

Leppington (1) 88 Development Pty Ltd

173-183 Rickard Road, Leppington

Acoustic Assessment for SSDA

State Significant Development Application (SSDA) SSD-84430209

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1 Introduction

This Acoustic Assessment for SSDA has been prepared by Acouras Consultancy on behalf of Leppington (1) 88 Development Pty Ltd (**the Applicant**) to address the project-specific Secretary's Environmental Assessment Requirements (SEARs) issued the proposed State Significant Development Application (SSDA) SSD-99319962. The development is located at 173-183 Rickard Road, Leppington (the Site) and is located within the South West Growth Area (**SWGA**) within the Camden Local Government Area (**LGA**).

The project seeks detailed development consent for the construction of a mixed-use development to deliver Leppington Civic Centre, comprising shop top housing to support residential development and commercial land uses at 173-183 Rickard Road, Leppington.

- Specifically, the SSDA seeks consent for:
- Demolition and earthworks to prepare the site for future development.
- Delivery of new roads and approximately 6,500 sqm of open space.
- Delivery of 8 residential buildings to accommodate a total of 1493 units, comprising of:
 - Build to Sell Apartments: 864
 - Build to Rent Apartments: 412
 - Affordable Apartments 217 (representing circa 15% of total residential yield)
- Delivery of a 156-key hotel (non-residential).
- Approximately 40,500 sqm of non-residential Gross Floor Area (GFA).
- Loading and car parking facilities on the lower ground and basement levels.

The proposed development is supported by concurrent rezoning application to seek amendments to Appendix 5 Camden Growth Centres Precinct Plan within the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* pursuant to the concurrent rezoning process through the Housing Delivery Authority (**HDA**) planning pathway. This concurrent rezoning will provide the rezoning and variations to development standards required to facilitate the delivery of the Leppington Civic Centre and Leppington Town Centre, generally in accordance with the Leppington Town Centre State-Assessed Rezoning Proposal (**SARP**).

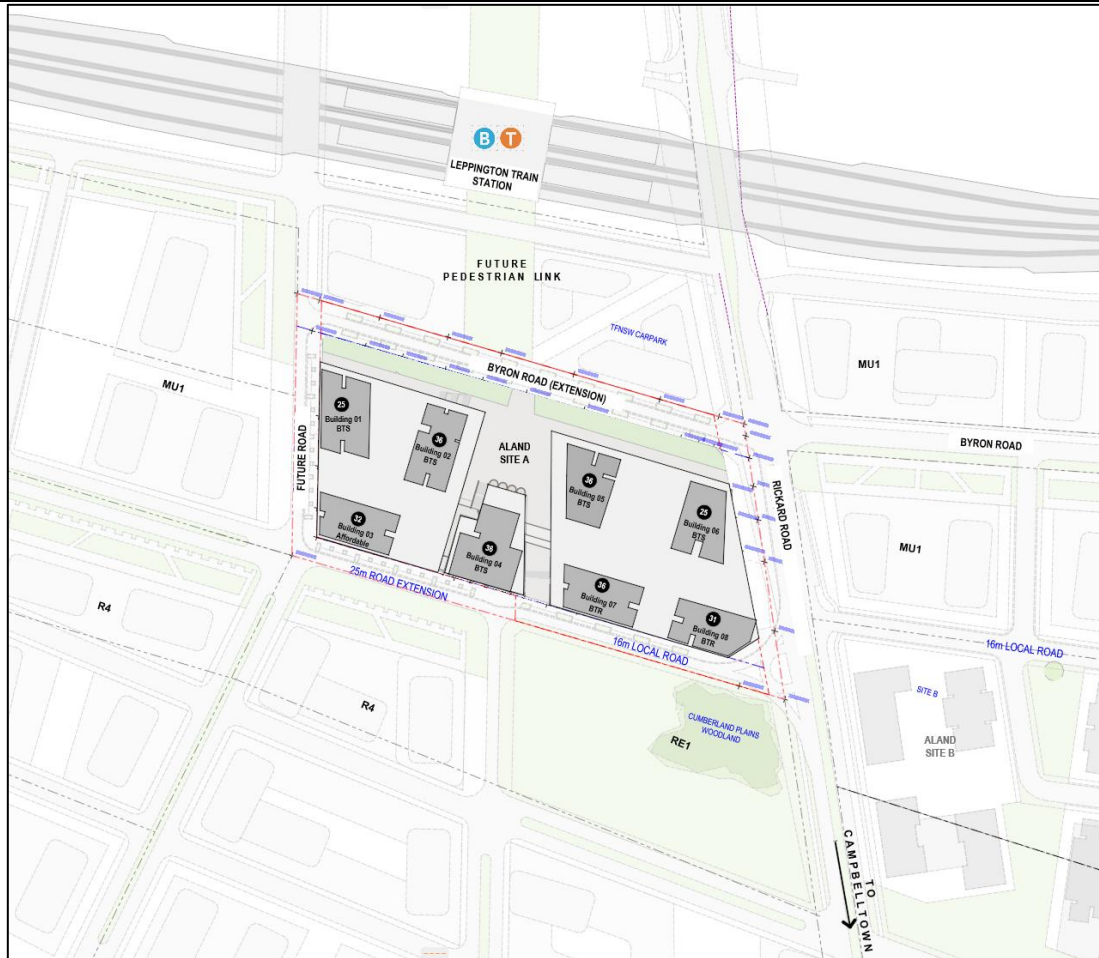


Figure 1 – SSDA – Proposed Works

The proposal seeks consent for:

- Approval of a Concurrent Rezoning Amendment: To facilitate the built form proposed under SSD- 99319962, concurrent amendments are sought to the WPC SEPP pursuant to the concurrent rezoning process facilitated by the HDA planning pathway. This concurrent rezoning seeks to vary existing controls under the WPC, whilst also seeking broad alignment with the LTC SARP which is expected to be finalised by DPHI mid-2026. Specifically, the project seeks to amend the WPC SEPP as follows:
- Amend the Land Zoning Map to rezone the site from B3 Commercial Centre to MU1 Mixed Use.
- Amend Clause 4.3 to increase the height of buildings control from 24m to 138.5m.
- Introduce a floor space ratio control of 5.8:1 for the entire site, equates to approximately 188,000sqm of GFA.
- Incorporating a site-specific provision, requiring the provision of a minimum of 6,500sqm of public open space

State Significant Development consent for the proposed development: The SSDA seeks detailed consent for the following works:

- Construction of 8 residential buildings to accommodate a total of 1493 units, comprising of:
 - Build to Sell Apartments: 864
 - Build to Rent Apartments: 412
 - Affordable Apartments 217 (representing circa 15% of total residential yield)
- Delivery of approximately 40,500m² of non-residential floor space, including:
 - Hotel (with ancillary function spaces).
 - Centre-based child care facility, accommodating approx. 70 children.
 - Pub (licensed).
 - Shop – neighbourhood supermarket, discount department store (DDS), other retail.
 - Retail liquor store.
 - Food and beverage premises.
 - Vehicle repair station – Tyre and auto, carwash.
 - Recreation facility (indoor) – Indoor swim school, Gym.
- Delivery of retail and residential parking spaces across seven (7) basement levels.
- The proposed development is surrounded by existing rural residential and commercial properties. The location is shown in Figure 2.



Figure 2 – Site Location, Nearest Residents and Noise Logger Position

The proposed residential development is surrounded by rural residential dwellings and to the south and east (opposite Rickard Road). To the north is a public carpark.

The nearest residential receivers that may potential be affected by the construction and use of the development are listed Table 1.

Table 1 – Noise Sensitive Receivers

Receiver Type	Location
R1: Residential dwelling	No.183 Rickard Road to the north.
R2: Residential dwelling	No.166 and No.176 Rickard Road.

I Fu Siong Hie, confirm this Acoustic Assessment for SSDA addresses the requirement of SEAR No.10 Noise and Vibration and relevant State and local legislation, policies, and guidelines including:

- Camden Council Environmental Noise Policy.
- NSW EPA “Noise Policy for Industry” (NPfI).
- Department of Planning (DoP) ‘Development near Rail Corridors and Busy Roads – Interim Guideline’.
- State Environmental Planning Policy (Transport and Infrastructure) Clause 2.119 and Clause 2.120.
- Association of Australian Acoustical Consultants (AAAC) “Guideline for Child Care Centre Acoustic Assessment” (Version 3.0).
- NSW Government of Planning and Environment “Child Care Planning Guide”.
- NSW Governments Office of Liquor, Gaming and Racing (OLGR).
- NCC/BCA Part F7 (2022).
- NSW EPA ‘Interim Construction Noise Guideline’ (DECC, 2009).
- Australian standard AS/NZS 2107-2016: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard AS 3671-1989 ‘Acoustics - Road traffic noise intrusion -building siting and construction’.
- Australian standard AS 1055-2018: Acoustics – Description and measurement of environmental noise - General procedures.

