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Our Reference: 213534
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Amended Report

ACOUSTIC ASSESSMENT REPORT/ DA STAGE

Road Traffic Noise Intrusion

Proposed Boarding House Development

225 Bungarribee Road BLACKTOWN NSW

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Checked by:
Barry Barakat / General Manager

For Client: Gus Fares Architects

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1. INTRODUCTION

This report has been reviewed and amended based on the new architectural plans provided by *Gus Fares Architects P/L dated August 2021 issue D*.

An acoustic report has been carried out for the proposed Boarding Rooms located at 225 Bungarribee Rd. Blacktown to assess the potential for noise impact associated with the operation of the development and assess potential noise impacts on the nearby residential properties. The report shall support documents submission for Development Application Approval from Blacktown City Council.

The objective of this work is to establish a background noise level of the area; and outline noise mitigation measures & recommendations if the results indicate a noise level exceedance against relevant environmental guidelines and statutory legislation as follows:

- SEPP Infrastructure 2007 for Interior L_{Aeq} Noise Levels Criteria
- EPA/ Road Traffic Noise criteria for ambient noise levels
- Australian Standard AS 2107 – 2000 for building interiors – sound level design.
- AS 3671 – 1989 Acoustics – Road traffic noise intrusion – Building siting and construction.
- Protection of the Environment Operations Act 1997
- NSW/ EPA Industrial Noise Policy 2000.
- Building Code of Australia – BCA 2019.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT AND EXPECTED NOISE SOURCES

The subject land has a rectangular shape known as Lot 8 in DP 26584 no. 225 Bungarribee Road and bounded by residential properties (single houses to a double storey houses) to the north and east; western boundary bounded by a single house no. 227 Bungarribee Road proposed for demolition and construction of a new boarding rooms building; and Bungarribee Road bounded the subject land to the south.

The proposed development is a two (2) storey building consisting of (12) Boarding rooms over one level basement car parking located within medium density residential zone. Vehicular access to the site will be through a new combined driveway entry/exit off Bungarribee Road.

During site inspection and noise levels monitoring in February 2021, we have noticed the following:

- Bungarribee Road is a local road comprise the remaining Council control roads which provide for local circulation and access; and carries low-medium traffic volumes with vehicle's speed does not exceed 60 km/h.
- No parking permitted on both sides of the road.
- Existing properties in close vicinity to the site are mainly residential premises single houses to multi-unit buildings.
- Traffic noise generated from Bungarribee Rd. considered as the main noise source contributing to the existing ambient background noise level.
- The following Photo-1 shows site development and locality:

