APPENDIX I

Acoustic Report

Prepared by:

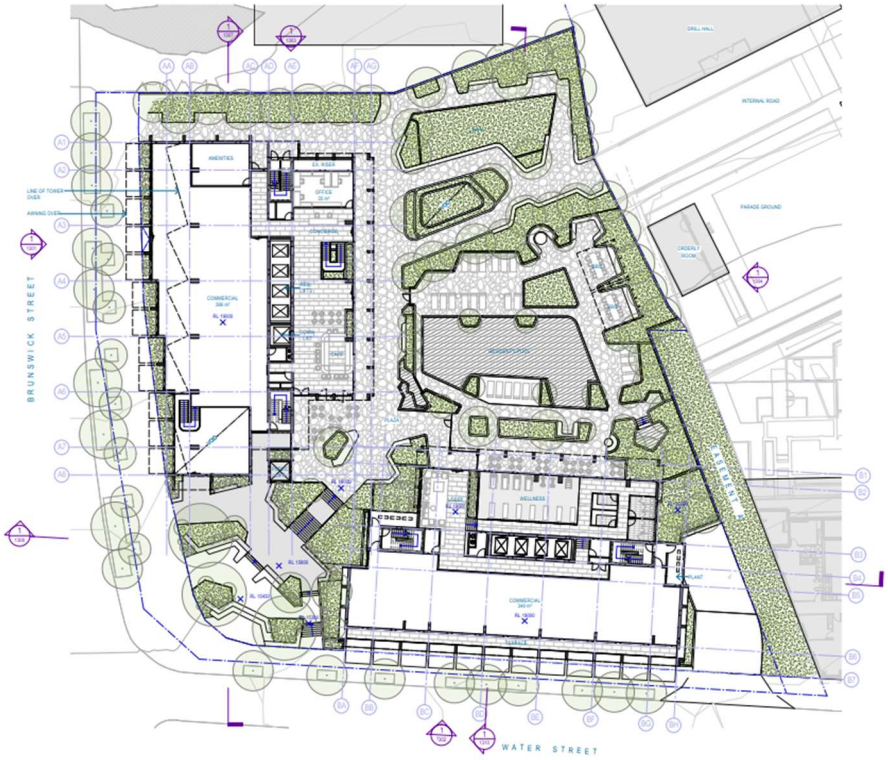
WSP

Pellicano Pty Ltd

332-334 Water Street, Fortitude Valley

Noise Impact Assessment

DECEMBER 2023



Question today
Imagine tomorrow
Create for the future

332-334 Water Street, Fortitude Valley
Noise Impact Assessment

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REV	DATE	DETAILS
0	21/11/2022	Noise Impact Assessment
1	07/09/2023	Updated floorplans and layout
2	03/10/2023	Update zoning information
3	20/12/2023	Updated site layout

	NAME	DATE	SIGNATURE
Prepared by:	Jarryd Shuker Allison Cuskelly	03 October 2023	
Reviewed by:	Alex Vuillemin Chris Grainger	03 October 2023	
Approved by:	Alex Vuillemin	03 October 2023	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Project background

Pellicano Pty Ltd has engaged WSP Australia Pty Ltd (WSP) to provide acoustic consulting advice for a proposed residential development at 332-334 Water Street, Fortitude Valley (the Project). The Project is comprised of two buildings, the Brunswick Street and Water Street towers. Common to both towers, there are four basement levels (with car parking and plant areas), lower and upper ground levels (with car parking, EOT facilities, plant and commercial areas), and a plaza level (with entry and commercial areas). The Brunswick Street Tower then has two commercial levels and 26 residential storeys, while the Water Street Tower has 28 residential storeys. Both towers have their own rooftop terrace.

1.1 Purpose of report

The purpose of this report is to provide an assessment of expected noise impacts associated with the Project.

This noise impact assessment is to be included in the Development Application.

1.2 Information sources

The following documents were used in providing the preliminary design advice:

- Australian Standard *AS 1055:2018 Acoustics - Description and Measurement of Environmental Noise*
- Brisbane City Council - *Brisbane City Plan 2014*
- Queensland Department of Environment and Heritage Protection (now Department of Environment and Science) - *Noise Measurement Manual Version 4.01*
- Queensland Department of Transport and Main Roads *Development Affected by Environmental Emissions from Transport Policy Version 4*
- Preliminary layout drawings by Woods Bagot, dated 29 August 2022.

1.3 Project site

The Project is proposed to be located at 332-334 Water Street, Fortitude Valley, encompassing the following lots:

- Lots 5, 6 and 94 on SP266307
- Lots 11 and 12 on RP10552
- Lots 13 on RP81335
- Lot 1 on RP10553.

The sites are currently zoned as *Mixed Use (Bowen Hills PDA)* and adjoin properties zoned as *Mixed Use (Bowen Hills PDA)* to the north and east and *Mixed Use (Inner city, Brisbane City Council)* to the south and west.

Figure 1.1 shows the proposed Project site and zoning areas. Figure 1.2 shows the proposed typical layout for the Project.

1.4 Nearest noise sensitive receivers

The closest potential noise sensitive receiver is the neighbouring residential building at 338 Water Street (Oxford Towers), which includes 160 residential units across 18 levels.

