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Child Care Centre

Units 3 to 5, 31 Thompson Street, Bowen Hills

Noise Impact Assessment

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1. Introduction

ASK Consulting Engineers Pty Ltd (ASK) was commissioned by Viva Property Group to provide acoustic consultancy services for the proposed child care centre being constructed at 31 Thompson Street Bowen Hills.

This acoustic report is to accompany a Development Application for the development. The application is made over land at Units 3 to 5, 31 Thompson Street, Bowen Hills QLD 4006, and described as Lots 3, 4 and 5 on BUP9936.

The purpose of this report is as follows:

- Outline the relevant project noise criteria.
- Present the results of noise monitoring.
- Predict and assess the noise emissions from the development onto surrounding sensitive receivers.
- Describe noise mitigation requirements, if any.

To aid in the understanding of the terms in this report a glossary is included in **Appendix A**.

2. Study Area Description

The proposed development is to be located at Units 3 to 5, 31 Thompson Street, Bowen Hills. The site location is shown in **Figure 2.1** (source: QLD Globe Aerial Photography).



Figure 2.1 Site Location

The site consists of 3 two-storey commercial units that are currently unoccupied.

The proposed development is surrounded by the following uses (refer **Figure 2.1**):

- Light industry and offices to the north and east on the overall 31 Thompson Street site.
- Residences to the east within unit 6 and 7 on the overall 31 Thomson Street site (R1 in **Figure 2.1**).
- Hope Centre Church to the north of the overall site.
- Commercial/Light Industrial uses to the south of the site.

The proposed development has the potential to create noise impacts on the caretaker residence from children playing within the subject building and carparking uses. It is noted that there are no outdoor play areas and therefore only indoor play areas can be assessed. It is also noted that the child care centre carpark is part of the carpark associated with the overall 31 Thomson Street site.

3. Proposed Development

The proposed development includes the following components:

- Indoor education and play areas
- Staff facilities and offices.
- Amenities
- Kitchen facilities

The childcare centre hours are currently not confirmed, and therefore it will be assessed based on operational hours of 24 hours per day, 7 days per week.

The proposed building plans are included in **Appendix B**. The proposed Ground and Upper Floor plans are included in **Figure 3.1** and **Figure 3.2** respectively.

