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Building B, East End, QT Newcastle

Rooftop Bar Noise Assessment

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1 INTRODUCTION

Acoustic Logic has been engaged to conduct an assessment of potential noise impacts associated with the proposed extension in hours of use of roof top bar at Level 6 Building B, East End, Newcastle.

This document addresses noise impacts assessed with the following:

- Noise emission from the proposed operation of the tenancy. This will include patron activity and music noise from the use of the internal roof top bar and patron activity for outdoor bar terrace.
- Identify noise emission controls based on NSW Liquor & Gaming requirements, and
- Determine acoustic treatments/management controls as necessary to ensure ongoing compliance with noise emission requirements.

2 SITE DESCRIPTION

The site located at Level 6, 185 Hunter Street, Newcastle NSW 2300. The site contains an internal bar and a bar terrace facing Hunter Street.

The proposed change to the operating of the bar is to extend the operating hour from 10pm to 12am at midnight, from Monday to Sunday, with a maximum occupancy of 100 patrons.

A site survey has been carried out by this office to identify surrounding noise sensitive receivers and the existing acoustic environment. Nearest sensitive receivers are as follows:

- **R1: Residential Receiver 1**: Residential apartment to the east, Building C, Washington House at 163 Hunter Street, East End, Newcastle
- **R2: Residential Receiver 2:** Residential apartment to the southeast, Building D, Fabric House at 169/185 Hunter Street, East End, Newcastle
- **R3: Residential Receiver 3:** Residential apartment to the south, Building A, Perkins & King House at 11 Perkins St, East End, Newcastle
- **R4: Residential Receiver 4:** Residential apartment to the west, The Crown &Anchor Hotel at 189 Hunter Street, East End, Newcastle
- **R5: Residential Receiver 5:** Residential apartment to the north across Hunter Street, shop top residents at 200 Hunter Street, East End, Newcastle

A site map, measurement locations and surrounding receivers are presented in Figure 1

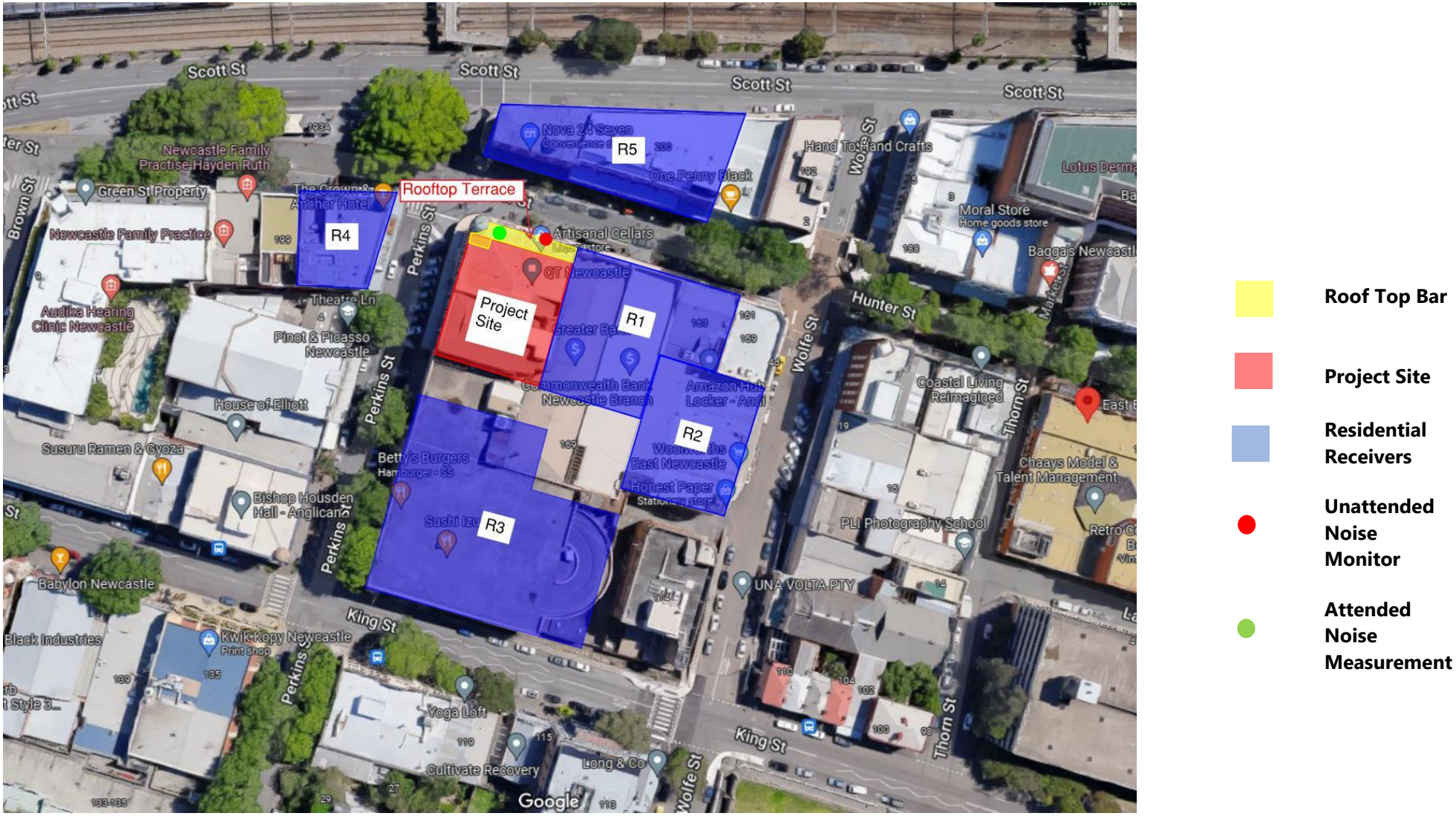


Figure 1 – Project Site and Noise Measurement (Source from: Six Map NSW)

3 NOISE DESCRIPTORS

Ambient noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify ambient noise, a 15-minute measurement interval is typically utilised. Noise levels are monitored continuously during this period, and then statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters obtained from the data are:

L_{eq} - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of time-varying noise sources (such as traffic noise).

L_{90} – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise 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.

L_{10} is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

L_{max} is the highest noise level produced during a noise event and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

L_1 is sometimes used in place of L_{max} to represent a typical noise level from a number of high-level, short-term noise events.

4 ENVIRONMENTAL NOISE SURVEY

4.1 MEASUREMENT LOCATION

One unattended noise monitor was located on the level 5 balcony of Building B apartment, facing Hunter Street. Refer to Figure 1 for detailed location. Attended measurements were conducted at the roof top bar facing Hunter Street.

4.2 MEASUREMENT PERIOD

Unattended noise monitoring was conducted from Thursday 27th of October 2022 to Friday 4th of November 2022. Attended measurements were conducted on Thursday 27th of October 2022.

4.3 MEASUREMENT EQUIPMENT

Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response mode and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the start and end of the monitoring period using a Rion NC-74 calibrator. No significant drift was noted.

Attended noise measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

4.4 SUMMARISED RATING BACKGROUND NOISE LEVELS

NSW EPA's RBL assessment procedure requires determination of background noise levels for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendix A provides detailed results of the unattended noise monitoring. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are outlined in the table below.

Table 1 – Rating Background Noise Levels

Time of Day	Measured Background Noise Level dB(A)$L_{90(period)}$
Day (7am – 6pm)	52
Evening (6pm – 10pm)	51
Night (10pm – 7am)	46

A background noise spectrum measurement was also measured on site and adjusted based on day/night difference, as presented below.

Table 2 – Background Noise Spectrum

Location	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Hunter Street (Night)	58	54	50	46	45	39	36	33	31	46

5 NOISE EMISSION CRITERIA

Noise emissions from the roof top bar will be assessed to comply with the criteria outlined in NSW Liquor & Gaming requirements.

5.1 NSW LIQUOR & GAMING

NSW Liquor & Gaming requirements are as follows:

- *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 Public Entertainment are to be inaudible within any habitable rooms in nearby residential properties.

5.2 SLEEP DISTURBANCE CRITERIA

The Noise Policy for Industry recommends the following noise limits to mitigate sleeping disturbance:

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

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

- *L_{Fmax} 52dB(A) or the prevailing RBL plus 15dB, whichever is the greater*

A detailed maximum noise level evet assessment should be undertaken.

A summary of the sleep arousal criteria is presented below:

Table 3 – Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A)L_{90}	Emergence Level
Residences Surrounding Site Night (10pm-7am)	46dB(A)L_{90}	51 dB(A) $L_{eq,\ 15min}$ 61 dB(A) L_{Fmax}

5.3 SUMMARISED NOISE EMISSION CRITERIA

Based on the noise emission criteria detailed above, a summary of the noise emission criteria for the usage between 10:00pm – 12:00am is presented in the table below.

Table 4 – Summarised Patron/Music Noise Emission Goals – Residential Receivers (External)

Time of Day	Noise Level dB – Frequency (Hz)									A-wt
	31.5	63	125	250	500	1k	2k	4k	8k	
Night 10pm-12am (BG + 5)	63	59	55	51	50	44	41	38	34	**51**

Table 5 – Sleep Arousal Criteria for Residential Receivers

Receiver	Emergence Level
Residences Surrounding Site Night (10pm-12am)	61 dB(A) L_{Fmax}

6 NOISE EMISSION ASSESSMENT

Noise emissions from the site are addressed for the following noise sources:

- Patron and music noise from Level 6 (roof top) internal bar exiting the building, and
- Patron noise from Level 6 outdoor bar terrace within the premises exiting the building

This section of the report examines the cumulative potential noise impacts from patron and music noise from the project site between 10pm and 12am. The emission levels presented within this assessment were corrected for distance attenuation and barrier effects (building shielding) where applicable.

6.1 ASSUMPTIONS

Predicted noise levels from patron noise have been assessed using the following assumptions:

- There is a maximum capacity of 100 people using the facility and it is assumed the max capacity at all times during the proposed extended operation hours (10pm to 12am)
- Assume that 30 people are using the outdoor terrace and 70 people are sitting inside the bar during the proposed extended operation hours (10pm to 12am) roughly based on the furniture layout.

