Wallacia Country Club Refurbishment

Noise Emission Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to conduct an operational noise emission assessment of proposed refurbishment works at the Wallacia Country Club.

In this report we will:

- Identify relevant noise emission criteria applicable to the site.
- Identify nearby noise sensitive receivers to the site.
- Identify operational noise sources with the potential to adversely impact them.
- Predict operational noise emissions (primarily patron/music noise, gaming room noise and vehicle noise) at the nearest residential receivers and assess the predicted noise levels against acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with the noise emission goals.

2 SITE DESCRIPTION AND PROPOSED WORKS

Wallacia Country Club is located on Park Road, Wallacia.

The works the subject of this development application are:

- Internal refurbishment works, including internal refurbishment of the ground floor to create a function room.
- A New Deck on Ground Floor of the eastern façade.
- New outdoor gaming area adjacent to the existing southern façade.
- Construction of a gym and indoor pool to the north of the main club building.
- Expansion of the existing car park on the southern boundary of the site, and in the north-western corner of the site.
- Construction of a bowling green on the eastern side of the club building.

The Club is bounded by Park Road to the south.

The nearest noise sensitive development to the site is:

- To the north/west of the site – single storey residence at 1586 Mulgoa Road and the Wallacia Hotel, (near the proposed gym/indoor pool and car park expansion).
- To the east – single storey residence at 21 Park Road (the nearest residential property – to the south-east, near the car park expansion, outdoor gaming and main club building).

This assessment has been undertaken for the following closing times:

- Sunday to Thursday – 10pm
- Friday and Saturday - midnight

The currently proposed trading hours of the club are:

- Monday, Wednesday and Thursdays – 10am to 10pm
- Tuesday and Sunday - 10am to 9pm
- Friday and Saturday – 11pm

Where the proposed closing times are earlier than our assessment, the assessment will be conservative since background noise levels decrease later into the night. Therefore, if operation to a later time is acceptable then so too would an earlier closing time.

See aerial photo below.

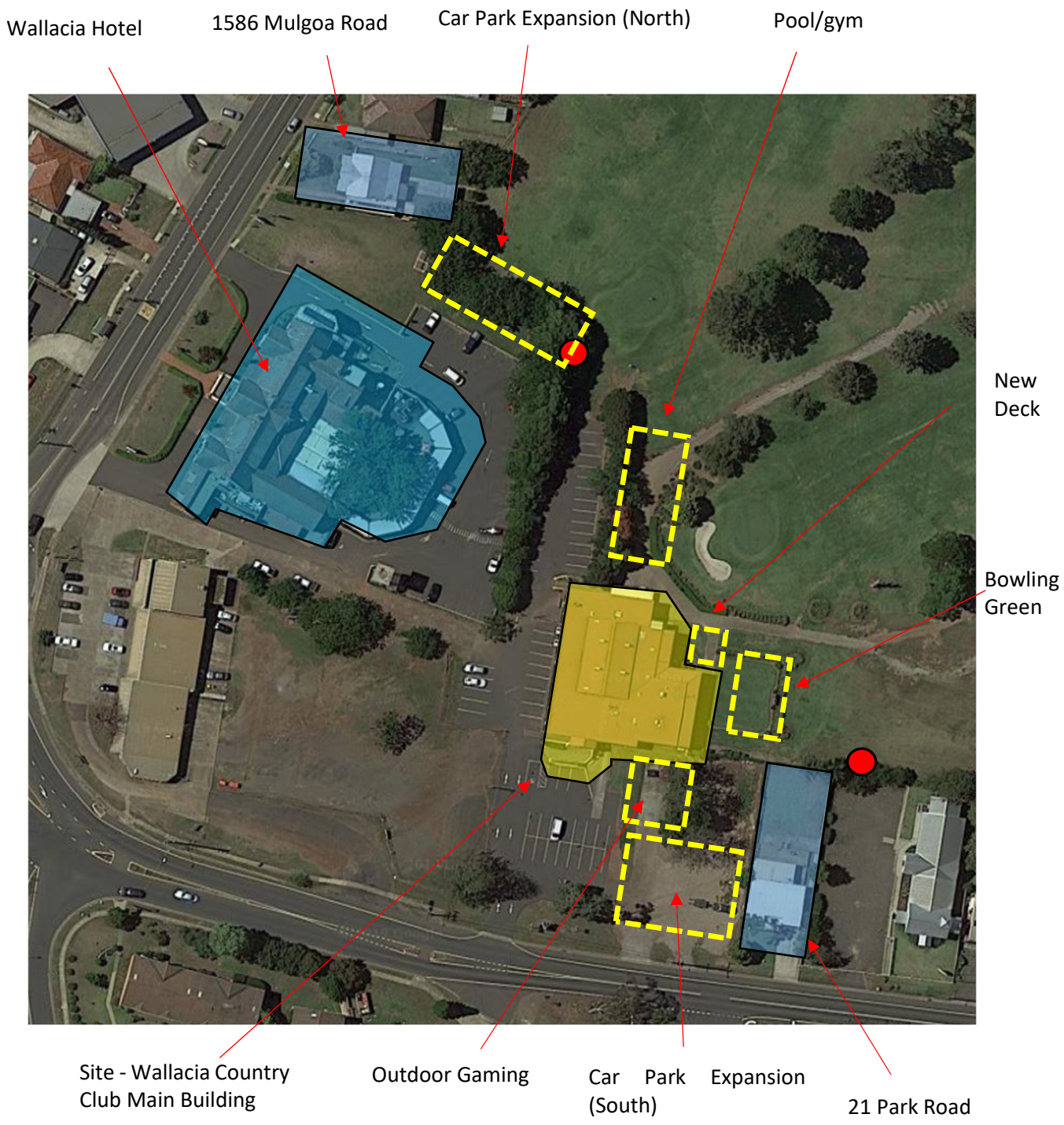


Figure 1 – Site Map
(Sourced from Google Maps)

Noise Monitor Locations

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-minute 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.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15-minute period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

L_{max} levels represent is the loudest noise event during a measurement period.

4 SURVEY OF EXISTING NOISE CONDITIONS

4.1 SURVEY OF AMBIENT NOISE

Long term unattended noise logging was conducted to quantify the existing acoustic environmental at the site.

Unattended noise monitoring using Acoustic Research Laboratories monitors set on A-weighted fast response mode. The monitors were calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded. Periods of adverse weather have been omitted when determine the Rating Background Noise Level. Logging data and daily noise level results are presented in appendix 1.

Two monitors were installed (refer to aerial photograph in section 2):

- One monitor ("Logger A") was installed in the eastern edge of the Wallacia Hotel car park. Ambient noise levels measured here will be indicative of ambient levels at the Wallacia Hotel and 1586 Mulgoa Road. This monitor was installed between 28 October and 5 November 2019.

- A second monitor ("Logger B") was installed near the northern boundary of 21 the Park Road residence. Data measured by this logger is suitable for use in setting noise goals for residences on Park Road. This monitor was installed between 28 October and 5 November 2019.

Measured long term noise levels are presented below.

Table 1 – Long Term Noise Logging Data (Rating Background Noise Level)

Monitor Location	Measured Noise Level - Time of Day			
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Overnight (10pm-7am)**	**Up to Close (10pm-12am)**
Wallacia Hotel/ 1586 Mulgoa Road (Logger A)	41dB(A)L_{90}	38dB(A)L_{90}	30dB(A)L_{90}	31dB(A)L_{90}
21 Park Road (Logger B)	44dB(A)L_{90}	46dB(A)L_{90}	35dB(A)L_{90}	39dB(A)L_{90}

In addition, a background noise spectrum on the site was measured on 5 November 2019. The background noise spectrum is presented below.

Table 2 – Background Noise Spectrum (dB)

31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
53	53	50	46	43	41	37	28	18	**46**

5 NOISE EMISSION CRITERIA

Relevant acoustic criteria applicable to the development are as follows:

- Noise associated with the licenced premises – the Office of Liquor and Gaming acoustic criteria. This will be applicable patron/music noise from the outdoor gaming, and the main building (function room, New Deck).

- Noise associated with the car park, gym, pool and plant/equipment. These noise sources are assessed with reference to the EPA Noise Policy for Industry.