I further confirm that none of the information contained in the Acoustic Assessment for SSDA is false or misleading.

**Table 2 – SEARS Item**

SEARS Item	Report Reference
10. Noise and Vibration <i>Provide a noise and vibration impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented</i>	Section 3.3 : Operational noise of retail premises. Section 3.4 : Mechanical noise. Section 3.7 : Traffic noise generation. Section 3.8 : Construction noise and vibration

2 Noise Criteria

2.1 Residential Internal Noise Levels

The Department of Planning (DoP) 'Development near Rail Corridors and Busy Roads – Interim Guideline' and the State Environmental Planning Policy (Infrastructure) Clause 102 for residential developments, which states:

Development for any of the following purposes that is on land in or adjacent to a road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data available on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- *building for residential use*
- *a place of public worship*
- *a hospital*
- *an educational establishment or childcare centre*

The NSW Department of Planning (DoP) 'Development near Rail Corridors and Busy Roads – Interim Guideline' and Clause 2.119 and Clause 2.120 of the State Environmental Planning Policy (Transport and Infrastructure), requires the following:

2.119 Development with frontage to classified road

(1) The objectives of this section are—

(a) to ensure that new development does not compromise the effective and ongoing operation and function of classified roads, and

(b) to prevent or reduce the potential impact of traffic noise and vehicle emission on development adjacent to classified roads.

(2) The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that—

(a) where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and

(b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of—

(i) the design of the vehicular access to the land, or

(ii) the emission of smoke or dust from the development, or

(iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and

(c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.

2.120 Impact of road noise or vibration on non-road development

(1) This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration—

- (a) residential accommodation,*
- (b) a place of public worship,*
- (c) a hospital,*
- (d) an educational establishment or centre-based child care facility.*

(2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.

(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—

- (a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,*
- (b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*

(3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.

(4) In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

Mitigation measures are based on having windows and external doors closed. If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

The Australian Standard AS 3671-1989 'Acoustics - Road traffic noise intrusion -building siting and construction' provides guidance on the design but is limited as it refers to the Australian Standard AS 2107. Australian Standard AS 2107 – 2016 'Acoustic – Recommended Design Sound Levels and Reverberation Times for Building Interiors' to provide the recommended design sound levels for different areas of occupancy in buildings.

Table 3 presents the recommended internal design noise levels in accordance with AS 2107 – 2016.

Table 3— Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Design sound level (L _{Aeq,t}) range
Apartment common areas, corridors, lobbies (e.g. foyer, lift lobby)	45 to 50
Living Areas	30 to 40 dB(A) L _{eq(15hour)}
Sleeping Areas	30 to 35 dB(A) L _{eq(9hour)}
Hotels and motels— Sleeping areas (night time)— inner city areas or entertainment districts or near major roads	35 to 40
Common rooms	40 to 45
Enclosed Carparks	< 65

2.2 Commercial & Retail Internal Noise Levels

The AS/NZS 2107–2016 outlines the acceptable internal noise levels such that a satisfactory acoustic environment within non-residential spaces in new and existing buildings can be achieved. Table 4 presents the recommended internal design noise levels.

Table 4—Commercial & Retail: Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range
Department Stores (Main Floor)	< 55
Supermarkets	< 55
Small retail stores (general)	< 50
Cafeteria, Coffee shops, Restaurants	40 to 50
Shopping malls	< 55
General office	40 to 45
Toilets	< 55
Enclosed Carparks	< 65

2.3 NSW Child Care Planning Guide

The NSW Government of Planning and Environment provides a guideline for assessing any proposed childcare centre. The guideline states in Section 3.6:

C26: An acoustic report should identify appropriate noise levels for sleeping areas and other non play areas and examine impacts and noise attenuation measures where a child care facility is proposed in any of the following locations:

- *on industrial zoned land*
- *where the ANEF contour is between 20 and 25, consistent with AS 2021 – 2000*
- *along a railway or mass transit corridor, as defined by State Environmental Planning Policy (Infrastructure) 2007*
- *on a major or busy road*
- *other land that is impacted by substantial external noise.*

The proposed location of the childcare centre is not affected by aircraft noise and is not located on “major or busy road” that carries more than 40 000 AADT in as defined by the SEPP(I) and the RMS.

2.4 Childcare Centre Internal Noise Level

For the childcare centre, the Association of Australian Acoustical Consultants (AAAC) 'Guideline for Child Care Centre Acoustic Assessment' recommends the following criteria for noise intrusion from traffic, rail and industry.

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall be capable (ie with doors and / or windows closed) of achieving 40 dB(A) within indoor activity areas and 35 dB(A) in sleeping areas.

Table 5 presents the recommended internal design noise levels for the various spaces in a childcare centre based on the Australian Standard AS/NZS 2107–2016.

Table 5— Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range
Administrative offices	35 to 40
Staff common rooms	40 to 45
Toilets	< 55

2.5 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Noise monitoring was placed on the ground level as shown in Figure 2.

Measurements were conducted using the following equipment:

- SVAN 977C Type 1 Real time Analyser/Noise Logger. Serial No. 98078.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian Standard AS 1055-2018: Acoustics-Description and measurement of environmental noise-General procedures. The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990. During the monitoring period any adverse weather condition have been excluded. The noise logger results are presented in Appendix C.

2.5.1 Measured Traffic Noise Levels

Table 6 presents a summary of the measured ambient noise level and traffic noise impacting the development.

Table 6 – Measured Ambient and Traffic Noise and Levels, dBA

Location	Period	Average L_{eq}	Highest L_{eq} 1hr
Rickard Rd	Day (07:00-22:00)	59	63
	Night (22:00-07:00)	52	59

2.5.2 EPA Noise Policy for Industry

Table 7 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project. The amenity criteria are based on a rural receiver.

Table 7—Noise Survey Summary and Project Limits, dBA

Time Period	Existing Noise Levels		NSW EPA NPfI			
	L_{eq} (period)	RBL	Recommended ANL	Project ANL ¹ $L_{eq}(15min)$	Intrusiveness Criteria, $L_{eq}(15min)$	Project Noise Trigger Level $L_{eq}(15min)$
Day	60	46	50	48	51	48
Evening	57	39	45	43	44	43
Night	52	29	40	38	34	34

During detailed design stage, the design and selection of the mechanical equipment required to service the proposed development will be required to achieve the EPA noise limits as presented in the table above.

¹ 2. Project ANL is recommended ANL minus 5 dB(A) and plus 3 dB(A), to convert from a period level to a 15-minute level.

2.5.3 NSW OLGR Noise Limits

To assess the impact of noise emanating from the operation of the licenced restaurant of the hotel to the adjacent residents, the NSW Governments Office of Liquor, Gaming and Racing (OLGR) provides the following noise guidelines:

The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) by more than 5 dB between 07:00 am and 12:00 midnight at the boundary of any affected residence.*

The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) between 12:00 midnight and 07:00 am at the boundary of any affected residence.*

Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07:00 am.

** LA10 is the average maximum deflection of the noise emission from the licensed premises.*

The noise impact of the proposed function room, gaming room and outdoor terraces is to be assessed based on the existing background noise level, determining by the lowest repeatable L₉₀ dB(A) during the respective periods. The background levels recorded at the location and the OLGR noise limit are shown in the following Table 8.

Table 8 — OLGR Noise Limit

7.00am to midnight	Octave Band, Hz Lin									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Background Noise Level Before Midnight, RBL	38	38	30	25	25	24	22	21	14	30
Noise Criteria Before Midnight, L₁₀	43	43	35	30	30	29	27	26	19	35

2.5.4 Camden Council Environmental Noise Policy

Camden Council's Environmental Noise Policy provide the acoustic requirements for new childcare centres. In Part C it states that:

The $L_{Aeq(15 \text{ minutes})}$ noise level from children in the outdoor areas of the site must not exceed the background L_{A90} sound level by more than 10dB(A). When measured at the boundary of the nearest or most affected residential premises, or if the boundary is more than 30 metres from a residential dwelling, at the most affected point within 30 metres of a residence.

All other noise impacts from the use of the site, including children inside the buildings, mechanical plant, kitchen exhaust, amplified music, vehicle use of the car park must comply with Part B - Section 4 of this document.

2.5.5 Children Activity Noise Limits (AAAC)

To provide an objective assessment of the proposed childcare centre the Association of Australian Acoustical Consultants (AAAC) 'Guideline for Child Care Centre Acoustic Assessment'.as a best practice method to determine the intrusive noise levels.