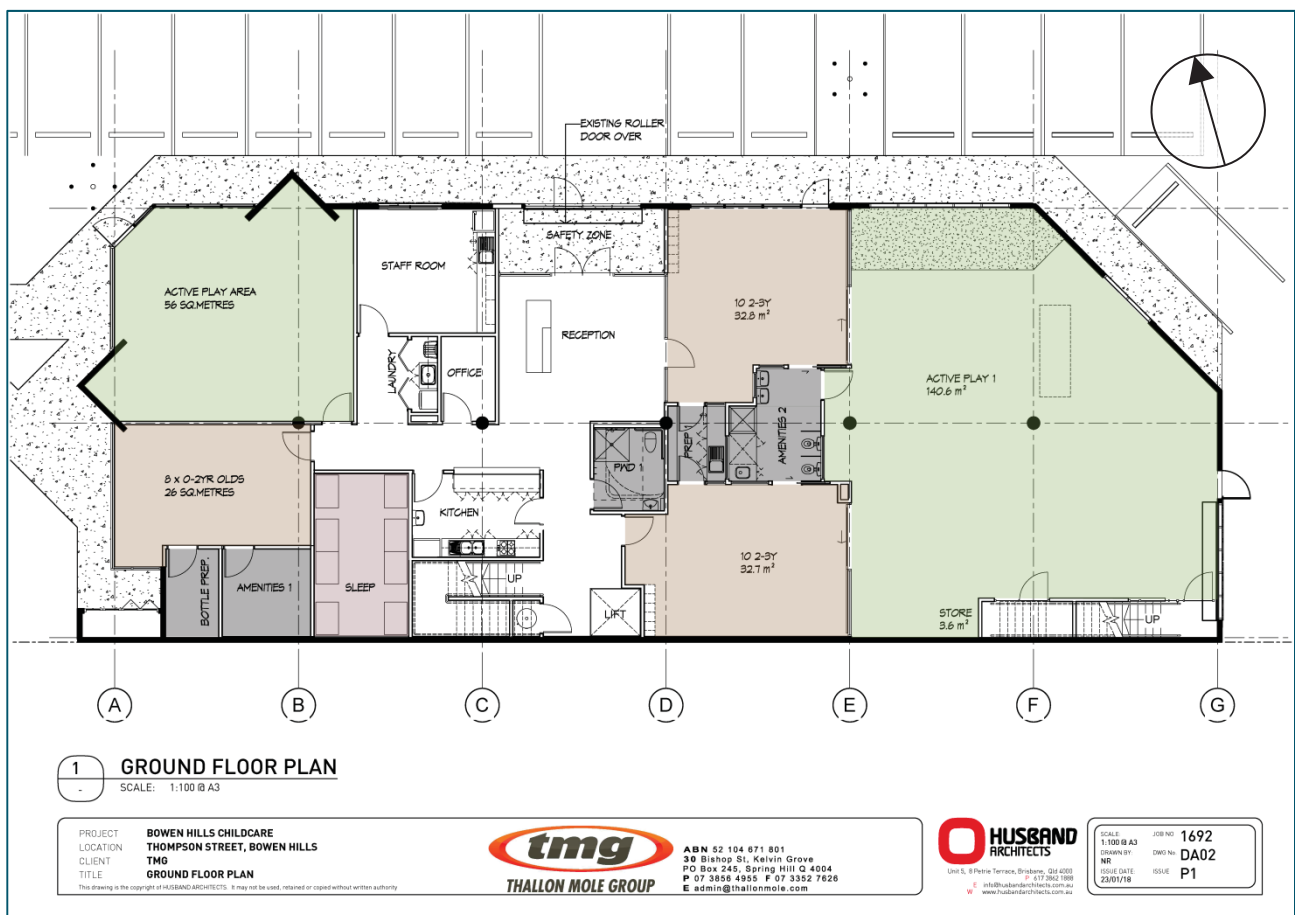


Figure 3.1 Proposed Ground Floor Plan

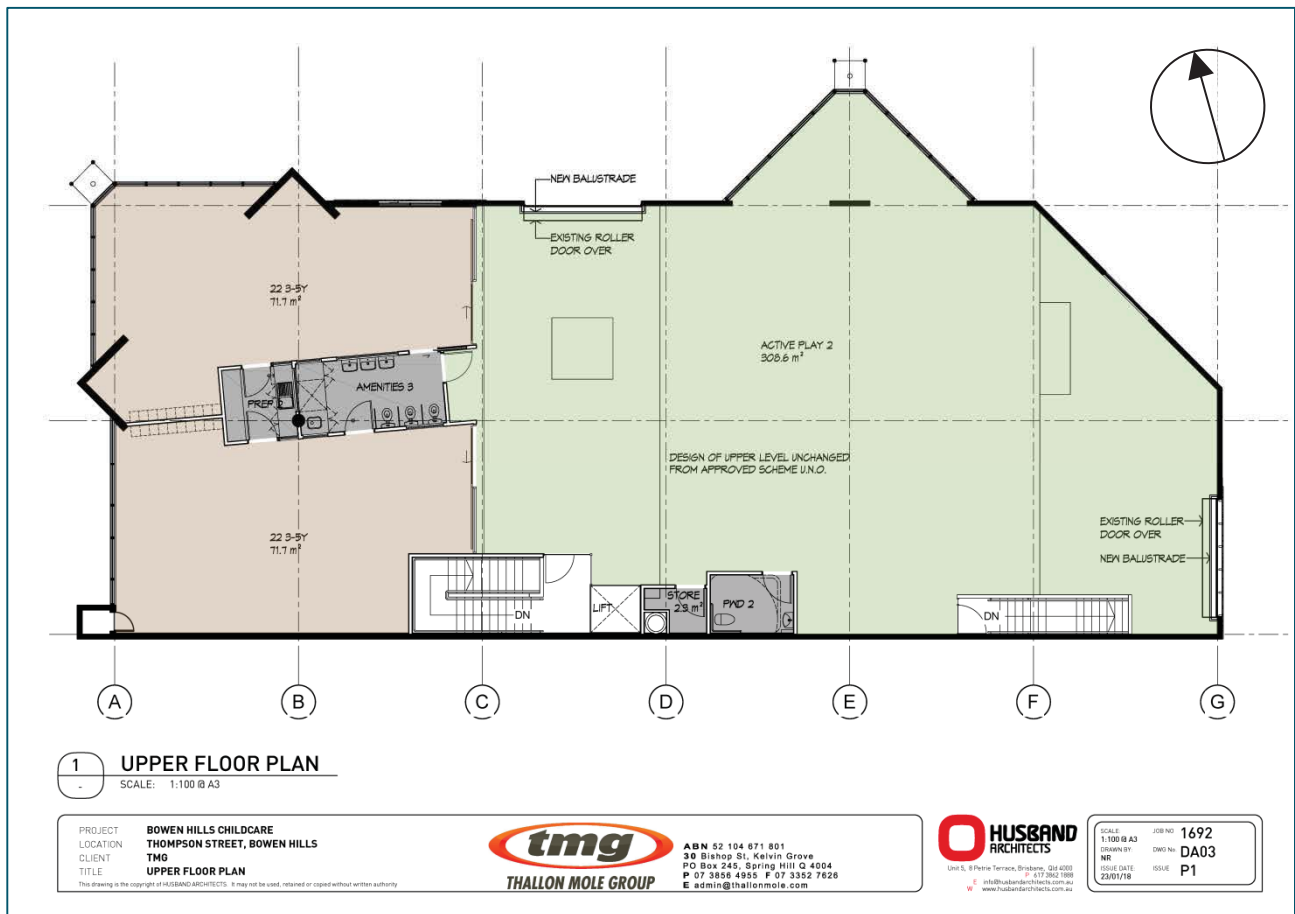


Figure 3.2 Proposed Upper Floor Plan

4. Acoustic Criteria

4.1 Overview

Acoustic criteria for the project will address noise emissions from the proposed development and vehicle movements associated with the development. The noise impact assessment will be undertaken in accordance with relevant codes and policies from Brisbane City Council's (BCC) City Plan 2014 as well as the Bowen Hills Urban Development Area Development Scheme.

4.2 Bowen Hills Urban Development Area Development Scheme

The acoustic assessment will be undertaken in accordance with the Bowen Hills Urban Development Area (UDA) Development Scheme. The Bowen Hills UDA was declared by regulation by the Minister for Infrastructure and Planning on 27 March 2008.

According to the Development Scheme, the subject site is located within Precinct 8 and is zoned as Mixed Use. The Development Scheme level of assessment table for Precinct 8 does not include noise criteria and it is therefore proposed to assess noise from the development against the noise criteria included in the Brisbane City Council (BCC) Centre or Mixed Use Development Code.

4.3 Brisbane City Council

4.3.1 Overview

The Brisbane City Council (BCC) City Plan 2014 includes noise criteria within the various codes in the document. Schedule 6 of City Plan 2014 includes SC6.21 "Noise impact assessment planning scheme policy" which includes information on location of noise criteria within the City Plan, guidelines for preparation of a noise impact assessment report, noise impact control measure information (including maximum acoustic barrier heights), and methods for undertaking assessment.

The relevant code is the Centre or Mixed Use Development Code.

4.3.2 Centre or Mixed Use Development Code

It is proposed that the development is assessed under the Centre or Mixed Use Development Code in Council's City Plan. The Centre or Mixed Use Code contains performance outcomes and acceptable outcomes for noise impacts relating to development in a centre or mixed use zone. The relevant performance outcomes and acceptable outcomes from the Code are presented in **Table 4.1**.