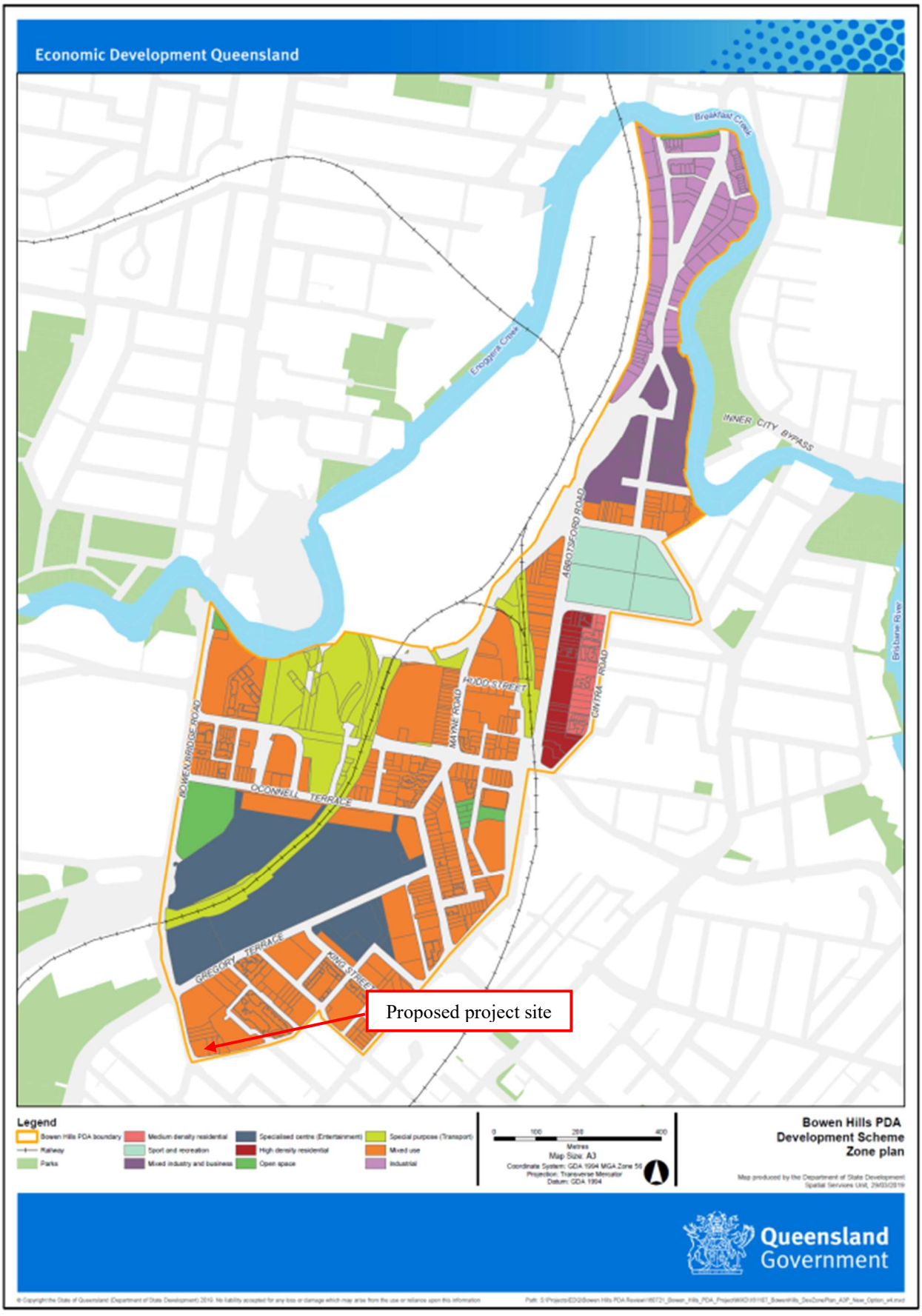


Figure 1.1 Site Location
(source: Economic Development Queensland Bowen Hills PDA Development Scheme Zone Plan)

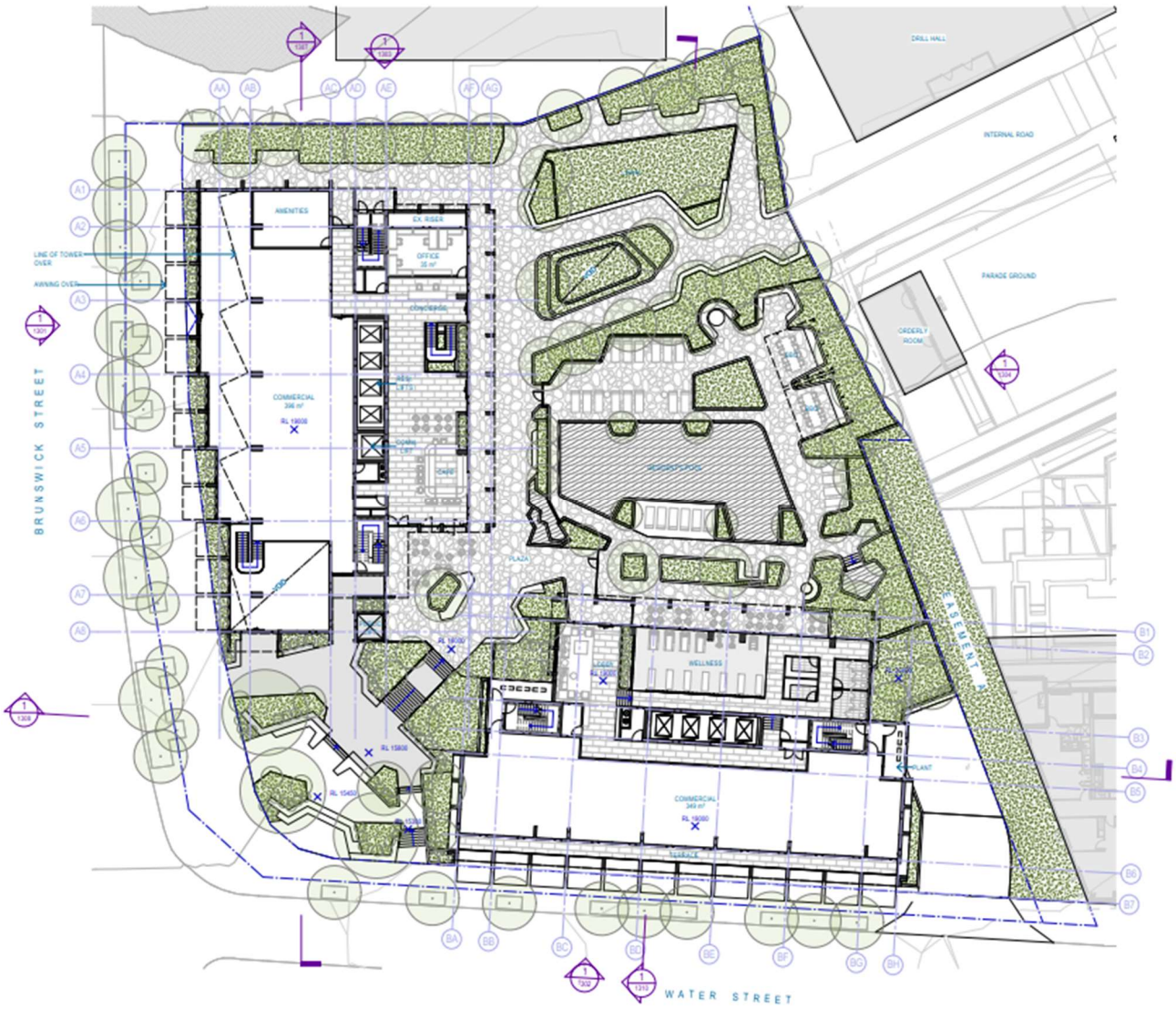


Figure 1.2 Site Layout, Plaza Level
(source: Woods Bagot drawing 150536, A-1207 revision Q, dated 14 December 2023)

2 Existing background noise

To establish existing noise levels at the nearest noise sensitive receivers and the Project site itself, an environmental noise survey was undertaken between Thursday 18 August and Tuesday 23 August 2022 in accordance with the following requirements:

- Australian Standard *AS 1055:2018 Acoustics - Description and Measurement of Environmental Noise*
- Queensland Department of Environment and Heritage Protection (now Department of Environment and Science) - *Noise Measurement Manual Version 4.01*

Unattended noise monitoring locations were selected to be representative of the nearest noise sensitive receivers and the proposed façade locations for the Project. The noise monitoring locations are shown in Figure 2.1.

A summary of the noise monitoring equipment used in this assessment is presented in Table 2.1. Calibration of the noise equipment was checked on site before and after the measurements to monitor any drift. No significant drift (+/- 0.5 dB) was noted across the measurement period.

