All Saints Grammar School

Noise Impact Assessment – Increase in Capacity

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Client	All Saints Grammar School

E-LAB Consulting

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Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
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2				
3				
4				

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Authorised by:

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1 INTRODUCTION

This Noise Impact Assessment has been prepared in support of a Development Application (DA) made to the City of Canterbury Bankstown Council for All Saints Grammar School, located at 31 Forsyth St, Belmore. The application seeks the increase in school capacity from 360 to 385 students.

In summary, this noise impact assessment shall address the noise impact to nearby noise sensitive receivers from the increase in students within the school.

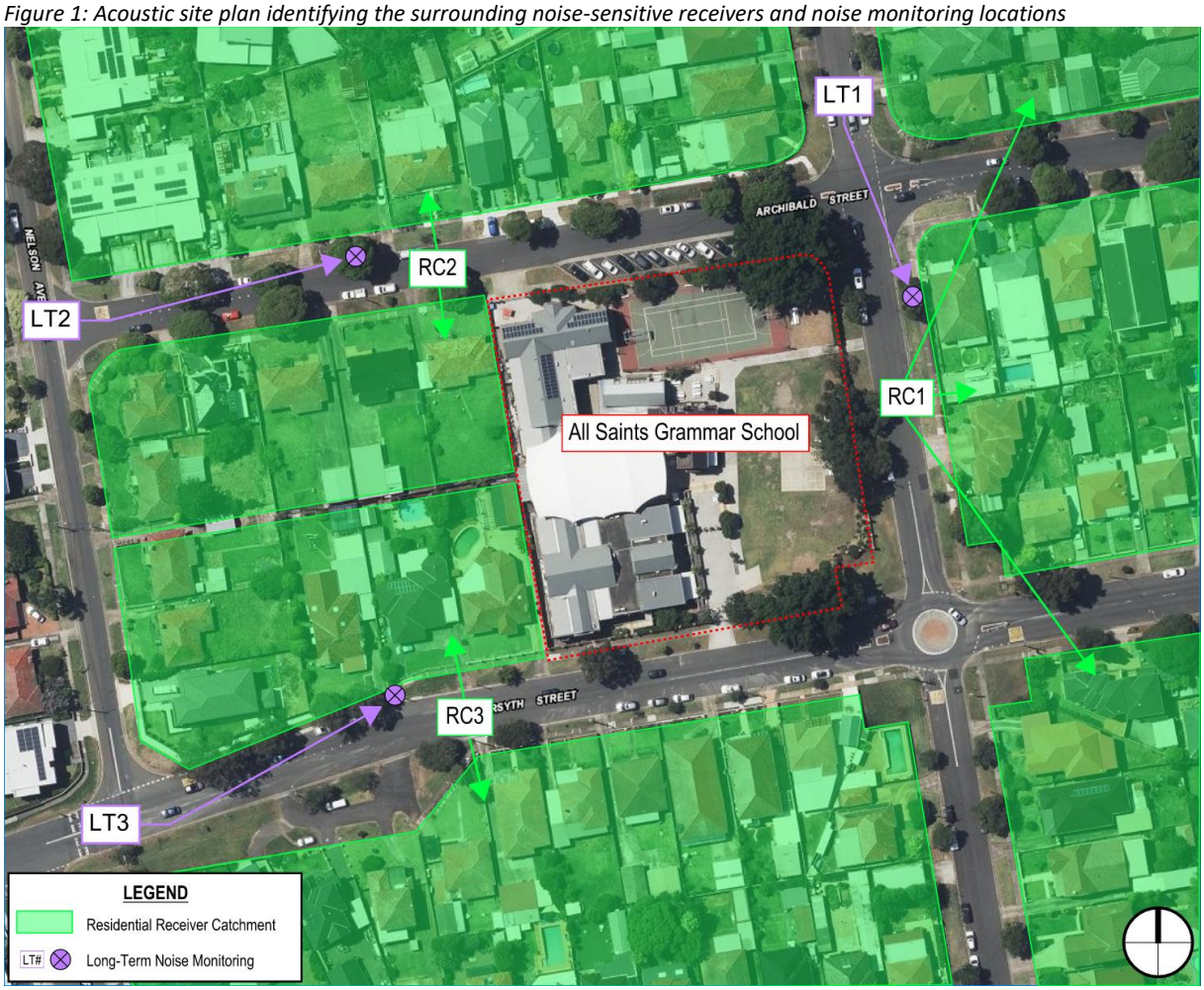
2 PROJECT OVERVIEW

2.1 SITE DESCRIPTION

The location of the school, long-term noise monitoring positions, and the surrounding noise-sensitive receivers are shown in Figure 1. The noise-sensitive receivers have been delineated into receiver catchments (RCs) as noted in Figure 1, where the permissible land-uses within each of the receiver catchments are outlined below:

- RC1 – Residential receivers, medium density residential
- RC2 – Residential receivers, medium density residential
- RC3 – Residential receivers, medium density residential

Figure 1: Acoustic site plan identifying the surrounding noise-sensitive receivers and noise monitoring locations



3 NOISE SURVEYS

Long-term noise monitoring was conducted by E-LAB Consulting at the locations labelled LT1, LT2 and LT3 in Figure 1. Background noise levels and subsequent Rating Background Noise Level (RBL) are established in accordance with the Noise Policy for Industry 2017.

The description of time of day is outlined within the Noise Policy for Industry and described as follows:

- Day – the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays
- Evening – the period from 6pm to 10pm
- Night – the remaining periods

Table 1: Unattended noise monitoring results

LOCATION	MEASURED RATING BACKGROUND NOISE LEVELS - dB(A)		
	DAY	EVENING	NIGHT
LT1	43	41	37
LT2	44	42	38
LT3	46	44	37

The local ambient noise environment is typical of a suburban residential environment (as classified by the NPI).

4 PROJECT NOISE AND VIBRATION CRITERIA

4.1 EXTERNAL NOISE EMISSIONS

4.1.1 NSW EPA Noise Policy for Industry (NPI) 2017 – Industrial Noise

The NSW EPA's Noise Policy for Industry (NPI) 2017 has been implemented to assess the noise impacts of mechanical plant and equipment, as well as other industrial noise sources on the surrounding receiver catchments.

The NPI sets out a framework for the derivation of project noise trigger levels that are used to assess the potential impacts of noise from industry (and industrial noise sources) and indicate the noise level at which feasible and reasonable noise management measures should be considered.

This policy applies to noise sources from activities listed in Schedule 1 of the POEO Act and those regulated by the EPA. This includes noise sources from mechanical plant and equipment within the proposed redevelopment, for which this policy will be applied.

The project noise trigger level provides a benchmark for assessing a proposal, where if exceeded, indicates a potential noise impact on the community and so triggers a management response such as additional mitigation measures. The project noise trigger level is the lower (the more stringent) value of the project intrusiveness noise level and project amenity noise level determined in Sections 2.3 and 2.4 of the NPI, respectively.

Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (in terms of L_{Aeq}) measured over a 15-minute period does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. The project intrusiveness noise level is only applicable to surrounding residential receivers.

To account for the temporal variation of background noise levels, the method outlined in Fact Sheet A of the NPI establishes a method in determining the Rating Background Noise Level (RBL) to be used in the assessment.

The intrusiveness noise level is determined as follows:

$$L_{Aeq,15min}\text{ (Intrusiveness Criteria)} = \text{Rating Background Noise Level (RBL)} + 5\text{ dB(A)}$$

Where the RBLs established in accordance with Fact Sheet A are lower than the values presented in Table 2 for each assessment period, the values presented in Table 2 shall be used for that particular assessment period. These result in the minimum intrusiveness noise levels provided in Table 2.

Table 2: Minimum assumed RBLs and project intrusiveness noise levels

TIME OF DAY	MINIMUM ASSUMED RBL - dB(A)	MINIMUM PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
Day	35	40
Evening	30	35
Night	30	35

Table 3 provides the project intrusiveness noise levels applicable to each of the surrounding residential noise-sensitive receivers.

