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Environmental Noise Assessment

St Luke's Grammar School – New Senior Campus
800 Pittwater Rd & 224 Headland Rd, Dee Why, NSW

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1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Midson Group on behalf of The Anglican Schools Corporation to carry out an acoustic assessment of the proposed new St Luke's Grammar School Senior Campus at 800 Pittwater Road and 224 Headland Road, Dee Why, NSW. This commission involves the following:

Scope of Work:

- Inspect the site and environs
- Measure the background noise levels at critical locations and times
- Establish acceptable noise level criteria
- Quantify noise emissions from the new St Luke's Grammar School Senior Campus taking into consideration the proposed redevelopment
- 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 an Environmental Noise Assessment Report.

2.0 PROJECT DESCRIPTION & SUMMARY OF FINDINGS

St Luke's Grammar School propose to construct a new Senior Campus (*NSC*) at 800 Pittwater Road and 224 Headland Road, Dee Why, NSW, for 600 students.

The *NSC* is proposed to be situated on land zoned *B5 – Business Development* (800 Pittwater Road) and *IN1 – General Industrial* (224 Headland Road) under Warringah Local Environmental Plan (LEP) 2011. 800 Pittwater Road currently contains a three storey commercial building with 224 Headland Road containing at two storey industrial building.

The existing St Luke's Grammar School is located at 210 Headland Road, Dee Why and caters for approximately 1130 students (*information from www.myschool.edu.au provided by Australian Curriculum, Assessment and Reporting Authority*) in years K to 12. No work is proposed to the existing School at 210 Headland Road as part of this development.

The proposal seeks approval for the following:

800 Pittwater Road:

Village Centre: Welcoming the community into the building, cafe and heart of the building, natural daylight + green spaces and administration zone.

Gathering Spaces: Auditorium for 700+ students, library hubs and social + informal learning hubs.

Science and Maths Precinct: Speciality learning areas (Physics, Chemistry, Biology), general learning areas; connection to support units and seminar rooms.

Arts Precinct: Speciality learning areas (Visual Art, Kiln), general learning areas; connection to support units and seminar rooms.

Design + Technology Precinct: Speciality learning areas (Food technology, Design and technology), general learning areas; connection to support units and seminar rooms.

Humanities Precinct: General learning areas; connection to support units and seminar rooms.

Wellness Precinct: Pool with change facilities, dance studio, gymnasium and general learning areas; connection to support units.

Media Centre: Recording studio, editing studio, green screen and media presentation room.

External Areas: External hardcourts and open space.

Car Parking 91 spaced for staff, visitors or student and bicycle parking.

224 Headland Road:

Sports Precinct: 2 new basketball courts, existing half basketball court, existing change rooms and existing school clothing store.

Car Parking: 41 spaces for staff, visitors or student and bicycle parking.

The development is required to be staged to accommodate existing lease agreements. The development will take place over three stages, as follows:

- Stage 1 – 224 Headland Road;
- Stage 2 – Units 1, 3 and 5 (Fitness First and I-Med), 800 Pittwater Road; and
- Stage 3 – Units 2 and 4 (Officeworks), 800 Pittwater Road.

It is noted that the majority of the works proposed above are internal works to the existing commercial and industrial buildings on 800 Pittwater Road and 224 Headland Road.

Mechanical plant, including but not limited to air conditioning condenser units and exhaust fans, will be required to serve the proposed centres, spaces and precincts.

The proposed *NSC* site is bounded by land zoned *RE1 – Public Recreation* (Stony Range Botanic Garden) to the north and north-east, industrial premises to the east, Headland Road and industrial premises to the south and south-west and Pittwater Road to the west. The nearest residential premises to the site are located on the opposite side of Stony Range Botanic Garden to the north-east, Headland Road to the south-west and the opposite side of Pittwater Road to the west and north-west, as shown on Figure 1 and Figure 2.

The nearest noise sensitive receptors to the proposed *NSC* at the completion of Stage 3, in various directions, are shown on Figure 2 and as follows in Table 1.

Table 1 Noise Sensitive Receptors – NSC (Completion Stages 1, 2 & 3)

Receptor and Type	Address	Direction from site
R1 – Passive Recreation	Stony Range Botanic Garden	North
R2 – Residential	10 Tango Avenue	North - East
R3 – Industrial	222 Headland Road	East
R4 – Residential	213 Headland Road	South - East
R5 – Industrial	226 Headland Road	South
R6 – Industrial	275 Harbord Road	South - West
R7 – Residential	589 Pittwater Road	West
R8 – Residential	595 Pittwater Road	North-West

Each receptor location has been selected to represent the adjacent premises (where applicable), eg R7 is representative of all residential receptors to the west of the *NSC*; R6 is representative of all industrial receptors to the south-west of the *NSC*; etc.

In addition to the noise sensitive receptor locations shown in Table 1, at the completion of Stage 1 and Stage 2 of the development potential noise sensitive receptors will also be located within the development site itself. Additional Stage 1 and 2 receptor locations are shown in Table 2 below.

Table 2 Noise Sensitive Receptors – Completion Stages 1 and 2

Receptor and Type	Address	Direction from site
Stage 1		
R9 – Industrial	All Units, 800 Pittwater Road	N/A
Stage 2		
R10 – Industrial	Units 2 and 4, 800 Pittwater Road	N/A

The assumed operating hours for the *NSC* are:

Standard Hours:

- Monday – Friday: 8 am – 4 pm; including
- Recess: 11 am – 11.30 am; and
- Lunch: 1 pm – 1.30 pm.

The assumed out of school hours use of the auditorium or playing courts are:

- Monday – Sunday: 7 am – 10 pm

The assumed out of school hours use of the Wellness Centre are:

- Monday – Friday: 6 am – 9 pm; and
- Saturday: 7 am – 5 pm.

The proposal 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) – *SSD 10291*. The SEARs require an assessment against the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry 2017*.

This proposal is also to be undertaken in accordance with the NSW Department of Planning and Environment's (DoPE) *State Environmental Planning Policy (SEPP) (Educational Establishments and Child Care Facilities) 2017* and NSW Environment Protection Authority's (EPA) *NSW Road Noise Policy (RNP).*

An acoustic assessment of the noise from the outdoor play areas, general learning areas (GLAs) and speciality learning areas (SLAs), public address system and school bell, mechanical plant, enclosed basketball courts, auditorium and vehicle movements has been carried out to ensure the noise impact of the *NSC* will not adversely affect the acoustic amenity of the local neighbourhood.

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

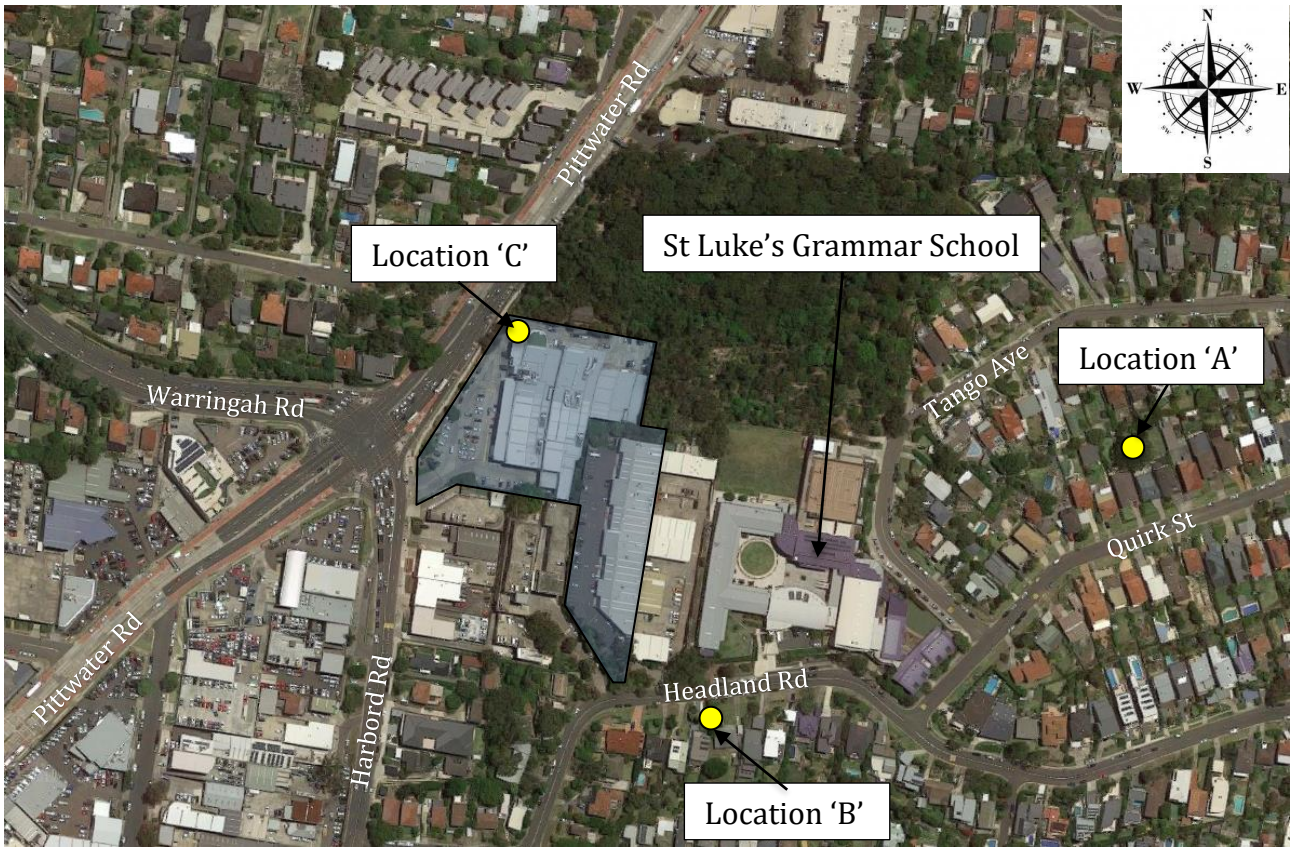


Figure 1 - Location Plan, 800 Pittwater & 224 Headland Road, Dee Why, NSW.



Figure 2 - Site Plan, 800 Pittwater & 224 Headland Road, Dee Why, NSW.

3.0 ACOUSTIC CRITERIA

The assumed operating hours of the *NSC* are between 7 am and 10 pm. This period can be defined as the day, 7 am to 6 pm, and as evening, 6 pm to 10 pm. Therefore, the acoustic criteria in this Section are based on the day and evening periods, only.

3.1 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 residential dwellings. These locations are shown in the Site Plan on Figure 2 as 'R2', 'R4', 'R7' and 'R8'. The times of worst possible annoyance will be during the day or evening when the *NSC* is operating.

Ambient noise levels were previously measured in the backyard of 20 Quirk Street, shown as Location 'A' on Figure 1, from Tuesday 10 April to Tuesday 17 April, 2018. Ambient noise level were also recently measured in the front yard of 209 Headland Road, shown as Location 'B' on Figure 1, and in the north-western corner of 800 Pittwater Road, shown as Location 'C' on Figure 1, from Tuesday 28 May to Wednesday 5 June, 2019.

The day time ambient noise levels are presented in the attached Appendix B1, B2 and B3, and also below in Table 3.

Table 3 Ambient Noise Levels – Dee Why, NSW

Noise Measurement Location	Time Period	L_{90} Rating Background Level	Existing L_{eq} Noise Level
Location 'A' *(10/4 to 17/4/18)*- Backyard, 20 Quirk St	Early Morning (6 am to 7 am)	**42 dBA**	**n/a**
	Day (7 am to 6 pm)	**42 dBA**	**56 dBA**
	Evening (6 pm to 10 pm)	**40 dBA**	**48 dBA**
Location 'B' *(28/5 to 5/6/2019)*- Front yard, 209 Headland Rd	Early Morning (6 am to 7 am)	**52 dBA**	**n/a**
	Day (7 am to 6 pm)	**51 dBA**	**62 dBA**
	Evening (6 pm to 10 pm)	**48 dBA**	**60 dBA**
Location 'C' *(28/5 to 5/6/2019)*- NW Corner, 800 Pittwater Rd	Early Morning (6 am to 7 am)	**60 dBA**	**n/a**
	Day (7 am to 6 pm)	**59 dBA**	**67 dBA**
	Evening (6 pm to 10 pm)	**56 dBA**	**66 dBA**

The measured ambient noise levels at Location 'C' were affected by road traffic noise from Pittwater Road. Where the existing $L_{eq,\ traffic}$ noise level is 10 dB or more above the recommended amenity noise level, the area is considered to have high traffic noise (EPA, *Noise Policy for Industry*, Section 2.4.1).

Meteorological conditions during the testing from Tuesday 10 April to Tuesday 17 April, 2018 typically consisted of clear skies. Temperatures ranged from 15 to 31°C. Atmospheric conditions were ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor area.

Meteorological conditions during the testing from Tuesday 28 May to Wednesday 5 June, 2019 typically consisted of clear skies with some rain. Rain affected data has been removed from the assessment period. Temperatures ranged from 8 to 18°C. Atmospheric conditions were ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor areas.

3.2 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

(1) Development for the purpose of a school may be carried out by any person with development consent on land in a prescribed zone..

(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.

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.'

3.3 NSW Environment Protection Authority

3.3.1 NSW 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 framework to assess noise emission from a premises, and whether that premises produces intrusive or non-intrusive noise and/or maintains the acoustic amenity.

Section 1.4 of the *NPI* specifies the types of industrial noise sources the policy is designed for, such as mechanical plant and equipment and vehicle movements within the premises and/or on private roads, etc. 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.

Section 2.1 of the *NPI* states the following:

"Intrusive noise levels are only applied to residential receivers (residences). For other receiver types identified in Table 2.2, only the amenity levels apply."

3.3.1.1 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 RBLs at Location 'A' were 42 dBA during the early morning and day and 40 dBA in the evening (see Table 3). Therefore the acceptable L_{eq} noise intrusiveness criteria in these areas are:

- (42 + 5 =) 47 dBA $L_{eq,\ 15\ minute}$ in the early morning and during the day; and
- (40 + 5 =) 45 dBA $L_{eq,\ 15\ minute}$ in the evening.

The RBLs at Location 'B' were 52 in the early morning, 51 dBA during the day and 48 dBA in the evening (see Table 3). Therefore the acceptable L_{eq} noise intrusiveness criteria in these areas are:

- (52 + 5 =) 57 dBA $L_{eq,\ 15\ minute}$ in the early morning; and
- (51 + 5 =) 56 dBA $L_{eq,\ 15\ minute}$ during the day; and
- (48 + 5 =) 53 dBA $L_{eq,\ 15\ minute}$ in the evening.

The RBLs at Location 'C' were 60 in the early morning, 59 dBA during the day and 56 dBA in the evening (see Table 3). Therefore the acceptable L_{eq} noise intrusiveness criteria in these areas are:

- (60 + 5 =) 65 dBA $L_{eq,\ 15\ minute}$ in the early morning; and
- (59 + 5 =) 64 dBA $L_{eq,\ 15\ minute}$ during the day; and
- (56 + 5 =) 61 dBA $L_{eq,\ 15\ minute}$ in the evening.

3.3.1.2 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 in Table 4 are taken from Section 2.4, Table 2.2 of the NPI.

Table 4 Amenity Noise Levels

Receiver	Noise Amenity Area	Time of Day	L_{eq}, dBA, Recommended Amenity Noise Level
Residential	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Area specifically reserved for passive recreation (eg national park)	All	When in use	50
Industrial premises	All	When in use	70

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 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 following exceptions to the above method to derive the project amenity noise level apply:

3. *Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.'*

In addition, the level of transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the project amenity noise level. In such cases the project amenity noise level may be derived from the $L_{Aeq, period (traffic)}$ minus 15 dBA.

The existing L_{eq} noise level at Location 'A' was 56 dBA during the day and 48 dBA in the evening (see Table 3), In accordance with Table 2.3 of the *NPI*, Location 'A' is considered to be a 'Suburban' Noise Amenity Area. Therefore, the acceptable amenity noise level for the residential receptors in this area, 'R2', are:

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

The existing L_{eq} noise level at Location 'B' was 62 dBA during the day and 60 dBA in the evening (see Table 3), In accordance with Table 2.3 of the *NPI*, Location 'B' is considered to be an 'Urban' Noise Amenity Area. Therefore, the acceptable amenity noise level for the residential receptors in this area, 'R2', are:

- (60 – 5 + 3 =) 58 dBA $L_{eq, 15 minute}$ during the day; and
- (60 – 10 + 3 =) 53 dBA $L_{eq, 15 minute}$ in the evening.

The existing L_{eq} noise level at Location 'C' was 67 dBA during the day and 66 dBA in the evening (see Table 3), In accordance with Table 2.3 of the *NPI*, Location 'C' is considered to be an 'Urban' Noise Amenity Area. Therefore, the acceptable amenity noise level for the residential receptors in this area, 'R2', are:

- (67 – 10 + 3 =) 60 dBA $L_{eq,\ 15\ minute}$ during the day; and
- (66 – 15 + 3 =) 54 dBA $L_{eq,\ 15\ minute}$ in the evening.

The acceptable amenity criteria for the adjacent Stony Range Botanic Garden, 'R1', is:

- (50 – 5 + 3 =) 48 dBA $L_{eq,\ 15\ minute}$ when in use.

The acceptable amenity criteria for the adjacent Industrial premises, 'R3', 'R5', 'R6', 'R9' and 'R10', is:

- (70 – 5 + 3 =) 68 dBA $L_{eq,\ 15\ minute}$ when in use.

3.3.2 NSW Road Noise Policy

The NSW Road Noise Policy (RNP), in Section 2.3.1, sets out road traffic noise assessment criteria for residential land uses in Table 3. The information in that table is extracted below in Table 5.

Table 5 Road Traffic Noise Assessment Criterion – Residential

Road Category	Type of project/land use	Assessment Criteria – dB(A)	
		Day (7 am – 10 pm)	**Night (10 pm – 7 am)**
Freeway/ arterial/ sub-arterial roads	3. Existing residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,\ (15\ hour)}$ 60 (external)	$L_{Aeq,\ (9\ hour)}$ 55 (external)
Local roads	6. Existing residences affected by **additional traffic** on existing local roads generated by land use developments	$L_{Aeq,\ (1\ hour)}$ 55 (external)	$L_{Aeq,\ (1\ hour)}$ 50 (external)

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 of the new school buildings, mechanical plant and the use of the staff, visitor and student car park will be assessed against requirements of the *NSW EPA NPI* and on-road traffic noise associated with vehicles arriving/leaving the *NSC* assessed against requirements of the *NSW EPA RNP*.

3.4.1 Residential Receivers

Residential Receiver – 'R2', based on the measured noise levels in Location 'A'

- **47 dBA** $L_{eq,\ 15\ minute}$ in the early morning for the use of the car park for access to the Wellness Centre;
- **53 dBA**[1] $L_{eq,\ 15\ minute}$ during the day for activities in the outdoor areas;
- **47 dBA** $L_{eq,\ 15\ minute}$ during the day for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park; and
- **43 dBA** $L_{eq,\ 15\ minute}$ during the evening for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park.

Residential Receiver – 'R4', based on the measured noise levels in Location 'B'

- **57 dBA** $L_{eq,\ 15\ minute}$ in the early morning for the use of the car park for access to the Wellness Centre;
- **58 dBA**[2] $L_{eq,\ 15\ minute}$ during the day for activities in the outdoor areas;
- **56 dBA** $L_{eq,\ 15\ minute}$ during the day for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park; and
- **53 dBA** $L_{eq,\ 15\ minute}$ during the evening for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park.

Residential Receivers – 'R7' and 'R8', based on the measured noise levels in Location 'C'

- **65 dBA** $L_{eq,\ 15\ minute}$ in the early morning for the use of the car park for access to the Wellness Centre;
- **60 dBA**[3] $L_{eq,\ 15\ minute}$ during the day for activities in the outdoor areas;
- **60 dBA** $L_{eq,\ 15\ minute}$ during the day for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park; and

[1] ***NOTE**: It is noted that the existing L_{eq} noise level at Location 'A' already exceeds this amenity noise level, see Table 2.*
[2] ***NOTE**: It is noted that the existing L_{eq} noise level at Location 'B' already exceeds this amenity noise level, see Table 2.*
[3] ***NOTE**: It is noted that the existing L_{eq} noise level at Location 'C' already exceeds this amenity noise level, see Table 2.*

- **54 dBA** $L_{eq,\ 15\ minute}$ during the evening for all noise associated with the use of the new school buildings and use of the staff, visitor and student car park.

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.

3.4.2 Passive Recreation Receiver

Passive Recreation Receiver – 'R1'

- **48**[4] **dBA** $L_{eq,\ 15\ minute}$ for activities in the outdoor areas, the use of the new school buildings and use of the staff, visitor and student car park, when in use.

This criterion applies at the most-affected point within the area that is reasonably expected to be used by people, when in use.

3.4.3 Industrial Receivers

Industrial Premises Receivers – 'R3', 'R5', 'R6', 'R9' and 'R10'

- **68 dBA** (external) $L_{eq,\ 15\ minute}$ for activities in the outdoor areas, the use of the new school buildings and use of the staff, visitor and student car park, when in use.

This criterion applies at the reasonably most-affected point on or within the property boundary.

3.4.4 On – Road Traffic Noise Criteria

The following criterion will be applied at 1 metre from the most affected façade of 'R4', for on – road traffic noise:

- **55 dBA** (external) $L_{eq,\ 1\ hour}$ between 7 am and 10 pm; and
- **50 dBA** (external) $L_{eq,\ 1\ hour}$ between 10 pm and 7 am.

The following criterion will be applied at 1 metre from the most affected façade of 'R7' and 'R8', for on – road traffic noise:

- **60 dBA** (external) $L_{eq,\ 15\ hour}$ between 7 am and 10 pm; and
- **55 dBA** (external) $L_{eq,\ 9\ hour}$ between 10 pm and 7 am.

[4] ***NOTE**: It is noted that the existing L_{eq} noise level at Location 'C' already exceeds this amenity noise level, see Table 2.*

4.0 SCHOOL NOISE EMISSION

The main sources of noise from the *NSC*, will be as follows:

- Students using the outdoor play areas – Stage 2 (*480 Students*) and 3 (*600 Students*);
- Students inside the GLAs and SLAs – Stage 2 and 3;
- Public address system and school bell – Stage 2 and 3;
- Mechanical plant – Stage 2 and 3;
- Use of the enclosed basketball courts – Stage 1, 2 and 3;
- Use of the auditorium Stage 3; and
- Use of the staff, visitor and student car park – Stage 1, 2 and 3.

The noise assessment was based on the drawings by Tonkin Zulaikha Greer Architects for Project Number 18032, dated 23 August 2019, attached as Appendix C.

Note: calculations of noise emissions for Stage 1 include noise sources associated with Stage 1 only, calculations of noise emissions for Stage 2 include noise sources associated with Stage 1 and Stage 2 (where relevant) only, and calculations of noise emission for Stage 3 include noise sources associated with Stages 1, 2 and 3 (where relevant).

4.1 Outdoor Areas Noise Emissions

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.

Stage 2 - In order to model the worst case scenario of noise emissions from students outdoors at the completion of Stage 2, we have assumed that 2/3 of the 480 students (320) will be outside at the one time, with half (160) of those students making noise at any given time. We have assumed the other 1/3 of the students (160) will be located indoors throughout the *NSC* building, ie in the 'Café' or 'Wellness Precinct'.

Stage 3 - In order to model the worst case scenario of noise emissions from students outdoors at the completion of Stage 3, we have assumed that 2/3 of the 600 students (400) will be outside at the one time, with half (200) of those students making noise at any given time. We have assumed the other 1/3 of the students (200) will be located indoors throughout the *NSC* building, ie in the 'Village Centre' or 'Wellness Precinct'.

Sound power levels of children at play were previously measured for other similar projects and are presented below in Table 6. We believe these levels represent the typical $L_{eq,\ 15\ minute}$ maximum noise levels of children at play and will be used in this noise assessment.

Table 6 $L_{eq,\ 15\ minute}$ Sound Power Levels - Students in Outdoor Areas

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
1 student – male with loud voice	**80**	59	61	70	77	76	72	65	56
320 x secondary students in outdoor areas	**102**	81	83	92	99	98	94	87	78
400 x secondary students in outdoor areas	**103**	82	84	93	100	99	95	88	79

4.2 General & Speciality Learning Areas Noise Emissions

We have assumed that the average class size within the NSC at the completion of Stage 3 will be (600 / 33 =) 18 students, based on the total number of students (600) and the total number of GLA/SLAs (33). A class size of 18 will also be used for Stage 2 calculations.

During normal classroom activities, the main source of noise will be from the teachers and students talking. We have assumed that there may be a maximum of 1/3 of the students (6) talking normally in the GLA and SLAs. We have also assumed that the teacher in each classroom may be talking loudly. We have also assumed, as a worst-case scenario, that a small amplified band, including drums, electric guitar, electric bass, electric keyboard and an amplified vocal, may be playing in the music SLA during classroom activities (Stage 3 only).

Calculations assume students are distributed evenly throughout the inside of the GLA and SLAs 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 at different noise levels. The $L_{eq,\ 15\ minute}$ sound power levels of teachers and students are shown in Table 7.

