



# WEPCo Bridgend Primaries - Welsh Medium School

## Noise Planning Report

For WEPCo Limited

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Date 29 September 2023

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## 1. Introduction

Hydrock has been appointed to develop the acoustic design of the proposed new Welsh Medium primary school in North Cornelly, Bridgend. The school is to be located on land off Hall Drive & Greenfield Terrace, replacing the existing Ysgol Y Ferch o'r Sgêr school and Corneli Primary School.

A summary of the measured noise levels at the site and our assessment in relation to achieving criteria set out in Building Bulletin 93: Acoustic Design of Schools: performance standards<sup>1</sup> is provided.

A noise impact assessment of sports activity on proposed Multi-Use Games Areas (MUGAs) has been carried out in line with Sports England guidance.

Limits for noise emissions from fixed items of plant are also provided in line with BS4142:2014 Method for Rating and Assessing Industrial and Commercial Sound<sup>2</sup>.

Figures 1 & 2 below show the site plans for the school, with the proposed buildings' locations.

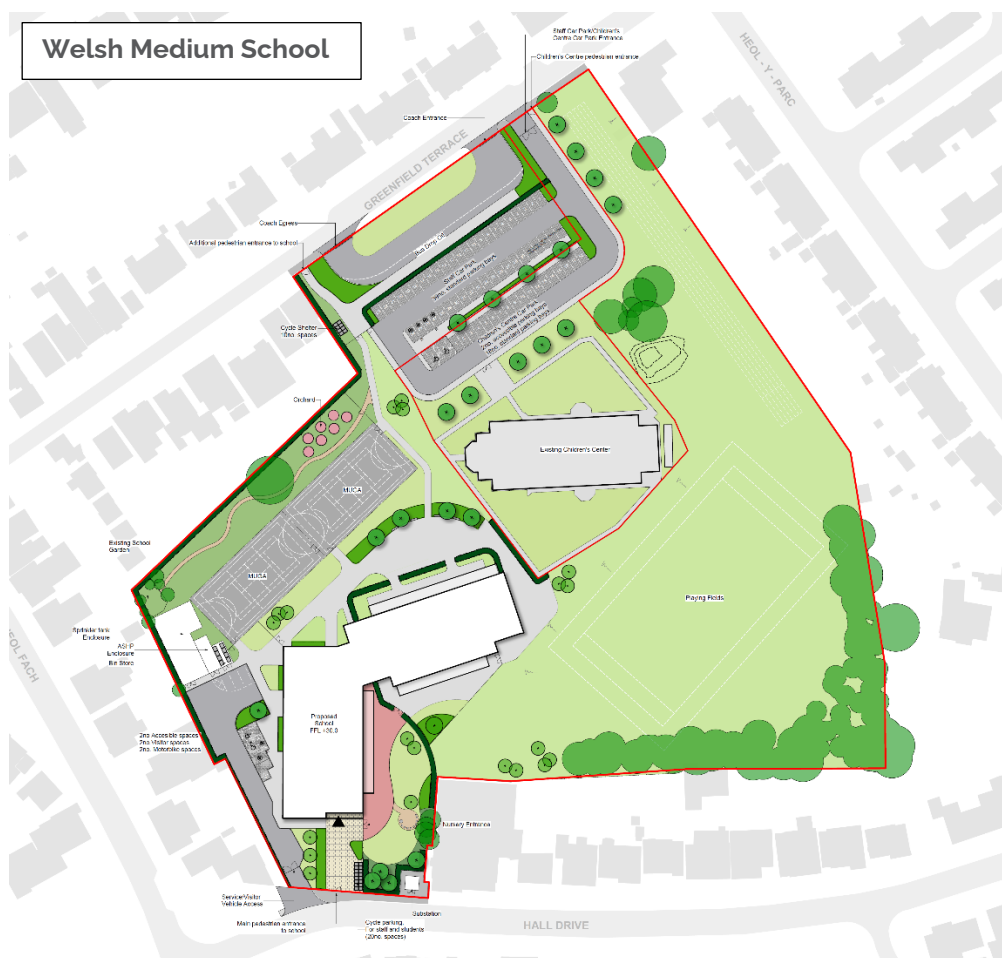


Figure 1: Proposed Site Plan

<sup>1</sup> Building Bulletin 93: 2015 Acoustic Design of Schools – performance standards, Department for Education, Education Funding Agency.

<sup>2</sup> British Standards Institution, 2014. British Standard 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound. BSI.





Figure 2: Site Location Plan

The closest noise sources to the proposed development site include the B4283 Heol Fach road, Hall Drive and Heol-Y-Parc. Residential houses surround the school site at all directions.

## 2. Acoustic Design Criteria

### 2.1 Noise break-in criteria: Building Bulletin 93

BB93 sets out indoor ambient noise level (IANL) criteria for a variety of spaces. The maximum IANL are summarised in Table 1, below:

Table 1: IANL Criteria

Space	Upper IANL limit (new-build standards) dB $L_{Aeq,30mins}$
SEN/ALN Teaching & Calming Rooms	30
General Teaching Classrooms and Group Rooms, Multi-Use Halls, Nursery, Music	35
Staff Rooms, Offices, Breakout/LRC, Art Classrooms, ICT Classrooms, Food Technology, Meeting Rooms.	40
Circulation Spaces (considered to include Reception/Admin), Dining Rooms	45
Changing Areas, Toilets, Kitchen (non-teaching)	50

The above noise limits apply to a combination of external noise levels breaking through the façade and noise associated with mechanical services. A +5 dB relaxation of the given criteria is applicable where natural or hybrid ventilation is provided, but the mechanical part of the system must still achieve the above limits (note the +5 dB relaxation is not applicable where the indoor ambient noise level limit is  $\geq 45$  dB  $L_{Aeq,30mins}$ ).

It is considered that ventilation via NVHR units constitutes 'Hybrid Ventilation'.

For summertime overheating mitigation during the hottest 200 hrs of the year, and for an intermittent boost in ventilation, the BB93 indoor ambient noise level criteria can be relaxed to 55 dB  $L_{Aeq}$  when the natural ventilation system is under local control of the teacher. In the case of a mechanical system the noise limit may be relaxed by +5 dB.