Table 2.1 Noise monitoring equipment

EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CALIBRATION STATUS
Sound level meter (unattended)	Rion	NL-42	296509	Current
Sound level meter (unattended)	Rion	NL-42	296510	Current
Calibrator	Rion	NC-73	1218327	Current

Figure 2.1 Noise monitoring locations
(source: Google Earth, accessed 15 August 2022)

2.1 Meteorological conditions

Inclement weather conditions (rainfall above 0.2 mm/h or wind velocities above 5 m/s) were recorded during the measurement period at the nearest Bureau of Meteorology station located at Kangaroo Point, Brisbane (station ID 040913), 1.2 km to the south-west of the site.

Noise measurements were corrected in accordance with Australian Standard AS 1055:2018 to take the adverse effect of rain and corrected wind velocities into account.

The recorded rainfall and wind velocities across the measurement period are provided on the noise trace graphs presented in Appendix A.

2.2 Measurement results

The noise levels obtained are expressed in term of L_{Aeq}, L_{A90}, and rating background levels (RBL) measured in 15-minute intervals, where:

- L_{Aeq} is the energy average A-weighted noise level containing the same acoustic energy as the actual fluctuating noise level over the period.
- L_{A90} is the period average A-weighted noise level that is exceeded for 90% of the period and is commonly referred to as the background noise level.
- RBL is the 10th percentile L_{A90} which accounts for temporal variation of background noise levels and is used as the assessment background level.

A summary of the L_{Aeq}, L_{A90}, and RBL levels over the period measured on-site is provided in Table 2.2 and Table 2.3. All results are provided graphically in Appendix A.

Table 2.2 NM01 unattended noise measurements summary, dBA

DATE	DAY 7 AM – 6 PM			EVENING 6 PM – 10 PM			NIGHT 10 PM – 7 AM		
	L_{Aeq}	L_{A90}	RBL	L_{Aeq}	L_{A90}	RBL	L_{Aeq}	L_{A90}	RBL
18/08/2022	-	-	-	65	55	54	63	50	45
19/08/2022	65	58	56	67	56	54	64	52	50
20/08/2022	67	57	55	67	55	54	65	52	50
21/08/2022	66	55	53	65	52	50	64	49	45
22/08/2022	67	58	56	66	53	51	64	48	44
23/08/2022	67	58	56	-	-	-	-	-	-
Median	**67**	**58**	**56**	**66**	**55**	**54**	**64**	**50**	**45**

Table 2.3 NM02 unattended noise measurements summary, dBA

DATE	DAY 7 AM – 6 PM			EVENING 6 PM – 10 PM			NIGHT 10 PM – 7 AM		
	L_{Aeq}	L_{A90}	RBL	L_{Aeq}	L_{A90}	RBL	L_{Aeq}	L_{A90}	RBL
18/08/2022	-	-	-	62	53	52	60	50	47
19/08/2022	63	57	55	63	54	53	61	51	49
20/08/2022	64	56	53	63	53	53	61	51	50
21/08/2022	63	53	52	63	51	50	60	50	47
22/08/2022	65	56	54	62	52	50	60	49	46
23/08/2022	64	56	54	-	-	-	-	-	-
Median	**64**	**56**	**54**	**63**	**53**	**52**	**60**	**50**	**47**

3 Acoustic design criteria

The following sections provide an overview of the noise criteria applicable to the Project.

3.1 Transport noise ingress

Transport noise ingress has potential to cause disruption to residents within the buildings. Façade noise isolation is required such that noise from external factors is controlled to acceptable levels within the occupied spaces of the building. The following sections detail special category criteria for consideration.

3.1.1 Development Affected by Environmental Emissions from Transport Policy

Part of the site is located within a Brisbane Noise Corridor, as shown in Figure 3.1. However, it is noted that the exact locations of the proposed Project buildings do not fall within the corridor, and as such no special requirements for the building façade are applicable under this policy.

Figure 3.1 Noise Corridor - Brisbane
Source: Brisbane City Plan 2014, accessed 06 September 2023

The site is not located within a State-Controlled Road (SCR) or Railway Transport Noise Corridor (TNC), as shown in Figure 3.2. Therefore, no special requirements for the building façade are applicable under this policy.

Figure 3.2 Transport Noise Corridors (Road TNC: none shown on figure, Rail TNC: shown by purple contours) (Source: Brisbane City Plan 2014, accessed 06 September 2023)

3.1.2 *Aircraft noise*

The site is not located within an Aircraft Noise Exposure Forecast (ANEF) produced by Brisbane Airport, as shown in Figure 3.3. Therefore, no special aircraft noise requirements for development are triggered.

Figure 3.3 ANEF contours – Brisbane Airport
(Source: Brisbane City Plan 2014, accessed 06 September 2023)

3.2 Brisbane City Plan 2014

It is noted that the Bown Hills PDA Development Scheme does not provide noise criteria by which to assess development. As such, guidance has been deferred to key sections of the *Noise Impact Assessment Planning Scheme Policy* and *Multiple Dwelling Code* to assist in appropriately assessing noise for development in this instance.

A summary of the Performance Outcomes (PO) associated with noise control are presented in Table 3.1.

Table 3.1 Excerpts from Table 9.3.14.3.A of the Brisbane City Plan 2014 (Multiple Dwelling Code)

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO21 Development in a zone in the centre zones category or the Mixed use zone must: **a** be located, designed and constructed to protect bedrooms and other habitable rooms from exposure to noise arising from non-residential activities outside the building; **b** be designed and constructed to achieve a minimum reduction in sound pressure level between the exterior of the building and the bedrooms or indoor primary living areas of 30dBA.	**AO21** Development in a zone in the centre zones category or the Mixed use zone has a minimum acoustic performance of: **a** R_W 35 for glazing (windows and doors) where total area of glazing is greater than 1.8m^2; **b** R_W 32 for glazing (windows and doors) where total area of glazing is less than or equal to 1.8m^2.
PO22 Development that includes mechanical plant (including air-conditioning plant, heat pumps and swimming pool pumps) ensures it is located, designed and attenuated to achieve the following criteria: — $L_{Aeq,adj,T}$ emitted from mechanical plant is not greater than the rating background level plus 3 at a sensitive use not associated with the development. Note— Where T is — Day (7am to 6pm): 11hr, — Evening (6pm to 10pm): 4hr, — Night (10pm to 7am): 9hr.	**AO22** Development ensures mechanical plant is acoustically screened from nearby sensitive uses.
PO32 Development provides refuse and recycling collection and storage facilities that: **a** are located conveniently in an unobtrusive dedicated storage room or separate screened structure; **b** are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised; **c** provide for refuse and recycling including source separation; **d** are of a design that allows low-frequency service collection; **e** minimise ongoing building management cost for occupants.	**AO32** Development provides refuse and recycling collection and storage facilities, including source separation, in accordance with the Refuse planning scheme policy. (Section 4.2 (13)(c) of the Refuse planning scheme policy states that "The storage areas for bulk bins are screened from neighbouring properties for odour, amenity and noise.")