Table 4.1 Relevant Sections of Centre or Mixed Use Code (Partial Copy of Code Table 9.3.3.3.A)

Performance Outcomes	Acceptable Outcomes
PO1 Development: (a) has hours of operation which are controlled so that the use does not detrimentally impact on the amenity of adjoining residents; (b) where not located in a Special entertainment precinct identified in a neighbourhood plan, does not result in noise emissions that exceed the noise (planning) criteria in Table 9.3.3.F low frequency noise criteria in Table 9.3.3.3.G and night-time noise criteria in Table 9.3.3.3.H in a sensitive zone or a nearby	AO1.1 Development: (a) for accommodation activities, dwelling unit or emergency services has unlimited hours of operation; (b) for a club, if licensed, function facility, hotel or nightclub entertainment facility does not generate noise which is clearly audible and detectable, or impacts on the amenity of a resident, in a dwelling or other sensitive use; Note—Development for a club, if licensed, function facility, hotel or nightclub entertainment facility is not

Performance Outcomes	Acceptable Outcomes
sensitive use. Note—A noise impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	expected to achieve this outcome. (c) for any other use: (i) where in the Principal centre zone or Major centre zone has unlimited hours of operation; (ii) where in the District centre zone, Neighbourhood centre zone or Mixed use zone: (A) has hours of operation, including for deliveries, which are limited to 6am to 10pm; or (B) does not generate noise which is clearly audible and disturbing in a dwelling or other sensitive use; (iii) where in any other zone: (A) has hours of operation, including for deliveries, which are limited to 6am to 8pm; or (B) does not generate noise which is clearly audible and disturbing in a dwelling or other sensitive use.
	AO1.2 Development ensures mechanical plant or equipment is acoustically screened from an adjoining sensitive use. Note—Mechanical plant includes generators, motors, compressors and pumps e.g. air-conditioning, refrigeration or cold room motors

Table 4.2 Relevant Noise Criteria For Sensitive Uses (Partial Copy of Code Table 9.3.3.3.F)

Criteria location	Intrusive noise criteria	Acoustic amenity criteria		
	Day, evening and night $L_{Aeq,adj,T}$ are not greater than the RBL plus the value in this column for the relevant criteria location, where T equals: day – 11hr evening – 4hr night – 9hr	Day, evening and night $L_{Aeq,adj,T}$ are not greater than the values in the columns below for the relevant criteria location, where T equals: day – 11hr evening – 4hr night – 9hr		
		Day	Evening	Night
At a sensitive use in the Mixed Use Zone.	5dBA	60dBA	55dBA	50dBA

Table 4.3 Relevant Night-time Noise Criteria for Sensitive Uses (Partial Copy of Code Table 9.3.3.3.H)

Criteria location	Where the existing $L_{Aeq,9hr\ night}$ at the criteria location is:	Average of the highest 15 single L_{Amax} events over a given night (10pm–7am) period is not greater than the following values at the relevant criteria location	The absolute highest single L_{Amax} event over a given night (10pm–7am) period is not greater than the following values at the relevant criteria location
External to a sensitive use located in a: Mixed use zone	Not applicable	65dBA	70dBA

5. Acoustic Measurements

5.1 Overview and Location

Acoustic measurements consisted of an attended noise measurement and noise logging. The noise measurement Location A is shown in **Figure 2.1**. Location A was located in the front ground level garden of Unit 7, 31 Thompson Street, Bowen Hills.

The noise monitoring was undertaken in general accordance with Australian Standard AS1055 Acoustics – Description and measurement of environmental noise and the EHP Noise Measurement Manual 2013.

5.2 Attended Noise Measurement

An attended noise measurement was undertaken at Location A. The measurement was undertaken at 11:47am on 30/04/2018 over a 15 minute period using a field and laboratory calibrated Norsonic NOR140 sound level meter. The microphone height was approximately 1.3m above ground level and was located in the free field. Weather during the time of monitoring was fine, 1/4 cloud cover, with a slight breeze.

The measured noise levels are summarised in **Table 5.1**.

Table 5.1 Attended Noise Measurement Results

Location	Date & Time	Period (Minutes)	Results & Notes
A	11:47pm 30/04/2018	15	Statistical noise levels: L_{10} 55 dBA, L_{eq} 53 dBA, L_{90} 49 dBA Traffic on Thompson Street 52 to 63 dBA Car moving in site car park 58 dBA Crows 54 to 56 dBA Impact noises from nearby unit 73 to 74 dBA

Note: * The reported noise levels, excluding the statistical noise levels, are the instantaneous levels read from the sound level meter, and generally represent the range in noise levels or maximum noise levels for a particular noise source.

5.3 Noise Logging

Noise logging was undertaken at Location A. Logging was undertaken from 24/04/2018 to 30/04/2018 using a field and laboratory calibrated Larson Davis LD831 environmental noise logger. Noise logging was undertaken in the free field.

Data from the Bureau of Meteorology (Brisbane) indicates that weather during the monitoring period was generally fine and warm, with light rainfall on Wednesday 25th (1.2mm) and Sunday 29th (0.4mm). Overall, the noise monitoring data is considered acceptable for use in this report.

The measured noise levels are shown in **Figure 5.1**.

