# Arden Clubs

# The Hills Club

# Planning Proposal Acoustic Assessment

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|---|---|
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**Table of Contents**

**Index of Figures**



**Index of Tables**

# 1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Arden Clubs to undertake a noise impact assessment for the proposed mixed-use development located at The Hills Club. The mixed-use development will include:

- A new Community Club with:
  - Members lounge, restaurant, cafe and dining facilities.
  - Multi-functional recreation areas.
  - Open air bowling green and an enclosed world championship bowling green.
  - 200 car spaces and loading dock.
- Commercial, retail and other ancillary uses.
- Three levels of basement residential carparking for approximately 500 cars.
- Approximately 275 residential apartments across 4 buildings comprising residential and seniors housing:
  - Building A: mixed use, commercial and residential building comprising a 2 storey podium transitioning up to 6, 12 and 21 storeys. The rooftops of the podium, 6 and 12 storeys include communal residential roof gardens.
  - Building B: 6 storey residential building with a 4 storey podium comprising residential housing and a communal area.
  - Building C: 6 storey seniors living building with a 4 storey podium comprising seniors housing and a communal area.
  - Building D: 4 storey residential building with a 3 storey podium comprising residential housing and a communal area.

The proposed re mixed-use development is surrounded by existing commercial, retail and residential buildings. Traffic noise along the Old Northern Road contributes to the surrounding ambient noise levels. The site location is shown in Figure 1.


**Figure 1 – Site Location, Nearest Residents and Noise Logger Position**

# 2 Noise Criteria

The following standards and guidelines are applicable to this project:

- The Hills Shire Council Development Control Plan (DCP 2012) for Residential Developments (Part B).
- NSW Department of Planning "Development Near Rail Corridors and Busy Roads".
- NCC/BCA Part F5.
- NSW EPA "Noise Policy for Industry" (NPI) and "Noise Guide for Local Government" (NGLG).
- NSW EPA "Road Noise Policy" (RNP).
- NSW Governments Office of Liquor, Gaming and Racing (OLGR)
- 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 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

## 2.1 Internal Noise Levels

Part B and Part B of the Hills Shire Council DCP does no specify any acoustic objective for road traffic noise. Therefore the Department of Planning guideline and SEPP (Infrastructure) Clause 87 (rail) and 102 (road) requires that if the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following $L_{Aeq}$ levels are not exceeded.

**Table 1— Development near Rail Corridors and Busy Roads – Interim Guideline**

| Residential Space | Internal Noise Criteria |
|---|---|
| in any bedroom in the building | 35dB(A) at any time 10pm–7am |
| anywhere else in the building (other than a garage, kitchen, bathroom or hallway) | 40dB(A) at any time |

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.

For the mixed-use development, the AS/NZS 2107–2016 outlines the acceptable internal noise levels such that a satisfactory acoustic environment within residential and non-residential spaces in new and existing buildings.

The Australian Standard AS 3671-1989 'Acoustics - Road traffic noise intrusion -building siting and construction' provides guidance on the design but is limited as is 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 2 presents the recommended internal design noise levels in accordance with AS 2107 – 2016.

**Table 2— 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 |
| Small retail stores (general) | < 50 |
| Restaurant/Dining rooms, Coffee Shops, Cafeterias | 40 to 50 |
| Food Courts | 45 to 55 |
| Bars | < 50 |
| Function areas | 40 to 45 |
| Indoor sports (Without coaching) | < 50 |
| Leisure centre and gaming | 40 to 50 |
| Change rooms | < 50 |
| Toilets | 45 to 55 |
| Foyer and recreation areas | 45 to 50 |
| Function Room (with sound reinforcement) | 35 to 45 |
| Kitchen | < 55 |
| General office | 40 to 45 |
| Meeting room (small) | 40 to 45 |
| Enclosed Carparks | < 65 |

## 2.2 Sound Insulation Requirement (Part F5 NCC/BCA)

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 F5 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 3.

**Table 3 - NCC Part F5 Requirements (Class 2 or 3)**

| Building Element | Minimum NCC Part F5 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 Rw + Ctr 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 9Â mm thick; or

(cc) other suitable material with a mass per unit area not less than 24.4 kg/$m^2$

(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.

## 2.3 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Nose monitoring was conducted between Wednesday 2nd to Wednesday 9th September 2020. The monitor was positioned (as shown in Figure 1) at the following locations:

- Location 1 (L1) – On ground level facing Old Northern Road.
- Location 2 (L2) – On ground level facing Jenner Street.

Measurements were conducted using the following equipment:

- SVAN 977 Type 1 Real time Analyser/Noise Logger. Serial No. 34892.
- SVAN 958A Type 1 Real time Analyser/Noise Logger. Serial No. 36624.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: 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.

### 2.3.1 Traffic Noise Levels

Table 4 presents a summary of the measured ambient noise level and traffic noise impacting the development.

**Table 4 – Measured Ambient and Traffic Noise and Levels, dBA**

| Location | Period | Average $L_{eq}$ | Highest $L_{eq}$ 1hr |
|---|---|---|---|
| Old Northern Rd | Day (07:00-22:00) | 70 | 72 |
| | Night (22:00-07:00) | 64 | 71 |
| Jenner St | Day (07:00-22:00) | 53 | 60 |
| | Night (22:00-07:00) | 48 | 56 |

By analysing measured data, the impact of the surrounding traffic noise on Old Northern Road and Jenner Street have been calculated by applying the CRTN method for predicting noise traffic noise using CadnaA (version 4.5.149) noise modelling software.

The following Figure 2 and Figure 3 shows the predicted impact of traffic noise during the daytime and night time periods respectively including the traffic generated by the development.