Photo – 1 – aerial photo showing the site and locality

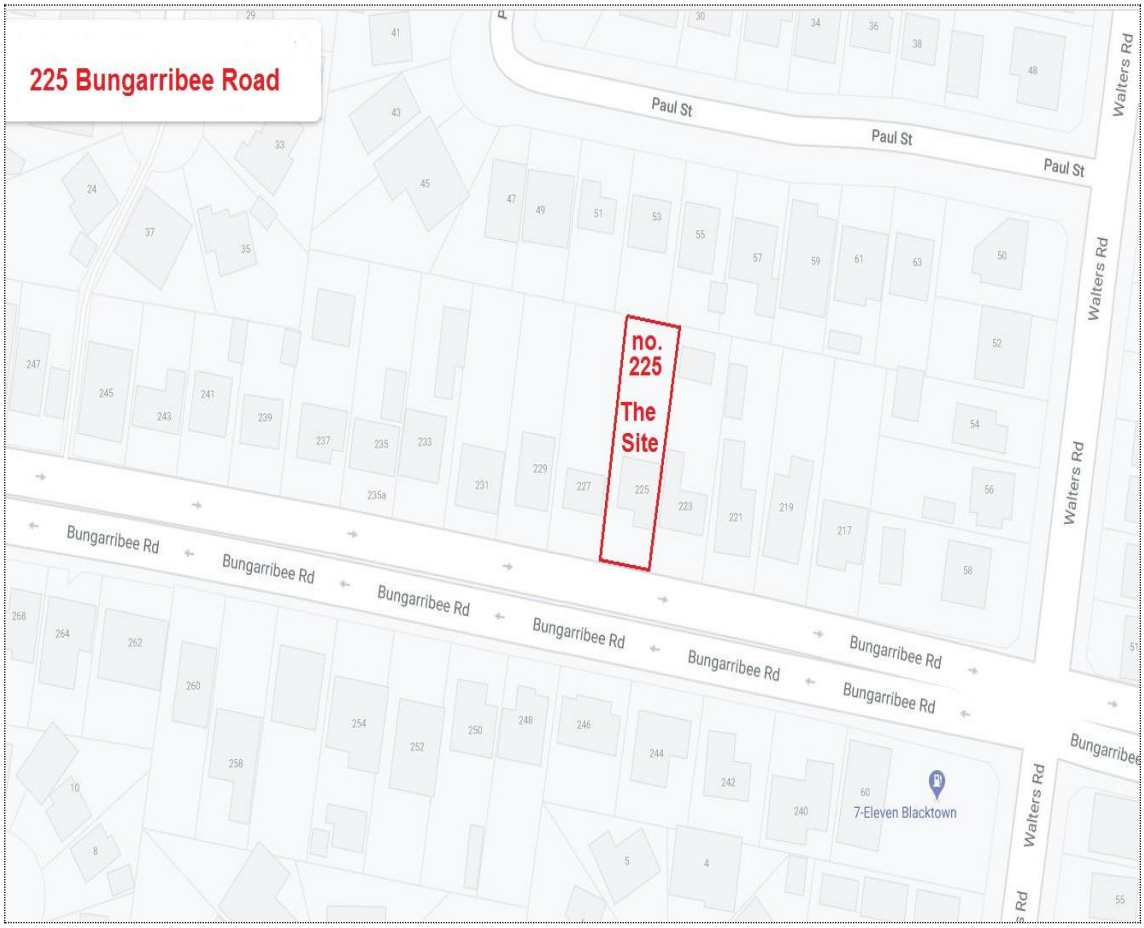

Figure – 1 – Site location and context of the surrounding area

3. OBJECTIVES AND LOCAL AUTHORITY REQUIREMENT

Blacktown City Council requires an acoustic assessment report to support documents submission to Council for Development Application Approval.

Such report shall demonstrate compliance with AS 3671 – 1989 – Building Siting and Construction and the EPA's Environmental Guidelines for Road Traffic Noise.

Table – 1 Road Traffic Noise Criteria for ambient noise levels

Type of development	**Criteria**	
	Day (7am – 10pm) dBA	Night (10pm – 7am) dBA
New residential developments affected by local traffic noise	$L_{Aeq.\ (1hr.)}$ 55	$L_{Aeq.(1hr)}$ 50

The building shall be designed and constructed taking into full account the requirements for effective sound insulation against external noise in accordance with the Australian Standard AS 2107 – 2000. This standard recommended satisfactory levels for different areas of occupancy in the residential development. These are given in the following Table – 2.

Table – 2 Interior noise design criteria

Type of occupancy	Recommended Design Sound Level (LAeq.) dBA	
	Satisfactory	Maximum
Residential Building House near Major Roads		
Living areas	35	45
Sleeping areas	30	40
Common Areas	45	55
Basement car parking	55	60

Where the EPA external noise criteria would not practically or reasonably be met, the RTA recommends that Council to apply the following internal noise objectives for all habitable rooms under ventilated conditions complying with the requirements of the Building Code of Australia:

- All habitable rooms other than sleeping rooms: 45 dBA $L_{Aeq.(15\ hr.)}$ and 40 dBA $L_{Aeq.(9\ hr)}$; and
- Sleeping rooms: 35 dBA $L_{Aeq.(9hr)}$

3.1 SEPP (Infrastructure) 2007 Criteria

It is required the assessment to be carried out based on SEPP Infrastructure 2007 – Clause 102 (Road), as stated that the following $L_{Aeq.}$ Levels are not exceeded:

- In any bedroom in the building; 35 dBA at any time between 10pm-7am
- Anywhere else in the building (other than garage, kitchen, bathroom, or hallway); 40 dBA at any time.

