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Whitmore High School

Acoustic Report for Planning

Whitmore High School

23 January 2019

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This document has 12 pages including the cover.

Document history

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1. Introduction

A new secondary school is proposed to replace the existing Whitmore High School. Atkins Ltd has been appointed to provide acoustic design input for the development.

This report has been prepared to support a planning application in relation to external noise emissions from fixed plant and building services associated with the development. The report sets out maximum plant noise limits to meet the requirements of the Local Authority. A full noise impact assessment will be carried out once the design has progressed to provide sufficient information.

A glossary of acoustic terms used in this report is provided in Appendix A.

1.1. Site Location

The site is located on Port Road West (A4226) within the grounds of the existing Whitmore High School in Barry, South Wales as shown in Figure 1-1.

To the north and north-west of the site is Port Road West (A4226), with a Tesco Superstore, Barry Emergency Services Station and residential houses on the opposite side. To the north-east is the existing school building, while to the east is Barry Hospital, and to the south-east is Bro Morgannwg School. To the south-west is Bro Morgannwg School's playing field.

1.2. Proposed Development

The proposal is to construct a new three storey school on the existing playing field of Whitmore High School. Once the building has been completed, the existing school will be demolished, with the space being re-developed into the school's playing fields, which includes Multi Use Games Areas (MUGA).

The typical operating hours of the new building are expected to be Monday to Friday 08:00 to 21:00. Items of plant are not expected to operate outside of these hours.

1.3. Closest Noise Sensitive Receptors

The closest noise sensitive receptors to the development are listed in Table 1 below and presented in Figure 1-1 below.

Table 1 - Closest Noise Sensitive Properties

Receptor	Description	Approximate Distance to Proposed Building (m)
1	Residential properties on Liscum Way	150
2	Residential properties on Stirling Road	90
3	Barry Hospital	170
4	Bro Morgannwg School	70

1.4. Local Authority External Noise Criteria

The Vale of Glamorgan Council have been contacted to confirm their site-specific criteria for external noise emissions. However, at the time of writing they have not yet responded. In lieu of confirmation from the Council, it is expected that a noise impact assessment of external plant noise emissions will be required in accordance with BS4142:2014, where a rating level of plant noise is to be equal to or lower than, 5dB below the background sound level at the nearest noise sensitive receptors.

Figure 1-1 - Closest noise sensitive receptors and approximate site location

2. Baseline Noise Survey

2.1. Survey Methodology

A baseline noise survey was carried out over two survey periods to measure noise levels representative of those that will be incident on the main building facades, and also background sound levels at nearby noise sensitive receptors.

The first survey period comprised attended short-term noise measurements between approximately 11:00 hours and 15:00 hours on Thursday 10th January 2019. The second survey period comprised both attended short-term measurements and unattended long-term measurements. The short-term measurements were taken between approximately 10:00 hours and 14:30 hours on Thursday 17 January 2019. The long-term measurements were taken between approximately 14:00 hours on Thursday 17 January 2019 and 15:00 the following day.

