

# ACOUSTIC CERTIFICATION ASSESSMENT REPORT: OCCUPATION CERTIFICATE

**Community School**

**1 ROSEMEAD ROAD HORNSBY NSW**



Prepared For:



Prepared By:

*N.G. Child & Associates*

**7 December 2021**

## DOCUMENT CONTROL REGISTER

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## CERTIFICATION

I am an environmental engineer and acoustic consultant possessing the qualifications and experience to render me eligible for membership of the Australian Acoustic Society, Institution of Engineers Australia or the Australian Association of Acoustic Consultants, as described in my CV as presented at Appendix A to this report.

Consent Conditions E19, E20 and E21 for the community school development currently approaching completion at 1 Rosemead Road Hornsby NSW require that:

### Noise Assessment

- E19. Prior to the issue of the occupation certificate, a report must be submitted to the satisfaction of the Certifier, and the Planning Secretary. The report must include the identification of external and internal noise levels that are representative of the typical maximum levels that may occur at this development and a conclusion as to whether the internal noise levels meet the required dB(A) levels as identified in the *Acoustic Assessment Report, Proposed Community School, 1 Rosemead Road Hornsby NSW*, dated 6 May 2020 and the addendum dated 6 November 2020 prepared by NG Child & Associates. Where it is found that internal noise levels are greater than the required dB(A) level, corrective measures must be identified to ensure that internal noise levels are compliant with the requirements of the Guideline.
- E20. Prior to the issue of the occupation certificate an acoustic consultant must undertake an assessment of the noise emissions from all indoor mechanical plant / equipment and certify that that the noise from this equipment does not exceed the maximum allowable noise levels as identified in *Acoustic Assessment Report, Proposed Community School, 1 Rosemead Road Hornsby NSW*, dated 6 May 2020 and the addendum dated 6 November 2020 prepared by NG Child & Associates. Where it is found that noise emission is greater than the required dB(A) level, corrective measures must be identified to ensure that internal noise levels are compliant with the requirements of the Guideline.
- E21. Prior to the issue of the occupation certificate, any corrective measures identified in condition E20 and condition E21 must be implemented to the satisfaction of the Certifier

I have considered all acoustic issues relevant to the requirements of Consent Conditions of E19, E20 and E21. My findings, as detailed in the associated report *Acoustic Certification: Occupation Certificate: Community School 1 Rosemead Road Hornsby NSW (Version 1; December 7th, 2021)* are as follows:

That based on a consideration of typical maximum anticipated external noise levels, internal noise levels throughout the development will comply with the noise levels identified in the *Acoustic Assessment Report: Proposed Community School 1 Rosemead Road Hornsby NSW (NG Child & Associates; Version 5; May 6th, 2020)*, and the *Updated Acoustic Comment and Advice (the "Addendum") Proposed Preschool & Community School – 1 Rosemead Road, Hornsby, NSW (NG Child & Associates; Version 2; November 6th, 2020)*; and

That noise levels from all indoor plant and equipment will not have acoustic impacts exceeding the allowable noise levels identified in the two reports identified in Conditions E19 and E20.

On this basis I am able to certify that the development complies with the requirements of Consent Condition E19 and E20 for the issue of an Occupation Certificate for the completed premises, and that accordingly no corrective actions are required pursuant to Condition 21.



Noel Child BSc (Hons), PhD, MIEA, MRACI  
Visiting Fellow, Engineering  
University of Technology, Sydney  
Principal, NG Child & Associates  
7 December 2021

# 1 INTRODUCTION

The Cowyn Building Group, on behalf of client Blue Gum Community School, is involved in the construction of a new Blue Gum Community School at 1 Rosemead Road Hornsby NSW. The proposed site will provide for a 32 place preschool and a 48 place primary school.

The proposed development has been approved by the NSW Department of Planning, and construction has now been completed.

Consent Conditions E19, E20 and E21, which are detailed in full in Section 4 of this report require certification regarding acoustic compliance prior to the issues of an Occupation Certificate (OC) for the premises.

Condition E19 requires certification that prior to the issue of an Occupation Certificate (OC) for the premises, projected indoor noise levels at the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance the identification of corrective measures.

Condition E20 requires certification that prior to the issue of an Occupation Certificate (OC) for the premises, noise emissions from plant and equipment associated with the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance the identification of corrective measures.

Condition E21 requires that in the absence of demonstrated acoustic compliance corrective measures are implemented prior to the issue of an Occupation Certificate (OC) for the premises.

These three Conditions are detailed in full in Section 4

The Cowyn Building Group has engaged NG Child & Associates to undertake an acoustic compliance assessment regarding the requirements of Conditions E19, E20 and E21, and to provide compliance certification if indicated, or alternatively advice re any corrective actions required in order to achieve compliance.

Noel Child of NG Child & Associates is an appropriately qualified and experienced person to undertake the work involved.

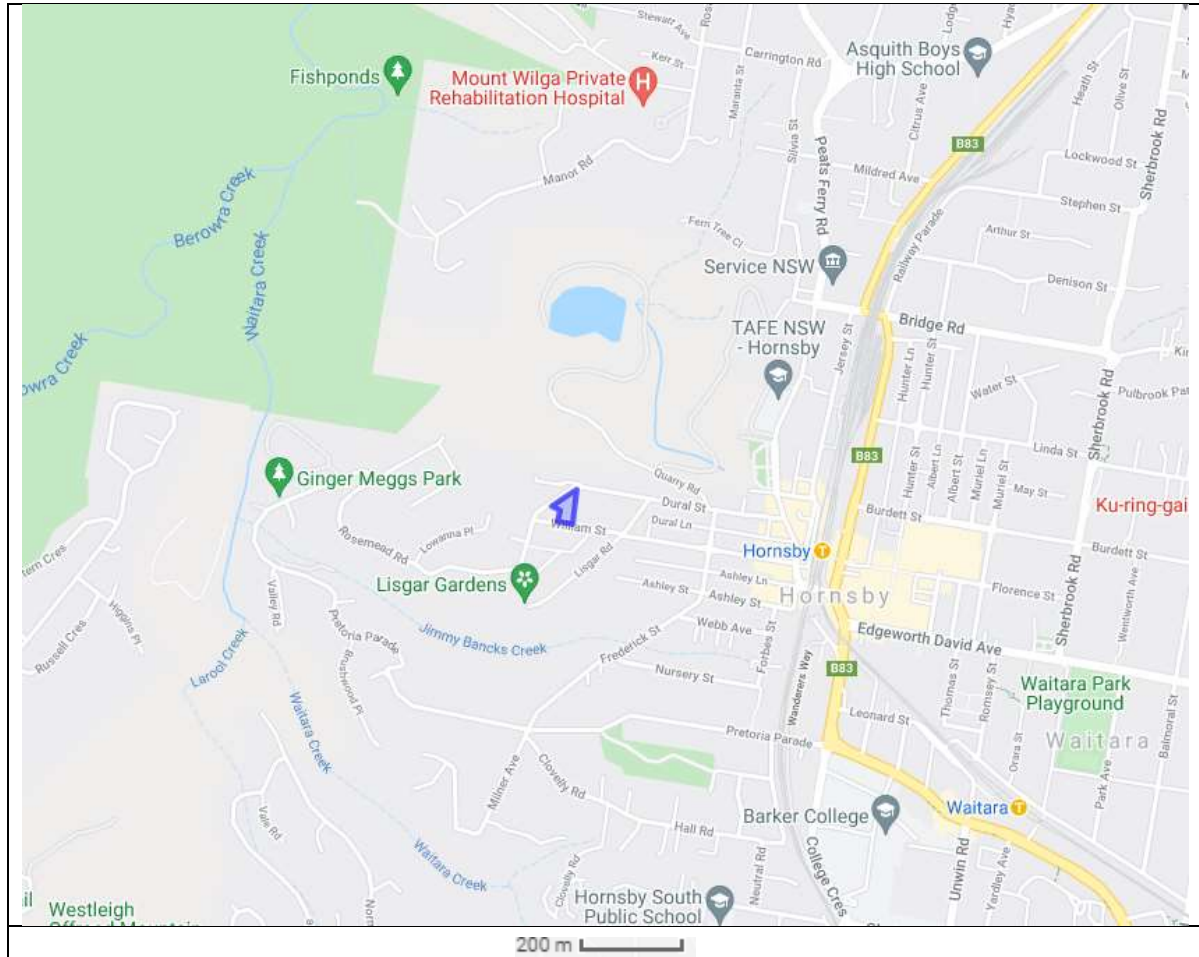
His CV is provided for reference at Appendix A.

