Bankstown RSL
Proposed New Club and Hotel

Development Application Acoustic Assessment

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Project	Bankstown RSL Proposed New Club and Hotel
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1. Executive Summary

JHA have been engaged by MMDCC Constructions to prepare an acoustic assessment for the development application of a new Bankstown RSL Club and Hotel at 23-29 Marion Street, Bankstown, NSW.

This report forms part of the development application submission to the Bankstown City Council for the development application for the new Bankstown RSL Club and Hotel. This report quantifies the existing noise environment and provides the noise criteria for the proposed new club and hotel and at the boundaries of potential neighbouring properties that could be impacted by the proposed new club and hotel in accordance with the Bankstown City Council requirements.

The contents of this report has been carried out in accordance with the JHA Engineers Quality Assurance System based on the Australian Standards AS/NZS ISO 9001.

2. Project Description

2.1 DEVELOPMENT INFORMATION

The subject property is located in Bankstown, near the intersection of Marion Street and Meredith Street. The proposed new Bankstown RSL Club and Hotel is a ten storey building with a basement carpark consisting of the following:

- Club facilities (4100 sq.m approx) and loading dock on the Ground Floor
- Parking for 492 cars on Levels 1, 2 & 3 plus basement carpark
- Restaurant, hotel and plantroom on Level 4 Podium
- Hotel rooms on Levels 5, 6. 7, 8 & 9

2.2 SITE DESCRIPTION

The site is located at 23-29 Marion Street, Bankstown, NSW, located at the corner of Marion and Meredith Streets. The site is currently occupied by existing buildings accommodating various business operations including commercial offices, physiotherapists, martial arts studio and signage printing facilities.

Figure 1: Photo of existing buildings at 23 Marion Street showing residential apartments at 16 Meredith Street in the background

Figure 2: Photo of existing buildings at 29 Marion Street

Figure 3: Photo of proposed site and buildings on Meredith Street

3. Existing Acoustic Environment and Applicable Acoustic Criteria for the Development

3.1 NSW INDUSRIAL NOISE POLICY CRITERIA

The NSW Industrial Noise Policy (INP) assessment procedure for industrial noise sources consists of two components. They are

- Controlling intrusive noise impacts in the short term for residences
- Maintaining noise level amenity for particular land uses for residences and land users.

The intrusiveness of an industrial noise source is considered acceptable if the continuous (energy-average) A-weighted level of noise from the source measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5dB. The Rating Background Level (RBL) is the background level used for the assessment purposes and the $L_{A90,\ 15minute}$ measure as recommended in Table 3.1 of the INP is used in the determination.

To limit the continuing increases in noise levels and maintain noise level amenity, the INP has set recommended and maximum noise for the various land usages. The criteria applicable to this Development Application are as follows.

Type of Receiver	Indicative Noise Amenity Area	Time of Day	L_{Aeq} (dB)	
			Recommended	Maximum
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Commercial Premises	All	When in use	65	70

Table 1: Development Amenity Criteria (from INP Table 2.1)

3.2 DETERMINING THE EXISTING NOISE ENVIRONMENT

Operator attended noise measurements and automated sound logging measurements were performed on site to document the existing acoustic environment, including traffic noise.

The operator attended noise measurement survey was conducted on with an integrating Type 1 sound level meter and windshield. Measurements were taken continuously and the microphone was set to receive direct frontal sound and facing the direction of sound emission.

The survey was conducted with the following instruments:

- NTI Precision Integrating Octave Band Sound Level Meter, Type XL2 with 1/3 oct band filter unit, which conforms to applicable standards of IEC 61672-1:2002-05 CLASS1 & IEC 60651 TYPE1.

- The sound level meter was calibrated before and after the measurements using a Bruel & Kjaer Acoustic Calibrator. No calibration deviations were recorded.

The operator attended noise measurements were performed on Wednesday 9th of September 2015 between 1.00pm and 2.00pm at locations M1 and M2 shown below in Figure 4.

Figure 4: Plan view of acoustic measurements locations

Figure 5: Sound logging measurement location

Long term noise monitoring with a Rion NL-52 noise logging sound level meter were conducted between 4th September and 9th September 2015 at Location L1 shown below in Figures 4 and 5. The sound level meter was calibrated before and after the measurements using a Bruel & Kjaer Acoustic Calibrator. No calibration deviations were recorded.

The results of the operator attended acoustic measurements and the site notes are tabulated below:

Date	Time	Duration	L_{Aeq} (dB)	L_{AF10} [dB]	L_{AF90} [dB]	Location	Notes
9/09/2015	13:01	15 mins	62	65	54	23 Marion St, Location M1	Some by train & traffic noise
9/09/2015	13:31	15 mins	68	72	54	16 Meredith St, Location M2 at nearest affected residence	Some by train & traffic noise
29/9/2015	19:06	15 mins	69	73	56	16 Meredith St, Location M2 at nearest affected residence	Some by train & traffic noise

Table 2: Operator attended acoustic measurements results

The LA90 Rating Background Level derived from the long-term noise monitoring measurements carried out between Friday 4 September 2015 and Wednesday 9 September 2015 determined in accordance with the INP guidelines are listed in Table 3 below. Detailed results of the long-term noise monitoring measurements can be found in Appendix A.

Location & Survey Period	L_{Aeq} Ambient Noise Levels			L_{A90} Rating Background Level			Notes
	Day	Evening	Night	Day	Evening	Night	
Location L1 1600/04/09/15 to 1300/09/09/15	58dB(A)	56dB(A)	52dB(A)	55dB(A)	52dB(A)	48dB(A)	

Table 3: Operator attended acoustic measurements results

Based on the above measurements and assessment in accordance with the NSW INP, the criteria for the project intrusiveness and amenity noise criteria (in bold) at the nearest affected residential property on 16 Meredith St are shown below.