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO34 Development where not in a zone in the centre zones category or the Mixed use zone, provides car parking that is sited and of a bulk and form that: **a** does not dominate the street frontage of the development; **b** does not impact on the safety and efficiency of the road networks; **c** does not detract from the quality of adjoining streetscape or public spaces; **d** is safe and convenient for residents, visitors and service providers; **e** does not negatively impact on the amenity of adjoining residents by way of noise, odour or light having regard to: **i** the proximity of dwelling houses or existing multiple dwellings on adjoining sites; **ii** the scale and detail of any parking structure walls when viewed from the street and adjoining properties; **iii** setback distances to mitigate impacts; **iv** the location of active frontages and public spaces.	**AO34.1** Development where not in a zone in the centre zones category or the Mixed use zone, provides car parking that is: **a** located: **i** below ground; or **ii** at ground level or above ground level only if contained within the development footprint and located behind the main building line, except where for visitor parking; **iii** set back from front, rear and side boundaries in accordance with a neighbourhood plan or if no neighbourhood plan applies or no requirements are specified in a neighbourhood plan, Table 9.3.14.3.E; **iv** landscaped and screened from view of the street, other public areas and adjoining properties; **v** not in conflict with required vehicle queuing distances.
PO35 Development where not in a zone in the centre zones category or the Mixed use zone, ensures that car parking, hardstand or manoeuvring areas are: **a** located to minimise noise and fumes disturbance on residents within and adjoining the site; **b** acoustically and visually screened to: **i** minimise the reflection of headlights into dwelling windows;	**AO35.1** Development where not in a zone in the centre zones category or the Mixed use zone, ensures that a hardstand or manoeuvring area situated at or above ground level is: **a** located a minimum of 3 metres vertically and horizontally from any habitable window on site to minimise noise disturbance on residents; **b** screened to prevent the reflection of car headlights onto dwelling windows adjoining or opposite the site.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
ii attenuate noise impacts; c landscaped to: i soften the visual appearance of at grade hardstand areas; ii enhance pedestrian safety; iii improve visual amenity for the streetscape and urban area; iv provide shade for pedestrians and reduce the impact of glare and radiant heat from car parking areas.	**AO35.2** Development where not in a zone in the centre zones category or the Mixed use zone ensures any vehicle movement or vehicle parking areas along the side or rear boundary are: a acoustically screened from adjoining dwellings to a minimum height of 1.8m; b provided with a vegetated buffer next to any movement or parking areas: i a minimum of 1m wide along the side boundary; ii a minimum of 2m wide along the rear boundary; iii planted at a pot size and density sufficient to screen up to 1.5m above ground level at establishment.
PO37 Development provides fencing and retaining walls that must: a facilitate casual surveillance of the street and public space; b enable use of private open space; c assist in highlighting entrances to the property; d provide a positive interface to the streetscape; e protect the privacy and amenity for residents and dwellings adjoining the site.	**AO37.1** Development ensures that, where fencing is provided: a along any common boundary to a street or public space, it is a maximum of: i 1.2m in height, where fence construction is solid or less than 50% transparent; ii 1.5m in height, where fence construction is at least 50% transparent; iii 1.8m in height and solid only where setback behind landscaping and the site is on an arterial road; b along any side or rear boundary, it is a minimum of 1.8m in height, except where forward of the main building line; c along any side boundary, where forward of the main building line to the front boundary, it is: i a maximum of 1.2m in height, where fence construction is solid or less than 50% transparent; or ii a maximum of 1.5m in height, where fence construction is at least 50% transparent.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
	AO37.2 Development incorporating solid front fences or walls that front the street or other public spaces 1.2m or more high and longer than 10m, indentations, material variation and landscaping is provided to add visual interest and soften the visual impact.

Each of the PO listed in Table 3.1 are discussed in Section 4.

Based on the noise monitoring described in Section 2, the applicable criteria for assessing PO22 are provided in Table 3.2.

Table 3.2 Mechanical plant noise emission limits for assessing PO22

SOURCE	DESCRIPTOR	TIME PERIOD		
		DAY 7 AM – 6 PM	EVENING 6 PM – 10 PM	NIGHT 10 PM – 7 AM
Mechanical plant	$L_{Aeq,adj,T}$	59 dBA	57 dBA	50 dBA

4 Noise assessment

4.1 Noise ingress (PO21)

The requirements of PO21 only apply to developments located in a zone in the *Centre Zones* category or the *Mixed-Use Zone*. As such, a noise ingress assessment is not considered required as part of this noise impact assessment.

4.2 Building services (PO22)

At the time of this report, the building services design approach and equipment selections for the proposed building are yet to be identified. Care will need to be taken in selection of new mechanical and electrical equipment as residential receivers are noted near the development site (refer Section 1.4). This is mainly applicable to mechanical plant to be installed and/or discharged externally (e.g. rooftop plant, etc.).

This report provides basic advice to help guide the design and selection of the mechanical services. As the design progresses, the mechanical services design will be assessed against the applicable criteria outlined in this report to ensure the final design meets the acoustic requirements.

Building services noise due plant is typically tonal and continuous. There are three main ways of controlling the noise emissions from external plant (in order of preference for effectiveness):

- equipment selection
- equipment-specific attenuation (e.g. acoustic attenuators on fan outlets / inlets)
- enclosures and screening.

To comply with the applicable noise emissions criteria, the combined noise emissions from all plant will need to be controlled such that they do not exceed the limits specified in Table 3.1 (Section 3).

It is expected that these limits can reasonably be complied with.

4.3 Refuse and recycling (PO32)

The proposed development includes Bin Stores within the Lower Ground areas. It is understood that waste collection will be conducted at the front curb side along Water Street. This is considered to fulfil the requirements of *SC6.26 Refuse planning scheme policy*.

An assessment of the refuse and recycling storage and collection processes is therefore considered not required as part of this noise impact assessment.

4.4 Car park noise emissions (PO34 and PO35)

The proposed development includes car parking areas for both residents and visitors across four basement levels and the Lower Ground of the development. As the basement levels are underground and the Lower Ground carpark is enclosed, the design is considered to fulfil the requirements of AO34.1(a). The entrance to the carpark is acoustically shielded by the building's facade as well as the Level 2 floor slab overhead. This is considered to fulfil the requirements of AO35.1(a) and AO35.2(b).

An assessment of the car park noise emissions is therefore considered not required as part of this noise impact assessment.

4.5 Fencing to adjoining properties (PO37)

A masonry wall greater than 1.8 metres is proposed along the boundary to the neighbouring Oxford Towers at 338-340 Water Street.

This is considered to fulfil the requirements of AO37(a).

5 Conclusion

WSP prepared a noise impact assessment to be included in the Development Application for a proposed development at 332-334 Water Street, Fortitude Valley. The Project comprises two 31-storey mixed use buildings (primarily residential), each with four basement carpark levels and a rooftop.

