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Acoustic Report

for Proposed Childcare Centre at

No. 32 Bagdad St, Regents Park

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11/07/2023	Initial Report	Domeniki Tsagaris	Moussa Zaioor
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1.0 INTRODUCTION

Acoustic, Noise & Vibration Solutions Pty Ltd was commissioned to investigate the environmental noise impact of a proposed childcare centre at No. 32 Bagdad St, Regents Park (Figure 1 – Site Location) on the surrounding environment, including recommending any necessary noise control measures.

This report has been prepared in conjunction with the Architectural plans by Boris Grgurevic & Associates P/L dated the 5th of September, 2023 and the Traffic & Parking Impact Assessment by Hemanote Consultant dated 26th September, 2023.

The operation of the proposed Childcare Centre will comply with Council requirements including the NSW Noise Policy for Industry 2017 & Association of Australasian Acoustical Consultants (AAAC) Guideline for Child Care Centre Acoustic Assessment (Version 3.0) dated September 2020.

2.0 GENERAL DESCRIPTION AND ENVIRONMENT

The proposed site is located on Bagdad St in the suburb of Regents Park (Figure 1 – Site Location). The surrounding area is predominately residential with a railway line located approximately 135m south of the site (Figure 2 – Surrounding Environment).

The proposed childcare centre will accommodate a total of forty-eight (48) children between the ages of 0 and 6 years old, as well as seven (7) staff members. Composition of the children will be as follows:

Table 2.2 - Composition of Children

Age Group:	No. of Children
0-2 years old	12
2-3 years old	15
3-6 years old	21
Max Total:	**48**

The nearest residential receivers that have the potential to be impacted by the proposed childcare centre are detailed below (Figure 3 – Nearest Residential Receivers):

Table 2.1 – Nearest Residential Receivers

Receiver	Address	Location Relative to Site	Building Type
R1	No. 30 Bagdad St, Regents Park	West	Double-Storey residential dwelling
R2	No. 34 Bagdad St, Regents Park	East	Single-Storey residential dwelling

The proposed childcare centre will have the following hours of operations:

- Monday to Friday: 7:00am to 6:00pm
- Saturday & Sunday: Closed

Children will mainly be dropped off in the morning between the hours of 7:00am – 9:00am and picked up in the afternoon between the hours of 4:00pm – 7:00pm.

The single storey childcare centre will include a basement car park that will accommodate a total of thirteen (13) car spaces. There will be seven (7) staff parking spaces and six (6) visitor parking spaces include disable parking (Figure 4 –Proposed Basement Car Park).

The proposed childcare centre will include three (3) indoor play areas and two (2) outdoor play areas adjacent to the northern boundary of the site (Figure 5 – Proposed Indoor and Outdoor Play Areas). The children will be taken outside for outdoor play in different age groups, at various times throughout the day.

Three major noise producing activities at the proposed childcare have been considered:

- Vehicles Entering & Exiting the Basement Car Park
- Children playing in the outdoor play area;
- Indoor activities; and,
- Noise from proposed mechanical plant & air-conditioning units.

3.0 NOISE SURVEY, INSTRUMENTATION & RESULTS

On the 27th of July, 2023 an engineer from this office visited the site to inspect the surroundings and carry out background noise measurements for the site. Unattended noise readings were carried out at the rear of the site adjacent to the nearest residential receivers at No. 30 & No. 32 Bagdad St [Figure 6 – Noise Reading Location (Point A)].

Noise readings were carried out for a period of 7 days between the 27th July, 2023 and the 3rd August, 2023. The unattended noise survey was conducted to determine a conservative reading of the existing acoustic environment and to determine the $L_{(A90, 15\ minutes)}$ and $L_{(Aeq, 15\ minutes)}$ for the day for the day, evening and night.

All sound level measurements and analysis performed throughout this project are carried out with a NSRTW_MK3 wireless sound level data logger (Serial No. CPp0Dd04c1c9iLtiSwBRPD- Office Tag -Machine 1-). The sound logger specification is as follows:

- Type 1 digital MEMS microphone
- Non-volatile 128 Mb recording memory
- Records L-max, L-min and Leq levels
- Log interval adjustable from 125 ms (8 points per second) up to hours
- A, C and Z weighting curves
- Oscilloscope and spectrum analyser features
- Observes and records 100% of the acoustic signal
- Software calculates global Leq according to ISO and OSHA methods
- WIFI connectivity to report measured levels remotely
- Weatherproof casing designed for indoor/outdoor applications
- Activity detection and logging.
- Long-term measurement and recording of acoustic levels for environmental impact studies.

The noise reading machine Microphone was positioned above the existing fence line in order to minimize the influence of reflection. The noise reading machine was calibrated prior to and after reading, using our Svantek SV 33A S/N: 90200 Class 1 Calibrator with no significant drift encountered. Any readings affected by strong wind or rain have been disregarded.

The Full Average Statistical Noise Parameters **$L_{(Aeq, 15\ minutes)}$, $L_{(A90, 15\ minutes)}$, $L_{(A10, 15\ minutes)}$, $L_{(A1, 15\ minutes)}$** are presented in Figure 7 – Noise Survey. A Summary of background noise readings is presented in the Table below:

Table 3.1 - Summary of Unattended Noise Survey Results at Point A (Background Noise Readings) Between the 27th July, 2023 and the 3rd August, 2023

Measurement Location	Time of Measurement	$L_{eq\ 15\ Minute}$ dB(A)	$L_{90\ 15\ Minute}$ dB(A)	RBL** dB(A)
Point A – Eastern Boundary of Site	Day 7:00-18:00	48	40	37
	Evening 18:00-22:00	46*	40*	37*
	Night 6:00-7:00	42*	37*	35*

***The centre will only operate from 7:00 a.m. till 6:00 p.m.**
**** Calculated in accordance with Fact Sheet B of the NPfI 2017.**

Note [1]: Noise data is validated using the weather zone websites addresses:
https://www.weatherzone.com.au/station/SITE/66137/observations/2023-07-27 to
https://www.weatherzone.com.au/station/SITE/66137/observations/2023-08-03.

L_{eq} – the level of noise equivalent to the energy average of noise levels occurring over a defined measurement period.
L_{90} – the level of noise that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise level.

4.0 INTERNAL ACOUSTIC AMENITY (NOISE BREAK IN)

There are guidelines for internal acoustic amenity for childcare centres, as well as outdoor play areas. The AAAC Technical Guideline for Child Care Noise Assessments states the following:

- The $L_{eq,1hr}$ 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.
- The $L_{eq,1hr}$ intrusive noise level from road traffic, rail or industry at any location within the outdoor play or activity area of the Centre during the hours when the centre is operating shall not exceed 55 dB(A).
- The $L_{eq,1hr}$ intrusive noise level from aircraft at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall not exceed 50 dB(A) in accordance with Australian Standard AS 2021.