### 2.2 BS4142:2014+A1 2019 Methods for rating and assessing industrial and commercial sound

BS4142:2014+A1 2019 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 6 dB), intermittent or impulsive (up to 9 dB), or otherwise 'readily distinctive against the residual acoustic environment' (up to 3 dB).

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 +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c. A difference of around +5 dB 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.

Based on guidance from BS4142:2014+A1 2019, the following magnitude of impacts apply:

Table 2: BS 4142:2014+A1:2019 Magnitudes of Impact

Description	Magnitude of Impact
<b>Predicted Rating level <math>L_{Ar,Tr}</math> at receptor is equal to or below the prevailing Background level <math>L_{A90,T}</math></b>	Low (Low)
<b>Predicted Rating level <math>L_{Ar,Tr}</math> at receptor is less than 5 dB above the prevailing Background level <math>L_{A90,T}</math></b>	Adverse (Moderate)
<b>Predicted Rating level <math>L_{Ar,Tr}</math> at receptor exceeds the prevailing Background level <math>L_{A90,T}</math> by 5 dB or more.</b>	Significant Adverse (High)

For this assessment, Rating level limits are set 5 dB below the prevailing background sound levels. This will therefore achieve a 'low' magnitude of impact, in line with BS4142:2014+A1 2019 guidance as summarised above.



### 3. Environmental Noise Survey

#### 3.1 Personnel

Survey by:

Rhodri Owen – Senior Consultant (Acoustics) at Hydrock:

- » BSc (Hons) Sound Technology
- » IOA Diploma in Acoustics & Noise Control
- » Corporate Member of the Institute of Acoustics (MIOA)

Rhodri has over 7 years' experience within acoustics, noise, and vibration consultancy across a broad range of sectors. Hydrock as a business is also a member of the Association of Noise Consultants (ANC).



Figure 3: Environmental Noise Survey Markup

#### 3.2 Site Surveys/Monitoring

Environmental noise measurements were initially carried-out from 10:00am on Wednesday 12 July 2023 for 24hrs by unattended noise monitoring equipment. During this survey period, the windshield on unattended logger LT2 slipped at around 20:00, leaving the microphone capsule exposed for the



remainder of the survey. The unattended survey was then repeated on the 15-16 August at positions LT1 & LT2.

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

The noise monitoring locations are shown on Figure 3 and summarised in Table 3:

Table 3: Monitoring Locations

Monitoring Location ID	Description
LT1	Unattended logger position located near the existing school yard, north of existing Corneli Primary School. Sound climate at this position deemed representative of that at the nearest residential dwellings overlooking the proposed new MUGA.
LT2	Unattended logger position located Central to the site. Sound climate at this position deemed representative of that at the nearest residential dwellings overlooking the proposed new school building.
DM1	Daytime measurement position near southern site boundary overlooking road traffic on the B428 and Hall Drive.
DM2	Daytime measurement position near northern site boundary overlooking road traffic on Greenfield Terrace.
EM1	Evening measurement position located immediately west of the proposed school building.
EM2	Evening measurement position located immediately east of the proposed school building.

The measurement microphone was located at a height of ~1.5m above local ground. 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.

Table 4: Equipment List

Monitoring ID	Equipment	Manufacturer	Instrument	Serial No.	Date of Last Laboratory Calibration
LT1 & DM/EM	Sound Level Meter	NTi Audio	XL2-TA	A2A-20607-E0	27/05/2022
	Pre-amp		MA220	10684	27/05/2022
	Microphone		MC230A	A23089	27/05/2022

LT2	Calibrator	Cirrus	CR:515	95714	16/06/2023
	Sound Level Meter	O1dB	FUSION	14526	02/05/2022
	Microphone	GRAS	40CD	470800	27/05/2022
	Calibrator	Cirrus	CR:515	96051	16/06/2023

### 3.3 Weather Conditions

Approximate weather history for Pyle can be viewed in Appendix A. To summarise conditions during both survey periods, the weather was generally dry and calm with a gentle breeze.

Average recorded wind speeds during the environmental noise measurement process did not exceed 5 m/s. BS 4142:2014 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.'

Weather conditions during the noise survey were suitable for the acquisition of noise data. Measurements are therefore considered to adhere to the guidance of the relevant British Standard and no corrections to the measured noise dataset has been applied.

### 3.4 Summary of 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'. It is used to describe the 'Discrete Noise Event Level' as referred to in BB93. A 'discrete noise event level' can often be controlled by a single vehicle or train pass-by.

#### 3.4.1 Unattended Logger Results (LT1 & LT2)

A summary of the ambient noise level measurements,  $L_{Aeq,30mins}$  is presented in Table 5 below. The ambient sound levels ( $L_{Aeq}$ ) are logarithmically averaged over each period. The full results are provided graphically in Appendix B.

The ambient sound climate at all measurement positions were predominantly controlled by road traffic noise from surrounding roads around North Cornelly. Background noise levels were controlled by M4 motorway distant road traffic.

It is assumed the school may operate outside of typical hours (i.e. 09:00-15:30hrs); therefore, a full daytime (07:00-19:00hrs) period is referenced in this assessment. LT2 survey results affected by the microphone windshield slipping have been excluded from this assessment.

Table 5: Unattended Logger Ambient Noise Level Results

Position	Period	Range of Measured Ambient Noise Levels (0700-1900hrs) dB L <sub>Aeq,30mins</sub>	Average Ambient Noise Level dB L <sub>Aeq,0700-1900hrs</sub>
LT1	Daytime (07:00-19:00)	43 - 50	47
LT2	Daytime (07:00-19:00)	44 - 55	50

Table 6: Unattended Logger Maximum Noise Level Results

Position	Period	Maximum Discreet Noise Event Level (BB93) dB L <sub>A1,30mins</sub>
LT1	Daytime (07:00-23:00)	61
LT2	Daytime (07:00-23:00)	69

Overall minimum consistent daytime & night-time background sound levels are presented in Table 7 and are based on distribution graphs shown in Appendix B.

Table 7: Unattended Logger Background Sound Level Results

Position	Period	Typical Background Noise Level dB L <sub>A90,T</sub>
LT1	Daytime (07:00-23:00)	42
	Night-time (23:00-07:00)	40
LT2	Daytime (07:00-23:00)	43
	Night-time (23:00-07:00)	35



### 3.4.2 Attended Sample Measurements (DM1-2 & EM1-2)

A summary of the attended measurements (DM1-2 & EM1-2) is presented in Table 8 below.

