DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST ABN 73 107 291 494
ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU P. 02 9046 3800

Environmental Noise Impact Assessment

Proposed Child Care Centre

198 Bennett Road, St Clair, NSW

REPORT No
7129-1.1R Rev A

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Prepared For:
Mr Samer Bachour
C/- Baini Design
1B Villiers Street
Parramatta NSW 2150

Attn: Mr Joseph Habis

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CONTENTS

TABLES

1.0 EXECUTIVE SUMMARY

A new child care centre (the Centre) is proposed to be constructed at 198 Bennett Road, St Clair, NSW. The site is located on land zoned R2 – *Low Density Residential* under the Penrith Local Environmental Plan (LEP) 2010.

The site is bounded by residential premises to the north and east, Coonawarra Drive to the south and Bennett Road to the west. Residential premises are also located on the opposite sides of Coonawarra Drive and Bennett Road to the south and west. Stepping Stones Children's Learning Centre is also located on the opposite side of Bennett Road to the southwest.

The proposal involves the demolition of an existing single storey residential dwelling and construction of a new two storey child care building with a basement level car park. The proposal includes 2 outdoor play areas, 3 indoor play rooms, a cot room, staff room, kitchen and amenities. The basement level car park will have capacity for 14 vehicles.

The Centre will have a total capacity for 53 children comprising:

- 0-2 years old – 8 children; and
- 2-3 years old – 15 children; and
- 3-5 years old – 30 children; and

The proposed hours of operation for the Centre are:

- Monday to Friday: 7:00 am – 6:00 pm; with
- Staff arriving to the site between 6.30 am – 7.00 am in the morning; and,
- Staff departing between 6.00 pm – 6.30 pm in the evening.

Nearby premises may be affected by the following noise sources at the proposed Child Care Centre:

- Children playing both outside and inside;
- Car park and on-road traffic; and
- Mechanical plant serving the Centre.

Penrith City Council requires an acoustic assessment to accompany the development application to demonstrate that the noise impact from the Centre will not adversely affect the acoustic amenity of nearby premises.

Acceptable noise limits have been derived from the Association of Australasian Acoustical Consultants *Guideline for Child Care Centres Acoustic Assessmen*t (the Guideline) and the Environmental Protection Authority's (EPA) *Noise Policy for Industry* (NPI) and *Road Noise Policy* (RNP).

Calculations show that, provided the recommendations in Section 8.0 are implemented, the level of noise emission from the child care centre will meet the acoustic requirements established in Section 5.6, and will therefore be acceptable.

2.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Baini Design on behalf of Mr Samer Bachour to assess the potential environmental noise impact from a proposed Child Care Centre to be constructed at 198 Bennett Road, St Clair, NSW. This commission involves the following:

Scope of Work:

- Inspect the site and environs
- Measure the background noise levels at critical locations and times
- Establish acceptable noise level criterion
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Quantify noise emissions from the proposed Child Care Centre
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls and distance attenuation
- Provide recommendations for noise control (if necessary)
- Prepare an Environmental Noise Impact Report.

3.0 SITE AND DEVELOPMENT DESCRIPTION

3.1 Site Description

A new child care centre (the Centre) is proposed to be constructed at 198 Bennett Road, St Clair, NSW, for up to 53 children. The site is located on land zoned R2 – *Low Density Residential* under the Penrith Local Environmental Plan (LEP) 2010.

The site is bounded by residential premises to the north and east, Coonawarra Drive to the south and Bennett Road to the west. Residential premises are also located on the opposite sides of Coonawarra Drive and Bennett Road to the south and west. Stepping Stones Children's Learning Centre is also located on the opposite side of Bennett Road to the southwest.

The nearest noise sensitive receptors to the site are shown in Figure 1, and are presented below in Table 1.

Table 1 Noise Sensitive Receptors

Receptor and Type	Address	Receptor Location	Direction from Site
R1a – Residential	196 Bennett Road	Front Facade	North-West
R1b – Residential		Southern Windows	North-West
R1c – Residential		Rear Yard	North
R2a – Residential	4 Coonawarra Drive	Rear Yard	North
R2b – Residential		Western Windows	East
R2c – Residential		Front Facade	East
R3 – Residential	200 Bennett Road	Front Yard	South
R4 – Early Learning Centre	207 Bennett Road – "Stepping Stones Early Learning Centre"	Eastern Façade	South-West
R5 – Residential	205 Bennett Road	Front Façade	West

As the noise sources on the site are at varying distances from the receptors, specific distances between each noise sources and receptor are used in all calculations. All distances are based on the architectural drawings prepared by Baini Design, dated 16 November 2021, and attached as Appendix C.

All residential receptor locations listed in Table 1 at which noise levels have been assessed, are representative of all adjacent residential receptors in the immediate area. Compliance at these representative locations will ensure compliance at every other residential receptor.

3.2 Development Description

The proposal involves the demolition of an existing single storey residential dwelling and construction of a new two storey building with a basement level car park.

The proposal includes 2 outdoor play areas, 3 indoor play rooms, a cot room, staff room, kitchen and amenities. The basement level car park will have capacity for 14 vehicles (9 staff spaces and 5 visitor spaces), with driveway access via Coonawarra Drive.

The proposed layout of the child care centre can be seen in the architectural drawings prepared by Baini Design, dated 16 November 2021, attached as Appendix C.

The proposed hours of operation for the Centre are:

- Monday to Friday: 7:00 am – 6:00 pm; with
- Staff arriving to the site between 6.30 am – 7.00 am in the morning; and,
- Staff departing between 6.00 pm – 6.30 pm in the evening.

The Centre will have a total capacity for 53 children comprising:

- 0-2 years old – 8 children; and
- 2-3 years old – 15 children; and
- 3-5 years old – 30 children.

Figure 1. Location Plan, 198 Bennet Road, St Clair, NSW.

4.0 MEASURED NOISE LEVELS

Noise survey instrumentation used in this assessment is listed in Appendix A.

Noise descriptors used in this assessment include:

L_{Aeq} The equivalent continuous noise level is the A weighted sound pressure level, energy averaged over a period of time. 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 noise level events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

L_{90} 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).

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

The background noise level should be measured at a location representative of the potentially affected receptors, in the absence of any noise sources that may be associated with the proposed development.

An environmental noise logger was placed on site in the rear yard of 198 Bennett Road, St Clair, between Friday 26 March and Tuesday 6 April, 2021, shown in Figure 1 as Location 'A'. The noise logger at Location 'A' was placed on a rear awning at a height of approximately 3 metres above ground level, and is considered representative of existing ambient levels for residential receptors surrounding the site.

The results of the background noise survey at Location 'A' are shown in the attached Appendix B, and below in Table 2. While the Centre is not proposed to operate during the night time periods, noise levels during this time are shown to provide a complete overview of the current acoustic environment.

Table 2 Ambient Background Levels – 198 Bennett Road, St Clair, NSW

Location	Time Period	L_{90} Rating Background Level - dBA	Existing L_{eq} Noise Levels - dBA
Location 'A'- Approximately 3 metres above Ground Floor Level	**Shoulder Period (6:30 am – 7 am)**	**47**	**N/A**
	Day (7 am to 6 pm)	**44**	**57**
	Evening (6 pm to 10 pm)	**46**	**57**
	Night (10 pm to 7 am)	*39*	*53*

Meteorological conditions during the measurement surveys typically consisted of clear skies with temperatures ranging from 12°C to 30°C. Atmospheric conditions were ideal for noise monitoring during this period. Therefore, noise level measurements are considered reliable and considered to be representative of the background noise levels at all nearby receptor locations.

It is noted that the early morning shoulder period is significantly higher than the day time RBL. This is likely due to peak hour road traffic on Coonawarra Drive and Bennett Road.

5.0 NOISE CRITERIA

5.1 Penrith City Council Requirements

5.1.1 Penrith Development Control Plan (DCP) 2014

Penrith City Council, in their Penrith Development Control Plan (DCP) 2014, Part D5 – Other Land Uses, Section 5.2, specifies the following in relation to noise emission from child care centres:

6) Noise

a) Outside playing areas shall be designed and located to minimise noise impact on any noise sensitive adjacent properties. Separation between boundary fencing and areas occupied by the children may be required.

b) Where there may be noise impact on adjacent properties, fencing shall be of a height, design and material (eg masonry) suitable to contain noise generated by the children's activities. This ensures the children may play outside without time limitations in accordance with licensing requirements.

c) Where a site may be affected by traffic, rail or aircraft noise, the childcare centre shall be designed to minimise any impact on the children and staff. A report from an acoustic consultant may be required to support the proposal. (design elements may include double glazing, insulated walls, locating sleeping rooms in protected areas and solid fencing).

d) A noise impact assessment may be required for the development of a child care centre proposing to cater for 40 children or more, or where surrounding land uses may have an impact on the proposal.

The objectives should be to limit the impact of the child care centre on adjacent properties, and also to limit the impact noise from external sources may have on the child care centre. While noise can be measure, the intent is to also minimise nuisance which is subjective by nature. This may be achieved either by physical separation, design and layout of the centre of by implementing noise mitigation measures, such as acoustic treatments to buildings.

e) A noise impact assessment report should address the relevant provisions of the Noise and Vibration section of this Plan.'

5.2 State Environmental Planning Policy - (Educational Establishments and Child Care Facilities) 2017

The State Environmental Planning Policy (SEPP) – (Educational Establishments and Child Care Facilities) 2017, issued under the Environmental Planning and Assessment Act 1979, aims to facilitate educational establishments and early education and care facilities across the State.

A key aim of the Policy is to establish consistent State-wide assessment requirements and design considerations for educational establishments and early education and care facilities to improve the quality of infrastructure delivered and to minimize impacts on surrounding areas. Clause 26 of the SEPP states the following with regard to Local Council Development Control Plans that contain specific requirements, standards or controls related to Child Care Centres:

'26 Centre-based child care facility—development control plans

(1) A provision of a development control plan that specifies a requirement, standard or control in relation to any of the following matters (including by reference to ages, age ratios, groupings, numbers or the like, of children) does not apply to development for the purpose of a centre-based child care facility:

(a) operational or management plans or arrangements (including hours of operation),

(b) demonstrated need or demand for child care services,

(c) proximity of facility to other early childhood education and care facilities,

(d) any matter relating to development for the purpose of a centre-based child care facility contained in:

(i) the design principles set out in Part 2 of the Child Care Planning Guideline, or

(ii) the matters for consideration set out in Part 3 or the regulatory requirements set out in Part 4 of that Guideline (other than those concerning building height, side and rear setbacks or car parking rates).

(2) This clause applies regardless of when the development control plan was made."

5.3 NSW Department of Planning & Environment – Child Care Planning Guideline

The NSW Department of Planning and Environment (DoPE) published the Child Care Planning Guideline (CCPG) in August 2017 as a supplement to the State Environmental Planning Policy (SEPP) (Educational Establishments and Child Care Facilities) 2017.

The SEPP states that "*a consent authority must take into consideration this Guideline* (CCPG) *when assessing a development application (DA) for a centre-based child care facility.*" The SEPP also determines the Guideline "*will take precedence over a Development Control Plan (DCP), with some exceptions, where the two overlap in relation to a child care facility."*

The Guideline was introduced to *'assist industry to deliver early childhood education facilities that are of the highest standards'* and *'to align NSW planning controls with the National Quality Framework for early education and care, creating more certainty for developers and operators seeking service approval'.*

Section 3, *Matters for Consideration*, Subsection 3.5 Visual and acoustic Privacy, contains the following for consideration:

Objective: To minimise the impact of child care facilities on the acoustic privacy of neighbouring residential developments.

C23

A new development, or development that includes alterations to more than 50 percent of the existing floor area, and is adjacent to residential accommodation should:

- *Provide an acoustic fence along any boundary where the adjoining property contains a residential use (An acoustic fence is one that is a solid, gap free fence)*
- *Ensure that mechanical plant or equipment is screened by solid, gap free material and constructed to reduce noise levels eg acoustic fence, building or enclosure.*

C24

A suitably qualified acoustic professional should prepare an acoustic report which will cover the following matters:

- *Identify an appropriate noise level for a child care facility located in residential and other zones*
- *Determine an appropriate background noise level for outdoor play area during times they are proposed to be in use*
- *Determine the appropriate height of any acoustic fence to enable the noise criteria to be met.*

Subsection 3.6 Noise and air pollution, contains the following for consideration:

'***Objective: To ensure that outside levels on the facility are minimized to acceptable levels.***

C25

Adopt design solutions to minimise the impacts of noise, such as:

- *creating physical separation between buildings and the noise source*
- *orienting the facility perpendicular to the noise source and where possible buffered by other uses*
- *using landscaping to reduce the perception of noise*
- *limiting the number and size of openings facing noise sources*
- *using double or acoustic glazing, acoustic louvres or enclosed balconies (wintergardens)*
- *using materials with mass and/or sound insulation or absorption properties, such as solid balcony balustrades, external screens and soffits*
- *locating cot rooms, sleeping areas and play areas away from external noise sources.'*

5.4 AAAC – Guideline for Child Care Centres Acoustic Assessment

The Association of Australasian Acoustical Consultants (AAAC) first published the *Guideline for Child Care Centre Acoustic Assessment*, in May 2008. The guideline was updated in October 2013 and again in September 2020 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).

Section 3 of the September 2020 AAAC Guideline states the following in relation to noise generation from child care centres, while Section 5.0 states the following in relation to noise impact on children:

'3.2 Criteria - Residential Receptors

3.2.1 Outdoor Play Area

The noise impact from children at play in a child care centre differs from the domestic situation in that it is a business carried out for commercial gain, the number of children can be far greater than in a domestic situation and the age range of the children at the centre does not significantly vary over time as it would in a domestic situation. However, the noise from children is vastly different, in both character and duration, from industrial, commercial or even domestic machine noise. The sound from children at play, in some circumstances, can be pleasant, with noise emission generally only audible during the times the children play outside. Night time, weekend or public holiday activity is not typical and child care centres have considerable social and community benefit.

Base Criteria *– With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed* $L_{eq,15min}$ *45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).*

Background Greater Than 40 dB(A) *– The contributed* $L_{eq,15min}$ *noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).*

Up to 4 hours (total) per day *– If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed* $L_{eq,15min}$ *noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

More than 4 hours (total) per day *– If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed* $L_{eq,\ 15min}$ *noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.*

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- *1.5 m above ground level;*
- *On a balcony at 1.5 m above floor level;*
- *Outside a window on the ground or higher floors.*

3.2.2 Indoor Play Area, Mechanical Plant, Pick up and Drop off

The cumulative $L_{eq,\ 15\ minute}$ noise emission level resulting from the use and operation of the child care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:

- *Indoor play;*
- *Mechanical plant;*
- *Drop off and pick up;*
- *Other activities/operations (not including outdoor play).'*

'3.4 Other Sensitive Receivers

Where appropriate, assessment should include consideration of noise emission to other sensitive uses including schools, hospitals, places of worship and parks (active and passive). Depending on the requirements of the state or territory where the centre is located, in the absence of applicable noise criteria for such a sensitive use, the cumulative $L_{eq,\ 15\ min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within the sensitive property boundary, and shall not exceed 45 dB(A) internally, with windows or doors of the sensitive receiver open.'

'5.0 External Noise Impact on Children

For proposals that are located within 60 metres of an arterial road, railway line, industry or within close proximity to an airport, a noise intrusion assessment should be submitted with the development application.

5.1 Road, Rail Traffic and Industry

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall be capable (ie with doors and/or windows closed) of achieving 40 dB(A) within indoor activity areas and 35 dB(A) in sleeping areas.'

5.5 NSW Environment Protection Authority

5.5.1 Sleep Disturbance

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

The *NPI* provides a useful framework to assess noise emission from non-scheduled premises, whether that premises produces intrusive or non-intrusive noise.

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.