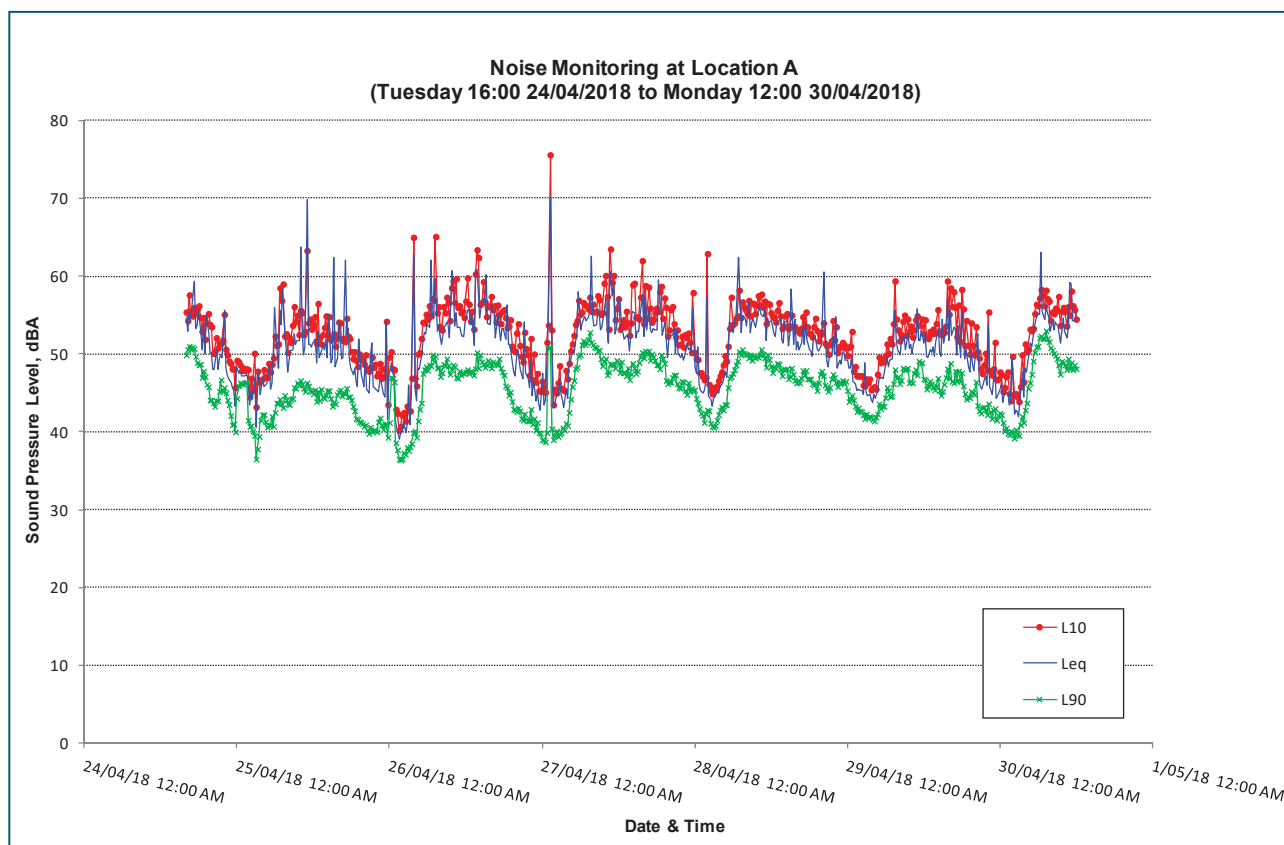


Figure 5.1 Graph of Noise Logging Results at Location A

From the noise logging the statistical results have been summarised in **Table 5.2**.

Table 5.2 Statistical Noise Levels at Location A

Parameter	Noise Levels dBA [Maximum-Top 10%-(Average)-Bottom 10%-Minimum]		
	Day	Evening	Night
$L_{\max}$	93-80-(72)-64-59	86-77-(67)-60-56	89-74-(64)-55-51
L_1	84-68-(62)-58-54	75-65-(59)-54-51	81-64-(56)-50-46
L_{10}	65-58-(55)-52-50	59-56-(52)-49-48	76-55-(49)-45-40
L_{eq}	70-57-(54)-50-48	61-54-(50)-47-45	70-54-(48)-43-39
L_{90}	53-50-(48)-45-43	50-48-(45)-41-40	52-48-(43)-39-36

The background noise levels calculated using the lowest 10th percentile method are shown in **Table 5.3**.

Table 5.3 Rating Background Noise Levels (RBLs) at Location A

Period	Rating Background Noise Level (RBL) L_{90} dBA
Day (7am to 6pm)	47
Evening (6pm to 10pm)	43
Night (10pm to 7am)	39

6. Play Area Noise Assessment

6.1 Overview

The child care centre is proposed to be located within units 3-5 as shown in **Figure 2.1**. All of the child care activities will occur inside of the building as there are no outdoor play areas.

Noise emissions from children playing inside the building are required to be assessed. The nearest sensitive receivers to the subject site are the residences in Unit 6 and 7 on the overall site (R1, see **Figure 2.1**).

6.2 Noise Source Data

Noise emissions from children in indoor play areas have been predicted at the nearest sensitive receivers using the following sound power levels (L_w) for a group of 10 children:

- 0-2 years general activity in outdoor play areas: 79 dBA $L_{w,eq}$
- 2-3 years general activity in outdoor play areas: 85 dBA $L_{w,eq}$
- 3-5 years general activity in outdoor play areas: 87 dBA $L_{w,eq}$

This is in accordance with the Association of Australian Acoustical Consultants (AAAC) Guideline for Child Care Centre Acoustic Assessments, which gives the L_w of 10 children aged 0 to 2 years to be 77 to 80 dBA, 2 to 3 years to be 83 to 87 dBA and children aged 3 to 6 years to be 84 to 90 dBA. The L_w of children playing varies widely depending on the age of the children and the activity that the children are engaged with. The sound power levels provided in the AAAC guideline are typical effective sound power levels that allow for children engaging in activities that include loud talking, laughing and shouting.

It is understood that the capacity of the child care centre is up to 72 children. Noise predictions have been undertaken including approximately 72 children within the centre.

6.3 Noise Criteria

The project noise criteria were outlined in **Section 4**, and the noise limits can be determined based on the noise monitoring results in **Section 5**. The proposed noise limits are presented in **Table 6.1**.

