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Environmental Noise Assessment

**1 Newmarket Parade, Butler
Proposed Childcare and Commercial
Development**

Reference: 21026155-01

Prepared for:
Oreana Property Group

Report: 21096672-01

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1 INTRODUCTION

It is proposed to develop 1 Newmarket Place in Butler (refer *Figure 1-1*) as a childcare centre (CCC) and a mixed commercial development. The proposed childcare centre development will consist of the following:

- Five internal play spaces capable of accommodating up to 90 children, grouped as follows:
 - Group Room 1 – 20 places for 3+ years
 - Group Room 2 – 20 places for 3+ years,
 - Group Room 3 – 20 places for 3+ years,
 - Group Room 4 – 15 places for 2-3 years,
 - Group Room 5 – 15 places for 0-2 years,
- Outdoor play areas located to the north, east and west of the building.
- Eight (8) Commercial tenancies, including one with alfresco dining.
- Amenities and associated mechanical plant to both tenancies such as:
 - kitchen with rangehood and exhaust fans assumed to be located on the roof above CCC and Cafe,
 - Various exhaust fans (toilets, laundry, nappy room) assumed to be located on the roof above the various tenancies, and
 - AC plant assumed to be located on rooftop above areas serviced.
- Car parking on the central area of the lot.

It is noted that existing residential premises are in the vicinity of the subject site. This report presents the assessment of the noise emissions from child play, patron noise, car doors closing in the car park and indicative mechanical plant associated with the overall development against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997* (the Regulations) based on the drawings shown in *Appendix A*.

The proposed hours of operation for the CCC are 6.30am to 6.30pm Monday to Friday. Therefore, staff and parents can arrive and park before 7.00am, which is during the night-time period of the Regulations. It is assumed outdoor child play would not occur until after 7.00am. The commercial tenancies are assumed to be open between 7am and 10pm Monday to Saturday, and 9am to 10pm on Sundays.

Appendix B contains a description of some of the terminology used throughout this report.



Figure 1-1 Project Locality

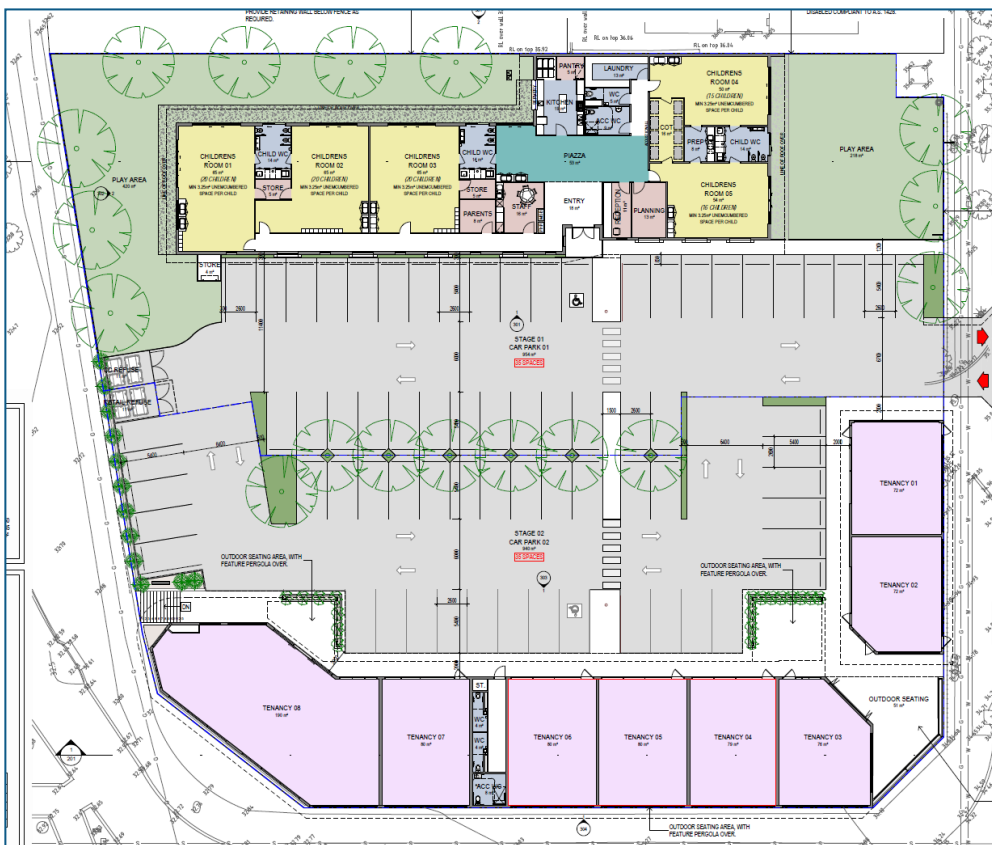


Figure 1-2 Project Site Plan

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

“7. (1) Noise emitted from any premises or public place when received at other premises –

- (a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and
- (b) Must be free of –
 - i. tonality;
 - ii. impulsiveness; and
 - iii. modulation,
 when assessed under regulation 9”

A “...noise emission is taken to significantly contribute to a level of noise if the noise emission ... exceeds a value which is 5 dB below the assigned level...”

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

- (a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and
- (b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

1. *highly sensitive area* means that area (if any) of noise sensitive premises comprising —
- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
 - any other part of the premises within 15 metres of that building or that part of the building.

The total influencing factor, applicable at the noise sensitive premises has been calculated as 7 dB, as shown in *Table 2-3*. The transport factor has been calculated as 6 dB, due to Marmion Avenue being considered a major road (> 15,000 vehicles per day – Traffic Site LM01050) within 100 metres of the residences.

Table 2-3 Influencing Factor Calculation

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	0 %	0 dB
Commercial Land	15%	1 %	7 dB
Transport Factor			6 dB
Total			7 dB

Table 2-4 shows the assigned noise levels including the influencing factor and transport factor at the receiving locations.

Table 2-4 Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	52	62	72
	0900 to 1900 hours Sunday and public holidays (Sunday)	47	57	72
	1900 to 2200 hours all days (Evening)	47	57	62
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	42	52	62
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

1. *highly sensitive area* means that area (if any) of noise sensitive premises comprising —
- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
 - any other part of the premises within 15 metres of that building or that part of the building.

It should be noted the assigned noise levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces. Where this was not possible to be achieved due to the close proximity of existing buildings and/or fences, the noise emissions were assessed at a point within 1 metre from building facades and a -2 dB adjustment was made to the predicted noise levels to account for reflected noise.

It is noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector or authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector or authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector or authorised person*. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

3 METHODOLOGY

Computer modelling has been used to predict the noise emissions from the development at all nearby receivers. The software used was *SoundPLAN 8.2* with the ISO 9613 algorithms (ISO 171534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances.

Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Day (0700-1900)	Night (1900-0700)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.2 Topographical Data

Topographical information was based on data publicly available (e.g. *Google*) in the form of spot heights and combined with finished floor levels provided on the development drawings. It is noted that the subject site sits on top of retaining walls (relative to Marmion Avenue), and properties to the east are also atop further retaining walls (5 course limestone blocks). The house to the immediate north is 1-metre higher relative to the development. This has been reproduced as accurately as possible in the noise model.

3.3 Buildings and Receivers

Surrounding existing buildings were included in the noise model, as these can provide noise shielding as well as reflection paths.

Nearby residences are single, double or triple storey and were modelled as 3.5 metre, 6.0 metre and 9.0 metre high buildings, with receivers located 1.4, 4.4 and 7.4 metres above ground level, respectively.

Figure 3-1 shows a 2D overview of the noise model with the location of all relevant receivers identified.

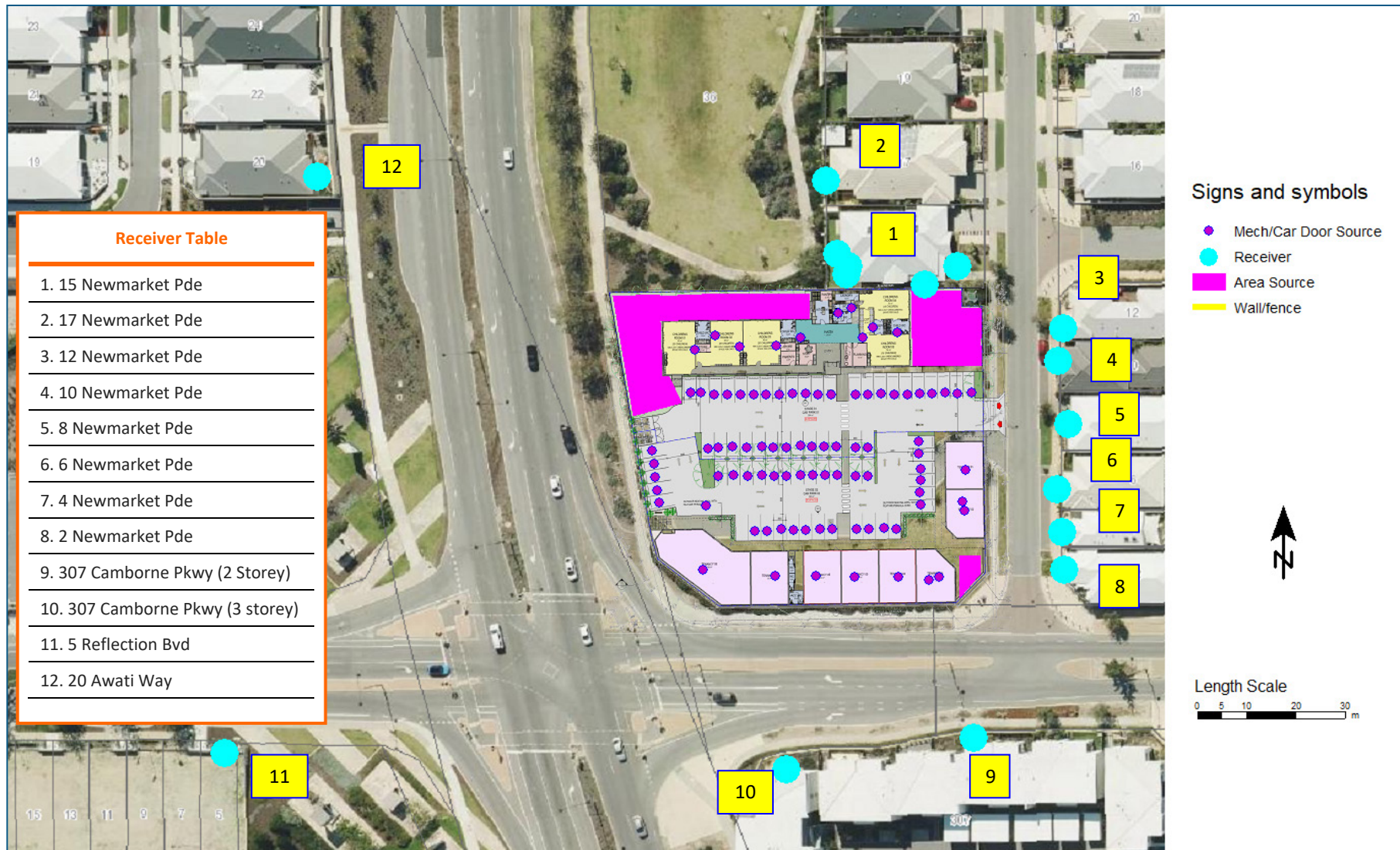


Figure 3-1 2D Overview of Noise Model

3.4 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2 Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Babies Play Aged 0-2 Years (10 kids), L ₁₀	78	54	60	66	72	74	71	67	78
Toddler Play Aged 2-3 Years (10 kids), L ₁₀	61	67	73	79	81	78	74	70	85
Kindy Play Aged 3+ Years (10 kids), L ₁₀	64	70	75	81	83	80	76	72	87
CCC AC plant, single fan unit (4 off), each,	62	69	67	62	58	53	48	42	64
Toilet/Laundry Exhausts, each, L ₁₀	60	65	62	63	60	61	56	53	67
Commercial AC Plant (8 off) each,	62	69	67	62	58	53	48	42	64
Kitchen Exhaust, L ₁₀	50	64	61	70	69	66	62	50	73
Alfresco Patrons per table, L ₁₀	53	64	68	70	62	60	57	53	70
Closing Car Door, L _{max}	71	74	77	81	80	78	72	61	84

The following is noted in relation to the source levels above:

- Child play source levels are based on Guideline 3.0 provided by the Association of Australasian Acoustical Consultants (AAAC) published September 2020. Where the number of children for individual play areas is specified in the plans, these have been adjusted from the reference source levels using appropriate acoustical calculations. Outdoor child play was modelled as area sources at 1-metre heights above ground level. The sound power levels used in the model were scaled as follows:
 - 15 Babies = 80 dB(A)
 - 15 Toddlers = 87 dB(A)
 - 20 Kindy (per space) = 90 dB(A)
- Based on the AAAC Guideline 3.0, source sound power levels for AC condensing units were assumed. Medium sized (single fan) outdoor units were deemed appropriate. Each was modelled as a point source located 1.0 metres above rooftop level positioned above tenancies and CCC activity rooms. Parapets were assumed to be up to 1.2m high atop each building.
- Other mechanical plant includes exhaust fans (toilets and laundry) and one kitchen exhaust fan/rangehood fan for the CCC and the Cafe (Tenancy 8). All were modelled as point sources approximately 0.5 metres above roof level and above the area serviced.
- Car doors closing were modelled as a point source 1.0 metre above ground level. Since noise from a car door closing is a short term event, only the L_{Amax} level is applicable.

