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Environmental Noise Assessment

Additions to St Mary St Joseph Catholic Primary School
274 Fitzgerald Avenue, Maroubra, NSW

REPORT NUMBER
6818-1.1R Rev A

DATE ISSUED
1 June 2020

Prepared For:
Sydney Catholic Schools
C/- JDH Architects
181 Oxford Street
Darlinghurst NSW 2010

Attention: Mr Stephen Haratsis

Revision History

Report	Date	Prepared	Checked	Comment
Draft	30/10/2019	William Wang	Stephen Gauld	By email, for client review
Draft2	12/12/2019	William Wang	Stephen Gauld	Updated Drawings
Draft3	06/05/2020	William Wang	Stephen Gauld	Updated Drawings
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Document R\6818-1.1R REV A, 20 pages plus attachments

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TABLES

1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by JDH Architects on behalf of Sydney Catholic Schools to carry out an acoustic assessment for a proposed extension of the existing St Mary St Joseph Catholic Primary School at 274 Fitzgerald Avenue, Maroubra, NSW The scope of work is as follows:

- Review the architectural drawings
- Establish acceptable noise level criteria
- Quantify noise emissions from the mechanical plant
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls, ground absorption and distance attenuation
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Provide recommendations for noise control (if necessary)
- Prepare an Environmental Noise Assessment Report.

2.0 PROJECT DESCRIPTION

St Mary St Joseph Catholic Primary School is located at 274 Fitzgerald Avenue, Maroubra, NSW. It is proposed to construct a new building at the existing school site, located along the north-western corner to contain staff and administration, a new library and 6 GLAS over two levels. The existing building along the south-west corner of the site (Block A, B and C) will be demolished to provide a new outdoor sports court. An existing building on the south-eastern corner of the site (Block D and E) will be retained and modified into 8 GLAs and an arts room.

Existing residences are located to the south and west of the school site, across Fitzgerald Avenue and Malabar Road respectively. To the east is Broadarrow Reserve and to the north is Maroubra Bowling Club. These locations are shown in Table 1 and Figure 1.

Table 1 Receptor Location

Receptor and Type	Address	Direction
R1 – Residence	514 Malabar Road	West
R2 – Residence	287 Fitzgerald Avenue	South
R3 – Reserve	288 Fitzgerald Avenue	East
R4 – Commercial	Maroubra Bowling Club	North

Long term ambient noise measurements have been taken around the School site at the nearby residential locations as shown in Figure 1. Ambient noise levels are presented in Section 3 of this report. These locations have been chosen to represent the acoustic environment of the nearby residential neighbours.

Acceptable noise limits are derived from the EPA's Noise Policy for Industry for intrusive noise impacts from mechanical plant and indoor noise, at each residence, and The Association of Australasian Acoustical Consultants (AAAC) *Technical Guideline for Child Care Centre Noise Assessment* noise criteria for children in outdoor areas.

Noise levels from children in the outdoor areas and the mechanical plant serving the new school building have been calculated at the nearest residential premises and are presented in Section 5.0.

Figure 1 : Location Plan – St Mary St Joseph Catholic Primary School

3.0 NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis in this report were made with instrumentation as follows.

Table 2 Noise Survey Instrumentation

Description	Model No	Serial No
Infobyte Noise Logger (Type 2) Condenser Microphone 0.5" diameter	iM4 MK 250	115 10312
Infobyte Noise Logger (Type 2) Condenser Microphone 0.5" diameter	iM4 MK 250	121 6595
Acoustical Calibrator	SV30A	10839

An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 is a Type 1 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 less than 1 dB during attended and unattended measurements. No adjustments for instrument drift during the measurement period were warranted.

4.0 NOISE CRITERIA

4.1 Background Noise Level

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 NSW EPA as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for the day, evening or night time 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 across Fitzgerald Avenue and Malabar Road. These potentially affected locations can be seen in Figure 1 above. The times of greatest annoyance will be during the day when the School is operating.

An environmental noise logger was placed at a residential property on each of Fitzgerald Avenue and Malabar Road, to determine the Rating Background Level. These locations are shown on Figure 1 as Logger Location 'A' and Logger Location 'B'.

The measured noise levels are presented in the attached Appendix A and also in Table 3 below.

Table 3 Ambient Noise Levels – Maroubra

Location	Time Period	L_{90} Rating Background Level (dBA)	Existing L_{eq} Noise Level (dBA)
Location 'A' – 285 Fitzgerald Avenue, Maroubra	Day (7 am to 6 pm)	**54**	**62**
	Evening (6 pm to 10 pm)	**47**	**60**
	Night (10 pm to 7 am)	**37**	**54**
Location 'B' – 512 Malabar Road, Maroubra	Day (7 am to 6 pm)	**50**	**62**
	Evening (6 pm to 10 pm)	**47**	**60**
	Night (10 pm to 7 am)	**31**	**55**

4.2 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. '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.'*

4.3 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).

While the *NPI* is not strictly applicable to this site, as the site is not scheduled, as the standards are consistent with the SEPP, the limits set out in the *NPI* will be used as a guide in determining whether the level of noise is considered intrusive or not.

4.3.1 Intrusiveness Criteria

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

The Rating Background Level at Maroubra is shown in Table 3. Therefore the acceptable L_{eq} noise intrusiveness criteria in this area is as shown in Table 4.

Table 4 Intrusiveness Noise Levels – Maroubra

Location	Time Period	L_{90} Rating Background Level (dBA)	Intrusiveness L_{eq} Noise Level (dBA)
Location 'A' – 285 Fitzgerald Avenue, Maroubra	Day (7 am to 6 pm)	**54**	(54+ 5 =) **59**
	Evening (6 pm to 10 pm)	**47**	(47 + 5 =) **52**
	Night (10 pm to 7 am)	**37**	(37 + 5 =) **42**
Location 'B' – 512 Malabar Road, Maroubra	Day (7 am to 6 pm)	**50**	(50+ 5 =) **55**
	Evening (6 pm to 10 pm)	**47**	(47 + 5 =) **52**
	Night (10 pm to 7 am)	**31**	(31 + 5 =) **36**

4.3.2 Amenity Criteria

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

The recommended L_{eq} noise levels below in Table 5 are taken from Section 2.4, Table 2.2 of the NPI.

Table 5 Amenity Criteria

Receiver	Noise Amenity Area	Time of Day	L_{eq}, dBA, Recommended Amenity Noise Level
Residential	Suburban	Day	55
		Evening	45
		Night	40
Passive Recreation	All	When in use	50
Passive Recreation	All	When in use	65

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 $\mathbf{L_{Aeq,15min}}$ will be taken to be equal to the $\mathbf{L_{Aeq,\,period}}$ **+ 3 decibels (dB)**.

Compliance with the amenity criteria will limit ambient noise creep. Wherever the existing L_{eq} noise level from industrial noise sources approaches or exceeds the amenity criteria at a critical receptor location, the intrusive L_{eq} noise from the noise source in question must be reduced to a level that may be as much as 10 dB below the existing L_{eq} industrial noise level.

The amenity L_{eq} noise level at Maroubra is shown in Table 2. Therefore the acceptable L_{eq} amenity criteria for in this area is as shown in Table 6.