4. NOISE MEASUREMENTS

Noise measurements have been performed to comply with the Australian Standard AS 1055 – 1997 “Description and measurement of environmental noise – General Procedures”.

4.1 Instrumentation

The instrumentation used during the noise survey consists of Sound Level metre/ *Acoustic Research Labs Pty Ltd.* serial no. 01173760 and Model NL-42EX.

This meter conforms to Australian Standard AS 1259 – 1982 “Acoustic – Sound Level Meters” or AS 1259.2 (IEC 60804) as a Type (1) precision Sound Level Meter and has an accuracy suitable for general field application.

The calibration of the meter was checked before and after measurements period with acoustic calibrator by *Acoustic Research Labs Pty Ltd*.

4.2 Measurement Procedure

An unattended ambient noise monitoring has been performed on Wednesday 17th to 24th February 2021. The machine was positioned on the veranda roof of the existing house no.225 approximately 6m from the front boundary. This position represents the most affected façade building to the traffic noise source.

Sample measurements were taken every 60minutes continuously; all measurements were taken on A- weighted fast response mode.

4.3 Measurement Parameters

Ambient noise constantly varies in levels; this is due to the changes in noise sources. Accordingly, it is not possible to accurately determine prevailing ambient noise conditions by measuring a single instantaneous noise level.

To accurately determine the effects of ambient noise a 15 or 60 minutes measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

These parameters are used to measure how much annoyance would be caused by a noise source. These main descriptors are:

- L_{A90}, represents noise level exceeded for 90% of a certain time period, and is used as background noise.
- L_{A10}, represents noise level exceeded for 10% of a certain time period, and is used as the source noise.
- L_{Aeq}. represents the average of noise energy and the noisiest hour during day and night time.
- L_{A1}, represents noise level exceeded for 1% of a certain time period, and is used as sleep disturbance.

4.4 Noise Results

An unattended noise monitoring and surveying has been performed on the site for one week from 17th to 24th February 2021 to establish a background noise level rating for the site development.

4.4.1 Traffic Ambient Noise Levels

An actual trace of road traffic noise over 24 hours shows the typical clear drop in the background noise level L_{A90} during the early hours of morning. In some cases, the $L_{Aeq.}$ values are higher than the L_{A10}, this indicates that the road traffic flow is not constant depend on the type and speed of vehicles passed the road.

This section presents the statistical ambient noise levels recorded during an unattended noise monitoring taken place on the site development. Logarithmic average of $L_{Aeq.}$ has been calculated and the following table-3 is showing day and night time results.

Table-3 (7) Days Traffic Ambient Noise Results in dBA

Period	$L_{Aeq.}$	L_{Amax}	L_{A10}	L_{A90}	L_{A1}
Day (7:00am – 10:00pm)	**60**	81	63	**49**	68
Night (10:00pm-7:00am)	**56**	76	57	**44**	65

The outcomes of these results will be assessed against SEPP (Infrastructure) 2007 Clause (102), and NSW Environmental Criteria for Road Traffic Noise ECRTN as mentioned in table-1 of this report.

