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ACOUSTICAL REPORT – DA STAGE

PROPOSED MIXED-USE DEVELOPMENT AT

351-353 BARRENJOEY ROAD, NEWPORT NSW

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ACOUSTICAL REPORT – DA STAGE

PROPOSED MIXED-USE DEVELOPMENT AT

351-353 BARRENJOEY ROAD, NEWPORT NSW

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TABLE OF APPENDICES

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was engaged to prepare a noise impact assessment for the proposed mixed-use development at 351-353 Barrenjoey Road, Newport NSW.

For the DA proposal, the acoustic adequacy of the proposed design must be assessed in terms of standard planning guidelines issued by Council in their Local Environment Plan (LEP) and Development Control Plan (DCP).

In accordance with Council guidelines and other standard planning instruments, Koikas Acoustics has determined the following acoustical components require assessment at the current DA stage to reflect the revised architectural drawings:

1. Traffic noise associated with Barrenjoey Road and its impact on future occupants of the development.
2. Mechanical plant noise emission and guests occupying outdoor areas from the proposed development to neighbouring dwellings.
3. Inter-tenancy sound insulation requirements for shared partitions within the building.

This report presents the results and findings of an acoustic assessment for the subject proposal. In-principle acoustic treatments and noise control recommendations are included (where required) so that the premises may operate in compliance with the nominated acoustic planning levels.

2.0 THE PROPOSAL

The development is proposed to occupy the site at 351-353 Barrenjoey Road, Newport NSW. The application is for nine (9) retail tenancies and fourteen (14) residential tenancies over three (3) above ground floor levels with associated basement parking over two (2) floor levels. The current development design can be seen in revised architectural drawings as prepared by Crawford Architects, detailed in Table 1. All calculations and noise modelled scenarios conducted for this assessment are referenced to these architectural drawings.

Table 1. Design drawings used in the assessment

Drawing Title	Drawing No.	Issue	Date [YY.MM.DD]
SITE LOCATION PLAN	A010	07	20.12.17
DEMOLITION PLAN	A011	06	20.12.15
EXCAVATION PLAN	A012	06	20.12.15
BASEMENT 2 FLOOR PLAN	A100	17	20.12.15
BASEMENT 1 FLOOR PLAN	A101	17	20.12.15
GROUND FLOOR PLAN	A102	21	20.12.15
FIRST FLOOR PLAN	A103	26	20.12.15
SECOND FLOOR PLAN	A104	24	20.12.15
ROOF PLAN	A105	22	20.12.15
SOUTH ELEVATION	A300	16	20.12.15
EAST ELEVATION	A301	14	20.12.15
NORTH AND WEST ELEVATIONS	A302	13	20.12.15
SECTION AA	A310	12	20.12.15
SECTION BB	A311	12	20.12.15
SECTION CC	A312	05	20.12.15
MATERIAL AND FINISHES	A320	07	20.12.15

Notes
1. Detailed above are the plans and drawings available at the time of assessment. Where design changes are made without the prior knowledge of Koikas Acoustics, our assessment results and conclusions published within this report may be incorrect.

The development location is situated in a primarily urban residential area. The subject site is surrounded by:

- Commercial/retail premises to all directions, and
- Possible shop-top residential premises to the south-east on the 1st floor level.

The road traffic noise of concern is from Barrenjoey that extends from south-west to north-east reference to assessment site.

Prevailing ambient noise conditions on-site and in the local area are generally the result of typical environmental noise such as traffic and commercial/retail activities.

The subject site and surrounding properties are identified on the aerial photograph included as Figure 1.

Figure 1. Aerial photo of the subject site and surrounding area (Image source – Six Maps)

3.0 AMBIENT NOISE SURVEY

Existing external ambient noise levels were based on two (2) unattended noise logging surveys that were previously installed for another near-by project at the corner of Barrenjoey Road and The Boulevarde.

Two unattended noise monitoring surveys were conducted by Koikas Acoustics at representative locations to determine:

- The existing ambient noise conditions pertaining to the area, and
- The existing road traffic noise level in the area.

The surveys were conducted from Friday 29th July to Thursday 4th August 2011 for seven consecutive days. Analysis of the meteorological records and ambient noise trends in the logger graphs suggests that the weather conditions over the monitoring period did not influence the noise survey results.

The unattended noise loggers were placed at the following locations:

- **Front** - On the site of 316-324 Barrenjoey, the microphone was placed at 1.5 m above the natural ground level approximately 16 meters from the centre of Barrenjoey Road. This site location was vacant in 2011.
- **Rear** - On the site of 2 The Boulevarde, the microphone was placed at 1.5 m above the natural ground level approximately 13 meters from the centre of The Boulevard. This site location was vacant in 2011.

Refer to Figure 1 of this report for monitoring locations.

The instrument was set-up to measure A-frequency and 'Fast' time-weighted noise levels. Calibration readings were taken before and after each survey with a NATA calibrated and certified Larson Davis CAL200 precision acoustic calibrator. No system drift was observed for this meter.

Table 2. Summary of noise logger results [dB]				
Location	**Period, T [1]**	**Ambient noise level** LAeq	**Rating Background Level** LA90	**Traffic noise level** LAeq,Period
316-324 Barrenjoey Rd (Front)	Day	66	53	65
	Evening	62	50	
	Night	60	36	60
2 The Boulevarde (Rear)	Day	57	47	56
	Evening	53	43	
	Night	51	29	51

Notes

1: The NSW EPA NPI refers to Night as 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays.

2: The noise survey measurements undertaken at the rear (Location B) were affected by refrigeration units operating intermittently. The estimated noise levels based on the graphical trend are provided in brackets.

Table 3. 1/1 octave band road traffic noise levels [dB] – $L_{Aeq,1hr}$ [dB]											
Location	**Period**	**1/1 octave band centre frequency [Hz]**									**Total**
		31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
316-324 Barrenjoey Rd (Front)	7am to 10pm	33	48	53	54	57	62	59	53	48	65
	10pm to 7am	27	42	47	48	51	57	54	49	42	60

Unattended noise survey summary is attached as **Appendix A** of this report.

4.0 ROAD TRAFFIC NOISE ASSESSMENT

4.1 ROAD TRAFFIC NOISE CRITERIA

In accordance with Clause 102 of the State Environmental Planning Policy (Infrastructure) 2007, hereafter referred to as ISEPP, development for the purpose of residential, place of public worship, hospital, educational facility or childcare centre use must be designed to consider the indoor noise amenity of future occupants.

Where the development is for residential use, and the site is adjacent to a classified road that carries an annual daily traffic volume of more than 40,000 vehicles, and that the consent authority considers is likely to be impacted by road noise or vibration, maximum allowable indoor traffic noise levels are defined as:

- L_{Aeq} 35 dB in any bedroom in the building between the hours of 10 pm and 7 am.
- L_{Aeq} 40 dB elsewhere in the building (excluding a garage, kitchen bathroom or hallway) at any other time.

ISEPP requires that before any application is determined under which this clause applies, consideration must be given to guidelines that are issued by the Director-General. It is the understanding of Koikas Acoustics that the Director-General has issued guidelines relating to the determination of suitable indoor noise levels for development with open windows allowing natural ventilation of indoor areas. The Director-General has recommended under this condition (open windows) that indoor noise levels should not exceed:

- L_{Aeq} 45 dB in any bedroom in the building between the hours of 10 pm and 7 am.
- L_{Aeq} 50 dB elsewhere in the building (excluding a garage, kitchen bathroom or hallway) at any other time.

The NSW Department of Planning (DoP) supports the design targets of ISEPP and the Director-General guidelines within their road/rail noise guidelines (*Development near rail corridors and busy roads, Interim Guideline 2008*). The DoP guideline further defines the duration under which noise levels are assessed, being $L_{Aeq\ 9\ hours\ (10\ pm\ to\ 7\ am)}$ for bedrooms and $L_{Aeq\ 15\ hours\ (7\ am\ to\ 10\ pm)}$ elsewhere.

A summary of the applied traffic noise planning levels is included as Table 4.

Table 4. Design criteria for internal spaces			
Description	**Area**	**Period**	**L_{Aeq} (Period) [dB]**
Windows and doors closed	Bedrooms	10 pm to 7 am	35
	Living areas	At any time	40
Windows & doors open (natural ventilation)	Bedrooms	10 pm to 7 am	45
	Living areas	At any time	50
Notes 1.	Assessment period for bedrooms taken as the 9 hours period between 10 pm and 7 am. Assessment period for living areas taken as the 15 hours period between 7 am and 10 pm.		

4.2 FAÇADE TRAFFIC NOISE LEVELS

Calculating the level of traffic noise that is transmitted through a façade and into a room is dependent upon the external façade noise level, the sound insulation performance of the building façade (inclusive of all building components), and the level of acoustic absorption that is present within the subject room.

In accordance with *AS3671-1989 Acoustics – Road traffic noise intrusion*, the prediction of façade traffic noise levels considers a forecast increase in traffic volumes over a 10-year planning period. In the absence of RMS traffic volume data for the specific road corridor on an annual basis, Koikas Acoustics has adopted a forecast 2% p.a. increase in traffic volumes over a 10-year from the time of preparing this report.

A calibrated Cadna/A noise model was used to predict external façade traffic noise levels. Maximum levels are predicted to be $L_{Aeq\ 15\ hour}$ 67 dB / $L_{Aeq\ 9\ hour}$ 62 dB along the south-eastern façade of the building fronting Barrenjoey Road. Reduced noise exposure along the sides and rear of the building will result from the limited field of view of traffic and noise shielding from adjacent buildings. Refer to Scenario 1 of **Appendix B** for calculated road traffic noise level to the subject development site.

External road traffic noise intrusion calculations are attached as **Appendix C** of this report.

4.3 RECOMMENDED CONSTRUCTION MATERIALS

Indoor noise levels were calculated to determine the acoustic performance of the proposed building facade. The noise modelling and subsequent analysis conclude the following:

4.3.1 Ceiling/roof

Table 5. Ceiling/roof recommendations	
Recommended construction	**Area to which the recommendation applies**
Metal deck roofing consists of: • 0.45 mm metal deck roof followed by • a layer of 100 mm thick 14 kg/m3 insulation batts fitted tightly between the ceiling joists and • One layer of 13 mm thick plasterboard screw fixed beneath the ceiling joists.	All areas

4.3.2 External walls

Table 6. External walls recommendations	
Recommended construction	**Area to which the recommendation applies**
Concrete wall with a minimum thickness of 150 mm.	All areas
Alternatively, brick-veneer wall system consisting of: • 110mm thick brick; • 64mm steed stud with 50mm insulation batts (11kg/m^3), and • 13mm Plasterboard.	All areas

4.3.3 Glass windows and doors

Recommendations for glass windows and doors are included in **Appendix D** of this report.