Given the proposed operating hours of the Centre (7 am to 6 pm), it follows that a number of staff will arrive prior to 7 am. As such, the potential for sleep disturbance, from maximum noise level events when vehicles may arrive during the shoulder period of 6:30 am and 7 am, has been considered.

The Noise Policy for Industry provides the following guidance for setting appropriate trigger levels for sleep disturbance:

> *'Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development/premises night-time noise levels at a residential location exceed:*
>
> - $L_{Aeq,15min}$ *40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
> - L_{AFmax} *52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *a detailed maximum noise level event assessment should be undertaken.*
>
> *Maximum noise level event assessments should be based on the* L_{AFmax} *descriptor on an event basis under 'fast' time response. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.'*

5.5.2 Road Traffic Noise Criterion

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

Table 3 Road Traffic Noise Assessment Criteria - Residential

Road Category	Type of project/land use	Assessment Criteria (dBA)	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)
Local roads	1. Existing residences affected by noise from **new** local road corridors 2. Existing residences affected by noise from **redevelopment** of existing local roads 3. Existing residences affected by **additional traffic** on existing local roads generated by land use developments.	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

5.6 Project Specific Noise Criteria

The measured background levels presented in Section 4.0 were measured at a height of 3 metres above ground level. It is likely that, due to this additional height above ground level, the noise monitor at Location 'A' was exposed to higher levels of road traffic noise from Bennett Road and Coonawarra Drive than would be experienced at the nearby residential receivers. Due to this, the measured noise levels presented in Section 4.0 are expected to be between 2-3 dB higher than levels normally be experienced at the ground floor level.

As a conservative assessment of the noise emission from the proposed child care centre, a minimum background noise level of 40 dBA, as stated in the AAAC's *Guideline for Child Care Centre Acoustic Assessment,* will be used in the establishment of noise criteria for nearby receptor locations as follows:

5.6.1 Residential Receptors

For residential premises 'R1a', 'R1b', 'R1c', 'R2a', 'R2b', 'R2c', 'R3 'and 'R5':

The following criteria is set for outdoor play of more than 4 hours per day:

- (40 + 5 =) **45 dBA** $L_{eq,\ 15\ minute}$ for outdoor play; and,
- (40 + 5 =) **45 dBA** for all other noise sources including car park, mechanical plant and indoor play areas.

The following criteria is set for outdoor play of up to 4 hours (total) per day:

- (40 + 10 =) **50 dBA** $L_{eq,\ 15\ minute}$ for outdoor play; and,
- (40 + 5 =) **45 dBA** for all other noise sources including car park, mechanical plant and indoor play areas.

Compliance with the residential noise criteria is assessed at 1 metre from the façade of the receptor or outside the most affected first floor window.

5.6.2 Other Sensitive Receivers

The AAAC's *Guideline for Child Care Centre Acoustic Assessment* recommends an internal noise limit of 45 dBA for schools, hospitals and places of worship and other sensitive receivers with windows open, for noise from outdoor play areas. A noise reduction of up to 10 dB can be achieved from outside to inside with windows/doors open. As such, the criteria for receptor 'R4', for noise emission from the outdoor play area, is set as:

For early learning facility 'R4':

- (45 + 10 =) **55 dBA** $L_{eq,\ 15\ minute}$ for outdoor play, assessed at the most affected façade.

For the assessment of other noise sources, such as car park, mechanical plant and indoor play areas, the following criteria is derived from measured background noise levels, similarly to the nearby residential receptors:

For early learning facility 'R4':

- **45 dBA** for all other noise sources including car park, mechanical plant and indoor play areas.

5.6.3 On-Road Traffic Noise Criterion

The following criterion will be applied at 1 metre from the most affected residential façades for on – road traffic noise:

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

5.6.4 Sleep Disturbance

Consideration has been given to sleep disturbance caused by noise generated from staff arriving prior to 7 am, and parking within the on-site car park.

The following criteria is applied for all residential receptors, during the early morning shoulder period of 6.30 am to 7 am:

Residential facades:

- **52 dBA** L_{Amax} at the closest affected façade of a residential premises between 6.30 am and 7 am.

For all residential premises:

- **50 – 55 dBA** L_{Amax} internal level between 6.30 am and 7 am (staff arriving).

5.6.5 Noise Intrusion Criteria

Road Traffic Noise Intrusion - in accordance with the NSW Road Noise Policy and AAAC Guideline:

- Internal traffic levels within sleeping areas of the Child Care Centre should not exceed $L_{Aeq,\ 1\ hour}$ 35 dBA during operating hours.
- Internal traffic noise levels within indoor play areas of the Child Care Centre should not exceed $L_{Aeq,\ 1\ hour}$ 40 dBA during operating hours.
- External traffic and industrial noise levels in any outdoor play or activity area of the Child Care Centre should not exceed $L_{Aeq,\ 1\ hour}$ 55 dBA during operating hours.

6.0 CHILD CARE CENTRE NOISE EMISSION

The main sources of noise from the proposed Child Care Centre will be as follows:

- Children playing both outside and inside;
- Cars entering and exiting the car park; and
- Mechanical plant serving the Centre.

Noise modelling is based on the architectural drawings prepared by Baini Design, dated 16 November, 2021, attached as Appendix C.

6.1 Indoor and Outdoor Play Areas

Day Design Pty Ltd has previously measured and quantified the $L_{Aeq,\ 15\ minute}$ sound levels of children at a number of different Child Care Centres. From this data we have been able to determine the $L_{Aeq,\ 15\ minute}$ sound power level (SWL) per child.

The Association of Australasian Acoustical Consultants has presented a range of A-weighted SWL's per child in its '*Guideline for Child Care Centre Acoustic Assessment*'. The logarithmic average of the full range of A-weighted SWL's for children has been used to represent the noise emission from a typical group of mixed aged children engaged in active play.

The sound power levels for each group are presented in Table 4 and used in this assessment.

Table 4 L_{eq} Sound Power Levels - Children Engaging in Active Play

Number and Age of Children	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
10 children, 0 to 2 years	**78**	54	60	66	72	74	71	67	64
10 children, 2 to 3 years	**85**	61	67	73	79	81	78	74	70
10 children, 3 to 5 years	**87**	64	70	75	81	83	80	76	72

6.2 Car Park Noise Emission

Based on the RTA's '*Guide to Traffic Generating Developments*' prediction of 0.8 peak (morning 7 am – 9 am) vehicle trips per child for Child Care Centres (Long-day care), we have assumed, as a worst-case scenario, a flow of cars equivalent to 42 trips in 1 hour arriving or leaving the car park in the morning peak. This is equivalent to approximately 11 vehicle trips in a 15-minute period.

The SEL and L_{Amax} sound power level and spectra of vehicle noise is shown in Table 5. These levels are based on previous measurements by Day Design.

For the assessment of sleep disturbance, we have assumed that staff vehicles will arrive at the Child Care Centre between 6:30 am and 7:00 am, enter the car park from Coonawarra Drive and park in the designated staff parking spaces.

For the assessment of vehicular activity from within the car park area we have assumed vehicles will travel at a rate of 10 km/h. For additional noise generated by on-road traffic, we have assumed vehicles will travel at a rate of 50 km/h as they approach or leave the site.

Table 5 SEL & L_{Amax} Sound Power Levels – Car Park Noise

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
SEL of car drive-by at approximately 10 km/h	**88**	92	88	84	83	84	79	76	70
SEL of car driving uphill at approximately 10 km/h	**88**	96	94	86	85	83	79	76	70
SEL of car driving downhill at approximately 10 km/h	**85**	91	89	83	81	81	77	75	68
SEL of car drive-by at approximately 50 km/h	**97**	99	97	94	96	95	87	77	70
SEL of car door slam, ignition and drive away	**91**	104	98	89	87	86	83	81	75
L_{Amax} of typical car door slam	**99**	108	102	100	96	93	92	86	83
L_{Amax} of car turning into driveway	**92**	98	92	90	88	88	83	80	76

6.3 Mechanical Plant

The mechanical plant, including air conditioning condensers kitchen, bathroom and carpark exhaust fans and lift motor, have not been selected at this stage. Therefore, a preliminary noise assessment will be based on typical units for the size of the development, with sound power levels from typical units being used.

The air conditioning condensers are assumed to be located at ground level, along the southern façade of the development, and the lift motor is assumed to be located within the proposed lift shaft, at the top of the shaft. These locations can be seen within the architectural drawings prepared by Baini Design dated 16 November, 2021, attached as Appendix C, with the assumed placement of the condensers and lift motor shown in Appendix D.

We have assumed that the kitchen and bathroom exhaust fans will be ducted through the façade or the roof of the development, and that the carpark exhaust fan will be ducted to the ground floor level along the southern façade of the development, near the location of the condenser units. The assumed locations of these exhaust fans are highlighted within Appendix D.

Sound power levels used in the calculation of the noise contribution from the mechanical plant are shown in Table 6.

Table 6 $L_{eq,\ 15\ minute}$ Sound Power Levels – Mechanical Plant

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Car park exhaust fan[1]	**75**	73	72	70	76	70	64	54	46
Medium (double fan) condenser (outdoor unit)	**70**	82	77	74	66	61	60	57	53
3 x Medium condenser (outdoor units)	**75**	87	82	79	71	66	65	62	58
Hydraulic lift motor[2]	**66**	59	61	55	59	58	56	52	48
Small kitchen exhaust fan[3]	**60**	61	67	62	54	54	50	45	39
Small exhaust fan (toilet)[4]	**60**	51	47	50	53	59	43	36	31

We recommend a detailed analysis be carried out once the mechanical plant is selected and locations are finalised, prior to the issue of a Construction Certificate.

[1] Spectral sound power level based on Fantech RDE10010DP6/10 – Downflow Discharge Axial Fan
[2] Spectral sound power based on a residential lift system previously measured by Day Design.
[3] Spectral sound power level based on Fantech CPD01254FSC
[4] Spectral sound power level based on Fantech TD-500/150 SIL

6.4 Predicted Noise Levels

Knowing the sound power level of a noise source (See Table 4 to Table 6), 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.

Where applicable, calculations include reductions for the acoustic screening provided by fences and the proposed child care centre itself. Based upon existing fences, and the drawings prepared by Baini Design, dated 16 November, 2021, and attached as Appendix C, the following solid boundary fence heights are noted for the child care centre:

- 1.5 metre Colorbond fence along the northern and eastern boundaries of the site, between the 3-5 year old outdoor play and receptors 'R1' and 'R2';
- 1.8 metre lapped and capped timber fence along the southern boundary of the 3-5 year old outdoor play area; and,
- 1.8 metre lapped and capped timber fence along the southern and western boundary of the 0-2 year old play area.

Calculations of noise emission from the indoor play area include reductions for operable glazing in the façade. For the purposes of our calculations, we have assumed all glazing to be of a standard construction (5 mm glass) and to be open (50 % of window area).

A source height level of 1 metre above ground level has been used for children of all age groups. As a worst-case scenario, noise emission has been modelled with all 53 children engaged in simultaneous outdoor play.

Noise levels at ground floor level are calculated to the nearest most reasonably affected point 3 metres inside the property boundary within the yards of receptor locations 'R1c', 'R2a', and 'R3', and to the nearest most reasonably affected window/façade of receptor locations 'R1a', 'R1b', 'R2b', 'R2c', 'R4' and 'R5'.

Table 7 and Table 8 show the predicted noise levels at the residential receptors from the activities discussed previously, during the day periods.

6.4.1 Outdoor Play Area Noise Levels

The following formula, which is well known to acoustic professionals, was used to calculate noise levels at the receptor locations:

$$L_p = L_w + 10\log(n/10) - 20\log(d) - 8 - B$$

Where: L_p = Sound Pressure Level at receptor

L_w = Sound Power Level for group of 10 children

n = number of children

d = distance from children playing to receptor

B = acoustic reduction due to barrier

The noise prediction was determined by spacing the 53 children across the child care centre outdoor play area as follows:

- 2-5 Outdoor Play Area = 30 x 3-5 year olds, 15 x 2-3 year olds; and,
- 0-2 Outdoor Play Area = 8 x 0-2 year olds.

The approximate locations of the noise sources (children) used for the assessment of the outdoor play area are shown in the attached Appendix D.

The $L_{eq,\ 15\ minute}$ noise levels at all receptor locations for children engaged in outdoor play are calculated to be as shown in Table 7, and are assessed against the criteria for outdoor play of more than four hours, and outdoor play of up to 4 hours per day, as established in Section 5.6.

Table 7 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Outdoor Play

Receptor Locations	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R1a – Front Façade, 196 Bennett Road	51	45	**No (+6 dB)**
		50 (for 4 hrs/day)	**No (+1 dB)**
R1b – Southern Windows, 196 Bennett Road	53	45 or 50 (for 4 hrs/day)	**No (+8 dB)** / **No (+3 dB)**
R1c – Rear Yard, 196 Bennett Road	49	45 or 50 (for 4 hrs/day)	**No (+4 dB)** / Yes
R2a – Rear Yard, 196 Bennett Road	46	45 or 50 (for 4 hrs/day)	**No (+1 dB)** / Yes

Table 7 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Outdoor Play (Continued)

Receptor Locations	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R2b – Western Windows, 196 Bennett Road	50	45 or 50 (for 4 hrs/day)	**No (+5 dB)** Yes
R2c – Front Façade, 196 Bennett Road	44	45 or 50 (for 4 hrs/day)	Yes Yes
R3 – Front Yard, 200 Bennett Road	39	45 or 50 (for 4 hrs/day)	Yes Yes
R4 – Eastern Façade, 207 Bennett Road	21	45 or 50 (for 4 hrs/day)	Yes Yes
R5 – Front Façade, 205 Bennett Road	26	45 or 50 (for 4 hrs/day)	Yes Yes

As summarised in Table 7, the predicted levels of noise will comply with the criteria established in Section 5.6 of this report for receptor locations 'R2c', 'R3', 'R4' and 'R5' for either noise criteria. For outdoor play of more than 4 hours, receptor locations 'R1a' – 'R1c', 'R2a' and 'R2b' will exceed the criteria Section 5.6. For outdoor play of up to 4 hours, receptor locations 'R1a' and 'R1b' will exceed the criteria in Section 5.6. As such, noise controls will be required for either criteria, as recommended in Section 8.0.

6.4.2 Cumulative Noise Level - Indoor Play Area, Car Park and Mechanical Plant

The predicted worst case cumulative $L_{eq,\ 15minute}$ noise levels at all receptor locations are calculated to be as shown in Table 8.

Table 8 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – Indoor Play, Mechanical Plant & Car Park

Description	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R1a – Front Façade, 196 Bennett Road			
- Indoor play areas	43		
- Car park	41		
- Mechanical	32		
Cumulative Noise Level	45	45	Yes
R1b – Southern Windows, 196 Bennett Road			
- Indoor play areas	40		
- Car park	37		
- Mechanical	34		
Cumulative Noise Level	40	45	Yes
R1c – Rear Yard, 196 Bennett Road			
- Indoor play areas	34		
- Car park	31		
- Mechanical	34		
Cumulative Noise Level	34	45	Yes
R2a – Rear Yard, 196 Bennett Road			
- Indoor play areas	33		
- Car park	28		
- Mechanical	35		
Cumulative Noise Level	38	45	Yes
R2b – Western Windows, 196 Bennett Road			
- Indoor play areas	39		
- Car park	31		
- Mechanical	36		
Cumulative Noise Level	41	45	Yes

Table 8 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – Indoor Play, Mechanical Plant & Car Park - Continued

Description	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R2c – Front Façade, 196 Bennett Road			
- Indoor play area	36		
- Car park	34		
- Mechanical	34		
Cumulative Noise Level	40	45	Yes
R3 – Front Yard, 200 Bennett Road			
- Indoor play area	<20		
- Car park	33		
- Mechanical	32		
Cumulative Noise Level	36	45	Yes
R4 – Eastern Façade, 207 Bennett Road			
- Indoor play area	38		
- Car park	28		
- Mechanical	32		
Cumulative Noise Level	39	45	Yes
R5 – Front Façade, 205 Bennett Road			
- Indoor play area	44		
- Car park	23		
- Mechanical	36		
Cumulative Noise Level	45	45	Yes

As summarised in Table 8, the predicted cumulative levels of noise from indoor play, mechanical plant and the use of the car park comply with the criteria established in Section 5.6 for all receptor locations, and is therefore considered acceptable.