4.4.2 Industrial Noise Level

Environmental noise is generally assessed by comparing the new potential intrusive noise against a criterion based on the pre-existing background noise level therefore, the background noise levels for the area have been measured before any construction work has been commenced as shown in the following Table-4:

Table – 4 Daily Average Industrial Noise Level Results

Period	$L_{Aeq.}$	L_{A90}
Day (7:00am – 6:00pm)	60 dBA	47 dBA
Evening (6:00pm –10:00pm)	57 dBA	46 dBA
Night (10:00pm – 7:00am)	56 dBA	43 dBA

In accordance with Industrial Noise Policy, the project fits with the residential premises type of receivers in suburban amenity area, and the acceptable noise levels are as follows:
55dBA – Day; 45dBA – Evening; 40dBA – Night;
Therefore, intrusiveness and project amenity noise levels applied to this project are as follows:

Table – 5 Project-Specific Noise Criteria

Period	*Intrusiveness noise level*	*Project amenity noise level*
Day	52 dBA LAeq. (47 + 5)	50 LAeq. (60 - 10) **dBA**
Evening	51 dBA LAeq. (46 + 5)	47 LAeq. (57 - 10) **dBA**
Night	48 dBA LAeq. (43 + 5)	46 LAeq. (56 - 10) **dBA**

The existing noise levels are mostly from traffic source and are unlikely to decrease in the future.

The project-specific noise criteria are the lower level that is the most stringent value of the intrusiveness and amenity noise levels. Accordingly, the project-specific noise criteria applied to this project are as follows:

- Daytime – $L_{Aeq.15min.}$ 50 dBA
- Evening – $L_{Aeq.15min.}$ 47 dBA
- Night-time – $L_{Aeq.15min.}$ 46 dBA

5.0 POTENTIAL MITIGATION MEASURES

The Environmental Criteria for Road Traffic Noise – NSW 1999; NSW Road Noise Policy set out ameliorative measures when the measured and/or calculated noise levels exceed the noise level criteria for any receiver. In order to mitigate against intrusive traffic noise at the proposed residential allotments, it's possible to use several ameliorative measures as follows:

5.1 Building Design

Appropriate building design to minimise or eliminate the noise emission to noise sensitive areas within the building is effective in reducing internal noise levels. The building orientation such that noise sensitive areas i.e. bedrooms are shielded from the dominate noise source will also assist to keep internal noise levels below acceptable standards.

A review of the proposed building layout, design such as setback at the front has been undertaken, the proposed building has a suitable 6m bedrooms setback from the main traffic noise source at the front, and on the ground level the bedrooms are shielded by storage room.

5.2 Building Construction Components and Acoustical Treatment

This may include the provision of noise control treatments to the building fabric, particularly glazing where is required as it is a weak element, and the provision of the mechanical ventilation such that windows can be closed to limit internal noise levels.

The typical outdoor to indoor noise reduction provided by most standard dwellings (i.e. without special acoustical treatment) is generally accepted as being 10 dBA with windows open (allowing for natural ventilation); and 25 dBA with windows closed.

Experience with residential construction, demonstrates that typical sound transmission loss characteristics for standard type construction will achieve the following:

- Rendered masonry walls with laminated or double glazed windows 40 dBA
- Masonry or lightweight insulated external walls with 6mm glazing 30 dBA
- Standard un-insulated domestic grade framing with 4mm glass 18 dBA

Proposed Hebel panel with 50mm cavity external walls construction for the proposed project will achieve Rw not less than 55.

6. NOISE EMISSIONS FROM THE OPERATION OF THE PROPODED BUILDING

6.1 The Use of (Mechanical Ventilation, Plant & Equipment)

Details of the mechanical ventilation/ air conditioning plant & equipment are unknown at this stage. It is anticipated that the building will be served by typical split unit or ducted system with the outdoor units (condensers) located either on basement car parking in the storage room or at the rear mounted on the floor according to the builder/developer desire.

Based on our experience of domestic A/C noise level assessment for the new residential apartment in the buildings, sound power levels typically generated by this low noise domestic system are in the range of 62 dBA, 66 dBA and 68 dBA.

If the condensers installed in basement car parking mounted into the wall, therefore there are not any concerns of the noise intrusiveness impacts on the closest neighbours or on the occupants within the proposed building.