5.1 OFFICE OF LIQUOR AND GAMING ACOUSTIC REQUIREMENTS (PATRON/MUSIC NOISE)

When assessing noise emissions from a licensed premise, noise emissions must comply with the acoustic requirements imposed by the Office of Liquor Gaming and Racing:

These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *That the L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises.*

- *L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises.*

- *After midnight, noise emissions from the Place of Pubic Entertainment are to be inaudible within any habitable rooms in nearby residential properties.*

The site is not proposed to operate after 12am. Corresponding noise emission goals from patrons/music/gaming are as follows:

Table 3 –Noise Emission Goals - 21 Park Road

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
Noise Emission (6pm to 10pm) Goal – dBL_{10}	59	59	56	52	48	47	42	34	24	**51**
Noise Emission (10pm-12am) Goal – dBL_{10}	57	57	54	50	46	45	40	32	22	**49**

Table 4 –Noise Emission Goals
Wallacia Hotel and 1586 Mulgoa Road

	31.5Hz	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**A-weighted level**
Noise Emission (6pm to 10pm) Goal – dBL_{10}	51	51	48	44	40	39	34	26	16	**43**
Noise Emission (10pm-12am) Goal – dBL_{10}	54	54	51	47	43	42	37	29	19	**46**

5.2 EPA - NOISE POLICY FOR INDUSTRY (NPfI)

Noise sources covered by this code will include vehicle noise (generated on the site) and mechanical services noise. The Intrusiveness, Project Amenity criteria and Sleep Disturbance criteria (as set out below) must be complied with.

5.2.1 NPfI - Intrusiveness Noise Goals

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels. The criteria are as follows:

Table 5 - EPA Intrusiveness Criteria

Location	Time of Day	Background noise Level - dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
Wallacia Hotel/ 1586 Mulgoa Road	Day Time (7am - 6pm)	41	46
	Evening (6pm - 10pm)	38	43
	Up to Close (12am)	31	36
	Overnight (10pm - 7am)	30	35
21 Park Road	Day Time (7am - 6pm)	44	49
	Evening (6pm - 10pm)	46	51
	Up to Close (12am)	39	44
	Overnight (10pm - 7am)	35	40

5.2.2 NPfI – Project Amenity Goals

Project amenity criteria are determined based on the land use in the area (residential/commercial/industrial). The residential land use is then further categorised into rural, sub-urban and urban areas.

For the purpose of this assessment the existing residential dwellings will be considered suburban.

Table 6 - EPA Project Amenity Criteria

Noise Receiver	Amenity Noise Level – dB(A)$L_{eq(15min)}$		
	Daytime	Evening	Night
Existing Residential (Sub-urban)	53	43	38

5.2.3 Sleep Disturbance

Potential sleep arousal impacts should be considered for noise generated after 10pm.

Sleep arousal is a function of both the noise level and the duration of the noise. Sleep arousal criteria in the Noise Policy for Industry have been *average* ($L_{eq(15min)}$) and momentary peak noise events (L_{Max}) noise events that must be considered.

As recommended in the NPfI, to assess potential sleep arousal impacts, a two-stage test is carried out:

- Step 1 – Section 2.5 *Maximum noise level event assessment* from the NPfI states the following:

  Where the subject development/premises night-time noise levels at a residential location exceed:

  - *$L_{Aeq,15min}$ 40dB(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 greater,*

  a detailed maximum noise level event assessment should be undertaken.

Based on the above the following noise objectives apply:

Table 6 – Sleep Arousal Criteria (*Average*/L_{eq} Noise Levels)

Location	Rating Background Level dB(A)L_{90}	Rating Background Level + 5dB(A)	Governing Criteria dB(A)$L_{Aeq(15mins)}$
Wallacia Hotel/ 1586 Mulgoa Road	30	35	40
21 Park Road	35	40	40

Table 7 – Sleep Arousal Criteria (*Maximum*/L_{Max} Noise Events)

Location	Rating Background Level dB(A)L_{90}	Rating Background Level + 15dB(A)	Governing Criteria dB(A)$L_{(Max)}$
Wallacia Hotel/ 1586 Mulgoa Road	30	45	52
21 Park Road	35	50	52

- Step 2 - If there are noise events that could exceed the average/maximum criteria detailed in the tables above, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number of occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

  For the research on sleep disturbance to date it can be concluded that:

  - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*
  - *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

6 NOISE EMISSION ASSESSMENT

An assessment of operational noise emissions is presented. The following noise sources are assessed:

- Main building (function room, outdoor areas).
- Outdoor gaming.
- Gym and Pool.
- Car park expansion.
- A preliminary assessment of noise from mechanical plant.

6.1 NOISE IMPACTS ON 1586 MULGOA ROAD (NORTHERN CAR PARK EXPANSION)

The primary noise source impacting this residence is the car park expansion in the northern-western corner of the site.

Noise emissions from the car park are assessed with refence to the EPA Noise Policy for Industry

The assessment is based on the following assumptions:

- Engine noise from passenger vehicles within car park: 82dB(A)L_{eq} sound power.
- Car door Slam/Raised voice (night time peak noise event): 95dB(A)L_{max} sound power.
- An approximate increase of 30 new spaces.
- During a peak period, it is assumed that all 30 spaces are vacated over a 30 minute period, and it typically takes 30 seconds for a vehicle to exit the site

Operational noise levels are predicted and assessed against the NPfI criteria detailed in section 5.

An assessment of both the *average* ($L_{eq(15min)}$) and *peak* noise events (L_{max} for sleep disturbance) is presented below.

Predicted noise levels are presented below.

Table 8 – Car Park Expansion – Noise Impact Assessment on 1586 Mulgoa Road (Average/L_{eq} Noise Emission Assessment) – 12am Assessment

Activity	Criteria	Permitted Noise Level	Predicted Noise Level	Complies
Car movement	Intrusiveness Criteria	36dB(A)$L_{eq(15min)}$*	36dB(A)$L_{eq(15min)}$	Yes
	Amenity Criteria	38dB(A)$L_{eq(15min)}$*	36dB(A)$L_{eq(15min)}$	Yes

Table 9 – Car Park Expansion – Noise Impact Assessment on 1586 Mulgoa Road (Peak event/L_{Max} Noise Emission Assessment) – Sleep Disturbance Assessment

Activity	Criteria	Screening Noise Level	Predicted Noise Level	Complies
Car start/door close	Sleep Disturbance – Maximum Noise Level	52dB(A)$L_{(max)}$	57dB(A)$L_{(max)}$*	Exceeds the screening level – additional analysis needed

*Parking space nearest 1586 Mulgoa Road including noise reduction from the boundary fence.

With respect to the potential sleep disturbance as a result of the short duration peak noise events the analysis indicates that a more detailed assessment of noise impacts is indicated.

In the event that a bedroom window to the residences is left open, one would expect that the noise level inside a bedroom would be 10dB(A) less than the noise level outside.

- The probability of an additional awakening per night from short term events in the proposed carpark is predicted to be 0.05. Or in other words, on average, there is a probability of an awakening occurring one night in 20 of operation. This assumes the events will be distributed around the carpark and all events will occur at the maximum (worst case) noise level. Given the Club will only operate 2 nights per week after 10pm, in this case an awakening will occur once every 2 ½ months. On average, people experience around 1 awakening per night for reasons other than noise, so the predicted additional sleep impact is very small.

- The nearest receiver on Mulgoa Road is already located next to an existing carpark. Noise generated by the existing carpark would only be 3 dB less than generated by the proposed carpark extension.

- Noise levels from general traffic movements on Mulgoa Road were also predicted. Passenger vehicles are predicted to generate 57 dB(A) at the subject residence, and 74 dB(A) from heavy vehicles. Passenger vehicle movements will generate a similar noise levels at the residence to those generated by the proposed extension, and heavy vehicle noise will be considerably louder. When the likely number of vehicle movements over a whole night are considered, the probability of an awakening occurring from existing vehicle movements on Mulgoa Road is likely to be significantly greater than from the carpark extension.

- The NPfI states that research on sleep disturbance indicates that maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep and one to two noise events per night and maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly. The predicted internal noise levels (windows open) are predicted to be less than 50-55 dB(A).

Taking the above factors into consideration, negligible additional sleep arousal impact from the proposal is indicated.

6.2 NOISE IMPACTS ON WALLACIA HOTEL (NEW POOL AND GYM ASSESSMENT)

The proposed gym and pool area lie closest to the Wallacia Hotel, which we assume has overnight accommodation.

Noise emissions from the pool/gym are assessed with refence to the EPA Noise Policy for Industry

The assessment is based on the following assumptions:

- A sound pressure level within the pool/gym of up to 75dB(A) (typical of a busy indoor pool or gym with moderate background music).
- That the building treatments detailed in section 7 are adopted.
- That the doors to the pool/gym are momentarily open (a worst case scenario).

Predicted noise levels are presented below.

