Edmondson Park High School (EPHS)

Construction Noise and Vibration Survey – 24th July 2025

Richard Crookes Constructions Pty Ltd

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TABLE OF CONTENTS

1 INTRODUCTION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged to undertake noise and vibration survey of the onsite civil works being conducted at the future Edmondson Park High School (EPHS) site located along Buchan Avenue, Edmondson Park.

The survey which is outlined in this report was undertaken on Thursday 24th July 2025 between 10:00am and 1:00pm.

The assessment has been conducted in accordance with the previously prepared site-specific *Construction Noise & Vibration Management Sub-Plan (CNVMSP), dated 5th December 2024, revision 4* prepared by PWNA for the project.

1.1 Project Description

The proposed development comprises a new high school in Edmondson Park accommodating 2,000 students, approximately 124 full time staff and 20 support staff. A detailed description of the proposal is as follows:

- Land use for the purpose of an educational establishment.
- Bulk earthworks, comprising fill and excavation and other site preparation works.
- Construction of four (4) new buildings for the proposed high school for a range of educational uses and ranging in height from one (1) to five (5) storeys.
- Landscaping and public domain works, including tree planting, low lying landscaping, a sensory garden, a large sports field in the mid-west portion of the site and three sports courts in the south-west portion of the site.
- An on-site staff carpark and waste collection area at the southern end of the site, accessible from South Road.
- Signage for the new school.
- Public domain and infrastructure works, including some offsite works outside the high school boundary within the Buchan Avenue, East Road and South Road reserves

1.2 Project Construction

To ensure the successful delivery of the project in line with the needs of the community for a school Day 1/Term 1/2026 the school it is proposed that the project is constructed in a staged approach. In this case staging of construction works will ensure some surrounding receivers are provided with respite from works as the works area will change throughout the project based on the size of the project.

1.3 Site Layout

The site is located in the suburb of Edmondson Park in the Southwest Growth Area of Sydney, and within the Edmondson Park South State Significant Precinct. The site is located approximately 45 km south-west of the Sydney central business district (CBD) and approximately 21 km south of the Parramatta CBD. The site is located immediately southeast of Edmondson Park Public School, which opened in 2023.

The site is located within the Liverpool City local government area (LGA), has a street address of 145 Buchan Avenue, Edmondson Park and is legally described as Lot 2 in Deposited Plan (DP) 1287903. The site has a total area of 3.903 hectares.

The site is currently vacant, largely cleared of vegetation (with the exception of grasses and small shrubs). It has been previously utilised for construction access and as a compound for the construction of the primary school immediately west of the site. The primary school construction has been completed and is now operational.

The site has an approximate 15m fall from the southwest boundary (RL 70.950) to the northeast boundary at Buchan Avenue (RL 55.220). Natural overland flow drains to a drainage culvert located at the north-east corner of the site.