Table 8: Attended Sample Measurement Results

Position	Period	Ambient Noise Level dB $L_{Aeq,30mins}$	Maximum Discreet Noise Event Level (BB93) dB $L_{A1,30mins}$	Background Noise Level dB $L_{A90,30mins}$
DM1	12/07/2023 14:13-14:43	58	63	54
DM2	13/07/2023 14:14-14:44	55	67	46
EM1	12/07/2023 19:21-19:51	50	54	48
EM2	12/07/2023 19:54-20:24	51	56	49

## 4. Internal Ambient Noise Levels

### 4.1 Ventilation

Based on survey results, we have carried out a feasibility review of utilising a natural ventilation strategy for the scheme.

BB93 states:

*"Where external ambient free field noise levels at the facade expressed as the  $L_{Aeq,30mins}$ , do not exceed the IANL figures given in Table 1 by more than 16 dB for single sided ventilated spaces and 20 dB for cross ventilated or roof ventilated spaces, the criteria for natural ventilation can usually be achieved."*

With external ambient noise levels up to 55dB  $L_{Aeq,30mins}$  for general teaching spaces, a natural ventilation strategy utilising cross ventilated or roof ventilated spaces is indicated feasible. Single-sided natural ventilation is not deemed feasible.

For more acoustically critical spaces such as SEN teaching spaces a natural ventilation strategy is not indicated feasible and a mechanical or hybrid solution should be sought.

It is understood at this stage, that an MVHR ventilation strategy is likely to be adopted on the scheme for reasons other than acoustics.

### 4.2 Façade and Glazing

Standard glazing and typical external facade constructions, providing a minimum of 35 dB  $R_w$  and 40 dB  $R_w$  respectively, are expected to be sufficient in terms of sound insulation performance, for all locations.

## 5. Mechanical Services and Plant Noise Limits

Building services noise emissions are to be controlled in order to fall below limits set at the nearest Noise-Sensitive Receptors (NSRs). These are noted to be residential dwellings surrounding both school site boundaries.

Rating plant noise limits have been set to be 5 dB below the typical Background Sound Level at existing receptors, in line with Pol 05 of BREEAM 2018. This would constitute a low impact at the identified receptors as is required by BS4142:2014 +A1 2019.

Table 9: Proposed Plant Noise Limits

Period	Measured Typical Background Sound Level dB L <sub>A90,T</sub>	Proposed Rating Plant Noise Limit dB L <sub>Ar,Tr</sub>
Daytime (07:00 - 23:00hrs)	42	≤ 37
Night-time (23:00-07:00hrs)	35	≤ 30

Internal housing of plant will help to reduce noise emissions to the nearest sensitive receptors. If required to comply with the design rating levels, the following additional mitigation measures could also be employed:

- » Selection of energy efficient and therefore lower noise emission plant.
- » Switching plant off/or operating plant at reduced duty during quieter periods or when demand is lower; via the BMS (building management system).
- » Use of in-duct attenuators to reduce noise emissions to atmosphere; and
- » Use of acoustically treated louvres to further reduce emissions to atmosphere from plant rooms.

By incorporating the mitigation strategies above (if required and identified during the appropriate design stage) into the detailed design of the proposed development, it is considered that the operational noise from fixed plant installations is predicted to result in no significant adverse impact on existing noise-sensitive receptors.

## 6. Sports Pitch Noise Impact Assessment

Proposed site plans for the school show 2 no. Multi-Use Games Areas (MUGAs) are proposed within the site.

Sports activity noise from these areas have been assessed in accordance with Sports England Artificial Grass Pitch (AGP) Acoustics – Planning Implications<sup>3</sup>. The Sport England document suggests that noise levels of 50 dB  $L_{Aeq,1\text{ hour}}$  should not be exceeded at the façade of residential dwellings, but goes on to state that 'it is not necessarily the case that where these levels are exceeded, the noise will adversely affect residential properties.'

The Sports England guidance states a typical level of 58dB  $L_{Aeq,1hr}$  at 10m from the pitch centreline. The dominant noise source will be shouting from the pitch. A noise prediction model has been prepared, calibrated to provide 58dB  $L_{Aeq}$  at 10m from the pitch centreline due to children shouting at a height of 1.2m. The resulting noise levels are shown below in Figure 4.

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<sup>3</sup> Sports England, 2015. Artificial Grass Pitch (AGP) Acoustics – Planning Implications – New Guidance for 2015, Sports England