Time of Day Period	Intrusiveness Criterion (dB)	Amenity Criterion (dB)
Day	**60 $L_{Aeq,15min}$** (55+5)	65 $L_{Aeq,Day}$
Evening	57 $L_{Aeq,15min}$ (52+5)	**55 $L_{Aeq,Even}$**
Night	53 $L_{Aeq,15min}$ (48+5)	**50 $L_{Aeq,Night}$**

Table 4: Noise Criteria for the Project at 16 Meredith St

3.3 NOISE FROM OUTDOOR PODIUM LEVEL DINING AND ENTERTAINMENT

The proposed development incorporates a podium level dining and entertainment areas on Level 4 of the proposed building, accessible from the proposed Level 4 restaurant. Subject to the final layout of the tables and seating of the 'optional additional area', diffusive and absorptive acoustic treatment would be incorporated or integrated with the pergola awnings and/or barriers at the northern end of Level 4 to control the noise reaching the residential apartments at 16 Meredith Street. Details of the acoustic treatment will be included in the construction documentation following the design development phase.

3.4 PROPOSED RSL CLUB CARPARK AND LOADING DOCK NOISE

The proposed development will provide parking for 492 cars on Levels 1, 2 & 3 plus basement carpark and a loading dock on the Ground Floor. The entry to the carpark and access to the loading dock is from Marion Street. The carpark exit is on Meredith Street. Figure 6 below shows Ground Floor plan and Loading Dock Access, Carpark Entry and Exits.

Noise level measurements conducted on Marion and Meredith Streets and long term noise monitoring indicate that carpark and loading dock entry and exits activities are expected to be below the criteria set in the “Table 1: Development Amenity Criteria” above.

Carpark ventilation noise will be addressed in the design and development stage of the project.

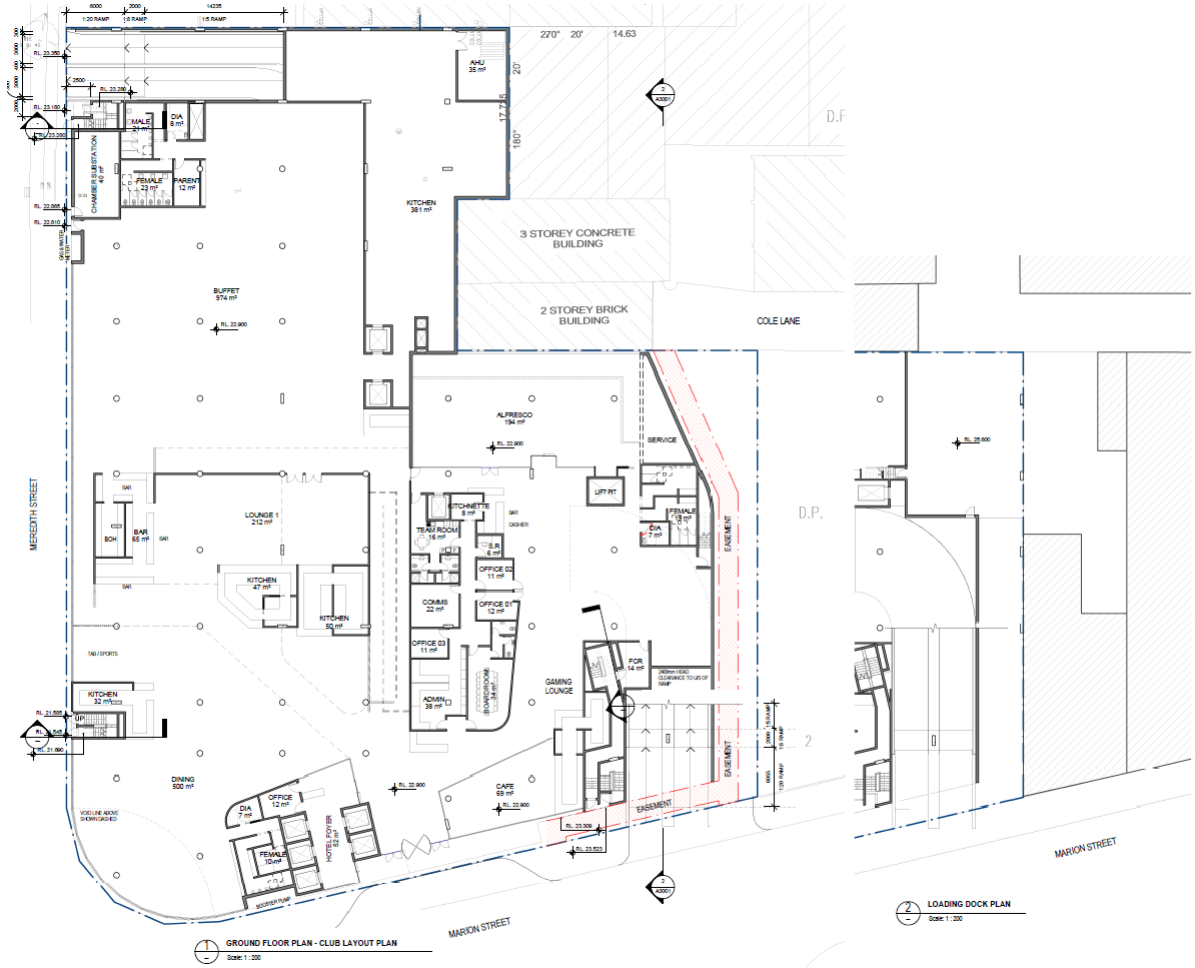


Figure 6: Ground Floor plan showing Loading Dock Access and Carpark Entry and Exits

3.5 MECHANICAL SERVICES AND PLANT ROOM NOISE

The mechanical services and plant rooms for the proposed development will be acoustically treated to achieve the project criteria above. The acoustic treatment of the mechanical services and plant rooms will finalised in the design development phase of the project.

3.6 AIRCRAFT OPERATIONS NOISE FROM BANKSTOWN AIRPORT

The Bankstown Airport Master Plan 2004/05 for Aircraft Noise provides the Aircraft Noise Exposure Forecasts (ANEF) contour map showing forecast aircraft noise levels based on the 2024/25 forecast level of aircraft movements.

The proposed development is outside the 20 ANEF zone and hence not subject to the “Australian Standards AS2021-1994, Acoustics – Aircraft noise Intrusion – Building Siting and Construction”. Figure 6 below shows the location of the proposed development site outside the ‘20 ANEF’’ zone of the Bankstown Airport 2024/25 ANEF contour map.

