WEPco

Mynydd Isa

Noise Impact Assessment

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Contents

1 Introduction

This report details the results of the noise impact assessment for the proposed multi-use games area for the new school and the results of the baseline noise survey conducted around the site and used to set noise emission limits for mechanical and electrical equipment.

2 Noise impact assessment for the multi-use games area and football pitch.

Through consultation with the noise pollution team at Flintshire County Council it has been confirmed that noise from the multi-use games area should be assessed in line with the Sport England Guidelines – Design Guidance Note: Artificial Grass Pitch (AGP) Acoustics – Planning Implications, 2015. Figure 1 shows the layout of the proposed school and location of the multi-use games area and football pitch.

Figure 1: Layout of the proposed school and new sports pitches

2.1 Sport England guidance

Sport England has issued guidance outlined in *"Artificial Grass Pitch Acoustics – Planning Implications – New Guidance for 2015"* to support the design and specification of artificial grass pitches (APG).

This guidance references the World Health Organisation (WHO) guidance in terms of internal noise limits of 35dBL$_{Aeq}$ during the daytime and external limits of 50dBL$_{Aeq}$ at 1m from the façade of living spaces (assuming a reduction of 15dB from a partially open window). The WHO document also states that the noise level in the outdoor living areas should not exceed 50dBL$_{Aeq}$.

In consultation with the Pollution Control Team at Flintshire County Council it has been agreed that noise from the multi-use games area and football pitch be limited to no more than 50dBL$_{Aeq}$ in the nearest gardens on Snowdon Avenue.

2.2 Assessment

Based on studies and noise measurements of various sporting activities on artificial grass pitches the Sport England guidance suggests that the typical free-field noise level from an APG at 10m from the halfway side-line is 58dBL$_{Aeq}$. Although the multi-use games area is 3 smaller individual pitches the noise effect can be deemed to be similar to that of one larger field of play. A 3-dimensional noise model has been created to predict the noise level from the pitches during use. Figure 2 below shows the predicted noise emission from the sport pitches to the surrounding areas. The results indicate that without mitigation the external noise level at the nearest residential gardens is >50dBL$_{Aeq}$ which is over the criteria.

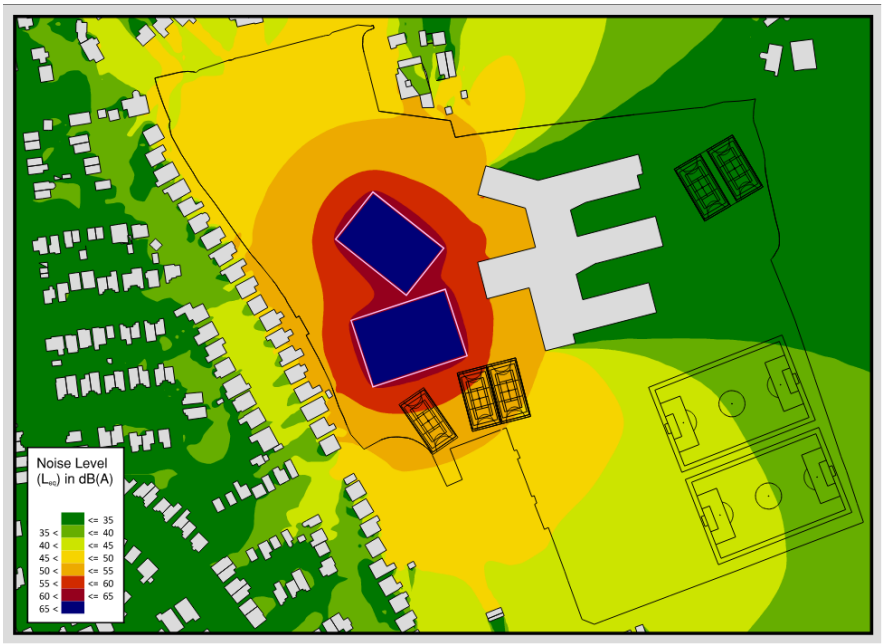


Figure 2: Predicted unmitigated noise level from the sports pitches at 1m above ground level in the gardens.

2.3 Mitigation of noise from the sports pitches.

To meet the criteria of less than 50dBL_{Aeq} in the nearest gardens, a 3m high solid noise barrier is proposed for each pitch as shown in Figure 3.

Figure 3: Layout showing noise barriers around the proposed sport pitches.

To provide the necessary screening of noise the barrier must have a minimum surface mass of >10kg/m^2 and be imperforate throughout its height and length.

To prevent impact noise from balls on the solid noise barriers additional mesh fences are included around the sports pitches between the pitch and the solid barrier, it is important that the specification of the mess fence includes resilient fixings so that this does not cause excessive impact noise.

Figure 4 shows the predicted noise level around the sports pitches and in the gardens of the nearby houses with the proposed mitigation in place.