As the Bown Hills PDA Development Scheme does not provide noise criteria by which to assess development, guidance has been deferred to key sections of the *Noise Impact Assessment Planning Scheme Policy* and *Multiple Dwelling Code* (*Brisbane City Plan 2014*) to assist in appropriately assessing noise for the development. In most instances, the design was shown to achieve the necessary acceptable outcomes presented in the Code.

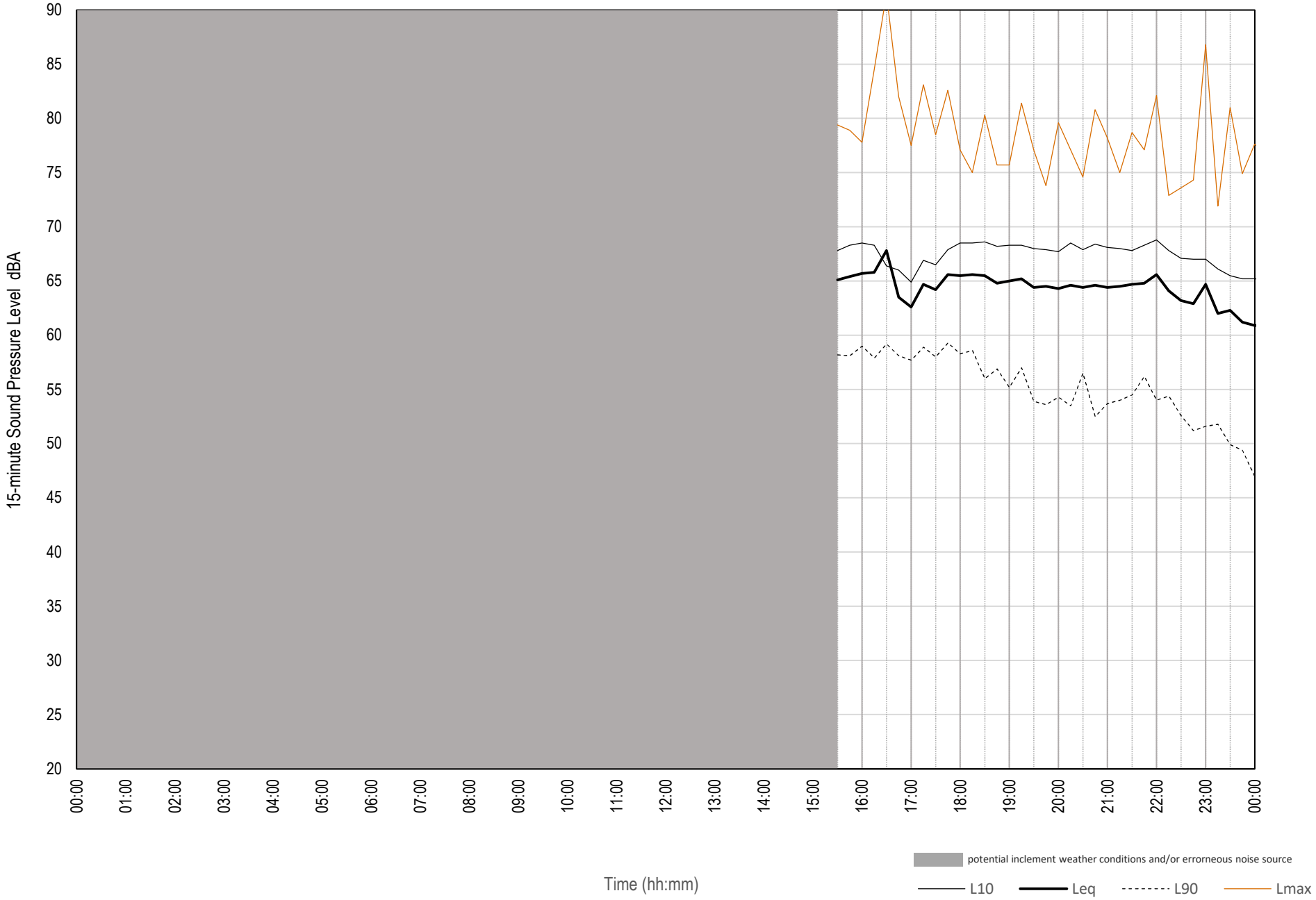
The fulfillment of AO22 requires all mechanical plant noise emissions to meet the limits established in this report (refer Table 3.2). At the time of this report, the exact locations and types of any mechanical and electrical equipment have not been finalised. Preliminary advice has been provided for the control of building services noise emissions. It is expected that noise emissions can reasonably comply with the established project noise limits.