Table 10 – Pool and Gymnasium Emissions – Noise Impact Assessment on Wallacia Hotel (Average/L_{eq} Noise Emission Assessment) – 10pm Assessment

Activity	Criteria	Permitted Noise Level	Predicted Noise Level	Complies
Pool and Gymnasium	Intrusiveness Criteria	43dB(A)$L_{eq(15min)}$*	<35dB(A)$L_{eq(15min)}$	Yes
	Amenity Criteria	43dB(A)$L_{eq(15min)}$*	<35dB(A)$L_{eq(15min)}$	Yes

The predicted noise levels are compliant.

The assessment of pool/gym noise at the nearest receiver (Wallacia Hotel) has been made on the assumption that there may be overnight accommodation. As the assessment criteria adopted for the Hotel were the same as a residential receiver, noise impacts to the most impacted residential receivers will be lower (as they are more distant) and also compliant.

6.3 NOISE IMPACTS ON 21 PARK ROAD.

Noise from the outdoor gaming, new deck and function room are assessed (with reference to Office of Liquor and Gaming acoustic criteria) cumulatively below.

Nosie from the car park expansion is assessed with reference to different criteria (the EPA Noise Policy for Industry) and therefore not assessed cumulatively with the other noise sources.

6.3.1 Outdoor Gaming, New Deck and Function Room – 10pm Assessment.

Noise from the outdoor gaming, New Deck (Ground Floor) and Function Room is assessed with reference to the Office of Liquor and Gaming acoustic criteria.

The cumulative noise from these noise sources is presented below.

The assessment is based on the following assumptions:

- Outdoor Deck:
    - Capacity of 60 to be permitted on the Ground Floor New Deck Area.
    - Patron vocal sound power in the Deck Area (outdoor dining – raised voice) of 77dB(A)L_{10} with one in two speaking at once.
    - Acoustic treatment to the perimeter of the deck (solid balustrade) as per section 7 is recommended.
- Gaming Area:
    - Internal sound pressure level of 65dB(A)L_{10} as assumed. This level is the upper end of typical in our experience for outdoor gaming area, provided that the recommendations in section 7 are adopted.
    - Nosie mitigation treatments as detailed in section 7 are to be adopted.
- Function Room:
    - Music in the room to be limited to 85dB(A)L_{10} (moderately loud).
    - Only the north facing doors are to be used after 6pm or during use of amplified music in the Function Room.

The cumulative noise from each of these noise sources is predicted at the property boundary of 21 Park Road, and presented below.

Table 11 – Predicted Noise Emissions to 21 Park Road (Gaming Room, Function Room, Deck)

10pm Assessment	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
Noise Emission Goal – dBL_{10}	56	56	53	49	46	44	40	31	21	**49**
Predicted Noise Emission – dBL_{10}	45	45	46	46	46	43	38	31	22	**48**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The combined noise level of the gaming area, the new deck and the function room is compliant with Office of Liquor and Gaming acoustic criteria provided that the recommendations in section 8 are adopted.

6.3.2 Outdoor Gaming and Function Room – 12am Assessment.

Noise from the Outdoor Gaming, Function Room is assessed with reference to the Office of Liquor and Gaming acoustic criteria. We note that the Outdoor Deck/terrace areas are to be closed after 10pm.

The cumulative noise from these noise sources is presented below.

The assessment is based on the following assumptions:

- Gaming Area:
    - Internal sound pressure level of 65dB(A)L_{10} as assumed. This level is the upper end of typical in our experience for outdoor gaming area, provided that the recommendations in section 7 are adopted.
    - Nosie mitigation treatments as detailed in section 7 are to be adopted.
- Function Room:
    - Music in the room to be limited to 85dB(A)L_{10} (moderately loud).
    - Only the north facing doors are to be used after 6pm or during use of amplified music in the Function Room.

The cumulative noise from each of these noise sources is predicted at the property boundary of 21 Park Road, and presented below.

Table 12 – Predicted Noise Emissions to 21 Park Road (Gaming Room, Function Room)

12am Assessment	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
Noise Emission Goal – dBL_{10}	57	57	54	50	46	45	40	32	22	**49**
Predicted Noise Emission – dBL_{10}	40	40	40	40	39	36	31	25	16	**40**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The combined noise level of the gaming area and the function room is compliant with Office of Liquor and Gaming acoustic criteria provided that the recommendations in section 8 are adopted.

6.3.3 Vehicular Noise (Car Park Expansion)

The proposed car park expansion at the southern end of the site is adjacent to the western façade of 21 Park Road. We note that the area in which the expansion is proposed is already used for vehicle parking (although on an unpaved surface).

Noise emissions are assessed with refence to the EPA Noise Policy for Industry

The assessment is based on the following assumptions:

- Engine noise from passenger vehicles within car park: 82dB(A)L_{eq} sound power.
- Car door Slam/Raised voice (night time peak noise event): 95dB(A)L_{max} sound power.
- An approximate increase of 35 new spaces near the eastern boundary.
- During a peak period, it is assumed that all 35 spaces are exited over a 30 minute period, and it typically takes 30 seconds for a vehicle to exit the site

Operational noise levels are predicted and assessed against the NPfI criteria detailed in section 5.

Predicted noise emissions are made on the assumption that the acoustic treatments detailed in Section 7 are adopted (new fence along the eastern boundary of the car park).

An assessment of both the *average* ($L_{eq(15min)}$) and *peak* noise events (L_{max} for sleep disturbance) is presented below. While the club trading hours cease at 10pm, an assessment of seep disturbance is presented in the event that a staff member or similar leaves the site after 10pm.

Predicted noise levels are presented below.

Table 13 – Car Park Expansion – Noise Impact Assessment on 21 Park Street (Average/L_{eq} Noise Emission Assessment) – 12am Assessment

Activity	Criteria	Permitted Noise Level	Predicted Noise Level	Complies
Car movement	Intrusiveness Criteria	40dB(A) $_{(15min)}$	38dB(A)$L_{eq(15min)}$	Yes
	Amenity Criteria	38dB(A)$L_{eq(15min)}$	38dB(A)$L_{eq(15min)}$	Yes

Table 14 – Car Park Expansion – Noise Impact Assessment on 21 Park Street (Peak event/L_{Max} Noise Emission Assessment) – Sleep Disturbance Assessment

Activity	Criteria	Screening Noise Level	Predicted Noise Level	Complies
Car start/door close	Sleep Disturbance – Maximum Noise Level	52dB(A)$L_{(Max)}$	65dB(A)$L_{(Max)}$*	Exceeds the screening level – additional analysis needed

*Parking space immediately adjacent to window on western façade of 21 Park Road.

With respect to the potential sleep disturbance as a result of the short duration peak noise events the analysis indicates that a more detailed assessment of noise impacts is indicated.

- The additional awakenings per night from the short term events is predicted to be 0.2. Or in other words, there is a probability of an awakening occurring on average of around one night in 5 of operation. This assumes the events will be distributed around the carpark and all events will occur at the maximum (worst case) noise level. Given the Club will only operate 2 nights per week after 10pm, in this case that means once every 3 weeks. On average, people experience around 1 awakening per night for reasons other than noise, so the additional impact on awakens is small.

- The 21 Park Road residence is already located next to an existing carpark, and the area proposed to be used is already used for overflow carparking. The proposal includes the construction of a boundary screening fence that will benefit the residence in respect of existing noise levels.

- Noise levels from general traffic movements on Park Road were also predicted at the residence. Passenger vehicles are predicted to generate 62 dB(A) at the subject residence, and 79 dB(A) from heavy vehicles. Passenger vehicle movements will generate a similar noise levels at the residence to those generated by the proposed extension, with heavy vehicle noise levels considerably higher. When the likely number of vehicle movements over a whole night are considered, the probability of an awakening occurring from existing vehicle movements on Park Road is likely to be significantly greater than from the carpark extension.

- The NPfI indicates that research on sleep disturbance indicates that maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep and one to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly. The predicted internal noise levels (windows open) are predicted to be in the range 50-55 dB(A).

Taking the above factors into consideration, negligible additional sleep arousal impact from the proposal is indicated with the mitigation proposed.

6.4 NOISE FROM MECHANICAL PLANT

Cumulative assessment of both plant noise with other noise sources is recommended when conducting acoustic design of plant items. This is particularly important for plant noise near the eastern property boundary, where cumulative assessment with the plant/vehicle noise is to be considered.

Compliance with EPA acoustic criteria (as set out in Section 5.2) will be achievable, provided that detailed acoustic review of plant items is undertaken once plant is selected, and acoustic treatments similar to those outlined above are adopted.

7 RECOMMENDATIONS

We recommend the following management controls in order to achieve compliance with the noise emission criteria outlined in section 5.