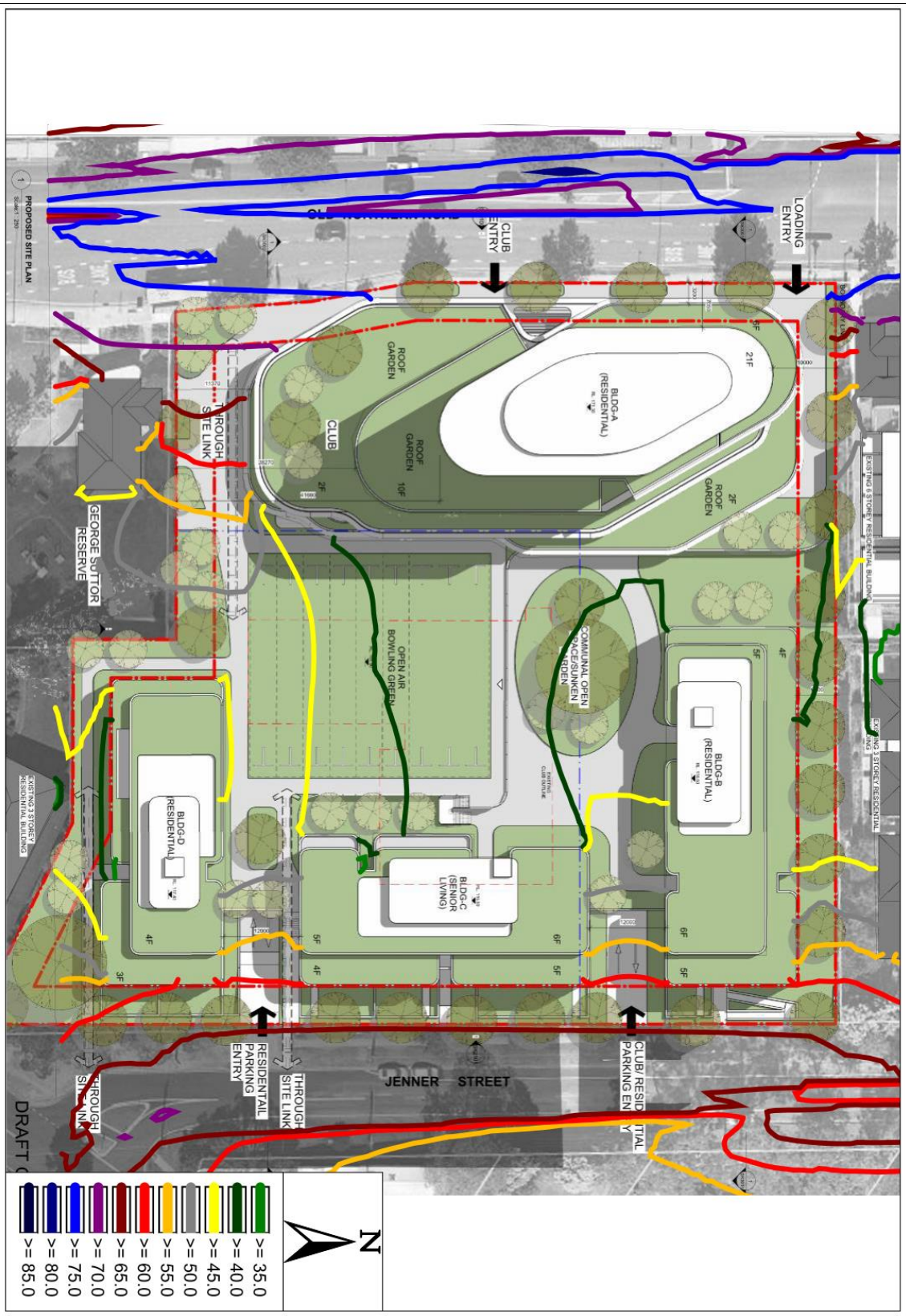



**Figure 2 – Daytime Traffic Noise Contour (Ground Level)**

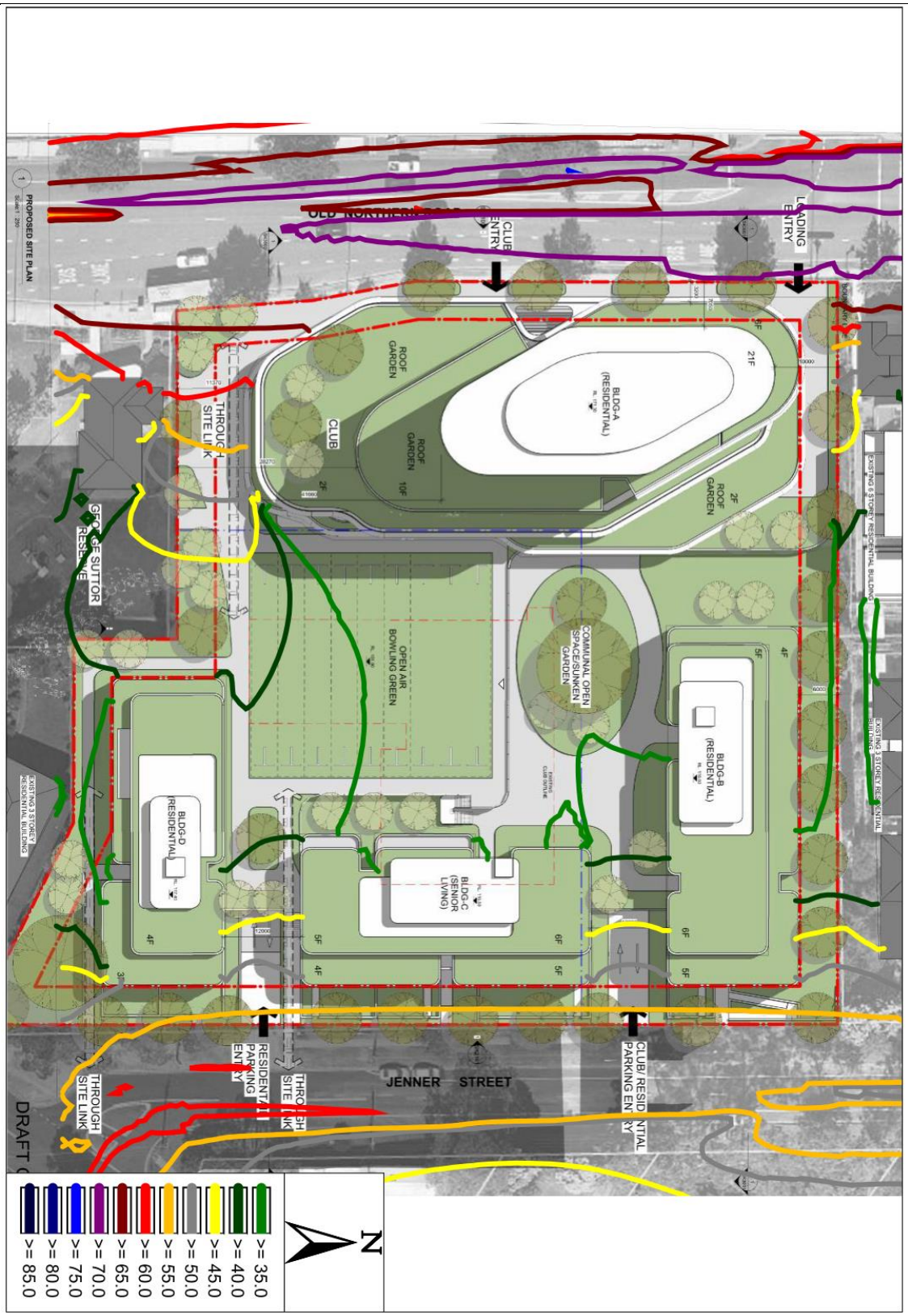



**Figure 3 – Night-Time Traffic Noise Contour (Ground Level)**

### 2.3.2 Ambient Noise Levels and Project Noise Limits

We recommend that operational mechanical noise be assessed in accordance with the procedures as set out in the NSW NPfI.