6.5 Sleep Disturbance

It is proposed that the Centre will accept children from 7 am. A number of staff will arrive prior to 7 am, to prepare for the arrival of the children, with more staff and parents arriving after 7 am. In order to assess the potential for sleep disturbance from staff vehicle activity, we have assumed that 2 staff vehicles will arrive between 6.30 am and 7 am.

As shown in the architectural drawings prepared by Baini Design, dated 16 November, 2021, attached as Appendix C, entrance to the basement level car park is permitted via the driveway on Coonawarra Drive, closest to receptors 'R2' and 'R3'. We have assumed that both staff vehicles arriving between 6.30 am and 7 am will enter via this driveway.

Consideration is given within this assessment to noise generated from vehicles entering the car park via the driveway on Coonawarra Drive, and staff members slamming their doors within the basement level car park.

The calculated L_{AFmax} noise levels at the residential receptor locations closest to both driveways are shown in Table 9 below.

Table 9 Calculated L_{AFmax} Noise Levels – Sleep Disturbance

Receptor Location	Calculated Noise Level - L_{AFmax} (dBA)	Noise Criterion - L_{AFmax} (dBA)	Compliance (Yes/No)
R1a – Front Façade, 196 Bennett Road	52	52	Yes
R1b – Southern Windows, 196 Bennett Road	48	52	Yes
R2b – Western Windows, 196 Bennett Road	42	52	Yes
R2c – Front Façade, 196 Bennett Road	48	52	Yes
R3 – Front Yard, 200 Bennett Road	45	52	Yes
R5 – Front Façade, 205 Bennett Road	50	52	Yes

It can be seen from Table 9 that the predicted external levels of noise from staff arriving at the Child Care Centre in their vehicles between 6.30 am and 7 am complies with the noise criteria in Section 5.6, and is therefore considered acceptable.

6.6 On-Road Traffic

The external $L_{Aeq,\ 1\ hour}$ traffic noise levels at the most affected residential receptor locations, from noise associated with on-road traffic travelling along Coonawarra Drive and Bennett Road throughout the day, are calculated to be as shown in Table 10.

Table 10 Calculated $L_{Aeq,\ 1\ hour}$ Noise Levels - Additional On – Road Traffic

Receptor Location	Calculated Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R1a – Front Façade, 196 Bennett Road	38	55	Yes
R1b – Southern Windows, 196 Bennett Road	49	55	Yes
R1c – Rear Yard, 196 Bennett Road	28	55	Yes
R2a – Rear Yard, 196 Bennett Road	38	55	Yes
R2b – Western Windows, 196 Bennett Road	48	55	Yes
R2c – Front Façade, 196 Bennett Road	43	55	Yes
R3 – Front Yard, 200 Bennett Road	45	55	Yes
R4 – Eastern Façade, 207 Bennett Road	47	55	Yes
R5 – Front Façade, 205 Bennett Road	54	55	Yes

Table 10 shows the calculated external levels of noise from on-road traffic meets the noise criteria at each of the residential receptor locations, as established in Section 5.6 and is therefore acceptable.

7.0 NOISE INTRUSION – ROAD TRAFFIC NOISE

7.1 External Road Traffic Noise Levels – Outdoor Play Areas

In the assessment of road traffic noise levels within the proposed outdoor play areas, we have assumed that traffic along Coonawarra Drive and Bennett Road will travel at 50 km/hr. The SEL sound power level of a car travelling at 50 km/hr is shown in Table 5.

We have assumed a traffic flow rate of 90 vehicles over a 15-minute period, which is equivalent to one passby every 10 seconds.

The existing L_{eq} noise level during the day time period was found to be 57 dBA at Location 'A', as shown in Section 4.0. As stated within Section 5.6, noise levels at Location 'A' are expected to be between 2-3 dB higher than levels normally experienced at ground floor. As such, the $L_{Aeq\ (1\ hour)}$ traffic noise level within the 2-5 year old outdoor play area will be below the RNP external noise limit of $L_{Aeq,\ 1\ hour}$ 55 dBA for outdoor play areas in Child Care Centres, and will therefore be acceptable.

The calculated $L_{Aeq\ (1\ hour)}$ traffic noise levels within the proposed 0-2 year old outdoor area, as shown in the architectural drawings prepared by Baini Design, dated 16 November, 2021, is found to be 64 dBA. This calculation takes into account the attenuation provided by the barriers listed in Section 6.4. This calculated noise level can be reduced to 55 dBA, providing the recommendations in Section 8.2 are implemented.

Once these recommendations are incorporated into the design, the levels within both outdoor play areas will meet the RNP external noise limit of $L_{Aeq,\ 1\ hour}$ 55 dBA for outdoor play areas in Child Care Centres, and will therefore be acceptable.

7.2 External Noise Within Indoor Play and Sleeping Areas

Based upon the assumed traffic flow rate of 90 vehicles travelling at 50 km/hr within a 15-minute period, we calculate that the $L_{eq,\,1\,hour}$ level of external road traffic noise at the facades of the indoor play areas will be as shown in Table 11, providing the recommendations in Section 8.2 are implemented.

We have assumed that windows and glazed doors comprise standard thickness glazing throughout the building. Standard façade construction with partially open windows/doors will typically reduce external noise by up to 10 dB.

Table 11 Calculated $L_{eq,\,1\,hour}$ Road Traffic Noise Levels – Indoor Play Areas

Receptor Location	Calculated Noise Level - $L_{eq,\,1\,hour}$	Noise Criterion - $L_{eq,\,1\,hour}$	Compliance (Yes/No)
0-2 Year Old Indoor Playroom			
- Windows/Doors Open	55 dBA	40 dBA	**No (+15 dB)**
- Windows/Doors Closed	36 dBA		Yes
2-3 Year Old Indoor Playroom			
- Windows/Doors Open	46 dBA	40 dBA	**No (+6 dB)**
- Windows/Doors Closed	31 dBA		Yes
3-5 Year Old Indoor Playroom			
- All Windows/Doors Open	51 dBA	40 dBA	**No (+11 dB)**
- Just Western Windows Open	51 dBA		**No (+11 dB)**
- Just Eastern Windows Open	39 dBA		Yes
- Windows/Doors Closed	34 dBA		Yes

It can be seen that the calculated internal levels of road traffic noise may exceed the noise criteria established in Section 5.6 when windows/glazed doors are open for the 0-2 Year Old Playroom and 2-3 Year Old Playroom, but will comply when the windows/glazed doors are closed.

The 3-5 Year Old Playroom can be seen to comply with the internal noise criteria with the eastern façade windows/glazed doors open or closed, but will exceed the internal noise criteria when the western façade windows/glazed doors are open.

8.0 NOISE CONTROL RECOMMENDATIONS

8.1 Management Plan

We recommend the Child Care Centre's management implement a Noise Management Plan that should include, but not be limited to the following:

- Ensuring all staff and parents are provided with a copy of the Centre's Noise Management Plan and its implications for them during their time at the Centre
- Neighbours should be provided with the name and contact details of the Centre Director, and the invitation to contact that person at any time the Centre is operating.
- All external windows and sliding doors to the 0-2 year old and 2-3 year old indoor play areas, and the western façade windows and sliding doors of the 3-5 year old indoor play area, shall be kept closed except when in use.
- Facilitating children's small group play when outside and encouraging educators to engage in children's play and facilitate friendships between children.
- Crying children should be comforted as quickly as possible and moved indoors.

8.2 Outdoor Play Areas

8.2.1 Sound Barrier Fences

The following barriers are recommended for installation around the perimeters of the outdoor play areas, if children are to play outdoors for more than 4 hours per day. Barrier heights are measured from the reference level of the proposed ground floor level for the outdoor play areas (RL 57.765), as shown in the architectural drawings of Appendix C:

- 2.4-metre-high solid acoustic fence, constructed along the northern boundary of the 2-5 year old and 0-2 year old outdoor play areas;
- 2-metre-high solid acoustic fence, constructed along the eastern boundary of the 2-5 year old outdoor play area;
- 1.8-metre high solid acoustic fence, constructed along the southern boundary of the 2-5 year old outdoor play area; and
- 1.8-metre-high solid acoustic fence, constructed along the southern and western boundaries of the 0-2 year old outdoor play area.

We recommend that the above sound barrier be constructed from 3-rail 'soli lapped and capped' timber, 6 mm fibre cement, 10 mm thick solid polycarbonate (not hollow), 6.38 mm thick laminated glass or masonry, or a combination of these materials. The construction shall be free of air gaps to provide an impervious sound barrier.

The location of these acoustic barries can be seen within the marked up architectural drawings attached as Appendix D.

8.3 Natural Ventilation

The windows and doors of the indoor play areas are required to be kept closed while these areas are in use, in order to reduce the level of noise from on-road traffic and comply with the noise criteria established in Section 5.6. Alternative ventilation should be provided, such as the inline acoustic ventilation manufactured by Silenceair. A datasheet for the Silenceair product is attached in Appendix E.

8.4 Mechanical Plant & Equipment – Construction Certificate

The specifications for the mechanical plant have not yet been selected for this development. For typical mechanical plant equipment with sound power levels not exceeding those listed in Table 6, it is reasonable and feasible to acoustically treat the associated ducting or locate the equipment itself so that noise will not impact the neighbouring properties.

Once mechanical plant and its location has been selected, a detailed acoustic assessment should be conducted, prior to the issue of a Construction Certificate (or during the detailed design stage), to ensure the use of the mechanical plant will comply with the project specific noise criteria in Section 5.6 of this report. We recommend that the mechanical services engineers select mechanical plant equipment with the lowest sound power levels available, to reduce the amount of acoustic treatment necessary to achieve the noise criteria at nearby residential receivers.

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

Rooms are to be ventilated to the standards set out in clause F4.5 of the Building Code of Australia and Australian Standard AS1688.2:1991.

8.5 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 implemented 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.

9.0 PREDICTED NOISE LEVELS – AFTER NOISE CONTROLS

9.1 Noise Emission – Outdoor Play Areas

Once the noise control recommendations in Section 8.2.1 are incorporated into the operation of the child care centre, the calculated sound pressure level at the nearby residential receptors from the outdoor play areas will be as shown in Table 12.

Table 12 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Outdoor Play

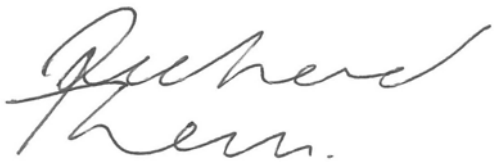
Receptor Locations	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
Outdoor Play of more than 4 hours/day			
R1a – Front Façade, 196 Bennett Road	44	45	Yes
R1b – Southern Windows, 196 Bennett Road	45	45	Yes
R1c – Rear Yard, 196 Bennett Road	43	45	Yes
R2a – Rear Yard, 196 Bennett Road	42	45	Yes
R2b – Western Windows, 196 Bennett Road	45	45	Yes
R2c – Front Façade, 196 Bennett Road	41	45	Yes
R3 – Front Yard, 200 Bennett Road	39	45	Yes
R4 – Eastern Façade, 207 Bennett Road	21	55	Yes
R5 – Front Façade, 205 Bennett Road	26	45	Yes

10.0 CONCLUSION

Day Design Pty Ltd was engaged by Baini Design on behalf of Mr Samer Bachour to assess the potential environmental noise impact from a proposed Child Care Centre to be constructed at 198 Bennett Road, St Clair, NSW.

Calculations show that the intrusive road traffic noise levels will meet the noise level requirements of the NSW Environment Planning Authority's Road Noise Policy and the NSW Department of Planning and Environment's *Child Care Planning Guideline*, and be considered acceptable.

Calculations also show that, provided the noise control recommendations made in Section 8.0 of this report are implemented, the level of noise emitted by the proposed Child Care Centre at 198 Bennett Road, St Clair, NSW, will meet the acceptable noise level requirements of the Association of Australasian Acoustical Consultants *Guideline for Child Care Centres Acoustic Assessmen*t and the Environmental Protection Authority's *Noise Policy for Industry* and *Road Noise Policy,* as detailed in Section 5.6 of this report, and is considered acceptable.



Ricky Thom, BA, BE(Mech)Hons, GradIEAust
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.

APPENDICES

Appendix A – Instrumentation
Appendix B – Ambient Noise Survey
Appendix C – Architectural Drawings
Appendix D – Approximate Nosie Source Locations and Noise Control Recommendations Mark-up
Appendix E – Silenceair Inline Acoustic Ventilators Brochure
AC108-1 to 4 – Glossary of Acoustical Terms

NOISE SURVEY INSTRUMENTATION

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

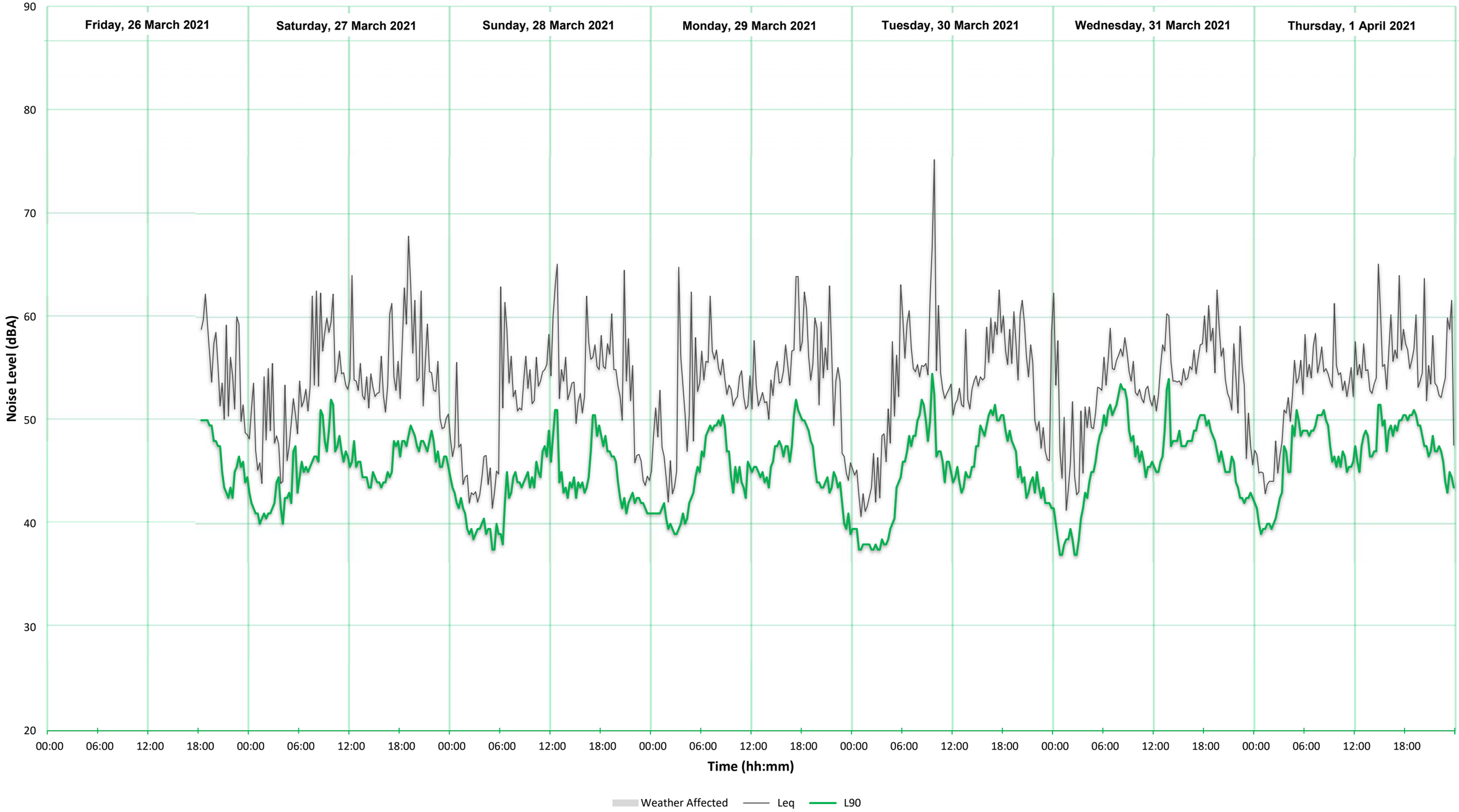
Table A1 Noise Survey Instrumentation

Description	Model No	Serial No
Infobyte Noise Logger (Type 2)	iM4	118
Condenser Microphone 0.5" diameter	MK 250	118