  The number of patrons presented above is a conservative assumption as all spaces will not operate at full capacity for normal operation of the club. In the case that above assumption complies with the criteria, all other conditions will comply with the criteria.
- Patron noise is subject to 1 in 2 patrons talking at a moderately loud level at any one time. A sound power level of 76dB(A)L_{10} was used for patron voice levels for this assessment

Table 6 – Patron Speech Spectrum

Noise Level dB – Frequency (Hz)									A-weighted level
31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
68	68	68	74	74	68	60	55	47	**76**

- Music within the internal space is assumed to be limited to background music, creating a spatially averaged sound pressure level of 75dB(A)

Table 7 – Music Spectrum

Noise Level dB – Frequency (Hz)									A-weighted level
31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
71	71	77	73	72	71	66	57	59	**75**

- Main source for peak noise events (L_{max})/Sleep disturbance is patron speaking/shouting. Assessment has been conducted using loud voice with SWL of 87dB(A) and shout voice with SWL of 100dB(A), respectively. Referenced from *Association of Australasian Acoustical Consultants Licensed Premises Noise Assessment Technical Guideline* (Version 2.0, dated November 2020).
- The recommendations set out in Section 7 of this report have been implemented.

6.2 SOUNDPLAN MODELLING

Noise levels have been predicted at the receiver locations using SoundPlan™ 8.0 modelling software implementing the ISO 9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation" noise propagation standard.

Noise enhancing meteorological effects have been adopted as recommended by the NPfI, noting that the ISO 9613 modelling approach assumes that all receivers are 'downwind' (i.e., that noise enhancing wind conditions are in effect at all times).

Ground absorption was conservatively calculated with a ground factor of 0 for all areas surrounding the site exclusive of any localised lawns and greenery, which have been modelled with a ground factor of 0.6, as recommended in *Engineering Noise Control* (Bies & Hanson).

In line with Factsheet C of the NPfI, penalties for annoying noise characteristics should be applied at the receiver, where applicable. Based on the predicted noise levels, no penalty should be applied (either for tonality, intermittency, or otherwise).

6.3 PREDICTED NOISE LEVELS AT SURROUNDING RECEIVERS

SoundPlan noise modelling has been used to predict operational noise emissions from the development. Predicted noise levels for receiver facades are presented in Appendix B.

Maximum predicted noise levels for all nearby developments against the relevant acoustic criteria are presented in the following tables.

Table 8 – Patron Noise Emission to Residential Receivers (Late Evening 10pm-12am)

Receivers	Noise Level dB – Frequency (Hz)									A-wt
	31.5	63	125	250	500	1k	2k	4k	8k	
R1	36	36	33	38	41	32	23	17	5	39
R2	24	24	18	22	23	13	4	0	0	22
R3	32	32	28	33	35	26	16	10	0	33
R4	33	33	31	35	36	25	14	6	0	34
R5	37	37	35	40	41	30	19	12	0	40
Noise Emission Criteria	**63**	**59**	**55**	**51**	**50**	**44**	**41**	**38**	**34**	**51**
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

6.4 PREDICTED PEAK NOISE LEVELS AT SURROUNDING RECEIVERS

Table 9 – Predicted Maximum Façade Noise Level at Residential Receivers L_{Fmax}

Noise Source	Receiver	Predicted Noise Level L_{Fmax}	Criteria	Complies?
Loud Voice SWL 87 dB(A)	R1	48 dB(A) L_{Fmax}	61 dB(A) L_{Fmax}	Yes
	R2	28 dB(A) L_{Fmax}		Yes
	R3	41 dB(A) L_{Fmax}		Yes
	R4	39 dB(A) L_{Fmax}		Yes
	R5	42 dB(A) L_{Fmax}		Yes
Shout Voice SWL 100 dB(A)	R1	61 dB(A) L_{Fmax}		Yes
	R2	41 dB(A) L_{Fmax}		Yes
	R3	54 dB(A) L_{Fmax}		Yes
	R4	52 dB(A) L_{Fmax}		Yes
	R5	55 dB(A) L_{Fmax}		Yes

The above assessment results indicate that compliance with Sleep Arousal Criteria can be achieved between 10pm and 12 midnight with the implementation of suitable construction and management practices detailed in Section 7.

6.4.1 Lmax Discussion

Noise levels from a shouting voice to R1 are predicted to reach but not exceed the criteria presented above as an external noise level. It is noted that the NSW EPA *Noise Policy for Industry* 2017 sleep arousal noise limit can be supplemented by a detailed maximum noise level assessment utilising the NSW EPA *Road Noise Policy* 2011 which states the following:

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

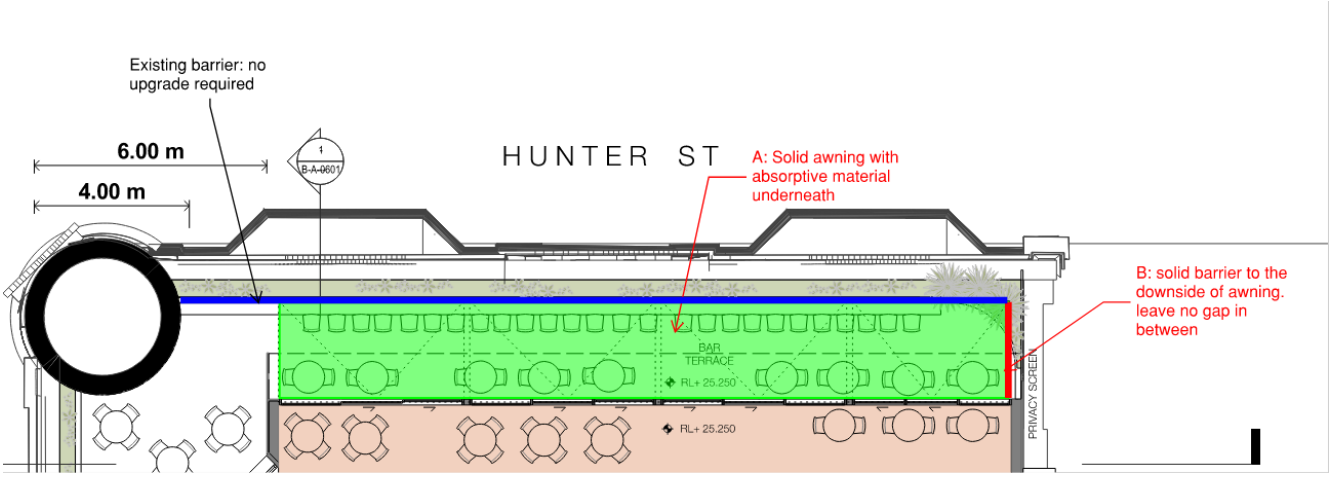
An internal noise level of 55dB(A) would conservatively correlate to an external noise level of 65dB(A) if predicted through a window open for natural ventilation. If the window is closed, modern closed façades can reduce internal noise levels by more than 20-30dB(A).

Based on the above, sleep disturbance is considered to be adequately managed.

7 COMPLYING CONSTRUCTIONS AND CONTROLS

The following noise emission controls should be imposed for the project site:

- Install a solid awning above the roof terrace to the extent of A. Absorptive material with minimum NRC 0.6 to be installed to the underside of the solid awning.
- Install a solid wall at B to underside of awning, see mark up below.



- Operating hours for the premises are to be restricted to 7am to 12am Monday to Saturday, 7am to 10am Sunday. Alcohol service will be limited to service between 10am to 12am Monday to Saturday, 10am to 10pm Sunday.
- Allowed a maximum of up to 100 patrons total between the indoor and outdoor sections of the bar. The number of patrons using outdoor terrace is not to exceed 30 between 10pm and 12am.
- Sliding doors between the bar and outdoor terrace are to remain closed after 10pm except for ingress and egress.
- The operable awning on the outdoor terrace is to be retained in the fully extended position during the period between 10pm-12am to provide additional noise attenuation.
- Existing barrier on the outdoor terrace to be retained. A picture of the existing eastern boundary barrier is presented in Appendix C.
- Indoor music is not to exceed 75dB(A)L_{eq} as a spatial average. No music or PA or audio systems is allowed within the outdoor terrace area.
- Signs are to be displayed at the entrance and rooftop terrace of the development reminding patrons to minimise noise when talking on rooftop terrace, departing the premise, especially during evening and night time.
- It is recommended that the manager keep a complaint register on site and that noise complaints are registered (if any) and what course of remedial action has been taken. This register should be stored on site and be accessible at all times.

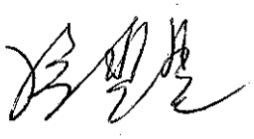
8 CONCLUSION

This report has been prepared to assess noise impacts associated with the proposed extension of operating hour to 12am for roof top bar on Level 6 at Building B, East End, Newcastle, 2300.

Provided that the recommendations in Section 7 of this report are adopted, noise emissions to all nearby development will be compliant with the noise emission guidelines.

