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Environmental Noise Assessment

Section 4.55 Modification Application
Redevelopment of Armidale Secondary College
Butler Street, Armidale, NSW

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TABLE OF CONTENTS

1.0	CONSULTING BRIEF	5
2.0	PROJECT DESCRIPTION & SUMMARY OF FINDINGS.....	6
3.0	ACOUSTIC CRITERIA	10
3.1	NSW Department of Planning and Environment	10
3.1.1	SEPP (Educational Establishments and Child Care Facilities) 2017	10
3.1.2	SEPP (Infrastructure) 2007	11
3.1.2.1	SEPP Clause 87 (Rail)	12
3.1.2.2	SEPP Clause 102 (Road)	12
3.2	NSW Environment Protection Authority – Noise Policy for Industry	13
3.2.1	Project Intrusiveness Noise Levels.....	13
3.2.2	Project Amenity Noise Levels	14
3.3	Measured Ambient Noise Levels	15
3.4	Project Specific Noise Criteria.....	16
4.0	SCHOOL NOISE EMISSION.....	17
4.1	Outdoor Play Areas	17
4.2	General Learning Areas.....	18
4.3	Multipurpose Hall.....	19
4.4	Games Courts	20
4.5	Public Address System & School Bell	20
4.6	Mechanical Plant.....	21
4.7	Predicted Noise Level at Receptor Locations	27
4.7.1	Outdoor Play Areas	27
4.7.2	Games Courts.....	28
4.7.3	Cumulative Noise Level – GLAs, Multipurpose Hall & Mechanical Plant.....	29
5.0	NOISE CONTROL RECOMMENDATIONS - MECHANICAL PLANT	31
6.0	NOISE IMPACT STATEMENT	32



TABLES

Table 1	Noise Sensitive Receptors.....	7
Table 2	Amenity Criteria.....	14
Table 3	Ambient Noise Levels.....	15
Table 4	$L_{eq, 15 \text{ minute}}$ Sound Power Levels - Students Playing in Outdoor Play Areas.....	17
Table 5	$L_{eq, 15 \text{ minute}}$ Sound Power Levels – Teacher & Students – GLAs.....	18
Table 6	$L_{eq, 15 \text{ minute}}$ Sound Power Levels - Proposed Auditorium.....	19
Table 7	$L_{eq, 15 \text{ minute}}$ Sound Power Levels – Active Sport On Games Courts	20
Table 8	$L_{eq, 15 \text{ minute}}$ Sound Power Levels - Mechanical Plant.....	21
Table 9	Predicted $L_{eq, 15 \text{ minute}}$ Noise Levels – Outdoor Play	27
Table 10	Predicted $L_{eq, 15 \text{ minute}}$ Noise Levels – Games Courts.....	28
Table 11	Predicted Cumulative $L_{eq, 15 \text{ minute}}$ Noise Levels – GLAs, Multipurpose Hall & Mechanical Plant	29



1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by NBRS Architects to carry out an acoustic assessment of the proposed Section 4.55 Modification Application to be submitted as part of the approved redevelopment of the Armidale Secondary College at Butler Street, Armidale, NSW. This commission involves the following:

Scope of Work:

- Establish acceptable noise level criteria
- Quantify noise emissions from the Secondary College taking into consideration the proposed Section 4.55 Modification Application
- Calculate the level of noise emission, taking into account building envelope transmission, screen walls and distance attenuation
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Provide recommendations for acoustical treatment (if necessary)
- Prepare a Section 4.55 Modification Application Environmental Noise Assessment Report.



2.0 PROJECT DESCRIPTION & SUMMARY OF FINDINGS

The Department of Education propose to submit a Section 4.55 Modification Application to modify the approved State Significant Development Application (SSDA) 9095 (29 May 2019). SSDA 2019 was approved for the redevelopment of the existing Armidale Secondary College at Butler Street, Armidale, NSW.

The Secondary College is situated on land zoned R1 – *General Residential* under Armidale Dumaresq Local Environmental Plan (LEP) 2012.

Prior to the SSDA, the Secondary College comprised of two blocks of general learning areas (GLAs), Science and Library block, two Tech blocks, hall, staff area, amenities, gymnasium (the Den) and a two storey heritage listed building (building B) containing ground floor administration and first floor GLAs

The approved SSDA will consolidate the students from Armidale Secondary College and the nearby Duval High School.

The SSDA includes the following:

- Construction of new school buildings to accommodate both Armidale Secondary College and Duval High School and allow for future growth.
- Construction of 4 x outdoor games courts.

We note that the construction of the new main school building is nearing completion and the construction of the 4 x outdoor games courts is complete at the time of writing this report (see Figure 1).

The SSDA will allow for an additional enrolment of 1009 students, taking the total number of students enrolled at the Secondary College to $(571 + 1009 =)$ 1580 students.

The Section 4.55 Modification Application seeks to modify the SSDA, as follows:

- Construct a new multipurpose hall with associated GLAs and support spaces on the southern side of the site.

Mechanical plant, including but not limited to air conditioning condenser units and exhaust fans, will be required to serve the proposed new secondary college buildings.

The Secondary College is bounded by Mann Street and Lambs Avenue to the north, Butler Street to the east, Kentucky Street to the south and Miller, Barry, Mossman and Stephen Streets to the west. Residential premises are located on the opposite side of Butler Street to the east and Miller and Stephen Streets to the west, as shown on Figure 1. The Secondary College has no shared boundary with any residential lots.



The nearest noise sensitive receptors to the Secondary College has no shared boundary with any residential lots, in various directions, are shown on Figure 1 and as follows in Table 1.

Table 1 Noise Sensitive Receptors

Receptor and Type	Address	Direction from site
R1 – Residential	186 Mossman Street	East
R2 – Residential	187 Mossman Street	West
R3 – Residential	42 Hargrave Street	East

Each receptor location has been selected to represent the adjacent residential premises, eg R1 and R3 are representative of all residential receptors to the east of the Secondary College; R2 is representative of all residential receptors to the west of the Secondary College.

The existing and ongoing operating hours for the Secondary College are:

Standard Hours:

- Monday – Friday: 9.00 am – 3.30 pm.

Outside of standard school hours, the existing and ongoing operating hours for the Den are:

Winter Hours:

- Monday – Thursday: 4.00 pm – 10.00 pm;

Summer Hours:

- Monday – Friday: 4.00 pm – 10.00 pm; and

Special Occasions (carnivals and training)

- Saturday – Sunday: 7.00 am – 10.00 pm.

The existing and ongoing operating hours of the games courts are:

- Monday – Sunday: 7.00 am – 10.00 pm.

We have assumed that the operating hours for the new multipurpose hall will be as follows:

- Monday – Sunday: 7.00 am – 10.00 pm.

The development is a State Significant Development (SSD) and has been issued by the NSW Department of Planning and Environment with the Secretary's Environmental Assessment Requirements (SEARs). The SEARs require an assessment against the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry 2017* and the NSW Department of Planning's (DoP) *Development Near Rail Corridors and Busy Roads – Interim Guideline*.



An acoustic assessment of the noise from the outdoor play areas, GLAs, multipurpose hall, games courts, public address system and school bell and mechanical plant has been carried out to ensure the noise impact of the Secondary College, subsequent to the Section 4.55 Modification Application/redevelopment, will not adversely affect the acoustic amenity of the nearby residences. The hours of use, functional use and capacity (two basketball courts) of the Den will not change as part of this proposal, subsequently, no further consideration of the use of the Den is required in this assessment.

Calculations show that, provided the recommendations in Section 5 of this report are implemented and adhered to, the level of noise emission, subsequent to the Section 4.55 Modification Application/redevelopment, from the Secondary College will meet the acoustic requirements in the NSW Department of Planning and Environment's *SEPP (Educational Establishments and Child Care Facilities) 2017* and NSW Environment Protection Authority's (EPA) *Noise Policy for Industry*.

Also, although not applicable to this site, the proposal will also comply with the requirements of the State Environment Planning Policy (SEPP) (Infrastructure) 2007 and the Department of Planning and Environment's (DoPE) *Development Near Rail Corridors and Busy Roads – Interim Guideline*.