Table 3: Project intrusiveness noise level criteria for each residential receiver catchment

RECEIVER CATCHMENT	TIME OF DAY	MEASURED RBL - dB(A)	PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
RC1	Day	43	48
	Evening	41	46
	Night	37	42
RC2	Day	44	49
	Evening	42	47
	Night	38	43
RC3	Day	46	51
	Evening	49	49
	Night	37	42

Project Amenity Noise Level

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

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 = Recommended Amenity Noise Level (see Table 4) – 5 dB(A)

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

- In areas with high traffic noise levels. Where the level of transport noise, road traffic noise in particular is high enough to make noise from an industrial source inaudible, the project amenity noise level shall be set at 15 dB(A) below the measured $L_{Aeq,period(traffic)}$ for the particular assessment period
- In proposed developments in major industrial clusters
- Where the resultant project amenity noise level is 10 dB(A) or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB(A) below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time
- Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development

The recommended amenity noise level, project amenity noise level, and converted project amenity noise level for comparison with the intrusiveness criteria (from time of day period to 15-minute) is provided for each surrounding receiver catchment in Table 4.

Table 4: Project amenity noise level criteria for each receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	RECOMMENDED AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)
RC1-RC3	Residential – Suburban[1]	Day	55	50	53
		Evening	45	40	43
		Night	40	35	38

Note 1: Suburban residential as classified in Table 2.3 of the Noise Policy for Industry (NPI) 2017

Sleep Disturbance and Maximum Noise Level Assessment

Where the proposed redevelopment night-time noise levels generated at a residential location exceed either:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB(A), whichever is greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB(A), whichever is greater,

a detailed maximum noise level event assessment should be undertaken.

Corrections for Annoying Noise Characteristics – Noise Policy for Industry Fact Sheet C

Fact Sheet C contained within the Noise Policy for Industry outlines the correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels established within this report, to account for the additional annoyance caused by these modifying factors.

The modifying factor corrections should be applied having regard to:

- The contribution noise level from the premises when assessed/measured at a receiver location, and
- The nature of the noise source and its characteristics (as set out in Fact Sheet C)

Table C1 within Fact Sheet C sets out the corrections to be applied for any assessment in-line with the NPI. The corrections specified for tonal, intermittent and low-frequency noise are to be added to be added to the measured or predicted levels at the receiver before comparison with the project noise trigger levels. The adjustments for duration are to be applied to the criterion.

Project Noise Trigger Levels

Table 5 presents the project intrusiveness and project amenity noise levels for each period, and each receiver catchment, as well as the resultant project noise trigger levels (PNTLs) that shall be applied for any assessment of impacts of mechanical plant and equipment noise on the surrounding receiver catchments.

Table 5: Project noise trigger levels (PNTL) to be applied to each surrounding receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	PROJECT INTRUSIVENESS NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	SLEEP DISTURBANCE NOISE LEVEL - dB(A)	PROJECT NOISE TRIGGER LEVEL - $L_{Aeq,15min}$ dB(A)
RC1	Residential	Day	48	53	N/A	**48**
		Evening	46	43	N/A	**43**
		Night	42	38	42 $L_{Aeq,15min}$ 57 L_{AFmax}	**38**
RC2	Residential	Day	49	53	N/A	**49**
		Evening	47	43	N/A	**43**
		Night	43	38	43 $L_{Aeq,15min}$ 58 L_{AFmax}	**38**
RC3	Residential	Day	51	53	N/A	**51**
		Evening	49	43	N/A	**43**
		Night	42	38	42 $L_{Aeq,15min}$ 57 L_{AFmax}	**38**

5 NOISE AND VIBRATION IMPACT ASSESSMENT

As part of the application, the school's capacity is proposed to increase from 360 to 385 students. To assess the extent of noise impact to surrounding receivers, noise emissions from within the school for both the currently allowed school capacity (360) and proposed new capacity (385) will be predicted and compared.

It is acknowledged in the field of acoustics that a noise difference of up to 2dB is generally indiscernible to an average person. This principle is discussed in Section 3.4 of the NSW Road Noise Policy, which states:

> *"In assessing feasible and reasonable mitigation measures, an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person"*

Further, the same approach is established in the NSW EPA Noise Policy for Industry, where Section 4.2 of the document provides the following tables.

Table 6 – Significance of residual noise impacts (Table 4.1 from NPI)

IF THE PREDICTED NOISE LEVEL MINUS THE PROJECT TRIGGER LEVEL IS:	AND THE TOTAL CUMULATIVE INDUSTRIAL NOISE LEVEL IS:	THEN THE SIGNIFICANCE OF RESIDUAL NOISE LEVEL IS:
≤ 2 dB(A)	Not Applicable	Negligible

Table 7 – Examples of receiver-based treatments to mitigate residual noise impacts (Table 4.2 from NPI)

SIGNIFICANCE OF RESIDUAL NOISE LEVEL	EXAMPLE OF POTENTIAL TREATMENT
Negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.