In addition to the minimum glass recommendation (**Appendix D**), the installed window/glazed door systems (inclusive or framing and seals) must achieve a minimum acoustic rating of:

- Rw 27 for 4 mm toughened glass;
- Rw 32 for 6.38mm laminated glass;
- Rw 34 for 10.38mm laminated glass;
- Rw 35 for 12.38mm laminated glass;
- and comply with Notes 1 to 5 below.

Koikas Acoustics notes that the recommendations provided in this report are for the minimum required glazing predicted to achieve satisfactory acoustic performance. Design factors such as safety, thermal or energy efficiency are outside the scope of this report and should be assessed accordingly. It is the Client's responsibility to ensure all glazed windows and sliding doors installed on-site to meet all building design requirements.

Notes

1. Recommendation based on typical aluminium framed sliding windows/doors with no weep holes in the frame.
2. Window frames should be tightly fitted to the external wall minimising any air gaps. Any air gaps present should be packed with timber and an appropriate acrylic sealant such as Knauf Bindex (or approved equivalent).
3. All open-able windows and glazed door systems should be airtight when closed.
4. Q-lon type seals or the equivalent should be fitted along the perimeter of all glazing systems to minimise air gaps. For sliding glass systems that cannot incorporate Q-lon seals, heavy-duty fin-type seals such as Schlegel SilentFin could be used. If the windows/doors are not designed to be air-tight when closed, the reduced performance of the windows/doors could compromise the acoustic integrity of the building facade.
5. Recommended glass systems have been calculated based on current architectural drawings as established within this report.

4.3.4 Timber entry doors

Main entry doors should be a minimum 35-40mm thick solid-core timber with acoustic perimeter and door bottom seals. Suitable acoustic seals could be Raven type RP10/RP10si door frame/perimeter seals and RP8si door bottom seals, or an approved equivalent from another manufacturer. Any glass inserts in external doors should be minimum 10.38 mm laminated glass.

4.3.5 Ventilation (To be advised by mechanical ventilation experts)

External noise levels for residential units fronting Barrenjoey Road and Robertson Road are generally too high to consider naturally ventilating apartments solely through open windows and doors. Therefore, to meet the Codes and recommendations of relevant Australian Standards it will be necessary to provide additional ventilation to these particular spaces. Additional ventilation is to be compliant with relevant provisions of the BCA.

To achieve the nominated road noise levels, windows and doors will need to be closed for some habitable spaces (marked with a "✡" symbol in **Appendix D**), unless confirmed otherwise by the ventilation expert. As such, the design of the ventilation must consider that windows and doors are closed.

Mechanical ventilation solutions that meet relevant building standards should be advised by a ventilation specialist. Possible options that may be considered (pending final approval from a

ventilation specialist) include:

- Borrowed air from elsewhere in the dwelling/unit
- Incorporating a component of fresh air into a ducted air conditioning system
- Installing a small air supply fan and acoustically treated duct
  - Round or square ceiling mounted ventilation duct fan that incorporating a minimum of 3 metres of sound-absorbing material to the inner surfaces of the ductwork
  - DuctTech Phone: (02) 9674 1577
  - Email: salesnsw@ducttech.com.au

Figure 2. Ceiling mounted ventilation duct fan

- Installing a small air supply fan and acoustically treated duct into a ceiling bulkhead

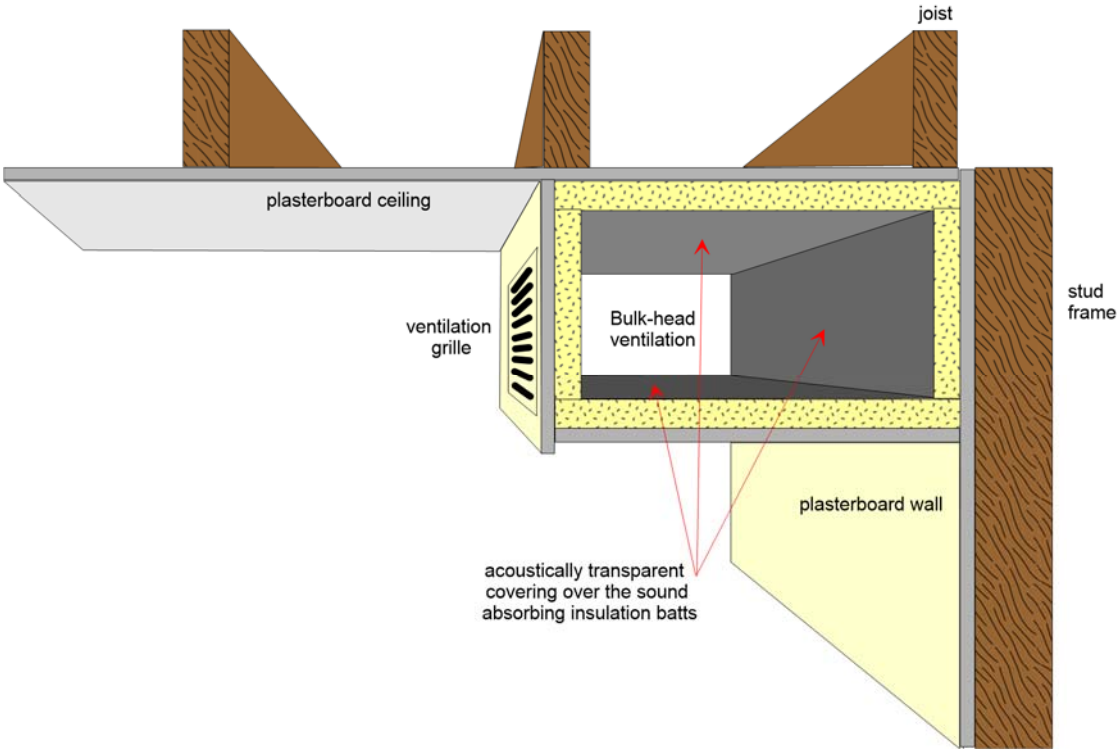


Figure 3. Ventilation system through ceiling bulkhead

- Installing a wall-mounted ventilator such as the Acoustica Aeropac or similar

Figure 4. A wall-mounted ventilator

Any penetrations in the walls or roof to accommodate ventilation system/s should not impact the acoustic integrity of the building façade. An acoustical engineer should review any proposed ventilation solution that proposes a penetration of the building façade.

5.0 MECHANICAL PLANT NOISE ASSESSMENT

5.1 MECHANICAL PLANT NOISE CRITERIA

Noise emission design targets have been referenced from the NSW Environmental Protection Authority Noise Policy (EPA) for Industry (NPfI). The NPfI replaces the former Industrial Noise Policy, also prepared by the EPA.

The NPfI is designed to assess environmental noise impacts associated with scheduled activities prescribed within the Protection of the Environment Operations Act 1997, Schedule 1. It is also commonly used as a reference tool for establishing suitable planning levels for noise generated by mechanical plant and equipment and noise emission from commercial operations.

The guideline applies limits on the short term intrusive nature of a noise or noise generating development (project intrusive noise level), as well as applying an upper limit on cumulative industrial noise emissions from all surrounding development/industry (project amenity noise level).

The most stringent of the project intrusive noise level and project amenity noise level is applied as the **project noise trigger level**. The project noise trigger level is the point, above which noise emission from a source or development site would trigger a management response.

To be able to define the more stringent of the intrusive and amenity noise levels, the underlying noise metrics must be the same. As the intrusive noise level is defined in terms of a $L_{Aeq\ 15\ minutes}$ and the amenity noise level is defined in terms of a $L_{Aeq\ Period}$, a correction +3dB correction is applied to the project amenity noise level to equate the $L_{Aeq\ Period}$ to $L_{Aeq\ 15\ minutes}$.

Further, Clause 45 of the Protection of the Environment Operations (POEO) (Noise Control) Regulation 2017 requires that air conditioning units installed on residential premises must not emit noise that is audible within a habitable room in any other residential premises between the hours of 10 pm and 7 am (Monday to Friday) or 10 pm and 8 am (Saturday, Sunday and public holidays).

The derivation of mechanical plant noise criteria is summarised in Table 7 below.

Table 7. Derivation of mechanical plant noise criteria

Period, T (Note 1)	Front								
	Intrusive		Amenity						
	RBL	RBL + 5	Area classification[2]	Recommended amenity noise level	High traffic area	Project amenity noise level[3]	+3dB correction	Project noise trigger level	Inaudibility Criteria[4]
Day	57	62	Urban	65	Yes	52	55	55	-
Evening	53	58	Urban	55	Yes	51	54	54	-
Night	45	50	Urban	50	Yes	50	53	50	37~40[4]
Period, T (Note 1)	**Rear**								
	Intrusive		Amenity						
	RBL	RBL + 5	Area classification[2]	Recommended amenity noise level	High traffic area	Project amenity noise level[3]	+3dB correction	Project noise trigger level	Inaudibility Criteria[4]
Day	49	54	Urban	65	No	60	63	54	-
Evening	46	51	Urban	55	No	50	53	51	-
Night	45	50	Urban	50	No	45	48	48	37~40[4]

Notes

1. The NSW EPA Industrial Noise Policy refers to the following time periods:
   Day – 7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sunday and public holidays
   Evening – 6 pm to 10 pm Monday to Sunday
   Night – 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays.
2. The amenity criterion is based on the area classification of the site as being 'urban' and has been corrected for an assessment in areas of high traffic and for existing industrial noise where applicable.
3. Project noise amenity level = recommended noise amenity level – 5dB, except where specific circumstances are met, such as high traffic.
4. The AC condenser unit inaudibility criteria is approximately 5~8 dB below the night-time RBL. The inaudibility thresholds adopted for this assessment apply outside a bedroom window. On this basis, where noise is inaudible outside the bedroom, it will be inaudible inside the bedroom.

Surrounding commercial properties must also not be exposed to noise that exceeds $L_{Aeq\ Period\ (business\ hours)}$ 60 dB during business hours.

5.2 NOISE MITIGATION MEASURES FOR MECHANICAL PLANT

As the mechanical plant selection is yet to be completed at the time of preparing this acoustical report, associated noise data is included based on other similar projects.