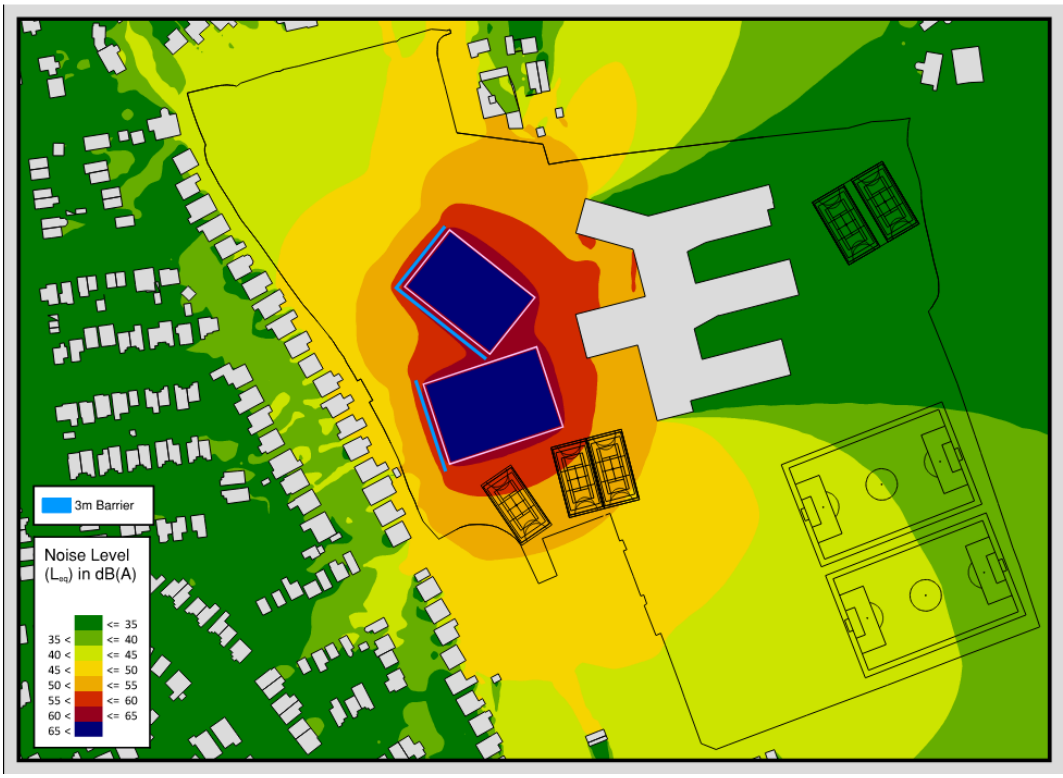


Figure 4: Predicted noise level from the sports pitches in use (at 1m above ground level in the gardens) with proposed mitigation.

2.4 Conclusion

A noise model has been created to predict noise from the multi-use games area and football pitch while being used simultaneously. The prediction has followed the guidance provided by Sport England. Assessment of the unmitigated noise from the pitches shows that noise in the nearest gardens was above the limit of 50dBA proposed in the Sport England Guidance. It has been shown, that with the addition of mitigation in the form of a mesh fence and solid noise barrier, that noise from the sports pitches can be limited to below the Sport England guideline limit in the nearest residential gardens.

3 Baseline noise survey

An environmental baseline noise survey has been undertaken to determine the existing noise climate and character of noise around the grounds of the current Argoed High School as part of the acoustic design process for the new Mynydd Isa campus development.

The noise survey work was carried out by Josh Heenan and Holly Cowperthwaite of Arup, with attended measurements taken on 10 and 15 June 2021 and unattended measurements taken between 10 June and 15 June 2021.

3.1 Site description

The site features an existing, operational secondary school (Argoed High School). It is proposed that this school will be demolished as part of the new Mynydd Isa campus development.

An indicative proposed site boundary and current building layout (existing Argoed High School building) is show in Figure 5.

Figure 5: Indicative site boundary for the proposed Mynydd Isa campus development

The nearest noise sensitive receptors have been identified in the following locations in relation to the site:

- Residential properties adjacent to the north site boundary on Bryn Road (R1).
- Residential properties adjacent to the north east of site boundary on Bryn Road (R2)
- Residential properties adjacent to the western boundary on Snowdon Avenue (R3)

Measurement locations for the baseline noise survey are displayed in Figure 6.

Measurement locations 1, 3 and 5 were chosen to be representative of the existing noise climate at the nearest noise sensitive receptors to the proposed new school. Measurements at these locations were taken at the quietest times of the evening and night-time period to aid in establishing noise emission limits for plant associated with the proposed school. The fixed noise level meter at location 6 logged noise levels continuously over a number of days so that a representative

noise climate for each of the noise sensitive receptors could be established in correlation with the attended measurements at locations 1, 3 and 5.

Noise measurements at locations 2 and 4 were taken during typical lesson times at locations representative of the north and south façade of the new school. Measurements were taken when the students were inside the classrooms so that noise from the road affecting the new school could be assessed and noise behind the school screened from the local road traffic could also be assessed.

Noise measurements at locations 2 and 4 are used to determine the necessary façade sound insulation levels required so that internal noise levels in classrooms meet those required by Building Regulations.

Figure 6: Baseline noise survey measurement locations.