Table 7 $L_{eq,\ 15\ minute}$ Sound Power Levels – Teacher & Students – GLA & SLAs

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
General and Specialty Learning Areas									
Teacher talking loudly	**80**	59	61	70	77	76	72	65	56
School student talking normally	**63**	53	53	60	63	58	53	52	47
1 teacher and 18 students – Block A	**80**	63	64	72	78	76	72	66	58
Small Amplified Band	**105**	114	110	109	102	99	89	89	88

4.3 Public Address System & School Bell Noise Emission

The *NSC* will be provided with a public address system and a bell to signal the start and end of classes. The location of the new speakers has not yet been determined, however assuming up to 6 external speaker locations are provided, the maximum sound pressure level should be no greater than **81 dBA** at 3 metres from each speaker in order to meet the noise criterion at the nearest noise sensitive premises.

4.4 Mechanical Plant Noise Emission

The mechanical spatial drawings, provided by Wood and Grieve Engineers for Project Number 43194, dated 17 September 2019, attached as Appendix E, show several items of mechanical plant throughout the *NSC*, including but not limited to, two chillers and one car park and pool exhaust fan in a roof top plant area on the north-eastern side of the *NSC* and one air handling unit (AHU) in a roof top plant area on the north side of the *NSC*.

The specific type/model of mechanical plant have not yet been selected. The proposed mechanical plant will typically only operate during day time hours, Monday to Friday and when required during the evening period, Monday to Sunday.

The $L_{eq,\ 15\ minute}$ sound power levels for typical equipment used at school sites are presented in Table 8.

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

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Toilet exhaust fan	**59**	48	48	56	57	54	53	45	38
Car Park/Pool Exhaust Fan	**89**	88	90	86	86	83	82	80	77
Air Handling Unit	**89**	89	89	90	86	84	80	76	71
Chiller (Condenser Unit) (8 fans)	**89**	94	88	89	87	84	79	74	66

Once mechanical plant selection has been finalised, a final assessment should be made, prior to the issue of a Construction Certificate/detailed design stage.

4.5 Enclosed Basketball Courts Usage Noise Emission

We have assumed the proposed Enclosed Basketball Courts (EBCs) will have capacity for up to 200 students. From our observations of other sites, we have modelled the noise emission from the EBCs as follows:

- Students talking loudly (10%), students talking with a raised voice (20%), students talking normally (20%) and the rest are not talking or listening (50%)
- We have assumed as a worst case scenario the EBCs may operate at full capacity during recess or lunch time on a rainy day.
- We have assumed that the windows on the southern and western sides of the EBCs are of fixed frame construction, with 6.38 mm laminated glass installed within the frames.
- We have assumed the doors on the western sides of the EBCs may be partially opened during the use, approximately 10% of the floor area.
- We have assumed the celling/roof system consists of a metal deck roof with standard thermal insulation batts installed beneath.
- We have assumed the walls are of pre-fabricated concrete panel construction.

Based on information in Harris[5] and in our noise level database gathered over many years, we calculate the sound power levels shown below in Tables 9.

Table 9 $L_{eq,\ 15\ minute}$ Sound Power Levels - Enclosed Basketball Courts – Students

Description	L_{eq} Sound Power Level dBA
One Male Student Talking Loudly	**80**
One Male Student Talking with Raised Voice	**69**
One Male Student Talking Normally	**63**
200 Students	**93**

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

4.6 Auditorium Noise Emission

The auditorium will have capacity for up to 761 people (Stage 3 only). From our observations of other sites, we have modelled the noise emission from the auditorium 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 auditorium may operate at full capacity during a performance.
- We have assumed that the double glazed operable tilt doors on the northern side of the auditorium will be closed during performances.
- We have assumed that the louvre windows on the northern side of the auditorium will have 6.38 mm laminated glass installed within the frames.
- We have assumed the windows will be partially opened during a performance, approximately 27 m^2 open area.
- We have assumed the walls are of pre-fabricated concrete panel construction

Based on information in Harris[5] and in our noise level database gathered over many years, we calculate the sound power levels shown below in Table 10.

Table 10 $L_{eq,\ 15\ minute}$ Sound Power Levels - Proposed Auditorium

Description	L_{eq} 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**
761 People	**99**
761 People with Amplified Live Band	**106**

4.7 Vehicle Noise Emission

The staff/student car park on 224 Headland Road provides a total of 41 parking spaces for vehicles with the staff/student car park on 800 Pittwater Road providing a total of 90 parking spaces for vehicles at the completion of Stage 2 and a total of 91 parking spaces for vehicles at the completion of Stage 3.

As a worst case scenario, we have assumed all spaces in both car parks will be filled/emptied within a 30 minute period either before or after school or during a special event in the auditorium (or Wellness Centre). This is equivalent to the following vehicle trip rates over a 15 minute period during the abovementioned periods:

- Stage 1 - 224 Headland Road Car Park – 21 vehicles entering/exiting the car park;
- Stage 2 - 800 Pittwater Road Car Park - 45 vehicles entering/exiting the car park and
- Stage 3 - 800 Pittwater Road Car Park - 46 vehicles entering/exiting the car park.

The Sound Exposure Level[6] (SEL) sound power level and spectra of vehicle noise is shown below in Table 11 and is based on previous measurements by Day Design.

Table 11 SEL Sound Power Levels - Vehicles

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
SEL level of car drive by at approximately 20 km/h (on an incline)	**86**	101	94	85	81	81	76	75	68
SEL level of car drive by at approximately 50 km/h (flat road)	**93**	95	93	90	89	91	83	73	66
SEL level of car door slam, ignition and drive away	**91**	104	96	89	87	86	83	81	75

[6] *SEL is the total sound energy of a single noise event condensed into a one second duration.*

4.8 Predicted Noise Level at Receptor Locations

Knowing the sound power level of a noise source (See Tables 6 - 11), 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, educational and industrial receptors from the various noise producing facets of the development are shown below.

Where applicable, calculations include acoustic shielding provided by the *NSC* buildings to the residential, educational and industrial receptors.

4.8.1 Predicted Noise Levels - Stage 1

4.8.1.1 Enclosed Basketball Courts – Stage 1

We have assumed the *EBCs* may be used at full capacity during recess or lunch or during the evening.

The noise impact from the *EBCs* during recess, lunch time, or during the evening is summarised and shown in Table 12.

Table 12 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Enclosed Basketball Court – Stage 1

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden			
- Students	30	48/48	Yes/Yes
R2 – 10 Tango Avenue			
- Students	22	47/43	Yes/Yes
R3 – 222 Headland Road			
- Students	46	68/68	Yes/Yes
R4 – 213 Headland Road			
- Students	34	56/53	Yes/Yes
R5 – 226 Headland Road			
- Students	41	68/68	Yes/Yes
R6 – 275 Harbord Road			
- Students	28	68/68	Yes/Yes
R7 – 589 Pittwater Road			
- Students	29	60/54	Yes/Yes
R8 – 595 Pittwater Road			
- Students	30	60/54	Yes/Yes
R9 – 800 Pittwater Road			
- Students	41	68/68	Yes/Yes

The predicted level of noise from the Enclosed Basketball Courts at the receptor locations 'R1' to 'R9', complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.1.2 Use of Staff, Visitor and Student Car Parks – 224 Headland Road – Stage 1

The external $L_{eq,\ 15\ minute}$ noise levels at the receptor locations from noise associated with the use of the staff, visitor and student car park at 224 Headland Road throughout the day (and evening) are calculated to be as shown below in Table 13.

Table 13 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Use of Staff, Visitor & Student Car Parks – Stage 1

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden	16	48/48	Yes/Yes
R2 – 10 Tango Avenue	< 10	47/43	Yes/Yes
R3 – 222 Headland Road	19	68/68	Yes/Yes
R4 – 213 Headland Road	30	56/53	Yes/Yes
R5 – 216 Headland Road	30	68/68	Yes/Yes
R6 – 275 Harbord Road	19	68/68	Yes/Yes
R7 – 589 Pittwater Road	18	60/54	Yes/Yes
R8 – 595 Pittwater Road	18	60/54	Yes/Yes
R9 – 800 Pittwater Road	30	68/68	Yes/Yes

The predicted external levels of noise from the use of the staff, visitor and student car park at 224 Headland Road are within the noise criteria in Section 3.4, and are therefore acceptable.

4.8.2 Predicted Noise Levels – Stage 2

4.8.2.1 Outdoor Areas – Stage 2

Based on a maximum of 320 students in the outdoor play areas at any one time at the completion of Stage 2, the predicted $L_{eq\ 15\ minute}$ noise level is calculated to be as shown below in Table 14. The noise prediction was determined by placing all 320 students into two groups throughout the outdoor areas as follows and as shown in Appendix D:

- Group 1 - 'External Hardcourt' = 160 students;
- Group 2 - Northern outdoor area = 160 students.

Table 14 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Outdoor Areas – Stage 2

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA)	Compliance (Yes/No)
R1 – Stony Range Botanic Garden	*50*	48	*Yes**
R2 – 10 Tango Avenue	48	53	Yes
R3 – 222 Headland Road	36	68	Yes
R4 – 213 Headland Road	23	58	Yes
R5 – 216 Headland Road	27	68	Yes
R6 – 275 Harbord Road	28	68	Yes
R7 – 589 Pittwater Road	28	60	Yes
R8 – 595 Pittwater Road	53	60	Yes
R10 – 800 Pittwater Road	21	68	Yes

**An exceedance of 2 dB in not considered significant as it is generally not discernable to the human ear.*

The predicted level of noise from the students in the outdoors at the receptor locations 'R1' to 'R8' and 'R10' complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.2.2 Cumulative Noise Level – GLAs & Mechanical Plant – Stage 2

The cumulative noise impact from the GLAs and mechanical plant associated with the *NSC* are summarised and shown in Table 15.

Table 15 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – GLAs & Mechanical Plant - Stage 2

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden			
- GLA/SLAs	40		
- Mechanical plant	38		
Cumulative Noise Level	42	48/48	Yes/Yes
R2 – 10 Tango Avenue			
- GLA/SLAs	32		
- Mechanical plant	41		
Cumulative Noise Level	42	47/43	Yes/Yes
R3 – 222 Headland Road			
- GLA/SLAs	47		
- Mechanical plant	56		
Cumulative Noise Level	57	68/68	Yes/Yes
R4 – 213 Headland Road			
- GLA/SLAs	< 20		
- Mechanical plant	25		
Cumulative Noise Level	25	56/53	Yes/Yes
R5 – 226 Headland Road			
- GLA/SLAs	51		
- Mechanical plant	40		
Cumulative Noise Level	51	68/68	Yes/Yes
R6 – 275 Harbord Road			
- GLA/SLAs	45		
- Mechanical plant	24		
Cumulative Noise Level	45	68/68	Yes/Yes
R7 – 589 Pittwater Road			
- GLA/SLAs	42		
- Mechanical plant	28		
Cumulative Noise Level	42	60/54	Yes/Yes

Table 15 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – GLAs & Mechanical Plant - Stage 2 - Continued

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R8 – 595 Pittwater Road			
- GLA/SLAs	43		
- Mechanical plant	28		
Cumulative Noise Level	44	60/54	Yes/Yes
R10 – 800 Pittwater Road			
- GLA/SLAs	45		
- Mechanical plant	18		
Cumulative Noise Level	45	68/68	Yes/Yes

The predicted cumulative level of noise from the GLA/SLAs and mechanical plant at the receptor locations 'R1' to 'R8' and 'R10', complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.2.3 Enclosed Basketball Courts – Stage 2

We have assumed the *EBCs* may be used at full capacity during recess or lunch or the evening.

The noise impact from the *EBCs* during recess, lunch time or the evening is summarised and shown in Table 16.

Table 16 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Enclosed Basketball Court – Stage 2

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden			
- Students	30	48/48	Yes/Yes
R2 – 10 Tango Avenue			
- Students	22	47/43	Yes/Yes
R3 – 222 Headland Road			
- Students	46	68/68	Yes/Yes
R4 – 213 Headland Road			
- Students	34	56/53	Yes/Yes
R5 – 226 Headland Road			
- Students	41	68/68	Yes/Yes
R6 – 275 Harbord Road			
- Students	28	68/68	Yes/Yes
R7 – 589 Pittwater Road			
- Students	29	60/54	Yes/Yes
R8 – 595 Pittwater Road			
- Students	30	60/54	Yes/Yes
R10 – 800 Pittwater Road			
- Students	39	68/68	Yes/Yes

The predicted level of noise from the Enclosed Basketball Courts at the receptor locations 'R1' to 'R8' and 'R10', complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.2.4 Use of Staff, Visitor and Student Car Parks – Stage 2

The external $L_{eq,\ 15\ minute}$ noise levels at the receptor locations from noise associated with the use of the staff, visitor and student car parks – 224 Headland Road and 800 Pittwater Road - throughout the day (and evening) are calculated to be as shown below in Table 17.

Table 17 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Use of Staff, Visitor & Student Car Parks – Stage 2

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden	41	48/48	Yes/Yes
R2 – 10 Tango Avenue	21	47/43	Yes/Yes
R3 – 222 Headland Road	36	68/68	Yes/Yes
R4 – 213 Headland Road	30	56/53	Yes/Yes
R5 – 216 Headland Road	48	68/68	Yes/Yes
R6 – 275 Harbord Road	54	68/68	Yes/Yes
R7 – 589 Pittwater Road	43	60/54	Yes/Yes
R8 – 595 Pittwater Road	43	60/54	Yes/Yes
R10 – 800 Pittwater Road	54	68/68	Yes/Yes

The predicted external levels of noise from the use of the staff, visitor and student car park at the completion of Stage 2 are within the noise criteria in Section 3.4, and are therefore acceptable.

4.8.3 Predicted Noise Levels – Stage 3

4.8.3.1 Outdoor Areas – Stage 3

Based on a maximum of 400 students in the outdoor play areas at any one time at the completion of Stage 3, the predicted $L_{eq\ 15\ minute}$ noise level is calculated to be as shown below in Table 18. The noise prediction was determined by placing all 400 students into three groups throughout the outdoor areas as follows and as shown in Appendix D:

- Group 1 - 'External Hardcourt' = 100 students;
- Group 2 - Northern outdoor area = 100 students; and
- Group 3 - Western outdoor area = 200 students.

Table 18 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Outdoor Areas – Stage 3

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA)	Compliance (Yes/No)
R1 – Stony Range Botanic Garden	*49*	48	*Yes**
R2 – 10 Tango Avenue	46	53	Yes
R3 – 222 Headland Road	35	68	Yes
R4 – 213 Headland Road	24	58	Yes
R5 – 216 Headland Road	34	68	Yes
R6 – 275 Harbord Road	57	68	Yes
R7 – 589 Pittwater Road	55	60	Yes
R8 – 595 Pittwater Road	56	60	Yes

**An exceedance of 1 dB in not considered significant as it is generally not discernable to the human ear.*

The predicted level of noise from the students in the outdoors at the receptor locations 'R1' to 'R8' complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.3.2 Cumulative Noise Level – GLAs & Mechanical Plant – Stage 3

The cumulative noise impact from the GLAs and mechanical plant associated with the *NSC* are summarised and shown in Table 19.

Table 19 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – GLAs & Mechanical Plant – Stage 3

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden			
- GLA/SLAs	43		
- Mechanical plant	38		
Cumulative Noise Level	44	48/48	Yes/Yes
R2 – 10 Tango Avenue			
- GLA/SLAs	35		
- Mechanical plant	41		
Cumulative Noise Level	42	47/43	Yes/Yes
R3 – 222 Headland Road			
- GLA/SLAs	50		
- Mechanical plant	56		
Cumulative Noise Level	57	68/68	Yes/Yes
R4 – 213 Headland Road			
- GLA/SLAs	< 20		
- Mechanical plant	25		
Cumulative Noise Level	25	56/53	Yes/Yes
R5 – 226 Headland Road			
- GLA/SLAs	54		
- Mechanical plant	40		
Cumulative Noise Level	54	68/68	Yes/Yes
R6 – 275 Harbord Road			
- GLA/SLAs	48		
- Mechanical plant	24		
Cumulative Noise Level	48	68/68	Yes/Yes
R7 – 589 Pittwater Road			
- GLA/SLAs	45		
- Mechanical plant	28		
Cumulative Noise Level	45	60/54	Yes/Yes
R8 – 595 Pittwater Road			
- GLA/SLAs	46		
- Mechanical plant	28		
Cumulative Noise Level	46	60/54	Yes/Yes

The predicted cumulative level of noise from the GLA / SLAs and mechanical plant at the receptor locations 'R1' to 'R8' at the completion of Stage 3, complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.3.3 Enclosed Basketball Courts – Stage 3

We have assumed the *EBCs* may be used at full capacity during recess or lunch or the evening.

The noise impact from the *EBCs* during recess, lunch time or the evening is summarised and shown in Table 20.

Table 20 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Enclosed Basketball Court – Stage 3

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden			
- Students	30	48/48	Yes/Yes
R2 – 10 Tango Avenue			
- Students	22	47/43	Yes/Yes
R3 – 222 Headland Road			
- Students	46	68/68	Yes/Yes
R4 – 213 Headland Road			
- Students	34	56/53	Yes/Yes
R5 – 226 Headland Road			
- Students	41	68/68	Yes/Yes
R6 – 275 Harbord Road			
- Students	28	68/68	Yes/Yes
R7 – 589 Pittwater Road			
- Students	29	60/54	Yes/Yes
R8 – 595 Pittwater Road			
- Students	30	60/54	Yes/Yes

The predicted level of noise from the Enclosed Basketball Courts at the receptor locations 'R1' to 'R8', complies with the criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.3.4 Auditorium – Stage 3

We have assumed the auditorium may be used at full capacity during recess, lunch or assemblies and during evening performances.

The noise impact from the auditorium during the evening is summarised and shown in Table 21. Compliance with the more stringent evening criterion will also ensure compliance during the day.

Table 21 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Auditorium – Evening (6 pm to 10 pm) – Stage 3

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA)	Compliance
R1 – Stony Range Botanic Garden			
- Special Event	44	48	Yes
R2 – 10 Tango Avenue			
- Special Event	31	43	Yes
R3 – 222 Headland Road			
- Special Event	17	68	Yes
R4 – 213 Headland Road			
- Special Event	13	53	Yes
R5 – 226 Headland Road			
- Special Event	22	68	Yes
R6 – 275 Harbord Road			
- Special Event	20	68	Yes
R7 – 589 Pittwater Road			
- Special Event	20	54	Yes
R8 – 595 Pittwater Road			
- Special Event	43	54	Yes

The predicted level of noise from the Auditorium at the receptor locations 'R1' to 'R8', complies with the day and evening criteria in Section 3.4 of this report, and is therefore acceptable.

4.8.3.5 Use of Staff, Visitor and Student Car Parks – Stage 3

The external $L_{eq,\ 15\ minute}$ noise levels at the receptor locations from noise associated with the use of the staff, visitor and student car park – 224 Headland Road and 800 Pittwater Road - throughout the day (and evening) are calculated to be as shown below in Table 22.

Table 22 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Use of Staff, Visitor & Student Car Parks – Stage 3

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA) Day/Evening	Compliance (Yes/No) Day/Evening
R1 – Stony Range Botanic Garden	41	48/48	Yes/Yes
R2 – 10 Tango Avenue	21	47/43	Yes/Yes
R3 – 222 Headland Road	36	68/68	Yes/Yes
R4 – 213 Headland Road	30	56/53	Yes/Yes
R5 – 216 Headland Road	48	68/68	Yes/Yes
R6 – 275 Harbord Road	54	68/68	Yes/Yes
R7 – 589 Pittwater Road	43	60/54	Yes/Yes
R8 – 595 Pittwater Road	43	60/54	Yes/Yes

The predicted external levels of noise from the use of the staff, visitor and student car park are within the noise criteria in Section 3.4, and are therefore acceptable.

4.8.4 On – Road Traffic Noise – Stage 3

As a worst-case scenario, on-road traffic noise has been calculated for Stage 3 only using the assumed worst case peak day time vehicle flow rate (see Section 4.7).

The external $L_{eq,\ 1\ hour}$ (R4), and $L_{eq,\ 15\ hour}$ and $L_{eq,\ 9\ hour}$ (R7 and R8) noise levels at the most affected residential receptor locations, 'R4', 'R7' and 'R8', from noise associated with on – road traffic throughout the day and night (6 am to 7 am) are calculated to be as shown below in Table 23.

Table 23 Predicted $L_{eq,\ 1\ hour}$, $L_{eq,\ 15\ hour}$ & $L_{eq,\ 9\ hour}$ Noise Levels – On – Road Traffic – Stage 3

Receptor Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
Day – 7 am to 10 pm			
R4 – 213 Headland Road	47	55	Yes
R7 – 589 Pittwater Road	48	60	Yes
R8 – 595 Pittwater Road	48	60	Yes
Night – 10 pm to 7 am			
R4 – 213 Headland Road	47	50	Yes
R7 – 589 Pittwater Road	48	55	Yes
R8 – 595 Pittwater Road	48	55	Yes

The predicted external levels of noise from on – road traffic are within the noise criteria in Section 3.4.4, and are therefore acceptable.

5.0 NOISE CONTROL RECOMMENDATIONS

5.1 Noise Management Plan

With regard to the *NSC's* delivery, garbage pickup and ground maintenance schedule, we recommend the following:

- We recommend that any deliveries to the *NSC*, such as food for the canteen, or garbage pickup from the *NSC* occur between the hours of 7 am and 6 pm;
- We recommend that any ground maintenance, such as leaf blowing or grass cutting, that may be required on the *NSC* grounds occur between the hours of 7 am and 6 pm.

5.2 Mechanical Plant

The specifications for the mechanical plant have not yet been finalised for this development. For typical mechanical plant equipment with sound power levels not exceeding those listed in Table 8, it is reasonable and feasible to acoustically treat the plant area or equipment itself so that noise will not impact the neighbouring properties.

Once mechanical plant selection 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 receivers.

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

5.3 Existing Common Wall

We recommend that the common wall between the Stage 2 (I-MED and Fitness First) and Stage 3 (Officeworks) buildings be maintained at the completion of the Stage 2 construction period. Should a justified noise complaint be received during the use of the Stage 2 areas, an investigation to determine whether the existing wall can be acoustically improved (to reduce the noise transmission) should be undertaken.

6.0 NOISE IMPACT STATEMENT

Day Design Pty Ltd was engaged by Midson Group on behalf of The Anglican Schools Corporation to carry out an acoustic assessment of the proposed new St Luke's Grammar School Senior Campus at 800 Pittwater Road and 224 Headland Road, Dee Why, NSW.

Calculations show that provided the recommendations in Section 5 of this report are implemented and adhered to, the level of noise emitted from St Luke's Grammar School Senior Campus at 800 Pittwater Road and 224 Headland Road, Dee Why, NSW, will meet the acoustic requirements in the NSW Department of Planning and Environment's *SEPP (Educational Establishments and Child Care Facilities) 2017* and the NSW Environment Protection Authority's (EPA) *NSW Noise Policy for Industry* and *NSW Road Noise Policy,* as detailed in Section 3 of this report, and be considered acceptable.