Appendix A

Unattended monitoring results

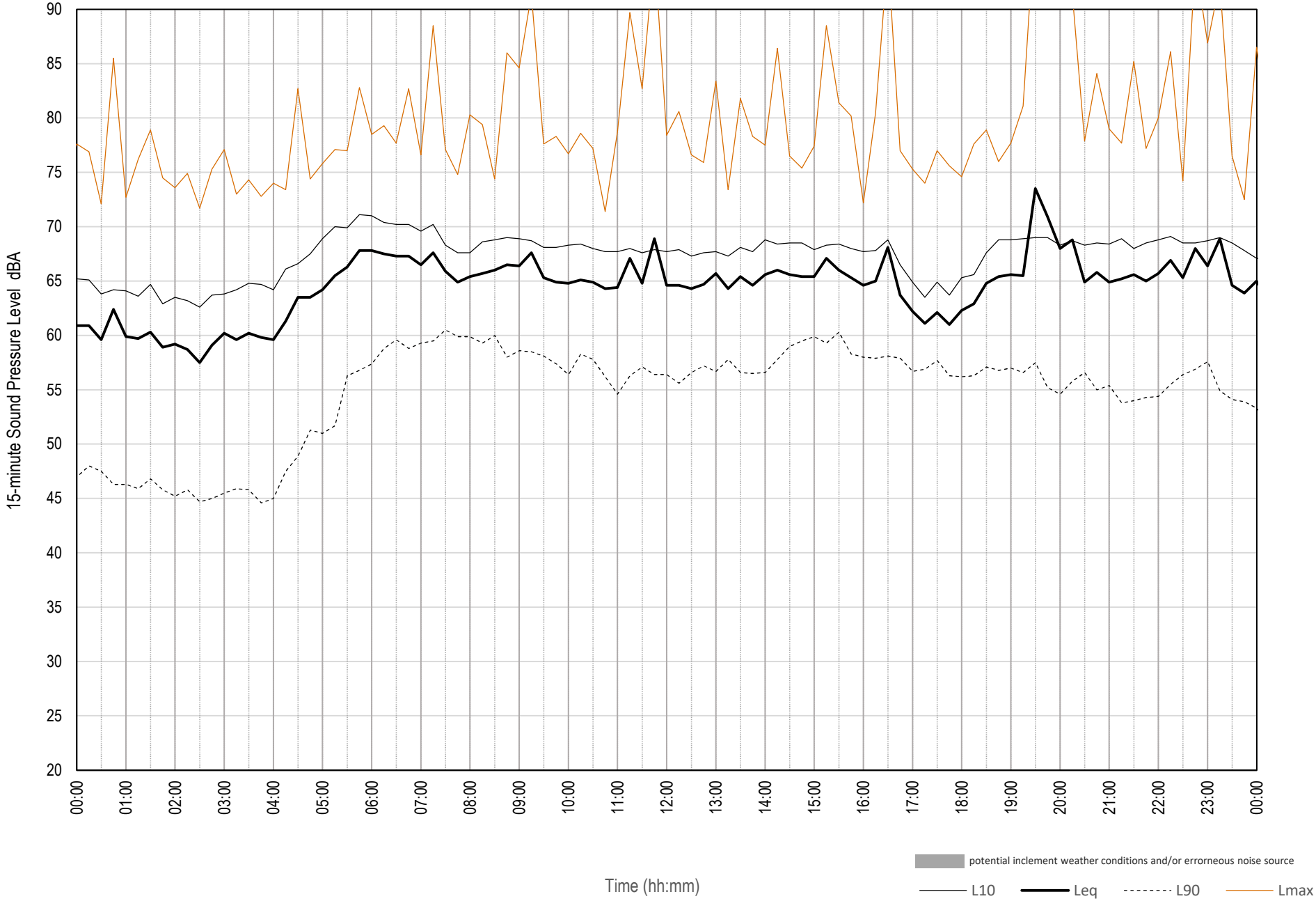
Measured Noise Levels -

Thursday, 18 August 2022



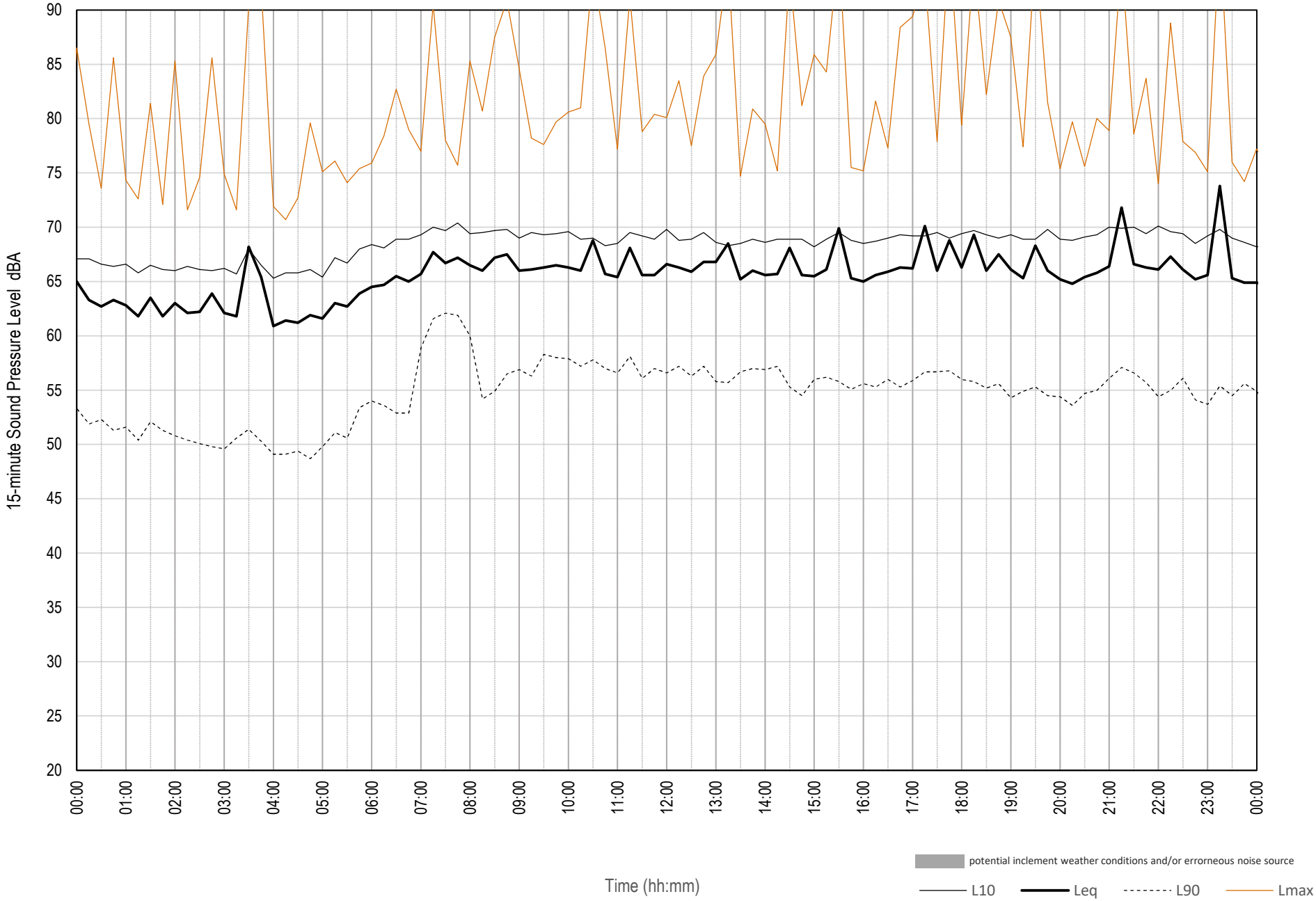
Measured Noise Levels -