The AAAC guideline recommends that outdoor play be assessed as follows:

- Base Criteria – With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed $L_{eq,15min}$ 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).
- Background Greater Than 40 dB(A) – The contributed $L_{eq,15min}$ noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10dB (ie background+10dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).
- Up to 4 hours (total) per day - If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15 \text{ minute}}$ noise level emitted from the outdoor play shall not exceed the background noise level by more than 10dB at the assessment location.
- More than 4 hours (total) per day - If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15 \text{ minute}}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- 1.5 m above ground level;

- On a balcony at 1.5 m above floor level;
- Outside a window on the ground or higher floors.

For outdoor playareas, the AAAC recommends the following:

- The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).

For the purpose of the assessment, the background noise level RBL has been determined based on the average noise level recorded during the expected play time periods. Table 7 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project from children activity noise.

Table 9—Children Activity Noise Limits, dBA (AAAC)

Time Period	Existing Noise Levels			AAAC Noise Limits, $L_{eq}(15min)^2$	AAAC Noise Limits, $L_{eq}(15min)^3$
	L_{eq} (period)	L_{90} (period)	RBL	(More than 4 hours)	(Up to 4 hours per day)
Day (07:00-18:00)	60	49	46	51	56
Evening (18:00-22:00)	57	45	39	44	49
Night (22:00-07:00)	52	35	29	N/A	N/A

² More than 4 hours per day - not exceed the background noise level by more than 5 dB.

³ Up to 4 hours per day - not exceed the background noise level by more than 10 dB.

2.6 Traffic Noise Generation

The development has the potential to generate increased traffic noise along Rickard Road will be assessed in accordance with the NSW EPA Road Noise Policy (RNP). Table 10 sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

Table 10— Road Traffic Noise Assessment Criteria

Road Category	Type of project/land use	Assessment Criteria - dBA	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/ arterial/ sub-arterial roads	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq} , (15 hour) 60 (external)	L _{Aeq} , (9 hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq} , (1 hour) 55 (external)	L _{Aeq} , (1 hour) 50 (external)

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

2.7 Smoke Control Systems

Guidance on noise from smoke control systems guidance is contained in Australian /New Zealand Standard AS/NZS 1668.1:1998. Clause 4.6 of AS/NZS 1668.1:1998 states the following:

“The noise level due to operation of smoke control systems (including smoke-spill and air pressurization fans) shall not exceed 65 dB(A) in occupied spaces or 5 dBA above the ambient noise levels to a maximum level of 80 dB(A). Noise levels in fire-isolated exits shall not exceed 80 dB(A).

During emergency egress situations, system noise levels may interfere with command conversation, which may represent a threat to safe occupant evacuation or may contribute to occupant distress in the event of a fire. For this reason, the maximum sound pressure level generated by smoke control systems should not exceed 65dB(A) and never exceed 80dB(A) in the occupied space. On reaching the safety of a fire-isolated exit, occupants can egress with considerably less verbal direction and, as such, can safely sustain higher sound levels. To this end, the maximum sound pressure level in the fire-isolated exits should not exceed 80dB(A). The designer should select mechanical equipment that will not increase noise to above these levels. Certainly, the noise generated by the supply air fan to pressurise a stair shaft should not deter people from entering the stair shaft. Noise from smoke control systems should be designed to comply with the criteria nominated above”.

Note, based on advice for the above requirements, noise levels in fire-isolated exits shall not exceed 80 dB(A)

2.8 Sound Insulation Requirement (NCC/BCA Part F7)

For sound transmission and insulation between sole occupancy units (SOU) within the same development, walls and floors to be constructed in accordance with requirements of Part F7 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 11.

Table 11 - NCC Part F7 Requirements (Class 2 or 3)

Building Element	Minimum NCC Part F7 Requirements
Sound Insulation Rating of Walls (Class 2 or 3)	
Walls between separate sole occupancy units.	Rw + Ctr 50 (airborne)
Walls between wet areas (bathrooms, sanitary compartment, laundry or kitchen) and a habitable room (other than kitchen) in adjoining apartments.	Rw + Ctr 50 (airborne) & of discontinuous construction
Walls between sole occupancy unit and stairway, public corridors, public lobby or the like or parts of a different classification.	Rw 50 (airborne)
Walls between a plant room or lift shaft and a sole occupancy unit.	Rw 50 (airborne) & of discontinuous construction
Sound Insulation Rating of Floors (Class 2 or 3)	
Floors between sole occupancy units or between a sole occupancy unit and plant room, lift shaft, stairway, public corridor, public lobby or the like.	Rw + Ctr 50 (airborne) & Ln,w + CI < 62 (impact)
Apartment Entry Doors (Class 2 or 3)	
A door incorporated in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like.	Rw 30 (airborne)
Services (Class 2, 3 or 9c)	
If a storm water pipe, a duct, soil, waste or water supply pipe including a duct or pipe that is located in a wall or floor cavity serves or passes through more than one sole occupancy unit must be separated:	
if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
if the room is a kitchen or non-habitable room	Rw + Ctr 25

Construction Deemed to Satisfy

The forms of construction must be installed as follows:

(a) Masonry—Units must be laid with all joints filled solid, including those between the masonry and any adjoining construction.

(b) Concrete slabs—Joints between concrete slabs or panels and any adjoining construction must be filled solid.

(c) Sheeting materials—

(i) if one layer is required on both sides of a wall, it must be fastened to the studs with joints staggered on opposite sides; and

(ii) if two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and

(iii) joints between sheets or between sheets and any adjoining construction must be taped and filled solid.

(d) Timber or steel-framed construction—perimeter framing members must be securely fixed to the adjoining structure and—

(i) bedded in resilient compound; or

(ii) the joints must be caulked so that there are no voids between the framing members and the adjoining structure.

(e) Services—

(i) Services must not be chased into concrete or masonry elements.

(ii) A door or panel required to have a certain $R_w + C_{tr}$ that provides access to a duct, pipe or other service must—

(A) not open into any habitable room (other than a kitchen); and

(B) be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and be constructed of—

(aa) wood, particleboard or blockboard not less than 33 mm thick; or

(bb) compressed fibre reinforced cement sheeting not less than 9 mm thick;
or

(cc) other suitable material with a mass per unit area not less than 24.4 kg/m²

(iii) A water supply pipe must—

(A) only be installed in the cavity of discontinuous construction; and

(B) in the case of a pipe that serves only one sole-occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit and have a clearance not less than 10 mm to the other wall leaf.

(iv) Electrical outlets must be offset from each other—

(A) in masonry walling, not less than 100 mm; and

(B) in timber or steel framed walling, not less than 300 mm.

2.9 Construction Noise Criteria

The NSW EPA “Interim Construction Noise Guideline” (ICNG) provides guidance on noise limits from construction sites. Table 12 is an extract from the EPA guideline. When assessing short-term construction works, best management practices should be implemented to reduce any impact as far as practically possible.

Table 12 – Noise at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq} (15min)^*$	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq} (15 min)$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected

Table 13 presents a summary of the measured background noise level and the noise management level for this project in accordance with EPA's ICNG.

Table 13 — EPA Construction Noise Management Level, dBA

Receiver	Time Period	Existing Noise Levels		Management Level
		L _{eq} (period)	RBL	L _{Aeq} (15min)*
Residential	Mon-Fri: 07.00-18.00	60	46	56 (Highly noise affected 75 dBA)
	Sat: 08.00- 13.00	58	48	58 (Highly noise affected 75 dBA)

2.10 Construction Vibration Criteria

The DEC/EPA's guideline "Assessing vibration: a technical guideline" is based on the "BS 6472-1992: Evaluation of human exposure to vibration in buildings (1-80 Hz)" which presents preferred and maximum vibration values for use in assessing human responses to vibration. Vibration and its associated effects are usually classified as follows:

- **Continuous** vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time).
- **Impulsive** vibration is a rapid build up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds.
- **Intermittent** vibration can be defined as interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude.

Higher levels of vibration are generated during excavation and piling operations, which are intermittent and are assessed using the Vibration Dose Value (VDV). The VDV criteria for a range of receiver types are stated in Table 14.

Table 14—Acceptable Vibration Dose Values for Intermittent Vibration (m/s^{1.75})

Location	Daytime ⁴		Night-time ⁴	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Critical Areas	0.10	0.20	0.10	0.20
Residence	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

Guidance for acceptable vibration at the foundation of buildings to limit cosmetic damage or nearby buildings is given in the British Standard “BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration”. It is recommended that vibration from construction activities should be limited to the values given in Table 15 below.

Table 15—BS 7385 Construction vibration criteria for buildings, PPV mm/s

Construction	Limits for Transient Vibration	
	4 – 15 Hz	>15 Hz
Heavy or reinforced	50 mm/s	
Light (e.g. normal dwellings)	15 mm/s at 4 Hz rising to 20 mm/s at 15 Hz	20 mm/s at 15 Hz rising to 50 mm/s for 40 Hz and above

Typically, it would be expected that no cosmetic damage would occur provided intermittent vibration levels do not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above.

⁴ Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.

