27 April 2023

Ref: 232281R/30040

Walker Gillieston Heights Pty Ltd
Level 21, Governor Macquarie Tower
1 Farrer Place, Sydney NSW 2000

RE: NOISE ASSESSMENT – 457 TO 527 CESSNOCK ROAD, GILLIESTON HEIGHTS

This letter report presents the results of a noise impact assessment conducted for a proposed residential development at Lot 2 DP 601226, Lot 1 DP 601226, Lot 1 DP 31179, Lot 1 DP 302745 and Lot 2 DP 302745, being 457 to 527 Cessnock Road, Gillieston Heights, as shown in **Figure 1**. The assessment has been prepared to accompany a D.A. to Maitland City Council (MCC).

Figure 1 – Proposed Subdivision Site

Figure 1 shows the entire subdivision will be up to several hundred metres wide. The potential for noise impacts, however, will come from traffic passing along Cessnock Road. This report, therefore, concentrates on the noise levels at the proposed lots that are closest to Cessnock Road.

AMBIENT NOISE LOGGING

Existing traffic noise levels were monitored at two locations on the site as shown in Figure 1. The noise logging was undertaken between 27 April and 4 May 2022. Ambient noise levels were measured at 15 minute statistical intervals using ARL Ngara environmental noise loggers.

The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The noise loggers used comply with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and has current NATA calibration certification.

The loggers were programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the loggers was performed during the instrument's initialisation procedures, with calibration results being within the allowable $\pm$ 0.5 dB(A) range.

The noise logging locations are shown in Figure 1. The noise loggers were located with full line of the site to Cessnock Road. Both loggers were located approximately 13m from the edge of traffic on the present alignment of Cessnock Road which is approximately the same distance as the boundaries of the closest of the lots in the proposed subdivision are set back. An analysis of the data showed that traffic noise dominated the measurements.

It is usual for Transport for NSW (TfNSW) and Councils to require design standards to meet projected traffic levels for the next 10 years after a development is completed. There are no published data on AADT figures for traffic on Cessnock Road. To consider a conservative scenario an increase in traffic volumes of approximately 30% over the measured noise levels has been used to determine potential impacts to the year 2033. Such a growth in traffic volumes would result in an increase in traffic noise of about 1dB(A) over the levels measured by the logger.

These calculated future predicted noise levels and measured background noise levels are shown in **Table 1**. The measured logger data is shown graphically in **Appendix A**. A full set of logged data is not included in this report but is available on request.

TABLE 1
MEASURED and CALCULATED TRAFFIC NOISE LEVELS dB(A)

	Logger 1		Logger 2	
Percentile	**Leq (period)**	**L90 (period)**	**Leq (period)**	**L90 (period)**
Day (i.e. 7 am to 10 pm)	65	50	64	48
Night (i.e. 10 pm to 7 am)	60	37	58	38

The data from the two loggers were relatively similar, as would be expected along a stretch of road carrying the same traffic flow. The noise levels at Logger 1 are marginally higher and this is most likely due to the topography, with this section of road being on an incline for traffic travelling to the north. To

consider a worst case the data from Logger 1 will be used here for the assessment of potential noise impacts.

TRAFFIC NOISE IMPACTS

The Office of Environment and Heritage (OEH) NSW Road Noise Policy (RNP, 2012), as adopted by TfNSW, recommends various criteria for different road developments and uses.

For new residential developments near roads, the RNP advises that land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW, 2007). The SEPP (2007) is supported by the Department of Planning guideline "Development near Rail Corridors and Busy Roads – Interim Guideline" (Guideline) which gives the following noise criteria in Section 3.5:

- In any bedroom in the building: **35 dB(A),L_{eq}** at any time 10pm – 7am, and
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): **40dB(A),L_{eq}** at any time.

These criteria originated from the Rail Infrastructure Corporation (RIC) publication "Consideration of Rail Noise and Vibration in the Planning Process" (2003) where it is explicit that the criteria apply with windows and doors closed.