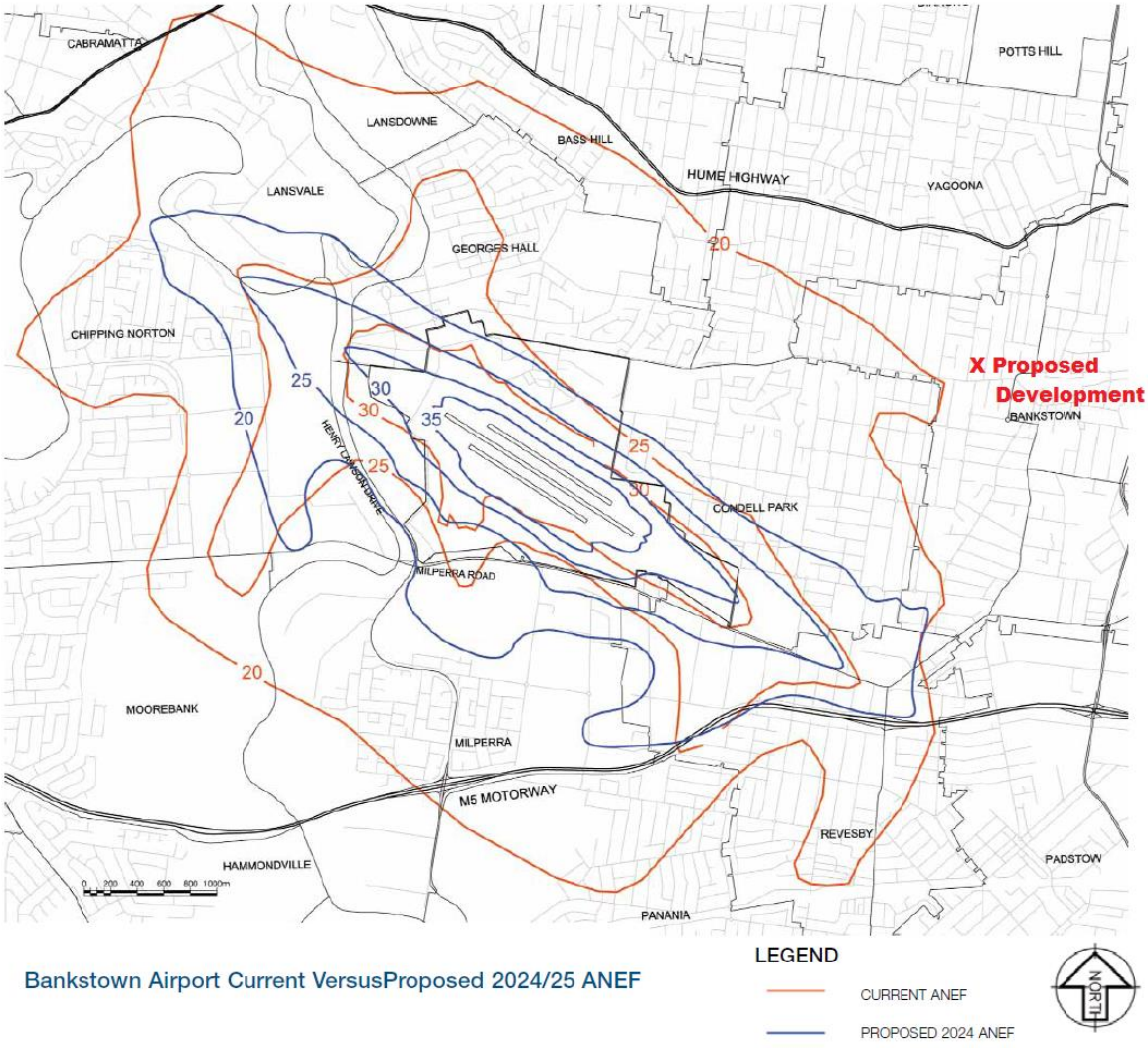


Figure 7: Location of the proposed development on the Bankstown Airport 2024/25 ANEF Contour Map

4. NCC BCA and Australian Standards Criteria and Compliance Requirements

The proposed Bankstown RSL new club and hotel is classified as Class 3, Class 6 and Class 9b under the Building Code of Australia classification of building.

4.1 NCC BCA NOISE CRITERIA FOR CLASS 3 PART OF BUILDING

For the Class 3 part of the building, the National Construction Code Series 2015 Volume 1, Building Code of Australia Class 2 to Class 9 Buildings 'Deemed-to-Satisfy Provisions' under 'Part F5 Sound Transmission and Insulation' requires that the following be met:

"F5.2 Determination of airborne sound insulation ratings
A form of construction required to have an airborne sound insulation rating must -
(a) have the required value of weighted sound reduction index (R_w) or weighted sound reduction index with spectrum adaptation term ($R_w + C_{tr}$) determined in accordance with AS/NZS 1276.1 or ISO 717.1 using results from laboratory measurements: or
(b) comply with Specification F5.2

F5.3 Determination of impact sound insulation ratings

(a) A floor in a building required to have an impact sound insulation rating must –
  (i) have the required value for weighted normalised impact sound pressure level with spectrum adaptation term ($L_{n,w} + C_l$) determined in accordance with AS/ISO 717.2 using results from laboratory measurements: or
  (ii) comply with Specification F5.2.

(b) A wall in a building required to have an impact sound insulation rating must –
  (i) for a Class 2 or 3 building be of discontinuous construction.

(c) For the purposes of this Part, discontinuous construction means a wall having a minimum 20mm cavity between 2 separate leaves, and
  (i) for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and

  (ii) for other than masonry, there is no mechanical linkage between leaves except at periphery.

F5.4 Sound insulation ratings of floors

(a) A floor in a Class 2 or Class 3 building must have an $R_w + C_{tr}$ (airborne) not less than 50 and an $L_{n,w} + C_l$ (impact) not more than 62 if it separates–
  (i) Sole occupancy units; or
  (ii) A sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.

F5.5 Sound insulation ratings of walls

(a) A wall in a Class 2 or 3 building must –
  (i) have an $R_w + C_{tr}$ (airborne) not less than 50, if it separates sole-occupancy units; and
  (ii) have an R_w (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and
  (iii) comply with F5.3(b) if it separates –
    (A) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or
    (B) a sole occupancy unit from a plant room or a lift shaft.

(b) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like provided the door assembly has an R_w of not less than 30.