Table 6 Amenity Noise Levels – Maroubra

Location	Time Period	Existing L_{eq} Noise Level (dBA)	Amenity L_{eq} Noise Level (dBA)
Location 'A' – 285 Fitzgerald Avenue, Maroubra	Day (7 am to 6 pm)	**62**	(55- 5 + 3 =) **53**
	Evening (6 pm to 10 pm)	**60**	(60 -10 + 3 =) **53**
	Night (10 pm to 7 am)	**54**	(54 -10 + 3 =) **47**
Location 'B' – 512 Malabar Road, Maroubra	Day (7 am to 6 pm)	**62**	(55- 5 + 3 =) **53**
	Evening (6 pm to 10 pm)	**60**	(60 -10 + 3 =) **53**
	Night (10 pm to 7 am)	**55**	(55 -10 + 3 =) **48**
Boardarrow Reserve	When in use	**-**	(50 – 5 + 3 =) **48**
Maroubra Bowling Club	When in use	**-**	(65 – 5 + 3 =) **63**

4.4 Modifying Factors

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. On the other hand, some sources may cause less annoyance where only a single event occurs for a limited duration. Correction factors are to be applied to the noise from the source measured or predicted at the receiver before comparison with the criteria. AC500-10 in the Appendices is extracted from Table C.1 of the *NPI*.

In this case the noise is of a steady broadband nature, therefore modifying factors are not applicable.

4.5 AAAC Noise Criteria for Outdoor Play Areas

In May 2008, the Association of Australasian Acoustical Consultants (AAAC) first published the *Technical Guideline for Child Care Centre Noise Assessment*. The guideline was updated in 2013 to assist both AAAC members and local councils to assess the noise impact from proposed child care centres both accurately and fairly, (see www.aaac.org.au).

Although the proposed development comprises alterations and additions to an existing school, and therefore may produce different levels of noise than a childcare centre, there are similarities in noise emission from uses of outdoor play areas for schools and childcare centres. As students do not play outdoors continuously for long periods of time, and as the duration of time for students playing outside is reduced, the overall noise annoyance reduces. Therefore, it is reasonable to allow a higher level of nose impact for a shorter duration.

The AAAC document states that a total time limit of 2 hours of outdoor play per day (e.g. 1 hour in the morning and 1 hour in the afternoon) should allow an additional 5 dB noise impact.

We recommend that the noise criteria detailed in *Technical Guideline for Child Care Centre Noise Assessment* be applied to outdoor areas of the School.

The relevant criteria is $L_{eq,\ 15min}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 10 dB at the residential assessment location.

Up to 2 hours (total) per day – The $L_{eq,\ 15minute}$ noise level emitted from the outdoor areas shall not exceed the background noise level by more than 10 dB at the assessment location.

More than 2 hours per day – The $L_{eq,\ 15minute}$ noise level emitted from the outdoor areas shall not exceed the background noise level by more than 5 dB at the assessment location.

For commercial premises, the $L_{eq,\ 15minute}$ noise level is not to exceed 65 dBA.

4.6 Project Specific Noise Criteria

4.6.1 School Noise Criteria

When all the above factors are considered, we find that the most stringent noise criterion is as shown in Table 7.

Table 7 Project Specific Noise Levels

Location	Time Period	Project Specific L_{eq} Noise Level (dBA)
Residences on Fitzgerald Avenue	Day (7 am to 6 pm)	(55- 5 + 3 =) **53**
	Evening (6 pm to 10 pm)	(47 + 5 =) **52**
	Night (10 pm to 7 am)	(54 -10 + 3 =) **47**
Residences on Malabar Road	Day (7 am to 6 pm)	(55- 5 + 3 =) **53**
	Evening (6 pm to 10 pm)	(47 + 5 =) **52**
	Night (10 pm to 7 am)	(55 -10 + 3 =) **48**
Boardarrow Reserve	When in use	**48**
Maroubra Bowling Club	When in use	**63**

4.6.2 Outdoor Play Noise Criteria

For outdoor play including recess and lunch breaks, the acceptable noise level is:

- (54 + 10 =) **64 dBA** during the day across Fitzgerald Avenue, and.
- (50 + 10 =) **60 dBA** during the day across Maroubra Road.

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.

5.0 NOISE EMISSION

The main sources of noise from the proposal are from the mechanical plant serving the proposed building. Calculations are based on the building layout provided by JDH architects dated 29 April 2020 as shown in Appendix B.

5.1 Mechanical Plant

The location of mechanical plant to provide conditioned air to the new building is proposed to be located along the western façade of the new building, facing Malabar Road, and on the southern façade of the refurbished building, facing Fitzgerald Avenue.

We have assumed typical units based on the size of the proposed building. The new mechanical plant will typically only operate during day time hours, Monday to Friday.

The sound power level for the typical equipment is presented in Table 9.

Table 8 Typical Mechanical Plant L_{eq} Sound Power Levels

Description	Sound Power Level (dBA)
GLA Condenser Unit (14 off)	**78**
Library/Breakout/Art Space Condenser Unit (2 off)	**83**

5.2 Children in Outdoor Areas

Children 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.

The existing school has a student population of 326. In order to model the worst case scenario of noise emission we have modelled all students outdoors at play.

Sound power levels of children at play were previously measured for other similar projects and are presented in Table 9. These levels represent the typical maximum noise levels of children at play and will be used in this noise assessment.

Table 9 Children at Play (outside) L_{eq} Sound Power Levels

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
1 Child at play – Primary School	**79**	54	64	69	73	76	73	68	65
326 Primary Children at play	**104**	79	89	94	98	101	98	93	90

Knowing the sound power level of a noise source, 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, etc.

6.0 PREDICTED NOISE LEVELS

6.1 Mechanical Plant

Given the sound power levels of typical air conditioning units shown in Table 8, the predicted level of noise emission to the nearby noise sensitive receptors of St Mary St Joseph Catholic Primary School are shown in Table 10 below.

Table 10 Predicted L_{eq} Noise Levels – AC Condenser Noise

Receptor Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R1 - 514 Malabar Road	47	52	Yes
R2 - 287 Fitzgerald Avenue	47	52	Yes
R3 - 288 Fitzgerald Avenue	38	48	Yes
R4 - Maroubra Bowling Club	48	63	Yes

Preliminary noise assessment of the mechanical plant demonstrate that the noise emission will comply at all locations. We recommend that once the condenser units are selected, a detailed design be carried out to ensure compliance with the acceptable noise criteria.

6.2 Outdoor Play

The predicted level of noise from the existing students playing was used as a worst case scenario and is calculated to be as shown in Table 11 at the upper most floor of the worst affected residences.

Table 11 Predicted L_{eq} Noise Levels – Outdoor Play

Receptor Location	Predicted Noise Level (dBA)	AAAC Noise Criteria (dBA)
R1 - 514 Malabar Road	61	60
R2 - 287 Fitzgerald Avenue	60	64
R3 - 288 Fitzgerald Avenue	45	-
R4 - Maroubra Bowling Club	59	65

With a standard open balustrade fence, the noise from outdoor play will likely exceed the acceptable noise criteria by up to 1 dB for residential properties along Malabar Road. However, the noise is from existing outdoor play currently at the School.