Table 5 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project. The amenity criteria for L1 is based on an industrial/urban receiver and the amenity criteria for L2 is based on an urban receiver.

**Table 5—EPA Noise Limits for Development, dBA**

| Receiver | Time Period | Existing Noise Levels | | NSW EPA NPI | | | Project Noise Trigger Level $L_{eq(15min)}$ |
|---|---|---|---|---|---|---|---|
| | | $L_{eq}$ (period) | RBL | Recommended ANL | Project ANL[1] $L_{eq(15min)}$ | Intrusiveness Criteria, $L_{eq(15min)}$ | |
| Residential (L1) | Day | 70 | 57 | 65 | 63 | 62 | **62** |
| | Evening | 69 | 53 | 66 | 64 | 58 | **58** |
| | Night | 64 | 38 | 50 | 48 | 43 | **43** |
| Residential (L2) | Day | 54 | 42 | 60 | 58 | 47 | **47** |
| | Evening | 51 | 43 | 50 | 48 | 48 | **48** |
| | Night | 48 | 38 | 45 | 43 | 43 | **43** |
| Commercial | All | - | - | - | - | - | **65** |

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] 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.

### 2.3.3 Noise Criteria for Licenced Premises

To assess the impact of noise emanating from the operation of the licenced bar 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 $L_{90}$ dB(A) during the respective periods. The background levels recorded at the location and the OLGR noise limit are shown in the following Table 6.

**Table 6 — 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, RBL | 46 | 53 | 50 | 41 | 40 | 33 | 39 | 32 | 30 | 38 |
| Noise Criteria Before Midnight, $L_{10}$ | 51 | 58 | 55 | 46 | 45 | 38 | 44 | 37 | 35 | 43 |

### 2.3.4 Sleep disturbance

To assess the potential of sleep disturbance, the EPA 'Noise Policy for Industry' applies the following criteria where premises night-time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- $L_{AFmax}$ 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur.
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development.
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods).
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

The $L_{A1, (1\ minute)}$ descriptor is meant to represent a maximum noise level measured under 'fast' time response. The EPA will accept analysis based on either $L_{A1, (1\ minute)}$ or $L_{A, (Max)}$. Table 2 presents the limits for sleep disturbance.

**Table 7 — Sleep Disturbance Limits, dBA**

| Location | Period | Night RBL | Sleep Disturbance Limits $L_{AFmax}$ | Sleep Disturbance Limits $L_{Aeq,15min}$ |
|---|---|---|---|---|
| L1 | Night (10pm-7am) | 38 | 53 | 43 |
| L2 | Night (10pm-7am) | 38 | 53 | 43 |

## 2.4 Traffic Noise Generation

The development of the development has the potential to generate increased traffic noise will be assessed in accordance with the NSW EPA Road Noise Policy (RNP). Table 8 sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

**Table 8— Road traffic noise assessment criteria for residential land uses**

| Road Category | Type of project/land use | Assessment Criteria - dBA | |
|---|---|---|---|
| | | Day (7am-10pm) | Night (10pm-7am) |
| 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'.

# 3 Assessment and Recommendations

## 3.1 Façade Glazing Requirements

Acoustic glazing for the apartments are given in Table 9 are required to reduce noise impact on the internal occupants and should result in noise levels within such units in accordance with the Department of Planning Noise Guidelines and AS/NZS 2107.

**Table 9 – Schedule of Window and Glazing ($R_w$)**

| Level | Façade | Space | Glazing Thickness | Minimum $R_w$ (Glazing+Frame) |
|---|---|---|---|---|
| Building A | | | | |
| LG | East | Club | 6.38mm laminated | 30 |
| | | Common Room | 6.38mm laminated | 30 |
| G | All | Retail & Club | 10.38mm laminated | 32 |
| 1-9 | North, South & West | Living & Bed | 12.5mm laminated (Viridian) | 37 |
| | East | Living | 6.38mm laminated | 30 |
| | | Bed | 10.38mm laminated | 32 |
| 10-20 | North, South & West | Living & Bed | 10.38mm laminated | 32 |
| | East | Living & Bed | 6.38mm laminated | 30 |
| Building B, C & D | | | | |
| All | All | Living & Bed | 6.38mm laminated | 30 |

All other non-habitable spaces, such as bathrooms and laundries require minimum 6mm monolithic glass (Rw 28).

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.

## 3.2 Building Façade Construction

To provide sufficient acoustic attention of noise, the general external construction of the proposed building would need to be constructed as detailed in Table 10.

**Table 10 – External Façade Construction ($R_w$)**

| Building Element | Proposed Construction | Minimum $R_w$ |
|---|---|---|
| External Wall | Masonry or cavity brick | 45 |
| Roof and ceiling | Concrete with a plasterboard cavity ceiling | 45 |

## 3.3 Mechanical Services

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 and DCP noise criteria. Typical acoustic measures may include the construction of acoustic barriers, enclosures, attenuators and/or acoustic louvres.

## 3.4 Separation Between Commercial and Residential

The wall partition and floor slab separating the retail/commercial space and the residential apartment is to be of solid masonry/concrete construction with a minimum sound insulation performance of Rw + Ctr 50 for airborne noise.

Any operation of the retail/commercial space that may have the potential to create noise is to comply with the EPA noise policies and the any other relevant Council consent conditions related to the use.

Following approval, a separate assessment would be submitted prior to occupation detailing proposed use and to ensure that any potential noise impacting the amenity of the adjoining residence is protected.

## 3.5 Noise from Waste Collection Vehicles

For all privately operated waste collection vehicles entering the loading dock on ground level, 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 8.00 am or after 8.00 pm on any Saturday, Sunday or public holiday.

This excludes motor vehicles (related to residents or patrons) entering of existing the premises.

Additional management controls of the 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.

Truck vehicle noise and loading activity will be controlled within the loading dock on ground level and this would provide an improved acoustic amenity to the nearby residents.

# 4 Conclusion

An acoustic assessment of the proposed development has been carried out in accordance with the requirements of The Hills Shire DCP, EPA noise polices and relevant Australian standards.

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 EPA noise policy. The limits are presented in Table 5. A detail assessment of all mechanical plant and equipment will be conducted to ensure compliance with the EPA noise criteria.

Construction for glazing, external walls and the roof/ceiling systems have been provided to achieve the internal noise criteria and are detailed in Section 3.1 and Section 3.2 based on the impact of road traffic noise.

Providing the recommendations in this report are implemented, the noise from the proposal are predicted to comply with acoustic requirements of The Hills Shire DCP, BCA Part F5, EPA noise polices and relevant 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.