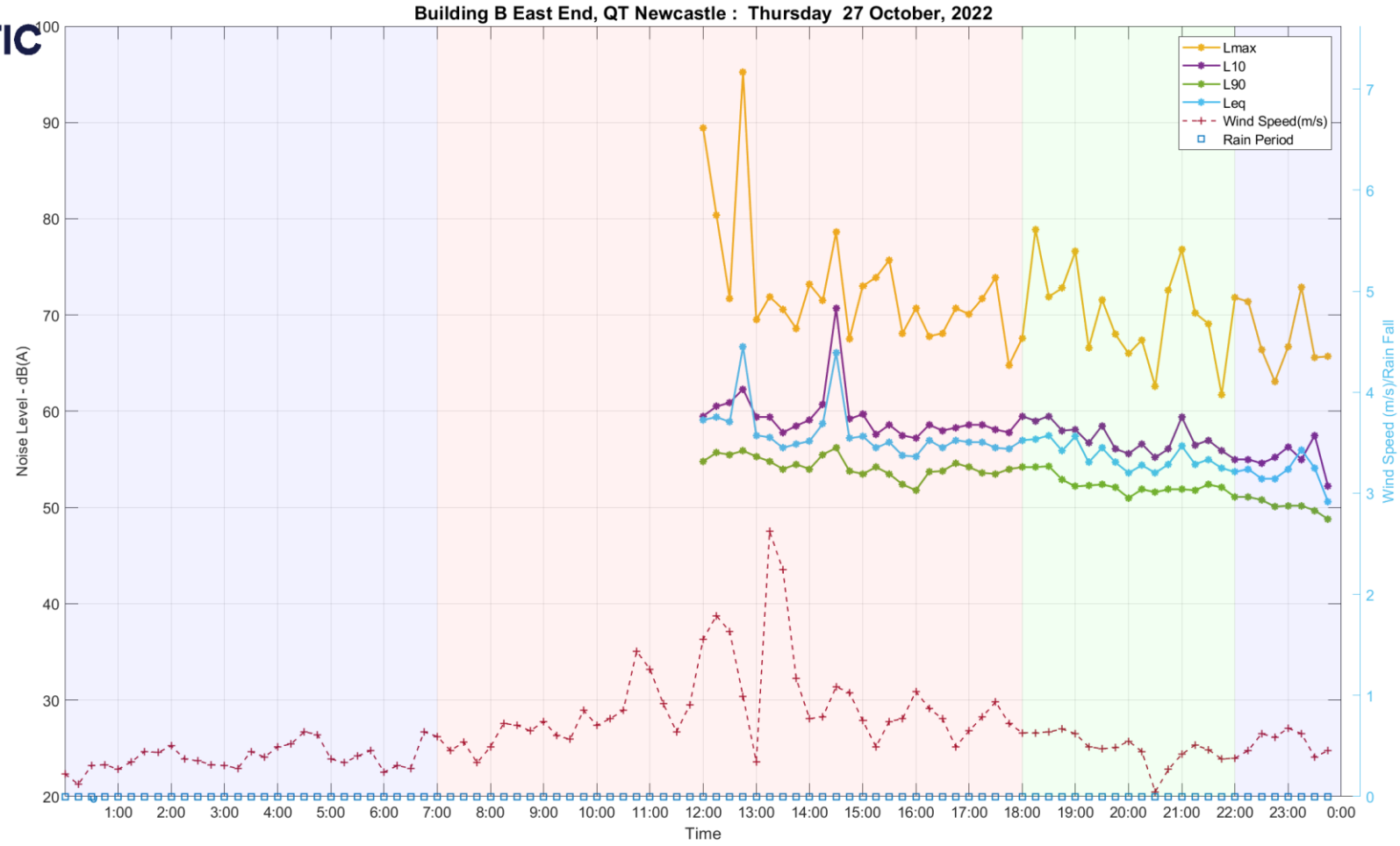
Please contact us should you have any further queries.