If it has suggested to be installed at the rear, and the building has sets back 17.3m to the rear boundary, Accordingly, we anticipated the air conditioning condensers will not have potential noise impact on the neighbours or to the building occupants and it is unlikely to emanate a noise level exceeds project-specific noise criterion as mentioned in clause 4.4.2 Table-5 of this report.

Proper selection of the mechanical plant and equipment associated with the operation of the proposed building with the best available technology including electrical roller shutter door of a lightweight material shall be sufficient to achieve the project specific noise level.

6.2 Traffic Noise Generation

NSW EPA – Road Noise Policy has framework guidelines to protect existing quiet areas from excessive changes in amenity due to noise from a road project. Any increase in the total traffic noise level at the location due to a proposed project or traffic-generation development must be considered. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

In order to increase the traffic noise levels by greater than 2dBA, the required increase in traffic volumes is greater than 65%. Roads are functionally classified by a range of factors, including their role in facilitating traffic movement; their relationship to other road categories; and whether they support through or local traffic, access to adjacent land uses and applicable traffic management options.

The additional traffic volumes on the surrounding road network due to the new development (5) car parking spaces on the basement will not be significant, therefore it is anticipated that the noise generated will be below the 2 dBA limit recommended by the Road Noise Policy RNP.

6.3 Communal Open Space

It has been proposed a communal open area located at the rear northern boundary with area 189m^2 and approximately 17m distance from the northern boundary.
Residents gathering within the communal open space to the rear of the building would not be a typical event but may occur on infrequent occasions.

Acoustic assessment for the communal area has been undertaken using the following assumptions:

- Boarding house residents will have limited activities.
- The open space activities will not be allowed for using an amplified music or alike.
- Communal open space shall be under management controls such as that the space should not be used during nigh-time hours 10:00pm to 7:00am.
- Based on the human various voices measured @1m indicated as follows:

Voice source	Distance	L_{Aeq}. dBA	L_{Amax}. dBA
Quiet voice	1m	60	66
Normal voice	1m	63	69
Loud voice	**1m**	**65**	**70**

It is anticipated the potential noise receivers are the closest neighbours at the rear boundary houses no.53 & 55 Paul Street with 10m & 8m distance respectively to the shared 1.8m high fence will exposed to the loud human voice.

Predicted noise emissions from communal open space when in use;

Receivers	Distance m	L_{Aeq}. dBA	L_{Amax}. dBA
House no. 53 Paul Street	10m	45	50
House no. 55 Paul Street	8m	47	52
Project-specific noise criteria	Day-50 dBA Evening-47 dBA Night-46 dBA		
Compliance		**Yes** with 1dBA exceedance the night criteria assumed unnoticeable	

7.0 SLEEP DISTURBANCE

The sleep disturbance criterion is commonly used to assess the impacts on sensitive receivers. Environmental Criteria for Road Traffic Noise published by EPA/NSW in May 1999 has compared a number of sleep disturbance criteria and concluded the following:

- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

The ECRTN recommends internal levels of 35-40 dBA at night for sleeping areas, being the most sensitive area to noise impact. The guidance for other living areas is that noise levels 10 dBA below external levels are recommended on the basis of openable windows opened sufficiently to provide adequate ventilation, typically equating to a minimum of 20% of the window area being open.

The following internal noise criteria for the existing dwellings façade to Bungarribee Road are affected by traffic noise:

Internal Criteria		
Day (7am – 10pm)	Night (10pm – 7am)	
	Sleeping areas	Other living areas
60 – 10 = 50 dBA	35-40 dBA	56 – 10 = 46 dBA

We consider that the maximum noise levels from vehicle movements, mainly heavy trucks pass-by significantly create maximum noise levels exceeds 70 dBA per more than two noise events in the night time as the results indicated from noise surveying; and results also revealed that the levels of the L_{A1} are higher than L_{A90} by more than 15 dBA during day and night time referring to table-3 of this report.