3.5 Walls and Fences

The area is mostly suburban residential with typical boundary fencing (*Colorbond* type) between residences. It is assumed that a 1.8m high solid fence will be installed encompassing the play areas on the north and east sides. The fence is proposed to be atop the retaining wall of 15 Newmarket Parade, and continuing down at the lower level of the play area. Note that some progression of the height down may be required to avoid sight lines into the play area. The eastern most play area is assumed to be open style fencing (such as garrison-style). A 1.8m solid barrier is proposed around the alfresco area of tenancy 8 – refer DA drawings for more detail. The modelling has assumed that no gaps are present in these barriers, and this will need to be ensured in the final build.

The material selected for all barriers must have a minimum 8kg/m^2 surface mass to be effective acoustically.

Figure 3-2 shows a view of the 3D model based on the information above in relation to topography and building and fence heights. Also shown are the outdoor play areas (pink polygon) and point sources (e.g. mechanical plant, car doors) as purple dots.

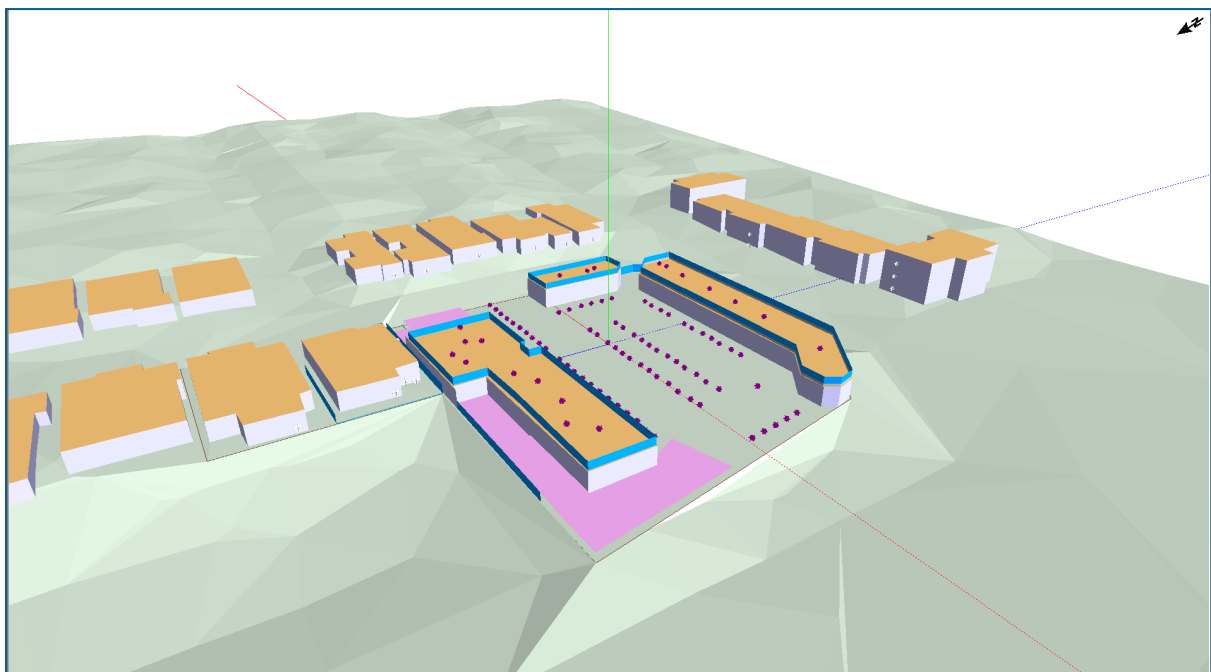


Figure 3-2 North West Elevation View of 3D Noise Model

3.6 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. asphalt, concrete) and 1 for acoustically absorbent ground (e.g. grass/sand). In this instance, a value of 0.1 has been used for the outdoor play areas and the car park and road areas, and 0.6 for all other areas.

4 RESULTS

4.1 Outdoor Child Play

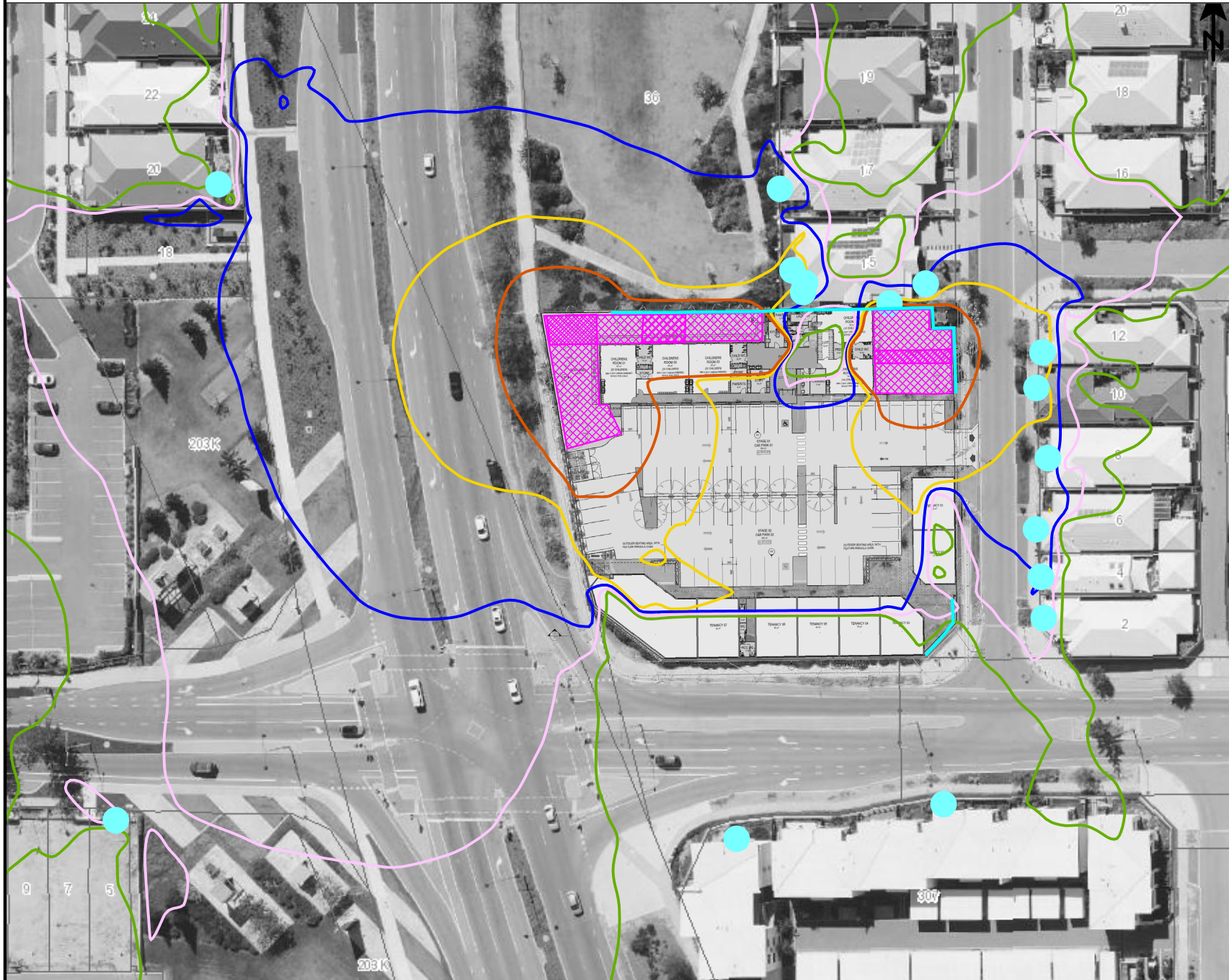
The childcare development will host up to 90 children. It is noted play time is generally staggered and therefore not all children would be playing outside at once for extended periods of time. However, noise levels were conservatively predicted for a worst-case scenario, totalling 90 children (all ages) playing outside simultaneously for extended periods of time.

Table 4-1 presents the predicted noise levels at each receiver, noting the predicted noise levels are from child play only i.e. mechanical plant noise is not included. Figure 4-1 also shows the predicted noise levels as a noise contour map at ground level (1.5 metres AGL).

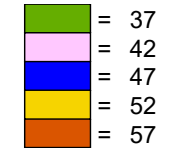
Table 4-1 Predicted Noise Levels of Child Play, dB LA10

Receiver	90 Children Outside
1. 15 Newmarket Pde (Rear)	51
1. 15 Newmarket Pde (Side)	49
2. 17 Newmarket Pde	46
3. 12 Newmarket Pde	49
4. 10 Newmarket Pde	49
5. 8 Newmarket Pde	48
6. 6 Newmarket Pde	46
7. 4 Newmarket Pde	44
8. 2 Newmarket Pde	42
9. 307 Camborne Pkwy (Ground Floor)	27
9. 307 Camborne Pkwy (First Floor)	30
10. 307 Camborne Pkwy (Ground Floor)	25
10. 307 Camborne Pkwy (First Floor)	28
10. 307 Camborne Pkwy (Second Floor)	35
11. 5 Reflection Bvd	39
12. 20 Awati Way	37

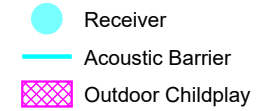
Figure 4-1 Outdoor Child Play Noise, All Children Outside, dB LA10



Predicted Noise level



Legend



Scale 1:1000



Project No: 21026155
 Consultant: MM
 Date: 16/09/2021
 Algorithm: ISO 9613
 SoundPLAN Version: 8.2



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4.2 Mechanical Plant at Night

Mechanical plant consists of AC plant and extraction fans for the kitchen, toilets and laundry. The exhaust fans were assumed to be located on the roof and above the tenancy/room being serviced.

Since the childcare centre opens from 6.30am and commercial tenancies may potentially operate prior to 7.00am, and for conservativeness, it was considered that all plant could be operating simultaneously at night-time (i.e. before 7.00am). The predicted mechanical plant noise levels are presented in *Table 4-2*. The overall plant noise levels are also shown on *Figure 4-2*.

Table 4-2 Predicted Noise Levels of Night Mechanical Plant, dB LA10

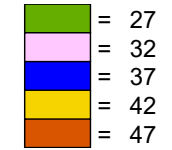
Receiver	All Plant Combined
1. 15 Newmarket Pde (Rear)	28
1. 15 Newmarket Pde (Side)	30
2. 17 Newmarket Pde	23
3. 12 Newmarket Pde	28
4. 10 Newmarket Pde	28
5. 8 Newmarket Pde	29
6. 6 Newmarket Pde	31
7. 4 Newmarket Pde	30
8. 2 Newmarket Pde	29
9. 307 Camborne Pkwy (Ground Floor)	24
9. 307 Camborne Pkwy (First Floor)	28
10. 307 Camborne Pkwy (Ground Floor)	24
10. 307 Camborne Pkwy (First Floor)	27
10. 307 Camborne Pkwy (Second Floor)	29
11. 5 Reflection Bvd	18
12. 20 Awati Way	14

It can be seen that at most receivers, the predicted mechanical plant noise is lower than the child play noise levels (*Table 4-1*). Therefore, child play noise would dominate the noise levels during the day at most receivers, except prior to 7.00am, when child play noise is not present. The above results should be recalculated once mechanical plant specifications are known closer to building permit application.