In order for the mechanical plant noise level not to be intrusive at the adjoining/surrounding residential premises, noise mitigation measures are required to attenuate the noise levels generated by the mechanical plant. The following noise mitigation measure may be required (this

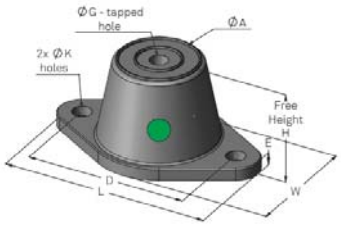
is to be verified once the design details becoming available at a later stage):

Table 8. Recommended Noise Mitigation Measures To Mechanical Plant	
MECHANICAL PLANT	**NOISE MITIGATION MEASURES**
Car Park Exhaust Fan Car Park Supply Fan **Fantech** AP0564GAB/20	• It is assumed that the Fantech AP0564GAB/20 exhaust fan mode is used for the car park exhaust fan. The sound power level is not to exceed L_{WAeq} 84 dB. • Ductwork length from the actual exhaust/supply fan to the terminating/inlet grille is not to be less than 5 meters in length. • Line the inside ductwork with 50 mm thick rigid grade fibreglass 32 kg/m^3 over a minimum length of 5 metres between the terminating/inlet grille end of the ductwork and the extraction/supply fan respectively. • The fans are to be fitted to CO sensor and likely to operate during peak hours only. • The fans are to be fitted with a VSD (variable speed device) such that the speed can be adjusted where necessary for compliance. This is to be verified at a later stage.
Residential Outdoor AC Condensing Unit **Dakin** FTXM46QVMA	• It is assumed that the Daikin FTXM46QVMA outdoor AC condensing unit is used. The sound power level is not to exceed L_{WAeq} 60 dB. • The distance between the outdoor AC unit and the nearest residential boundary is not to be less than 3 metres, alternatively, a noise barrier between the outdoor AC unit and the noise-affected residential may be required (to be verified). • "Night-time Quiet Mode" operation may require to be activated if any AC is to operate during the night-time period. This will reduce the overall noise level by up to 3 dB. • Footings/supports of outdoor AC units must be vibration isolated to minimise structure-borne vibrations transmitting into floor slabs/walls which will manifest as airborne noise in those adjoining spaces.

Furthermore, ductwork in risers adjacent to habitable spaces (if any) must be vibration isolated to minimise structure-borne vibrations transmitting into walls which would otherwise manifest as airborne noise in those spaces.

Rubber mounts for air-conditioning units that could be used are as follows:

Embelton Rubber Mounts Type NR/NRD.



NR / NRD

Alternative rubber mounts can also be considered of similar acoustic isolation characteristics.

Prior to construction, a detailed assessment of the mechanical plant noise assessment should be prepared for the subject development once more details have been confirmed.

6.0 INTER-TENANCY NOISE

6.1 BCA REQUIREMENTS

In Class 2 or 3 buildings, the BCA acoustical Performance Requirements state that separating walls and floors must provide insulation against the transmission of airborne or impact generated sound sufficient to prevent illness or loss of amenity for the occupants.

A wall or floor partition is considered to satisfy BCA Performance Requirements where it is shown to:

- Have a laboratory tested acoustic rating that meets or exceeds the Deemed-to-Satisfy provisions of F5.4 to F5.7, or
- Complies with Specification F5.2, or
- Is tested on-site to achieve the minimum acoustic performance as defined within *Verification Methods* FV5.1 and FV5.2.

The Deemed-to-Satisfy provisions applying to this specific development are summarised below:

Table 9. BCA acoustic design requirements			
Partition	**Detail**	**Airborne sound**	**Impact sound**
Floor	Separating SOU's, or an SOU from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or part of a different classification	Rw + Ctr ≥ 50	Ln,w ≤ 62
Wall *See notes 1 and 2*	Separating SOU's	Rw + Ctr ≥ 50	Not applicable
	Separating a habitable room (other than a kitchen) in one SOU from a bathroom, sanitary compartment, laundry, kitchen in another SOU	Rw + Ctr ≥ 50	Discontinuous construction
	Separating an SOU from a plant room or lift shaft	Rw ≥ 50	Discontinuous construction
	Separating an SOU from a stairway, public corridor, public lobby or the like, or part of a different classification	Rw ≥ 50	Not applicable
Door	Located in a wall separating an SOU from a stairway, public corridor, public lobby or the like	Rw ≥ 30	Not applicable
Services	Duct, soil, waste or water supply pipes located in a wall or floor cavity and serves or passes through more than one SOU (including a stormwater pipe)	Rw + Ctr ≥ 40 (habitable) Rw + Ctr ≥ 25 (other)	Not applicable
Pumps	A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulating or another pump.		
Notes 1. Where a wall is to achieve a sound insulation rating and has a floor above, the wall must continue to either the underside of the floor or to the ceiling which has a comparable sound insulation rating to the wall. 2. Where a wall is to achieve a sound insulation rating and has a roof above, the wall must continue to either the underside of the roof or to the ceiling which has a comparable sound insulation rating to the wall. 3. As defined by the BCA, a 'habitable room' means a room used for normal domestic activities such as bedroom, living room, lounge room, music room, television room, kitchen dining room, study, playroom, family room, home theatre and sunroom. 4. SOU = Sole occupancy unit.			

The following recommendations are expected to satisfy the relevant provisions of the BCA sound insulation requirements between tenancies. Options have been provided in all cases that consider a range of standard constructions.

All wall systems should be installed in accordance with general installation guidelines included in the BCA and as per relevant manufacturer installation guidelines/requirements.

Alternate systems and design may be considered to those recommended within this report provided that they are approved by an appropriately qualified acoustical engineer/consultant.

6.2 RECOMMENDED PARTITION WALLS

Table 10 recommends a number of partition wall systems that are capable of achieving the required acoustic performance.

Table 10. Recommended partition wall systems

Wall type	BCA design standard	Construction
Inter-tenancy wall	Rw + Ctr ≥ 50 Discontinuous	*Partition wall between sole-occupancy units – Separating a habitable room (other than a kitchen) in one unit from a bathroom, sanitary compartment, laundry or kitchen in an adjoining unit* **[AFS]** AFS 162 Logicwall, 20mm cavity, 64mm steel studs with 75mm thick Tontine TSB4 insulation within the stud cavity, 10mm Soundcheck. **[Masonry]** Two leaves of 110mm clay brick masonry, 50mm cavity between the leaves (where brick ties are used they are to be of the resilient type), 13mm cement render to each side. *BCA D.T.S.* **[Concrete]** 125mm concrete panel, 20mm cavity, 64mm steel studs, 70mm polyester insulation (9kg/m^3) between the studs, 13mm plasterboard fixed to studs. *BCA D.T.S.* **[Hebel]** 13mm Fyrchek, 75mm Hebel Powerpanel, 35mm cavity, 64mm steel studs with 100mm S6 polyester insulation, 13mm Fyrchek/Aquachek. **[Lightweight]** 2x64mm steel studs, 20mm cavity, 60mm polyester insulation (11kg/m3) positioned between one row of studs, 2x13mm fire resistant plasterboard each side.
	Rw + Ctr ≥ 50	*Partition wall between sole-occupancy units* **[AFS]** AFS 162 Logicwall panel, paint or render finish. **[AFS]** AFS 162 Logicwall panel, 28mm furring channel, Tontine TSB2 insulation within the framing cavity, 13mm plasterboard. **[Masonry / Hebel / Lightweight]** As above. **[Concrete]** 200mm concrete panel, 13mm cement render of each face. *BCA D.T.S.*
Common wall	Rw ≥ 50 Discontinuous	*Partition wall between sole-occupancy unit and plant room or lift shaft* As above for inter-tenancy wall partitions that satisfy discontinuous construction
	Rw ≥ 50	*Partition wall between sole-occupancy unit and stairway, public corridor, public lobby or the like or part of a different classification* **[AFS]** AFS 150 Logicwall panel, paint or render finish. **[AFS]** AFS 162 Logicwall panel, paint or render finish. **[Masonry]** Single leaf 150mm brick masonry with 13mm cement render on each face. **[Concrete]** 125mm thick concrete panel. **[Hebel]** 13mm Gyprock CD, 75mm Hebel Powerpanel, minimum 20mm cavity, 64mm steel framing with 50mm glasswool insulation, 13mm Gyprock CD. **[Lightweight]** 92mm steel studs, 60mm polyester insulation (11kg/m3) positioned between the studs, 2x13mm fire resistant plasterboard each side.
Services shaft wall	Rw+Ctr ≥40	*Services shaft wall to habitable room within unit* **[Masonry]** 110mm brick masonry with 13mm cement render on each face. *BCA D.T.S.* **[Concrete]** 100mm thick concrete panel. *BCA D.T.S.* **[Lightweight]** 2x13mm plasterboard, pipe lagging (Soundlag 4525C, Acoustilag 45)
	Rw+Ctr ≥25	*Services shaft wall to non-habitable room within unit* **[Lightweight]** 2 layers of 13mm plasterboard

Notes:

1. Recommendations within the above table are based on published acoustic data obtained from the manufacturer's website. Laboratory tests of the AFS 162 Logicwall on its own showed non-compliance with the BCA requirement of Rw + Ctr 50.
2. However, an investigation by PKA Consulting concludes that the poor acoustic performance was due to factors not related to the wall system, but rather the test facility. It is expected that the acoustic performance will satisfy the BCA condition. This conclusion is supported by numerous field tests that indicate compliance with the BCA verification methods rating.
3. All installation of proprietary type wall systems must be in accordance with the relevant installation guidelines and manuals.
4. *BCA D.T.S.* = BCA Deemed-to-Satisfy construction. These wall systems are to be installed as per "Construction Deemed-to-Satisfy" notes included within Specification F5.2 of Volume One of the BCA. Where these systems are installed correctly in accordance with the BCA they do not require compliance testing to verify acoustic performance.

6.3 FLOOR CONSTRUCTION

The following flooring systems could be considered to achieve the impact (L'nTw of 62):

Table 11 Recommended acoustic underlays to achieve or exceed the BCA nominated criterion of L'nTw 62