- Site to cease trading at 12am.
- Outdoor Terrace/Deck on Ground floor must cease use at 10pm.
- Outdoor space on Lower Ground Floor is to be used only as a breakout space for the Lower Ground Floor function rooms, and must not be used after 8pm.
- Pool and Gym:
    - All doors to have automatic closers.
    - All glazing to be minimum 6.38mm (R_w 31). No ventilation louvres are to face west unless acoustically treated to equivalent of the R_w 31 façade.
    - Music to be kept to background levels (70dB(A)$L_{eq(15min))}$).
- Outdoor Gaming Area:
    - The opening size in the roof for ventilation is not to exceed 75m^2.
    - Lining (70% of the total ceiling surface areas) must have a noise reduction co-efficient of at least 0.75 and be suitable for outdoor use (50mm Echosoft). Any facing to the acoustic lining must be perforated (minimum 20% open area).
    - Similarly, the inside face of solid bounding walls to the Outdoor Gaming Area are also to have noise absorptive lining with 50mm Echosoft (70% of the total wall surface areas). Any facing to the acoustic lining must be perforated (minimum 20% open area).
    - Bounding walls to the Gaming Area must solid (no holes), constructed of masonry/fc sheet or material with equal or higher surface density.
    - Gaming Machines are not to dispense coins.
    - Noise level from machines must not exceed 65dB(A) at 1m distance from the machine.
- New Car Parking Areas:
    - Solid fence (2.1m high) is recommended along the eastern boundary of the new eastern car park (to protect 21 Park Road).
    - Solid fence (2.1m high) is recommended along perimeter of the new northern car park. Fence to run along the western edge of the car park, and along the western half of the northern edge of the car park (to protect the Mulgoa Road residence).

- Fence to be lapped and capped timber or Colorbond. It is to extend for the full length of the eastern boundary of the car park. Fence can taper in height down as it approaches the southern boundary (to ensure adequate vehicle sightlines are maintained).

- Recommend that spaces in the new car parks are not used by staff to ensure that the parking spaces closest to property boundaries are not used after 10pm
- Security/management to ensure that patrons do not congregate in car park areas, and leave the site promptly in the evening after leaving the club building.

- Ground Floor New Deck:

  - Patron numbers to be limit to 60 in this area.

  - A solid balustrade (glass/Perspex or similar) is recommended around the perimeter of the New Deck and Smokers Terrace area to act as a noise screen to the residence at 21 Park Road. Balustrade/screen to be no less then 1.8m high.

- Function Room:

  - Moderate music noise levels (up to 85dB(A)L_{10}) are permitted in this space.

  - Windows/Doors to these spaces are to be constructed using 10.38mm laminated glass with acoustic seals.

  - Roof to the function room to be solid plasterboard (ie – no holes), to prevent excessive noise egress via the roof/ceiling. Floor is recommended to be carpeted. Alternatively a noise absorptive lining (NRC 0.7) is recommended to 60% of the underside of the ceiling area.

  - During use of the function room after 6pm, it is recommended that the east facing doors to the terrace are kept closed. North facing doors to eb used for egress.

- Waste Collection and Management

  - Waste should be retained within the buildings between the hours of 10pm and 7am (and 8am on weekends) to minimise emissions at night.

  - Waste collections should occur between 7am and 9pm weekdays and 8am and 8pm weekends.

- Generally:

  - Existing areas (Lower ground terrace) are not to change their operation (with respect to number of patrons, use of music or times of use).

  - Use of the bowling green:

    - This is recommended to cease at 6pm.

    - Unruly behaviour (eg shouting during barefoot bowls) is to be prohibited by staff.

- Bottle and waste disposal not to be done in external areas after 10pm.
- Management to install signs reminding patrons to respect neighbouring residents and leave the site quietly at night time.
- Detailed acoustic review of any new plant and equipment should be conducted at CC stage to ensure plant noise is acoustically treated such that noise emission will comply with the EPA Noise Policy for Industry.

8 CONCLUSION

Noise emissions associated with the proposed Wallacia Country Club alterations/refurbishment development have been assessed with reference to relevant EPA, Office of Liquor and Gaming and Council acoustic guidelines.

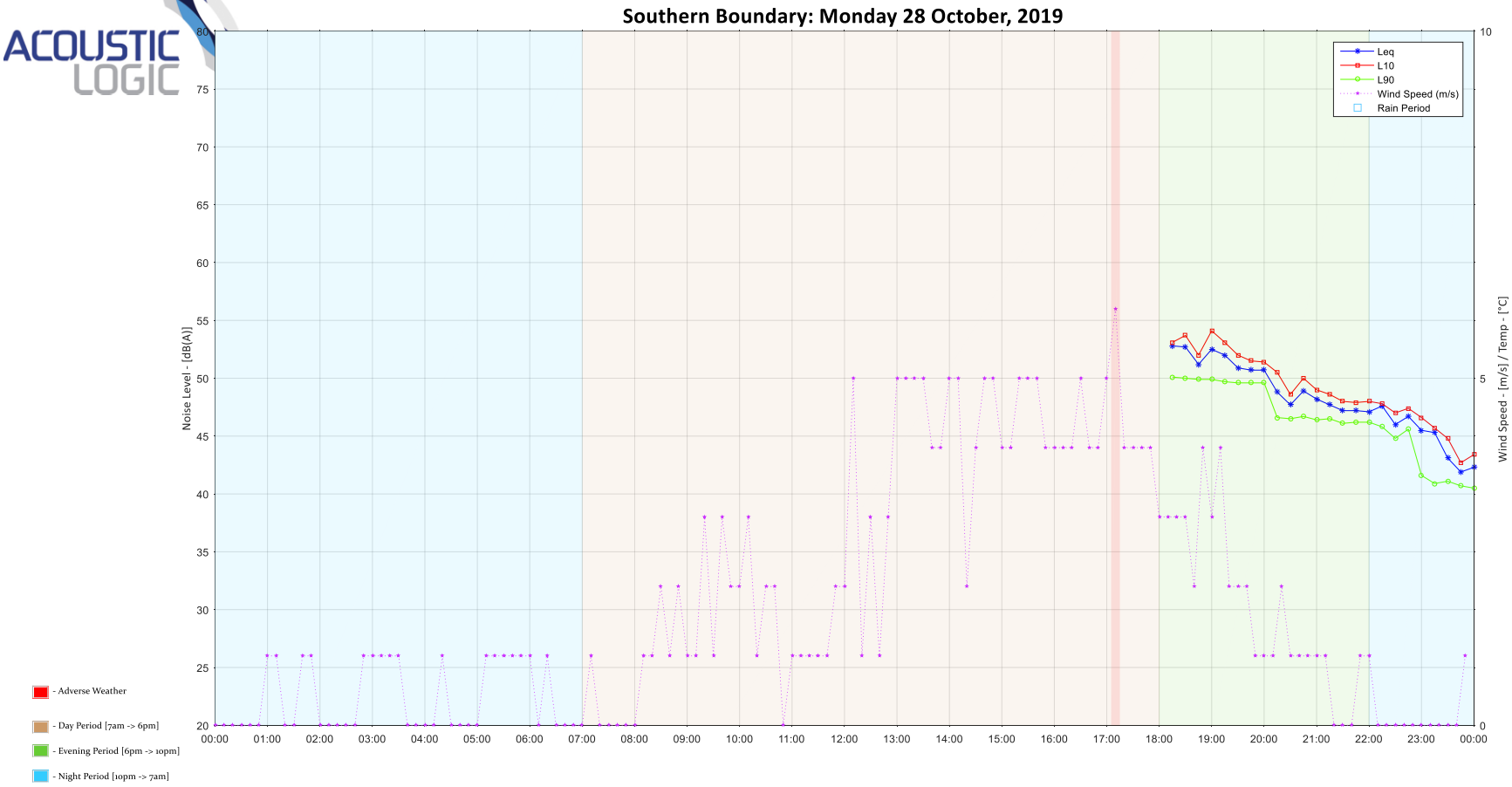
Provided that the recommendations presented in Section 7 of this report adopted, noise emissions from the operation of the site will comply with acoustic criteria set out in section 5, ensuring no unacceptable noise impact on nearby properties.

