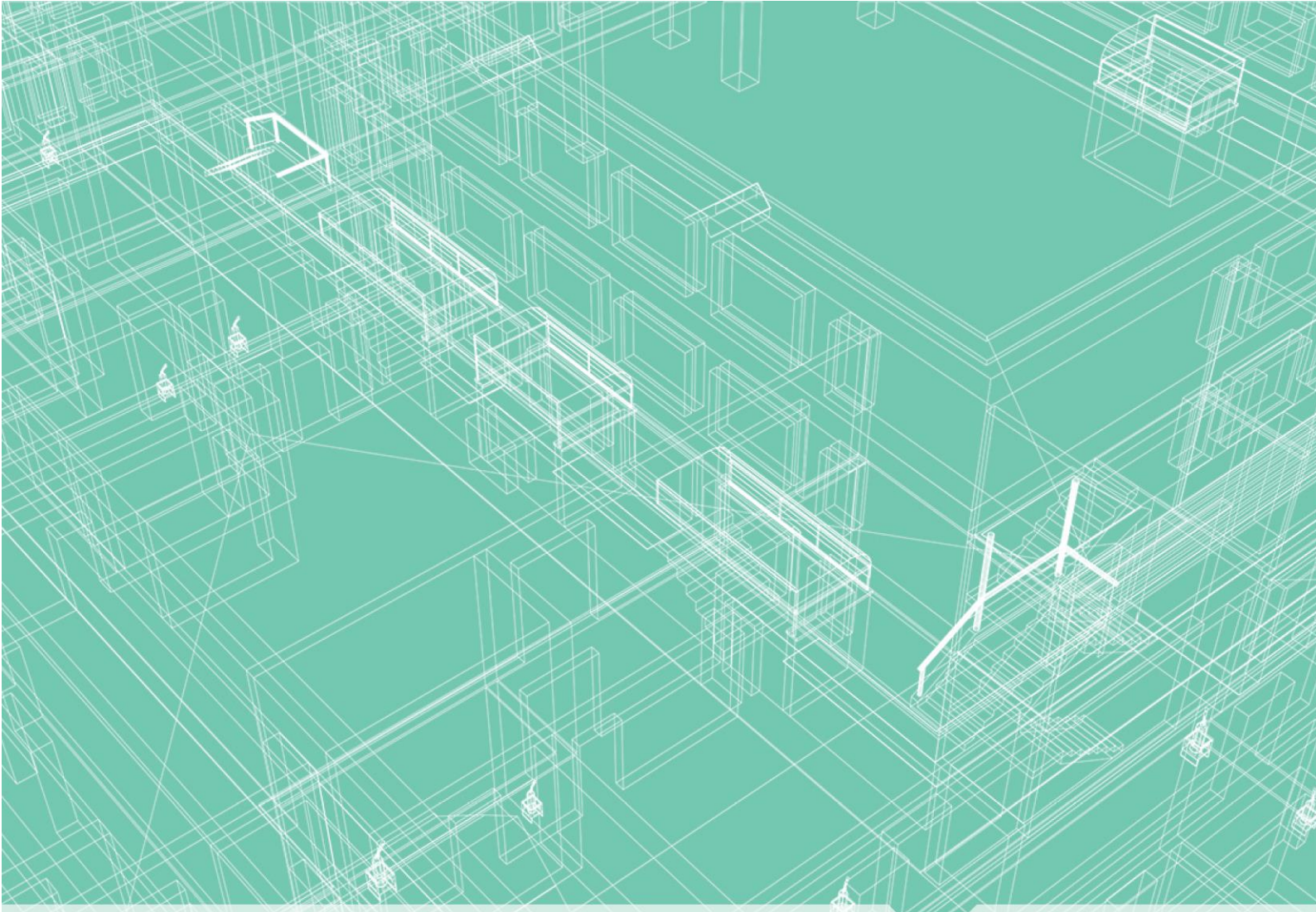

CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

HASTINGS SECONDARY COLLEGE UPGRADE
PORT MACQUARIE CAMPUS

JHA

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DOCUMENT CONTROL SHEET

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Key Contact	Bill Rushworth

Prepared By

Company	JHA
Address	Level 23, 101 Miller Street, North Sydney NSW 2060
Phone	61-2-9437 1000
Email	@jhaengineers.com.au
Website	www.jhaservices.com
Author	Dean Hunter and Jorge Reverter (MAAS)
Checked	Jorge Reverter
Authorised	Tom Hamer

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CONTENTS

1 INTRODUCTION

1.1 OVERVIEW

JHA Consulting Engineers has been engaged by FK Gardner & Sons to provide a Construction Noise and Vibration Management Plan (CNVMP) for the proposed construction works at Hastings Secondary College (Port Macquarie Campus), previously known as Port Macquarie High School.

The proposed works include:

- Demolition works to accommodate new works;
- Upgrade to school entry;
- Construction of new two (2) storey Creative and Performing Arts (CAPA) building;
- Construction of new Shared Multi-Sport Facility (SMSF);
- Partial refurbishment of Building L;
- Refurbishment and alteration to Building B;
- Removal of Building S and demountable buildings;
- New lift connections, covered outdoor learning area (COLA) and covered walkways;
- Associated earthworks, landscaping, stormwater works, service upgrades; and
- Tree removal / tree safety works.

The following documentation has been used for the preparation of this report:

- Noise data collected on site through the use of noise loggers;
- Noise & Vibration Impact Assessment for SSDA, JHA Engineers;
- Architectural Drawings, FJMT Architects.

This document and related work have been prepared following JHA Consulting Engineers Quality and Environmental Management Systems, which are based on AS/NZS ISO 9001:2015 and ISO 14001:2015.

1.2 PURPOSE OF THE CNVMP

The purpose of this CNVMP is to ensure that noise and vibration impacts due to Construction activities are appropriately managed in accordance with relevant legislation and standards, plus protection of nearby sensitive Noise Catchment Areas (NCA's). The objectives of this acoustic assessment are:

- Address SSD Condition of Consent B16 – Construction Noise and Vibration Management Plan.
- Identify NCA's that will potentially be affected by the works.
- Carry out noise surveys to determine existing ambient and background noise levels on site.
- Establish the appropriate noise level and vibration criteria in accordance with the relevant standards, guidelines and legislation.
- Determine whether the relevant criteria can be achieved based on assumed construction works and plant for the noise assessments. Where applicable, provide recommendations for any necessary acoustic control measures that will need to be incorporated into the development or use in order to ensure with the assessment criteria.
- Provide recommendations for Construction Noise and Vibration Planning.

This CNVMP identifies the Contractor's obligations and the requirements to manage noise and vibration during construction such that the necessary allowances within the construction costs, programmes and work methodologies can be made. Relevant legislation, guidelines and standards are identified in this CNVMP.

1.3 NOISE AND VIBRATION ISSUES

This CNVMP addresses all stages from construction works associated with the proposed development. The construction works will contribute noise and vibration emissions to the surrounding environment. Typically, this will comprise of continuous and intermittent noise and vibration from on-site construction equipment and plant equipment.

Construction noise associated with the project may include airborne and ground-borne noise impacts as follows:

- Airborne Noise: Proposed construction works will generate noise that will propagate through the air. Airborne noise generated by external construction activities is likely to impact on surrounding sensitive NCA's.
- Ground-borne noise and vibration impacts: Construction and piling works have the potential to generate noise and vibration that propagates through the ground and building structural elements which is then radiated by vibrating wall and floor surfaces of nearby sensitive NCA's.

1.4 RESPONSIBILITIES

The main Contractor must be responsible for ensuring that the noise and vibration from activities carried out on site are minimised as far as practical.

The Contractor is responsible for:

- Ensuring that any site noise and vibration plus any complaints, are monitored, investigated, managed and controlled in accordance with the recommendations provided in this plan.
- Ensuring procurement documents specify any particular requirements in relation to the management of noise and vibration.
- Ensuring all works are undertaken in accordance with the requirements of the contract documents and this plan.
- Ensuring all project personnel and sub-contractors employed are aware of their responsibilities in regard to the management of noise and vibration during construction and assume the responsibilities assigned to them within the plan.
- Monitoring and managing noise and vibration impacts on sensitive NCA's, in accordance with the requirements of the relevant guidelines and standards.
- Consulting with the occupants of surrounding buildings to inform them of the nature of the construction works, to determine any specific noise and vibration sensitivity they may have and to negotiate respite times during noisier works.

2 DESCRIPTION OF THE PROPOSAL

2.1 SITE DETAILS

The site is located approximately 1.2km south east of the Port Macquarie town centre, with access from Oxley Highway (Gordon Street) via Owen Street to the centre, William Street via Owen Street to the north and Burrawan Street via Owen Street to the south. A Maintenance access road exists to the east of the site along Burrawan Street.

The site is located at 16 Owen Street, Port Macquarie and is legally known as Lot 111 in DP 1270315. The Port Macquarie Campus site is located within a coastal setting (east), with residential (single two storey and residential flat buildings) located to the west and south and Port Macquarie Bowling Club to the north. The surrounding street network provides on-street parking. Maintenance vehicular access is located off Burrawan Street.

Figure below shows the site boundary and surrounding areas.

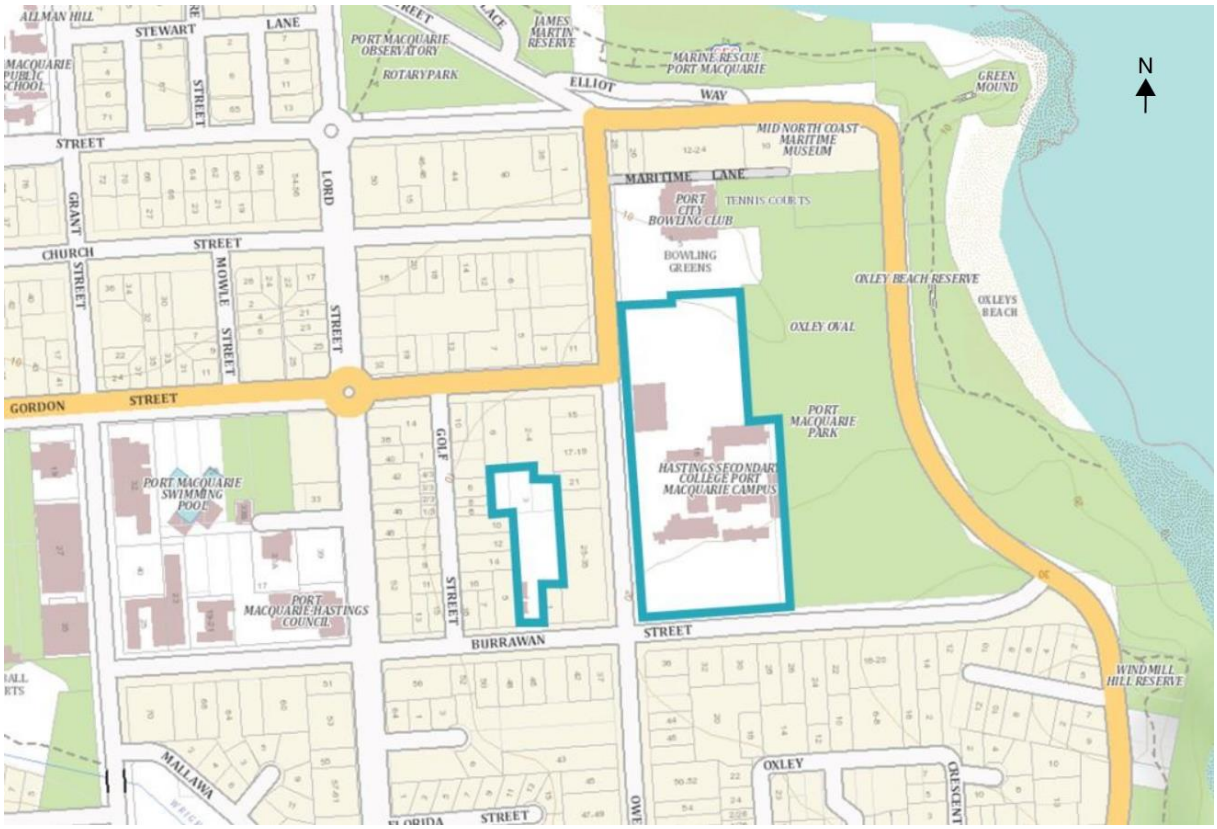


Figure 1: Map showing location of site.