TYPE	Uniroll	Regupol	Damtec	A1 Rubber
Carpet	Carpet over carpet underlay over ≥ 150 mm concrete slab will typically achieve L'nTw ≤ 40			
Direct Stick Tiles	9 or 10 mm ceramic tiles over 5 mm adhesive over the underlay (specified below) + ≥150 mm concrete slab over 100 mm ceiling cavity and 13 mm plasterboard ceiling will typically achieve L'nTw ≤ 50			
	RFC750 (4.5 mm) RF700 (4- 5- 10 mm)	4515 (4.5 mm)	Standard (4-6mm) Damtec Multi (4 mm)	Acoustamat 600 (5 mm, 10 mm) Acoustamat 700 (5 mm) Acoustamat 850 (3, 4 , 5, 10 mm),
Under Screed Tiles	9 or 10 mm ceramic tiles over 5 mm glue over 30 mm screed over the underlay (specified below) + ≥150 mm concrete slab over 100 mm ceiling cavity and 13 mm plasterboard ceiling will typically achieve L'nTw ≤ 50			
	RFC750 (4.5mm) RF700 (5mm)	4515 (4.5 mm) 6010 (8/4 mm) 6010 (10 mm)	Standard (4 or 6mm) Damtec Multi (4 mm)	Acoustamat 600 (5, 10 mm) Acoustamat 700 (5 mm) Acoustamat 850 (3, 4, 5, 10 mm)
Direct Stick or Floating Timber Flooring	Timber flooring over the underlay (specified below) + ≥150 mm concrete slab over 100 mm ceiling cavity and 13 mm plasterboard ceiling will typically achieve L'nTw ≤ 50			
	19 mm strip timber + adhesive + 15 mm ply + RFC700 ((4, 5 or 10 mm) ***Engineered floating floor*** + 2 mm foam slip layer + RF700 (4, 5mm)	***Parquetry flooring*** + adhesive + K225 (5 mm) ***Engineered timber or laminate*** floorings + adhesive + 5515 (5 mm) ***Engineered timber*** + adhesive + 6010 (8/4 mm) ***Engineered timber*** + adhesive + 6010 (10 mm) ***Engineered timber*** + adhesive + 6010 (17/8 mm) + 18 mm plywood	***10 mm Engineered timber*** + adhesive + Standard (2, 3 mm) ***16 mm parquetry*** + adhesive + Standard (2, 3 or 5 mm) ***18 mm timber floor*** + adhesive + Standard (3 or 5 mm) ***18 mm timber floor*** + adhesive + plywood + Color (2 mm) ***16 mm parquetry*** + adhesive + Color (2 mm)	***Solid timber*** +adhesive+ plywood+ Acoustamat 600, 700, 850 (5, 10 mm) ***Engineered timber floating*** + Acoustamat 600, 700, 850 (5, 10 mm) ***Engineered timber***+ Acoustamat 600, 700, 850 (5, 10mm) ***Laminate floating*** + adhesive + Acoustamat 600, 700, 850 (5, 10 mm) ***Engineered*** + Acoustamat 600, 700, 850 (5, 10 mm)
Direct Stick Vinyl Flooring	Vinyl flooring over the underlay (specified below) + ≥150 mm concrete slab over 100 mm ceiling cavity and 13 mm plasterboard ceiling will typically achieve L'nTw ≤ 50			
			2.5 mm vinyl sheeting + adhesive + Color (2 mm) ***4.5 mm LVT Plank*** + adhesive + Color (2 mm)	***Vinly plank floating*** + Acoustamat 850 (3, 4, 5, 10 mm), ***Vinyl plank*** + Acoustamat 850 (3, 4, 5, 10mm) ***Vinyl plank*** +Acoustamat 960 (3 mm) ***Vinyl sheet*** direct stick + Acoustamat 850 (3 mm)

The above recommendations also apply to balconies/terraces situated above indoor areas of apartments below.

All flooring and acoustic underlays should be installed as per relevant manufacturers installation and design guides.

Hard floor coverings such as tiles must not make contact with any walls or joinery such as kitchen benches, cupboards etc. During the installation of hard floor coverings, temporary spacers of 5 - 10 mm should be used to isolate the floor covering from walls and/or joinery with the resulting gaps

filled with a suitable mastic type sealant or off-cut of rubber underlay material. Most acoustic underlay manufacturers include a construction detail in this regard that involves an upturn of the rubber underlay material at the wall/floor junction.

Alternative floor/ceiling systems could be considered provided that the acoustic performance is tested or assessed by a consulting acoustical engineer to be compliant with the sound insulation performance requirements of the BCA.

Verification of installed acoustic performance should be determined following the recommendation above. Flooring systems tested in a NATA or an equivalent International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) certified laboratory and complying with the requirements of the BCA would not need to be tested in-situ for verification of installed acoustic performance. For flooring systems not tested by a NATA or equivalent certified laboratory, it is recommended that before any flooring is installed, preliminary testing be undertaken at the subject site to ensure that the acoustic impact rating required is achieved. Impact noise test results can vary from site to site as many factors can influence the acoustic impact rating.

These include:

- the thickness of floor slabs,
- the air gap between the plasterboard ceiling and the concrete slab,
- the sealing between the plasterboard and the walls,
- the thickness and density of the plasterboard ceiling,
- the connections of the suspended ceiling grid to the concrete slab,
- the surface area of the floor,
- flanking paths,
- the wall types, and
- the junctions between the slab and the walls.

It is recommended that in-situ testing be conducted on a representative, fully installed floor/ceiling (for all types of floor coverings – timber, tiles, carpet) to ensure adequate acoustic insulation and isolation is achieved before installing the flooring throughout the building.

The following is noted:

- The lower the rating number the better the acoustic performance for L'_{nTw} ratings.
- The information provided in this report relates to acoustic matters only. Supplementary advice should be sought for other matters relating to flooring installation, construction, design, structural, fire-rating, waterproofing, and the likes.
- Product installation details and methodologies for timber/tile flooring system must be sought from product supplier, installer or other experts.
- It is the client's responsibility to ensure that all Strata requirements (if any) for floors are met, as these (if any) were not known by Koikas Acoustics at the time of preparing this report.

6.4 SOIL, WASTE, WATER SUPPLY PIPES

Where a duct, soil, waste or water supply pipe is located within a wall or ceiling cavity and serves or passes through one or more SOU's, the following separation details may be used to comply with the required acoustic rating:

Table 12. Services in cavity wall or ceiling

Option	Rating	Documented source	System detail
1	Rw + Ctr 25	CSR Red Book, Koikas Acoustics opinion	2 layers of 10mm plasterboard
2	Rw + Ctr 25	CSR Red Book	Acoustilag 45 and 13mm plasterboard wall/ceiling lining
3	Rw + Ctr 25	CSR Red Book	Unlagged pipes and 13mm Soundchek wall/ceiling lining. Alternatively, 2 layers of 16mm Fychek may be used as wall/ceiling lining
4	Rw + Ctr 40	CSR Red Book	Acoustilag 45 and 13mm Soundchek wall/ceiling lining. Alternatively, 2 layers of 16mm Fychek may be used as wall/ceiling lining
5	Rw + Ctr 40	Pyrotech Soundlag 4525C brochure	Soundlag 4525C and minimum 10mm plasterboard wall/ceiling lining
Notes:			
1.	The acoustic lagging material may be excluded by using Rehau Raupiano Plus pipe system.		
2.	All installations are to be per relevant manufacturers' specifications and requirements.		
3.	Incorporating downlights into ceilings will impact on the acoustic rating of the partition system. Consultation should be made with an acoustic consultant in the event of downlights being proposed in the ceiling. The CSR Red Book provides some guidance on downlights being installed in a services partition system.		

The BCA further qualifies the acoustic requirements of services partitions with the following:

- Services must not be chased into concrete or masonry elements,
- An access door or panel must be firmly fixed to overlap the frame or rebate the frame by not less than 10mm and be fitted with proper sealing gasket along all edges and constructed of:
    - Wood, particle board or block board not less than 38mm thick; or
    - Compressed fibre reinforced cement sheeting not less than 9mm thick; or
    - Proprietary access panel as approved by an acoustical engineer.
- A water supply pipe must only be installed in the cavity of discontinuous construction, and in the case of a pipe that serves only one SOU, must not be fixed to the wall leaf on the side adjoining any other SOU and have a clearance not less than 10mm to the other wall leaf.

6.5 SOUND ISOLATION OF PUMPS

A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulation or another pump.

6.6 UNIT ENTRY DOORS

Where an entry door is incorporated into a wall that separates a tenancy from a common area such as a Lobby/Foyer, that door must achieve an acoustic rating of no less than R_w 30. Refer to Section 4.3.4 of this report for recommendations. Alternate systems could be considered pending approval from a consulting acoustic engineer.

6.7 VERIFICATION OF ACOUSTIC PERFORMANCE

It is common for comparable floor/ceiling systems designs to achieve varying acoustic insulation and isolation ratings between buildings. This can be due to the quality of workmanship, attention to detail in sealing any penetrations, and the emergence of flanking sound transmission paths within a building. For this reason, one cannot categorically state that any partition will achieve a specific acoustic rating without conducting in-situ testing.

Koikas Acoustics recommends that in-situ testing is conducted on a representative, and fully installed floor/ceiling assembly (for all types of floor coverings – timber, tiles, carpet) to ensure adequate acoustic insulation and isolation is achieved, before installing all floors on all floor levels of the building.

The proposed partitions separating adjacent units, and units from common areas in the development have been assessed for acoustical compliance with the current sound insulation provisions of the BCA.

7.0 CONCLUSION

Koikas Acoustics was requested to prepare an acoustic report for the proposed mixed-use development at 351-353 Barrenjoey Road, Newport NSW. The acoustic report is to accompany a development application being submitted to Northern Beaches Council.

The assessment considers potential noise impacts to future occupants of the development, and to surrounding residents such that acceptable acoustic amenity for the area is maintained.

Acoustic planning levels have been referenced from current NSW DoP, EPA and BCA acoustic planning guidelines and requirements.

The included recommendations are based on the revised designs prepared by Crawford Architect listed in Table 1.

The conclusions reached in this report should assist Council in making their determination of the proposal in terms of compliance with the necessary acoustic design requirements. A further detailed acoustic report may be required for the CC submission should the building design be amended, or as required by Council.

Of the assessed components of noise, the following conclusions have been reached:

1. The building can be sufficiently insulated against existing external sources of noise in the area such as road traffic through the use of acoustic glazing. Recommended glazing systems are provided in **Appendix D** of this report. These recommendations should be verified prior to construction.
2. A detailed assessment of mechanical plant and operational noise should be prepared for the subject development prior to construction. Based on the preliminary assessment conducted in this report, there are sufficient means to attenuate the mechanical plant and boarding house operation noise to the surrounding premises.
3. Acoustic treatment options for the common floors and services partitions included within this report would be adequate for satisfying the sound insulation provisions of the BCA.