5.0 ACCEPTABLE NOISE LEVEL (NOISE BREAK OUT)

5.1 NSW NOISE POLICY FOR INDUSTRY (2017)

The above policy seeks to promote environmental well-being through preventing and minimizing noise by providing a framework and process for deriving noise limits conditions for consent and licenses.

The Noise Policy for Industry 2017 recommends two separate noise criteria to be considered, the Intrusive Noise Criteria and the Amenity Noise Criteria. A project noise trigger level being the lowest of the amenity and the intrusiveness noise level is then determined.

If the predicted noise level L_{Aeq} from the proposed project exceeds the noise trigger level, then noise mitigation is required. The extent of any 'reasonable and feasible' noise mitigation required whether at the source or along the noise path is to ensure that the predicted noise level L_{Aeq} from the project at the boundary of most affected residential receiver is not greater than the noise trigger level.

Although the Noise policy for Industry 2017 is intended to be used for large industrial developments, council bodies still seek to apply this policy (especially the rise of noise from mechanical plant and air-conditioning use) to various proposed developments like this childcare.

The above intrusiveness and Amenity criterion were developed predominantly to assess the noise impact from industrial and mechanical noise sources. The NPI 2017 should not be applied strictly in the case of noise emissions from a childcare centre for the following reasons:

- The sounds made by young children playing do not resemble typical industrial or mechanical noise sources and would be less likely to cause any adverse noise impact compared to machinery noise at the same noise level above the RBL.
- Outdoor play is a required part of childcare and the ability to reduce the noise emissions to these areas is limited.
- Outdoor play areas for children serve a similar function to other public outdoor recreational areas and sporting fields. They provide a necessary social and recreational facility for the children. For this reason, the EPA in assessing the noise from community and social based activities moderate their standard criteria. This is because these activities provide significant benefits to the community and have a congenial character of sound in comparison to industrial and mechanical noise.

5.1.1 AMENITY NOISE CRITERIA

The amenity noise levels presented for different residential categories are presented in Table 2.2 of the Noise Policy for Industry 2017. These levels are introduced as guidance for appropriate noise levels in residential areas surrounding industrial areas. For the proposed childcare centre at No. 32 Bagdad St, Regents Park, the recommended amenity noise levels are presented in Table 5.1.1.1 below:

Table 5.1.1.1- Recommended Amenity Noise levels

Type of Receiver	*Area*	*Time Period*	*Recommended Leq Noise Level, dB(A)*
Residence	Suburban	Day	55
		Evening	45
		Night	40

Where a noise source contains certain characteristics such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, a correction is to be applied which is to be added to the measured or predicted noise levels at the receiver, before comparison with the criteria. Shown below are the correction factors that are to be applied:

Table 5.1.1.2 – Modifying Factor Corrections as per Fact Sheet C (Noise Policy for Industry 2017)

Factor	***Correction***
Tonal Noise	+ 5 dB [1,2]
Low-Frequency Noise	+ 2 or 5 dB [1]
Intermittent Noise	+ 5 dB
Duration	+ 0 to 2 dB(A)
Maximum Adjustment	Maximum correction of 10 dB(A)[1](excluding duration correction)

1. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.
2. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.

Correction for duration is to be applied where a single-event noise is continuous for a period of less than two and a half hours in any assessment period. The allowable exceedance of the $L_{Aequ,15min}$ equivalent noise criterion is depicted in Table 5.1.1.3 for the duration of the event. This adjustment accounts for unusual and one-off events and does not apply to regular and/or routine high-noise level events.

Table 5.1.1.3 – Adjustment for Duration as per Fact Sheet C (Noise Policy for Industry 2017)

Allowable duration of noise (one event in any 24-hour period)	***Allowable exceedance of LAeq,15min equivalent project noise trigger level at receptor for the period of the noise event, dB(A)***	
	Daytime & evening (7 am–10 pm)	***Night-time (10 pm–7 am)***
1 to 2.5 hours	2	Nil
15 minutes to 1 hour	5	Nil
6 minutes to 15 minutes	7	2
1.5 minutes to 6 minutes	15	5
less than 1.5 minutes	20	10

According to Section 2.4 of the above policy, the project amenity noise level is determined as follows:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)

To convert from a period level to a 15-minute level, a plus 3 is added as per section 2.2 of the policy. Therefore, the project amenity noise levels for the proposed childcare at No. 32 Bagdad St, Regents Park is as follows:

Daytime: **55 – 5 + 3 = 53 dB(A)**
Evening: **45 – 5 + 3 = 43 dB(A)**
Night-time: **40 – 5 + 3 = 38 dB(A)**

5.1.2 INTRUSIVE NOISE CRITERIA

Section 2.3 of the Noise Policy for Industry 2017 summarizes the intrusive criteria as below:

$L_{Aeq,\,15\,minute} \leq$ rating background level plus 5

Therefore, the acceptable L_{eq} noise intrusiveness criterion for the proposed childcare centre at No. 32 Bagdad St, Regents Park is as follows:

Daytime: **37 + 5 = 42 dB(A)**
Evening: **37 + 5 = 42 dB(A)**
Night-time: **35 + 5 = 40 dB(A)**

5.1.3 PROJECT NOISE TRIGGER LEVEL

A summary of intrusiveness and amenity noise levels as determined in sections 5.1.1 & 5.1.2 are shown in table 5.1.3 below:

Table 5.1.3 - Summary of Intrusiveness and project amenity noise levels

Period	Intrusiveness Noise Level	Project Amenity Noise level
Day Time (7:00am-6:00pm)	42	53
Evening Time (6:00pm-10:00pm)	42	43
Night & Early Morning (10:00pm – 7:00am)	40	38

The project noise trigger level is the lower (that is, the most stringent) value of the amenity and intrusiveness noise levels for the day and evening. Therefore, the project noise trigger levels for the proposed childcare centre are as shown below.

Daytime: **$L_{Aeq,15\,min}$ 42 dB(A)**
Evening*: **$L_{Aeq,15\,min}$ 42 dB(A)**
Night*: **$L_{Aeq,15\,min}$ 38 dB(A)**

***The Childcare centre will not be operating during the evening or night-time.**

The proposed childcare centre will not exceed the project noise trigger level at the most sensitive locations, provided all noise control recommendations in Section 7 of this report are adhered to.