2.2 NOISE SENSITIVE RECEIVER DETAILS

A summary of the nearest noise sensitive receivers, grouped into NCA's, surrounding the site is shown in Table 1, including approximate distances from the site to the NCA's boundaries, noting also the type of receiver within the NCA's.

Noise Catchment ID	*Identifier*	*Receiver Type*	*Building Type*	*Distances from boundaries (m)*
1	Port City Bowling Club	Active Recreational	Multi-storey sporting clubhouse	10
2	Oxley Oval	Active Recreational	--	50
3	28-36 Burrawan Street	Residential	Single and Multi-storey residential buildings	140
4	15-35 Owen Street	Residential	Single and Multi-storey residential buildings	30
5	5-11 Owen Street	Residential	Multi-storey residential building	30

Table 1: NCA's surrounding the site and the approximate distances from boundaries.

Figure 2 shows the location of the Hastings Secondary College site (yellow shading with dotted red outline) and the NCA's as described in Table 1 above. Residential NCA's are shown in blue shading and Active Recreation NCA's are shown in orange.

Figure 2: Aerial view of the site and surrounding NCA's.

It is noted that if noise and vibration impacts associated with the proposed development are controlled at the nearest sensitive NCA's, then compliance with the recommended criteria at all NCA's should be achieved.

3 SITE MEASUREMENTS

3.1 GENERAL

Attended and unattended noise surveys were conducted in the locations shown in Figure 3 to establish the ambient and background noise levels of the site and surrounds. JHA Consulting Engineers carried out the noise surveys, in accordance with the method described in the *'AS/NZS 1055:2018 Description and measurement of environmental noise'*.

Figure 3: Noise survey locations and boundary of the site.

3.2 SHORT-TERM NOISE MONITORING

Short-term noise monitoring was carried out to obtain representative third-octave band noise levels of the site. On Tuesday 8th December 2020, short-term noise measurements were carried out during day-time. Short-term noise measurements were carried out with a NTi XL-2 hand-held Sound Level Meter (SLM) (Serial Number A2A-13742-E0). The calibration of the SLM was checked before and after each use and no deviations were recorded.

The SLM microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Measurements were undertaken in the free-field – i.e. more than 3 metres away from any building façade or vertical reflective surface. Weather conditions were calm and dry during the attended noise monitoring.

From observations during the noise survey, it is noted that ambient noise levels are dominated by low activity of students in the school grounds and low traffic flows.

A summary of the results of the short-term noise monitoring are shown in Table 2.

Location	Date and Time	Parameter	Sound Pressure Level, dB re 20µPa								
			Overall dB(A)	Octave Band Centre FrequeNCAy, Hz							
				63	125	250	500	1k	2k	4k	8k
S1	08/12/2020 10:33am – 10:48am	$L_{90,15min}$	49	54	51	45	43	45	41	32	26
		$L_{eq,15min}$	53	60	59	53	47	49	46	37	34
		$L_{10,15min}$	54	63	60	53	48	51	46	38	37
S2	08/12/2020 10:59am – 11:14am	$L_{90,15min}$	49	55	52	47	44	44	41	35	29
		$L_{eq,15min}$	62	69	62	63	60	57	54	49	42
		$L_{10,15min}$	63	68	63	61	60	59	55	50	43
S3	08/12/2020 11:20am – 11:35am	$L_{90,15min}$	48	54	49	44	42	43	39	36	29
		$L_{eq,15min}$	57	62	58	55	53	54	49	46	39
		$L_{10,15min}$	60	64	60	58	55	57	51	46	39
S4	08/12/2020 11:37am – 11:52am	$L_{90,15min}$	49	56	53	48	44	44	40	35	26
		$L_{eq,15min}$	59	65	65	58	55	56	51	44	38
		$L_{10,15min}$	63	67	65	61	58	59	54	48	39

Table 2: Results of short-term noise monitoring.

3.3 LONG-TERM NOISE MONITORING

Long-term noise monitoring was carried out from Tuesday 8th December to Tuesday 15th December 2020 with a Rion NL-52 noise logger (Serial Number 00175549). The noise logger recorded L_{A1}, L_{A10}, L_{Aeq} and L_{A90} noise parameters at 15-minute intervals during the measurement period. The calibration of the noise logger was checked before and after use and no deviations were recorded.

The noise logger was located on the proposed development site – facing Owen Street – as shown in Figure 3. The location was secured and is considered to be representative of the typical ambient and background noise levels plus traffic noise levels along Owen Street.

The noise logger microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Weather conditions were monitored during the unattended noise monitoring period.

The detailed results of the long-term noise monitoring are presented graphically in Appendix A. As stated in the NSW NPI, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations (shaded in the Appendix A graphs).

The Ambient Background Levels (ABLs) have been established in general accordance with the methodology described in the NSW NPI, i.e. 10th percentile background noise level (L_{A90}) for each period of each day of the ambient noise survey. The median of these levels is then presented as the RBLs (Rating Background Levels) for each assessment period.

These RBLs are shown in Table 3, together with the ambient noise levels (L_{Aeq}) measured for each period.

Location	Rating Background Levels, dB(A)			L_{Aeq} Ambient Noise Levels, dB(A)		
	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am
L1	46	39	38	58	55	50

Table 3: Results of long-term noise monitoring.

4 NOISE AND VIBRATION CRITERIA

4.1 RELEVANT CODES AND STANDARDS

In preparing this CNVMP, the following documentation including legislation, codes, standards and guidelines have been considered:

- Regulatory Framework:
  - Environmental Planning and Assessment (EP&A) Act 1979.
  - Protection of the Environmental Operations (POEO) Act 1997.
- State Significant Development Conditions of Consent.
- Construction Noise and Vibration:
  - NSW Department of Environment and Climate Change (DECC) *'Interim Construction Noise Guideline'* (ICNG) 2009.
  - NSW DECC Assessing Vibration: A Technical Guideline 2006.
  - NSW Transport Roads & Maritime Services (RMS) *'Construction Noise and Vibration Guideline'* 2016.
  - Australian Standard AS 2436:2010 *'Acoustics – Guide to Noise Control on Construction, Maintenance & Demolition Sites'*.
  - British Standards Institution BS 6472:2008 *'Evaluation of human exposure to vibration in buildings (1 to 80 Hz)'*.
  - British Standards Institution BS 7385.2:1993 *'Evaluation and Measurement for Vibration in Buildings. Guide to Damage Levels from Ground-borne Vibration'*.

4.2 REGULATORY FRAMEWORK

4.2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT (EP&A) ACT 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) provides the regulatory framework for the protection of the environment in NSW. The EP&A Act is relevantly about planning matters and ensuring that "environmental impact" associated with the proposed development is properly considered and reasonable before granting development consent to develop.

The assessment of "environmental impact" relies upon the identification of acceptable noise criteria which may be defined in a Development Control Plan, or derived from principles using guidelines like NSW EPA Noise Policy for Industry (NPI 2017) or Noise Guide for Local Government (NGLG 2013).

4.2.2 PROTECTION OF THE ENVIRONMENTAL OPERATIONS (POEO) ACT 1997

The Protection of the Environment Operations (POEO) Act 1997 has the objective to protect, restore and enhance the quality of the NSW environment. Abatement of noise pollution is underpinned by the definition of *"offensive noise"* as follows:

"...

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

> *(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

..."

Noise Guide for Local Government (NGLG) 2013, provides a consideration checklist to determine an *"offensive noise"*.

4.3 STATE SIGNIFICANT DEVELOPMENT CODITIONS OF CONSENT

This CNVMP has been prepared to address SSD Condition of Consent B16. This condition states the following:

"B16 – Construction Noise and Vibration Management Sub-Plan.

The Construction Noise and Vibration Management Sub-Plan must address, but not limited to, the following:

a) *Be prepared by a suitably qualified and experienced noise expert;*
b) *Describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);*
c) *Describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;*
d) *Include strategies that have been developed with the community for managing high noise generating works;*
e) *Describe the community consultation undertaken to develop the strategies in Condition B17(d);*
f) *Include a complaints management system that would be implemented for the duration of the construction; and*
g) *Include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the management measures in accordance with Condition B17(d)."*

4.4 NSW INTERIM CONSTRUCTION NOISE GUIDELINE

The ICNG suggest construction noise management levels that may minimise the likelihood of annoyance being caused to noise sensitive residential NCA's depending on the duration of works. The management levels for long-term duration works are as follows for residential NCA's.

Time of Day	*NML $L_{Aeq,15min}$*	*How to Apply*
ICNG Criteria for Recommended Standard Hours: Mon-Fri 7am-6pm Sat 8am-1pm No work on Sundays or public holidays	Noise affected: RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. ▪ Where predicted or measured $L_{Aeq,15min}$ is greater that the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected: 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. ▪ Where noise is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
ICNGC Criteria for Outside Recommended Standard Hours *Refer to approved hours from the Consent Conditions*	Noise affected: RBL + 5dB	▪ A strong justification would typically be required for work outside the recommended standard hours. ▪ The proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community.

Table 4: ICNG construction airborne noise criteria for residential NCA's surrounding the construction site.

In order to establish the airborne construction noise criteria, noise levels from the unattended noise monitoring have been used for the NCA's– refer to Section 2. Table 5 below summarises the airborne construction noise criteria for most affected noise catchment areas surrounding the development site.

Sensitive NCA		*Airborne Construction Noise Criteria, L_{Aeq} dB(A)*	
		Within Standard Hours	*Outside Standard Hours*
Residential	Noise affected / External	56	51
	Highly noise affected / External	75	NA
Active Recreation	When in use	65	NA

Table 5: ICNG construction airborne noise criteria for NCA's surrounding the site.

Where reference is made to an internal noise level, an external noise level 10dB above the internal noise levels are applied which should achieve the internal noise level where a window is adequately opened to provide natural ventilation.

The ICNG recommends internal ground-borne noise maximum levels at residences affected by nearby construction activities. Ground-borne noise is noise generated by vibration transmitted through the ground into a structure and can be more noticeable than airborne noise for some sensitive NCA's. The ground-borne noise levels presented below from the ICNG are for residential NCA's during evening and night-time periods only, as the objective is to protect the amenity and sleep of people when they are at home.

- Evening: $L_{Aeq,15min}$ 40dB(A) (internal)
- Night: $L_{Aeq,15min}$ 35dB(A) (internal)

The internal noise levels are assessed at the centre of the most affected habitable room. No assessments of ground borne noise have been conducted as no out of hours work is proposed to occur during evening time and night time.

4.5 VIBRATION CRITERIA

There are two items that shall be considered in the assessment of vibration impacts from construction works. These include vibration impacts in terms of human comfort and building damage.

4.5.1 HUMAN COMFORT

The Department of Environment and Climate Change (DECC) developed the document *'Assessing Vibration: A Technical Guideline'* in February 2006 to assist in preventing people from exposure to excessive vibration levels within buildings. It is based on the guidelines contained in BS 6472.1:2008 *'Guide to evaluation of human exposure to vibration in buildings – Vibration sources other than blasting'*. The guideline does not however address vibration induced damage to structures or structure-borne noise effects.

Vibration and its associated effects are usually classified as follows:

- *Continuous vibration*. An uninterrupted vibration for a defined period. This type of vibration is assessed on the basis of weighted root-mean-squared (rms) acceleration values.
- *Impulsive vibration*. A vibration which has a rapid build up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on the frequency and damping).
- *Intermittent vibration*. An interrupted periodic vibration of continuous or repeated periods of impulsive vibration, or continuous vibration that varies significantly in amplitude. This type of vibration is assessed on the basis of Vibration Dose Values (VDV).

Vibration criteria for continuous and impulsive vibration are presented in Table 6, in terms of vibration velocity levels. The values are assessed for the most critical frequency range (higher than 8 Hz assuming sinusoidal motion). When assessing intermittent vibration comprising a number of events, it is recommended that the Vibration Dose Value (VDV) is used Table 7 shows the acceptable VDV values for intermittent vibration.