Figure 4-2 Mechanical Plant Noise, Night Time, dB LA10



Predicted Noise level



Legend

-  Receiver
-  Acoustic Barrier
-  Mech Plant Source

Scale 1:1000



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 Algorithm: ISO 9613
 SoundPLAN Version: 8.2



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4.3 Evening/Sunday Plant and Cafe Noise

The Evening/Sunday time period does not contain noise from the childcare centre, which will be closed at this time. The running mechanical plant consists of AC plant and exhaust fans for the kitchen and toilets of commercial tenancies and the cafe. The exhaust fans and AC plant were assumed to be located on the roof and above the tenancy being serviced. Cafe alfresco noise is also considered, with patrons seated at 8 tables included in this area.

The predicted mechanical plant and cafe noise levels are presented in *Table 4-3*. The overall noise levels for this scenario are also shown on *Figure 4-3*.

Table 4-3 Predicted Noise Levels, Evening/Sunday, dB LA10

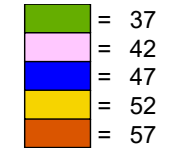
Receiver	Mechanical Plant	Cafe Alfresco Noise	Combined
1. 15 Newmarket Pde (Rear)	16	12	16
1. 15 Newmarket Pde (Side)	16	12	16
2. 17 Newmarket Pde	14	11	16
3. 12 Newmarket Pde	25	29	30
4. 10 Newmarket Pde	26	29	31
5. 8 Newmarket Pde	28	34	35
6. 6 Newmarket Pde	31	39	40
7. 4 Newmarket Pde	30	38	38
8. 2 Newmarket Pde	29	37	38
9. 307 Camborne Pkwy (Ground Floor)	24	31	32
9. 307 Camborne Pkwy (First Floor)	27	34	35
10. 307 Camborne Pkwy (Ground Floor)	24	21	26
10. 307 Camborne Pkwy (First Floor)	26	21	28
10. 307 Camborne Pkwy (Second Floor)	28	22	29
11. 5 Reflection Bvd	16	11	18
12. 20 Awati Way	11	14	16

It can be seen that at most receivers, the predicted mechanical plant noise is lower than the alfresco patron noise levels (*Table 4-3*). This noise type is not considered to possess annoying characteristics under the definitions of the Regulations. The above results should be recalculated once mechanical plant specifications are known closer to building permit application.





Figure 4-3 Sunday/Evening Noise, with Cafe, dB LA10



Predicted Noise level



Legend

-  Receiver
-  Acoustic Barrier
-  Alfresco Noise
-  Mech Plant Source

Scale 1:1000



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 SoundPLAN Version: 8.2



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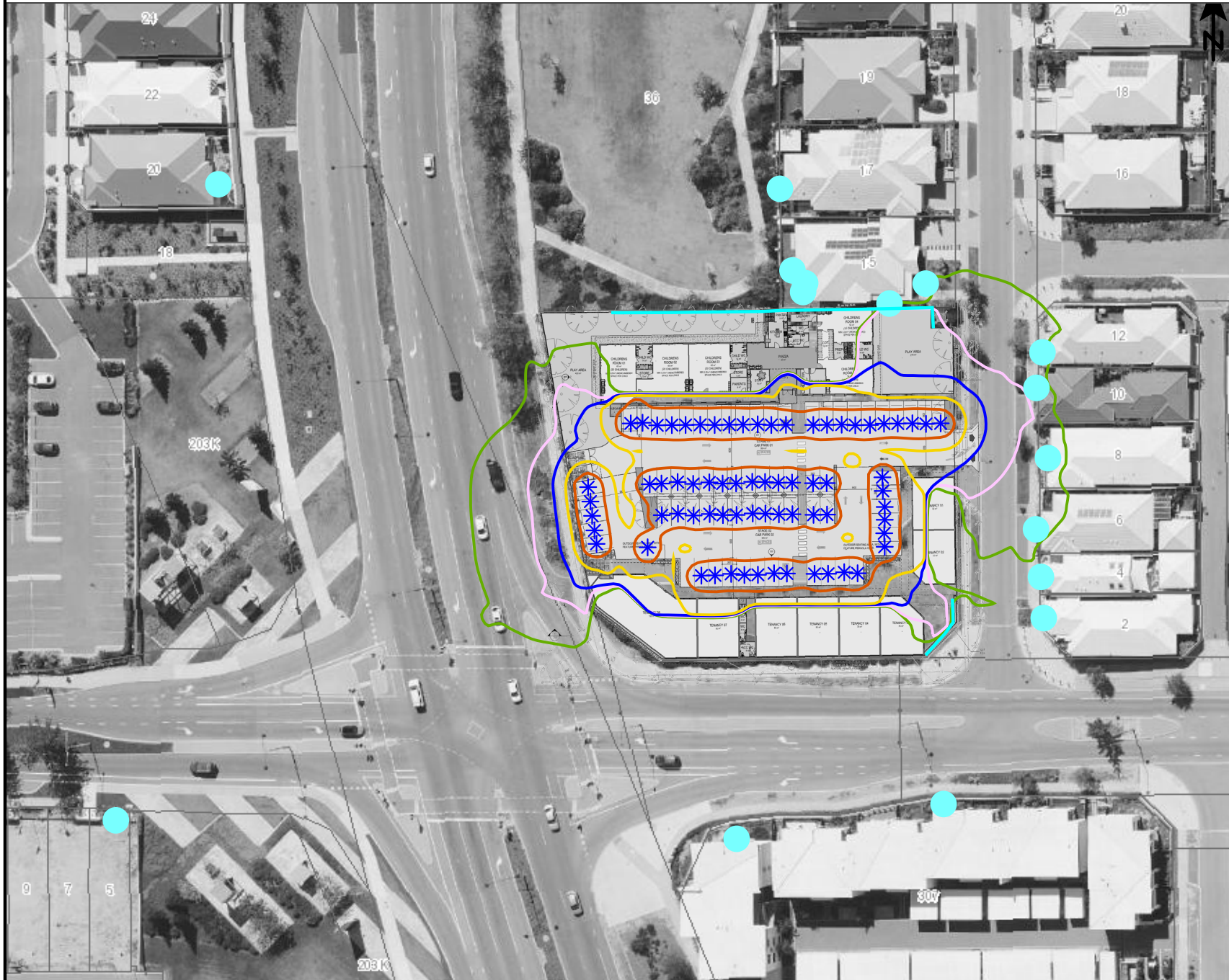
4.4 Car Park

The model includes noise from car doors closing in all parking bays and *Table 4-4* presents the highest predicted noise levels applicable to each receiver. *Figure 4-4* also presents the maximum noise levels at ground level (1.5 m AGL) for car doors as a contour map. Note that this contour is not a cumulative level, but a composite contour of each maximum noise event.

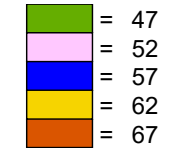
Table 4-4 Predicted Car Doors Closing Noise Levels, dB L_{Amax}

Receiver	Car doors
1. 15 Newmarket Pde (Rear)	22
1. 15 Newmarket Pde (Side)	40
2. 17 Newmarket Pde	21
3. 12 Newmarket Pde	45
4. 10 Newmarket Pde	47
5. 8 Newmarket Pde	46
6. 6 Newmarket Pde	45
7. 4 Newmarket Pde	42
8. 2 Newmarket Pde	42
9. 307 Camborne Pkwy (Ground Floor)	26
9. 307 Camborne Pkwy (First Floor)	30
10. 307 Camborne Pkwy (Ground Floor)	21
10. 307 Camborne Pkwy (First Floor)	24
10. 307 Camborne Pkwy (Second Floor)	31
11. 5 Reflection Bvd	32
12. 20 Awati Way	25

Figure 4-4 Car Door Noise, dB L_{Amax}



Predicted Noise level



Legend

- Receiver
- Acoustic Barrier
- ✱ Car Door Source

Scale 1:1000



Project No: 21026155
 Consultant: MM
 Date: 16/09/2021
 Algorithm: ISO 9613
 SoundPLAN Version: 8.2



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5 ASSESSMENT

5.1 Outdoor Child Play

Although the childcare centre opens from 6.30am, outdoor child play will only occur after 7.00am, when the assigned noise levels increase by 10 dB compared to prior to 7.00am. Noise from child play is not considered to contain annoying characteristics within the definition of the Regulations and therefore, no adjustments are made to the predicted noise levels.

Table 5-1 presents the assessment of the highest predicted noise levels from all 90 children playing outside against the L_{A10} assigned noise level at each receiver.

Table 5-1 Assessment of Outdoor Child Play Noise Levels, dB L_{A10}

Receiver	Assigned Noise Level	Predicted Level	Exceedance
1. 15 Newmarket Pde (Rear)	52	51	Complies
1. 15 Newmarket Pde (Side)	52	49	Complies
2. 17 Newmarket Pde	52	46	Complies
3. 12 Newmarket Pde	52	49	Complies
4. 10 Newmarket Pde	52	49	Complies
5. 8 Newmarket Pde	52	48	Complies
6. 6 Newmarket Pde	52	46	Complies
7. 4 Newmarket Pde	52	44	Complies
8. 2 Newmarket Pde	52	42	Complies
9. 307 Camborne Pkwy (Ground Floor)	52	27	Complies
9. 307 Camborne Pkwy (First Floor)	52	30	Complies
10. 307 Camborne Pkwy (Ground Floor)	52	25	Complies
10. 307 Camborne Pkwy (First Floor)	52	28	Complies
10. 307 Camborne Pkwy (Second Floor)	52	35	Complies
11. 5 Reflection Bvd	52	39	Complies
12. 20 Awati Way	52	37	Complies

From Table 5-1 it can be seen that noise levels comply with the most critical receivers. The assessment demonstrates compliance based on a conservative scenario of all 90 children playing simultaneously. The proposed barriers are effective and no further mitigation measures are required.

5.2 Mechanical Plant at Night

Given the proposed opening hours of the childcare centre, the night-time period (i.e. before 7.00am) is most critical. Whilst the commercial plant may not operate during the night, this has been assumed to be conservative. The overall noise levels are generally dominated by the exhaust plant and A/C condenser noise, which may be considered tonal, and a +5 dB adjustment (refer *Table 5-2*) applies to predictions.

Table 5-2 Assessment of Mechanical Plant Noise Levels, dB LA10

Receiver	Night Assigned Noise Level	Predicted Level	Adjusted Level	Exceedance
1. 15 Newmarket Pde (Rear)	42	28	33	Complies
1. 15 Newmarket Pde (Side)	42	30	35	Complies
2. 17 Newmarket Pde	42	23	28	Complies
3. 12 Newmarket Pde	42	28	33	Complies
4. 10 Newmarket Pde	42	28	33	Complies
5. 8 Newmarket Pde	42	29	34	Complies
6. 6 Newmarket Pde	42	31	36	Complies
7. 4 Newmarket Pde	42	30	35	Complies
8. 2 Newmarket Pde	42	29	34	Complies
9. 307 Camborne Pkwy (Ground Floor)	42	24	29	Complies
9. 307 Camborne Pkwy (First Floor)	42	28	33	Complies
10. 307 Camborne Pkwy (Ground Floor)	42	24	29	Complies
10. 307 Camborne Pkwy (First Floor)	42	27	32	Complies
10. 307 Camborne Pkwy (Second Floor)	42	29	34	Complies
11. 5 Reflection Bvd	42	18	23	Complies
12. 20 Awati Way	42	14	19	Complies

Based on the predicted noise levels in *Table 5-2*, the most critical mechanical plant noise levels are to the east, though levels are compliant for all receivers. The primary contributors are the AC condensers, though the kitchen exhaust also contributes and therefore should be designed with reduced noise as a consideration.

As compliance is achieved at night, it will also be achieved at other times where the assigned level is 5-10 dB higher than at night. Note that this assessment is based on assumptions in relation to the number, size and type of AC plant and exhaust fans. Therefore, mechanical plant noise is to be

reviewed by a qualified acoustical consultant during detailed design, when plant selections and locations become known.

5.3 Evening/Sunday Plant and Cafe Noise

Noise from the cafe and other commercial tenancies is expected on Sundays (9.00am to 7.00pm) and during the evening (7.00pm to 10.00pm) Monday to Saturday. The overall noise levels are generally dominated by the alfresco patron noise, which is not considered to contain any annoying characteristics under the definition of the Regulations.