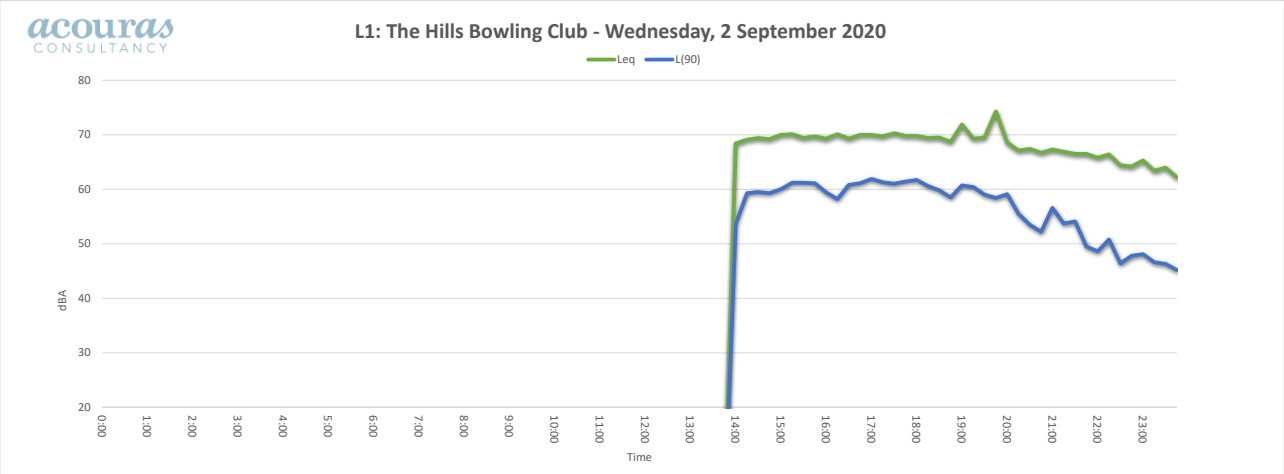
**L AEQ,T :** Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

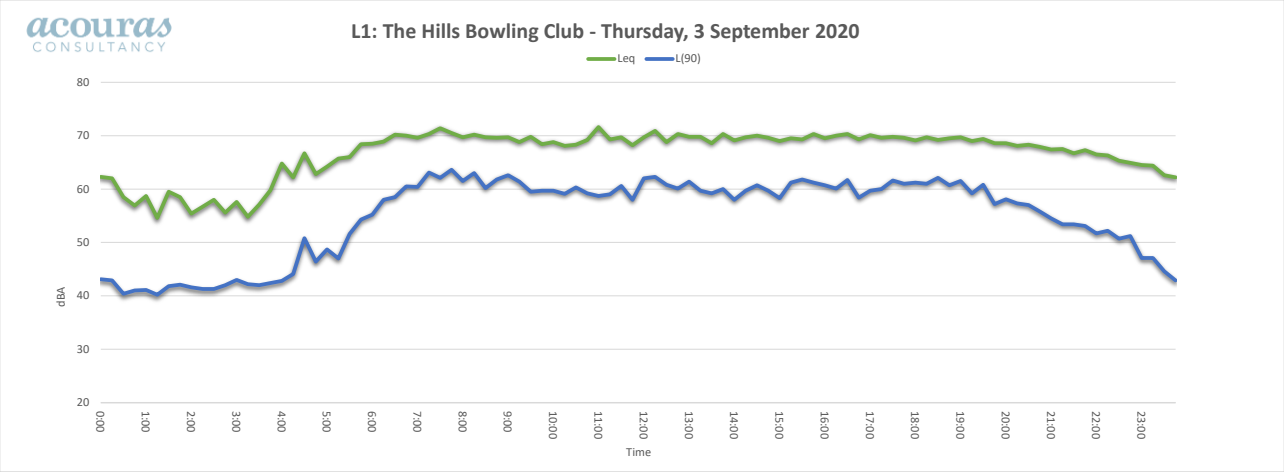
# Appendix B – Architectural Drawings

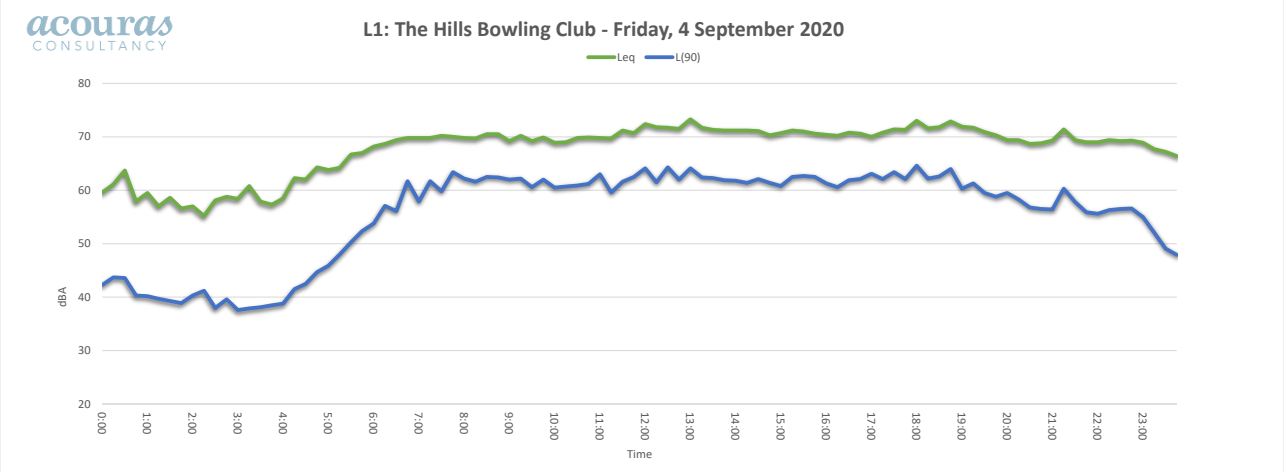
This assessment was based on the following architectural drawings provided by Altis Architecture.