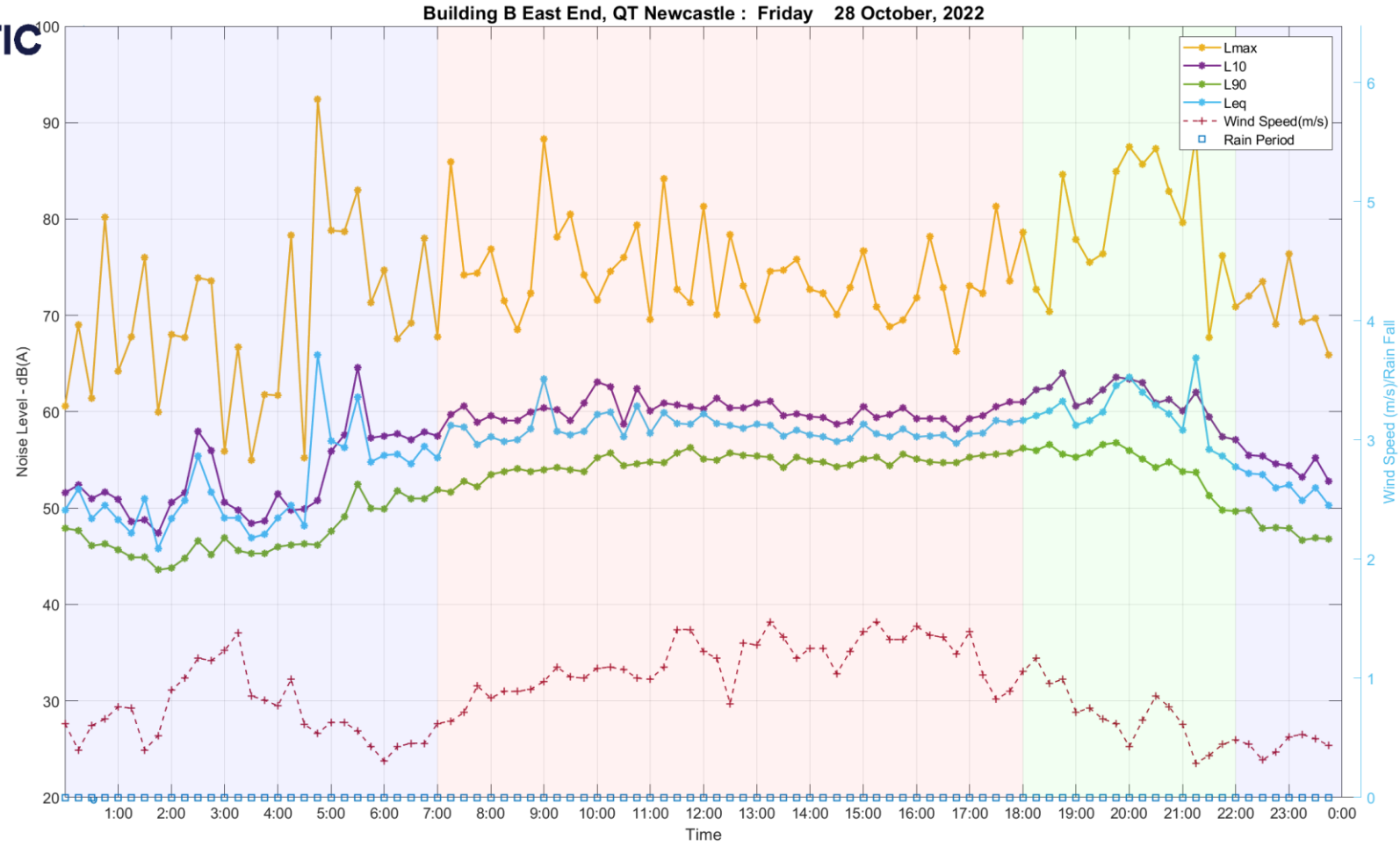
Yours faithfully,

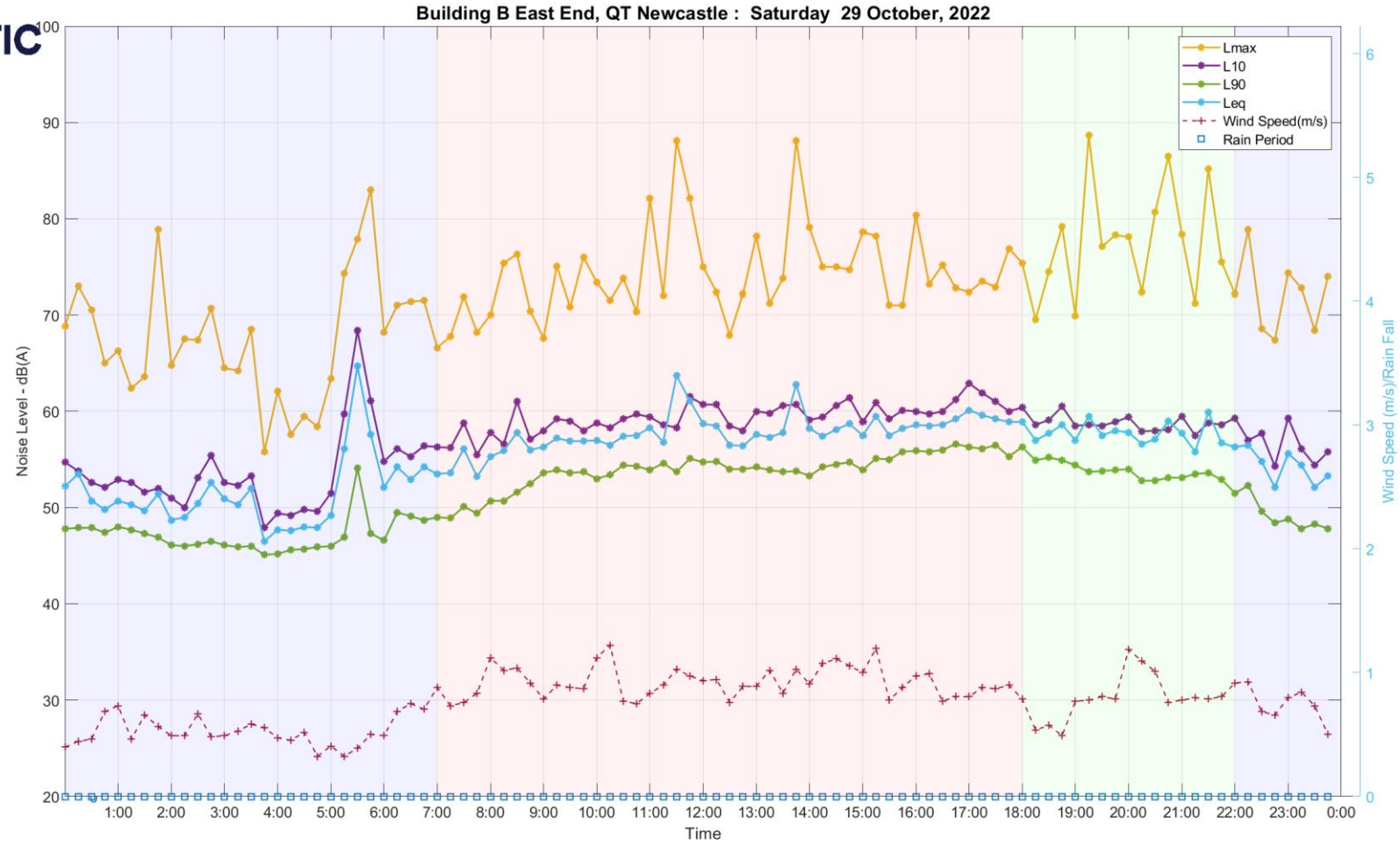


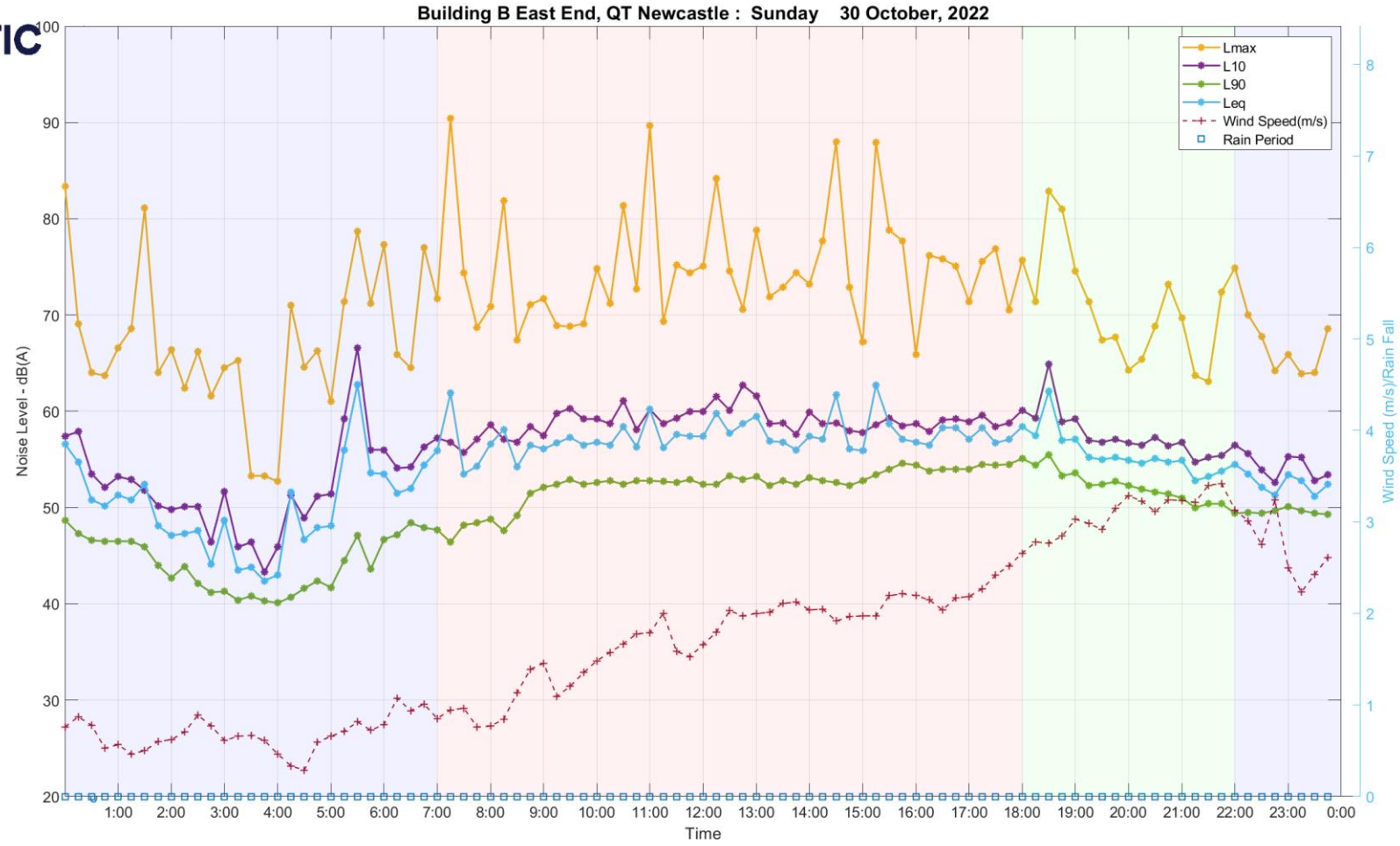
Acoustic Logic Pty Ltd
PeiPei Feng

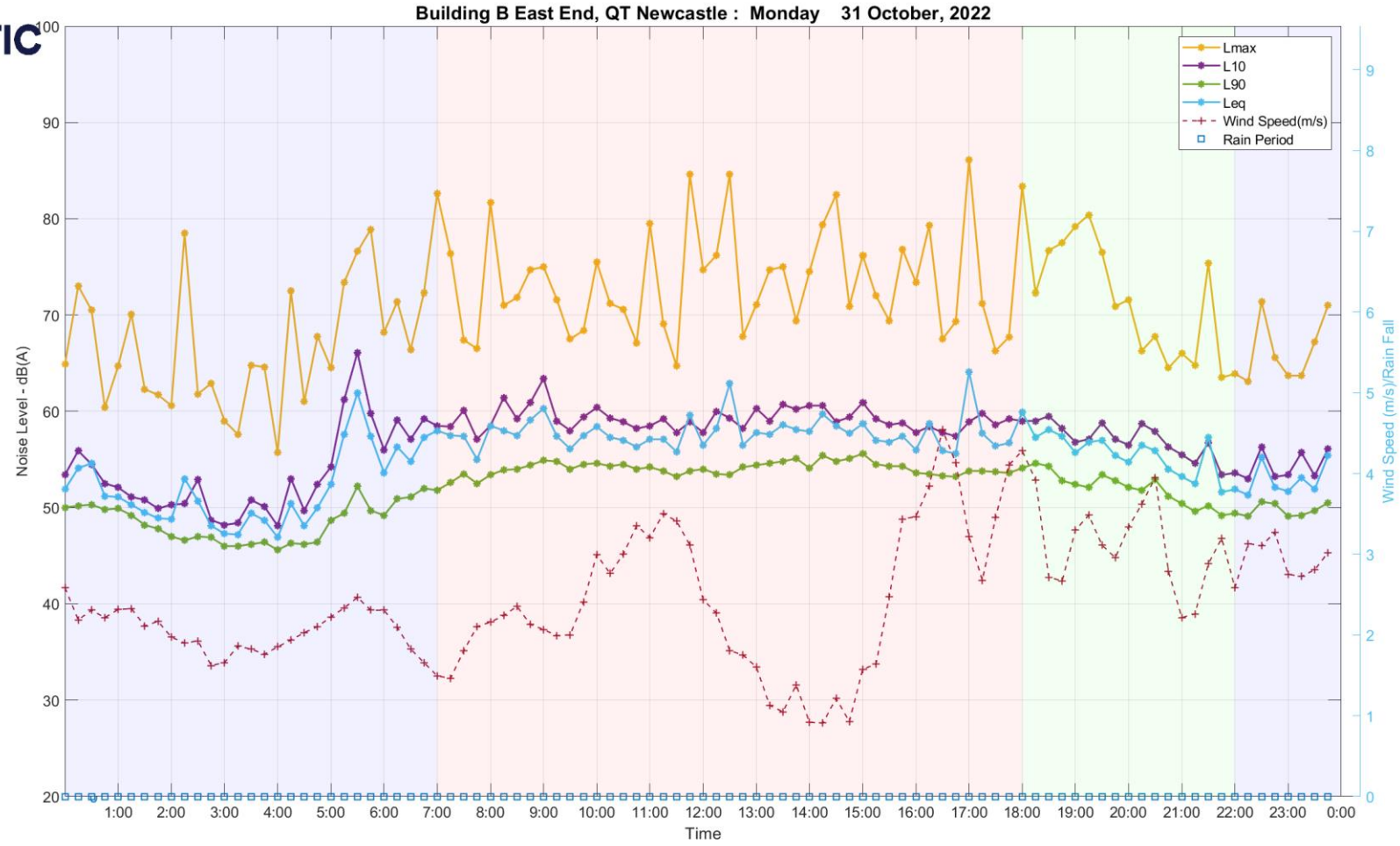
APPENDIX A – UNATTENDED NOISE MONITORING DATA