3 Assessment and Recommendations

3.1 Building Façade Construction

To provide sufficient acoustic attenuation, the general external construction of the proposed building would need to be constructed as detailed in Table 16.

Table 16 – External Façade Construction (R_w)

Building Element	Proposed Construction	Minimum R_w
External Wall	External concrete (render or cladding) with internal plasterboard lining. Insulation as per thermal requirements.	45
Roof and ceiling	Concrete roof with 13mm plasterboard ceiling. Insulation as per thermal requirements.	45

3.2 Façade Glazing Requirements

Acoustic glazing for the various spaces are given in Table 17 is required to reduce noise intrusion into the internal spaces and should result in noise levels within such units in accordance with the AAAC and the Australian Standards AS/NZS 2107:2016.

Table 17 – Schedule of Window and Glazing (R_w)

Level	Façade	Space	Glazing Thickness	Minimum R_w (Glazing+Frame)
Shopping Centre & Retail				
LG, G & UG	All	All	6.38mm laminated	30
Building 1, 2, 3, 4, 5 & 7				
All	All	Living & Bed	6.38mm laminated	30
Building 6 & 8				
All	East	Living & Bed	10.38mm laminated	32
	North, South, West	Living & Bed	6.38mm laminated	30

All Windows/doors should be well sealed (air tight) when closed with good acoustic seals around the top and bottom sliders. Mohair seals are not considered to be acoustic seals.

3.3 Operational Noise from Retail Spaces

As a first principle we should note we have operational hours in this assessment are indicative only, but have been provided to inform the operational noise assessment of the proposed land uses. Also reinforce that the Civic Centre proposal seeks to deliver an 18hr-economy, 24/7 potential to enable the delivery of an active and vibrant town centre and night time economy etc.

Based on similar projects, we would expect the following noise activities and noise mitigation measures. The following are the proposed trading hours:

- Major supermarket, major department store and specialty retail stores: 7am-10pm.
- Food beverage: Monday to Sunday 11am to 9pm. Friday to Saturday extension trade to 11pm.
- Fitness gym: 24hrs access.
- Family Entertainment, MM/Entertainment: Monday to Sunday 11am to 9pm. Friday to Saturday extension trade to 11pm.
- Hotel: Foyer, reception and parking to have 24hr access.
- Pub & Restaurant: Monday to Sunday 10:00am - midnight.
- Swim school: Monday to Saturday, 7am-10pm.
- Childcare Centre: Monday to Friday, 7am-6pm. Closed on Public Holidays.
- Carwash, tyre and car workshop stores: 7am-10pm.

A separate acoustic assessment would be submitted for each tenant to apply of 24hr operation.

3.3.1 Swim School Facility

The proposed swim school is located to the basement 1 level or lower ground level of the shopping centre. The operating hours are to be determined based on operators requirements.

The swimming pool mechanical equipment (heat pumps and filtration) will be located dedicated plantrooms. Plantrooms may include acoustic treatment such as:

- Acoustic louvres be fitted to the intake/discharge of the enclosure.
- The internal face of the solid wall is be lined with absorptive acoustic insulation fixed to a solid walls.

Purpose built swimming pool on top of concrete slab (no penetrations), and supporting structures are subject to manufacture and structural engineers' advice

- Pool to be appropriately vibration isolated (eg, springs or rubber pads/mounts).
- All pool equipment is to be in accordance with manufacturers details and recommendations.

3.3.2 Childcare Centre

The proposed childcare centre would be located on level 1 in Building 6. The centre intends to operate Monday to Friday between 7.00am to 6.00pm. The facility will be closed on Public Holidays.

To control activity noise, there will be restricted outdoor activity before 8:00am or after 5.30pm. A separate acoustic assessment would be submitted for the operational activities of the childcare centre to ensure that any potential noise impacting the amenity of nearby residence is protected. Operation noise is to comply with the AAAC limits as given in Table 9.

External noise levels within the childcare centre outdoor playareas should be designed to achieve noise levels in accordance with the AAAC Guideline. Table 18 summaries the results predicted noise level in the outdoor playarea located on level 1.

Table 18—Traffic Noise Intrusion Levels, dBA

Location	Predicted Noise Level in Outdoor Areas, L_{eq} dBA	AAAC Recommended Noise Level, L_{eq1hr} dBA	Complies (Y/N)
Outdoor Playarea (Level 1)	49-53	55	Y

3.3.3 Fitness Gym and Personal Training Centre

The proposed fitness facility is located to the level 1 of the shopping centre. Fitness gym may have 24hrs access.

- The gym would typical have equipment such as:
 - Fixed cardio equipment, eg, treadmills, spin bike, rower etc.
 - Fixed pulldown, shoulder press, chest press, leg press/curl, etc.
 - Free weights such as barbells, dumbbells, kettlebells and lifting platforms.
- There is no activity outside.
- The floor slab separating the retail/commercial space and the residential apartment above is assumed be at least 200-250mm thick solid concrete construction. To minimise the potential vibration impact from the various gym equipment we would recommend the following acoustic floor:
 - General fitness zones—20-25mm thick rubber gym floor matts.
 - High Impact cardio equipment, free weights (eg, barbells, dumbbells and kettlebells), weight machines, etc – 50-80mm rubber gym floor matts
 - Rubber floor matts such as to Benow, A1 Rubber 'Olympact, Regupol 'Sonusfit' or equivalent.

A separate acoustic assessment would be submitted for the operational activities of the fitness centre and gym based on the operating activities of the future tenant. A detail acoustic assessment will to ensure that any there is no potential noise/vibration impacting the amenity of residentials located in the apartments above.

3.3.4 Family Entertainment Centre

The proposed indoor amusement centre is located on level 1 of the shopping centre. The facility would typically operate Monday to Sunday 11am to 9pm. Friday to Saturday extension trade to 11pm.

- The facility would typically include a kids play area, escape room(s), rock climb activities.
- Table 19 are typical noise levels of an indoor playcentre with background music and children activity.
- The centre would be air-conditioned. There is no external seating, no external playareas and no music to be played outside.
- Internal wall/ceiling finishes may include soft floor (acoustic matts) and acoustic absorption panels to minimise sound reverberation in the tenancy.

All activities are internal and we would expect there to be no impact to surrounding receives.

Table 19— Indoor Children Play Centre Measured Noise Levels, L_{eq} dBA

Description	Octave Band, Hz Lin									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Indoor Play Centre -Measured Noise Level (including café and background music)	73	68	60	60	64	63	61	54	48	67

3.3.5 Carwash Facility

The carwash is located on Basement Level 1 of the shopping centre. The carwash would typically operate between 7am and 10pm and operational noise from a typical carwash operation are listed in Table 9.

Table 20 –Typical Noise Level for Vehicle and Carwash, L_{max} dBA

Noise Source	Sound Pressure Level
High pressure rinse	68 @ 9m, L_{eq} dBA
Vacuum	76 @ 1.5m, L_{eq} dBA

All car wash operations and noise activities would be confined the carpark basement levels, there is no activity outside. We would predict the noise levels would be less inaudible outside the building and no noise impact at the nearest receiver.

3.3.6 Tyre or Car Workshop

The proposed tyre/car workshop is located on Basement Level 1 of the shopping centre. The workshop would operate between 7am and 6pm and all service/repairs and use of pneumatic hand tools would be used within the building envelope of the workshop. Table 21 presents the typical noise level of had operated power tools that would be common in workshops.

Table 21 – Typical Noise Level of Power Tools

Description of Noise Source	Sound Pressure Level, L _p dBA @ 10m ⁵
Hand tools (electric)	74
Hand tools (pneumatic)	88

All car wash operations and noise activities would be confined the carpark basement levels, there is no activity outside. We would predict the noise levels would be less inaudible outside the building and no noise impact at the nearest receiver.

3.3.7 Pub & Restaurant

The proposed restaurant located on upper ground level of the shopping centre would have internal seating area. The proposed pub and restaurant operating hours would typically be Monday to Sunday 10:00AM to midnight. A separate acoustic assessment would be submitted for the operation of the pub and restaurant tenancy detailing proposed use and to ensure that any potential noise impacting the amenity of nearby residence is protected. In assessing the potential impact, the acoustic assessment is to consider the following:

- There is no live music and/or prerecorded music is played outside.
- No gaming machines.
- At all times., windows and doors are closed and mechanical ventilation is to be provided to the restaurant.
- There is no outdoor seating area.

All operational noise, including patron activity noise is to be assessed and comply with the EPA NPfI limits (Table 7) and the OLGR (Table 8).

3.3.8 Landscape Maintenance

All landscape maintenance activities would be done between 9am and 5pm and provided by a subcontractor. The subcontractor to apply best practice techniques to minimise noise impact, such as using electric or battery-operated equipment, no use of radios/stereos and turning off equipment that is not being used.

