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ACOUSTICAL REPORT FOR S4.55

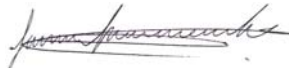
PROPOSED CHILD CARE CENTRE

21-23 NORFOLK ROAD EPPING NSW

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ACOUSTICAL REPORT FOR S4.55
PROPOSED CHILD CARE CENTRE
21-23 NORFOLK ROAD EPPING NSW

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1.0 INTRODUCTION

Koikas Acoustics Pty Ltd has been engaged by Oggi Investment Group Pty Ltd to prepare a noise impact assessment for the proposed modification to the approved child care centre at 21-23 Norfolk Road Epping NSW. The application seeks to modify the number of children at the centre which ultimately results in a net increase in total children of from 53 (approved) to 82 (proposed).

This report primarily presents an assessment of noise egress from the proposed child care centre. The site is not located adjacent to a main road, rail corridor, under a flight path, or adjacent to industrial premises, meaning that external noise impacts on the proposed child care centre are not anticipated.

To derive suitable noise objectives by which to assess the development, reference is made to the City of Parramatta Council Development Control Plan (DCP) and other relevant planning documents such as:

- NSW Government Child Care Planning Guidelines 2017
- State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017
- Association of Australasian Acoustical Consultants (AAAC) Guideline for Child Care Centre Acoustic Assessment (v3.0)
- NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPfI) 2017
- NSW Environmental Protection Authority (EPA) Road Noise Policy (RNP)

The following sections of this report provide a brief outline of the development, establish the project noise objectives through referencing appropriate guidelines and documents, predicts noise levels to surrounding receivers, and recommend noise mitigation/management measures necessary to meet the project noise objectives.

This report makes reference to the previously prepared DA Acoustic Report prepared by Acoustic Dynamics (File Reference: 4391R001.MW.180818, Dated: 7 September 2018).



2.0 THE DEVELOPMENT PROPOSAL

The proposed child care centre is two (2) single-storey buildings with basement parking located at 21-23 Norfolk Road Epping NSW. The site has a single street frontage (Norfolk Road) to the east and is surrounded by residential premises in all directions. Epping Public School is also located across Norfolk Road.

The designs of the child care centre as prepared by Loucas Architects (Project No.: Pn-21017, Dated: 11.02.2022, Revision: A) shows:

- Basement parking with 23 spaces (visitors drop-off and staff).
- Three (3) separate internal play areas (divided by age group), reception/waiting area, offices, kitchen, staff/meeting room, and amenities in the main building.
- Covered and uncovered areas dedicated to outdoor play (575 m² unencumbered area).

Note: *This acoustic report and any associated recommendations are based solely on the architectural design and drawings as referenced above. Any changes to the above-referenced plans may require a new assessment and recommendations.*

The centre will operate between the hours of 7 am and 6 pm Monday to Friday. Staff members will generally arrive 15-30 minutes prior to opening and depart 15-30 minutes after closing hours. This represents no change to the approved development.

The facility is proposed to cater for a total of 82 children which represents an increase of 29 children from the approved development. The breakdown per age group of the approved versus proposed modified child numbers is:

Table 1. Approved and proposed child numbers		
Age group	DA approved	S4.55 proposed
0-2 years	16	17
2-3 years	17	25
3-5 years	20	40
Total	53	82



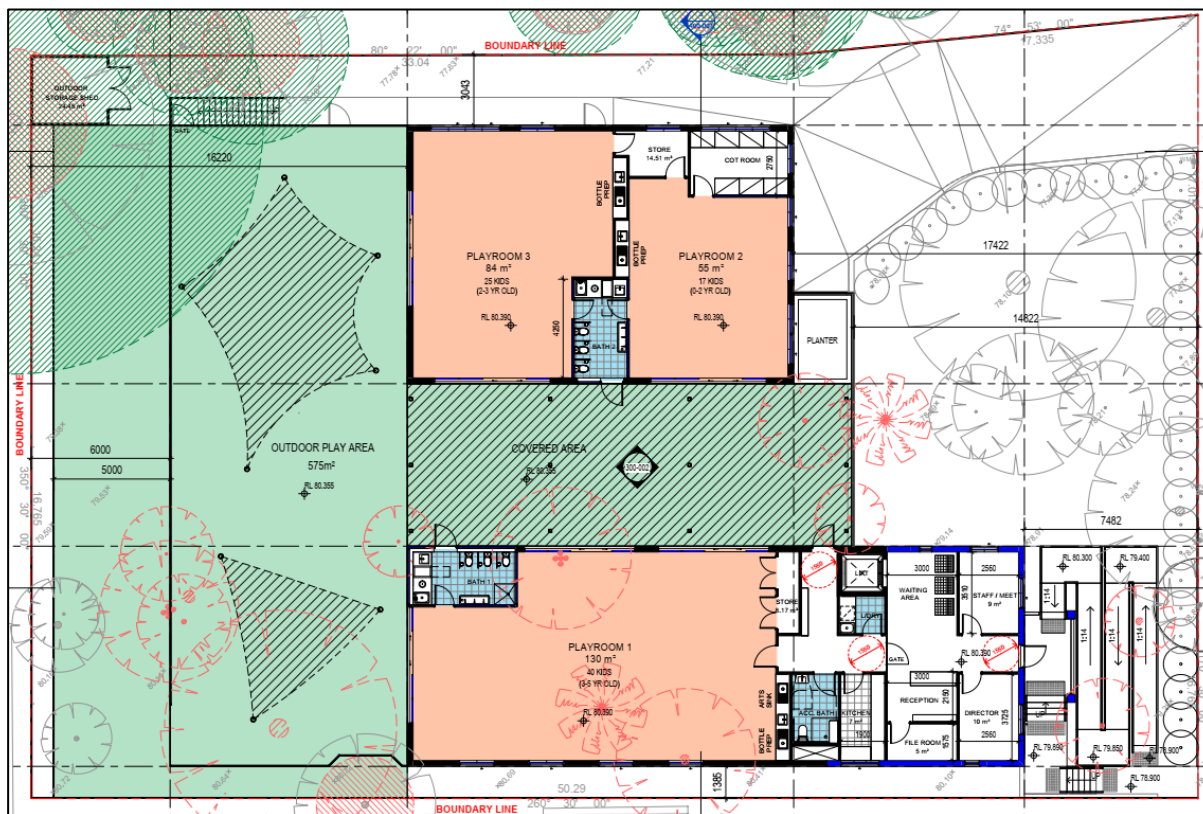


Figure 1. Site plan (Source: Loucas Architects)

3.0 IDENTIFIED NOISE-SENSITIVE RECEIVERS

The development site and the adjacent residential lots are all located within an R3 Medium-Density Residential zoning to the west and R2 Low-Density Residential zoning in all other directions as per the Hornsby Local Environment Plan 2013. The nearest surrounding noise-sensitive residential receptors are the adjacent lots to the north, south and west as well as across Norfolk Road to the East. These premises are identified as:

Table 2. Identified noise-sensitive receptors		
Receptor type	Address	Orientation to the development site
Residential dwelling [double storey]	22 Norfolk Road	North-east
Residential dwelling [single storey]	20 Norfolk Road	East
Epping Public School	Epping Public School	East
Residential dwelling [single storey]	19 Norfolk Road	South
Residential townhouses [double storey]	21 Rockleigh Way	West
Residential townhouses [double storey]	19 Rockleigh Way	West
Residential dwelling [double storey]	24 Chester Street	North

Each of the identified noise-sensitive residential receptors is shown in Figure 2, along with the location of the noise loggers installed on-site (by others). These properties and several locations within each property (where necessary) are assessed for resulting noise impacts from the proposed child care centre.