This report describes and presents the findings of the acoustic compliance assessment undertaken.

## 2 BACKGROUND

### 2.1 LOCATION

The general location of the Community School is indicated by the road map in Figure 2.1 on the following page.



**Figure 2.1 – Location of the Community School**

Figure 2.2 on the following page a recent (August 7<sup>th</sup>, 2021) satellite photograph of the site area.

The direction of north is towards the top of both diagrams, and the approximate scale is indicated below.

The site area is shown shaded in blue in both diagrams.



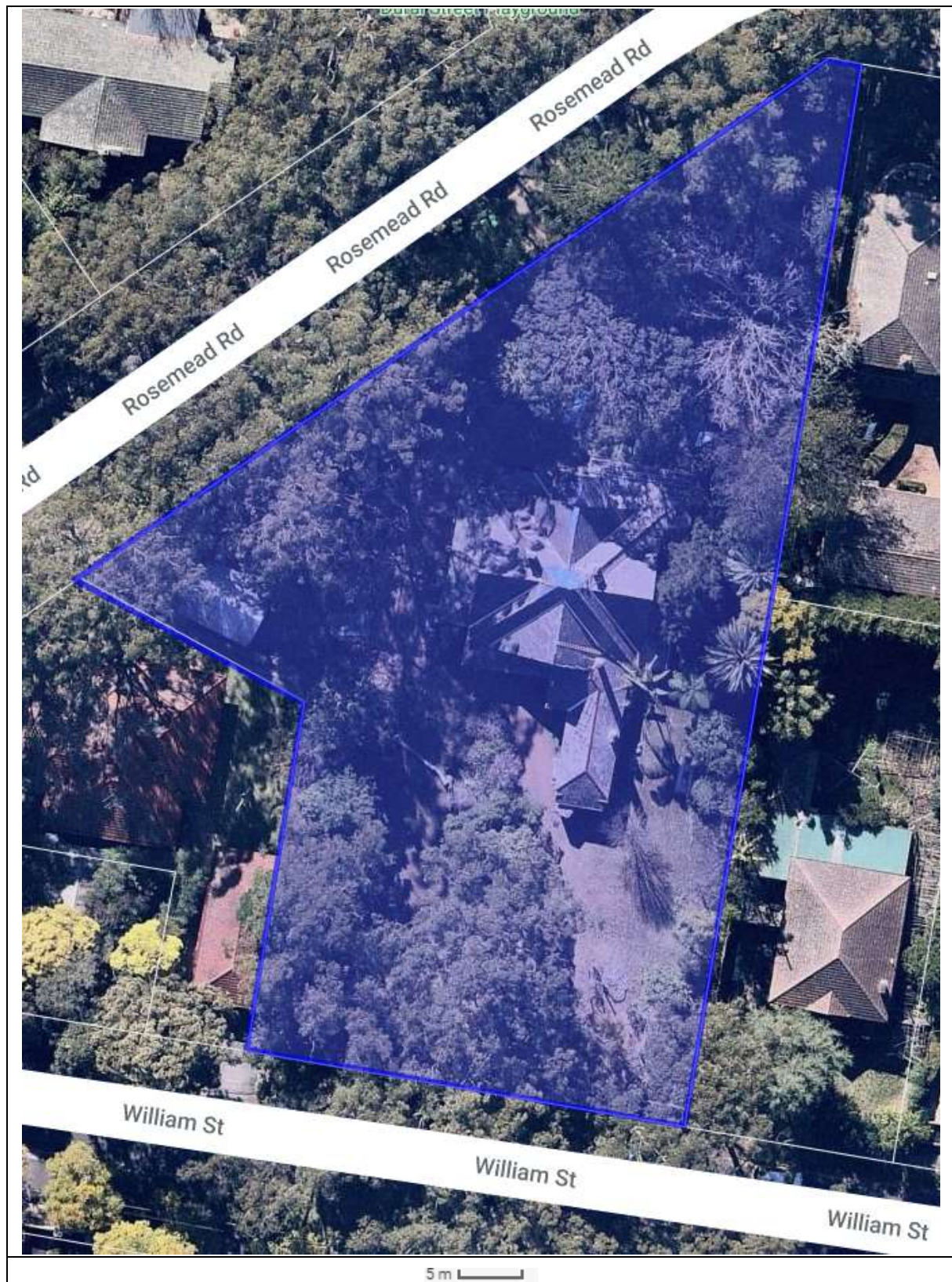


Figure 2.2 – Satellite Photograph of Site Location (August 7<sup>th</sup>, 2021)



## 2.2 LOCAL GOVERNMENT CONSENT AUTHORITY

The development site falls within the local government area of Hornsby Shire Council.

The site is zoned “R2 – Low Density Residential”, as shown in Figure 2.3 below.

The Rosemead Road site is at the left-centre of the map.

Other land uses in the general vicinity include other low density residential, medium and high density residential, mixed use and public recreation.

Land in the immediate vicinity of the subject site is low density residential.

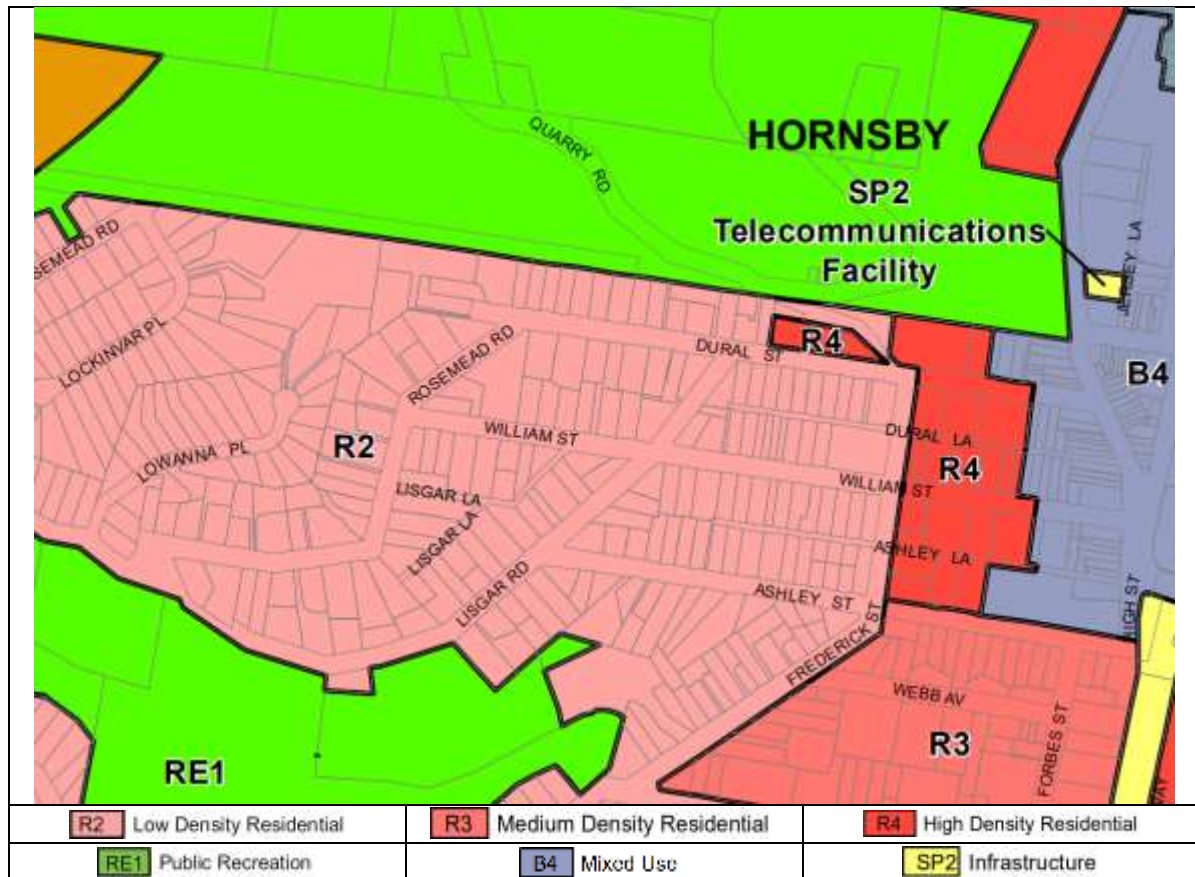


Figure 2.3 – Hornsby Shire Council Land Zoning Map

The zoning diagram shown in Figure 2.3 was sourced from the Hornsby Local Environment Plan 2013 (HELP 2013).