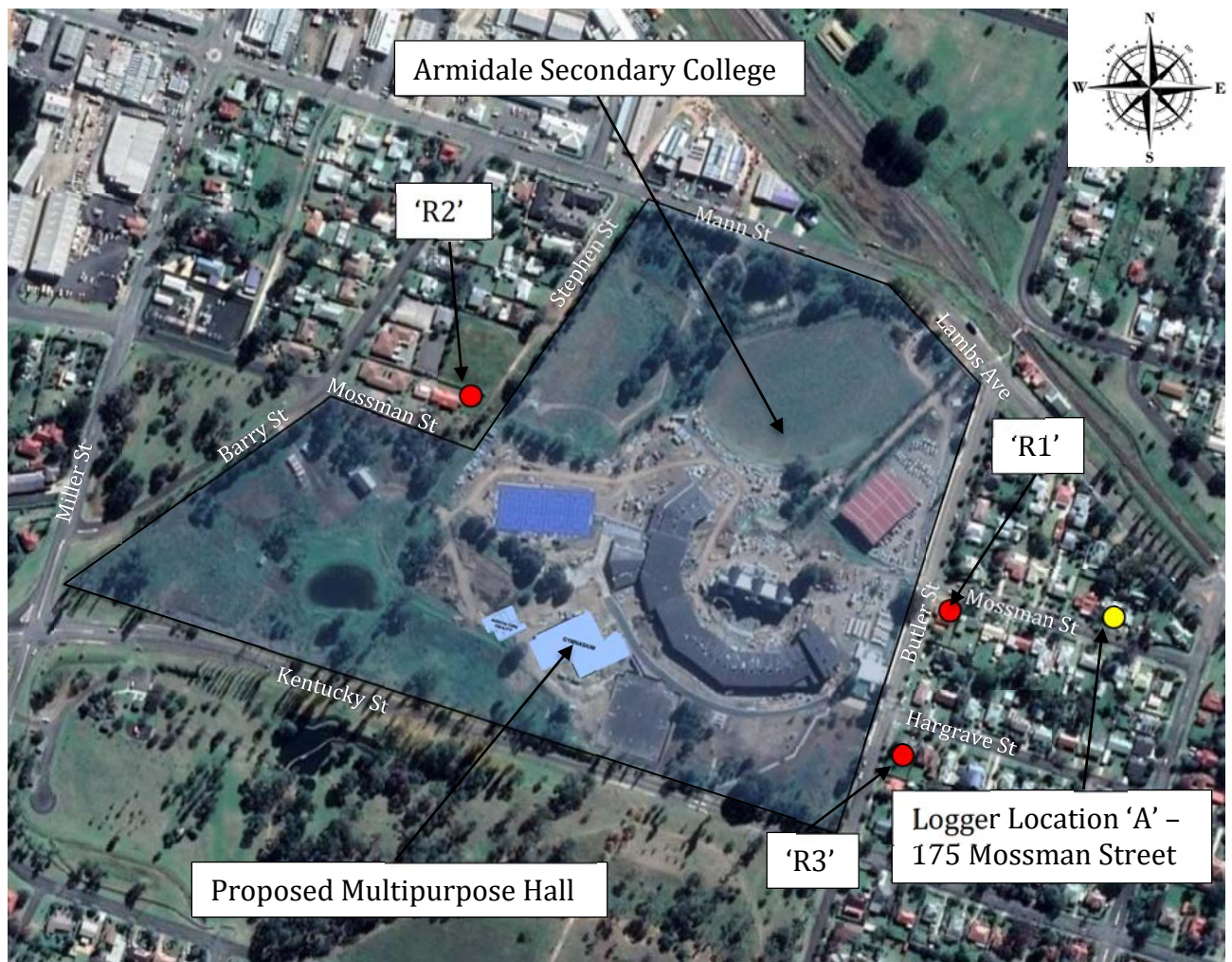


Figure 1 - Location Plan, Butler Street, Armidale, NSW.



3.0 ACOUSTIC CRITERIA

3.1 NSW Department of Planning and Environment

3.1.1 SEPP (Educational Establishments and Child Care Facilities) 2017

The NSW Department of Planning and Environment (DoPE) published the State Environmental Planning Policy (SEPP) (Educational Establishments and Child Care Facilities) 2017 on 1 September 2017. The relevant parts of the SEPP to this proposal have been extracted and are revised below.

Part 4 Schools - specific development controls

35 Schools – development permitted with consent

- (2) *Development for a purpose specified in clause 39 (1) or 40 (2) (e) may be carried out by any person with development consent on land within the boundaries of an existing school.*
- (9) *A provision of a development control plan that specifies a requirement, standard or control in relation to development of a kind referred to in subclause (1), (2), (3) or (5) is of no effect, regardless of when the development control plan was made.*

39 Existing schools – complying development

- (1) *Development carried out by or on behalf of any person on land within the boundaries of an existing school is complying development if:*
 - (a) *it consists of the construction of, or alterations or additions to, any of the following:*
 - (i) *a library, an administration building or office premises for the purposes of the school,*
 - (ii) *a gym, indoor sporting facility or hall,*
 - (iii) *a teaching facility (including lecture theatre), laboratory, trade facility or training facility,*
 - (iv) *a cafeteria that is carried out in accordance with AS4674:2004, Design, construction and fit-out of food premises, published by Standards Australia on 11 February 2004,*
 - (v) *a kiosk or bookshop for students or staff (or both),*
 - (vi) *a hall with associated covered outdoor learning area or kiosk,*
 - (vii) *an outdoor learning or play area and associated awning or canopy,*
 - (viii) *demolition of a building or structure (unless a State heritage item or local heritage item),*



- (ix) *minor alterations or additions (such as internal fitouts, structural upgrades, or alterations or additions to enable plant or equipment to be installed, to address work health and safety requirements or to provide access for people with a disability),*
 - (x) *restoration, replacement or repair of a damaged building or structure, and*
 - (b) *it complies with this clause.*
 - (3) *The development standards for complying development under this clause (other than for development referred to in subclause (1) (a) (viii), (ix) or (x)) are set out in Schedule 2.*

‘Schedule 2 Schools – Complying development’ of the SEPP requires the following regarding noise:

‘6 Noise

A new building or (if the development is an alteration or addition to an existing building for the purpose of changing its use) an existing building that is to be used for the purpose of a school or school-based child care must be designed so as not to emit noise exceeding an L_{Aeq} of 5 dB(A) above background noise when measured at any lot boundary.’

Also, ‘Schedule 4 Schools – design quality principles’ of the SEPP requires the following:

‘Principle 5. Amenity

Schools should provide pleasant and engaging spaces that are accessible for a wide range of educational, informal and community activities, while also considering the amenity of adjacent development and the local neighbourhood.’

3.1.2 SEPP (Infrastructure) 2007

The NSW Department of Planning and Environment (DoPE) published the “*Development Near Rail Corridors and Busy Roads – Interim Guidelines*” in 2008. The Guidelines refer to Clauses 87 (Rail) and Clause 102 (Road) of the State Environment Planning Policy (Infrastructure) 2007 for the noise criteria for developments affected by railway or road traffic noise.



3.1.2.1 SEPP Clause 87 (Rail)

Clause 87 of the State Environmental Planning Policy (SEPP) (Infrastructure) 2007 details the following in with regards to rail noise and vibration:

- (1) *This clause applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration:*
 - (a) *a building for residential use,*
 - (b) *a place of public worship,*
 - (c) *a hospital,*
 - (d) *an educational establishment or child care centre.*
- (2) *Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.*

The rail corridor (North West NSW Line) on the opposite side of Mann Street to the north of Armidale Secondary College is used by trains twice per day (train arrives at Armidale Station – same train departs Armidale Station). The development will not be ‘adversely affected by rail noise or vibration’ as per the above, therefore the SEPP is not applicable.

3.1.2.2 SEPP Clause 102 (Road)

Clause 102 of the State Environmental Planning Policy (SEPP) (Infrastructure) 2007 details the following in with regards to road noise and vibration:

This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- (a) *a building for residential use,*
- (b) *a place of public worship,*
- (c) *a hospital,*
- (d) *an educational establishment or child care centre.*

It is unlikely that the AADT will reach 40,000 on roads surrounding the Secondary College site, therefore the SEPP is not applicable.



3.2 NSW Environment Protection Authority – Noise Policy for Industry

The NSW Environment Protection Authority (EPA) published the *Noise Policy for Industry* (NPI) in October 2017. The *NPI* is specifically aimed at assessing noise from industrial noise sources listed in Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO, 1997).

The *NPI* provides a useful framework to assess noise emission from non-scheduled premises, whether that premises maintains the amenity of an area.

Section 1.4 of the *NPI* specifies the types of industrial noise sources the policy is designed for, such as mechanical plant and equipment. In addition, Section 1.5 of the *NPI* lists the type of noise sources to which the policy does not apply to, which includes '*noise sources covered by regulation (domestic/neighbourhood uses)*'.