The Environmental Noise Management Manual (ENMM) details that the facade of a single glazed, light framed house, with the windows closed, will typically attenuate up to 20 dB(A) of traffic noise (note with the windows open it will attenuate up to 10 dB(A)).

This means that an external noise level of 60 dB(A) Leq at night and 65 dB(A) Leq during the day (i.e., based on Logger 1 data) would result in internal noise levels of 40 dB(A) Leq (9hr) in bedrooms, and 45 dB(A) Leq (15 hr) in living rooms, under the detailed circumstances and with windows closed.

The future predicted noise levels, therefore, indicate that further assessment is required to determine if noise control is necessary to achieve compliance in internal areas of residences in the houses which are most exposed to the noise from traffic on Cessnock Road, where the projected noise levels are as shown in Table 1.

As there are no building plans or defined building envelopes on the lots the following comments can be considered applicable to any construction of residences in the first row of houses from Cessnock Road.

Figure 2 is a close up of those lots in the subdivision which are closest to Cessnock Road. The figure is in two parts showing the lots in the northern section on the left and the lots in the southern section on the right.

In some other locations along Cessnock Road, acoustic barrier fences have been employed to mitigate some of the traffic noise.

The effectiveness of an acoustic barrier is dependent upon several factors which relate to the ground level at the location of the noise source and the receiver, the height of each the source and receiver and the ground level and height at the barrier location.

To have any acoustic effect an acoustic barrier must break the line of sight between the source and the receiver. As a rule of thumb, a barrier which just breaks the line of sight will achieve an insertion loss of approximately 5dB(A). Increasing the height of the top of a barrier, relative to the height of the source and/or receiver will increase its acoustic effectiveness. Reductions in traffic noise of greater than 10 to 12 dB(A) are, typically, difficult to achieve using just an acoustic barrier.

Figure 2 – Lot Layout – Cessnock Rd. Frontage

The lot layout in Figure 2 shows that the lots are to have boundaries which are setback 12.5m from the current alignment of Cessnock Road. Future plans for the area indicate that Cessnock Road will be widened into this zone by 10m. The DCP indicates there is to be a 2.5m acoustic buffer to the residential boundaries and then a minimum 2.5m landscaped buffer inside each residential lot.

All lots will be accessed from local roads within the subdivision. The residences on the lots will, therefore, likely be constructed with the closest facades to be set back a minimum of approximately 5m from the boundary (as is the case in the nearby subdivisions).

The noise logger was located approximately 13m from the edge of traffic on Cessnock Road, and, therefore, about 17m from the centre of traffic on that road. Assuming a typical road configuration for the widened road, the future boundaries of the residential lots will, therefore, be around 12.5m from the centre of the traffic. Received noise levels at the boundaries will be similar to those measured by the logger (adjusted for future traffic flow).

Based on the calculated future noise levels the facade of a proposed residence in the all of the lots adjoining Cessnock Road would be subjected to approximately 60 dB(A) Leq (9 hr) and 65 dB(A) Leq (15 hr) of traffic noise.

For windows with direct line of sight to the traffic this means that the facade of the bedrooms and living areas would need to attenuate about 25 dB(A) of the traffic noise (i.e., to achieve the requisite internal noise levels). Introducing an acoustic barrier into the noise propagation path can reduce the received noise at ground floor levels of residences as detailed above (i.e., by between 5 and 10 dB(A)).

The above discussion represents the situation where proposed residences have line of sight to the traffic noise source (and with no effective acoustic barrier in place). Obviously, not all facades face directly towards a road. In this light, **Figure 3** is a reproduction of Figure B2 from the Guideline showing a typical theoretical situation of a dwelling adjacent to a busy road. Acoustic consultants often use this Guideline (and Figure B2 specifically) in recommending architectural modifications to achieve the recommended internal noise levels.