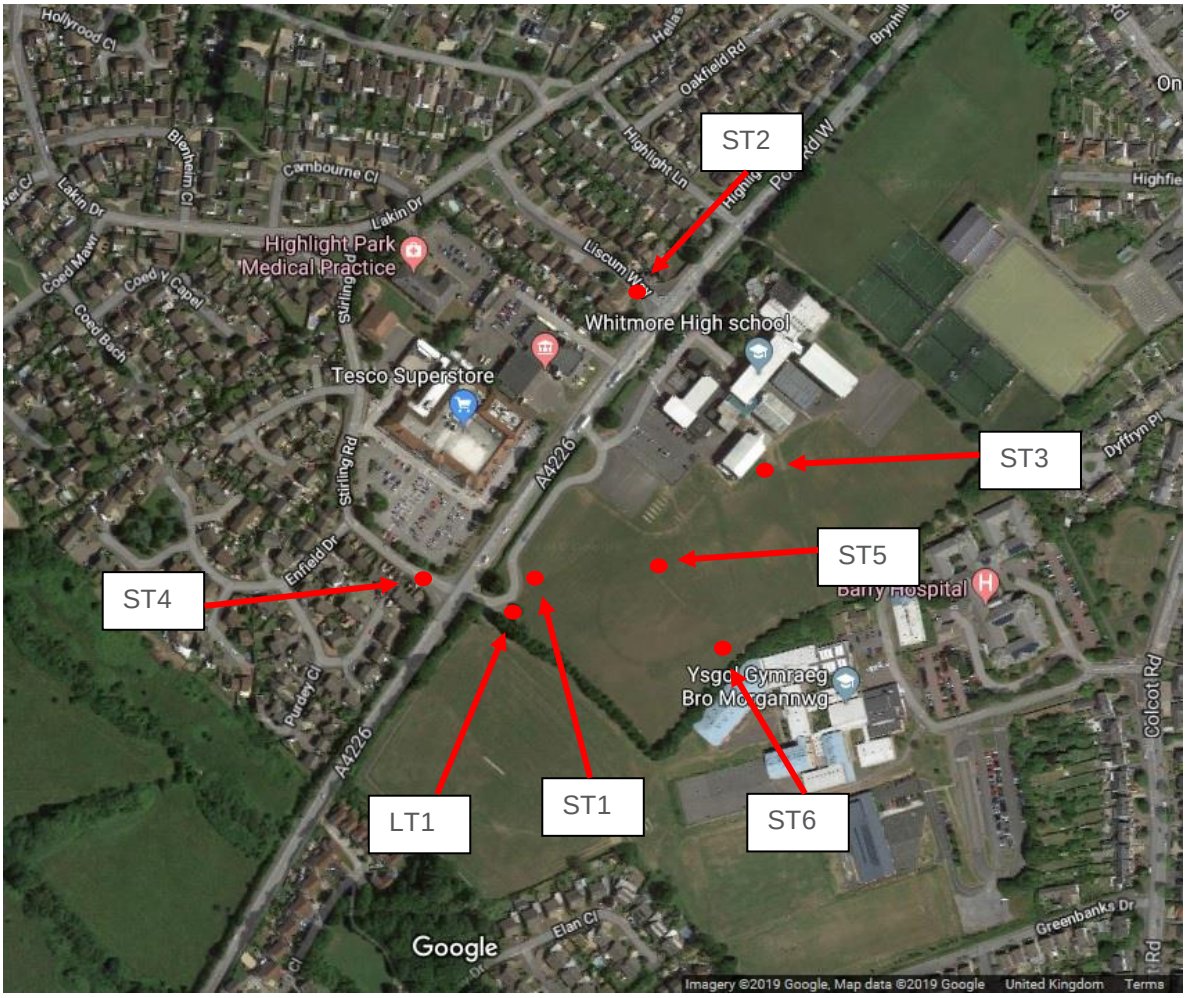
The long-term measurement (LT1) and short-term measurements (ST1 to ST6) were taken at the locations shown on Figure 2-1. At position LT1, noise levels were recorded over a 1 minute time period continuously during the measurement period. At ST1 to ST6, a 15-minute noise measurement was taken at each position during every hour of each survey period. The noise levels recorded during the short-term measurements are considered representative of the hour in which they were taken.

All measurements were taken under free-field conditions, i.e. >3m away from acoustically reflective surfaces other than the ground.

For the unattended continuous measurement at (LT1), the microphone was placed inside an environmental housing and fitted to a tripod at approximately 1.5m above local ground level. For the attended short-term measurements (ST1 to ST6), the equipment was placed on a tripod with a

windshield fitted to the microphone. The height of the microphone was approximately 1.5m above the local ground level.

Figure 2-1 - Measurement positions



2.2. Measurement Equipment

Noise level measurements were taken using a 01dB and Rion NL-52 sound level meters, which conform to the specifications for sound level meters of Class 1 as given by BS EN 61672-1:2013.

The sound level meters were field calibrated using an acoustic calibrator, both before and on completion of the survey. No drift in sensitivity was observed. Table 2 presents the equipment details used for each survey period. Calibration certificates can be provided on request.

Table 2 - Survey measurement equipment

Item	Manufacturer	Model	Serial	Last Calibration
Attended short-term measurements (sets 51)				
Frequency Meter	01dB	FUSION	11199	01/11/2018
Microphone	GRAS	40CE	233344	01/11/2018
Ext Pre Amplifier	01dB	Pre No22	1605096	01/11/2018
Int Pre Amplifier	01dB	FUSION	11199	01/11/2018
Associated Calibrator	01dB	CAL21	34565046	30/10/2018
Unattended continuous long-term measurement (set 41)				
Frequency Meter	Rion	NL-52	00620857	13/09/2018

Microphone	Rion	UC-59	03693	13/09/2018
Pre Amplifier	Rion	NH-25	20917	13/09/2018
Calibrator	Rion	NC-74	31525804	13/09/2018

At each measurement position, multiple noise level metrics were recorded, however, the following are presented in this report as these are considered relevant to the development:

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period;
- $L_{A90,T}$ The A-weighted noise level exceeded for 90% of the measurement period; and
- $L_{AF,max}$ The maximum A-weighted noise level during the sample period, measured using a fast time weighting.