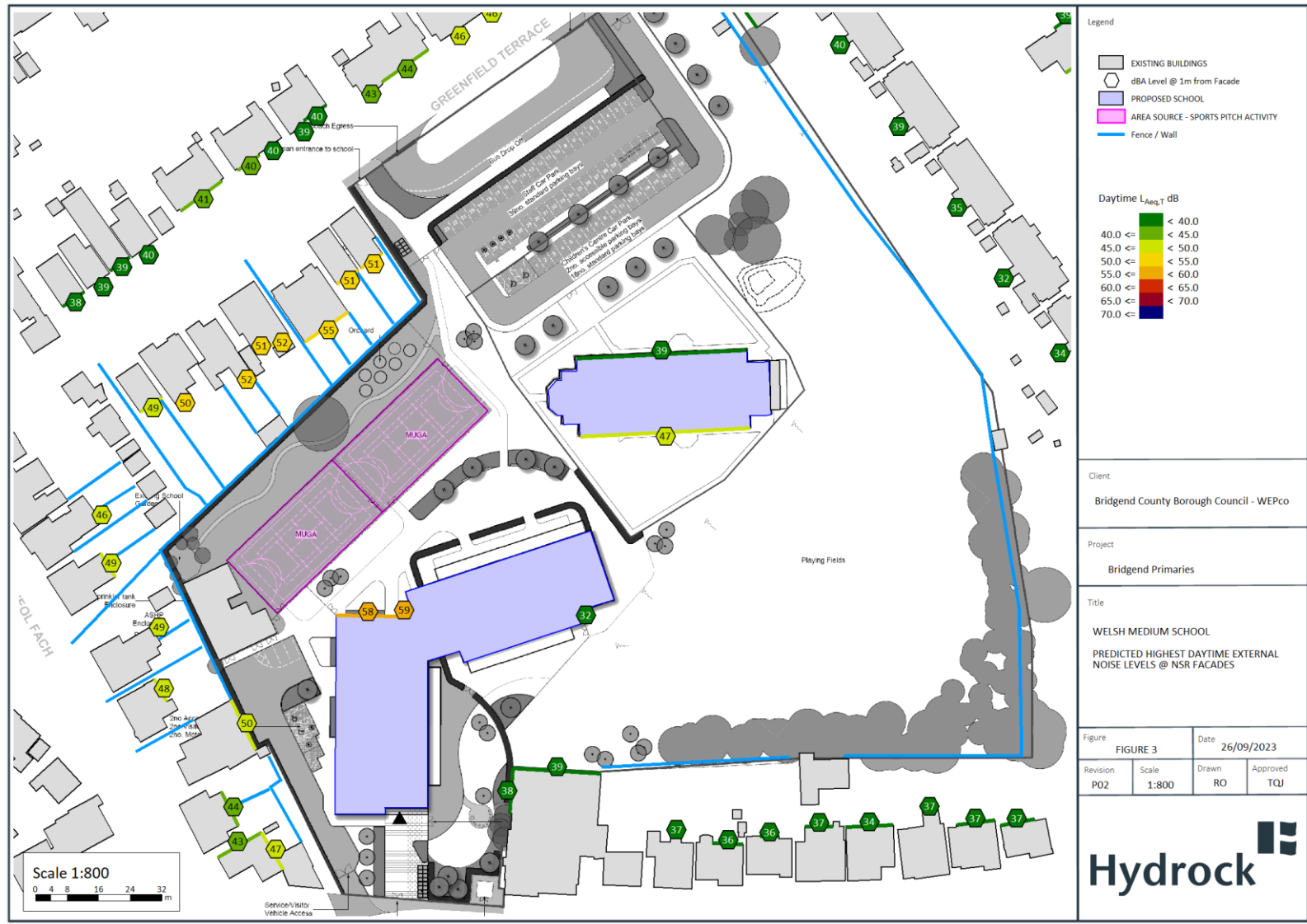


Figure 4: School Site MUGA Noise Emissions

## 6.1 Results

Noise levels up to 55 dB  $L_{Aeq,1hr}$  (free-field) are predicted at the nearest residential receptors. These are shown to exceed Sport England guidance criteria by up to 5dB; however, fall within the range of measured ambient noise levels for the site and surrounding NSRs (i.e. prevailing ambient sound climate).

The proposed MUGAs are understood to replace an existing school yard. Therefore, predicted noise from the MUGAs are deemed unlikely to significantly alter the existing sound climate and soundscape at the surrounding residential dwellings.

It is therefore assessed that no significant noise impact from the proposed MUGAs is likely and no further mitigation measures are required to control noise.

## 7. Summary and Conclusions

A baseline noise survey assessment has been carried out for the proposed Welsh Medium primary school proposed in North Cornelly, Bridgend.

Road traffic is indicated to control the existing ambient noise climate during the daytime period.

The assessment concludes that a natural ventilation strategy is feasible for general teaching areas at the proposed development; however, for more acoustically critical spaces such as recording studios / SEN teaching spaces etc. a natural ventilation strategy is not indicated feasible and a mechanical or hybrid solution should be sought.

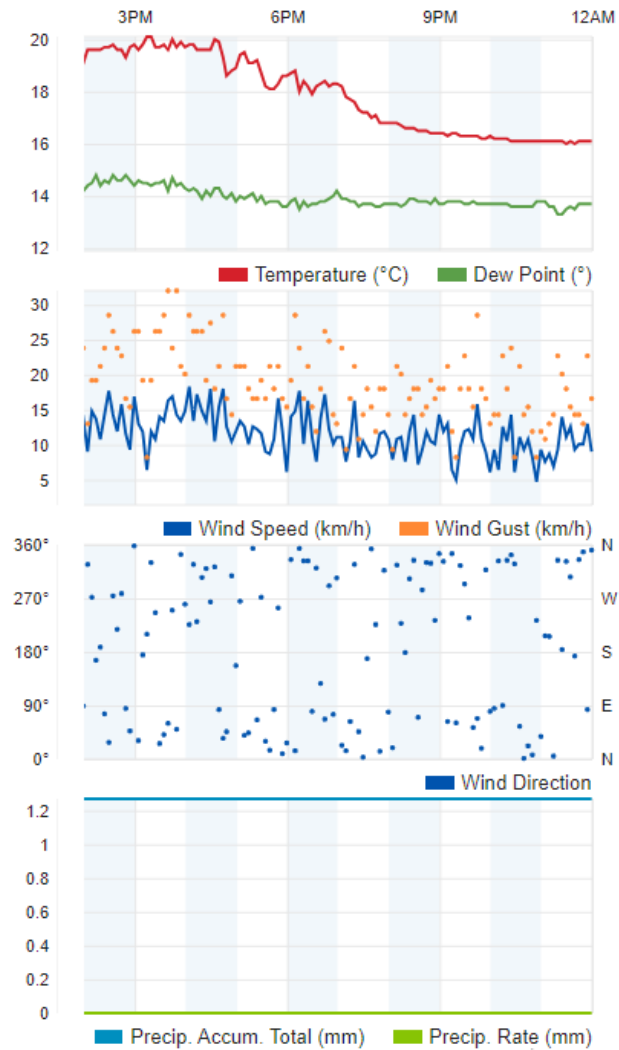
A noise impact assessment of sports activity on the proposed MUGAs has been undertaken in line with Sports England guidance. The predicted noise impact is not deemed significant and therefore no additional noise mitigation measures are deemed necessary.

Initial advice on façade wall & glazing elements is included however a detailed review should be undertaken by at detailed design stage.