As shown above, the NSW NPI similarly suggests that a noise level exceedance of up to 2 dB is of negligible significance. Based on this principle, an increase of up to 2dB at surrounding receivers from the increase in school student capacity would be acceptable.

5.1 SCHOOL OPERATION NOISE IMPACT ASSESSMENT

Noise modelling software, Sound PLAN v9.0 was used to conduct detailed noise emission modelling for 360 and 385 students to determine predicted noise levels at surrounding noise sensitive receivers for both scenarios. Using the software, a 3D model of the site and its surroundings were constructed including the nearby buildings, and the students were positioned as noise sources. Within the model, the effects of the environment (built and natural) on propagation of sound were considered to reliably estimate the resulting noise effects on the surrounding noise sensitive receivers.

5.1.1 Source Noise Levels

Sound levels of groups of students have been sourced from E-Lab internal acoustic library and were allocated into outdoor areas for the daytime period during school operating hours (7am to 6pm) under the following assumptions:

- Students are in groups of 8, with 1 in 2 speaking/shouting at any one time (50% of students)
- Sound power level (amount of noise emitted) for 1 student speaking with a raised voice is 78 dB(A)
- Noise sources (students) were set at a height of 1 meter to correspond with the average student height

The noise generated by students during a 15-minute period have been been predicted to the most-affected facade of the nearest noise-sensitive receivers within each receiver catchment, with consideration of the above reasonable worst-case scenario assumptions.

5.1.2 Methodology

The noise assessment has been conducted based on the methodology described in the standard ISO 9613-2: 1996 *"Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation".*

The noise model has considered noise source levels, distance from the source to receivers, and screening effects due to existing buildings and ground topology.

The method predicts the equivalent continuous downwind sound pressure level under meteorological conditions favorable to propagation from sources of known sound emission.

5.1.3 Results

The noise emissions contour maps for the operation of the school with both 360 and 385 students on the premises provided in Appendix A. The results of the noise modelling are provided in Table 8.

Table 8: Predicted noise levels at most affected façade of receiver catchment

RECEIVER CATCHMENT	PREDICTED NOISE LEVEL (360 STUDENTS) $L_{Aeq,daytime}$ – dB(A)	PREDICTED NOISE LEVEL (385 STUDENTS) $L_{Aeq,daytime}$ – dB(A)	PREDICTED INCREASE IN NOISE LEVEL $L_{Aeq,daytime}$ – dB(A)	ACCEPTABLE? (YES/NO)
RC1	59 - 62	59 - 62	Up to 1	Yes
RC2	56 - 59	56 - 59	Up to 1	Yes
RC3	56 - 59	56 - 59	Up to 1	Yes

5.1.4 Discussion

Based on the noise emission modelling of both student capacities, it is observed that predicted noise levels at surrounding receiver catchments increases by up to 1dB(A) as a result of an additional 25 students. As noted above, a difference of up to 2 dB(A) will not be discernible by the average listener and is considered acceptable.