Given the existing school noise emission, the limited duration of noise from outdoor play, and expectations of noise from children at a school site we are of the opinion that the increase in noise from outdoor play is noise expected from a school, is of negligible impact and would be considered acceptable.

7.0 NOISE CONTROL RECOMMENDATIONS

7.1 Mechanical Plant

We recommend that all mechanical plant be vibration isolated from the building structure.

Noise emission from the mechanical plant should be acoustically designed to reduce the noise emission level at the neighbouring properties to levels complying with the criteria in Section 4.6 of this report.

For typical outdoor condensing units, with sound power levels of up to 83 dBA, the noise emission will meet the acceptable noise criteria at the nearest residential premises.

We recommend that a noise assessment be carried out once the mechanical plant is selected.

7.2 Undercroft Area

To reduce the level of noise buildup within the proposed undercroft area, we recommend that the soffit be lined with sound absorptive insulation.

The sound absorptive panelling may consist of perforated metal or fibre cement (min. 20% open area) with 50 mm thick polyester insulation (minimum density 32 kg/m^3) fitted behind. Other constructions will be acceptable provided the absorptive panels will have a noise reduction coefficient (NRC) of 0.8 or greater.

Exposed black polyester insulation supported by chicken wire strung from the soffit is also acceptable.

7.3 Construction Disclaimer

Recommendations made in this report are intended to resolve acoustical problems only. We make no claims of expertise in other areas of building construction and therefore the recommended noise controls should be implements into the building design in consultation with other specialists to ensure they meet the structural, fire, thermal or other aspects of building construction.

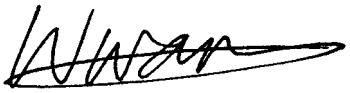
We encourage clients to check with us before using materials or equipment that are alternative to those specified in our Acoustical Report.

8.0 NOISE IMPACT STATEMENT

Day Design Pty Ltd was engaged by JDH Architects to provide acoustical advice for the proposed new building as part of the additions to St Mary St Joseph Catholic Primary School at 274 Fitzgerald Avenue, Maroubra, NSW.

Calculations show that the level of noise emitted by the mechanical plant serving the new building will meet the acceptable noise level requirements as detailed in Section 4 of this report and will therefore be acceptable.

The increase in noise of 1 dB from the increase in number of students engaging in outdoor play during recess and lunch is considered a negligible impact and considered acceptable.



William Wang, BE (Mechatronics), MIEAust, MAAS

Senior Acoustical Engineer

for and on behalf of Day Design Pty Ltd

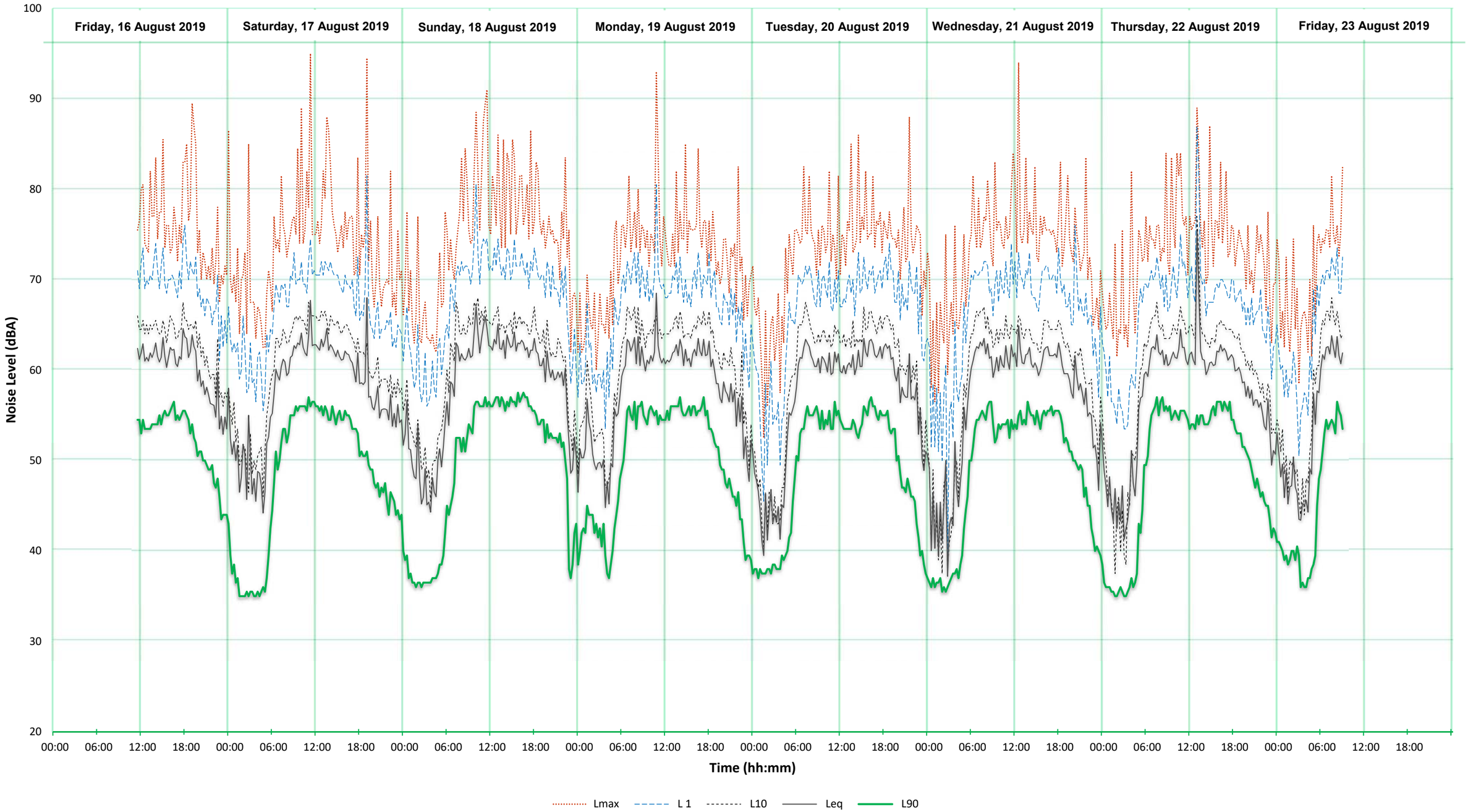
AAAC MEMBERSHIP

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.