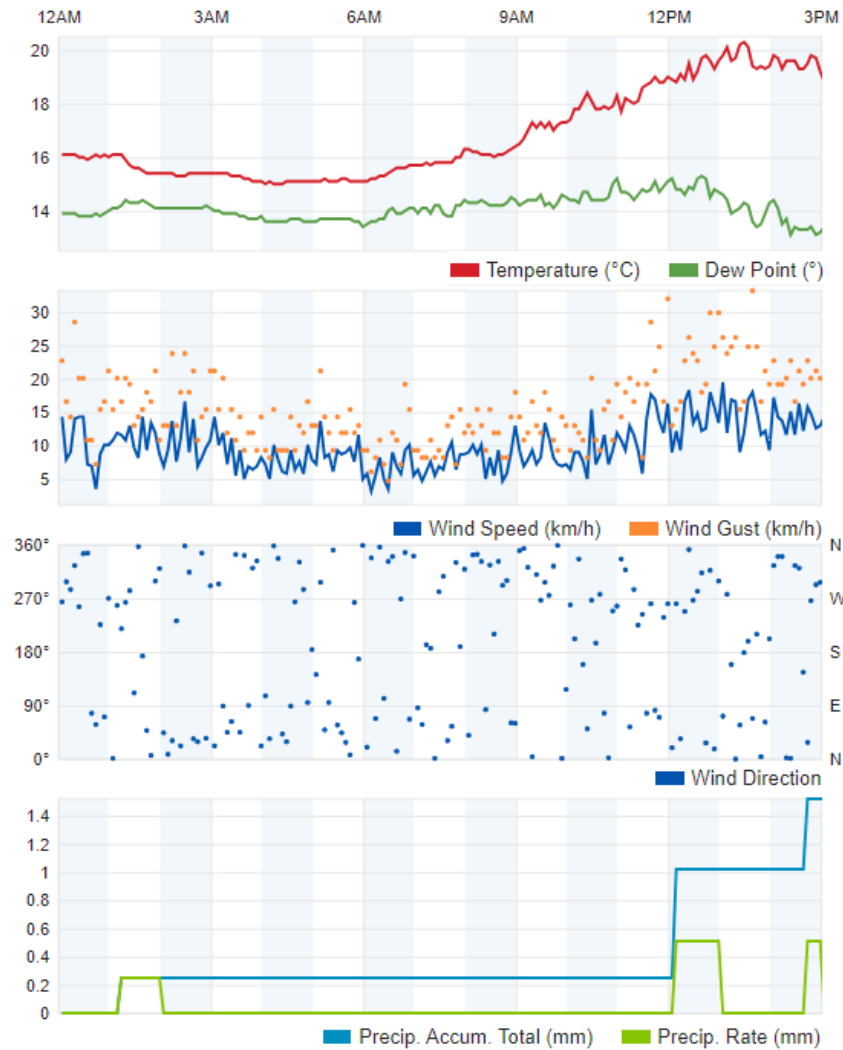
Noise emissions of fixed plant installations will need to be designed to achieve the plant noise limits detailed in this report. It is recommended that noise emissions from future plant installations are controlled via a suitably worded planning condition. It is expected that if the rating levels for new plant installations are designed to achieve the plant noise limits of this report, plant noise will not cause significant effects at the nearest sensitive receptors.