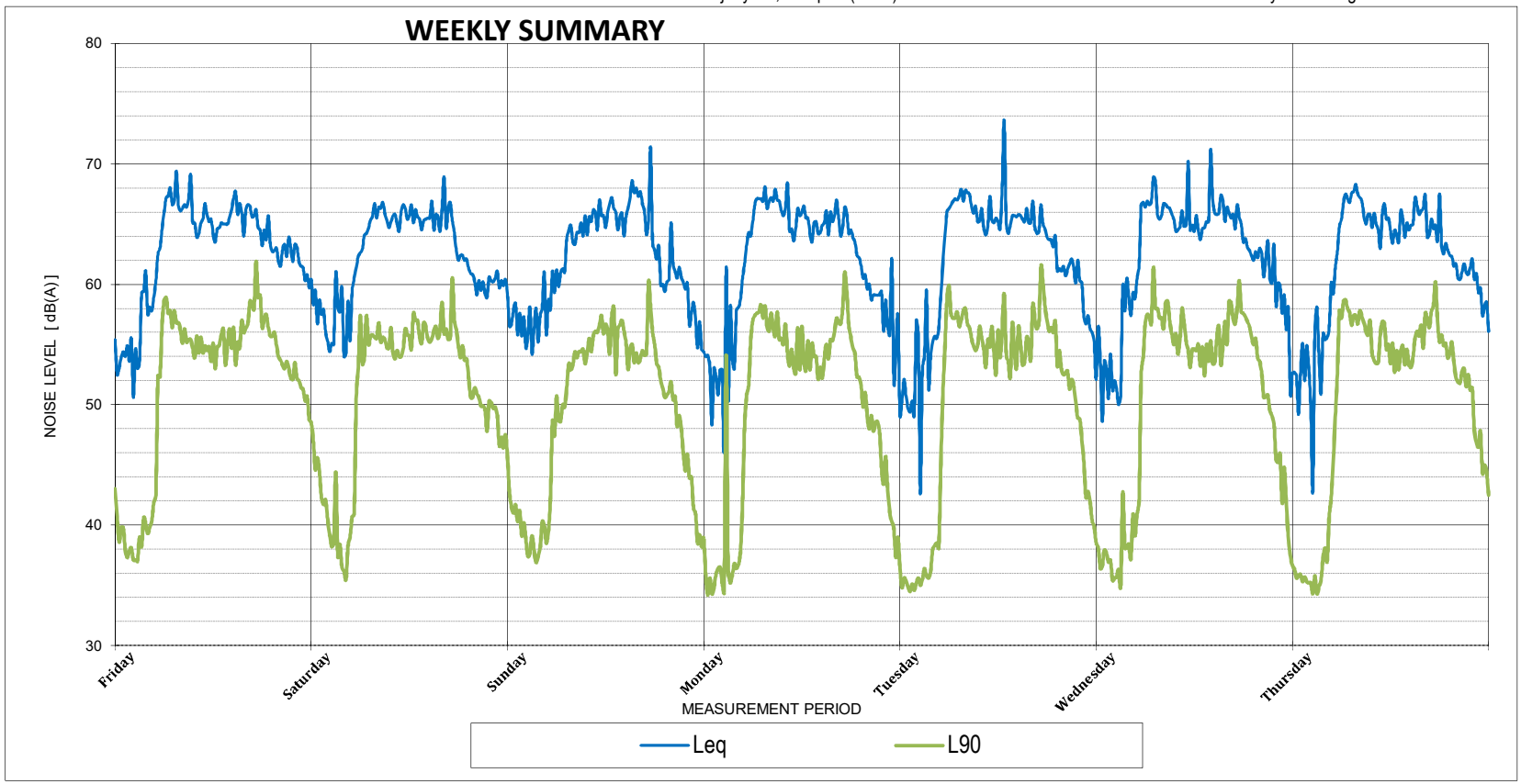
In our professional opinion, there is sufficient scope within the proposed building design to achieve the applied acoustic planning guidelines.

APPENDIX A

APPENDIX A

APPENDIX A

WEEKLY SUMMARY **ADDRESS:** 316-324 Barrenjoey Rd, Newport (Front) **PERIOD:** 29th July to 4th August 2011



SUMMARY OF AMBIENT NOISE LEVELS

	L90 Daytime	*L90* Evening	*L90* Nighttime
Day 1	54	53	38
Day 2	54	50	38
Day 3	53	47	38
Day 4	53	48	35
Day 5	53	51	35
Day 6	53	49	36
Day 7	53	52	35
RBL	**53**	**50**	**36**

	Leq Daytime	*Leq* Evening	*Leq* Nighttime
Day 1	66	63	61
Day 2	66	61	60
Day 3	66	61	60
Day 4	66	61	60
Day 5	66	62	60
Day 6	66	63	61
Day 7	66	63	60
Average	**66**	**62**	**60**

SUMMARY OF TRAFFIC & MISC. NOISE LEVELS

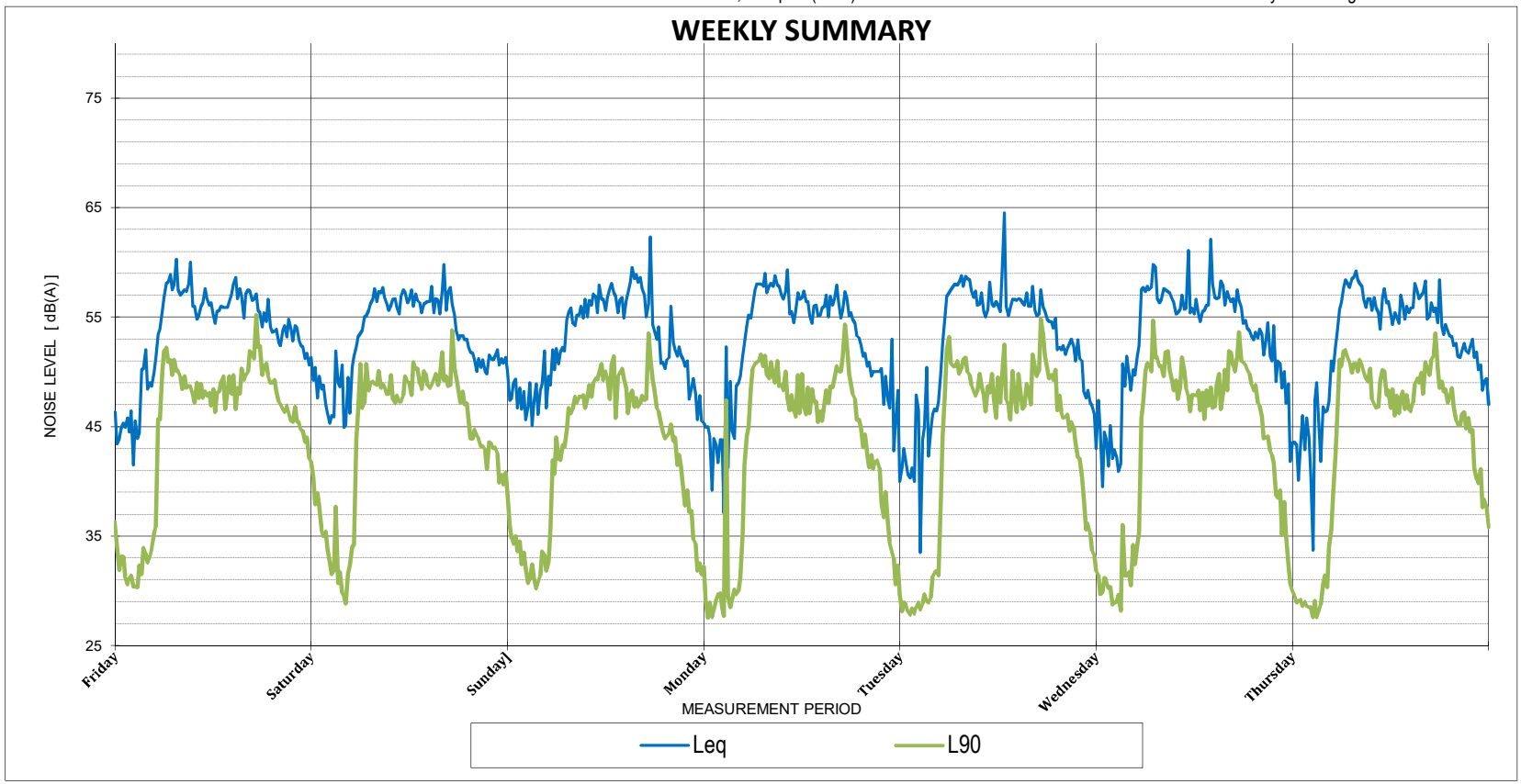
Leq 15 hrs	0700-2200	65	dB(A)
Leq 9 hrs	2200-0700	60	dB(A)
Leq 24 hrs	0000-2400	64	dB(A)
L10 18 hrs	0600-2400	67	dB(A)
max Leq 1 hr	0700-2200	67	dB(A)
max Leq 1 hr	2200-0700	64	dB(A)

Maximum noise events as defined in the Envirnmental Noise Management Manual 7 day average - [Lmax - Leq ≥ 15]	32

WEEKKLY SUMMARY

		Frequency [Hz]									
Descritpor	**Period**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	0700-1800	22	35	40	43	45	48	46	39	29	53
10% min L90 Evening	1800-2200	17	29	35	39	42	46	42	32	21	50
10% min L90 Night	2200-0700	16	17	23	28	29	30	27	21	17	36
10% min L90 Period	0000-0700	16	17	23	28	29	30	26	20	17	36
10% min L90 Period	0700-0000	16	27	32	37	40	45	40	29	21	48
Leq 15 hours	0700-2200	33	48	53	54	57	62	59	53	48	65
Leq 9 hours	2200-0700	27	42	47	48	51	57	54	49	42	60

WEEKLY SUMMARY **ADDRESS:** 2 The Boulevarde, Newport (Rear) **PERIOD:** 29th July to 4th August 2011



SUMMARY OF AMBIENT NOISE LEVELS

	L90 Daytime	*L90* Evening	*L90* Nighttime
Day 1	47	46	31
Day 2	48	43	31
Day 3	46	40	31
Day 4	46	41	28
Day 5	47	44	28
Day 6	47	43	29
Day 7	47	45	29
RBL	**47**	**43**	**29**

	Leq Daytime	*Leq* Evening	*Leq* Nighttime
Day 1	57	54	52
Day 2	57	52	51
Day 3	57	52	50
Day 4	57	52	51
Day 5	57	53	51
Day 6	57	53	52
Day 7	57	53	51
Average	**57**	**53**	**51**