Friday, 19 August 2022



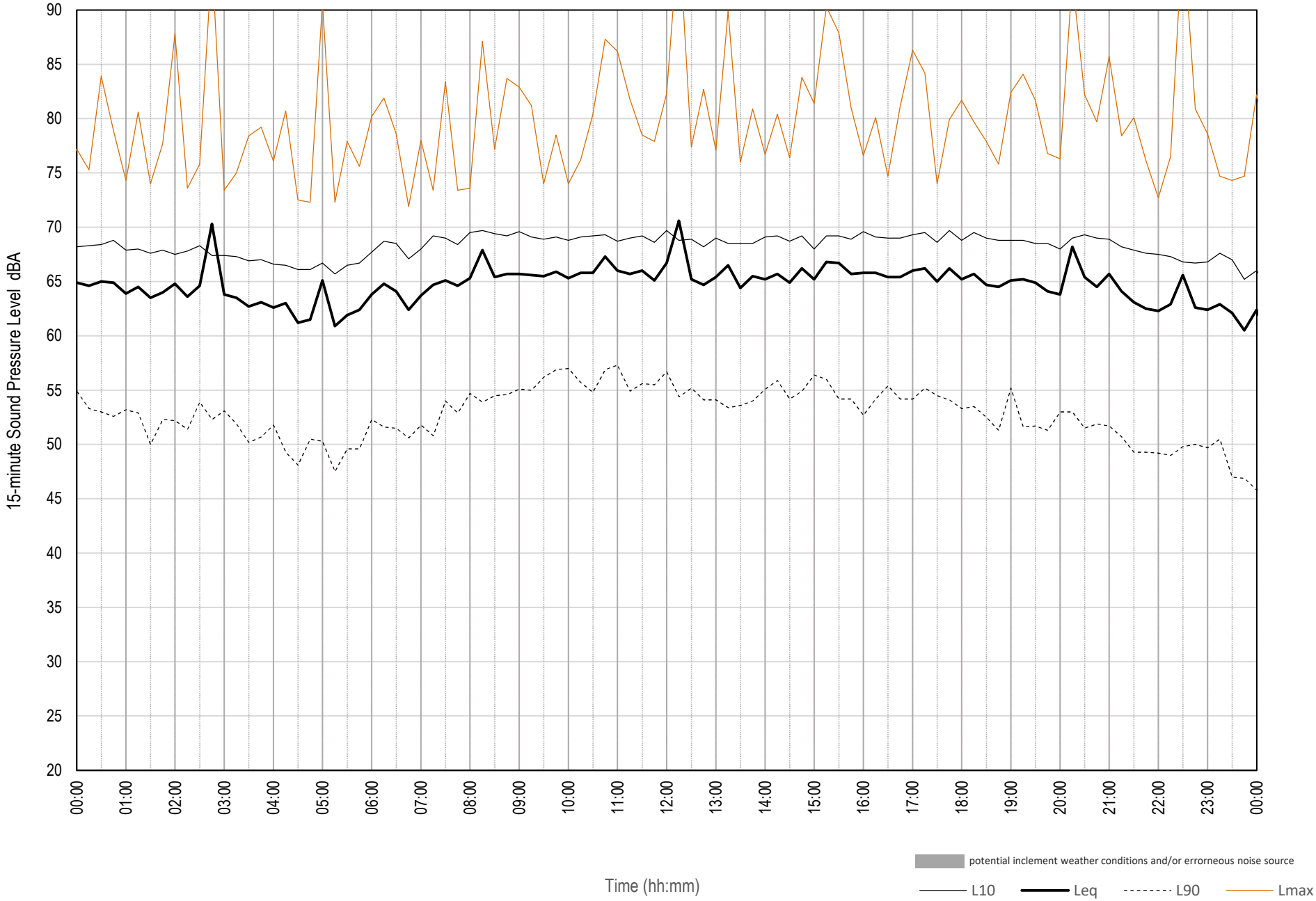
Measured Noise Levels -

Saturday, 20 August 2022



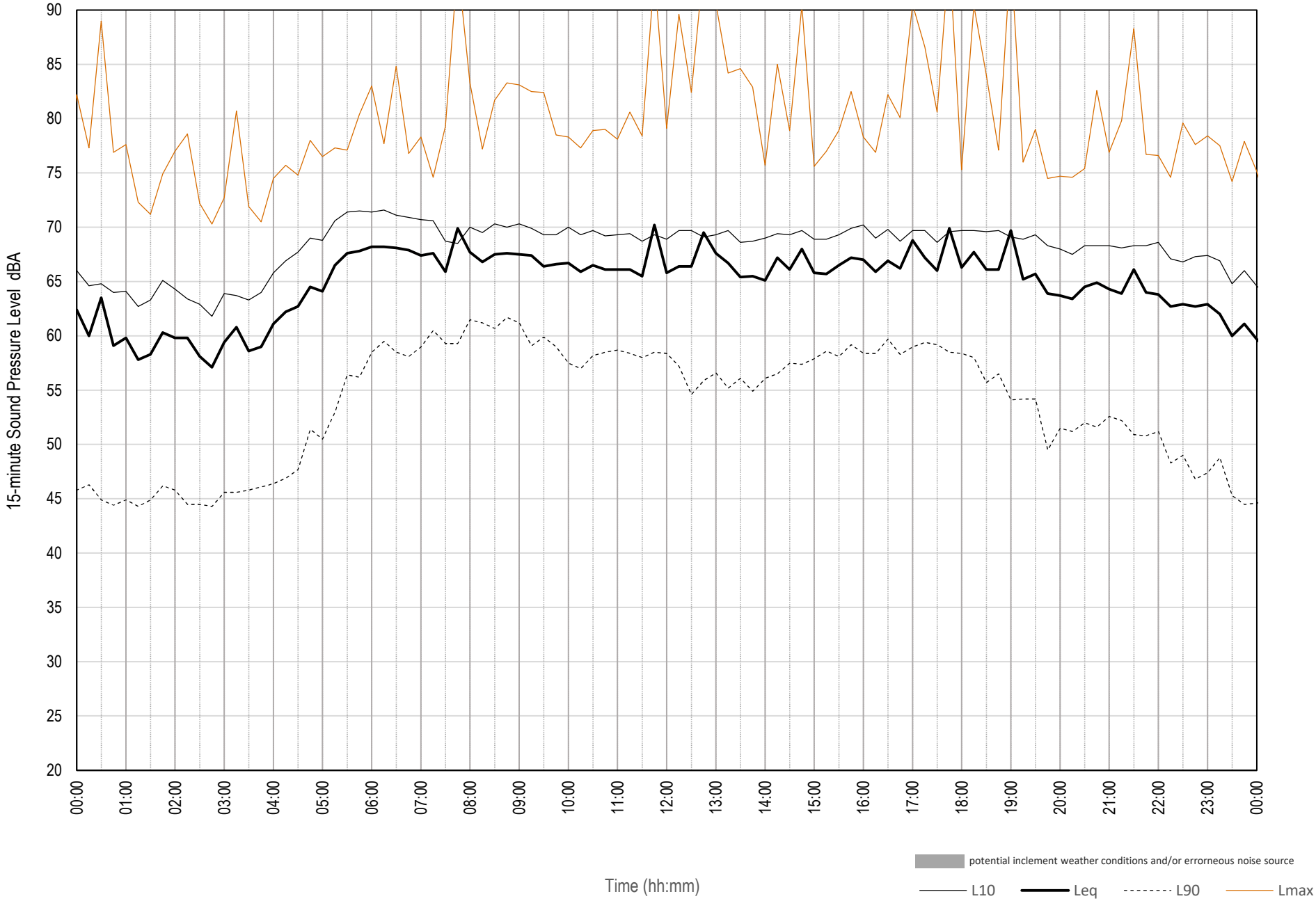
Measured Noise Levels -