NCA Type	Time	RMS velocity, mm/s [dB ref 10^{-6}mm/s]			
		Continuous Vibration		Impulsive Vibration	
		Preferred	Maximum	Preferred	Maximum
Residences	Day-time	0.20 [106 dB]	0.40 [112 dB]	6.00 [136 dB]	12.00 [142 dB]
	Night-time	0.14 [103 dB]	0.28 [109 dB]	2.00 [126 dB]	4.00 [132 dB]
Offices, schools, educational and worship	When in use	0.40 [112 dB]	0.80 [118 dB]	13.00 [142 dB]	26.00 [148 dB]

Table 6: Continuous and impulsive vibration criteria applicable to the site. Note: Day-time is 07:00am to 10:00pm and night-time is 10:00pm to 07:00am.

Place	Time	Vibration Dose Values, $m/s^{1.75}$	
		Preferred	Maximum
Residences	Day-time	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational and worship	When in use	0.40	0.80

Table 7: Intermittent vibration criteria applicable to the site.

4.5.2 STRUCTURAL BUILDING DAMAGE

4.5.2.1 Structural Building Damage

Ground vibration from construction activities can damage surrounding buildings or structures. For unoccupied buildings, or during periods where the buildings are unoccupied, the vibration criteria for building damage suggested by German Standard DIN 4150.3:2016 *'Structural Vibration – Effects of Vibration on Structures'* and British Standard BS 7385.2:1993 *'Evaluation and Measurement for Vibration in Buildings'* are to be adopted. Guideline values from DIN 4150.3:2016 and BS 7385.2:1993 are presented in Table 8 and Table 9 respectively.

Structural type	RMS velocity, mm/s			
	Foundation			Plane of floor uppermost full storey
	Less than 10Hz	10 to 50Hz	50 to 100Hz	Frequency mixture
Buildings used for commercial purpose, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Particularly sensitive	3	3 to 8	8 to 10	8

Table 8: DIN 4150.3:2016 Guideline values of vibration velocity for evaluating the effects of short-term vibration.

Structural type	*Peak particle velocity, mm/s*	
	4 to 15Hz	*15Hz and above*
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s @ 4Hz increasing to 20mm/s @ 15Hz	20mm/s @ 15Hz increasing to 50mm/s @ 40Hz and above

Table 9: BS 7385.2:1993 Guideline values of vibration velocity for evaluating cosmetic damage.

5 CONSTRUCTION ACTIVITIES

A construction noise and vibration impact assessment has been carried out as per the provided construction plant for all the phases of construction work. The Contractor will be responsible for preparing a Works Plan and Schedule which include all relevant noise and vibration information.

5.1 DESCRIPTION OF WORKS

Refer to Table 10 for the assumed stages of work that have been assessed, and which typical construction plant and equipment will be used during these stages.

Stage of Works	*Plant and Construction Equipment in use*
Demolition	Excavator with hammer attachment, concrete saw, Excavator with bucket, 25t truck, front end loader
Earthworks	Excavator with bucket, bored piling rig, Truck (>20tonne), front end loader
Structure	Concrete pump, concrete agitators & mobile crane, hand tools, angle grinder
Façade	Mobile crane, electric hand-tools
Fitout	Mobile crane, electric hand-tools
Landscaping	Concrete pump, concrete agitator, small excavator with buckets, delivery truck

Table 10: Stages of work and associated construction plant.

5.2 PROPOSED CONSTRUCTION WORKING HOURS

The following construction hours as per DECC ICNG are proposed as follows:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.
- Sundays and Public Holidays: No excavation or construction works.

It is recommended that high noise level works – piling, rock hammering, braking, etc – shall only occur during the periods of the SSD Condition C8 hours - 9am to 12pm and 2pm to 5pm.

Deliveries will be scheduled and distributed to ensure avoidance of congestion to surrounding roads networks and within the precinct. Materials handling will be conducted within the construction site perimeter reducing any impacts on traffic flows within the area, when feasible.

5.3 TYPICAL EQUIPMENT AND NOISE LEVELS

In accordance with the information provided and in order to assess potential noise and vibration impacts during works from a quantitative point of view, the construction noise sources for the works occurring during the project and the associated equipment noise levels have been assumed and are listed in Table 11.

These levels are based on the databases published by Australian Standard 2436:2010 '*Guide to Noise Control on Construction, Maintenance & Demolition Sites*', Roads and Maritime Services '*Construction Noise and Vibration Guideline*' and the UK Department for Environmental, Food and Rural Affairs (DEFRA).

Stage of works	*Item*	*Typical Sound Power Level L_{Aeq} (dB ref 1pW)*	*Typical Sound Pressure Level L_{Aeq} at 10m (dB ref 20μPa)*
Demolition	30t Excavator	113	85
	Truck (>25tonne)	111	83
	Front end loader	113	85
	Excavator Rock breaker	118	90
	Demolition Saw	117	89
Earthworks	30t Excavator	113	85
	Truck (>20tonne)	107	79
	Bored Piling Rig	111	83
	Front end loader	113	85
Structure	Concrete pump	108	80
	Concrete agitator	109	76
	Mobile Crane	104	76
	Electric Hand-Tools	102	74
	Angle grinders	102	74
Façade	Electric Hand-Tools	102	74
	Mobile Crane	104	76
Fitout	Mobile Crane	104	76
	Electric Hand-Tools	102	74
Landscaping	Delivery Truck	107	79
	Concrete pump	108	80
	Concrete agitator	109	76
	8t Excavator	108	80

Table 11: Anticipated maximum airborne noise levels for equipment / plant used during the different stages of the works.

6 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

A construction noise and vibration assessment has been carried out based on typical plant and machinery expected throughout the works associated as per Section 5.

6.1 ASSESSMENT METHODOLOGY

An assessment of the likely noise and vibration impacts of the assumed stage of works on the most affected noise sensitive receivers surrounding the site has been carried out. The assessment has been considered the following:

- Typical construction activities considered in the noise impact are detailed in Section 5.1.
- Proposed construction hours as per Section 5.2.
- Typical noise source levels considered in the noise impact are detailed in Section 5.3.
- Project specific noise and vibration criteria at sensitive NCA's as outlined in Section 4.
- A typical 3m high solid hoarding is installed on the boundary of the work sites.
- The predictions consider continuous operation of the construction plant over the 15-minute assessment period plus a range of distances from the site boundaries.

It should be noted that the predicted noise levels generated during the construction works may vary depending on many factors including:

- Final selection of plant and equipment which could differ from the plant presented in Table 11.
- Exact location of equipment and plant on site – relative to the noise catchment areas.
- Shielding of noise provided by structures and hoardings on and around the site.
- Reflections provided by existing structures on and around the site.

6.2 NOISE ASSESSMENT

Refer to Sections below for the predicted noise levels for the stages of work as detailed in Table 10. These levels are typically representative of the worst case 15 minutes that would be expected. The predicted noise levels at noise sensitive receiver locations are calculated to 1.5m above ground level, at the most affected point externally of each noise catchment area that has been identified as the most affected.

The ICNG requires, and it is usual practice, to predict the reasonable worst-case noise level. For construction-type activities this will typically be when plant is operating close to an assessment location. However, it shall be considered that on larger construction sites (such as this one) where plant moves around, noise will not be at the reasonable worst-case noise level throughout the entire duration of the activity: it will be lower when the plant is further away. Therefore, it can be stated that noise levels will be lower at times throughout the construction activity

6.2.1 DEMOLITION

Demolition works will take place on various locations within the site. Figure 4 shows the approximate location of demolition works on site and the nearest NCA's.

Table 12 shows the predicted range of sound pressure levels at the boundary of the nearest NCA's areas due to the assumed construction plant for the demolition works. Allowances have been made for distances attenuation, shielding and reflections.

Figure 4: Demolition works (yellow shading with red dotted outline) on site and nearest NCA's.

Item	*Typical Noise Level L_{WA} dB*	*Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (ref. 20μPa)*				
		NCA 1	*NCA 2*	*NCA 3*	*NCA 4*	*NCA 5*
30t Excavator	113	57-58	69-75	59-62	62-66	58-60
Truck (>25tonne)	111	55-56	67-73	57-60	60-64	56-59
Front end loader	113	57-58	69-75	59-62	62-66	58-60
Excavator Rock breaker	118	60-61	72-78	62-65	65-69	61-64
Demolition Saw	117	56-58	68-75	59-62	61-65	57-60

Table 12: Predicted airborne noise levels for equipment used during demolition works at the nearest NCA's areas.

Results show that predicted construction noise levels are expected to exceed all the NMLs, except for NCA 1 – Bowling Club. All construction activities within the demolition stage are expected to cause exceedances of the NML's (orange font) for NCA 2 to NCA 5.

The predicted exceedance of the NMLs in the surrounding NCA's areas triggers the proponent to apply all reasonable and feasible work practices to minimise the noise as much as possible, and community consultation, as per the requirements of the ICNG. Refer to Section 7 for details.

The excavator with rock breaker attachment is predicted to exceed the Highly Affected Noise Level of 75dB(A) to NCA 2. This predicted exceedance of the Highly Affected Noise level triggers the proponent to apply time mitigation practices – i.e respite periods – to minimise noise when this plant is in use, and use community consultation, as per the requirements of the ICNG. Refer to Section 7 for details.

6.2.2 EARTHWORKS

Earthworks works will take place on various locations within the site. Figure 5 shows the approximate location of earth-works on site and the NCA's.

Table 13 shows the predicted range of sound pressure levels at the boundary of the nearest NCA's areas due to the assumed construction plant for the earth works. Allowances have been made for distances attenuation, shielding and reflections.

Figure 5: Earth-works onsite (yellow shadow with dotted red line) and nearest NCA's.

Item	*Typical Noise Level L_{WA} dB*	*Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (re. 20μPa)*				
		NCA 1	*NCA 2*	*NCA 3*	*NCA 4*	*NCA 5*
30t Excavator	113	64-75	64-75	59-63	62-64	61-64
Truck (>20tonne)	107	55-66	55-66	50-53	51-55	52-55
Bored Piling Rig	111	64-75	64-75	59-62	62-64	60-64
Front end loader	113	64-75	64-75	59-62	62-64	61-64

Table 13: Predicted airborne noise levels for equipment used during eathworks at the nearest noise catchment areas.

Results show that predicted construction noise levels are expected to exceed the NML's of all NCA's, particularly when construction activities will take place in close proximity to the boundary. The noise emissions from the 20 tonne truck are not predicted to exceed the NML of the residential NCA's.

The predicted exceedance of the NMLs in the surrounding NCA's triggers the proponent to apply all reasonable and feasible work practices to minimise the noise as much as possible, and community consultation, as per the requirements of the ICNG. Refer to Section 7 for details.

6.2.3 STRUCTURE

Structural works will take place in various locations within the site. Figure 6 shows the approximate location of structural works on site and the nearest NCA's.

Figure 6: Structural works onsite (yellow shadow with dotted red line) and NCA's.

Table 14 shows the predicted range of sound pressure levels at the boundary of the nearest NCA's areas due to the assumed construction plant for the structural works. Allowances have been made for distances attenuation, shielding and reflections.

Item	Typical Noise Level L_{WA} dB	Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (re. 20µPa)				
		NCA 1	NCA 2	NCA 3	NCA 4	NCA 5
Concrete pump	108	61-72	61-72	56-59	59-61	61-64
Concrete agitator	109	63-74	63-74	58-61	61-63	60-63
Mobile Crane	104	55-66	55-66	50-53	53-55	52-55
Electric Hand-Tools	102	53-64	53-64	48-51	51-53	50-53
Angle grinders	102	53-64	53-64	48-51	51-53	50-53

Table 14: Predicted airborne noise levels for equipment used during structural construction works at the nearest NCA's.

Results show that predicted construction noise levels are expected to exceed the NMLs, in all catchment areas for certain construction plant – i.e. Concrete pump, concrete agitator and mobile crane.

The predicted exceedance of the NMLs in the surrounding NCA's triggers the proponent to apply all reasonable and feasible work practices to minimise the noise as much as possible, and community consultation, as per the requirements of the ICNG. Refer to Section 7 for details.

6.2.4 FAÇADE

Façade works will take place in various locations within the site Figure 7 shows the approximate location of façade works on site the NCA's.

Table 15 shows the predicted range of sound pressure levels at the boundary of the nearest NCA's areas due to the assumed construction plant for the façade works. Allowances have been made for distances attenuation, shielding and reflections.