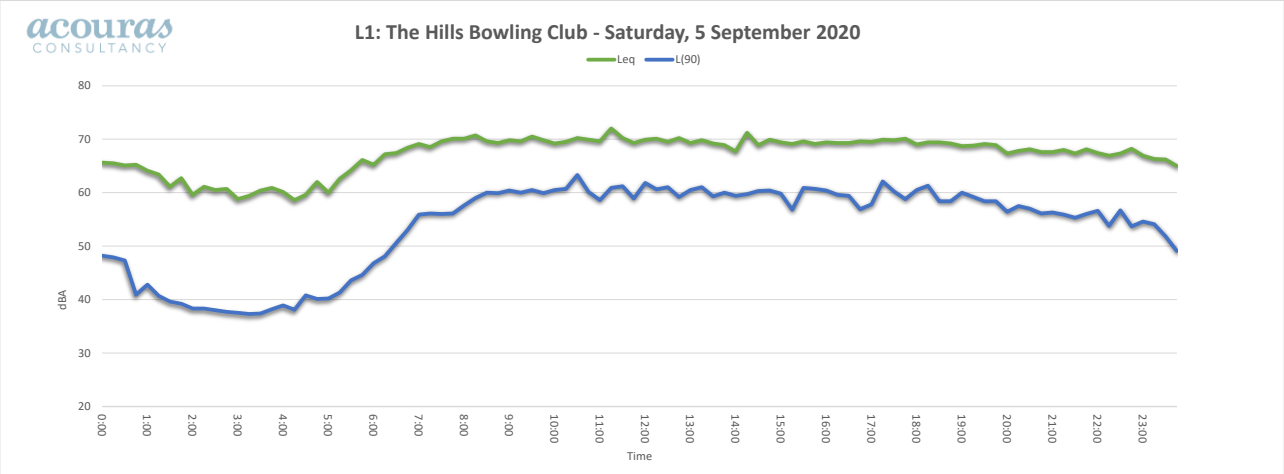
| Drawing | Issue | Date | Description |
|---|---|---|---|
| SK0010 | 2 | 11.09.2020 | Site Location Plan |
| SK0100 | 2 | 11.09.2020 | Proposed Site Plan |
| SK1101 | 2 | 11.09.2020 | Basement 3 |
| SK1102 | 2 | 11.09.2020 | Basement 2 |
| SK1103 | 2 | 11.09.2020 | Basement 1 |
| SK1104 | 2 | 11.09.2020 | Lower Ground Floor |
| SK1105 | 2 | 11.09.2020 | Ground Floor Plan |
| SK1106 | 2 | 11.09.2020 | Level 1 Floor Plan |
| SK1107 | 2 | 11.09.2020 | Level 2 Floor Plan |
| SK1108 | 2 | 11.09.2020 | Level 3 Floor Plan |
| SK1109 | 2 | 11.09.2020 | Level 4 Floor Plan |
| SK1110 | 2 | 11.09.2020 | Level 5 Floor Plan |
| SK1111 | 2 | 11.09.2020 | Level 6-9 Floor Plan |
| SK1112 | 2 | 11.09.2020 | Level 10-20 Floor Plan |
| SK2100 | 2 | 11.09.2020 | Elevations |
| SK2101 | 2 | 11.09.2020 | Elevations 2 |
| SK3001 | 2 | 11.09.2020 | Proposed Sections |
| SK3002 | 2 | 11.09.2020 | Proposed Sections 2 |

# Appendix C – Noise Logger Results

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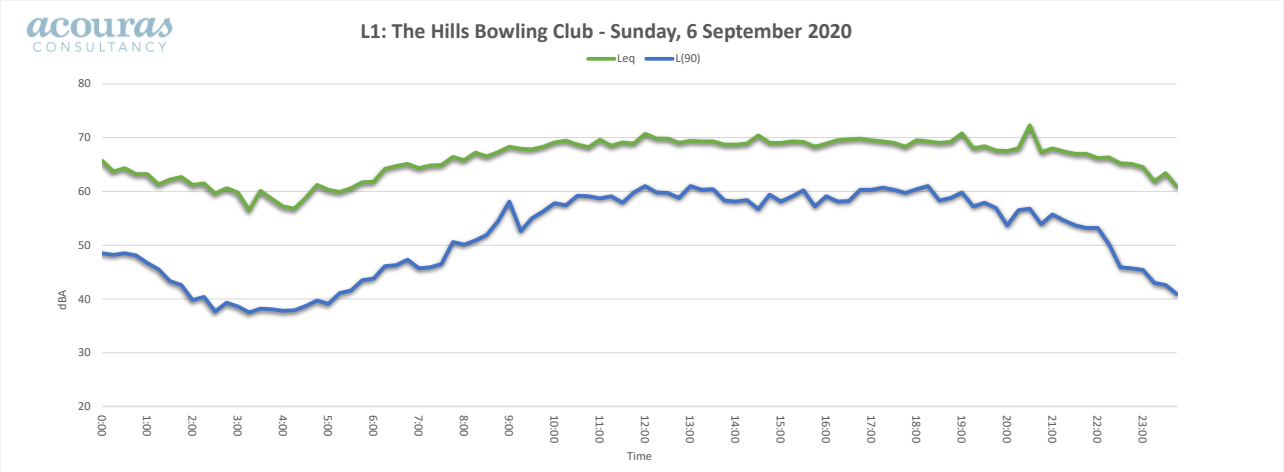
Leq
L(90)
dBA
Time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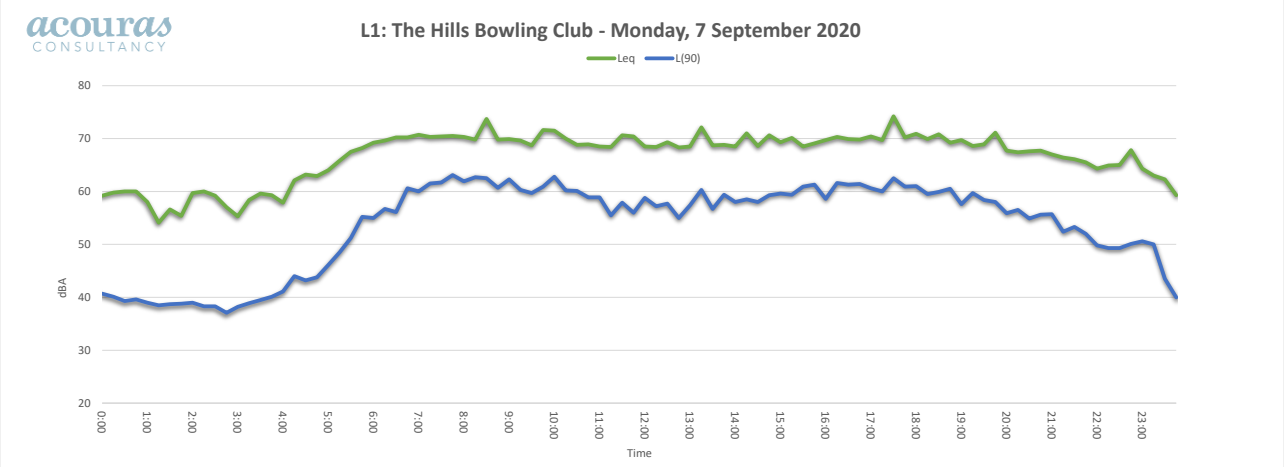
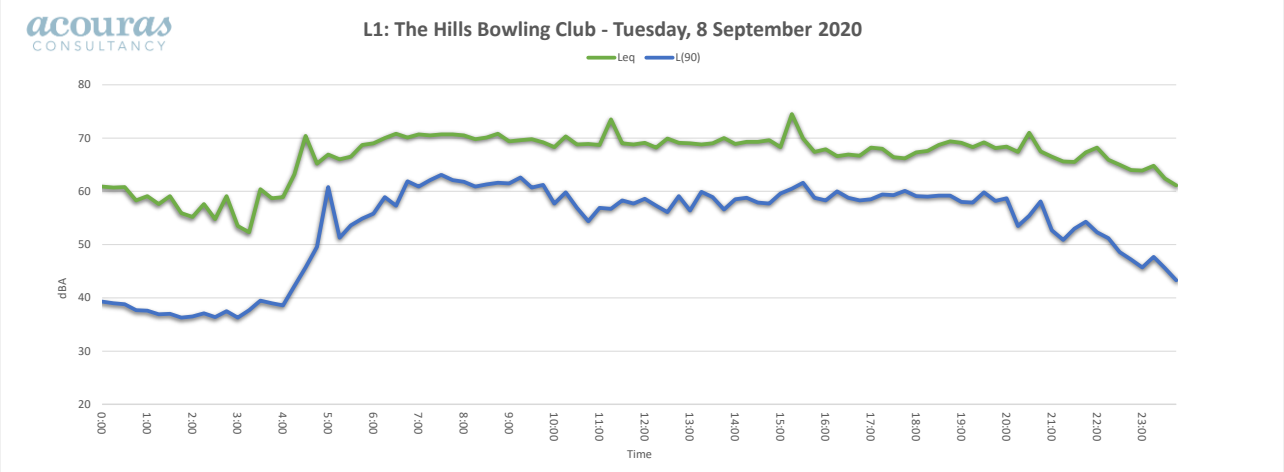
Leq
L(90)
dBA
Time