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



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 B1 – Ambient Noise Survey – 20 Quirk Street, Dee Why
- Appendix B2 – Ambient Noise Survey – 209 Headland Road, Dee Why
- Appendix B3 – Ambient Noise Survey – 800 Pittwater Road, Dee Why
- Appendix C – Proposed Site Layout
- Appendix D – Approximate Noise Source Locations
- Appendix E – Mechanical Spatial

APPENDIX A – NOISE SURVEY INSTRUMENTATION

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

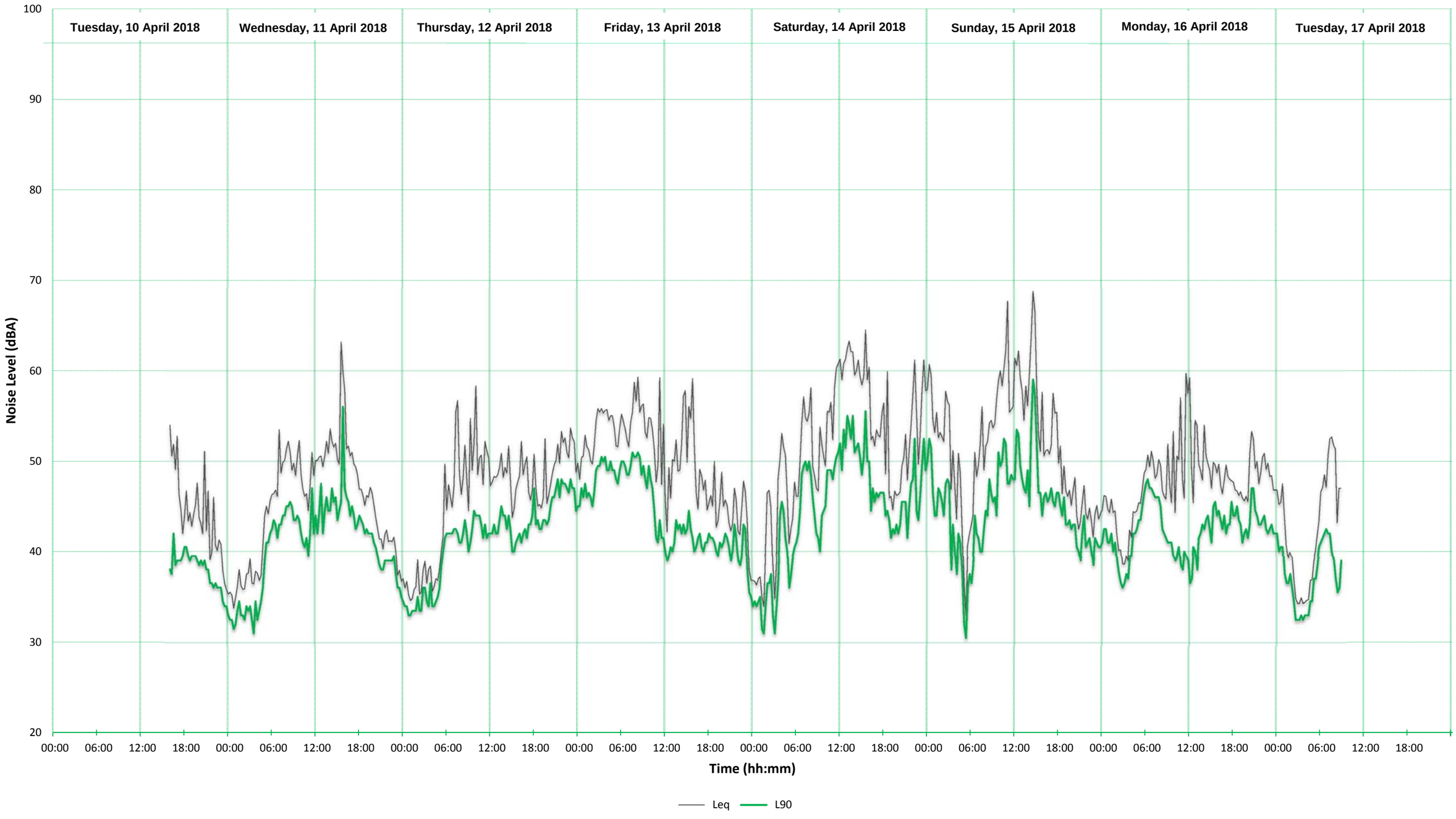
Table A Noise Instrumentation

Description	Model No.	Serial No.
Infobyte Noise Logger	iM4	113
Condenser Microphone 0.5” diameter	MK 250	113
Infobyte Noise Logger	iM4	117
Condenser Microphone 0.5” diameter	MK 250	117
Infobyte Noise Logger	iM4	118
Condenser Microphone 0.5” diameter	MK 250	118

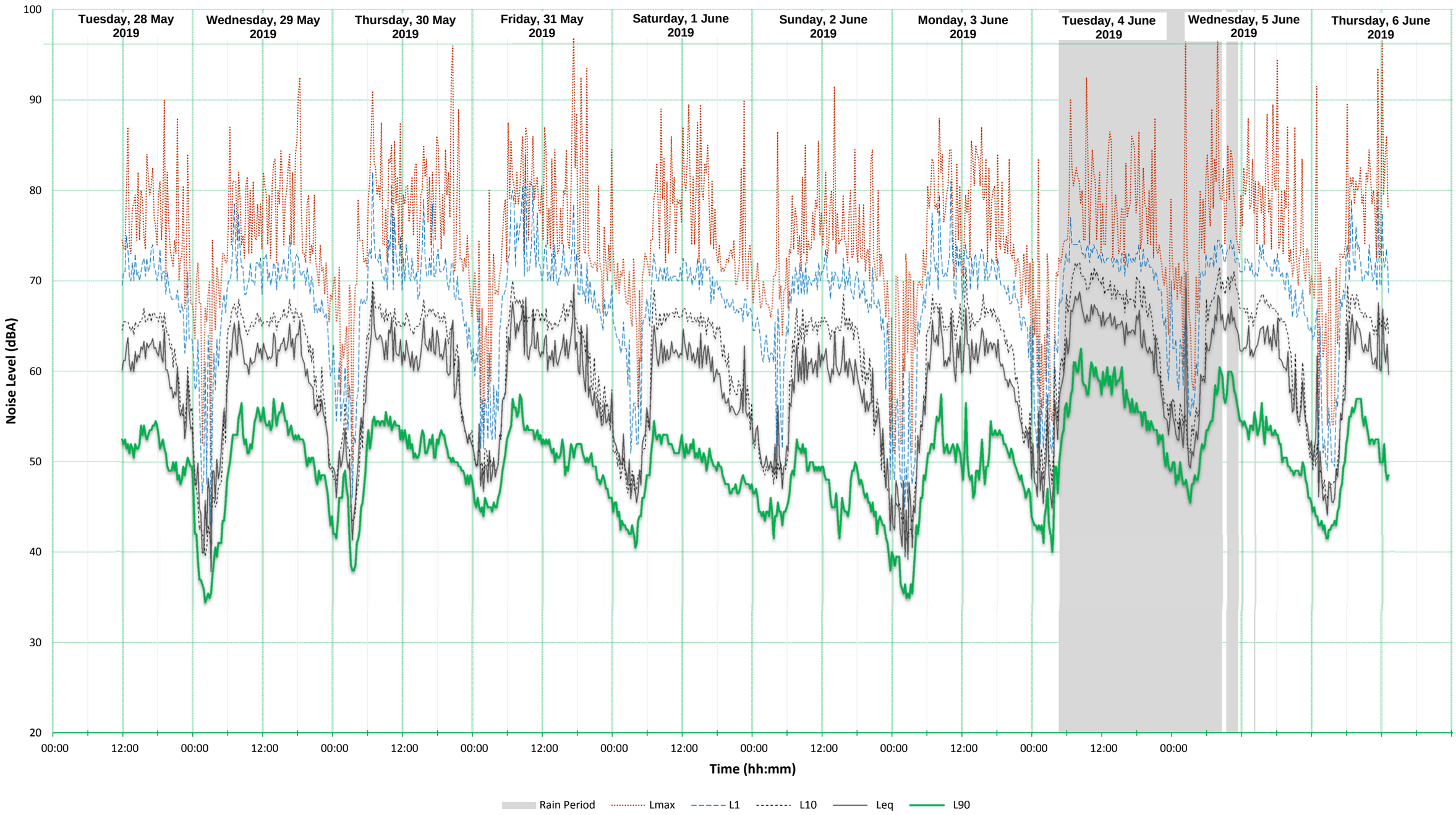
An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitors iM4 #113, #117 and #118 are Type 2 precision environmental noise monitor meeting all the applicable 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.

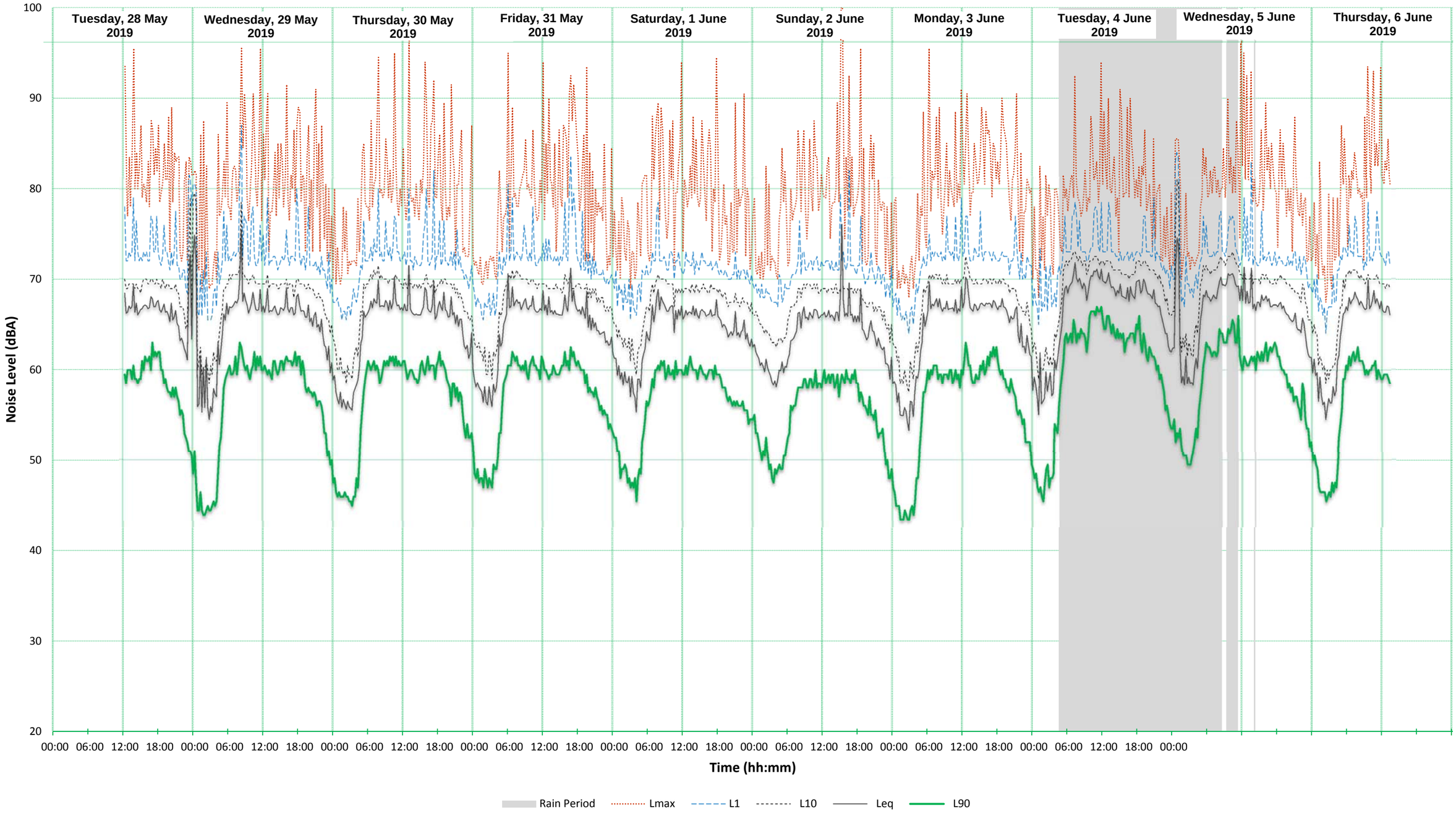
Located at Rear yard - 20 Quick Street, Dee Why, NSW



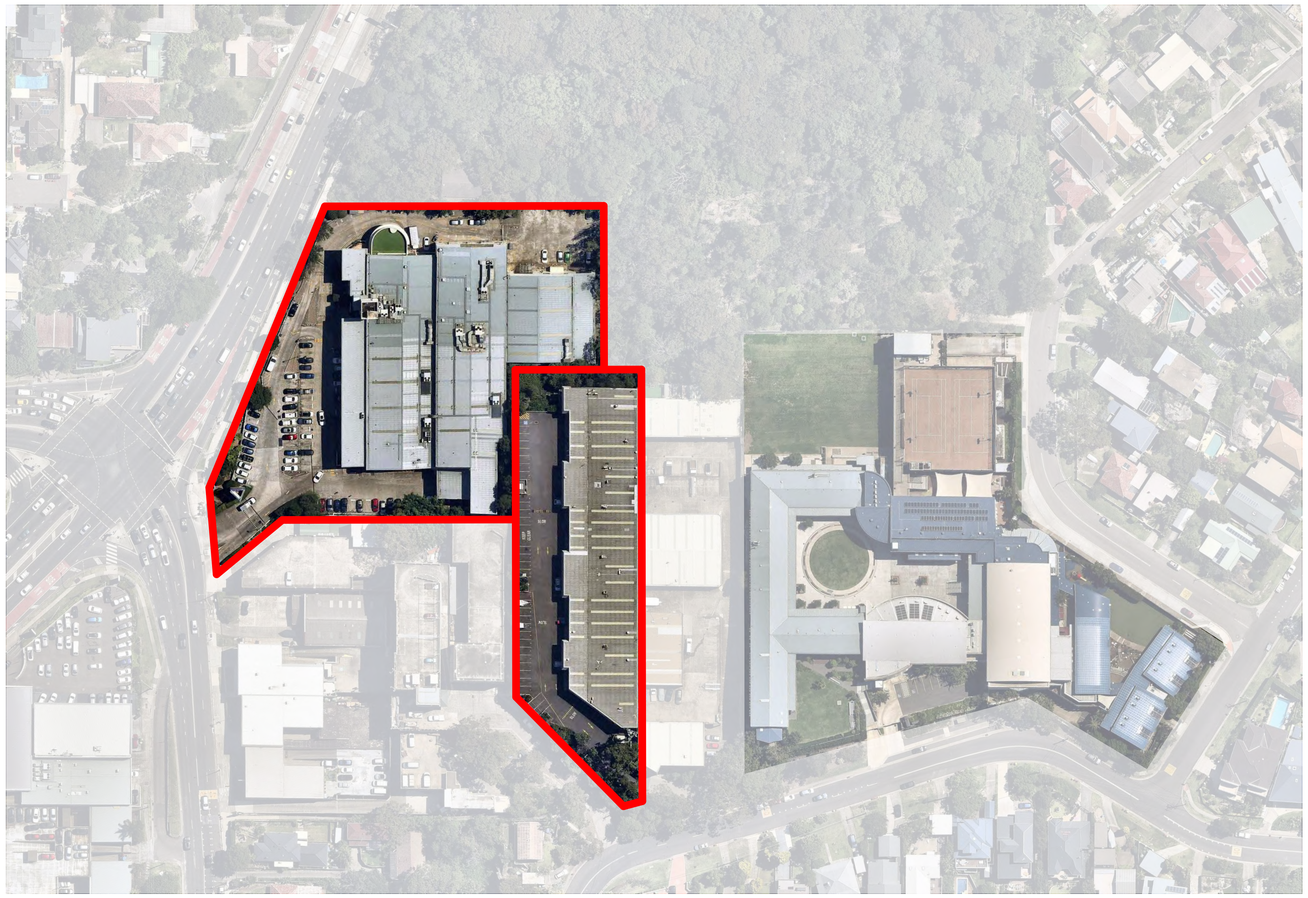
Located at 209 Headland Rd, Dee Why, NSW



Located at 800 Pittwater Rd, Dee Why, NSW



ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS



DRAWING LIST		
		Scale @ A1
A 000 GENERAL INFORMATION		
A-000	COVER PAGE	1:1000, 1:1
A-001	SITE PLAN	1:500
A-002	STAGING DIAGRAMS	1:500
A 030 DEMOLITION PLANS - 224 HEADLAND RD		
A-031	LEVEL 0 DEMOLITION PLAN_224	1:200
A-032	LEVEL 1 DEMOLITION PLAN_224	1:200
A-033	ROOF DEMOLITION PLAN_224	1:200
A-034	DEMOLITON ELEVATIONS - 224 HEADLAND ROAD	1:200
A 040 DEMOLITION PLANS - 800 PITTWATER RD		
A-040	LEVEL 0 DEMOLITION PLAN_800	1:200, 1:10
A-041	LEVEL 1 DEMOLITION PLAN_800	1:200, 1:10
A-042	LEVEL 2 DEMOLITION PLAN_800	1:200, 1:10
A-043	LEVEL 3 DEMOLITION PLAN_800	1:200, 1:10
A-044	LEVEL 4 DEMOLITION PLAN_800	1:10, 1:200
A-045	WEST + NORTH DEMOLITION ELEVATIONS_800	1:200, 1:10
A-046	EAST + SOUTH DEMOLITION ELEVATIONS_800	1:200, 1:10
A-047	CHANGE PLANS_800	1:500
A 100 GENERAL ARRANGEMENT PLANS - 224 HEADLAND RD		
A-100	LEVEL 0 PLAN - STAGE 1 + 3_224	1:200
A-101	LEVEL 0 PLAN - STAGE 2_224	1:200
A-102	LEVEL 1 PLAN - STAGE 1_224	1:200
A-103	ROOF PLAN - STAGE 1_224	1:200
A 110 GENERAL ARRANGEMENT PLANS - 800 PITTWATER RD		
A-110	LEVEL 0 PLAN - STAGE 2_800	1:200
A-111	LEVEL 1 PLAN - STAGE 2_800	1:200
A-112	LEVEL 2 PLAN - STAGE 2_800	1:200
A-113	LEVEL 3 PLAN - STAGE 2_800	1:200
A-114	LEVEL 4 PLAN - STAGE 2_800	1:200
A-115	LEVEL 0 PLAN - STAGE 3_800	1:200
A-116	LEVEL 1 PLAN - STAGE 3_800	1:200
A-117	LEVEL 2 PLAN - STAGE 3_800	1:200
A-118	LEVEL 3 PLAN - STAGE 3_800	1:200
A-119	LEVEL 4 PLAN - STAGE 3_800	1:200
A 120 PROJECT COORDINATION - 224 HEADLAND RD		
A-121	SERVICES COORDINATION LEVEL 0_224	1:200
A-122	SERVICES COORDINATION 3D VIEWS_224	
A 130 PROJECT COORDINATION - 800 PITTWATER RD		
A-130	SERVICES COORDINATION LEVEL 0_800	1:200, 1:10
A-131	SERVICES COORDINATION LEVEL 1_800	1:200, 1:10
A-132	SERVICES COORDINATION LEVEL 2_800	1:200, 1:10
A-133	SERVICES COORDINATION LEVEL 3_800	1:200, 1:10
A-134	SERVICES COORDINATION LEVEL 4_800	1:200, 1:10
A-135	SERVICES COORDINATION 3D VIEWS_800	
A-136	POPULATION NUMBERS - STAGE 2_800	1:500
A-137	POPULATION NUMBERS - STAGE 3_800	1:500
A 200 ELEVATIONS - 224 HEADLAND RD		
A-200	ELEVATIONS_224	1:200
A 210 ELEVATIONS - 800 PITTWATER RD		
A-210	ELEVATIONS WEST + NORTH_800	1:200
A-211	ELEVATIONS EAST + SOUTH_800	1:200
A 300 SECTIONS - 224 HEADLAND RD		
A-300	SECTIONS 1_224	1:200
A 310 SECTIONS - 800 PITTWATER RD		
A-310	SECTIONS 1_800	1:200
A-311	SECTIONS 2_800	1:200
A-312	SECTIONS 3_800	1:200
A-313	DETAIL SECTIONS 2_800	1:100
A-314	DETAIL SECTIONS 3_800	1:100
A-315	DETAIL SECTIONS 4_800	1:100
A-316	TYPICAL WALL SECTIONS	1:50
A 400 AREA CALCULATIONS - 224 HEADLAND RD		
A-400	ACCOMMODATION SCHEDULE _224	1:1
A 410 AREA CALCULATIONS - 800 PITTWATER RD		
A-410	ACCOMMODATION SCHEDULE - STAGE 2_800	
A-411	ACCOMMODATION SCHEDULE - STAGE 3_800	1:1
A-412	GFA CALCULATION_800	1:500
A-413	OPEN SPACE AND LANDSCAPE AREA CALCULATION	
A 500 SHADOW DIAGRAMS - 224 HEADLAND RD		
A-500	SHADOW DIAGRAMS - 21 JUNE	
A 510 SHADOW DIAGRAMS - 800 PITTWATER RD		
A-510	SHADOW DIAGRAMS - 21 JUNE	
A 600 VISUALIZATION		
A-601	MATERIALS SCHEDULE	
A-602	PERSPECTIVE IMAGES - EXTERIOR	
A-603	PERSPECTIVE IMAGES - INTERIOR	

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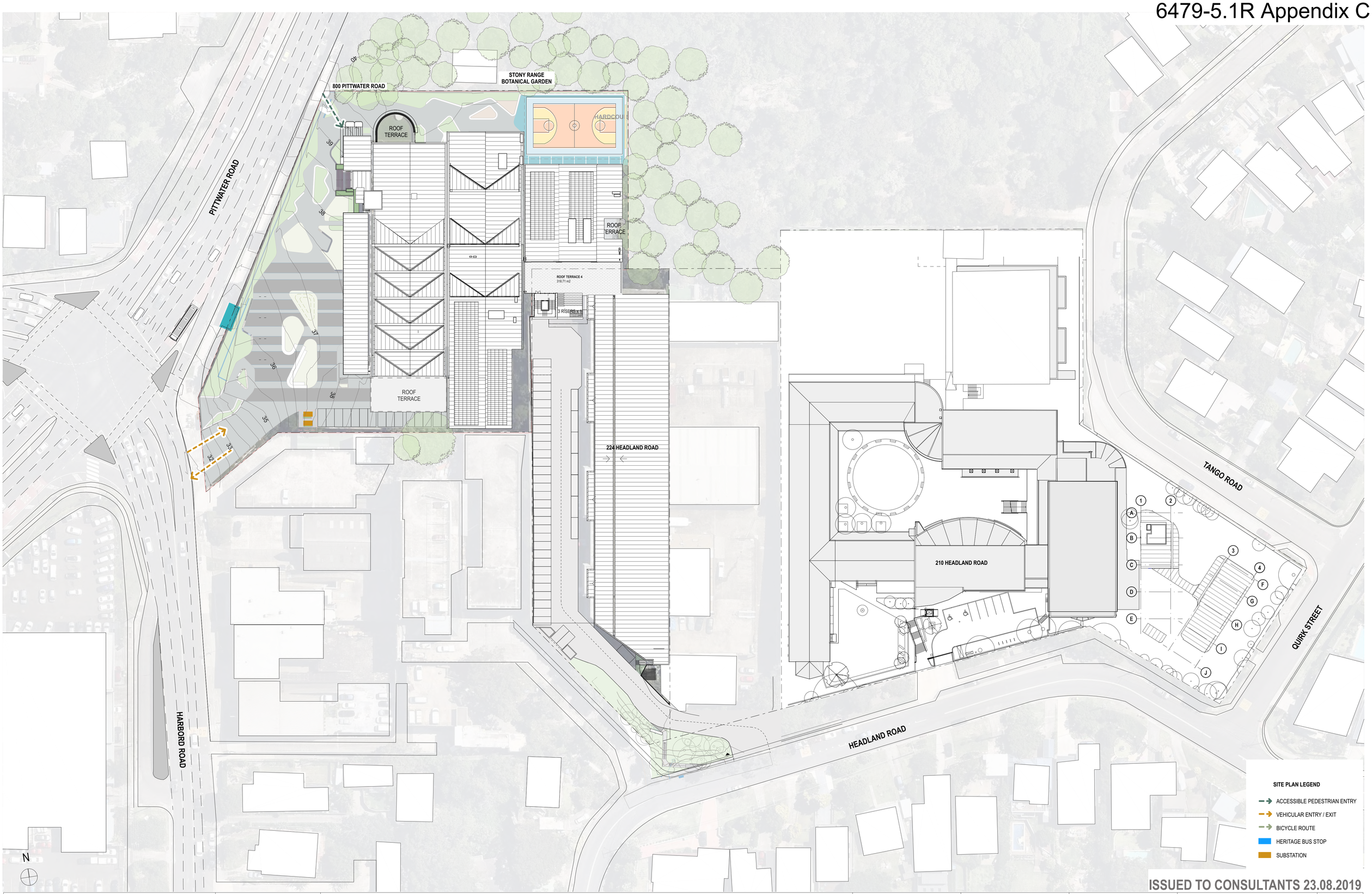
PROJECT :
ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS

PROJECT NO : 18032

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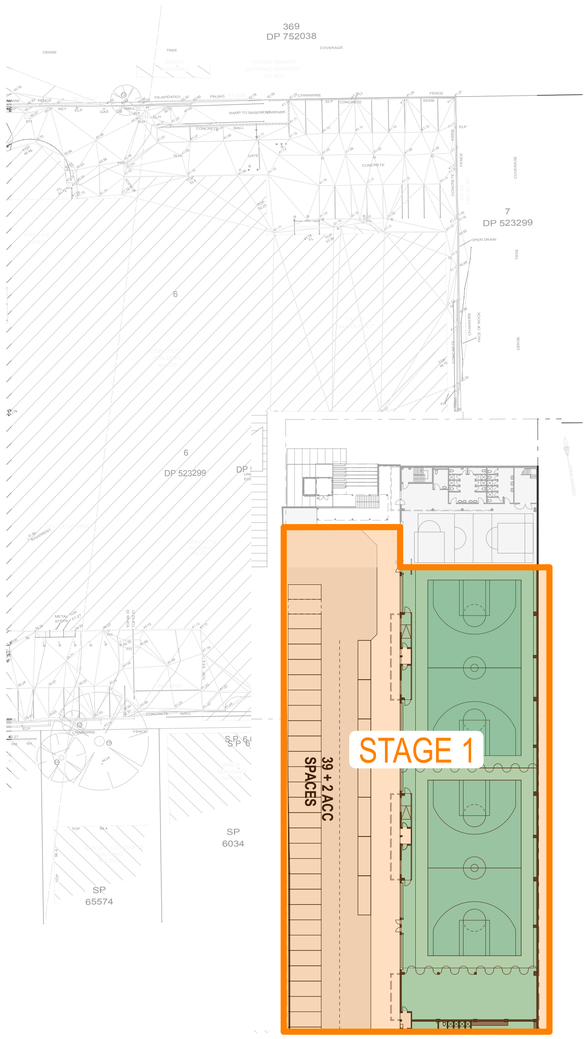
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1 STAGE 1
1:500

STAGE 1 OVERVIEW

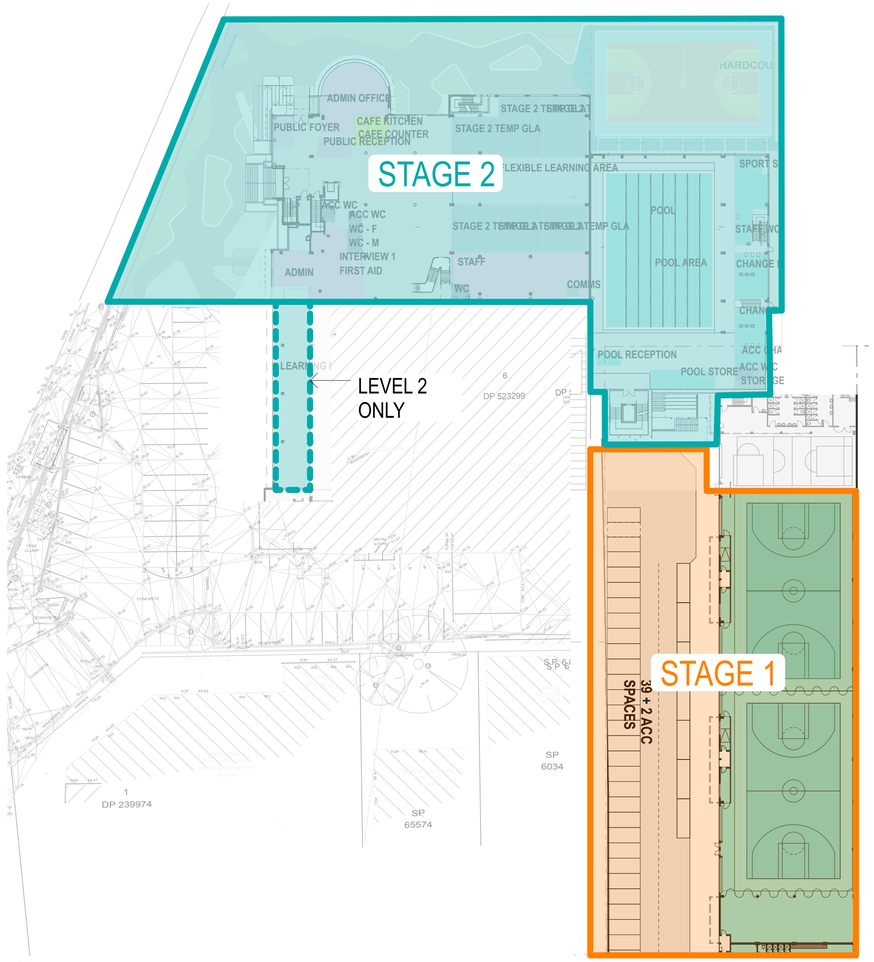
LOCATION - 224 HEADLAND ROAD

LEASE END DATE - 30 June 2022

STAGE 1 SUMMARY

1. Remove existing internal walls to create large open space for two basketball courts within footprint of former units 2-6 of 224 Headland Road.
2. In stage 1 Basketball courts will also be used as Dance Studio and Multi Purpose Hall.