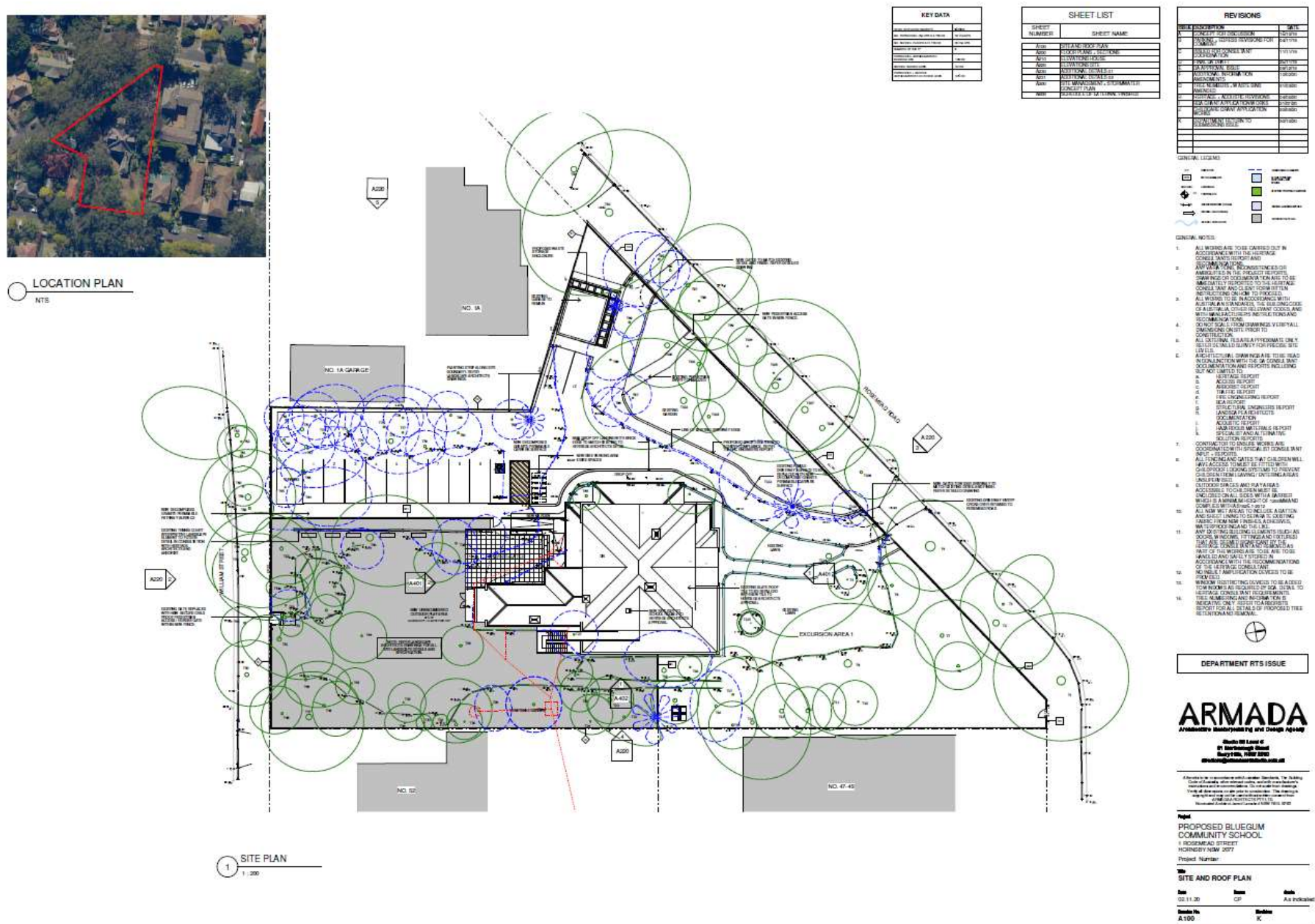
## **2.3 PROPOSED DEVELOPMENT**

The proposed development is a small community school incorporating a 32 place preschool and a 48 place primary school.

A total of 80 children will be involved.

Construction of the development will involve modifications to an existing building at the 1 Rosemead Road site, and associated works including a car park area, as indicated by the plans and drawings provided in Figures 2.4 and 2.5 on subsequent pages, as follows:

Figure 2.4	Site & Roof Plan
Figure 2.5	Floor Plans & Sections
Figure 2.6	Elevations (House)
Figure 2.7	Elevations (Site)
Figure 2.8	Additional Details
Figure 2.9	Stormwater Concept Plan







6 May 20020

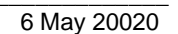




### Figure 2.7 – Elevations (Site)









### 3 BASIC NOISE & ACOUSTIC CONCEPTS

#### 3.1 SOUND & NOISE

##### 3.1.1 Loudness

In terms of human hearing, sound is caused by vibrations in the air, causing variations in air pressure that are detected by the ear. Noise is often described as unwanted sound. Sound pressure is measured in units called Pascals (Pa) but is generally expressed as a sound pressure level in decibels (dB). Sound consists of various frequency components called octaves. A correction factor is generally applied to combine these frequencies into a single number that most closely corresponds to the response of the human ear. When this is done, the sound pressure level is referred to as “A” - weighted, and is expressed as dB (A), or dBA. “A” - weighted units have generally been used in this report.

##### 3.1.2 Other Sound or Noise Characteristics

The sound pressure levels discussed above provide a measure of the loudness of a noise. This is an important measure, as the loudness of a sound can be a major contributor to disturbance, or annoyance. There are a number of other aspects of a sound or noise that can also contribute to disturbance or annoyance. These include:

- ❑ **Tonal Noise** – containing a prominent frequency and characterized by a definite pitch
- ❑ **Low Frequency Noise** – containing major components within the low frequency range (20 -250 Hz) of the frequency spectrum
- ❑ **Impulsive Noise** – having a high peak of short duration, or a sequence of such peaks
- ❑ **Intermittent Noise** – the level suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dBA

##### 3.1.3 Adding Noise Levels

Sound pressure levels are expressed in decibels, which is a logarithmic scale able to compress the range of sound levels audible to the human ear into manageable numerical units. Because the scale is logarithmic, however, noise levels cannot be added in simple arithmetic terms. For example, 35 dB plus 35 dB does not equal 70 dB. To add two or more noise levels expressed in decibels, if the difference between the highest and next highest noise level is:

- 0-1dB** - add **3 dB** to the higher level to give the total noise level;
- 2-3 dB** - add **2 dB** to the higher level to give the total noise level;
- 4-9 dB** - add **1 dB** to the higher level to give the total noise level; and
- 10 dB and over** - the noise level is **unchanged** (i.e. the higher level is the total level)

##### 3.1.4 Attenuation or Reduction of Noise with Distance

Noise reduces with increasing distance from the source. In the case of a point source, this attenuation with distance is governed by the following formula:

$$SPL_2 = SPL_1 - 20 \log (d_2/d_1)$$

where:

SPL <sub>2</sub>	=	sound level a distance “2” from the source in metres (predicted)
SPL <sub>1</sub>	=	sound level a distance “1” from the source in metres (measured)
d <sub>2</sub>	=	distance in metres to location 2 from the source
d <sub>1</sub>	=	distance in metres to location 1 from the source

### 3.2 KEY TERMS DEFINITIONS & ABBREVIATIONS

The following terms, definitions and abbreviations have been used in this acoustic assessment:

<b>INP</b>	Industrial Noise Policy
<b>dBA</b>	Decibels – a logarithmic unit commonly used to measure sound levels.
<b>ANL</b>	Acceptable Noise Level
<b>ABL</b>	Assessment Background Level - a single figure sound or noise background level representing each assessment period (daytime, evening and nighttime) for each day. It is determined by calculating the 10 <sup>th</sup> percentile (lowest 10 <sup>th</sup> percent) background level ( $L_{A90}$ ) for each period.
<b>RBL</b>	The Rating Background Level for each period is the median value of the ABL values for the period over all the days measured. There is therefore an RBL value for each period – daytime, evening and nighttime.
<b><math>L_{Aeq}</math></b>	The equivalent continuous sound level ( $L_{Aeq}$ ) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is the most commonly used measure of environmental noise and road traffic noise.
<b><math>L_{Aeq, period}</math></b>	The equivalent continuous sound level for a specified period of time.
<b><math>L_{A10, period}</math></b>	The $L_{A10}$ measure is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the $L_{A10}$ Level for 90% of the time. This measure, recorded over a one-hour period, provides a reliable indication the repeatable maximum $L_{Aeq, 1hour}$ measure.
<b><math>L_{A90, period}</math></b>	The $L_{A90}$ measure is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the $L_{A90}$ Level for 10% of the time. This measure is commonly referred to as the “background noise level”. The notation “15 minute” means that the sample period was 15 minutes.
<b>Maximum Noise Level <math>L_{Amax}</math></b>	The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

## 4 CERTIFICATION REQUIREMENTS

### 4.1 OC CERTIFICATION REQUIREMENTS

The development was approved by the NSW Department of Planning. Hornsby Shire Council is the local government consent authority at interest. Consent Conditions E19, E20 and E21 require certification regarding acoustic compliance.

Condition E19 requires certification that prior to the issue of an Occupation Certificate (OC) for the premises, projected indoor noise levels at the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance the identification of corrective measures.

Condition E20 requires certification that prior to the issue of an Occupation Certificate (OC) for the premises, noise emissions from plant and equipment associated with the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance the identification of corrective measures.

Condition E21 requires that in the absence of demonstrated acoustic compliance corrective measures are implemented prior to the issue of an Occupation Certificate (OC) for the premises.

Conditions E19, E20 and E21 are as follows:

#### Noise Assessment

- E19. Prior to the issue of the occupation certificate, a report must be submitted to the satisfaction of the Certifier, and the Planning Secretary. The report must include the identification of external and internal noise levels that are representative of the typical maximum levels that may occur at this development and a conclusion as to whether the internal noise levels meet the required dB(A) levels as identified in the *Acoustic Assessment Report, Proposed Community School, 1 Rosemead Road Hornsby NSW*, dated 6 May 2020 and the addendum dated 6 November 2020 prepared by NG Child & Associates. Where it is found that internal noise levels are greater than the required dB(A) level, corrective measures must be identified to ensure that internal noise levels are compliant with the requirements of the Guideline.
- E20. Prior to the issue of the occupation certificate an acoustic consultant must undertake an assessment of the noise emissions from all indoor mechanical plant / equipment and certify that that the noise from this equipment does not exceed the maximum allowable noise levels as identified in *Acoustic Assessment Report, Proposed Community School, 1 Rosemead Road Hornsby NSW*, dated 6 May 2020 and the addendum dated 6 November 2020 prepared by NG Child & Associates. Where it is found that noise emission is greater than the required dB(A) level, corrective measures must be identified to ensure that internal noise levels are compliant with the requirements of the Guideline.
- E21. Prior to the issue of the occupation certificate, any corrective measures identified in condition E20 and condition E21 must be implemented to the satisfaction of the Certifier

### 4.2 PREVIOUS ACOUSTIC ASSESSMENT REPORTS

The subject development has been the subject of previous acoustic assessments.

1. Acoustic Assessment Report: Proposed Community School 1 Rosemead Road Hornsby NSW (NG Child & Associates; Version 5; May 6<sup>th</sup>, 2020) – the “*Acoustic Report*”; and
2. Updated Acoustic Comment and Advice Proposed Preschool & Community School – 1 Rosemead Road, Hornsby, NSW (NG Child & Associates; Version 2; November 6<sup>th</sup>, 2020) – the “*Addendum Report*”.

The Conditions of Consent reference the acoustic report of May 6<sup>th</sup>, 2020, and the updated advice (“*the addendum*”) dated November 6<sup>th</sup>, 2020.

These previous reports have been considered, and where relevant referred to, in this OC certification assessment report.

## 5 CERTIFICATION ASSESSMENT

### 5.1 INTRODUCTION

Two of the most important considerations in the acoustic assessment of childcare centres are the effect of surrounding noise sources on the centre and its occupants, and the effect of any noise generated by the centre itself, its occupants and its operations, on nearby residents and any other potentially sensitive receivers. The assessment of acoustic issues in turn requires an understanding and clear definition of the existing acoustic environment at the site under consideration. This section of the report describes the measurement of the acoustic background at the site.

### 5.2 MEASURES OF LOUDNESS OF SOUND & NOISE

#### 5.2.1 General

In terms of human hearing, sound is caused by vibrations in the air, causing variations in air pressure that are detected by the ear. Noise is often described as unwanted sound. Sound pressure is measured in units called Pascals (Pa) but is generally expressed as a sound pressure level in decibels (dB).

Sound consists of various frequency components called octaves. A correction factor is generally applied to combine these frequencies into a single number that most closely corresponds to the response of the human ear. When this is done, the sound pressure level is referred to as "A" - weighted, and is expressed as dB (A), or dBA. "A" - weighted units have been used in this report.

#### 5.2.2 Noise Descriptors

The following standard noise descriptors have been used in this assessment:

$L_{Aeq, 15min}$	continuous equivalent sound pressure level over a 15-minute period
$L_{Amax, 15 min}$	maximum sound pressure level over 15 minutes
$L_{Amin, 15 min}$	minimum sound pressure level over 15 minutes
$L_{A90, 15min}$	sound pressure level exceeded for 90% of a 15-minute period

### 5.3 REFERENCE BACKGROUND SOUND LEVELS (RBL's)

Reference Background Sound Levels (RBL's) for the project were measured and reported in the June 20<sup>th</sup>, 2018 acoustic report.

These RBL's are repeated in Table 5.1, below, for convenient reference.

Table 5.1 – Rated Background Sound Levels

Rated Background Sound Levels for Assessment Purposes (dBA)	
$L_{AF90}$	39
$L_{Aeq}$	47

The important implications of these RBL's for this certification assessment is that the identified  $L_{A90}$ , 15-minute RBL of 53 dBA identifies the background daytime sound level at the site in the absence of road traffic noise.

It is this  $L_{A90}$ , 15-minute background RBL that forms the basis for the requirement set out in Condition 29, which is that noise impacts from any plant and item of equipment at the site may not exceed this  $L_{A90}$ , 15-minute RBL by more than 5 dBA at the boundary of the nearest potentially affected residential occupancies.

It is noted that the centre, and the associated plant and equipment, will only operate during daytime and very early evening hours, that is from 7:00 am to 7:00 pm.



## **5.4 ACOUSTIC COMPLIANCE ASSESSMENT – INTERNAL NOISE**

### **5.4.1 Compliance Requirement**

Compliance with Consent Condition E19 requires that prior to the issue of an Occupation Certificate (OC) for the premises, it is demonstrated and appropriately certified that projected indoor noise levels at the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance that appropriate corrective measures are identified.

The May 2020 Acoustic Report identified that background indoor noise levels at the development are required to be less than 40 dBA.

The certification of indoor noise compliance is required to take into account the maximum external and internal noise levels that may occur at the development.

### **5.4.2 Relevant Noise Sources & Levels**

Background indoor noise levels are influenced by:

- ☐ ambient background environmental noise (including traffic on local roads);
- ☐ Noise from outdoor play activities.
- ☐ acoustic impacts from externally located plant and equipment;
- ☐ acoustic impacts from internally located plant & equipment; and
- ☐ acoustic impacts from traffic movements.

The maximum external noise levels associated with these sources are as follows:

#### **Ambient Background Noise**

Maximum ambient background environmental noise is identified by the measured LAeq rated background sound level ("RBL") of 47 dBA as measured and reported in the Acoustic report, and as repeated for reference in Table 5.1 above.