# Appendix A Approximate Weather History

July 12, 2023



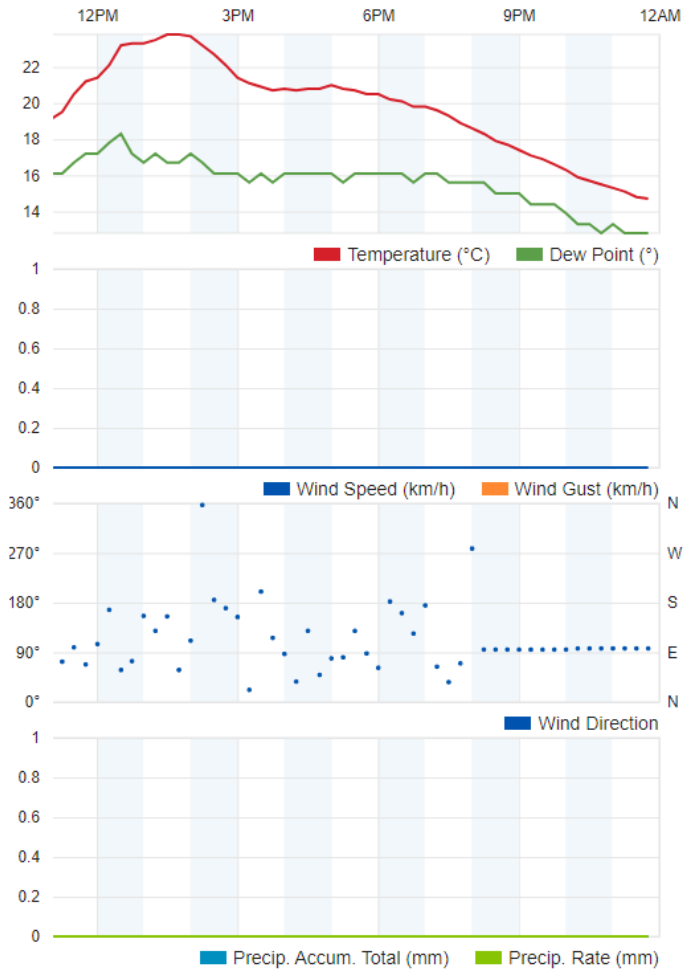
July 13, 2023



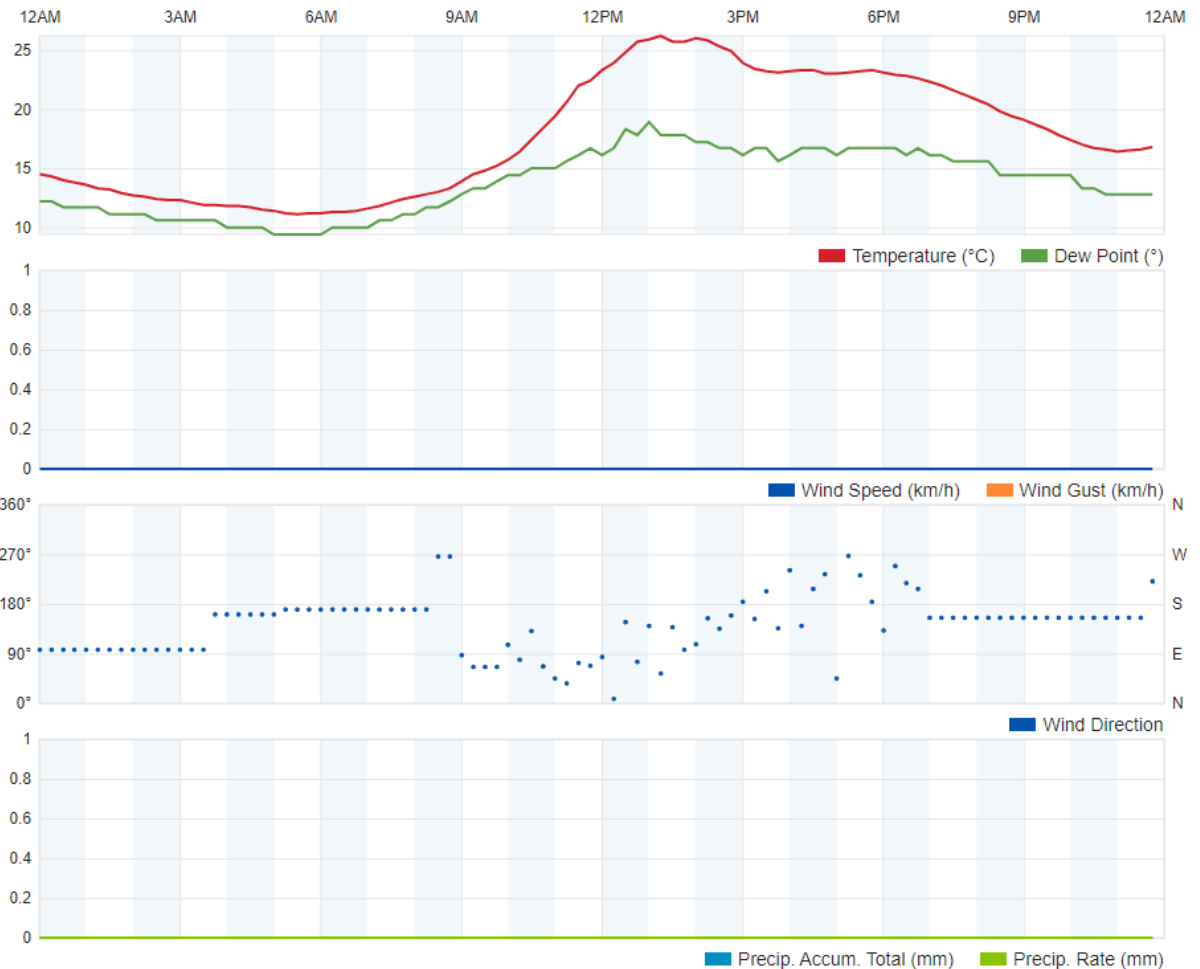
Taken from [www.wunderground.com](http://www.wunderground.com) - weather station IBRIDG250 located in Pyle



