

ELANORA HOTEL, EAST GOSFORD

DA Acoustic Assessment

26 July 2024

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TN253-01F02 DA Acoustic Assessment (r5)

Document details

Detail	Reference
Doc reference:	TN253-01F02 DA Acoustic Assessment (r5)
Prepared for:	John Singleton Group
Address:	120b Underwood Street Paddington NSW 2021
Attention:	Rachel Hulks

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Authorised
16/10/23	Draft issue	-	0	H.Pearce	-	
18/10/23			1, 2, 3	H.Pearce		
26/07/24			4	T.Taylor		
26/07/24	Final issue		5	T.Taylor		
File Path: R:\AssocSydProjects\TN251-TN300\TN253 hpe Elanora Hotel\1 Docs\2 Report\TN253-01F02 DA Acoustic Assessment (r5).docx						

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1 Introduction

Renzo Tonin & Associates was engaged to undertake an operational noise assessment to support the Development Application (DA) for the proposed alterations and additions at Elanora Hotel, 41-45 Victoria Street, East Gosford.

The proposed scope of works is as follows:

- Extension of venue to include additional dining area large terrace/beer garden with retractable roof
- Extension to kitchen
- Changes to site entry/exit
- Bottle shop - work relates to reconfiguration and repositioning; access still from Victoria Street, egress for delivery vehicles to Victoria Street, passenger vehicle egress to Victoria Street or via ramp to Brougham St.
- Add - Motel (61 rooms) in a new 3-storey building, running parallel with Brougham St
- Implementation of a two-level parking arrangement, with entry/exit to/from the upper level via Victoria Street, one way ramp down from the upper parking to the lower parking, entries to the lower parking from Adelaide and Brougham and lower parking exit via Brougham Street.

The current trading hours are as follows:

- Hotel & Dragon Lounge
 1. Monday - Saturday 10:00am - Midnight
 2. Sunday 10:00am - 10:00pm
- Brasserie & Grill
 1. 11:30am - 9:00pm, 7 days a week
- Bottle Shop
 1. Monday - Saturday 9:00am - 11:00pm
 2. Sunday 10:00am - 10:00pm

The new terraces will be positioned behind the existing hotel building (demolition of the existing motel accommodation) along Adelaide Street with the new 3-storey motel situated towards the north-east fronting Brougham Street. The front side of the existing hotel building facing Victoria Street will be retained. No change is proposed to the existing Bar, Dining, Gaming and Outdoor Areas of the original hotel on the intersection of Victoria and Adelaide Streets.

The on-site accommodation will continue to be managed by the operator.

With the additions, the patron capacity will increase from by approximately 400 patrons.

The primary aspects of noise emission with respect to DA will be outdoor patrons and background music (if provided, but music for entertainment is not proposed outdoors) from the new terraces and breakouts from the internal space mainly the Dining Area that is connected directly to the Upper Terrace.

The use as proposed will be required to comply with the general acoustic requirements of the Central Coast Council for a licensed premise, if any, and has been assessed to the noise condition of the Liquor & Gaming NSW (L&GNSW) (for patron and music noise), the Noise Policy For Industry (for noise from mechanical plant and vehicles being driven on the site), the Road Noise Policy (for additional noise on the public roads from additional traffic generated by the development), and internal road traffic noise goals for the Motel either from SEPP (Transport and Infrastructure) or AS2107:2016, and internal patron noise goals based on existing site conditions.

We anticipate that alterations/ additions may be required to the mechanical services and refrigeration plant and equipment and so have determined project noise emission goals in accordance with the NSW Environment Protection Authority (EPA) Noise Policy for Industry (NPfI) so that they can be assessed by the client once plant selections are available.

APPENDIX A contains a glossary of acoustic terms used in this report.

2 Project description

2.1 Site description and development overview

The site is located on Victoria Street, East Gosford. The nearest residential receivers are identified along Brougham Street (multi-unit residential development at 17 Brougham Street and 21 Brougham Street across the roundabout) and Victoria Street (single and double-storey residential dwellings and the multi-unit residential development at 25 Victoria Street). Figure 1 below presents the subject site location.

Figure 1: Site location



2.2 Acoustic aspects

Based on the proposed design and operational parameters, the following aspects are deemed to require acoustic assessment:

- Outdoor patrons on the Adelaide Street balconies and the beer garden/outdoor dining areas.
- Mechanical services and refrigeration system plant and equipment
- Vehicle movements on-site and car parking activities
- Additional noise from additional traffic generated by the proposed alterations.

At this early stage of the DA process, additional mechanical services and refrigeration plant and equipment specification is not available and therefore, in-principal recommendations have been included in Section 8.3. Compliance with the nominated project noise emission goals should be achievable subject to detailed assessment for Construction Certificate.

2.3 Acoustic assessment methodology

In order to assess the potential noise impact from subject proposal the following methodology was used:

- Identify nearest most potentially affected receiver locations to the subject site
- Determine existing background noise levels at the nearest most potentially affected receiver locations
- Use measured background noise levels to establish noise goals in accordance with the relevant noise criteria
- Using predictive noise modelling, determine treatments necessary to comply with external noise emissions to neighbours.

2.4 Reference material

The following documentation has been referenced for this report:

- Architectural drawing set prepared by loopcreative dated July 2024.

3 Project noise goals

3.1 Applicable noise criteria

3.1.1 Central Coast Council

In respect of commercial uses, the Central Coast Council nominates the following in Section 2.5.7, Requirement c) of the Central Coast Development Control Plan 2022 includes reference to noise:

The location and design of service areas must have regard for neighbours in terms of noise, light spill, odour, hours of operation and deliveries, especially when adjacent to residential development.

3.1.2 NSW Noise Policy for Industry

The assessment procedure in terms of the NPfI has two components:

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

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise level and project amenity noise level. The noise trigger levels are designed to illicit an response, but not to act as hard and fast objectives. If there is a residual over the trigger level after all feasible and reasonable measures to mitigate the noise have been applied, then further analysis is required to consider the significance of the residual. However, for this project, the NPfI goals are relating to new mechanical plant and equipment and given the type of plant that may be required and the distance to the nearest sensitive receivers, compliance with the trigger levels should be fairly straightforward.

3.1.3 Patron and Music Noise - Existing and Future

We are not aware of any objective noise condition/criterion being imposed on the existing hotel. External noise emissions from the proposed extension has been assessed in isolation and designed for compliance with the modern controls.

Where feasible and reasonable, the assessment has also considered refinement to building shell treatments and/or management controls that could be implemented to reduce noise emission from the use of premises.

3.2 Assessment locations

The identified assessment locations are outlined in Table 1 below and are shown in Figure 1 above.

Table 1: Assessment locations

ID	Address	Description
R1	17 Brougham Street, East Gosford	Double-storey residential dwellings located to the north east
R2	25 Victoria Street, East Gosford	Double-storey residential dwellings located to the south east
R3	32 Victoria Street, East Gosford	Double-storey residential dwellings located to the south west
R4	21-23 Adelaide Street, East Gosford	Double-storey residential dwellings located to the south west behind the first row of houses fronting Victoria Street

4 Existing noise environment

Criteria for the assessment of operational noise are usually derived from the existing noise environment of an area, excluding noise from the subject development.

Fact Sheet B of the NPfI outlines two methods for determining the background noise level of an area, being 'B1 - Determining background noise using long-term noise measurements' and 'B2 - Determining background noise using short-term noise measurements'. This assessment has used long-term noise monitoring.

As the noise environment of an area almost always varies over time, background and ambient noise levels need to be determined for the operational times of the proposed development. For example, in a suburban or urban area the noise environment is typically at its minimum at 3:00am in the morning and at its maximum during the morning and afternoon traffic peak hours. The NPfI outlines the following standard time periods over which the background and ambient noise levels are to be determined:

- Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays
- Evening: 18:00-22:00 Monday to Sunday & Public Holidays
- Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays

4.1 Noise measurement locations

Noise measurements are ideally carried out at the nearest or most potentially affected locations surrounding a development. An alternative, representative location should be established in the case of access restrictions, or a safe and secure location cannot be identified. Furthermore, representative locations may be established in the case of multiple receivers as it is usually impractical to carry out measurements at all locations surrounding a site.

The long-term and short-term measurement locations are outlined in Table 2 and shown in

Figure 2.

Table 2: Noise monitoring locations

ID	Address	Description
Long-term noise monitoring		
L1	31 Melbourne Street, East Gosford – in the back yard, on the Adelaide Street side	The noise monitoring location is considered representative of receiver location R4 due to its setback and acoustically shielded location from the main thoroughfare.
L2	17 Brougham Street, East Gosford – courtyard facing Adelaide Street	The monitor was located in the free field in the courtyard facing Adelaide Street. The noise monitoring location is considered representative of receiver location R1

ID	Address	Description
L3	32 Victoria Street, East Gosford - side yard along Victoria Street	The monitor was located 1m from the north-eastern facade of the existing building. The noise monitoring location is considered representative of receiver location R3 and also the areas of R2 near Victoria Street or in an exposed location (such as North facing windows overlooking the rear of the site).
L4	Fire and Rescue NSW Gosford Fire Station, 12 Brougham Street, East Gosford - rear boundary of the site	The monitor was located in the free field in the rear yard. The noise monitoring location is considered representative of parts of receiver location R2 that are acoustically shielded from Victoria Street noise.

Figure 2: Noise monitoring locations



Figure 3: Site location



4.2 Long-term noise measurement results

Long-term noise monitoring was carried out from Friday, 12 to Friday 19 May 2023. The long-term noise monitoring methodology is detailed in APPENDIX B, and noise level-vs-time graphs of the data are included in APPENDIX C.