#### **Noise from Outdoor Play Activities**

Maximum noise from outdoor play activities was established in the Acoustic Report as being in the range 70 – 75 dBA (refer Acoustic report; Section 6.3.1)

#### **Acoustic Impacts from Externally Installed Plant & Equipment**

Section 5.5 (below) of this report identified the items of plant and equipment installed externally to the facility. These comprise five items of air conditioning plant & equipment.

The maximum noise level generated by these items at the external wall of the community school building is identified as 61 dBA.

#### **Acoustic Impacts from Internally Installed Plant & Equipment**

Internal items of plant and equipment comprise domestic appliances such as refrigerators and other kitchen appliances, and internal fans and ducting associated with the air conditioning system.

#### **Acoustic Impacts from Car Park Traffic Movements**

The acoustic report identified maximum noise levels of 56 – 58 dBA associated with traffic arriving and departing from the community school parking area (refer Acoustic Report; Section 6.3.5).

### 5.4.3 Mitigation of External Noise Sources

The Acoustic Report considered and quantified the acoustic capacity of the community school building structure to mitigate external noise sources, and to achieve the background indoor noise levels required.

Based on this consideration of the acoustic qualities of the building structure, the Acoustic report found (refer Acoustic Report; Section 6.1):

#### Acoustic Qualities of Solid Walls

Typically, solid form external wall elements have  $R_w$  sound reduction (or attenuation) ratings in excess of 35 dBA, and in the case of double brick elements in excess of 50 dBA.

#### External Windows & Doors

The most acoustically “vulnerable” elements of the external building facades are the glazed windows and doors.

Glazed construction elements (windows and doors) provide lower levels of sound attenuation (or reduction) than solid structural elements such as walls.

In this case, an examination of existing external glazed elements, primarily windows, indicates that float glass with thicknesses between 4 and 6 mm is in place, which has an  $R_w$  or “noise reduction” rating of 27.

Ambient background sound is assumed to apply at the building boundary. No reduction due to distance has been assumed, and the acoustic quality of the external glazing has been adopted to provide a conservative assessment of internal noise levels.

External plant & equipment is installed adjacent to solid walls, and the acoustic reduction associated with double brick structure applies. External plant and equipment is installed adjacent to the external walls, and no reduction in sound due to distance has been assumed. A cumulative noise level of 63 dBA has been assumed, based on all items of plant and equipment operating at the same time.

The maximum noise level of 75 dBA assessed as being associated with outdoor play activities will be reduced by distance. To ensure a conservative assessment of internal noise, the acoustic reduction quality of external glazing rather than wall structure has been assumed.

The maximum noise level of 58 dBA assessed as being associated with car park traffic movements will be reduced by distance. To ensure a conservative assessment of internal noise, the acoustic reduction quality of external glazing rather than wall structure has been assumed.

On this basis, Table 5.2 below provides an analysis of the reduction in noise by both distance and the building structure of the three significant external noise sources identified and resulting indoor noise levels and compliance.

**Table 5.2 – Indoor Noise Levels & Compliance**

Noise Source	Noise Level	Reduction (Structure)	Reduction (Distance)	Indoor Noise Level	Requirement	Comply
Ambient Background (max)	47 dBA	27	0	27	40 dBA	Yes
External Play Activity (max)	75 dBA	27	15	33	40 dBA	Yes
External P & E (max)	61 dBA	50	0	11 dBA	40 dBA	Yes
Car Park Traffic (max)	58 dBA	27	15	16	40 dBA	Yes

### 5.4.4 Assessment of Compliance with Consent Condition E19

On the above basis, compliance with Consent Condition E19 is demonstrated. No corrective measures are required to achieve that compliance

## 5.5 ACOUSTIC COMPLIANCE ASSESSMENT – PLANT & EQUIPMENT

### 5.5.1 Compliance Requirement

Consent Condition E20 requires that certification is provided prior to the issue of an Occupation Certificate (OC) for the premises, confirming that noise emissions from plant and equipment associated with the development will comply with the required sound levels as identified in the relevant acoustic assessment reports, and in the absence of such compliance that appropriate corrective measures are identified.

### 5.5.2 Items of Plant & Equipment

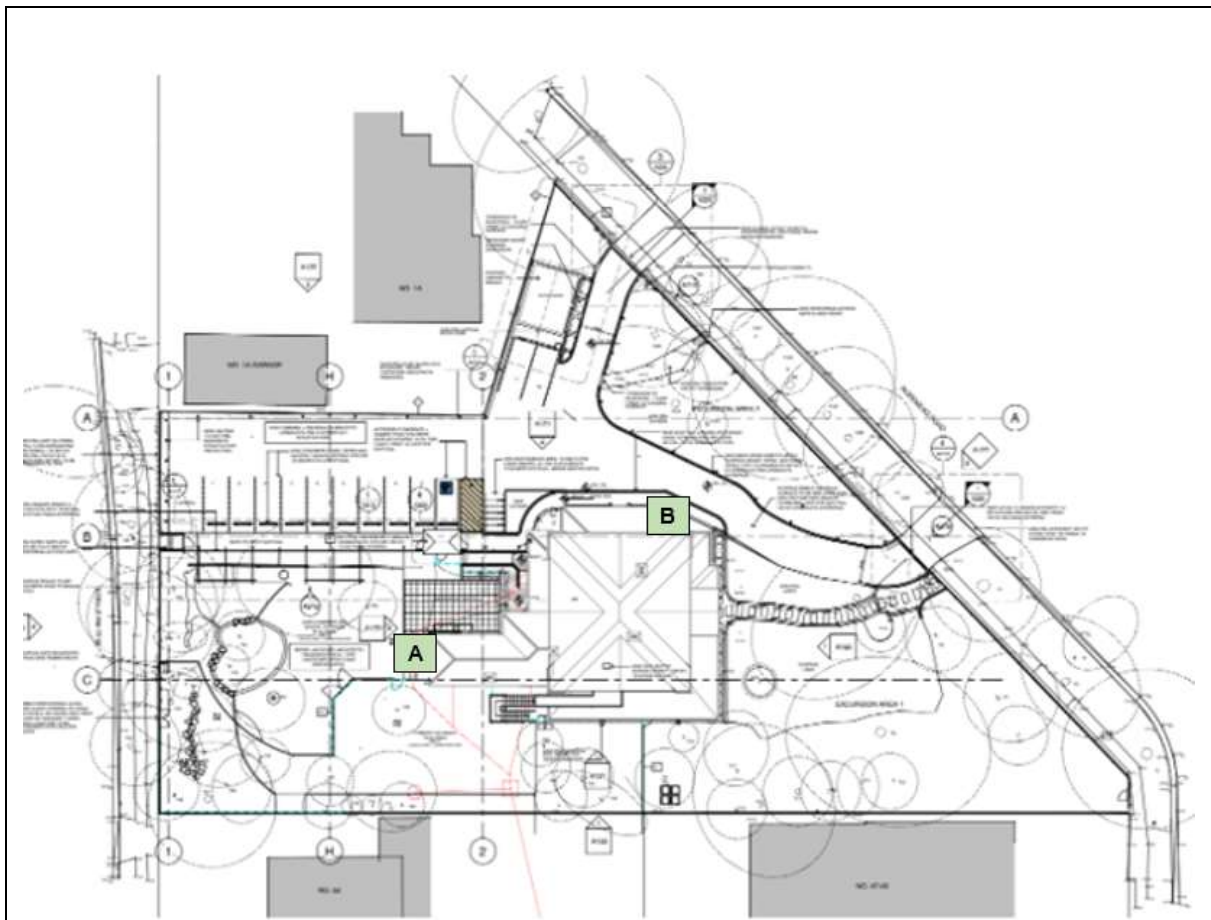
He relevant items of plant and equipment are identified in Table 5.3, below.

**Table 5.3 – Summary of Plant & Equipment Impacting the External Environment**

Description	Model	Number of Units	Location
Air Conditioning Unit	Daikin RXV50UVMA	1	A
Air Conditioning Unit	Daikin RXV46UVMA	1	A
Air Conditioning Unit	Daikin 5MXM100RVMA	1	B
Air Conditioning Unit	Mitsubishi SCM40ZG-S	3	A

These items are installed externally to the community school building.