### August 15, 2023



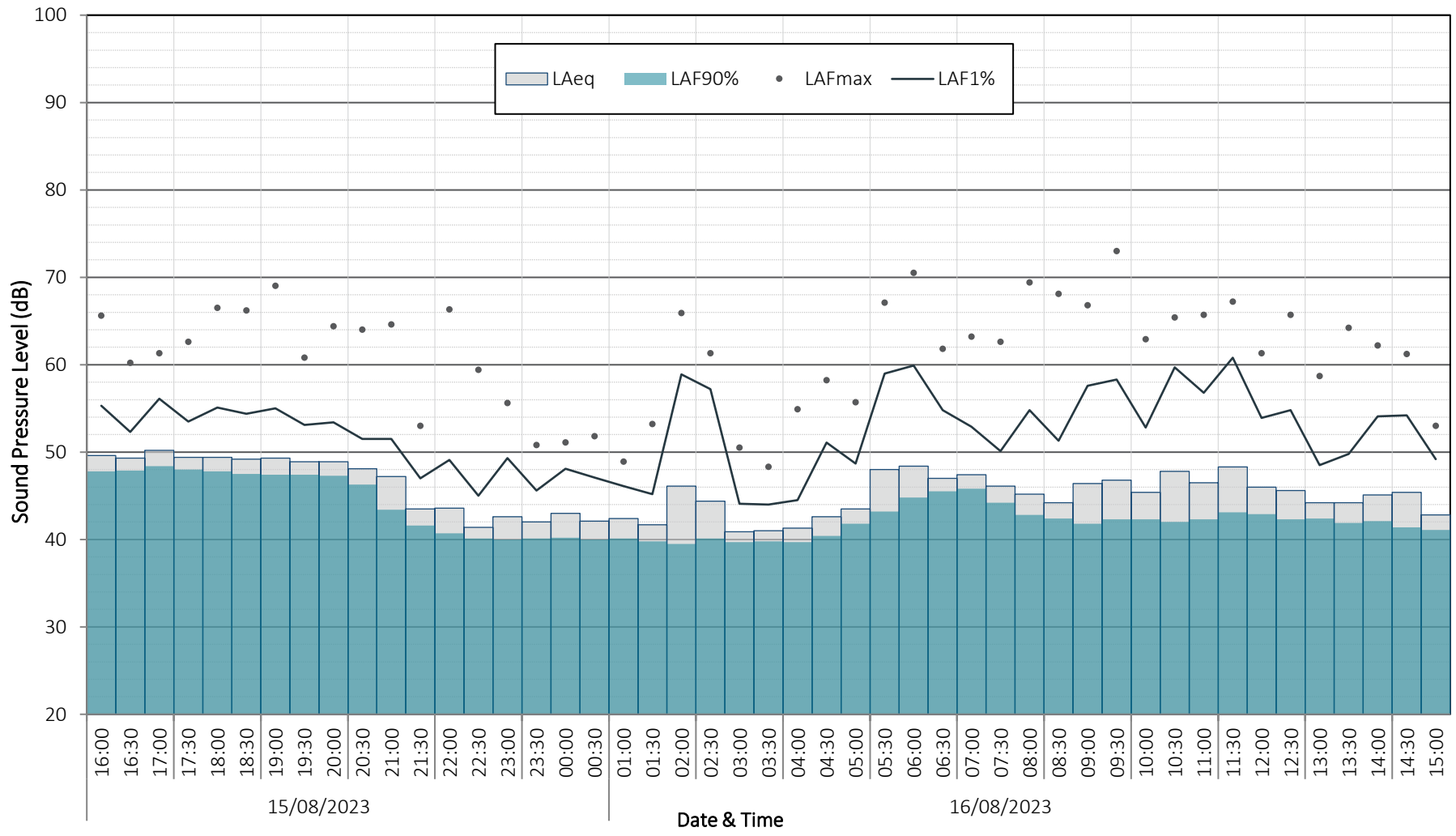
### August 16, 2023



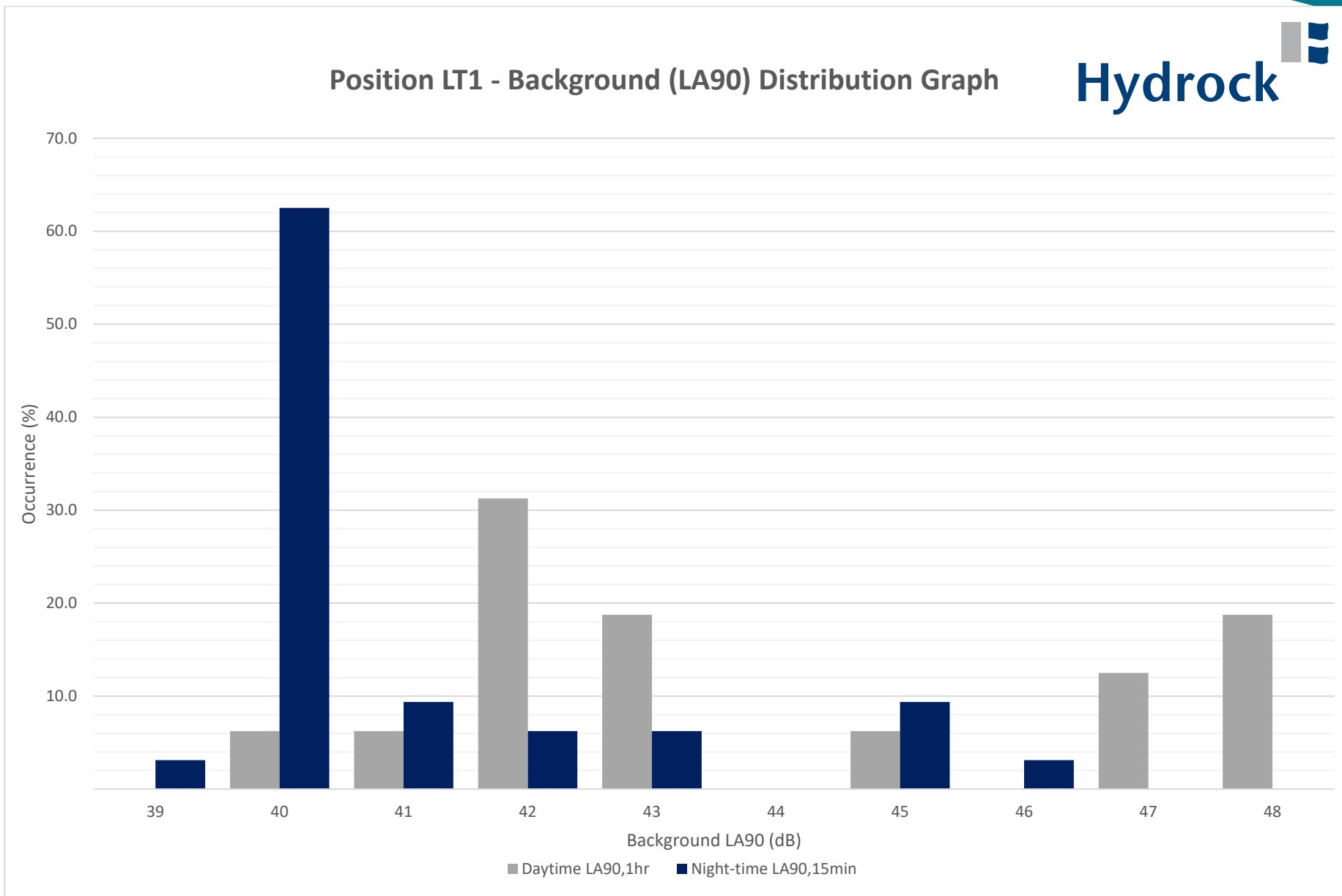
Taken from [www.wunderground.com](http://www.wunderground.com) - weather station IKENFIG4 located in Pyle