3.2 Instrumentation

The sound level meters (SLMs), microphones and sound pressure level calibrators used by Arup are Class 1 instruments, conforming to BS EN 61672-1:2013. All Arup instrumentation is calibrated annually and has full traceable calibration to national and international standards, which are undertaken by an accredited calibration laboratory. Calibration certificates can be provided upon request.

The SLM was checked for correct calibration before and after each series of measurements. No significant fluctuation in level was noted throughout each survey period.

All of the SLMs and other related noise monitoring instrumentation used to undertake the survey is described in Table 1 below.

Description	Serial Number	Item Type
RION NC-74	34304657	Calibrator
Rion NA-28	00301365	Sound level meter
Rion NH-23	01963	Microphone
Rion UC-59	91399	Microphone
B&K 4189 Microphone	3087165	Microphone
B&K 4231 Calibrator	3018054	Sound level meter
B&K ZC-0032 Preamp	25776	Microphone
B&K 2250	3011327	Sound level meter
RION NL-52	00120480	Sound level meter
RION NH-25 Preamplifier	10479	Microphone
Microphone RION UC-59	03152	Microphone
Calibrator RION NC-74	35015346	Calibrator

Table 1: Measurement instrumentation

3.3 Measurement methodology

At each location, the L_{Aeq}, L_{A90}, $L_{A10,}$ and L_{A1} metric parameters were measured and recorded. All broadband measurements were A-weighted and used a fast time constant (0.125s).

At each measurement location, the SLM was mounted on a tripod with the microphone set between 1.2m to 1.5m above local ground level. All measurements were taken under acoustically free-field conditions. The appropriate windshield for the SLM was fitted to the microphone throughout to minimise wind-induced noise.

Attended measurements of 5 minutes duration were made at each location, dependent upon conditions at the measurement location. Unattended measurements of 5 minutes duration were made at the fixed noise logger location. In each case, the time period was appropriate to provide a good representation of the typical noise climate at each measurement location.

3.4 Attended measurement results

The summary tables for each measurement location provide an arithmetic average of the individual measurements during each time period for L_{A90} and L_{A10}, a logarithmic average for L_{Aeq} and a range of the values for L_{A1}.

Location 1

Location Description:

This measurement location was to the north side of the site. The nearest residential receptor was located on Bryn Road at a distance of 10m.

Environment and Observations:

The noise climate was dominated primarily by leaf noise caused by wind rustle in the nearby trees. Noise caused by vehicle usage was observed intermittently, with very little vehicle usage observed.

Measurement Duration:

Measurements were taken for a duration of 5 minutes and are displayed in table 3.

Weather Conditions:

Wind Speed: 1.4 m/s
Wind Direction: N/A
Summary: Dry conditions, slight wind throughout, medium amount of cloud coverage.

Personnel:

Josh Heenan & Holly Cowperthwaite

Additional Comments:

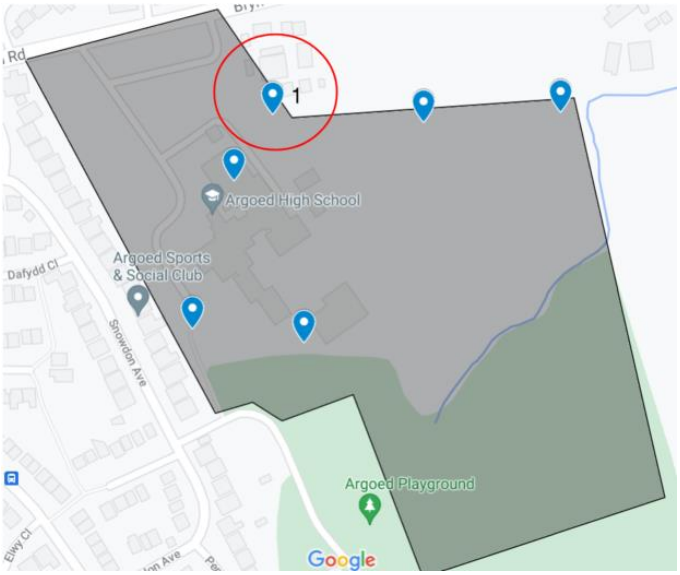


Figure 7: Sound level meter at measurement location 1

Period	Sound pressure level, dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_1
Day (07:00-23:00)	37	47	46	64
Night (23:00-07:00)	41	49	51	57

Table 2: Summary of averaged sound pressure levels at location 1

Date	Time		Sound pressure level, dB(A) (re 20 µPa)				Comments
	Start [hh:mm]	Duration [mm:ss]	L_{90}	L_{eq}	L_{10}	L_1	
Evening							
10/06/2021	21:07	05:00	44	51	53	65	
10/06/2021	22:12	05:00	37	45	47	65	
10/06/2021	22:46	05:00	30	37	38	57	
Night							
11/06/2021	02:02	05:00	46	53	57	61	
11/06/2021	02:34	05:00	39	47	50	53	
11/06/2021	03:11	05:00	38	48	51	54	
11/06/2021	03:42	05:00	41	45	47	49	Notable increase in bird noise evident.