Table 5-3 Assessment of Sunday/Evening Noise Levels, dB LA10

Receiver	Assigned Noise Level	Predicted Level	Exceedance
1. 15 Newmarket Pde	47	16	Complies
1. 15 Newmarket Pde	47	16	Complies
2. 17 Newmarket Pde	47	16	Complies
3. 12 Newmarket Pde	47	30	Complies
4. 10 Newmarket Pde	47	31	Complies
5. 8 Newmarket Pde	47	35	Complies
6. 6 Newmarket Pde	47	40	Complies
7. 4 Newmarket Pde	47	38	Complies
8. 2 Newmarket Pde	47	38	Complies
9. 307 Camborne Pkwy (Ground Floor)	47	32	Complies
9. 307 Camborne Pkwy (First Floor)	47	35	Complies
10. 307 Camborne Pkwy (Ground Floor)	47	26	Complies
10. 307 Camborne Pkwy (First Floor)	47	28	Complies
10. 307 Camborne Pkwy (Second Floor)	47	29	Complies
11. 5 Reflection Bvd	47	18	Complies
12. 20 Awati Way	47	16	Complies

Based on the predicted noise levels in *Table 5-2*, the most critical are to the east, though levels are compliant for all receivers. The primary contributor is the cafe noise from the alfresco area, though the levels are compliant due to the proposed acoustic barriers.

Note that this assessment is based on assumptions in relation to the number, size and type of AC plant and exhaust fans as well as number of patrons (8 tables and approximately 20 seated patrons).

Therefore, compliance is to be reviewed by a qualified acoustical consultant during detailed design, when plant selections and other details are known.

5.4 Car Doors

Car doors closing noise are short duration events and were therefore assessed against the L_{Amax} assigned noise level. Given the proposed hours of operation, staff and visitors may arrive before 7.00am when the night-time assigned noise level of 62 dB L_{Amax} is applicable. Car door noise was considered impulsive within the definition of the Regulations. Therefore, an adjustment of +10 dB (refer *Table 5-4*) is to be applied to the predicted noise levels.

Table 5-4 Assessment of Car Doors Closing Noise Levels, dB L_{Amax}

Receiver	Night Assigned Noise Level	Predicted Level	Adjusted Level	Exceedance
1. 15 Newmarket Pde (Rear)	62	22	32	Complies
1. 15 Newmarket Pde (Side)	62	40	50	Complies
2. 17 Newmarket Pde	62	21	31	Complies
3. 12 Newmarket Pde	62	45	55	Complies
4. 10 Newmarket Pde	62	47	57	Complies
5. 8 Newmarket Pde	62	46	56	Complies
6. 6 Newmarket Pde	62	45	55	Complies
7. 4 Newmarket Pde	62	42	52	Complies
8. 2 Newmarket Pde	62	42	52	Complies
9. 307 Camborne Pkwy (Ground Floor)	62	26	36	Complies
9. 307 Camborne Pkwy (First Floor)	62	30	40	Complies
10. 307 Camborne Pkwy (Ground Floor)	62	21	31	Complies
10. 307 Camborne Pkwy (First Floor)	62	24	34	Complies
10. 307 Camborne Pkwy (Second Floor)	62	31	41	Complies
11. 5 Reflection Bvd	62	32	42	Complies
12. 20 Awati Way	62	25	35	Complies

The noise from car doors is demonstrated to comply at all locations. During the day compliance is readily achieved.

5.5 Indoor Child Play

An assessment of noise levels from indoor child play was carried out and the resulting noise levels at all locations were predicted to be well below that of outdoor child play considered in *Section 4.1*. This assessment was carried out based on the following considerations:

- External doors and windows will be closed during indoor activity / play;
- Internal noise levels within activity rooms would not exceed those from outdoor play for each age group; and,
- Any music played within the internal activity areas would be 'light' music with no significant bass content and played at a relatively low level.

6 RECOMMENDATIONS

To mitigate noise from exhaust fans, it is recommended that these be designed as inline or ceiling type fans, which could be installed with attenuators, rather than externally mounted plant.

The AC condensing units, while potentially compliant at all times, may be mitigated further with quiet mode (reduced capacity) programming prior to 7.00 am. These options should be explored during detailed design and verified by the mechanical services engineer and a qualified acoustical consultant, when plant selections and locations become known.

Cafe noise in the alfresco dining area is compliant provided the proposed barrier is installed, noting that it is a minimum 1.8m height, free of gaps, and of a minimum material surface mass of 8kg/m². The operator is to ensure that patron numbers are restricted and to seated allocations only.

Noise from child play is demonstrated to comply during the day, with the proposed walls ensuring the walls and gates are free of gaps and a material with minimum surface mass of 8 kg/m². The existing wall on boundary with 15 Newmarket Parade is to be supplemented with an additional layer of *colorbond* to provide the required surface mass overall.

Noise from car park use to properties to the east should be anticipated, however the assessment demonstrates compliance at all times and no further recommendations are applicable.

Finally, the following best practices should be implemented where practicable:

- The behaviour and 'style of play' of children should be monitored to prevent particularly loud activity e.g. loud banging/crashing of objects, 'group' shouts/yelling,
- Favour soft finishes in the outdoor play area to minimise impact noise (e.g. soft grass, sand pit(s), rubber mats) over timber or plastic,
- Favour soft balls and rubber wheeled toys,
- No amplified music to be played outside,
- External doors and windows to be closed during indoor activity / play, and
- Any music played within the internal activity areas to be 'light' music with no significant bass content and played at a relatively low level.
- Car park drainage grates to be plastic or metal with rubber gasket and secured to avoid excess banging

7 CONCLUSIONS

The noise impacts from the proposed mixed commercial and childcare centre development at 1 Newmarket Place, Butler have been assessed against the relevant criteria of the *Environmental Protection (Noise) Regulations 1997*.

Based on the modelling and assessments in relation to the noise emissions from child play, commercial tenancies, alfresco dining, mechanical plant and car doors closing, it is concluded that compliance can be achieved for all nearest noise sensitive premises.

Appendix A

Development Plans

TOWN PLANNING SHEET LIST		
No.	Sheet Name	Current Revision
001	COVER SHEET	1
002	EXISTING AND DEMOLITION PLAN	1
003	NEIGHBOURHOOD CHARACTER STUDY	1
100	PROPOSED SITE PLAN	1
103	PROPOSED GROUND FLOOR PLAN	1
110	PROPOSED ROOF PLAN	1
201	SECTIONS	1
301	PROPOSED ELEVATIONS - CHILDCARE	1
302	PROPOSED ELEVATIONS - CHILDCARE	1
303	PROPOSED ELEVATIONS - RETAIL	1
304	PROPOSED ELEVATIONS - RETAIL	1

TOWN PLANNING SHEET LIST		
No.	Sheet Name	Current Revision
401	SHADOW DIAGRAM - 9AM SEPTEMBER EQUINOX	1
402	SHADOW DIAGRAM - 12PM SEPTEMBER EQUINOX	1
403	SHADOW DIAGRAM - 3PM SEPTEMBER EQUINOX	1
501	3D IMAGES	1
502	3D IMAGES	1
503	3D IMAGES	1
504	3D IMAGES	1
505	3D IMAGES	1
506	3D IMAGES	1
507	3D IMAGES	1
508	3D IMAGES	1



PROPOSED CHILDCARE + RETAIL DEVELOPMENT 1 NEWMARKET PARADE, BUTLER, WA 6036

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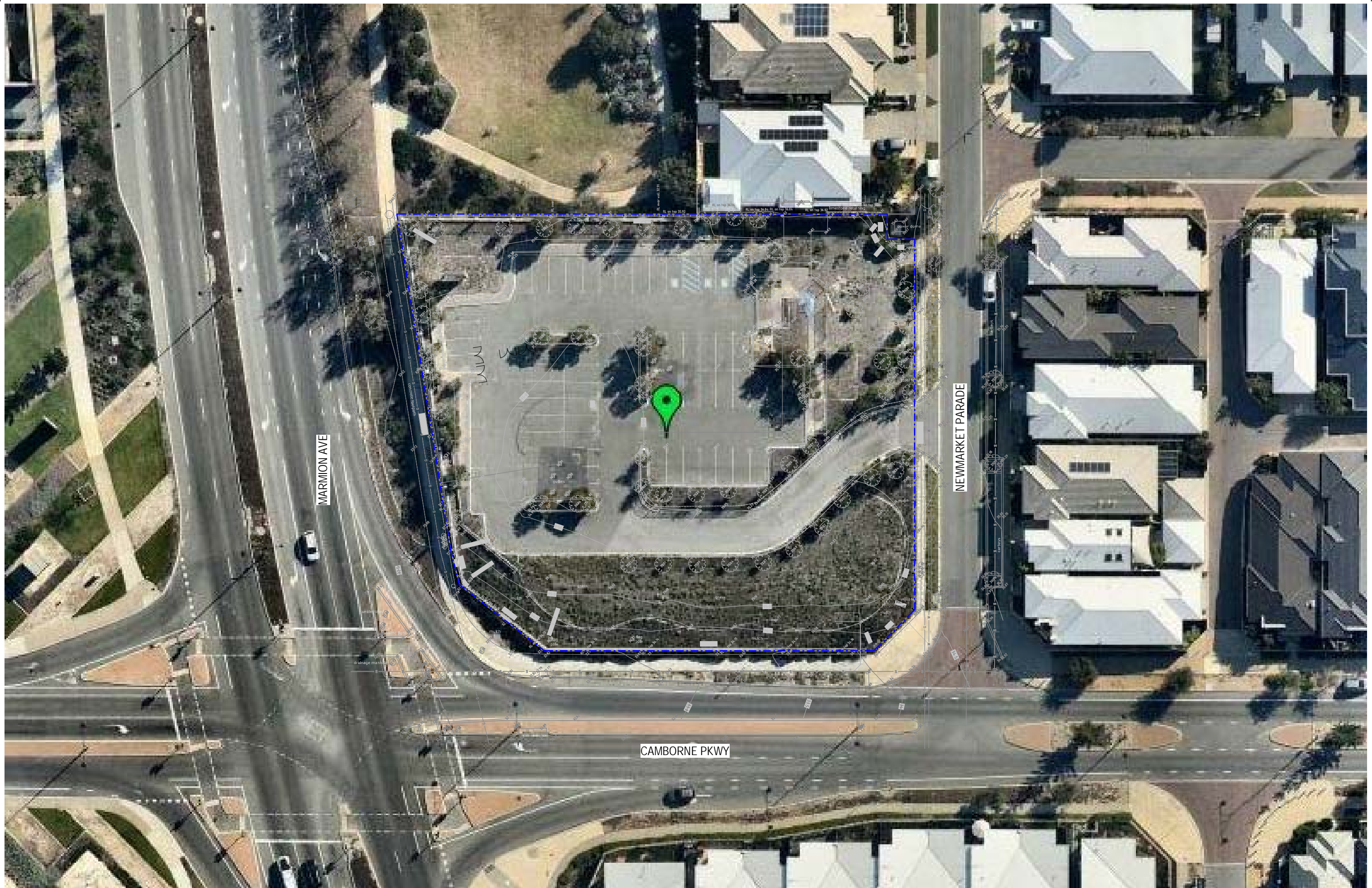
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COVER SHEET