Figure 2. Aerial image (Source: Six Maps)

4.0 EXISTING NOISE ENVIRONMENT

Koikas Acoustics has relied on the noise surveys undertaken by Acoustic Dynamics to determine the ambient noise levels in the area.

Existing unattended ambient noise levels in the local area were surveyed by others between Thursday 16th August and Thursday 23rd August 2018. The relevant noise measurements equipment and standards have been extracted below from the report prepared by Acoustic Dynamics.

3 NOISE MEASUREMENT EQUIPMENT & STANDARDS

All measurements were conducted in general accordance with Australian Standard 1055.1-1997, "*Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures*". Acoustic Dynamics' sound measurements were carried out using precision sound level meters conforming to the requirements of IEC 61672-2002 "*Electroacoustics: Sound Level Meters – Part 1: Specifications*". The survey instrumentation used during the survey is set out in **Table 3.1**.

Table 3.1 Noise Survey Instrumentation

Type	Serial Number	Instrument Description
2270	2664115	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2650956	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4231	1730737	Brüel & Kjaer Acoustic Calibrator
EL-316	16-306-020	ARL Environmental Data Logger

The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

Acoustic Dynamics has presented the daytime RBL to be L_{A90} 39 dB. No further noise measurement summaries have been presented in the DA acoustic report prepared by Acoustic Dynamics. The shoulder period between 6.30 am and 7 am was determined to be approximately L_{A90} 40 dB from the unattended noise logger graphs.

Acoustics Dynamics has also advised they have undertaken an attended noise survey of the ambient noise levels at the front of the site, however, details of the measurements have not been presented in the report. Acoustic Dynamics has predicted the following ambient noise levels for the development:

- Indoor play/sleeping area (windows closed) $L_{Aeq} \leq 25$ dB
- Indoor play/sleeping area (windows open) $L_{Aeq} \leq 35$ dB
- Outdoor play or activity area $L_{Aeq} \leq 40$ dB



5.0 NOISE ASSESSMENT GUIDELINES

5.1 HORNSBY DCP 2013

There are no other specific noise-related guidelines for child care centre development within the Hornsby DCP 2013.

5.2 NSW PLANNING AND ENVIRONMENT

The CCPG under Item C23 and C24 recommend the following to minimise noise impacts from the facility on residential neighbours:

- *Provision of an acoustic fence along the property boundary.*
- *Ensure that mechanical plant and equipment is suitably screened to reduce noise.*
- *That an acoustic report is provided with an application that establishes an appropriate background noise level for times the outdoor play area will be in use, identifies an appropriate target noise level (noise criteria) for child care centre noise emission, recommends appropriate heights for any acoustic fences.*

Item C25 which relates to external noise impacts on the proposed child care centre is not relevant in this case.

5.3 SEPP (EDUCATIONAL ESTABLISHMENTS AND CHILD CARE FACILITIES) 2017

Further to the CCPG, the State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 outlines assessment requirements for educational establishments and child care facilities across NSW, however, also does not present any specific criteria relevant to noise emissions.

To establish suitable noise emission objectives for the use and operation of the proposed child care centre, the guidelines prepared by the Association of Australasian Acoustical Consultants (AAAC) in their *Guidelines for Child Care Centres Acoustic Assessment* document are referenced. The AAAC guidelines do not, however, present noise objectives for an assessment of vehicle noise attributed to additional cars on local roads. The NSW Environment Protection Authority Road Noise Policy (EPA RNP) is referenced for specific noise objectives related to on-road vehicular noise emissions.



5.4 AAAC GUIDELINES

5.4.1 Outdoor play areas

The AAAC recognise that childcare centres will generally be located in residential areas. Some of these areas will have very low pre-existing background noise levels. In such areas where the background level is lower than 40 dB(A), the AAAC recommend adopting a base criterion of $L_{Aeq\ 15\ minutes}$ 45 dB(A) rather than defining a criterion based on a specified emergence of noise above the existing background level.

Where the background noise level is greater than 40 dB(A), the contributed $L_{Aeq\ 15\ minutes}$ of noise emitted from outdoor play must not exceed the background level by more than 5 or 10 dB at the assessment location depending on the usage of the outdoor play area.

If the outdoor play area is limited to no more than two (2) hours in the morning and a further two (2) hours in the afternoon, thus a total usage of four (4) hours per day, the contributed $L_{Aeq\ 15\ minutes}$ of noise emitted from outdoor play shall not exceed the background noise level by more than 10 dB.

If the outdoor play area is not limited to two (2) hours in the morning and a further two (2) hours in the afternoon, thus a total usage of more than four (4) hours per day, the contributed $L_{Aeq\ 15\ minutes}$ of noise emitted from outdoor play shall not exceed the background noise level by more than 5 dB.

To summarise, the noise emitted from outdoor play, assessed as an $L_{Aeq\ 15\ minutes}$, must not exceed:

- A base criterion of 45 dB(A) in areas where the background level is below 40 dB(A).
- The background noise level + 10 dB in areas where the background noise level is greater than 40 dB(A) and where outdoor play **is limited** to no more than two (2) hours in the morning and two (2) hours in the afternoon.
- The background noise level + 5 dB in areas where the background noise level is greater than 40 dB(A) and where outdoor play **is not limited** to two (2) hours in the morning and two (2) hours in the afternoon.

The assessment location is at the most affected point on or within the residential boundary:

- At 1.5 metres above the ground,
- On a balcony at 1.5 metres above the floor level,
- Outside a window on the ground or higher floors.



5.4.2 Indoor play area, mechanical plant, pick-up and drop-off

Noise that is generated as a result of indoor activities, mechanical plant and equipment, and site pick-up/drop-off zones must not exceed the L_{A90} background noise level by more than 5 dB when assessed at the most affected point within any residential property. Childcare centre noise is assessed as $L_{Aeq, 15\text{-minutes}}$.

5.4.3 Sleep disturbance

Activity on-site before 7 am or during night hours, such as staff arrivals, cleaning etc must be assessed for potential sleep disturbance impacts on nearby residential receptors. The sleep disturbance assessment criterion adopted by the AAAC is for a L_{Amax} not exceeding the background noise level by more than 15 dB outside the nearest habitable room window.

**Note: In addition to the sleep disturbance guideline provided by the AAAC, reference is also taken from the latest version of the NSW EPA industrial noise guidelines (Noise Policy for Industry – 2017) concerning maximum noise levels and the potential for sleep disturbance (Report Section 5.5).*

5.4.4 Commercial receptors and other sensitive receivers

The noise emitted from the cumulative impact of the childcare centre shall not exceed $L_{Aeq, 15\text{min}}$ 65 dB when assessed at the most affected point at or within the commercial property boundary.

5.4.5 Noise intrusion from external sources

The development site is not affected by external noise sources meaning this component of the guideline has no relevance in this case.