Table 6.1 Proposed Noise Limits

Time period	Rating Background Noise Level (RBL) L_{90} dBA	Proposed Noise Limits
Day (7am to 6pm)	47	52 dBA $L_{Aeq,adj,11hour}$
Evening (6pm to 10pm)	43	48 dBA $L_{Aeq,adj,4hour}$
Night (10pm to 7am)	39	44 dBA $L_{Aeq,adj,9hour}$ 65 dBA $L_{Amax(15\text{ events})}$ 70 dBA L_{Amax}

6.4 Predicted Noise Levels

Based on the proposed plans, only noise from the active play areas closest to the existing residences are considered potential noise issues, and are proposed to be assessed in further detail. Other rooms are generally considered able to achieve noise limits without detailed analysis.

The existing residences to the east of the subject site are located at the following approximate distances from the closest active play areas.

- 11m from the eastern wall of Active Play Area 1 (Ground Floor)
- 11m from the eastern wall of Active Play Area 2 (Upper Floor)

The general construction of the rooms is assumed as follows:

- Lightweight insulated wall (e.g. cladding, timber stud, insulation and 13mm plasterboard walls) or masonry construction (minimum Rw 38).
- Minimum 6mm laminated glass windows (Rw 30) to northern side of Active Play Area 2.
- Minimum 3mm glass windows (Rw 23) to eastern side of Active Play Area 1 and 2.
- Solid core external doors with seals (Rw 25).
- Existing metal roller doors (Rw 15).
- Metal roof, bulk insulation, and plasterboard ceiling (Rw 41).
- Suitable internal absorptive finishes to achieve target reverberation times from AS2107.

Based on the proposed child care sound power levels and room conditions the calculated average room noise levels are 76 dBA L_{eq} in Active Play Area 1 and 78 dBA L_{eq} in Active Play Area 2.

Based on standard acoustic algorithms and assuming Active Play Area windows and doors are closed, the calculated noise level at the nearest residences from Active Play Area 1 is 40 dBA L_{eq} and from Active Play Area 2 is 42 dBA L_{eq} (refer **Table 6.2** and **Table 6.3**). The weakest element of the play rooms is the roller door on the eastern side of the building.

Table 6.2 Summary of Calculations of Noise Emissions from Active Play Area 1 (Ground Floor)

Room-Element	Noise Level inside Room, dBA (dBZ)	Material Acoustic Rating, Rw dB	Area, m ²	External Sound Power Level of Element, dBA	Distance to Receiver, metres	Shielding, dBA	Directivity/Other, dBA	Noise Level at Receiver, dBA
East Wall	76 (81)	38	29	52	11	0	0	24
North Wall	76 (81)	38	16	50	17	0	0	19
South Wall	76 (81)	38	32	53	12	0	0	24
East Window	76 (81)	23	4	56	11	0	0	29
East Door	76 (81)	25	2	53	11	0	0	26
East Roller Door	76 (81)	15	9	66	11	0	0	39
TOTAL	-	-	96	67	-	-	-	40

Note: Noise levels at receivers are calculated using octave band data.

Table 6.3 Summary of Calculations of Noise Emissions from Active Play Area 2 (Upper Floor)

Room-Element	Noise Level inside Room, dBA (dBZ)	Material Acoustic Rating, Rw dB	Area, m ²	External Sound Power Level of Element, dBA	Distance to Receiver, metres	Shielding, dBA	Directivity/Other, dBA	Noise Level at Receiver, dBA
East Wall	78 (84)	38	31	55	11	0	0	26
North Wall	78 (84)	38	29	54	17	0	0	23
South Wall	78 (84)	38	37	55	12	0	0	26
Roof	78 (84)	41	309	65	28	0	0	25
North Glazing	78 (84)	30	29	62	19	0	0	30
East Window	78 (84)	23	4	58	11	0	0	31
East Roller Door	78 (84)	15	9	69	11	0	0	41
TOTAL	-	-	452	71	-	-	-	42

Note: Noise levels at receivers are calculated using octave band data.

It can be seen from **Table 6.2** and **Table 6.3** that the predicted noise levels from both active play areas are compliant with the day evening and night time limits in **Table 6.1** at the nearest residence.

If both play areas were to be used at one time at full capacity the predicted noise level at the nearest residence, calculated using a logarithmic addition, is calculated to be 44 dBA L_{eq} which is compliant with the day, evening at night time criteria at the nearest residence. If the centre was at half capacity, the calculated noise level at nearby residences would reduce by 3 dB to 41 dBA L_{eq} .

Based on the calculated average noise levels of up to 44 dBA L_{eq} , the maximum noise limits of 65 and 70 dBA L_{max} in **Table 6.1** would also be readily achieved.

To achieve the required level of noise control with noisy activities occurring will require all external openings (e.g. windows) to play areas to be closed. Therefore, an air-conditioning/mechanical ventilation system that does not degrade the internal acoustic environment or the sound isolation of the building envelope, and also meets the ventilation requirements of the Building Code of Australia may need to be installed.

7. Carpark Noise Assessment

7.1 Overview

Noise emissions from onsite vehicle movements require assessment to manage potential noise impacts on to nearby residential locations. The onsite vehicle movements during the proposed hours are expected to be comprised of patron and staff vehicles (i.e. cars).

7.2 Noise Source Data

Source noise level data has been adopted from ASK's library of noise measurements and is presented in **Table 7.1**.

Table 7.1 Source Noise Level Data

Activity	Source	Noise Level
Onsite vehicles	Car, slow movement (flat and level)	50 dBA L_{max} @ 20m
	Car door slam	58 dBA L_{max} @ 20m

7.3 Noise Criteria

The project noise criteria were outlined in **Table 4.2** and **Table 4.3**, and the noise limits can be determined based on the noise monitoring results in **Section 5**. The proposed noise limits are presented in **Table 6.1**.

7.4 Predicted Noise Levels

7.4.1 Overview

The noise emissions from the proposed development have been predicted using moving point source (vehicle movements) and fixed point sources (car door slams) formulas.

7.4.2 Noise Level Results

The predicted L_{eq} noise levels for vehicle movements are included in **Table 7.2** and are based on the maximum number of vehicles per hour allowed to achieve compliance. It has been assumed that the number of vehicles accessing the site during the night time would be half of the daytime and evening values. According to the BCC City Plan L_{max} noise levels from vehicle movements are to be excluded from L_{max} assessment and therefore have not been assessed.