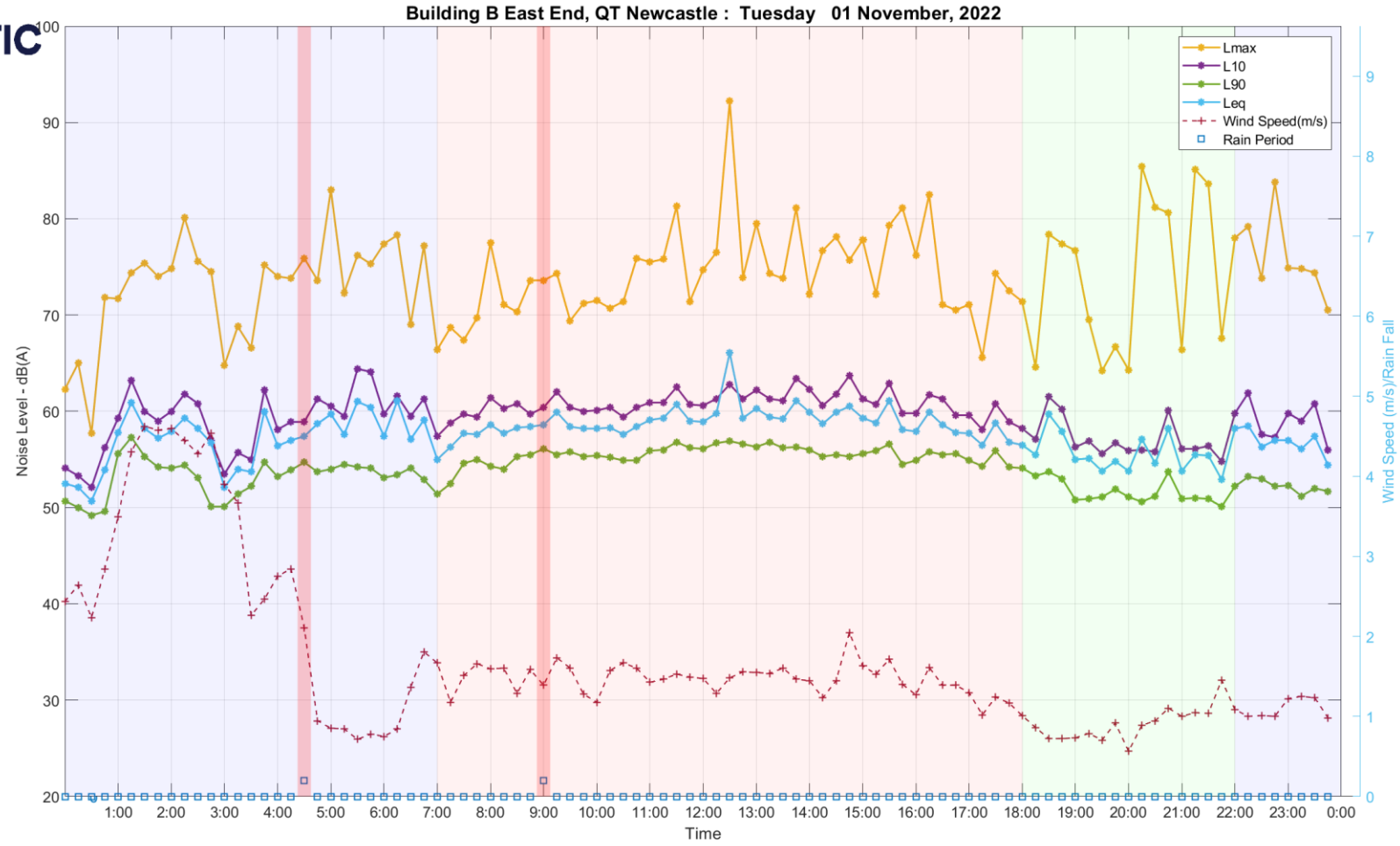


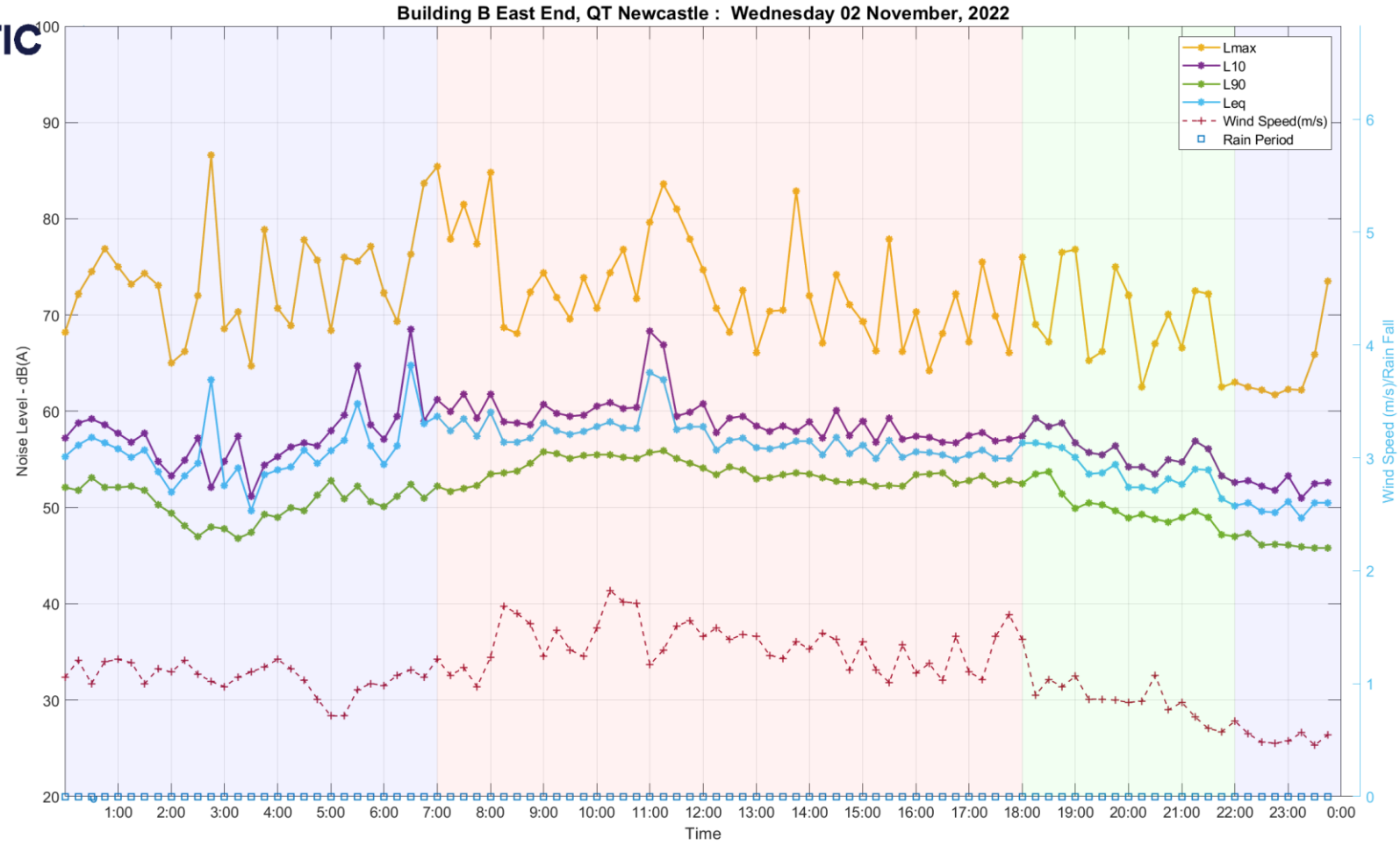


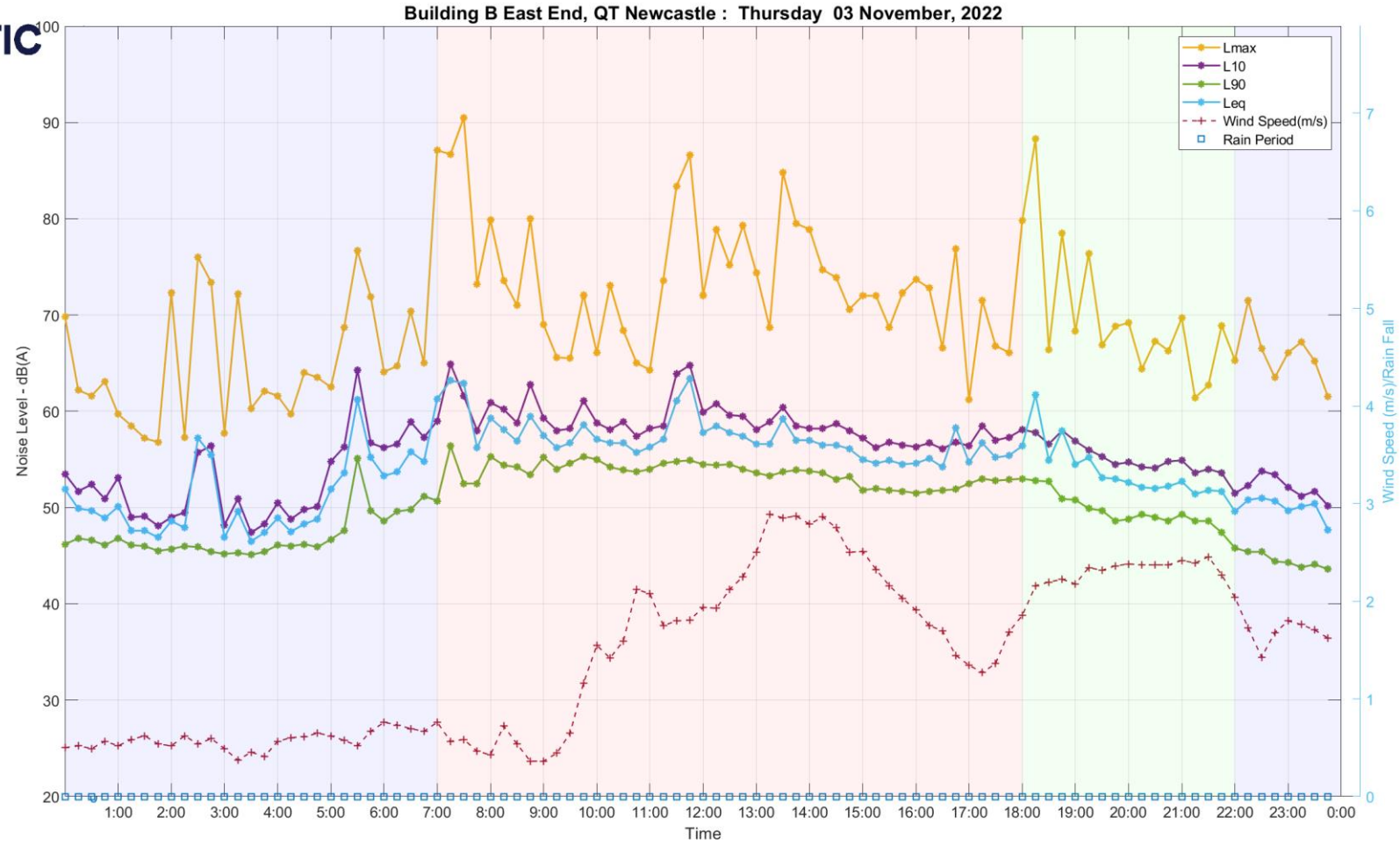


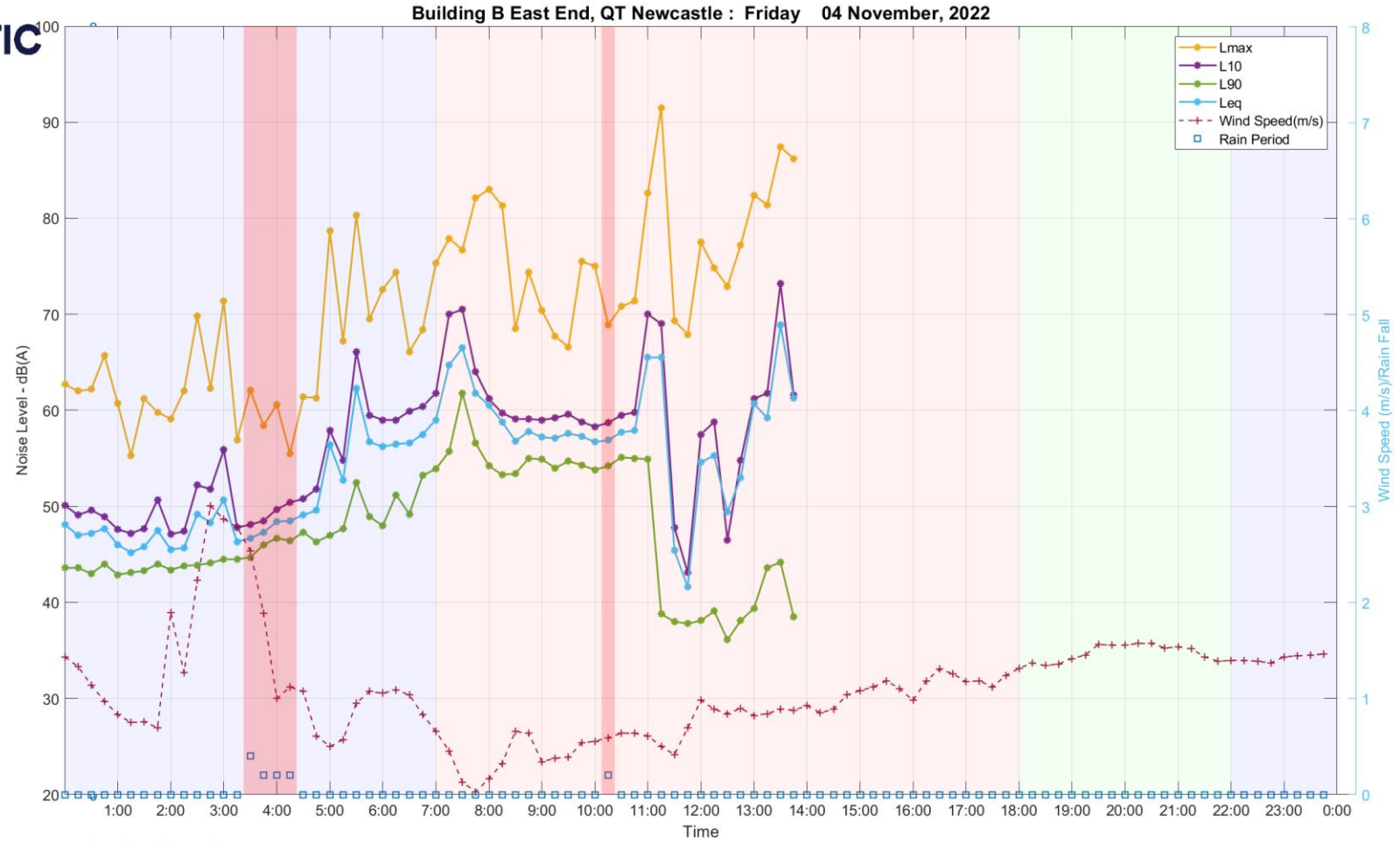






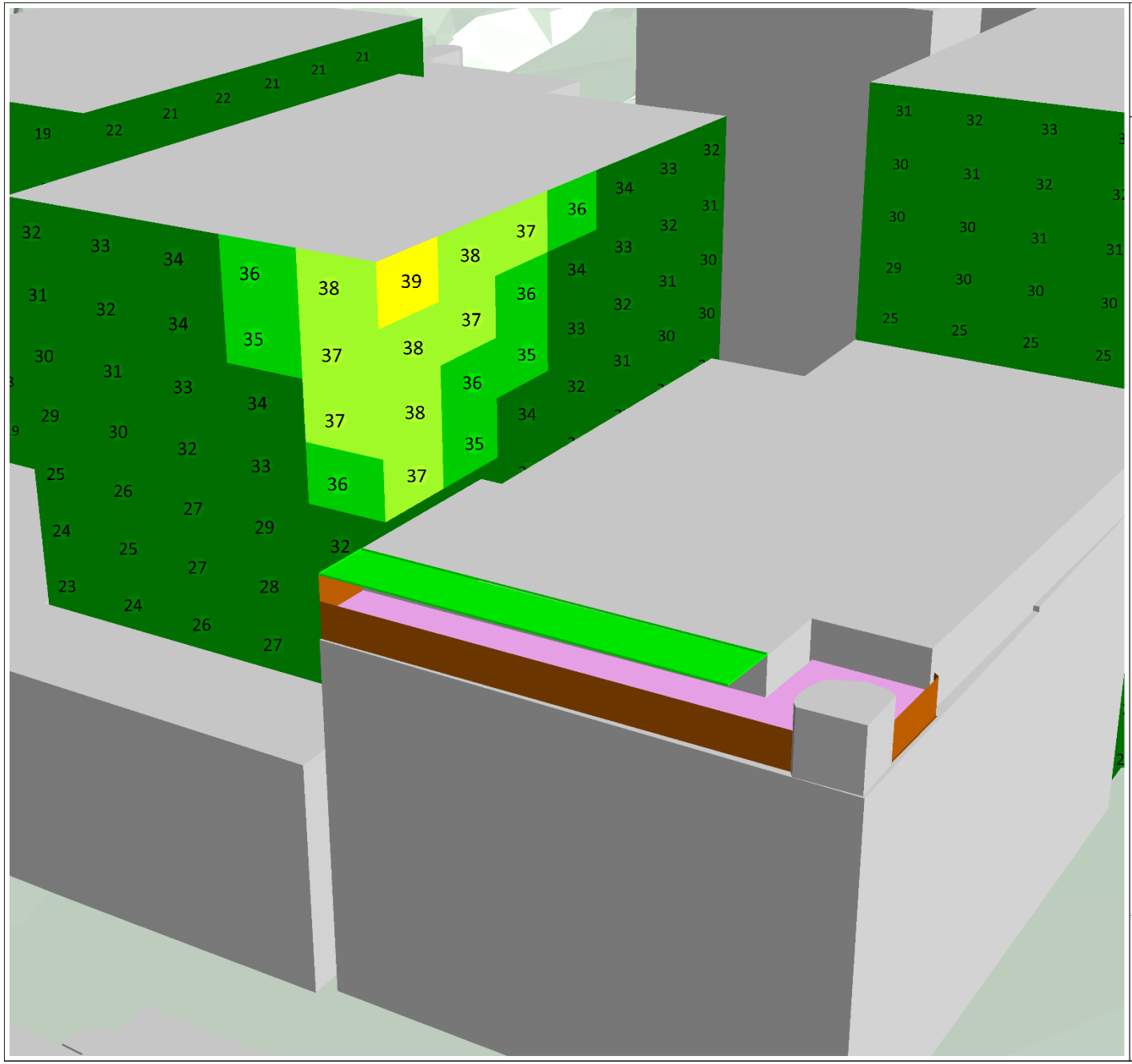






Wind Speed is corrected using factor 0.3333 based on logger location