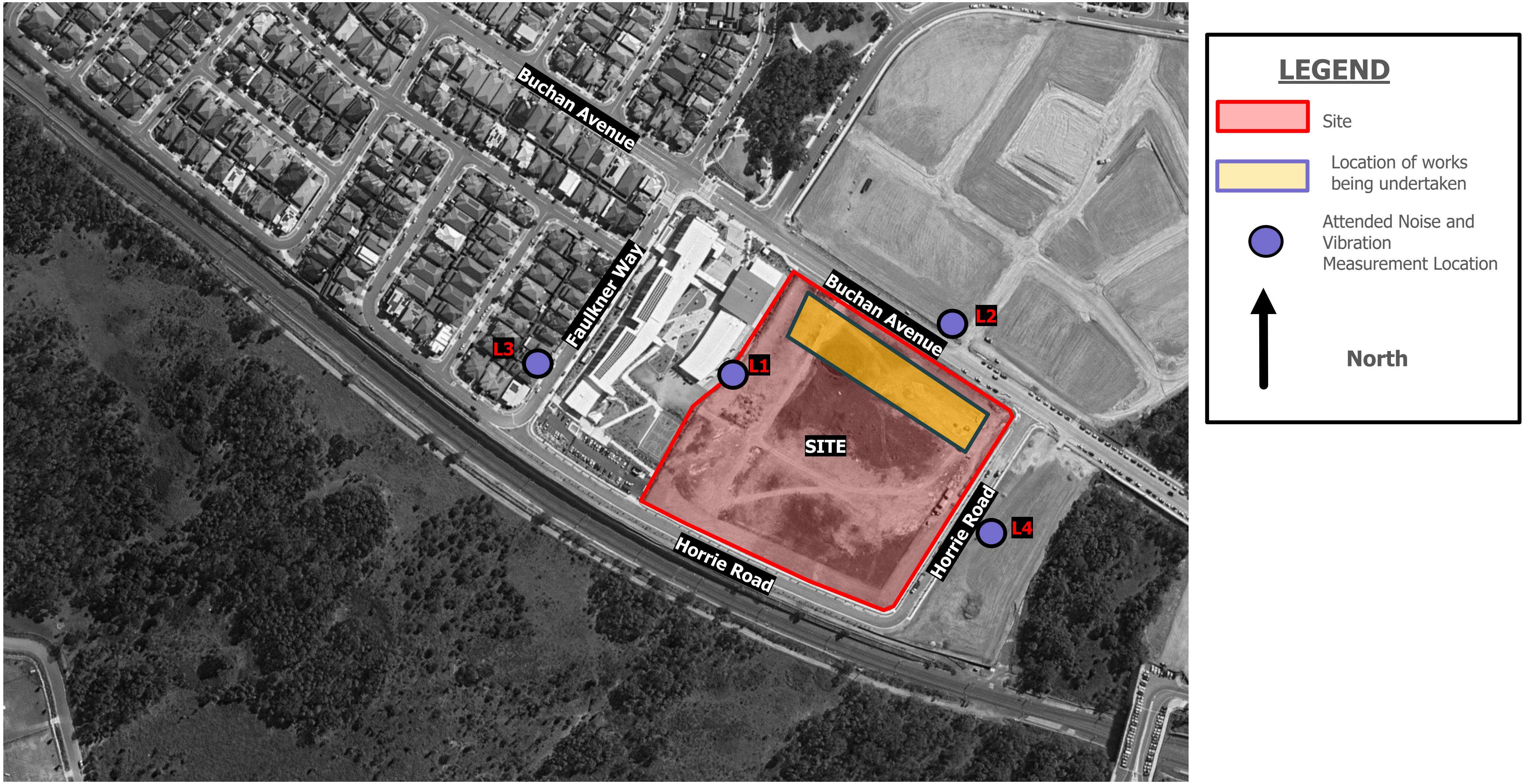
Two easements are identified adjacent to Buchan Avenue. A stormwater easement has been established to convey stormwater from the primary school through the site to Buchan Avenue, and a sewer easement has been established for the primary school along the northern boundary of the site.

The surrounding context of the site has experienced significant transformation due to the introduction of the south-west railway line and rapid housing growth in release areas that has seen development of greenfield sites to new communities.

Recent and proposed development immediately south and east of the site includes the recently constructed East Road and South Road and several proposed major residential developments. Edmondson Park town centre is situated to the south of the nearby railway station, comprising a shopping centre and various residential flat building development.

A map showing the site location and all measurement locations is provided in Figure 1 below.

Figure 1 - Site Map and Nearest Sensitive Receivers (Sourced SixMaps NSW)



2 CONSTRUCTION NOISE CRITERIA

Outlined below is the relevant project noise and vibration objectives as outlined in the *Construction Noise & Vibration Management Sub-Plan (CNVMSP), dated 5th December 2024, revision 4* prepared by PWNA previously. See below. For ease of reference, the resulting project criteria are highlighted in red.

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4 NOISE AND VIBRATION CRITERIA

Relevant noise and vibration criteria for construction activities are detailed below.

4.1 SSD Approval (SSD-62028458) Planning Conditions

Relevant conditions of the consent require the following in relation to construction noise and vibration impacts from the site.