6 CONCLUSION

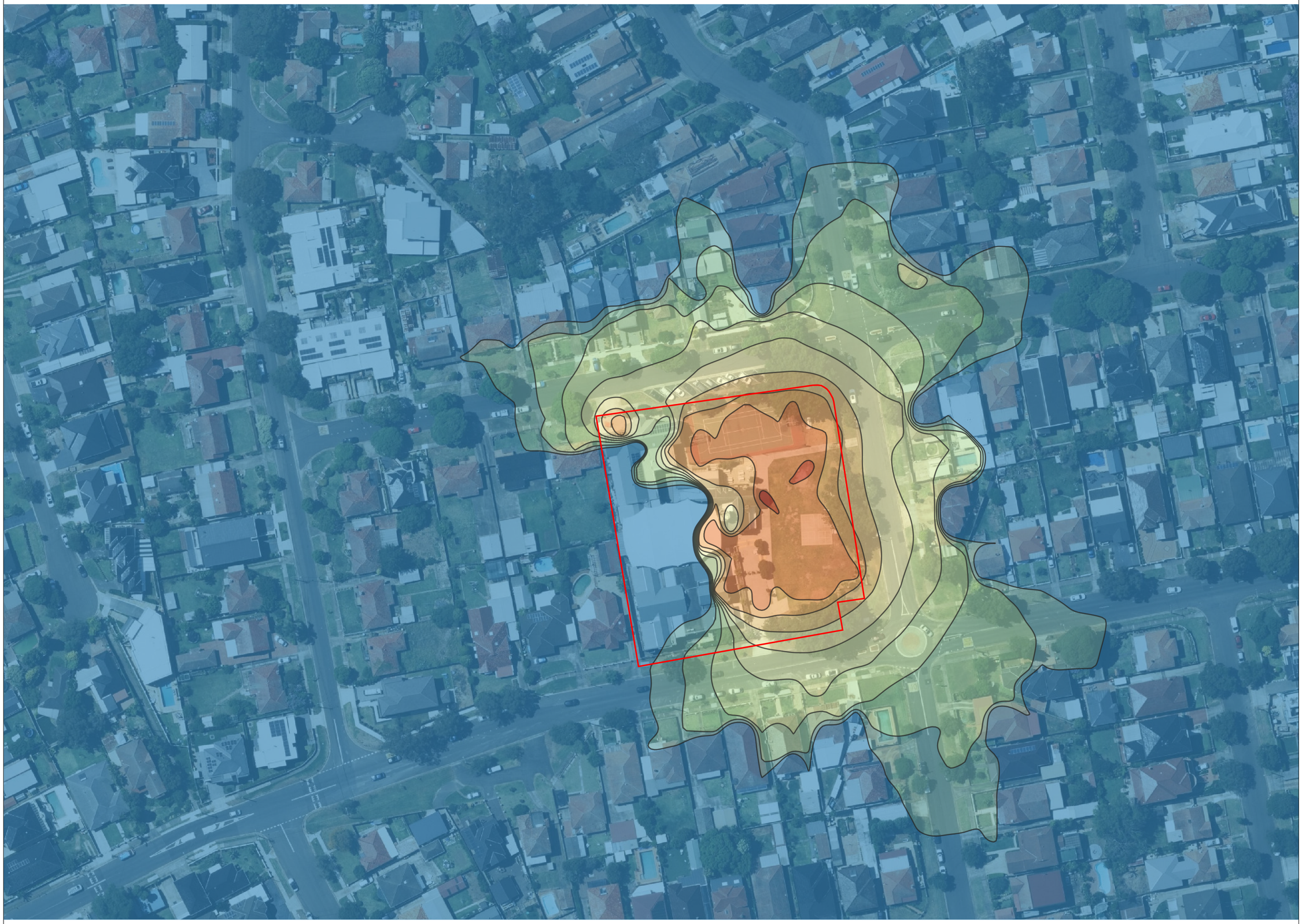
This Noise Impact Assessment has been prepared in support of a Development Application (DA) made to the City of Canterbury Bankstown Council for All Saints Grammar School, located at 31 Forsyth St, Belmore.

The assessment has considered the following key acoustic elements:

- Noise impact to nearby noise sensitive receivers from the increase in students within the school

The predicted noise emissions were compared for the existing school capacity to the proposed increased capacity. The predicted noise levels were similar, and it is expected the acoustic amenity of the residential receivers remains unchanged and therefore no adverse impacts could be expected. Having given regard to the analysis conducted within this report, it is the finding of this noise impact assessment that the proposed increase in student capacity is not expected to have any increase in noise levels. It is recommended the Development Application for the proposed development is not rejected based on noise.

Appendix A **Noise Contour Maps**



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ISSUE	DATE	STATUS
1	17/10/2024	For Information

LEGEND

Noise Level, L_{eq} dBA

- < 50
- 50 - 53
- 53 - 56
- 56 - 59
- 59 - 62
- 62 - 65
- 65 - 68
- 68 - 71
- 71 - 74
- 74 - 77
- > 77