The *NPI* is **not** applicable (Section 1.5 of the *NPI* - see above) to noise associated with students engaged in active/passive play in the outdoor/indoor areas of an educational establishment. However, the amenity noise levels may be used as a screening test to establish whether further investigation into the likely effects, if any, on the acoustic amenity (as per the *SEPP*) of the local area is warranted.

3.2.1 Project Intrusiveness Noise Levels

The EPA states in Section 2.3 of its NSW *NPI* (October 2017) that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the rating background noise level by more than 5 dB when beyond a minimum threshold (EPA *NPI*, 2017, Section 2.3).

The Rating Background Level at Logger Location 'A', 175 Mossman Street, Armidale was 39 dBA during the day and 34 dBA in the evening (see Table 3).

Therefore, the acceptable $L_{eq, 15 \text{ minute}}$ noise intrusiveness criteria in this area is:

- $(39 + 5 =) 44 \text{ dBA } L_{eq, 15 \text{ minute}}$ during the day; and
- $(34 + 5 =) 39 \text{ dBA } L_{eq, 15 \text{ minute}}$ in the evening.



3.2.2 Project Amenity Noise Levels

Depending on the type of area in which the noise is being made, there is a certain reasonable expectancy for noise amenity. The NSW *NPI* provides a schedule of recommended L_{eq} industrial noise levels that under normal circumstances should not be exceeded. If successive developments occur near a residential area, each one allowing a criterion of background noise level plus 5 dB, the ambient noise level will gradually creep higher.

The recommended L_{eq} noise levels below in Table 2 are taken from Section 2.4, Table 2.2 of the *NPI*.

Table 2 Amenity Criteria

Receiver	Noise Amenity Area	Time of Day	L_{eq} , dBA, Recommended Amenity Noise Level
Residential	Suburban	Day	55
		Evening	45
		Night	40

The L_{Aeq} is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, the *NPI* assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq, period} + 3 \text{ decibels (dB)}$ (Section 2.2, *NPI*).

Compliance with the amenity criteria will limit ambient noise creep. **Section 2.4** of the *NPI* states the following:

*“To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a **project amenity noise level** applies for each new source of industrial noise as follows:*

- ***Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB (A)***”.

The existing L_{eq} noise level at Logger Location ‘A’, 175 Mossman Street, Armidale was 52 dBA during the day and 45 dBA in the evening (see Table 3). Therefore, the acceptable amenity criteria for the residential receptors in this area are:

- $(55 - 5 + 3 =) 53 \text{ dBA } L_{eq, 15 \text{ minute}}$ during the day; and
- $(45 - 5 + 3 =) 43 \text{ dBA } L_{eq, 15 \text{ minute}}$ in the evening.



3.3 Measured Ambient Noise Levels

In order to assess the severity of a possible environmental noise problem in a residential area it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The ambient L_{90} background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measuring period (typically 15 minutes).

The Rating Background Level (RBL) is defined by the Environment Protection Authority (NSW) as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for day, evening or night periods, measured over a number of days during the proposed days and times of operation.

The places of worst possible annoyance are the nearby residential dwellings. These locations are shown in the Site Plan on Figure 1 as 'R1' to 'R3'. The times of worst possible annoyance will be during the day when the Secondary College is operating.

Ambient noise levels were measured in the front yard of 175 Mossman Street, Armidale, shown as Logger Locations 'A' on Figure 1, from Thursday 10 May to Friday 18 May, 2018.

The day and evening ambient noise levels are presented in the attached Appendix B and also below in Table 3.

Table 3 Ambient Noise Levels

Noise Measurement Location	Time Period	L_{90} Rating Background Level	Existing L_{eq} Noise Level
Logger Location 'A' -	Day (7 am to 6 pm)	39 dBA	52 dBA
Front yard – 175 Mossman Street	Evening (6 pm to 10 pm)	34 dBA	45 dBA

Meteorological conditions during the testing typically consisted of clear skies and temperatures of - 4 to 20°C. Atmospheric conditions were ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor areas.



3.4 Project Specific Noise Criteria

Considering there is no specific noise criteria for outdoor activities taking place at an educational establishment, noise emission from outdoor activities will be screened against the amenity noise levels specified in the *NPI. Schedule 4, Principle 5 – Amenity* of the *SEPP*, requires that the amenity of adjacent development and the local neighbourhood be considered.

Noise emissions from the use (indoor classes and mechanical plant) of the new school buildings will be assessed against the requirements of *Schedule 2, Part 6 - Noise* of the *SEPP*.

When all the above factors are considered, we find that the most stringent noise criteria are:

Residential Receivers – ‘R1’ to ‘R3’ – based on Logger Locations ‘A’

- **53 dBA** $L_{eq, 15 \text{ minute}}$ during the day for activities in the outdoor areas;
- **44 dBA** $L_{eq, 15 \text{ minute}}$ during the day for all noise associated with the use of the new school buildings; and
- **39 dBA** $L_{eq, 15 \text{ minute}}$ in the evening for all noise associated with the use of the new school buildings.

These criteria apply at the most-affected point on or within the residential property boundary. For upper floors, the noise is assessed outside the nearest window.



4.0 SCHOOL NOISE EMISSION

The main sources of noise from the Secondary College, will be as follows:

- Students playing in the outdoor play area;
- Students inside the GLAs;
- Gymnasium with the multipurpose hall ;
- Games courts;
- Public address system and school bell; and
- Mechanical plant.

The noise assessment was based on the drawings by NBRS Architects, dated 21 August, 2020, attached as Appendix C.

4.1 Outdoor Play Areas

Students will be outside for a range of times, including before school, recess, lunch, PE classes and after school, however the outdoor areas are only likely to be at capacity during recess and lunch.

In order to model the worst case scenario of noise emission from students outdoors at play, we have assumed that 2/3 of the 1580 students (1043) will engage in active play at the one time, with half (522) of those students making noise at any given time.

Based on Harris¹ and our noise level database gathered over many years, we calculate the sound power levels shown in Table 4.

Table 4 Leq, 15 minute **Sound Power Levels - Students Playing in Outdoor Play Areas**

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
10 x students – males with loud voice	90	69	71	80	87	86	82	75	66
1043 students at play (522 students making noise)	107	86	88	97	104	103	99	92	83

¹ Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, McGraw-Hill Inc, New York, (Page 16.2)



4.2 General Learning Areas

We have been advised that the maximum GLA class size within the proposed new rooms will be 30 students.

During normal classroom activities, the main source of noise will be from the teachers and students talking, or in the technology and applied studies (TAS) rooms, the operation of machinery. We have assumed that there may be a maximum of 1/3 (10) of the students talking normally. We have also assumed that the teacher in each classroom may be talking loudly.

Calculations assume students are distributed evenly throughout the inside of the GLAs and windows and doors are partially open (10% of floor area).

Day Design Pty Ltd has previously measured and quantified the Octave Band Centre Frequency sound power level of teachers and students talking and machinery at different noise levels. The $L_{eq, 15 \text{ minute}}$ sound power levels of teachers and students are shown below in Table 5.

Table 5 $L_{eq, 15 \text{ minute}}$ Sound Power Levels – Teacher & Students – GLAs

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
General Learning Areas									
Teacher talking loudly	79	60	70	75	80	73	70	62	55
School student talking normally	63	53	53	60	63	58	53	52	47
1 teacher and 30 students	80	65	71	76	81	74	71	65	59
Technology and Applied Studies									
Drill press	76	61	81	79	71	68	68	59	52
Wood lathe	87	65	70	72	82	84	81	76	66
Disc sander	86	82	76	79	77	77	79	80	81
Band saw	87	75	76	84	86	81	76	77	70
Drop saw	96	69	75	74	79	89	88	93	83
Mortiser	80	78	75	78	77	74	72	72	72
Router	93	73	77	96	91	87	83	81	76
Thicknesser	84	68	69	73	75	77	79	76	71



4.3 Multipurpose Hall

We have assumed the gymnasium within the multipurpose hall will have capacity for up to 1156 people. From our observations of other sites, we have modelled the noise emission from the gymnasium as follows:

- People talking loudly (10%), guests talking with a raised voice (20%), guests talking normally (20%) and the rest are not talking or listening (50%)
- Amplified music will be played during performances and will consist predominantly of either pre-recorded amplified music or live performances.
- We have assumed as a worst case scenario the gymnasium may operate at full capacity during a performance.
- We have assumed that the glazed operable doors on the south-eastern side of the gymnasium will be closed during performances and will be constructed with 6.38 mm laminated glass.
- We have assumed that the fixed framed windows on the north-western side of the gymnasium will have 6.38 mm laminated glass installed within the frames.
- We have assumed that the louvres on the north-western side of the gymnasium will be 50 % open during a performance.
- We have assumed that the walls will be constructed with pre-fabricated concrete panels.
- We have assumed that the roof/ceiling will be constructed with a steel framing system with external metal cladding.

