ACOUSTIC ASSESSMENT 1908082

PROPOSED CHILD CARE CENTRE
LOT 516, CNR REFLECTION, MARLINSPIKE BOULEVARD, NICOBAR WAY & TONNA LANE
JINDALEE (EDEN BEACH) WA 6036

prepared for

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CONTENTS:

REFERENCES:

A. Environmental Protection (Noise) Regulations 1997.

B. Drawings: JPBD; 6 sheets;
Revision D, Dated 28 MAY 2019.

REVISIONS

Revision N°:	Date:	Issue / Comment	Status
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SUMMARY

0.1 ND Engineering's opinion is that the proposed Child Care Centre (CCC) for the daytime periods of 0700 - 1900 hours Monday to Friday including if required Saturday 0700 - 1900 hours the:

a. Children's' noise emissions will comply with the Noise Regulations (Reference A) subject to implementation of the recommendations contained in Section 5 'Recommendations'.

b. Parents' and Staff car door closing noise emissions will comply with the Noise Regulations (Reference A), subject to implementation of the recommendations contained in Section 5 'Recommendations'.

INTRODUCTION

1.1 ND Engineering was commissioned to provide an acoustic assessment of the potential noise emanating from the proposed Child Care Centre (CCC) with regards to the surrounding Residential premises.

DESCRIPTION

2.1.1 The proposed CCC site is located in Jindalee, with the City of Wanneroo being the Local Government Authority. The area is predominately zoned as a residential.

2.1.2 The nearest noise sensitive 'residential' premises are located to the West, North and East

2.1.3 Refer to the following Annexes for detailed location and site descriptions:

a. Annex A 'Location'.

b. Annex B 'Site Plans'.

2.2 The main non-equipment noise source at the site will be:

a. Children's voices categorised by age groups:

-	Schoolies 4+ years old;	Room 4 - over 48 months
-	Kindy 3 – 4 years old (17);	Room 3 – over 36 months
-	Toddlers 2 - 3 years old (17 each);	Rooms 1 & 2 - 24 to 36 months
-	Babes 0 - 2 years old (19).	Room 5 – 0 to 24 months old.

b. Occasional music for children with the music being non-impulsive by nature. Refer Annex E 'Music'.

c. Carpark car door closing noises. Refer Annex G 'Carpark'.

2.3 The main equipment noise sources at the site are expected to comprise air-conditioning systems and mechanical ventilation systems. Refer Annex F 'Mechanical Services'.

ASSESSMENT

3.1 Noise emissions from the child care centre are expected to occur Monday to Friday between 0700 to 1900 hours and if required Saturday 0700 to 1900 hours, mainly during outdoor play weather permitting for the Kindy group.

This means that for evenings, night time, public holidays and Sundays there is expected to be no noise emissions from the child care centre at all.

Anecdotal evidence indicates this is a desirable situation sought by some residences when purchasing properties adjacent to a child care centre as their will be no afterhours noise thus negating a common source of complaint.

3.2 The relevant assigned noise levels at receiving premises, residential in the vicinity of the noise source, as allowed under Reference A are shown in the following Table 3.2. The assessments of the various noise sources emissions from the CCC are assessed against Table 3.2 as applicable.

Table 3.2 – ASSIGNED NOISE LEVELS
(East of Marlinspike Boulevard, elsewhere 2dB(A) lower

Noise sensitive premises at locations . . . . . a building directly associated with a noise sensitive use.	Time of day	Time of day	Assigned Noise Levels dB(A)		
			LA10	LA1	LAmax
. . within 15 m of . .	Day	0700-1900 hrs Monday to Saturday	47	57	67
		0900-1900 hrs Sunday, Public holidays	42	52	
	Evening	1900-2200 hrs all days			57
	Night	2200-0700 hrs Monday to Saturday	37	47	
		2200-0900 hrs Sunday, Public holidays			
. . greater than 15 m from . .	All hours	All hours	60	75	80
Commercial	All hours	All hours	60	75	80

3.3 Refer to the following annexes for the detailed assessments:

a. Assigned Noise Levels. Refer Annex C ‘Assigned Noise Levels’.

b. Children. . Refer Annex D ‘Children’.

c. Music. Refer Annex E ‘Music’.

d. Mechanical Services. Refer Annex F ‘Mechanical Services’.

e. Mechanical Services. Refer Annex G ‘Carpark’.

3.4 Recommendations arising from the assessments are collated and presented in Section 5 ‘Recommendations’ in the main body of the report.

CONCLUSIONS

4.1 ND Engineering's opinion is that the proposed Child Care Centre (CCC) for the daytime periods of 0700 - 1900 hours Monday to Friday including if required Saturday 0700 - 1900 hours the:

a. Children's' noise emissions will comply with the Noise Regulations (Reference A) subject to implementation of the recommendations contained in Section 5 'Recommendations'.

b. Parents' and Staff car door closing noise emissions will comply with the Noise Regulations (Reference A), subject to implementation of the recommendations contained in Section 5 'Recommendations'.

RECOMMENDATIONS

5.1 The recommendations presented in this report are in outline format only and require:

a. Detailed final design of components by appropriately experienced persons in accordance with the current relevant editions of Australian Standards, Regulations, Gas Installation Code/s and the Bca.

b. Completion of minor details, including acoustic/vibration details, on site by competent and qualified tradesmen and technicians.

c. New materials and equipment to be installed in accordance with the manufacturer's and/or supplier's instructions.

d. New materials and equipment to comply with, and be installed in accordance with, the BCA.

e. Installer of materials and/or equipment to comply with:

(1) Regulatory safety requirements.
(2) The safety procedures on the relevant Materials Safety Data Sheets (MSDS).
(3) The site safety requirements including the wearing of protective clothing such as safety boots, safety glasses, safety goggles and hard hats.

f. A site inspection to fully determine the extent of the work and the nature of the site.