Table 3: Measured sound pressure levels at location 1

Location 3

Location Description:

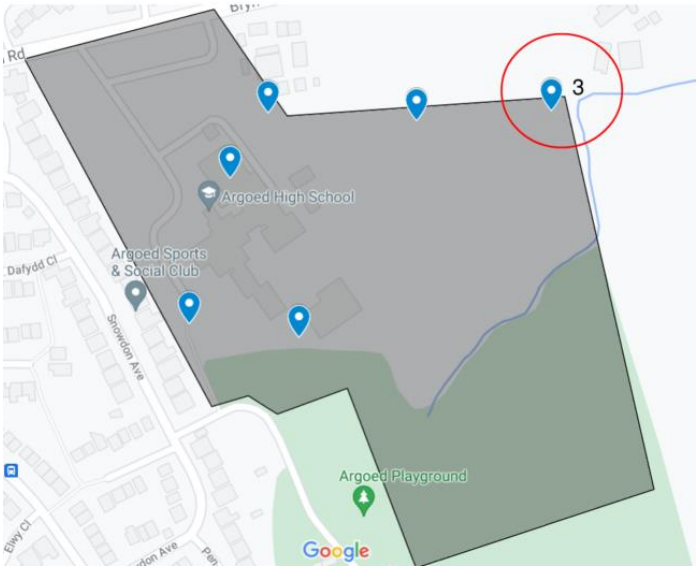
This measurement location was to the north eastern side of the site at the boundary of the current high school rugby pitch. The nearest residential receptors were located on Bryn Road at a distance of 25m.

Environment and Observations:

The noise climate was dominated primarily by leaf noise caused by wind rustle in the nearby trees. Noise caused by vehicle usage was observed to be subjectively very distant.

Measurement Duration:
Measurements were taken for a duration of 5 minutes and are displayed in table 4.

Weather Conditions:
Wind Speed: 1.2 m/s
Wind Direction: N/A
Summary: Dry conditions, slight wind throughout, medium amount of cloud coverage



Personnel:
Josh Heenan & Holly Cowperthwaite

Additional Comments:

Figure 8: Sound level meter at location 3

Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_1
Day (07:00-23:00)	35	40	42	46
Night (23:00-07:00)	42	48	50	56

Table 4: Summary of averaged sound pressure levels at location 3

Date	Time		Sound pressure level, dB(A) (re 20 µPa)				Comments
	Start [hh:mm]	Duration [mm:ss]	L_{90}	L_{eq}	L_{10}	L_1	
Evening							
10/06/2021	21:48	00:05:00	38	41	44	49	
10/06/2021	22:23	00:05:00	34	39	42	45	
10/06/2021	22:57	00:05:00	34	37.9	40	43	
Night							
11/06/2021	02:12	00:05:00	38	42	44	48	
11/06/2021	02:45	00:05:00	42	48	51	55	
11/06/2021	03:21	00:05:00	44	50	54	57	
11/06/2021	03:53	00:05:00	43	48	51	57	Notable increase in bird noise evident.

Table 5:Measured sound pressure levels at location 3

Location 5

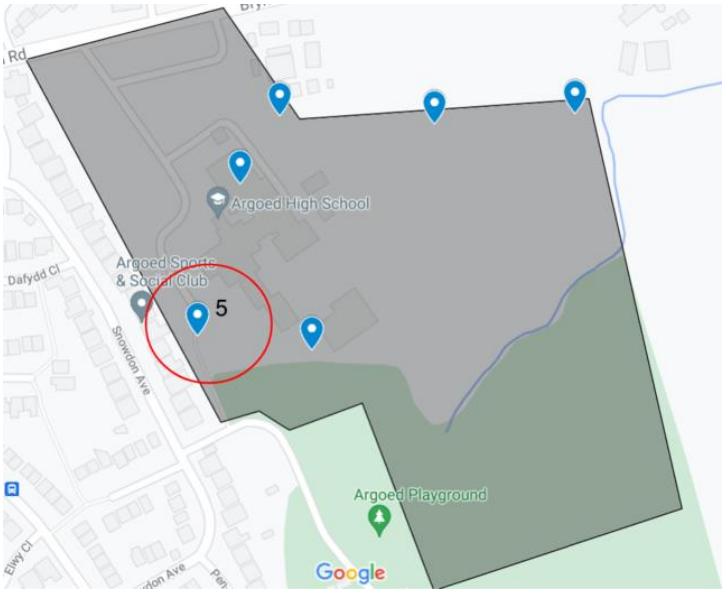
Location Description:
This measurement location was to the western side of the site. The nearest residential receptors were located on Snowdon Avenue at a distance of 25m.

Environment and Observations:
The noise climate was dominated primarily by leaf noise caused by wind rustle in the nearby trees. One instance of vehicle usage on Snowdon Avenue was observed.

Measurement Duration:
Measurements were taken for a duration of 5 minutes and are displayed in table 6.