5.5 EPA NOISE POLICY FOR INDUSTRY – SLEEP DISTURBANCE

The NPfl is provided as a guide to determine suitable project noise objectives when assessing environmental noise impacts associated with scheduled activities prescribed within Schedule 1 of the Protection of the Environment Operations Act 1997. It is also commonly used as a reference tool for establishing suitable planning levels for noise generated by mechanical plant and equipment and noise emissions from commercial operations.

With staff cars likely to arrive before the 7 am centre opening, noise associated with the vehicles entering the car park ramp could potentially generate noise-induced sleep disturbance. The NPfl advises conducting a screening assessment to determine the potential for sleep disturbance. Where the screening levels are exceeded, a detailed maximum noise level assessment should be



completed to review the likelihood of sleep disturbance impacts to nearby residential receivers.

The sleep disturbance screening level adopted in the NPfI is:

- $L_{Aeq\ 15\ mins}$ 40 dB(A) or the prevailing RBL + 5 dB, whichever is the greater, and/or
- L_{Amax} 52 dB(A) or the prevailing RBL + 15 dB, whichever is the greater

5.6 EPA ROAD NOISE POLICY

Traffic generating development such as a child care centre will introduce additional vehicles onto the local road network. The noise that is associated with these additional vehicles forms part of the acoustical assessment of the proposed development.

The EPA RNP recommends that traffic noise levels should not exceed $L_{Aeq, 1-hour}$ 55 dB during daytime hours (7 am to 10 pm) at an assessment location of (one) 1 metre from the façade of an affected residential building and at a height of 1.5 metres above the ground. Outside of daytime hours, the objective becomes $L_{Aeq, 1-hour}$ 50 dB.

5.7 PROJECT NOISE OBJECTIVES

Considering the guidelines presented by the AAAC, Koikas Acoustics finds the following project noise objectives for the development to be appropriate:

Table 4. Noise emission objectives [dB]		
Assessment location	Assessment period	Noise objective
Outdoor play (4 hours total only per day)		
Residential receivers	Day [7 am to 6 pm]	$L_{Aeq\ 15\ mins}$ 45
Residential receivers ^{Note 1}	Day [7 am to 6 pm]	$L_{Aeq\ 15\ mins}$ 50
Commercial Receivers	Day [7 am to 6 pm]	$L_{Aeq\ 15\ mins}$ 65
Indoor play, car park, mechanical plant		
Residential receivers	Day [7 am to 6 pm]	$L_{Aeq\ 15\ mins}$ 44
Commercial Receivers	Day [7 am to 6 pm]	$L_{Aeq\ 15\ mins}$ 65
Sleep disturbance		
Residential receivers fronting Norfolk Road	Night [6.30 am to 7 am]	$L_{Aeq\ 15\ mins}$ 45 L_{Amax} 55
On-road traffic noise		
Residential receivers fronting Norfolk Road	Day [7 am to 6 pm]	$L_{Aeq\ 1\ hr}$ 55

Note 1: If measured ambient background noise levels were found to be L_{A90} 40 dB during the daytime, the adopted outdoor play criterion is L_{A90} 50 dB. Ambient background noise level may have increased by 1 dB since 2018 when the noise logging was conducted by Acoustic Dynamics.



6.0 NOISE MODEL

The noise predictions are based on computer simulation (CadnaA) of the site and the surrounding area. The program predicts noise levels to receiver points based on source sound power levels, source-receiver distances, the presence of any acoustic shielding objects, and the effects of acoustic absorption of the ground and other elements. Noise propagation calculations follow *ISO 9613 Acoustics – Attenuation of sound during propagation outdoors*. Per the sound propagation algorithms adopted in the ISO standard, the output of the noise model is a downwind sound pressure level which constitutes an assessment of noise-enhancing weather conditions.

The CadnaA model has been used to:

- Predict noise emission from the child care centre outdoor play areas
- Breakout from the indoor play areas
- Vehicular noise from drop-off and pick-up
- Noise levels attributed to vehicles on the car park ramp potentially affect residents' sleep
- On-road vehicle noise emission



7.0 ASSESSMENT OF THE CHILD CARE CENTRE

7.1 NOISE SOURCES

Noise sources associated with the child care centre that must be assessed, include:

- Children occupying the outdoor play area
- Noise breakout from children in the indoor play area
- Noise from vehicles during morning drop-off and afternoon pick-up
- Mechanical plant noise such as air conditioners, basement ventilation fans, kitchen fans
- On-road noise from vehicles arriving and departing during morning and afternoon drop-off/pick-up

It is noted that the system selections for the mechanical plant and equipment are not generally available at the application stage. This noise is more appropriately assessed during the detailed design stage. This report presents the noise limits applying to the equipment only.

Noise levels of children playing are referenced from the AAAC guidelines that present effective sound power levels and associated noise spectra for groups of 10 children in age groups of 0-2 years, 2-3 years, and 3-5 years. Outdoor play noise levels are directly calculated from these sound levels. Indoor play noise levels considered these sound levels as well as a room effect. The room effect presumes that the internal reverberation time within each playroom does not exceed 0.7 seconds.

Vehicle noise includes that attributed to cars travelling up and/or down the car park ramp. Database noise levels from measurements conducted by Koikas Acoustics of vehicles travelling up and down a basement car park ramp are used in the assessment. Traffic generation rates for child care centres are referenced from the *RTA Guide to Traffic Generating Development*, being 0.8 vehicle trips per child between 7 am and 9 am. This equates to 65.6 (rounded up to 66) vehicle trips between 7 am and 9 am, or 8 vehicle trips per 15-minutes. This assessment conservatively allows for up to 10 vehicles to enter and leave the basement in 15 minutes.

Noise attributed to engines starting and car doors opening/closing is expected to be well contained in the basement level of the building, having a negligible impact on neighbours.

Maximum noise levels from cars on the ramp arriving before 7 am are typically 6 dB above the corresponding L_{Aeq} sound power level.



On-road vehicle noise is predicted via the road noise module in CadnaA on the presumption of up to 40 cars arriving or departing during 1-hour. Adopting 40 cars in 1-hour presumes that slightly more than half the peak 2-hour vehicles (66 cars) will arrive/depart in peak hour.

Table 5. Source noise levels [dB]			
Noise source	Classification	Noise metric	Noise level
10 children aged 0-2 years playing	Effective sound power level ¹	L _{Aeq}	78
10 children aged 2-3 years playing	Effective sound power level ¹	L _{Aeq}	85
10 children aged 3-5 years playing	Effective sound power level ¹	L _{Aeq}	87
0-2 yrs room noise level	Internal average room noise level ²	L _{Aeq}	80
2-3 yrs room noise level	Internal average room noise level ²	L _{Aeq}	85
3-5 yrs room noise level	Internal average room noise level ²	L _{Aeq}	88
1 car driving down the ramp ³ (10 kph)	Sound power level Sound power level	L _{Aeq} L _{Amax}	77 83
1 car driving up the ramp ³ (10 kph)	Sound power level	L _{Aeq}	82
Car door closing	Sound power level	L _{Amax}	93
Notes:	1. An effective sound power level takes into account the directionality of sound from a source where the source orientation is varying, such as for children in outdoor play areas. 2. Data obtained from AAAC Guidelines and corrected for internal space, and number of children 3. The sound power level of 1 car driving UP/DOWN the ramp is entered into the noise model and corrected for the total number of corresponding vehicle movements in the 15-minute assessment period. The model presumes this as a moving point source. 4. The AAAC advise that a -6 dB adjustment can be made to each age group for children involved in passive play.		