L1: The Hills Bowling Club - Monday, 7 September 2020
Leq
L(90)
dBA
Time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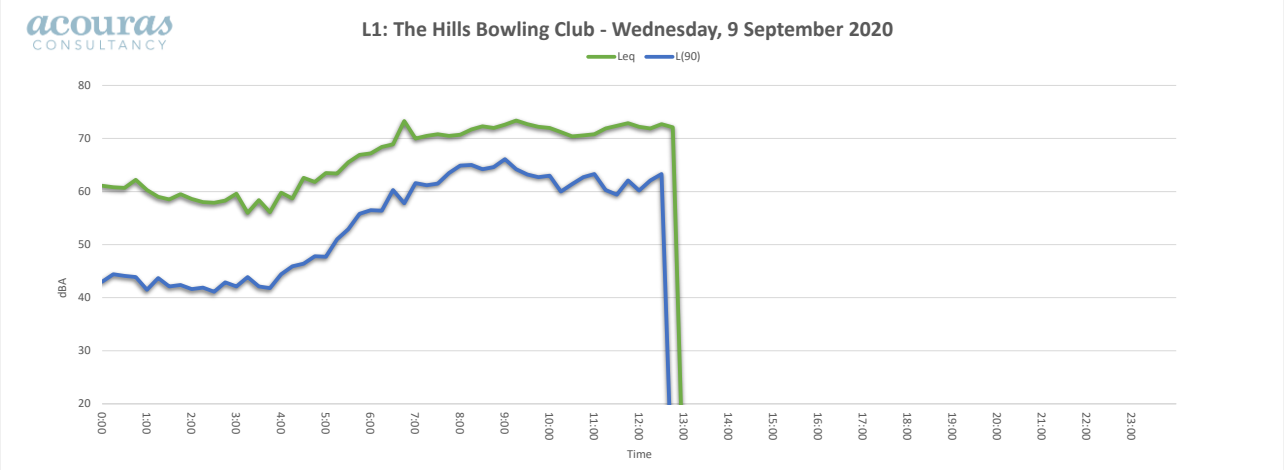