Approximate locations are illustrated in Figure 5.1, below.



**Figure 5.1 – Approximate External P & E Locations**

As indicated in Section 5.4 above, items of plant and equipment within the community school building have been considered, and found to comprise domestic appliances such as refrigerators, and internal air conditioning ducts and fans.

Section 4 conforms that these internally installed items do not impact adversely on indoor noise levels. The nature of the building structure, and its acoustic qualities, ensure that no acoustic impact from these internal items will be experienced external to the building, and at neighbouring property boundaries.

The externally installed items of plant and equipment are illustrated in Figures 5.2 to 5.7, below and on subsequent pages.



**Figure 5.2 – Five Items of Plant & Equipment at Location A**





Figure 5.3 – Technical Data Daikin RXV46UVMA



Figure 5.4 – Technical Data Daikin RXV100UVMA



Figure 5.5 – Technical Data Daikin RXV50UVMA



Figure 5.6 – Item of Plant & Equipment at Location B



Figure 5.7 – Technical Data Mitsubishi SCM40ZG-S

### 5.5.3 Acoustic Emissions from Plant & Equipment

Acoustic emissions from the relevant items of plant and equipment are summarised in Table 5.4, below.

Table 5.4 – Summary of Plant & Equipment Impacting the External Environment

Description	Model	dBA
Air Conditioning Unit	Daikin RXV50UVMA	60 @ 1-metre
Air Conditioning Unit	Daikin RXV46UVMA	60 @ 1-metre
Air Conditioning Unit	Daikin 5MXM100RVMA	61 @ 1-metre
Air Conditioning Unit	Mitsubishi SCM40ZG-S	60 @ 1-metres

Noise associated with the various items of outdoor plant and equipment are noise levels measured at a distance of 1 metre from the units.

Cumulative noise emissions from the five items of plant and equipment at Location A, assuming all units operating together, is estimated at 64 dBA, using the methodology described in Section 3.1.3 of this report.



#### 5.5.4 Acoustic Fence at 1A Rosemead Road Boundary

Both the May 2020 Acoustic Report and the November Addendum Acoustic Report included recommendations for a double lapped and capped timber acoustic fence along the boundary between the development and the adjacent residential property at 1A Rosemead Road.

This residential fence provides an important acoustic control and is relevant to the assessment of any acoustic impacts from plant and equipment noise emissions.

The recommended acoustic fence has been constructed, and is illustrated in Figures 5.8 and 5.9, below.



**Figure 5.8 – Acoustic Fence at the 1A Rosemead Road Boundary (1)**



**Figure 5.9 – Acoustic Fence at the 1A Rosemead Road Boundary (2)**



### 5.5.5 Assessment of Acoustic Impact & Compliance at Property Boundaries

The acoustic impact of the various items of plant and equipment at the four property boundaries, including the two residential property boundaries, has been calculated and is shown in Table 5.5, below.

**Table 5.5 – Acoustic Impact of Plant & Equipment at Property Boundaries**

Boundary	Location	Maximum Noise at Unit(s)	Noise Reduction Due to Distance	Noise Reduction Due to Structure	Acoustic Impact at Boundary
North (Rosemead Road Boundary)	A	64 dB	≥20	≥20	<44 dB
	B	61 dB	≥20	≥20	<44 dB
South-East (IA Rosemead Road)	A	64 dB	≥20	≥15	<44 dB
	B	61 dB	≥20	≥15	<44 dB
West (Western Property Boundary)	A	64 dB	≥20	≥10	<44 dB
	B	61 dB	≥20	≥10	<44 dB
South (William Street Boundary)	A	64 dB	≥ 30 dB	0	<44 dB
	B	61 dB	≥ 30 dB	0	<44 dB

Note: Permissible Impact at Boundary = LA 90, 15-minute RBL + 5 = 39 + 5 = 44 dBA

The following notes apply:

1. The reduction on sound with distance has been calculated in accordance with the following formula (refer Section 3):

*Noise reduces with increasing distance from the source. In the case of a point source, this attenuation with distance is governed by the following formula:*

$$SPL_2 = SPL_1 - 20 \log (d_2/d_1)$$

where:

$SPL_2$	=	sound level a distance "2" from the source in metres (predicted)
$SPL_1$	=	sound level a distance "1" from the source in metres (measured)
$d_2$	=	distance in metres to location 2 from the source
$d_1$	=	distance in metres to location 1 from the source

2. The combined acoustic impact of multiple items of plant and equipment situated close together has been assessed on the basis of the relationship identified in Section 3, namely:

*Sound pressure levels are expressed in decibels, which is a logarithmic scale able to compress the range of sound levels audible to the human ear into manageable numerical units. Because the scale is logarithmic, however, noise levels cannot be added in simple arithmetic terms. For example, 35 dB plus 35 dB does not equal 70 dB. To add two or more noise levels expressed in decibels, if the difference between the highest and next highest noise level is:*

*0-1dB - add 3 dB to the higher level to give the total noise level;  
2-3 dB - add 2 dB to the higher level to give the total noise level;  
4-9 dB - add 1 dB to the higher level to give the total noise level; and  
10 dB and over - the noise level is unchanged (i.e. the higher level is the total level)*

### **5.5.6 Assessment of Compliance with Consent Condition E19**

On the above basis, compliance with Consent Condition E20 is demonstrated. No corrective measures are required to achieve that compliance

## **5.6 COMPLIANCE WITH CONDITION E 21**

Sections 5.4 and 5.5 above demonstrate that compliance with Consent Conditions E19 and E20 is demonstrated.

On this basis, no corrective measures are required, and no such action is required under the terms of Consent Condition E21.

## **6 FINDINGS & RECOMMENDATIONS**

### **6.1 KEY FINDINGS**

This report presents the results of an acoustic certification assessment undertaken in relation to the compliance with the requirements of Consent Conditions E19, E20 and E21 in relation to a community school development at 1 Rosemead Road Hornsby, NSW.

Compliance with Consent Conditions E19 and E20 has been demonstrated.

On this basis no corrective actions are required to achieve compliance with Consent Condition E21.

### **6.2 RECOMMENDATION**

This acoustic certification assessment has found that the requirements of Consent Conditions E19, E20 and E21 have been satisfied.

On this basis, the following recommendation is made:

1. That certification confirming the compliance of the completed development with the acoustic requirements of Consent Conditions E19, E20 and E21 may be issued; and
2. That on this basis, and in terms of the acoustic requirements of Consent Conditions E19, E20 and E21, it is recommended that an Occupation Certificate for the premises may be issued.

## 7 AUTHORISATION & LIMITATIONS

NG Child & Associates has based this report on the data, methods and sources described herein. Subject to the limitations described within the report, it is the professional opinion of NG Child & Associates that this report provides an accurate and reliable assessment of acoustic compliance and performance in relation to Consent Conditions E19, E20 and E21 for the community school development now approaching completion at 1 Rosemead Road Hornsby NSW, as described in this report.



**Noel Child BSc (Hons) ME PhD**  
**Visiting Fellow, Engineering**  
**University of Technology, Sydney**  
**Principal, NG Child & Associates**

**7 December 2021**



## **APPENDIX A**

### **Noel Child Summary of Qualifications, Capability & Experience**

## 1 PERSONAL DETAILS

**Full Name:** Noel George CHILD  
**Profession:** Consultant in Environmental Assessment and Management  
**Date of Birth:** 6th December 1946  
**Nationality:** Australian  
**Experience:** > 30 Years  
**Address:** 22 Britannia Road, Castle Hill, NSW, 2154  
**Contact:** **Phone:** 61 2 9899 1968 **Fax:** 61 2 9899 1797 **Mobile:** 0409 393024

## 2 CAPABILITY AND EXPERIENCE - SHORT SUMMARY

Noel Child is a successful and experienced commercial and technical professional with over 30 years' experience in a variety of senior level appointments and assignments, within both the corporate and private sectors, with a particular focus on strategic, infrastructure and environmental applications.

Noel's experience includes senior management at both the State and National levels in the Australian petroleum industry, and a number of senior consultancies for both government and corporate clients. His record reflects the ability to develop and achieve positive commercial outcomes through effective planning and communication; critical and objective analysis; and quality task completion and delivery at both the personal and team level.