The above noise levels were used as a basis to calculate/predict noise emission from the proposed development. The base noise levels from the table are corrected per specific design parameters such as the number of vehicle movements, number of children etc.

For reference, the octave band effective sound power levels for children in outdoor play areas as published within the AAAC guidelines are presented below.

Table 6. Effective sound power levels (L _{Aeq 15 mins}) for groups of 10 children playing [dB]									
Number and age of children	1/1 octave band centre frequency [Hz]								Total
	63	125	250	500	1000	2000	4000	8000	
Active/free play									
10 children – 0 to 2 years	54	60	66	72	74	71	67	64	78
10 children – 2 to 3 years	61	67	73	79	81	78	74	70	85
10 children – 3 to 5 years	64	70	75	81	83	80	76	72	87
Notes:	1. An effective sound power level takes into account the directionality of sound from a source where the source orientation is varying, such as for children in outdoor play areas.								



7.2 PREDICTED RECEIVER LEVELS

Noise emitted from the outdoor play area, indoor playrooms, and the car park was assessed to all surrounding residential receptors previously identified in Section 3.0 of this report. Noise levels are assessed at the most affected point within the property boundary, including upper floor windows.

Sleep disturbance noise levels are assessed outside the nearest affected residential windows. The sleep disturbance noise levels are only relevant for staff arrivals in the morning before 7 am.

On-road traffic noise levels are assessed at 1 metre from the residential façade.

The CadnaA noise model layouts provided as an appendix to this report clearly show the location of all receiver points used to assess noise emitted by the child care centre. On those layouts, 'ground' refers to a point at 1.5 m above ground level and 'first' refers to a point at 1.5 m above the upper floor level and outside a window.

7.2.1 Outdoor play (Scenario 1.1-1.4)

The following assumptions are made for the outdoor play area:

- Staggered use of the outdoor play area. Children aged 0-2 years and 2-3 years are outside for 2 hours (total). During a separate 2 hours (total), the 3-5 years children may use the outdoor play area. 0-3 years and 3-5 years children must not be outside at the same time.
- The outdoor play area must not be occupied for longer than 4 hours (total) per day.
- 1.8 m high solid noise barriers are required along the northern, southern and western residential boundaries.



Table 7. Receptor noise levels – Outdoor play, $L_{Aeq,15\text{ mins}}$ [dB]

Receptor ID	Receptor description	Noise criteria	Predicted receiver level	
			10 children 0-2 yrs 15 children 2-3 yrs (Scenario 1.1)	10 children 3-5 yrs (free-play) 10 children 3-5 yrs (passive-play) (Scenario 1.2)
R1	22 Norfolk Road	45	32	37
R2	20 Norfolk Road	45	34	38
R3	Epping Public School	65	32	36
R4	19 Norfolk Road	45	28	29
R5	19 Norfolk Road	45	35	32
R6	21 Rockleigh Way	45	39	38
R7	19 Rockleigh Way	45	45	45
R8	24 Chester Street	45	38	40
R9	24 Chester Street	45	40	43
R10	24 Chester Street	45	26	34
Note:	1.	Where receivers are not included in the above table, noise levels are sufficiently low to not be of concern regarding acoustic compliance. The above receivers are those most affected.		

The predicted noise levels for both design options are within $L_{Aeq,15\text{min}}$ 45 dB and thus are acceptable per the AAAC guidelines, provided the recommendations in Section 7.3 are implemented.

Table 8. Receptor noise levels – Outdoor play, $L_{Aeq,15\text{ mins}}$ [dB]

Receptor ID	Receptor description	Noise criteria	Predicted receiver level	
			17 children 0-2 yrs 25 children 2-3 yrs (Scenario 1.3)	20 children 3-5 yrs (free-play) 20 children 3-5 yrs (passive-play) (Scenario 1.4)
R1	22 Norfolk Road	50	30	38
R2	20 Norfolk Road	50	34	39
R3	Epping Public School	65	32	34
R4	19 Norfolk Road	50	29	32
R5	19 Norfolk Road	50	37	39
R6	21 Rockleigh Way	50	42	44
R7	19 Rockleigh Way	50	48	50
R8	24 Chester Street	50	43	44
R9	24 Chester Street	50	46	47
R10	24 Chester Street	50	27	35
Note:	1.	Where receivers are not included in the above table, noise levels are sufficiently low to not be of concern regarding acoustic compliance. The above receivers are those most affected.		

The predicted noise levels for both design options are within $L_{Aeq,15\text{min}}$ 50 dB and thus are acceptable per the AAAC guidelines, provided the recommendations in Section 7.3 are implemented.



7.2.2 Indoor play and drop-off/pick-up (Scenario 2)

The second stage of the child care centre assessment is to review potential noise impacts arising from noise breakout with the children indoors and from vehicles during morning drop-off and afternoon pick-up. A provisional mechanical plant noise limit can also be set.

Indoor play noise levels have been calculated individually for each of the three (3) playrooms and are dependent upon the number of children, their age range, and the acoustical condition of the room. The calculated indoor average noise levels in each playroom are:

- Playroom 1 – 17 children aged 0-2 years – LAeq 15 minutes 80 dB
- Playroom 2 – 27 children aged 2-3 years – LAeq 15 minutes 85 dB
- Playroom 3 – 40 children aged 3-5 years – LAeq 15 minutes 88 dB

It is assumed that the doors to the playrooms are closed and the glass is 6.38 mm laminated.

As previously discussed in Section 7.1 of this report, up to 10 vehicles are assumed to enter and leave the basement parking level during any 15 minutes.

The following noise levels are predicted at the nearest residential premises:

Table 8. Receptor noise levels – Indoor play and cars, LAeq 15 mins [dB]			
Receptor ID	Receptor description	Noise criteria	Predicted noise level
R1	22 Norfolk Road	44	38
R2	20 Norfolk Road	44	39
R3	Epping Public School	65	36
R4	19 Norfolk Road	44	25
R5	19 Norfolk Road	44	32
R6	21 Rockleigh Way	44	25
R7	19 Rockleigh Way	44	31
R8	24 Chester Street	44	31
R9	24 Chester Street	44	33
R10	24 Chester Street	44	42

Predicted noise levels are within 5 dB of the background level and thus comply with the project noise criterion.



The design and selection of mechanical plant and equipment must consider the cumulative noise generated by the equipment, the parking area, and noise breakout from indoor play areas. The combined noise level must meet the noise objectives stipulated in this report. Considering the small margin of compliance predicted to neighbours, a detailed acoustical review of mechanical plant noise emission will be critical to ensure adequate noise treatments are specified. This detailed review should be commissioned before construction.

7.2.3 Sleep disturbance (Scenario 3.1 and 3.2)

Staff cars entering the basement parking level are predicted to generate $L_{Aeq\ 15\ minutes}$ noise levels of 29 dB (Scenario 3.1) at the most affected windows of 20 and 22 Norfolk Road and are within the $L_{Aeq\ 15\ minutes}$ 44 dB limit.