# Appendix B Continuous Monitoring Results

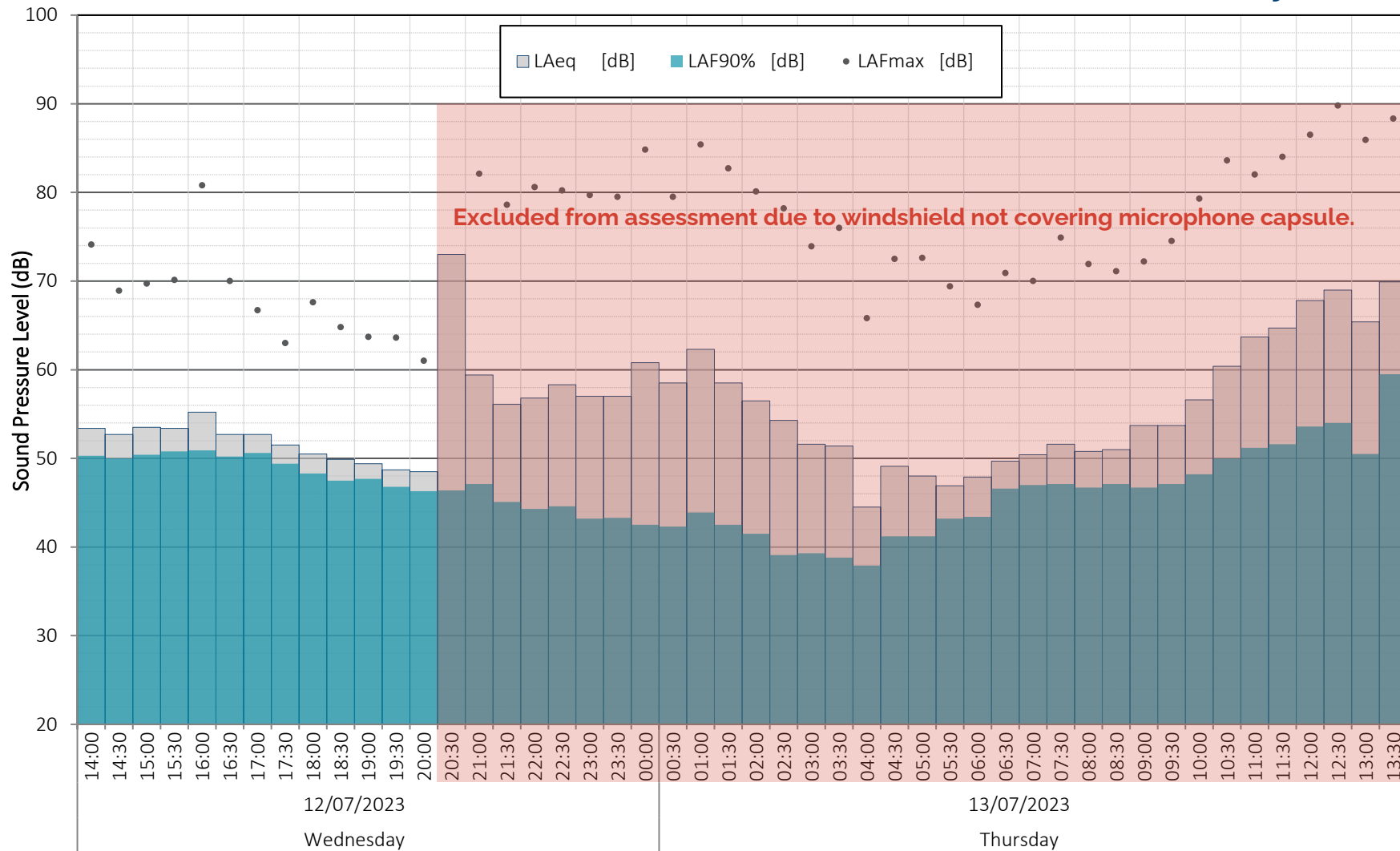
Position LT1 - Time History



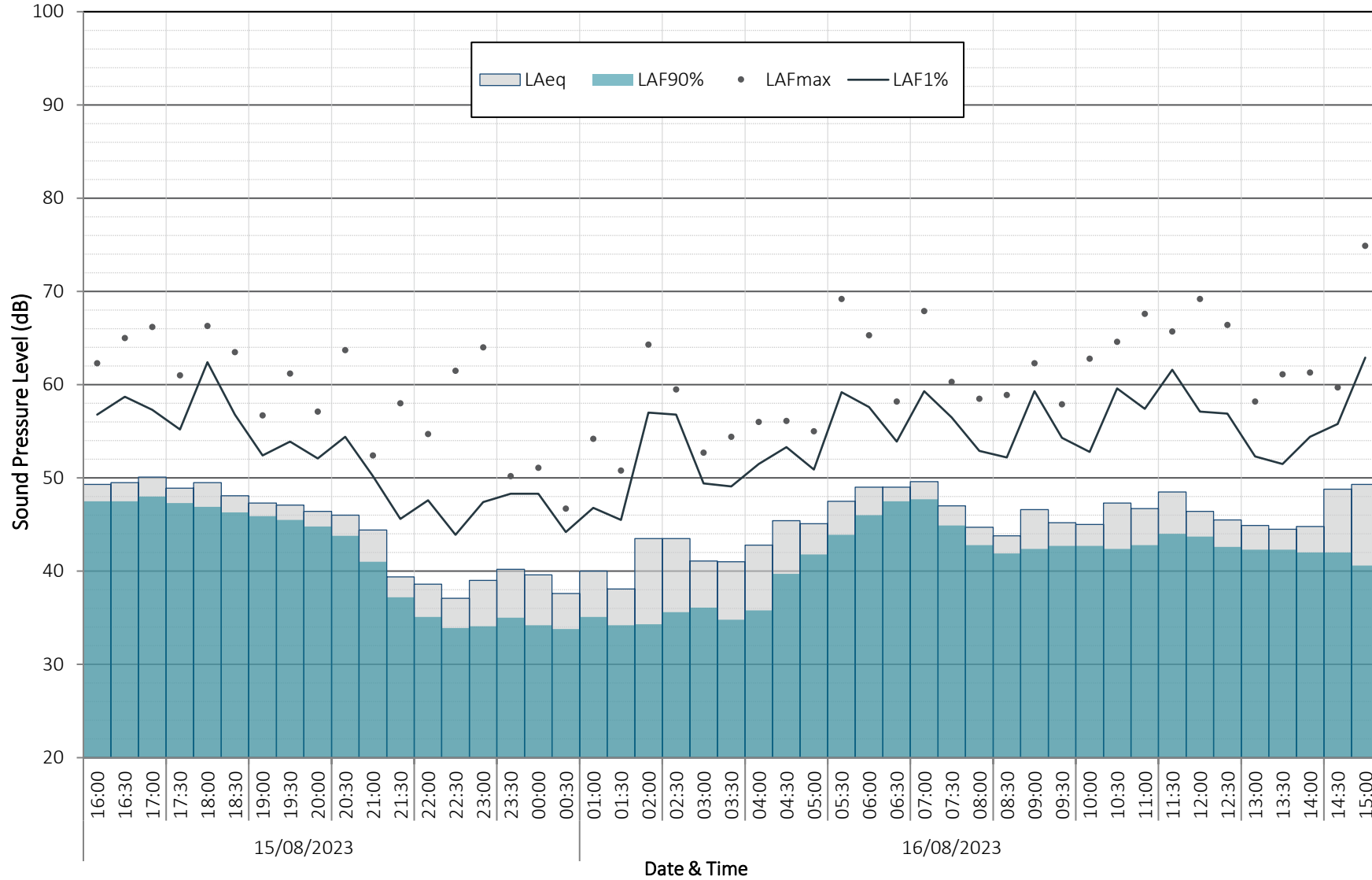
Position LT1 - Background (LA90) Distribution Graph



### LT2 - Time History



Position LT2 - Time History





Position LT2 - Background (LA90) Distribution Graph