Condition B14 – Construction Impacts

The Construction Noise and Vibration Management Plan must address, but not be limited to, the following:

(a) be prepared by a suitably qualified and experienced noise and vibration expert;

(b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);

(c) describe the measures to be implemented to manage high noise and vibration generating works such as piling, in close proximity to sensitive receivers;

(d) include strategies that have been developed with the community for managing high noise and vibration generating works;

(e) describe the community consultation undertaken to develop the strategies in condition (d);

(f) include a complaints management system that would be implemented for the duration of the construction;

(g) Include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B12; and

(h) Address the requirements of Section 9 of the Noise and Vibration Impact Assessment prepared by Acoustic Studio and dated 4 December 2023.

Condition C3 – Construction Hours

C3. Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:

a) between 7am and 6pm, Mondays to Fridays inclusive; and

b) between 8am and 1pm, Saturdays.

No work may be carried out on Sundays or public holidays.

Condition C4 – Construction Hours

C4. Notwithstanding condition C3, provided noise levels do not exceed the existing background noise level plus 5dB, works may also be undertaken during the following hours:

Pulse White Noise Acoustics Pty Ltd Page 14 of 54 *a) between 6pm and 7pm, Mondays to Fridays inclusive; and*

b) between 1pm and 4pm, Saturdays.

Condition C5 – Construction Hours

C5. Construction activities may be undertaken outside of the hours in condition C3 and C4 if required:

a) by the Police or a public authority for the delivery of vehicles, plant or materials; or

b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or

c) where the works are inaudible at the nearest sensitive receivers; or

d) for the delivery, set-up and removal of construction cranes, where notice of the crane related works is provided to the Planning Secretary and affected residents at least seven days prior to the works; or

e) by the relevant roads authority or utilities service provider in order to minimise disruption to the roadway or essential services, where the related works have been provided to the Planning Secretary and affected residents at least seven days prior to the works; or

f) here a variation is approved in advance in writing by the Planning Secretary or their nominee if appropriate justification is provided for the works.

Condition C6 – Construction Hours

C6. Notification of such construction activities as referenced in condition C5 must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

Condition C7 – Construction Hours

C7. Rock breaking, rock hammering, sheet piling, pile driving, and similar activities may only be carried out between the following hours:

a) 9am to 12pm, Monday to Friday;

b) 2pm to 5pm Monday to Friday; and

c) 9am to 12pm, Saturday.

Condition C13 – Construction Noise Limits

C13. The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Plan.

Condition C14– Construction Noise Limits

C14. The Applicant must ensure construction vehicles (including concrete agitator trucks but excluding site personnel vehicles) do not arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition C3 and C4.

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Condition C15 – Construction Noise Limits

C15. The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised.

Condition C16 – Construction Vibration Limits

C16. Vibration caused by construction at any residence or structure outside the site must be limited to:

a) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and

b) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006) (as may be updated or replaced from time to time).

Condition C17 – Construction Vibration Limits

C17. Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C16.

Condition C18 – Construction Vibration Limits

C18. The limits in conditions C16 and C17 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan, submitted as part of the CEMP required by condition B14 of this consent.

4.2 Construction Noise Criteria

4.2.1 NSW EPA Interim Construction Noise Guideline (ICNG) – DECC 2009

Noise criteria for construction and demolition activities are discussed in the Interim Construction Noise Guideline (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

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The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for residential receivers have been reproduced from the guideline and are listed in the table below.

Table 5 NMLs for quantitative assessment at residences

Time of Day	Noise Management Level $L_{Aeq(15minute)}$ 1,2	How to Apply
Recommended standard hours: **Monday to Friday** **7 am to 6 pm** **Saturday 8 am to 1 pm** **No work on Sundays or public holidays**	"Noise Affected Level" RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
(Condition C3)	"Highly Noise Affected Level" 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours **(Condition C4)**	Noise affected. RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Note 1 Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Note 2 The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Noise Policy for Industry (EPA 2017).

Note 3 Requirements listed in the table above are in accordance with the Construction Hours listed in Condition C3 and C4.