L_{Amax} noise levels are predicted to reach 54 dB (Scenario 3.2) outside the windows of 20 and 22 Norfolk Road. This complies with the sleep disturbance screening level of L_{Amax} 55 dB.

Koikas Acoustics also draws attention to the NSW EPA RNP, a planning document that includes an extensive review of sleep disturbance research that was available at the time of its publication. The conclusion reached within the sleep disturbance section of the RNP is that internal L_{Amax} noise levels of 50-55 dB are unlikely to awaken people and 1-2 noise events per night of 65-70 dB are not likely to affect health and well-being significantly.

Considering the predicted external maximum noise level of 54 dB, the corresponding internal noise level assuming open windows is 44 dB. This is within the acceptable level prescribed in the RNP and further supports the position that sleep disturbance is unlikely.

7.2.4 On-road vehicle noise (Scenario 4)

Noise attributed to up to 40 vehicles arriving and departing the centre along Norfolk Road during a 1-hour window is predicted to generate noise levels at the residential facades of neighbours ranging from $L_{Aeq\ 1-hour}$ 41-50 dB. This is within the $L_{Aeq\ 1-hour}$ 55 dB allowed under the RNP.



7.3 SUMMARY OF RECOMMENDATIONS – CHILD CARE CENTRE

The assessment has found that noise emissions from the child care centre play areas (outdoor and indoor) and noise generated during drop-off/pick-up will meet the project noise objectives with the following requirements for noise mitigation implemented in the design and operation of the premises:

Outdoor play areas (Option 1) – Existing noise logging data (L_{A90} 39 dB)

- All children must not occupy the outdoor play area at the same time. Use of the outdoor play area must be staggered so that either:
 - o 10 children (free-play) aged 0-2 years and 15 children (free-play) aged 2-3 years are outside at any one time.
 - o 10 children (free-play) aged 3-5 years and 10 children (passive-play) aged 3-5 years outside at any one time
 - o Passive activities include painting, drawing, reading, etc.

Outdoor play areas (Option 2) – *will need unattended noise logging to be reconducted*

- Unattended noise logging will have to be reconducted to confirm whether the existing ambient background noise level is L_{A90} 40 dB or higher. If the ambient background noise level is $\geq L_{A90}$ 40 dB, the following recommendation may be implemented.
- Occupation of the outdoor play areas must be limited to not more than 4 hours in total per day.
- All children must not occupy the outdoor play area at the same time. Use of the outdoor play area must be staggered so that either:
 - o 17 children (free-play) aged 0-2 years and 25 children (free-play) aged 2-3 years are outside for no more than 2 hours (total per day).
 - o 20 children (free-play) aged 3-5 years and 20 children (passive-play) aged 3-5 years outside for no more than 2 hours (total per day).
 - o Passive activities include painting, drawing, reading, etc.

Covered outdoor play areas

- Install acoustic absorption to the underside of the roof for the covered outdoor play area. Use 38 mm thick Megasorber FM38 or an approved equivalent.



Indoor play areas

- Windows and doors must be closed so that the noise is suitably contained internally.
- Glass windows and doors are to be no less than 6.38 mm laminated glass and fitted with acoustic seals.

Mechanical plant and equipment

- A detailed assessment of mechanical plant noise must be completed before construction.

Noise Management Plan

- A centre Noise Management Plan should be prepared and implemented which outlines :
 - o staffing responsibilities in terms of noise control and management of children's activities,
 - o outlines the noise management requirements of the development as recommended in this report (such as time limits on outdoor play,
 - o the closing of doors and windows),
 - o notify all neighbours of the relevant site contact assigned to handling noise complaints,
 - o outlines the site-specific complaints handling procedure.

Barrier construction materials

- Unless otherwise specified in this report, noise barriers are to be constructed of either:
 - a. Double lapped and capped timber
 - b. 9 mm fibre cement sheeting fixed to a suitable framing structure
 - c. Masonry (70 mm thick or above)
 - d. Transparent materials such as 10.38 mm laminated glass or 15 mm thick Perspex panels
 - e. Proprietary noise wall solutions such as SlimWall by Modular Walls or similar
- It is to be noted that gaps between the panels and the posts or the ground will significantly reduce the effectiveness of the noise barrier and may lead to non-compliant noise levels at the adjoining premises. Therefore, all gaps should be minimised.
- The extent of all noise barriers is detailed below in Figure 2.
 - a. Lines presented in **PURPLE** show noise barriers of 2.4 m height with a 45° 0.5m cantilever top towards the play area.
 - b. Lines presented in **BLUE** show noise barriers of 1.8 m in height.
 - c. Lines presented in **RED** show noise barriers of 1.5 m in height.



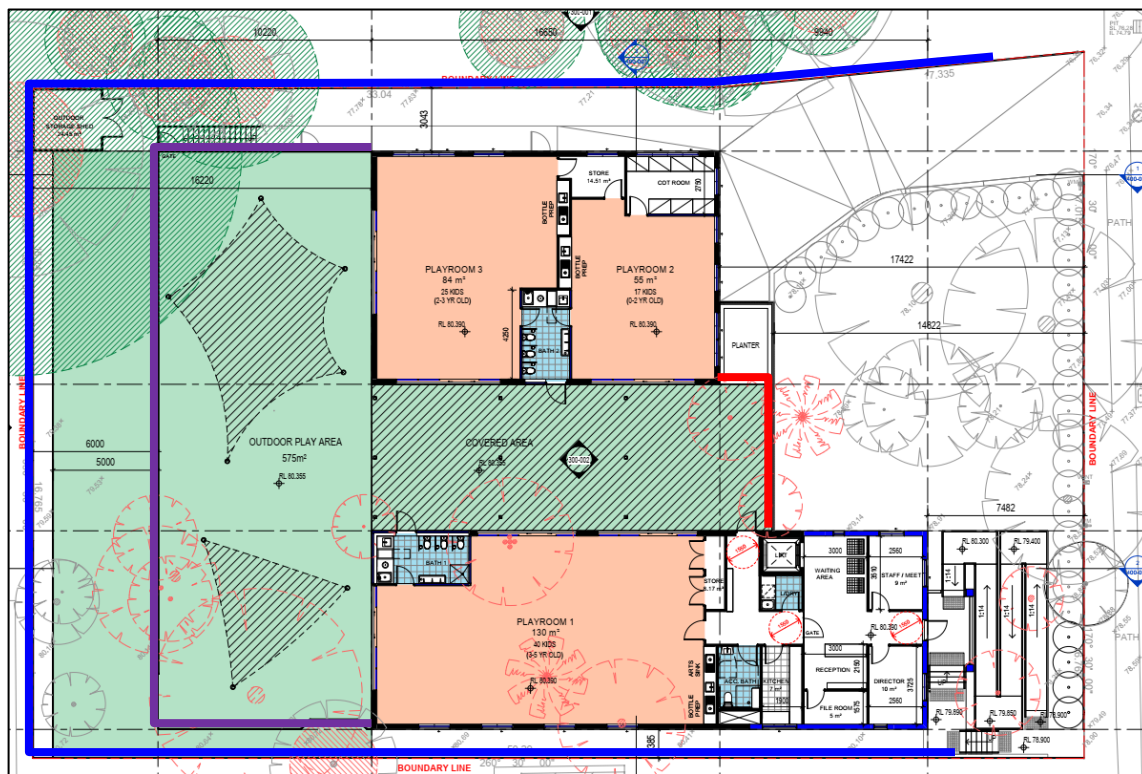


Figure 3. Extent of proposed noise barriers (Source: Architectural Drawings)

8.0 CONCLUSION

This report provides an assessment of noise emission from the proposed child care centre at 21-23 Norfolk Road Epping NSW. The assessment is required to address proposed modifications sought in a Section 4.55 application to City of Parramatta Council.