⁵ • Australian Standard 2436:2010: "Guide to noise and vibration control on construction, demolition and maintenance sites".

3.4 Mechanical Services

At the DA stage, the design and selection of mechanical equipment has not been finalised. Typically, based on similar sized residential projects we would expect the following noise control measures to be implemented:

- Carpark exhaust/supply fans located in the basement:
 - Car park supply and exhaust fans to be located on Level 1 and 2 in dedicated plantrooms with acoustic louvre and/or attenuators.
 - Exhaust and supply fans system to be CO controlled and operate with a VSD.
 - The fans operate on variable speed and are unlikely to operate at full speed during the night period of between 10pm and 7am.
 - Provide acoustic attenuators to the supply and discharge of the fans.
 - Fans to be located in acoustically sealed plantrooms.
- Stair Pressurisations, smoke exhaust and lobby relief fans:
 - Fans rooms located lower ground, ground level and roof top.
 - Install acoustic attenuators or internally lined ducts to the supply and discharge of the fans.
 - The operation of the fans is limited to the emergency and test modes.
- Shopping Centre and retail: Cooling Towers, Chillers and A/C Condenser:
 - Condenser water system with heat rejection cooling towers to be installed on the roof of Building 6. Dedicated roof plantroom with acoustic louvres.
 - Refrigeration condenser units for Supermarket to be located in plantrooms on ground floor.
 - Supply and exhaust ventilation fans associated with Supermarket and retail to discharge to Podium and roof levels.
 - Install acoustic attenuators or internally lined ducts to the supply and discharge of the fans.
- Residential buildings:
 - Air-conditioning condenser units serving residential apartments to be located in dedicated 'condenser farms' on each level, discharging through external acoustic louvres.
 - Kitchen, bathroom/laundry exhaust system for each apartment to discharge horizontally through facade louvres.

- Hotel development (Building 4):
 - Chilled water system with water-cooled chillers located in dedicated plantroom on Basement 01 with acoustic louvres for air intake/discharge.
 - Cooling towers located on roof with acoustic louvres and attenuators for the discharge.

Following the DA approval of the proposed development, during the Construction Certification stage a detail assessment of all mechanical plant and equipment will be conducted to ensure compliance with the EPA NPfl (Table 7) noise criteria.

3.5 Delivery and Waste Collection Vehicles

For all delivery vehicles and privately operated waste collection vehicles used for the retail, commercial and hotel tenancies, Part 4.3.3 of EPA Noise Guide for Local Government it is recommends the following time restrictions:

- Before 8.00 am or after 8.00 pm on any Saturday, Sunday or public holiday.
- Before 7.00 am or after 8.00 pm on any other day.

Additional management controls of the delivery and rubbish collection vehicles to minimise noise impact to the units on ground floor could include:

- Using up-to-date equipment that uses 'quieter' technology such as low-noise bin lifters.
- Maintaining rubbish trucks and braking materials to minimise or eliminate noise such as squeaky brakes.
- Educating drivers and collectors to be careful and to implement quiet work practices.
- Setting more appropriate times for the rubbish collection.

The new loading is located on the eastern side of the shopping centres with access via the new services road. All waste collection vehicles would enter into loading dock and exit in forward direction, a maximum of one (1) vehicle can enter or exit the loading dock at anyone time.

We would recommend the following to minimise the impact of noise and vibration with the development:

- An acoustic mat (with high durability) be installed on the floor of the waste collection zone to minimise vibration impact.
- Acoustic vibration springs/mounts to be installed for all equipment to minimise vibration transfer.
- It is recommended that soffit (underside of slab) of the garbage bin room and loading zone be lined with sound absorption material (min. NRC 0.5), such as Acoufelt or CSR Martini.

3.6 Integrated Waste Compactor Bins

The proposed compactors are located inside loading dock on ground level as shown in Figure 3. Compactors would be similar to Elephants Foot and based on the information provided, the noise output of the auger compactor is approximately 70 dBA (@1m, dry operational), with peak levels reaching up to 100 dBA. Refer to Appendix D for equipment type.

For the installation and use if the integrated waste compactor bins:

- The waste compactors are only to be operated between 9am and 5pm.
- Acoustic treatment, such as sound dampening and vibration isolation is to be provided and installed as per manufacturers requirements.



Figure 3 – Location of Compactor in Loading Dock

The operational noise level of the compactors (outside the loading dock) is predicted to be in the range 30-35dBA. Provided the equipment is operated in the recommended times there would not be any sleep disturbance impact.

3.7 Assessment of Traffic Noise Generation

This section details a review of the expected increase in traffic noise generation from this subdivision development. Based on the 'Traffic and Parking Assessment' prepared by Varga Traffic Planning (Ref: 26067, 13 May 2026), indicates the following existing traffic conditions surround the development:

- *northbound traffic flows in Rickard Road past the site frontage are typically in the order of 466 vph during the AM peak period, decreasing to 345 vph during the PM peak period*
- *southbound traffic flows in Rickard Road past the site frontage are typically in the order of 524 vph during the AM peak period, decreasing to 433 vph during the PM peak period*
- *eastbound traffic flows in Byron Road are typically in the order of 77 vph in the AM peak period, decreasing to 67 vph during the PM peak period*
- *westbound traffic flows in Byron Road are typically in the order of 122 vph during the AM peak period, decreasing to 9 vph during the PM peak period*

During the AM and PM peak periods upon completion of the residential, retail and hotel development:

- AM Peak = 900 vehicle trips per hour.
- PM Peak = 1449 vehicle trips per hour.

Based on the current traffic flows along Rickard Road, the following Table 22 summaries the predicted change in traffic noise levels.

Table 22 – Predicted Change Traffic Noise Levels during Peak Periods

Road	Period	Existing Peak Traffic Flow	Total Increase Peak Traffic Flow	Change in Traffic Noise, dBA	Predicted Future Traffic Noise Level, dBA
Rickard Road	AM Peak	990	1890	+2.8	L _{Aeq} , (15 hour) 61.8
	PM Peak	778	2227	+4.6	L _{Aeq} , (9 hour) 56.6

We would expect that the change in traffic noise levels on the surrounding roads during the AM/PM peak times would only marginally exceed the EPA criteria (Table 10) by a 2dB increase.

It is also noted that in the traffic report, it states that in practice the traffic generation potential of the site is likely to be substantially less due to other factor such as, being close to public transport, hotel users would most likely taxis, Uber or public transport (bus/rail), etc. Refer to Varga Traffic Planning for details.

3.8 Management of Construction Noise and Vibration

3.8.1 General Guideline for Construction Noise

Details of the construction schedule (timeframe), methodology and construction equipment to be used have not been finalised. The following are the typical operational activities for the demolition, excavation and buildings stages.

In order to manage the noise from the construction activities the following work practices and procedures are to be considered:

- Adherence to the recommended preferred hours for construction and deliveries. Truck drivers are to be informed of site access routes, acceptable delivery hours and minimising extended periods of engine idling.
- When selecting equipment ensure where feasible and reasonable it has the most effective mufflers, enclosures and low-noise tool bits and blades. Always seek the manufacturer's advice before making modifications to plant to reduce noise.
- Table 23 is an excerpt from Appendix E 'Noise Sources, remedies and their effectiveness' Australian Standard 2436:2010, presenting possible noise reductions from various control mechanisms.

In order to manage the noise from the construction activities, Table 23 is an excerpt from Appendix E 'Noise Sources, remedies and their effectiveness' Australian Standard 2436:2010, presenting possible noise reductions from various control mechanisms.

Table 23 – Relative Effectiveness of Various forms of Noise Control

Control by	Noise Reduction Possible in Practice, dB(A)
Distance	Approximately 6 for each doubling of distance
Screening	Normally 5 to 10, maximum 15
Enclosure	Normally 15 to 25, maximum 50
Silencing	Normally 5 to 10, maximum 20

Applying the above mentioned noise reduction techniques from acoustic mitigation measures, distance and time corrections, the following Table 24 indicate the predicted construction noise levels at receives that are greater than 20m from the site would comply with “Highly noise affected” EPA management levels. Predicted construction noise levels at receives that are greater than 40, most construction activity from the site would comply with the EPA management levels.