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

F5.6 Sound insulation ratings of internal services
(a) If 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, the duct or 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 a non-habitable room.
(b) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like provided the door assembly has an R_w of not less than 30.

F5.7 Sound isolation of pumps
A flexible coupling must be used at the point of pump connection between the service pipes in a building and any circulating or other pump."

4.2 RECOMMENDED INTERIOR DESIGN SOUND LEVELS

Table 5 below shows the recommended Australian Standard AS/NZS 2107 Interior Sound Levels for the project.

Australian Standard AS/NZS 2107 'Acoustics – Recommended design sound levels and reverberation times for building interiors' recommend the following indoor sound levels.

Type of Occupancy	**Recommended Design Sound Level, LAeq, dB(A)**	
	Satisfactory	Maximum
Hotel Bedrooms	30	40
General Office & Reception Areas	40	45
Restaurant and Dining Areas	45	50
Corridors and Lobbies	45	50
Toilet/Change/Showers	45	55
Undercover Carparks	55	65

Table 5: Recommended Interior Sound Levels for the project

Although these levels are not mandatory, the maximum recommended sound levels have been adopted for this project as good engineering practice.
The following recommendations for wall and roof construction and treatment are based on the maximum recommended sound levels shown above.

4.3 WALL R_W RATINGS

An R_W rating is the weighted sound reduction index of a material or assembly. It is essentially the soundproofing effectiveness of a system or material. Each R_W equates to 1dB of noise reduction. In general then, higher R_W ratings will block more noise from being transmitted through the partition.

4.3.1 EXTERNAL WALL RATINGS

Based on the site noise measurements, which principally consisted of traffic noise, we recommend that the external building walls enclosing the occupied spaces (except vehicle parking areas and bays) be constructed of wall elements with an R_W rating of $50 + C_{tr}$.

The NCC 2015 Building Code of Australia Volume 1 Specification F5.2 (Sound Insulation for Building Elements) provides examples of Acceptable forms of Construction for Walls that meet the minimum R_W rating of 50 + C_{tr}. Alternative wall constructions are subject to assessment and approval at the design and development phase.

ACCEPTABLE FORMS OF CONSTRUCTION FOR WALLS

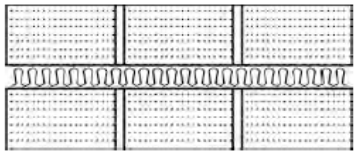
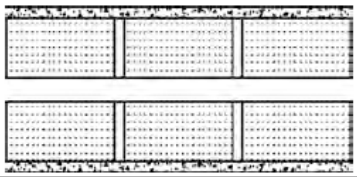
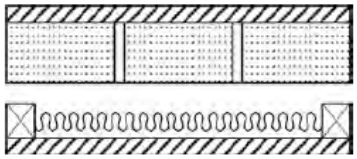
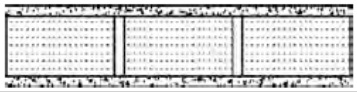
Description	$R_w + C_{tr}$ (not less than)	R_w (not less than)	Construction
Wall construction type: Masonry			
Two leaves of 110 mm clay brick masonry with— (a) cavity not less than 50 mm between leaves; and (b) 50 mm thick glass wool insulation with a density of 11 kg/m^3 or 50 mm thick polyester insulation with a density of 20 kg/m^3 in the cavity.	50	50	
Two leaves of 110 mm clay brick masonry with— (a) cavity not less than 50 mm between leaves and; (b) 13 mm cement render on each outside face.	50	50	
Single leaf of 110 mm clay brick masonry with— (a) a row of 70 mm × 35 mm timber studs or 64 mm steel studs at 600 mm centres, spaced 20 mm from the masonry wall; and (b) 50 mm thick glass or mineral wool insulation with a density of 11 kg/m^3 positioned between studs; and (c) one layer of 13 mm plasterboard fixed to outside face of studs and outside face of masonry.	50	50	
Single leaf of 220 mm brick masonry with 13 mm cement render on each face.	50	50	
150 mm thick concrete panel.	50	50	

Figure 8: Acceptable forms construction of walls in NCC BCA 2015

4.3.2 INTERNAL WALL RATINGS

As covered in Section 4.1 above, the walls between any two hotel rooms shall be constructed of wall elements with an R_W rating of 50 + C_{tr} and walls separating a hotel room and from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification shall be constructed of wall elements with an R_W rating of 50. Acceptable forms of wall construction are shown in Figure 8 above.

Note that a wall in a building required to have an impact sound insulation rating must meet the discontinuous construction criteria as described in the NCC BCA 2015 and F5.3(c) in section 4.1 above.

Alternative wall constructions are subject to assessment and approval at the design and development phase.

4.4 RECOMMENDED GLAZING

For the external glazing of the ground floor club and entertainment areas, standard 10mm annealed or laminated glazing is recommended.
For hotel room external window glazing, Viridian 6.5mm VLam Hush (Rw36) is recommended.
The frames and seals for the glazing shall have equal or better acoustic rating to that of the respective glazing.

4.5 RECOMMENDED DOORS AND DOOR SEALS

All hotel room doors opening to the corridor shall be a minimum of 40mm thick solid core timber and fitted with acoustic door seals. A suitable door seal is the Raven RP124 Delta Plus Seal, a rigid and flexible co-polymer acoustic and smoke seal.