The basis for the assessment is to ensure that noise amenity is maintained for surrounding premises by applying appropriate noise emission objectives as referenced from standard planning guidelines and as required by the Council under their relevant DCP and LEP provisions.

The noise objectives adopted in this assessment are referenced from the AAAC guidelines for child care centre noise assessment and are supported by additional guidelines proposed by the NSW EPA in their NPfl and RNP. Where noise from the development is found to comply with the project noise objectives it is deemed that an acceptable noise outcome is reached.

The design criterion for this assessment is directly related to the prevailing environmental noise levels. Background levels have been surveyed on-site to determine appropriate noise objectives.

To facilitate the prediction of noise impacts on surrounding receivers, a Cadna/A noise model was prepared. The modelling and subsequent analysis have found that the operation of the child care centre can achieve an acceptable noise outcome for neighbouring residents provided that several noise controls are included within the design and operation of the facility. These recommendations are outlined in detail within the preceding sections of this report.

It must be noted that the predictions of this report do not include noise attributed to mechanical plant and equipment, which should be dealt with in a detailed assessment during the design phase of the development. Otherwise, Koikas Acoustics is satisfied that the development as proposed will not result in an unacceptable noise outcome for residential neighbours.



APPENDIX A

APPENDIX A

APPENDIX A





Scenario 1.2 (Day)

** NOISE SOURCES **

- ~10 children 3-5yo playing (free-play)
- ~10 children 3-5yo playing (passive-play)

Note:

- LAeq,15minutes noise contours are at a height of 1.5 m above the ground level

- All Receiver points are at 1.5 m above ground level, except R7 & R9 are 4.5m above the ground.

PRINT DATE: 10/05/2022

- + Point Source
- Building
- Barrier
- 3D-Reflector
- Ground Absorption
- Contour Line
- Receiver
- Calculation Area

- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikasacoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5378

CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects

SITE ADDRESS: 21-23 Norfolk Road Epping

ASSESSED TO: AAAC

LIMITING CRITERIA: 45 dB(A) - residential

65 dB(A) - commercial



Scenario 1.3 (Day)

** NOISE SOURCES **

~17 children 0-2yo playing
~25 children 2-3yo playing

Note:

- LAeq,15minutes noise contours
are at a height of 1.5 m above
the ground level

- All Receiver points are at 1.5 m
above ground level, except
R7 & R9 are 4.5m above the ground.

PRINT DATE: 10/05/2022

- + Point Source
- Building
- Barrier
- 3D-Reflector
- Ground Absorption
- Contour Line
- Receiver
- Calculation Area

- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikasacoustics PTY LTD
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JOB NUMBER: 5378

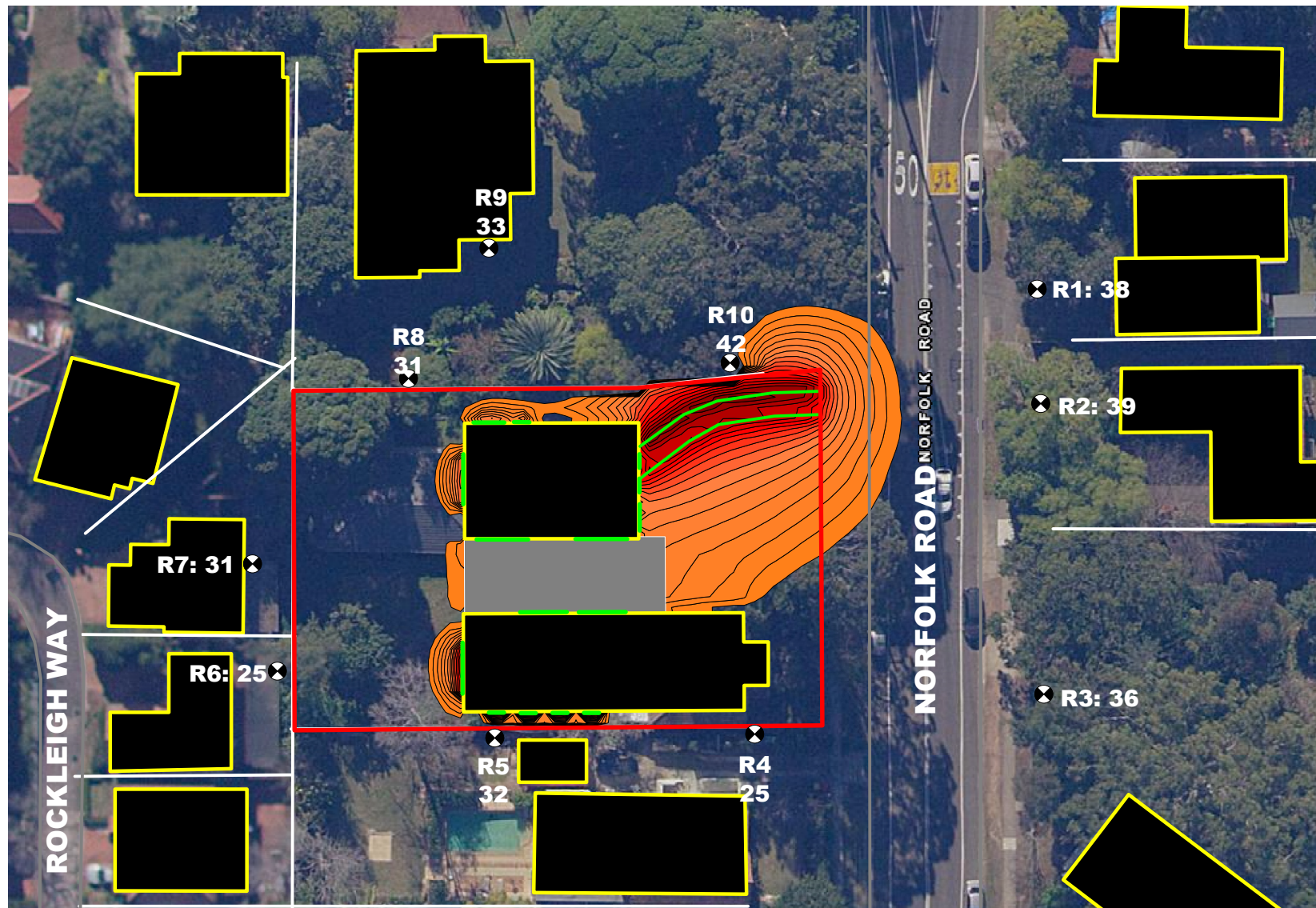
CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects

SITE ADDRESS: 21-23 Norfolk Road Epping

ASSESSED TO: AAAC

LIMITING CRITERIA: 50 dB(A) - residential
65 dB(A) - commercial





**Scenario 2
(Day)**
**** NOISE SOURCES ****

~10 vehicles arriving
~10 vehicles arriving
~Breakout noise from indoor play

Note:
- LAeq,15minutes noise contours
are at a height of 1.5 m above
the ground level

- All Receiver points are at 1.5 m
above ground level, except
R7 & R9 are 4.5m above the ground.