Table 24 – Phase 1, 2 & 3 – Typical Noise Level of Construction Equipment (with mitigation)

Description of Noise Source	# of Sources	Sound Pressure Level, L _p dBA				
		10m	20m	40m	80m	160m
Location R1						
Excavator	1	61	55	49	43	37
Jack hammer	1	67	61	55	49	43
Backhoe with auger	1	60	54	48	42	36
Piling (bored)	1	60	54	48	42	36
Loader (wheeled)	1	69	63	57	51	45
Concrete agitator truck	1	68	62	56	50	44
Concrete pump truck	1	77	71	65	59	53
Crane (tower)	1	74	68	62	56	50
Forklift	1	59	53	47	41	35
Cherry picker	1	60	54	48	42	36
Hand tools (electric)	1	46	40	34	28	22
Welder	1	49	43	37	31	25
Materials hoist (electric)	1	63	57	51	45	39
Location R2						
Excavator	1	61	55	49	43	37
Jack hammer	1	67	61	55	49	43
Backhoe with auger	1	60	54	48	42	36
Piling (bored)	1	60	54	48	42	36
Loader (wheeled)	1	69	63	57	51	45
Concrete agitator truck	1	68	62	56	50	44
Concrete pump truck	1	77	71	65	59	53
Crane (tower)	1	74	68	62	56	50

Description of Noise Source	# of Sources	Sound Pressure Level, L _p dBA				
		10m	20m	40m	80m	160m
Forklift	1	59	53	47	41	35
Cherry picker	1	60	54	48	42	36
Hand tools (electric)	1	46	40	34	28	22
Welder	1	49	43	37	31	25
Materials hoist (electric)	1	63	57	51	45	39

Notes:

- Internal noise criteria assessed at the centre of the occupied room.
- Difference between internal and external noise levels is 10 dB for buildings other than residences with the window opened.
- No-openable/fixed windows would achieve a greater performance.

3.8.2 Management of Construction Vibration

Vibration levels due to construction activities are very difficult to predict due to variations in ground and structural conditions. In general, construction activity conducted within 10m of an existing structure may have the potential to generate vibration.

In all cases, where the vibration levels are found to exceed the relevant criteria, alternative construction methods should be considered to reduce the impact which may include:

- During the construction, consider conducting vibration monitoring next to the sensitive buildings to determine when exceedances that may take place.
- Any building located within 40m of the site should be subject to inspection prior to commencement of construction activities in order to identify and rule out any existing damage.
- When exceedances occur/are likely to occur:
 - Alter the excavation method - For example use circular concrete/rock saws instead of heavy rockhammering. This may result in longer durations for that activity and may compromise the end results as the alternative method may not be so effective.
 - Use smaller equipment - This will reduce the level of impact, but will need longer duration. The number of smaller equipment can be increased to compensate for the longer duration.
 - Organise construction activity that has the potential to create vibration, such as cutting and rockbreaking not to occur in the same time period when possible.
 - Allowance for respites - When human comfort levels are exceeded, breaking up the longer exposure periods to allow for rest will reduce the degree of impact.

3.8.3 Community Consultation

The proponent is to develop within The Construction Management Plan details and strategies to handle disputes and resolution. This may include:

- Strategies to inform the community of the various ways they could contact the project staff if they have queries, concerns or complaints. This may include a 24 hour complaints phone line, project email and website addresses.
- Procedures to notifying residents and occupants of other sensitive land uses of forthcoming works likely to affect their noise amenity (such as letterbox drops).
- In accordance the Condition 99, the Project Manager to maintain a register of complaints and any corrective actions taken. The register must record, but not necessarily be limited to:
 - (a) The date and time of the complaint;
 - (b) The means by which the complaint was made;
 - (c) (c) Any personal details of the complainants that were provided, or if no details were provided, a note to that affect;
 - (d) Nature of the complaints;
 - (e) Any action(s) taken by the applicant in relation to the complaint, including any follow up contact with the complainant; and
 - (f) If no action was taken by the applicant in relation to the complaint, the reason(s) why no action was taken.
- When complaints are received, implement a long/short term noise monitoring strategy and analysis of the results to improve the management plan, so that best practice noise control measures are continually met for the duration of the project.

4 Conclusion

An acoustic assessment of the proposed mixed-use development including a shopping centre, hotel and residential development at 173-183 Rickard Road, Leppington has been carried out in accordance with Secretary's Environmental Assessment Requirements (SEARs), Camden Council Noise Policy, EPA noise guidelines and Australian Standards.

An environmental noise survey of the site has been conducted to determine the noise criteria for mechanical plant/equipment noise emission. The determined noise limits are presented in Table 7 in Section 2.3. The L&GNSW noise limits are presented in Table 8 (before midnight) for the proposed hotel restaurant.

The recommendations given in this report, in coordination with the Architectural Design Report and drawings prepared by DKO are as follows:

- External walls and the roof/ceiling systems is given in Table 16 (façade and roof) in Section 3.1 to achieve the internal noise criteria based on the impact of road traffic noise from Rickard Road to ensure compliance with SEPP (T&I).
- External façade glazing is given in Table 17 (acoustic glazing) in Section 3.2 to achieve the internal noise criteria based on the impact of road traffic noise from Rickard Road to ensure compliance with Australian Standards and the SEPP (T&I).
- Noise control measures for external mechanical equipment for similar sized commercial, retail and residential projects are given in Section 3.4. Provided the acoustic attenuation and noise control measures are appropriately implemented there would be no impact to surrounding noise sensitive receivers.
- For the commercial and retail operational activities are outlined in Section 3.3. A separate DA acoustic assessment would be submitted for each tenancy prior to occupation of the retail tenancy, such as a swim school, childcare centre, gym, indoor recreation facility, car wash, etc, detailing proposed use and to ensure that any potential noise impacting the amenity of nearby residence is protected. All activities are conducted within the shopping centre facility (no external activities) and any operation noise from external mechanical equipment is to be designed to comply with the EPA NPfl (Table 7) noise criteria.
- Noise management level for construction activity noise has been determined based on the on the EPA ICNG. The management levels are presented in Table 13 of Section 2.9. The criteria for construction vibration has been established in Section 2.10 based on the EPA guidelines.
- Construction noise predictions of typical activities are presented in Section 3.8 and the predictions in Table 13 indicate receivers that are greater than 20m from the site would comply with "Highly noise affected" EPA management levels and receives that are greater than 40, most construction activity from the site would comply with the EPA management levels.

- Vibration levels due to construction activities are very difficult to predict due to variations in ground and structural conditions. Any building located within 40m of the site should be subject to inspection prior to commencement of construction activities in order to identify and rule out any existing damage.

Providing the recommendations in this report are implemented, activity noise from the proposed shopping centre and hotel will comply with SEARs, Camden Council Noise Policy, SEPP (T&I), EPA noise guidelines and Australian Standards.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L_p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

Percentile Level - L_{90} , L_{10} , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L_{90} is the level which is exceeded for 90% of a measurement period. L_{90} is commonly referred to as the "background" sound level.

Background Noise (L_{90}): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L_{A90} measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

$L_{AEQ,T}$: Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Appendix B – Architectural Drawings

This assessment was based on the following architectural drawings provided by DKO.

Drawing	Issue	Date	Description
DA000	P3	22/05/2026	Cover Page
DA100	P3	22/05/2026	Site & Location Plan
DA101	P2	22/05/2026	Site Analysis Plan
DA103	P1	22/05/2026	Site Plan
DA200	P3	22/05/2026	Basement 07
DA201	P3	22/05/2026	Basement 06
DA202	P3	22/05/2026	Basement 05
DA203	P3	22/05/2026	Basement 04
DA204	P3	22/05/2026	Basement 03
DA205	P3	22/05/2026	Basement 02
DA206	P3	22/05/2026	Basement 01
DA207	P3	22/05/2026	Lower Ground
DA208	P3	22/05/2026	Ground Floor
DA209	P3	22/05/2026	Upper Ground
DA210	P3	22/05/2026	Level 1
DA211	P3	22/05/2026	Level 2
DA212	P3	22/05/2026	Level 3
DA213	P3	22/05/2026	Level 4
DA214	P3	22/05/2026	Level 5
DA215	P3	22/05/2026	Level 6
DA216	P3	22/05/2026	Level 7
DA217	P3	22/05/2026	Level 8
DA218	P3	22/05/2026	Level 9
DA219	P3	22/05/2026	Level 10
DA220	P3	22/05/2026	Level 11
DA221	P3	22/05/2026	Level 12
DA222	P3	22/05/2026	Level 13
DA223	P3	22/05/2026	Level 14
DA224	P3	22/05/2026	Level 15