SUMMARY OF TRAFFIC & MISC. NOISE LEVELS

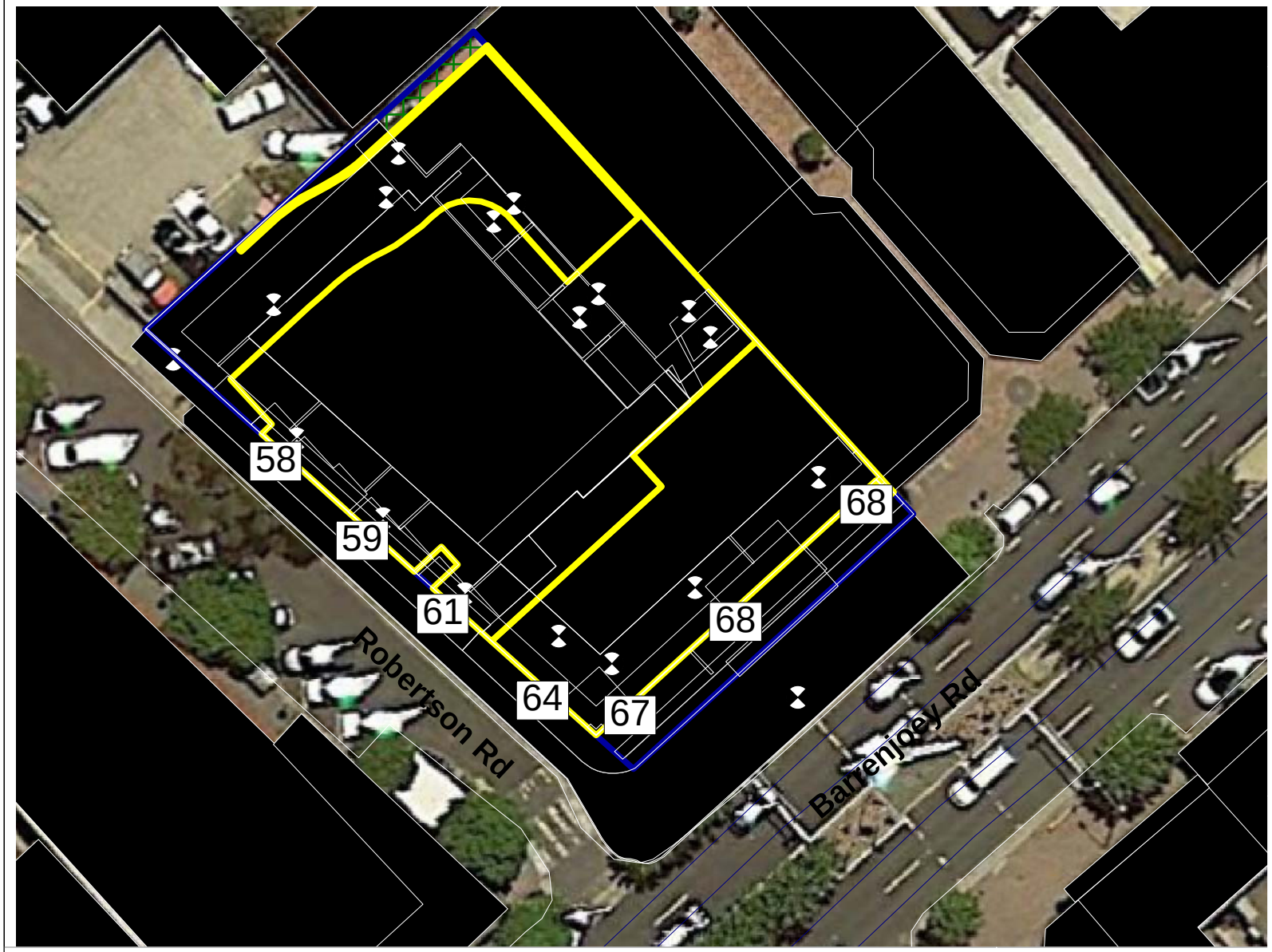
Leq 15 hrs	0700-2200	56	dB(A)
Leq 9 hrs	2200-0700	51	dB(A)
Leq 24 hrs	0000-2400	55	dB(A)
L10 18 hrs	0600-2400	58	dB(A)
max Leq 1 hr	0700-2200	58	dB(A)
max Leq 1 hr	2200-0700	54	dB(A)

Maximum noise events as defined in the Envirnmental Noise Management Manual 7 day average - [Lmax - Leq ≥ 15]	16

APPENDIX B

APPENDIX B

APPENDIX B



**** SCENARIO 1****
TRAFFIC NOISE MODEL
(GROUND FLOOR)

NOISE SOURCES

~ Traffic along Barrenjoey Rd.

Note:

- LAeq,15hrs noise levels shown are at 1.5 m above the ground floor level of the subject development site.

- The maximum reading at the proposed development is LAeq,15hrs 68 dB.

- Night-time noise levels are approximately 5 dB less.

PRINT DATE: 19/01/21

Line Source
Building
Barrier
3D-Reflector
Foliage
Contour Line
Receiver

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

SCENARIO 1: TRAFFIC NOISE MODEL (GROUND FLOOR)

JOB NUMBER: 3918
SITE ADDRESS: 351-353 BARRENJOY RD, NEWPORT
ASSESSED TO: NSW Department of Planning
LIMITING CRITERIA: 35-40 dB(A)

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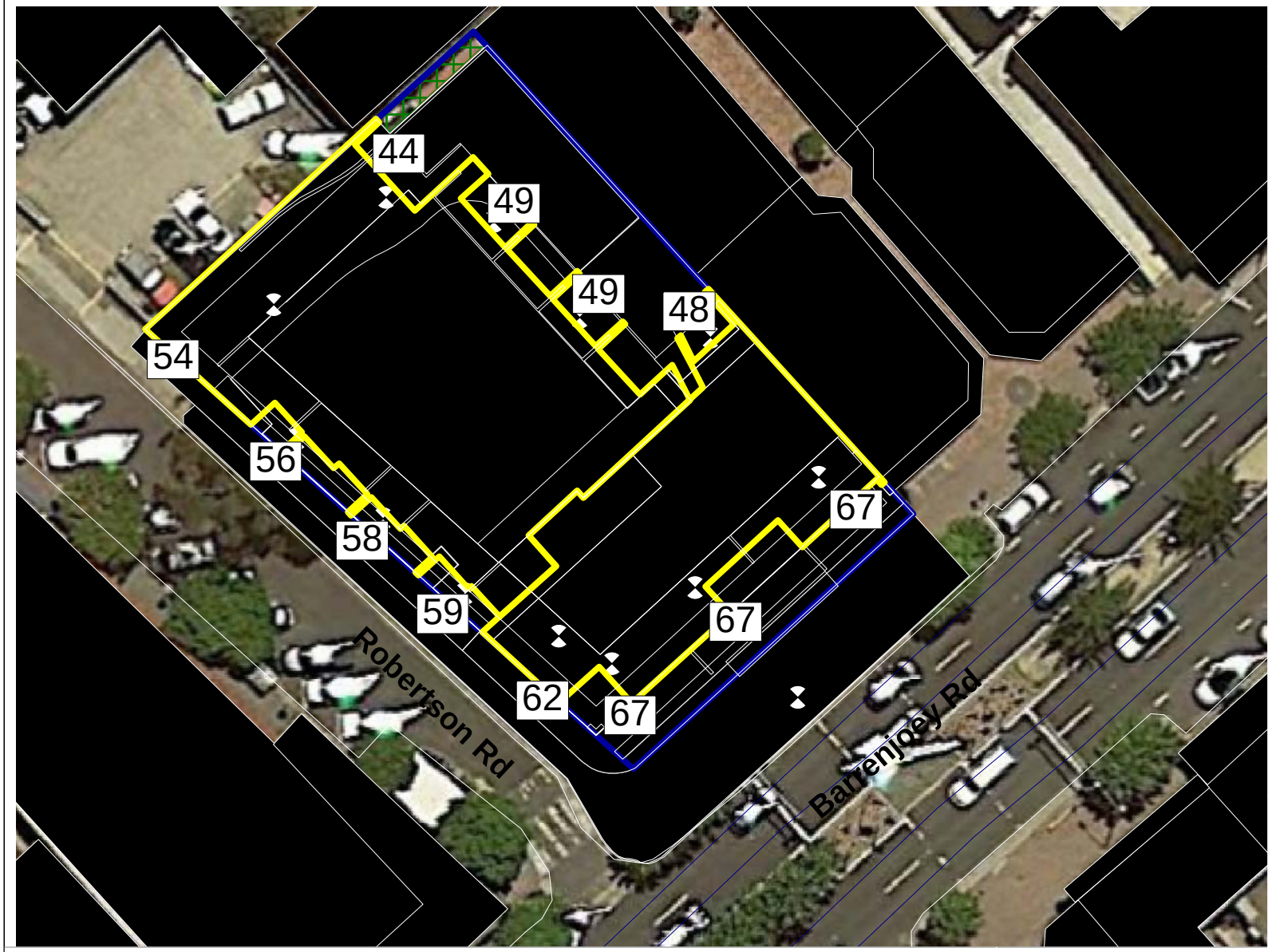

**** SCENARIO 1****
TRAFFIC NOISE MODEL
(1st FLOOR LEVEL)

NOISE SOURCES

~ Traffic along Barrenjoey Rd.

Note:

- LAeq,15hrs noise levels shown are at 1.5 m above the 1st floor level of the subject development site.

- The maximum reading at the proposed development is LAeq,15hrs 67 dB.

- Night-time noise levels are approximately 5 dB less.

PRINT DATE: 19/01/21

Line Source
Building
Barrier
3D-Reflector
Foliage
Contour Line
Receiver

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

SCENARIO 1: TRAFFIC NOISE MODEL (1st FLOOR LEVEL)

JOB NUMBER: 3918
SITE ADDRESS: 351-353 BARRENJOY RD, NEWPORT
ASSESSED TO: NSW Department of Planning
LIMITING CRITERIA: 35-40 dB(A)

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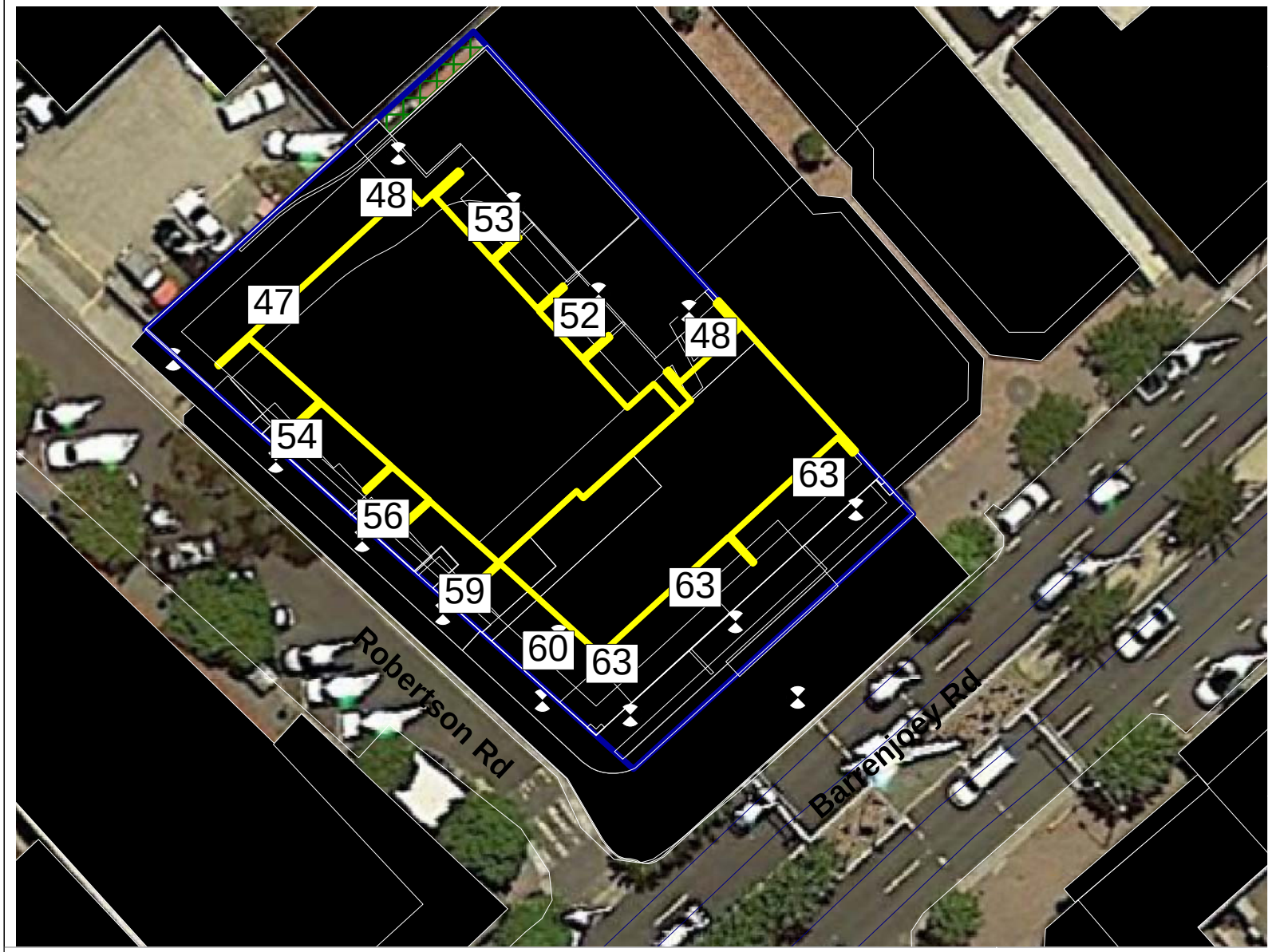

**** SCENARIO 1****
TRAFFIC NOISE MODEL
(2nd FLOOR LEVEL)

NOISE SOURCES

~ Traffic along Barrenjoey Rd.