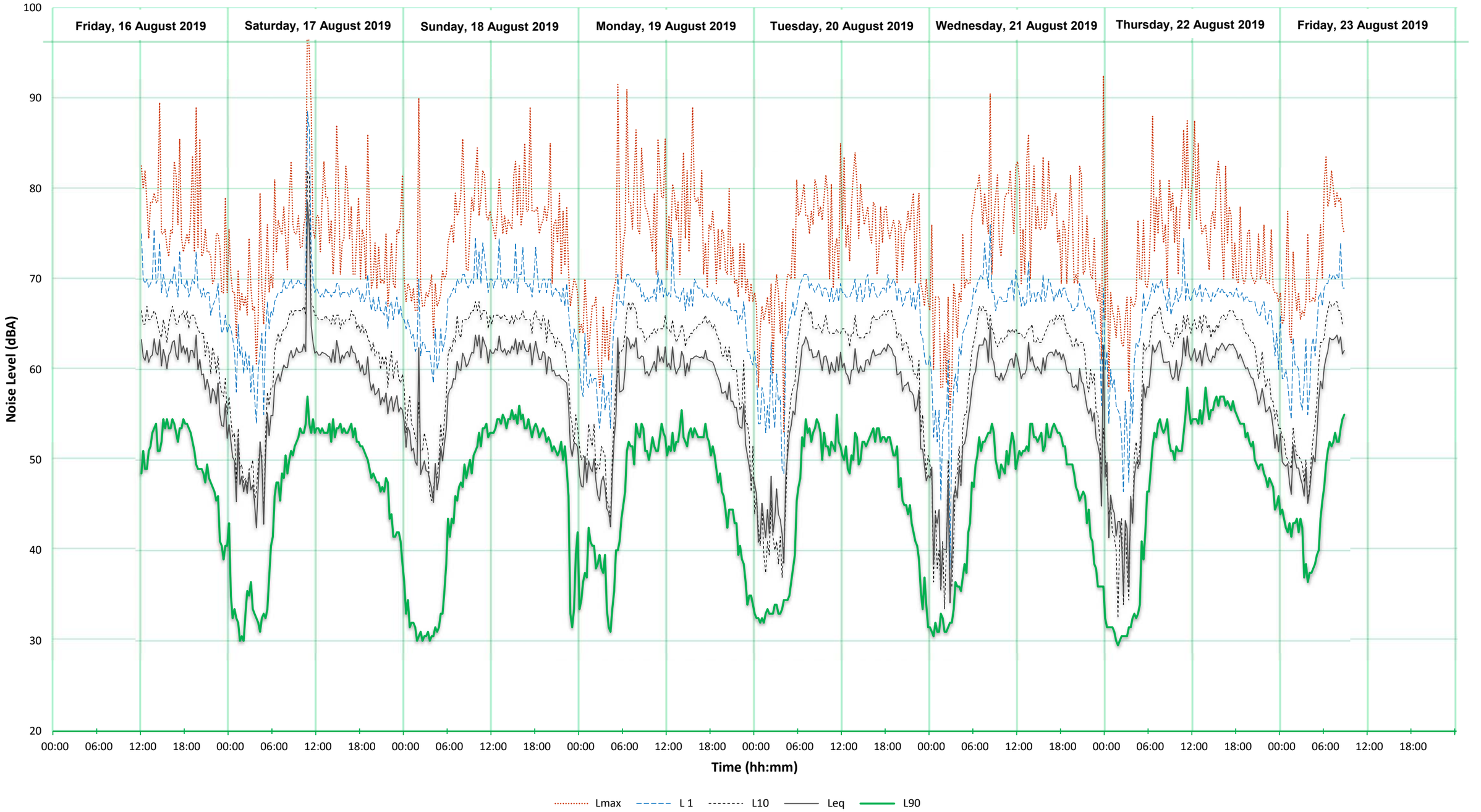
Attachments:

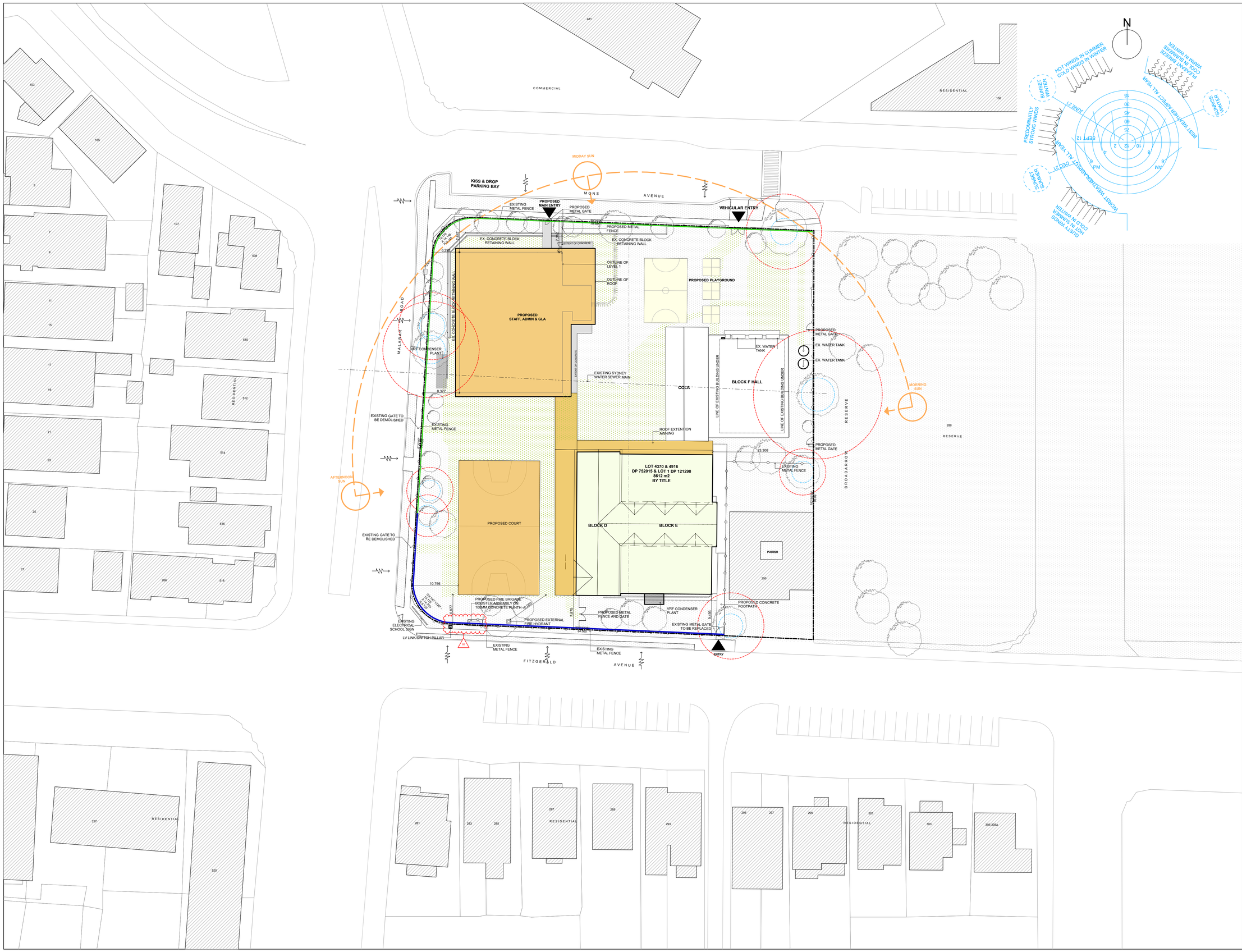
- Appendix A – Ambient Noise Survey
- Appendix B – Architectural Drawings
- AC108-1 to 4 – Glossary of Acoustical Terms
- AC500-10 – Modifying Factor Corrections

Located at 285 Fitzgerald Ave, Maroubra, NSW



Located at 512 Malabar Rd, Maroubra, NSW





Rev	Date	By	Issue Name	CK
01	16/04/2020	JK	Issue to Consultants	SH
02	29/04/2020	JK	Issue to Consultants	SH