Figure 7: Façade works onsite (yellow shadow with dotted red line) and NCA's.

Item	*Typical Noise Level L_{WA} dB*	*Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (re. 20µPa)*				
		NCA 1	*NCA 2*	*NCA 3*	*NCA 4*	*NCA 5*
Electric Hand-Tools	102	53-64	53-64	48-51	51-53	50-53
Mobile Crane	104	55-66	55-66	50-53	53-55	52-55

Table 15: Predicted airborne noise levels for façade construction works at the nearest NCA's.

Results show that predicted noise levels from the mobile crane are expected exceedances to slightly exceed the NML of NCA 1 and NCA 2 by 1dB when at close distances. These exceedances are considered negligible and therefore, no action is required.

6.2.5 FITOUT

Fitout works will take place in various locations within the site. It should be noted that some plant will be used within buildings and, therefore, their noise emissions will be attenuated by the shell of the façade. In this stage of works the hand tools have been modelled within an enclosed building and have been attenuated accordingly. Figure 8 shows the approximate location of fitout works on site and the nearest NCA's.

Figure 8: Fitout works onsite (yellow shadow with dotted red line) and NCA's.

Table 16 shows the predicted range of sound pressure levels at the boundary of the nearest noise catchment areas due to the assumed construction plant for the fitout works. Allowances have been made for distances attenuation, shielding and reflections.

Item	*Typical Noise Level L_{WA} dB*	*Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (re. 20µPa)*				
		NCA 1	*NCA 2*	*NCA 3*	*NCA 4*	*NCA 5*
Electric Hand-Tools	102	53-64	53-64	48-51	51-53	50-53
Mobile Crane	104	55-66	55-66	50-53	53-55	52-55

Table 16: Predicted airborne noise levels for fitout construction works at the nearest noise catchment areas.

Results show that predicted noise levels from the mobile crane are expected exceedances to slightly exceed the NML of NCA 1 and NCA 2 by 1dB when at close distances. These exceedances are considered negligible and therefore, no action is required.

6.2.6 LANDSCAPING

Landscaping works will take place in various locations within the site. Figure 9 shows the approximate location of landscaping works on site and the nearest NCA's.

Figure 9: Landscaping works onsite (yellow shadow with dotted red line) and NCA's.

Table 17 shows the predicted range of sound pressure levels at the boundary of the nearest noise catchment areas due to the assumed construction plant for the landscaping works. Allowances have been made for distances attenuation, shielding and reflections.

Item	*Typical Noise Level L_{WA} dB*	*Predicted Noise Levels $L_{Aeq,15min}$, dB(A) (re. 20µPa)*				
		NCA 1	*NCA 2*	*NCA 3*	*NCA 4*	*NCA 5*
Delivery Truck	107	58-69	58-69	53-56	56-58	55-58
Concrete pump	108	61-72	61-72	56-59	59-61	58-61
Concrete agitator	109	61-72	61-72	56-59	59-61	58-61
8t Excavator	108	59-70	59-70	54-57	57-59	56-59

Table 17: Predicted airborne noise levels for landscaping construction works at the nearest NCA's.

Results show that predicted construction noise levels have NML exceedances when in close proximity to NCA's. The predicted exceedance of the NMLs in the surrounding NCA's triggers the proponent to apply all reasonable and feasible work practices to minimise the noise as much as possible, and community consultation, as per the requirements of the ICNG. Refer to Section 7 for details.

6.3 VIBRATION ASSESSMENT

The vibration intensive plant used during the construction works may impact in adjacent sensitive NCA's. In order to assess the construction vibration impact due to heavy construction plant, the NSW RMS *'Construction Noise and Vibration Guideline'* provides safe working distances for vibration intensive plant and are quoted for both 'cosmetic' damage (in accordance with BS 7385.2:1993) and human comfort (in accordance with DEC's *'Assessing Vibration: A Technical Guideline'*). The recommended safe working distances are provided in Table 18.

Plant Item	*Description*	*Cosmetic Damage*	*Human Response*
Vibratory Roller	200 kN (Typically 4-6 tonnes)	12m	40m
	300 kN (Typically 7-13 tonnes)	15m	100m
Medium Hydraulic Hammer	12–18 t excavator	7m	23m
Large Hydraulic Hammer	18-34 t excavator	22m	73m
Jackhammer	Hand held	1m	Avoid contact with structure

Table 18: Recommended minimum working distances for vibration intensive plant from sensitive NCA's.

The minimum working distances are indicative and will vary depending on the particular item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions.

All work, particularly piling is to be conducted in accordance with the safe working distances. Where sheet piling is within 20m of a building, vibratory piling should be considered, and attended vibration measurements conducted in order to verify levels.

In relation to human comfort (response), the minimum working distances in Table 18 relate to intermittent vibration (VDV parameter) as for most construction activities, vibration emissions are intermittent in nature. Where the predicted vibration levels will exceed the human comfort objectives, the procedures Section 7.3.2 are to be followed in order to mitigate the potential impacts at sensitive NCA's.

If the contractor has concerns for the disruptions at the nearest sensitive NCA's due to vibration intensive plant use, it is recommended that prior to the commencement of the works, to undertake a preliminary vibration survey on each key vibration generating activity / equipment.

7 NOISE AND VIBRATION CONTROL RECOMMENDATIONS

This section of the Construction Noise and Vibration Planning provides general recommendations only and provides applicable criteria together with best noise and vibration control practices to be observed during the proposed works associated.

Any noise from construction activities to be carried out on site must not result in *'offensive noise'* to any noise sensitive NCA. To this end, the Contractor employed to undertake the construction works is responsible for ensuring that any site noise and, in particular, any complaints shall be monitored, investigated, managed and controlled.

7.1 ACOUSTIC SCREENING

Acoustic screening is to be installed during demolition and earthworks of the construction work facing residential noise sensitive receivers to the West. The acoustic screening should be 2.4m high acoustic screen (Class A hoarding or equivalent) and constructed from minimum 15mm thick plywood or similar mass surface, and be free of any air gaps.

7.2 RESPITE PERIODS

Respite periods must generally be implemented into the work methodology in order to reduce the impact onto the surrounding NCA's, as detailed in Section 7.7. The following general respite periods should be applied during these phases of demolition and excavation, primarily due to the use of rock breakers and excavators:

- The use of rock breakers or piling equipment is only permitted between 9am-12pm and 2pm-5pm.
- Rock breaking and excavation will not occur for more than 3 hours continuously, and at least a 2 hour respite period in between.

7.3 GENERAL CONTROLS FOR NOISE AND VIBRATION

According to ICNG and AS 2436:2010 *'Guide to Noise Control on Construction, Maintenance & Demolition Sites'*, the following techniques could be applied to minimise the spread of noise and vibration to the nearest sensitive NCA's. These mitigation measures will be implemented as required to keep noise levels acceptable.

7.3.1 NOISE

If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the NCA should be minimised. Two ways of achieving this are to either increase the distances between the noise source and the NCA or to introduce noise reduction measures such as screens (which will be used for early works).

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. Practices that will reduce noise from the site include:

Restrict areas in which mobile plant can operate so that it is away from residences and other sensitive land uses at particular times.

Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and transportable site offices can be effective barriers).

- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose built noise barriers, acoustic sheds and enclosures.

7.3.2 VIBRATION

Vibration can be more difficult to control than noise, and there are few generalisations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Impulsive vibration can, in some cases, provide a trigger mechanism that could result in the failure of building components that had previously been in a stable state.

During the demolition works, some vibrations (transmitted through the existing structures nearby the demolition sites) are expected, being more of a concern for the surrounding NCA's.

It can also trigger annoyance being elevated into action by occupants of exposed buildings, and should therefore be included in the planning of communication with impacted communities. It should be remembered that failures, sometimes catastrophic, can occur as a result of conditions not directly connected with the transmission of vibrations, e.g. the removal of supports from retaining structures to facilitate site access.

Where site activities may affect existing structures, a thorough engineering appraisal should be made at the planning stage.

General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive NCA's are recommended when they are relatively close, depending on the magnitude of the source of the vibration or the distances associated. Relatively simple prediction methods are available in texts, codes of practice or other standards, however it is preferable to measure and assess site transmission and propagation characteristics between source and NCA locations.

Guidance for measures available for the mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228.2:2009 *'Code of practice for noise and vibration control on construction and open sites. Vibration'* or policy documents, such as the NSW DEC *'Assessing Vibration: A technical guideline'*.

Identifying the strategy best suited to the control of vibration follows a similar approach to that of noise avoidance, control at the source, control along the propagation path, control at the NCA's, or a combination of these. It is noted that vibration sources can include stationary plants (pumps and compressors), portable plants (jackhammers and pavement vibrators), mobile plants, pile-drivers, tunneling machines and activities, and blasting, amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially when considering the noise propagated from piling.

7.4 UNIVERSAL WORK PRACTICES

To minimise construction noise complaints due to preventable activities at any time of the day, the following work practices will be considered and implemented to ensure noise levels are kept to acceptable levels:

- Regularly train workers and contractors (such as a toolbox talks) to use equipment in ways to minimise noise.
- Ensure site managers periodically check the site and nearby residences and other sensitive land use for noise problems so that solutions can be quickly applied.

- Include in tenders, employment contracts, subcontractor agreements and work method statements clauses that require minimisation of noise and compliance with directions from management to minimise noise.
- Avoid the use of radios or stereos outdoors where neighbours can be affected.
- Avoid shouting, and minimise talking loudly and slamming vehicle doors.
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices.
- Develop a one-page summary of approval or consent conditions that relate to relevant work practices, and pin it to a noticeboard so that all site operators can quickly reference noise information.
- Workers may at times need to discuss or negotiate practices with their managers.

For work practices outside of construction hours, the following shall be considered:

- Avoid the use of equipment which generates impulsive noise.
- Minimise the need for reversing or movement alarms.
- Avoid dropping materials from a height.
- Avoid metal-to-metal contact on equipment.
- Schedule truck movements to avoid residential streets if possible.
- Avoid mobile plant clustering near residences and other sensitive land uses.
- Ensure periods of respite are provided in the case of unavoidable maximum noise level events.

7.5 COMMUNITY COMMUNICATION STRATEGY & CONSULTATION

Community consultation and complaints handling is primarily the responsibility of the Client. FK Gardner & Sons will provide assistance where possible to ensure that the client is complying with the requirements of Community Communication Strategy, developed for the upgrade works at Hastings Secondary College. Please refer to the CCS for the SINSW Hastings Secondary College.

Consultation with both Port Macquarie Hastings Council and the local Community. As a condition of consent for the SSD SINSW consulted with the local community to develop strategies for managing high noise generating works. Details were provided on how the project proposed to minimise or manage the impact on nearby properties. One response was received from the community (which is addressed at the end of this plan) and PMHC had no comments on the CVNMSP.

The Managing Construction Impacts notice of consultation was issued to the affected neighbours on 16th December and were requested to provide feedback on or before the 23rd December 2021. The letter that was issued can be referenced at the back of the CVNMP.

7.6 MANAGING NOISE LEVELS AND MAINTENANCE PROGRAM FOR PLANT AND EQUIPMENT

In terms of both cost and results, controlling noise at the source is one of the most effective methods of minimising the noise impacts from any construction activities. Recommendations for managing noise levels from plant and equipment are as follows:

- Use quieter methods (wherever possible)
  - Examine and implement, where feasible and reasonable, alternatives to rock-breaking work methods, such as hydraulic splitters for rock and concrete, hydraulic jaw crushers, chemical rock and concrete splitting, and controlled blasting such as penetrating cone fracture. The suitability of alternative methods should be considered on a case-by-case basis.
  - Use alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric controlled units where feasible and reasonable. Where there is no electricity supply, use an electrical generator located away from residences.
- Use quieter equipment (wherever possible)
  - Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine. For example, rubber wheeled tractors can be less noisy than steel tracked tractors.
  - Noise labels are required by NSW legislation for pavement breakers, mobile compressors, chainsaws and mobile garbage compactors. These noise labels can be used to assist in selecting less noisy plant.
  - Pneumatic equipment is traditionally a problem – select super silenced compressors, silenced jackhammers and damped bits where possible.
  - When renting, select quieter items of plant and equipment where feasible and reasonable.
  - When purchasing, select, where feasible and reasonable, the most effective mufflers, enclosures and low-noise tool bits and blades. Always seek the manufacturer's advice before making modifications to plant to reduce noise.
- Operate plant in a quiet and efficient manner
  - Reduce throttle setting and turn off equipment when not being used.
  - Examine and implement, where feasible and reasonable, the option of reducing noise from metal chutes and bins by placing damping material in the bin.