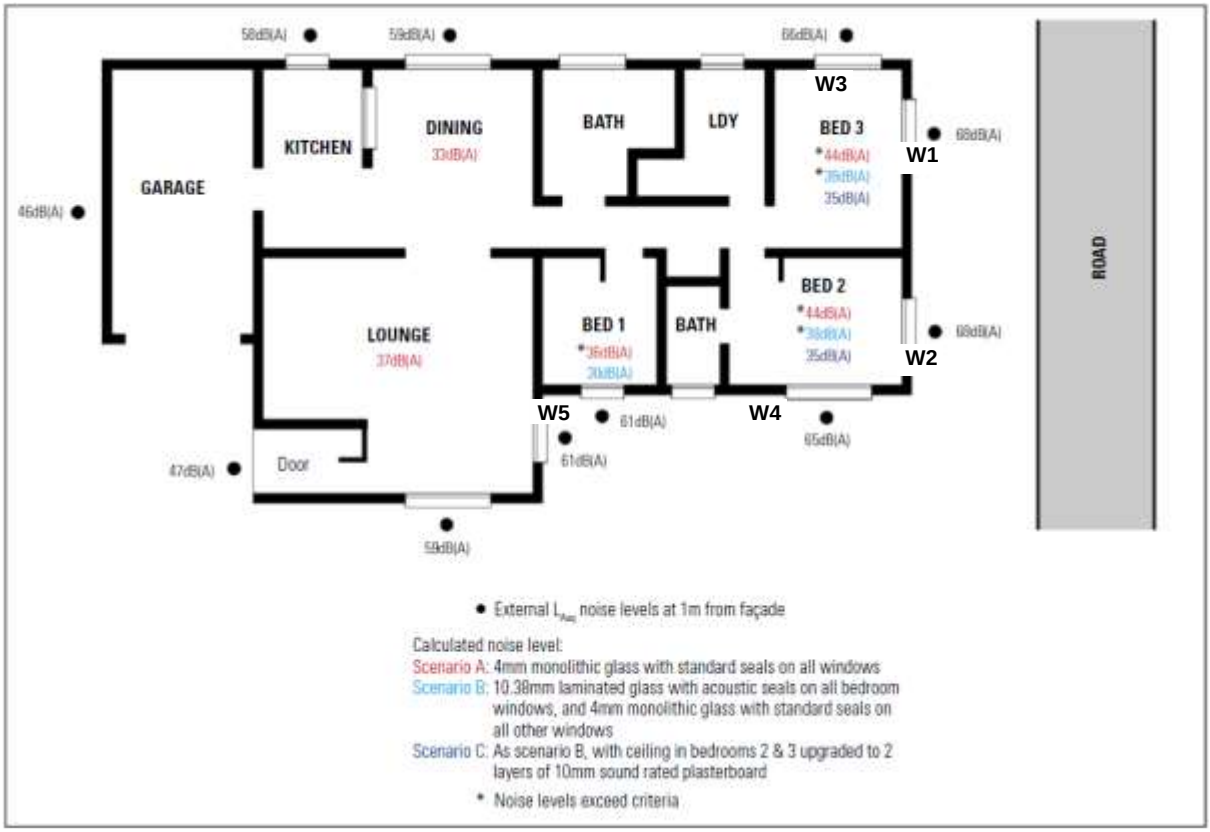


Figure 3 - Traffic noise reduction for various construction types.

Figure 3 shows a theoretical example at a residence with traffic noise level of 68 dB(A) at windows W1 and W2 directly facing a busy road. The figure shows that this noise may be reduced by 24 dB(A) by the sound transmission loss associated with construction conforming, at a minimum, to “Scenario A”.

This indicates that, as a minimum, the facade of any rooms facing the traffic in the first row of houses from Cessnock Road need be constructed to achieve greater noise attenuation than that as per the requirements for “Specification A”, from the Guideline, as detailed below.

Specification A

Windows	standard 4mm monolithic glass with standard weather seals on all windows	(Rw 25)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: ‘Rw’ is the weighted sound reduction index of a building element

The acoustic weak point in any typical residential facade is through glazing or door (as indicated above). The required increase in noise attenuation, in the current circumstances, can most readily be achieved by substituting, say, 6.38mm laminated glass for the standard 4mm monolithic glass in windows and glass sliding doors and providing seals around any potentially exposed doors.