PROPOSED SITE LEGEND

- EXISTING NEIGHBOURING BUILDINGS
- EXISTING BUILDINGS ON SITE
- EXISTING TURF
- NEW CONSTRUCTION
- INTERNAL REFURBISHMENT
- PROPOSED TURF / LANDSCAPED AREA
- SITE BOUNDARY
- NEIGHBOURING BOUNDARY
- NEW SCHOOL FENCE 1300MM HIGH
- NEW SCHOOL FENCE 600MM HIGH
- EXISTING TREE
- SUN PATH
- SITE ENTRY
- NOISE
- PEDESTRIAN CROSSING

Building Certifier

Mechanical, Electrical & Hydraulic Engineering Consultant

Structural & Civil Engineer Consultant

Architect

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Project Name

ST MARY ST JOSEPH CPS, MAROUBRA

280 FITZGERALD AVE, MAROUBRA NSW 2035

Drawing Title

PROPOSED SITE & ANALYSIS PLAN

Scale : 1:400 @A1	Date : 29/04/2020
Drawn : JK	Checked : JT

Project No.	Drawing No.	Rev.
1076	DA-02	02

QUALITY CERTIFIED ISO 9001

INITIALLING THE 'DRAWN' AND THE 'CHECK' BOXES CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMITY WITH JDH ARCHITECTS Q.M.S. PROCEDURES.

Status: PRELIMINARY

PROPOSED MAIN ENTRY

BATTER

+10,850

+9,662

EX. CONCRETE FOOTPATH

95°
03'30"
79,385

EX. CONCRETE BLOCK RETAINING WALL

EX. CONCRETE BLOCK RETAINING WALL

+9,682

+10,750

BUILDING LINE OVER

LINE OF PROPOSED FENCE

COORD. OFFICE
21.2 m2

ASSISTANT PRINC.
13.2 m2

PRINC. OFFICE
14.1 m2

INTERVIEW ROOM
11.2 m2

INTERNAL CIRCULATION
52.7 m2

PUBLIC FOYER
15.8 m2

UNDERCROFT
80.9 m2

BUILDING LINE OVER

STAFF ANNEX
18.4 m2

RECORDS
5.3 m2

ACCESS WC
7.4 m2

CLERICAL/RECEPTION
36.0 m2

BATTER TO LATER DETAIL

TOILETS
11.7 m2

PRINT
16.8 m2

STUDENT FOYER
10.8 m2

LIFT
4.6 m2

STAIR 01
19.0 m2

STAFF RM
46.7 m2

COMMS
13.9 m2

SB WC
2.2 m2

STORAGE/CLEANERS ROOM
6.5 m2

SICK BAY
7.0 m2

OFFICE
12.2 m2

+8,430

+8,201

+7,900

ENTRY

02

+8,430

LIBRARY
240.0 m2

ENTRY

UNDERCROFT
69.4 m2

+8,430

BUILDING LINE OVER

EXTENT OF CONCRETE

ENTRY

+8,430

VRF CONDENSER PLANT

ACCESS WC
5.8 m2

M. AMB.
2.5 m2

E. AMB.
2.5 m2

F WC
2.4 m2

F WC
2.4 m2

F WC
2.4 m2

ENTRY

+8,430

UNDERCROFT
16.6 m2

+8,430

LINE OF PROPOSED FENCE

NEW FOOTPATH

02

BUILDING LINE OVER

EXTENT OF CONCRETE

ELECTRICAL RISER CUPBOARD

02

COVERED WALKWAY
69.7 m2

LINE OF COVERED WALKWAY

EXISTING SYDNEY WATER SEWER MAIN

+8,000

+8,000

+7,500

PROPOSED LOCATION OF EXISTING RELOCATED SOCCER FEILD

+7,510

+7,517

+7,538

COLA

COLA
316.4 m2

VERANDAH
50.3 m2

EXISTING CONCRETE PATHWAY

+7,497

+7,503

Rev	Date	By	Issue Name	CK
01	16/04/2020	JK	Issue to Consultants	SH
02	29/04/2020	JK	Issue to Consultants	SH

PROPOSED FLOOR PLAN LEGEND

- EXISTING NEIGHBOURING BUILDINGS
- EXISTING BUILDINGS ON SITE
- NEW CONSTRUCTION
- INTERNAL REFURBISHMENT
- NEW SOFT SOIL LANDSCAPE
- SITE BOUNDARY/ BOUNDARY FENCE
- TREE PROTECTION ZONE (TPZ)
- OUTLINE OF PROPOSED NEW BUILDING
- EXISTING TREE
- BUILDING ENTRY
- EXISTING RL
- PROPOSED RL

Building Certifier

Mechanical, Electrical & Hydraulic Engineering Consultant

Structural & Civil Engineer Consultant

Architect

JDH architects

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Project Name

ST MARY ST JOSEPH CPS, MAROUBRA

280 FITZGERALD AVE, MAROUBRA NSW 2035

Drawing Title

ZONE A - PROPOSED GROUND FLOOR PLAN

Scale : 1:100 @A1	Date : 29/04/2020
Drawn : JK	Checked :JT

Project No.	Drawing No.	Rev.
1076	DA-07	02

QUALITY CERTIFIED ISO 9001

INITIALLING THE 'DRAWN' AND THE 'CHECK' BOXES CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMITY WITH JDH ARCHITECTS Q.M.S. PROCEDURES.

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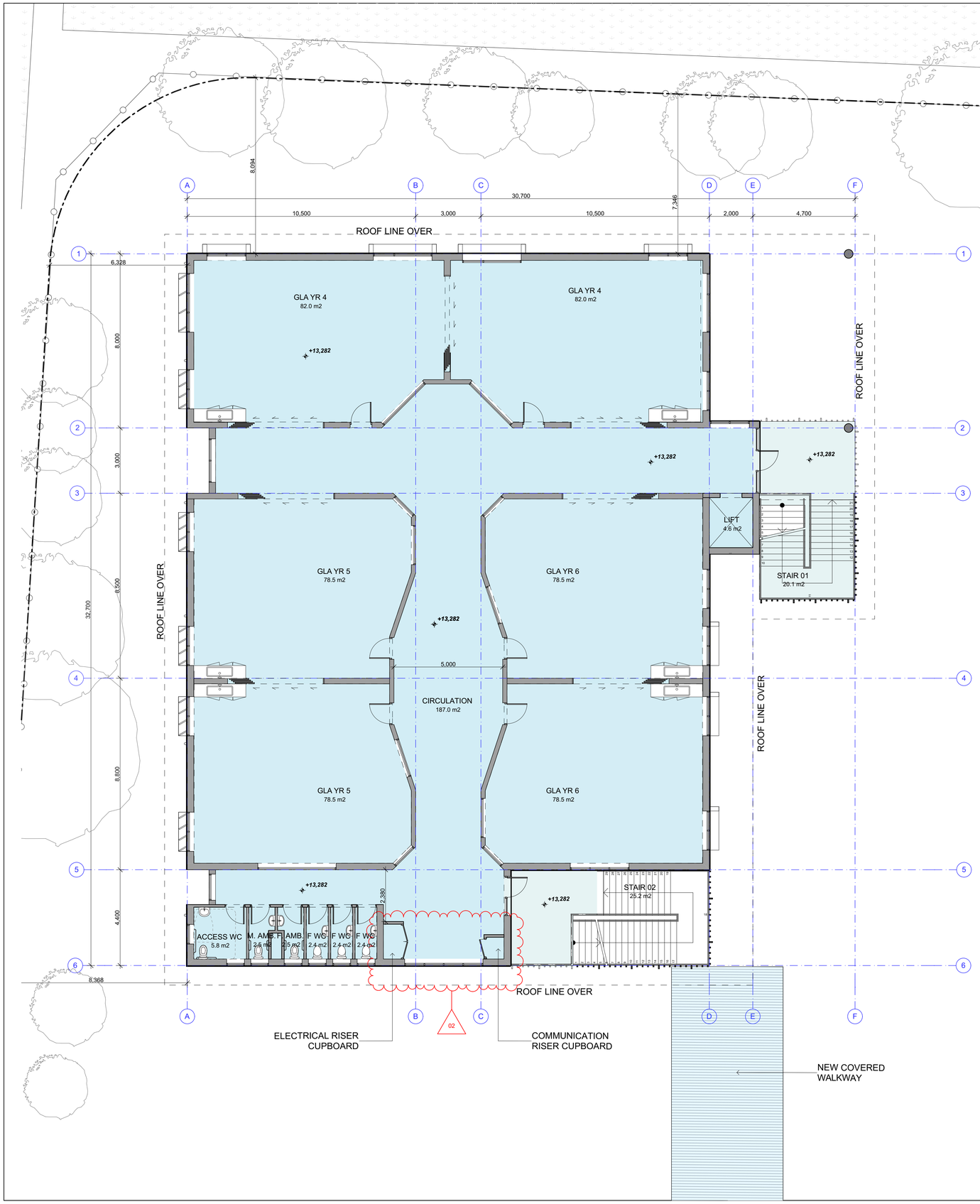