Yours faithfully,

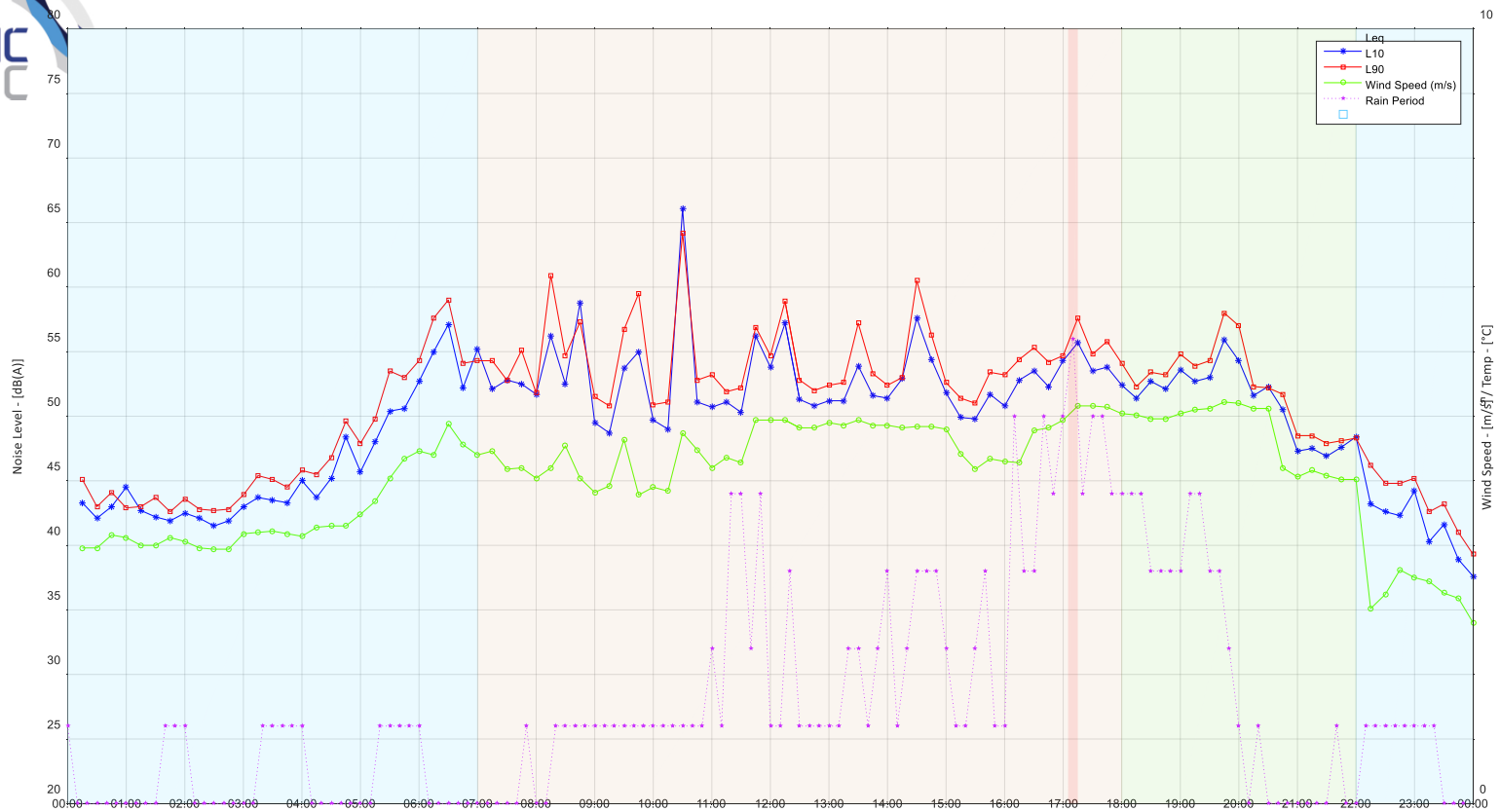
Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

Appendix 1

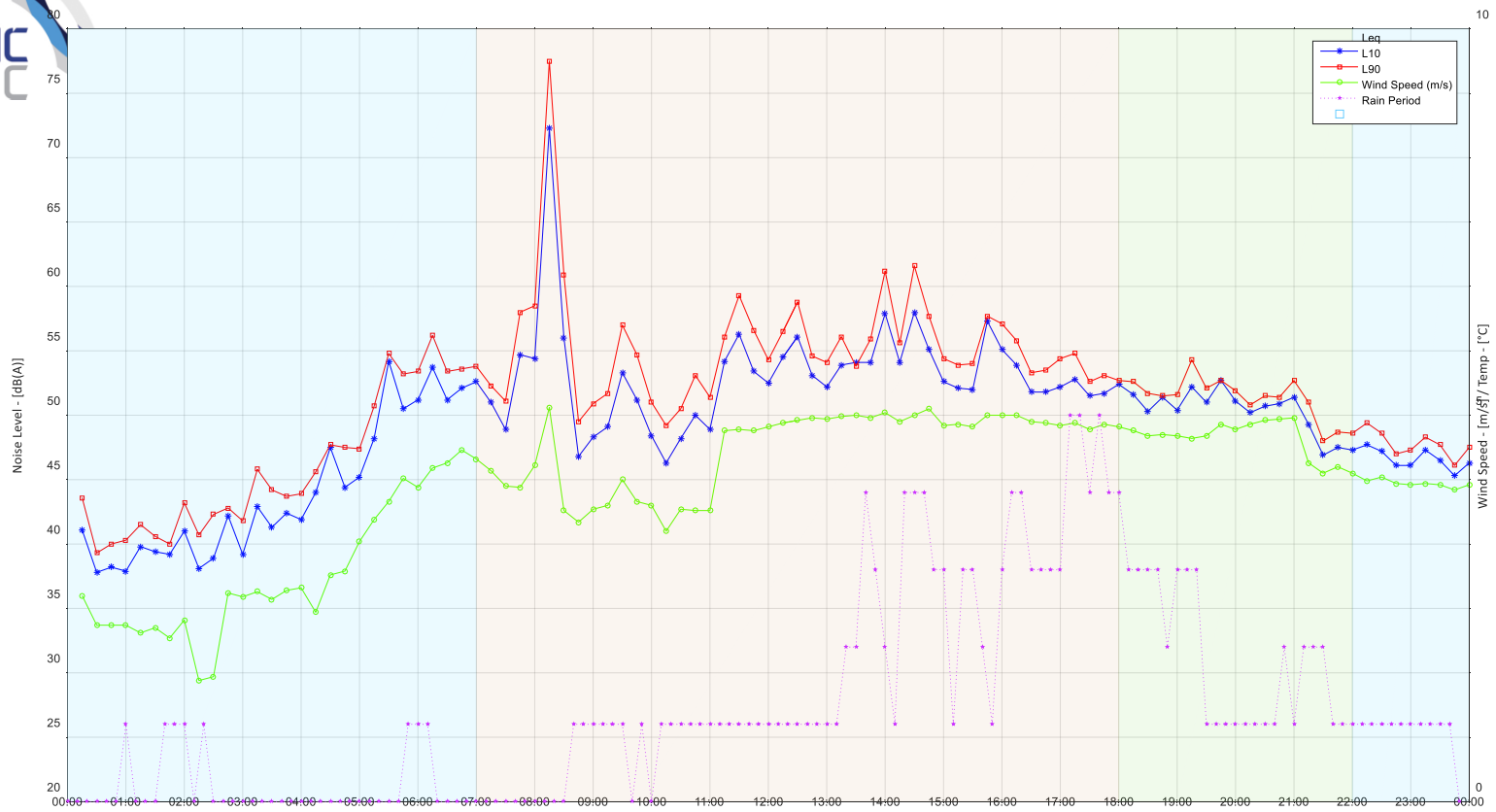
Background Noise Logging Results – 21 Park Road