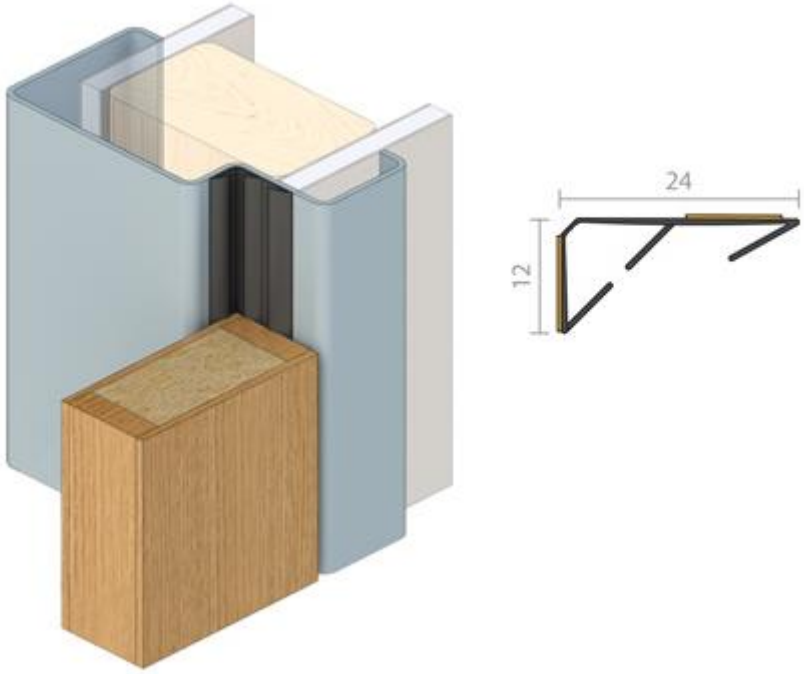


Figure 9: A suitable type of acoustic door seal for the hotel room doors.

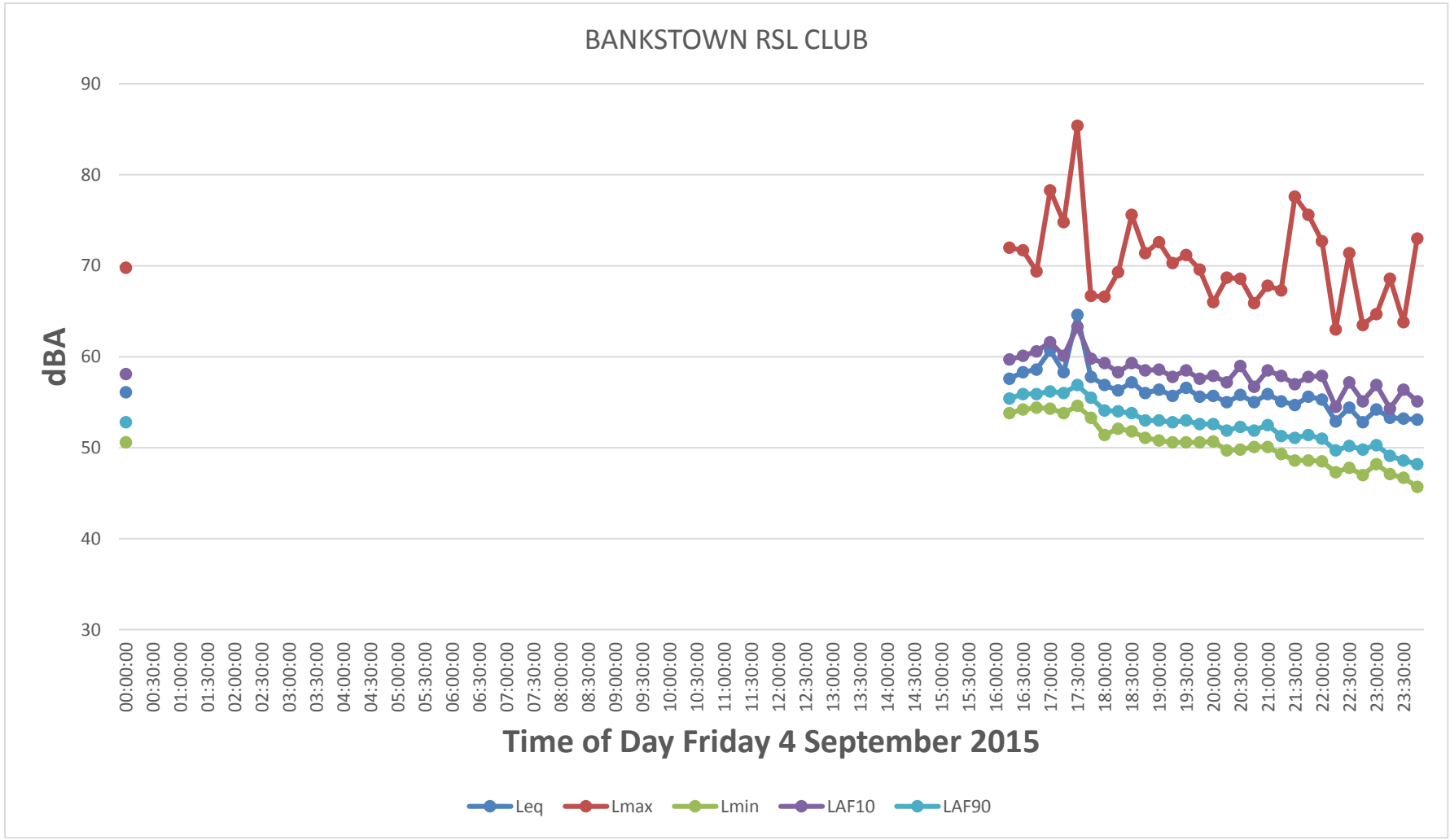
4.6 BUILDING MECHANICAL SERVICES ACOUSTIC TREATMENT