The above discussion relates to facades with a full line of sight to the traffic. Figure 3 also shows an example of windows W3 and W4 which are on facades perpendicular to the road. The noise impacting on these windows is, thereby, shielded from 50% of the traffic noise by the building structure, and noise levels are 2-3 dB below the traffic noise level at W1 and W2 which have direct line of sight to the traffic. Window W5 is approximately twice the distance from the road as W4 and experiences an external traffic noise level 4 dB below the level at W4.

The requirements for the modified Specification A type construction would generally be applicable to the row of houses closest to Cessnock Road. Houses further removed from Cessnock Road will be, by definition, more distant from the traffic noise. The lot layout shows that the additional distance from Cessnock Road to lots in the second row of houses will result in an approximately 6dB(A) reduction in the traffic noise (relative to the closer Lots).

The intervening structure of houses in the first row from Cessnock Road will also shield any houses in the lots further away from the traffic noise. This would also apply, to a lesser extent to any two storey houses in these lots. Houses in the closer lots will act as (at least partial) acoustic barriers with respect to the further lots.

As detailed above, the most significant noise leakage path in a typical residential building is through glazing (window and glass sliding doors etc.). The acoustic treatment of any of the residences in the closest lots to Cessnock Road is dependent on several factors relating to such things as room size and orientation, the size and location of windows or other openings and shielding from other structures. Detailed acoustic planning may require specific analysis at the design stage of each residence.

Based on the discussion above, the resultant received noise at the first floor window level in the facade of any dwellings in lots that are not in the closest row of house to Cessnock Road will be lower than 50 dB(A) Leq (9 hr) and 55 dB(A) Leq (15 hr). Noise levels at windows or glass doors to ground floor areas would be lower again than those shown above. Under those circumstances, no noise control would be required for any of these houses.

SUMMARY OF RESULTS AND FINDINGS

Following is a summary of the results of the traffic noise assessment.

- Traffic noise has the potential to create some adverse impacts at the closest row of houses to Cessnock Road,
- The traffic noise is at levels that should be readily controlled using standard building techniques,
- Some windows may require upgrades from standard,
- A 1.8m high acoustic barrier along the Cessnock Road boundary of the site may provide adequate noise reduction to ground floor levels of houses in the closest row such that acoustic treatment may not be required (the barrier height and effectiveness would require specific calculations based on survey),

- The barrier effects will be minimal at any first floor living spaces or bedrooms in the houses in the closest row to Cessnock Road,

- Houses in lots further removed from Cessnock Road will not require acoustic treatment, and

- Specific acoustic assessment on individual house designs may be required to confirm the points detailed above.

- **Building Treatments**

The following sections provide some general information in relation to incorporating good acoustic practises in house design.

- **Ventilation Requirements**

The Guideline indicates that if internal noise levels with windows and doors open sufficiently to provide adequate ventilation (for most residences this equates to a minimum of 20% of the window area left open) exceed the criteria by more than 10 dB(A) the design of the ventilation of these rooms should be such that occupants can leave windows closed, if they so desire, whilst meeting the ventilation requirements of the Building Code of Australia.

This equates to an internal noise level, with windows open, of 45 dB(A) Leq during the night and 50 dB(A) Leq during the day.

As a general guide the facade of a typical residence will attenuate approximately 10 dB(A) of road traffic noise with windows open (to the centre of the room). Windows in facades with line of sight to Cessnock Road in residences in the closest row of houses, where the received noise is >55 dB(A) Leq (9hr) or > 60 Leq (15 hr) will, therefore, likely front rooms in which the internal noise levels are predicted to exceed the criterion by more than 10 dB(A) if those windows are open.

Living and sleeping areas in these residences may have need of a more detailed analysis of the ventilation requirements (i.e., depending on room design, internal house layout, line of sight to traffic etc.), to ensure compliance with the requirements of the BCA.

- **Walls**

Masonry walls typically have better noise insulation properties than other elements in the building envelope. Generally, walls are not a significant noise transmission path. Attention, therefore, should be given to the windows, doors, roof and ventilation openings as these elements will not insulate as well as the walls.