Note:

- LAeq,15hrs noise levels shown are at 1.5 m above the 2nd floor level of the subject development site.

- The maximum reading at the proposed development is LAeq,15hrs 63 dB.

- Night-time noise levels are approximately 5 dB less.

PRINT DATE: 19/01/21

Line Source
Building
Barrier
3D-Reflector
Foliage
Contour Line
Receiver

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

SCENARIO 1: TRAFFIC NOISE MODEL (2nd FLOOR LEVEL)

JOB NUMBER: 3918
SITE ADDRESS: 351-353 BARRENJOY RD, NEWPORT
ASSESSED TO: NSW Department of Planning
LIMITING CRITERIA: 35-40 dB(A)

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W E
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APPENDIX C

APPENDIX C

APPENDIX C

TRAFFIC NOISE INTRUSION CALCULATIONS - UNIT 02 (MASTER BEDROOM)

Job 3918
Client Atlen Construction Pty Ltd
Site 351-353 Barrenjoey Road, Newport
Room Unit 0 2 , Master Bedroom

ROOM DATA
H 2.7 m D 3.5 m
W 3.5 m V 33.0 m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, carpet floor, furnished (RT60, sec)	*0.4*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.33*
	SOUTH-EASTERN FAÇADE NOISE LEVEL, LAeq,9hrs [dB]	43	50	51	52	58	55	48	43	62
STL 1	*Brick Venear: Brick + R1.5 insulation batts + 90 timber + 13 mm P/B*	*32*	*43*	*43*	*49*	*57*	*65*	*69*	*73*	7.4
STL 2	*12.38 mm laminated*	*24*	*28*	*31*	*34*	*34*	*36*	*39*	*45*	3.1
STL 3										
STL 4										
	Noise through Component 1	14	10	11	6	4	-7	-18	-28	17
	Noise through Component 2	19	21	19	17	23	18	7	-3	28
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**20**	**21**	**20**	**17**	**23**	**18**	**9**	**4**	**28**
	EXTERNAL FAÇADE TO BALCONY - NOISE LEVEL, LAeq,9hrs [dB]	43	50	51	52	58	55	48	43	62
STL 1	*Brick Venear: Brick + R1.5 insulation batts + 90 timber + 13 mm P/B*	*32*	*43*	*43*	*49*	*57*	*65*	*69*	*73*	1.8
STL 2	*12.38 mm laminated*	*24*	*28*	*31*	*34*	*34*	*36*	*39*	*45*	5.2
STL 3										
STL 4										
	Noise through Component 1	8	3	5	0	-2	-14	-25	-34	11
	Noise through Component 2	21	23	21	19	25	20	10	-1	30
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**21**	**23**	**21**	**19**	**25**	**20**	**11**	**5**	**30**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	20	21	20	17	23	18	9	4	28
Façade 2	21	23	21	19	25	20	11	5	30
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**24**	**25**	**24**	**22**	**28**	**22**	**13**	**9**	**32**

TRAFFIC NOISE INTRUSION CALCULATIONS - UNIT 02 (BEDROOM 2)

Job 3918
Client Atlen Construction Pty Ltd
Site 351-353 Barrenjoey Road, Newport
Room Unit 02, Bedroom 2

ROOM DATA
H 2.7 m D 3.5 m
W 3.5 m V 33.0 m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, carpet floor, furnished (RT60, sec)	*0.4*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.33*
	SOUTH-EASTERN FAÇADE NOISE LEVEL, LAeq,9hrs [dB]	42	49	50	51	57	54	47	42	61
STL 1	*Brick Venear: Brick + R1.5 insulation batts + 90 timber + 13 mm P/B*	*32*	*43*	*43*	*49*	*57*	*65*	*69*	*73*	7.4
STL 2	*10.38 mm laminated*	*21*	*25*	*30*	*33*	*32*	*34*	*39*	*45*	3.1
STL 3										
STL 4										
	Noise through Component 1	13	9	10	5	3	-8	-19	-29	16
	Noise through Component 2	20	23	19	17	24	19	7	-4	29
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**21**	**23**	**20**	**18**	**24**	**19**	**9**	**4**	**29**
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	21	23	20	18	24	19	9	4	29
Façade 2	0	0	0	0	0	0	0	0	0
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**21**	**23**	**20**	**18**	**24**	**19**	**10**	**7**	**29**

TRAFFIC NOISE INTRUSION CALCULATIONS - UNIT 02 (LIVING/DINING)

Job 3918
Client Atlen Construction Pty Ltd
Site 351-353 Barrenjoey Road, Newport
Room Unit 02, Living/dining area

ROOM DATA
H 2.7 m D 7.5 m
W 4.0 m V 81.0 m3

		63	125	250	500	1k	2k	4k	8k	Area
	KLD, timber and tile floor, furnished (RT60, sec)	*0.6*	*0.6*	*0.6*	*0.7*	*0.7*	*0.7*	*0.6*	*0.6*	*0.64*
	SOUTH-EASTERN FAÇADE NOISE LEVEL, LAeq,15hrs [dB]	49	54	55	58	63	60	54	49	67
STL 1	*Brick Venear: Brick + R1.5 insulation batts + 90 timber + 13 mm P/B*	*32*	*43*	*43*	*49*	*57*	*65*	*69*	*73*	3.9
STL 2	*10.38 mm laminated*	*21*	*25*	*30*	*33*	*32*	*34*	*39*	*45*	9.6
STL 3										
STL 4										
	Noise through Component 1	15	10	11	8	5	-6	-16	-26	18
	Noise through Component 2	30	32	28	28	34	29	18	7	39
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**30**	**32**	**28**	**29**	**34**	**29**	**18**	**8**	**39**
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
STL 1										0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

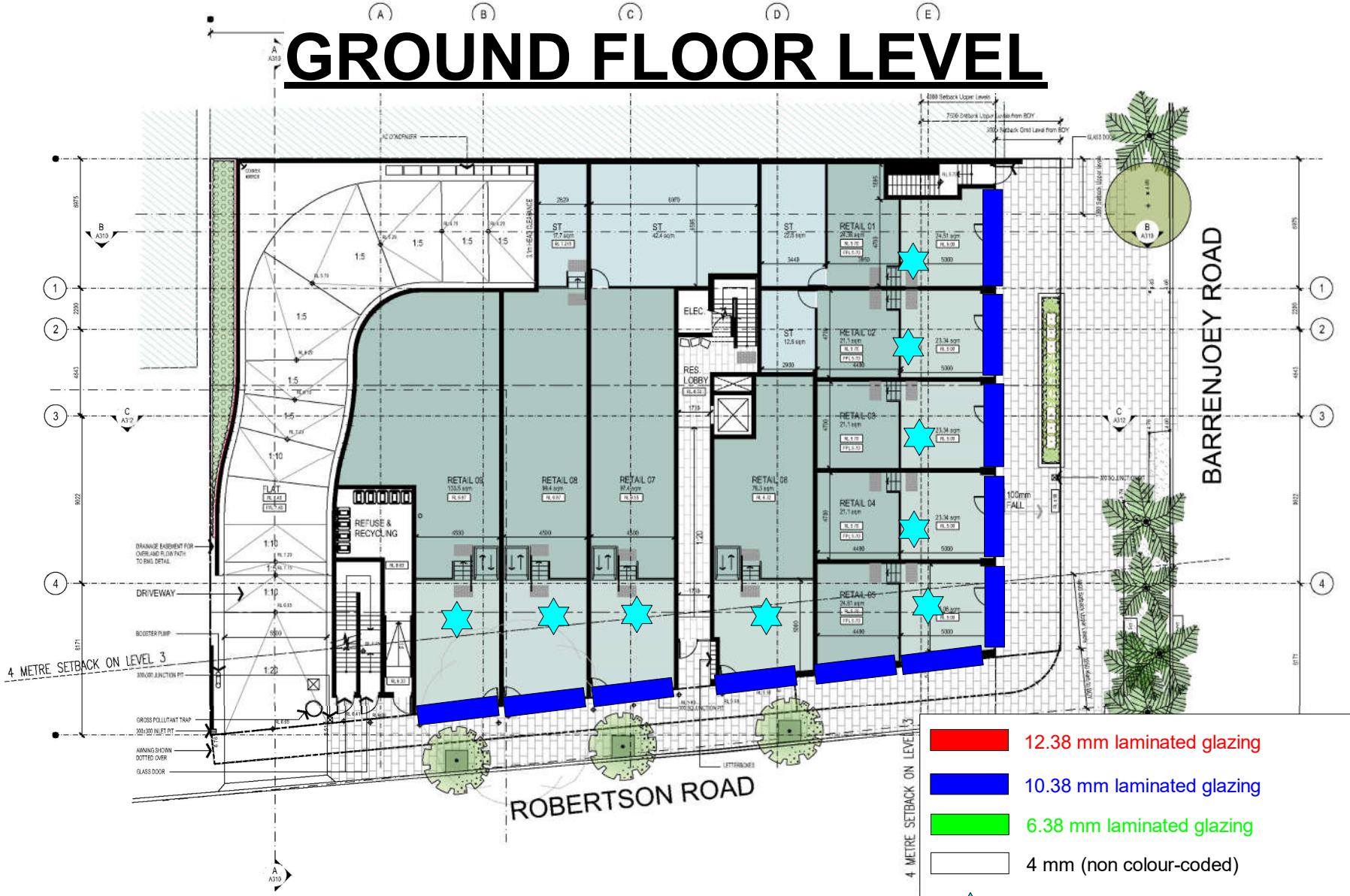
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	30	32	28	29	34	29	18	8	39
Façade 2	0	0	0	0	0	0	0	0	0
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**31**	**32**	**28**	**29**	**34**	**29**	**18**	**10**	**39**