Weather Conditions:

Wind Speed: 1.2 m/s
Wind Direction: N/A
Summary: Dry conditions, slight wind throughout, medium amount of cloud coverage



Personnel:
Josh Heenan & Holly Cowperthwaite

Additional Comments:

Figure 9: Sound level meter at location 5

Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_1
Day (07:00-23:00)	32	34	36	41
Night (23:00-07:00)	34	43	42	48

Table 6: Summary of averaged sound pressure levels at location 5

Date	Time		Sound pressure level, dB(A) (re 20 µPa)				Comments
	Start [hh:mm]	Duration [mm:ss]	L_{90}	L_{eq}	L_{10}	L_1	
Evening							
10/06/2021	21:59	00:05:00	33	35	37	42	
10/06/2021	22:36	00:05:00	30	34	36	41	
Night							
10/06/2021	23:10	00:05:00	29	32	34	38	
11/06/2021	02:23	00:05:00	34	39	41	46	
11/06/2021	02:59	00:05:00	37	42	44	51	
11/06/2021	03:32	00:05:00	31	35	39	44	
11/06/2021	04:03	00:05:00	41	49	53	58	Notable increase in bird noise evident.

Table 7: Measured sound pressure levels at location 5

Location 2

Location Description:
This measurement location was to the northern side of the site and was selected to be representative of the northern façade of the new school campus.

Environment and Observations:

Occasional internal classroom noise observed (distance from measurement location to nearest classroom 100m). Traffic noise from Bryn Road was observed to be the most consistent source of noise. Daytime measurements were undertaken during school lesson times.

Measurement Duration:
Measurements were taken for a duration of 5 minutes and are displayed in table 9.

Weather Conditions:

Wind Speed: 0.8 m/s

Wind Direction: N/A

Summary: Dry conditions, light to no wind, sparse cloud coverage.

Personnel:
Josh Heenan

Additional Comments:

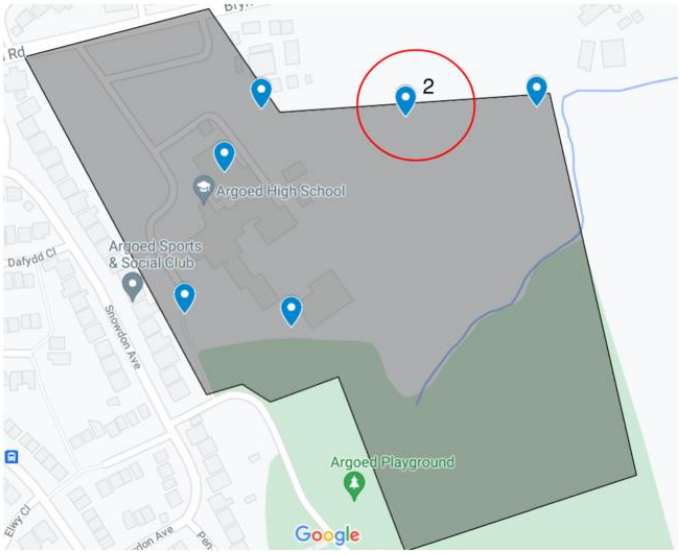


Figure 10: Sound level meter at location 2

Period	Sound pressure level, dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_1
Day (09:07-11:38)	37	40	43	46

Table 8:Summary of averaged sound pressure levels at location 2

Date	Time		Sound pressure level, dB(A) (re 20 µPa)				Comments
	Start [hh:mm]	Duration [mm:ss]	L_{90}	L_{eq}	L_{10}	L_1	
15/06/2021	09:07	00:05:00	37	41	43	45	
15/06/2021	09:13	00:05:00	38	41	43	46	
15/06/2021	09:18	00:05:00	38	41	47	44	
15/06/2021	11:23	00:05:00	37	40	42	45	
15/06/2021	11:28	00:05:00	36	40	41	47	
15/06/2021	11:33	00:05:00	36	39	41	46	

Table 9: Measured sound pressure levels at location 2

Location 4

Location Description:
This measurement location was to the south westerly side of the site and was selected to be representative of the southern façade of the new school campus.

Environment and Observations:
Occasional classroom noise observed (distance from measurement location to nearest classroom 30m). Noise from nearby residencies on Snowdon Avenue observed intermittently. Daytime measurements were undertaken during school lesson times.

Measurement Duration:
Measurements were taken for a duration of 5 minutes and are displayed in table 10.

Weather Conditions:
Wind Speed: 0.8 m/s

Wind Direction: N/A

Summary: Dry conditions, light to no wind, sparse cloud coverage.

Personnel:
Josh Heenan

Additional Comments:

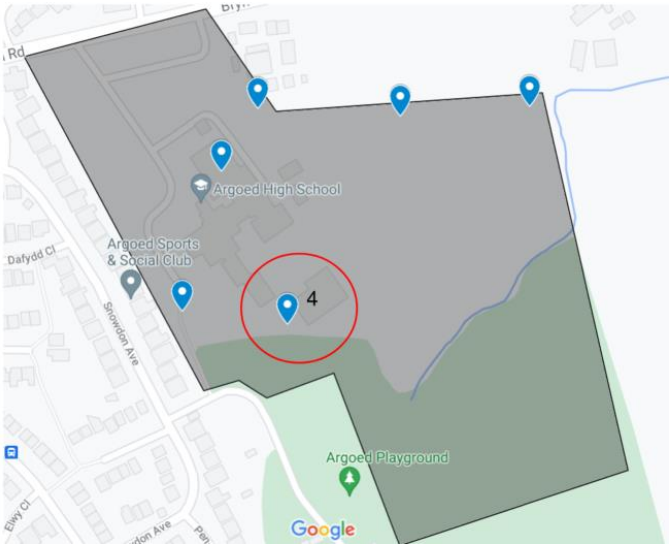


Figure 11: Sound level meter at location 4

Period	Sound Pressure Level, dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_1
Day (09:31-11:59)	38	44	47	53