5.2 The following recommendations are made:

a. **Operational:**

(1) The CCC is to be operational, excluding public holidays, between 0700 - 1900 hours Monday to Friday and if required 0700 - 1900 hours Saturday;

(2) Staff will be instructed not to arrive prior to 0600 hours and to be off site by 1900 hours.

(3) Staff are should park in the Western car bays along Tonna Lane.

(4) Children are not permitted outdoors for play purposes, carpark excluded, prior to 0700 hours.

b. **Children's play areas:**

(1) Children are not permitted outdoors for play purposes, carpark excluded, prior to 0700 hours.

(2) Practical considerations:

(a) Fixed play equipment should be non-metallic. If metal fixed play equipment is used then hollow metal sections shall be filled with expanding foam or sand.

(b) Concrete or brick paved areas, if any, should be minimised and where practicable covered with synthetic grass to minimise noise of play equipment on hard surfaces.

(3). Restrict the number of Kindy or Schoolies, over 36 months, in Play Areas 1 and 2 to a maximum of 34 children at any one time; and

(4). There are no restrictions on children below 36 months in any Play Area; and

(5) Provide the following *Noise Barriers* – NIL.

c. **Music:**

(1) Keep external windows and doors closed; and

(2) Do not play music outdoors.

d. **Mechanical Services:**

(1) Exhaust systems:

(a) No specific external acoustic requirements for small non-kitchen exhaust systems.

(b) No specific acoustic requirements for domestic kitchen canopy ducted to exterior when kitchen equipment inputs is less than either 8 kW electrical or 29 MJH gas.

(c) Specific external acoustics requirements for a commercial kitchen canopy with an external fan when the kitchen equipment input is greater than either 8 kW electrical or 29 MJH gas then the exhaust fan shall be:

(i) Located more than 6.0 metres from residential boundary with a vertical discharge;

(ii) Operating at a speed not exceeding nominally 960 rpm with a Sound Pressure Level not exceeding 52 dB(A) @ 3.0 m at the operating speed.

(2) Air conditioning systems:

(a) Evaporative AC units shall be of the centrifugal fan type and shall be sized to deliver the required air quantity on the low speed setting; and

(b) Refrigerated AC units shall be inverter type with night time ‘quiet/silent’ mode; and

(c) Do not locate the AC unit/s closer than 6 metres to any residential boundary; and

(d) AC units shall have Sound Pressure Level not exceeding 61 dB(A) @ 1.0 metre when operating at rated conditions.

(e) Position refrigerated AC units facing Reflection Boulevard.

e. **Carpark:**

(1). Signage is placed within the two carparks asking parents/staff not to slam car doors/boots; and

(2). Signage is placed within the two carparks asking parents/staff not to play music or radio, and

(3). The pathway from the Northern car bays be extend to the front entry area to encourage parents to park away from the Southern boundary areas of the carpark; and

(4). Staff are required to park in Western car bays along Tonna Lane.

ANNEXES:

A. Location.
B. Site Plans.
C. Assigned Noise Levels.
D. Children.
E. Music.
F. Mechanical Services.
G. Carpark.

Annex A – Location

FIGURE A1 – SITE OVER VIEW

Annex B - Site Plans

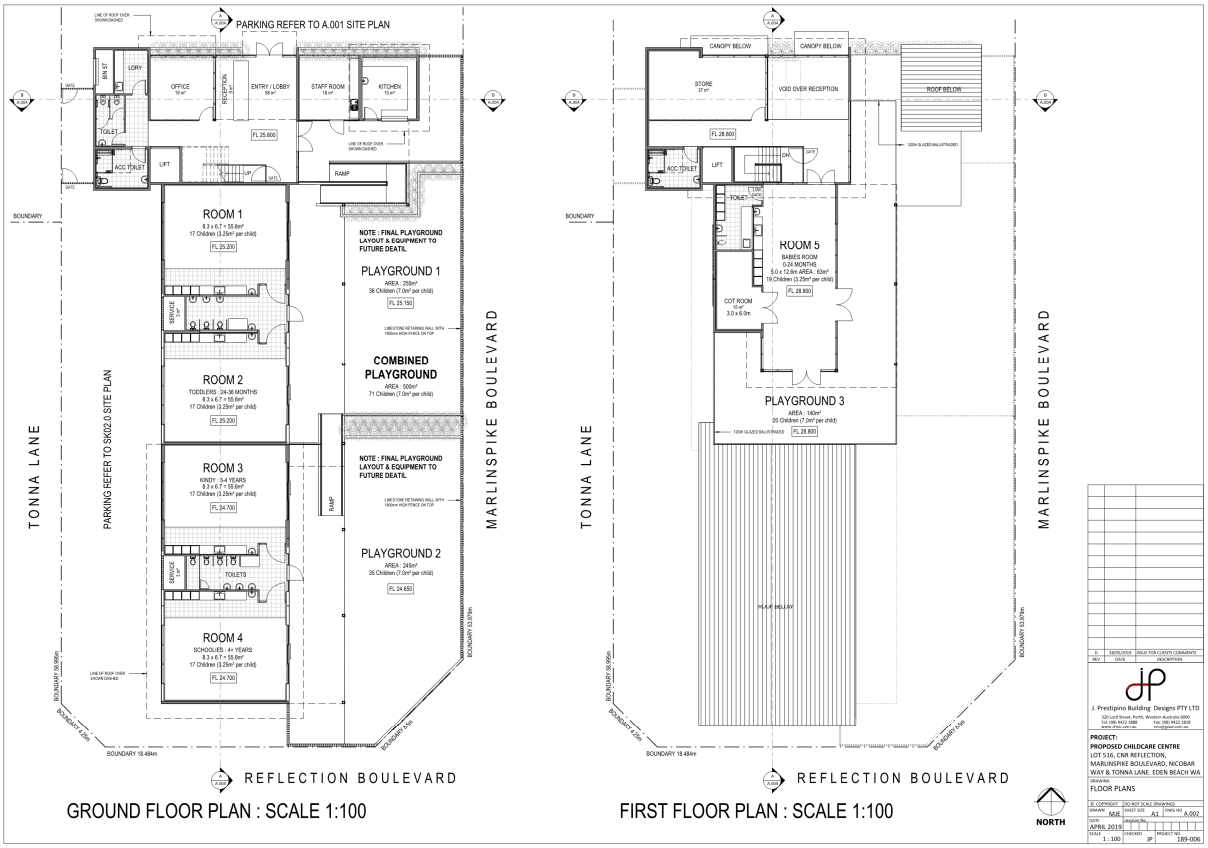

FIGURE B1 – FLOOR PLAN

Annex C - Assigned Noise Levels

C1. The assigned noise level, as determined by Reference A, comprises a Base Noise Level and an Influencing Factor adjustment to take into consideration noise from nearby features such as major roads, industrial and commercial premises. The assigned noise level comprises three criteria being the LAmax, LA1 and LA10.

C2. LAmax and LA1 represent respectively the single maximum noise event and the 1 percentile highest A weighted sound pressure levels over a representative measurement period.

The measurement criteria LA10 represents the 10 percentile highest A weighted sound pressure level over a representative measurement period of not less than 15 minutes and not more than 4 hours.

ND Engineering's understanding as a result of discussions with the DEP in March 2005 indicated that a representative measurement period for a CCC would be 4 hours.

C3. Repeated attempts at obtaining statistical noise measurement data at various CCC without interference from traffic is difficult as most CCC are located on major and/or secondary roads with children playing outdoors when there is significant traffic noise in the morning and afternoon.

The LAmax is fairly easy to obtain as it represents a single noise event such as a shout or scream. The other two criteria LA1 and LA10 are statistical measurements and traffic noise creates significant problems in acquiring the measurement in particular the LA1 measurement.

The LA10 measurement criteria provides a reasonable indication of the objectionable noise as any unwanted noise events such as traffic, wind induced vegetation noise and animal noise form a smaller and less significant component which can be partially edited out.

C4. ND Engineering's assessment is based primarily on the LAmax and LA10 criteria as obtaining a LA1 measurement that is 'legally' watertight is virtually impossible or not achievable when gathering noise data for the assessments. As a consequence, the assessments are based on the LAmax and LA10 criteria. The LAmax criteria is the most important criteria as this is the criteria associated with shouting that is most objectionable.

C5. The base assigned noise levels are shown in the following table.

Table C5 – ASSIGNED 'BASE' NOISE LEVELS

Noise sensitive premises at locations . . . . . a building directly associated with a noise sensitive use.	Time of day	Time of day	Assigned Noise Levels dB(A)		
			LA10	LA1	LAmax
. . within 15 m of . .	Day	**0700-1900 hrs Monday to Saturday**	**45+IF**	55+IF	**65+IF**
		0900-1900 hrs Sunday, Public holidays	40+IF	50+IF	
	Evening	1900-2200 hrs all days			55+IF
	Night	2200-0700 hrs Monday to Saturday	35+IF	45+IF	
		2200-0900 hrs Sunday, Public holidays			
. . greater than 15 m from . .	All hours	All hours	60	75	80

C6. The following table shows the Influencing Factor calculation for the adjustments to the base noise levels for the nearest residences to the childcare centre.

Table C6 – INFLUENCING FACTOR ASSESSMENT
(East of Marlinspike Boulevard, elsewhere 2dB(A) lower

INFLUENCING FACTOR CRITERIA			ASSESSMENT		
Item	**Criteria**	**Value**	**Criteria**	**Value**	**Totals**
Major Road within the					2 (Transport Factor ≤ 6)
- 100 m radius inner circle	veh/day > 15000	6 dB	-	0	
- 450 m radius outer circle	veh / day > 15000	2 dB	Marmion Ave ~23k vpd-	0	
Minor Road within the					
- 100 m radius inner circle	15k > veh/day > 6k	2 dB	-	0	
Type A 'Industrial and Utility premises' within the					0 (≤ 30)
- 100 m radius inner circle	1/10 x Area%	≤ 10	0 %	0	
- 450 m radius outer circle	1/10 x Area%	≤ 10	0 %	0	
Type B 'Commercial premises' within the					
- 100 m radius inner circle	1/20 x Area%	≤ 5	0 %	0	
- 450 m radius outer circle	1/20 x Area%	≤ 5	0 %	0	
					INFLUENCING FACTOR = 2 dB(A)

C7. The assigned noise levels at receiving noise sensitive premises, residential in the vicinity of the noise source, as allowed under Reference A are shown in the following table.

Table C7 – ASSIGNED NOISE LEVELS
(East of Marlinspike Boulevard, elsewhere 2dB(A) lower

Noise sensitive premises at locations . . . . . a building directly associated with a noise sensitive use.	Time of day	Time of day	Assigned Noise Levels dB(A)		
			LA10	LA1	LAmax
. . within 15 m of . .	Day	**0700-1900 hrs Monday to Saturday**	**47**	57	**67**
		0900-1900 hrs Sunday, Public holidays	42	52	
	Evening	1900-2200 hrs all days			57
	Night	2200-0700 hrs Monday to Saturday	37	47	
		2200-0900 hrs Sunday, Public holidays			
. . greater than 15 m from . .	All hours	All hours	60	75	80

Annex D - Children

D1. Noise emissions from the child care centre are expected to occur Monday to Friday between 0700 to 1800 hours and if applicable Saturday 0700 to 1800 hours, mainly during the two hours of outdoor play per day weather permitting for the Kindy group. This means that for evenings, night time, public holidays and Sundays there is expected to be no noise emissions from the child care centre at all.