The Contractor will prepare and implement a regular plant and equipment use and Maintenance program. This is to ensure that 'noisy' equipment or tools are not used. This program should ensure that the contractor will:

- Regularly inspect and maintain equipment to ensure it is in good working order. Also check the condition of mufflers.
- Equipment must not be operated until it is maintained or repaired, where Maintenance or repair would address the annoying character of noise identified.
- For machines with enclosures, check that doors and door seals are in good working order and that the doors close properly against the seals.
- Return any hired equipment that is causing noise that is not typical for the equipment – the increased noise may indicate the need for repair.
- Ensure air lines on pneumatic equipment do not leak.

7.7 WORKS TIMING RESTRICTIONS AND SCHEDULING

Works should be carried out during periods specified by the approved Construction Hours. Scheduling noisy work during periods when people are least affected reduces noise impact on those. Recommendations for work scheduling are as follows:

- Provide respite periods.
- Schedule activities to minimise noise impacts.
  - Organise work to be undertaken during the recommended standard hours where possible.
  - When works outside the recommended standard hours are planned, avoid scheduling on Sundays or public holidays.
  - Schedule work when neighbours are not present (for example, commercial neighbours).
  - Schedule noisy activities around times of high background noise (local road traffic or when other local noise sources are active) where possible to provide masking or to reduce the amount that the construction noise intrudes above the background.
  - Consult with affected neighbours about scheduling activities to minimise noise impacts.
- Organise deliveries and access.
  - Nominate an off-site truck parking area, away from residences, for trucks arriving prior to gates opening.
  - Amalgamated loads can lead to less noise and congestion in nearby streets.
  - Optimise the number of vehicle trips to and from the site – movements can be organised to amalgamate loads rather than using a number of vehicles with smaller loads.
  - Inform, and consult where possible, the potentially noise-affected residences or other sensitive land uses of designated access routes to and from site, and make drivers aware of nominated vehicle routes.
  - Provide on-site parking for staff and on-site truck waiting areas away from residences and other sensitive land uses. Truck waiting areas may require walls to minimise noise.
  - Schedule deliveries to nominated hours only.

7.8 ADDITIONAL NOISE AND VIBRATION CONTROLS

As there will likely be times/situations when construction works are likely to exceed stated criteria at the nearest NCA's, particularly when works occur in the areas closer to the NCA's. Therefore, all feasible and reasonable noise control measures should be considered.

If, during construction, an item of equipment exceeds either the noise criteria at any location or the equipment noise level limits, the following noise control measures, together with construction best practices presented in this Section shall be considered to minimise the noise and vibration impacts of the project on the surrounding noise catchment areas.

- Schedule noisy activities to occur outside of the most sensitive times of the day for each nominated NCA. For example, the residential NCA's are likely to be more sensitive to noise before 8am and after 6pm.
- Consider implementing equipment specific temporary screening for noisy equipment, or other noise control measures recommended in Appendix C of AS2436:2010. This is most likely to apply to noisier hand-held items such as jack-hammers and circular saws.

- Locate specific activities such as carpentry areas (use of circular saws, etc.) to internal spaces or where shielding is provided by existing structures or temporary screening.
- Limit the number of trucks and heavy vehicles on site at any given time through scheduling deliveries at differing times.
- Traffic rules should be prepared to minimise the noise impact on the community.
- When loading and unloading trucks, adopt best practice noise management strategies to avoid materials being dropped from height.
- Avoid unnecessary idling of trucks and equipment, limit to maximum 5 minutes.
- Ensure that any miscellaneous equipment (extraction fans, hand tools, etc.) not specifically identified in this plan incorporates silencing/shielding equipment as required to meet the noise criteria.

If the measured construction vibration levels exceed the appropriate criteria during the works, one or more of the following measures should be taken:

- Modifications to construction equipment used.
- Modifications to methods of construction.
- Rescheduling of activities to less sensitive times.

If the measures given cannot be implemented or have no effect on noise or vibration levels or impact generated, a review of the criteria should be undertaken and the noise and vibration strategy amended.

7.9 MONITORING PROGRAM

Noise and vibration levels are recommended to be monitored from time to time to ensure that noise generated as a result of remediation and construction activities does not disturb the nearby noise and vibration sensitive receivers. Monitoring will occur weekly on an anticipated noisy day using hand held receivers.

Monitoring will be in the form of regular checks by FKG and the results will be forwarded to the Client Project Manager Currie & Brown. FKG will also monitor noise in response to any complaints received.

Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected NCA's.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short-term monitoring: Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the sub-contractor on site letting them know when the noise and vibration criteria are exceeded allowing the selection of alternative method on construction or equipment selection in order to minimise noise and vibration impacts.
- Long-term monitoring: Similarly long-term monitoring uses noise and vibration loggers providing real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded. Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project. Sometimes the period of construction noise and vibration monitoring is dictated by the local authorities through the Conditions of Consent if applicable.

Both methodologies are complementary and normally used simultaneously providing a significant of amount of data via the long-term monitoring but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

The following may be included in a noise monitoring report:

- The type of monitoring conducted (for example, at a particular project stage or following complaints) and a brief statement of the measurement method.
- The noise / vibration conditions on the consent / license, or the relevant noise management objectives.
- Descriptions of the nearest affected residences and other sensitive land uses or, in the case of complaints, description of the complainant location and complaint.
- Plan or diagram showing the location of the monitoring and the noise generating works.
- Description of the instrumentation used.
- Name and relevant qualifications or professional memberships of monitoring personnel.
- The weather conditions during monitoring.
- The time(s) and duration(s) of monitoring, including dates – in the case of complaints.
- A clear description of the construction activities taking place during the monitoring.
- The results of monitoring at each monitoring location, including a comparison with the consent conditions or relevant noise management objectives.
- A clear statement outlining the project's compliance or non-compliance with the conditions or objectives.
- Where the monitored level is higher than the conditions or objectives, the reasons for non-compliance should be stated, strategies for minimising noise identified and stated, and the appropriate actions to implement the strategies.

7.10 WORKERS TRAINING AND AWARENESS

The Contractor shall provide all project personnel and subcontractors with training on the environmental obligations through project inductions, toolbox talks, and through Safety Works Methods (SWMs).

All Project work personnel and subcontractors shall undergo a general project induction prior to commencing work. This should include a noise component to reinforce the importance of noise issues and the measures that will be implemented to protect the environment.

All inductions shall be carried out by the site manager, or his designate in the site office as appropriate. During the induction, each contractor / worker shall be taken around the site to ensure they are fully aware of the exclusion zones and site specific environment.

Site inductions and daily SWMs and toolbox talks will highlight the specific environmental requirements and activities being undertaken at each work area which will include relevant noise management matters.

7.11 OCCUPATIONAL HEALTH AND SAFETY

In addition to potential noise and vibration impacts on the community and structures, construction noise and vibration can also have an adverse impact upon the health of workers. It is important that Contractors adopt noise management strategies to prevent or minimise worker exposure to excessive noise and vibration. Such measures will also assist in reducing noise and vibration impacts on the surrounding community.

The National Occupational Health and Safety Commission (NOHSC) recommends a maximum acceptable workplace noise exposure level of 85dB(A) ($L_{Aeq,8h}$) for an eight hour time period.

Personnel involved in operations should be issued with ear plugs or ear muffs which must be used whenever noise levels interfere with normal speech when individuals are standing at a distance of 1m from each other, or when the $L_{Aeq,8hr}$ exceeds 85dB(A).

Signs should be erected and made visible at the entry to all areas where noise levels will exceed 85dB(A).

7.12 CONSTRUCTION TRAFFIC ROUTES

The contractor shall establish and implement traffic routes for deliveries to the site, which minimise the noise impact on surrounding noise catchment areas as best possible.

8 CONCLUSIONS

A noise assessment has been carried out for the proposed construction works associated with the Hastings Secondary College (Port Macquarie Campus), previously known as Port Macquarie High School. This report addresses the Condition of Consent B16 of the State Significant Development.

In particular, this report identifies the Contractor's obligations and the requirements to manage noise and vibration during construction such that Contractor can make the necessary allowances within the construction costs, programmes and work methodologies.

The responsibilities of all stakeholders are identified and a framework for the management of noise and vibration during construction works is provided.

This report establishes relevant noise level criteria, details the acoustic assessment and provides comments and recommendations for the proposed development.

Potential construction noise and vibration impacts on the surroundings have been presented in this report and recommendations based on the relevant guidelines are provided. It is expected that the predicted exceedance of the NMLs in the surrounding NCA's triggers the proponent to apply all reasonable and feasible work practices to minimise the noise as much as possible, and community consultation, as per the requirements of the NSW ICNG. Refer to Section 6 for details.

For each of these work stages and associated plant, and assuming that in fact are exceeding the noise level criteria, then the noise control measures presented in Section 7 shall be considered and implemented wherever reasonable and feasible in order to minimise any potential noise impact. Operation time restrictions shall be applied to 'noisy' construction plant to minimise noise impact to the nearest sensitive NCA's.

The information presented in this report shall be reviewed if any modifications to selection of equipment / machinery, construction methodologies and modifications to the works construction program.

Based on the information presented in this report, relevant objectives will be satisfied and therefore approval is recommended to be granted.

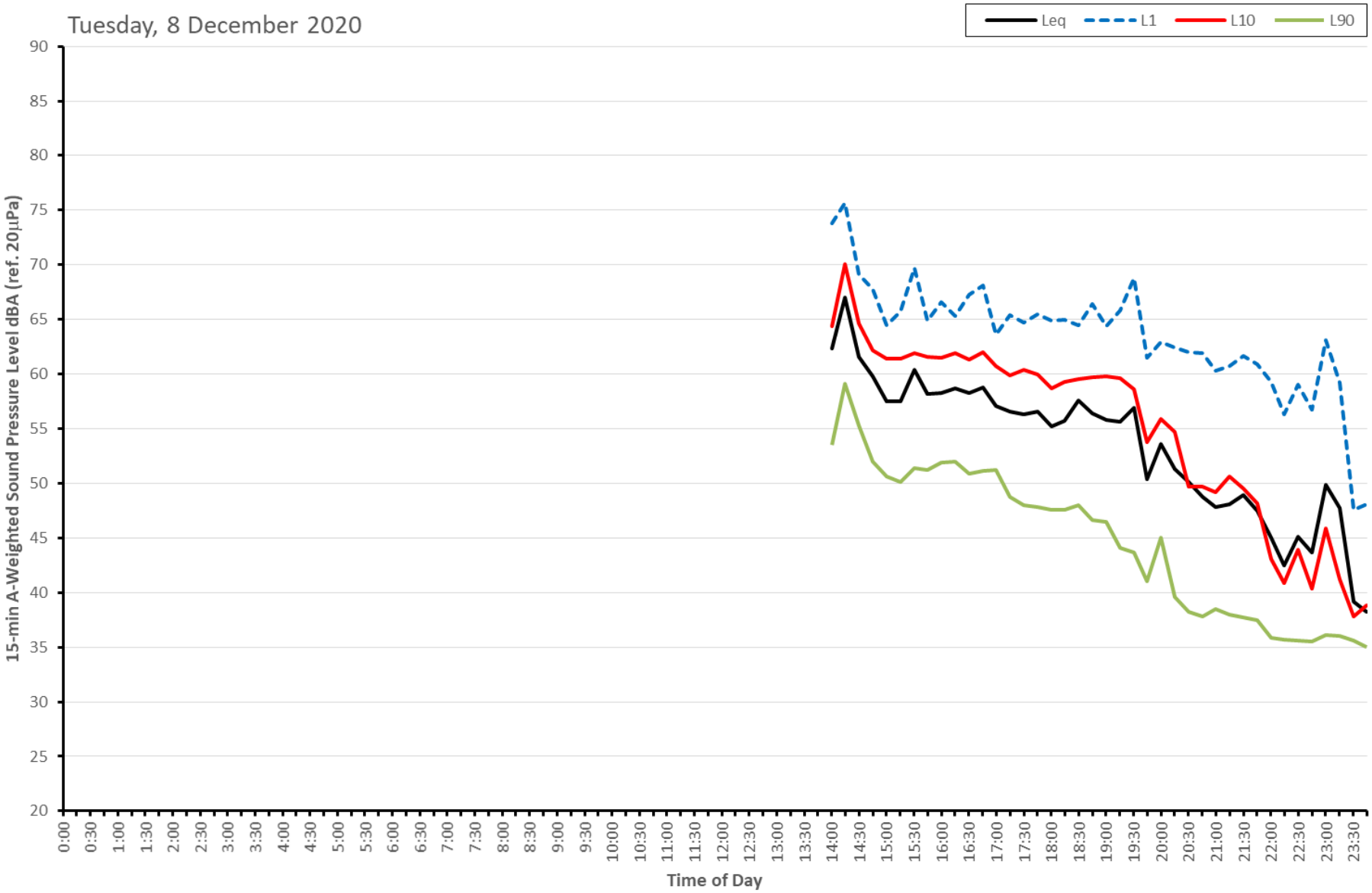
APPENDIX A: LONG TERM NOISE MONITORING

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time. This measure is commonly referred to as the maximum noise level.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise. This measure is commonly referred to as the average maximum noise level.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.


