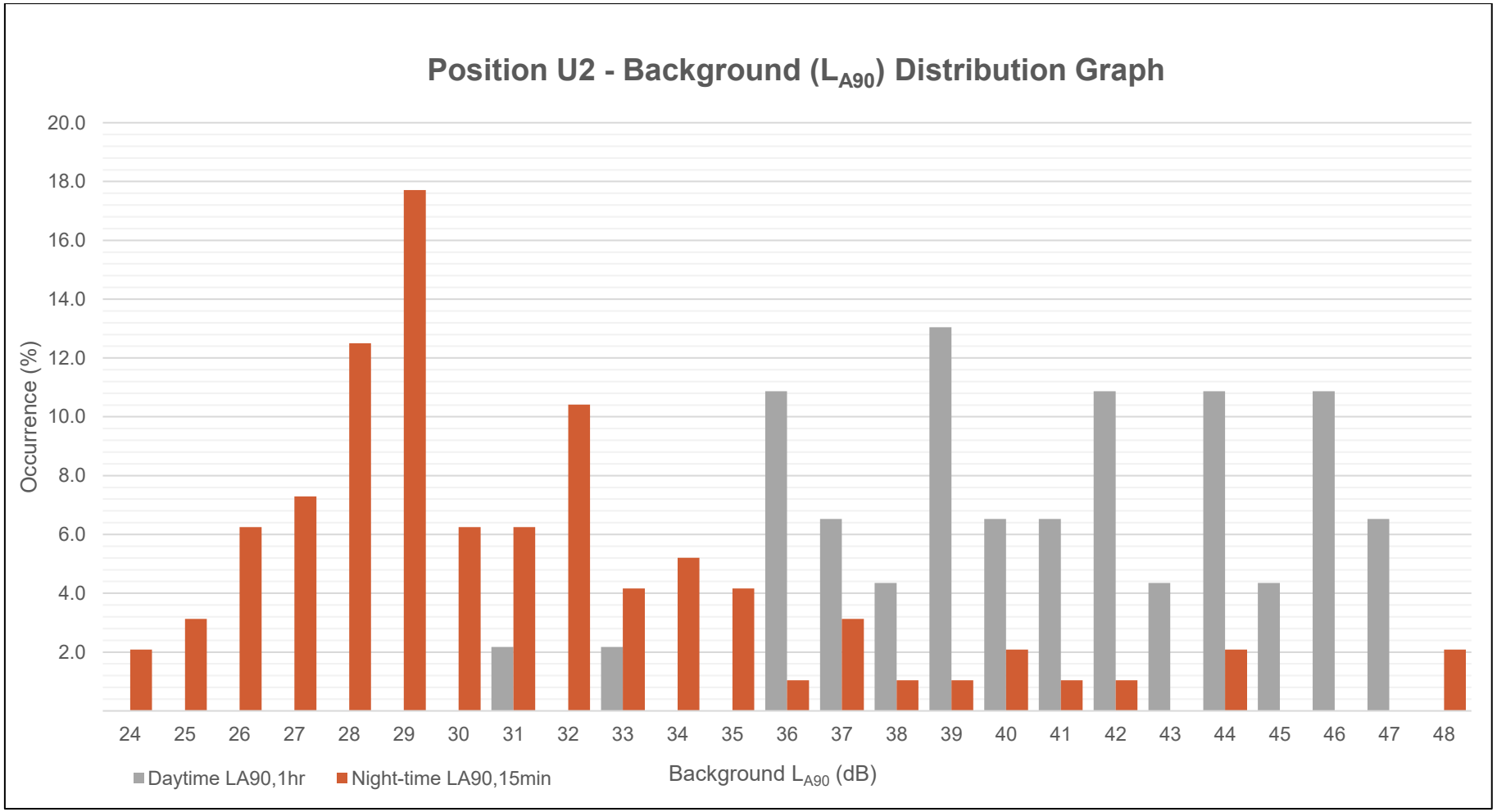
Appendix B Environmental Noise Survey Results