D2. Anecdotal evidence indicates this is a desirable situation sought by some residences when purchasing properties adjacent to a child care centre as their will be no afterhours noise thus negating a common source of complaint.

D3. The Children's voices categorised by age groups:

a. Kindy 3 – 4 years old & Schoolies over 4 years old.

Measurements, observations and discussions with CCC staff since year 2000 indicates that this is the most significant noise producing group.

b. Toddlers 2 – 3 years old:

This is a very low noise producing group based on observations and discussions with CCC staff since year 2000. Their external play time is generally less than the Kindy group but more than the Babes group.

Attempts to obtain noise measurements suitable for use with Environmental Protection (Noise) Regulations 1997 "Reference A" have not been successful mainly due to traffic noise from nearby minor and/or major roads associated with the CCC's that ND Engineering has been reporting upon.

c. The Babes 0 - 2 years old:

This is a very low noise producing group based on observations and discussions with CCC staff on previous assessments.

Attempts to obtain noise measurements suitable for use with Reference A have not been successful.

D4. Children, weather permitting, are allowed outside to play for about 2 hours per day being typically about 0830 to 1000 hours and 1500 to 1800 hours with play typically being broken up into about 30 minute sessions at a time. Sometimes the afternoon outdoor play time is not utilised due to higher levels of sun exposure at this time of day. This low number of outdoor play hours is:

(1) Consistent with information obtained from CCC operators since year 2005. There are some variations between CCC but it is generally consistent with ND Engineering experience with the CCC assessments undertaken since year 2005;

(2) Also due to current sun exposure policies as expressed by the Cancer Council's Sun Protection Policy which does not recommend outdoor play between 1000 to 1500 hours;

(3) Play groups are typically for 12 to 24 children depending upon supervision requirements, with play times being staggered with children being rotated between outdoor and indoor activities.

Children 0 to 3 years old - Assessment

D5.1 The Babes 0 - 2 years old is a very low noise producing group based on observations and discussions with CCC staff since year 2000. Their external play time is typically about 30 minute sessions. Attempts to obtain noise measurements suitable for use with Reference A have not been successful due to the typically low noise output of this age group.

D5.2 The Toddlers 2 – 3 years old age group is again a very low noise producing group based on observations and discussions with CCC staff since 2000. Their external play time is generally less than the Kindy group but more than the Babes group. Attempts to obtain noise measurements suitable for use with Reference A have not been successful mainly due to traffic noise from nearby secondary and/or major roads associated with the CCC's that ND Engineering has been reporting upon since 2000.

D5.3 The noise levels created by small groups of children, in the Babes 0 to 2 years old and Toddlers 2 to 3 year old age groups, is unlikely to cause a problem for any of the surrounding residences due to the:

a. Low noise output of this age group; and

b. These age groups engage in parallel play, rather than group play, at this stage of their social development which is a low noise activity; and

c. Short duration of outdoor play times, typically 30 minutes, especially if the weather is not mild.

Children 3 to 4 years old and Schoolies 4+ years old - Assessment

D6.1 The data utilised for this assessment is derived from '*Proceeding of ACOUSTICS 2006 dated 20-22 November 2006*' with the relevant extract on the following page.

D6.2 The assessment is based on using sound data as follows:

a. LAmax Sound Pressure Lp = 82 dB(A) @ 1.0 m, Sound Power Lw = 90 dB(A)
note that LAmax is time independent;

b. LA01 not utilised as past experience shows that this data is difficult to acquire, and substantiate, as it is easily influenced by traffic, animal and vegetation noise.

c. LA10 Sound Pressure Lp = 65 dB(A) @ 1.0 m, Sound Power Lw = 73 dB(A)
note LA10 is time dependent and measured over 15 minutes;

D6.3 ND Engineering's assessment with regards to Residential Premises is that the noise emissions from the play areas as currently presented see Reference B and Annex A, complies with the assigned noise levels, see Figure D6.1 and Figure D6.2, subject to implementation of the recommendations.

D6.4 ND Engineering recommendations are to provide *Noise Barriers* (See Figure 5 in the Recommendations section of the report).

D6.5 Refer to the Section 'Recommendations' in the main body of the report.

OUTDOOR PLAY AREA NOISE SOURCE MODELS

The sound produced from children at play varies significantly at different times. Nevertheless a model based on the realistic worst-case (or at least an upper percentile) noise level is required to be established to assess the impact on neighbouring premises. The noise levels when the children are quiet are not relevant. Annoyance is only likely and the neighbours will only complain when the sound level from the children at play is raised. Aspects of the noise source model include, the number of children in an area, the number of children that are likely to be vocal in that area, the type of voice (i.e. casual, normal, loud, etc) and the times and distances between source and receiver.

General assumptions are that the boundaries of the proposed outdoor play area will be at least 2 metres from the neighbouring boundaries due to landscaped areas. Typical play positions are approximately 2 to 9 metres from the boundaries of the nearest affected residences with an average distance of 5 metres. The maximum numbers of children in the proposed outdoor play area(s) at any given time, not including babies or very young children (i.e. 2 years of age or under), are normally 20 to 40 and occasionally as many as 70.

Noise models have been developed for the calculation of child sound levels from children at play. This is based on sound pressure level data for one child at 1 metre as given by Kryter (1985). This model covers various types of voice shown in column 1 of Table 1 below.

The estimated time of each type of voice is used to predict a 15-minute average for one child. Attenuation is then applied for a distance of 5 metres and an adjustment is made for the amount of children vocal at any one time. This is typically 20% to 35% of the number of children at a centre. Hence, for the rear play area for, for example, 35 children (aged 2 to 5 years) and for a typical worst-case scenario, a maximum of 12 children could be expected to be vocal at any one time, in any one area. Site-specific distance attenuations are then applied as shown in Table 1 below.