The predicted L_{eq} and L_{max} noise levels for car door slams are included in **Table 7.3**.

s L_{eq} Noise Levels

Vehicle Speed (km/hr)	Distance (m)	Duration per Event (seconds)	Interval (seconds)	Events per Interval	Predicted Noise Level, $L_{eq,adj,1hr}$ dBA	Day Noise Limit $L_{eq,adj,1hr}$ dBA	Evening Noise Limit $L_{eq,adj,1hr}$ dBA	Night Noise Limit $L_{eq,adj,1hr}$ dBA	Compliance with Table 6.1 Limits?
15	15	26	3600	96	42	52	48	44	Yes
15	15	26	3600	48	39	52	48	44	Yes

Table 7.3 Predicted Car Door Slam Noise Levels

Carpark	Distance to Receptor (m)	Predicted Noise Level, $L_{eq,adj,1hr}$ dBA	Predicted Noise Level, L_{max} dBA
1	12	34	63
2	12	34	63
3	14	33	62
4	16	32	60
5	18	31	59
6	20	30	59
7	22	29	58
8	24	28	57
9	26	28	56
10	28	27	56
11	30	26	55
12	32	26	54
13	34	25	54
14	36	25	53
15	38	24	53
TOTAL	-	42	-
Average	-	-	57 (Limit 65 dBA)
Maximum	-	-	63 (Limit 70 dBA)

From **Table 7.3** the predicted maximum noise levels are below the maximum noise level limits in **Table 6.1**.

The total predicted L_{eq} noise levels from vehicle movements and car door slams are shown below in **Table 7.4**.

Table 7.4 Total Predicted Carpark L_{eq} Noise Levels

Noise Source	Predicted Noise Level, $L_{eq,adj,1hr}$ dBA (Vehicle Movements)	Predicted Noise Level, $L_{eq,adj,1hr}$ dBA (Car Door Slams)	Predicted Noise Level, $L_{eq,adj,1hr}$ dBA (Total)
Carpark Vehicles (Daytime and Evening)	42	42	45
Carpark Vehicles (Night)	39	39	42

From **Table 7.4** the total predicted L_{eq} noise levels from vehicle movements and car door slams within the car park are compliant with the daytime, evening and night criteria in **Table 6.1**.

Noise from the carpark could further be reduced at the nearby residences by limiting any night time carpark usage to the western carparks, but calculations indicate this is not required.

7.4.3 Cumulative Noise

The noise levels from children playing in the centre and the carpark are both predicted to comply with the **Table 6.1** noise limits in the day, evening and night periods (i.e. 24 hours per day, 7 days per week).

It is not expected that the peak childcare noise in **Section 6** would occur simultaneously with the peak carpark movements in **Table 7.4**. Never-the-less the total of the peak hour childcare centre noise (44 dBA L_{eq}) and peak hour traffic movements (45 dBA L_{eq}) equals 48 dBA L_{eq} which achieves the day and evening noise limits of 52 dBA L_{eq} and 48 dBA L_{eq} (refer **Table 6.1**) respectively. At night, the cumulative peak hours (calculated at half capacity) would be 41 dBA and 42 dBA = 45 dBA L_{eq} which exceeds the night limit of 44 dBA by 1 dBA, but as stated above, this situation is not expected to occur in reality and could be avoided by limited night time carparks to the western half of the nominated carpark area.

8. Mechanical Plant Noise Assessment

The existing mechanical plant is proposed to be used for the child care, and this is presumably acceptable under the original development approval for the site. The existing plant may not be acoustically approved for night time use, and thus two options are presented if night-time child care centre use is proposed:

- In accordance with Acceptable Outcome AO1.2 from the Centre or Mixed Use Development Code, acoustic screening of the mechanical plant from nearby sensitive receivers will fulfil the performance outcomes for mechanical plant noise emissions. 'Acoustic screening' is defined in City Plan 2014 as "The source of noise is completely screened from view of habitable rooms (including balconies, patios, decks and verandas) of an adjoining sensitive use by solid, gap free material and construction e.g. acoustic fence, building, or enclosure."
- Noise from the mechanical plant could be measured, assessed and (if required) mitigated to achieve the noise limits in **Table 6.1**.

9. Recommendations & Conclusion

A noise assessment has been conducted for the proposed child care centre. The results and recommendations of the assessment are as follows:

Child Care Centre Noise

- Predicted noise levels from the active play areas comply with the day, evening and night time limits.
- The minimum construction of the building is included in **Section 6.4**.
- External windows and doors to play areas/rooms are to remain closed when in use with noisy activities. Therefore, an air-conditioning/mechanical ventilation system that does not degrade the internal acoustic environment or the sound isolation of the building envelope, and also meets the ventilation requirements of the Building Code of Australia may need to be installed.

Car Park Noise

- Noise emissions from the child care centre car park are assessed in **Section 7**.
- Based on the results of noise calculations, noise emissions from the car park will be compliant with the day, evening and night time noise limits.

Cumulative Noise

- Cumulative noise from the children and cars has been considered in Section 7.4.3 and is considered acceptable. It is recommended that if the centre is used at night (10pm to 6am particularly), the carparking be limited to the western carparks away from the nearby residence.

Mechanical Plant Noise

- The existing mechanical plant is proposed to be used for the child care, and this is presumably acceptable under the original development approval for the site. The existing plant may not be acoustically approved for night time use, and thus two options are presented if night-time child care centre use is proposed:
 - In accordance with Acceptable Outcome AO1.2 from the Centre or Mixed Use Development Code, acoustic screening of the mechanical plant from nearby sensitive receivers will fulfil the performance outcomes for mechanical plant noise emissions. 'Acoustic screening' is defined in City Plan 2014 as "The source of noise is completely screened from view of habitable rooms (including balconies, patios, decks and verandas) of an adjoining sensitive use by solid, gap free material and construction e.g. acoustic fence, building, or enclosure."
 - Noise from the mechanical plant could be measured, assessed and (if required) mitigated to achieve the noise limits in **Table 6.1**.