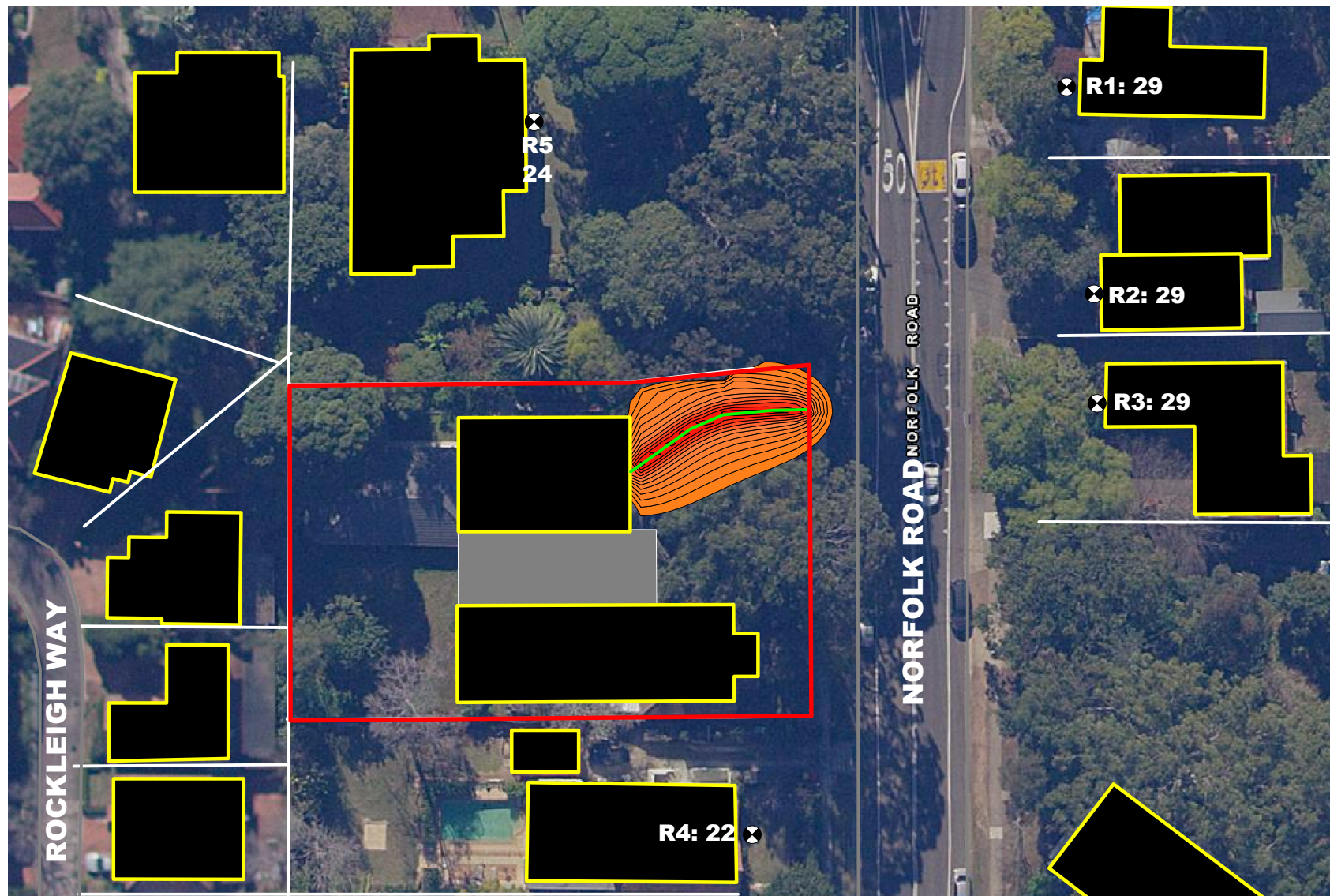
PRINT DATE: 10/05/2022

- Line Source
- vert. Area Source
- Building
- Barrier
- 3D-Reflector
- Contour Line
- X Receiver
- Calculation Area

- > 40.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

koikasacoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5378
CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects
SITE ADDRESS: 21-23 Norfolk Road Epping
ASSESSED TO: AAAC
LIMITING CRITERIA: 44 dB(A) - residential
65 dB(A) - commercial



Scenario 3.1 (Night)

** NOISE SOURCES **

~10 vehicles arriving

Note:

- LAeq,15mins noise contours are at a height of 1.5 m above the ground level.

- All Receiver points are at 1.5 m above ground level.

PRINT DATE: 10/05/2022

- Line Source
- Building
- Barrier
- 3D-Reflector
- Contour Line
- ⊗ Receiver
- Calculation Area

- > 40.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

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CONSULTANTS IN NOISE & VIBRATION