Table 1. An example of the predicted noise levels for children at play

Type of Voice	Sound Pressure Level (dBA) at 1 metre	Estimated Time Spent at each type of voice (minutes in 15)	Resultant Sound Level (dBA) 15 minute average
Casual	53	2.8	46
Normal	58	5	53
Raised	65	5	60
Loud	74	2	65
Shout	82	0.2	63
15 minute Average for 1 Child at 1 metre			68
15 minute Average for 12 Children at 1 metre Average Distance (From 68 + 10 $\log_{10}$ (12) dB)			79
15 minute Average for 12 Children at 5 metres (From 79 - 20 $\log_{10}$ (5/1) dB)			65

This model was tested and verified with acoustical measurements taken at the Shore Preparatory School, Northbridge, NSW, on Monday 10 November 2003. At 8 metres a sound pressure level of 60 dBA was found to be the highest 15-minute noise level when 30 children first entered the play area. After the children settled, the noise level dropped by 3 to 5 dB. It was noted that the sand pit was the area where the children played the quietest.

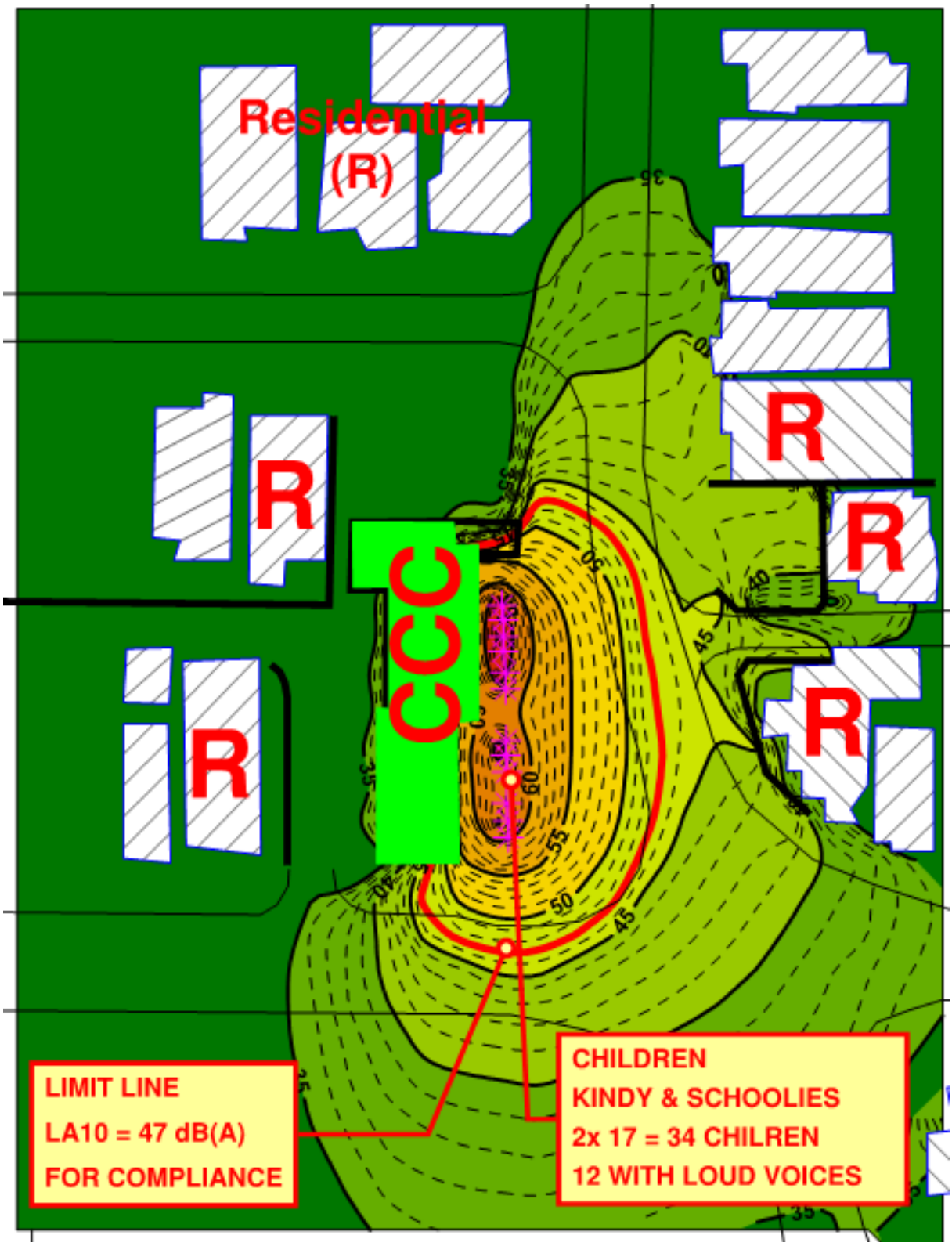

Figure D6.1 – OUTDOOR PLAY AREAS LA_{10} ASSESSMENT

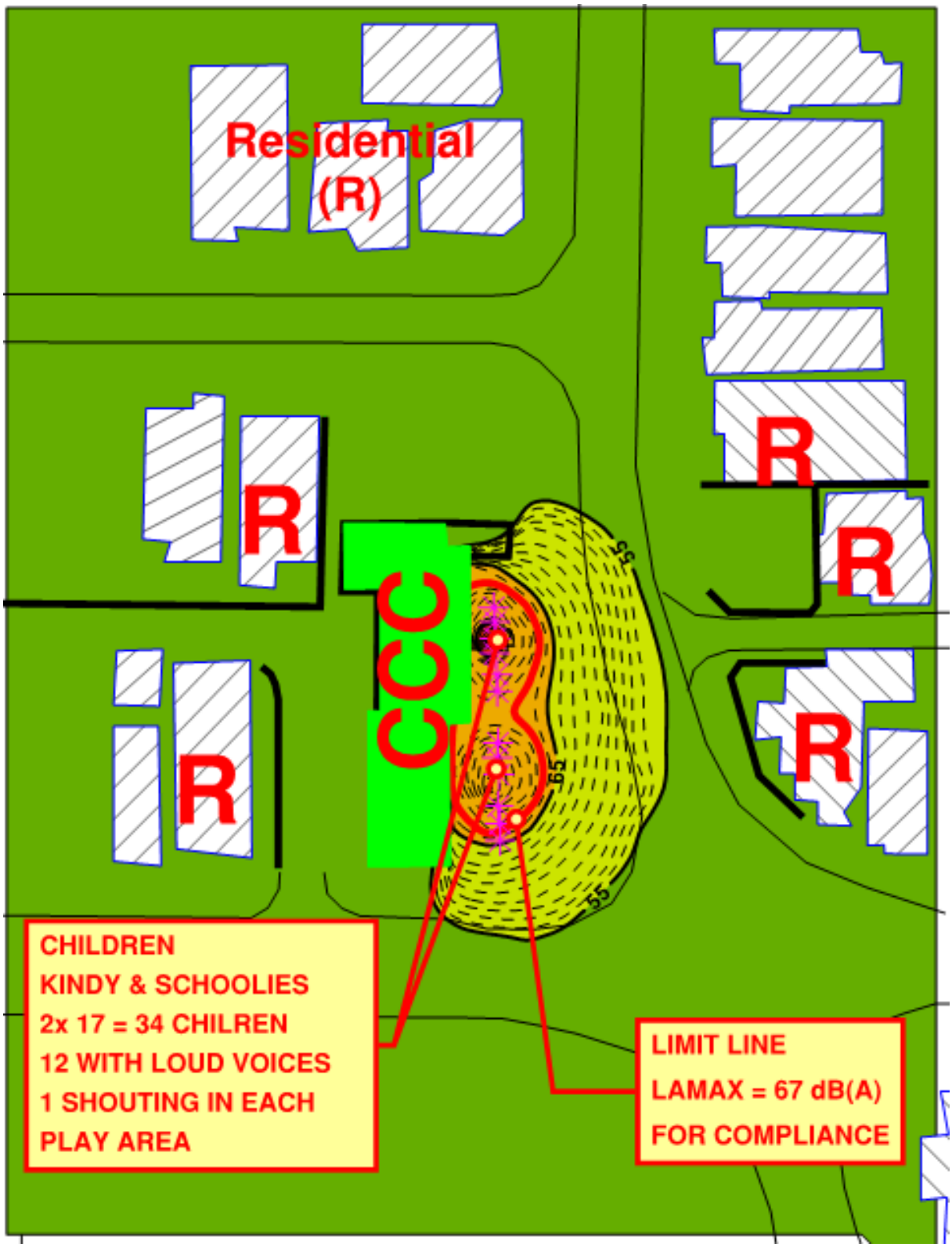

Figure D6.2 – OUTDOOR PLAY AREAS LA_{max} ASSESSMENT

Annex E - Music

E1. Typically, music produced within child care centres is for short durations as part of an activity and is played at a low volume as small children will typically not be able to follow instructions in rooms with a high noise background.

Basically, music levels will need to be kept at about 60 dB(A) or lower within the room which is equivalent to the noise level produced by a conversational adult male voice at 1 metre.

The music is typically non-impulsive, minimal bass, thus minimizing the main source of complaint typically associated with music.

E2. The reduction in noise levels to the nearest residential boundary has been calculated to be at least 20 dB(A) as a result of attenuation due to the transmission loss of the glass.

Essentially with all external doors and windows closed the noise level due to music at the nearest residential boundary will be about 35 dB(A) which with all adjustments included is well below the daytime assigned noise level of LA10 = 45 dB(A).