U2 - Time History
LAeq [dB]
LAF90% [dB]
LAFmax [dB]
LAF1% [dB]
Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
00:00
01:30
03:00
04:30
06:00
07:30
09:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
00:00
01:30
03:00
04:30
06:00
07:30
09:00
10:30
12:00
13:30
15:00
16:30
18:00
19:30
21:00
22:30
00:00
01:30
03:00
04:30
06:00
07:30
09:00
26/07/2024
Friday
27/07/2024
Saturday
28/07/2024
Sunday
29/07/2024
Monday

Appendix C Background Sound Level Analysis




Position U2 - Background (L_{A90}) Distribution Graph
Occurrence (%)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
Daytime LA90,1hr
Night-time LA90,15min
Background L_{A90} (dB)

Appendix D Noise Modelling Graphics

On-Site Activities External Noise Assessment

D1: Workshop Noise Breakout and Delivery Noise Model

External Plant Noise Assessment

D2: Modular Heat Pump Compound Noise Model

D1: Workshop Noise Breakout and Delivery Noise

D2: Modular Heat Pump Compound Noise

Appendix E BS4142 Assessment Tables

External On-Site Activities Noise Assessment

E1: Workshop Noise Breakout and Delivery Noise

External Plant Noise Assessment

E2: Modular Heat Pump Compound Noise

E1: Workshop Noise Breakout and Delivery Noise (Forklift at Building B)

Results			**Relevant Clause**	**Commentary**
Estimated specific sound level at worst-affected receptor (2 Pibwrlwyd Lane) due to workshop noise breakout and delivery noise (assuming forklift activity at Building B)	L_{Aeq} =	38dB	7.3.2	Estimated sound level at receptor calculated using SoundPlan 9.1 noise model, see Appendix D1.
Representative background sound level at receptor (daytime)	L_{A90} =	39dB	8.1.1, 8.1.3, 8.3	Typical daytime background sound level measured at monitoring position U2, see Table 6.
Assessment made during the daytime, therefore the reference time interval is 1 hour			7.2	
Acoustic feature correction		3dB	9.2	Acoustic feature correction applied for impulsivity or sound being distinctive against the residual acoustic environment; this is to allow for a robust assessment.
Rating level	(38 + 3) =	41dB		
Excess of rating over background sound level	(41 - 39) =	+2dB	11	
Assessment indicates low impact depending on context			11	Since the rating level is 2dB above the typical background sound level, this is an indication of the sound having a low impact, depending on the context.
Uncertainty of assessment			10	Assessment uncertainty is considered low, as discussed in Section 3.6.

E2: Modular Heat Pump Compound Noise

Results			**Relevant Clause**	**Commentary**
Estimated specific sound level at worst-affected receptor (2 Pibwrlwyd Lane) due to modular heat pump compound (5no. Mitsubishi EAHV-M1500YCL(-N) units)	L_{Aeq} =	25dB	7.3.2	Estimated sound level at receptor calculated using SoundPlan 9.1 noise model, see Appendix D4.
Representative background sound level at receptor (daytime)	L_{A90} =	39dB	8.1.1, 8.1.3, 8.3	Typical daytime background sound level measured at monitoring position U2, see Table 6.
Assessment made during the daytime, therefore the reference time interval is 1 hour			7.2	
Acoustic feature correction		3dB	9.2	Acoustic feature correction applied for impulsivity or sound being distinctive against the residual acoustic environment; this is to allow for a robust assessment.
Rating level	(25 + 3) =	28dB		
Excess of rating over background sound level	(28 - 39) =	-11dB	11	
Assessment indicates low impact depending on context			11	At 11dB below background, this is an indication of the sound having a low impact, depending on the context.
Uncertainty of assessment			10	Assessment uncertainty is considered low, as discussed in Section **4.6**.

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