Table 3 presents the overall single Rating Background Levels (RBL) and representative ambient L_{Aeq} noise levels for each assessment period, determined in accordance with the NPfI.

Table 3: Long-term noise monitoring results, dB(A)

Monitoring location		Representative of receiver	LA90 Rating Background Level (RBL)			LAeq Ambient noise levels		
			Day	Evening	Night	Day	Evening	Night
L1	31 Melbourne Street	R4	48	44	37	60	55	53
L2	17 Brougham Street	R1	44	41	34	54	52	47
L3	32 Victoria Street	R3 and exposed areas of R2	62	55	40	71	68	66
L4	Fire and Rescue NSW Gosford Fire Station, 12 Brougham Street	R2 (except exposed or close to Victoria)	45	42	33	61	50	47

Monitoring location	Representative of receiver	LA90 Rating Background Level (RBL)			LAeq Ambient noise levels		
		Day	Evening	Night	Day	Evening	Night

Notes: Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays
Evening: 18:00-22:00 Monday to Sunday & Public Holidays
Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays
As required by the NPfl, the external ambient noise levels presented are free-field noise levels, ie. no facade reflection.

5 Noise emission assessment

5.1 Patron and music noise (licensed premises)

The noise sources associated with the proposal for assessment are as follows:

- Noise from use of the Lower Terrace/Conservatory, with a nominal capacity of 244 patrons.
- Noise from use of the Upper Terrace, with a nominal capacity of 116 patrons.
- Noise from use of the internal dining area, with a nominal capacity of 108 patrons in the Dining area, with light background music.
- Noise from use of the Adelaide Street terraces, with a nominal capacity of 116 patrons.
- A kids play area is proposed adjacent to the upper terrace and it is assumed to occupy in the order of 20 children.
- There to be no changes to the hours of use as part of the proposed works.
- No major works are nominated to the existing Gaming, Sports Bar, main Bar, or the outdoor area at the corner of Victoria and Adelaide Streets and these are excluded from assessment.

The source noise levels used for the predictions, presented in Table 4, were based on our file data obtained from measurements on site and of similar types of developments.

Table 4: Source noise levels for licensed premises assessment

Area	Applicable noise source	Overall dB(A)	Octave band centre frequency - Hz (dBZ)								
			31.5	63	125	250	500	1k	2k	4k	8k
Upper and Lower Terrace	Patrons per person, 1 in 2 speaking. (L _w L ₁₀) ^{1, 2}	77	62	66	75	71	76	73	68	61	52
Internal Bar Areas	Patrons & low background music (Reverberant L _p L ₁₀) ²	84	67	63	73	77	82	79	76	71	59

Notes: 1. AAAC Licensed Premises Noise Assessment Technical Guideline (Version 2.0)
2. Obtained from library database due to low patronage of existing operation at the time of attended measurements

Low background music means music played through an in-house system to provide an ambience to the premises. It is not intended for live music and/or bands. Our library database collects data from various venues across Sydney and low background music generally means an environment dominated by patron noise not highly influenced by the music played in the background.

5.2 Project noise emission goals

There are no project noise emission limits defined in the liquor license conditions. Whilst we are not in receipt of the original consent conditions, a small modification to the hotel (relocation of the Gaming Area) was approved in 2022 and the Central Coast Council did not define any objective controls for operational noise emissions from that component.

In the recent past, noise emission from licensed premises in NSW, such as restaurants, bars and clubs, should aim to comply with the standard noise criteria set by Liquor and Gaming NSW (L&GNSW). The L&GNSW criteria applies to all noise emission associated with activities from the licensed area of the premises, including music and patron noise, but excludes mechanical services equipment.

L&GNSW, through the Liquor Act 2007, had been the regulatory authority that deals with noise pollution issues pertaining to licensed premises. In the Liquor Act 2021 this was amended to give Councils the ability to accept responsibility by self-nominating. We assume that Central Coast Council has not accepted the responsibility to manage complaints from licensed premises in their Local Government Area, leaving it with Liquor and Gaming. L&GNSW historically recommended the use of their standard noise criteria when assessing noise impact from licensed premises and when determining the occurrence of noise nuisance and annoyance. Noise emissions are assessed in terms of the following 'Standard Noise Condition' (which is no longer published on their website):

"The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) by more than 5dB between 7:00am 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 an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between 12:00 midnight and 7:00am 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 7:00am.

Interior noise levels which still exceed safe hearing levels are in no way supported or condoned by the NSW Office of Liquor, Gaming and Racing.

This is a minimum standard. In some instances the Board may specify a time earlier than midnight in respect of the above condition.

**For the purposes of this condition, the LA10 can be taken as the average maximum deflection of the noise emission from the licensed premises."*

For the determination of octave band criteria, octave band noise levels measured by the long-term noise logger have been utilised. The assessment periods for the proposed operations are;

- 7am - 6pm
- 6pm - 10pm; and
- 10pm - 12am

The long term noise logger measurements were analysed between the above time periods to establish the L&GNSW noise goals and are set out in Table 5: L&GNSW noise goals, below.

Table 5: L&GNSW noise goals

Assessment period	Item	Octave band centre frequency - Hz (dBZ)								
		31.5	63	125	250	500	1k	2k	4k	8k
32 Victoria Street, East Gosford										
7am – 6pm	Measured Background L ₉₀	62	61	57	57	56	59	53	42	30
6pm - 10pm		52	52	51	49	49	52	46	33	19
10pm - 12am		44	44	45	38	36	37	30	20	14
7am – 6pm	Noise emission goals L ₁₀	67	66	62	62	61	64	58	47	35
6pm - 10pm		57	57	56	54	54	57	51	38	24
10pm - 12am		49	49	50	43	41	42	35	25	19
25 Victoria Street, East Gosford										
7am – 6pm	Measured Background L ₉₀	54	53	44	41	41	41	35	26	17
6pm - 10pm		47	46	41	37	36	37	32	26	18
10pm - 12am		39	38	38	33	30	27	24	20	16
7am – 6pm	Noise emission goals L ₁₀	59	58	49	46	46	46	40	31	22
6pm - 10pm		52	51	46	42	41	42	37	31	23
10pm - 12am		44	43	43	38	35	32	29	25	21
21 Brougham Street, East Gosford										
7am – 6pm	Measured Background L ₉₀	51	51	43	40	38	39	33	22	16
6pm - 10pm		45	46	42	38	35	35	28	21	17
10pm - 12am		39	39	36	32	29	29	23	16	16
7am – 6pm	Noise emission goals L ₁₀	56	56	48	45	43	44	38	27	21
6pm - 10pm		50	51	47	43	40	40	33	26	22
10pm - 12am		44	44	41	37	34	34	28	21	21
21 Adelaide Street, East Gosford										
7am – 6pm	Measured Background L ₉₀	55	51	47	45	42	43	39	30	19
6pm - 10pm		47	45	44	42	38	38	33	24	16
10pm - 12am		41	40	40	35	33	32	27	19	15
7am – 6pm	Noise emission goals L ₁₀	60	56	52	50	47	48	44	35	24
6pm - 10pm		52	50	49	47	43	43	38	29	21
10pm - 12am		46	45	45	40	38	37	32	24	20

5.3 Prediction methodology and noise mitigation considerations

The assessment of the proposed design investigates the following scenarios:

- Scenario 1 - Operation up to 6pm.
 - Indoor areas and all outdoor areas operating at capacity.
 - Sliding windows on the eastern frontage open.
 - Folding Doors to Adelaide Street Terraces open.
 - Operable roof open.
 - Music limited as detailed in Section 8.
 - Sliding entry door to car park momentarily open.
- Scenario 2 - Operation up to 10pm.
 - Indoor areas and all outdoor areas operating at capacity.
 - Sliding windows on the eastern frontage open.
 - Folding Doors to Adelaide Street Terraces closed (hinged doors used for ingress/egress).
 - Operable roof open.
 - Music limited as detailed in Section 8.
 - Sliding entry door to car park momentarily open.
- Scenario 3 – 10pm to 12am.
 - Indoor and outdoor areas operating at capacity except:
 - Adelaide Street terraces closed.
 - Conservatory closed and divided from the rest of the beer garden by closing the operable partitions.
 - Sliding windows on the eastern frontage closed.
 - Folding Doors to Adelaide Street Balcony closed (hinged doors used for ingress/egress).
 - Operable roof half closed.
 - Music limited as detailed in Section 8.
 - Sliding entry door to car park momentarily open.

The following assumptions regarding the acoustic performance of the building envelope design have been made for the acoustic assessment.

Table 6: Building envelope acoustic performance

Construction element	Assumed acoustic rating R_w	Indicative construction
Glazed roof, door and window elements	33	10mm thick glass in aluminium frame. Acoustic seals for operable elements.
Roof/ceiling – Internal areas	41	Pitched roof frame with 0.5mm corrugated galvanised steel cladding, insulation in the cavity and minimum 13mm plasterboard ceiling
Roof/ceiling – Upper terrace	41	Pitched roof frame with 0.5mm corrugated galvanised steel cladding, insulation in the cavity and minimum 13mm plasterboard ceiling. 50mm thick Megasorber acoustic lining to underside of plasterboard.
Operable roof	15	4.5kg/m ² operable roof element, seals air tight around the perimeter when closed.

Before committing to any form of construction or committing to any contractor, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variation which may occur as a result of changes to the project.

Predicted noise emissions for each of the three operating scenarios are presented in the table below, and assessed with reference to the noise emissions goals for the corresponding time of day (6pm – Scenario 1, 10pm – Scenario 2, 12am – Scenario 3).

All predictions are made on the assumption that the noise controls detailed in Section 8 are adopted.