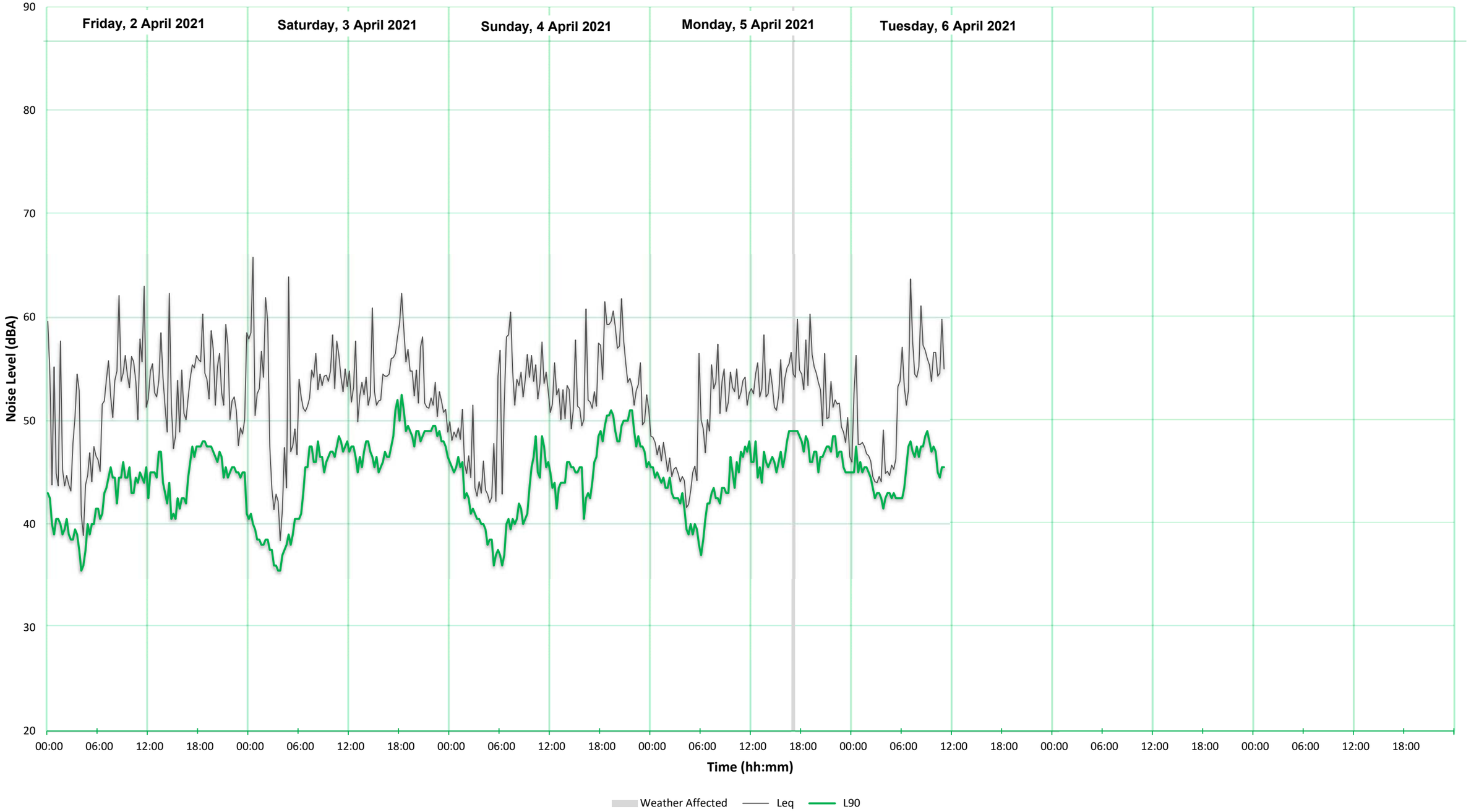
An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 (#118) is a Type 2 precision environmental noise monitor meeting all the applicable requirements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

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

Located at Rear Awning, 198 Bennett Road, St Clair, NSW



Located at Rear Awning, 198 Bennett Road, St Clair, NSW



PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING

21032

198 BENNETT ROAD, ST CLAIR NSW 2759
LOT / SECTION / PLAN NO: 1156/DP259309 | PENRITH CITY COUNCIL

	ITEM			PROPOSED	STANDARD	COMPLIANCE
A	SITE AREA			916 m²	-	-
B	SETBACK					
		FRONT (PRIMARY)		7.04m	5.5m	YES
		FRONT (SECONDARY)		3m	3m	YES
		SIDE		4m	0.9m	YES
		REAR		8.8m	6m	YES
C	GROSS FLOOR AREA					
		BASEMENT		490 m²	-	-
		GROUND		243 m²	-	-
		FIRST		90 m²	-	
		STAIRS / LIFT			-	-
		TOTAL GROSS FLOOR AREA		333 m²	N/A	-
D	FSR			357m² / 0.36:1	N/A	YES
E	HEIGHT			8.7m	8.5 m	YES
F	LANDSCAPE AREA			455.5 m² / 50%	40% (366.4m²)	YES
G	DEEP SOIL					YES
	STORAGE m³					
		INTERNAL				
			0-2 YEARS	1.63 m³	1.6 m³	YES
			2-3 YEARS	3 m³	3 m³	YES
			3-5 YEARS	7.4 m³	6 m³	YES
		EXTERNAL				
			0-5 YEARS	15.97 m³	0.3 m³ / KID	YES
H	CHILDCARE					
		NUMBER OF CHILDREN				
			0-2 YEARS	8 KIDS	-	YES
			2-3 YEARS	15 KIDS	-	YES
			3-5 YEARS	30 KIDS	-	YES
			TOTAL NO.	53 KIDS	-	YES
		NUMBER OF TEACHERS				
			0-2 YEARS	2 TEACHERS	1:4 KIDS	YES
			2-3 YEARS	3 TEACHERS	1:5 KIDS	YES
			3-5 YEARS	3 TEACHERS	1:10 KIDS	YES
			TOTAL NO.	8 TEACHERS	-	YES
		INDOOR PLAY AREA				
			0-2 YEARS	26 m²	3.25 m² / KID	YES
			2-3 YEARS	49 m²	3.25 m² / KID	YES
			3-5 YEARS	99 m²	3.25 m² / KID	YES
			TOTAL AREA	174 m²	3.25 m² / KID	YES
		OUTDOOR PLAY AREA				
			TOTAL AREA	376 m²	7 m² / KID	YES
I	CAR PARKING					
		SHARED		1 SPACE	-	
		DISABLED		1 SPACE	-	
		VISITORS		6 SPACES	1:10	
		STAFF		8 SPACES	1:1	
		TOTAL CAR SPACES		14 SPACES	14	YES
J	WASTE MANAGEMENT					
		TOTAL BINS		12 BINS	-	YES

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

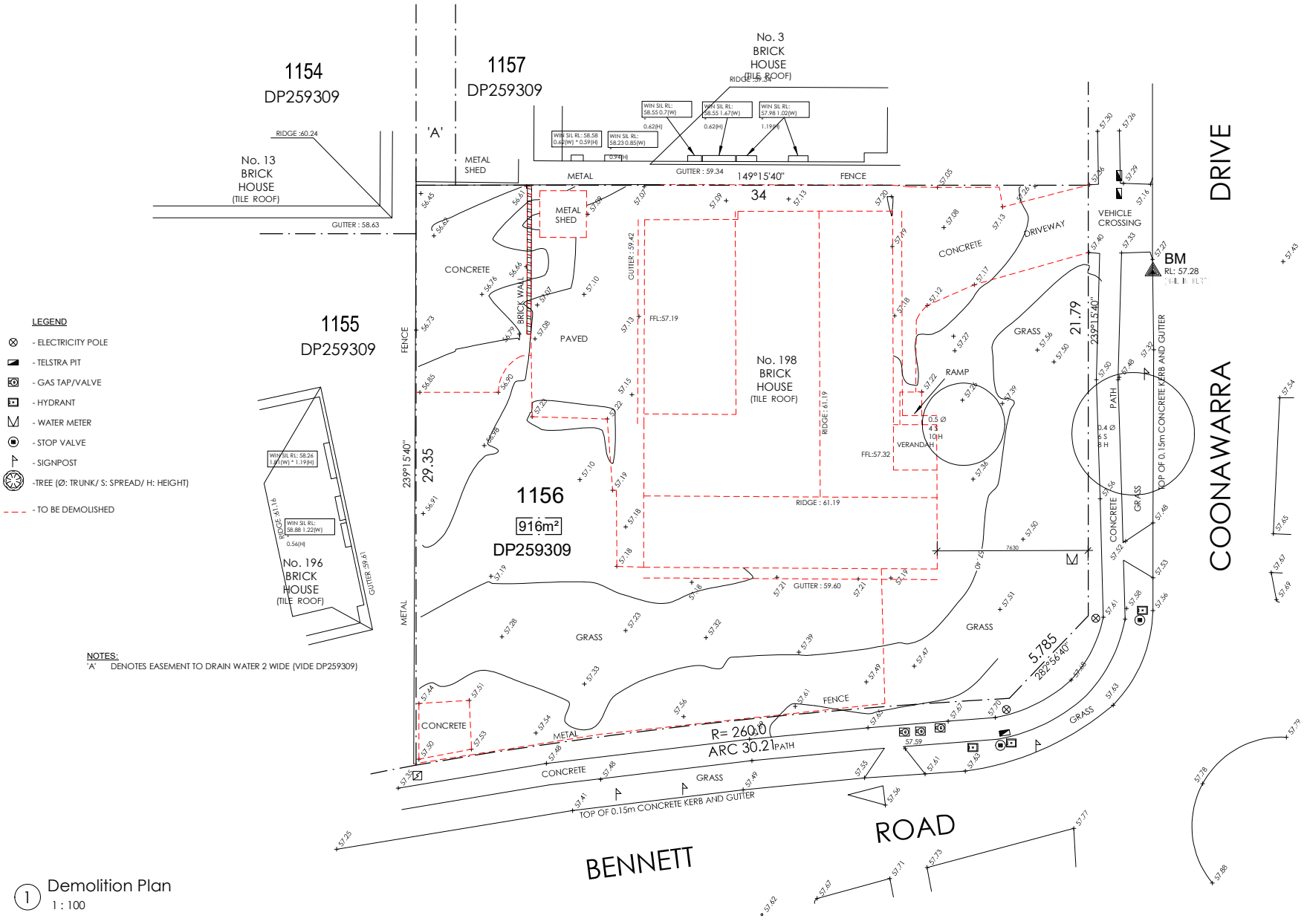
FOR DA APPROVAL

bainidesign

BAINI DESIGN
ABN 51 068 732 593
1B Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
COMPLIANCE TABLE

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	00	06/07/17	C
	SCALE @ A1	DRAWN BY	CHECKED BY
		CB	CB



LEGEND

- ELECTRICITY POLE
- TELSTRA PIT
- GAS TAP/VALVE
- HYDRANT
- WATER METER
- STOP VALVE
- SIGNPOST
- TREE (Ø: TRUNK/ S: SPREAD/ H: HEIGHT)
- TO BE DEMOLISHED

NOTES:
'A' DENOTES EASEMENT TO DRAIN WATER 2 WIDE (VIDE DP259309)

1 Demolition Plan
1 : 100

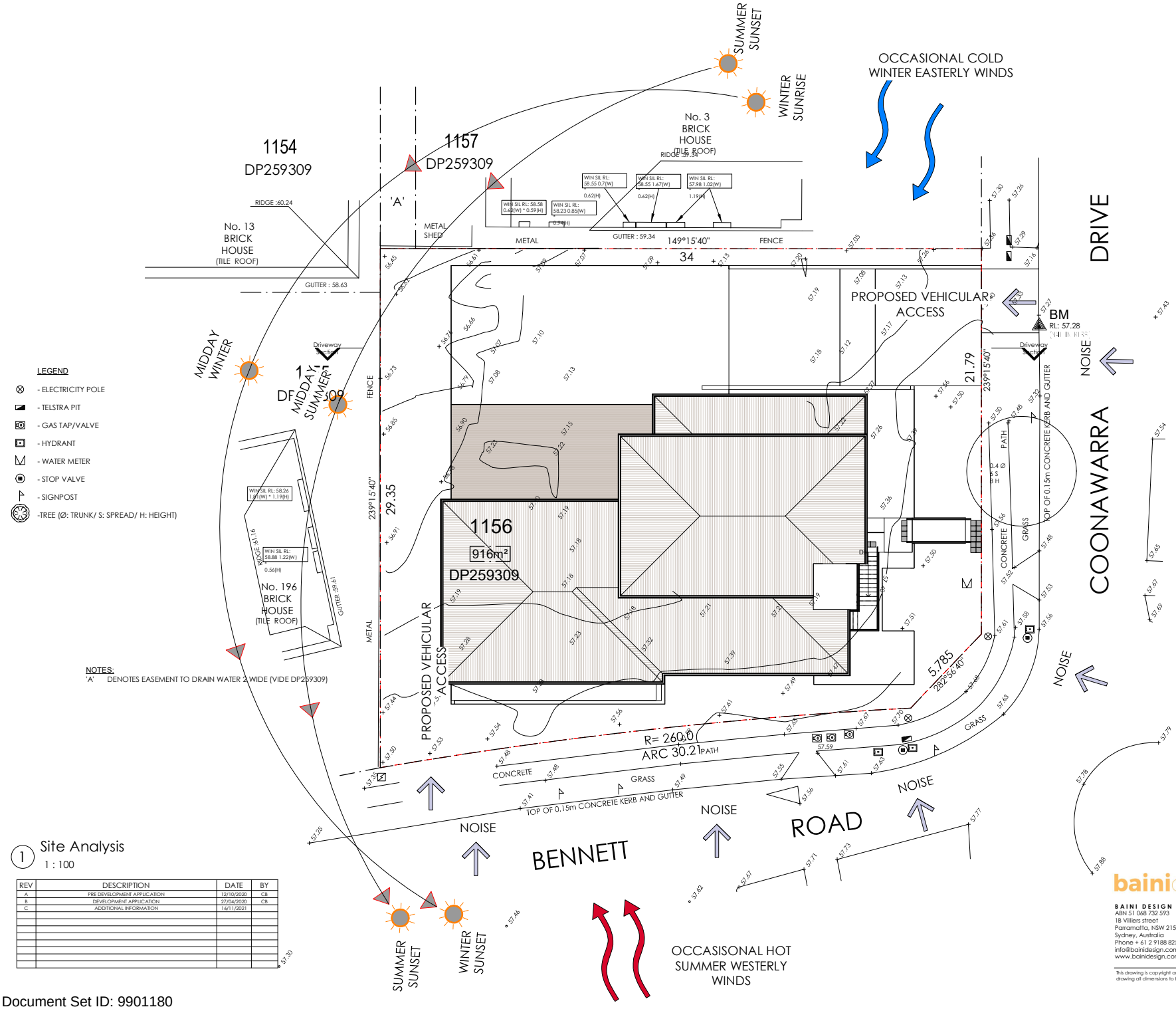
REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