5.2 AAAC GUIDELINE FOR CHILDCARE ACOUSTIC ASSESSMENT

5.2.1 OUTDOOR PLAY AREAS

The AAAC Guideline sets out recommended noise levels from outdoor play areas of childcare centres. For most childcare centres, the duration of time that children can play outside directly associates with the overall noise impact. The less amount of time a child is allowed to play outside, the overall noise impact reduces. Therefore, it is reasonable to allow a higher level of noise impact for shorter duration of outdoor play.

Section 3.2.1 of the AAAC Technical Guideline for Child Care Noise Assessment on page 6, allows an increase of ***10 dB above the background noise level*** for outdoor play time of up to ***four (4) hours per day (2 hours in the morning and 2 hours in the afternoon)*** and 5 dB above the background noise levels if outdoor play time *exceeds four (4) hours per day*.

As children will be in the outdoor play area for more than four (4) hours per day *(during daytime hours only),* the noise emission criterion from outdoor play times is:

- **Daytime:** **40 + 10 = 50 dB(A)**
- **Evening:** **40 + 10 = 50 dB(A)**
- **Night-time:** **NA**

5.2.2 INDOOR PLAY AREA, MECHANICAL PLANT, PICK UP/DROP OFF

Section 3.2.2 of the AAAC Guideline for Child Care Centre Acoustic Assessment, lists the following criteria to all other noise emission from a Child Care Centre including children playing in indoor play areas, operation of mechanical plant and parent pick up/drop off:

"The cumulative Leq,15min noise emission level resulting from the use and operation of the childcare 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".

Therefore, the cumulative noise emission criterion from indoor play, mechanical plant & pickup/drop off should not exceed:

- **Daytime:** **40 + 5 = 45 dB(A)**
- **Evening:** **NA**
- **Night:** **NA**

5.3 TRAFFIC NOISE GENERATION CRITERIA

For the potential impact of additional traffic that may be generated by the development on nearby residential developments, the operation of the proposed childcare centre also needs to comply with the NSW Road Noise Policy criteria. Table 3 in Section 2.3.1 of the NSW Road Noise Policy, sets out traffic noise assessment criteria as follows:

Table 5.3 – NSW Road Noise Policy Traffic Noise Criteria

Road Category	Type of Project/Land Use	Assessment Criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Local Roads	Existing Residences affected by additional traffic on existing local roads general by land use developments	$L_{Aeq\ (1\ hour)}$ 55 (external)	$L_{Aeq\ (1\ hour)}$ 50 (external)

5.4 NSW NOISE GUIDE FOR LOCAL GOVERNMENT & SLEEP DISTURBANCE (Applicable for any operation/part operation of the childcare before 7:00 a.m.)[2]

The Department of Environment and Conservation (NSW) published the amended *Noise Guide for Local Government* in October 2010. The policy is specifically aimed at assessing noise from light industry, shops, entertainment, public buildings, air conditioners, pool pumps and other noise sources in residential areas.

Section 2.2.3 of the Noise Guide for Local Government recommends noise measurements and an intrusive noise level when attempting to achieve acceptable and achievable noise limits.

Section 2.2.1 of the Noise Guide for Local Government states that a noise source is generally considered to be intrusive if the noise from the source when measured over a 15-minute period exceeds the background noise by more than 5 dB(A). Therefore, the noise criteria are as follows:

- **Day period:** **40 + 5 = 50 dB(A)**
- **Evening period:** **40 + 5 = 50 dB(A)**
- **Night period:** **37 + 5 = 42 dB(A)**

The appropriate regulatory authority (Local Council) may, by notice in writing given to such a

person, prohibit the person from causing, permitting or allowing:

1. any specified activity to be carried on at the premises, or
2. any specified article to be used or operated at the premises.

or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

5.4.1 SLEEP DISTURBANCE [2]

In order to minimize the potential of sleep disturbance due to transient noises from staff arriving during the early morning hours (6:00am – 7:00am), Section 2.2.4 of the Noise Guide For Local Government recommends that $L_{A1,1\text{-minute}}$ level of any noise outside a bedroom should not exceed the background noise level by more than 15dB. Therefore, the following criteria will apply at the outside window of the nearest residential receivers:

- **$L_{A1,\ 1\ minute}$ =< 37 + 15= 52 dB(A) at external windows of Nearest Residential Receivers**

Similar text about sleep arousal is adopted in the Noise Policy for Industry 2017 as below:

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.

Additionally, Section 5.4 of the NSW Road Noise Policy states the following:

Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:

'as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) $L_{A,\ (Max)}$ more than 10 or 15 times per night'.

Note [2]: The above applies to the staff arriving at opening time of the childcare centre just before 7:00 a.m.

6.0 PREDICTED NOISE FROM THE CHILDCARE

As stated in Section 2.0 of this report noise levels from the childcare are classified into four main noise sources:

- Noise From vehicles in the car park and on the Road due to staff and parents arriving and departing the childcare,
- Noise from Indoor activities,
- Noise from Children playing in the outdoor playground, and,
- Noise from Mechanical plant & air-conditioning.

6.1 NOISE FROM VEHICLES ON THE ROAD AND IN THE CARPARK

The single storey childcare centre will include a basement car park that will accommodate a total of thirteen (13) car spaces. There will be seven (7) staff parking spaces and six (6) visitor parking spaces (Figure 4 –Proposed Basement Car Park). Entry to the car park will be from Bagdad St.

Parents will mainly drop children off in the morning between 7:00am & 9:00am and pick them up in the afternoon between 4:00pm & 6:00pm, Monday to Friday only.

Essentially the first and last persons on site are the childcare centre staff usually arriving at opening time and leaving at closing time, therefore they will enter and exit the site only once a day.

Noise generated by cars entering/exiting the car park driveway will need to comply with criteria listed in Section 5 of this report. Additional traffic noise generated on Bagdad St by parents dropping off/picking up their children, will need to comply with the Traffic Noise Criteria detailed in Section 5.3 of this report.

6.1.1 NOISE ON BAGDAD ST FROM ADDITIONAL TRAFFIC GENERATION

The Traffic & Parking Assessment prepared by Hemanote Consultant (dated 26th September 2023) predicted 39 *net* vehicle movements in the morning peak hour and 34 *net* vehicle movements in the afternoon peak hour.

The nearest residential receivers that will be affected by the additional traffic noise generation from the proposed childcare will be the residential properties along Bagdad St. Predicted noise levels at 1.0m from the building line of the residences of Bagdad St due to additional traffic generation are presented in Table 6.1.1 below:

Table 6.1.1 – Predicted Noise from Traffic Generation on Bagdad St at 1.0m from Facade

Activity	Period	Expected Leq 1hr dB(A) from Additional Traffic Noise on Bagdad St	Complies with Traffic Noise Criteria- as per section 5.3
Noise from Additional Traffic Generation	AM Peak Hour	49.5 dB(A)	Yes <55 dB(A)
	PM Peak Hour	49.0 dB(A)	

6.1.2 NOISE FROM CARS ENTERING/EXITING THE BASEMENT CARPARK

Car parking noises may typically comprise of adults talking, children's voices, car radios, car doors closing, cars starting up, and cars moving. We depended on various acoustic literature, in addition to measurements and observations conducted at various other childcare centres to produce the following carpark noise data.