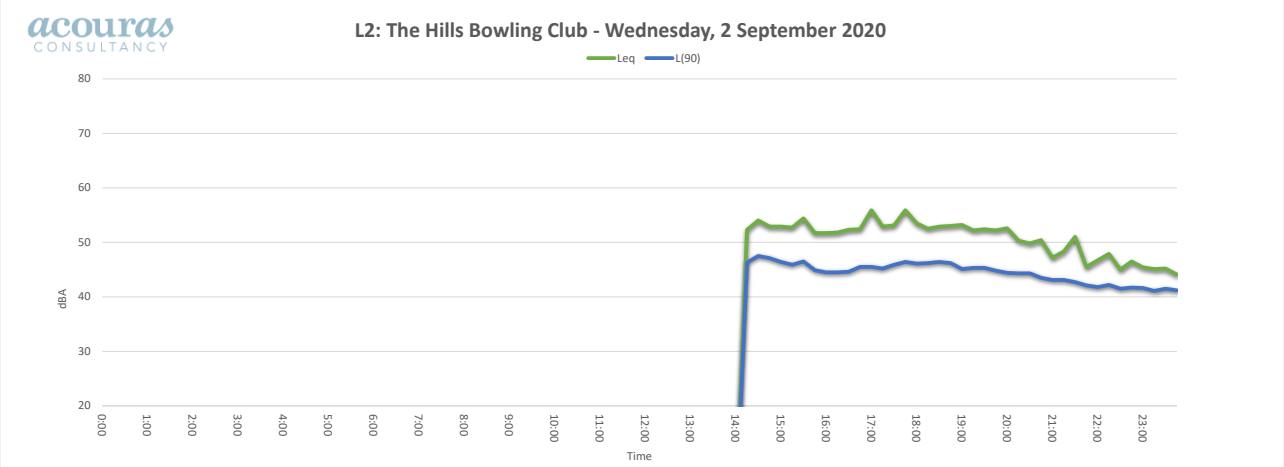
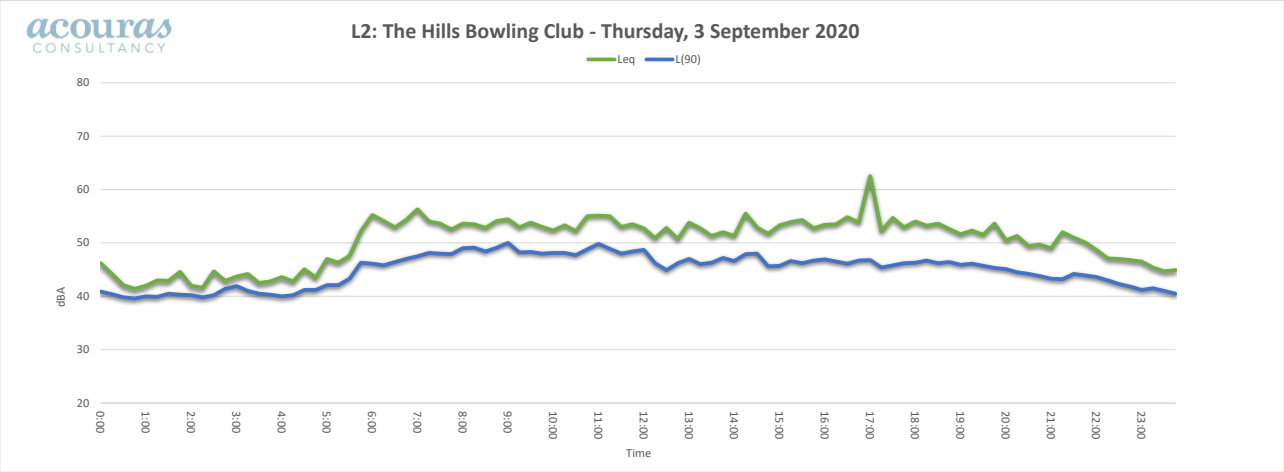
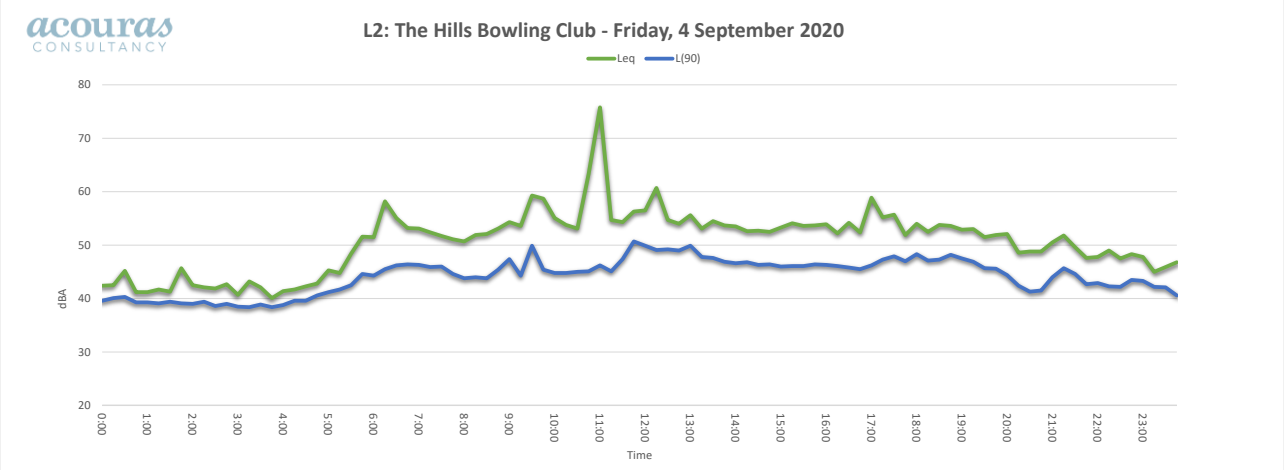
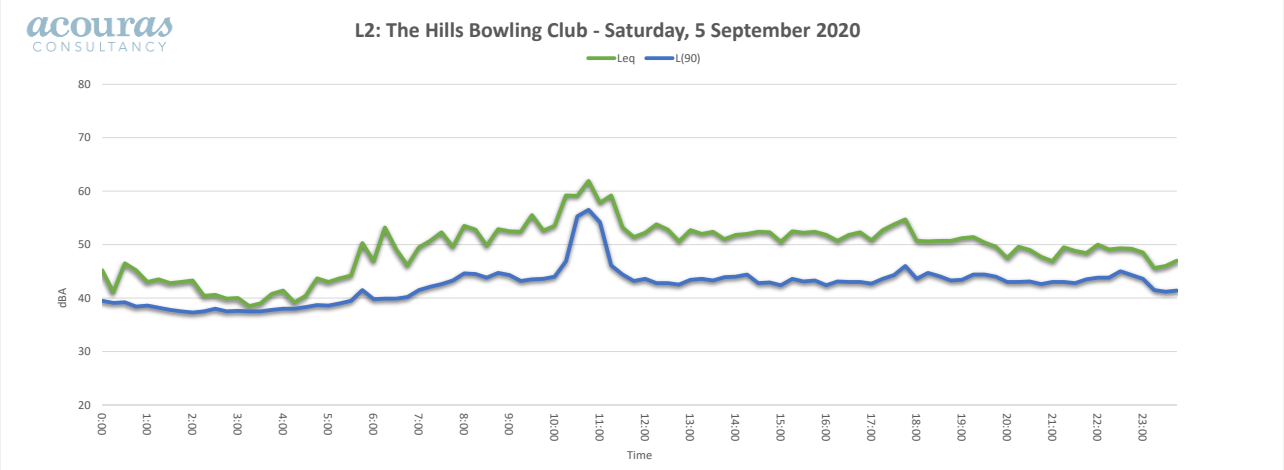
Leq
L(90)
dBA
Time