Based on information in Harris⁵ and in our noise level database gathered over many years, we calculate the sound power levels shown below in Table 6.

Table 6 Leq, 15 minute **Sound Power Levels - Proposed Auditorium**

Description	Leq Sound Power Level dBA
One Man Talking Loudly	80
One Man Talking with Raised Voice	69
One Man Talking Normally	63
Amplified Live Band	105
1156 People	101
1156 People with Amplified Live Band	107



4.4 Games Courts

Four games courts are proposed to be constructed on the western side of the Secondary College. The proposed games courts may be used during school hours between 7 am and 3.30 pm, Monday to Friday, or leased out to the public between the times of 3.30 pm and 10 pm, Monday to Friday and on weekends between 7 am and 10 pm.

In order to model the worst case scenario of noise emission from people playing on the proposed games courts, we have assumed the following:

- A single basketball game, consisting of 10 people, will be played on each of the new games courts. We have assumed that 25% of the participants may be making noise at any given time during a game.

The $L_{eq, 15 \text{ minute}}$ sound power level and spectra of people engaging in active sport are shown below in Table 7 and is based on previous measurements by Day Design.

Table 7 $L_{eq, 15 \text{ minute}}$ Sound Power Levels – Active Sport On Games Courts

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
One child engaged in active sport	82	56	59	64	69	79	77	72	66

4.5 Public Address System & School Bell

The Secondary College will be provided with a public address system and a bell to signal the start and end of classes. The location of the speakers has not yet been determined however assuming up to 6 speaker locations are provided, the maximum sound pressure level should be no greater than **72 dBA** at 3 metres from each speaker in order to meet the residential noise criteria.



4.6 Mechanical Plant

No changes to the mechanical plant serving the new main building and Block B are proposed as part of this assessment.

The air conditioning condenser units for the multipurpose hall will be located in a roof top plant area on the northern of the new buildings.

The specific type of mechanical plant have not yet been selected for the multipurpose hall, therefore this assessment is based on typical units used for similar developments.

The $L_{eq, 15 \text{ minute}}$ sound power levels for typical equipment used at school sites and the commissioned equipment for the new main building and Building B, as part of the SSDA, are presented in Table 8.

Table 8 $L_{eq, 15 \text{ minute}}$ Sound Power Levels - Mechanical Plant

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
Typical Mechanical Plant for Multipurpose Halls									
Split system air conditioner (Classrooms)	72	76	73	72	69	68	63	55	52
VRF air conditioner (Large spaces)	89	82	82	85	74	87	80	77	69
PAC Units	89	89	89	90	86	84	80	76	71
Smoke Spill Exhaust Fans	86	92	88	85	82	81	80	78	71
Toilet Exhaust Fans	83	77	79	88	78	77	71	67	62
Commissioned Mechanical Plant									
Fans									
EF1 - Building O, Zone 1 – Change Room and Amenities <i>Fantech - GUD568V</i>	72	54	65	68	68	69	64	58	46
EF2 - Building O, Zone 1 – Change Room and Amenities <i>Fantech - GUE284V</i>	69	70	66	69	67	64	64	57	48
EF3 - Zone 7 – Upper Ground Tea Room <i>Fantech - GUE284V</i>	69	70	66	69	67	64	64	57	48
EF4 -Zone 7 – Upper Ground & Level 1 WC's <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50



Table 8 Leq, 15 minute Sound Power Levels - Mechanical Plant - Continued

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
EF5 - Zone 7 – Upper Ground Boys & Girls Clinic – <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50
EF6 - Zone 7 – Level 2 WC's – <i>Fantech - GUE284V</i>	69	70	66	69	67	64	64	57	48
EF7 - Zone 7 – Level 2 Kitchen <i>Fantech - GUE254V</i>	66	65	63	64	63	61	61	53	44
EF8 - Zone 6 – Upper Ground WC's <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50
EF9 - Zone 6 – Upper Ground WC's <i>Fantech - GUEEC40V</i>	83	77	79	88	78	77	71	67	62
EF10 - Zone 5 – Upper Ground WC's <i>Fantech - GUEEC40V</i>	83	77	79	88	78	77	71	67	62
EF11 - Zone 4 – Upper Ground WC's <i>Fantech - GUEEC40V</i>	83	77	79	88	78	77	71	67	62
EF12 - Zone 3 – Ground WC's <i>Fantech - GUEEC40V</i>	83	77	79	88	78	77	71	67	62
EF13 - Building Zone 1 – Change Rooms <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50
EF14 - Zone 3 – Upper Ground Laundry <i>Fantech - GUE254V</i>	66	65	63	64	63	61	61	53	44
EF15 - Zone 2 – Lower Ground WC's <i>Fantech - GUEEC40V</i>	83	77	79	88	78	77	71	67	62
EF16 - Zone 2 – Lower Ground Chemical Store <i>Fantech - CE314VGL</i>	67	82	76	68	65	57	57	55	49



Table 8 Leq, 15 minute Sound Power Levels - Mechanical Plant - Continued

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
EF17 - Zone 3 – Upper Ground Pantry <i>Fantech - CE314VGL</i>	67	82	76	68	65	57	57	55	49
EF18 - Zone 7 – Upper Ground Main Switchroom <i>Fantech - TD-500/150SIL Lo</i>	53	51	47	53	53	48	40	32	28
EF19 - Agriculture Building – Access WC <i>Fantech - CE254V</i>	61	71	69	63	60	52	52	50	44
EF20 - Building B – Upper Ground & Level 1 WC's & CLNR <i>Fantech - TD-1300/250 SIL Hi</i>	74	56	52	70	72	71	62	51	48
EF21 - Building B – Level 1 Kiln Hood 1 <i>Fantech - PCD506DD-SS316</i>	71	81	80	73	67	63	61	59	57
EF22 - Building B – Level 1 Kiln Hood 2 <i>Fantech - PCD506DD-SS316</i>	71	81	80	73	67	63	61	59	57
EF23 - Building B – Level 1 Dark Room <i>Fantech - PUE354ER</i>	67	68	70	66	61	62	61	59	53
EF24 - Zone 3 – Ground Lazer Cutter <i>Fantech - CEEC35V(75.7SPD)</i>	69	67	69	67	67	63	62	57	45
EF25 - Agriculture Building – WC's <i>Fantech - TD-800/200 SIL Lo</i>	60	63	61	63	56	55	53	49	43
EF26 - Agriculture Building – Boot Room <i>Fantech - RIL-150TSW Lo</i>	59	51	47	55	57	56	53	46	39
EF27 - Agriculture Building – Acc WC <i>Fantech - RIL-150TSW Hi</i>	63	55	51	59	61	59	56	49	42



Table 8 **Leq, 15 minute Sound Power Levels - Mechanical Plant - Continued**

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
EF28 - Agriculture Building – Acc WE <i>Fantech - RIL-150TSW Hi</i>	63	55	51	59	61	59	56	49	42
EF29 - Agriculture Building – Comms <i>Fantech - RIL-150TSW Hi</i>	63	55	51	59	61	59	56	49	42
EF30 - Agriculture Building – Chemical Store <i>Fantech - PFC316D</i>	62	76	68	64	60	54	54	48	-
EF31 - Building B – Upper Ground F Amenities <i>Fantech - PCE314ER</i>	67	72	69	68	64	60	57	55	58
EF32 - Building B – Upper Ground M Amenities <i>Fantech - PCE314ER</i>	67	72	69	68	64	60	57	55	58
EF33 - Building B – Upper Ground Canteen General Exhaust <i>Fantech - TD-800/200 SIL Lo</i>	60	50	51	57	55	58	53	48	43
EF34 - Building O – Sports Store <i>Fantech - MV254</i>	63	62	67	67	60	56	52	45	-
KEF1 - Zone 3 – Upper Ground Kitchen Cert 2 Hoods EH1&2 <i>Fantech - CDEC63VGL (63.9SPD)</i>	74	73	78	77	73	66	62	64	53
KEF2 - Zone 3 – Upper Ground Kitchen Cert 2 Hoods EH3&4 <i>Fantech - CDEC63VGL (63.9SPD)</i>	74	73	78	77	73	66	62	64	53
KEF3 - Zone 3 – Upper Ground Kitchen Cert 2 Hood EH5 <i>Fantech - CDEC63VGL (56.3SPD)</i>	71	69	75	75	69	62	58	62	48