ADDITIONAL STUDENTS: NIL



2 STAGE 2
1:500

STAGE 2 OVERVIEW

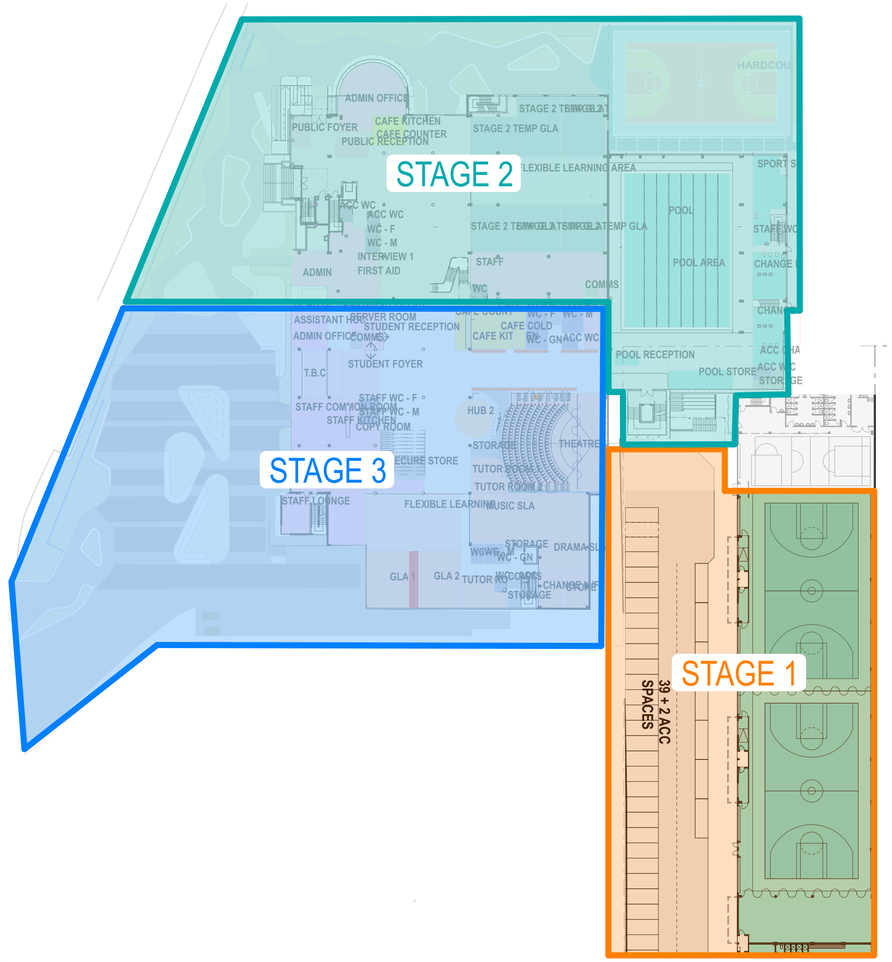
LOCATION - 800 PITTWATER ROAD

LEASE END DATE - IMED - 31 August 2024; Fitness First - 30 June 2025

STAGE 2 SUMMARY

1. Internal refurbishment of IMED and Fitness First tenancies as per Architectural drawings
2. Landscaping to Northern portion of site as per Landscape design
3. Accessible path to main entrance of school as per Architectural and Landscape drawings
4. Basement North carparking reconfigured
5. Basement South carparking retained
6. New pedestrian path from Officeworks Basement carparking to Officeworks entrance.

ADDITIONAL STUDENTS: 480



3 STAGE 2
1:500

STAGE 3 OVERVIEW

LOCATION - 800 PITTWATER ROAD

LEASE END DATE - Officeworks - 30 April 2029

STAGE 3 SUMMARY

1. Internal refurbishment of Officeworks as per Architectural drawings
2. New extension to south of existing building as per Architectural drawings
3. Temporary spaces in Stage 2 reconfigured as per Architectural drawings
4. Landscaping to remainder of site as per Landscape design
5. Front parking area to be reconfigured to accomodate bus and kiss and drop area
6. Basement carpark reconfigured, entrance to carpark relocated to South.

ADDITIONAL STUDENTS: 600

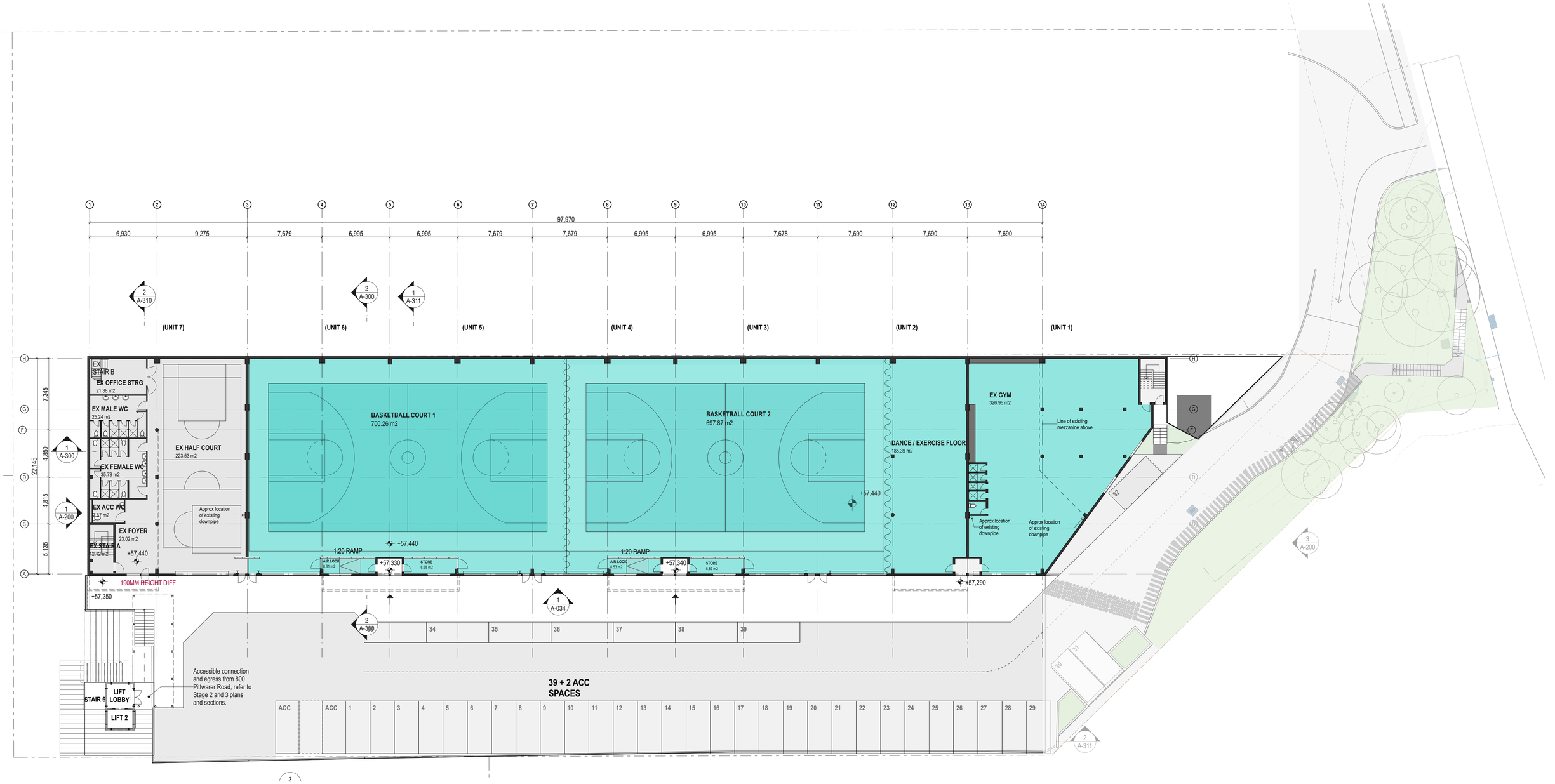
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Dee Why NSW 2099

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800 Pittwater Road
Dee Why NSW 2099
and
224 Headland Road
North Curl Curl NSW 2099
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DRAWING TITLE: 224 HEADLAND ROAD STAGING DIAGRAMS		DRAWN BY: RM + CE + EG
		CHECKED: PT
SCALES: 1:500		DATE: 23/8/19
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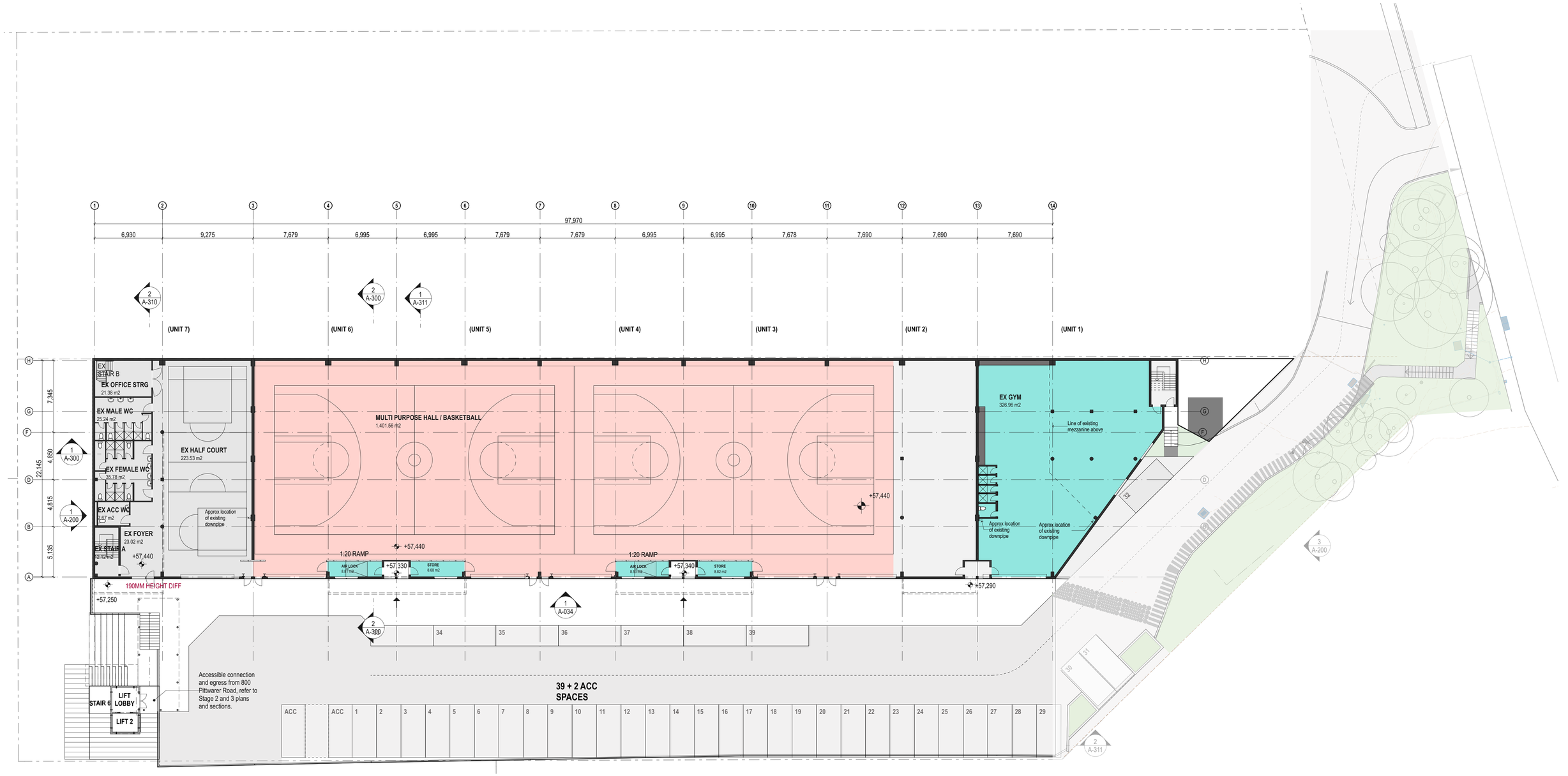
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224 HEADLAND ROAD
LEVEL 0 PLAN - STAGE 1 + 3_224

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DRAWING TITLE
224 HEADLAND ROAD
LEVEL 0 PLAN - STAGE 2_224

SCALES 1:200

PHASE DD

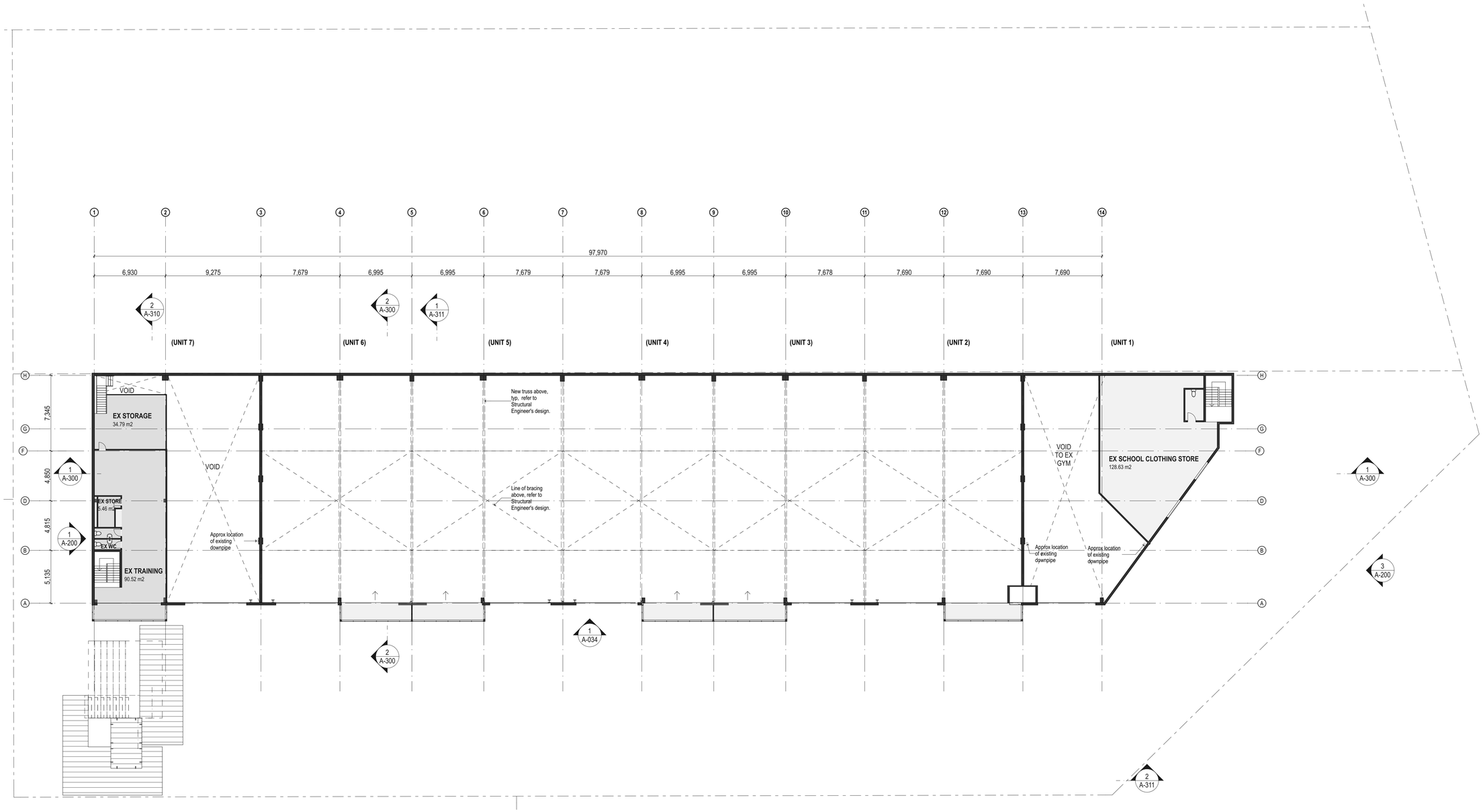
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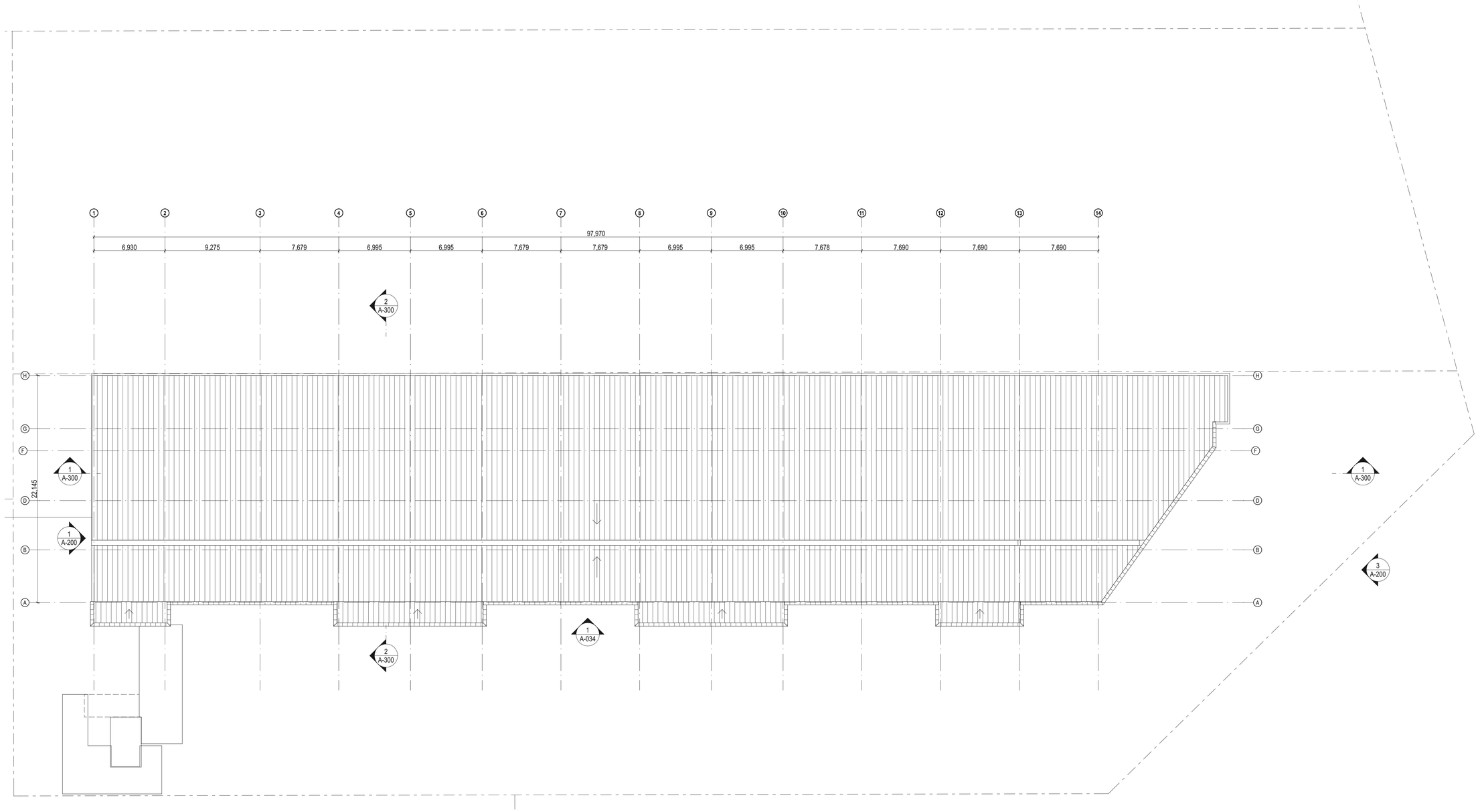
APPLICANT:
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224 HEADLAND ROAD
LEVEL 1 PLAN - STAGE 1_224

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224 HEADLAND ROAD
ROOF PLAN - STAGE 1_224

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DATE 23/8/19
PHASE DD
DRAWING NO A-103
REV

ELECTRICAL SWITCHROOM
21.60 m2
COMMS ROOM
16.00 m2
STAIR 1
NEW LIFT CAR
(1400 x 1600)
LIFT 1
EX
STAIR 1
CAR PARK
52 + 2
ACC
SPACES
POOL BALANCE TANK
34.50 m2
POOL MECHANICAL PLANT ROOM
100.89 m2
CHEMICAL STORE
5.00 m2
POOL FILTRATION ROOM
89.75 m2
EX
STAIR 3
BOILER ROOM
55.98 m2
GENERAL STORE
30.99 m2
FIRE SERVICES PUMP ROOM
45.95 m2
GARDEN STORE
32.63 m2
+44,720
BICYCLE PARKING
76.23 m2
CAR PARK
22 SPACES
+37,867
STAIR 6
LIFT 2
TBD
28.34 m2
STAIR 4
GARBAGE ROOM
55.36 m2
MAINTENANCE STORE
74.35 m2
CAR PARK ENTRY
LIFT 3
GOODS AND ACCESS
LIFT L0 TO L5
STAIR 5
15 SPACES
NEW ELECTRICAL
SUBSTATIONS
EXISTING
HERITAGE
BUS STOP
EX SIGN
EX SIGN
N

1 A-310
2 A-211
1 A-310
4 A-316
2 A-310
1 A-210
3 A-211
2 A-310
1 A-311
1 A-311

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PROJECT :
ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS

PROJECT NO : 18032

ARCHITECT
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 0 PLAN - STAGE 3_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE SD
DRAWING NO A-115
REV

ACCESSIBLE PEDESTRIAN ENRTY

Existing Electrical substation to be relocated. Refer to level 0 and consultant design.