FOR DA APPROVAL

bainidesign
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
DEMOLITION PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	01	02/09/21	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB



LEGEND

- ELECTRICITY POLE
- TELSTRA PIT
- GAS TAP/VALVE
- HYDRANT
- WATER METER
- STOP VALVE
- SIGNPOST
- TREE (Ø: TRUNK/ S: SPREAD/ H: HEIGHT)

NOTES:
'A' DENOTES EASEMENT TO DRAIN WATER 2 WIDE (VIDE DP259309)

1 Site Analysis
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

FOR DA APPROVAL

bainidesign
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
SITE ANALYSIS

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	02	06/07/17	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

1 SITE CONTEXT PLAN
1 : 1000

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

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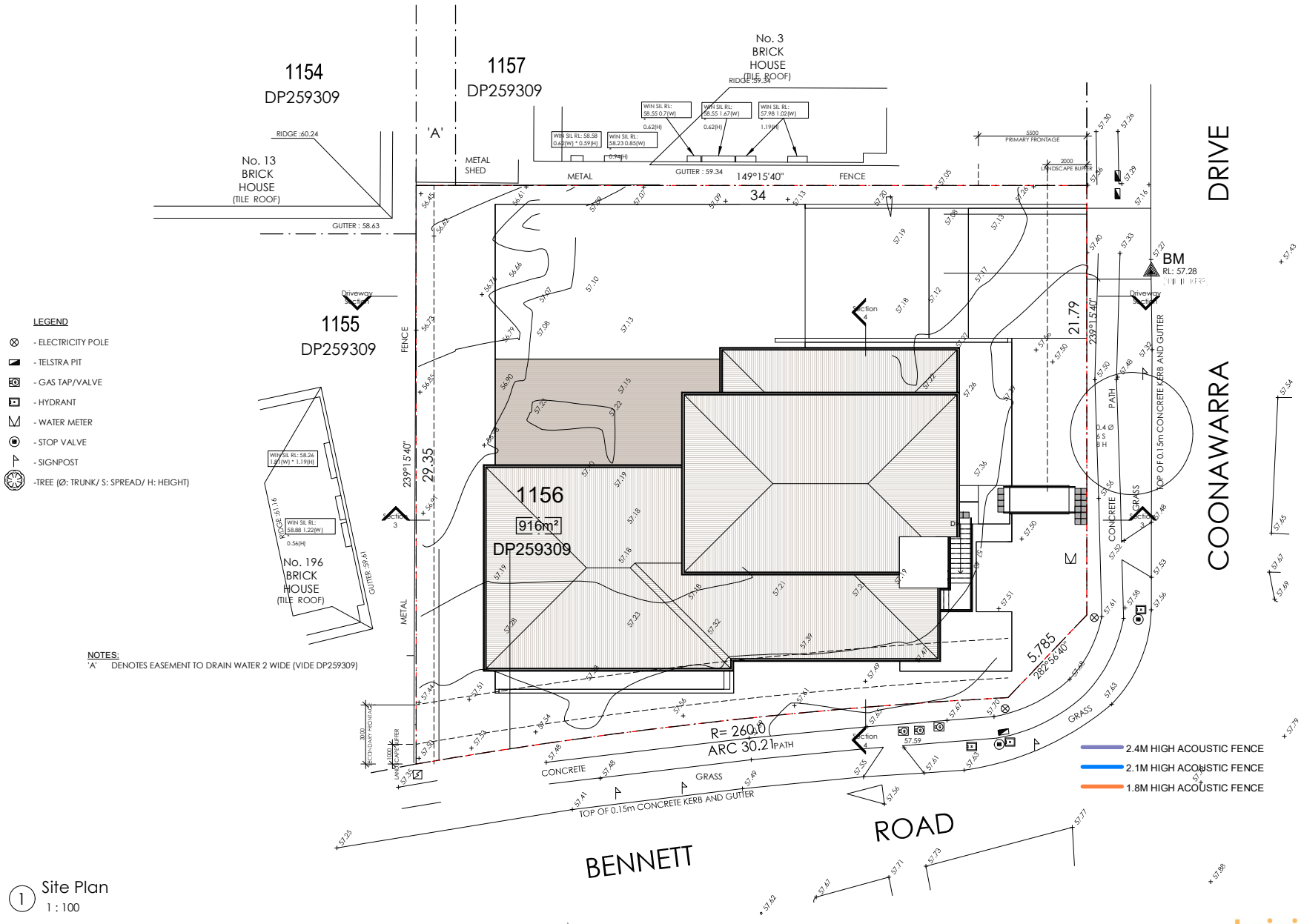
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
SITE CONTEXT PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	03	02/09/21	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 1000	CB	CB



LEGEND

- ELECTRICITY POLE
- TELSTRA PIT
- GAS TAP/VALVE
- HYDRANT
- WATER METER
- STOP VALVE
- SIGNPOST
- TREE (Ø: TRUNK/ S: SPREAD/ H: HEIGHT)

NOTES:
'A' DENOTES EASEMENT TO DRAIN WATER 2 WIDE (VIDE DP259309)

1 Site Plan
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

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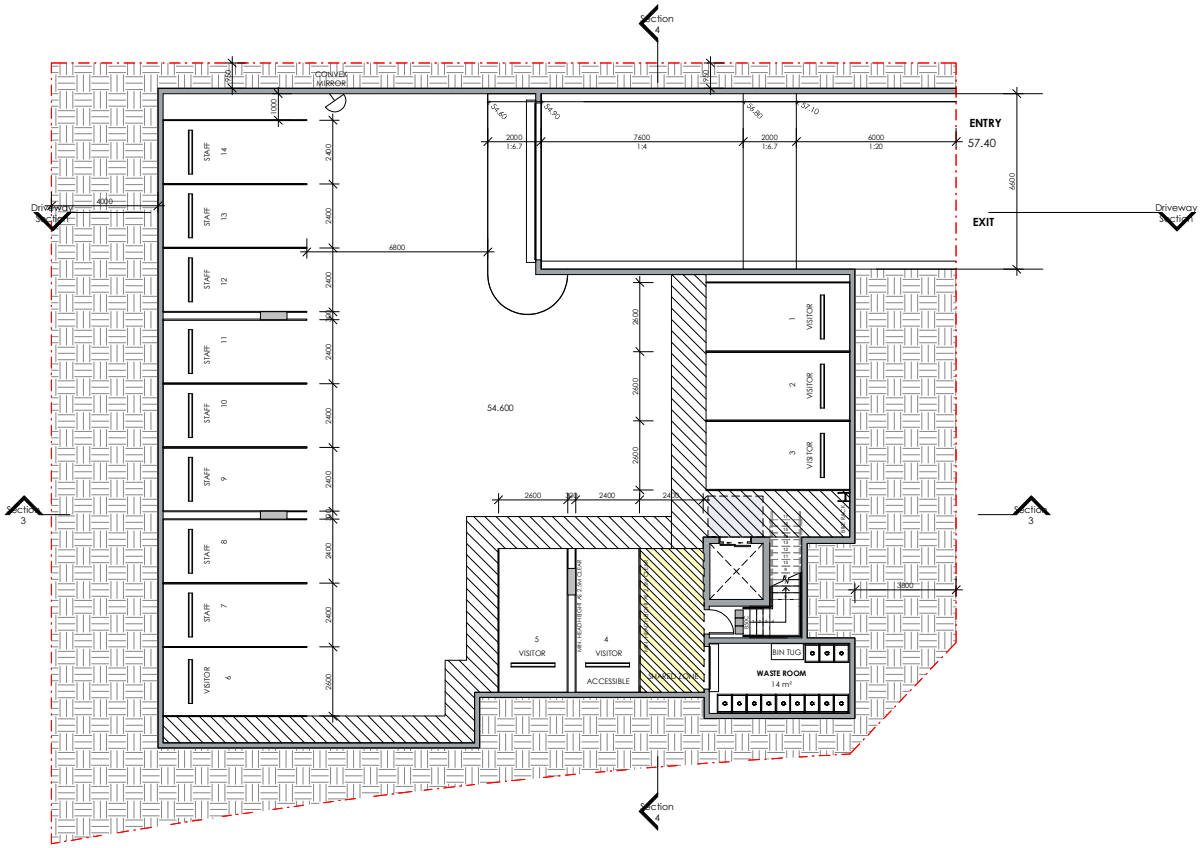
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
SITE PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	05	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB



1 BASEMENT FLOOR
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

FOR DA APPROVAL

BAINI DESIGN
CHILD CARE SPECIALISTS

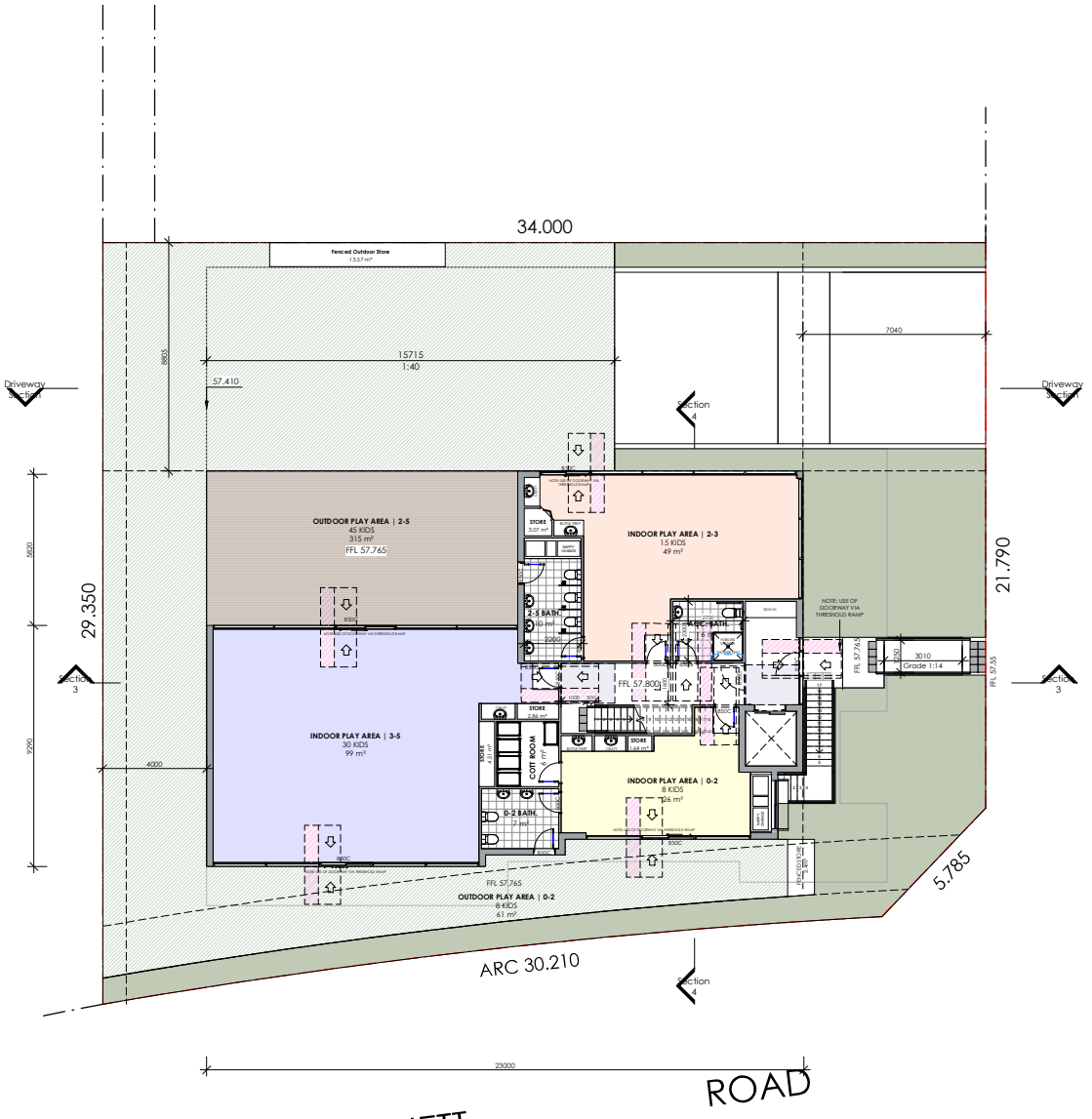
bainidesign

BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
BASEMENT PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	06	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

Room Schedule	
Name	Area
0-2 BATH.	7 m²
0-2 BATH.	Not Placed
2-5 BATH.	10 m²
ACC. BATH.	6 m²
BATH	6 m²
COTT ROOM	6 m²
Fenced Outdoor Store	6 m²
INDOOR PLAY AREA | 0-2	26 m²
INDOOR PLAY AREA | 2-3	49 m²
INDOOR PLAY AREA | 3-5	99 m²
KITCHEN	15 m²
L'DRY	10 m²
MEETING ROOM	Not Placed
OFFICE	13 m²
OUTDOOR PLAY AREA | 0-2	61 m²
OUTDOOR PLAY AREA | 2-5	315 m²
RECEPTION	Not Placed
STAFF ROOM	14 m²
STORAGE	Not Placed
STORE	1 m²
STORE	Not Placed
STORE	1 m²
STORE	2 m²
STORE	1 m²
STORE	4 m²
W.I.P	3 m²
WASTE ROOM	14 m²



KEY

SITE BOUNDARY	LANDSCAPE	0 - 2 INDOOR PLAY AREA	CIRCULATION SPACE
DEMOLISHED	DENSE LANDSCAPING	2 - 3 INDOOR PLAY AREA	2.4m ACOUSTIC BARRIER
BUILDING FOOTPRINT	AREA CALC.	3 - 5 INDOOR PLAY AREA	2.1m ACOUSTIC BARRIER
	EARTH	SINGLE ROOM 12m² - 15m²	1.8m ACOUSTIC BARRIER
	EXISTING WALLS	DOUBLE ROOM 16m² - 25m²	
	PROPOSED WALLS	COMMUNAL AREA 20m²	

1 GROUND FLOOR
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

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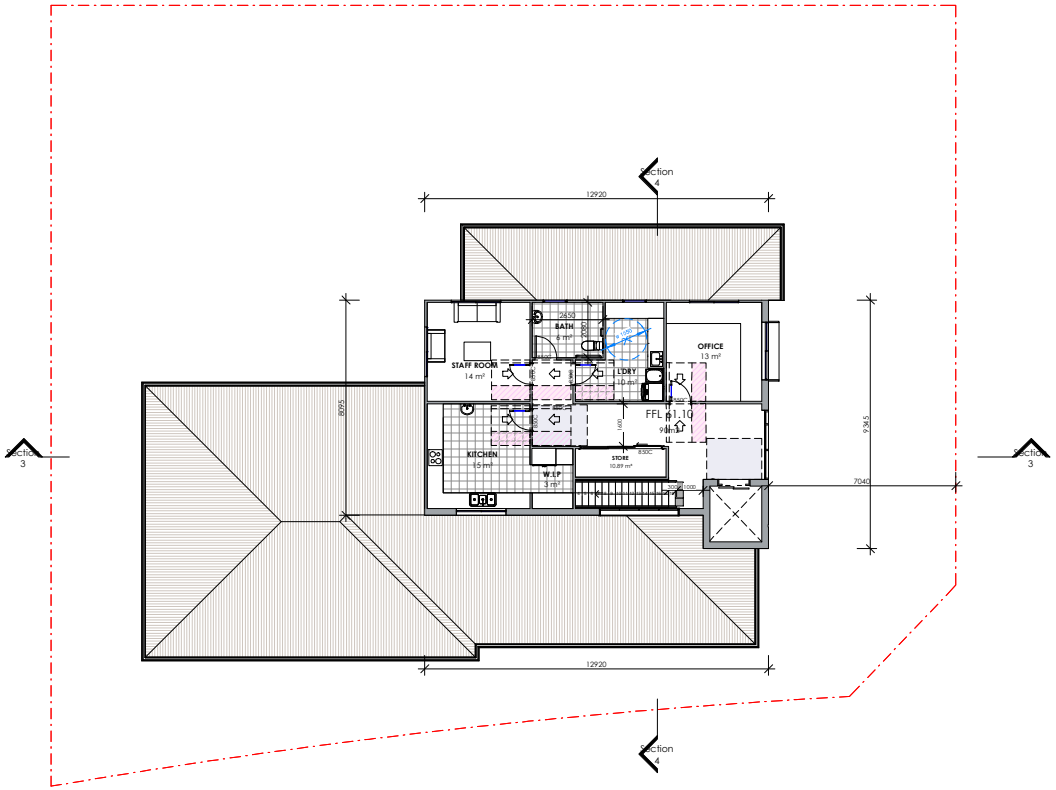
bainidesign

BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
GROUND FLOOR PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	07	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

Room Schedule	
Name	Area
0-2 BATH.	7 m²
0-2 BATH.	Not Placed
2-5 BATH.	10 m²
ACC. BATH.	6 m²
BATH	6 m²
COTT ROOM	6 m²
Fenced Outdoor Store	6 m²
INDOOR PLAY AREA | 0-2	26 m²
INDOOR PLAY AREA | 2-3	49 m²
INDOOR PLAY AREA | 3-5	99 m²
KITCHEN	15 m²
L'DRY	10 m²
MEETING ROOM	Not Placed
OFFICE	13 m²
OUTDOOR PLAY AREA | 0-2	61 m²
OUTDOOR PLAY AREA | 2-5	315 m²
RECEPTION	Not Placed
STAFF ROOM	14 m²
STORAGE	Not Placed
STORE	1 m²
STORE	Not Placed
STORE	1 m²
STORE	2 m²
STORE	1 m²
STORE	4 m²
W.I.P	3 m²
WASTE ROOM	14 m²



1 FIRST FLOOR
1 : 100

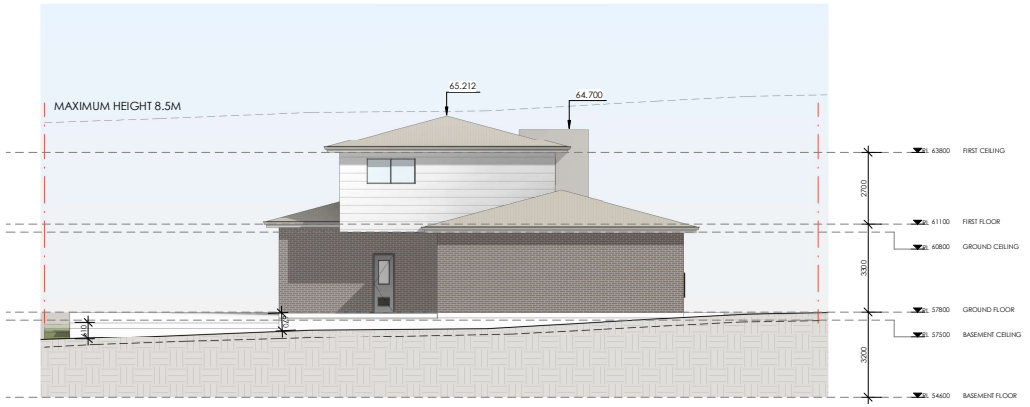
REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	14/11/2021	

FOR DA APPROVAL

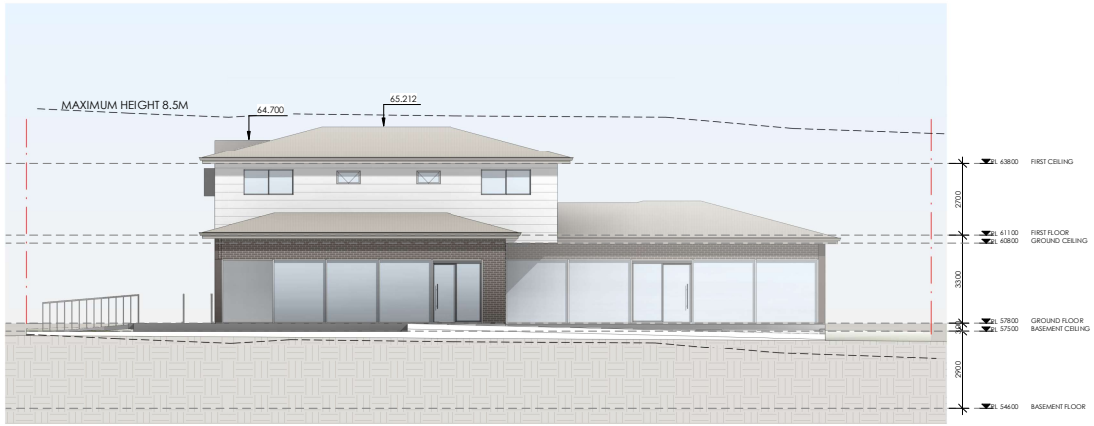
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
FIRST FLOOR PLAN

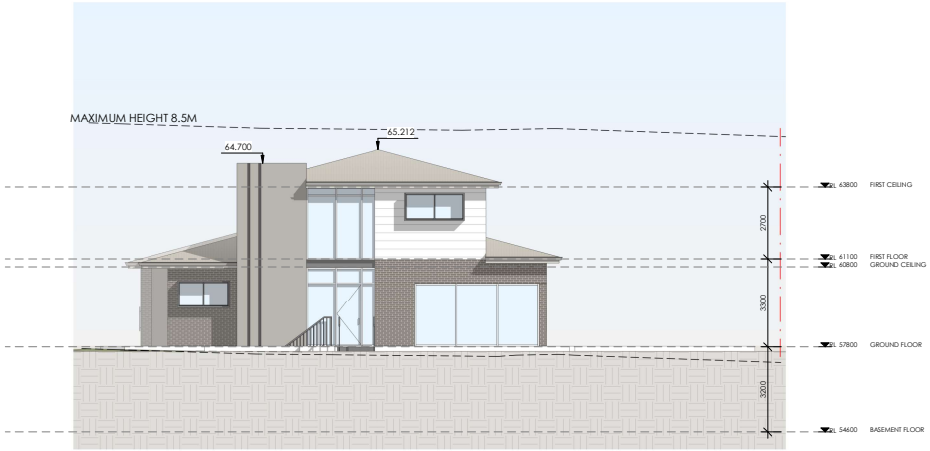
PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	08	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB



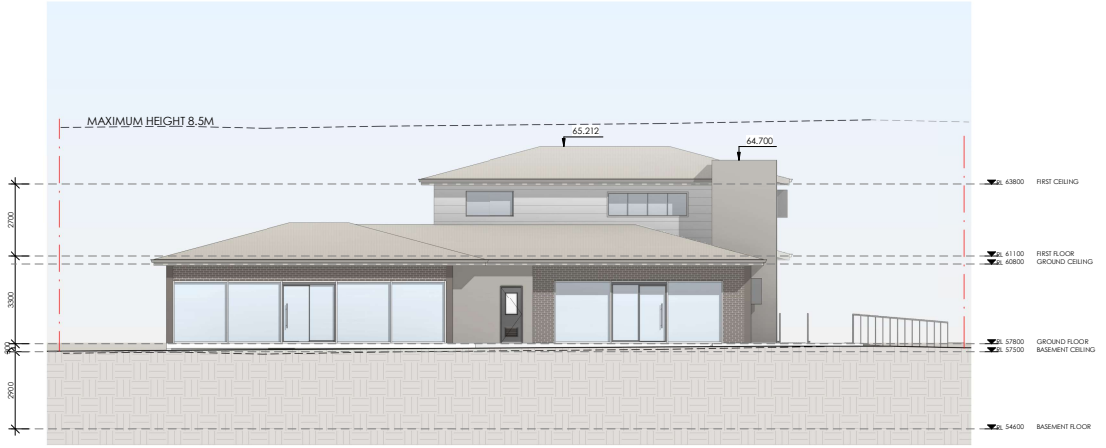
1 North Elevation
1 : 100



2 East Elevation
1 : 100



3 South Elevation (Coonawarra Dr)
1 : 100



4 West Elevation (Bennett Road)
1 : 100

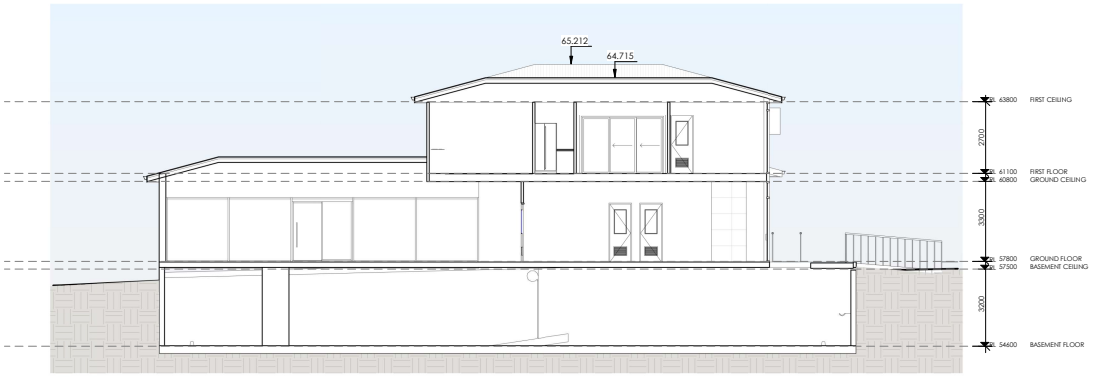
REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

FOR DA APPROVAL

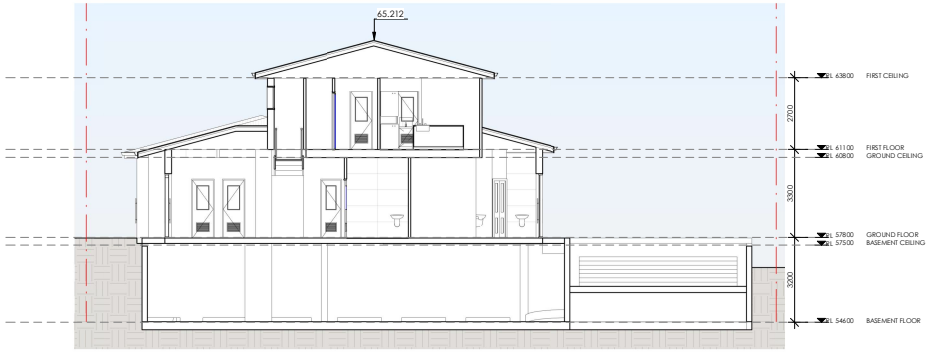
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
ELEVATIONS

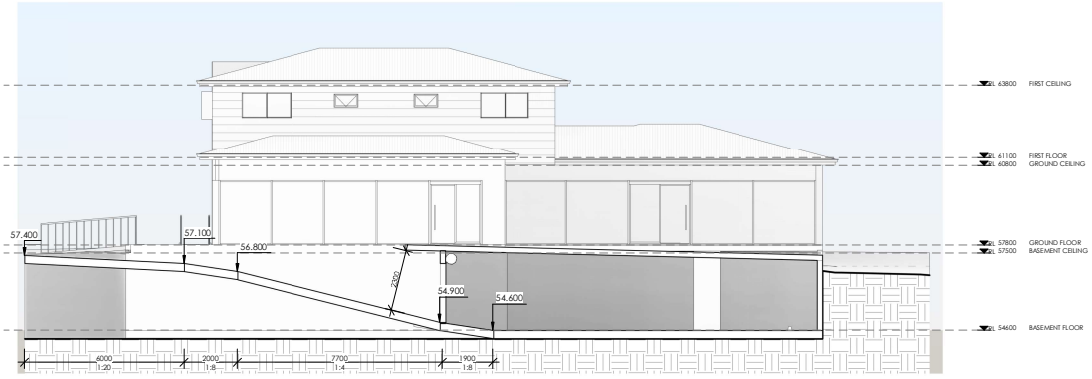
PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	09	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB



3 Section 3
1 : 100



4 Section 4
1 : 100



1 Driveway Section
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

FOR DA APPROVAL

BAINI DESIGN
CHILD CARE SPECIALISTS

bainidesign

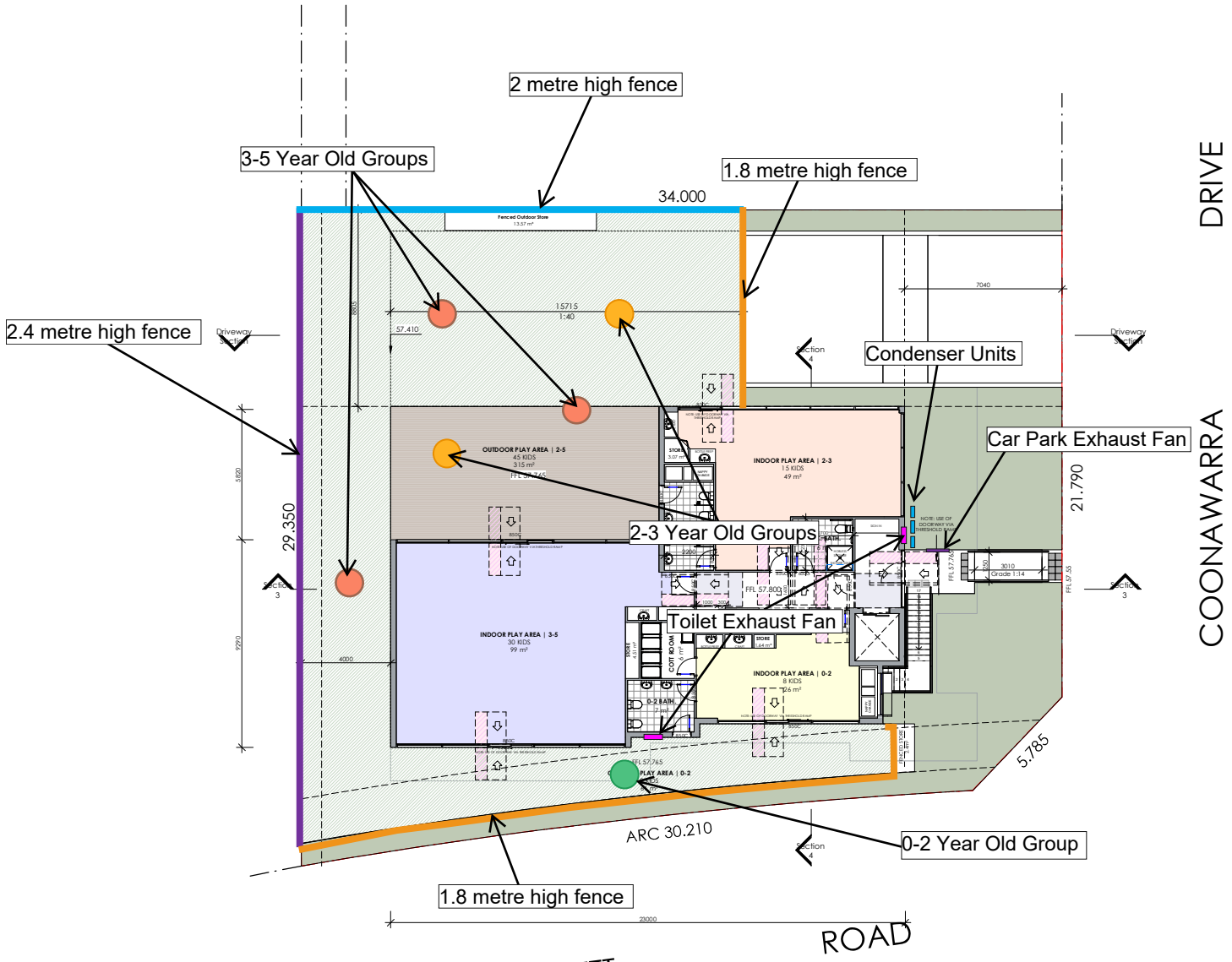
BAINI DESIGN
ABN 51 068 732 593
1B Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759