Table 8 Leq, 15 minute Sound Power Levels - Mechanical Plant - Continued

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
KEF4 - Zone 3 – Upper Ground Kitchen Cert 2 Hood EH7 <i>Fantech - CDEC63VGL</i> (70.3SPD)	70	77	76	70	68	64	61	63	47
KEF5 - Zone 3 – Upper Ground Kitchen Cert 2 Hood EH6 <i>Fantech - GUE314V</i>	66	68	66	66	63	61	58	54	47
KEF6 - Zone 3 – Upper Ground Semi Commercial Hood EH9 <i>Fantech - CEEC45VGL</i> (70.3SPD)	70	77	76	70	68	64	61	63	47
KEF7 - Zone 3 – Upper Ground Semi Commercial <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50
KEF8 - Zone 3 – Upper Ground Domestic Kitchen <i>Fantech - GUE354V</i>	72	71	73	72	70	67	64	58	50
Smoke Spill Exhaust Fans									
SEF1 - Building O, Zone 1 <i>Fantech - RSS1258CA9/32</i>	86	92	88	85	82	81	80	78	71
SEF2 - Building O, Zone 1 <i>Fantech - RSS1258CA9/32</i>	86	92	88	85	82	81	80	78	71
VRV Heat Recovery Multi Split Systems - Condenser Units									
HR8 - Daikin – REYQ8TY1	77	82	80	80	76	70	64	56	50
HR10 - Daikin – REYQ10TY1	78	81	83	79	77	72	66	62	52
HR12 - Daikin – REYQ12TY1	80	84	85	79	79	74	72	65	58
HR14 - Daikin – REYQ14TY1	81	85	85	82	80	74	69	63	67
HR16 - Daikin – REYQ16TY1	82	89	87	85	80	75	70	64	61
HR20 - Daikin – REYQ20TY1	86	86	85	87	85	80	77	73	66
HR24 - Daikin – REYQ24TY1	83	87	88	82	82	77	75	68	61



Table 8 Leq, 15 minute Sound Power Levels - Mechanical Plant - Continued

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
HR26 - Daikin – REYQ26TY1	84	88	88	84	83	77	74	67	68
HR30 - Daikin – REYQ30TY1	85	88	88	86	83	79	75	70	64
HR32 - Daikin – REYQ32TY1	85	92	90	88	83	78	73	67	64
HR34 - Daikin – REYQ34TY1	86	91	89	88	84	80	74	70	65
HR36 - Daikin – REYQ36TY1	88	91	89	89	86	81	78	74	67
Single Split Systems - Condenser Units									
CUA - Daikin – RZQS71AV1	69	71	68	70	66	65	59	56	49
CUB - Daikin – RZQS100AV1	69	72	73	66	66	65	59	58	48
CUC - Daikin – RXS50L2V1B	62	65	66	63	59	56	53	45	37
CUD - Daikin – RZQS160AV1	69	67	68	70	66	67	59	54	50
CUE - Daikin – RZQ10PUY1	79	84	82	81	77	72	68	63	61
CUF - Daikin – RZQS60AV1	66	58	59	52	52	51	46	44	34
CUG - Daikin – RZQS125AV1	70	41	54	61	66	66	63	58	51
CUE1/CUG - Daikin – RXYMQ5AV4A	72	77	74	73	68	67	64	59	52

Once mechanical plant selection for the multipurpose hall has been finalised, a final assessment should be made, prior to the issue of a Construction Certificate.



4.7 Predicted Noise Level at Receptor Locations

Knowing the sound power level of a noise source (See Tables 4 – 7), the sound pressure level (as measured with a sound level meter) can be calculated at a remote location using suitable formulae to account for distance losses, sound barriers, building envelope transmission, etc. The predicted noise level at the residential receptors from the various noise producing facets of the development are shown below.

Where applicable, calculations include acoustic shielding provided by the Secondary College buildings and sound barrier walls to the residential receptors.

4.7.1 Outdoor Play Areas

Based on a maximum of 1043 students playing in the outdoor play areas at any one time, the predicted $L_{eq\ 15\ minute}$ noise level is calculated to be as shown below in Table 8. The noise prediction was determined by placing all 1043 students into four equal groups of 260 students throughout the outdoor play areas.

Table 9 Predicted $L_{eq\ 15\ minute}$ Noise Levels – Outdoor Play

Receptor Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R1 – 186 Mossman Street	48	53	Yes
R2 – 187 Mossman Street	51	53	Yes
R3 – 42 Hargrave Street	50	53	Yes

The predicted level of noise from the students playing outdoors at the receptor locations 'R1', 'R2' and 'R3' complies with the criteria in Section 3.4 of this report, and is therefore acceptable.



4.7.2 Games Courts

Based on a maximum of 40 people playing games of basketball on the games courts at any one time during the day and evening, the predicted $L_{eq, 15 \text{ minute}}$ noise level is calculated to be as shown in Table 9. The noise prediction was determined by placing the 40 people into four equal groups of 10 on each of the games courts.

Table 10 Predicted $L_{eq, 15 \text{ minute}}$ Noise Levels – Games Courts

Receptor Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
Day Period– 7 am to 6 pm			
R1 – 186 Mossman Street	26	44	Yes
R2 – 187 Mossman Street	38	44	Yes
R3 – 42 Hargrave Street	17	44	Yes
Evening Period – 6 pm to 10 pm			
R1 – 186 Mossman Street	26	39	Yes
R2 – 187 Mossman Street	38	39	Yes
R3 – 42 Hargrave Street	17	39	Yes

The predicted level of noise from the use of the games courts at the receptor locations 'R1', 'R2' and 'R3' complies with the day and evening criteria in Section 3.4 of this report, and is therefore acceptable.



4.7.3 Cumulative Noise Level – GLAs, Multipurpose Hall & Mechanical Plant

The cumulative noise impact from the GLAs, multipurpose hall and mechanical plant within the Secondary College are summarised and shown in Table 10.

Table 11 Predicted Cumulative $L_{eq, 15 \text{ minute}}$ Noise Levels – GLAs, Multipurpose Hall & Mechanical Plant

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA)	Compliance
Day – 7 am to 6 pm			
R1 – 186 Mossman Street			
- GLAs	41		
- Multipurpose Hall	30		
- Mechanical plant	42		
Cumulative Noise Level	45	44	Yes*
R2 – 187 Mossman Street			
- GLAs	43		
- Multipurpose Hall	40		
- Mechanical plant	40		
Cumulative Noise Level	46	44	Yes*
R3 – 42 Hargrave Street			
- GLAs	42		
- Multipurpose Hall	34		
- Mechanical plant	42		
Cumulative Noise Level	45	44	Yes*
Evening – 6 pm to 10 pm			
R1 – 186 Mossman Street			
- Multipurpose Hall	30		
- Mechanical plant	< 20		
Cumulative Noise Level	30	39	Yes
R2 – 187 Mossman Street			
- Multipurpose Hall	40		
- Mechanical plant	33		
Cumulative Noise Level	41	39	Yes*
R3 – 42 Hargrave Street			
- Multipurpose Hall	34		
- Mechanical plant	32		
Cumulative Noise Level	36	39	Yes

**An exceedance of up to 2 dB is not considered significant and is generally not discernable to the human ear.*



The predicted cumulative level of noise from the GLAs and mechanical plant at the receptor locations 'R1', 'R2' and 'R3', complies with the criteria in Section 3.4 of this report, and is therefore acceptable.



5.0 NOISE CONTROL RECOMMENDATIONS - MECHANICAL PLANT

The levels of noise emission from the mechanical plant associated with the new multipurpose hall has potential to be in excess of the acceptable noise criteria in Section 3.4 of this report. Therefore, noise controls may be required.

The specifications for the mechanical plant have not yet been finalised for the new multipurpose hall. For typical mechanical plant equipment with sound power levels not exceeding those listed in Table 8 (*multipurpose hall only*), it is reasonable and feasible to locate the plant area or equipment itself so that noise will not impact the neighbouring properties.

Once mechanical plant has been finalised, a detailed acoustic assessment should be made, prior to the issue of a Construction Certificate (or during the detailed design stage). We recommend that the mechanical services engineers select mechanical plant equipment with the lowest sound power levels to reduce the amount of acoustic treatment necessary to achieve the noise criteria at nearby residential receivers.

We offer to provide detailed noise controls when specifications of the mechanical plant equipment have been finalised.