Rev	Date	By	Issue Name	CK
01	16/04/2020	JK	Issue to Consultants	SH
02	29/04/2020	JK	Issue to Consultants	SH

PROPOSED FLOOR PLAN LEGEND

- EXISTING NEIGHBOURING BUILDINGS
- EXISTING BUILDINGS ON SITE
- NEW CONSTRUCTION
- INTERNAL REFURBISHMENT
- NEW SOFT SOIL LANDSCAPE
- SITE BOUNDARY/ BOUNDARY FENCE
- TREE PROTECTION ZONE (TPZ)
- OUTLINE OF PROPOSED NEW BUILDING
- EXISTING TREE
- BUILDING ENTRY
- EXISTING RL (RL +1.000)
- PROPOSED RL (RL +1.000)

Building Certifier

Mechanical, Electrical & Hydraulic Engineering Consultant

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280 FITZGERALD AVE, MAROUBRA NSW 2035

Drawing Title

ZONE A - PROPOSED FIRST FLOOR PLAN

Scale : 1:100 @A1	Date : 29/04/2020
Drawn : JK	Checked :JT

Project No.	Drawing No.	Rev.
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QUALITY CERTIFIED ISO 9001

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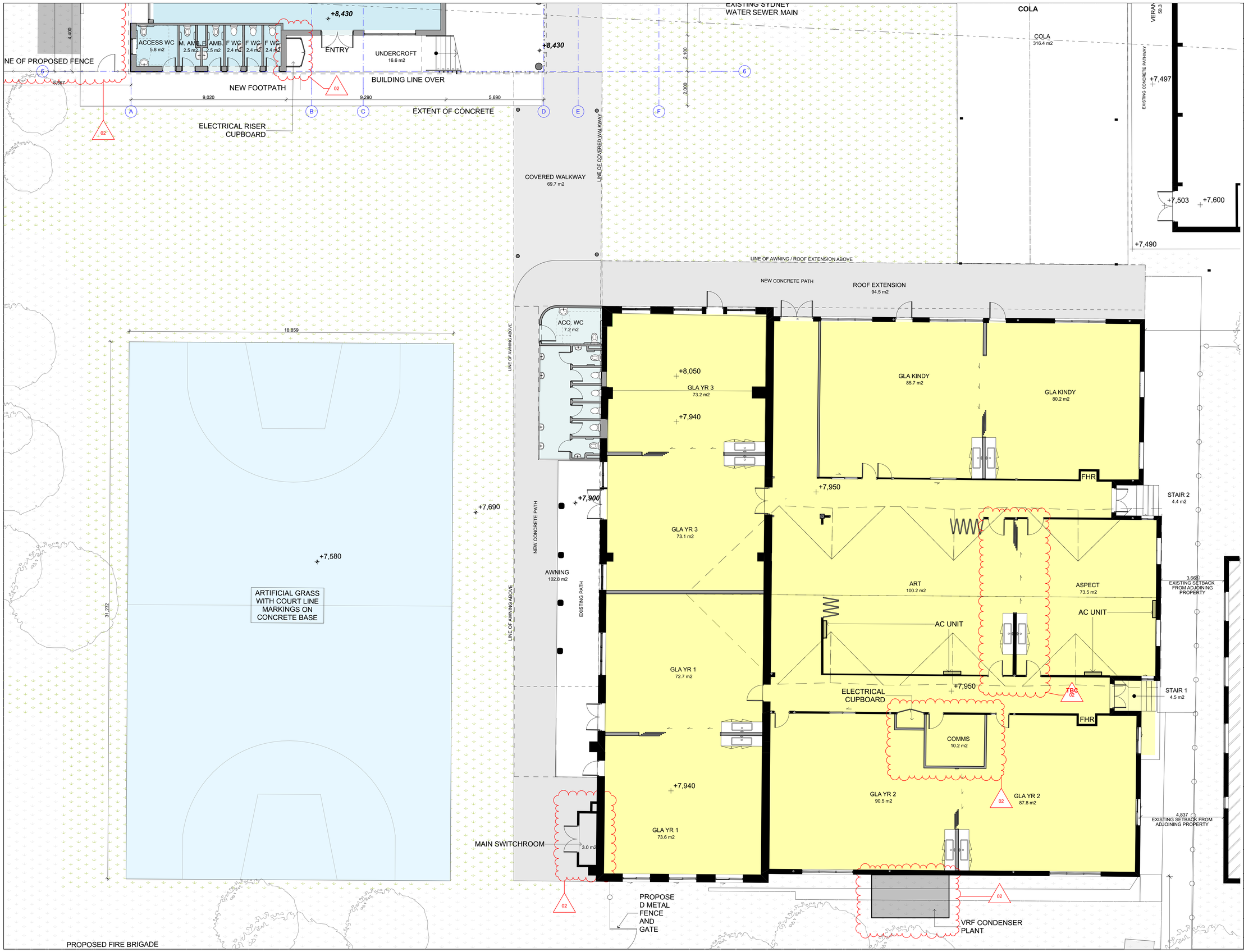

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PROPOSED FLOOR PLAN LEGEND

- EXISTING NEIGHBOURING BUILDINGS
- EXISTING BUILDINGS ON SITE
- NEW CONSTRUCTION
- INTERNAL REFURBISHMENT
- NEW SOFT SOIL LANDSCAPE
- SITE BOUNDARY/ BOUNDARY FENCE
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- OUTLINE OF PROPOSED NEW BUILDING
- EXISTING TREE
- BUILDING ENTRY
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Project Name