Date: 11.08.21 Drawn: SM
Job No. 2880 Scale: A1

SK 001 1



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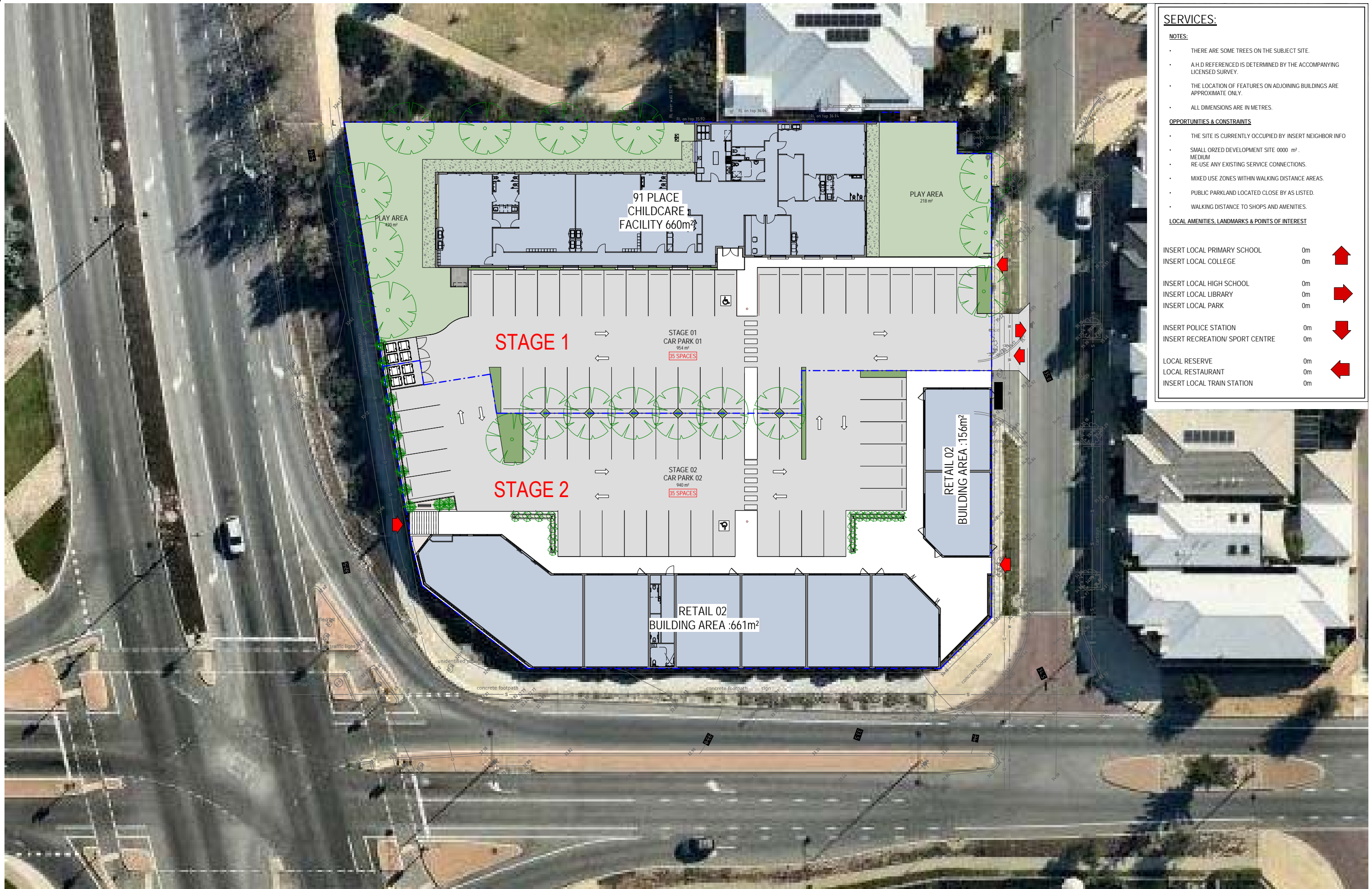


PROPOSED CHILDCARE + RETAIL DEVELOPMENT
 1 NEWMARKET PARADE, BUTLER, WA 6036

EXISTING AND DEMOLITION PLAN

Date: 11.08.21 Drawn: SM
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SK 002 1



SERVICES:

NOTES:

- THERE ARE SOME TREES ON THE SUBJECT SITE.
- A.H.D REFERENCED IS DETERMINED BY THE ACCOMPANYING LICENSED SURVEY.
- THE LOCATION OF FEATURES ON ADJOINING BUILDINGS ARE APPROXIMATE ONLY.
- ALL DIMENSIONS ARE IN METRES.

OPPORTUNITIES & CONSTRAINTS

- THE SITE IS CURRENTLY OCCUPIED BY INSERT NEIGHBOR INFO
- SMALL ORZED DEVELOPMENT SITE 0000 m².
- MEDIUM
- RE-USE ANY EXISTING SERVICE CONNECTIONS.
- MIXED USE ZONES WITHIN WALKING DISTANCE AREAS.
- PUBLIC PARKLAND LOCATED CLOSE BY AS LISTED.
- WALKING DISTANCE TO SHOPS AND AMENITIES.

LOCAL AMENITIES, LANDMARKS & POINTS OF INTEREST

INSERT LOCAL PRIMARY SCHOOL	0m	↑
INSERT LOCAL COLLEGE	0m	→
INSERT LOCAL HIGH SCHOOL	0m	→
INSERT LOCAL LIBRARY	0m	→
INSERT LOCAL PARK	0m	→
INSERT POLICE STATION	0m	↓
INSERT RECREATION/ SPORT CENTRE	0m	↓
LOCAL RESERVE	0m	←
LOCAL RESTAURANT	0m	←
INSERT LOCAL TRAIN STATION	0m	←

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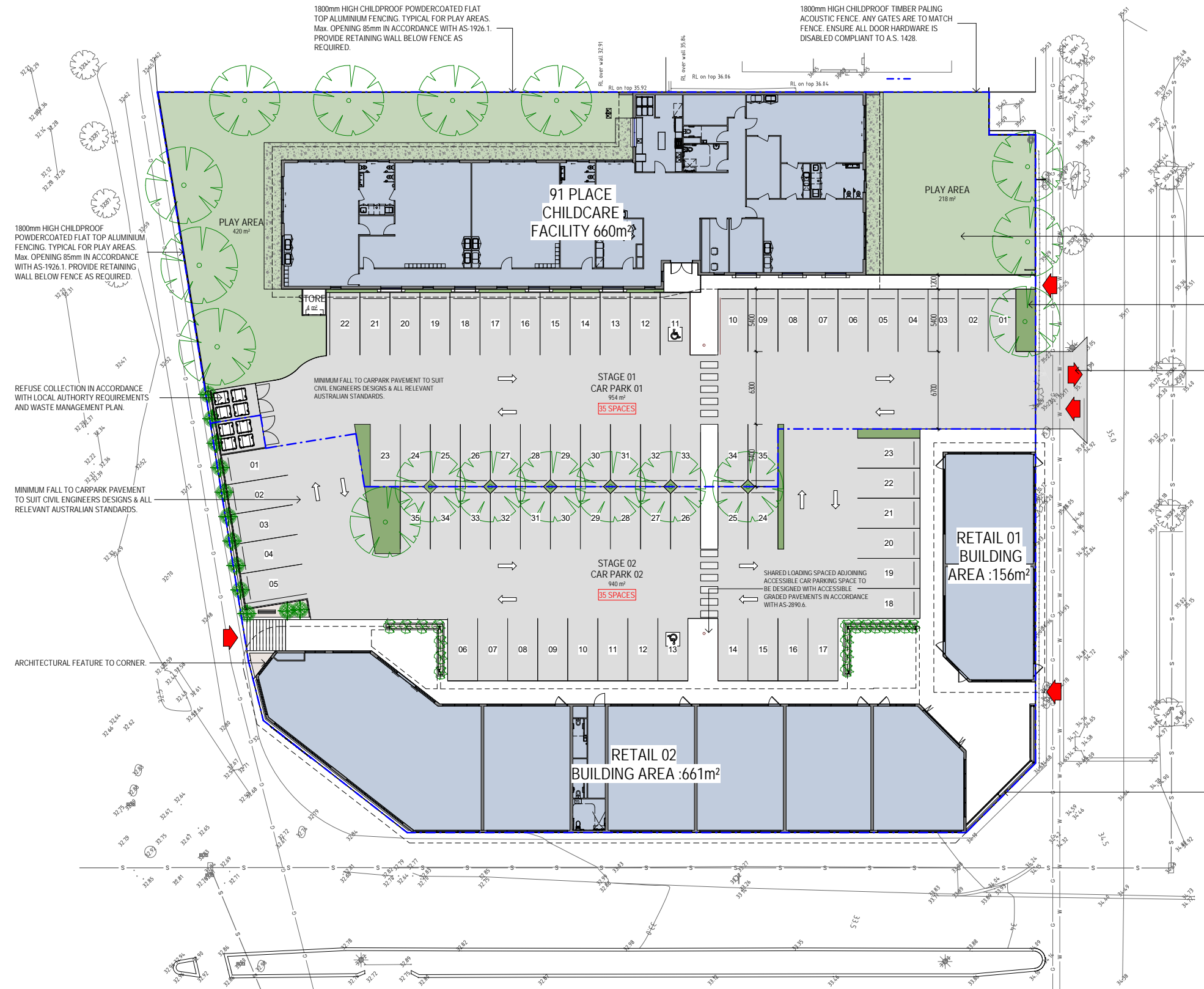
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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
 1 NEWMARKET PARADE, BUTLER, WA 6036

NEIGHBOURHOOD CHARACTER STUDY

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1800mm HIGH CHILDPROOF POWDERCOATED FLAT TOP ALUMINIUM FENCING. TYPICAL FOR PLAY AREAS. Max. OPENING 85mm IN ACCORDANCE WITH AS-1926.1. PROVIDE RETAINING WALL BELOW FENCE AS REQUIRED.

1800mm HIGH CHILDPROOF TIMBER PALING ACOUSTIC FENCE. ANY GATES ARE TO MATCH FENCE. ENSURE ALL DOOR HARDWARE IS DISABLED COMPLIANT TO A.S. 1428.

REFUSE COLLECTION IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS AND WASTE MANAGEMENT PLAN.

MINIMUM FALL TO CARPARK PAVEMENT TO SUIT CIVIL ENGINEERS DESIGNS & ALL RELEVANT AUSTRALIAN STANDARDS.

MINIMUM FALL TO CARPARK PAVEMENT TO SUIT CIVIL ENGINEERS DESIGNS & ALL RELEVANT AUSTRALIAN STANDARDS.

SHARED LOADING SPACED ADJOINING ACCESSIBLE CAR PARKING SPACE TO BE DESIGNED WITH ACCESSIBLE GRADED PAVEMENTS IN ACCORDANCE WITH AS-2890.6.

NOTE: REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR ALL LANDSCAPING DESIGN.

LANDSCAPE SETBACK REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR ALL LANDSCAPING DESIGN.

CONSTRUCT NEW CONCRETE CROSSING IN ACCORDANCE WITH LOCAL AUTHORITY DETAILS.

ARCHITECTURAL FEATURE TO CORNER.

TENANCY UNITS SCHEDULE

TOTAL NET LETTABLE AREA	
UNIT 01	72m ²
UNIT 02	72m ²
UNIT 03	76m ²
UNIT 04	79m ²
UNIT 05	80m ²
UNIT 06	80m ²
UNIT 07	80m ²
UNIT 08	150m ²
	729m ²
CAR PARKING REQUIRED	(7100m ² RETAIL SPACE) = 50 CARS PROVIDED = 35 CAR PARKING AREA = 940m ²

AREA ANALYSIS CHILD CARE + SITE

SITE AREA:	4453 m ²
TOTAL BUILDING (CHILDCARE) AREA:	660 m ²
CC CAR PARKING AREA:	954 m ²
OVERALL SITE COVERAGE:	33.16 %
OVERALL SITE PERMEABILITY:	14.32 %
TOTAL CHILDREN SPACES:	91
OUTDOOR PLAY AREA - REQUIRED:	637 m ²
OUTDOOR PLAY AREA - PROVIDED:	638 m ²
TOTAL CAR PARKING REQUIRED:	35
TOTAL CAR PARKING PROVIDED:	35

ROOM NAME	AREA	No. OF CHILDREN
CHILDRENS ROOM 01	65 m ²	20
CHILDRENS ROOM 02	65 m ²	20
CHILDRENS ROOM 03	65 m ²	20
CHILDRENS ROOM 04	50 m ²	15
CHILDRENS ROOM 05	54 m ²	16
TOTAL: 5	299 m ²	91