Table 6.1.2.1 – Car Park Noise Source Levels

Car Park Noise Source	Average Sound Power Level, dB(A)
Car Door Closing	95*
Car Starting	91*
Car Accelerating	91
Car Moving	81
Roller Door Opening and Closing- If any	85

***Taking place inside enclosed carpark.**

For vehicles entering the basement carpark, the only noise generated will be by cars moving in and out of the driveway. The remainder of car activities listed in the table above will occur inside the basement and therefore noise produced by those activities will be attenuated by the basement enclosure.

Entry to the basement will be via a ramp located at the front of the site. Predicted noise levels at the boundary of the nearest residential receiver due to cars entering and exiting the basement carpark, are presented in Table 6.1.2.2 below. Noise attenuation loss from the basement enclosure, distance to the nearest receiver, as well as any sound barriers (fences) have been taken into account.

Table 6.1.2.2 – Predicted Noise from Vehicles Entering and Exiting the Carpark*

Activity	Period	Expected L Aeq , 15 mins dB(A) at No. 30 Bagdad Street, Regents Park- (R1)	Expected L Aeq , 15 mins dB(A) at No. 34 Bagdad Street, Regents Park-(R2)	Complies with Project Noise Trigger level as per Section 5.1.3
Vehicles Entering/Exiting the Basement Car Park	7:00am – 6:00pm	39 ** dB(A)	36 ** dB(A)	**Yes** **L Aeq , 15 mins** <42

***Assessment location as per page 6, Section 3.2 AAAC guideline**
****Based on Peak Traffic generation as per Hemanote Consultants**

Table 6.1.2.3 below presents $L_{Aeq,\ 15\ mins}$ & $L_{A1,1\ minute}$ noise levels, at the external window of the nearest residential receivers R1 & R2 from staff vehicles arriving in the early mornings (between 6:00am – 7:00am).

Table 6.1.2.3 – Predicted Noise from Staff Vehicle entering the carpark outside nearest Bedroom Windows of R1 & R2

Activity	Period	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R1*	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R2	Complies with Sleep Arousal Criteria as per Section 5.4
Staff Vehicles Entering the Car Park	6:00am – 7:00am	47 dB(A)	39 dB(A)	**Yes** $L_{A1,\ 1\ minute}$ <52 dB(A), [L90+15] $L_{A1,\ 1\ minute}$ <50 dB(A), [RBL+15] L_{AFmax} <52.

***Noise levels Outside Upper floors bedroom window.**

6.2 NOISE BREAK-OUT FROM INDOOR ACTIVITIES

The predicted noise levels with maximum 48 children and 7 staff members inside the proposed childcare at the most affected residential receivers, No. 30 & 34 Bagdad St, are shown in Table 6.2 below.

The sound loss through the façade of the childcare centre is calculated using Templeton/Saunders equation (A-Weighted):

$$L_{p2} = L_{p1} - R + 10Log_{10}(S) - 20Log_{10}(r) - 17 + DI \ \ dB$$

Where; L_{p2} Noise level at location 2 from the source;
L_{p1} Noise level at the source;
R Weighted sound reduction index of the façade;
S Area of the façade;

r Distance in meters to location 2 from the source; and
DI Directivity associated with the source =3.

Table 6.2 – Predicted Noise from Proposed Indoor Activities at Critical Façades of Nearest Receivers*

Activity	Period	Expected Leq dB(A)
Forty-Eight (48) Children and Seven (7) Staff members indoors	7:00am – 6:00pm	28 dB(A) @ **R1** – No. 30 Bagdad St 28 dB(A) @ **R2** – No. 34 Bagdad St

***Assumed Masonry/Brick veneer Construction and all recommendations of Section 7 are adhered to.**

6.3 MECHANICAL PLANT NOISE EMISSION

A range of mechanical plant, equipment and ventilation will be installed at the proposed childcare centre, including Air-conditioning units. As per Section 4.2 of the AAAC Guideline, typical range of sound power levels for mechanical plant is listed in Table 6.3.1 below:

Table 6.3.1 – Typical Mechanical Plant Sound Power Levels

Small (single fan) condenser (outdoor unit)	65 dB
Medium (double fan) condenser (outdoor unit)	70 dB
Large (double fan) condenser (outdoor unit)	80 dB
Small Exhaust Fan (toilet, garbage room)	60 dB
Small Kitchen Exhaust Fan	70 dB
Carpark Exhaust Fan	85 dB

As the proposed development is still in the initial application stage, we recommend that further acoustic assessment is carried out when the development has been approved and Mechanical Services plans have been prepared for our review.

In general, we recommend that all new external air-conditioning units are to be acoustically enclosed or set away by more than 2.5 m from any residential boundary- A/C condenser with Max 65 dB(A) sound power level -. The assessment of the mechanical plans once available will provide recommendations such that noise levels emitted from the mechanical plant servicing the childcare meet the requirements of this report.

6.4 CUMULATIVE NOISE FROM INDOOR ACTIVITIES, MECHANICAL PLANT AND PICKUP/DROP OFF

Based on noise predictions for indoor activities, vehicles entering/exiting the carpark (pick-up/drop-off) and operation of mechanical plant listed in Sections 6.1-6.3 above, the predicted cumulative noise from the above listed activities complies at all nearest residential receivers as per the AAAC Technical Guideline for Childcare Noise Assessment.

6.5 NOISE FROM CHILDREN PLAYING IN THE OUTDOOR AREA

The proposed childcare centre will include two (2) outdoor play areas adjacent to the northern boundary of the site (Figure 5 – Proposed Indoor and Outdoor Play Areas).

Children spend the majority of the day doing indoor activities. They are taken outside for external educational play activities that are supervised in accordance with the Department of Community Services' guidelines. The children will be taken outside for outdoor play time at various times of the day at a maximum of 4 hours /day.

Based on the sound data published in the AAAC 'Guideline for Childcare Centre Acoustic Assessment' (September 2020 V3.0) the sound levels of the various age groups of 10 children playing are summarised in Table 6.5.1 below.