APPENDIX B – SOUNDPLAN MODELLING RESULTS



Building B East End, QT Newcastle

Facade Noise Map - R1

30 patron using outdoor terrace

Prepared by: P. Feng
Date: 16/01/2024

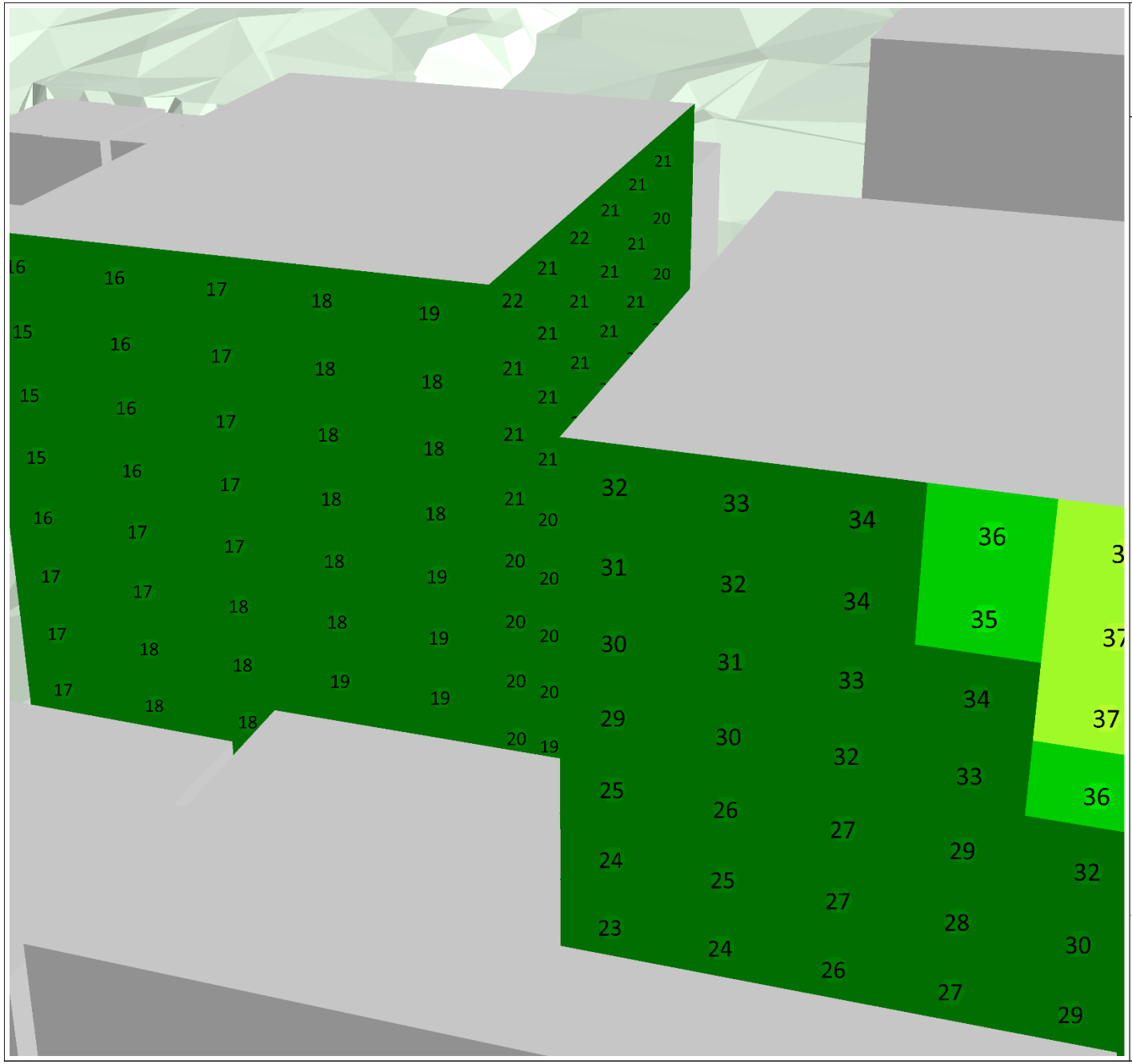
Noise Level
L_{eq}
in dB(A)