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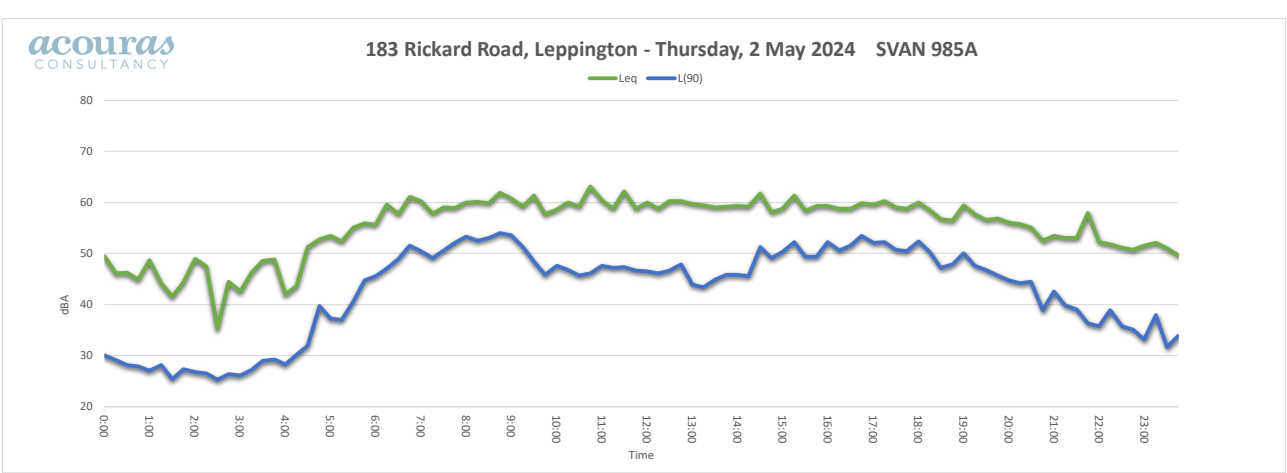
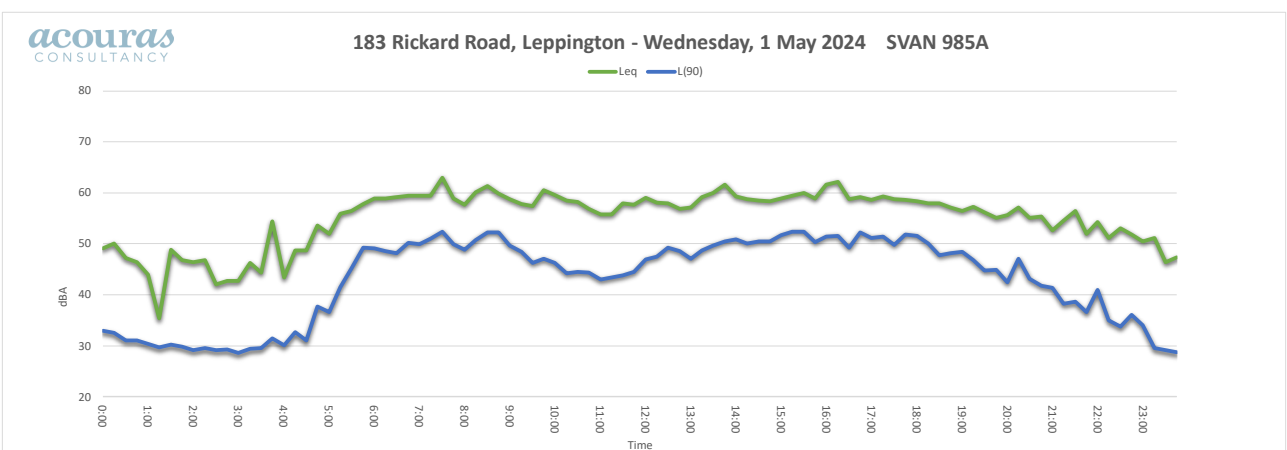
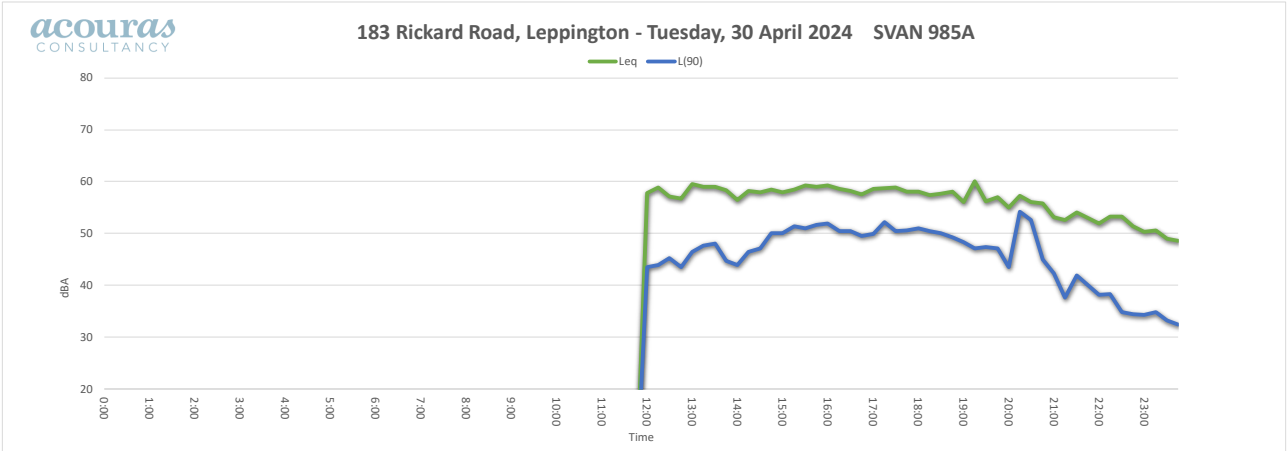
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Drawing	Issue	Date	Description
DA225	P3	22/05/2026	Level 16
DA226	P3	22/05/2026	Level 17
DA227	P3	22/05/2026	Level 18
DA228	P3	22/05/2026	Level 19
DA229	P3	22/05/2026	Level 20
DA230	P3	22/05/2026	Level 21
DA231	P3	22/05/2026	Level 22
DA232	P3	22/05/2026	Level 23
DA233	P3	22/05/2026	Level 24
DA234	P3	22/05/2026	Level 25
DA235	P3	22/05/2026	Level 26
DA236	P3	22/05/2026	Level 27
DA237	P3	22/05/2026	Level 28
DA238	P3	22/05/2026	Level 29
DA239	P3	22/05/2026	Level 30
DA240	P3	22/05/2026	Level 31
DA241	P3	22/05/2026	Level 32
DA242	P3	22/05/2026	Level 33
DA243	P3	22/05/2026	Level 34
DA244	P3	22/05/2026	Level 35
DA245	P3	22/05/2026	Level 36
DA246	P3	22/05/2026	Roof
DA300	P3	22/05/2026	Overall North Elevations
DA301	P3	22/05/2026	Overall South Elevations
DA302	P3	22/05/2026	Overall West Elevations
DA303	P3	22/05/2026	Overall East Elevations