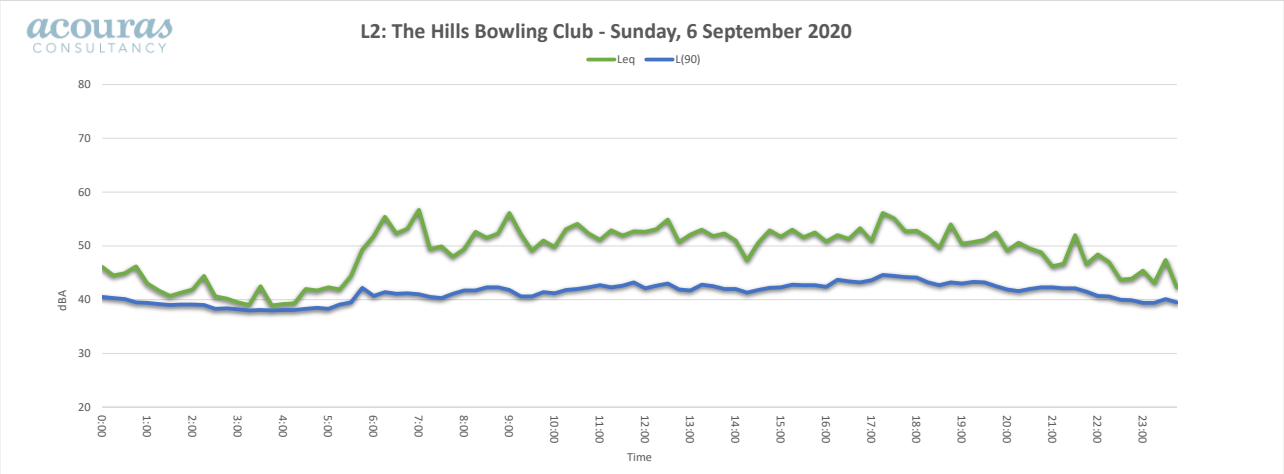

L1: The Hills Bowling Club - Wednesday, 9 September 2020
Leq
L(90)
dBA
Time

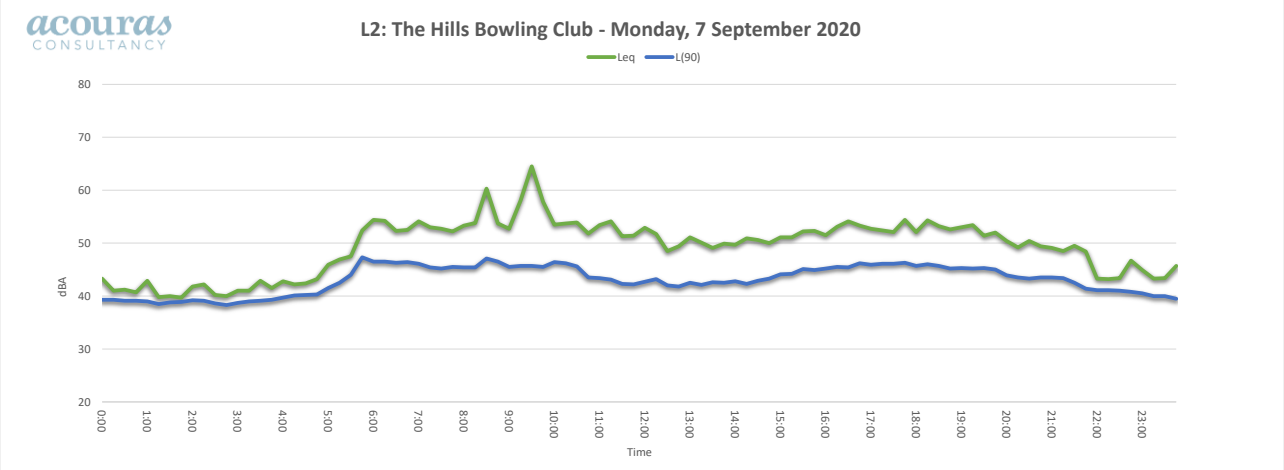

L2: The Hills Bowling Club - Wednesday, 2 September 2020
Leq
L(90)
dBA
Time

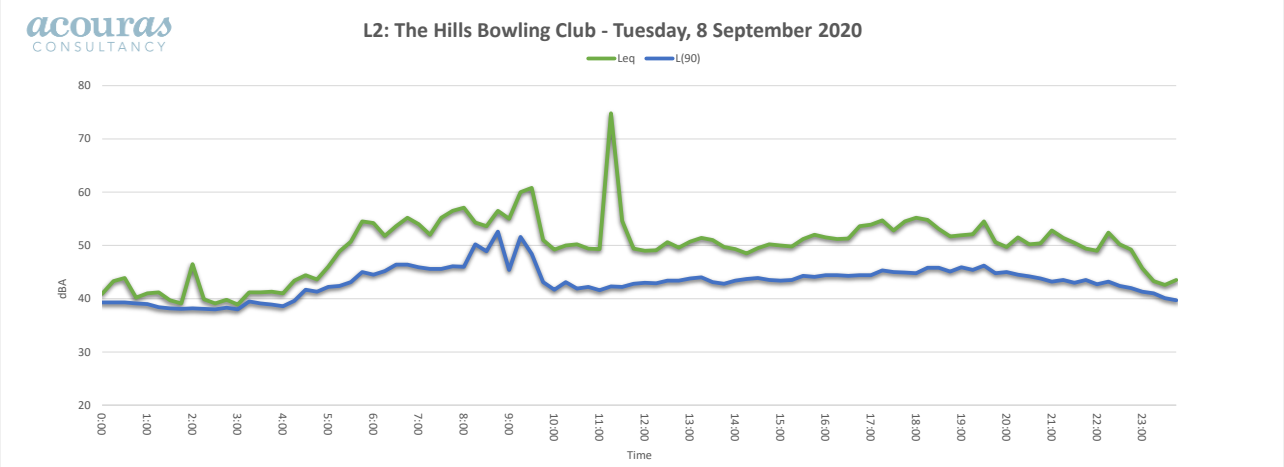

L2: The Hills Bowling Club - Thursday, 3 September 2020
Leq
L(90)
dBA
Time

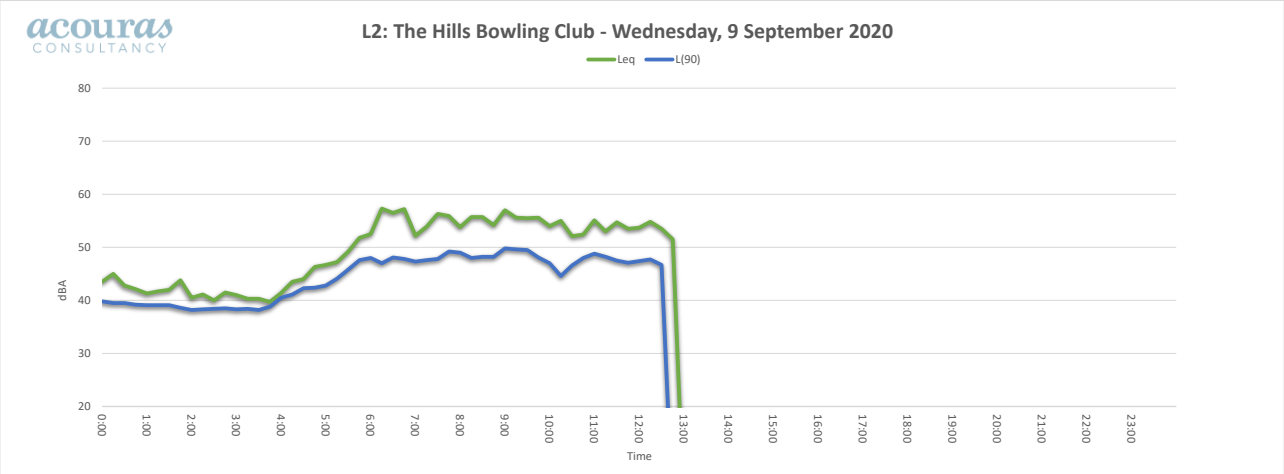

L2: The Hills Bowling Club - Friday, 4 September 2020
Leq
L(90)
dBA
Time


L2: The Hills Bowling Club - Saturday, 5 September 2020
Leq
L(90)
dBA
Time


L2: The Hills Bowling Club - Sunday, 6 September 2020
Leq
L(90)
dBA
Time


L2: The Hills Bowling Club - Monday, 7 September 2020
Leq
L(90)
dBA
Time


L2: The Hills Bowling Club - Tuesday, 8 September 2020
Leq
L(90)
dBA
Time


L2: The Hills Bowling Club - Wednesday, 9 September 2020
Leq
L(90)
dBA
80
70
60
50
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20
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1:00
2:00
3:00
4:00
5:00
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Time