Table 6.5.1 – Sound Power levels of 10 Children Playing in Different Age Groups

	Sound Power Level [dB] at Octave Band Centre Frequencies [Hz]								
Number of Children & Age Group	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
10 Children – 0 to 2 Years Old	54	60	66	72	74	71	67	64	**78**
10 Children – 2 to 3 Years Old	61	67	73	79	81	78	74	70	**85**
10 Children – 3 to 5 Years Old	64	70	75	81	83	80	76	72	**87**

Therefore, in line with the AAAC data presented in Table 6.5.1, the sound power level of each group of children playing in this proposed childcare centre was calculated and presented in Table 6.5.2 below.

Table 6.5.2 – Sound Power Levels of Children Playing in Different Age Groups for Proposed Childcare Centre

	Sound Power Level [dB] at Octave Band Centre Frequencies [Hz]								
Number of Children & Age Group	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
12 Children – 0 to 2 Years Old	57	61	67	73	75	72	68	65	**79**
15 Children – 2 to 3 Years Old	65	69	75	81	83	80	76	72	**87**
21 Children – 3 to 5 Years Old	68	73	78	84	86	83	79	75	**90**

Assuming all control measurements recommended in Section 7 of this report have been fully implemented, the predicted maximum noise level at the boundary of the nearest residential receivers will comply with the allowable noise emission criterion defined in Section 5. The following prediction also takes into account distance attenuation from the centre of the outdoor play areas to the residential receivers, including attenuation from any proposed or existing sound barriers.

The noise prediction computations presented in table 6.5.3 below are based on the methods and Standards as per **AS ISO 9613- :1996** Acoustics -- Attenuation of sound during propagation outdoors --: General method of calculation. The assessment location is in accordance with the assessment locations described in Section 3.2.1 of the AAAC Guideline for Childcare Centre Acoustic Assessment.

Table 6.5.3 – Predicted Noise from Children Playing in the Outdoor Play Areas @ Façade of Most Sensitive Receivers

Activity	**Period**	**Expected $L_{Aeq,15min}$ dB(A) at 30 Bagdad St**	**Expected $L_{Aeq,15min}$ dB(A) at 34 Bagdad St**	**Complies with AAAC Criteria**
All Forty-Eight (48) Children in the outplay area	Various times throughout the day **(up to 4 hours/day)**	**49 dB(A)**(1),(2)	**44 dB(A)**(1),	Yes<50 dB(A) [L90+10]

(1) Provided recommendations in Section 7 of this report are adhered to.
(2) At Upper Floor windows.

7.0 NOISE CONTROL RECOMMENDATIONS

For the operation of the proposed childcare at No. 32 Bagdad St, Regents Park to comply with the Noise Criteria presented in section 5.0 of this report, the following noise control recommendations are to be adhered to:

7.1 OPERATING HOURS & OUTDOOR PLAY TIME

- Childcare Operating hours is from 7:00 am to 6:00 p.m.
- Children not allowed to be taken out into the outdoor play area before 7:00 a.m
- Maximum Time the children to spend in the outdoor play area is 4 hrs/day.

7.2 PROPOSED WINDOWS AND DOORS OF CHILDCARE CENTRE

In order to comply with the AAAC internal acoustic amenity criteria as stated in Section 4 of this report, and to limit the level of noise emission from the childcare, we recommend that all proposed windows & sliding doors in the childcare are to be 6.38mm laminated type with full perimeter acoustic seals (except for bathrooms/laundries). External doors are to be Solid Core with acoustic seals fitted around the door. A drop seal is required at the base of the external door. The seals should be similar to the Raven RP47 for the top and sides and RP38 at the base of the door.

We recommend that windows and doors of the proposed childcare are closed, and mechanical ventilation is used whenever music is being played indoors at high volumes. During all other activities, windows and doors can be opened to allow natural ventilation.

7.3 MECHANICAL PLANT & EQUIPMENT

We recommend that all mechanical plant & equipment is assessed at CC stage when Mechanical Services Plans have become available for review. Preliminary recommendations to comply with the criteria set out in Section 5 of this report are as follows:

1) Airconditioning units are to be located approximately 2.5 metres from the northern and eastern boundaries of the site.
2) The outdoor Sound Power Level of any air conditioning unit is not to exceed 65dB(A).
3) The proposed sound barrier will be installed as described in Section 7.5 of this report, along the adjacent boundaries shielding the noise from the potential receivers.
4) Provide proper duct lagging and silencers on supply/exhaust basement mechanical ventilation fans.

7.4 OUTDOOR PLAY AREAS

Additionally, we recommend the following takes place with respect to play areas:

1) Fixed play equipment should be plastic. If metal fixed play equipment is used, then hollow metal sections shall be filled with expanding foam or sand.
2) Concrete or brick paved areas, if any, should be minimised and where practicable covered with synthetic grass carpet to minimise noise of play equipment on the hard surfaces.
3) Children are to be separated into groups during outdoor play time as to not allow a large number of them to congregate in a single area at any one time.

7.5 WASTE COLLECTION

All waste collection from the site is to be carried out between the hours of 8:00 am – 5:00 pm.

7.6 SOUND BARRIER FENCE

We recommend that a 2.0 m lapped & capped timber, colourbond or brick fence be constructed around the east, north and west boundaries of the site and is to be tapered down to 1m as per Figure 8 – Proposed Ground Floor Sound Barrier Location.

7.7 MUSIC

The following acoustic recommendations with regards to music being played at the proposed childcare centre are as follows:

1) Whilst music is being played inside the proposed childcare centre, the windows and doors of the areas that the music is being played are to be closed.
2) Music is not recommended to be played outdoors. If it is, then sound system volume controls should always be used to control the level of noise in the outdoor play area.

7.8 SIGNS

Signs reminding staff and parents to arrive and depart in a quiet and orderly manner at all times shall be installed at entry and exit points of the childcare centre.

7.9 SUPERVISION

Ensuring that children are supervised at all times will minimize the noise generated by the children. In instances where typically louder activities are to take place, smaller groups are to be taken outside at different intervals throughout the day and they are to be properly supervised.

Staff must be informed of the residential noise receivers and the importance of minimizing the outdoor noise produced by the children.

Additionally, childcare staffs are to be appropriately trained and are to keep the children occupied in educational and instructive play so as to keep them occupied and learning and subsequently less noisy. It is recommended that there be continuous monitoring of the activities within the outdoor areas to ensure casual-normal speech is used. The following table is indicative of children sound level of speech and the associated standard deviation.

Table 7.8 – Children Speech Sound Levels- *

Descriptor	**Sound Pressure Level- -Anechoic Chamber-**	**Standard Deviation**
Casual Speech	53 dB(A	± 5dB
Normal Speech	58 dB(A)	± 5dB
Raised Speech	65 dB(A)	± 7dB
Loud Speech	74 dB(A)	± 9dB
Shouting	82 dB(A)	± 9dB

*Pearson, Bennett & Fidell (1977).