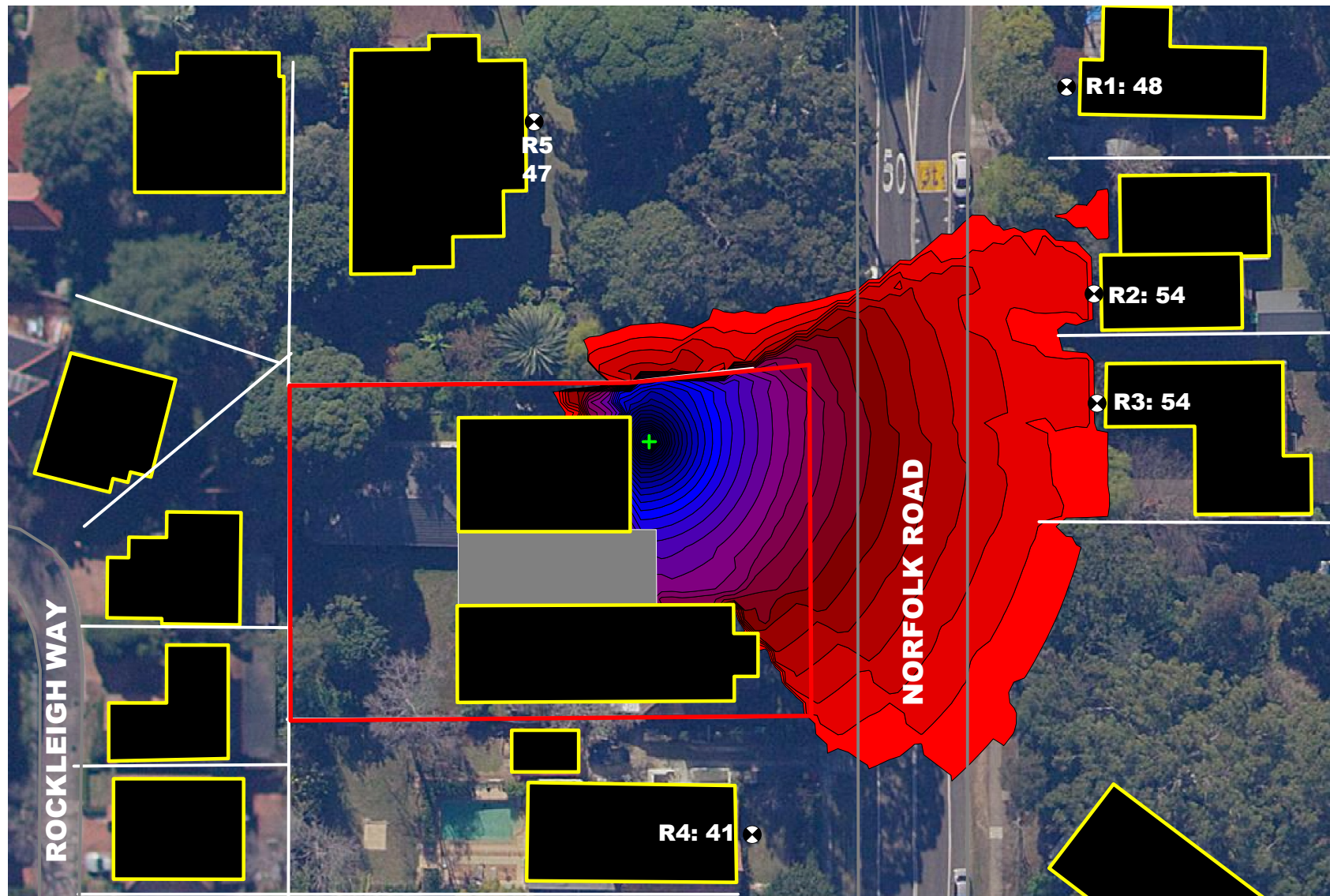
JOB NUMBER: 5378

CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects

SITE ADDRESS: 21-23 Norfolk Road Epping

ASSESSED TO: EPA NPfI

LIMITING CRITERIA: 44 dB(A) - residential



**Scenario 3.2
(Night)**
**** NOISE SOURCES ****

~Car closing of door

Note:

- L_{Amax} noise contours
are at a height of 1.5 m above
the ground level.

- All Receiver points are at 1.5 m
above ground level.

PRINT DATE: 10/05/2022

- + Point Source
- Building
- Barrier
- 3D-Reflector
- Contour Line
- Receiver
- Calculation Area

- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB

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CONSULTANTS IN NOISE & VIBRATION

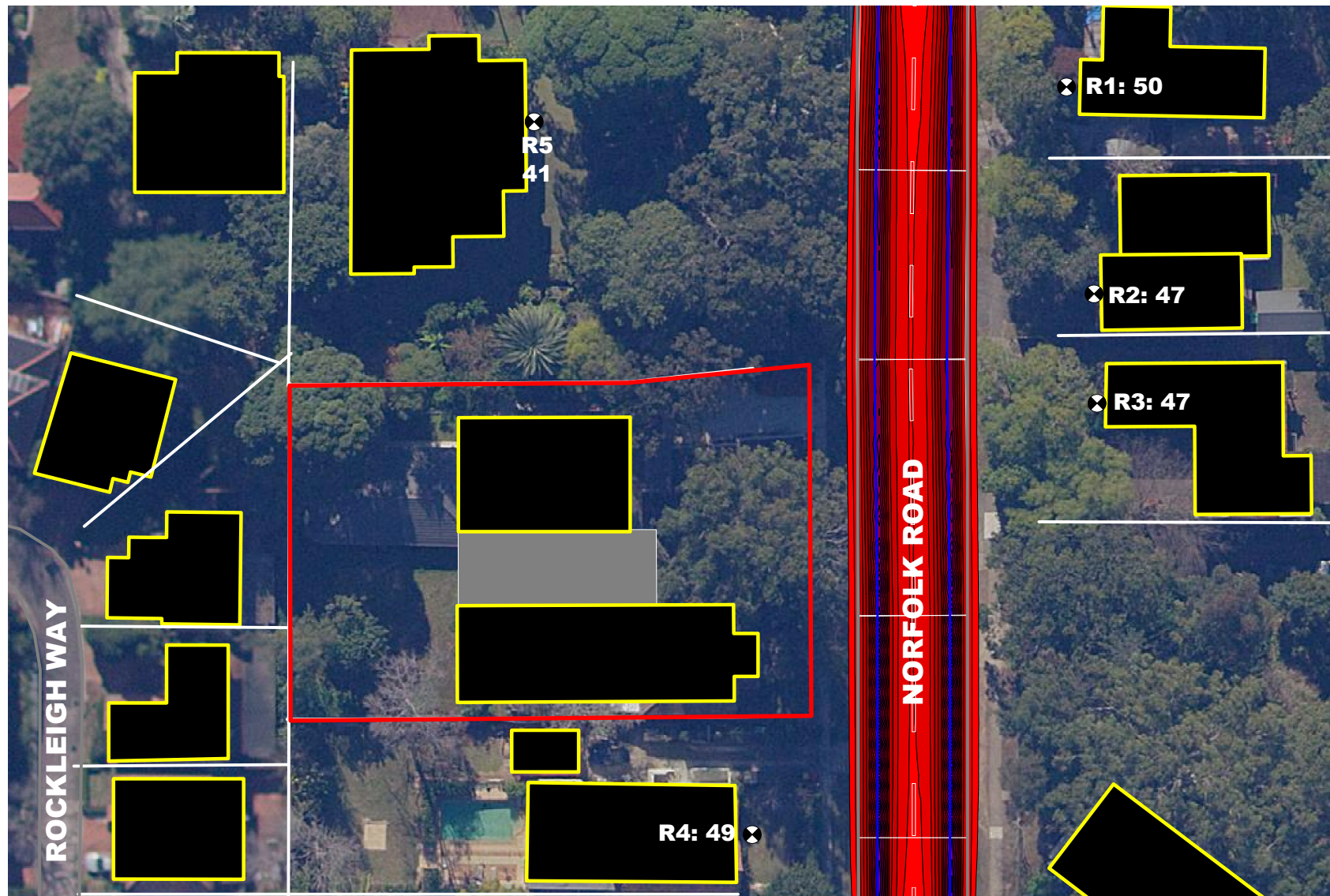
JOB NUMBER: 5378

CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects

SITE ADDRESS: 21-23 Norfolk Road Epping

ASSESSED TO: EPA NPfI

LIMITING CRITERIA: 55 dB(A) - residential



Scenario 4

(Day)

** NOISE SOURCES **

~40 vehicles traversing along Norfolk Road.

Note:

- LAeq,1hr noise contours are at a height of 1.5 m above the ground level.

- All Receiver points are at 1.5 m above ground level.

PRINT DATE: 10/05/2022

-  Road
-  Building
-  Barrier
-  3D-Reflector
-  Contour Line
-  Receiver
-  Calculation Area

-  > 55.0 dB
-  > 60.0 dB
-  > 65.0 dB
-  > 70.0 dB
-  > 75.0 dB
-  > 80.0 dB

koikasacoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5378

CLIENT: Oggi Investment Group Pty Ltd C/o Loucas Architects

SITE ADDRESS: 21-23 Norfolk Road Epping

ASSESSED TO: Road Noise Policy

LIMITING CRITERIA: 55 dB(A) - residential