Table 7: Predicted noise emissions and comparison to project noise emission goals

Assessment period	Item	Octave band centre frequency - Hz (dBZ)								
		31.5	63	125	250	500	1k	2k	4k	8k
32 Victoria Street, East Gosford										
7am – 6pm	Scenario 1	25	25	34	37	40	35	30	22	4
6pm - 10pm	Scenario 2	24	24	33	36	39	34	29	21	2
10pm - 12am	Scenario 3	18	18	27	29	31	25	20	10	-10
7am – 6pm	Noise emission goals L ₁₀	67	66	62	62	61	64	58	47	35
6pm - 10pm		57	57	56	54	54	57	51	38	24
10pm - 12am		49	49	50	43	41	42	35	25	19
25 Victoria Street, East Gosford										
7am – 6pm	Scenario 1	26	26	35	38	41	36	32	26	10
6pm - 10pm	Scenario 2	25	25	35	38	41	36	32	26	10
10pm - 12am	Scenario 3	19	19	28	30	32	26	20	11	-9
7am – 6pm	Noise emission goals L ₁₀	59	58	49	46	46	46	40	31	22
6pm - 10pm		52	51	46	42	41	42	37	31	23
10pm - 12am		44	43	43	38	35	32	29	25	21
21 Brougham Street, East Gosford										
7am – 6pm	Scenario 1	27	27	37	40	43	40	36	30	14
6pm - 10pm	Scenario 2	26	26	35	38	40	36	31	24	6
10pm - 12am	Scenario 3	19	19	28	30	32	26	21	12	-8
7am – 6pm	Noise emission goals L ₁₀	56	56	48	45	43	44	38	27	21
6pm - 10pm		50	51	47	43	40	40	33	26	22
10pm - 12am		44	44	41	37	34	34	28	21	21
21 Adelaide Street, East Gosford										
7am – 6pm	Scenario 1	26	26	36	38	43	38	34	26	8
6pm - 10pm	Scenario 2	25	25	35	37	41	37	32	25	7
10pm - 12am	Scenario 3	19	19	28	30	32	26	20	11	-9
7am – 6pm	Noise emission goals L ₁₀	60	56	52	50	47	48	44	35	24
6pm - 10pm		52	50	49	47	43	43	38	29	21
10pm - 12am		46	45	45	40	38	37	32	24	20

At the shielded areas to the rear of 25 Victoria Street, the predictions are showing exceedances of 1-2dB(A). A noise level difference of up to 2dB(A) is not typically perceptible to the average listener. As such, no additional controls are proposed to mitigate the small exceedances predicted.

Provided that that acoustic treatments and management controls detailed in Section 8 are adopted, noise emissions will comply with requirements.

5.4 Noise from mechanical plant and equipment and vehicles being driven on the site

External noise emissions from use of the carpark and mechanical plant and equipment have been assessed for compliance with the Noise Policy for Industry. Noise from additional traffic on the surrounding road network will be assessed to the NSW EPA Road Noise Policy.

5.4.1 Project noise goals - NSW NPfI

5.4.1.1 Project intrusiveness noise levels/Council's DCP requirement

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the LAeq,15min descriptor) does not exceed the background noise level measured in the absence of the source by more than 5dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$$L_{Aeq,15minute} \text{ Intrusiveness noise level} = \text{RBL plus } 5\text{dB(A)}$$

Based on the background noise monitoring carried out at the monitoring locations and the proposed operating hours of the licensed premises, the intrusiveness noise levels for the nearest affected residential receivers are reproduced in Table 8 below.

Table 8: Intrusiveness noise level, dB(A)

Receiver ID	Intrusiveness noise level, LAeq,15min		
	Day	Evening	Night
R1	44+5=49	41+5=46	34+5=39
R2 (except exposed or close to Victoria)	45+5=50	42+5=47	33+5=38
R3 and exposed areas of R2	62+5=67	55+5=60	40+5=45
R4	48+5=53	44+5=49	37+5=43

Notes:

Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays

Evening: 18:00-22:00 Monday to Sunday & Public Holidays

Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays

Number in brackets represents the project intrusiveness noise level for evening that is set at no greater than the project intrusiveness noise level for daytime as recommended in Section 2.3 of the NPfI.

5.4.1.2 Project amenity noise levels

The project amenity noise levels for different time periods of the day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels (LAeq,period) for various receivers including residential, commercial and industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area, "project amenity noise levels" apply.

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

$$L_{Aeq,period} \text{ Project amenity noise level} = L_{Aeq,period} \text{ Recommended amenity noise level} - 5\text{dB(A)}$$

Given that the intrusiveness noise level is based on a 15-minute assessment period and the project amenity noise level is based on much longer periods extending over an entire day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15\text{minute}}$ level in order to standardise the time periods for the purpose of conducting a noise impact assessment. The adjustment or conversion from $L_{Aeq,period}$ to $L_{Aeq,15\text{min}}$ is:

$$L_{Aeq,15\text{minute}} = L_{Aeq,period} + 3\text{dB(A)}$$

The project amenity noise levels ($L_{Aeq, 15\text{min}}$) applied for this project are reproduced in Table 9 below.

Table 9: Adopted project amenity noise levels, dB(A)

Receiver ID	Noise amenity area	Time of day	Project Amenity Noise Level	
			$L_{Aeq,period}$	$L_{Aeq, 15\text{min}}$
R1, R2, R4	Residential - Urban	Day	$60 - 5 = 55$	$55 + 3 = 58$
		Evening	$50 - 5 = 45$	$45 + 3 = 48$
		Night	$45 - 5 = 40$	$40 + 3 = 43$
R3 and exposed areas of R2	Residential – Urban and High Traffic	Day	$71 - 15 = 56$	$56 + 3 = 59$
		Evening	$68 - 15 = 53$	$53 + 3 = 56$
		Night	$66 - 15 = 51$	$51 + 3 = 54$

Notes: Day: 7:00 to 18:00 Monday to Saturday and 8:00 to 18:00 Sundays & Public Holidays
 Evening: 18:00-22:00 Monday to Sunday & Public Holidays
 Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays
 The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

5.4.1.3 NPfI Project noise trigger levels

In accordance with the NPfI, the project noise trigger levels, which are the lower (ie. more stringent) value of the project intrusiveness noise level and project amenity noise level, have been determined and shown in Table 10 below.

Table 10: Project noise trigger levels

Receiver ID	Intrusiveness noise level, $L_{Aeq,15\text{min}}$			Project amenity noise level, $L_{Aeq,15\text{min}}$			Project noise trigger level, $L_{Aeq,15\text{min}}$		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1	49	46	39	58	48	43	49	46	39
R2 (except exposed or close to Victoria St)	50	47	38	58	48	43	50	47	38

Receiver ID	Intrusiveness noise level, LAeq,15min			Project amenity noise level, LAeq,15min			Project noise trigger level, LAeq,15min		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R3 and exposed areas of R2	67	60	45	59	56	54	59	56	45
R4	53	49	43	58	48	43	53	48	43

Notes: Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays
 Evening: 18:00-22:00 Monday to Sunday & Public Holidays
 Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays

5.4.2 Carpark Noise

Alterations to the carpark are proposed, which will increase the parking provisions on the site, by removing the existing commercial building fronting Victoria Street, along with the Carwash to make way for an on grade carpark with access to/from Victoria Street and a lower level carpark with access to/from Brougham Street.

Noise emissions from the use of the carpark have been assessed, based on traffic generation rates provided by traffic engineers Barker Ryan Stewart, who predict peak hour usage of 80 vehicle trips, with peak hour occurring 6:30pm to 8:30pm Friday and Saturday evenings and 12:00pm to 2:00pm on Sundays. It is assumed that 40% of vehicle movements occur on the upper carpark and 60% on the lower carpark (as this is the approximate distribution of the parking provisions). Further, it is assumed that 40% of the upper level movements exit by going down the ramp.

The peak period of use of the car park will be in the evening period (6pm-10pm). Based on the above, it is predicted that the Friday/Saturday evening period would result in an average noise level in the order of 41dB(A) $L_{eq(15min)}$ to the North façade of 25 Victoria Street, East Gosford, which easily complies with the project noise emission goals of 47 to 56 dB(A) (being the evening time noise goals detailed in Section 5.4.1.3, depending on whether the receiver is near Victoria Street or screened from it).

Based on the existing mode of usage, patron numbers reduce steadily in the late evening/early night period, rather than having a mass exodus at closing time. As such, minimal movements are anticipated after midnight and use is predicted to comply with the project noise emission goals.

5.4.3 Mechanical Plant and Equipment

Plant selections are not available at this early stage of the development. These will be selected during the detailed design stage. External noise emissions from new mechanical plant and equipment (including refrigeration) are to be assessed prior to Construction Certificate (CC) and treatments applied for compliance with the project noise emission goals defined in Table 10 when combined with carpark noise.

The contribution from mechanical noise emissions shall be 3dB less than the criterion nominated in Table 10, to ensure that cumulative noise emissions from carpark and mechanical plant complies.