E3. Reductions due to distance and boundary fence reductions have been included in the preceding calculation and are expected to be about 3 to 8 dB(A) with an average of 5 dB(A).

E4. Refer to the Section ‘Recommendations’ in the main body of the report.

Annex F – Mechanical Services

F1. The main equipment noise sources at the site are expected to comprise:

a. Air-conditioning being either:

(1) Evaporative ducted; or

(2) Refrigerated reverse cycle air conditioning systems configure possibly as a mixture of ducted and wall mounted systems;

b. Mechanical ventilation exhaust systems (for Bath, Kitchen, Laundry, WC's) being typically of two types for;

(1) Rooms with an external non-boundary wall having either window or wall mounted exhaust fans; and

(2) Rooms without an external non-boundary wall having either:

(i) Ceiling mounted exhaust fan ducted vertically to the exterior through the roof; or

(ii) Bulkhead/ceiling ducted exhaust system to a non-boundary external wall; and

F2. The child care centre is expected to be operational, excluding public holidays, between 0700 to 1900 hours Monday to Friday and including Saturday 0700 – 1900 hours.

F3.1 The main potential noise source is the air-conditioning condenser units and the detailed requirements for these AC condenser units are contained in the recommendations section of this report. Essentially the recommendations are the use of inverter AC condenser units and positioning of the AC condenser units at least 6.0 metres from the adjoining properties boundary fences with the AC condenser units facing the roads to the South and South East roundabout.

F3.2 The toilet exhaust fans are unlikely to pose a problem and are not assessed in detail. In the unlikely event that these exhaust discharges through the roof do present some objectionable noise this can be easily overcome by the insertion of some additional acoustic flexible duct into the discharge line.