Summary

- The proposed child care centre is considered able to operate 24 hours/day.

Appendix A Glossary

Parameter or Term	Description
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
Free-field	The description of a noise receiver or source location which is away from any significantly reflective objects (e.g. buildings, walls).
L_1	The noise level exceeded for 1% of the measurement period.
L_{10}	The noise level exceeded for 10% of the measurement period. It is sometimes referred to as the average maximum noise level.
L_{90}	The noise level exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level, which is the constant sound level over a given time period, which is equivalent in total sound energy to the time-varying sound level, measured over the same time period.
$L_{eq,1hour}$	As for L_{eq} except the measurement intervals are defined as 1 hour duration.
L_{max}	Maximum A-weighted sound pressure level. Brisbane City Council 2014 City Plan and Moreton Bay Regional Council Noise Policy additional definition: L_{max} assessment only applies to 'specified noise sources' which are defined as - (a) impact noises; (b) hammering; (c) loading/unloading; (d) dropping items; (e) beepers, alarms, bells, phones, sirens; (f) power tools; (g) valve releases; (h) air brakes; and (i) door slamming. People noise and vehicle pass-by noise (engine, exhaust, induction, and tyres) are specifically excluded.
$L_{eq}(24 \text{ hour})$	The average L_{eq} noise level over the 24-hour period from midnight to midnight.
$L_{10}(18 \text{ hour})$	The arithmetic average of the one-hour L_{10} values between 6am and midnight. This parameter is used in the assessment of road traffic noise.
R_w	Weighted Sound Reduction Index – is a single number evaluation of the property of a partition to attenuate sounds. For the majority of partitions, the value of R_w will be similar to the value for STC. Partitions with particularly poor performance at 100 Hz may have lower values for R_w than for STC. Conversely, partitions with poor performance at 4000 Hz may have higher R_w than for STC. (As per AS1276.1-1999).
Habitable Rooms	According to the "Building Code of Australia" a Habitable Room is: "a room used for normal domestic activities and Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre, and sunroom, but Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised

Parameter or Term	Description
	nature occupied neither frequently nor for extended periods."
Acoustically screened	Brisbane City Council 2014 City Plan definition: The source of noise is completely screened from view of habitable rooms (including balconies, patios, decks and verandas) of an adjoining sensitive use by solid, gap free material and construction e.g. acoustic fence, building, or enclosure.
Sensitive Uses	Brisbane City Council 2014 City Plan definition: A use that is child care centre, community care centre, community residence, dual occupancy, dwelling house, dwelling unit, educational establishment, health care services, hospital, multiple dwelling, relocatable home park, residential care facility, retirement facility, rooming accommodation, short term accommodation or tourist park.