The following in-principle noise management measures should be considered:

- Acoustic assessment of mechanical services equipment should be undertaken during the detailed design phase of the development to ensure that the cumulative noise of all equipment does not exceed the applicable noise criteria. The contribution from mechanical noise emissions shall be 3dB less than the criterion nominated in Table 10, to ensure that cumulative noise emissions from carpark and mechanical plant complies. Development Consent Conditions typically require detailed assessment of mechanical plant and equipment prior to issue of the Construction Certificate.
- Noise control treatment can affect the operation of the mechanical services system. An acoustic engineer should be consulted during the initial design phase of mechanical services system to reduce potential redesign of the mechanical system.
- Mechanical plant noise emission can be controlled by appropriate mechanical system design and implementation of common engineering methods, which may include:
 - procurement of 'quiet' plant
 - strategic positioning of plant away from sensitive neighbouring premises to maximise intervening acoustic shielding between the plant and sensitive neighbouring premises
 - commercially available acoustic attenuators for air discharge and air intakes of plant
 - acoustically lined and lagged ductwork
 - acoustic barriers between plant and sensitive neighbouring premises
 - partial or complete acoustic enclosures over plant
 - The specification and location of mechanical plant should be confirmed prior to installation on site, and
 - Fans shall be mounted on vibration isolators and balanced in accordance with Australian Standard 2625 '*Rotating and Reciprocating Machinery - Mechanical Vibration*'.

5.4.4 Sleep disturbance

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed:

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

Where there are noise events found to exceed the initial screening level, further analysis is undertaken to identify:

- The likely number of events that might occur during the night assessment period,
- The extent to which the maximum noise level exceeds the rating background noise level.

The sleep disturbance noise levels for the project are presented in Table 11.

Table 11: Sleep disturbance assessment levels

Receiver ID	Assessment Level $L_{Aeq,15min}$	Assessment Level L_{AFMax}
R2- shielded areas of 25 Victoria St	40	52

Sleep disturbance would most potentially be caused by a single event of a door slam or engine start in the carpark area, or patron shouting while on the at-grade carpark, where there is a limited degree of acoustic shielding (compared with internal activities) and due to the relatively high L_{Max} noise levels that can be generated.

In respect of peak noise events from car start/door close, the parking spots nearest to 25 Victoria Street present the critical case. A peak noise event (car door close/car start with 90dB(A) sound power) occurring in the parking spot closest to the façade of 25 Victoria Street is predicted to be 61dB(A) L_{max} . This will result in an internal noise level of 51dB(A) L_{max} (assuming an open window), which is not likely to cause an awakening.

5.5 Noise from Additional Traffic Generated by the Development

5.5.1 Road Noise Policy - Noise assessment criteria - residential land uses

Table 3 sets out the assessment criteria for residences to be applied to particular types of project, road category and land use. These criteria are for assessment against façade corrected noise levels when measured in front of a building façade. In Table 3, freeways, arterial roads and sub-arterial roads are grouped together and attract the same criteria.

Table 12: Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day 7:00am-10:00pm	Night 10:00pm-7:00am
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	L _{Aeq} (15 hour) 55 (external)	L _{Aeq} (9 hour) 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway / arterial / sub-arterial roads	L _{Aeq} (15 hour) 60 (external)	L _{Aeq} (9 hour) 55 (external)
	3. Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	L _{Aeq} (15 hour) 60 (external)	L _{Aeq} (9 hour) 55 (external)
Local roads	4. Existing residences affected by noise from new local road corridors	L _{Aeq} (1 hour) 55 (external)	L _{Aeq} (1 hour) 50 (external)
	5. Existing residences affected by noise from redevelopment of existing local roads		
	6. Existing residences affected by additional traffic on existing local roads generated by land use developments		

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads (see Appendix C10).

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

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 (where the assessment criteria cannot be achieved) should be limited to 2 dB above that of the corresponding 'no build option'.

5.5.2 Road Noise Policy Assessment

Based on long term unattended noise monitoring at 17 Brougham Street, the existing road traffic noise levels (including façade reflection) are 57dB(A) Leq (worst 1hr, day) and 53dB(A) Leq(worst 1hr, night).

These are above the Local Road targets. On that basis, the proposed development should not result in an increase in existing traffic noise of more than 2 dB.

Traffic engineers Baker Ryan Stewart (BRS) predicted that the amended development would generate approximately 80 vehicle movements in peak hour. By the distribution of parking spaces (approximately 40% in the upper carpark and 60% in the lower carpark), this would equate to approximately 31 movements in the upper carpark and 49 in the lower carpark. From the upper carpark, BRS estimated that 60% would exit directly to Victoria Street and 40% would go down the ramp to exit. This would result in the order of 61 vehicles exiting via Brougham Street and 19 exiting via Victoria Street.

BRS predicted that the current uses on the site would generate in the order of 30 vehicle movements per hour. However, taking into account all the existing approved uses (372m² of commercial in the building fronting Victoria Street; carwash, Elanora Hotel and Bottle Shop, and assuming 16 motel rooms in the old motel) BRS predict a total of approximately 54 movements. With the addition of the vehicle exit to Victoria Street, we anticipate an increase in movements on Brougham Street in the order of +7 vehicles per hour (61 future vs 54 current). This would result in an increase in road traffic noise on Brougham Street of less than 1dB(A), achieving compliance with the NSW EPA Road Noise Policy.

6 Noise from loading activities

The client has advised that there will not be a significant change to the loading type activities to/from the site. The volume transferred may increase, however it is not anticipated that the number of service visits will increase appreciably.

6.1 Deliveries

Kegs were previously delivered by a truck stopped on Adelaide Street. In the amended development, it is proposed for kegs to be delivered utilising the on-site loading bay near Adelaide Street. These typically arrive on site after 10am. This is comparable to the existing condition and so does not warrant detailed assessment.

Liquor deliveries are currently scheduled to arrive after 9am Monday to Friday. Bottle shop deliveries will enter from Victoria Street, direct to the bottle shop and exit via Victoria Street. There are no bottle shop deliveries typically required Sundays or public holidays. For vehicles that are too tall to fit under the canopy, the vehicles will manoeuvre through the upper carpark and exit via Victoria St. This is comparable to the existing condition and so does not warrant detailed assessment.

Food deliveries typically arrive to the site between 10am and 12pm daily (when there are staff on site to receive and prepare the delivered food). Larger vehicles will enter the site via the Adelaide Street driveway and utilise the on site loading dock and exit via Brougham Street. Small deliveries may be made via the upper carpark to the main entrance. This is comparable to the existing condition and so does not warrant detailed assessment.

6.2 Waste retrieval

The existing arrangement is that waste is retrieved from the site in the area near the back of the bottle shop between 3am and 5am. With the future development it is proposed that the waste would be retrieved during the day time i.e. between 7am and 6pm weekdays, 8am - 6pm weekends and public holidays. Waste retrieval will be from the on site loading dock near Adelaide Street.

The waste retrieval requirements are as follows:

- Recycling - 1x per week
- General - 3x per week
- It is proposed that glass will be crushed on site, thus reducing the noise of the glass recycling retrieval.

The above presents a far preferable solution to the current arrangement for waste retrieval.

7 Noise intrusion assessment – Hotel Accommodation

7.1 Internal noise criteria

Australian/New Zealand Standard AS/NZS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors" recommends design criteria for conditions affecting the acoustic environment within building interiors to ensure a healthy, comfortable and productive environment for the occupants and the users. The background sound levels recommended take into account the function of the area(s) and apply to the sound level measured within the space unoccupied but ready for occupancy. The Standard is applicable to steady-state or quasi-steady-state sounds such as mechanical services equipment and road traffic noise intrusion, but not intended for transient or variable sources such as aircraft noise, railways and construction noise. The reverberation times recommended are for the occupied state of the space.

The sound levels given in this Standard are for the design of spaces in buildings and are provided as a range with a recommended lower level and upper level. Sound levels within the given ranges have been found to be acceptable by most people for the space under consideration. When the sound level is greater than the upper level of the range most people occupying the space will become dissatisfied with the level of sound. When the sound level is below the lower level of the range, the inadequacy of background sound to provide masking sound can become problematic, for example, by allowing other intermittent noise sources to cause distraction, annoyance, or lack of privacy.

Table 13: Design sound levels and reverberation times for different areas of occupancy in buildings

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
6	PUBLIC BUILDINGS		
	Restaurants and cafeterias -		
	Cafeterias	40 to 50	See Note 1
	Food courts	45 to 55	See Note 1
	Coffee shops	40 to 50	See Note 1
	Restaurants	40 to 50	See Note 1
	Sport clubs or clubrooms -		
	Bars	< 50	0.6 to 1.0
	Function areas	40 to 45	See Note 1
	Change rooms	< 50	-
	Theatres for operetta and musical plays	See Note 3	See Note 3
7	RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)		
	Hotels and motels -		
	Bars and lounges	< 50	0.6 to 1.0
	Enclosed carparks	< 65	-
	Foyers and recreation areas	45 to 50	See Note 1
	Kitchen, laundry and maintenance areas	< 55	-

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
Sleeping areas (night time) -			
	Hotels and motels in inner city areas or entertainment districts or near major roads	35 to 40	-
	Hotels and motels in suburbs or near minor roads	30 to 35	-
	Washrooms and toilets	45 to 55	-
8	SHOP BUILDINGS		
	Small retails stores (general)	< 50	See Note 1

NOTES:

1. In situations where traffic noise levels may vary widely over a 24 h period, measurement to assess compliance with this Standard should be taken at the relevant time and for an appropriate measurement period according to the area of occupancy or activity in the building. Where traffic noise fluctuates rapidly with the passage of individual vehicles, the community reaction may not correlate well with the equivalent continuous noise level as measured.

7.2 Building shell treatments

For compliance with the project internal noise goals, the following are recommended:

- Bottle shop - Minimum 10.38mm laminated glass with full perimeter acoustic seals, system performance Rw 35 (glass in frame)
- Elanora Hotel - minimum 6.38mm laminated with full perimeter acoustic seals, system performance Rw 32 (glass in frame); Main entry airlock - each set of doors min 6mm glass, Rw29.
- New Motel - 10.38mm laminated glass for rooms facing toward the carpark due/hotel to noise from loading. Rooms facing into the site to be provided with air conditioning with fresh air component so that Motel users can keep the windows closed if they desire. East facing windows to have 10.38mm laminated glass.