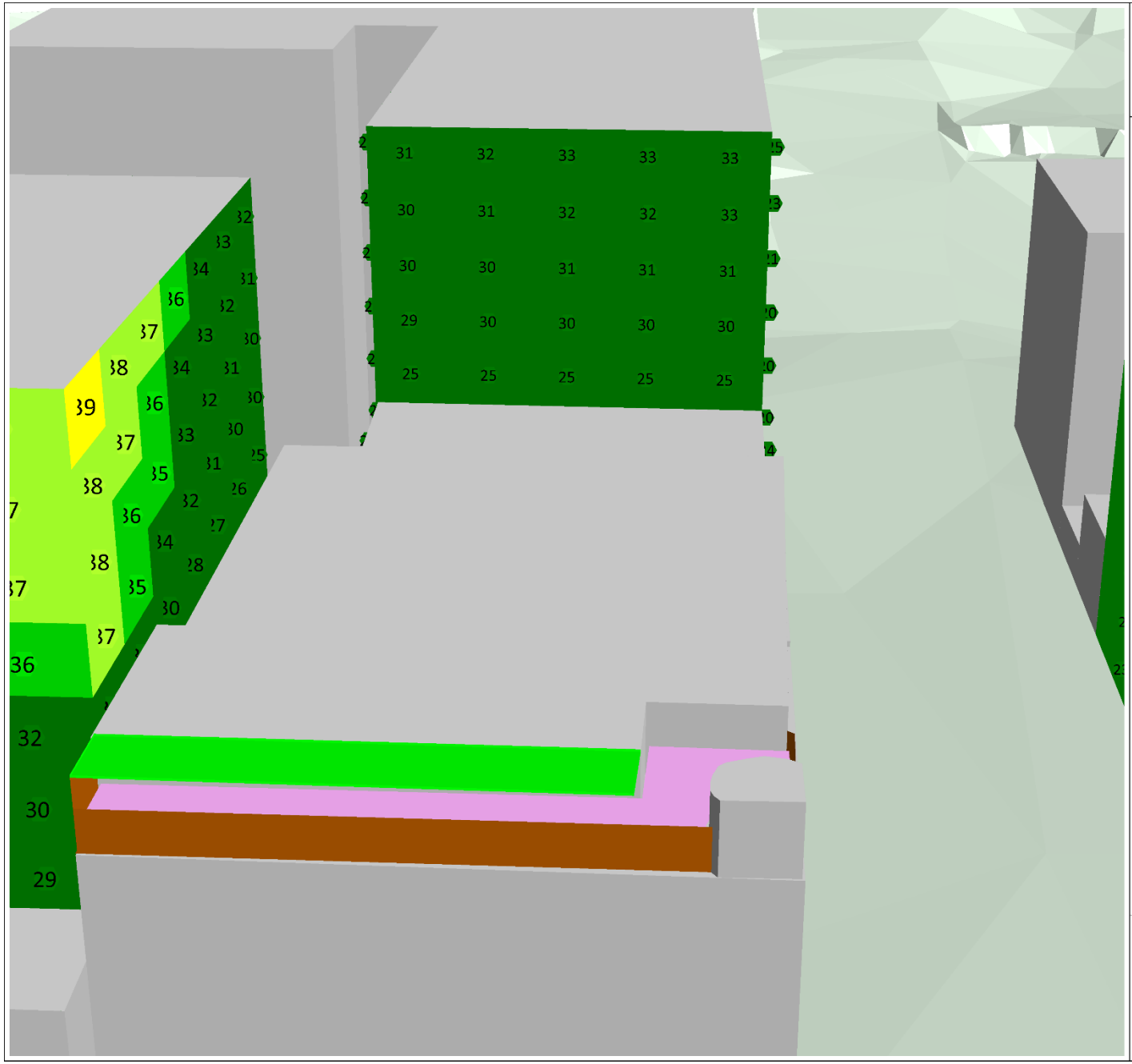
	< 35
	35 - 37
	37 - 39
	39 - 41
	41 - 43
	43 - 45
	45 - 47
	47 - 49
	49 - 51
	51 - 53
	53 - 55
	>= 55

Length scale 1:2585
0 12.5 25 50 75 100 m

N

ACOUSTIC LOGIC





Building B East End, QT Newcastle

Facade Noise Map - R3

30 patron using outdoor terrace

Prepared by: P. Feng
Date: 16/01/2024

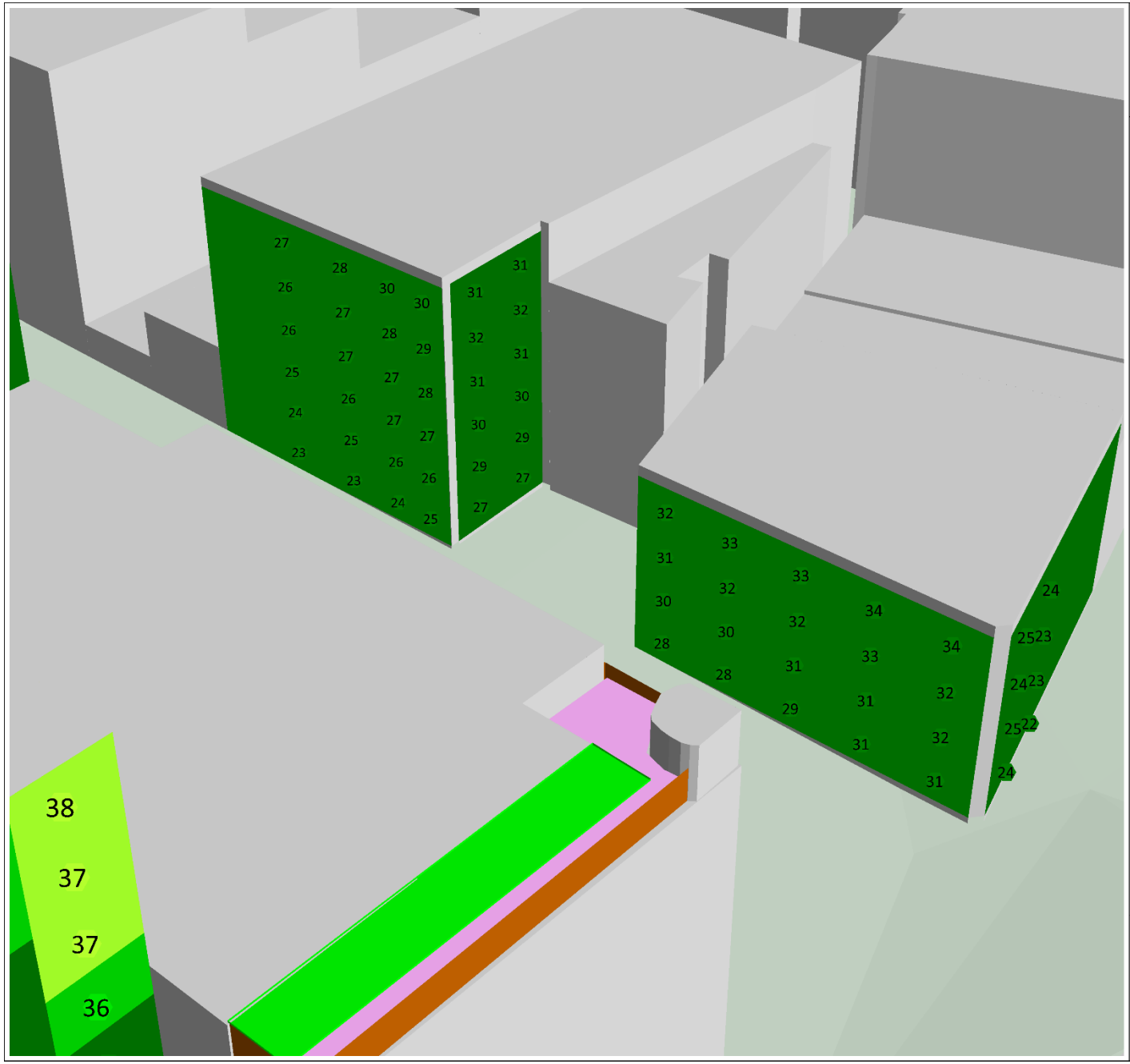
Noise Level
L_{eq}
in dB(A)

	< 35
	35 - 37
	37 - 39
	39 - 41
	41 - 43
	43 - 45
	45 - 47
	47 - 49
	49 - 51
	51 - 53
	53 - 55
	>= 55

Length scale 1:2585
0 12.5 25 50 75 100 m

N

ACOUSTIC LOGIC



Building B East End, QT Newcastle

Facade Noise Map - R4

30 patron using outdoor terrace

Prepared by: P. Feng
Date: 16/01/2024

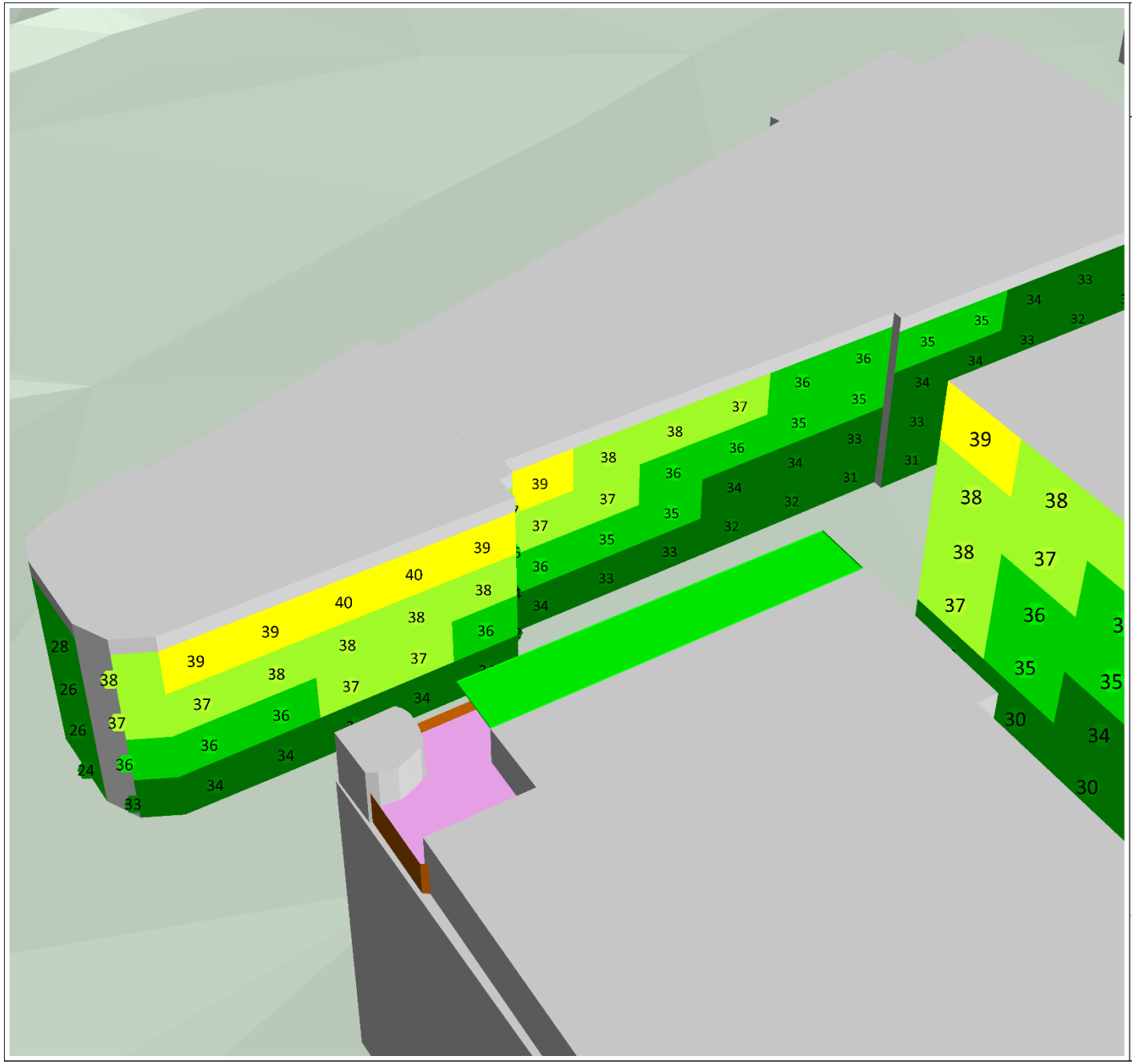
Noise Level
L_{eq}
in dB(A)