6.0 NOISE IMPACT STATEMENT

Day Design Pty Ltd was engaged by NBRS Architects to carry out an acoustic assessment of the proposed Section 4.55 Modification Application to be submitted as part of the approved redevelopment of the Armidale Secondary College at Butler Street, Armidale, NSW. This commission involves the following:

Calculations show that provided the recommendation in Section 5 of this report are implemented and adhered to, the level of noise emitted from the Armidale Secondary College at Butler Street, Armidale, NSW, subsequent to the Section 4.55 Modification Application, will meet the acoustic requirements in the NSW Department of Planning and Environment's *SEPP (Educational Establishments and Child Care Facilities) 2017* and NSW Environment Protection Authority's (EPA) *Noise Policy for Industry*, as detailed in Section 3 of this report, and be considered acceptable.

In addition, the amenity of adjacent development and the local neighbourhood will be respected and upheld.

Also, although not applicable to this site, the proposal will also comply with the requirements of the State Environment Planning Policy (SEPP) (Infrastructure) 2007 and the Department of Planning's (DoP) *Development Near Rail Corridors and Busy Roads – Interim Guideline*.



Adam Shearer, BCT (Audio), MDesSc (Audio and Acoustics), MAAS
Senior Acoustical Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES

- Appendix A – Noise Survey Instrumentation
- Appendix B – Ambient Noise Survey
- Appendix C – Proposed Site Layout



APPENDIX A – NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis were made with instrumentation as follows in Table A:

Table A Noise Instrumentation

Description	Model No.	Serial No.
Infobyte Noise Logger	iM4	118
Condenser Microphone 0.5" diameter	MK 250	118

An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 #118 is a Type 2 precision environmental noise monitor meeting all the applicable requirements of AS1259 for an integrating-averaging sound level meter.

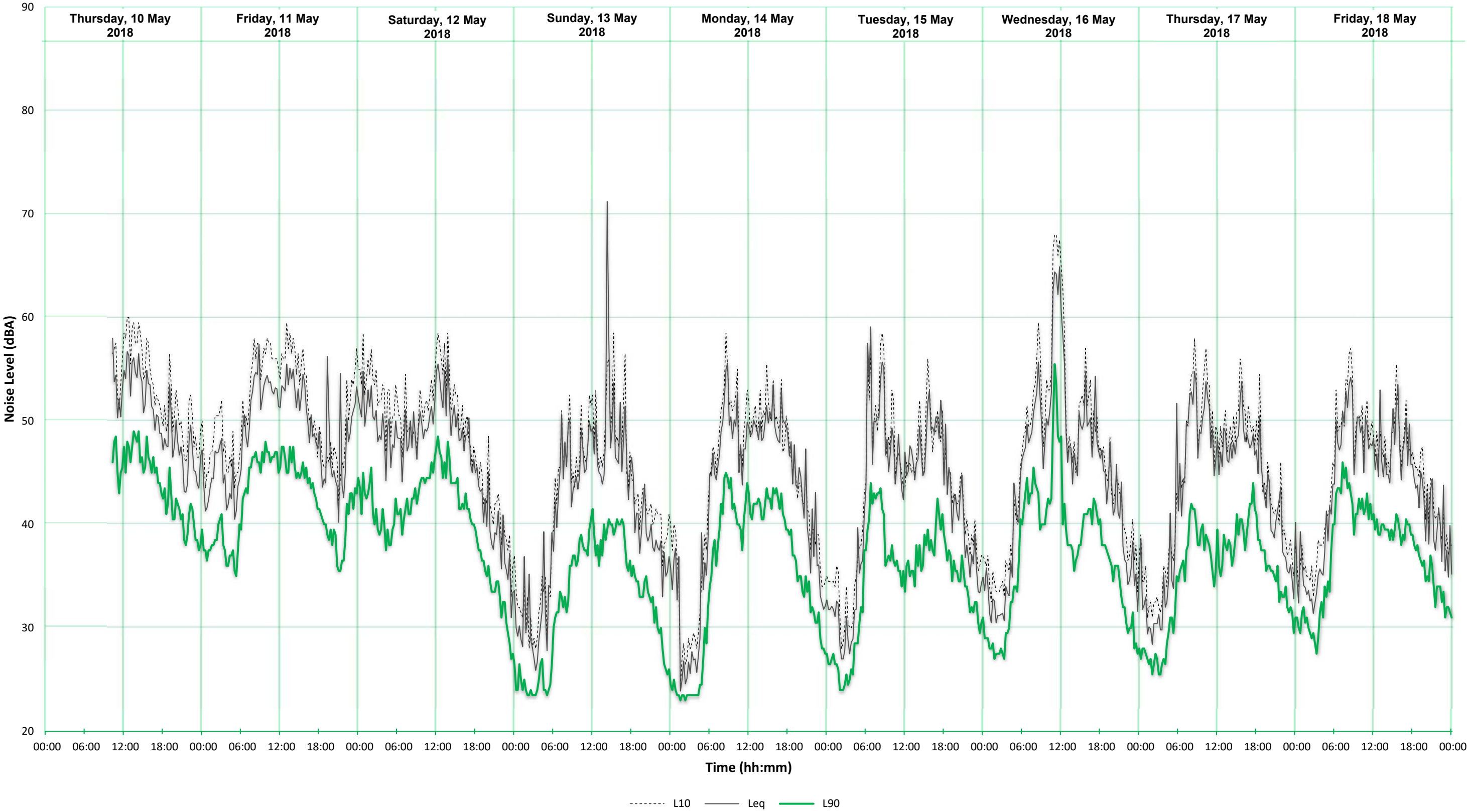
All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be within 1 dB for long-term measurements. No adjustments for instrument drift during the measurement period were warranted.



AMBIENT NOISE SURVEY

6495-12
Appendix B

Located at 175 Mossman Street, Armidale, NSW



LEGEND

- VEHICLE ACCESS
- PEDESTRIAN ACCESS
- BUS STOP
- CAR PARKS
- FENCE 2100H
- NATURE TRAIL
- COLA
- EXTERNAL LIGHT
- EXTERNAL LIGHT TO BASKETBALL COURTS (DUSK - 10PM), TO ELECTRICAL ENGINEERS SPECIFICATION.
- CAR PARKS AND INTERNAL RENOVATION AND RESTORATION TO B BLOCK SUBJECT TO SEPARATE PLANNING PATHWAY. THESE WORKS DO NOT FORM PART OF THIS PROPOSAL

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SECURITY
DEPARTMENT OF EDUCATION NSW

Issue No.	Date	Description	Chkd
5	21.08.2020	NEW MULTI PURPOSE HALL ADDED, NEW GRAVEL DRIVEWAY, RELOCATED CHOOK SHED AND GREENHOUSE, SERVICE POLES TO FARMING PLOTS REMOVED	