DRAWING TITLE
SECTIONS

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	10	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

Room Schedule	
Name	Area
0-2 BATH.	7 m²
0-2 BATH.	Not Placed
2-5 BATH.	10 m²
ACC. BATH.	6 m²
BATH	6 m²
COTT ROOM	6 m²
Fenced Outdoor Store	6 m²
INDOOR PLAY AREA | 0-2	26 m²
INDOOR PLAY AREA | 2-3	49 m²
INDOOR PLAY AREA | 3-5	99 m²
KITCHEN	15 m²
L'DRY	10 m²
MEETING ROOM	Not Placed
OFFICE	13 m²
OUTDOOR PLAY AREA | 0-2	61 m²
OUTDOOR PLAY AREA | 2-5	315 m²
RECEPTION	Not Placed
STAFF ROOM	14 m²
STORAGE	Not Placed
STORE	1 m²
STORE	Not Placed
STORE	1 m²
STORE	2 m²
STORE	1 m²
STORE	4 m²
W.I.P	3 m²
WASTE ROOM	14 m²



1 GROUND FLOOR
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

KEY

SITE BOUNDARY
DEMOLISHED
BUILDING FOOTPRINT
LANDSCAPE
DENSE LANDSCAPING
AREA CALC.
EARTH
EXISTING WALLS
PROPOSED WALLS
0 - 2 INDOOR PLAY AREA
2 - 3 INDOOR PLAY AREA
3 - 5 INDOOR PLAY AREA
SINGLE ROOM 12m² - 15m²
DOUBLE ROOM 16m² - 25m²
COMMUNAL AREA 20m²
CIRCULATION SPACE
2.4m ACOUSTIC BARRIER
2.1m ACOUSTIC BARRIER
1.8m ACOUSTIC BARRIER

BAINI DESIGN
CHILD CARE SPECIALISTS

FOR DA APPROVAL

bainidesign
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
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PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
GROUND FLOOR PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	07	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

Room Schedule	
Name	Area
0-2 BATH.	7 m²
0-2 BATH.	Not Placed
2-5 BATH.	10 m²
ACC. BATH.	6 m²
BATH	6 m²
COTT ROOM	6 m²
Fenced Outdoor Store	6 m²
INDOOR PLAY AREA | 0-2	26 m²
INDOOR PLAY AREA | 2-3	49 m²
INDOOR PLAY AREA | 3-5	99 m²
KITCHEN	15 m²
L'DRY	10 m²
MEETING ROOM	Not Placed
OFFICE	13 m²
OUTDOOR PLAY AREA | 0-2	61 m²
OUTDOOR PLAY AREA | 2-5	315 m²
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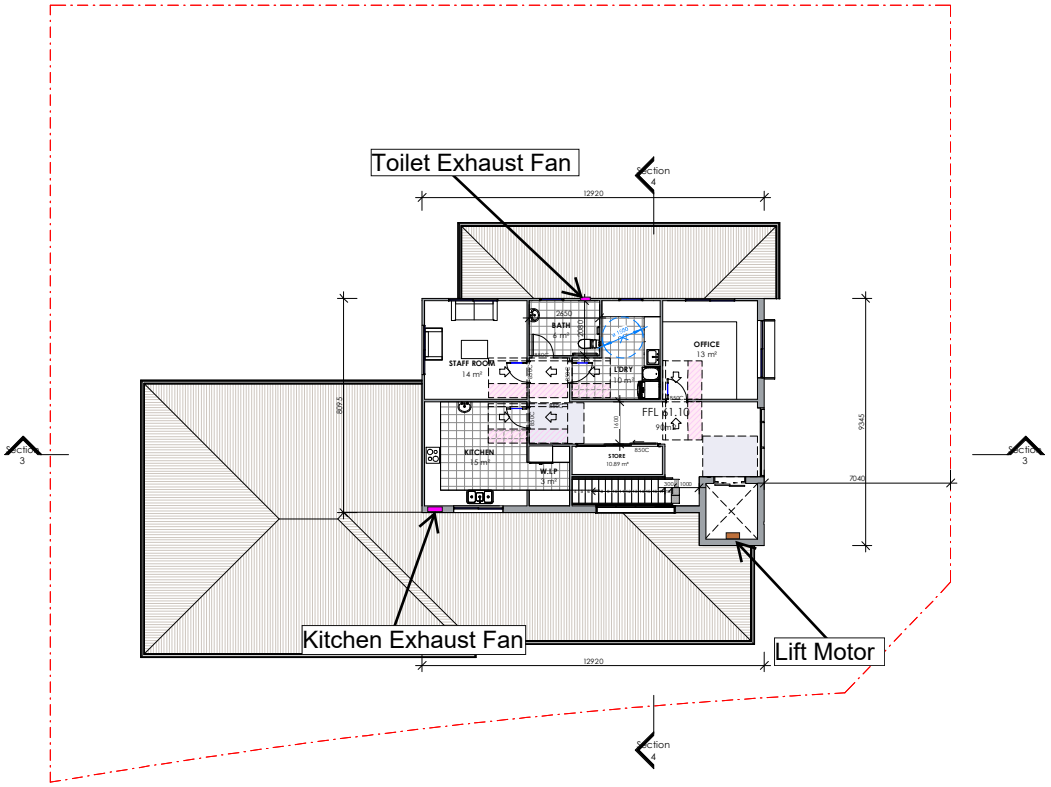
STAFF ROOM	14 m²
STORAGE	Not Placed
STORE	1 m²
STORE	Not Placed
STORE	1 m²
STORE	2 m²
STORE	1 m²
STORE	4 m²
W.I.P	3 m²
WASTE ROOM	14 m²



1 FIRST FLOOR
1 : 100

REV	DESCRIPTION	DATE	BY
A	PRE DEVELOPMENT APPLICATION	12/10/2020	CB
B	DEVELOPMENT APPLICATION	27/04/2020	CB
C	ADDITIONAL INFORMATION	16/11/2021	

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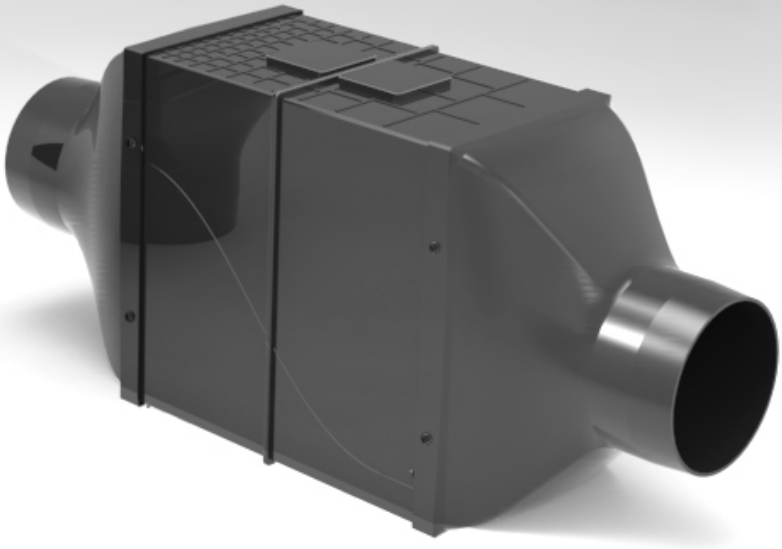
BAINI DESIGN
ABN 51 068 732 593
18 Villiers street
Parramatta, NSW 2150
Sydney, Australia
Phone + 61 2 9188 8250
info@bainidesign.com.au
www.bainidesign.com.au

PROJECT TITLE
PROPOSED CHILDCARE CENTRE WITH BASEMENT PARKING
198 BENNETT ROAD, ST CLAIR NSW 2759
DRAWING TITLE
FIRST FLOOR PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE	REVISION
21032	08	10/01/20	C
	SCALE @ A1	DRAWN BY	CHECKED BY
	1 : 100	CB	CB

Appendix E

Your proven answer to soundproof ventilation in noise affected buildings.



140mm 'Inline' Passive Acoustic Ventilator

Product Code: 11-84-01

SILENCEair

silent sounds, fresh air

Best new product
DesignBuild Australasia

Top 10 Eco Product in the USA
Sustainable Building Magazines

Silver Medal
International Salon des Inventions.
Geneve, Switzerland

CUT AWAY VIEW

EXTERIOR VIEW

The Silenceair 140mm 'Inline' Passive Acoustic Ventilator is designed to give you total flexibility when designing your installation. It can be located in the wall or ceiling cavity, in fact, anywhere that you have 140mm clearance. It can be fixed in any orientation to suit the space available.

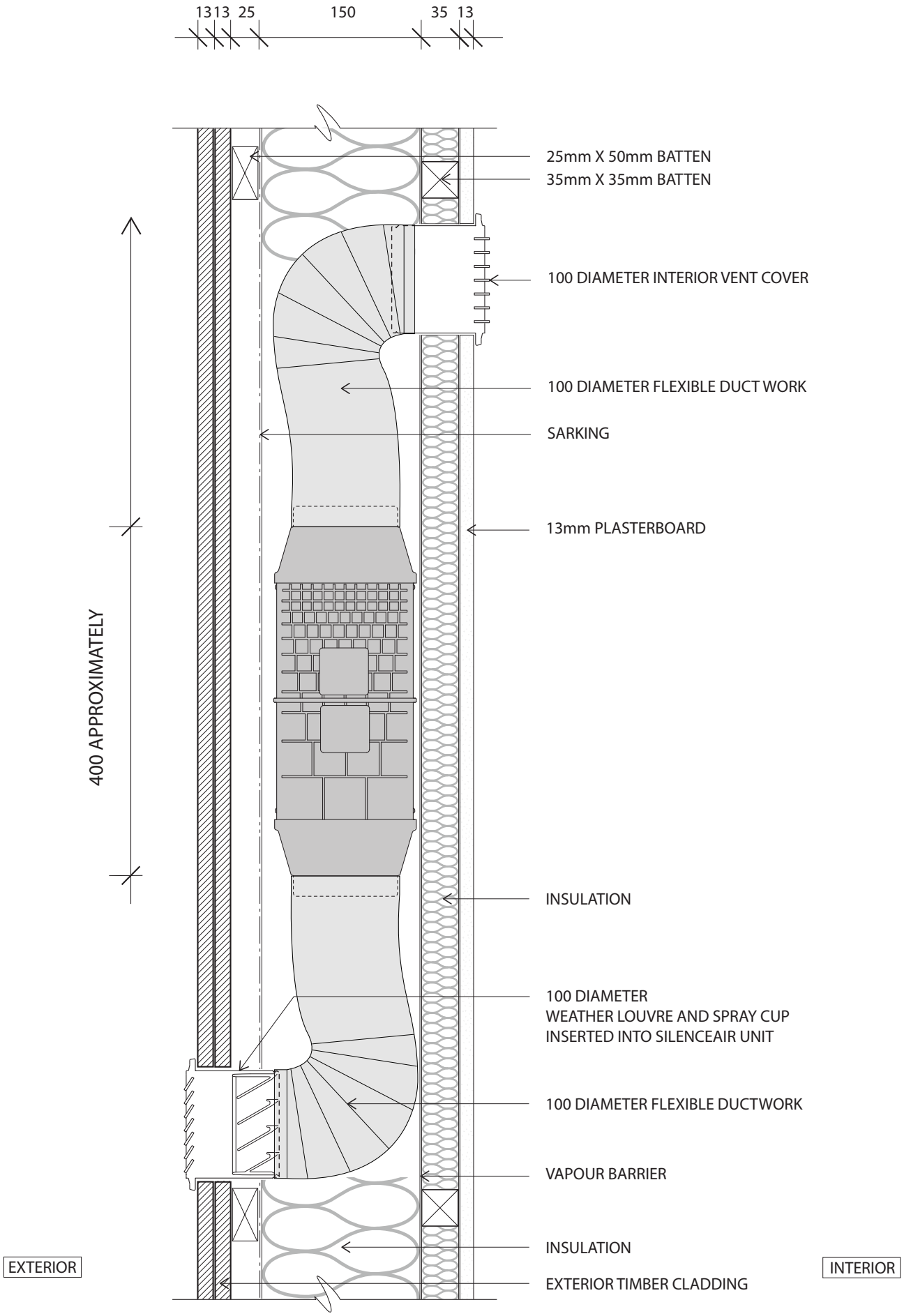
The inline take-offs at each end allow you to attach standard 100mm flexible duckwork. This can then connect to any variety of standard air intake louvre and outlet register.

The ventilator can be screwed, glued or strapped to studwork, masonry, or any other support material. The attachments will not affect performance. The ventilator is tough and robust.

The acoustic workings do not contain foams or fibres. They will not clog with dust, or grow moulds or pathogens as they contain medical grade biocidals, similar to those used in Hospital equipment to help keep them clean and germ free.

The ventilator will not deteriorate over time and will last the life of the building. It will maintain superior acoustic performance and air flow characteristics.

Document Set ID: 9901180
Version: 1, Version Date: 04/02/2022



Sound Reduction

By using a revolutionary patented technology that incorporates arrays of sound attenuating tubes, Silenceair can reduce the noise that enters the room through a ventilation opening by up to 85%. The compact size removes the need for bulky and costly acoustic ducting.

Airflow

The aerodynamic air-passage allows for a highly efficient flow of air at very low pressure. For example, a single unit will allow 20 cubic metres of air into a room at very low pressure of 2 Pascals. Airflow rates at these low pressures can be increased simply by increasing the number of units used. Balancing can be achieved by the same method.

Applications

Silenceair can be used to KEEP OUT THE NOISE in a variety of ventilation systems: for background ventilation; natural cross ventilations; in conjunction with environmentally friendly passive systems, providing make up air to A/C units; and as part of cost effective and code compliant mechanical ventilation systems.

It can be used to KEEP IN NOISE. ACTUAL applications include home theaters, night clubs and commercial dog kennels.

Visit our website for case studies, or contact the office for more advise on potential applications.

Wall suitability

The Silenceair 140mm acoustic ventilator can be installed in any wall that is at least 140mm thick.

It is ideal for use in brick veneer walls, where the slim design allows for small and discrete vents to the inside and outside. A standard brick vent can be used for the outside.

Advantages

Reduces noise transmission by 85% across the acoustic barrier.

Highly efficient. The unique design allows for higher airflow at minimum pressure, and superior noise reduction over the thickness of the wall than alternative technologies.

Cost effective. Silenceair is a highly effective solution for air penetrations through acoustic barriers. You can save on materials, installation time and operating costs.

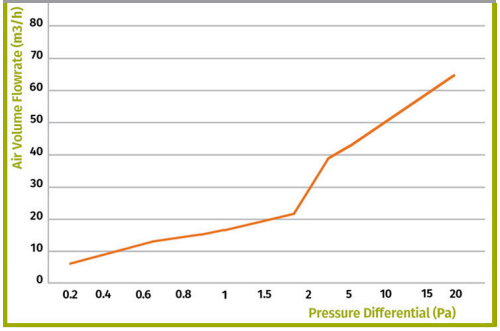
Installation

Silenceair is designed to be compatible with most common construction systems and can be installed by a competent home handyman.

It can be installed in new work or retrofitted into existing buildings. You have choices of decorative interior and exterior face plate lourves, or you may choose from any number of commercially available designs.

Silenceair is fully recyclable is UV stabilised and contains spread of flame and smoke inhibitors.