F3.3 The kitchen exhaust fans will either be of a domestic kitchen canopy type or commercial kitchen canopy type depending upon the size of the kitchen equipment. If the kitchen equipment has inputs:

a. Less than either 8 kW electrical or 29 MJH gas then a commercial kitchen canopy is not required and a domestic kitchen canopy ducted to the exterior will suffice. In this situation, the exhaust system is unlikely to pose a problem and therefore is not assessed in detail.

b. Greater than either 8 kW electrical or 29 MJH gas then a commercial kitchen canopy is required with an external roof mounted fan. Essentially the exhaust fan will need to be located further than 6.0 metres from a residential boundary with a maximum speed of 960 rpm. Detailed requirements for these AC condenser units are contained in the recommendations section of this report.

F4. Refer to the Section 'Recommendations' in the main body of the report.

Annex G - Carpark

G1. Carpark noises typically may comprise adults talking and children's voices, car radios and car doors.

G2. Essentially the first and last persons on site are the staff. The staff parking should be restricted to *either* car bays outside of the client parking areas to reduce client stress by allowing them to park closer to the CCC doors *or* car bays that have a greater effect upon nearby residences.

G3 Observations on various sites shows that arrivals/departures of children to/from the site are generally fairly quick especially in the morning. Morning client activity tend to occur in several distinct groups being the construction workers arrivals prior to 0730 hours, the first school morning arrivals at about 0815 hours (before older siblings being taken to school) and the second school morning arrivals at about 0915 hours (after older siblings have been taken to school in the morning).

G4.1 Measurements and observations were conducted at the Kids Campus CCC on 103 Canning Road Kalamunda on the morning of Wednesday 14 SEP 05 between 0730 to 0830 hours in order to obtain carpark noise data and discuss operational matters with the manager. This carpark contains about 21 car bays with about 15 on the residential side of the carpark and 6 on the CCC building side.

G4.2 A series of three noise measurements on site at the Kids Campus CCC side of the residential boundary showed noise levels as follows: Cars doors closing LAmax = 54 to 58 dB(A) at approximately 10 metres; and Children talking about LAmax = 50 dB(A) at approximately 10 metres.

ND Engineering's measurement point near the residential boundary was located about 10 metres from the CCC entry doors. Parents were not made aware of ND Engineering's presence so that the behaviour was allowed to be as normal as possible. The entire carpark location was fairly reverberant. Parents were parking fairly close to either side of or in front of the CCC entry doors.

The LA10 and LA1 measurements were meaningless as the noise from the nearby road heavily contaminated these two measurements however it would be safe to say that both the LA1 and LA10 would be lower than the LAmax measured values.

G4.3 These LAmax noise levels are not significant and given the short duration of the arrivals/departures the application of tonality and modulation penalties could not be applied to the measurements as the duration of the event was less than 10% of any representative measurement period. The only penalty that could be applied is if car doors are slammed resulting in the application of an impulsive penalty of +10 dB(A). The following figures show that for 'normal' car door action the situation is one of compliance with the assigned noise levels however slamming of car doors would not be compliant and thus a noise management is required via signage.

G5.1 ND Engineering's opinion is that the proposed Child Care Centre (CCC) for the daytime periods of 0700 - 1900 hours Monday to Friday including if required Saturday 0700 – 1900 hours the:

a. Car door closing noise emissions will comply with the Noise Regulations (Reference A), subject to implementation of the recommendations contained in Section 5 'Recommendations'.

G5.2 ND Engineering recommendations are:

a. Signage is placed within the two carparks asking parents/staff not to slam car doors/boots; and

b. Signage is placed within the two carparks asking parents/staff not to play music or radio; and

c. Staff are required to park in Western car bays along Tonna Lane;

G6. Refer to the Section 'Recommendations' in the main body of the report.