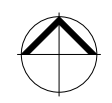
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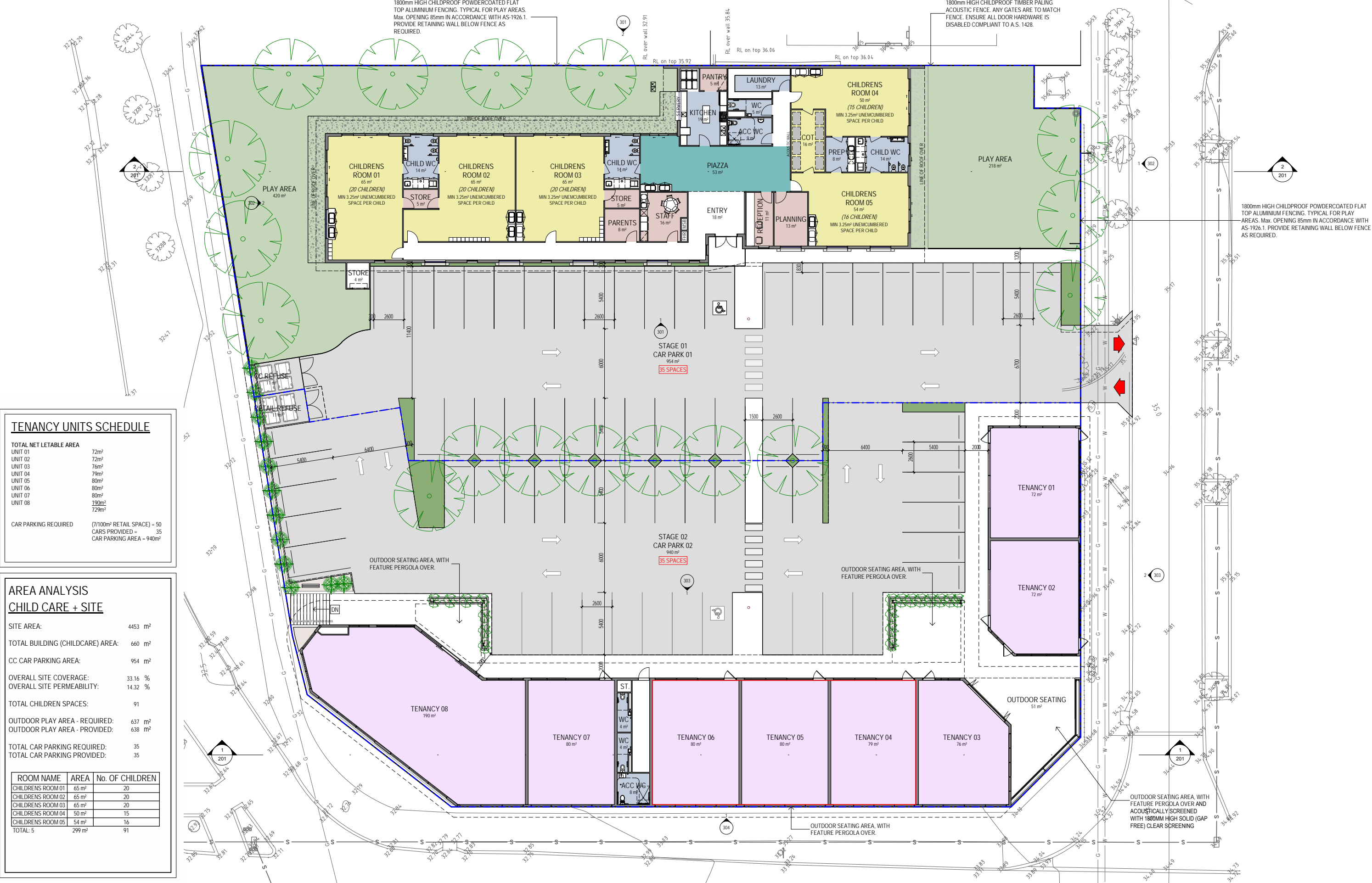
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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
 1 NEWMARKET PARADE, BUTLER, WA 6036

PROPOSED SITE PLAN
 Date: 11.08.21 Drawn: SM
 Job No: 2880 Scale: A1 1 : 200



TENANCY UNITS SCHEDULE

TOTAL NET LETTABLE AREA	
UNIT 01	72m ²
UNIT 02	72m ²
UNIT 03	76m ²
UNIT 04	79m ²
UNIT 05	80m ²
UNIT 06	80m ²
UNIT 07	80m ²
UNIT 08	190m ²
TOTAL: 729m ²	
CAR PARKING REQUIRED	(7/100m ² RETAIL SPACE) = 50
CARS PROVIDED	35
CAR PARKING AREA	= 940m ²

AREA ANALYSIS CHILD CARE + SITE

SITE AREA:	4453 m ²
TOTAL BUILDING (CHILDCARE) AREA:	660 m ²
CC CAR PARKING AREA:	954 m ²
OVERALL SITE COVERAGE:	33.16 %
OVERALL SITE PERMEABILITY:	14.32 %
TOTAL CHILDREN SPACES:	91
OUTDOOR PLAY AREA - REQUIRED:	637 m ²
OUTDOOR PLAY AREA - PROVIDED:	638 m ²
TOTAL CAR PARKING REQUIRED:	35
TOTAL CAR PARKING PROVIDED:	35

ROOM NAME	AREA	No. OF CHILDREN
CHILDRENS ROOM 01	65 m ²	20
CHILDRENS ROOM 02	65 m ²	20
CHILDRENS ROOM 03	65 m ²	20
CHILDRENS ROOM 04	50 m ²	15
CHILDRENS ROOM 05	54 m ²	16
TOTAL: 5	299 m ²	91

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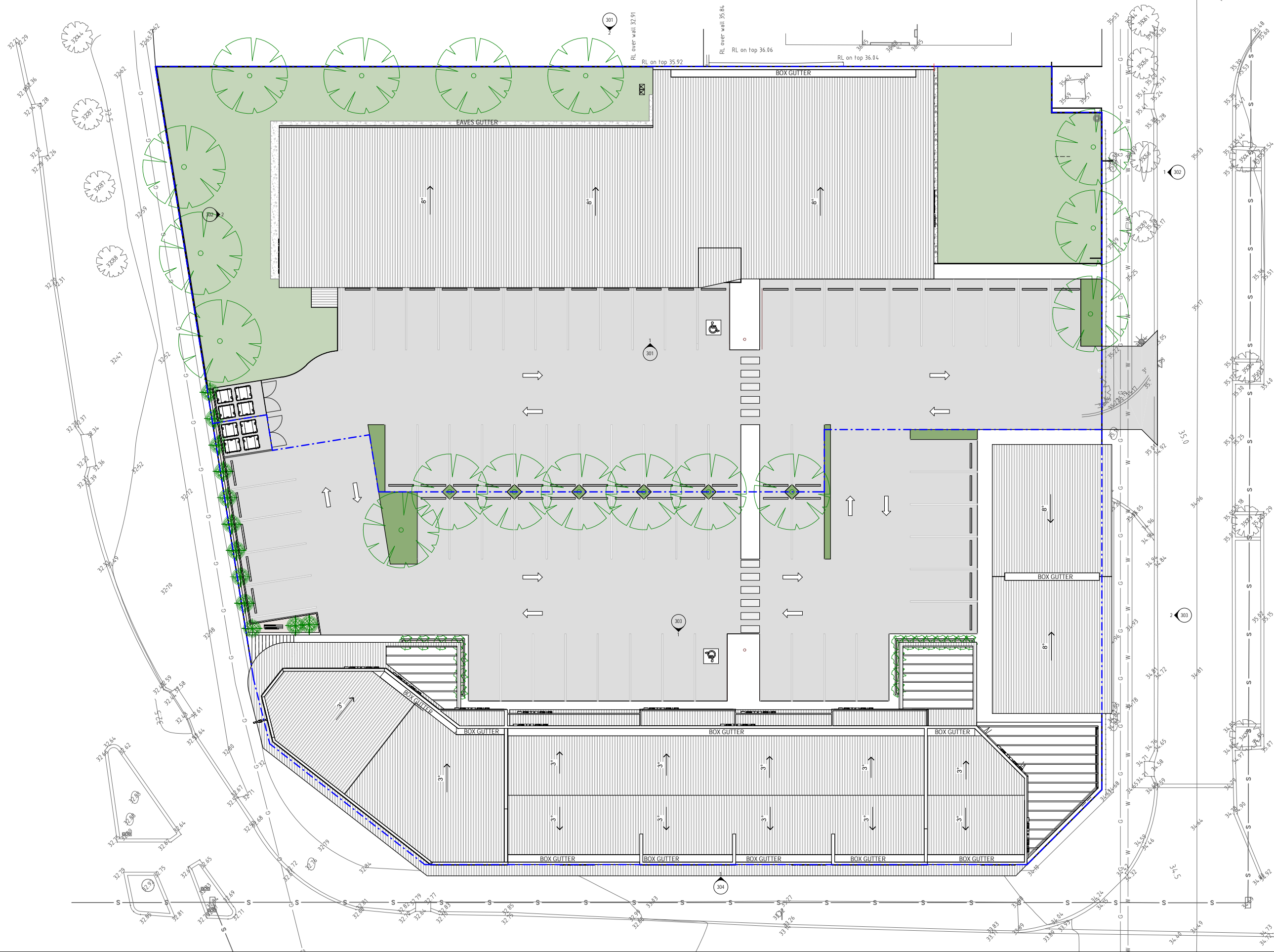
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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
 1 NEWMARKET PARADE, BUTLER, WA 6036

PROPOSED GROUND FLOOR PLAN

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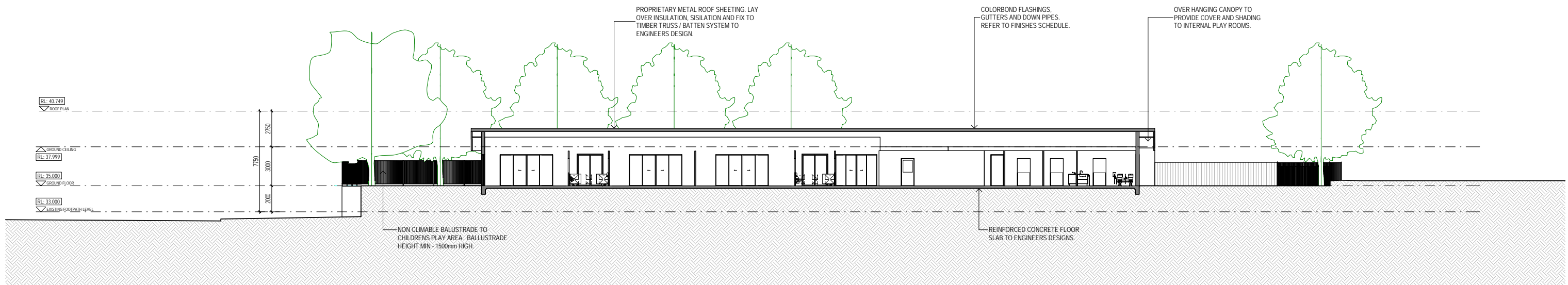
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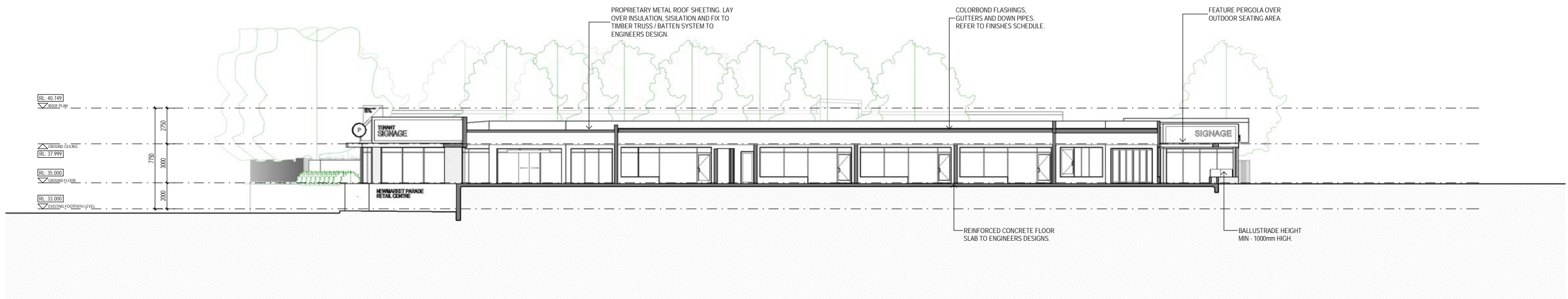
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 1 NEWMARKET PARADE, BUTLER, WA 6036

PROPOSED ROOF PLAN

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2 SECTION 01 TP
1:150



1 SECTION 02 TP
1:150

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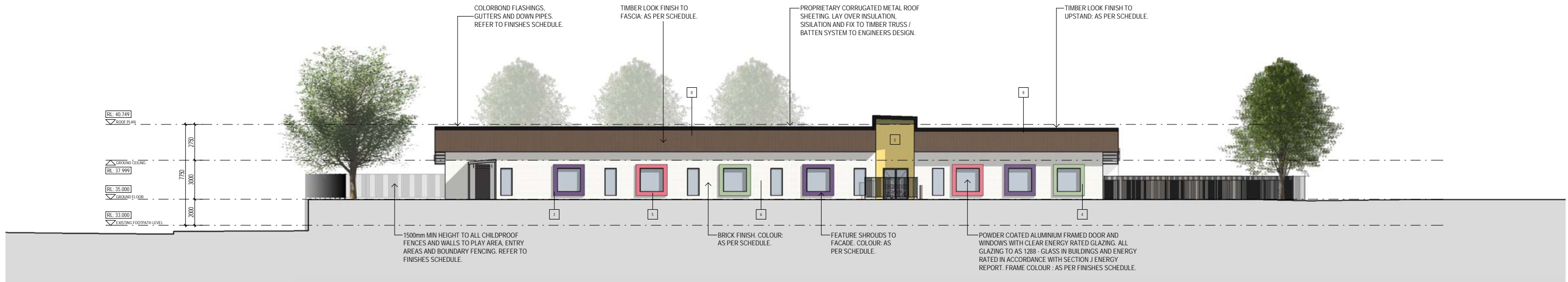
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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
1 NEWMARKET PARADE, BUTLER, WA 6036