8 Recommendations

The building envelopes as set out in Table 6 are to be provided as a minimum.

8.1 Building envelope

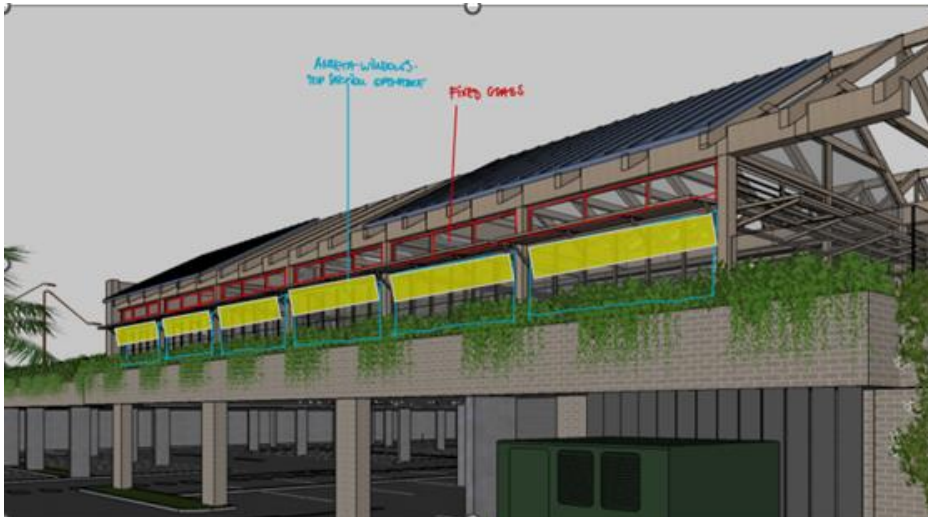
Adelaide Street Balcony:

- Min 2.2m high glass screen along northern (Adelaide Street) edge, and return back long the eastern edge.
- Top of screen to align with bottom edge of the folding doors from internal area to the Balcony in the open position.
- Gap no more than 200mm between the Adelaide Street panel and the side panel.



Eastern Façade Windows;

- Windows on eastern façade facing new accommodation are proposed to consist of vertically sliding windows (Aneeta). All glass to be minimum 10mm thick (R_w 33).
- Up to 10pm, windows can have 1m high opening along the length of each of the windows until 10pm – marked yellow.
- Windows to be closed at 10pm.



Lower and Upper Terrace Roof:

- Fixed roof elements – sheet metal with plasterboard/ply/fc sheet ceiling and acoustic lining to underside of ceiling (50mm thick Megasorber or similar).
- Glass roof elements – Min 6mm thick.
- Operable roof elements – 4.5kg/m² solid material, capable of closing close to air tight.
- Conservatory – no roof over. 10mm glass dividing wall/doors between beer garden and conservatory. This will need to extend to underside of roof structure to ensure separation between conservatory and remainder of beer garden

Boundary Fence:

- A 2.2m high solid acoustic screen (lapped and capped timber, Colorbond or acoustically approved alternative) is required to the south boundary of the site.
- Where adjacent to the residential receivers at 25 Victoria Street, it is anticipated this fence would extend up to their vehicle access gate. Between the access gate and Victoria Street, the height of the fence can be reduced as necessary for pedestrian and vehicle safety.
- The walls around the upper and lower terraces are to be solid. They are predominantly masonry and this is acoustically acceptable.

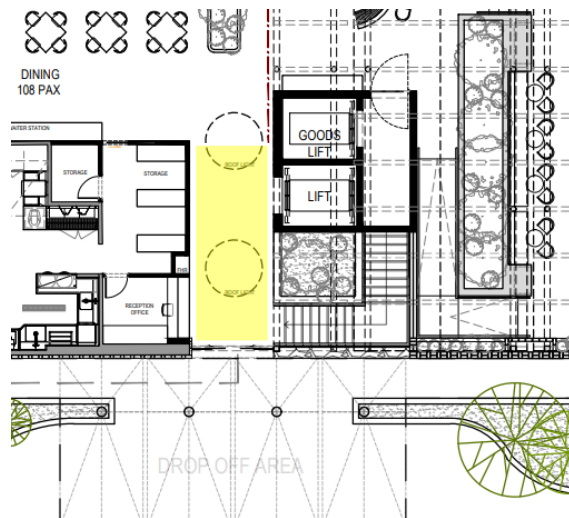
Music:

- Internally the sound pressure level should not exceed 75dB(A) L₁₀ as an average or at 3m from any speaker.

- In the external areas the music sound pressure level should not exceed 70dB(A) L_{10} as an average or at 3m from any speaker in the beer garden and 65dB(A) L_{10} as an average or at 3m on the Adelaide Street Balcony.

Entry Doors for car park:

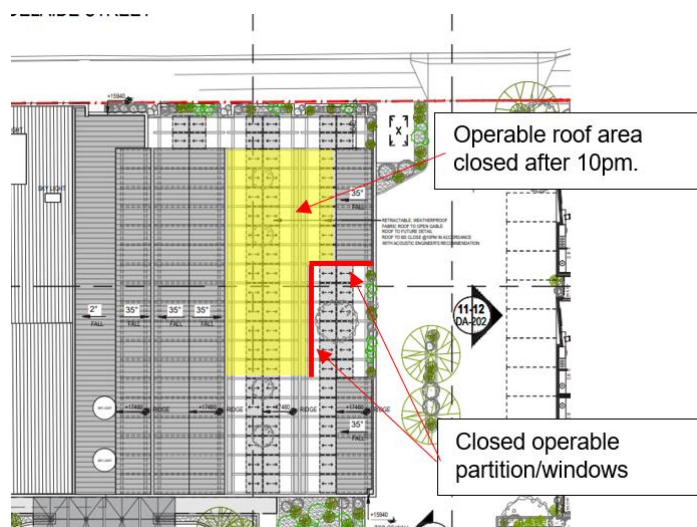
- Ceiling to the lobby area near the car park entry door to incorporate noise absorptive lining with NRC no less than 0.85.
- Required lining location shown in yellow below:



8.2 Management requirements:

In order to comply with noise emission requirements, management of window/roof openings and times of use of particular areas must be regulated, as detailed below:

- Up to 6pm operation.
 - Adelaide Street terrace – maximum of 90 people.
 - Folding doors between the lower terrace/ beer garden and the Adelaide Street terrace can be open.
 - Aneeta windows can be open.
 - Operable parts of the roof can be open.
- 6pm-10pm operation.
 - Adelaide Street terrace – maximum of 90 people.
 - Folding doors between the lower terrace/ beer garden and the Adelaide Street terrace are to be closed, and hinged doors can be used for ingress/egress to the Adelaide Street Terrace.
 - Aneeta windows can be open.
 - Operable parts of the roof can be open.
- 10pm-12am operation.
 - Adelaide Street terrace is to be closed.
 - All doors between the lower terrace/ beer garden and the Adelaide Street terrace are to be closed.
 - Aneeta windows are to be closed.
 - Half of the operable roof is to be closed (the half towards Adelaide Street), as below. The balance of the roof can be open
 - Operable walls/windows to the northern and western side of the conservatory, as shown below, are to be closed. Access to the conservatory can be provided from the southern side.
 - Max 30 people to use the conservatory.



In addition:

- Waste pick up between 7am and 6pm weekdays, and 8am - 6pm weekends and public holidays.
- No crushing of glass in external areas between 10pm and 7am.

8.3 Patronage

The assumed maximum patron capacities for each area of the hotel are those marked on the plans.

8.4 Mechanical plant

Mechanical plant associated with the development has the potential to impact on nearby noise sensitive properties. Mechanical plant selections are not typically available for DA and a detailed noise assessment should be prepared prior to CC based on the criteria in this assessment. Refer Section 5.4.3.

9 Conclusion

Renzo Tonin & Associates has completed an assessment of operational noise for the proposed alterations and additions at Elanora Hotel, 41-45 Victoria Street, East Gosford. The primary aspects of noise emission with respect to DA will be outdoor patrons and music (if provided as background) from the new terraces/beer garden.

The outcome of the assessment is that provided the treatments and management controls nominated in this report are applied, the site can comply with the nominated noise emission goals.

If new mechanical plant and equipment is required, a follow up assessment of associated noise emissions will be necessary for CC. The contribution from mechanical noise emissions shall be 3dB less than the criterion nominated in Table 10, to ensure that cumulative noise emissions from carpark and mechanical plant complies.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of everyday sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz) but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch, and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.

L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance, and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Long-term noise monitoring methodology

B.1 Noise monitoring equipment

A long-term unattended noise monitor consists of a sound level meter housed inside a weather resistant enclosure. Noise levels are monitored continuously with statistical data stored in memory for every 15-minute period.

Long term noise monitoring was conducted using the following instrumentation:

Description	Type	Octave band data	Logger location(s)
RTA07 (NTi Audio XL2, with low noise microphone)	Type 1	1/1	L1, L2, L3 & L4

Notes: All meters comply with AS IEC 61672.1 2004 "Electroacoustics - Sound Level Meters" and designated either Type 1 or Type 2 as per table and are suitable for field use.

The equipment was calibrated prior and subsequent to the measurement period using a Brüel & Kjær Type 4231 calibrator. No significant drift in calibration was observed.