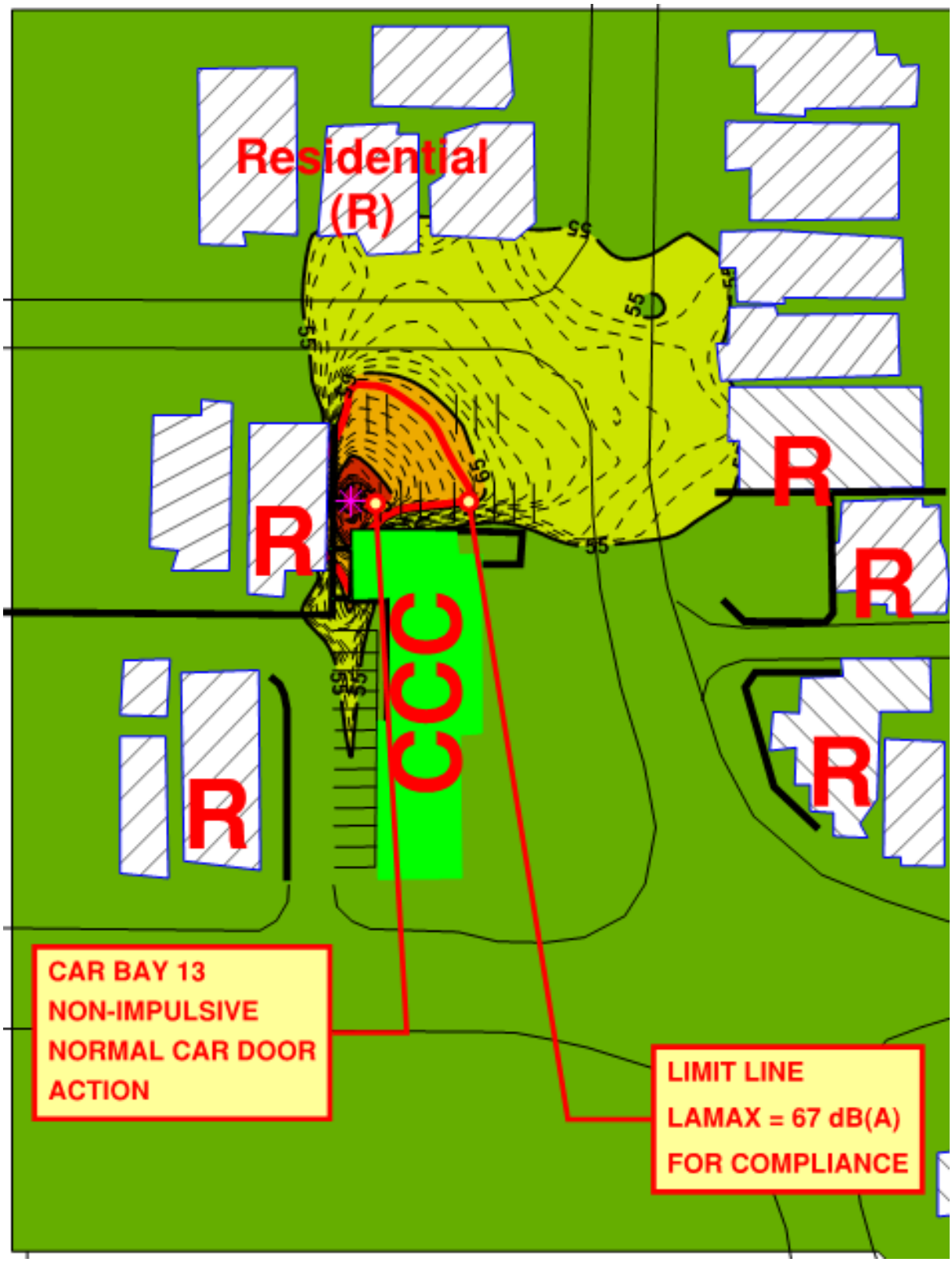

Figure F5.1 – PARENT CAR PARKING NORTH BAY 13 LA_{MAX} ASSESSMENT - NON-IMPULSIVE

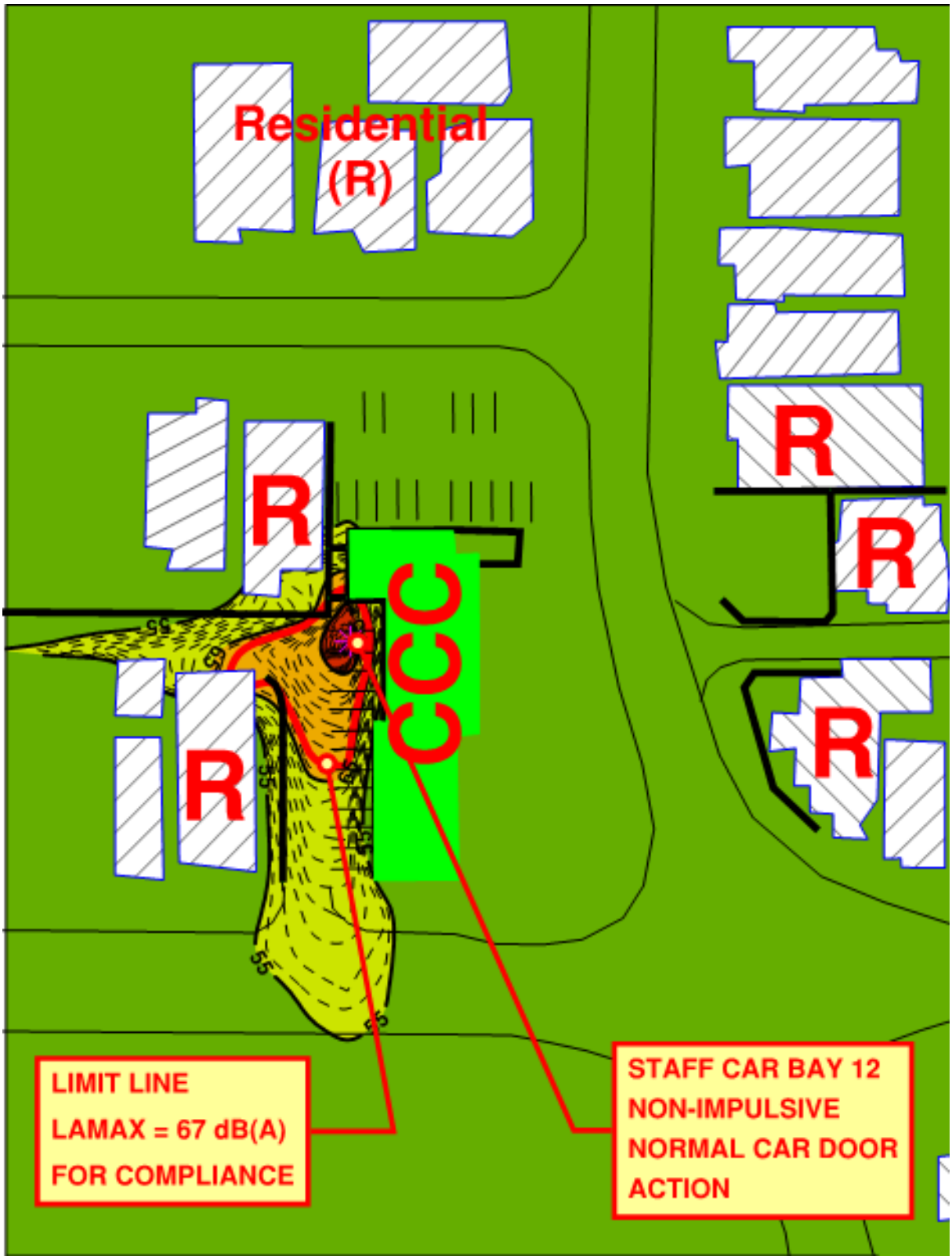

Figure F5.2 – STAFF CAR PARKING CENTREBAY 12
LA_{MAX} ASSESSMENT- NON-IMPULSIVE