SECTIONS

Date: 11.08.21 Drawn: SM
Job No: 2880 Scale: A1:1:150

SK 201 1



1 SOUTH ELEVATION - CHILDCARE
1:150

FINISHES SCHEDULE		
	1	POWDERCOATED ALUMINIUM FLASHING 'MONUMENT'
	2	CLEAR GLAZING
	3	PAINT FINISH - Presley Purple P44G8
	4	PAINT FINISH - Light Leaf P22D4
	5	PAINT FINISH - Pink Spell S03H7
	5	PAINT FINISH - Pale Buttercup S16G5

FINISHES SCHEDULE		
	6	SMOOTH FACE BRICKWORK - WHITE TONES
	8	FEATURE TIMBER LOOK CLADDING
	9	PAINT FINISH - Pale Oriental S16F3
	10	PAINT FINISH - Winter Storm S32A6
	11	PAINT FINISH - Peastake S24C4

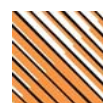
FINISHES SCHEDULE		
	13	BRICKWORK - GREY TONES OR SIMILAR
	14	BRICKWORK - BLUE TONES OR SIMILAR
	15	BRICKWORK - GREEN TONES OR SIMILAR
	16	'MONUMENT' METAL ROOF SHEETING.
	17	FC SHEET HORIZONTAL CLADDING WITH PAINT FINISH

FINISHES SCHEDULE		
	18	FC SHEET VERTICAL CLADDING WITH PAINT FINISH
	19	DULUX - 'WHISPER WHITE'
	20	METAL ROOF SHEETING - GREY
	21	EXISTING STONE - EXTENDED IN SECTIONS.



2 NORTH ELEVATION - CHILDCARE
1:150

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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
1 NEWMARKET PARADE, BUTLER, WA 6036

PROPOSED ELEVATIONS - CHILDCARE

Date: 11.08.21 Drawn: SM
Job No. 2880 Scale: A1:1:150

SK 301 1



1 EAST ELEVATION - CHILDCARE
1:150

FINISHES SCHEDULE		
	1	POWDERCOATED ALUMINIUM FLASHING 'MONUMENT'
	2	CLEAR GLAZING
	3	PAINT FINISH - Presley Purple P44G8
	4	PAINT FINISH - Light Leaf P22D4
	5	PAINT FINISH - Pink Spell S03H7
	5	PAINT FINISH - Pale Buttercup S16G5

FINISHES SCHEDULE		
	6	SMOOTH FACE BRICKWORK - WHITE TONES
	8	FEATURE TIMBER LOOK CLADDING
	9	PAINT FINISH - Pale Oriental S16F3
	10	PAINT FINISH - Winter Storm S32A6
	11	PAINT FINISH - Peastake S24C4

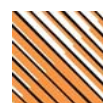
FINISHES SCHEDULE		
	13	BRICKWORK - GREY TONES OR SIMILAR
	14	BRICKWORK - BLUE TONES OR SIMILAR
	15	BRICKWORK - GREEN TONES OR SIMILAR
	16	'MONUMENT' METAL ROOF SHEETING.
	17	FC SHEET HORIZONTAL CLADDING WITH PAINT FINISH

FINISHES SCHEDULE		
	18	FC SHEET VERTICAL CLADDING WITH PAINT FINISH
	19	DULUX - 'WHISPER WHITE'
	20	METAL ROOF SHEETING - GREY
	21	EXISTING STONE - EXTENDED IN SECTIONS.



2 WEST ELEVATION - CHILDCARE
1:150

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PROPOSED CHILDCARE + RETAIL DEVELOPMENT
1 NEWMARKET PARADE, BUTLER, WA 6036

PROPOSED ELEVATIONS - CHILDCARE

Date: 11.08.21 Drawn: SM
Job No: 2880 Scale: A1: 1:150

SK 302 1



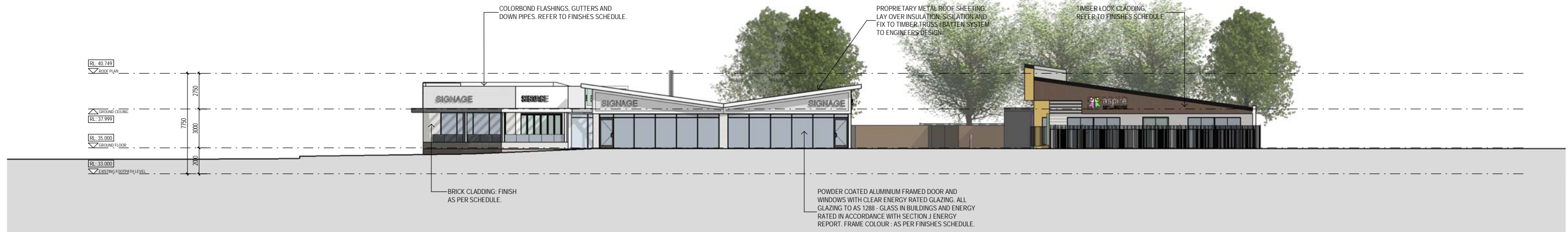
1 NORTH ELEVATION - RETAIL
1:150

FINISHES SCHEDULE		
	1	POWDERCOATED ALUMINIUM FLASHING 'MONUMENT'
	2	CLEAR GLAZING
	3	PAINT FINISH - Presley Purple P44G8
	4	PAINT FINISH - Light Leaf P22D4
	5	PAINT FINISH - Pink Spell S03H7
	5	PAINT FINISH - Pale Buttercup S16G5

FINISHES SCHEDULE		
	6	SMOOTH FACE BRICKWORK - WHITE TONES
	8	FEATURE TIMBER LOOK CLADDING
	9	PAINT FINISH - Pale Oriental S16F3
	10	PAINT FINISH - Winter Storm S32A6
	11	PAINT FINISH - Peastake S24C4

FINISHES SCHEDULE		
	13	BRICKWORK - GREY TONES OR SIMILAR
	14	BRICKWORK - BLUE TONES OR SIMILAR
	15	BRICKWORK - GREEN TONES OR SIMILAR
	16	'MONUMENT' METAL ROOF SHEETING.
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	18	FC SHEET VERTICAL CLADDING WITH PAINT FINISH
	19	DULUX - 'WHISPER WHITE'
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	21	EXISTING STONE - EXTENDED IN SECTIONS.



2 EAST ELEVATION - RETAIL
1:150

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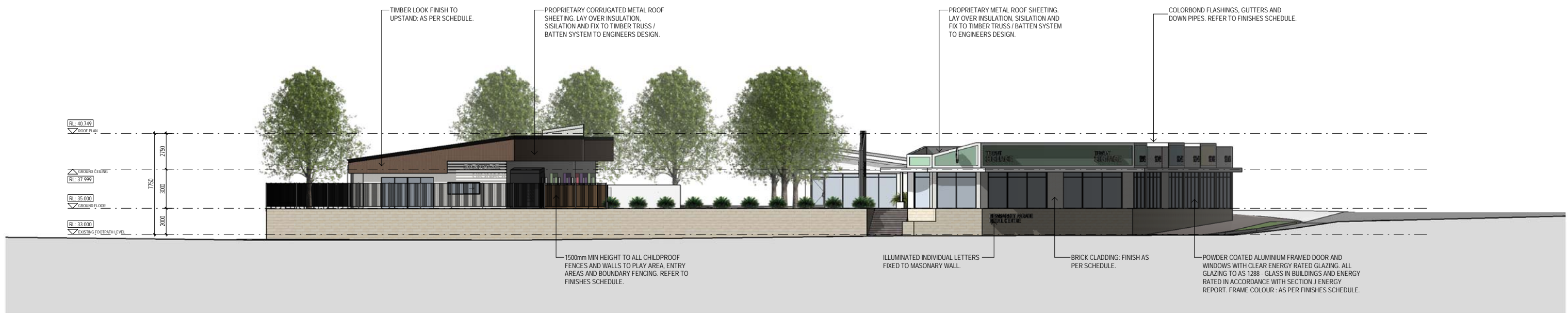


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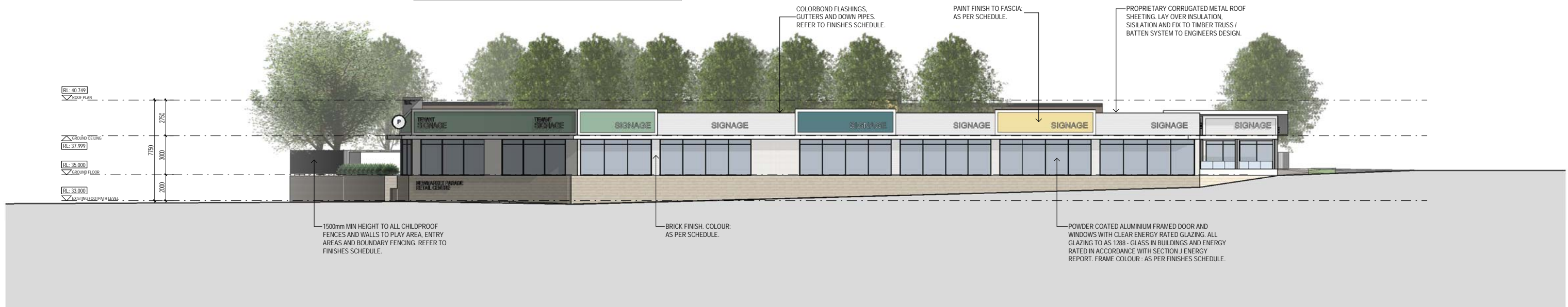
2 WEST ELEVATION RETAIL
1:150

FINISHES SCHEDULE		
	1	POWDERCOATED ALUMINIUM FLASHING 'MONUMENT'
	2	CLEAR GLAZING
	3	PAINT FINISH - Presley Purple P44G8
	4	PAINT FINISH - Light Leaf P22D4
	5	PAINT FINISH - Pink Spell S03H7
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FINISHES SCHEDULE		
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FINISHES SCHEDULE		
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	19	DULUX - 'WHISPER WHITE'
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1 SOUTH ELEVATION - RETAIL
1:150