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ARMIDALE SECONDARY COLLEGE

at
BUTLER STREET, ARMIDALE, NSW, 2350

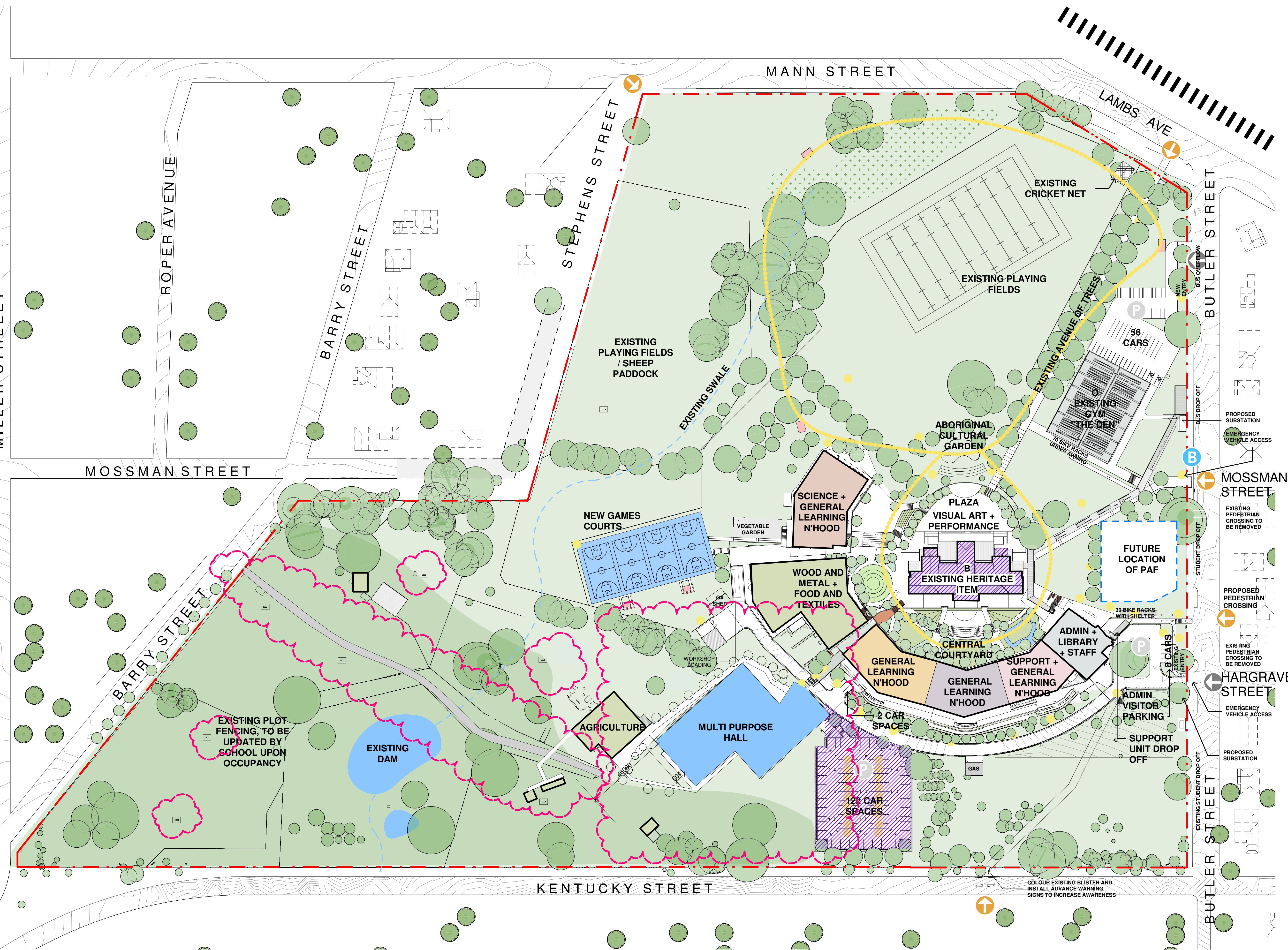
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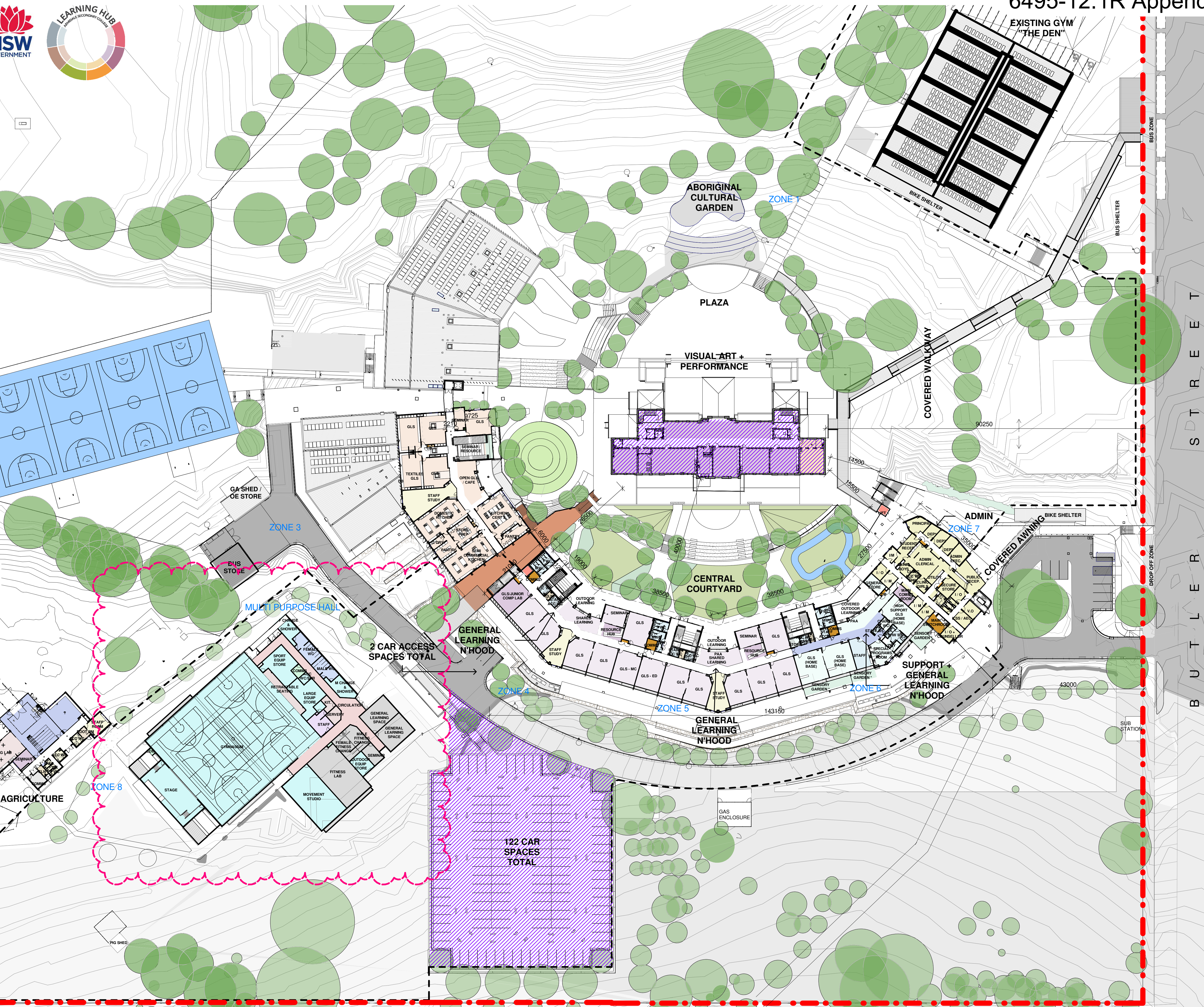
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17352- NBR-DA-012

Revision
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DEPARTMENT

- MOVEMENT
- LIFT
- HS401 - GENERAL LEARNING UNIT
- HS402 - SENIOR LEARNING UNIT - TYPE 1 (large school)
- HS406 - PERFORMANCE LEARNING UNIT
- HS501 - LIBRARY
- HS504 - OUTDOOR LEARNING
- HS505 - GAMES
- HS506 - AGRICULTURAL LEARNING UNIT
- HS601 - ADMINISTRATION
- HS602 - STAFF
- HS611 - SERVICES
- HS605 - STORAGE
- STUDENT SERVICES - HS603
- SERVICES - HS611
- SSP430 - SUPPORT UNIT