Walls of lightweight construction (e.g., weatherboard, compressed fibrous cement sheeting, timber slats, timber sheeting etc.) provide less noise insulation to low frequency noise than masonry walls. At particularly noisy locations lightweight cladding should be avoided unless specifically designed to provide adequate insulation.

Whether the walls are masonry or of light-weight construction, the wall's insulation capacity will be weakened if it contains ventilators, doors or windows of a lesser insulation capacity. To improve

insulation response, ventilators can be treated with sound-absorbing material or located on walls which are not directly exposed to the external noise.

- **Windows**

In acoustic terms, windows are one of the weakest parts of a facade. An open or acoustically weak window will severely negate the effect of an acoustically strong facade. Whenever windows are incorporated in a building design their effect on acoustic performance of the building facade should be considered. Reducing the numbers of windows and/or appropriately positioning them away from the road can be beneficial.

Proper sealing is crucial to the success of noise reduction of windows. To prevent sound leaks, windows should be caulked (with a flexible sealant such as mastic or silicone) thoroughly from the inside, and outside between the wall opening and the window frame. Usually, the best option is use one of the many commercially available double glazed or laminated windows with acoustic seals.

Laminated glass is usually cheaper and easier to install than double glazing and is relatively effective in reducing moderate to high levels of traffic noise. The use of laminated glass has proved successful in reducing road traffic noise but its success is largely dependent upon the effectiveness of the frames and the fitting of the frames into the parent walls.

Louvered windows are not recommended for any habitable rooms with line of sight to Cessnock Road in the closest row of houses to that road.

- **External Noise**

The Guideline indicates that where a new residential development is planned to occur near a busy road appropriate building design, layout and construction techniques should be applied to minimise noise intrusion and provide suitable internal noise levels for sleeping and other uses. External areas should be shielded from high levels of noise.

Whilst it may not be possible to acoustically shield the entire yard of a house it is usually relatively simple to shield smaller active recreation areas such as courtyards. These courtyard areas can be located to be acoustically shielded by the building elements of the house and/or garage or can be otherwise shielded by the construction of solid fencing or walls. To act as an acoustic barrier any fencing or walls must be solid to the intended height (to be determined by individual assessment) with no gaps for the passage of sound.

CONCLUSION

A noise impact assessment has been conducted for a proposed residential development at Lot 2 DP 601226, Lot 1 DP 601226, Lot 1 DP 31179, Lot 1 DP 302745 and Lot 2 DP 302745, being 457 to 527 Cessnock Road, Gillieston Heights. The results of site noise measurements and theoretical calculations have shown elevated noise from road traffic on Cessnock Road has the potential to create adverse impacts at some sections of the subject land.

A summary of the recommendations arising from the assessment is detailed in the report along with a number of generic minimum architectural modifications to enable an assessment of the minimum requirements that may be required to ensure the acoustic amenity of any future residents.