Table 10: Summary of averaged sound pressure levels at location 4

Date	Time		Sound pressure level, dB(A) (re 20 µPa)				Comments
	Start [hh:mm]	Duration [mm:ss]	L_{90}	L_{eq}	L_{10}	L_1	
15/06/2021	09:31	00:05:00	38	44	48	52	
15/06/2021	09:36	00:05:00	38	43	47	51	
15/06/2021	09:42	00:05:00	37	44	47	51	
15/06/2021	11:43	00:05:00	37	43	47	50	
15/06/2021	11:49	00:05:00	37	45	48	57	Audible shouting from teacher and pupil from inside classroom.
15/06/2021	11:54	00:05:00	38	44	48	52	

Table 11: Measured sound pressure levels at location 4

3.5 Unattended measurement results

Location 6

Location Description:

Noise logging equipment installed on the roof of the design technology block of the current Argoed High School Building.

Measurement Duration:
Measurements were taken for a duration of 5 minutes for the following duration.

Thu 10/06/2021 15:20
to
Tue 15/06/2021 12:20

Logging Interval:
00:05:00

Weather Conditions:
10/06/21-15/06/21. Dry conditions throughout

Additional Comments:

Environment and Observations:
Design technology building rooftop- Nearby housing approximately 80m to the nearest sensitive residential receptors on Snowdon Avenue.