B.2 Meteorology during monitoring

Measurements affected by extraneous noise, wind (greater than 5m/s) or rain were excluded from the recorded data in accordance with the NSW INP. Determination of extraneous meteorological conditions was based on data provided by the Bureau of Meteorology (BOM), for a location considered representative of the noise monitoring location(s). However, the data was adjusted to account for the height difference between the BOM weather station, where wind speed and direction is recorded at a height of 10m above ground level, and the microphone location, which is typically 1.5m above ground level (and less than 3m). The correction factor applied to the data is based on Table C.1 of ISO 4354:2009 '*Wind actions on structures*'.

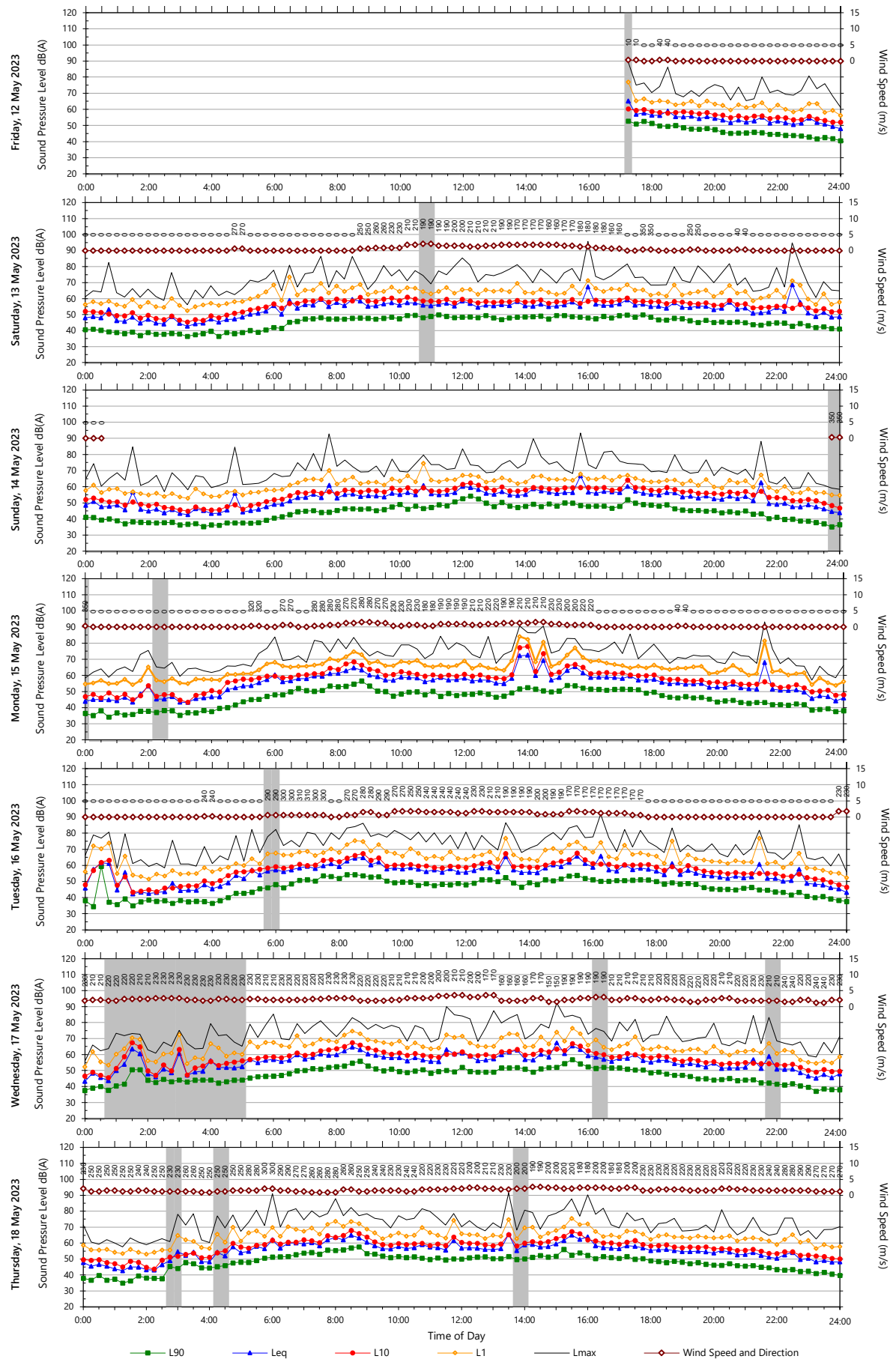
B.3 Noise vs time graphs

Noise almost always varies with time. Noise environments can be described using various descriptors to show how a noise ranges about a level. In this report, noise values measured or referred to include the L_{10} , L_{90} , and L_{eq} levels. The statistical descriptors L_{10} and L_{90} measure the noise level exceeded for 10% and 90% of the sample measurement time. The L_{eq} level is the equivalent continuous noise level, or the level averaged on an equal energy basis. Measurement sample periods are usually ten to fifteen minutes. The Noise -vs- Time graphs representing measured noise levels, as presented in this report, illustrate these concepts for the broadband dB(A) results.