2.3. Baseline Survey Results

2.3.1. Short-term measurement results

The results from the short-term noise measurements carried out during the daytime period on Thursday 10 January and Thursday 17 January 2019 are presented in Table 3.

Table 3 - Short-term measurement results

Location	Date	Time	$L_{Aeq,15min}$ dB	$L_{AF,max}$ dB	$L_{A90,15min}$ dB
ST1	Thursday 10 January 2019	11:00 – 12:00	57	71	50
		12:00 – 13:00	57	69	49
		13:00 – 14:00	57	64	51
		14:00 – 15:00	56	64	51
ST2	Thursday 17 January 2019	10:00 – 11:00	65	80	57
		11:00 – 12:00	64	80	55
		12:00 – 13:00	66	86	58
		13:00 – 14:00	64	85	56
ST3	Thursday 10 January 2019	11:00 – 12:00	49	67	42
		12:00 – 13:00	56	78	40
		13:00 – 14:00	45	61	40
		14:00 – 15:00	48	66	42
ST4	Thursday 17 January 2019	10:00 – 11:00	70	83	57
		11:00 – 12:00	68	80	55
		12:00 – 13:00	69	81	55
		13:00 – 14:00	69	84	55
ST5	Thursday 10 January 2019	11:00 – 12:00	53	65	49
		12:00 – 13:00	53	61	48
		13:00 – 14:00	53	67	48
		14:00 – 15:00	55	68	49
ST6	Thursday 17 January 2019	10:00 – 11:00	49	64	45
		11:00 – 12:00	53	73	46
		12:00 – 13:00	50	59	47
		14:00 – 15:00	50	61	45

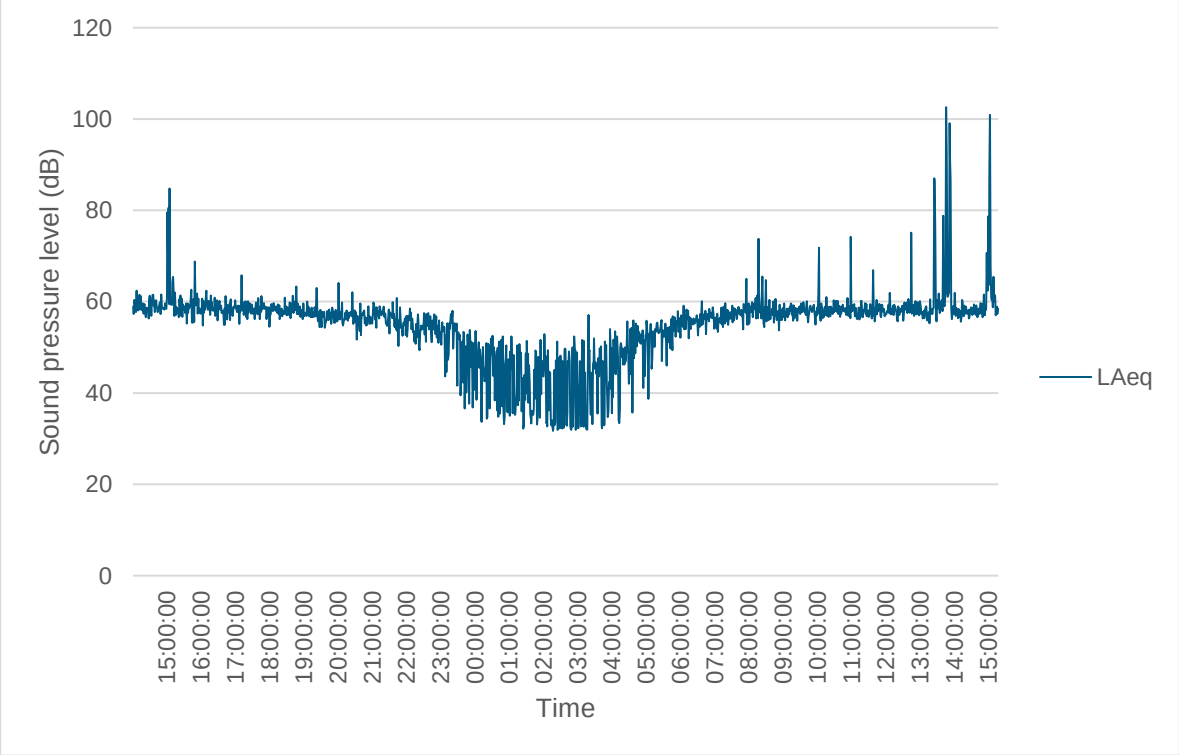
During the attended measurements, the noise climate at ST1, ST2, ST4, ST5 and ST6 were mostly controlled by traffic noise emanating from Port Road West (A4226), with occasional noise from birds and infrequent light aircraft also having an effect on the measured levels. During these measurements, occasional emergency vehicle sirens were also recorded.