Tuesday, 8 December 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
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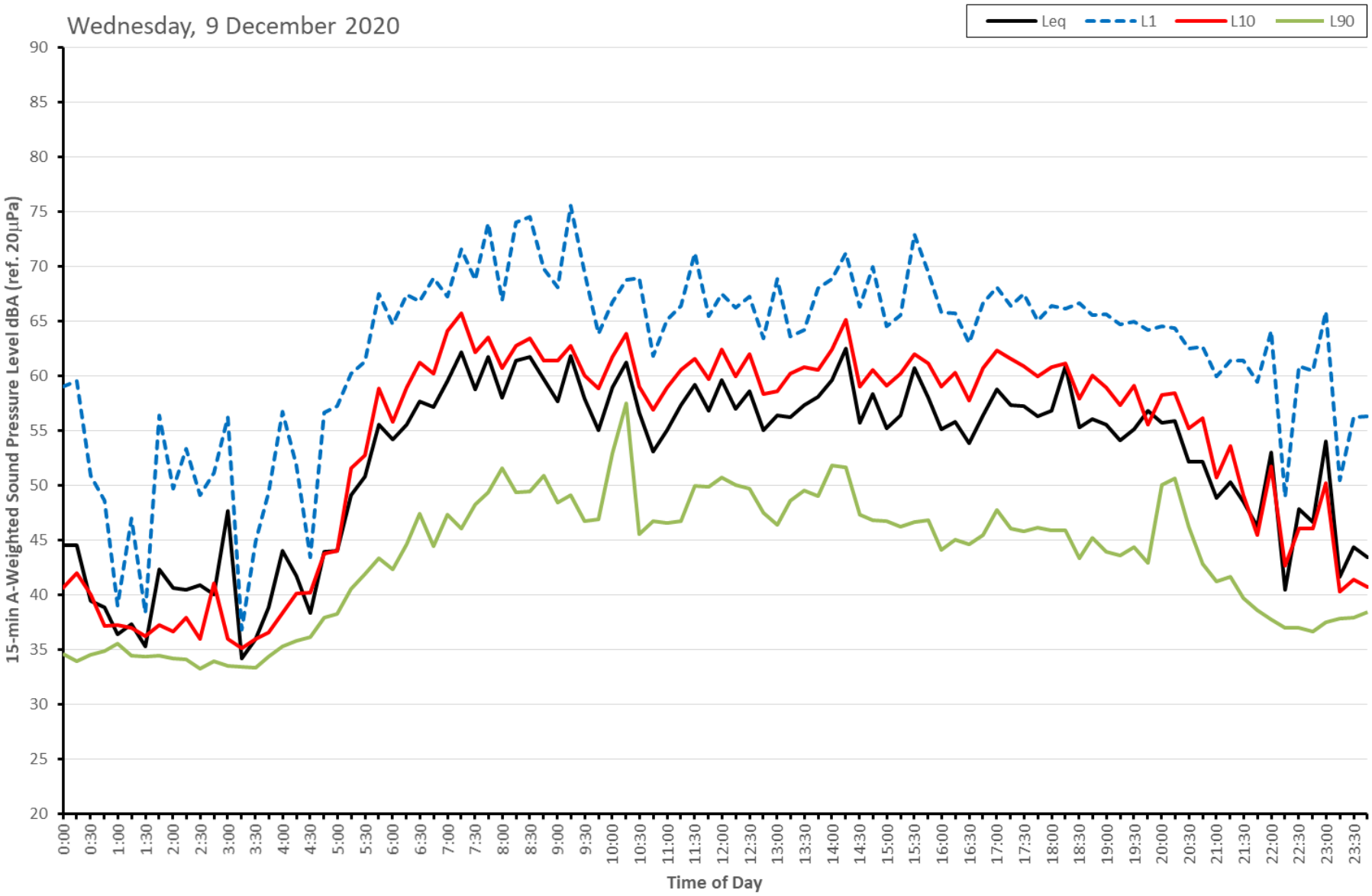
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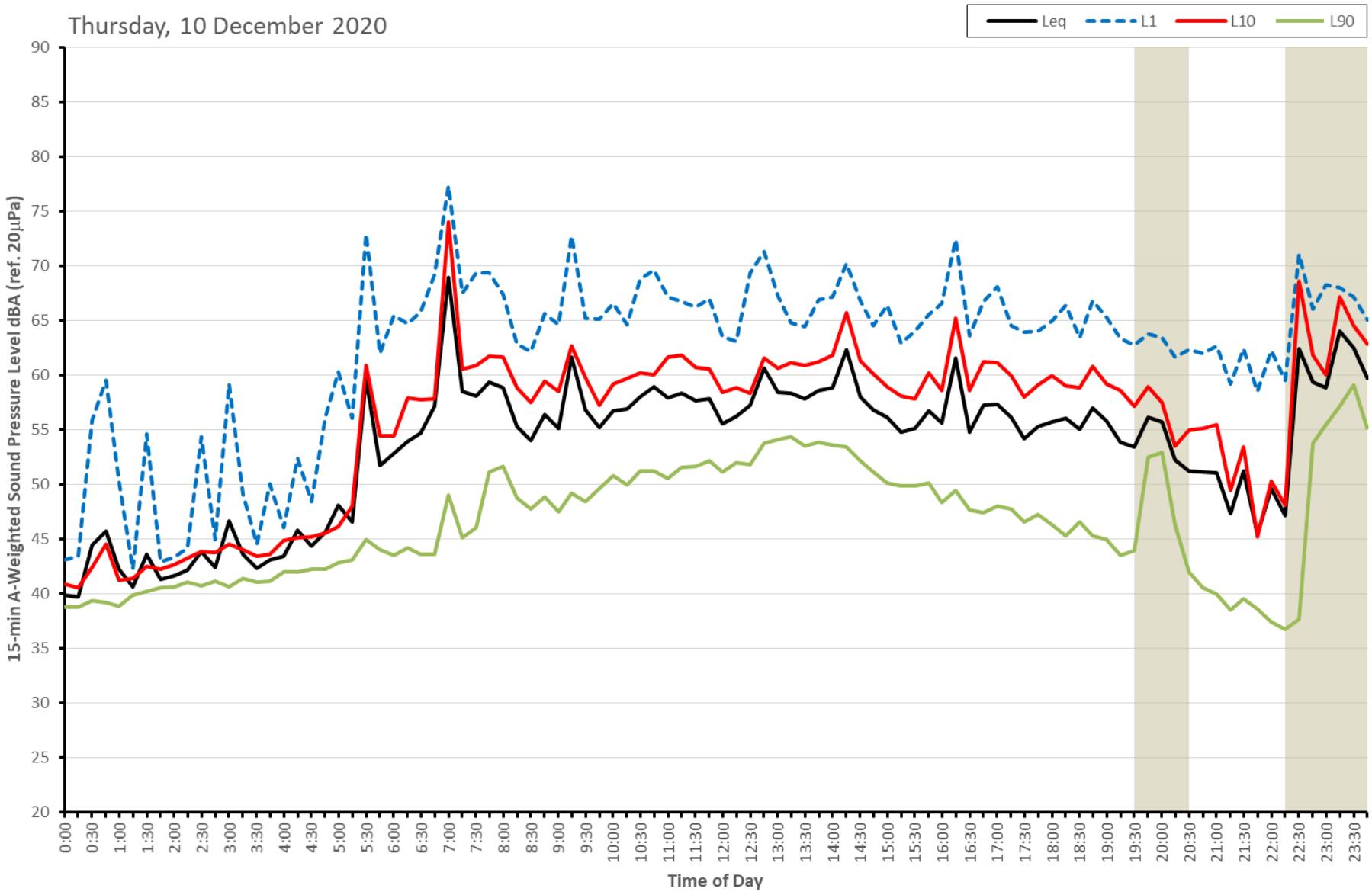
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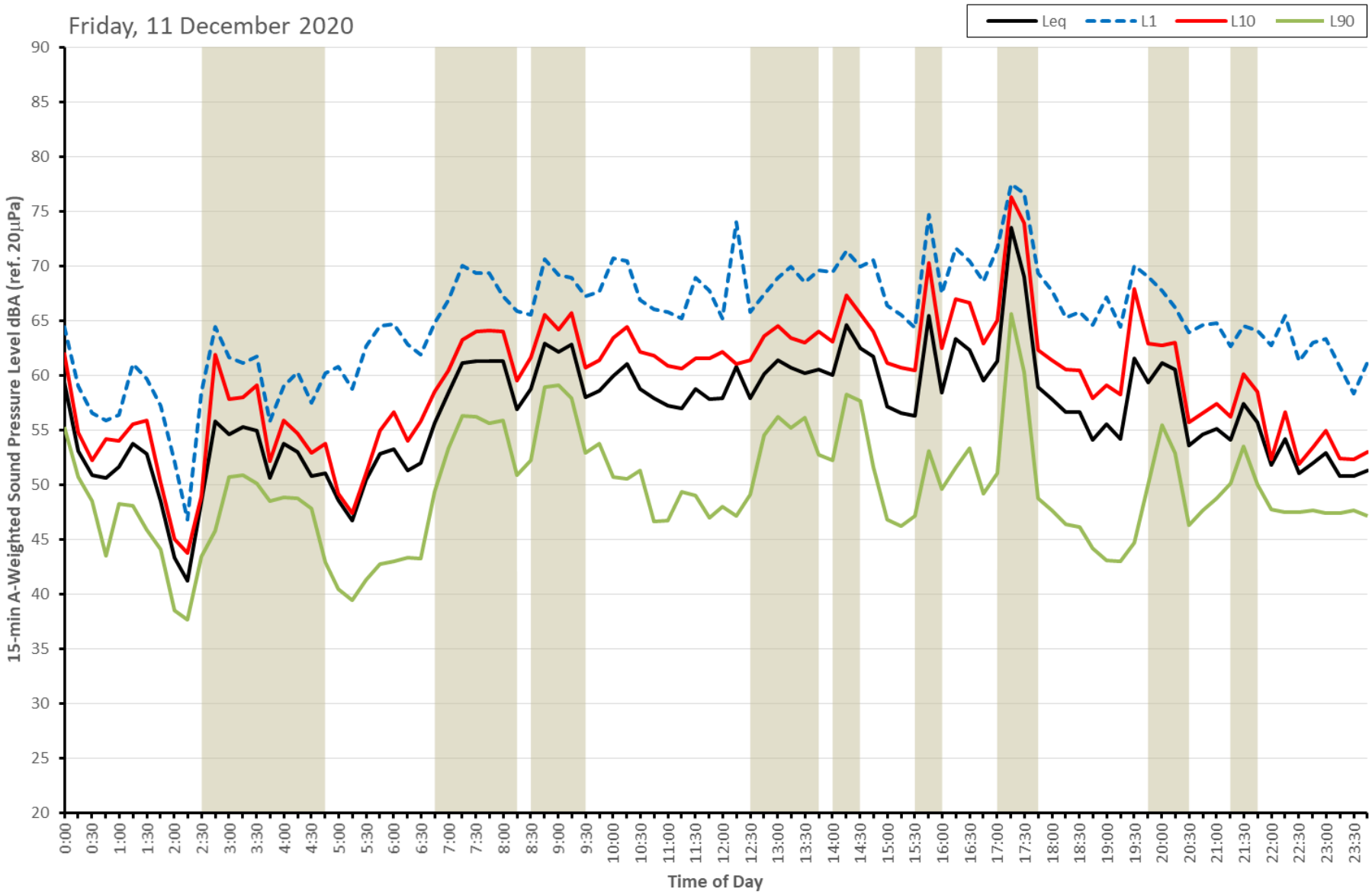
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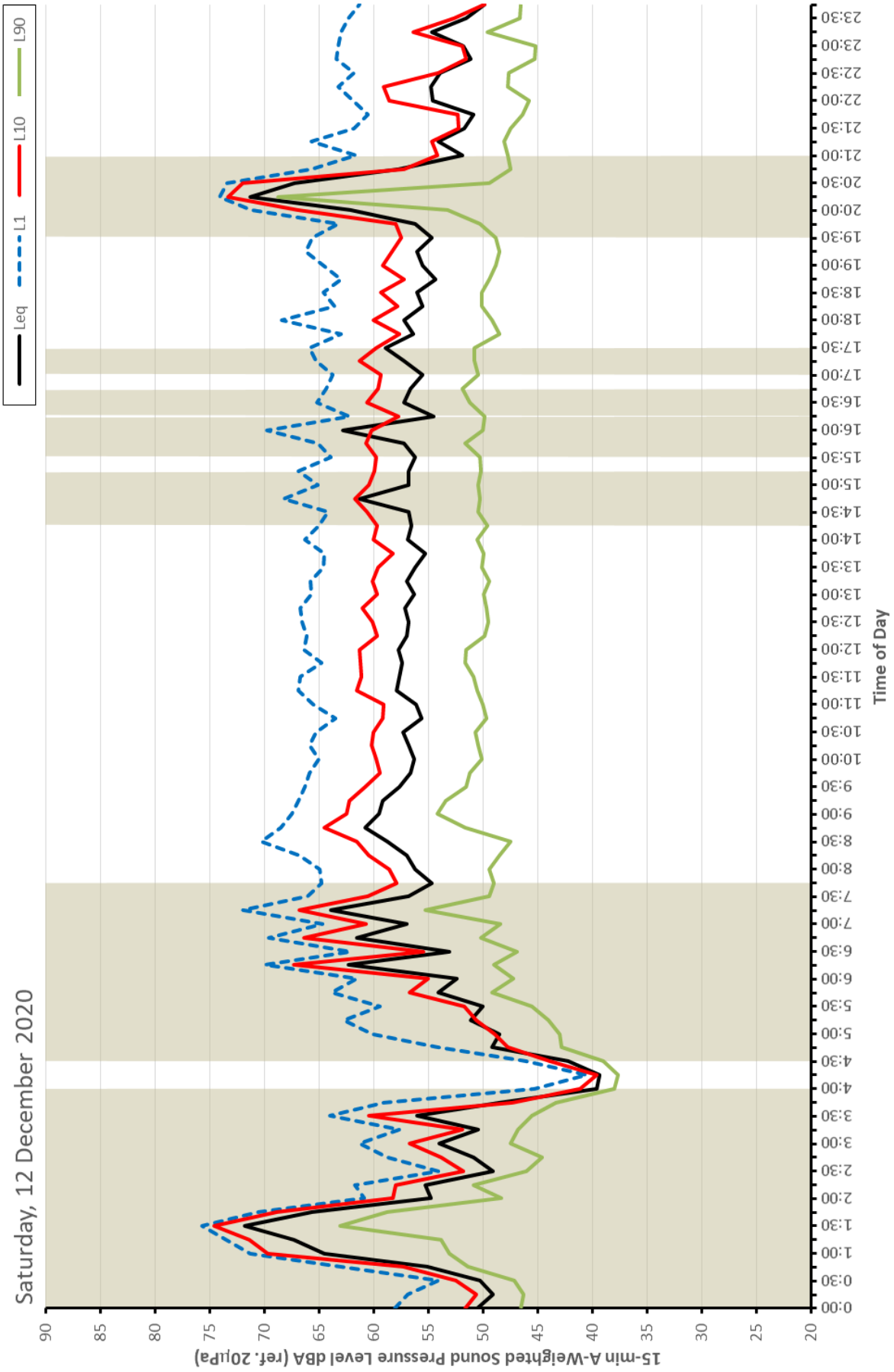