Construction noise levels at other noise receivers are outlined below:

- Construction noise levels within classrooms at schools and other educational institutions is not to exceed 45dB $L_{Aeq,15minute}$, when measured internally.

Based on the measured background noise levels summarised in section 3, and the NMLs outlined above the construction noise criteria to be used in this assessment are listed above.

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Table 6 NMLs as basis for the acoustic assessment

Receiver Types		NML, dB $L_{Aeq(15minute)}$		
		Standard Hours Monday to Friday: 7:00am to 6:00pm Saturday: 8:00am to 1:00pm	Non-Standard Hours Monday to Friday: 6:00pm to 7:00pm	 Saturday: 1:00pm to 4:00pm
Residences (Measured externally)	Receiver 1	NAFL: **53** + HNAL: **75**	NAFL: **45**	NAFL: **48**
	Receiver 2	NAFL: **53** + HNAL: **75**	NAFL: **44**	NAFL: **48**
	Receiver 3	NAFL: **47** + HNAL: **75**	NAFL: **42**	NAFL: **42**
	Receiver 4	NAFL: **53** + HNAL: **75**	NAFL: **45**	NAFL: **48**
	Receiver 5	NAFL: **53** + HNAL: **75**	NAFL: **45**	NAFL: **48**
Edmonson Park Public School (Measured internally)	Receiver 6	**45**		

4.2.2 Construction Traffic Noise Criteria

For existing residences and other sensitive land uses affected by additional traffic on existing roads, the NSW Road Noise Policy (RNP) states that for noise associated with increased road traffic generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB during both day and night-time periods. An increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.

4.3 Vibration Criteria

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed. Refer to further discussion in Section 4.3.1.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects. Refer to further discussion in Section 4.3.2.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself. Refer to further discussion in Section 4.3.2.

4.3.1 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled "Assessing Vibration – A Technical Guideline". (AVTG) This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to Table 7).

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- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (refer to Table 8).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to Table 9)

Table 7 Continuous vibration acceleration criteria (m/s2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
		0.04	0.029	0.080	0.058

Table 8 Impulsive vibration acceleration criteria (m/s2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92

Table 9 Intermittent vibration impacts criteria (m/s1.75) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

4.3.2 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed against international standards as follows:

- For transient vibration: British Standard BS 7385: Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration" (BSI 1993); and
- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 "Effects of Vibration on Structure" (DIN 1999).

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4.3.2.1 Standard BS 7385 Part 2 - 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 10 and illustrated in Figure 6.

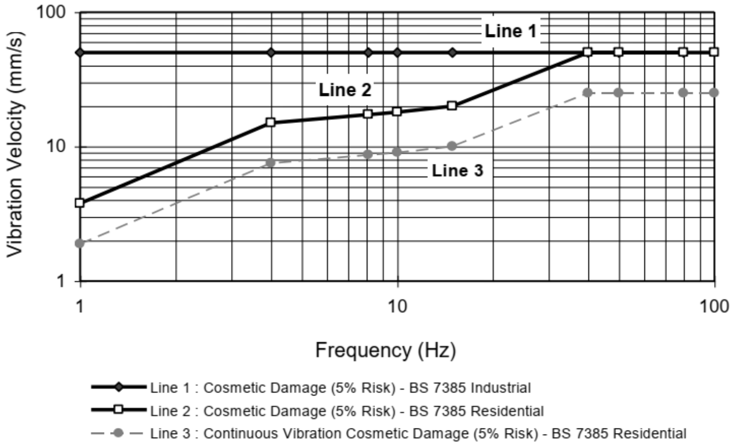
Table 10 Transient vibration criteria as per standard BS 7385 Part 2 - 1993

Line in Figure 6	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the values in Table 10 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such as that results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 10 may need to be reduced by up to 50% (refer to Line 3 in Figure 6).

Figure 6 BS 7385 Part 2 – 1993, graph of transient vibration values for cosmetic damage



In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the recommended values corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

Pulse White Noise Acoustics Pty Ltd Page 20 of 54

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The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 10, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the values in Table 10 should not be reduced for fatigue considerations.