Superior Airflow

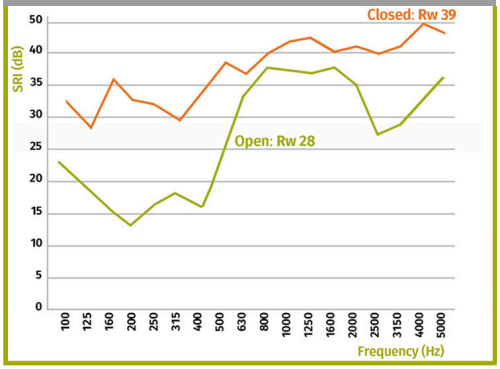


Tabulate Airflow Performance

Pressure Drop (Pa)	m3/h	l/s
0.20	5.4	1.5
0.40	8.6	2.4
0.60	10.8	3
0.80	12.3	3.4
1.00	13.3	3.7
1.50	15.8	4.4
2.00	19	5.3
5.00	31.3	8.7
10.00	37.8	10.5
15.00	45	12.5
20.00	54.3	15.1

The airflow performance graph and table above shows how much air flows through the Silenceair acoustic attenuation device at different air pressures. For example, when the air pressure differential is 0.20 Pascals, air will flow through the device at 6 cubic metres an hour, or 1.6 litres per second.

Superior Noise Reduction

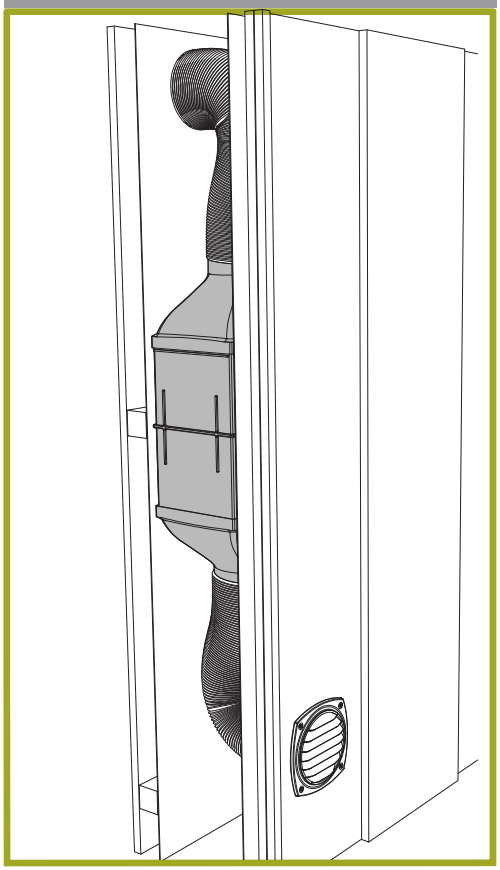


Data Table SRI, dB re 20 µPa

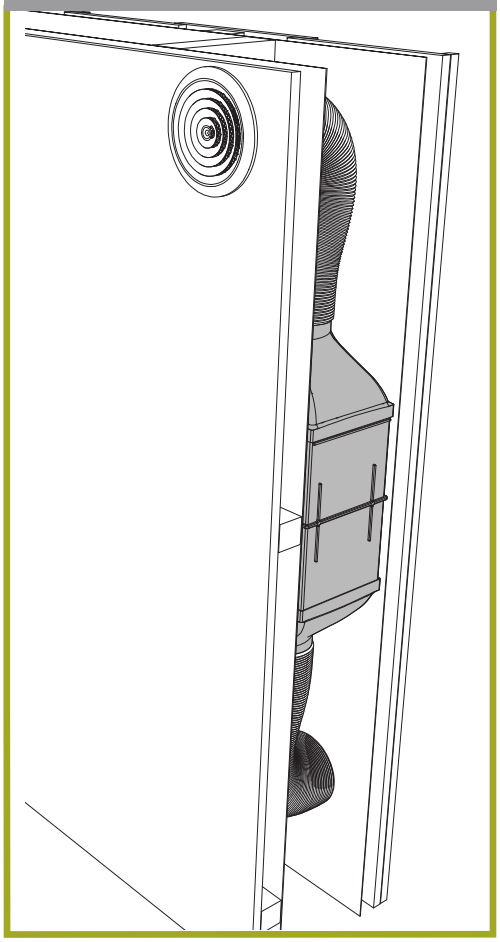
Frequency (Hz)	Vent Open	Vent Closed
100	22.6	30.2
125	18.3	26.1
160	9.5	34.2
200	7.6	32.7
250	16.2	32.0
315	18.3	28.5
400	16.2	33.9
500	24.8	36.2
630	33.2	35.2
800	37.3	38.0
1000	37.2	42.3
1250	37.0	42.8
1600	37.8	38.1
2000	35.1	40.7
2500	27.1	37.8
3150	28.1	41.1
4000	33.4	48.3
5000	35.9	44.1

The noise reduction graph and table above show the reduction in sound power levels through the Silenceair acoustic attenuation device. Over the spectrum from 100hz to 5000hz the Silenceair acoustic ventilator has a Rw39 when adjustable louvre is closed.

Exterior View-Section



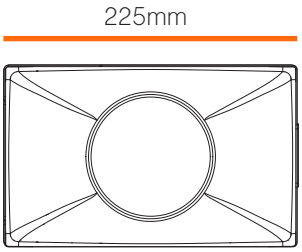
Interior View-Section



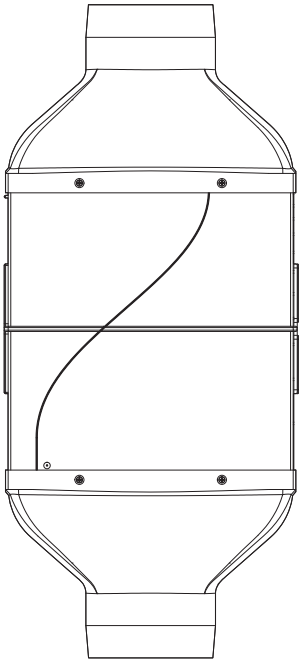
Silenceair International Pty Lid reserves the right to reissue performance data without notice.

Document Set ID: 9901180
Version: 1, Version Date: 04/02/2022

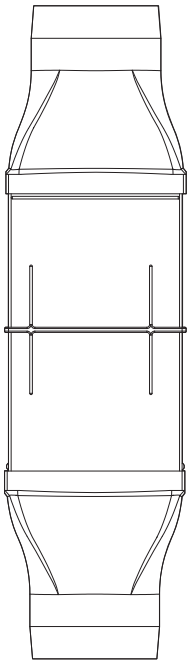
Dimensions



TOP VIEW



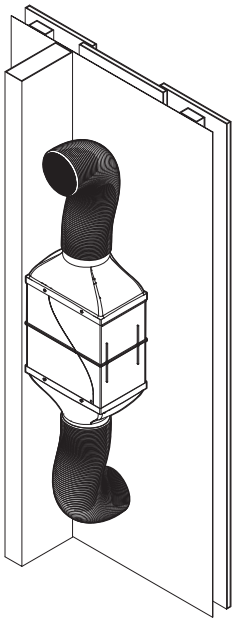
FRONT VIEW

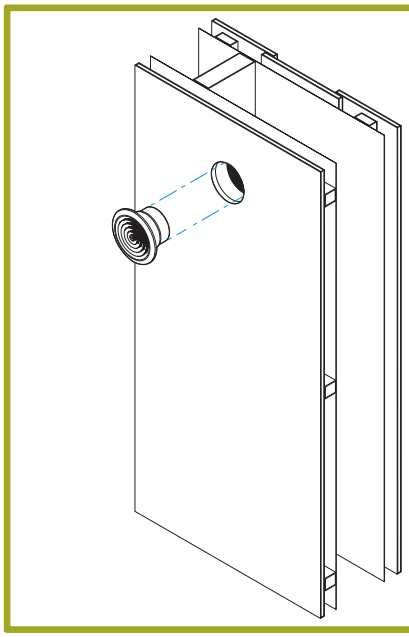


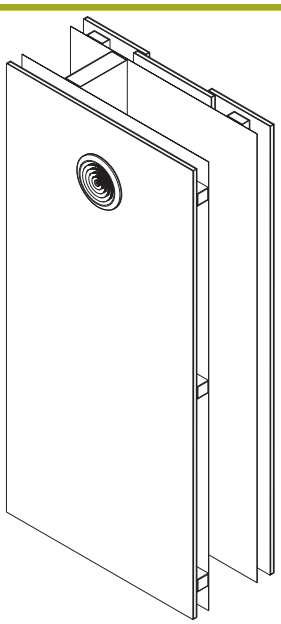
SIDE VIEW

Open Vent Area	5,200mm²
Weight	2.0kg
Material	ABS

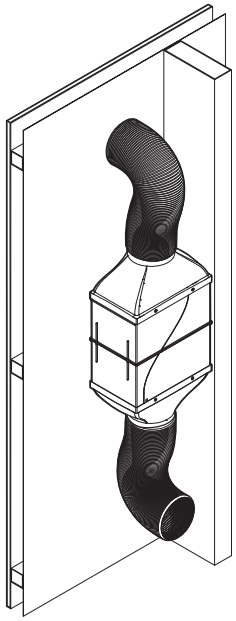
Interior

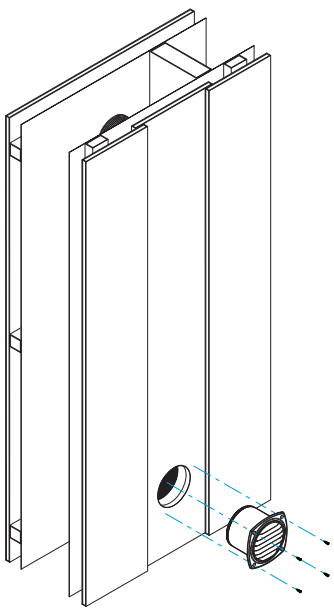


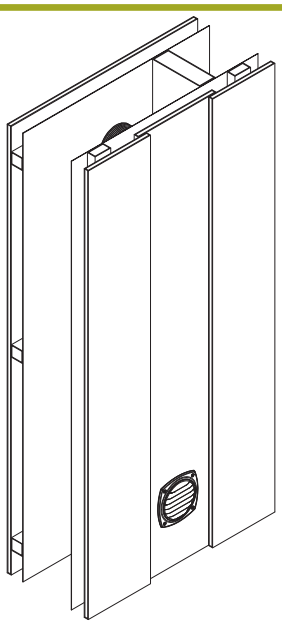




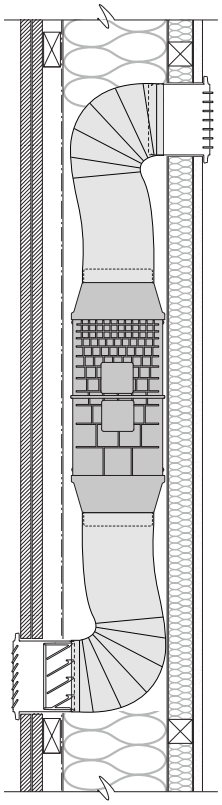
Exterior



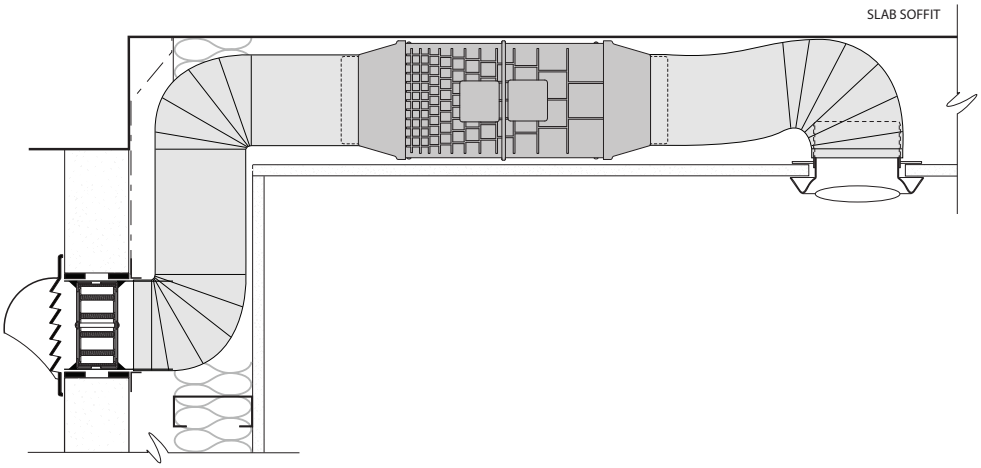




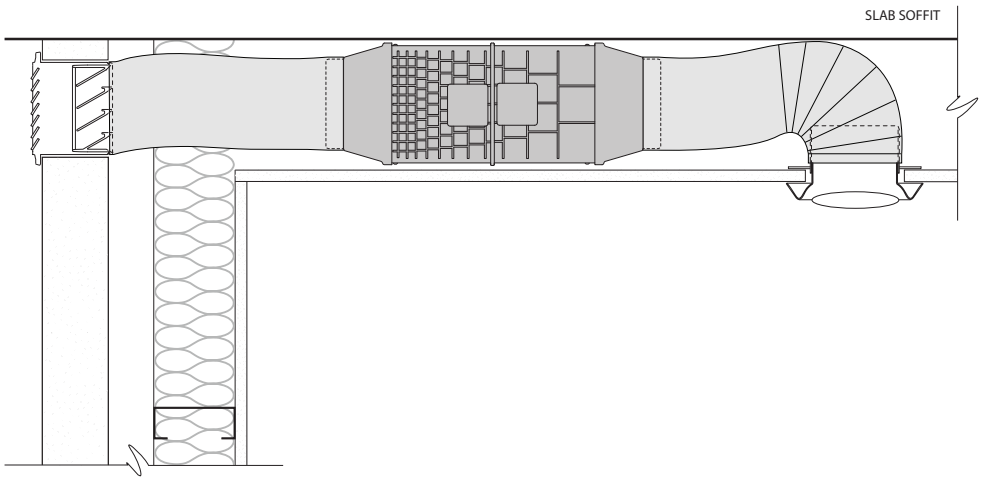
Example A



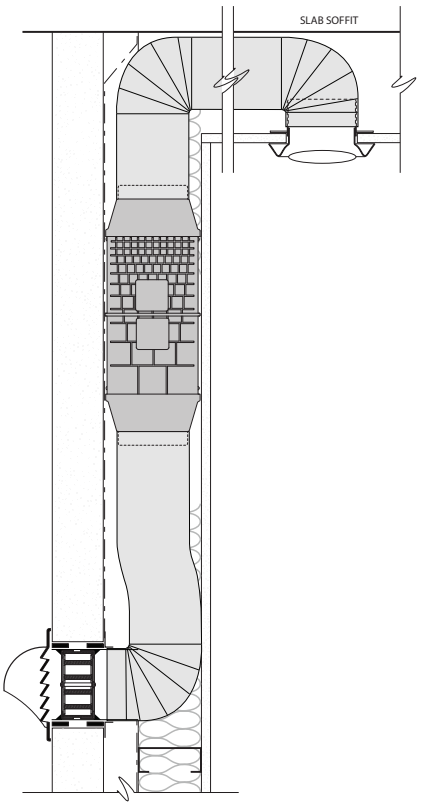
Example B



Example C



Example D



The Silenceair 'Inline' 140mm acoustic ventilator is designed to be installed in any number of configurations and orientations. Installation is determined by what you consider to be the best orientation and location to suite your requirements.

Some of the issues that may influence the installation design are: –

- Is there enough space?
- Where do I want the air inlet?
- Where do I want the air outlet?

Customised air inlet and outlet cowlings for the ventilator can be supplied if the 100mm diameter cowlings are not suitable. Please contact our office to discuss the options and possibilities available.

GLOSSARY OF ACOUSTICAL TERMS

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.