EXTERNAL HARDCOURT
492.55 m2

GALLERY / CHAPEL HUB
81.22 m2

PUBLIC FOYER
15.00 m2

PUBLIC RECEPTION
17.45 m2

ENTRY

STAIR 1

761 SEATS SHOWN
AUDITORIUM
661.75 m2
221 SEATS
314 SEATS
226 SEATS

LIFT 1

ACC WC
5.83 m2

EX STAIR 2

EX STAIR 1

STORAGE
13.41 m2

EX CLOCK TOWER

WC - F
4.99 m2

WC - M
4.99 m2

BOARDROOM
35.00 m2

INTERVIEW 1
11.16 m2

FIRST AID
11.97 m2

ADMIN

PRINCIPAL
15.00 m2

IT OFFICE
17.00 m2

HEAD OF CAMPUS
15.00 m2

STUDENT OFFICE
9.51 m2

SERVER ROOM
6.10 m2

ASSISTANT HOC
15.00 m2

+44.720

+41.170

STUDENT RECEPTION
15.00 m2

ADMIN OFFICE
13.62 m2

COMMS
4.00 m2

STUDENT FOYER
47.12 m2

T.B.C
66.19 m2

STAFF WC - F
7.31 m2

STAFF WC - M
7.31 m2

STAFF COMMON ROOM
79.56 m2

STAFF KITCHEN

COPY ROOM
15.89 m2

STAIR 3

UNDER STAIR SECURE STORE
28.88 m2

ADMIN OFFICE
179.01 m2

STAFF LOUNGE
30.23 m2

STAIR 4

FLEXIBLE LEARNING
147.83 m2

GLA 1
70.06 m2

GLA 2
69.80 m2

VILLAGE CENTRE

STAIR 2

CAFE OFFICE
11.18 m2

WC
4.94 m2

CHAIR STORE
28.31 m2

COMMS
4.00 m2

CAFE COUNTER
19.28 m2

CAFE STORE
8.12 m2

CLEANERS STORE
7.95 m2

BACKSTAGE
63.29 m2

WC - F
22.76 m2

WC - M
18.86 m2

CAFE COLD
7.70 m2

CAFE KITCHEN
54.51 m2

WC - GN
4.76 m2

ACC WC
5.30 m2

HUB 2
32.10 m2

STORAGE
21.78 m2

TUTOR ROOM 1
15.41 m2

TUTOR ROOM 2
15.62 m2

TUTOR ROOM 3
39.47 m2

THEATRE
282.85 m2
228 SEATS

MUSIC SLA
89.76 m2

PERFORMING ARTS PRECINCT

DRAMA SLA
105.66 m2

WC - F
5.83 m2

WC - M
5.82 m2

WC - GN
3.20 m2

STORAGE
5.58 m2

LIFT LOBBY

LIFT 3

WC - A
5.30 m2

COMMS
4.00 m2

STORAGE
4.88 m2

STAIR 5

CHANGE M/F
20.28 m2

STORE
21.03 m2

STAIR 6

LIFT 2

WELLNESS PRECINCT

POOL
430.00 m2

POOL AREA
803.74 m2

SPECTATOR SEATING

RAMP

SPORT STORE
45.54 m2

STAIR 7

STAFF WC
13.35 m2

CHANGE F
41.21 m2

EX STAIR 3

CHANGE M
31.60 m2

ACC CHANGE
13.90 m2

ACC WC
7.03 m2

STORAGE
10.45 m2

BLEACHER SEATING

POOL RECEPTION
7.77 m2

POOL STORE
34.22 m2

EXISTING HERITAGE BUS STOP

N

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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 1 PLAN - STAGE 3_800

SCALES 1:200

PHASE SD

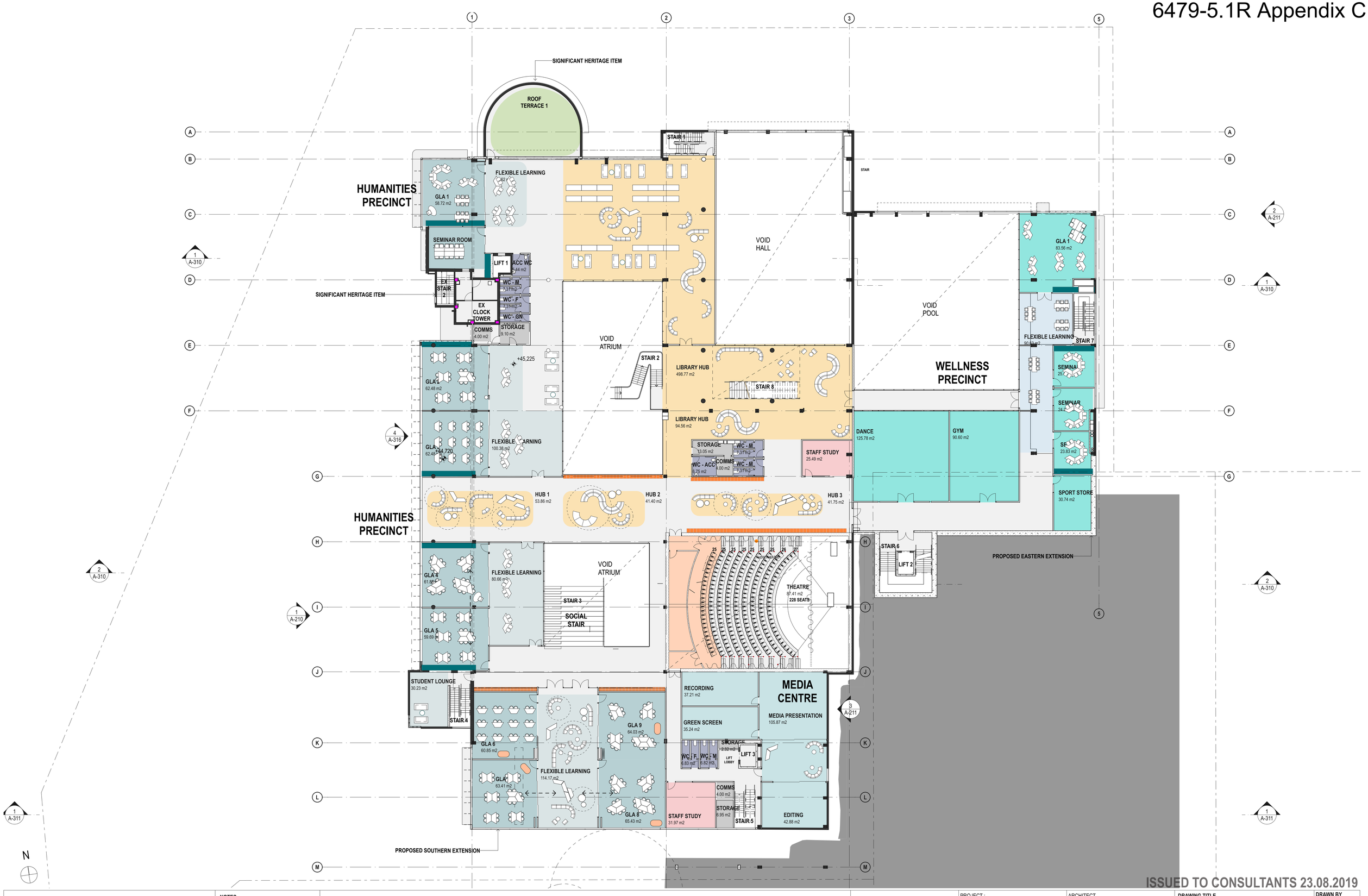
DRAWING NO A-116

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DATE 23/8/19

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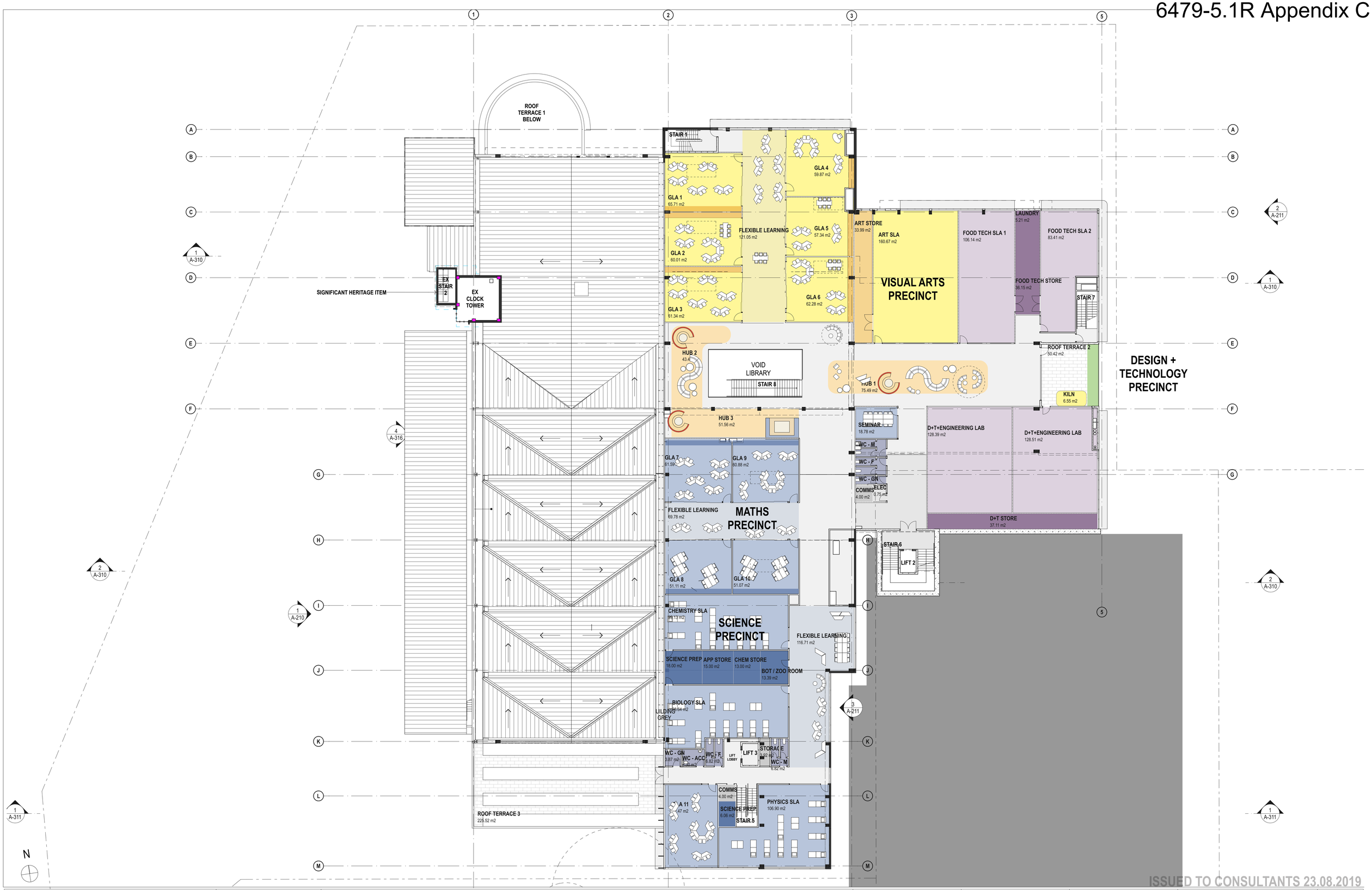
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 2 PLAN - STAGE 3_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE SD
DRAWING NO A-117
REV



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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 3 PLAN - STAGE 3_800

SCALES 1:200

PHASE SD

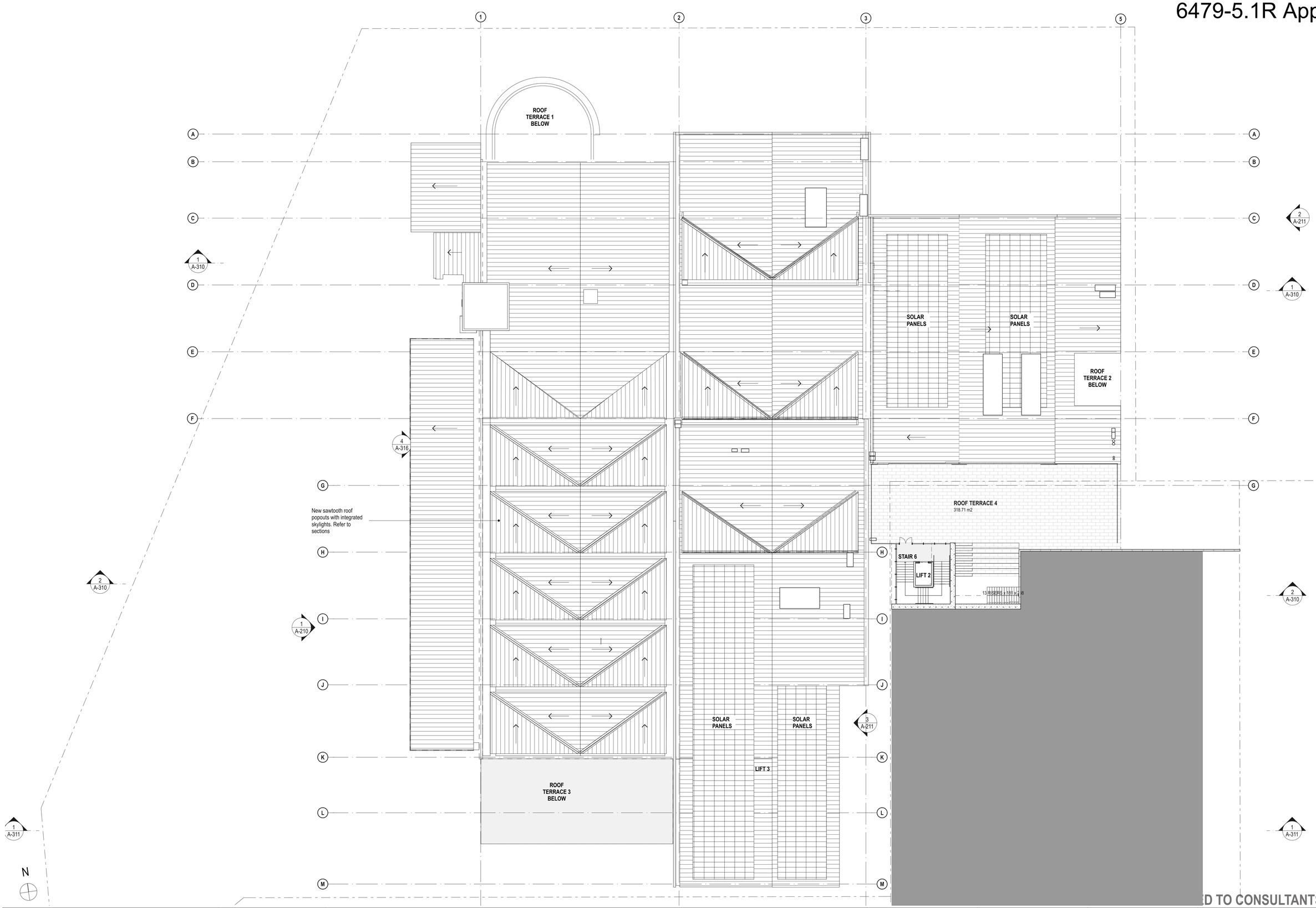
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DATE 23/8/19



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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 4 PLAN - STAGE 3_800

SCALES 1:200

PHASE SD

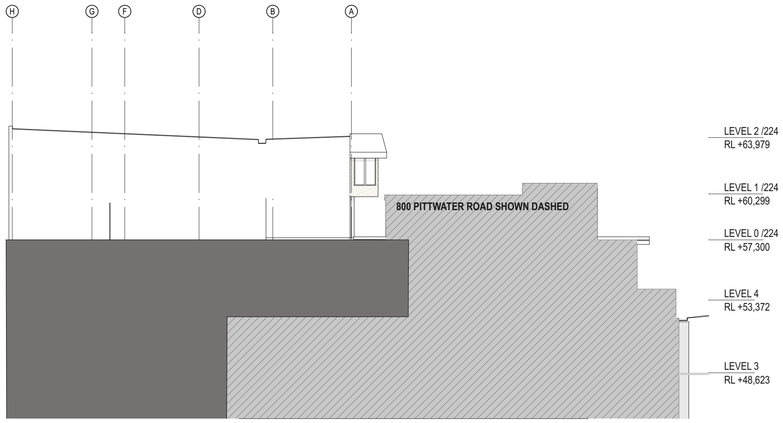
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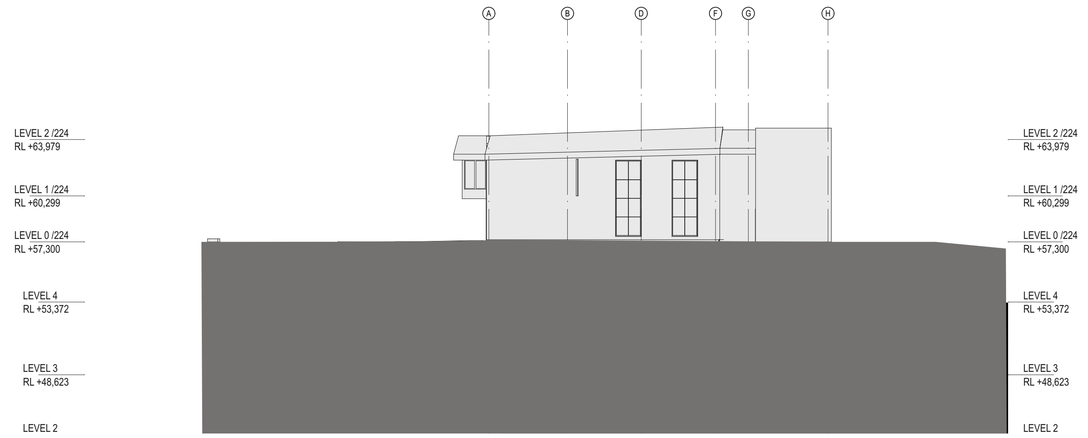
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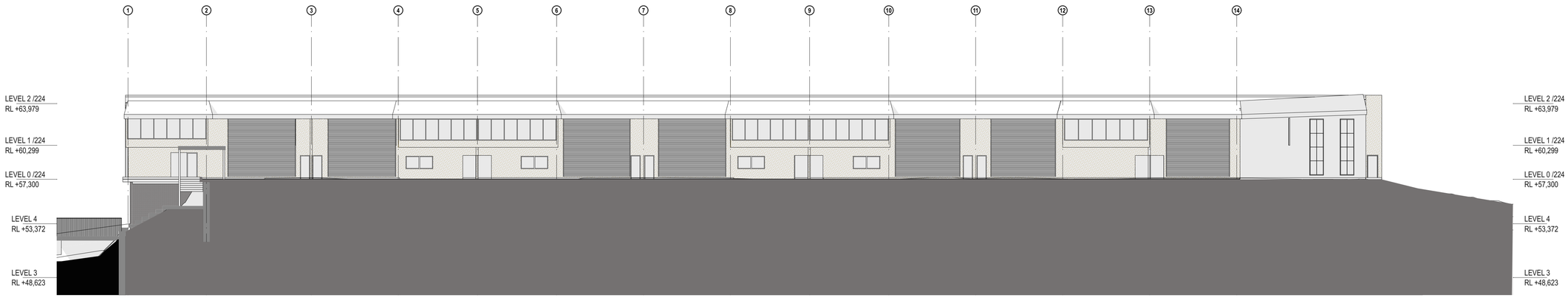
DATE 23/8/19



1 NORTH ELEVATION
1:200



3 SOUTH ELEVATION
1:200



2 WEST ELEVATION
1:200

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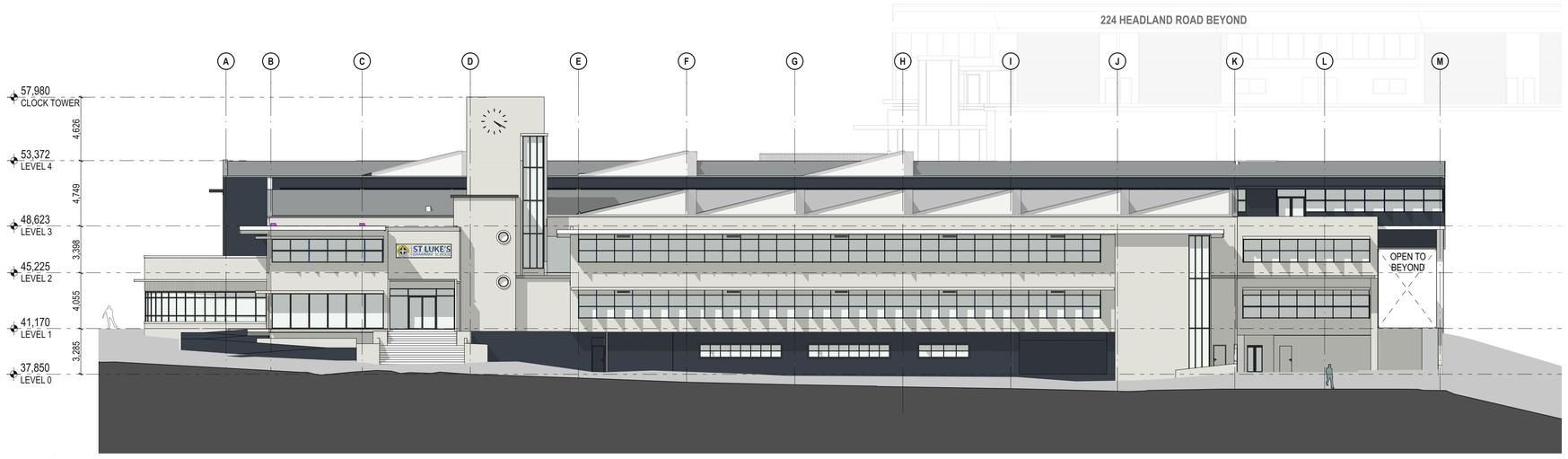
APPLICANT:
ST LUKE'S GRAMMAR SCHOOL
Mrs Jane Hughes (Business Manager)
210 Headland Road
Dee Why NSW 2099

PROJECT :
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and
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North Curl Curl NSW 2099
PROJECT NO : 18032

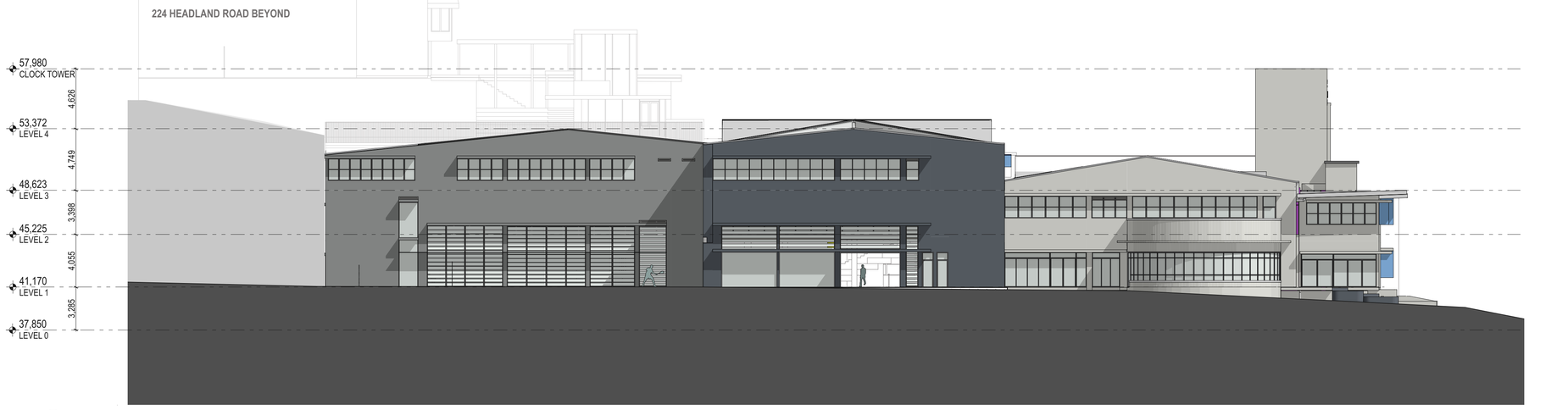
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DRAWING TITLE
224 HEADLAND ROAD
ELEVATIONS_224