4.3.2.2 Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in Table 11. The criteria are frequency dependent and specific to particular categories of structures.

Table 11 Structural damage criteria as per standard DIN 4150 Part 3 - 1999

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz1	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1 For frequencies above 100Hz, at least the values specified in this column shall be applied.

4.4 Ground-Borne Noise Criteria

According to the NSW EPA Interim Construction Noise Guideline (ICNG) 2009, the criteria for ground-borne noise at residences is defined as follows:

- Maximum internal noise levels of 40 dB $L_{Aeq(15mins)}$ between 6:00pm and 10:00pm.

It is noted that the ground borne criteria will apply for construction works undertaken outside of standard hours.

3 MEASURED ONSITE NOISE AND VIBRATION LEVELS

3.1 Noise & Vibration Monitoring Equipment

The noise level survey was performed using a SVAN 958A Sound and Vibration Analyser (serial number 92806). The associated calibration certificate is presented in the Appendix. Calibration of the sound level meter was checked with a Brüel & Kjær Type 4231 acoustical calibrator (serial number 3009148) prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried current NATA calibration certificates.

3.2 Onsite Works

At the time of the survey, onsite civil construction activities were actively in progress. Operations included earthmoving, drilling, mechanical hammering, and crane usage, indicating significant advancement in the project's early stage works.

Figure 2 Photo of Civil Site Works from Buchan Ave

3.3 Measurement Locations

As shown in Figure 1 above are the four (4) measurement locations, site photo from each measurement position are provided below.

Measurement Location One (L1)	Measurement Location Two (L2)
	
Measurement Location Three (L3)	**Measurement Location Four (L4)**
	

3.4 Measured Noise Levels

Outlined below in the table are the measured noise levels, relevant construction Noise Management Levels (NML's) and site observations.

Table 1 Measured construction noise

Measurement Location	Measured Noise Level dB(A) L_{Aeq}	Measurement Observations	Construction Noise Management Level/ 'Highly Noise Affected' Level	Compliance / Comments
Measurement Location **L1** (Public School Boundary)	70	Noise at location one (1) general construction activities dominated by power tools, hydraulic hammering and other construction noise	**NAFL:** 53 dB(A) L_{Aeq} (15min) **HNAL:** 75 dB(A) L_{Aeq} (15min)	Measured noise level above NAFL, however below HNAL. PWNA *CNVMSP* identified this would occur and subsequently formulated required acoustic management controls accordingly.
Measurement Location **L2** (Across Buchan Avenue – future residents)	63	Noise at location two (2) dominated by onsite civil works, occasional vehicle pass by	**NAFL:** 53 dB(A) L_{Aeq} (15min) **HNAL:** 75 dB(A) L_{Aeq} (15min)	Measured noise levels are less than predicted noise levels in *CNVMSP* as such no additional acoustic mitigation measures are required to be implemented because of the site survey results. All documented acoustic mitigation measures as outlined in the *CNVMSP* are to be implemented.
Measurement Location **L3** (Faulkner Way)	47	Noise at location three (3), including general construction noise was just audible. Cannot distinguish between EPHS site and adjacent construction sites. Occasional train pass by.	**NAFL:** 53 dB(A) L_{Aeq} (15min) **HNAL:** 75 dB(A) L_{Aeq} (15min)	Noise levels were compliant with project noise management levels.

Measurement Location	Measured Noise Level dB(A) L_{Aeq}	Measurement Observations	Construction Noise Management Level/ 'Highly Noise Affected' Level	Compliance / Comments
Measurement Location **L4** (Across Horrie Road – future residents)	48	Noise at location four (4) dominated by onsite civil works, occasional vehicle pass by (mostly cars) and music from construction workers.	**NAFL:** 53 dB(A) L_{Aeq} (15min) **HNAL:** 75 dB(A) L_{Aeq} (15min)	Measured noise level above NAFL, however below HNAL. PWNA *CNVMSP* identified this would occur and subsequently formulated required acoustic management controls accordingly. Measured noise levels are less than predicted noise levels in *CNVMSP* as such no additional acoustic mitigation measures are required to be implemented because of the site survey results. All documented acoustic mitigation measures as outlined in the *CNVMSP* are to be implemented.