8.0 ASSESSM ENT OF THE AMBIENT NOISE LEVELS

The impact of ambient noise on the neighbourhood during construction should be considered; therefore, a letter of notification to be issued to all occupants surrounding the site before commencement of any construction works.

Traffic noise can potentially cause sleep disturbance and other specific activities within residence, when the level of sleep disturbance L_1 level of any noise source exceeds the ambient L_{90} background noise level by more than 15 dBA. Hence, the construction materials for the proposed building must be chosen with acoustic performance to achieve the requirements of interior noise design mentioned in SEPP (Infrastructure) 2007. Acoustic treatment for the proposed building is recommended to avoid sleep disturbance and to keep residents' amenity.

Noise sources from all plant/ equipment associated with the operation of the proposed building shall not cause a nature of "offensive noise" as defined by the *Protection of the Environment Operations Act 1997* and shall comply with table-5 project specific noise criteria as mentioned in this report.

The proposed building provided with basement car parking, any suggestion for the mechanical ventilation design should meet the requirements in AS1668.2; and if the air conditioning system has been provided to the building with condensers to be installed in basement car parking or at the rear of the building, accordingly we anticipate the use of the proposed building is unlikely to have a nature of an offensive noise or any adverse impacts on the neighbours and comfortably comply with the project specific noise criteria as mentioned in table-5 of this report.

9.0 Sound Insulation for the Proposed Building

The proposed building is classified as Class 3 Boarding house building and Class 7a basement car parking and shall be assessed to comply with Part F5 of the Building Code of Australia 2019, regarding sound transmission and insulation rating for construction materials.

- Common walls between units must achieve a minimum of (R_W + Ctr) = 50; and wall separating dry-to-wet areas i.e. (bedroom, living/dining room-to-bathroom, laundry, kitchen) must have a discontinuous wall with minimum 20mm cavity and achieve minimum (R_W + Ctr) = 50 to minimise the impacts of airborne noise.

- Wall separating unit from stairway, public corridor, public lobby or the like, or parts of a different classification must achieve R_W = 50.

- A discontinuous construction with sound insulation and R_W not less than 50, if it separates a sole-occupancy unit from a plant room or lift shaft.

- Floors for the proposed building must have minimum 200mm concrete with carpet on underlay to achieve the requirements of F5.4; tiles concrete floor should be treated with 4mm Damtec or Regupol underlay sound insulation to avoid airborne noise impact.

- A door in the wall separates a unit from a stairway, public corridor, public lobby or the like must achieve R_W not less than 30.

- Where a wall required to have sound insulation has a floor above, the wall must continue to –
  (i) The underside of the floor above; or
  (ii) A ceiling that provides the sound insulation required for the wall.

- Where a wall required to have sound insulation has a roof above, the wall must continue –
  (i) The underside of the roof above; or
  (ii) A ceiling that provides the sound insulation required for the wall.

- For waste pipes service;
  Services must not be chased into concrete or masonry elements. The pipe must be separated from the rooms of any sole-occupancy unit by construction with an $R_W + C_{tr}$ (airborne) not less than:

  i- 40 if the adjacent room is a habitable room (other than a kitchen); or
  ii- 25 if the adjacent room is a kitchen or non-habitable room.

  The waste pipes passing through adjacent habitable (bedroom, living/dining room & family room) of the unit; must be acoustically treated by using Soundlag Acoustic Pipe Wrap with R_W 40; and
  the waste pipes passing through adjacent kitchen, laundry, and bathroom of the unit must be acoustically treated by using Soundlag Acoustic Pipe Wrap; this will reduce the noise in hydraulic and waste pipes by 25 dBA.

If the services are passing through a duct; this construction must have minimum two layers of 16mm thick fire protective grade plasterboard to achieve minimum requirements of (R_W + Ctr) not less than 40.