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE DD
DRAWING NO A-200
REV



1 WEST ELEVATION
1:200



2 NORTH ELEVATION
1:200

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DRAWING TITLE
800 PITTWATER ROAD
ELEVATIONS WEST + NORTH_800

SCALES 1:200

PHASE SD

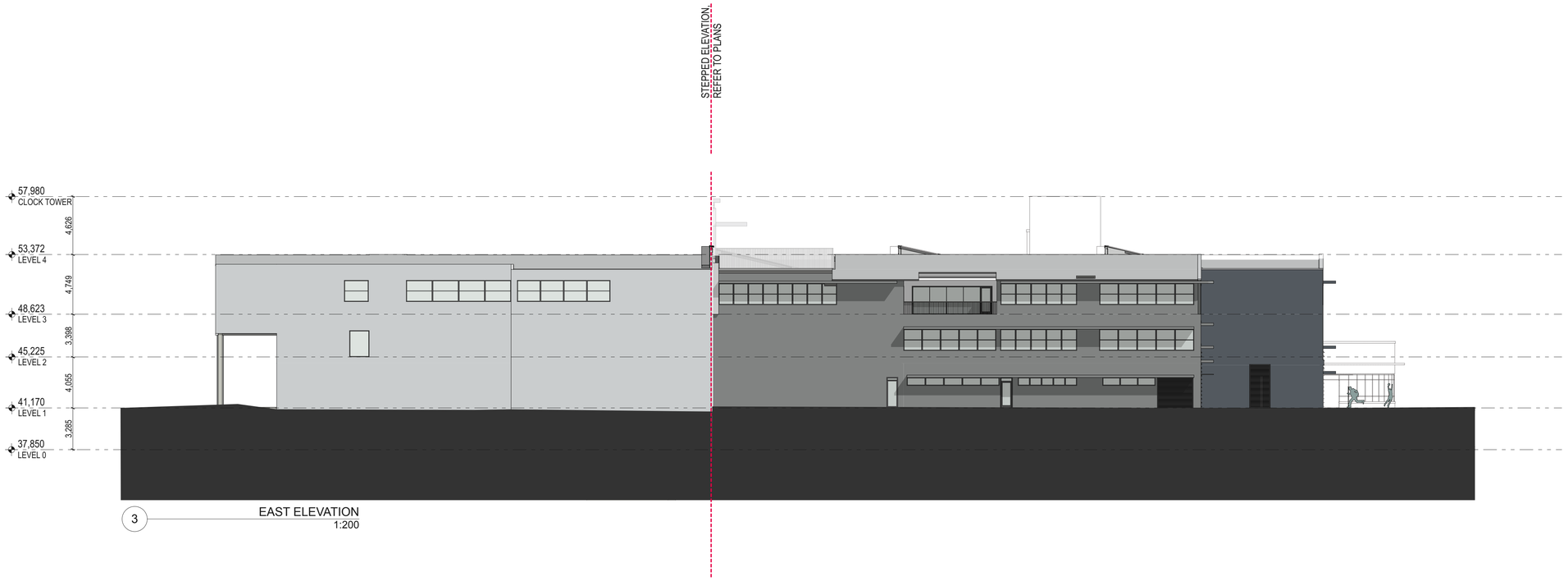
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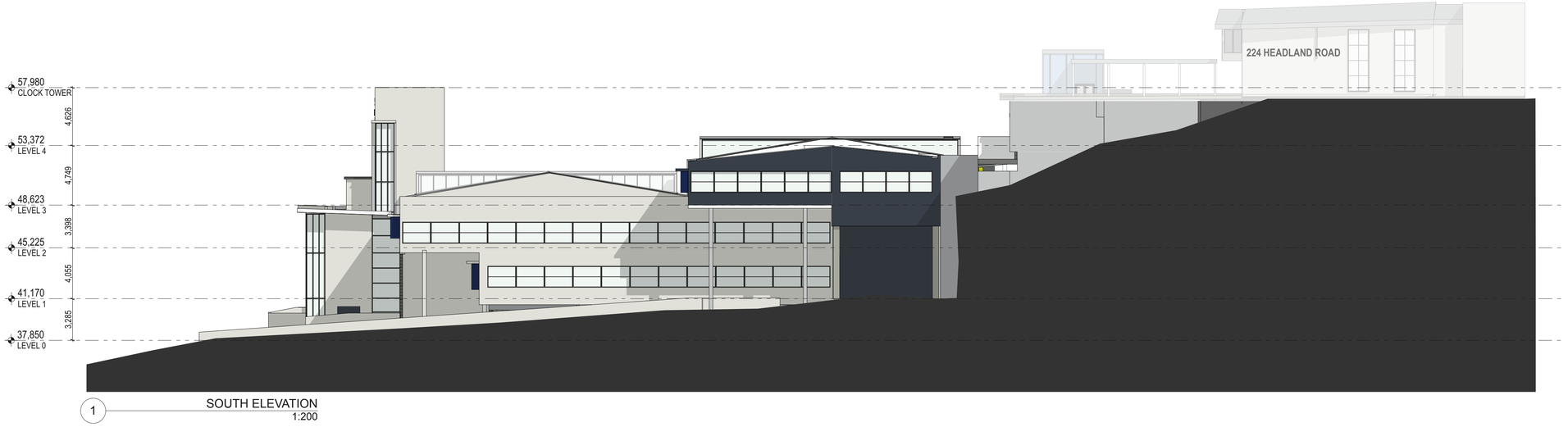
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DATE 23/8/19

REV



3 EAST ELEVATION
1:200



1 SOUTH ELEVATION
1:200

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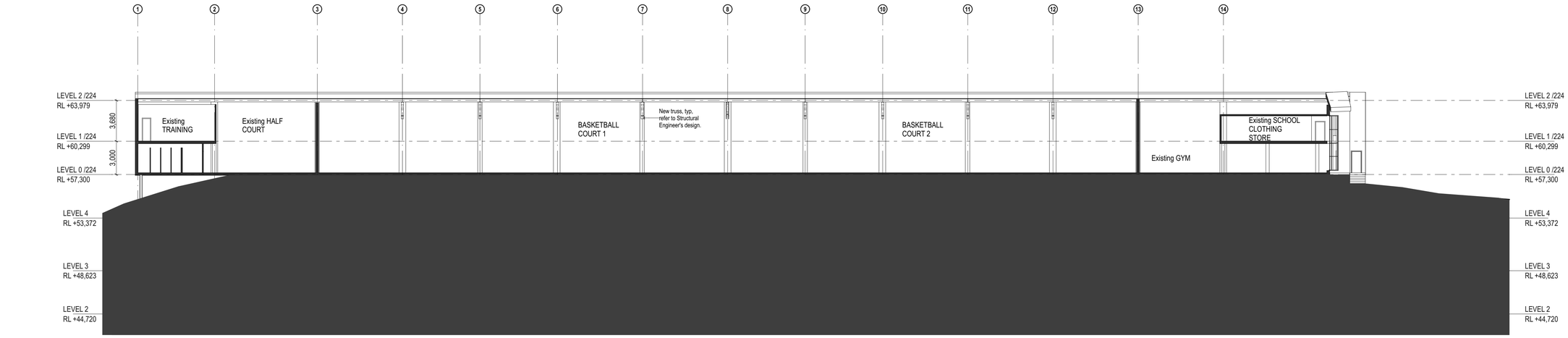
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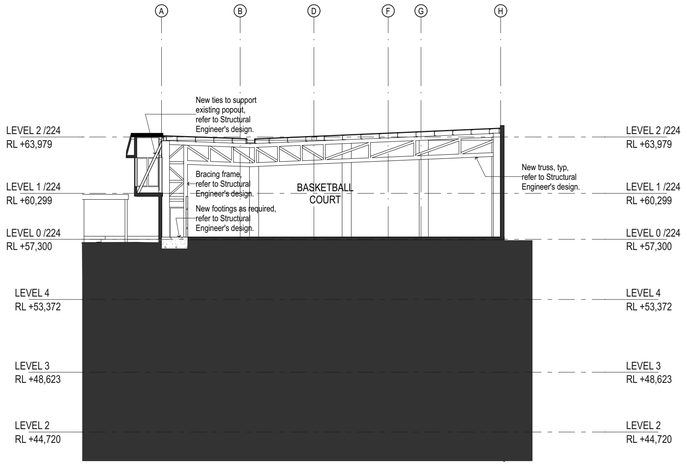
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DRAWING TITLE
800 PITTWATER ROAD
ELEVATIONS EAST + SOUTH_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE SD
DRAWING NO A-211
REV



1 PROPOSED N-S SECTION 1
1:200



2 PROPOSED E-W SECTION 1
1:200

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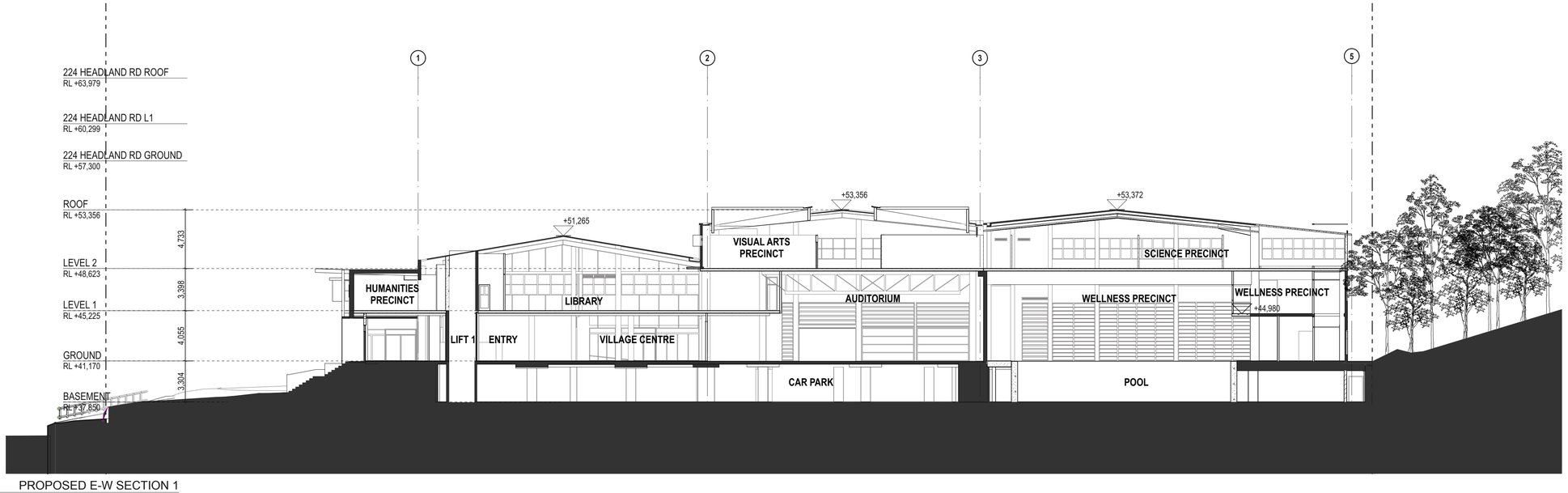
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PROJECT NO : 18032
SCHOOL CAMPUS
Dee Why NSW 2099

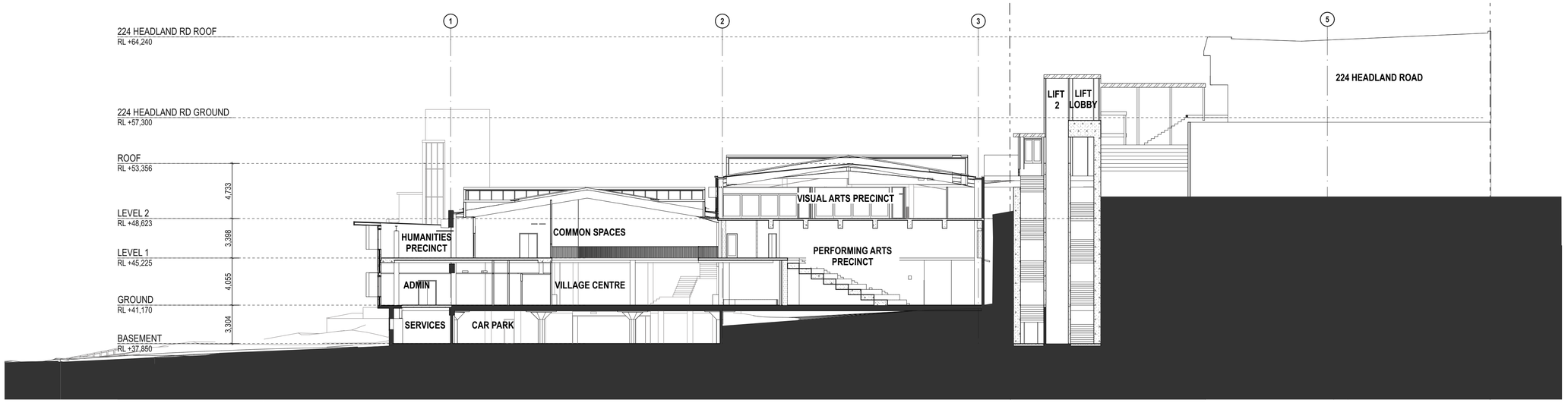
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DRAWING TITLE
224 HEADLAND ROAD
SECTIONS 1_224

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE DD
DRAWING NO A-300
REV



1 PROPOSED E-W SECTION 1
1:200



2 PROPOSED E-W SECTION 2
1:200

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DRAWING TITLE
800 PITTWATER ROAD
SECTIONS 1_800

SCALES 1:200

PHASE SD

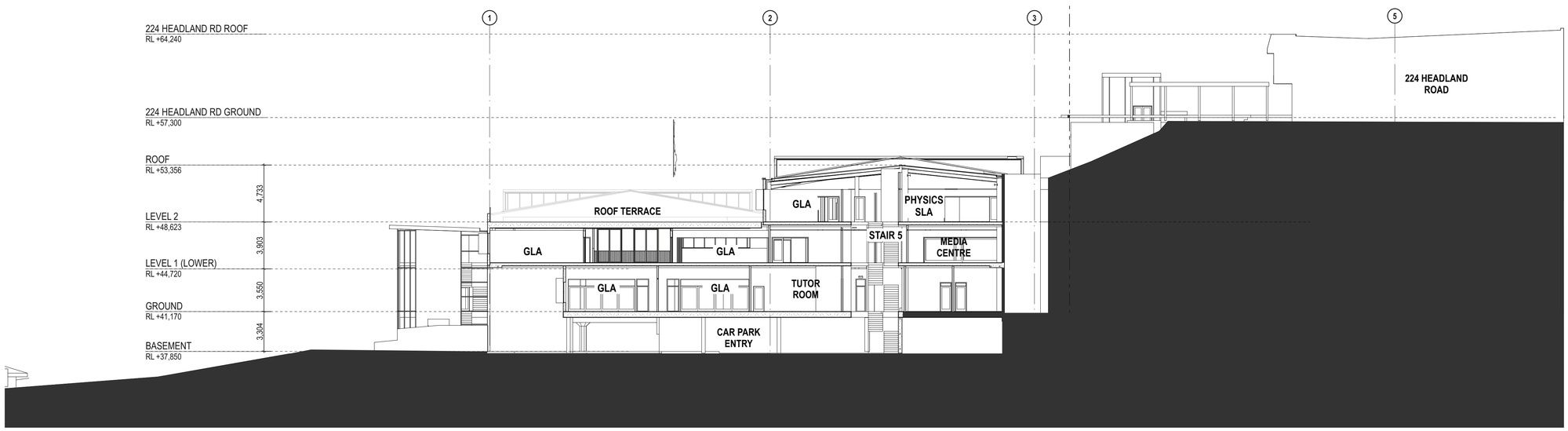
DRAWING NO A-310

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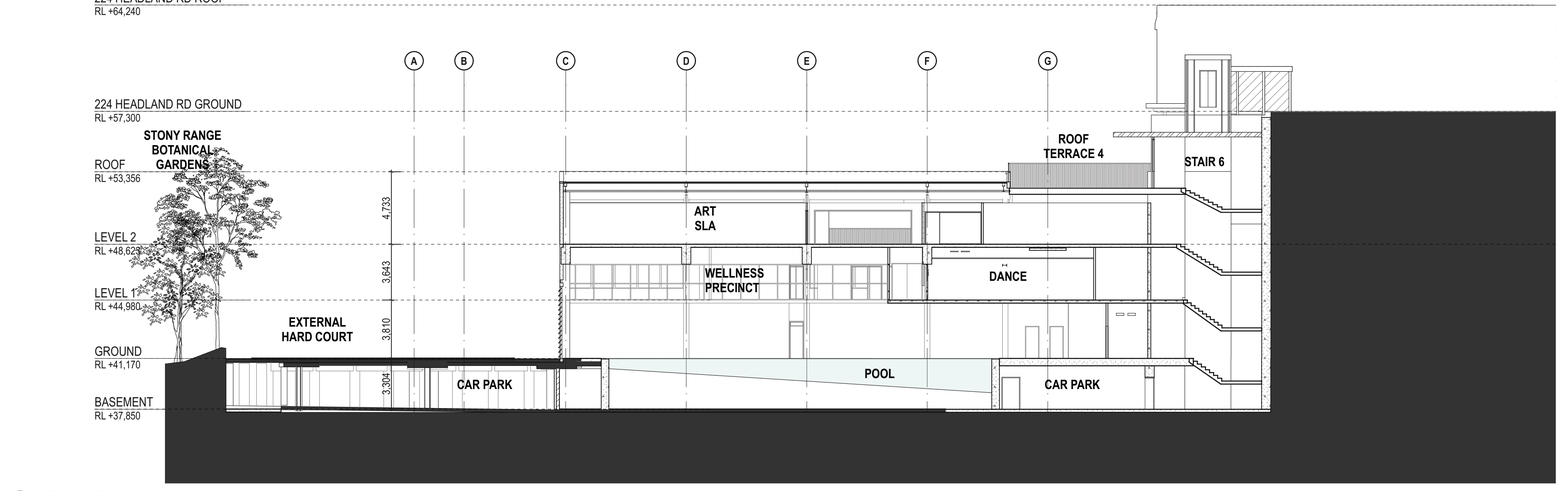
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1 PROPOSED E-W SECTION 3
1:200



2 PROPOSED N-S SECTION 3
1:200

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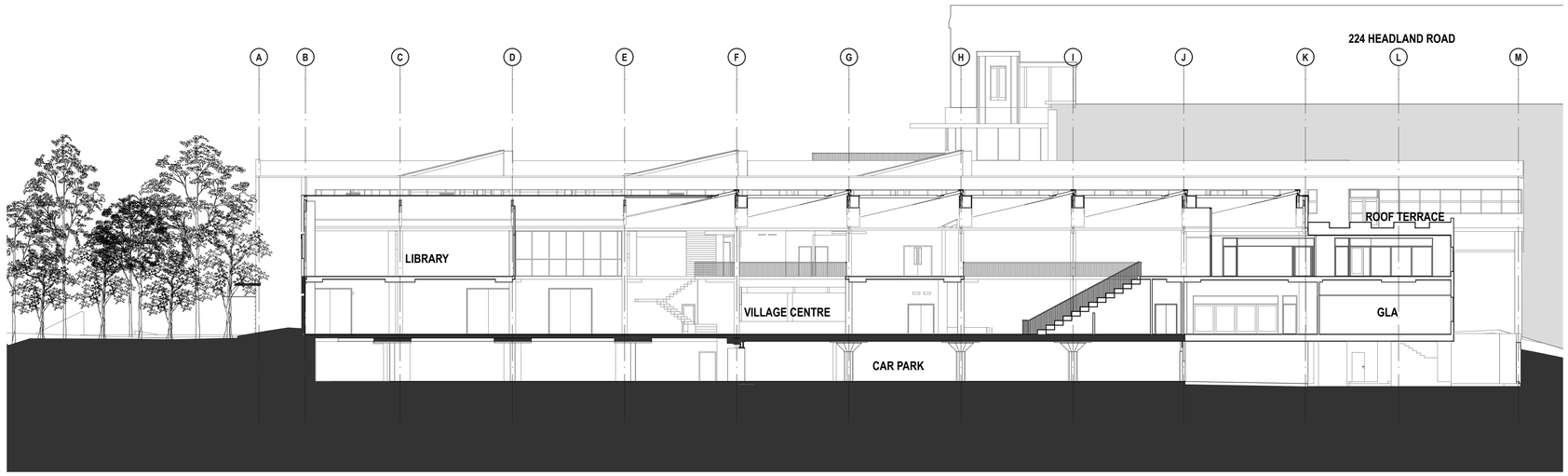
PROJECT :
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PROJECT NO : 18032

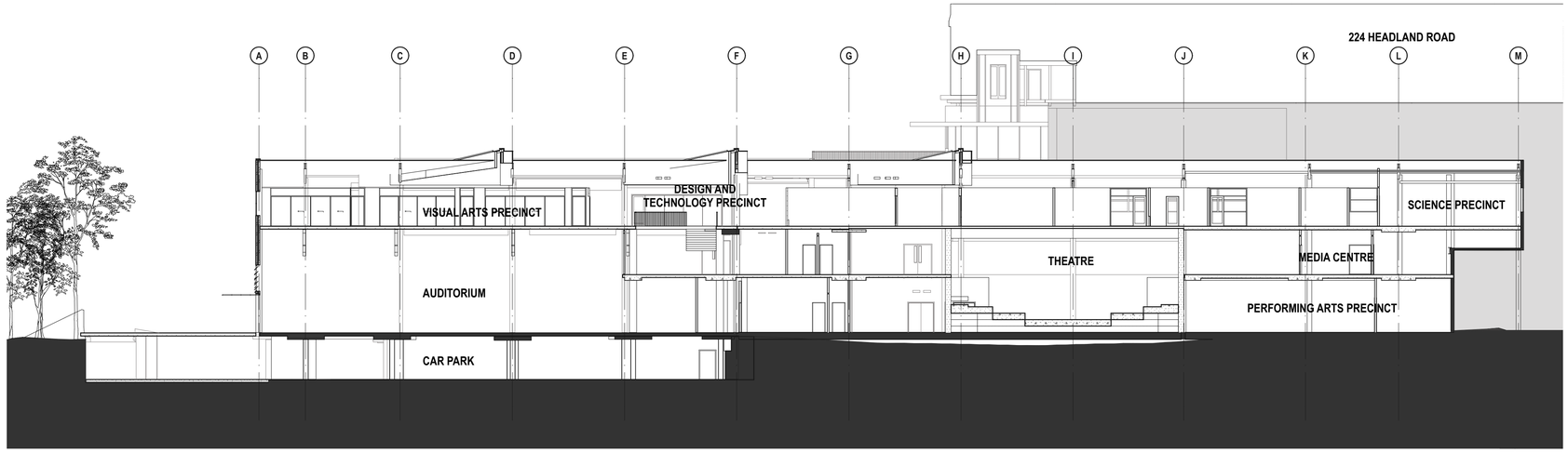
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DRAWING TITLE
800 PITTWATER ROAD
SECTIONS 2_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:200
DATE 23/8/19
PHASE SD
DRAWING NO A-311
REV



1 PROPOSED N-S SECTION 1
1:200



2 PROPOSED N-S SECTION 2
1:200

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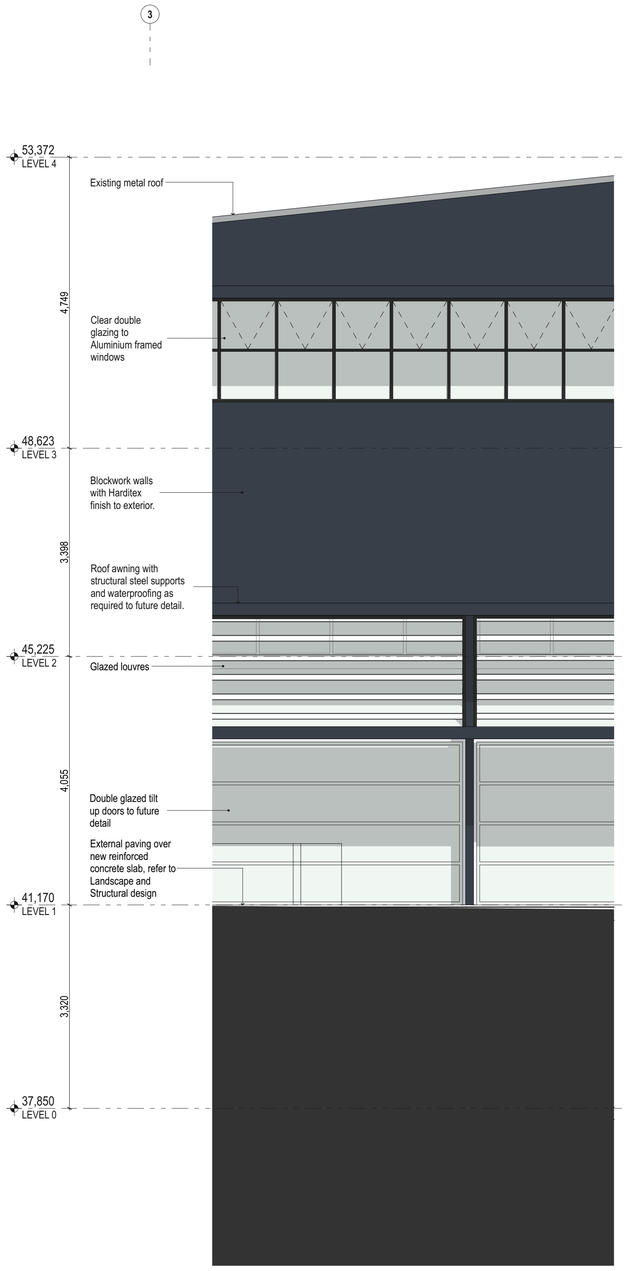
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ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS

PROJECT NO : 18032

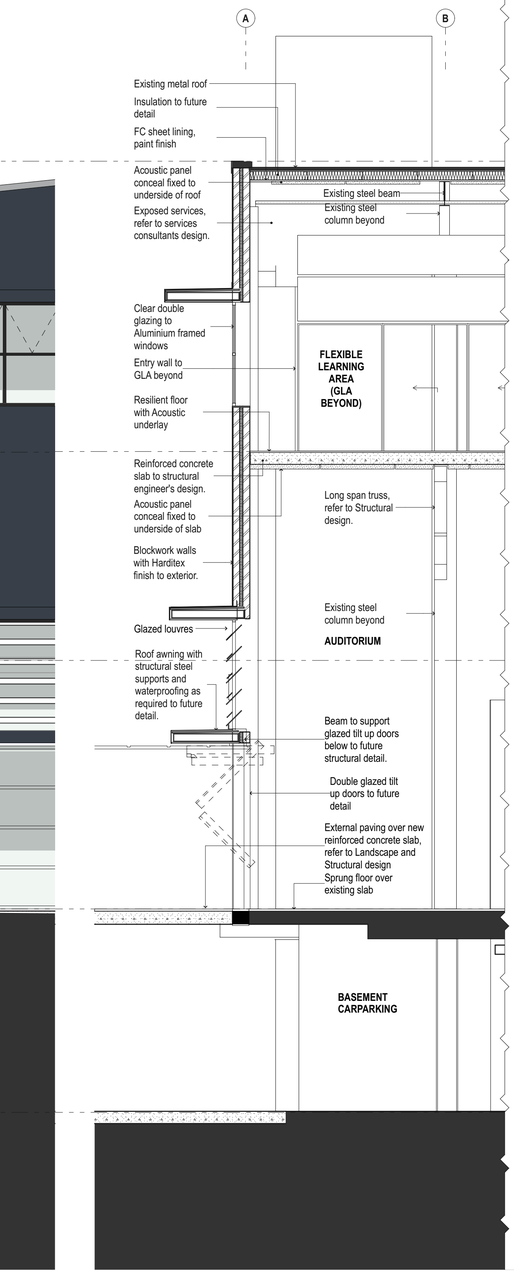
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DRAWING TITLE
800 PITTWATER ROAD
SECTIONS 3_800

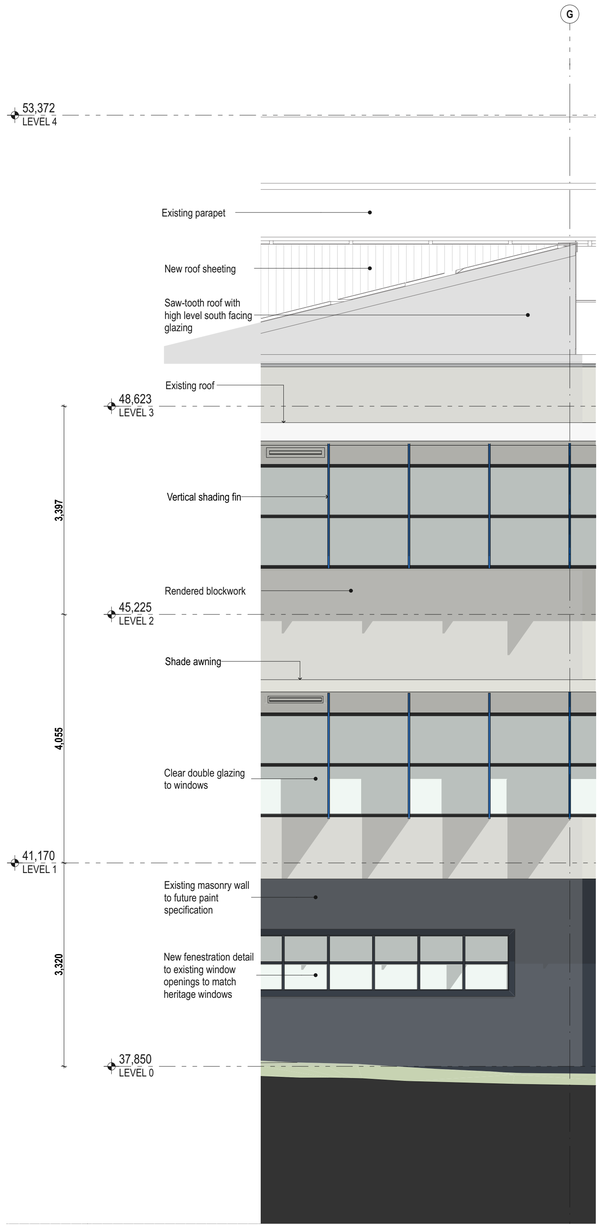
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SCALES 1:200
DATE 23/8/19
PHASE SD
DRAWING NO A-312
REV



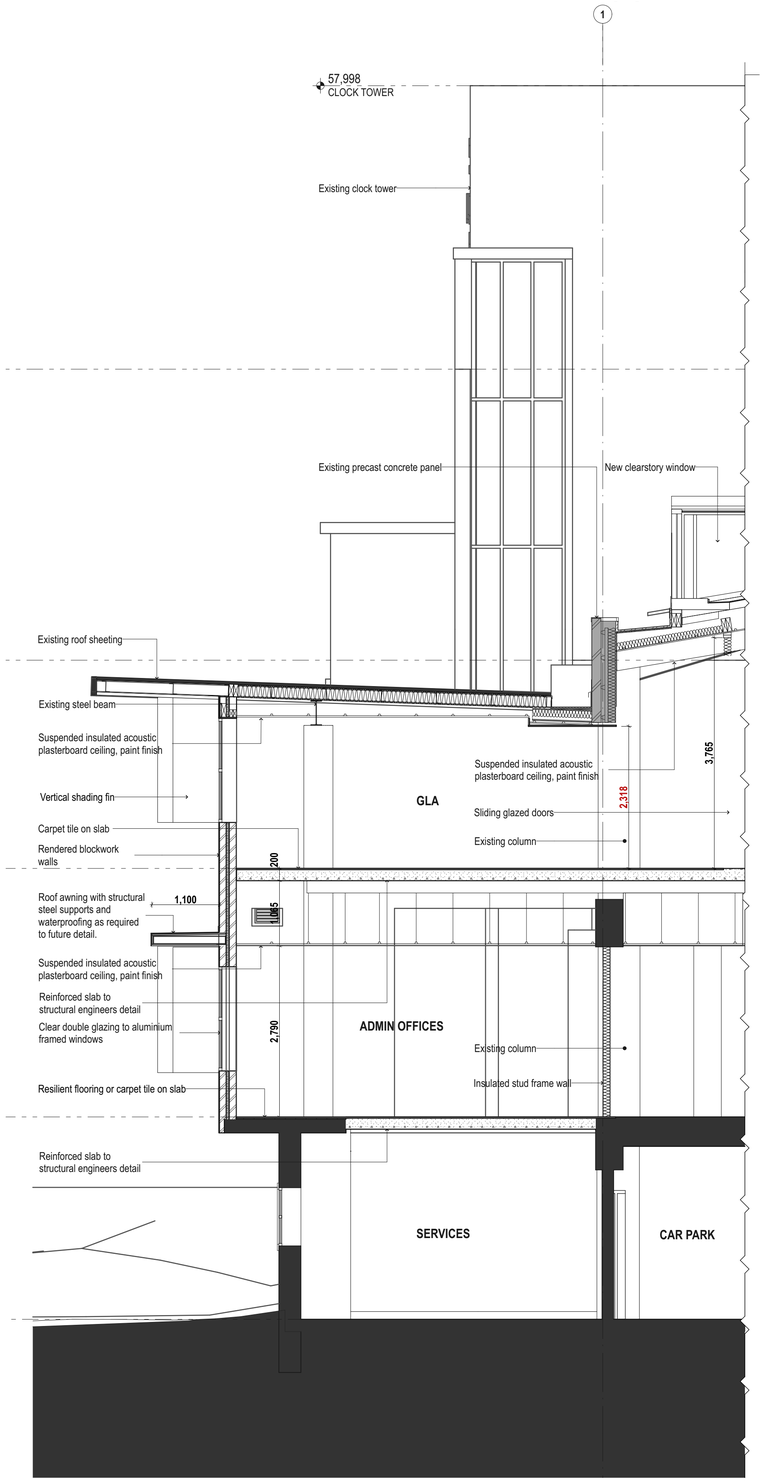
1 E1 DETAIL NORTH ELEVATION
1:50



2 NORTHERN FACADE DETAIL SECTION
1:50



4 DETAIL WEST ELEVATION
1:50



3 WESTERN FACADE DETAIL
1:50

ISSUED TO CONSULTANTS 23.08.2019

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PROJECT :
ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS

PROJECT NO : 18032

ARCHITECT
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DRAWING TITLE
800 PITTWATER ROAD
TYPICAL WALL SECTIONS

DRAWN BY RM + CE + EG
CHECKED PT
SCALES 1:50
DATE 23/8/19
PHASE SD
DRAWING NO A-316
REV

Approximate Noise Source Locations

6479-5.1R Appendix D

Group 1

Group 2

Group 3

ACCESSIBLE PEDESTRIAN ENRTY

Existing Electrical substation to be relocated. Refer to level 0 and consultant design.

EXTERNAL HARDCOURT 492.55 m2

GALLERY / CHAPEL HUB 81.22 m2

PUBLIC FOYER 15.00 m2

PUBLIC RECEPTION 17.45 m2

ENTRY

STAIR 1

761 SEATS SHOWN AUDITORIUM 661.75 m2 221 SEATS

314 SEATS

226 SEATS

STAIR

SPORT STORE 45.54 m2

POOL 430.00 m2

WELLNESS PRECINCT

POOL AREA 803.74 m2

SPECTATOR SEATING

STAIR 7

STAFF WC 13.35 m2

CHANGE F 41.21 m2

EX STAIR 3

CHANGE M 31.60 m2

ACC CHANGE 13.90 m2

ACC W/C 7.03 m2

STORAGE 10.40 m2

BLEACHER SEATING

POOL STORE 34.22 m2

POOL RECEPTION 7.77 m2

LIFT 1

ACC WC 5.83 m2

EX STAIR 2

STORAGE 13.41 m2

EX CLOCK TOWER

ACC WC 5.83 m2

WC - F 4.99 m2

WC - M 4.99 m2

BOARDROOM 35.00 m2

PRINCIPAL 15.00 m2

HEAD OF CAMPUS 15.00 m2

ASSISTANT HOC 15.00 m2

ADMIN OFFICE 13.62 m2

INTERVIEW 1 11.16 m2

FIRST AID 11.97 m2

IT OFFICE 17.00 m2

ADMIN

STUDENT OFFICE 9.51 m2

SERVER ROOM 6.10 m2

STUDENT RECEPTION 15.00 m2

COMMS 4.00 m2

+44.720

+41.170

STUDENT FOYER 47.12 m2

T.B.C 66.19 m2

STAIR 2

CAFE OFFICE 11.18 m2

WC 4.94 m2

CHAIR STORE 28.31 m2

COMMS 4.00 m2

VILLAGE CENTRE

CAFE COUNTER 19.28 m2

CAFE STORE 8.12 m2

CAFE COLD 7.70 m2

CAFE KITCHEN 54.51 m2

WC - F 22.76 m2

WC - GN 4.76 m2

CLEANERS STORE 7.95 m2

WC - M 18.66 m2

BACKSTAGE 63.29 m2

ACC WC 5.30 m2

STAFF COMMON ROOM 79.56 m2

STAFF KITCHEN

STAFF WC - F 7.31 m2

STAFF WC - M 7.31 m2

COPY ROOM 15.89 m2

STAIR 3

UNDER STAIR SECURE STORE 28.88 m2

ADMIN OFFICE 179.01 m2

HUB 2 32.10 m2

STORAGE 21.78 m2

TUTOR ROOM 1 15.41 m2

TUTOR ROOM 2 15.62 m2

THEATRE 282.85 m2 228 SEATS

STAIR 6

LIFT 2

STAFF LOUNGE 30.23 m2

STAIR 4

FLEXIBLE LEARNING 147.83 m2

MUSIC SLA 89.76 m2

PERFORMING ARTS PRECINCT

DRAMA SLA 105.66 m2

STORAGE 5.58 m2

LIFT LOBBY

LIFT 3

WC - F 5.83 m2

WC - M 5.82 m2

WC - GN 3.20 m2

GLA 1 70.06 m2

GLA 2 69.80 m2

TUTOR ROOM 3 39.47 m2

WC - A 5.30 m2

COMMS 4.00 m2

STORAGE 4.88 m2

STAIR 5

CHANGE M/F 20.28 m2

STORE 21.03 m2

EXISTING HERITAGE BUS STOP

N

ISSUED TO CONSULTANTS 23.08.2019

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ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR SCHOOL CAMPUS

PROJECT NO : 18032

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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 1 PLAN - STAGE 3_800

SCALES 1:200

PHASE SD

DRAWING NO A-116

DRAWN BY RM + CE + EG

CHECKED PT

DATE 23/8/19

REV

COMMS ROOM WALL MOUNTED SPLIT AC SYSTEM C/W OUTDOOR CONDENSER UNIT LOCATED @ HIGH LEVEL WITHIN THE CAR PARK SPACE

ARCHITECT TO CONFIRM THIS IS NOT A SOLID WALL

4000 x 3400 CAR PARK SUPPLY FAN ROOM

1600 x 500 SUPPLY AIR DUCTWORK FROM ABOVE TO TRANSITION TO CAR PARK FAN ROOM

1700 x 650 CAR PARK SUPPLY AIR RISER ZONE FROM ABOVE

11700 x 8650 x 3100 (L X W X H) INDICATIVE LOCATION & SIZE OF THE POOL MECHANICAL PLANT SPACE

2100 X 750 CAR PARK EXHAUST RISER ZONE TO ABOVE

500 X 300 SUPPLY AIR RISER ZONE FROM ABOVE TO SERVE SWITCH & COMMS ROOM

2300 X 1200 POOL INTAKE RISER FROM ABOVE

2200 X 850 POOL SUPPLY & RETURN AIR RISERS

4200 X 2350 X 2210 (W X D X H) 1 OFF POOL PAC UNITS

MAINTENANCE ACCESS ZONE

2400 X 700 POOL EXHAUST RISER TO ABOVE

700 X 450 SUPPLY AIR RISER ZONE FROM ABOVE

250 X 250 CHEMICAL STORE ROOM EXHAUST RISER TO ABOVE

500 X 350 POOL FILTRATION ROOM EXHAUST RISER TO ABOVE

4M2 MIN 50% FREE AREA FIRE PUMP ROOM RELIEF AIR LOUVRE.
BCA CONSULTAT/ ARCHITECT TO CONFIRM THAT FIRE PUMP ROOM IS NOT REQUIRED TO BE FIRE ISOLATED

2 OFF Ø 200 mm HOT WATER PIPEWORK RISER TO ABOVE

350 X 350 EXHAUST RISER TO ABOVE

2 OFF Ø 300 mm FLUE EXHAUST RISERS TO ABOVE

2 OFF 1650 X 1100 X 1450 (W X D X H) HOT WATER BOILERS

4650 x 8080 (L X W)
INDICATIVE LOCATION OF THE POOL MECHANICAL PLANT

ELECTRICAL SWITCH ROOM 27.00 m2
COMMS ROOM 16.00 m2
STAIR 1
4,000 mm
ACCESS HATCH TO FUTURE DETAIL
POOL BALANCE TANK 38.72 m2
EX ACC
NEW LIFT CAR (1400 x 1600)
LIFT 1
EX STAIR 1
STAGE 2
CAR PARK 52 + 2 ACC SPACES
POOL MECHANICAL PLANT ROOM 101.76 m2
CHEMICAL STORE 5.00 m2
POOL FILTRATION ROOM 89.75 m2
EX STAIR 3
BOILER ROOM 55.98 m2
FIRE SERVICES PUMP ROOM 15.95 m2
EXISTING ENTRY TO OFFICEWORKS
EXISTING TENANCY
CAR PARK 22 SPACES
48 + 2 ACC SPACES 7 DROP OFF
EXISTING CAR PARK ENTRY
+37,867
STAIR 6
LIFT 2
EXISTING HERITAGE BUS STOP
EX SIGN
EX SIGN
NEW ELECTRICAL SUBSTATIONS
EXISTING DETENTION TANK NO.
N

1 A-310 · 2 A-310 · 1 A-311 · 3 A-211 · 1 A-311

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Project Name ST LUKES GRAMMAR SCHOOL
Project No 43194
Sketch Title MECHANICAL SPATIALS
Sketch No 3.2
Date 17/09/2019 By Lydia

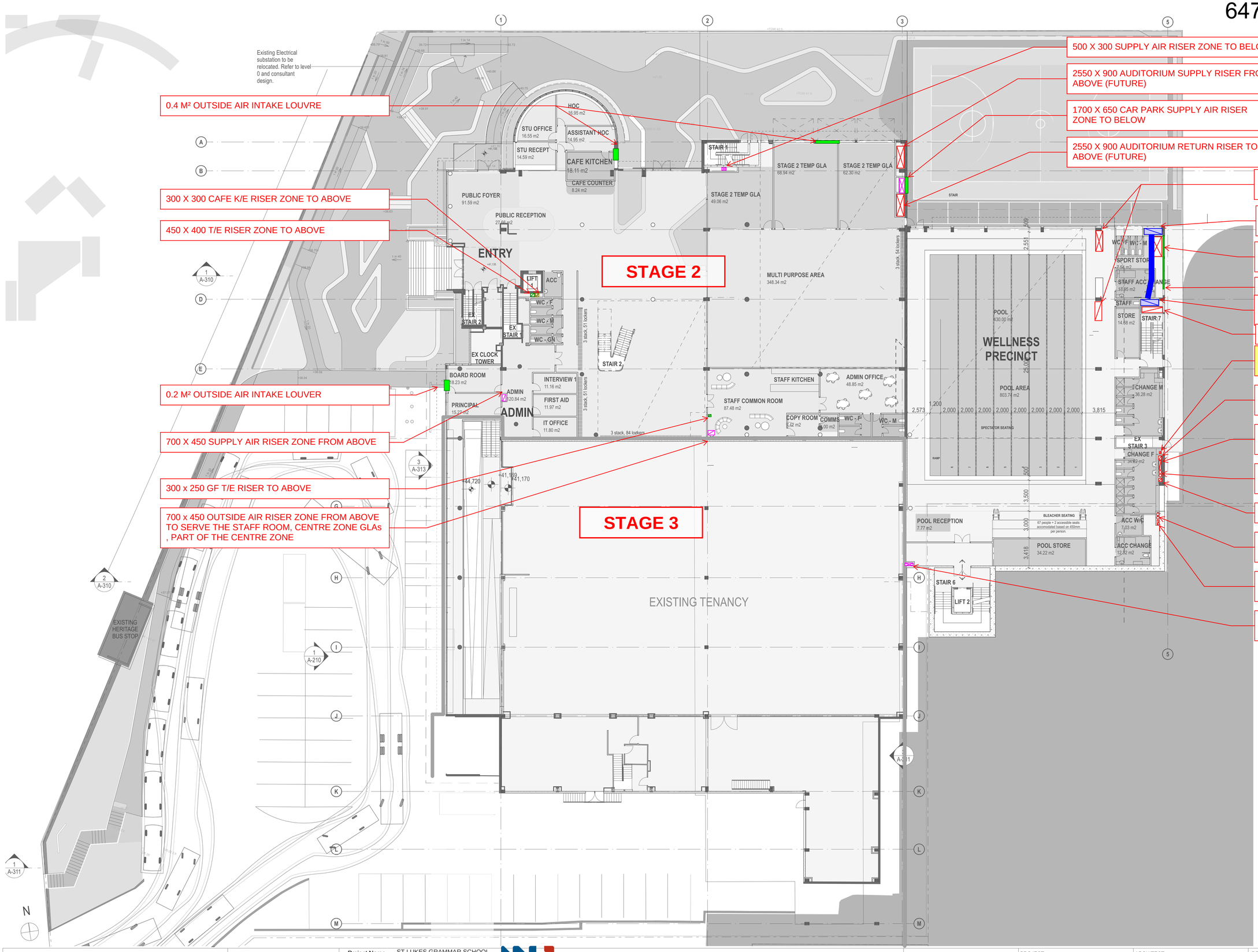
WOOD & GRIEVE ENGINEERS
NOW PART OF Stantec
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Phone 02 8484 7000

PROJECT :
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PROJECT NO : 18032

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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 0 PLAN - STAGE 2_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES AT A1 1:200
DATE 12/9/19
PHASE SD
DRAWING NO A-110
REV



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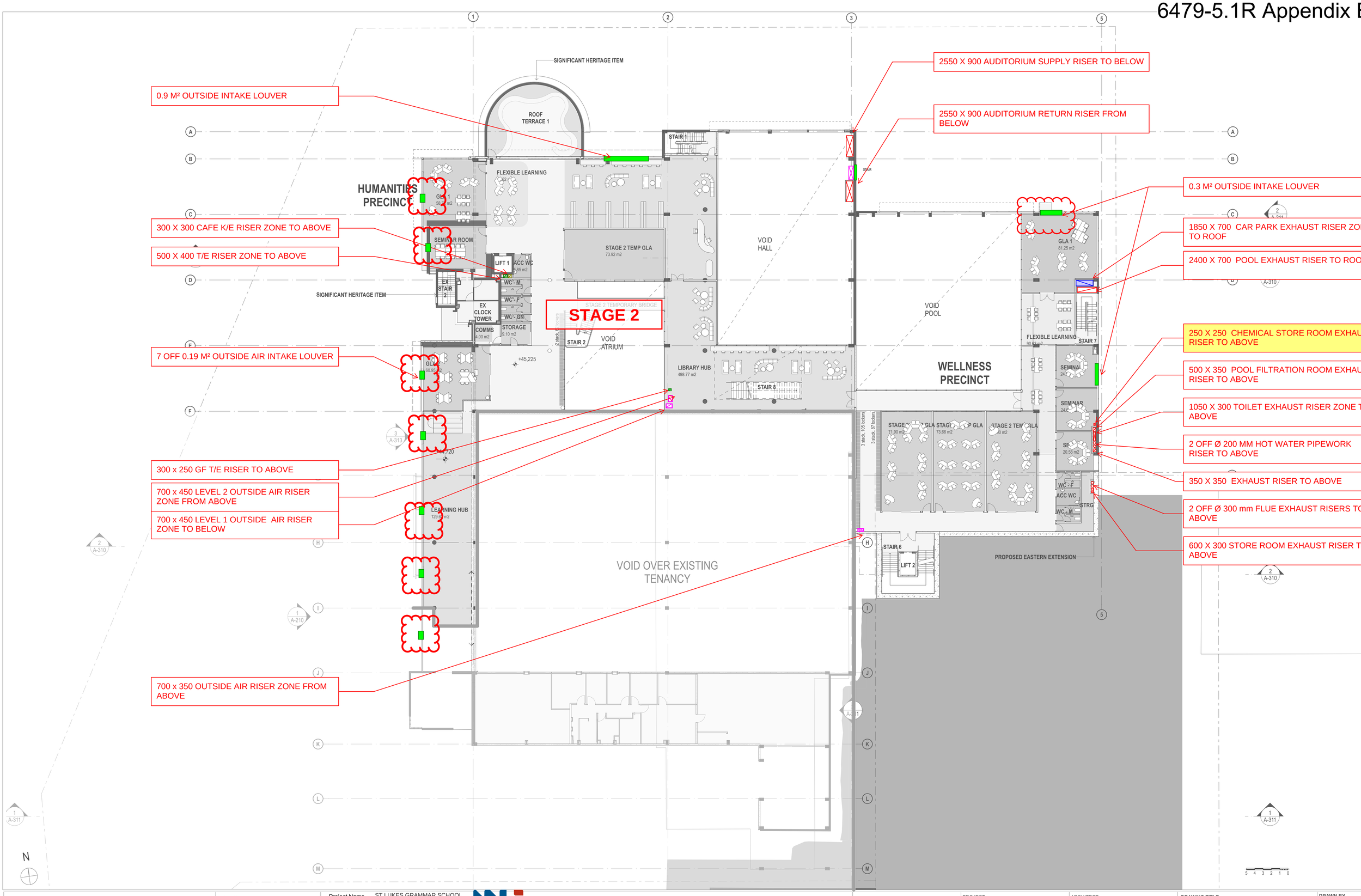
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 1 PLAN - STAGE 2_800