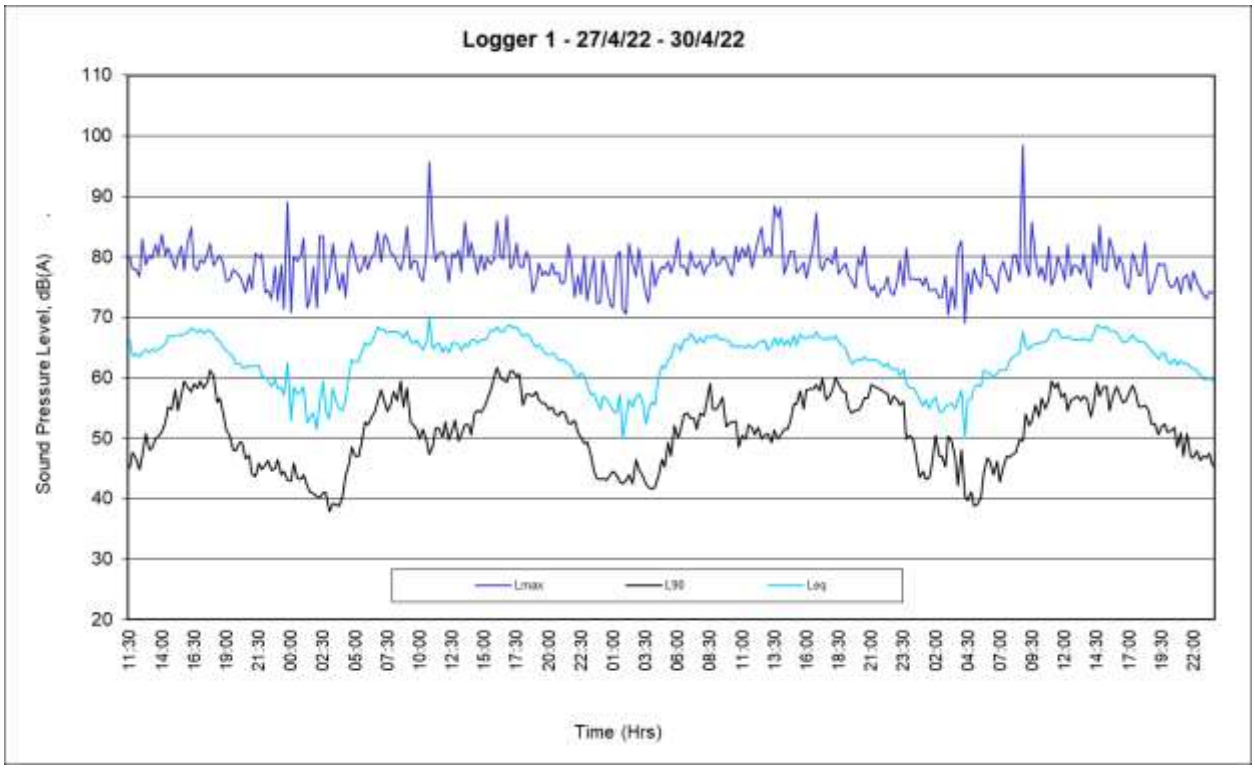
We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please do not hesitate to contact the undersigned.