His management responsibilities have included transport, environmental, safety, and general operational activities at a national level, while his formal professional training includes strategic management, environmental, engineering and business disciplines. He has undertaken a number of senior corporate appointments with distinction and been successfully involved in the ownership and operation of a major petroleum distribution and marketing company in regional Australia. More recently, working through his own businesses Environment Australia and NG Child & Associates, he has applied his knowledge and experience in the areas of strategic management, infrastructure development, energy and the environment on a consultancy and contractual basis to a number of private and public-sector clients, both nationally and internationally.

Noel has had post-graduate training in several technical and commercial disciplines, and provides specialised teaching input, by invitation, to post graduate engineering and business management courses conducted by the Faculties of Business and Engineering at Sydney's University of Technology. He has strong affiliations with a number of international corporations and agencies and has worked closely with both the regulators and the regulated in a number of aspects of environmental management, assessment and performance. He has also been recognised as an independent expert on engineering, and environmental issues by the Land and Environment Court of NSW.

Noel has a detailed understanding of environmental engineering and associated processes and has specific experience and expertise in the fields of acoustics, air quality, electromagnetic field assessment, electrolysis and stray current assessment, contaminated site assessment, and liquid and solid waste management. He also provides post graduate teaching input on environmental engineering issues to post graduate courses at the University of Technology, Sydney, and La Trobe and Monash Universities in Melbourne.

## 3 EDUCATION, QUALIFICATIONS AND AFFILIATIONS

BE (Chemical Engineering), UNSW, Sydney  
Master of Business Studies, University of New South Wales, Sydney  
B.Sc. (Hons) Applied Chemistry (Environmental), University of Technology, Sydney  
Graduate Diploma (Environmental Engineering and Management), UNSW, Sydney  
Qualified Environmental Auditor, Standards Australia  
Member, Royal Australian Chemical Institute, 1972/2021  
Member, Institution of Engineers, Australia, 1972/2021  
Member, Clean Air Society of Australia and New Zealand, 1992/2021  
Member, Australian Natural Gas Vehicle Council, 1996/2004  
Executive Director, Australasian Natural Gas Vehicles Council, 2003/2004  
Visiting Fellow, Institute for Sustainable Futures, UTS, 1995/2002  
Research Fellow, Faculty of Civil & Environmental Engineering, UTS, 1996/2012  
Research Associate, New York Academy of Sciences, 2000/2014

## 4 RECENT ASSIGNMENTS & EXPERIENCE

**Mostyn Copper (2016 – Current)** – Assessment of air quality, acoustic, electromagnetic field and site contamination issues associated with a number of childcare centre projects undertaken by the Mostyn Copper Group and clients throughout the Sydney metropolitan area.

**Mostyn Copper & the ATC (2017 – Current)** – Environmental assessment of various aspects of the Coopers Paddock site near the ATC racecourse at Warwick Farm.

**Boskovitz Lawyers & Ceerose Construction (2019 - Current)** – Independent assessment of acoustic, air quality and electromagnetic field issues associated with a proposed childcare centre development at Willoughby Road Willoughby for submission to the NSW Land and Environment Court,

**Lodestone HQ (1998 - Current)** – Environmental assessment of proposed childcare centre development at the Princes Highway Kirrawee NSW, and several previous childcare centre developments over a twenty year period, including acoustic, electromagnetic field, air quality and site contamination considerations.

**Government of the PRC & Thyssen Transrapid Australia (2004 - Current)** – Adviser on technical and operational issues associated with the development and construction of a high-speed magnetic levitation train systems within the People's Republic of China, and elsewhere, including electrolysis, electromagnetic and stray field effects.

**The Bathla Group (2014 - Current)** – Environmental assessment of a number of residential development projects for submission to local government consent authorities, or the NSW Land and Environment Court, including acoustic, air quality, site contamination and environmental management issues.

**Trumen Corporation (2006 - Current)** – Environmental assessment, including electromagnetic field, acoustic and contamination assessment and certification, of mixed use, childcare centre and industrial unit and self-storage development projects throughout the Sydney metropolitan area.

**Montessori Academy (2012 - Current)** – Independent audit and assessment of acoustic, air quality and electromagnetic field issues associated with a range of childcare centre and early learning developments throughout the Sydney area, and in the ACT.

**Archizen Architects (2003 - Current)** – Environmental assessment of a range of proposed childcare centre developments throughout NSW, including general environmental, acoustic assessment, air quality and electromagnetic field assessment.

**Dr James Smith SC (2018 – Current)** – Provision of specialist advice and delivery of expert evidence regarding a number of cases, including acoustic, electromagnetic and site contamination issues.

**Australian Consulting Architects (2010 – 2019)** – Acoustic, electromagnetic, stray current and electrolysis assessments of development projects a Field Place Telopea; Windsor Road Vineyard; Camden Valley way Horningsea Park and others.

**Futurespace/Renascent (2008 - 2018)** – Environmental assessment of proposed childcare centre developments at Waterloo Road Macquarie Park and Cleveland Street Strawberry Hills, including general environmental, acoustic assessment, air quality and electromagnetic field assessment.

**Commonwealth Bank (2016 – Current)** – Environmental assessment, including general, acoustic, air quality, electromagnetic field and wind impact assessment, of a childcare centre development to be located on Level 2 of Darling Park Power 2, Sussex Street, Sydney.

**LEDA Holdings** – Environmental Assessment of a proposed childcare centre at 32 Cawarra Road Caringbah NSW, including general environmental, acoustic, air quality and electromagnetic field assessments.

**Universal Property Group (Current)** – Environmental assessment of a proposed multi building, multi-level residential development at Garfield Street, Wentworthville NSW, including general environmental, acoustic, site and soil contamination and preliminary geotechnical assessments.

**Gundagai Meat Processors (Current)** – Review and enhancement of solid and liquid waste processing and management systems at GMP's Gundagai abattoir, including the on-site treatment of waste streams from meat processing and other operations.

**Campbelltown City Council (Current)** – Peer review of acoustic assessments submitted to Campbelltown City Council regarding assessment of the acoustic impacts of developments including a major truck maintenance facility and the expansion of Macarthur Square shopping centre, including the conduct of noise measurements.

**Brenchley Architects (2009 - Current)** – Acoustic assessments of proposed residential and commercial developments at Elizabeth Street Sydney; Spit Road Mosman, Botany Road Waterloo, Cranbrook Street, Botany and Bellevue Hill Road, Bellevue Hill NSW.

**Bovis Lend Lease (2010 -2017)** – Environmental assessment of a major development site at Darling Walk, Darling Harbour NSW, including a detailed review of air quality, electromagnetic field and acoustic issues for review by the NSW Department of Planning.

**Penrith City Council (2012 - 2016)** – Preparation of the ongoing Penrith City Council response to the NSW Government Long Term Transport Plan, including consideration of transport and associated environmental issues affecting the Penrith Local Government Area.

**Western Sydney Mayoral Forum (1998- 2015)** – Environmental assessment and review of the development of a second Sydney airport at Badgerys Creek, including assessment of acoustic and electromagnetic field impacts.

**Michael Bell Architects & Clients (2004 to Current)** – Assessment of the environmental impacts, including acoustic impacts, associated with various childcare centre applications in suburban Sydney, and the Sydney CBD, including the development of plans for the management and control of such impacts.

**NSW Roads & Traffic Authority (2004 to 2018)** – Review of international technologies, systems & applications in relation to the treatment of motor vehicle exhaust emissions and associated air pollution within and discharged from road tunnels, in accordance with the conditions of approval for the M5 East Motorway

**Federal Airports Corporation (1995 - 2017)** – Environmental studies for the Sydney West Airport, including consideration of air quality, acoustic and electromagnetic and radio-frequency issues.

**Isuzu-GM (2003 to 2018)** – Representations to Environment Australia and the Department of Transport and regional Services regarding the emission performance standards of Japanese sourced medium and heavy natural gas trucks, with the aim of having the current Japanese emission standard accepted within the Australian design Rule 80 series of vehicle emission standards.