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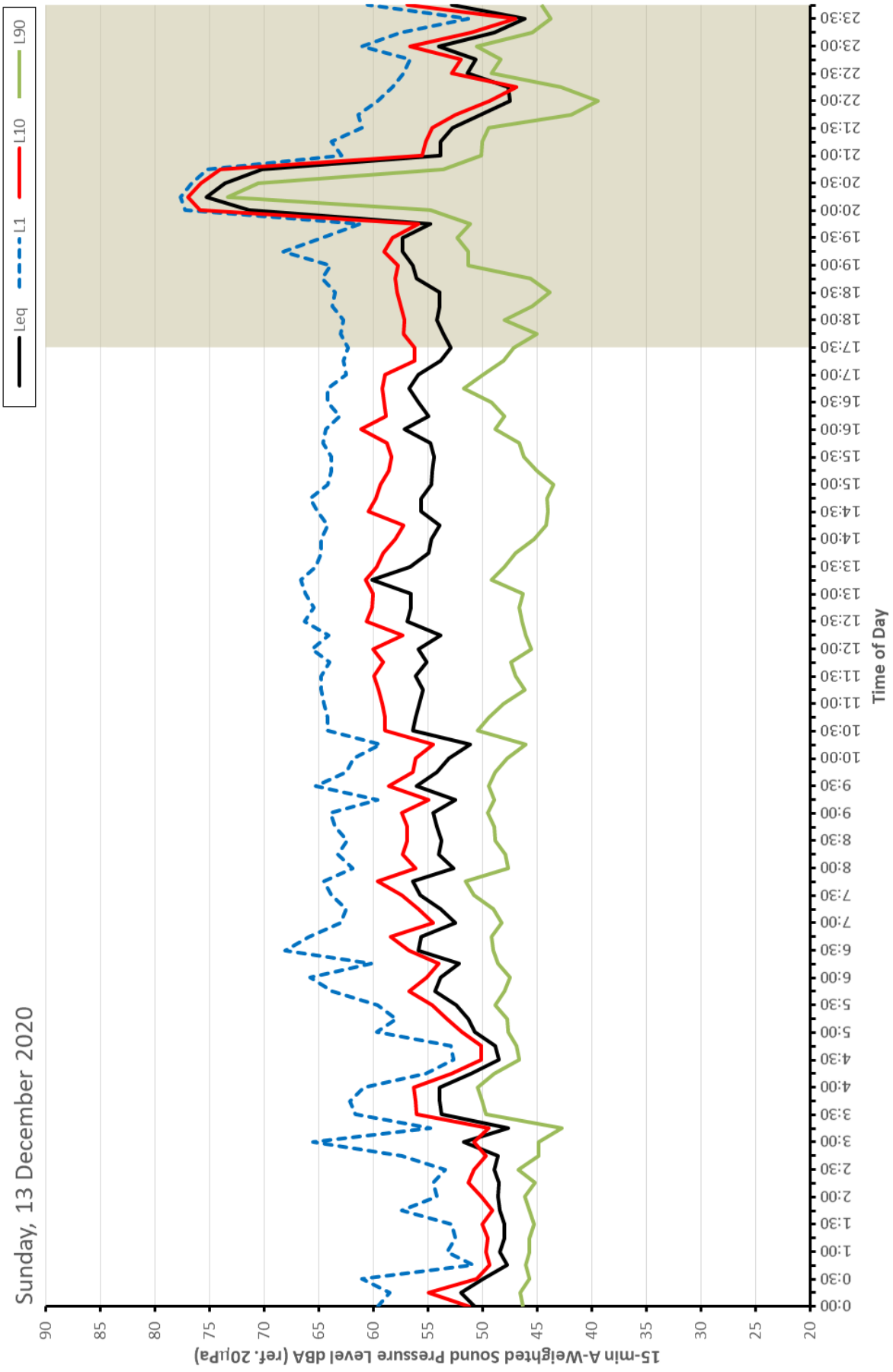
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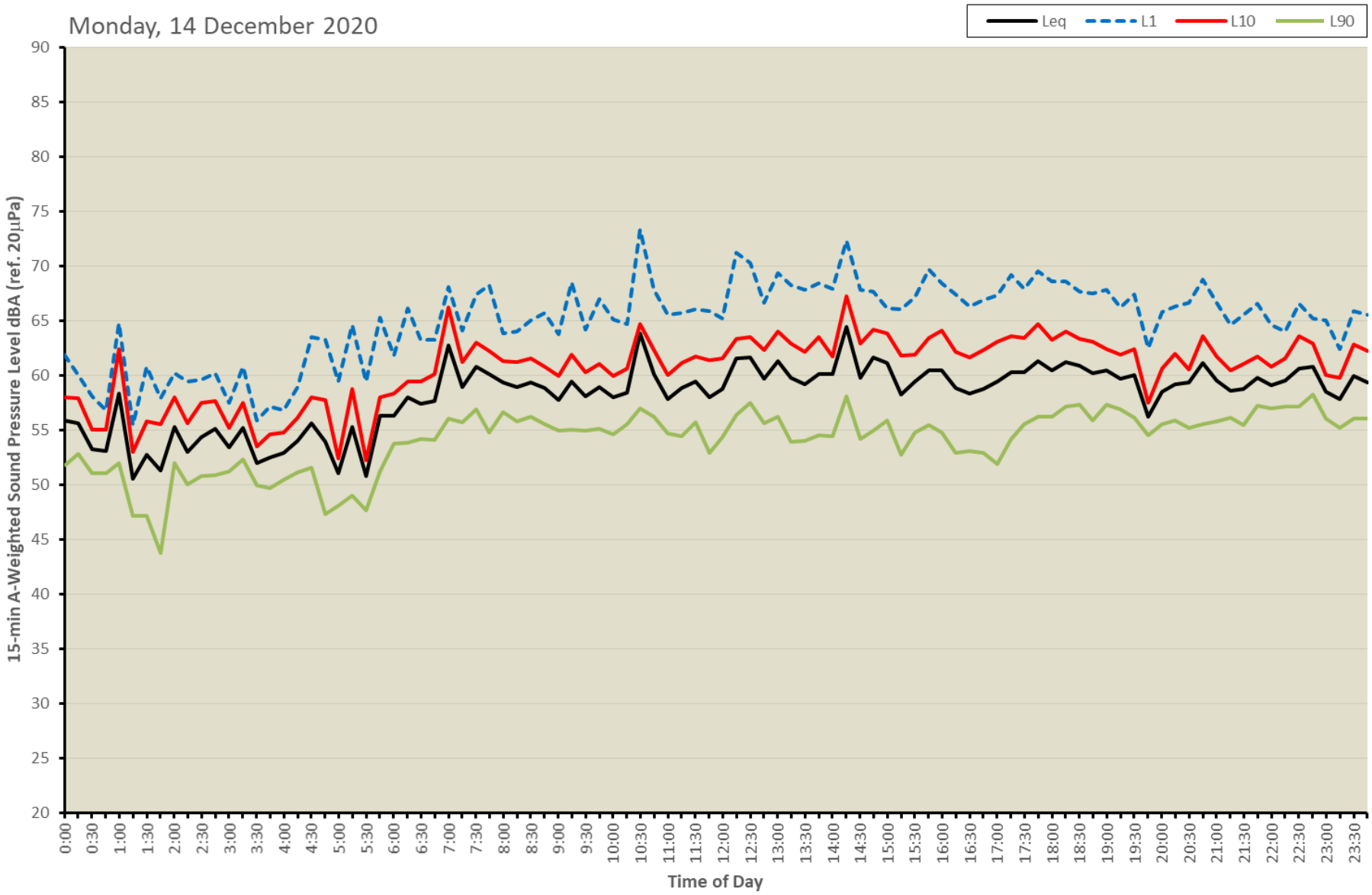
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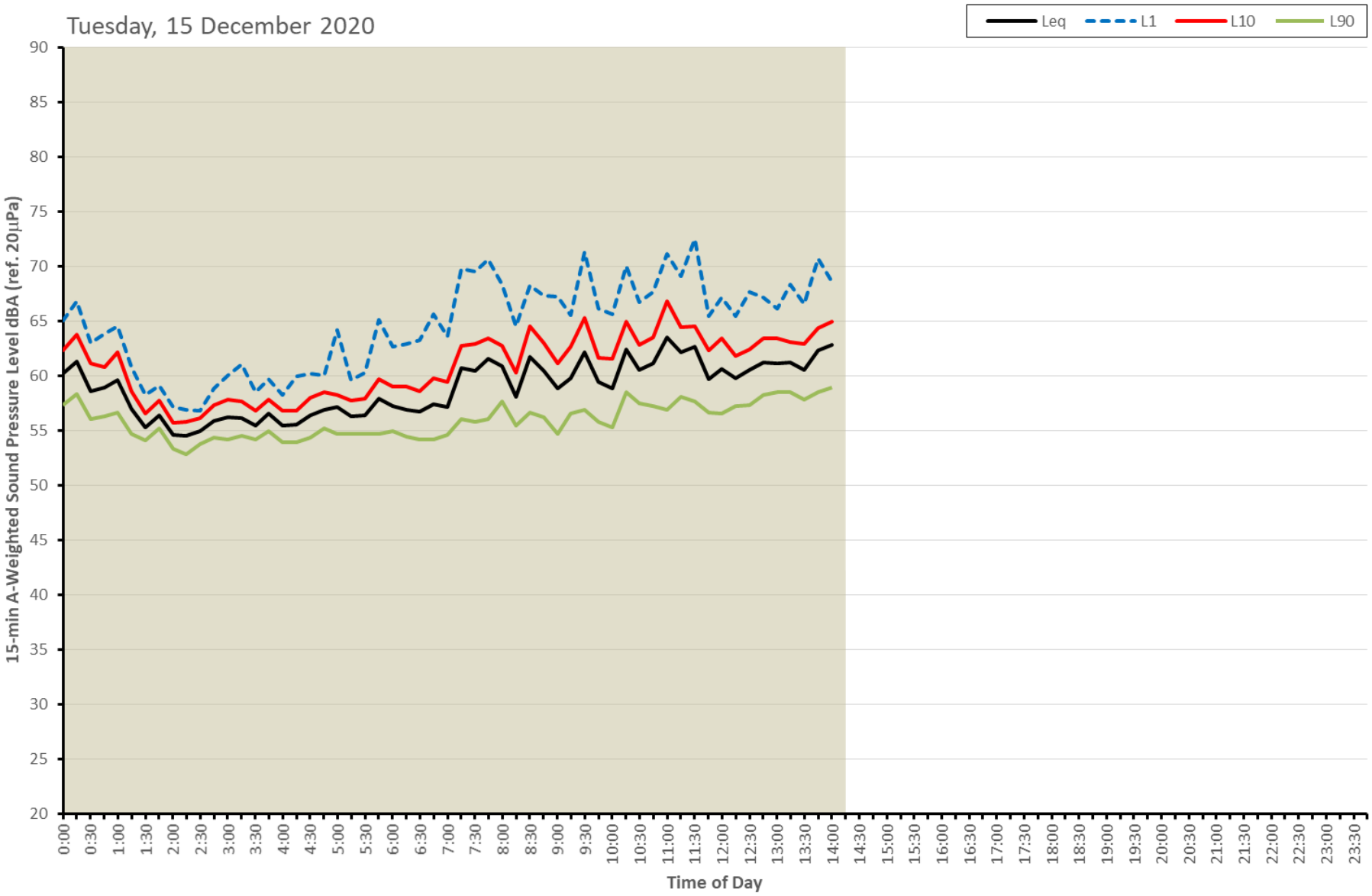
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JORGE REVERTER | ACOUSTIC GROUP MANAGER