SPECTRUM ACOUSTICS PTY LIMITED

Ross Hodge *M.A.A.S.*
Principal/Director

APPENDIX B

NOISE LOGGER DATA CHART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40
30
20
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L90
Leq
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16:30
19:00
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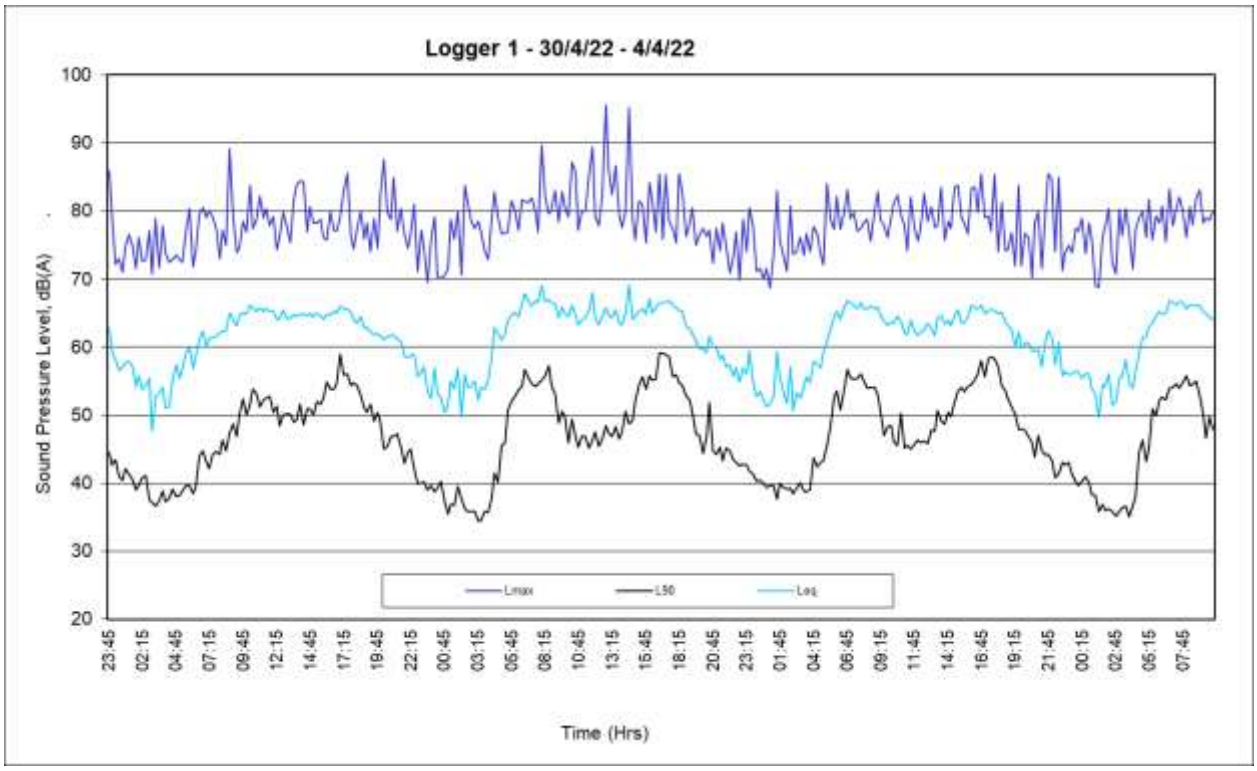