LEGEND

- CAR PARK SPACE / INTERNAL RENOVATION AND RESTORATION TO B BLOCK AS PART OF THE EARLY WORK PACKAGE

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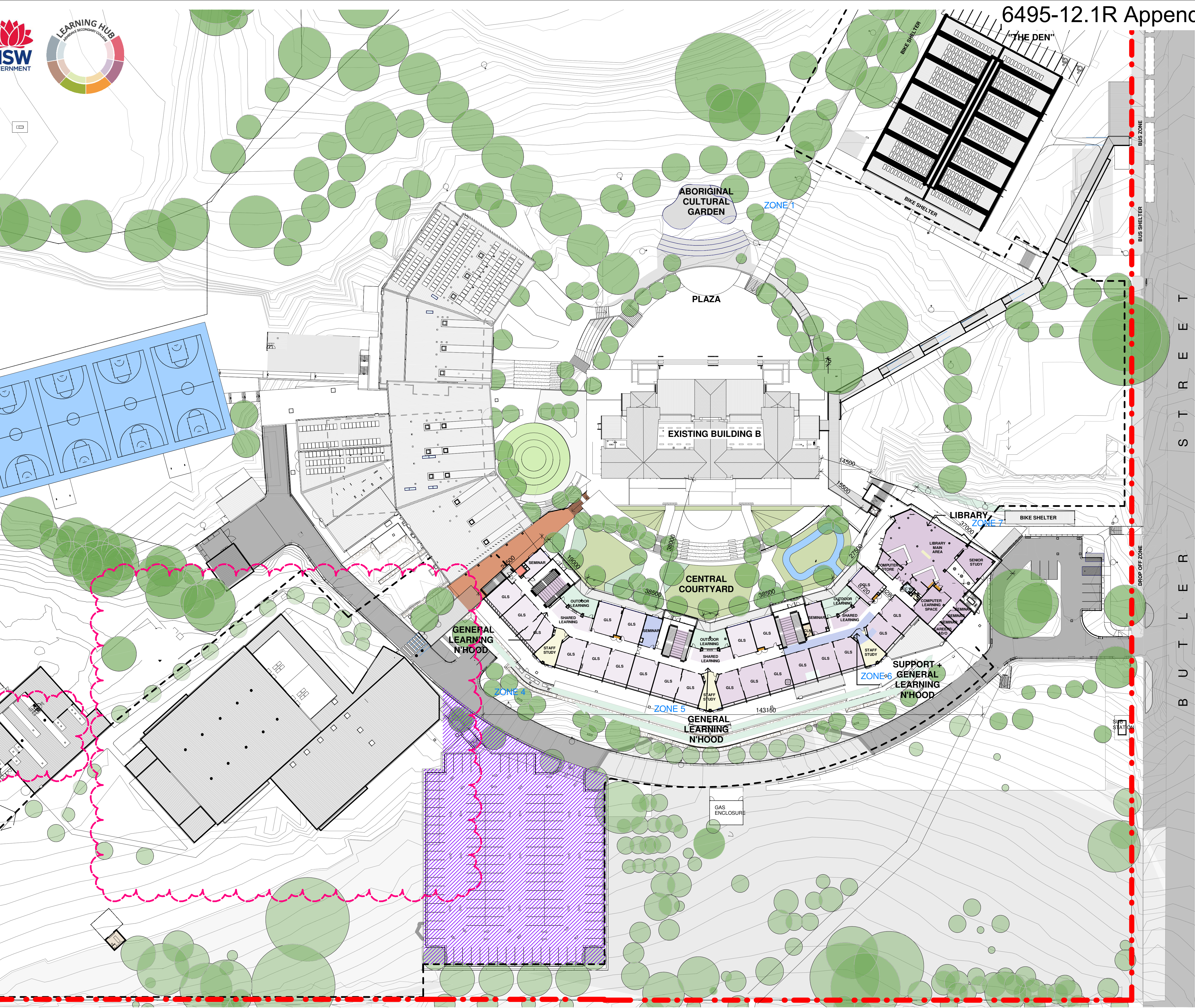
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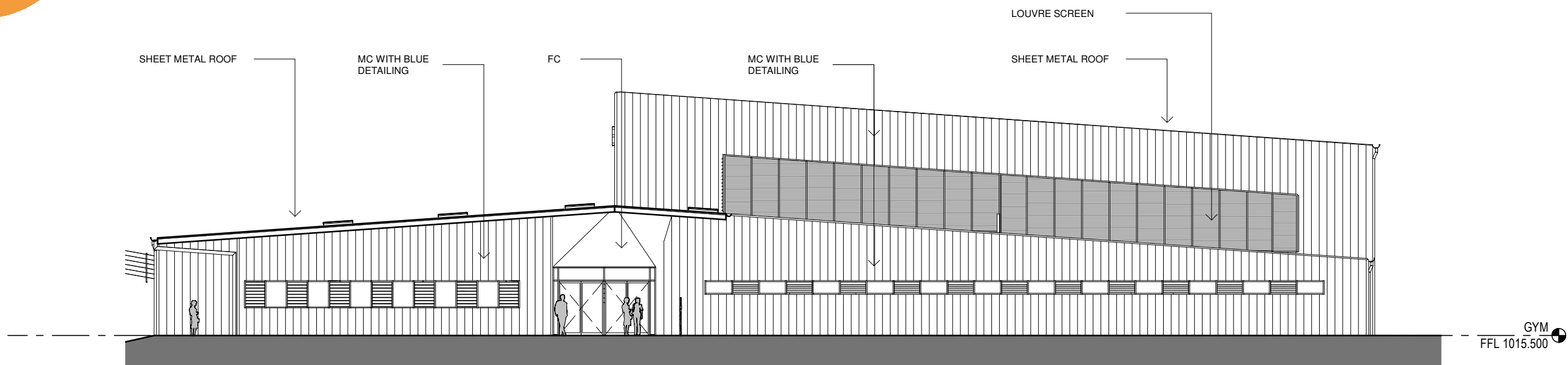
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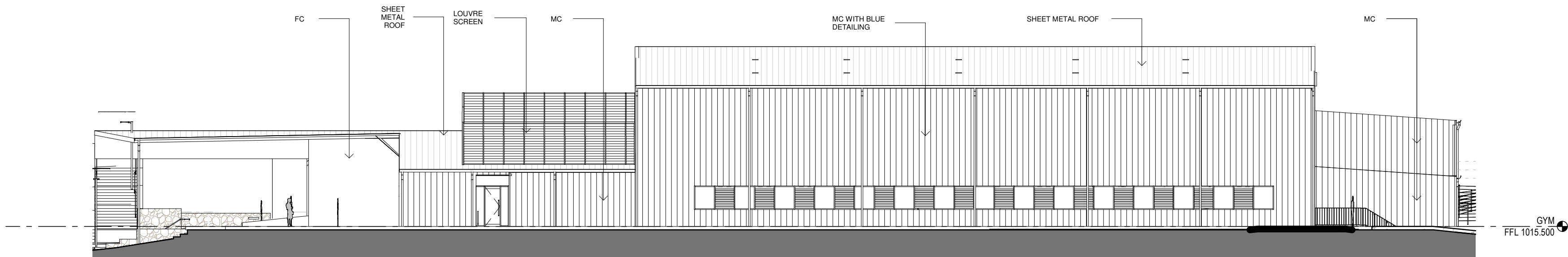
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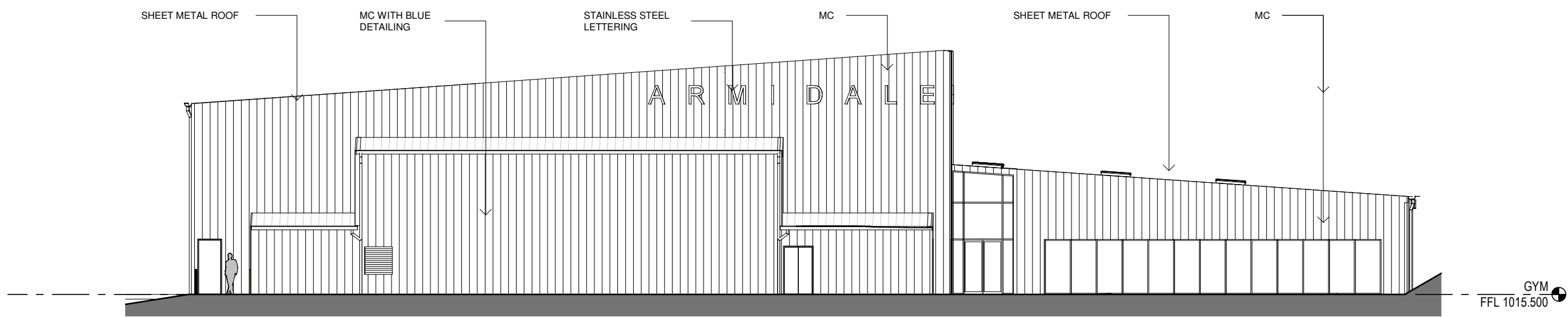




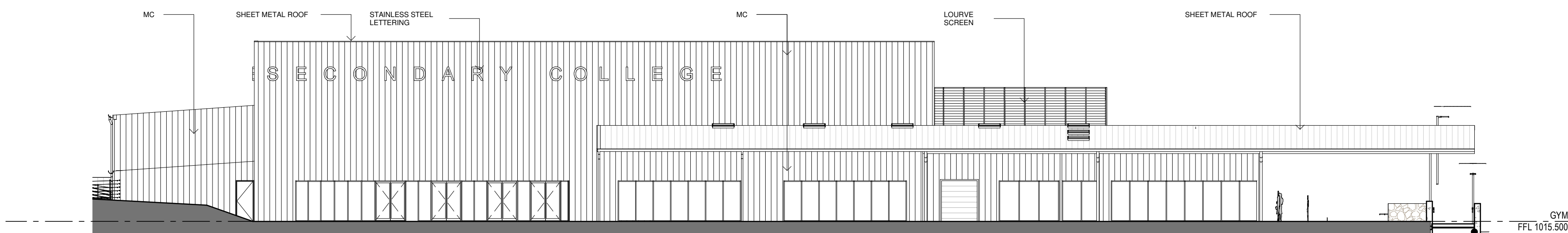
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1 : 200



2 MPH - WEST ELEVATION
1 : 200



3 MPH - SOUTH ELEVATION
1 : 200



4 MPH - EAST ELEVATION
1 : 200

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