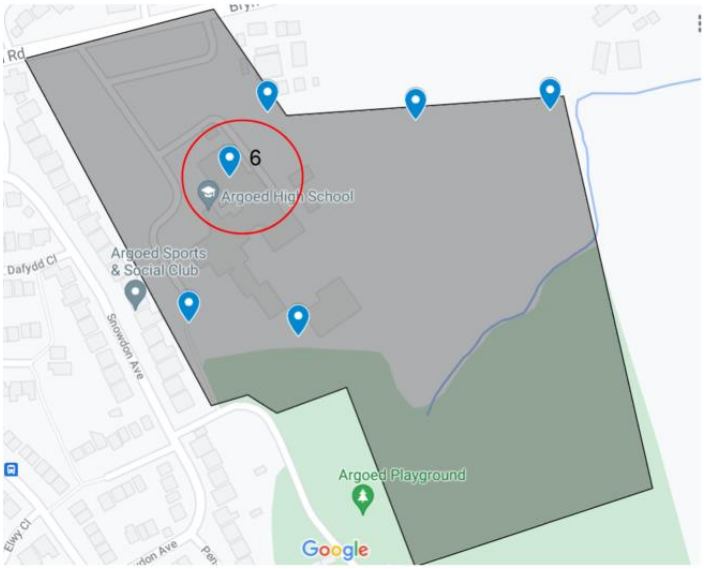


Figure 12: Noise logging equipment at location 6

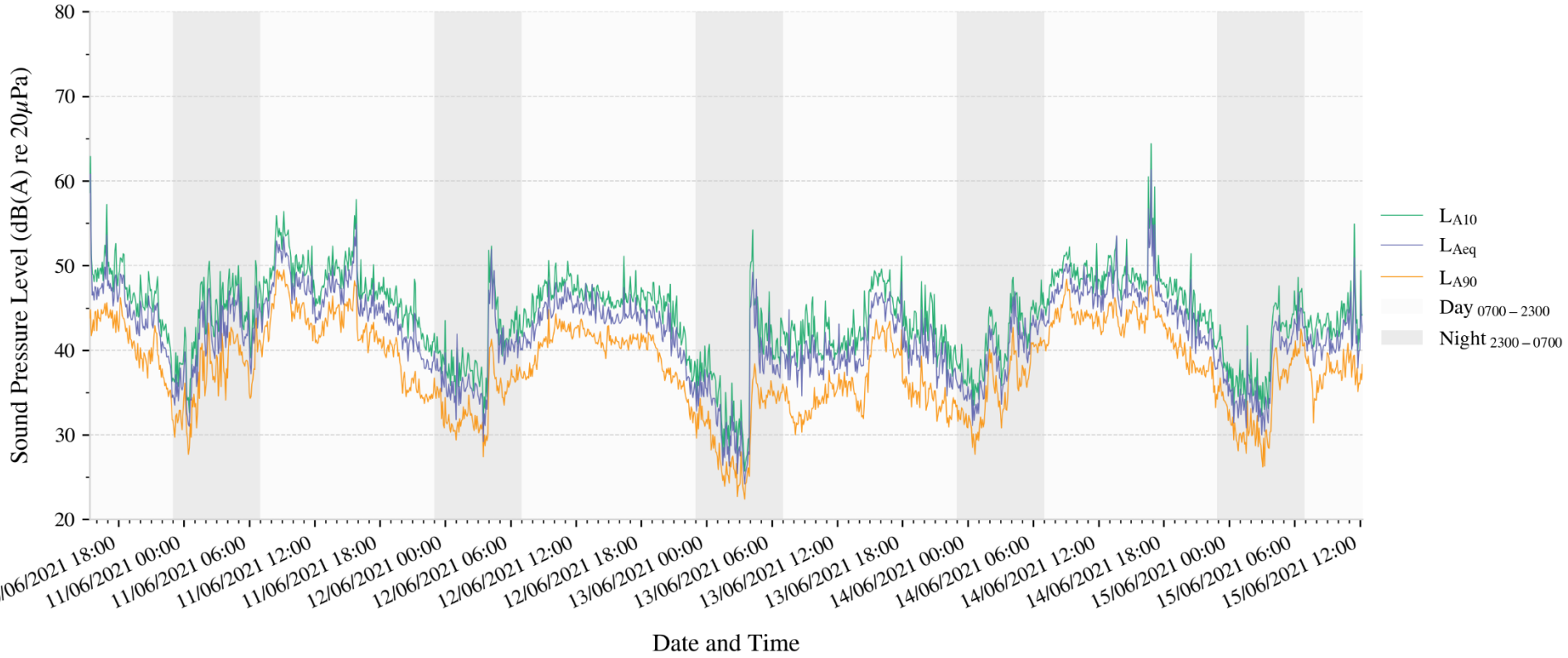


Figure 13: Time history for the unattended measurement at location 6

4 Noise emission limits at nearby receptors

4.1 Local authority noise emission limits.

Through consultation with the Noise Pollution Team at Flintshire County Council it has been agreed that noise from fixed plant associated with the proposed new school shall be assessed in accordance with the methodology in BS4142.

- For normal operating plant the noise emission shall be controlled so that the rating level for fixed plant, as established using the BS4142 methodology, shall be 5dB below the typical background noise level at the residences during the day and night. The rating level includes a penalty for the plant if it exhibits any tones, impulsivity, or other nuisance characteristics.
- For plant that operates in emergency only the noise emission shall be controlled so that the rating level of such plant shall be no more than 10dB above typical background.

4.2 Typical background noise levels

To establish the typical day and night noise levels for each of the nearby noise sensitive residential receptors an analysis of measurements over the 5 day period at the fixed logger at location 6 has been undertaken. Figures 14 and 15 show the distribution of the 5 minute measurement at the fixed logger location.