At position ST3, the noise levels were controlled by noise break out from the existing school buildings, bird noise and infrequent light aircraft. During the measurement between 13:00 and 14:00 hours, no noise breakout from the existing school was recorded.

2.3.2. Long-term continuous measurement results

The long-term continuous measurement results are presented in graphical form in Figure 2-2. The measured $L_{Aeq,T}$ typically varies between 57dB and 60dB between the typical operating hours of 08:00 – 21:00.

Figure 2-2 - Long-term monitoring measurement



During the set up and collection of the long-term monitoring equipment the noise levels were observed as being controlled by the drone of traffic emanating from Port Road West (A4226). During the intervening period, the noise levels remained at a similar level until around 22:00 hours, when the noise levels began to drop, and remained lower until around 06:00 hours, as is typical of a traffic-controlled noise climate, where fewer vehicles are travelling on the road network during the night-time period.

Noise levels were only recorded above $L_{Aeq,T}$ 80dB on four occasions, and all occurred during school break times, or the end of the school day. These increases are not typical of sirens being recorded during the attended measurement positions, and are therefore thought to be untypical sources, such as students shouting into, or near to, the sound level meter.

2.3.3. Meteorological conditions

The weather conditions during both attended survey periods was dry with only a light breeze and had no observed effect on the measured noise levels.

During the set up and collection of the unattended noise logger, the weather was again dry with only a slight breeze. During the intervening period, the weather forecast was for dry conditions with wind

speeds well below 10m/s. The weather conditions throughout the noise survey are therefore considered suitable for noise measurements.

3. External Plant Noise Limits

The type, quantity and location of fixed mechanical and electrical (M&E) plant associated with the scheme has not been defined at this stage in the design, therefore it is not yet possible to fully quantify the potential noise impact at the nearest noise sensitive receptors. Once sufficient information is available a full noise impact assessment is to be carried out and this report revised accordingly.

As stated in Section 1.4, the Local Authority have been contacted and are yet to confirm their site-specific noise criteria for this development. In lieu of confirmation from the Local Authority, it is recommended that cumulative noise emissions from fixed plant are controlled to the maximum BS 4142:2014 rating levels given in Table 4 at the identified receptors during the day (07:00 to 23:00). Night-time operation of plant is note expected.

These limits are set, based on the anticipated Local Authority requirements stated in Section 1.4 and the background sound levels taken from Table 3.

Table 4 – Day time plant noise limits (07:00 to 23:00)

Nearest Noise Sensitive Receptor	Approximate distance from building to NSR (metres)	Daytime Free Field BS 4142:2014 rating limits for plant noise at the closest identified receptors ($L_{Ar,1hour}$ dB) 07:00 – 23:00
1 (Liscum Way)	150	50
2 (Stirling Road)	90	50
3 (Barry Hospital)	170	40
4 (Bro Morgannwg School)	70	40

4. Summary

This report has been prepared to support the planning application in relation to external noise emissions from fixed plant and building services associated with the proposed Whitmore High School development.

In lieu of confirmation from the Vale of Glamorgan Council regarding their site-specific noise criteria for external plant, it is expected that a noise impact assessment in accordance with BS4142:2014 will be required, where the rating level of plant noise is to be equal to or lower than 5dB below the existing background sound level, at the nearest noise sensitive receptors.

The nearest noise sensitive receptors have been identified as residential properties along Liscum Way and Stirling Road, Barry hospital and Bro Morgannwg School.

A baseline noise survey has been carried out at the proposed site and details in Section 0 of this report.

At this stage of the project, the type, quantity and location of fixed mechanical and electrical (M&E) plant associated with the Scheme has not yet been defined to allow a full noise impact assessment to be carried out. Therefore, this report sets out day time maximum plant noise limits to be achieved at the identified receptors, in Table 4. These must be confirmed with the Local Authority. Night time operation of plant is not expected.

Once sufficient information is available a full noise impact assessment is to be carried out and this report revised accordingly.

Appendices

Appendix A. Glossary

Decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

A-Weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dB LA.

Description of Noise Characteristics

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In order to describe noise where the level is varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. It is the level of a continuous noise that has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period.

L_{A01} is the A-weighted noise level exceeded for 1% of the specified time period. LA01 is an indication of the loudest measured noise levels.

L_{A90} is the A-weighted noise level exceeded for 90% of the time period. LA90 is used as a measure of background noise.

$L_{AF,max}$ is the maximum A-weighted noise level during the sample period, measured using a fast time weighting.

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