Children are to be separated into groups within the outdoor play area so as to not allow a large group to congregate in one area at any one time.

7.10 NOISE MANAGEMENT PLAN

A Noise Management Plan should be implemented and should include the following:

- Install a contact number at the front of the childcare centre so that complaints regarding the centre operation can be made.
- Implement a complaint handling procedure. If a noise complaint is received the complaint should be recorded on a Complaint Form. The Complaint Form should contain the following:
    - Name and Address of the Complainant
    - Time and Date the Complaint was received
    - The nature of the complaint and the time/date the noise was heard
    - The name of the employee that received the complaint
    - Actions taken to investigate the complaint and the summary of the results of the investigation
    - Indication of what was occurring at the time the noise was happening (if applicable)
    - Required remedial action (if applicable)
    - Validation of the remedial action
    - Summary of feedback to the complaint

Also a register of complaints should be held on the premises for at least 24 months, which shall be reviewed monthly by staff to ensure all complaints are being responded to. All complaints received shall be reported to management with initial action/investigation commencing within 7 days. The complaint should also be notified of the results and actions arising from the investigation.

8 NOISE IMPACT STATEMENT

Acoustic, Noise & Vibration Solutions Pty Ltd have taken background noise level measurements at the most noise sensitive locations near the proposed Childcare Centre located at No. 32 Bagdad St, Regents Park. The levels of noise emission from the Childcare Centre have been calculated and quantified using reliable test data.

Provided the noise controls as recommended in Section 7.0 of this report are fully implemented the noise emission levels will be controlled and not exceed the criteria outlined in this report, including Canterbury Bankstown Council, the AAAC Childcare Guidelines & the NSW Noise Policy for Industry.

Should you require further explanations, please do not hesitate to contact us.