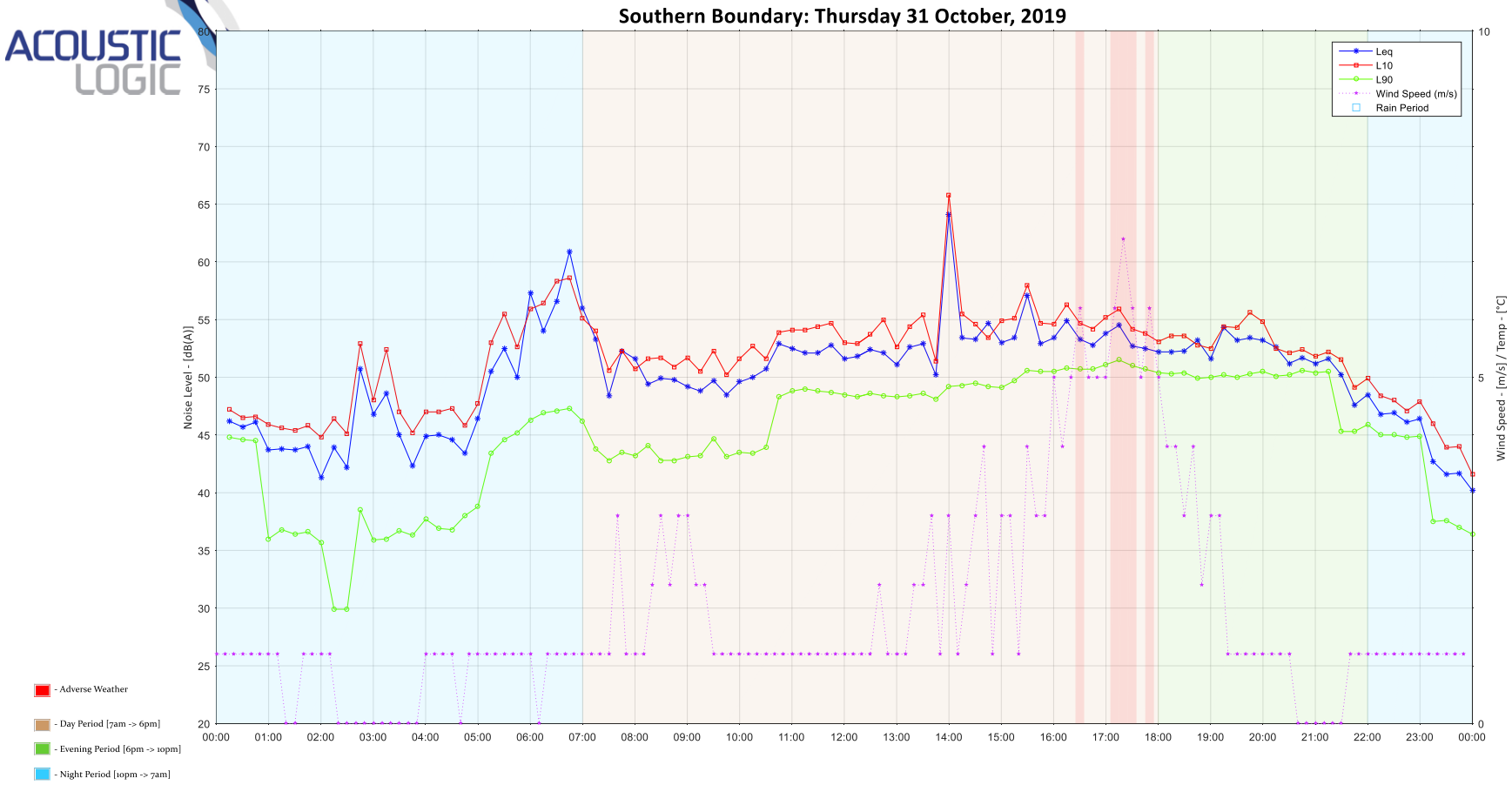


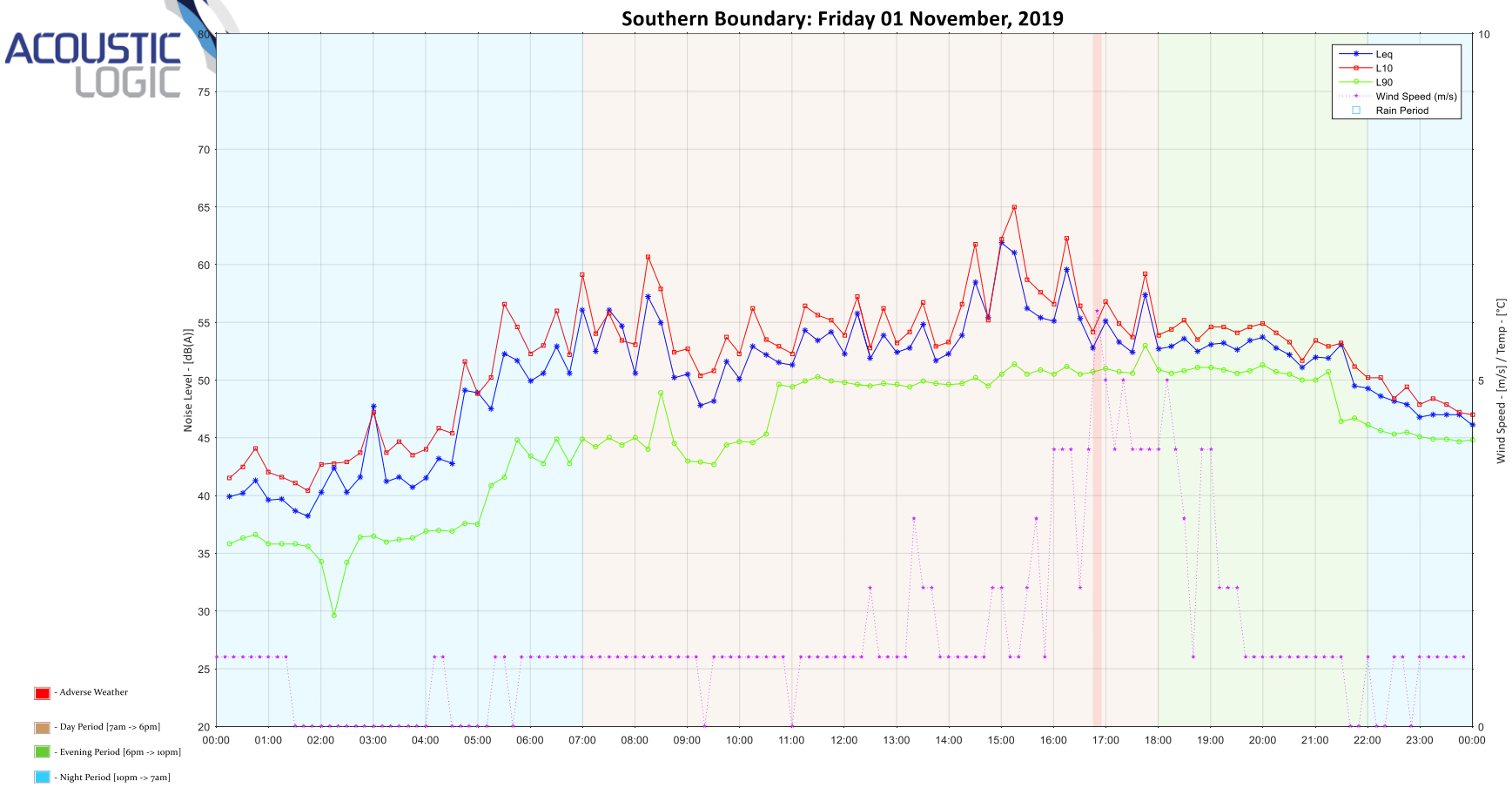
Southern Boundary: Tuesday 29 October, 2019