SCALES AT A1 1:200
PHASE SD
DRAWING NO A-111
REV
DRAWN BY RM + CE + EG
CHECKED PT
DATE 12/9/19



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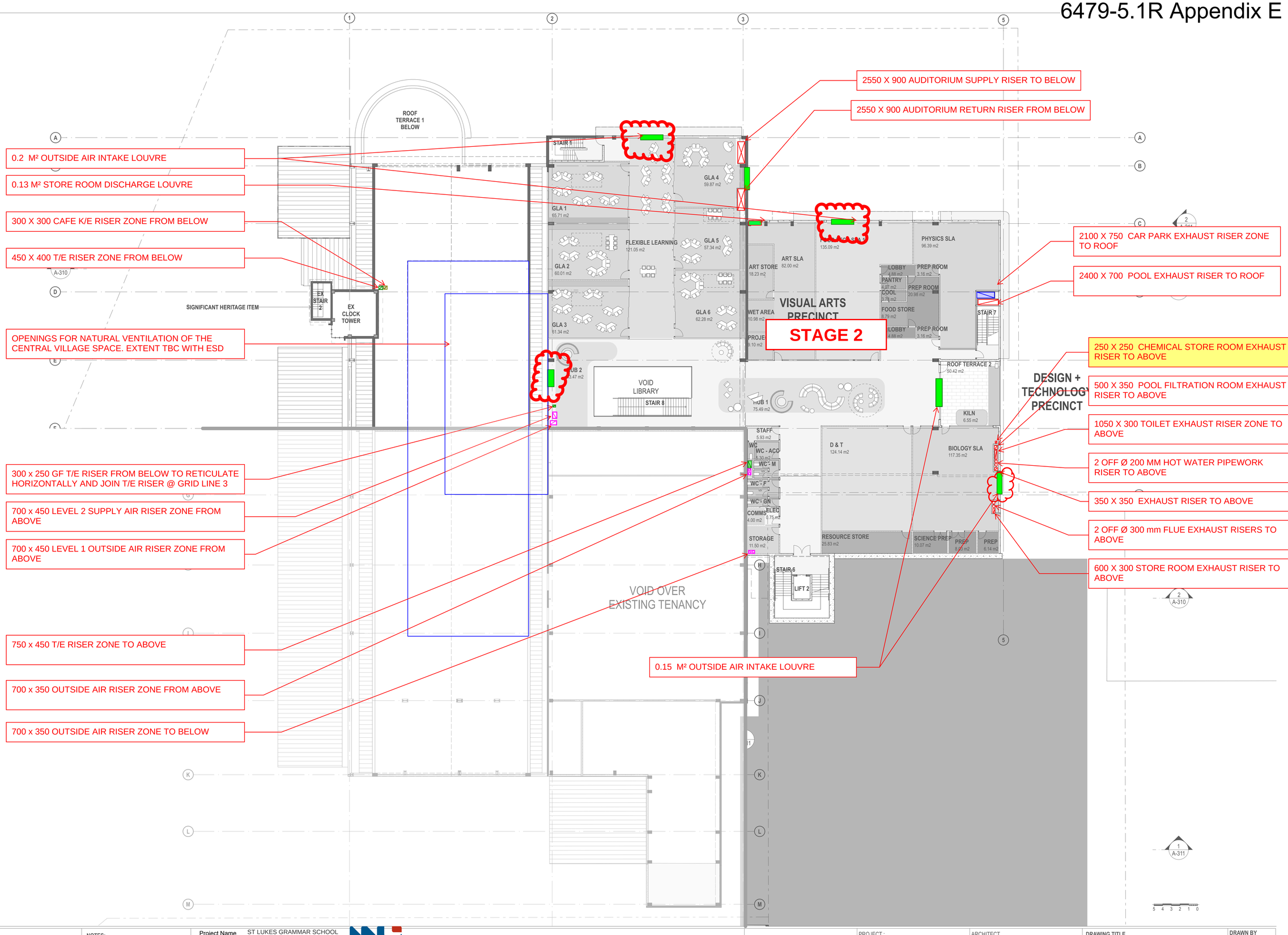
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 2 PLAN - STAGE 2_800

SCALES AT A1 1:200
PHASE SD
DRAWING NO A-112
DRAWN BY RM + CE + EG
CHECKED PT
DATE 12/9/19
REV



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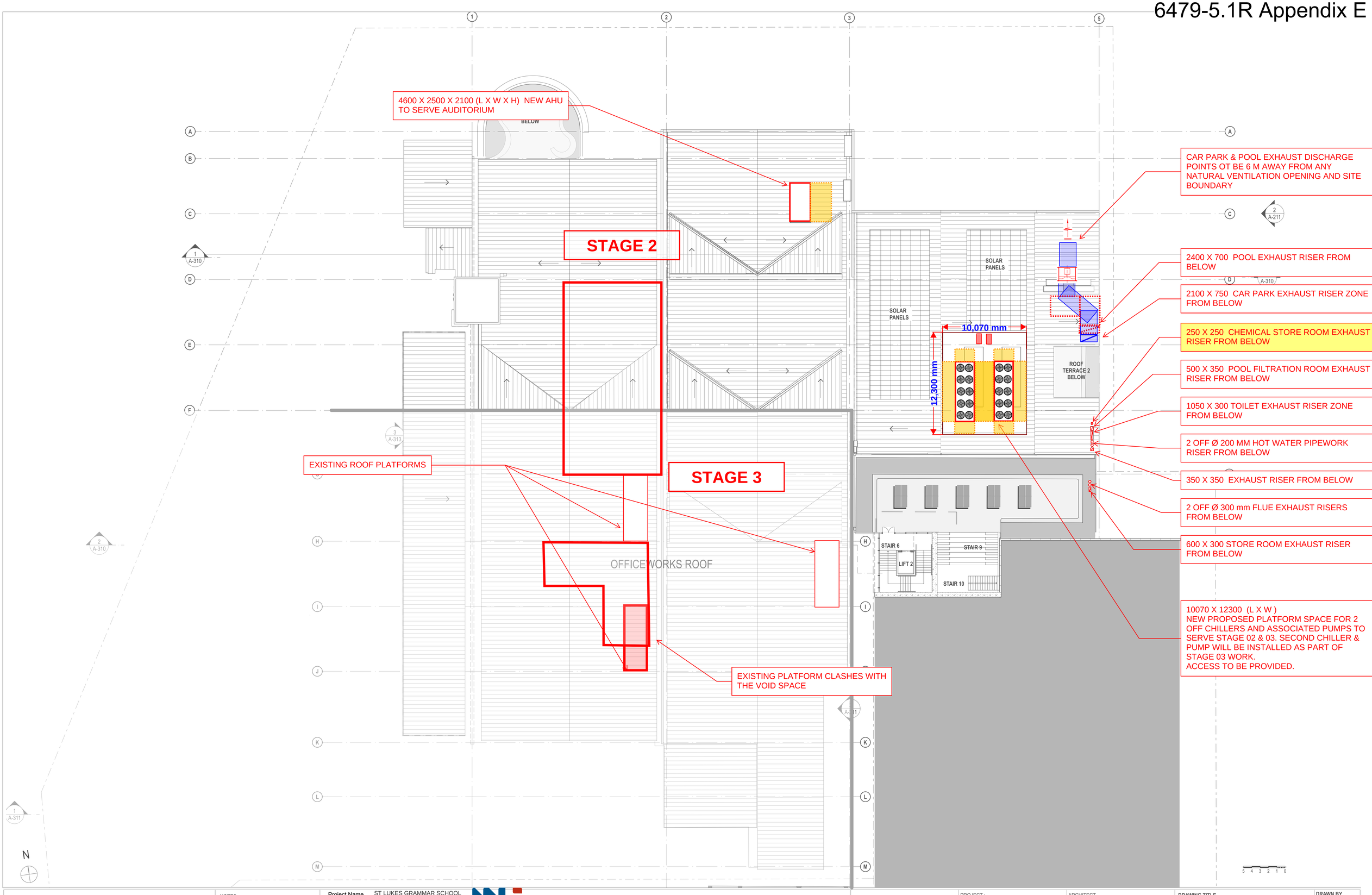
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 3 PLAN - STAGE 2_800

SCALES AT A1 1:200
DRAWN BY RM + CE + EG
CHECKED PT
DATE 12/9/19
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DRAWING NO A-113
REV



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Project No	43194
Sketch Title	MECHANICAL SPATIALS
Sketch No	3.2
Date	17/09/2019
By	Lydia

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DRAWING TITLE: 800 PITTWATER ROAD LEVEL 4 PLAN - STAGE 2_800		DRAWN BY: RM + CE + EG
		CHECKED: PT
SCALES AT A1: 1:200		DATE: 12/9/19
PHASE: SD	DRAWING NO: A-114	REV

STORE ROOMS AND BICYCLE PARKING ROOM TO BE PROVIDED WITH NATURAL VENTILATION IN COMPLIANCE WITH BCA CLAUSE F4.6

0.23 M² INTAKE LOUVRE

500 X 300 GARBAGE EXHAUST RISER TO ABOVE

CONFIRM IF THE SPACE IS A STORE/PLANT ROOM SPACE OR AN OCCUPIED SPACE

CONFIRM IF THE CAR PARK SPACE WILL BE OPEN AT THIS SIDE

750 X 250 SUPPLY AIR DUCTWORK ZONE @ HIGH LEVEL

1100 X 350 CAR PARK EXHAUST TO BE CONNECTED TO THE STAGE 02 CAR PARK EXHAUST DUCTWORK AS PART OF STAGE 03

1250 X 500 LOADING DOCK EXHAUST RISER TO ABOVE

CONFIRM IF THE SPACE IS NAMED AS A LOADING DOCK AREA. CLARIFY IF THE SPACE IS OPEN TO OUTSIDE VIA ROLLER SHUTTER DOOR

ELECTRICAL SWITCHROOM 21.60 m2
COMMS ROOM 16.00 m2
STAIR 1
NEW LIFT CAR (1400 x 1600)
LIFT 1
EX STAIR 1
CAR PARK 52 + 2 ACC SPACES
ACCESS HATCH TO FUTURE DETAIL
POOL BALANCE TANK 38.72 m2
POOL MECHANICAL PLANT ROOM 101.76 m2
CHEMICAL STORE 5.00 m2
POOL FILTRATION ROOM 89.75 m2
EX STAIR 3
BOILER ROOM 55.98 m2
GENERAL STORE 30.99 m2
FIRE SERVICES PUMP ROOM 45.95 m2
+44,720
GARDEN STORE 36.08 m2
CAR PARK 22 SPACES
TBD 38.61 m2
BIKE PARKING 25.74 m2
+37,867
TBD 28.34 m2
STAIR 4
GARBAGE ROOM 55.36 m2
MAINTENANCE STORE 74.35 m2
STAIR 6
LIFT 2
CAR PARK ENTRY
GOODS AND ACCESS LIFT L0 TO L3
LIFT 3
STAIR 5
TREE 1 CLASS A
15 SPACES
NEW ELECTRICAL SUBSTATIONS
EXISTING HERITAGE BUS STOP
EX SIGN
TPZ 6.7M
TREE 20 CLASS B
TREE 22
TREE 33 CLASS C
TREE 34 CLASS C
N

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Sketch No	3.2
Date	17/09/2019
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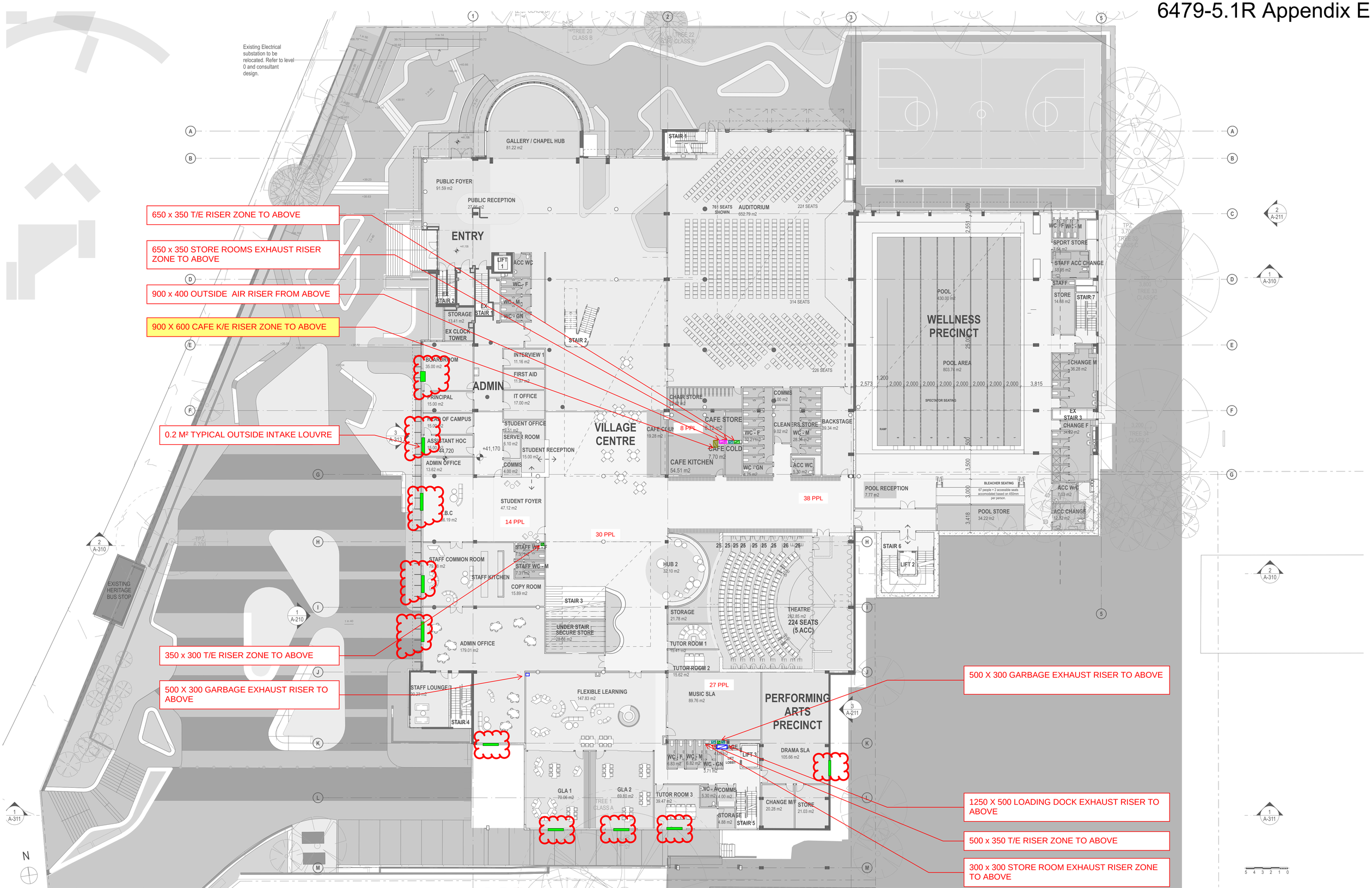
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 0 PLAN - STAGE 3_800

SCALES AT A1: 1:200
PHASE: SD
DRAWING NO: A-115
DRAWN BY: RM + CE + EG
CHECKED: PT
DATE: 12/9/19
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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 1 PLAN - STAGE 3_800

SCALES AT A1: 1:200

PHASE: SD

DRAWING NO: A-116

REV:

DRAWN BY: RM + CE + EG

CHECKED: PT

DATE: 12/9/19

650 x 350 T/E RISER ZONE TO ABOVE

650 x 350 STORE ROOMS EXHAUST RISER ZONE TO ABOVE

900 x 400 OUTSIDE AIR RISER FROM ABOVE

900 X 600 CAFE K/E RISER ZONE TO ABOVE

350 x 300 T/E RISER ZONE FROM BELOW

1650 X 750 THEATRE SUPPLY & RETURN RISERS FROM/TO ABOVE

500 x 350 T/E RISER ZONE TO ABOVE

300 x 300 STORE ROOM EXHAUST RISER ZONE TO ABOVE

500 X 300 GARBAGE EXHAUST RISER TO ABOVE

1250 X 500 LOADING DOCK EXHAUST RISER TO ABOVE

0.25 M² OUTSIDE AIR INTAKE LOUVRE

SIGNIFICANT HERITAGE ITEM

HERITAGE ITEM

HUMANITIES PRECINCT

WELLNESS PRECINCT

MEDIA CENTRE

PROPOSED EASTERN EXTENSION

PROPOSED SOUTHERN EXTENSION

ROOF TERRACE 1

FLEXIBLE LEARNING

GLA 1 58.72 m2

SEMINAR ROOM

LIFT 1

ACC WC 5.95 m2

EX STAIR 2

WC - M

WC - F

WC - GN

EX CLOCK TOWER

COMMS 4.00 m2

STORAGE 9.10 m2

STAIR 1

STAIR

VOID HALL

VOID POOL

VOID ATRIUM

STAIR 2

+45.225

GLA 2 62.48 m2

GLA 3 62.72 m2

FLEXIBLE LEARNING 100.38 m2

15 PPL

LIBRARY HUB 498.77 m2

STAIR 8

LIBRARY HUB 94.56 m2

STAFF WC - M

WC - MP

COMMS 4.00 m2

WC - F

STAFF STUDY 25.49 m2

DANCE 125.78 m2

GYM 90.60 m2

GLA 1 81.25 m2

FLEXIBLE LEARNING 90.43 m2

STAIR 7

SEMINAR 24.7

SEMINAR 24.6

SE 20.56 m2

WC - F

ACC WC

WC - M

STRG

HUB 1 53.86 m2

HUB 2 41.40 m2

110 PPL

HUB 3 41.75 m2

GLA 4 61.86 m2

GLA 5 59.69 m2

FLEXIBLE LEARNING 80.66 m2

STAIR 3

SOCIAL STAIR

STAIR 6

LIFT 2

THEATRE 97.41 m2 224 SEATS (INCL 5 ACC)

STUDENT LOUNGE 30.23 m2

STAIR 4

GLA 6 60.85 m2

GLA 9 64.03 m2

GLA 7 63.41 m2

FLEXIBLE LEARNING 119.79 m2

GLA 8 65.43 m2

STAFF STUDY 31.97 m2

STAIR 5

RECORDING 35.62 m2

GREEN SCREEN 33.55 m2

MEDIA PRESENTATION 105.87 m2

WC - F 6.31 m2

WC - M 6.97 m2

LIFT LOBBY

LIFT 3

COMMS 4.00 m2

STORAGE 6.62 m2

EDITING 42.88 m2

TREE 20 CLASS B

TREE 22 CLASS B

TREE 11 CLASS C

TREE 12 CLASS C

TPZ 3,700 TREE 32 CLASS C

TPZ 3,800 TREE 33 CLASS C

3,200 TREE 34 CLASS C

N

Project Name	ST LUKES GRAMMAR SCHOOL		
Project No	43194		
Sketch Title	MECHANICAL SPATIALS		
Sketch No	3.2		
Date	17/09/2019	By	Lydia

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WOOD & GRIEVE ENGINEERS
NOW PART OF Stantec
Level 6, Building B
207 Pacific Highway
St Leonards NSW 2065
Phone 02 8484 7000

PROJECT :
ST. LUKE'S GRAMMAR SCHOOL - NEW SENIOR

ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS
117 Reservoir Street
800 Pittwater Road Dee Why NSW 2099 + 224 Headland Road North Curl Curl NSW 2099
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PROJECT NO : 18032

DRAWING TITLE
800 PITTWATER ROAD
LEVEL 2 PLAN - STAGE 3_800

DRAWN BY RM + CE + EG
CHECKED PT
SCALES AT A1 1:200
DATE 12/9/19
PHASE SD
DRAWING NO A-117
REV

650 x 350 T/E RISER ZONE TO ABOVE

650 x 350 STORE ROOMS EXHAUST RISER ZONE TO ABOVE

900 x 400 OUTSIDE AIR RISER FROM ABOVE

900 X 600 CAFE K/E RISER ZONE TO ABOVE

OPENINGS FOR NATURAL VENTILATION OF THE CENTRAL VILLAGE SPACE. EXTENT TBC WITH ESD

0.2 M² TYPICAL OUTSIDE AIR INTAKE LOUVRE

SPECIALISED LOCAL EXHAUSTS ARE TO RISE TO THE ROOF TO DISCHARGE VIA ROOF COWLS

1650 X 750 THEATRE SUPPLY & RETURN RISERS FROM/TO ABOVE

500 x 350 T/E RISER ZONE TO ABOVE

300 x 300 STORE ROOM EXHAUST RISER ZONE TO ABOVE

500 X 300 GARBAGE EXHAUST RISER TO ABOVE

1250 X 500 LOADING DOCK EXHAUST RISER TO ABOVE

ROOF TERRACE 1 BELOW
STAIR 1
GLA 1 65.71 m2
GLA 2 60.01 m2
GLA 3 61.34 m2
GLA 4 59.87 m2
FLEXIBLE LEARNING 121.05 m2
GLA 5 57.34 m2
GLA 6 62.28 m2
EX STAIR 2
EX CLOCK TOWER
HUB 2 43.4
VOID LIBRARY
STAIR 8
HUB 3 51.56 m2
GLA 9 60.24 m2
GLA 7 60.78 m2
FLEXIBLE LEARNING 69.78 m2
GLA 8 51.11 m2
GLA 10 51.07 m2
MATHS PRECINCT
43 PPL
7 PPL
CHEMISTRY SLA 89.13 m2
SCIENCE PRECINCT
FLEXIBLE LEARNING 116.71 m2
SCIENCE PREP 17.49 m2
CHEM STORE 14.50 m2
APP STORE 12.50 m2
BOT / ZOO ROOM 19.39 m2
BIOLOGY SLA 89.14 m2
WC - M WC - F
LIFT LOBBY
LIFT 3
STORAGE 15.15 m2
COMMS 4.00 m2
SCIENCE PREP 5.81 m2
STAIR 5
A 11 67.07 m2
PHYSICS SLA 106.90 m2
ROOF TERRACE 3 225.52 m2
TREE 1 CLASS A
TPZ 12.800
TREE 20 CLASS B
TREE 22 CLASS B
TREE 11 CLASS C
FOOD TECH SLA 1 135.09 m2
FOOD TECH SLA 2 95.74 m2
ART SLA 82.00 m2
ART STORE 18.23 m2
WET AREA 10.98 m2
PROJECT STORE 9.10 m2
VISUAL ARTS PRECINCT
LOBBY 8.03 m2
PANTRY 4.07 m2
COOL 8.79 m2
PREP ROOM 20.98 m2
FOOD STORE 8.79 m2
LOBBY 8.03 m2
STAIR 7
ROOF TERRACE 2 50.42 m2
KILN 6.55 m2
DESIGN + TECHNOLOGY PRECINCT
STAFF 5.93 m2
WC WC - ACC 2.60 m2
WC - M
WC - F
WC - GN
COMMS 4.00 m2
ELEC 0.75 m2
MATERIALS RACKS 13.91 m2
D+T 65.52 m2
D+T WORKSHOP 159.07 m2
RESOURCE STORE 29.83 m2
FINISHING 10.07 m2
WELDING 8.03 m2
DUST EXTRACTOR 8.14 m2
STAIR 6
LIFT 2
TPZ 3,700 TREE 32 CLASS C
TPZ 3,800 TREE 33 CLASS C
3,200 TREE 34 CLASS C
2 A-211
1 A-310
3 A-313
2 A-310
1 A-210
2 A-211
1 A-311
1 A-310
1 A-311
N

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DRAWING TITLE
800 PITTWATER ROAD
LEVEL 3 PLAN - STAGE 3_800

SCALES AT A1 1:200
PHASE SD
DRAWING NO A-118
DRAWN BY RM + CE + EG
CHECKED PT
DATE 12/9/19
REV

650 x 350 T/E RISER ZONE TO ABOVE

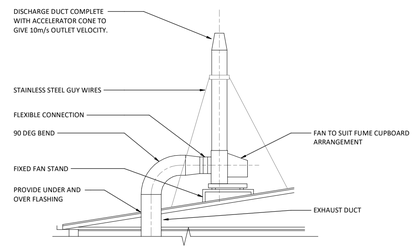
650 x 350 STORE ROOMS EXHAUST RISER ZONE TO ABOVE

900 x 400 OUTSIDE AIR RISER FROM ABOVE

900 X 600 CAFE K/E RISER ZONE TO ABOVE

EXISTING ROOF PLATFORMS

NOTE: SPECIALISED EXHAUST REQUIREMENTS ARE TO BE CONFIRMED. IF FUME CUPBOARDS OR OTHER EQUIPMENT ARE REQUIRED TO EXHAUST A TYPE A EFFLUENT AS DEFINED IN AS 1668.2, DUCWORK IS TO DISCHARGE 3M ABOVE ANY TRAFFICABLE AREA WITHIN 15M HORIZONALLY AND 1M ABOVE THE HIGHEST PITCH OF THE ROOF.SEE EXAMPLE ARRANGEMENT BELOW.



FUME CUPBOARD EXHAUST DETAIL
NOT TO SCALE

STAGE 3

3500 X 2500 X 2200 (W X D XH) THEATRE AHU

1650 X 750 THEATRE SUPPLY & RETURN RISERS FROM/TO BELOW

800 x 350 T/E RISER ZONE FROM BELOW

300 x 300 STORE ROOM EXHAUST RISER ZONE TO ABOVE

500 X 300 GARBAGE EXHAUST RISER TO FROM BELOW

1250 X 500 LOADING DOCK EXHAUST RISER TO ABOVE

LOADING DOCK EXHAUST DISCHARGE POINT TO BE 6 M AWAY FROM ANY NATURAL VENTILATION OPENING

ROOF TERRACE 1 BELOW

ROOF TERRACE 2 BELOW

ROOF TERRACE 3 BELOW

SOLAR PANELS

STAIR 6

STAIR 10

LIFT 2

LIFT 3

TREE 20 CLASS B

TREE 22 CLASS B

TREE 32 CLASS C

TREE 33 CLASS C

TREE 34 CLASS C

TREE 11 CLASS C

TREE 1 CLASS A

New sawtooth roof

N

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LEVEL 4 PLAN - STAGE 3_800

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REV