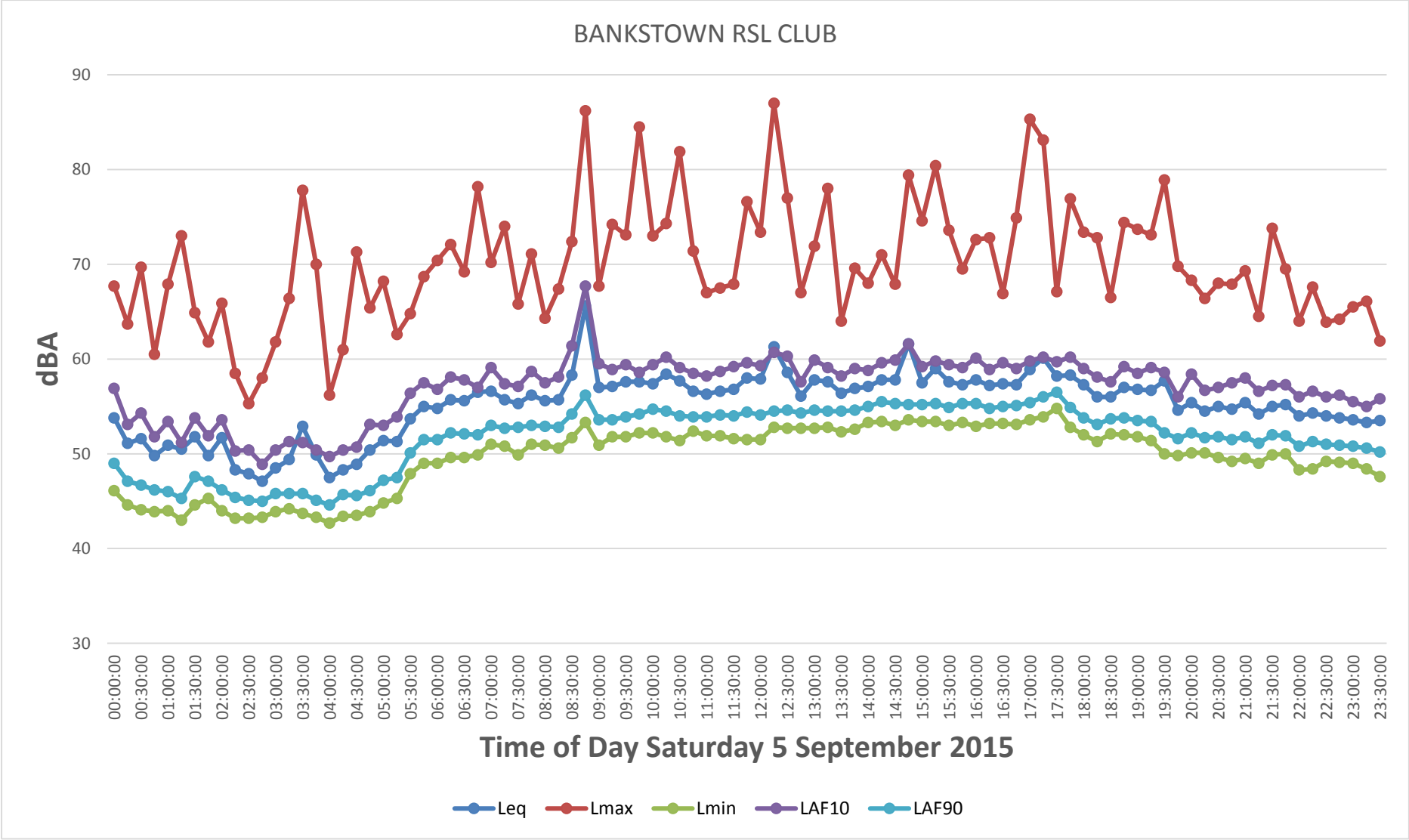
Recommendations for the acoustic treatment of the mechanical services to meet the project criteria will be provided at finalisation of the mechanical services design in the design development phase of the project.

5. Conclusion

This report forms part of the development application submission for the proposed new Bankstown RSL Club and Hotel at 23-29 Marion Street, Bankstown. Operator attended measurements and long term noise logging were conducted at the site and the measurements presented in this report. In this report the noise criteria at the nearest affected residence for the project following completion of the new Bankstown RSL Club and Hotel has been quantified.
Detail design of the acoustic treatment for the project will be developed and incorporated in the design development phase of the project and will be included in the construction drawings and documentation for the project.