Time (Hrs)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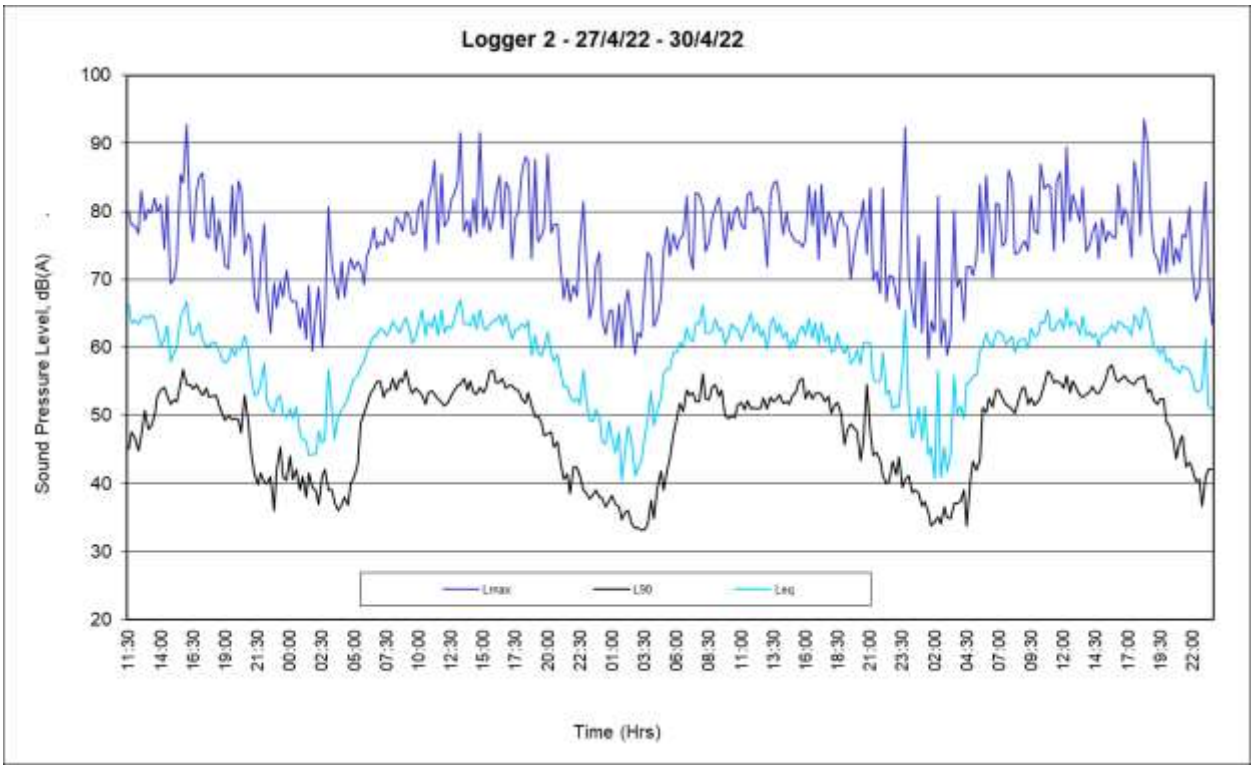
Time (Hrs)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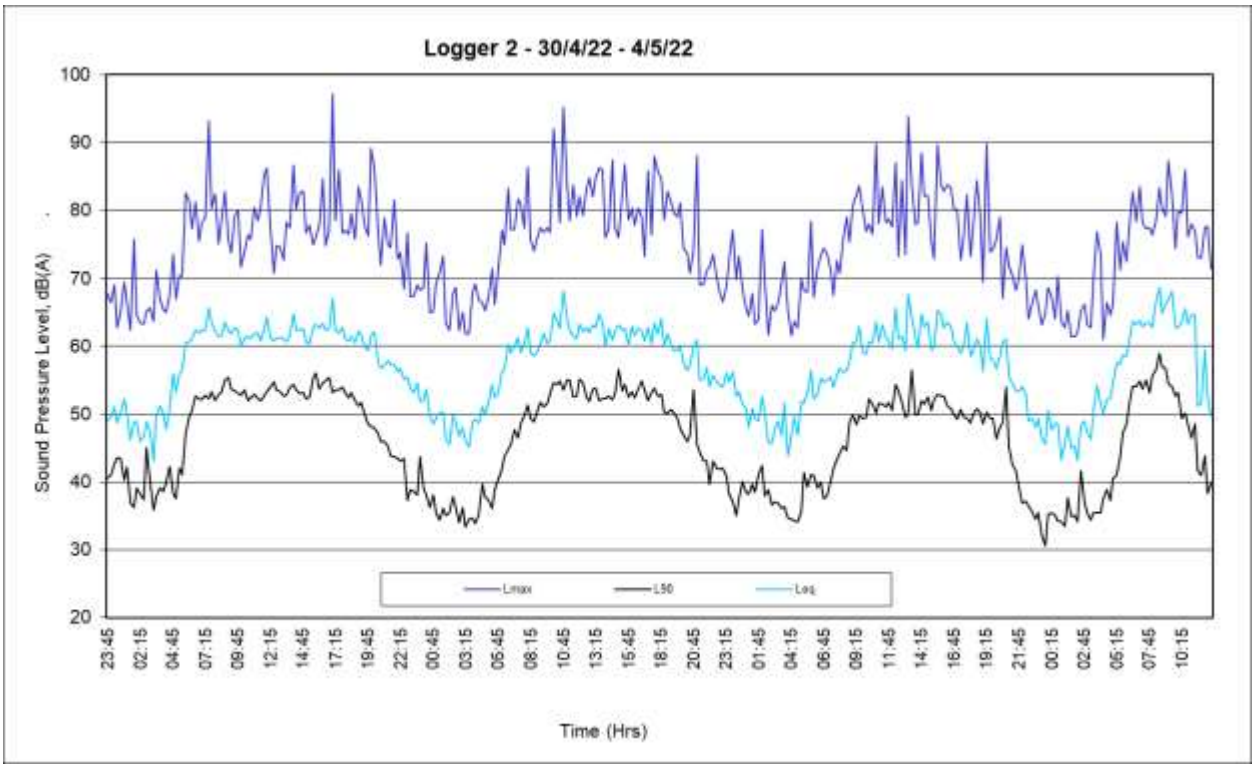
L90
Leq


Logger 2 - 30/4/22 - 4/5/22
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Leq