**City of Sydney (2005 - 2007)** – Assessment of air quality and odour issues associated with a proposed redevelopment of craft studios and associated facilities at Fox Studios, Moore Park, Sydney, and review of air quality monitoring stations in the Sydney CBD area, in part as a basis for monitoring the air quality and potential health cost impacts of transport congestion and modes.

**Warren Centre for Advanced Engineering, University of Sydney (2000 to 2003)** – Contribution to the report “Sustainable Transport for Sustainable Cities”, a major government and private enterprise funded study into the future sustainability of transport in Sydney and adjoining regions, including in particular a review of associated environmental issues. Study received the 2003 Bradfield Award for Engineering Excellence from the Australian Institute of Engineers.

**United Kingdom Department of the Environment (1994)** – Contribution to the development of revised environmental guidelines for air, soil and groundwater water quality.

**United States Environmental Protection Agency (1994)** - Contribution to an international team developing strategies for the control and management of air pollution in seven major US cities.

## 5 CORPORATE EXPERIENCE

### NG Child & Associates

- ❑ **1992--Present**, Managing Principal - Responsible for all aspects of the conduct of a specialist private engineering and environmental consultancy, including administration, marketing, team coordination and technical and professional delivery.

### Western Fuel Distributions Pty Limited, Australia

- ❑ **1984-92** Managing Principal. - Responsible for all aspects of the management and development of one of the largest private petroleum distributorships then operating in Australia, with a peak annual sales volume of 70 million litres, turnover of \$30 million per annum, a direct staff of thirty, and a network of some 40 retail and wholesale agency outlets. This position included direct personal accountability for all aspects of storage, distribution and environmental performance.

### Caltex Oil Australia Limited

- ❑ **1982-84** General Manager, Marketing and Operations. Responsible for the management and operation of Caltex Australia's marketing, storage, warehousing, distribution, environmental and safety functions, including seaboard terminal and marine operations.
- ❑ **1980-82** National Consumer Marketing Manager. Responsible for Caltex Australia's national consumer, industrial and distributor marketing activities.

### Golden Fleece Petroleum Limited

- ❑ **1977 - 1980** Manager Operations, NSW. Responsible for the overall management of the distribution, warehousing, seaboard terminal and lubricant production activities of Golden Fleece Petroleum in New South Wales, including environmental, occupational health and safety matters.

### Esso Australia Limited

- ❑ **1976-77** SA Manager, Marketing and Operations. Responsible for all aspects of the management of Esso's petroleum, lubricant and LPG storage, distribution and marketing throughout South Australia.
- ❑ **1975-76** Refinery Manager. Responsible for all engineering, operational and environmental aspects of the joint Esso/Mobil refinery at Port Stanvac in South Australia.
- ❑ **1975** Manager, Process Operations, Port Dixon Refinery, Malaysia. Six-month special assignment at the Esso Petroleum Refinery, Port Dixon, Malaysia.
- ❑ **1971-75** Senior Analyst, Logistics and Corporate Strategy Departments, Esso Sydney Head office.



## 6 SOME REPORTS & PUBLICATIONS

- ❑ **High Speed Rail – Benefits for the Nation**, Keynote address at the UNSW Institute of Environmental and Urban Studies International High-Speed Rail Seminar, August 2018.
- ❑ **Electromagnetic Impact of Magnetic Levitation Trains**, Report to the Shanghai Municipal Transport Commission detailing constraints associated with electromagnetic field impacts, September 2017)
- ❑ **The M5 East Road Tunnel: Implications for Ventilation, Air Quality and Emission Treatment Systems**, International Road Transport and Tunneling Forum, Graz Austria, May 2016.
- ❑ **Sydney's High Residential Growth Areas: Averting the Risk of a Transportation Underclass**, World Transport & Environmental Forum, Reims France, June 2014.
- ❑ **Review of Options for the Treatment or "Filtration" of Tunnel Gases and Stack Emissions**, City of Sydney. January 2014
- ❑ **M5 East Freeway: A Review of Emission Treatment Technologies, Systems and Applications**, NSW RTA and NSW Department of Planning, April 2004; June 2008; September 2010)
- ❑ **High Speed Trains in Australia: Connecting Cities and Energising Regions**; with the Hon Peter Nixon AO, October 2010.
- ❑ **Transport Fuels in Australia: The Folly of Australia's Increasing Reliance on Imported Crude Oil**, Submission to the Australian Senate Rural and Regional Affairs and Transport Committee Inquiry into Australia's Future Oil Supply and Alternative Transport Fuels, February 2006.
- ❑ **The Japan 2003 CNG Emission Standard & the Emission Performance of the Isuzu 4HF-1-CNG: The Case for Acceptance under ADR80**. Submission on behalf of Isuzu GM Australia to the Commonwealth Department of Transport and Regional Services, June 2004.
- ❑ **Sustainable Transport for Sustainable Cities**, Warren Centre for Advanced Engineering, Sydney University, January 2003
- ❑ **Future Directions: Challenges & Opportunities in the Australian CNG Vehicle Industry**, ANGVC, December 2002
- ❑ **Engineering and Environmental Aspects of Enclosing the Cahill Expressway Cutting**, City of Sydney, May 2001.
- ❑ **High Speed Rail in Australia: Beyond 2000** (with the Hon Peter Nixon), November 2000
- ❑ **M5 East Motorway: Proposed Single Emission Stack at Turrella – Review of Air Quality Impacts and Consideration of Alternative Strategies**, Canterbury City Council, February 1999

## 7 PERSONAL & PROFESSIONAL REFERENCES

- ❑ The Hon Peter Nixon AO, Former Federal Transport Minister
- ❑ John Black, Professor Emeritus of Civil & Transport Engineering, University of NSW
- ❑ The Hon Frank Sartor, former Lord Mayor of Sydney; Former NSW Government Minister.
- ❑ Dr Jack Munday, Past Chairman Historic Houses Trust, Environmentalist
- ❑ Mr Stephen Lye, Development Manager, Trumen Corporation, Sydney.
- ❑ Mr Peter Han, Project Director, Commonwealth Bank, Sydney
- ❑ Mr Michael Bell, Principal, Michael Bell Architects, Sydney.
- ❑ Mr Graeme Allen, Director, the Bathla Group
- ❑ Mr Luke Johnson, General Manager, Wollondilly Shire Council
- ❑ Mr Bernie Clark, Chief Executive, Thyssen Australia
- ❑ Mr Bruce Glanville, former Managing Partner, Deloitte Canberra
- ❑ Alex Mitchell, Journalist



Noel G Child  
7 December 2021

**ATTACHMENT A**  
**Client Reference List**

Acre Woods Childcare Pty Ltd  
Australian Commonwealth Environmental Protection Agency  
Australian Consulting Architects  
Australian Federal Airports Corporation  
Australian Federal Department of Transport and Regional Development  
Bovis Lend Lease  
Brenchley Architects  
Campbelltown City Council  
Canterbury City Council, Sydney, NSW  
Commonwealth Banking Corporation  
Environment Protection Authority of NSW  
Exxon Chemical  
Fairfield City Council, Sydney, NSW  
First Impressions Property  
FreightCorp, Sydney, NSW  
Futurespace  
GM - Isuzu  
Guangxi Environment Protection Bureau  
Gundagai Meat Processors  
Hong Kong Department of the Environment  
Hornsby and Ku-ring-gai Councils, Sydney, NSW  
John McCormack  
Kaunitz Yeung Architecture  
LEDA Holdings  
Michael Bell Architects  
Minter Ellison  
Mobil Oil Australia Associated  
NSW Roads & Traffic Authority  
Ove Arup & Partners  
Qantas Airways  
Queensland Ports Corporation  
Renascent  
Salibeau Pty Ltd  
Shell Australia  
Sinclair Knight Merz  
Skouras and Mabrokardatos  
Southern Sydney Regional Organisation of Councils (SSROC)  
State Rail Authority of NSW  
Stephen Davidson Property Investments  
Sydney Skips & Galaxy Waste  
The City of Sydney  
The Western Sydney Alliance of Mayors  
Thyssen Krup Transrapid Australia  
Tom Howard QC  
Trumen Corporation  
UK Department of the Environment  
United States Environment Protection Agency  
University of Technology, Sydney  
Warren Centre for Advanced Engineering, University of Sydney  
Waverley Council, Sydney, NSW  
Western Sydney Parklands