Appendix C – Noise Logger Results

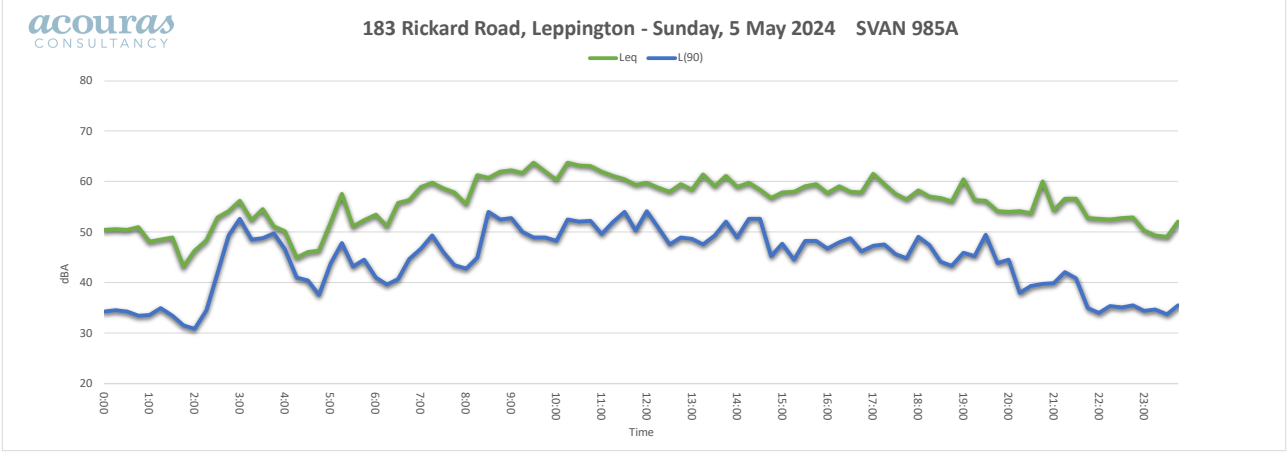
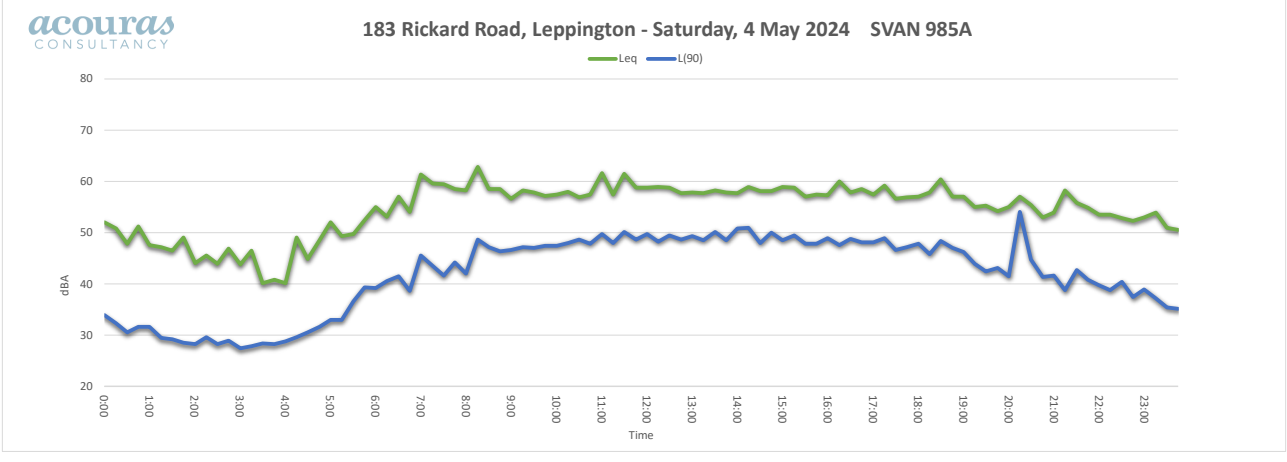
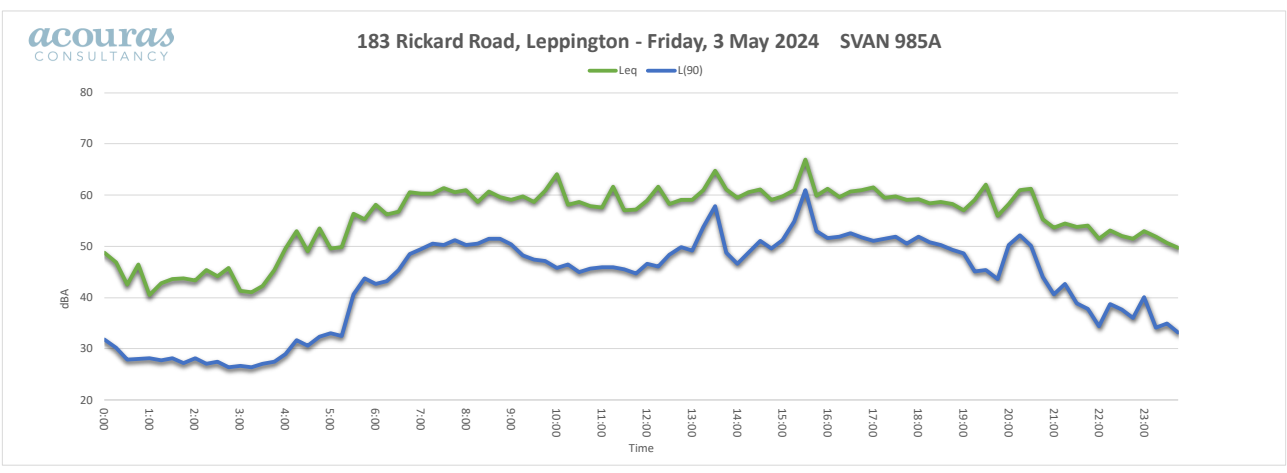


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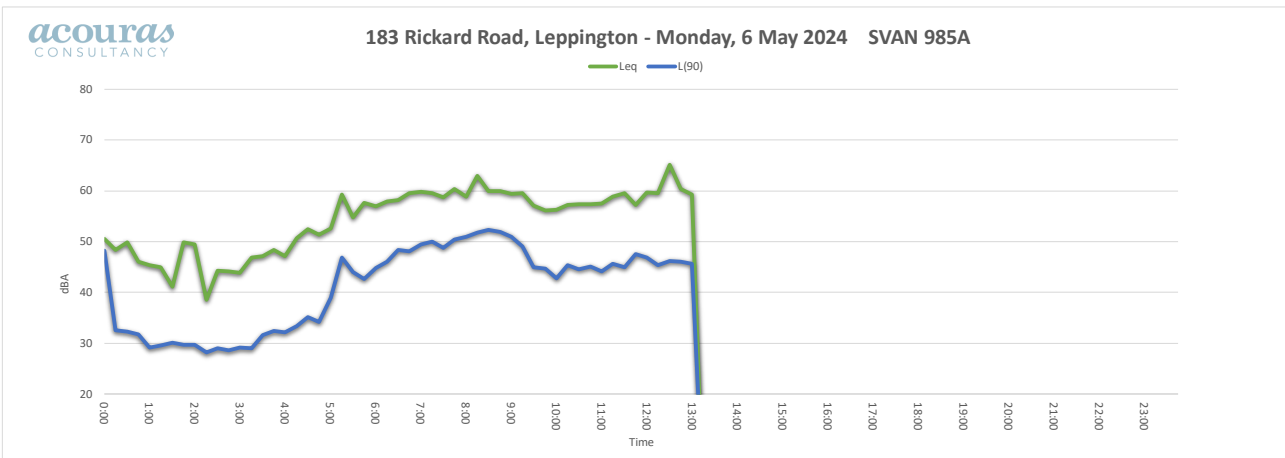


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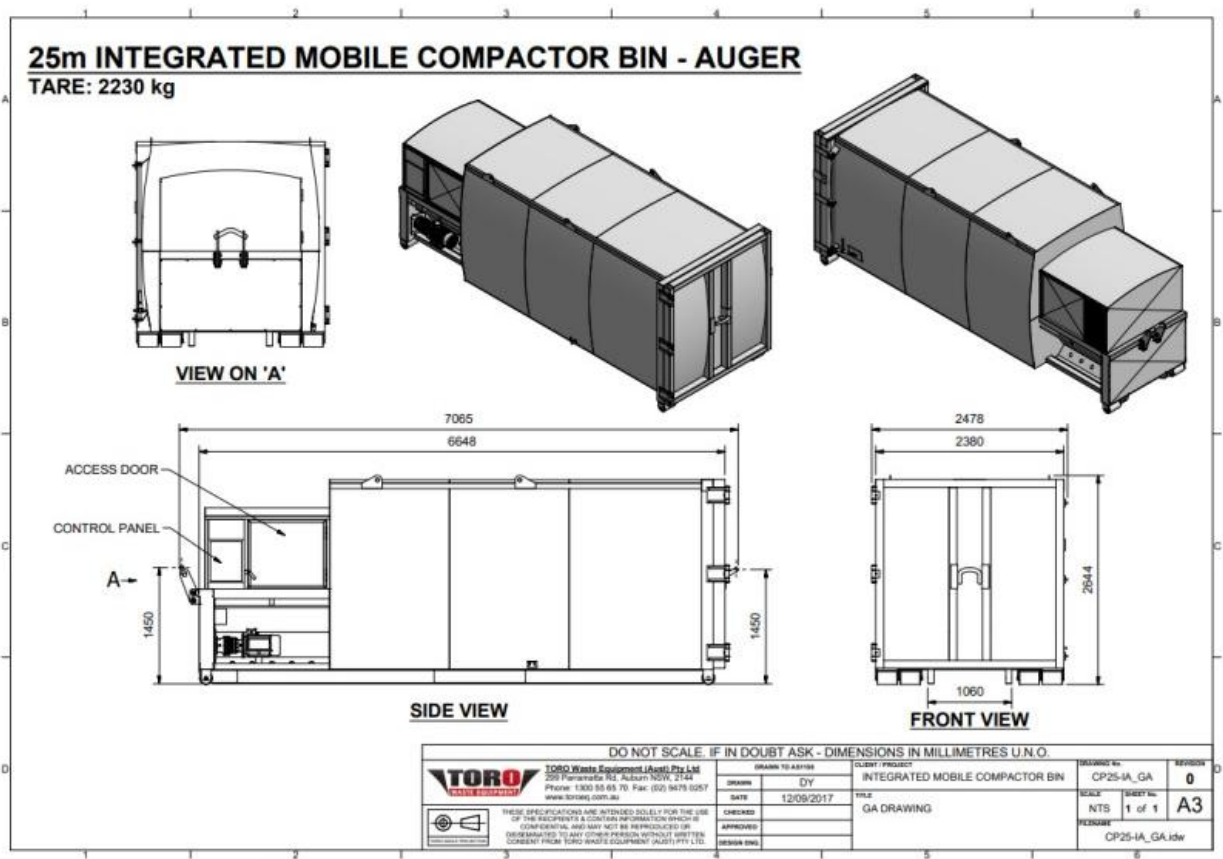
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Appendix D – List of Equipment



<https://www.elephantsfoot.com.au/bin-lifters/eco-weighing-bin-lifter/>