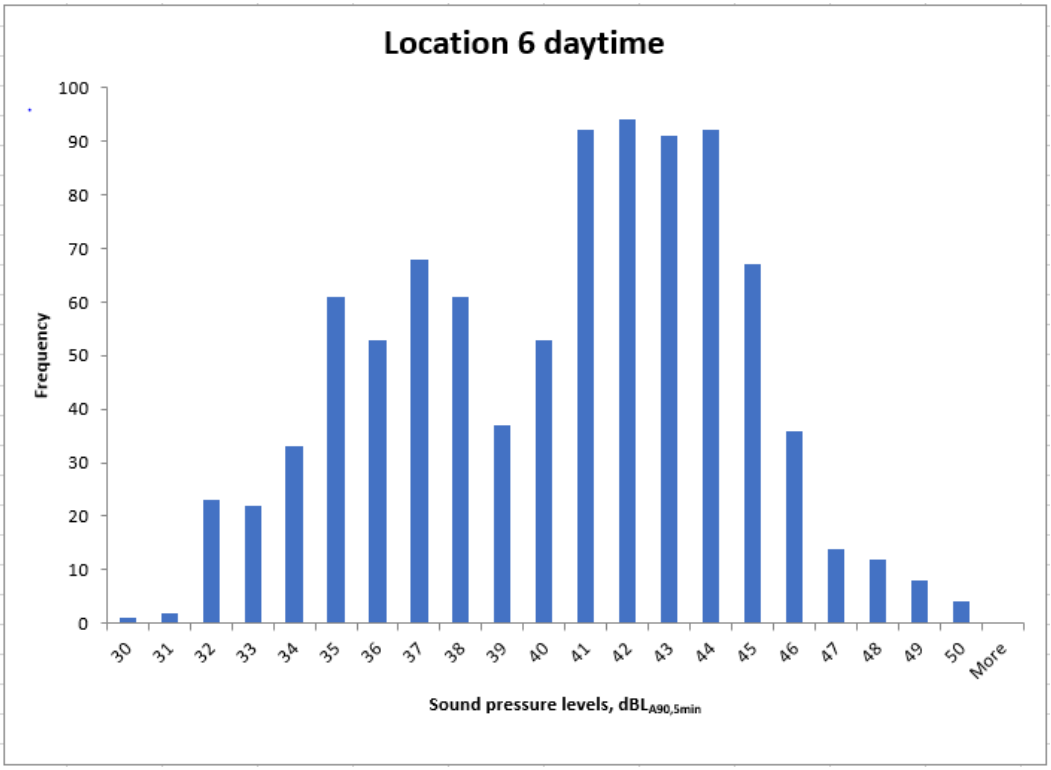


Figure 14: Distribution of daytime 5 minute L_{A90} noise levels at location 6

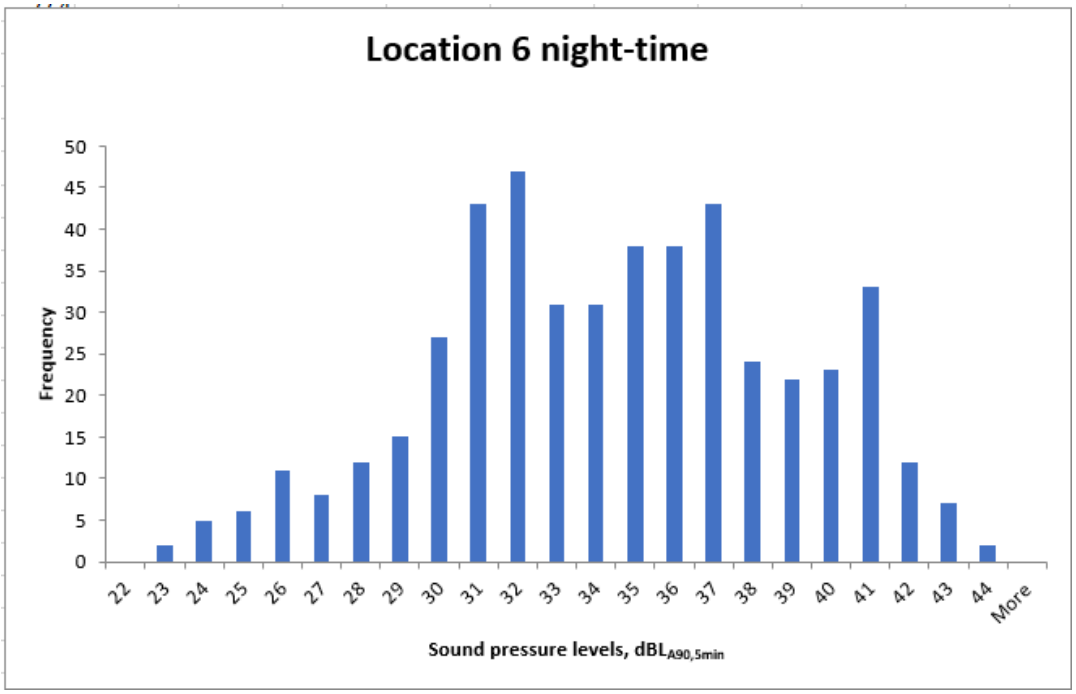


Figure 15: Distribution of night-time 5 minute L_{A90} noise levels at location 6

Using the methodology in BS4142 the typical daytime and night-time background noise levels at location 6 are provided in Table 12 along with the minimum L_{A90} 5 minute noise level measured during the survey.

Period	Minimum measured $dBL_{A90,5mins}$	Derived typical lowest background noise level, dBL_{A90}	Difference, dB
Daytime	30	32	+2
Night-time	22	25	+3

Table 12: Typical and minimum background noise level at location 6

As the noise climate at each of the nearby noise sensitive receptors adjacent to the site is dominated by the same noise sources as that at location 6 then the it can be assumed that the difference between the minimum noise level and typical noise level at these locations would be the same as that at location 6.

Table 13 shows the derived typical noise level for the daytime and night-time period at the noise sensitive receptors.

Location	Daytime		Night-time	
	Minimum measured $dBL_{A90,5mins}$	Derived typical lowest background noise level, dBL_{A90}	Minimum measured $dBL_{A90,5mins}$	Derived typical lowest background noise level, dBL_{A90}
1	30	32	38	41
3	34	36	38	41
5	30	32	28	31

Table 13: Typical period noise level at nearby receptor locations

It can be seen from Table 13 that the noise levels are lower for the daytime period than that of the night, this an unusual occurrence and is mainly due to the effect of wind noise in the trees close to the measurement locations.

4.3 Noise emission limits.

Individual items of plant have not be specified at planning stage as thus a BS4142 assessment cannot be undertaken at this time. It is proposed that the noise limits for plant associated with the new school shall not exceed those specified in Table 14 and that this could be covered by a suitably worded planning condition to be discharged prior to occupation of the school.

It is expected that plant associated with the new school would be operating at its highest duty and therefore noise level during the day and therefore in ensuring that the daytime noise limit is not exceeded night-time noise emission will lower than both the day and night time limits.

Location	Plant operating normally		Emergency operation plant.	
	Daytime limiting noise rating level, $dBL_{Ar,Tr}$	Night-time limiting noise rating level, $dBL_{Ar,Tr}$	Daytime limiting noise rating level, $dBL_{Ar,Tr}$	Night-time limiting noise rating level, $dBL_{Ar,Tr}$
1	27	36	42	51
3	31	36	46	51
5	27	26	42	41

Table 14: Noise emission limits at nearby receptors