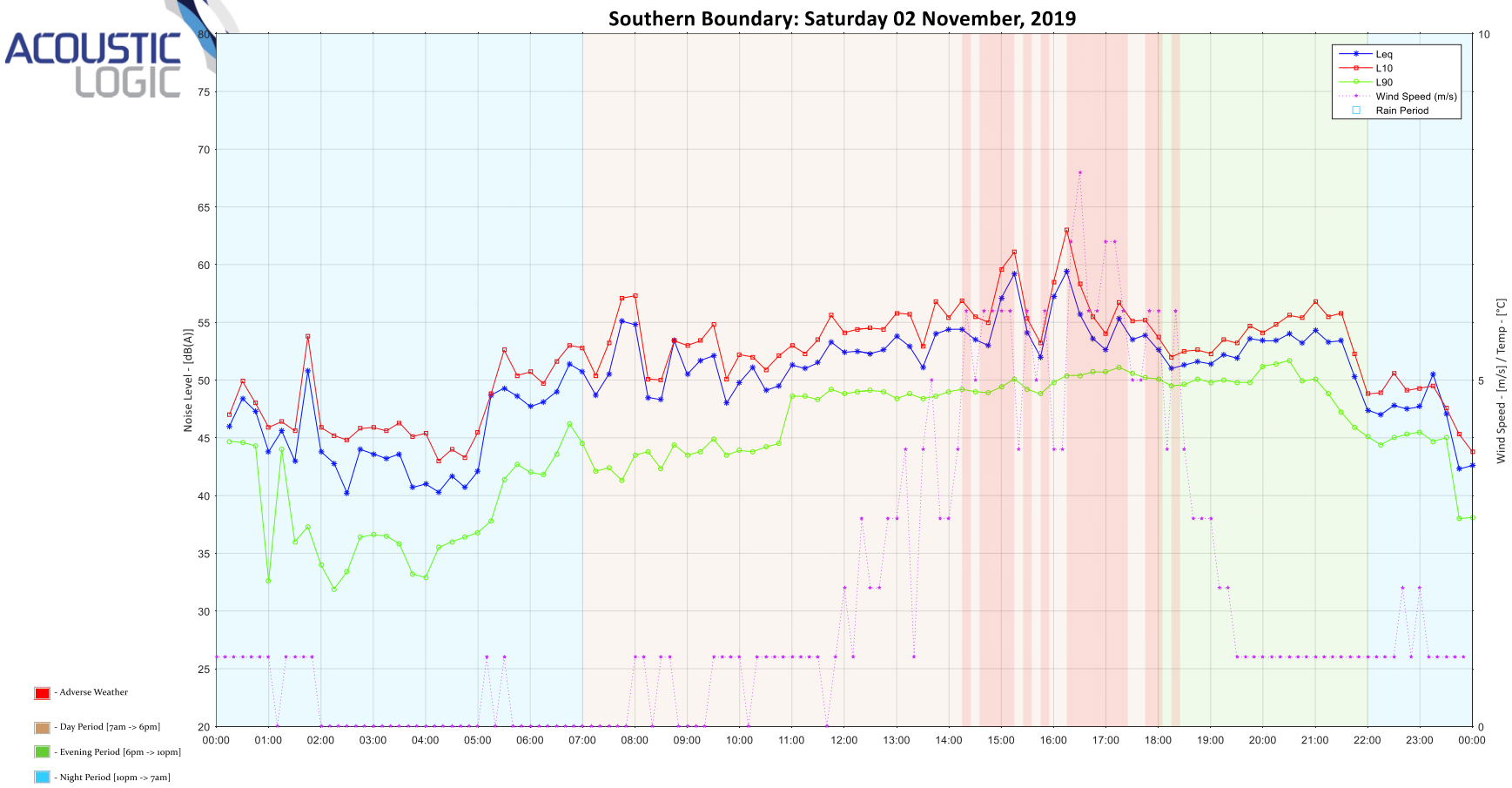


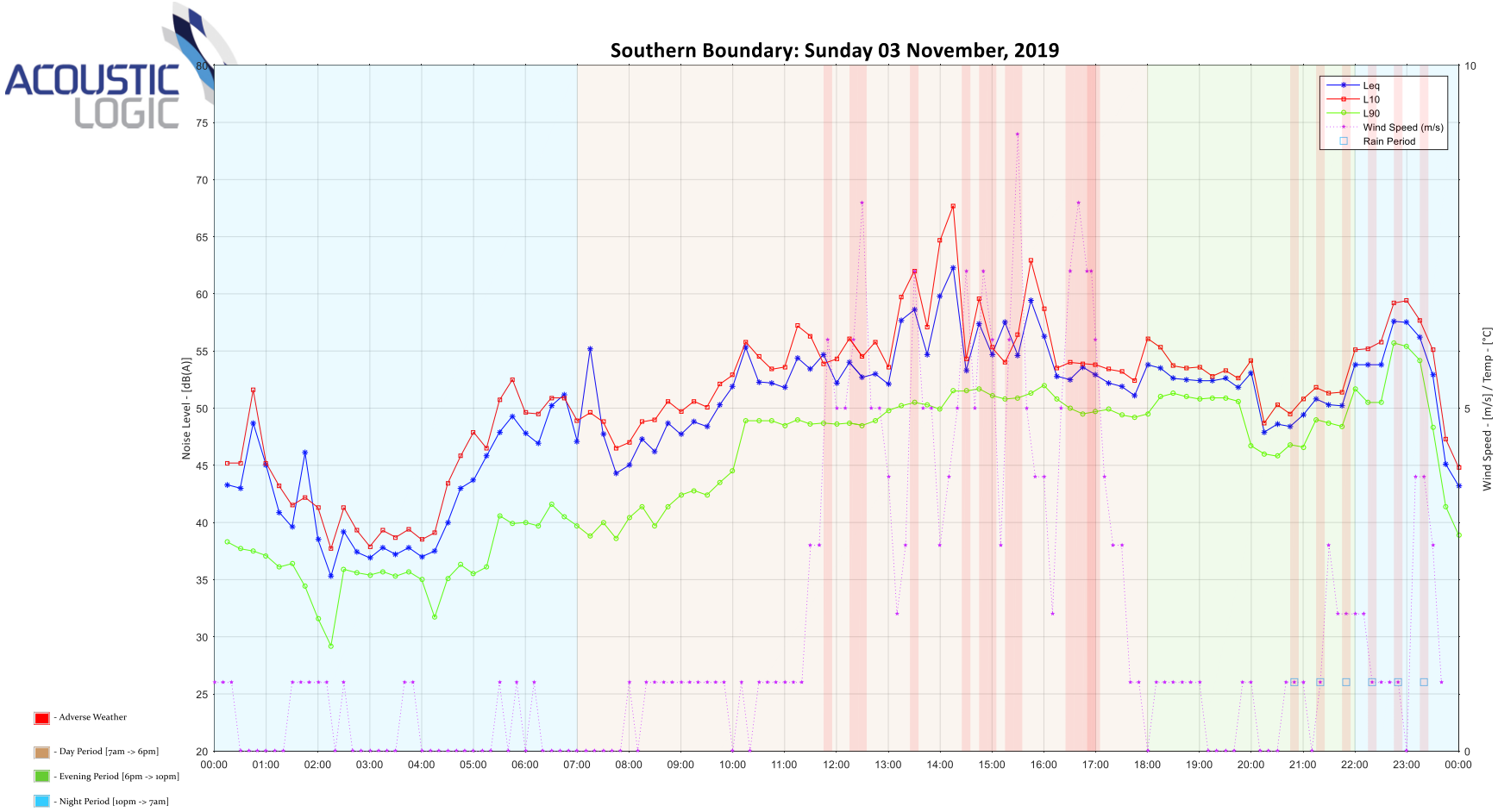
Southern Boundary: Wednesday 30 October, 2019