3.5 Measured Vibration Levels

Measured vibration levels against frequency for compliance with Line 2 (L2) are presented below.

Table 2 Measured construction noise

Measurement Location	Suitable Vibration Criteria (mm/s)	Measured maximum vibration (mm/s)	Comments
Measurement Location **L1** (Public School Boundary)	5 mm/s	>1mm/s	Measured vibration levels were not associated with construction activities
Measurement Location **L2** (Across Buchan Avenue – future residents)	5 mm/s	>1mm/s	
Measurement Location **L3** (Faulkner Way)	5 mm/s	>1mm/s	
Measurement Location **L4** (Across Horrie Road – future residents)	5 mm/s	>1mm/s	

Measured vibration levels as shown above are compliant.

4 CONCLUSION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged to undertake noise and vibration survey of the onsite civil works being conducted at the future Edmondson Park High School (EPHS) site located along Buchan Avenue, Edmondson Park.

The survey which is outlined in this report was undertaken on Thursday 24th July 2025 between 10:00am and 1:00pm.

The assessment has been conducted in accordance with the previously prepared site-specific *Construction Noise & Vibration Management Sub-Plan (CNVMSP), dated 5th December 2024, revision 4* prepared by PWNA for the project.

Based on the measured onsite noise and vibration levels presented above, we note:

- Measured onsite noise level were above the *Noise Affected Level (NAFL)* as formulated in the site-specific *Construction Noise & Vibration Management Sub Plan (CNVMSP)*, however in all instances the measured results are below the Highly Noise Affected Level (HNAL) of 75dBA.

- Measured vibration levels are below the relevant Human Comfort and Building Damage Criteria.

- PWNA *CNVMSP* identified this would occur and subsequently formulated required acoustic management controls accordingly.

- Measured noise and vibration levels are less than predicted noise levels in *CNVMSP* as such no additional acoustic mitigation measures are required to be implemented because of the site survey results.

- All documented acoustic mitigation measures as outlined in the *CNVMSP* are to be implemented.

Therefore, we can confirm that from our site survey we believe the site is operating in accordance with the *Construction Noise & Vibration Management Sub Plan (CNVMSP).*

For any additional information please do not hesitate to contact the person below.

Regards,

ALeffler

Alicia Leffler
Acoustic Engineer
PULSE WHITE NOISE ACOUSTICS PTY LTD

APPENDIX A: ACOUSTIC GLOSSARY

The following is a brief description of the acoustic terminology used in this report:

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
dB (A)	'A' Weighted overall sound pressure level
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.

Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt.

APPENDIX B – EQUIPMENT CALIBRATION CERTIFICATE – SVANTEK 958A – SERIAL 92806

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: G36559

EQUIPMENT TESTED : Ground Vibration Monitor

Manufacturer: Svantek

Meter Type: SVAN-958A **Serial No:** 92806

Transducers A: SV84 **Serial No:** L5548

Owner: Pulse White Noise Acoustics Pty Ltd
Level 6, 32 Walker Street
North Sydney, NSW 2060

Tests Performed: Measured Frequency response, Correct level display, Linearity display and Nominal Sensitivity

Comments: Detailed overleaf.

CONDITION OF TEST:

Temperature	22 °C ±1° C	**Date of Receipt :**	16/06/2023
Relative Humidity	40 % ±5%	**Date of Calibration :**	23/06/2023
		Date of Issue :	26/06/2023

Acu-Vib Test Procedure: AVP15 (Ground vibration Monitor & Low Frequency Transducer) based on AS2187.2 & DIN45669-1

CHECKED BY: .... **AUTHORISED SIGNATURE:** ....

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Acu-Vib Electronics
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Head Office & Calibration Laboratory
Unit 14, 22 Hudson Ave, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

Page 1 of 2 Calibration Certificate
AVCERT15 Rev.2.0 14.04.2021

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Note: In accordance with Australian Standard AS 1055:2018 calibration is required every two (2) years.