Yours Sincerely,

M. Zaioor
M.S. Eng'g Sci. (UNSW).
M.I.E.(Aust), CPEng
Australian Acoustical Society (Member).

9 APPENDIX

Figure 1 – Site Location

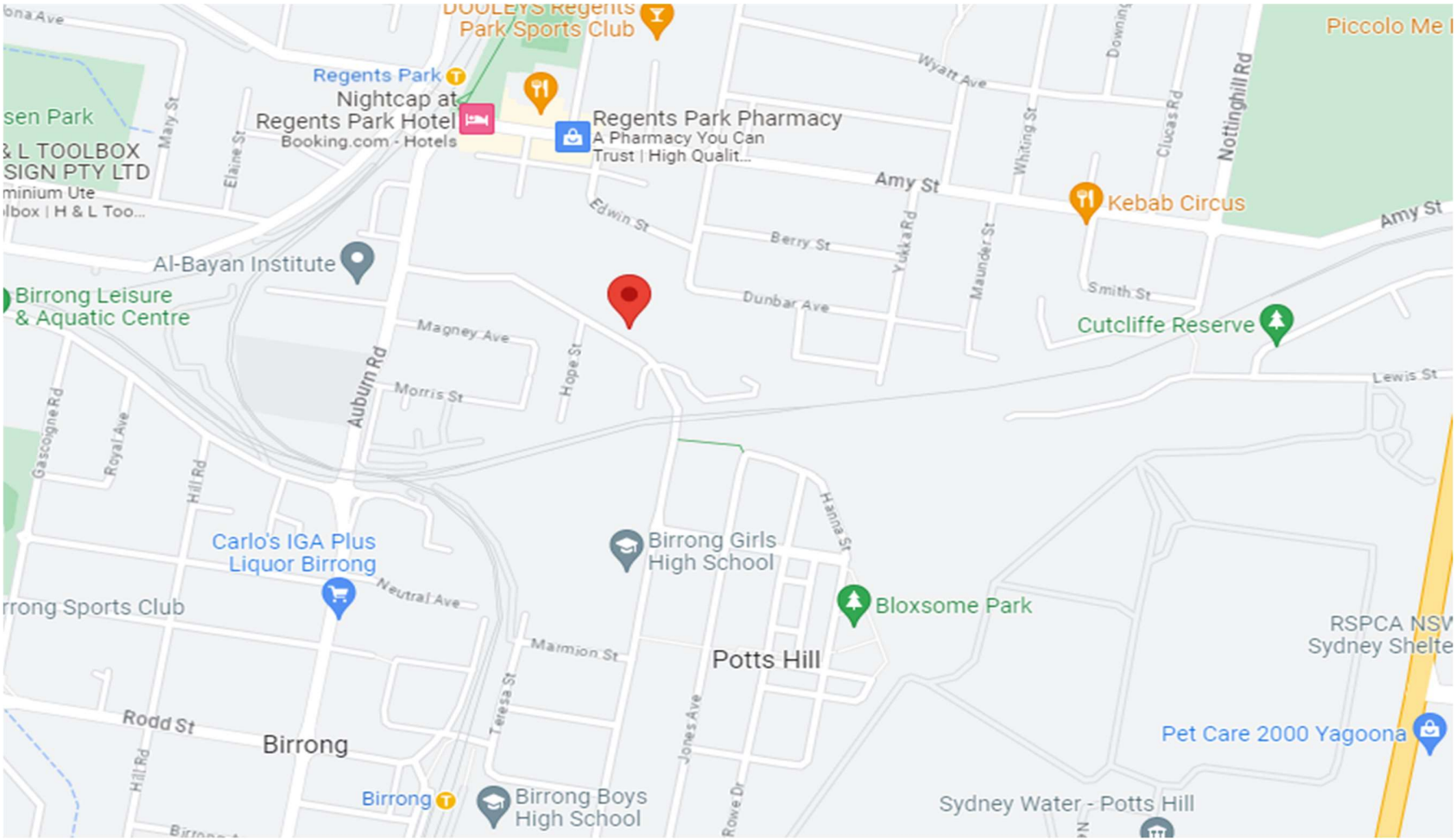

Figure 2 - Surrounding Environment

Figure 3 - Nearest Residential Receivers

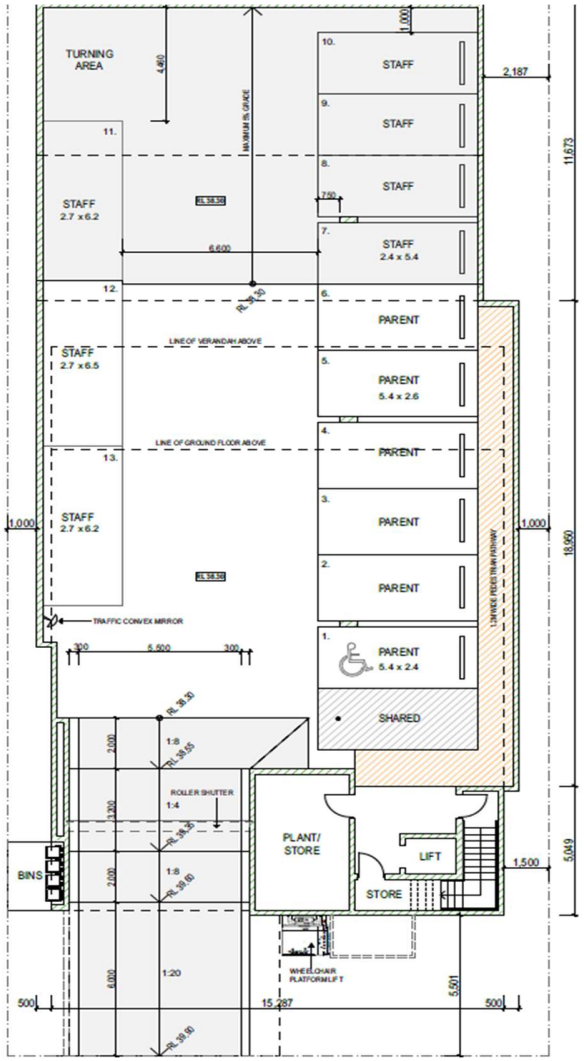

Figure 4 - Proposed Basement Car Park

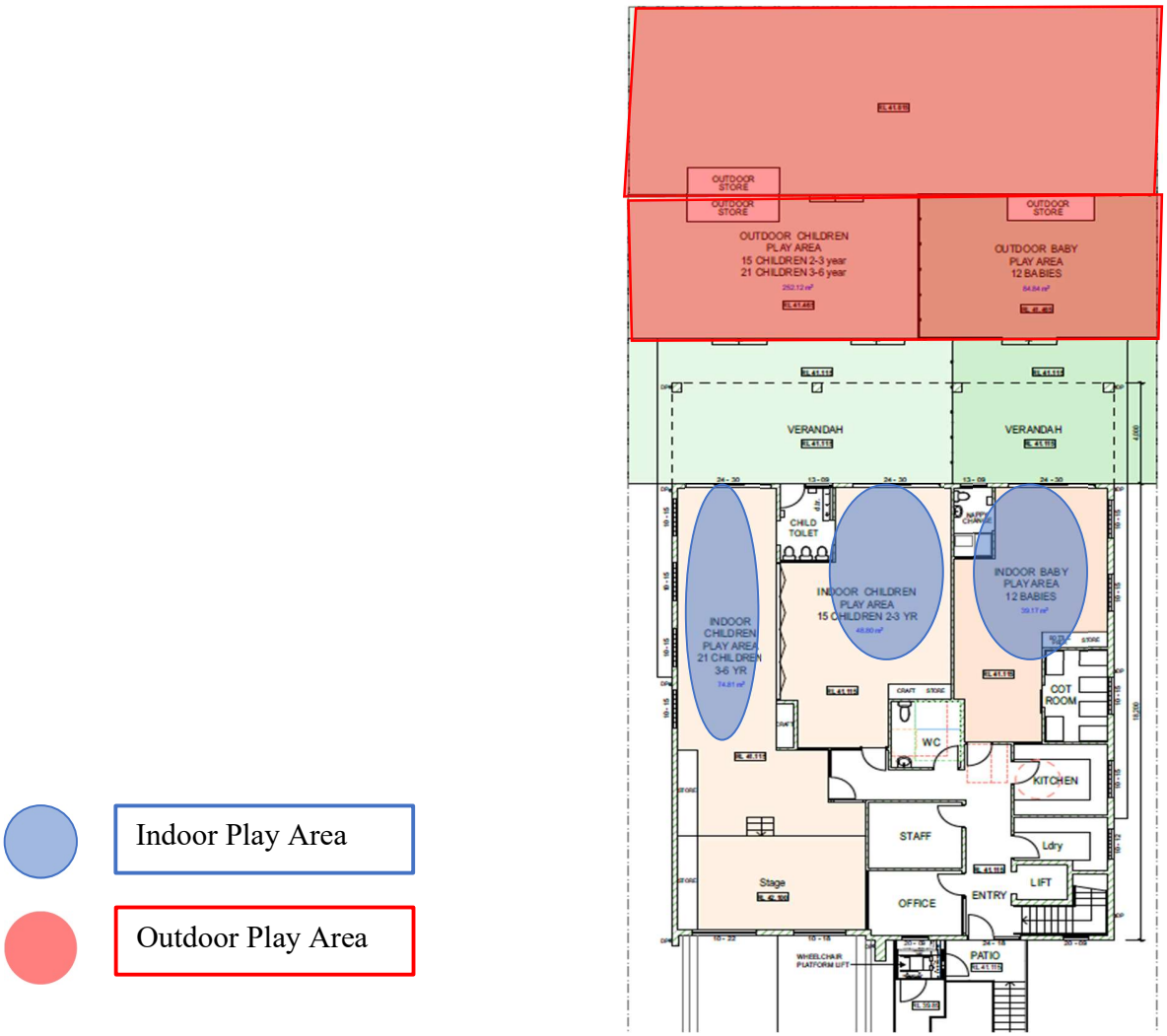

Figure 5 – Proposed Indoor and Outdoor Play Areas

Figure 6 - Noise Reading Location (Point A)