ST MARY ST JOSEPH CPS, MAROUBRA

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Drawing Title

ZONE B - PROPOSED GROUND FLOOR PLAN

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Project No.	Drawing No.	Rev.
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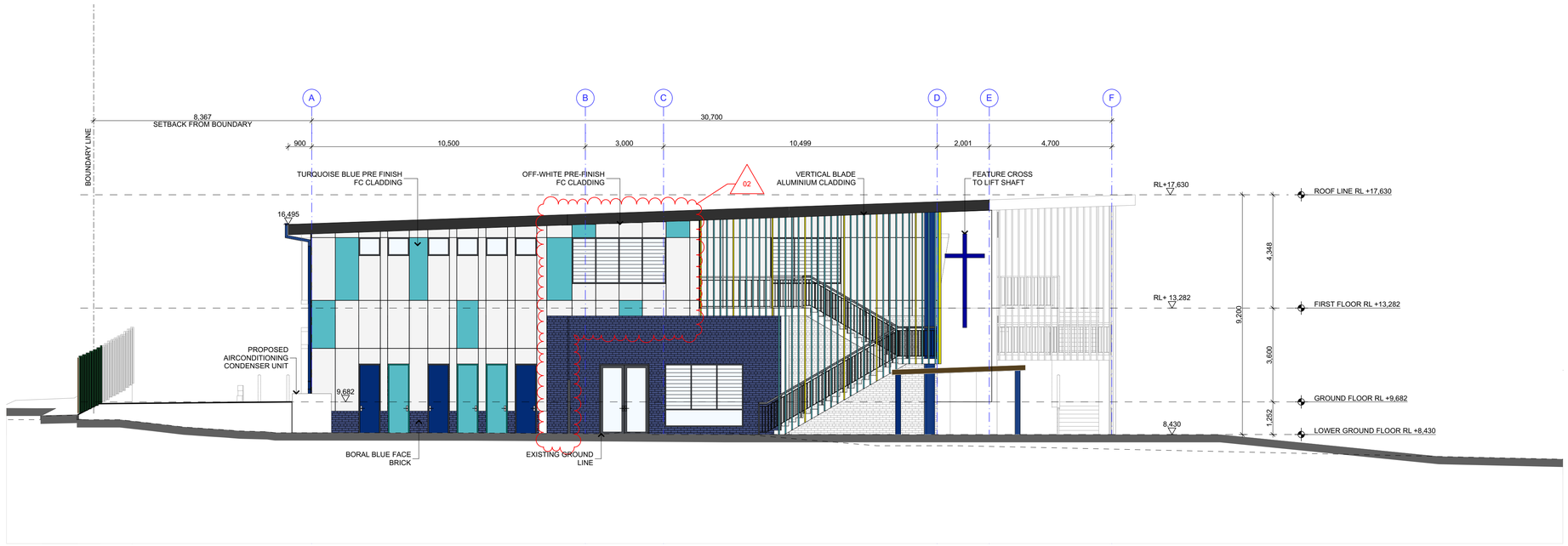
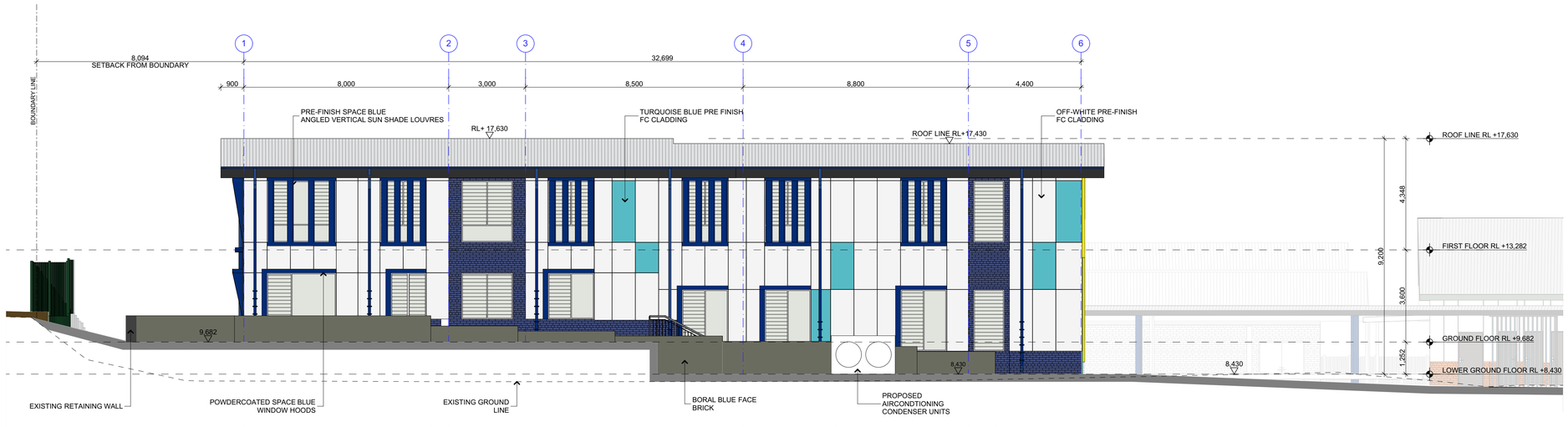
Status: PRELIMINARY



1
-

SOUTH ELEVATION
1:100



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WEST ELEVATION
1:100

Rev	Date	By	Issue Name	CK
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02	29/04/2020	JK	Issue to Consultants	SH

Building Certifier

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Project Name

ST MARY ST JOSEPH CPS, MAROUBRA

280 FITZGERALD AVE, MAROUBRA NSW 2035

Drawing Title

ZONE A - SOUTH & WEST ELEVATIONS

Scale : 1:100 @A1	Date : 29/04/2020
Drawn : JK	Checked :JT

Project No.	Drawing No.	Rev.
1076	DA-13	02

QUALITY CERTIFIED ISO 9001

INITIALLING THE 'DRAWN' AND THE 'CHECK' BOXES CONFIRMS THAT THIS DRAWING HAS BEEN PREPARED IN CONFORMITY WITH JDH ARCHITECTS Q.M.S. PROCEDURES.

Status: PRELIMINARY

ACOUSTICAL – Pertaining to the science of sound, including the generation, propagation, effects and control of both noise and vibration.

AMBIENT NOISE – The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including road traffic, factories, wind in the trees, birds, insects, animals, etc.

AUDIBLE – means that a sound can be heard. However, there are a wide range of audibility grades, varying from "barely audible" to "just audible", "clearly audible" and "prominent". Chapter 83 of the NSW Environment Protection Authority – Environmental Noise Control Manual (1985) states:
"noise from a particular source might be offensive if it is clearly audible, distinct from the prevailing background noise and of a volume or character that a reasonable person would be conscious of the intrusion and find it annoying or disruptive".

It follows that the word "audible" in an environmental noise context means "clearly audible".

BACKGROUND NOISE LEVEL – Silence does not exist in the natural or the built-environment, only varying degrees of noise. The Background Noise Level is the average minimum dBA level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by cicadas, lawnmowers, etc. It is quantified by the L_{A90} or the dBA noise level that is exceeded for 90 % of the measurement period (usually 15 minutes).