10.0 RECOMMENDATION

The construction materials designed including recommended glazing for the proposed development details are as the following:

10.1 Sliding windows & doors

The proposed building affected by ambient traffic noise required acoustic treatment, glazing as recommended in appendix- A will be able to minimize and enhance internal noise to the acceptable interior sound design levels as stated in SEPP Infrastructure 2007.

10.2 Roof / Ceiling System

Construction of metal sheeting roof with timber frame and sarking water prove above one layer of 13mm gyprock plasterboard ceiling and provided with Bradford acoustic insulation will achieve Rw not less than 50 dBA.

10.3 External walls

External wall of Hebel panel with 50mm gap to the wall plus furring studs and insulation fixed to 13mm plasterboard will achieve Rw not less than 55 dBA or other alternatives.

10.4 External Doors

All external doors to the rooms must be solid-core 35mm thick plywood fire rated, soft plastics gasket around sides and top, and drop seal at base.

10.5 Ventilation and air conditioning

Assessment of the noise levels and recommendation for the construction components are based on the assumption that the external sliding doors, windows and external doors are closed in order to achieve the recommended interior sound design detailed in clause 3.1 of this report.

To keep doors and windows closed if desired, then ventilation is needed for entire units by supplying of a Split unit or ducted air conditioning system; and if the proposed building has been provided with mechanical ventilation for basement car parking, details to mechanical engineer and shall comply with AS1668.2.

10.6 Sound Insulation for the Building

The proposed building has assessed as Class 3 for Boarding house building and Class 7a for basement car parking and must comply with Part F5 of the Building Code of Australia 2019, regarding to sound insulation and Sound Transmission Class rating for the construction materials. *Details as shown in section 9 above.*

11.0 CONCLUSION

Ambient noise assessment for the proposed Boarding rooms development located at 225 Bungarribee Rd. Blacktown has been carried out in accordance with the requirements of the relevant environmental guidelines mentioned in this report.

This report provides acoustic recommendations to ensure the residential occupants are adequately insulated from external ambient noise sources and to establish appropriate noise control measures to protect the amenity of the future occupants and closest neighbours.

An environmental noise survey of the site has been conducted and the noise limiting criteria for mechanical plant/equipment noise emission has been determined based on the NSW/EPA Industrial Noise Policy as represented in Table-5 of this report.

The existing ambient traffic noise L_{Aeq} was also performed for the site and revealed a basic acoustic performance shall be provided to the project to keep and ensure the amenity of the new occupants, and to achieve SEPP (Infrastructure) 2007, Clause 102 (Road).

We certify that the proposed building complies with the relevant Australian Standards and achieve DCP of Blacktown City Council for Development Application Approval, should our recommendations as stated in section 10 of this report be fully implemented.

We trust this information is satisfactory to meet your requirements. Please contact us should you have further queries on 0418 865 514.

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APPENDIX – A – GLAZING RECOMMENDATION

The recommended glazing is detailed in the following table:

Levels	Location	Glazing Thickness	Acoustic Seals	Minimum Rw or STC Rating
Ground Floor				
West elevation /Room01,02	Bedrooms Kitchen	8.38mm Lam 6.38mm Lam	Yes Yes	34 32
Communal living room	Living/dining	8.38mm Lam	Yes	34
East elevation / Room 03	Bedroom	8.38mm Lam	Yes	34
First Floor				
Façade to Road /Room04, 11	Bedroom	8.38mm Lam	Yes	34
	Kitchen	6.36mm Lam	Yes	32
East & west Elevation/ Rooms 05, 06, 07, 09 & 10	Bedroom kitchen	8.38mm Lam 6.38mm Lam	Yes Yes	34 32
North Elevation Ground and first floor Communal living room	Living/dining	6.38mm Lam	Yes	32
Manager room Bedroom 07 & 08	Bedroom Bedroom	8.38mm Lam 8.38mm Lam	Yes Yes	34 34