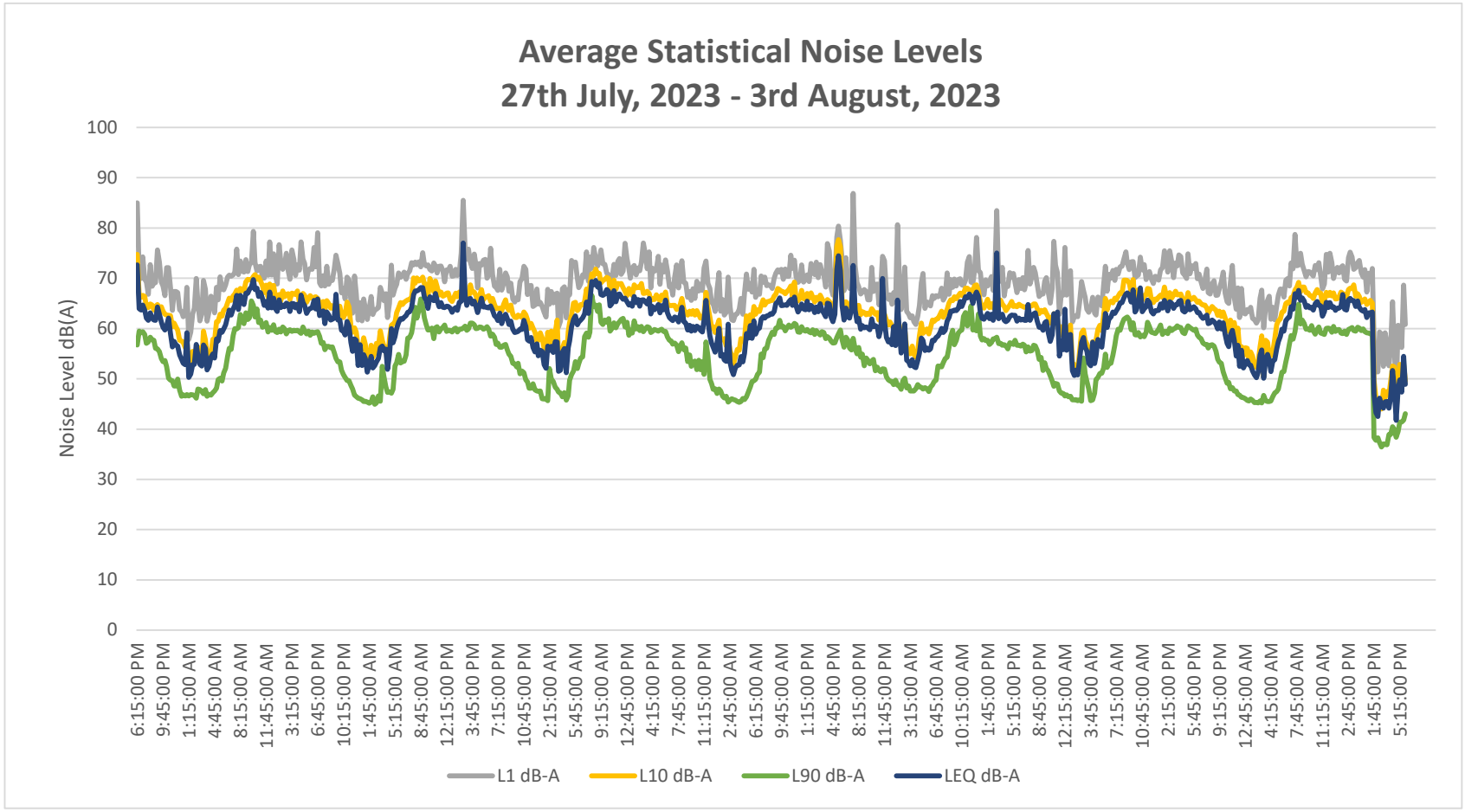

Figure 7 - Noise Survey

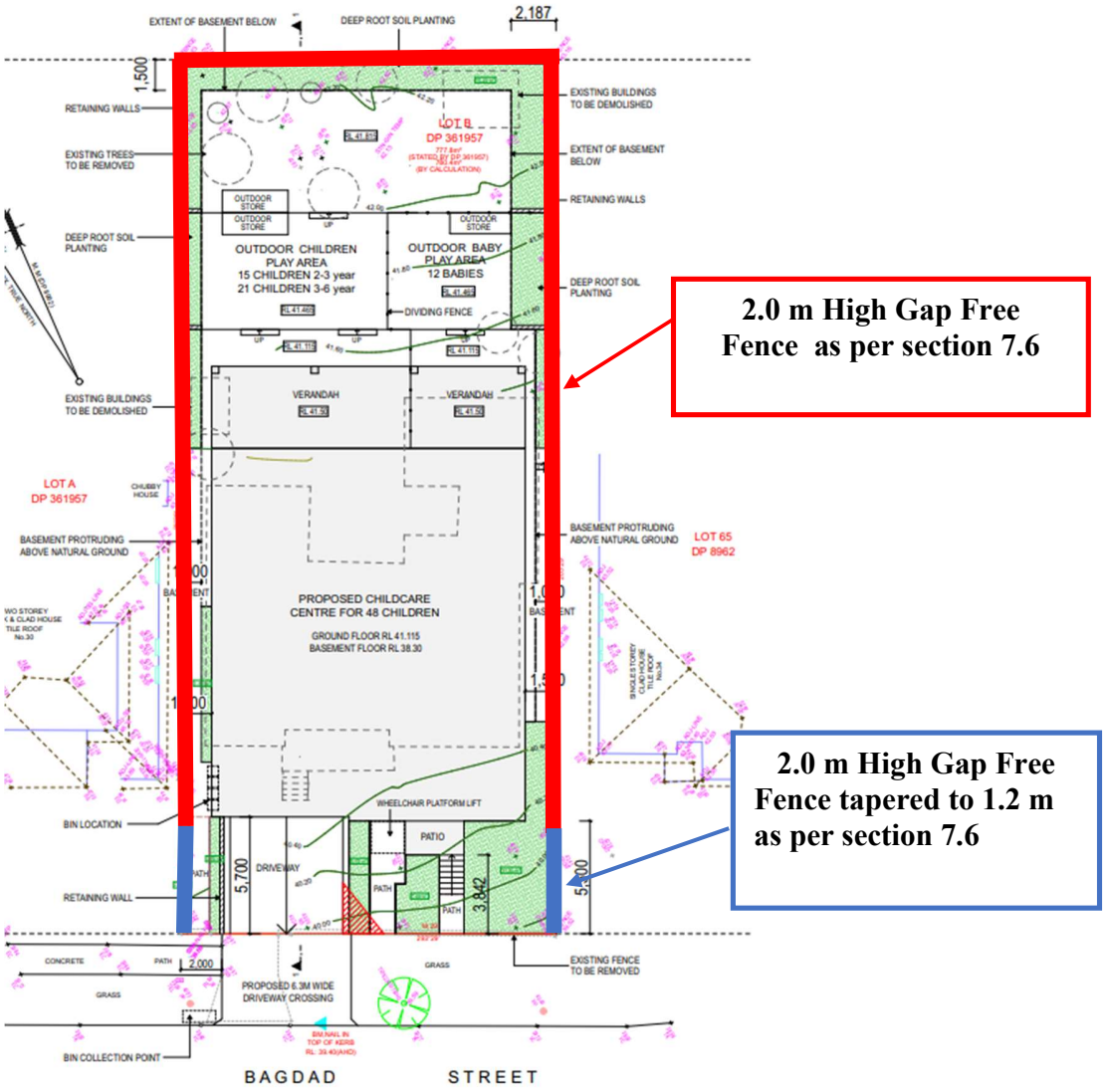

Figure 8 - Proposed Ground Floor Sound Barrier Location