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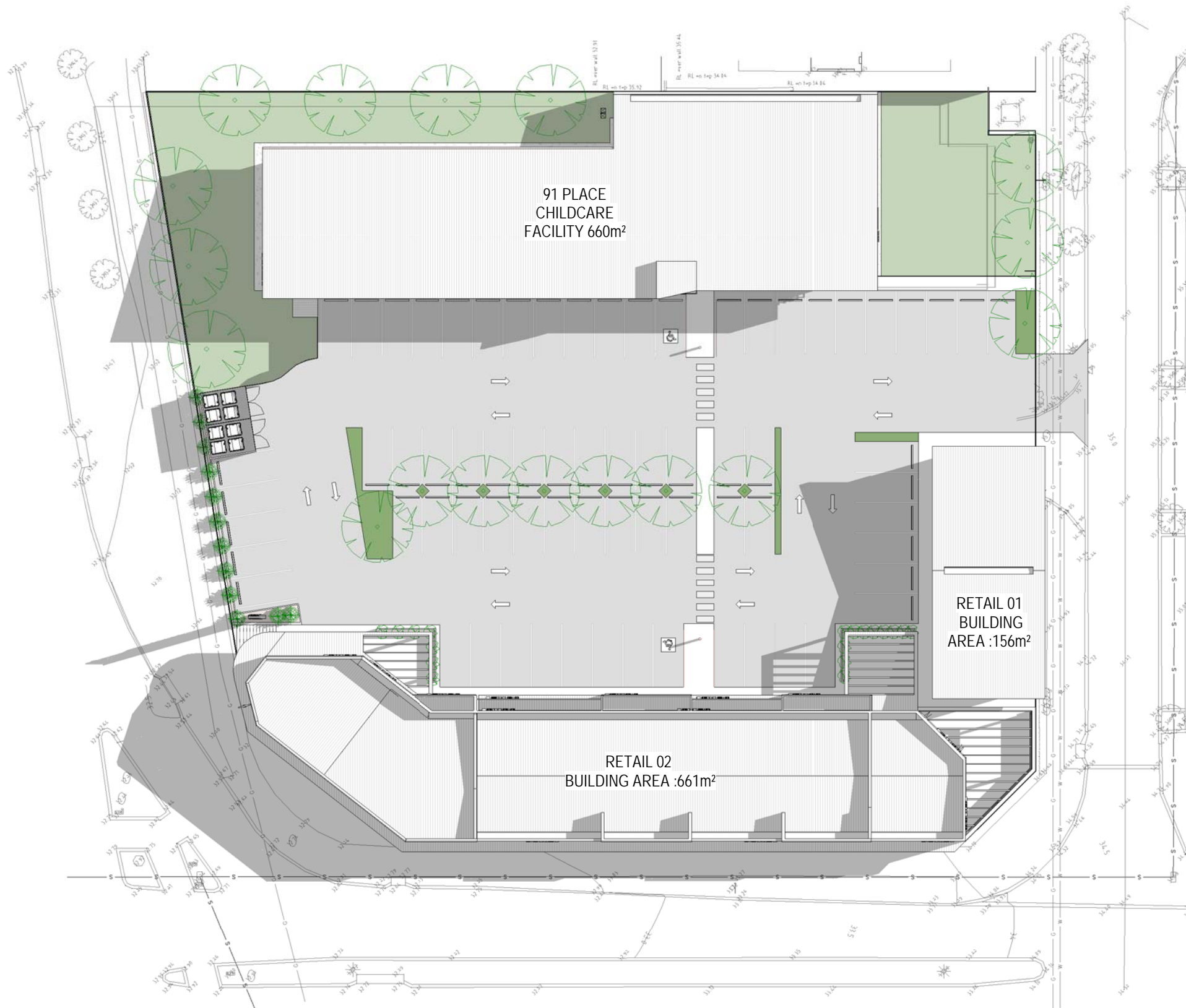
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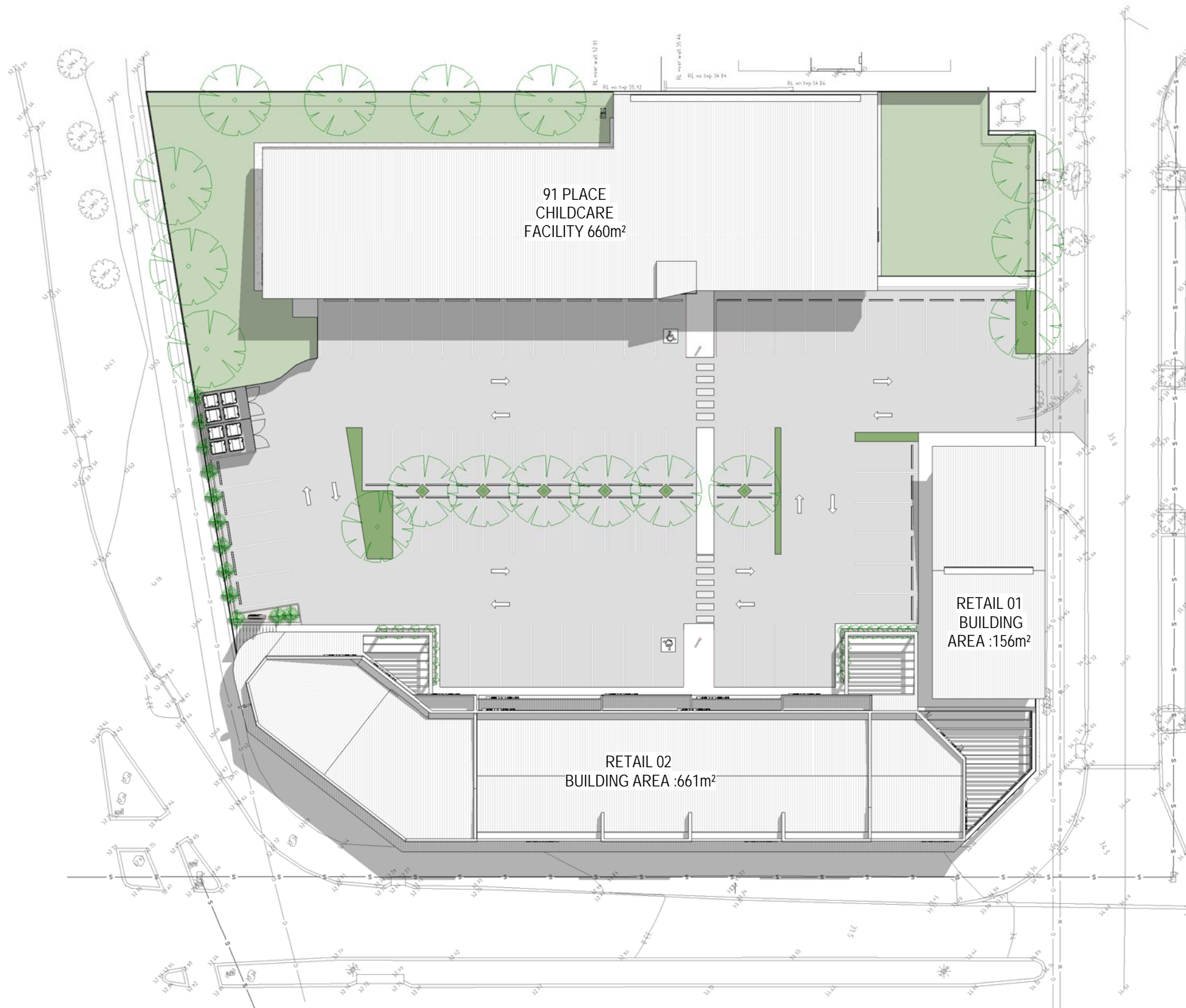
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SHADOW DIAGRAM - 9AM SEPTEMBER EQUINOX

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 Job No. 2880 Scale@A1 1 : 200



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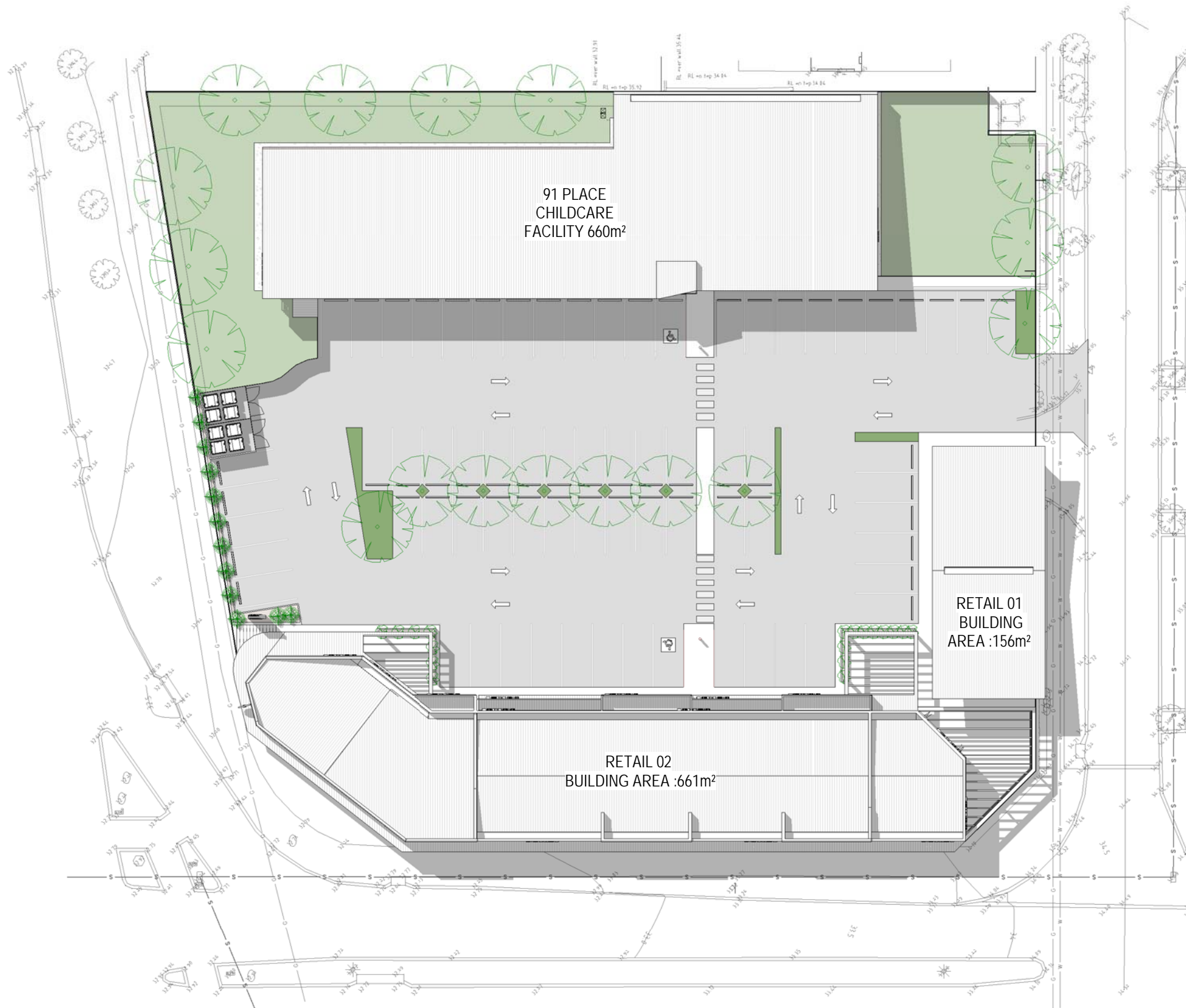
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SHADOW DIAGRAM - 12PM SEPTEMBER EQUINOX

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SHADOW DIAGRAM - 3PM SEPTEMBER EQUINOX

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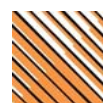
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Appendix B

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}

This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}

This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

L_{APeak}

This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

L_{Amax}

An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}

An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}

An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "intrusive" noise level.

L_{Aeq}

The equivalent steady state A-weighted sound level (“equal energy”) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the “average” noise level.

 L_{A90}

An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

One-Third-Octave Band

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

 L_{Amax} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

 L_{A1} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

 L_{A10} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

- (a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
- (b) is present for at least 10% of the representative.

Impulsive Noise

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A \text{ peak}}$ and $L_{A \text{ Max slow}}$ is more than 15 dB when determined for a single representative event;

Major Road

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10} (\% \text{ Type A}_{100} + \% \text{ Type A}_{450}) + \frac{1}{20} (\% \text{ Type B}_{100} + \% \text{ Type B}_{450})$$

where :

$\% \text{ Type A}_{100}$ = the percentage of industrial land within
a 100m radius of the premises receiving the noise

$\% \text{ Type A}_{450}$ = the percentage of industrial land within
a 450m radius of the premises receiving the noise

$\% \text{ Type B}_{100}$ = the percentage of commercial land within
a 100m radius of the premises receiving the noise

$\% \text{ Type B}_{450}$ = the percentage of commercial land within
a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

Representative Assessment Period

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise

Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

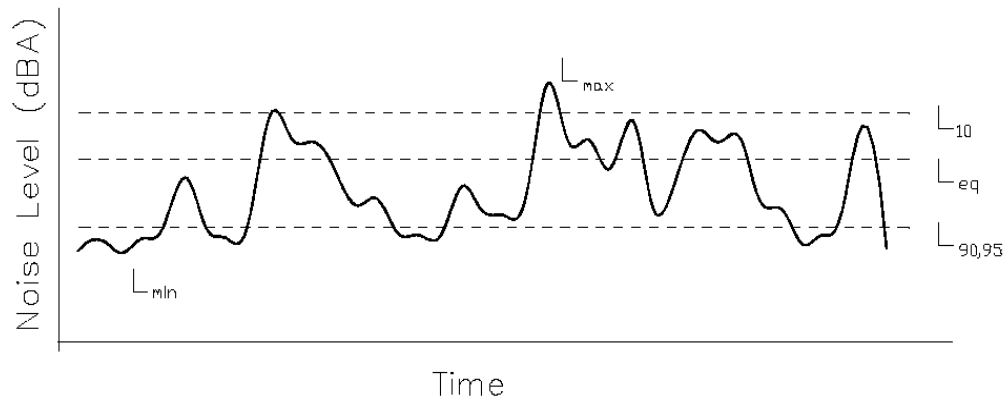
Ambient Noise

Means the level of noise from all sources, including background noise from near and far and the source of interest.

Specific Noise

Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

Chart of Noise Level Descriptors



Typical Noise Levels