APPENDIX C Long-term noise monitoring results

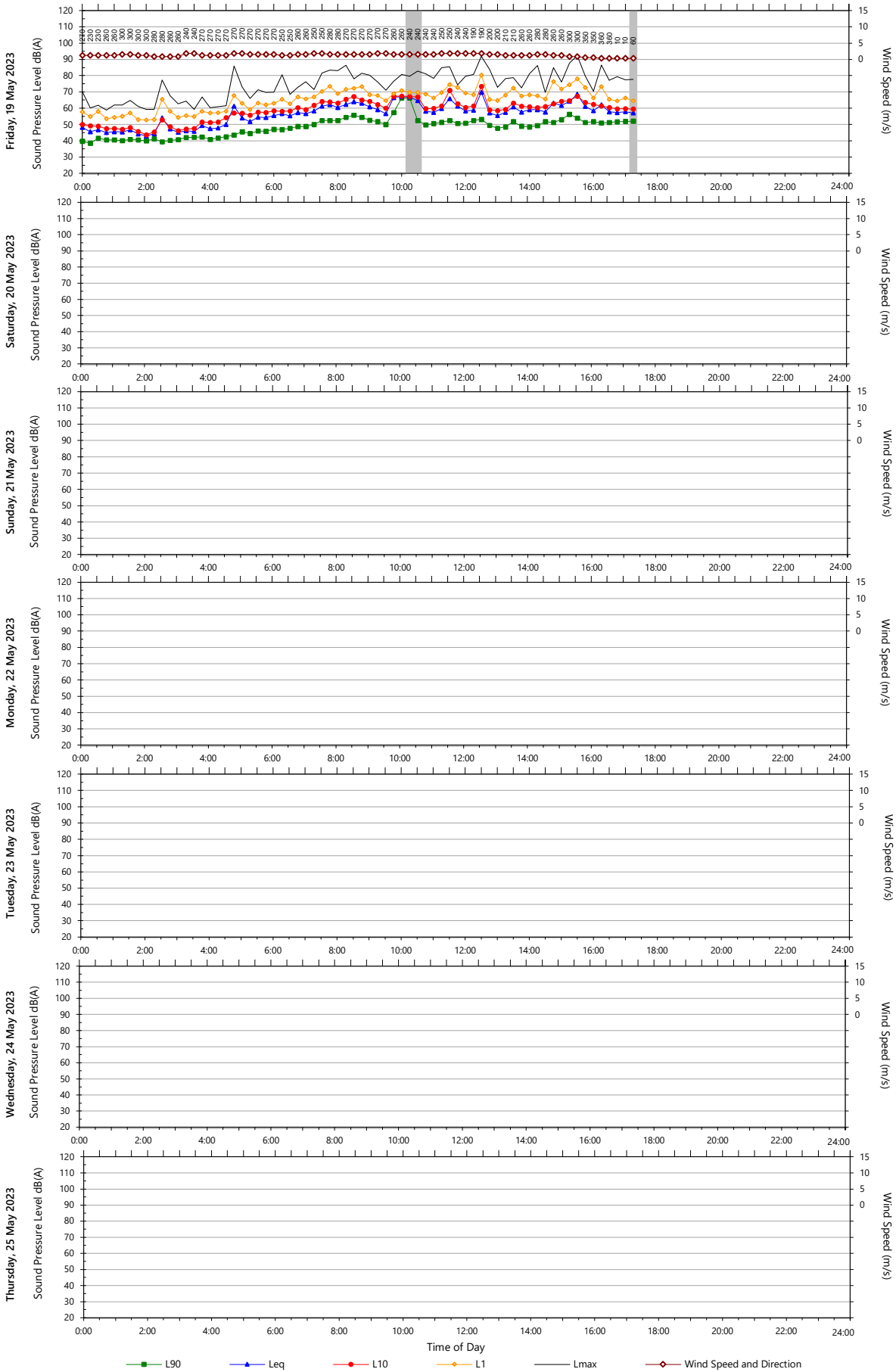
Unattended Monitoring Results

Location: L01 - 31 Melbourne Street, East Gosford



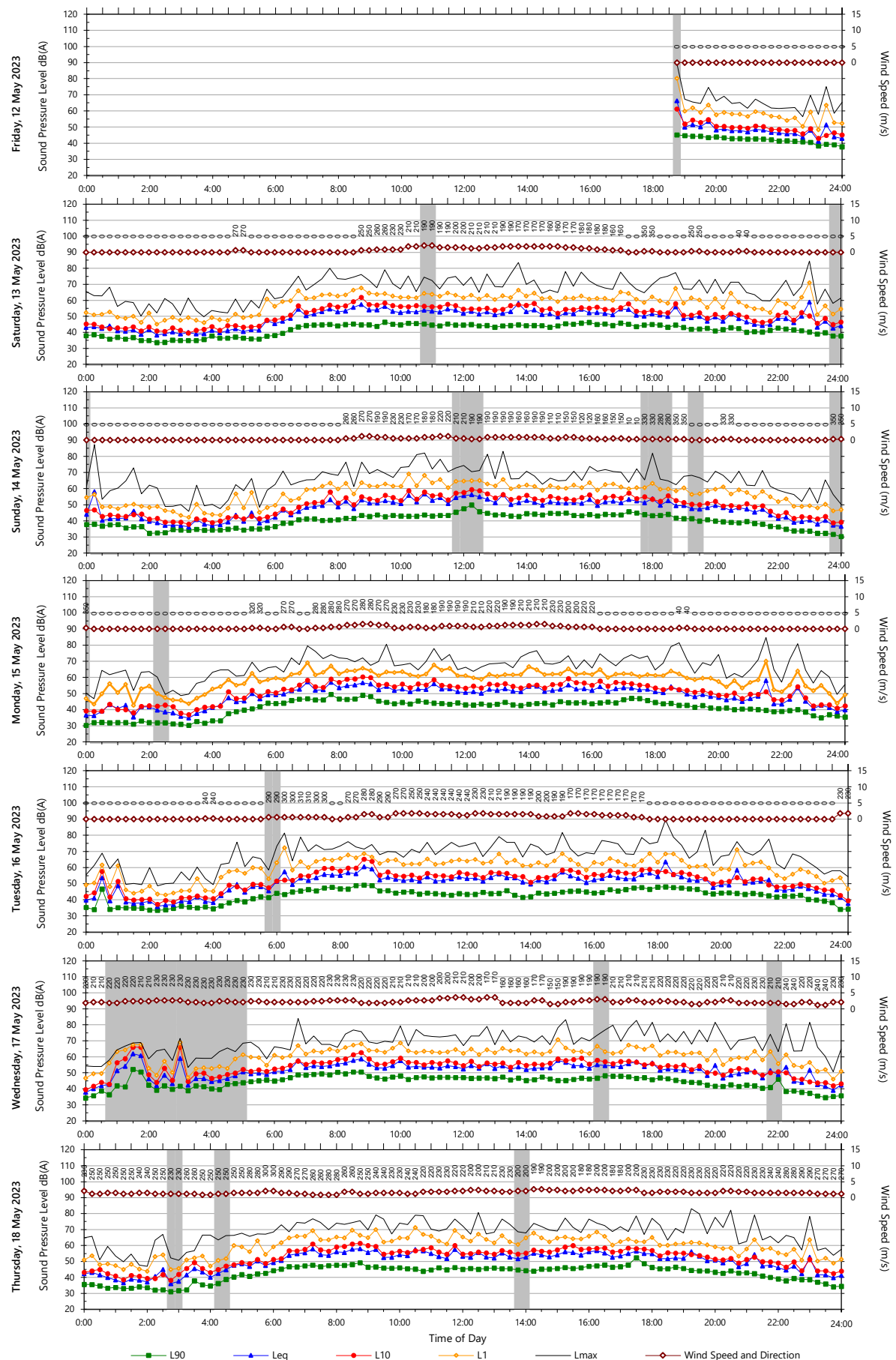
Unattended Monitoring Results

Location: L01 - 31 Melbourne Street, East Gosford



Unattended Monitoring Results

Location: L02 - 17 Brougham St, East Gosford

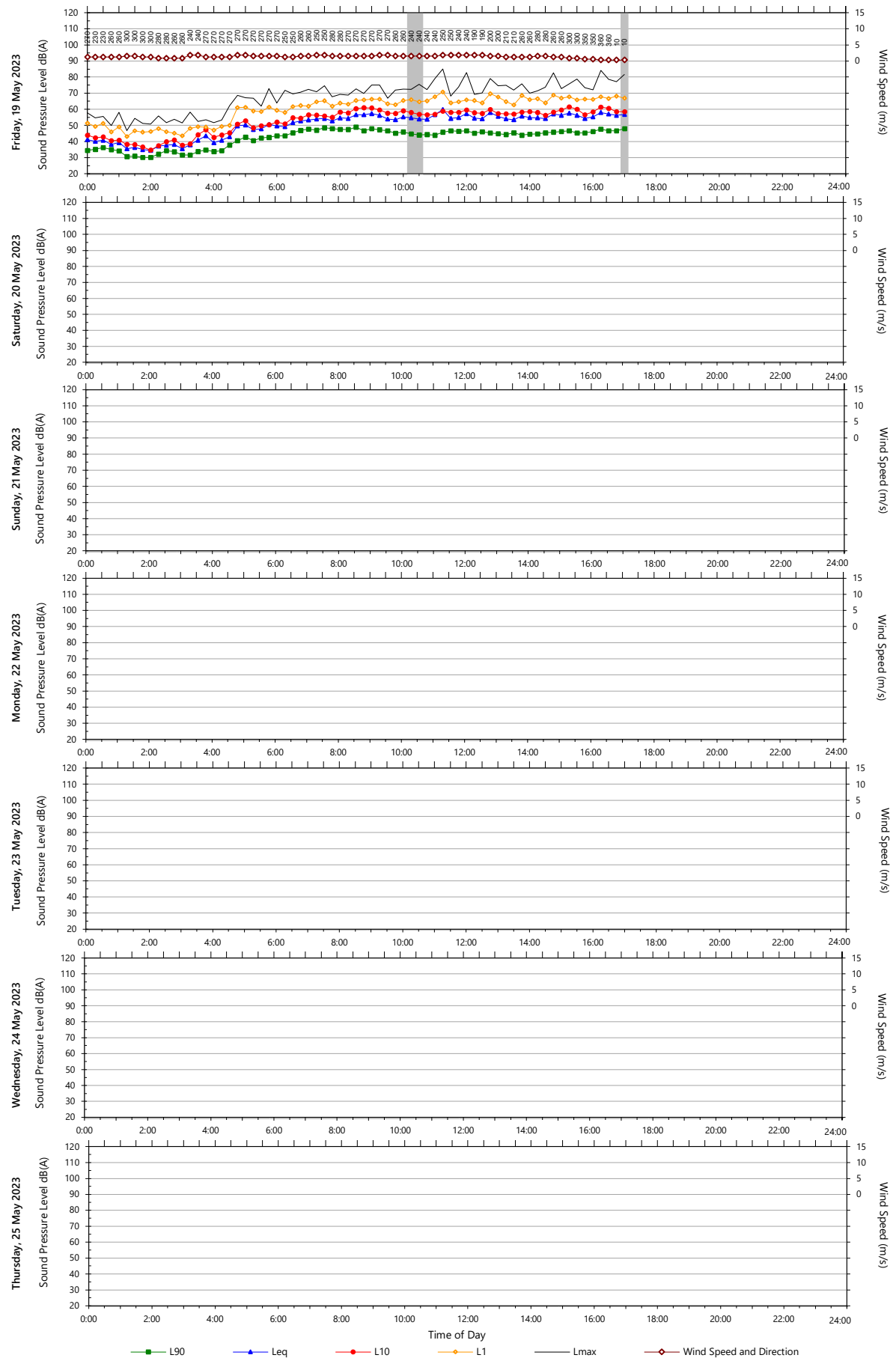


Data File: 2023-05-12_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)