6. Appendix A – Noise Logger Details

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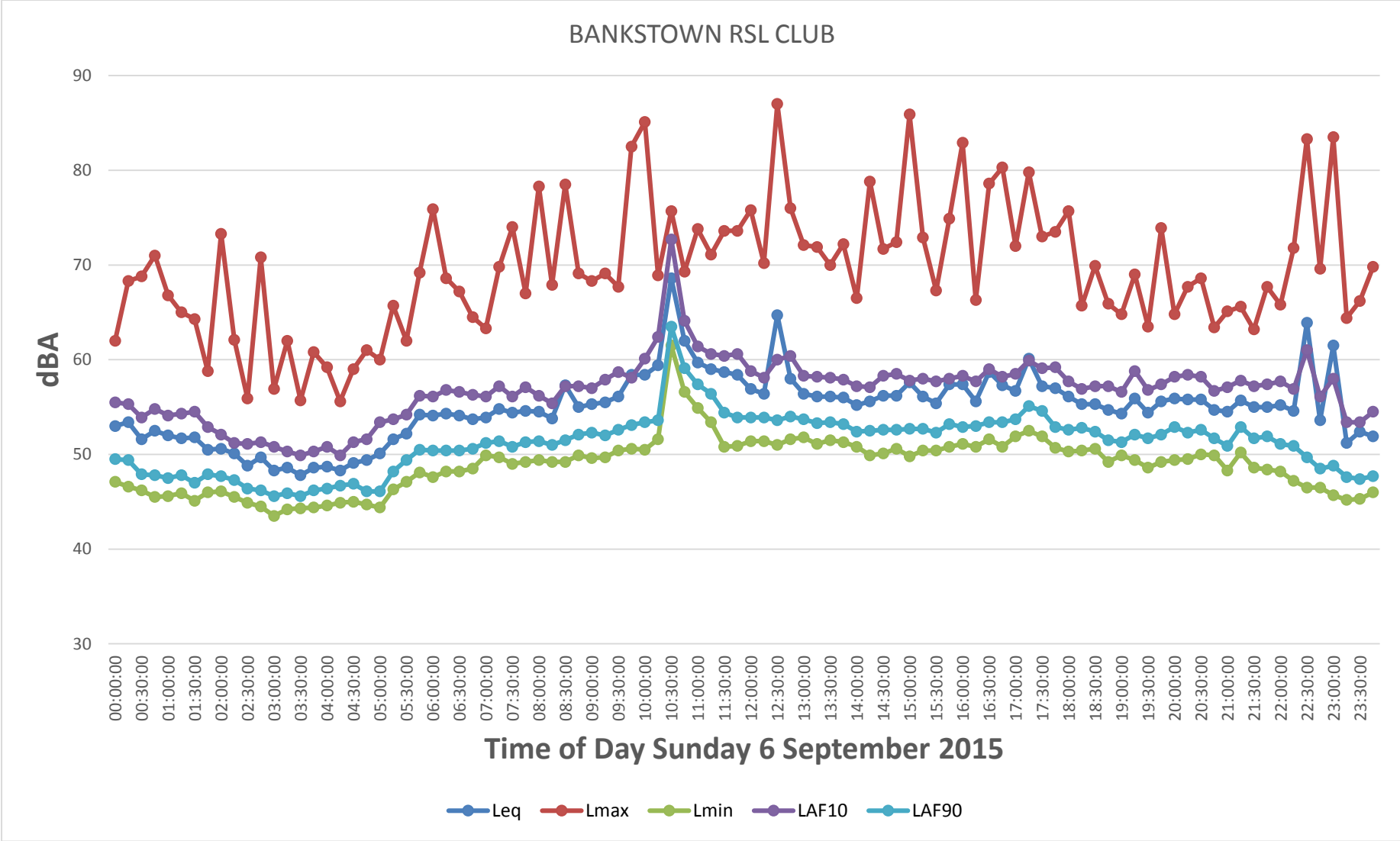
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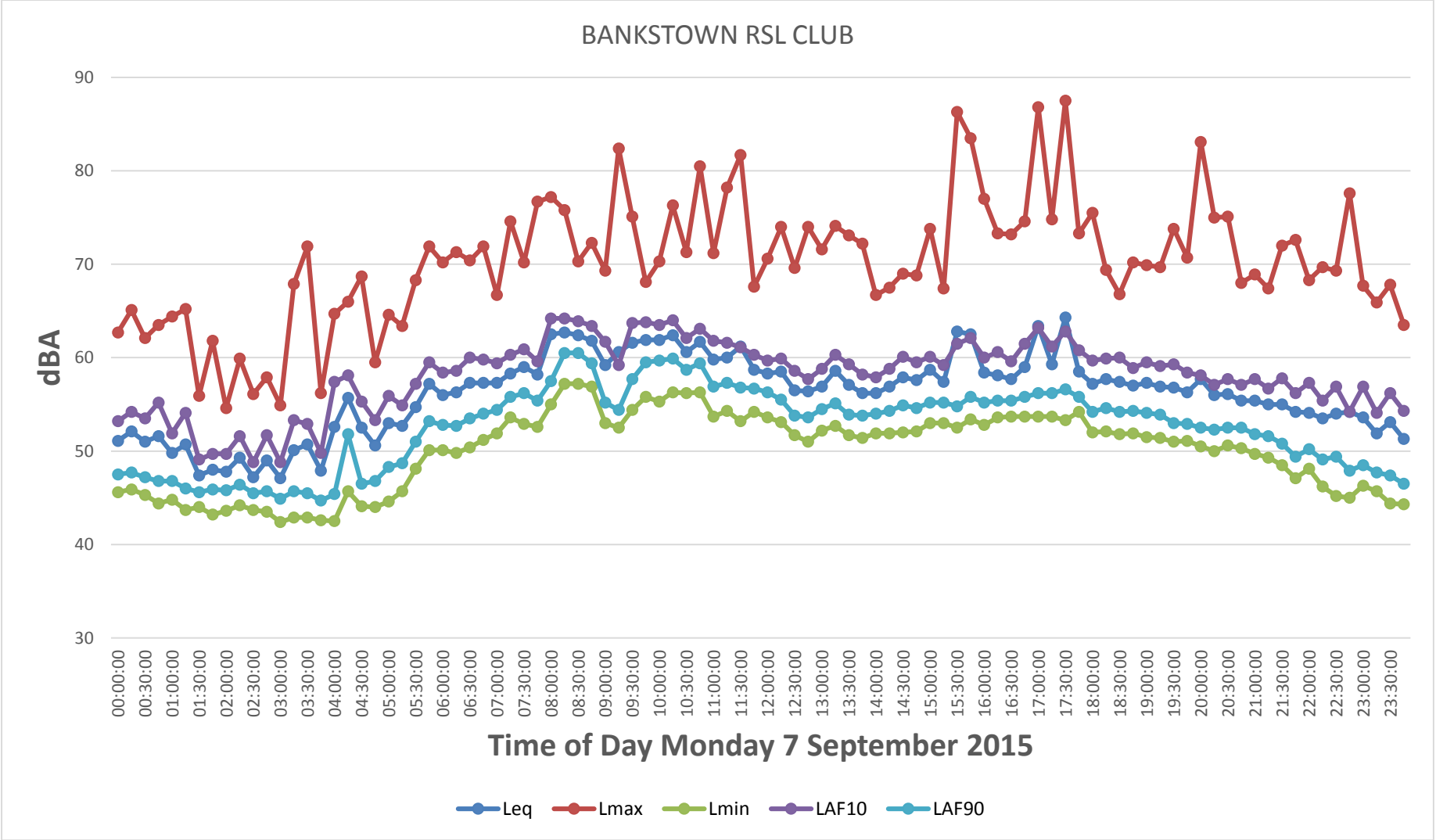