Note:

- *All acoustic seal to be a Q-Lon seal type with Rw 33*; and
- *Any alternatives of glazing, Far West Consulting Engineers should be advised.*

APPENDIX – B
Daily Noise Results Monitoring

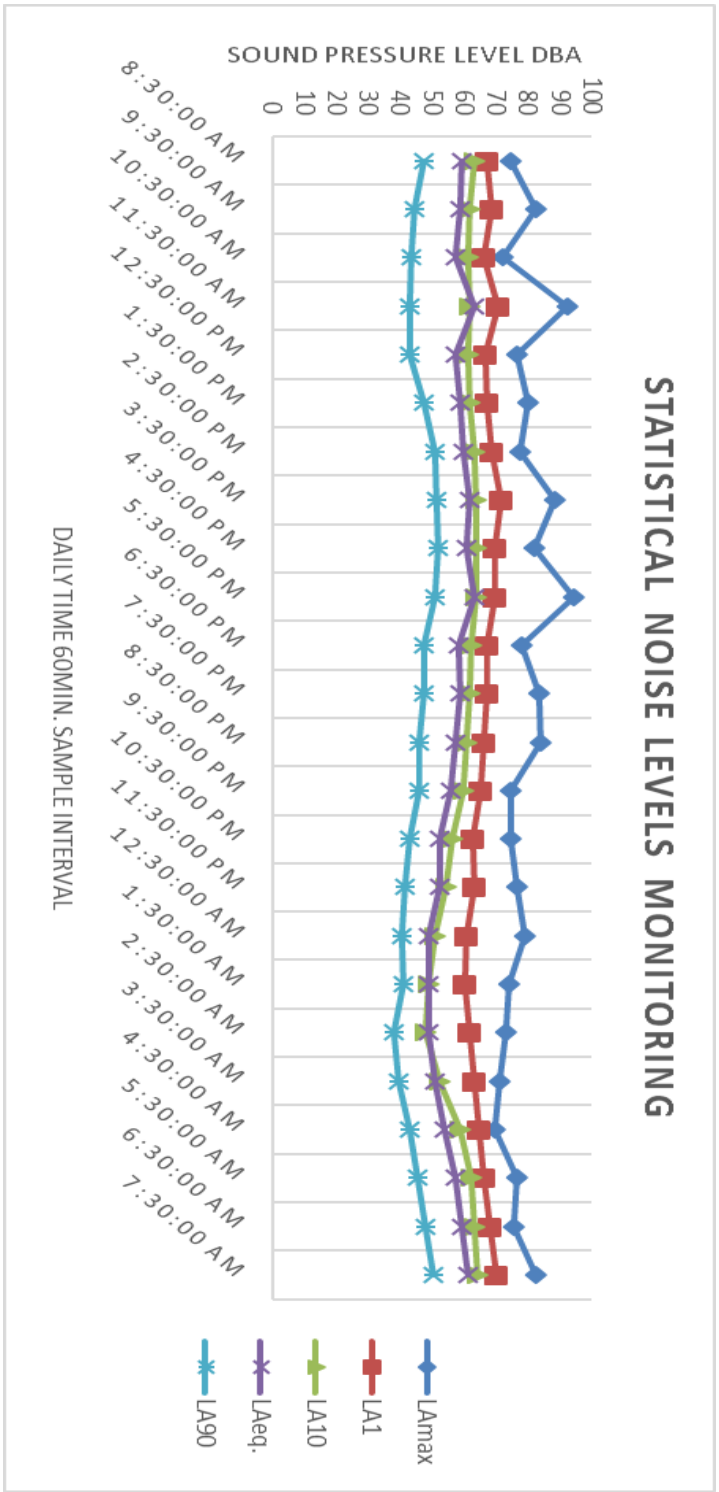

Photo-1Site Development and the location of the logger for noise monitoring

APPENDIX – C
PROJECT ARCHITECTURAL PLANS