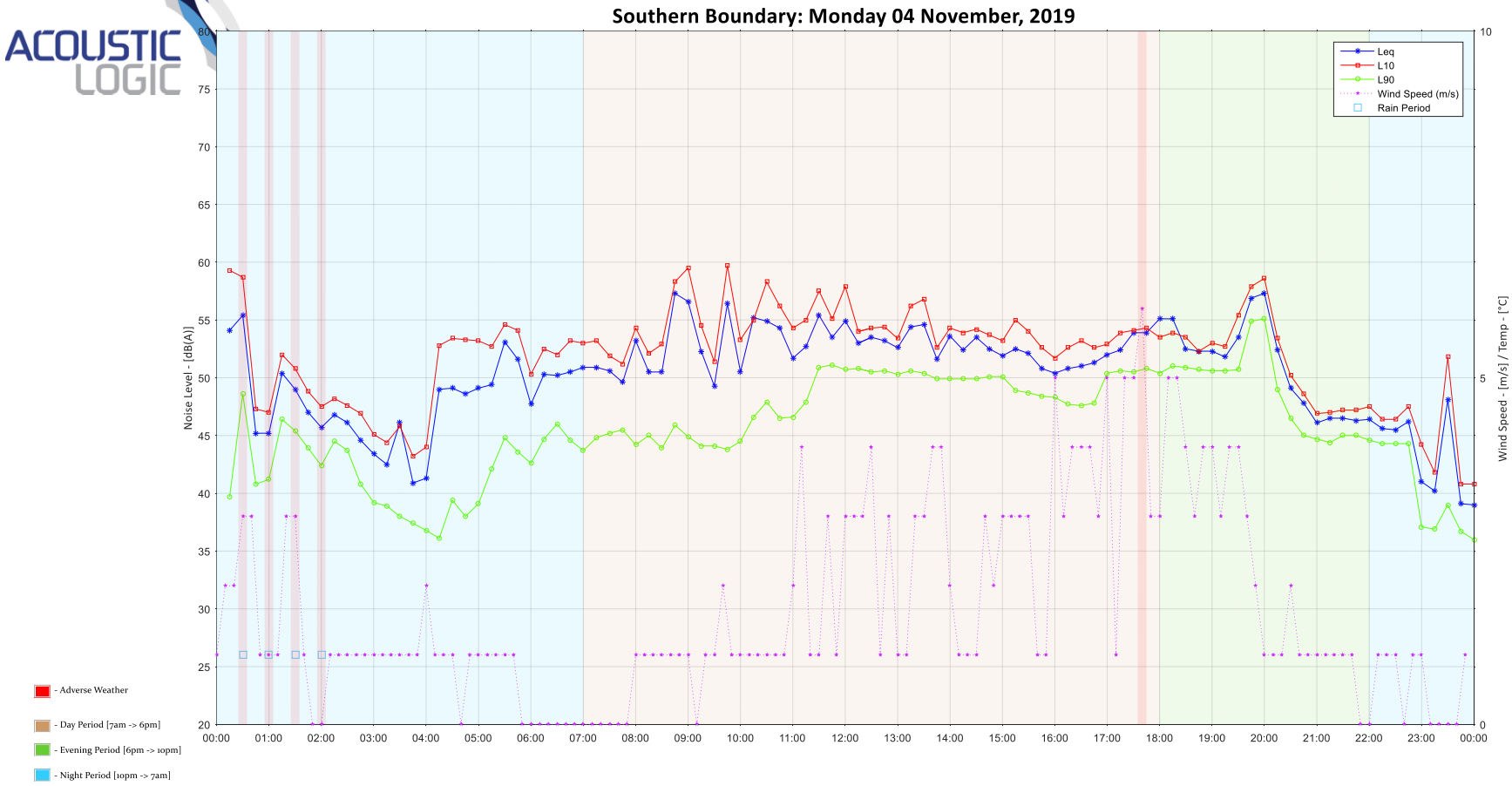


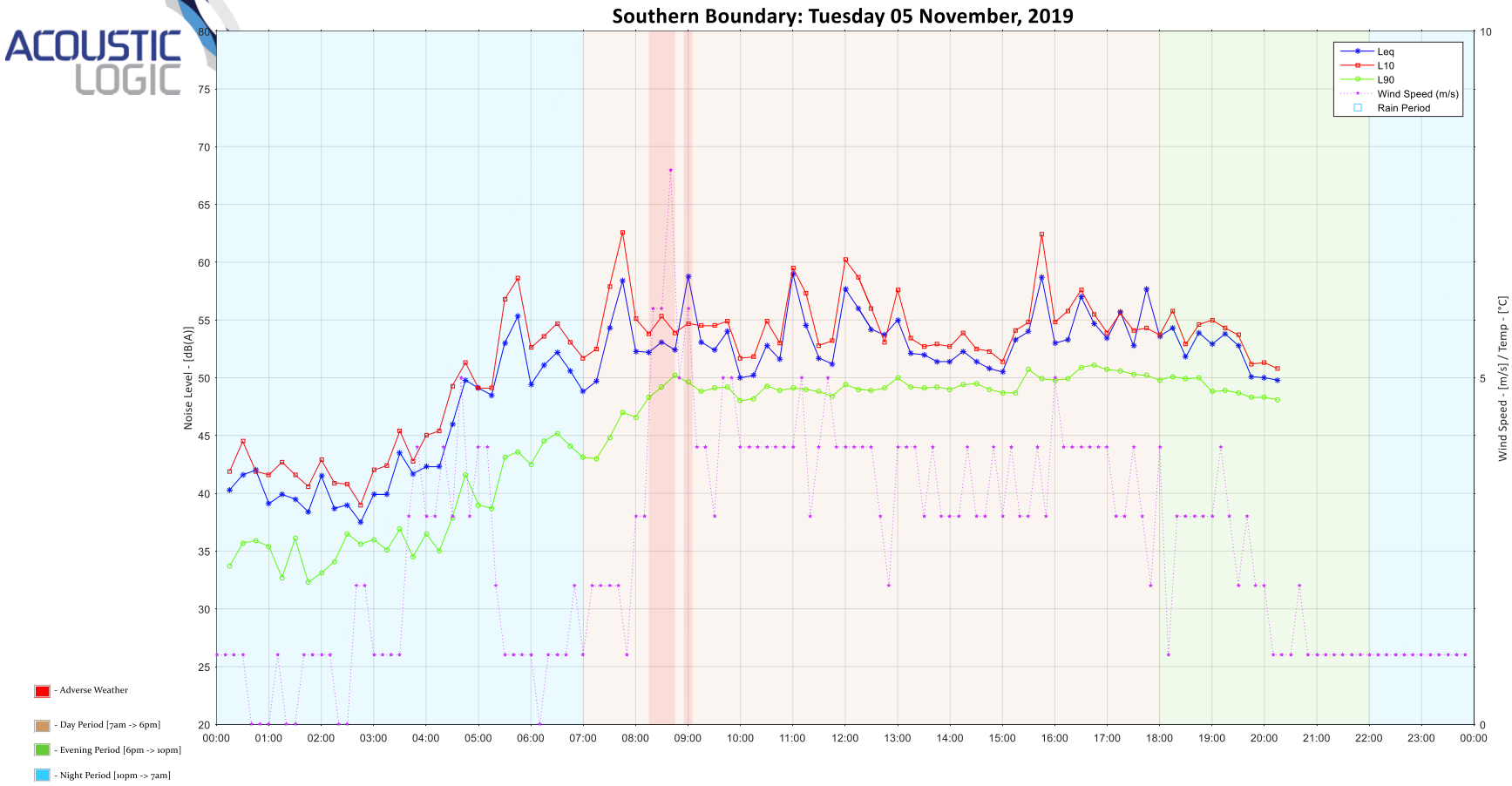






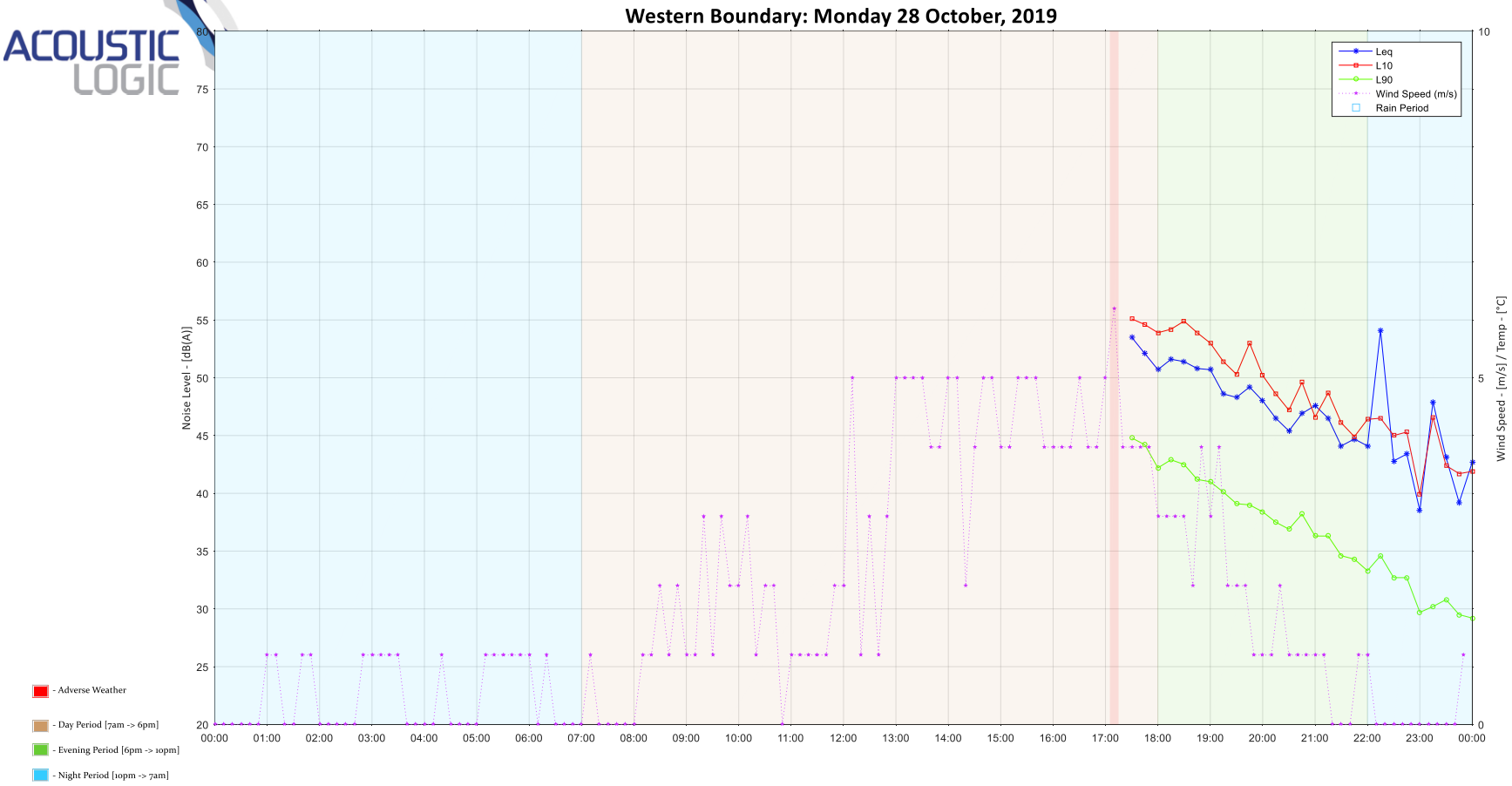






Appendix 2

Background Noise Logging Results – 1586 Mulgoa Road



Western Boundary: Tuesday 29 October, 2019