	< 35
	35 - 37
	37 - 39
	39 - 41
	41 - 43
	43 - 45
	45 - 47
	47 - 49
	49 - 51
	51 - 53
	53 - 55
	>= 55

Length scale 1:2585
0 12.5 25 50 75 100 m

N

ACOUSTIC LOGIC



Building B East End, QT Newcastle

Facade Noise Map - R5

30 patron using outdoor terrace

Prepared by: P. Feng
Date: 16/01/2024

Noise Level
L_{eq}
in dB(A)

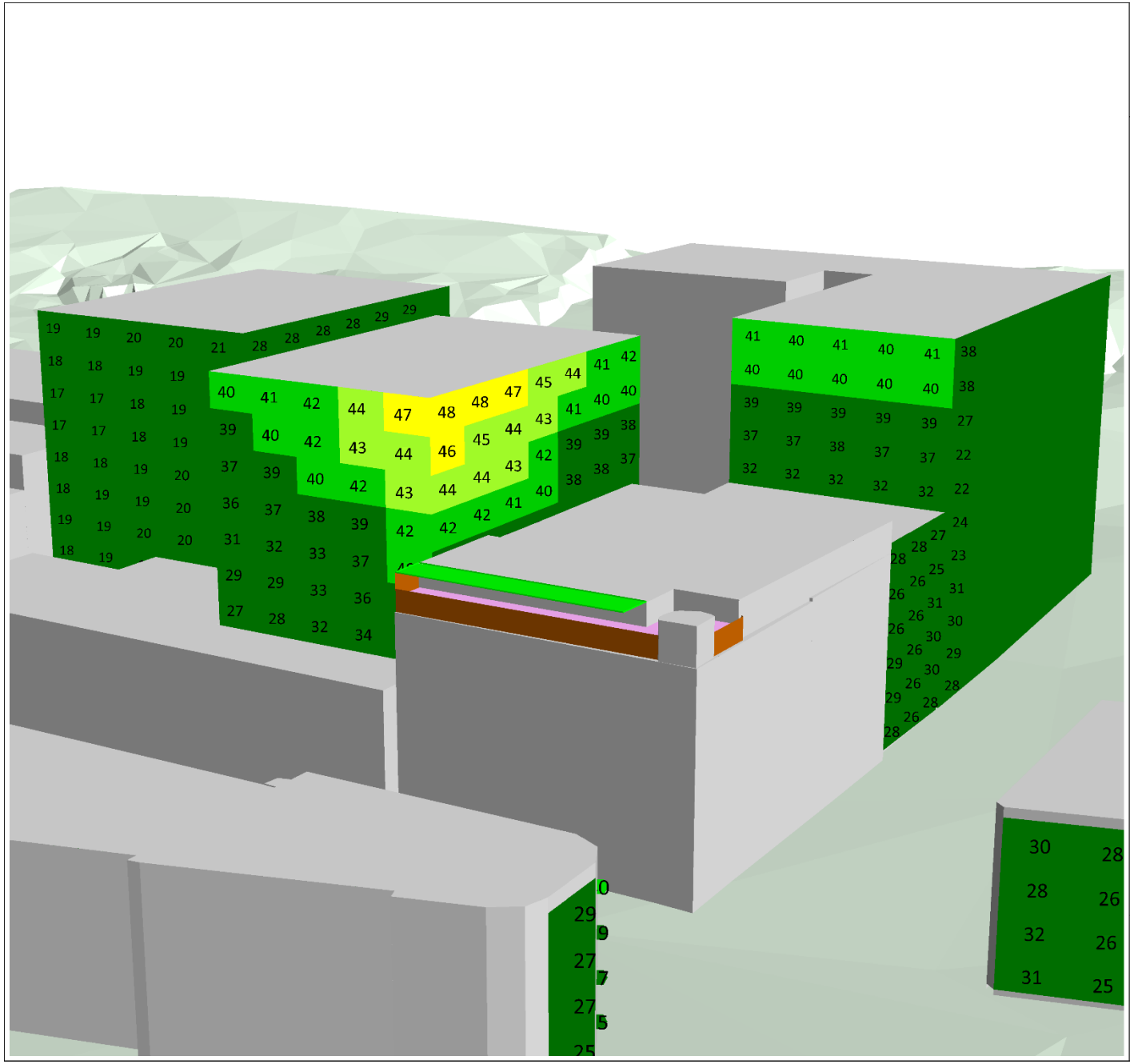
	< 35
	35 - 37
	37 - 39
	39 - 41
	41 - 43
	43 - 45
	45 - 47
	47 - 49
	49 - 51
	51 - 53
	53 - 55
	>= 55

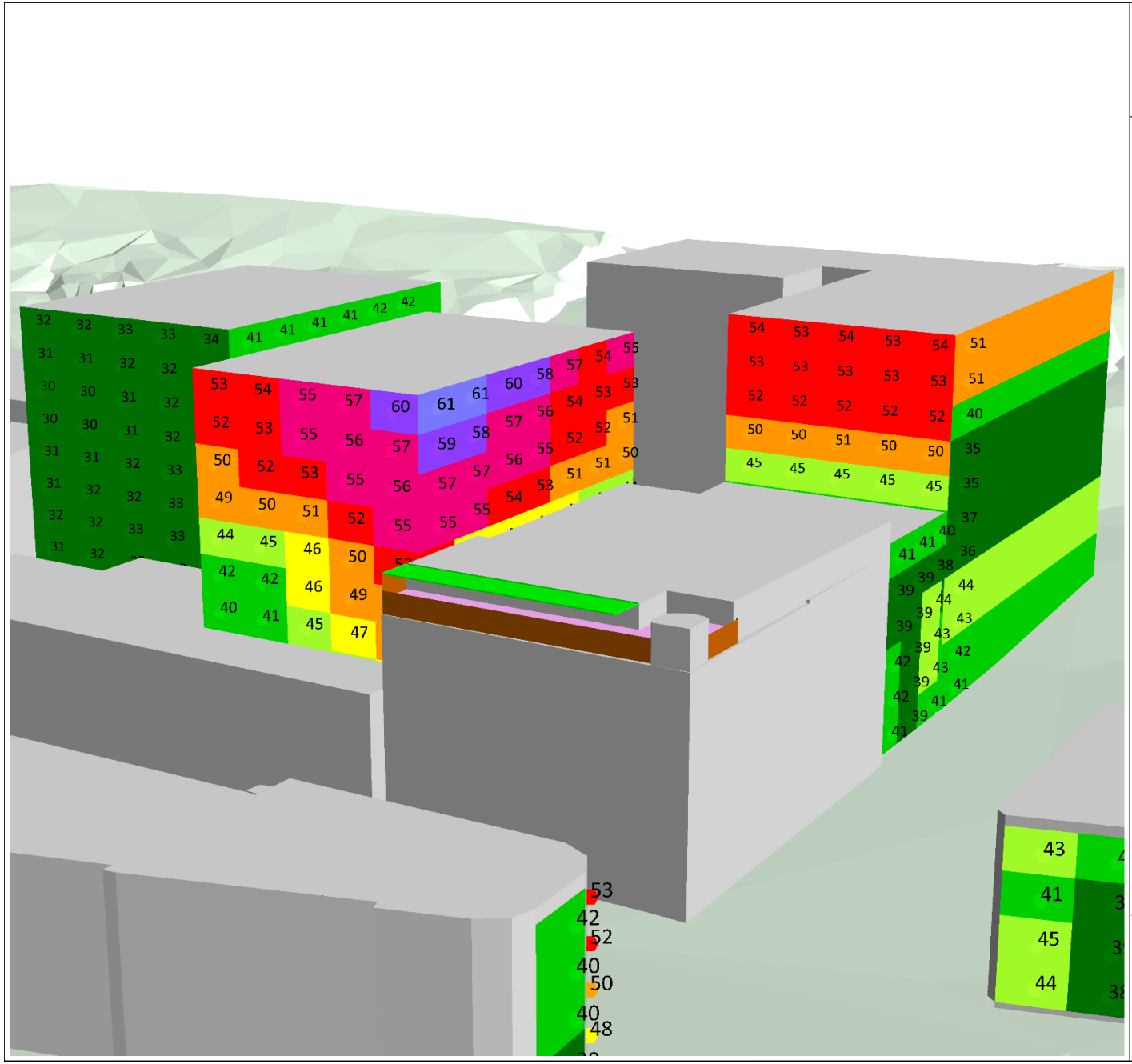
Length scale 1:2585

0 12.5 25 50 75 100 m

N

ACOUSTIC LOGIC





APPENDIX C – CURRENT BARRIER CONSTRUCTION

Figure 2 – Current Eastern Boundary Barrier on Outdoor Terrace