Jorge is a Senior Acoustic Engineer with over 20 years of comprehensive experience in the acoustic consultancy field in Australia and Spain.

His experience includes a broad spectrum of acoustics projects covering: transport infrastructures, land planning, room acoustics, building acoustics, noise and vibration control for building services, environmental noise control and assessments, programming and computer modelling.

QUALIFICATIONS

BEng. Telecommunications - Acoustics, 1999. Universitat Politecnica Valencia (Spain)

MSc. Occupational Health and Safety, 2008. Universitat Jaume I (Spain)

AFFILIATIONS

Member of Australian Acoustical Society (MAAS)

KEY PROJECT EXPERIENCE

- Ultimo Public School
- Riverina Conservatorium of Music.
- University of Wollongong Electron Microscope, Wollongong.
- University of Sydney F07 Carslaw Extension LEES1, Sydney.
- UTS Central Project, Sydney.
- UNSW COFA, Paddington.
- Australian National University RSPE, Canberra.
- University of New South Wales - Myers Studio, Fig Tree Lane, COFA Recording Studios.
- St. Andrew's College (UoS), Sydney.
- Santa Sophia Catholic School, Box Hill.
- Science Technology Engineering & Mathematic School (STEM), Sydney Science Park.
- Munro Park Amphitheatre, Cairns.
- Armengol Theatre, Bellpuig (Spain).
- Palau de la Musica, Barcelona (Spain) – Concert Hall.
- Girona Auditorium and Exhibition Centre, Girona (Spain).
- Sydney Opera House. Forecourt waterproofing plus DT and JST Staging Equipment replacement.
- IESE, Barcelona (Spain).
- PLC Alpha Omega, Croydon.
- St. Rita's College, Brisbane.
- St. Marks Catholic College, Stanhope Gardens.
- Clancy Catholic College, West Hoxton.
- St. Anthony of Padua, Austral.
- Monaro High School, Cooma.
- St Patrick's, Sutherland.
- Darcy Road Public School, Wentworthville.
- TAFE Meadowbank.
- TAFE Design CLP.
- Hurstville Marist College.
- Hastings Secondary College Upgrade.
- Edmondson Park Public School.
- Mosman High School Upgrade, Mosman
- Hyatt Regency at 161 Sussex Street.
- Australian Film, Television and Radio School Teaching Spaces.
- NSW Health Infrastructure RAIR.
- High Court of Australia.
- PCYC Northern Beaches, Dee Why.
- Royal Commission into Institutional Responses to Child Abuse.
- East Sydney Community and Arts Centre.
- NSW Police Stations: Belmont, Toronto, Morriset, Taree, Queanbeyan, Broken Hill, Parramatta.

Hastings Secondary College
Port Macquarie Campus

16 December 2021

We are upgrading Hastings Secondary College to support the student community. Hastings Secondary College comprises of the Port Macquarie Campus (PMC) and Westport Campus (WPC). The upgrade will involve work at both campuses.

The State Significant Development (SSD) application for Stages 2 and 3 of the PMC upgrade has been approved by the Department of Planning, Industry and Environment (DPIE). The Conditions of Approval can be found on the DPIE major projects website: www.planningportal.nsw.gov.au/major-projects/project/40801

Stage 2 of the PMC upgrade will deliver new and upgraded learning spaces, new Creative and Performing Arts (CAPA) building and a redeveloped school entry. Stage 3 is a new shared use multi-sports facility in partnership with Police Citizens Youth Clubs (PCYC) NSW.

Managing construction impacts: Port Macquarie Campus Stage 2 and 3 works

As part of the consent to undertake these works, the project is required to develop a Construction Noise and Vibration Management Sub-Plan to outline how it will manage any impacts on nearby properties and residents. These impacts include noise, vibration and vehicle movements.

Your feedback is sought on how we propose to manage the high noise and vibration generating works listed in the table below. Please provide your feedback by Thursday 23 December 2021 via email at schoolinfrastructure@det.nsw.edu.au or phone 1300 482 651.

Activity	How we propose to minimise or manage the impact on nearby properties
General	▪ Construction works, including the delivery of materials to and from the site, will take place between the approved work hours: o between 7 am and 6 pm Monday to Friday o between 8 am and 1 pm on Saturdays. ▪ We may also carry out work where noise levels do not exceed the existing background noise level plus 5dB between 6 pm and 7 pm Monday to Friday and between 1 pm and 4 pm Saturdays. ▪ Under the consent, no work is permitted to be carried out on Sundays or public holidays unless approved by the Department of Industry, Planning and Environment. ▪ We will provide advance notice if any work is approved to take place outside of the above hours. ▪ Noise levels on site will be managed in accordance with the noise control guidelines outlined in the Environment Protection Authority's Environmental Noise Control Manual for construction and demolition works. ▪ We will provide advance notice of work to the local community, particularly when we anticipate high noise generating works. ▪ Trucks will be well maintained and only use approved truck routes to and from the site (including entry and exit via Owen St). Truck drivers will be kept informed of parking locations, acceptable delivery hours or other relevant practices.

For more information contact:

School Infrastructure NSW
Email: schoolinfrastructure@det.nsw.edu.au
Phone: 1300 482 651
www.schoolinfrastructure.nsw.gov.au

NSW GOVERNMENT

	▪ A one-page summary of the consent conditions will be developed for the site noticeboard for workers to quickly reference this information.
Construction	Measures for managing high noise generating works. Proposed actions: ▪ Plant and equipment will be set up/orientated to direct noise away from the closest receivers/residents. ▪ Regular reinforcement and briefings to workers on-site about the need to minimise noise and vibration will occur. ▪ If rock breaking, rock hammering, sheet piling, and pile driving activities are required, impacts will be managed through equipment selection, and respite periods. These activities will be strictly limited to approved hours: o 9 am to 12 pm, Monday to Friday o 2 pm to 5 pm, Monday to Friday o 9 am to 12 pm, Saturday. ▪ Work will occur within approved standard work hours, unless otherwise notified. ▪ In close proximity of sensitive receiver residents, machines will not be used simultaneously. ▪ Workers and contractors are regularly trained to use equipment in ways to minimise noise
Construction	Measures to ensure road safety and network efficiency during construction. Proposed actions: ▪ Construction vehicles will not arrive at the site or surrounding residential precincts outside of approved construction hours. ▪ Construction vehicles will be well maintained and will be required to observe speed limits. ▪ Trucks will only use approved truck routes to and from the site. ▪ We will provide advance notice of any works that will impact access to residents or change local traffic conditions.
Construction	Mechanism for the community to discuss or provide feedback regarding construction impacts. Proposed actions: The community and information phone line and email address will be available throughout the project and for a minimum of 12 months following the completion of the project. Phone: 1300 482 651 Email: schoolinfrastrucutre@det.nsw.edu.au

Consultation with Community on Construction Noise and Vibration Management Plans for SSDA-11920082

During SINSW's Consultation with the community, a local resident made the following suggestions in relation to the Noise and Vibration Management for SSDA-11920082 works.

The resident's suggestions are as follows:

1. The Pacific Drive (back) entrance to the School be used as the primary entry for trucks / heavy machinery
2. That trucks/heavy machinery do not sit idling with engines on for longer than 2 minutes (turn off engines)
3. That no work is conducted before 9:am including work preparation activities or past 11am Saturday (ie only work between 9am and 11am at most)

FKG Comment on the following:

1. The Pacific Drive entrance to the School cannot be used as there is no access from that entrance to the works to be undertaken for the SSD-11920082. Furthermore FKG are aiming to limit the interaction with the school staff and students for primarily safety reasons. Access from Owen Street has been carefully considered throughout the entire SSDA process and is the most appropriate.
2. FKG understand that trucks / heavy machinery can be intrusive for local residents. In considering this suggestion, FKG have adjusted the CNVMP to incorporate a maximum idling time of 5 minutes.
3. Work on Saturday will be strictly in accordance with the SSD Conditions C4 and C5. FKG will aim to limit works on Saturday's but a restriction to a two hour window is untenable.

Response is on behalf of FKG's Project Manager – Josh Pointon

NEWCASTLE
P 0746 200 500 **E** info@fkg.com.au
Suite 8, 335 Wharf Road, Newcastle, NSW 2300
PO Box 838, Newcastle, NSW 2300

FK Gardner & Sons Pty Ltd ABN 99 010 136 053