Unattended Monitoring Results

Location: L02 - 17 Brougham St, East Gosford

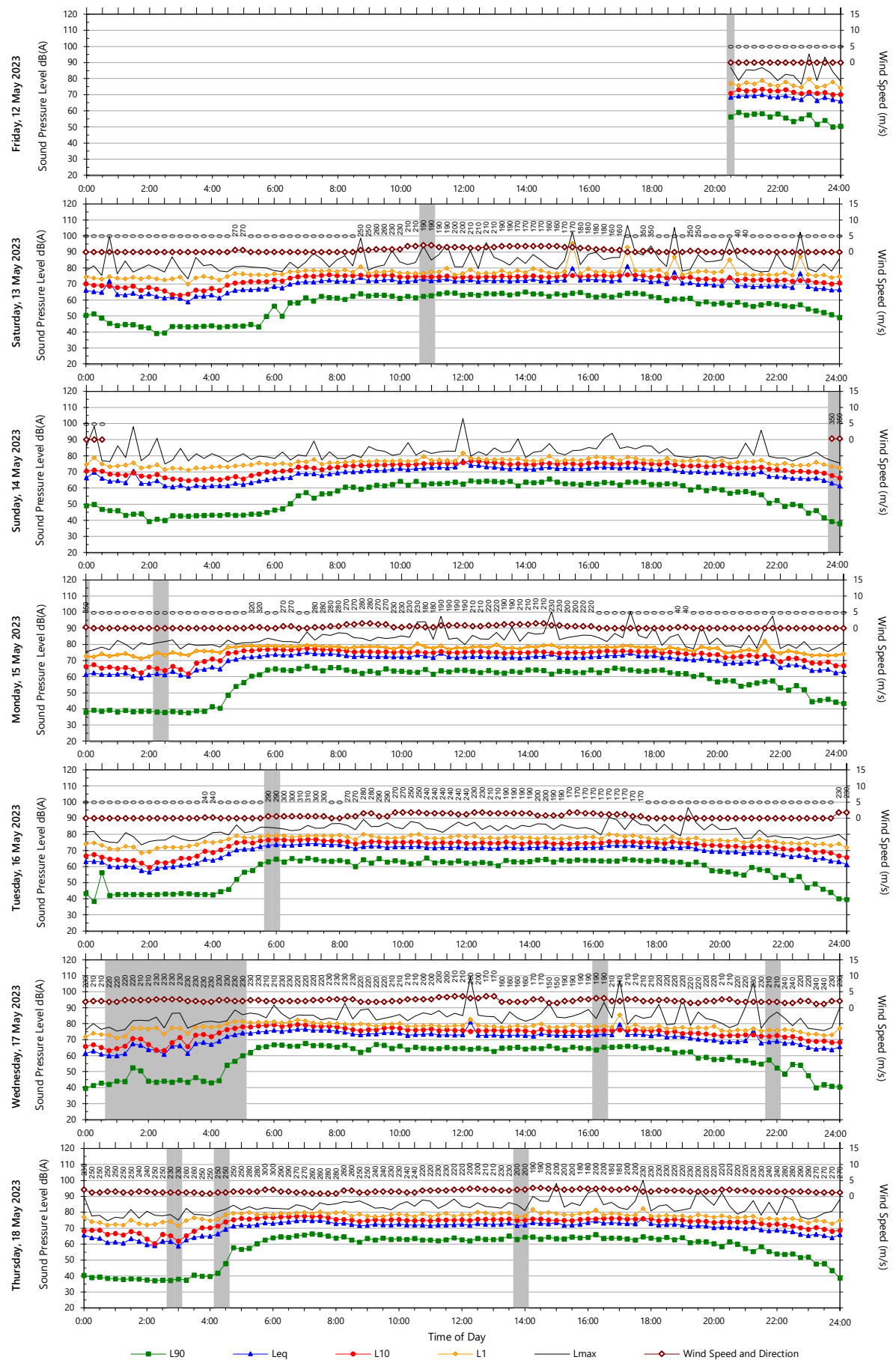


Data File: 2023-05-12_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)

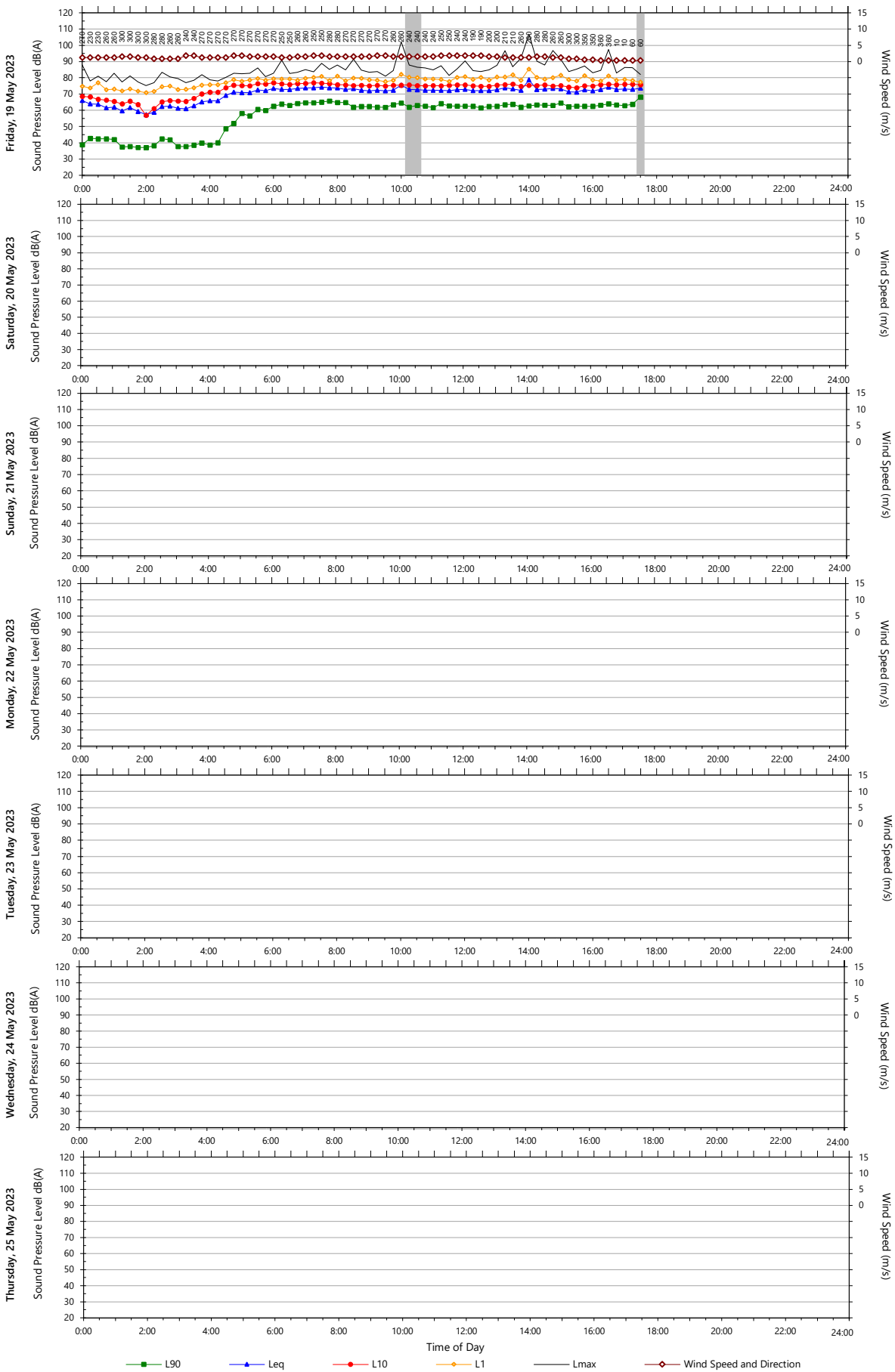
Unattended Monitoring Results

Location: L03 - 32 Victoria Street, East Gosford



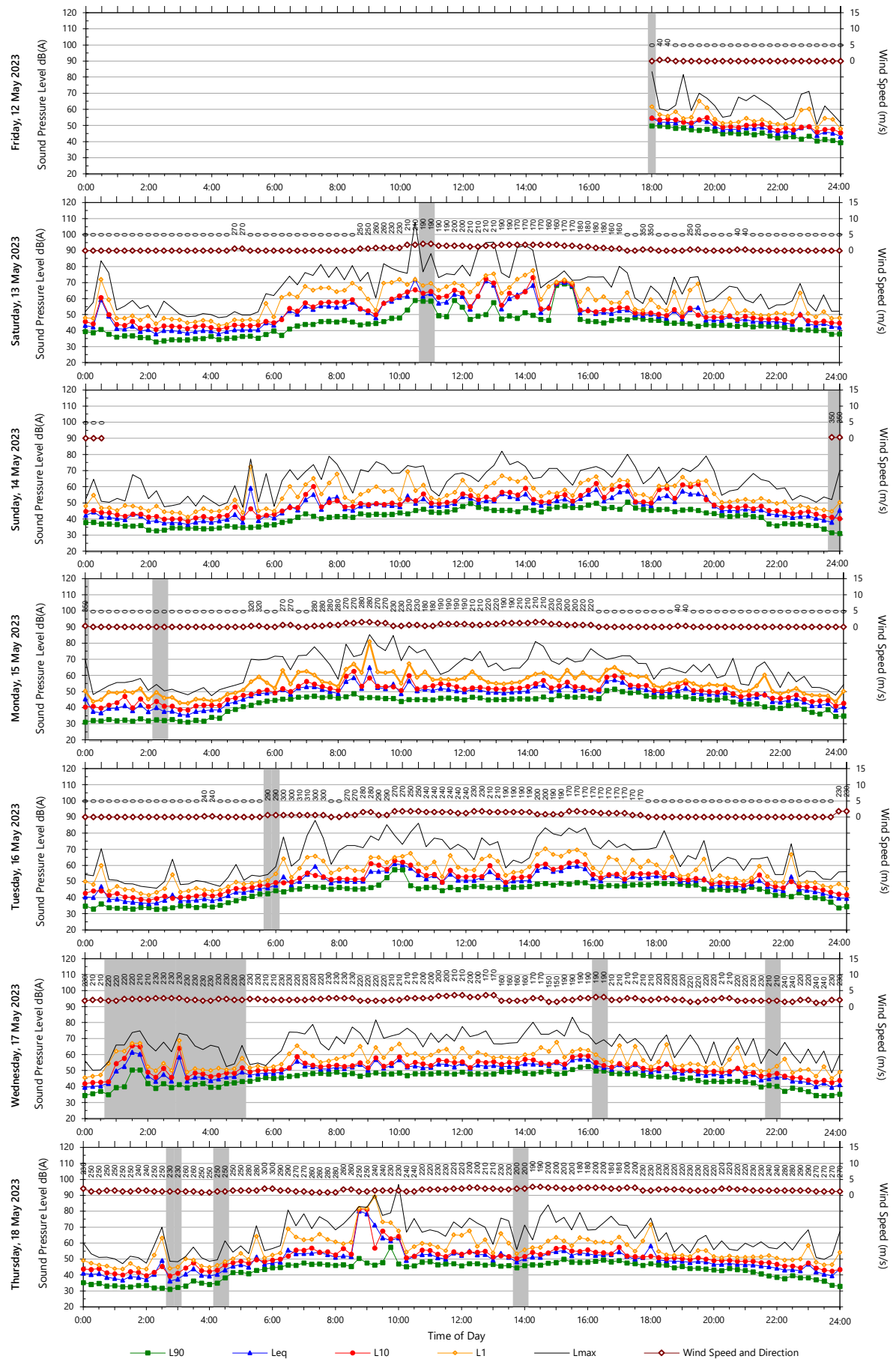
Unattended Monitoring Results

Location: L03 - 32 Victoria Street, East Gosford



Unattended Monitoring Results

Location: L04 - Gosford Fire Station



Data File: 2023-05-12_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)

Unattended Monitoring Results

Location: L04 - Gosford Fire Station