Appendix B Project Drawings

THOMPSON STREET

EXISTING NEIGHBOURING BUILDING

SITE BOUNDARY

EXISTING CAR PARK

ALL EXTERNAL
AND OPENING
REMAIN

EXISTING EXTERNAL
LANDSCAPING AND
PATHWAYS TO REMAIN

SITE BOUNDARY

SITE BOUNDARY

A

B

C

D

E

1

SITE PLAN

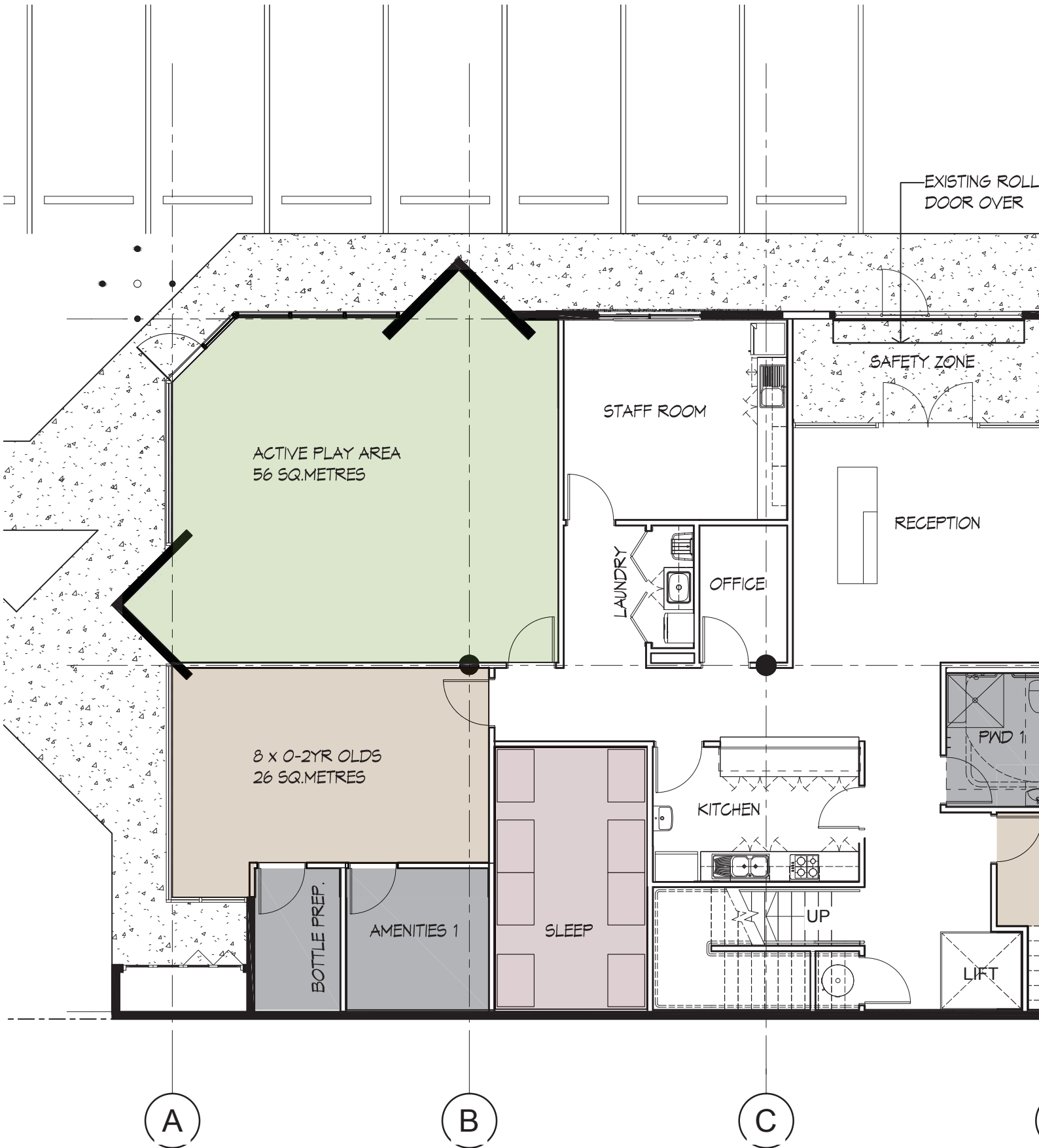
SCALE: 1:200 @ A3

PROJECT
LOCATION
CLIENT
TITLE

BOWEN HILLS CHILDCARE
THOMPSON STREET, BOWEN HILLS
TMG
SITE PLAN

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tmg
THALLON MOLE GROUP



1

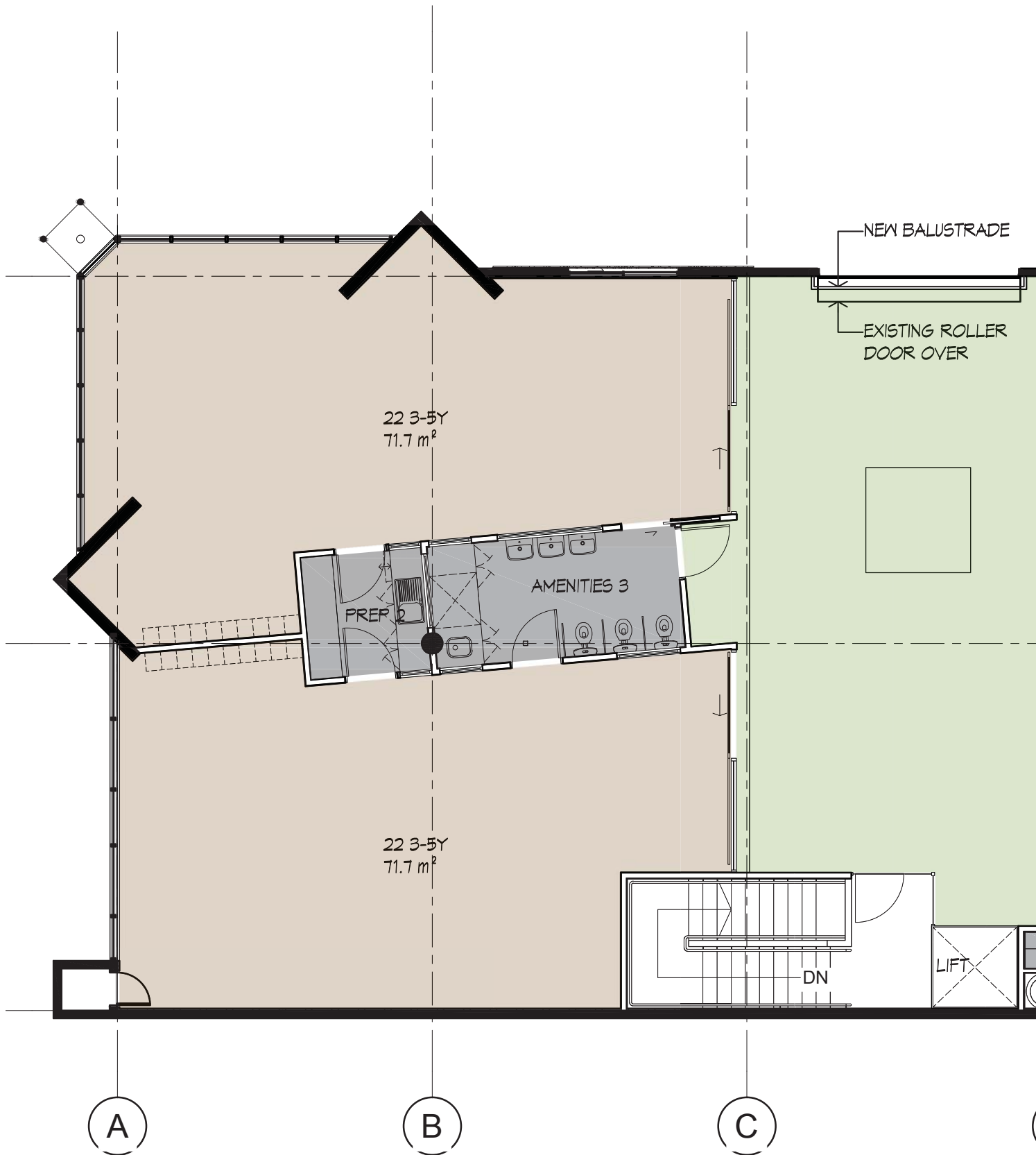
GROUND FLOOR PLAN

SCALE: 1:100 @ A3

PROJECT
LOCATION
CLIENT
TITLE

BOWEN HILLS CHILDCARE
THOMPSON STREET, BOWEN HILLS
TMG
GROUND FLOOR PLAN

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1 UPPER FLOOR PLAN

SCALE: 1:100 @ A3

PROJECT **BOWEN HILLS CHILDCARE**
 LOCATION **THOMPSON STREET, BOWEN HILLS**
 CLIENT **TMG**
 TITLE **UPPER FLOOR PLAN**

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