Project Site Boundary

NOTES

PROJECT
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PROJECT NO.
P01502

ARCHITECT

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SCALE
NTS

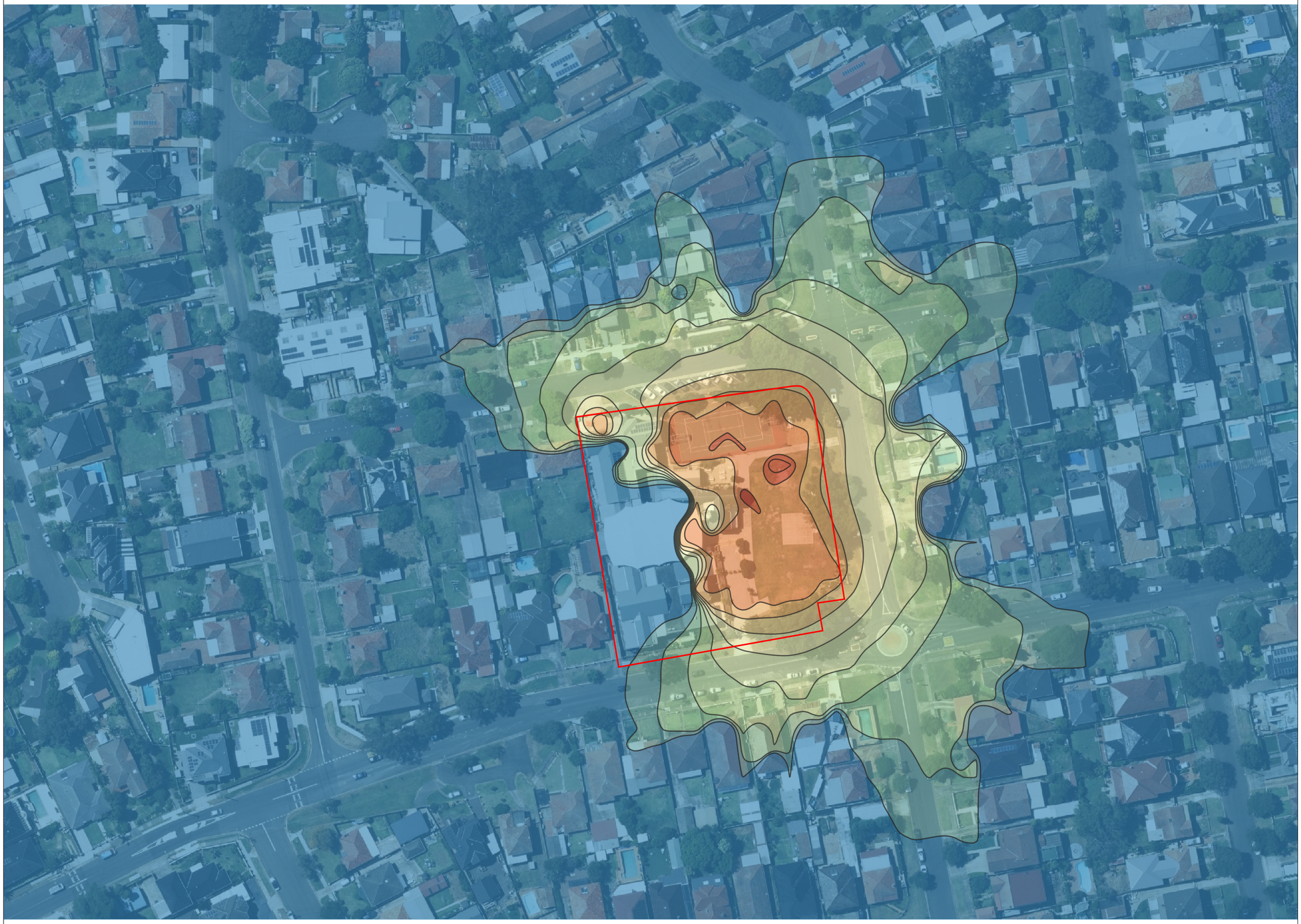
STATUS
FOR INFORMATION

DRAWING
NOISE CONTOUR MAP

EXISTING STUDENT CAPACITY

DISCIPLINE
ACOUSTICS

DRAWING NUMBER	REVISION
AC-DWG-100-01-01	001



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ISSUE	DATE	STATUS
1	17/10/2024	For Information

LEGEND

Noise Level, L_{eq} dBA

- < 50
- 50 - 53
- 53 - 56
- 56 - 59
- 59 - 62
- 62 - 65
- 65 - 68
- 68 - 71
- 71 - 74
- 74 - 77
- > 77

Project Site Boundary

NOTES

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DRAWING
NOISE CONTOUR MAP

INCREASED STUDENT CAPACITY

DISCIPLINE
ACOUSTICS

DRAWING NUMBER	REVISION
AC-DWG-100-01-02	001

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