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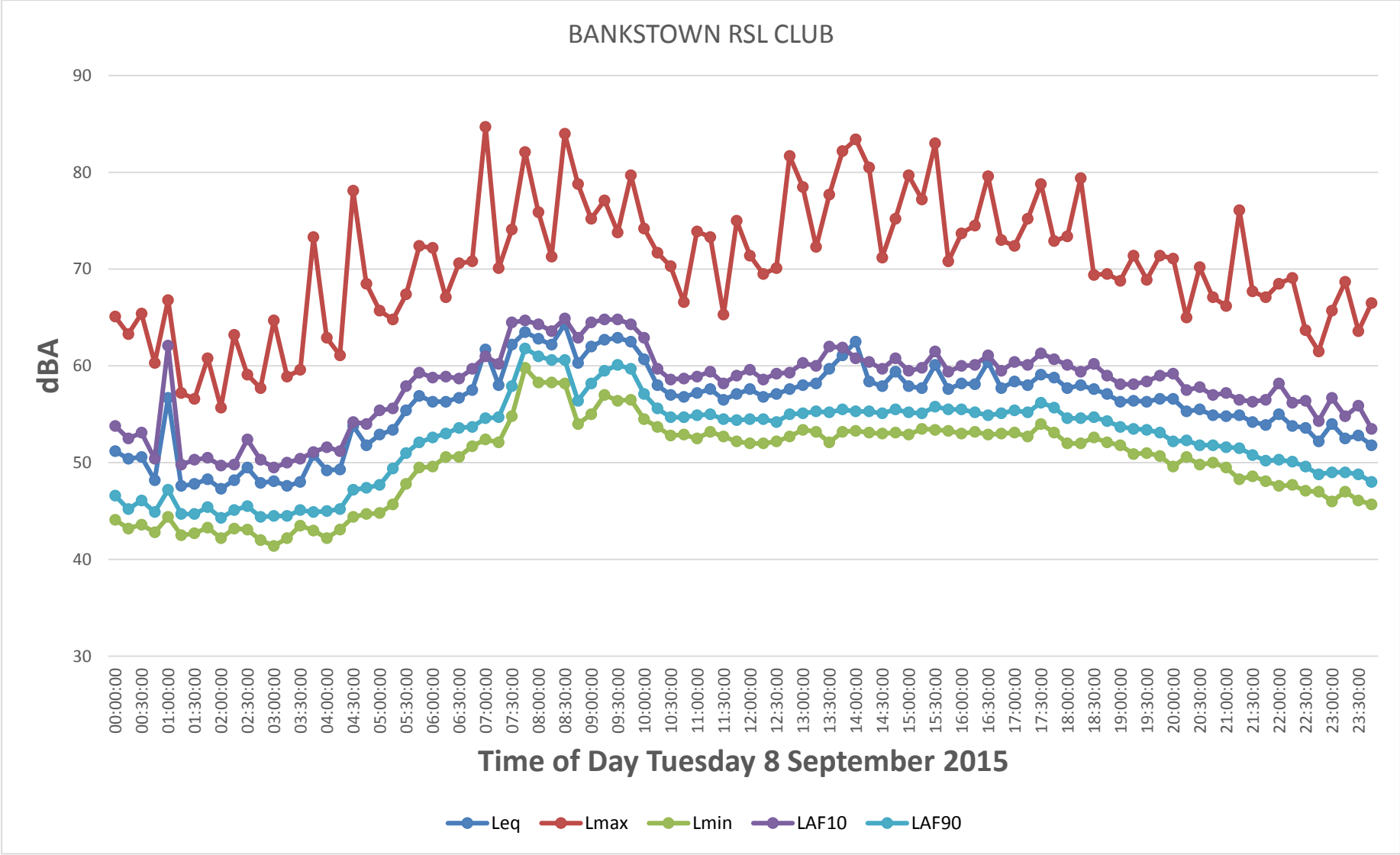
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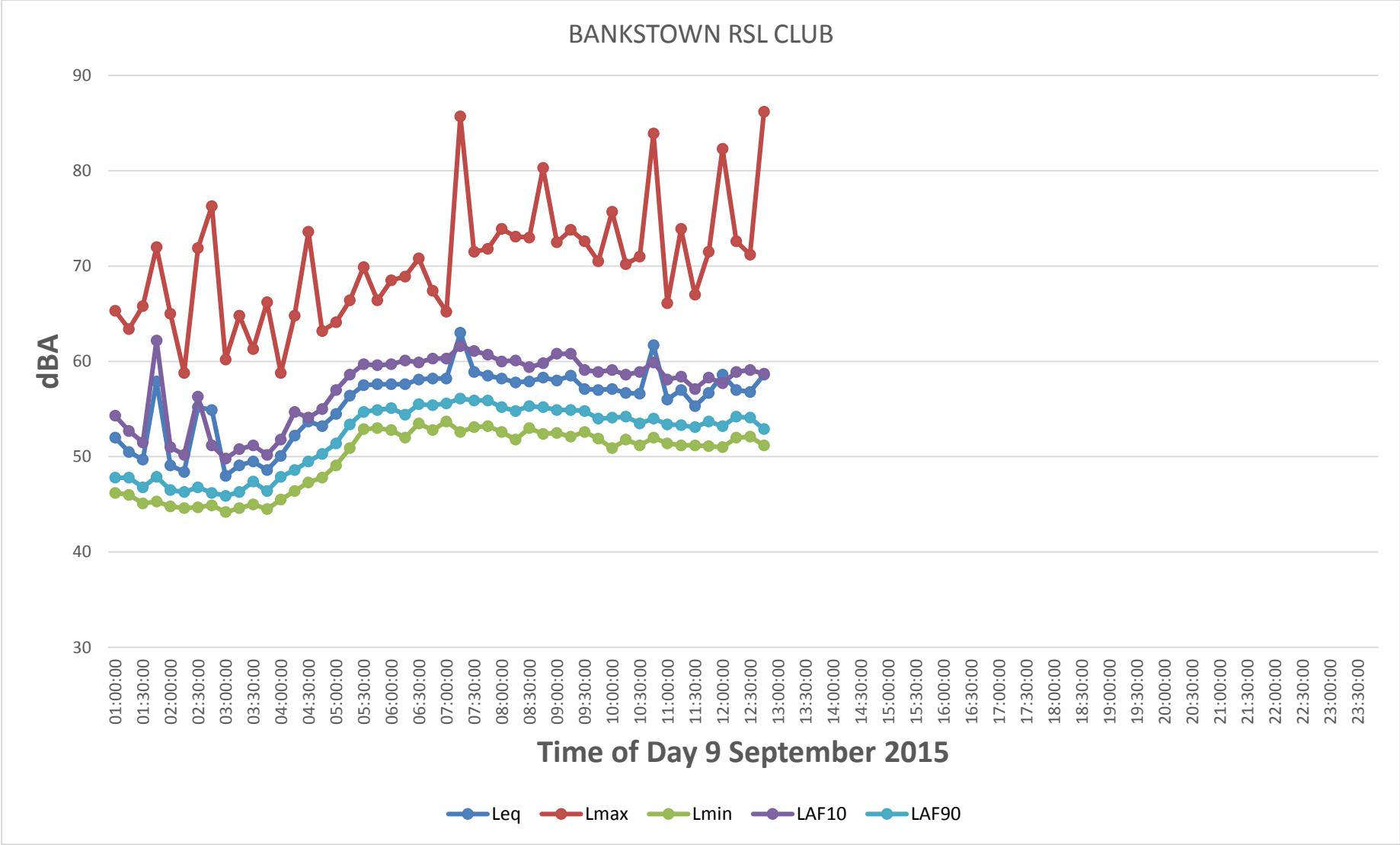
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