- **Assessment Background Level (ABL)** is the single figure background level representing each assessment period – day, evening and night (ie three assessment background levels are determined for each 24hr period of the monitoring period). Determination of the assessment background level is by calculating the tenth percentile (the lowest tenth percent value) of the background levels (L_{A90}) for each period (refer: NSW Industrial Noise Policy, 2000).
- **Rating Background Level (RBL)** as specified by the Environment Protection Authority is the overall single figure (L_{A90}) background noise level representing an assessment period (day, evening or night) over a monitoring period of (normally) three to seven days.

  The RBL for an assessment period is the median of the daily lowest tenth percentile of L_{90} background noise levels.

  If the measured background noise level is less than 30 dBA, then the Rating Background Level (RBL) is considered to be 30 dBA.

DECIBEL – The human ear has a vast sound-sensitivity range of over a thousand billion to one. The decibel is a logarithmic unit that allows this same range to be compressed into a somewhat more comprehensible range of 0 to 120 dB. The decibel is ten times the logarithm of the ratio of a sound level to a reference sound level. See also Sound Pressure Level and Sound Power Level.

Decibel noise levels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dBA, and another similar machine is placed beside it, the level will increase to 53 dBA, not 100 dBA. Ten similar machines placed side by side increase the sound level by 10 dBA, and one hundred machines increase the sound level by 20 dBA.

dBA – The human ear is less sensitive to low frequency sound than high frequency sound. We are most sensitive to high frequency sounds, such as a child's scream. Sound level meters have an inbuilt weighting network, termed the dBA scale, that approximates the human loudness response at quiet sound levels (roughly approximates the 40 phon equal loudness contour).

However, the dBA sound level provides a poor indication of loudness for sounds that are dominated by low frequency components (below 250 Hz). If the difference between the "C" weighted and the "A" weighted sound level is 15 dB or more, then the NSW Industrial Noise Policy recommends a 5 dBA penalty be applied to the measured dBA level.

dBC – The dBC scale of a sound level meter is similar to the dBA scale defined above, except that at high sound intensity levels, the human ear frequency response is more linear. The dBC scale approximates the 100 phon equal loudness contour.

EQUIVALENT CONTINUOUS NOISE LEVEL, L_{Aeq} – Many noises, such as road traffic or construction noise, vary continually in level over a period of time. More sophisticated sound level meters have an integrating electronic device inbuilt, which average the A weighted sound pressure levels over a period of time and then display the energy average or L_{Aeq} sound level. Because the decibel scale is a logarithmic ratio the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

FREE FIELD – This is a sound field not subject to significant reflection of acoustical energy. A free field over a reflecting plane is usually outdoors with the noise source resting on hard flat ground, and not closer than 6 metres to any large flat object such as a fence or wall; or inside an anechoic chamber.

FREQUENCY – The number of oscillations or cycles of a wave motion per unit time, the SI unit being the Hertz, or one cycle per second.

IMPACT ISOLATION CLASS (IIC) – The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation.

IMPACT SOUND INSULATION ($L_{nT,w}$) – Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE – An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

INTRUSIVE NOISE LEVEL, L_{Aeq} – The level of noise from a factory, place of entertainment, etc. in NSW is assessed on the basis of the average maximum noise level, or the $L_{Aeq\ (15\ min)}$. This is the energy average A weighted noise level measured over any 15 minute period.

LOUDNESS – The degree to which a sound is audible to a listener is termed the loudness. The human ear perceives a 10 dBA noise level increase as a doubling of loudness and a 20 dBA noise increase as a quadrupling of the loudness.

MAXIMUM NOISE LEVEL, L_{Amax} – The rms maximum sound pressure level measured on the "A" scale of a sound level meter during a noise survey is the L_{Amax} noise level. It may be measured using either the Fast or Slow response time of the meter. This should be stated.

NOISE RATING NUMBERS – A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the dBA level minus five.

NOISE – Noise is unwanted sound. Sound is wave motion within matter, be it gaseous, liquid or solid. "Noise includes sound and vibration".

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient".

OFFENSIVE NOISE - (Reference: Dictionary of the Protection of the Environment Operations Act 1997). *"Offensive Noise means noise:*

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE – Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T_{60} – The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α – α Sound is absorbed in porous materials by the viscous conversion of sound energy to heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2000 Hz is termed the Noise Reduction Coefficient (NRC).

SOUND ATTENUATION – If an enclosure is placed around a machine, or a silencer is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 30 dBA, reduces the sound energy by one thousand times.

SOUND EXPOSURE LEVEL (SEL) – The total sound energy of a single noise event condensed into a one second duration or in other words it is an L_{eq} (1 sec).

SOUND PRESSURE LEVEL, L_p – The level of sound measured on a sound level meter and expressed in decibels, dB, dBA, dBC, etc. $L_p = 20 \times \log (P/P_o)$ ... dB

where P is the rms sound pressure in Pascal and P_o is a reference sound pressure of 20 µPa. L_p varies with distance from a noise source.

SOUND POWER LEVEL, L_w – The Sound Power Level of a noise source is an absolute that does not vary with distance or with a different acoustic environment.

$L_w = L_p + 10 \log A$ ... dB, re: 1pW,
where A is the measurement noise-emission area in square metres in a free field.

SOUND TRANSMISSION CLASS (STC) – An internationally standardised method of rating the sound transmission loss of partition walls to indicate the decibels of noise reduction of a human voice from one side to the other. (Refer: Australian Standard AS1276 – 1979)

SOUND TRANSMISSION LOSS – The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191 - 2002.

STATISTICAL EXCEEDENCE SOUND LEVELS, L_{A90}, L_{A10}, L_{A1}, etc – Noise which varies in level over a specific period of time (usually 15 minutes) may be quantified in terms of various statistical descriptors:

The L_{A90} is the dBA level exceeded for 90 % of the time. In NSW the L_{A90} is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

The L_{A10} is the dBA level that is exceeded for 10 % of the time. In NSW the L_{A10} measured over a period of 10 to 15 minutes. It was until recently used to describe the average maximum noise level, but has largely been replaced by the L_{Aeq} for describing level-varying noise.

The L_{A1} is the dBA level that is exceeded for 1 % of the time. In NSW the L_{A1} may be used for describing short-term noise levels such as could cause sleep arousal during the night.

STEADY NOISE – Noise, which varies in level by 6 dBA or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997)

WEIGHTED SOUND REDUCTION INDEX, R_w – This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 to 3,150 Hertz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999).

Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is always similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. This is normally a lower number than the STC rating value.

WHITE NOISE – White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.

Table C.1 Modifying factor corrections
(See definitions in Section C2)

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (*ISO1996.2-2007 – Annex D*).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.	5 dB [2, 3]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. **Note:** Narrow-band analysis using the reference method in *ISO1996-2:2007, Annex C* may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.
Low frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: • where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dB(A) positive adjustment applies for the daytime period.	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.

Table C.1 Modifying factor corrections – continued

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for **night-time only**
Duration	Single-event noise duration may range from 1.5 min to 2.5 h.	One event in any assessment period.	0 to 20 dB(A)	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum Adjustment	Refer to individual modifying factors.	Where two or more modifying factors are indicated.	Maximum correction of 10 dB(A)[2] (excluding duration correction).	

Notes:

1. *Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.*
3. *Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.*