APPENDIX D

APPENDIX D

APPENDIX D

GROUND FLOOR LEVEL



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SUITE 3.01, LEVEL 3 80 MOUNT STREET
NORTH SYDNEY, NSW 2060 AUSTRALIA
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NOMINATED ARCHITECTS
TONY GRAY 5303 & PAUL GORSELL 6726
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ISSUE	DATE	AMENDMENTS
21	20.12.15	DA ISSUE
20	20.12.15	DA ISSUE
19	20.12.11	ISSUED TO CONSULTANT
18	20.10.01	ISSUED TO CONSULTANTS
17	20.11.23	ISSUED TO COUNCIL

CLIENT: DEVELOPMENT LINK

PROJECT: MIXED USE DEVELOPMENT

351-353 BARRENJOEY ROAD, NEWPORT NSW 2106

LOT 65 & 66 SEC 5 DP 6248

TITLE: GROUND FLOOR PLAN

SCALE 1:100 @ A1
APPROVED
DRAWN MT LH HH
CHECKED PG
DATE JAN 2019
STATUS DA

PROJECT NUMBER 18057
DRAWING NUMBER A102
ISSUE 21

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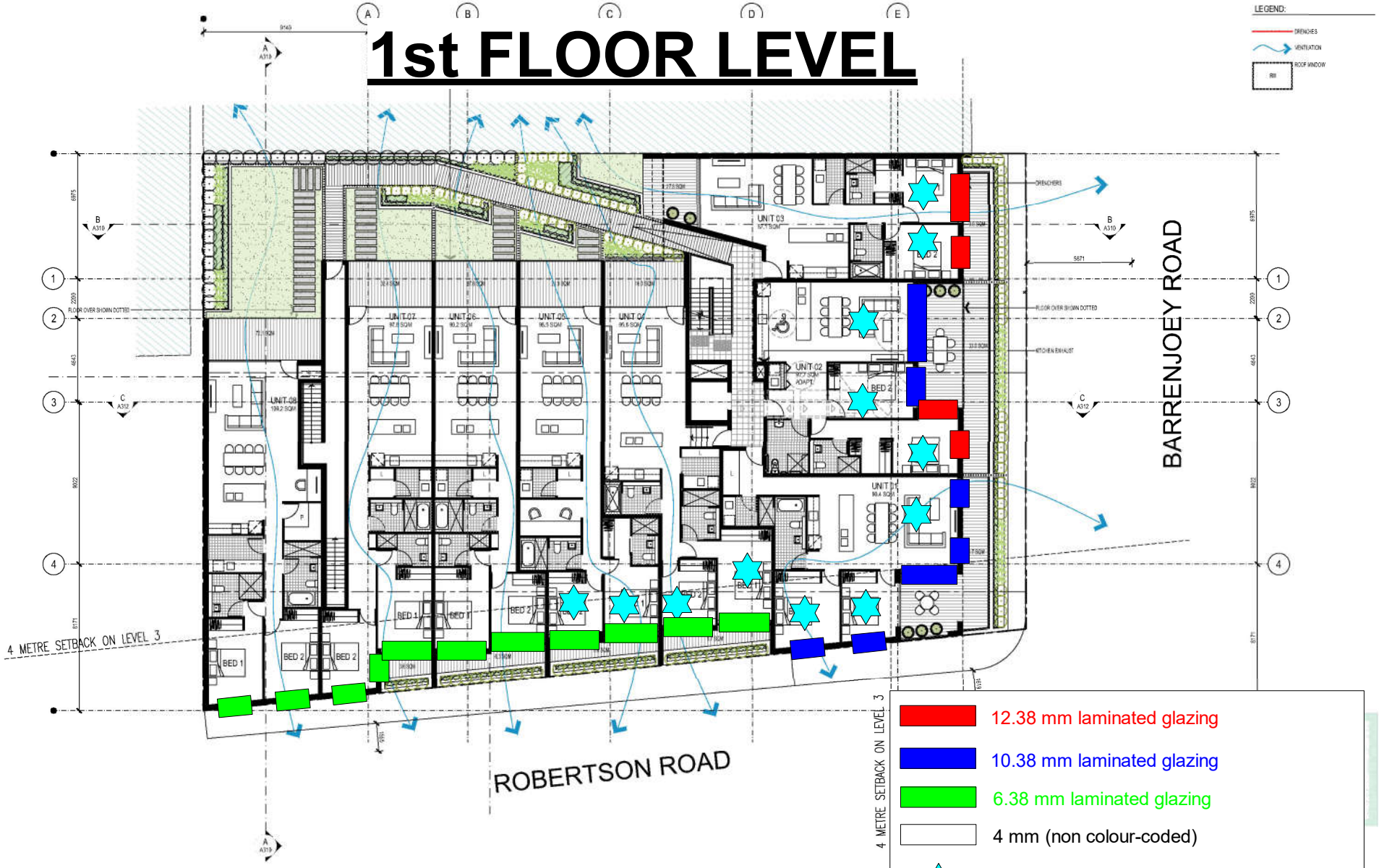
1st FLOOR LEVEL



SUITE 3.01, LEVEL 3 80 MOUNT STREET
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ISSUE	DATE	AMENDMENTS
26	20.12.15	DA ISSUE
25	20.12.15	DA ISSUE
24	20.12.15	DA ISSUE
23	20.12.11	ISSUED TO CONSULTANT
22	20.12.03	REVISED ISSUE
21	20.12.01	ISSUED TO CONSULTANTS
20	20.11.23	ISSUED TO COUNCIL

CLIENT: DEVELOPMENT LINK

PROJECT: MIXED USE DEVELOPMENT

351-353 BARRENJOEY ROAD, NEWPORT NSW 2106

LOT 65 & 66 SEC 5 DP6248

TITLE: FIRST FLOOR PLAN

SCALE: 1:100 @ A1

APPROVED
DRAWN MT LH
CHECKED PG

DATE JAN 2019

STATUS DA

PROJECT NUMBER: 18057

DRAWING NUMBER: A103

ISSUE: 26

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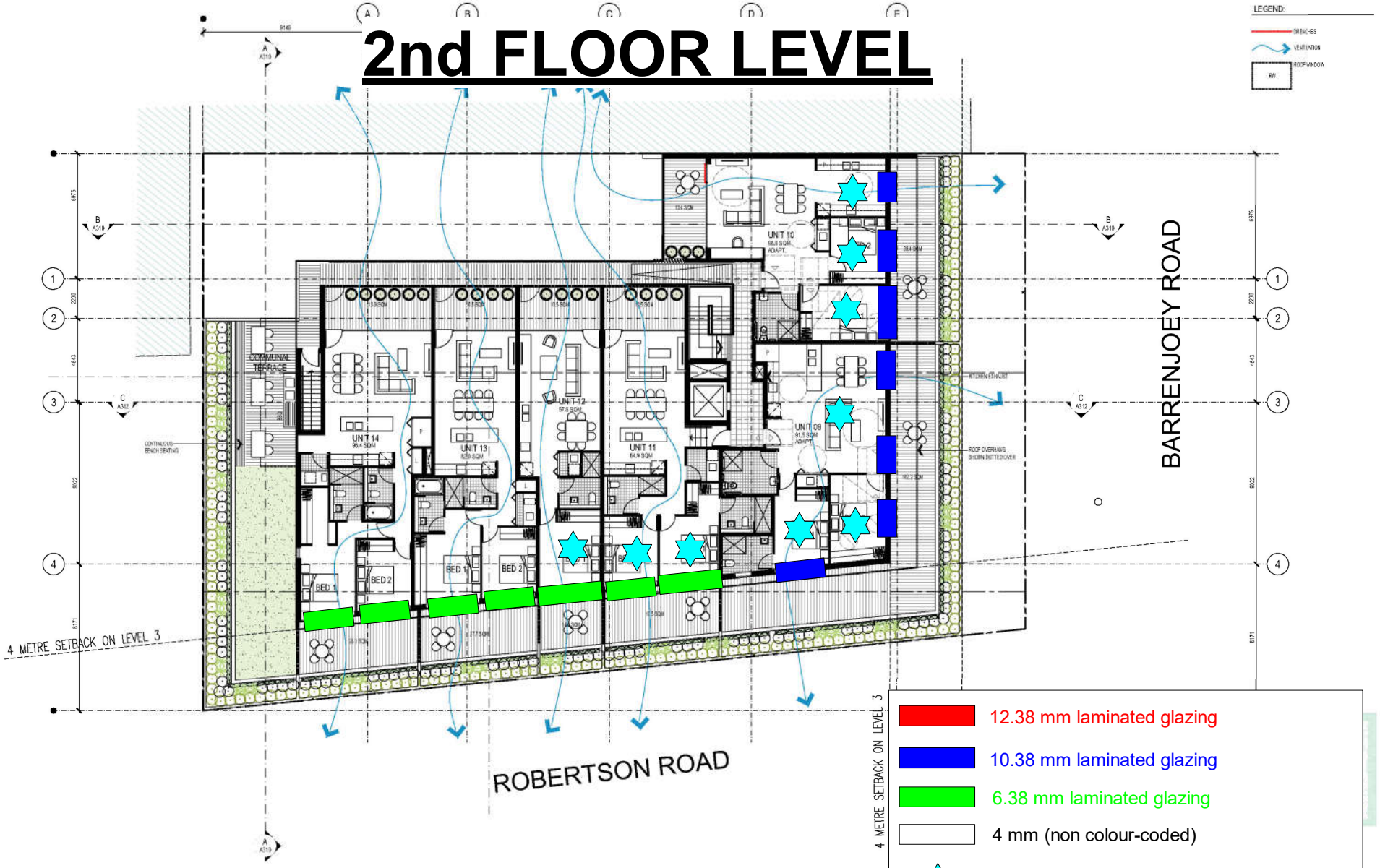
2nd FLOOR LEVEL



SUITE 3.01, LEVEL 3 80 MOUNT STREET
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ISSUE	DATE	AMENDMENTS
24	20.12.13	DA ISSUE
23	20.12.13	DA ISSUE
22	20.12.13	DA ISSUE
21	20.12.11	ISSUED TO CONSULTANT

CLIENT: DEVELOPMENT LINK

PROJECT: MIXED USE DEVELOPMENT
351-353 BARRENJOEY ROAD, NEWPORT NSW 2106
LOT 65 & 66 SEC 5 DP 6248

TITLE: SECOND FLOOR PLAN

SCALE 1:100 @ A1
APPROVED
DRAWN MT LH
CHECKED PG
DATE JAN 2019
STATUS DA

PROJECT NUMBER 18057
DRAWING NUMBER A104
ISSUE 24

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