Sunday, 21 August 2022



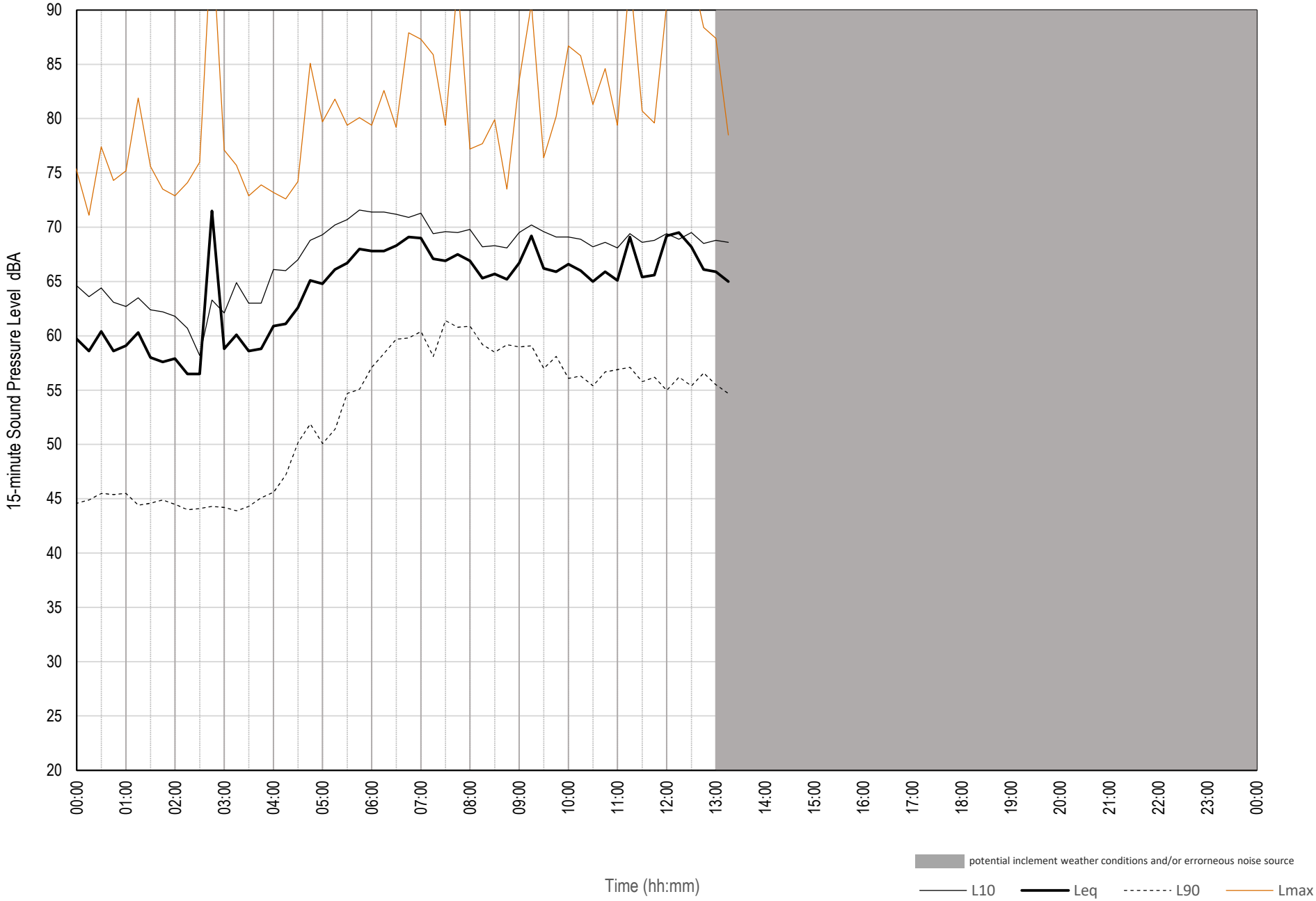
Measured Noise Levels -

Monday, 22 August 2022



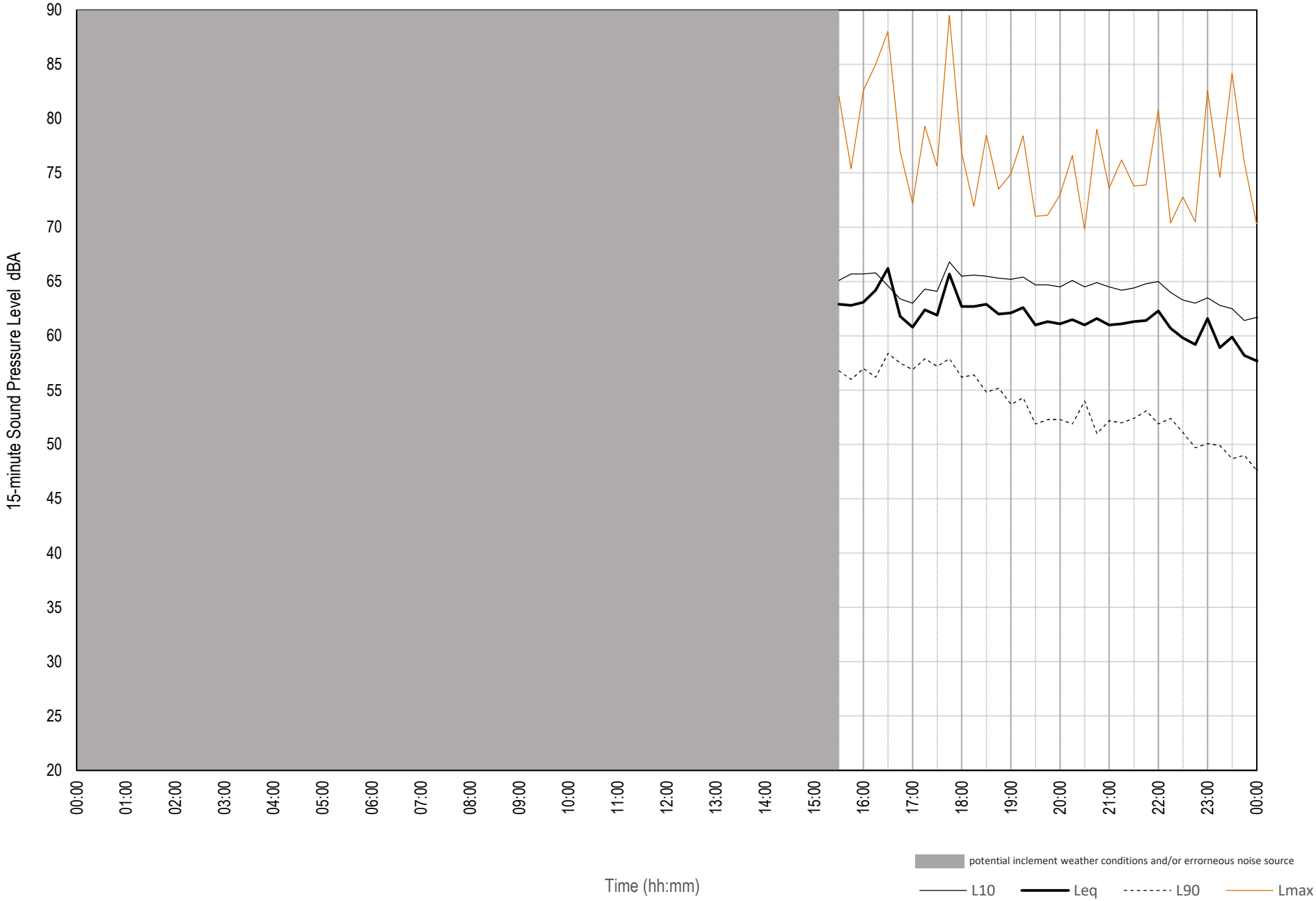
Measured Noise Levels -

Tuesday, 23 August 2022



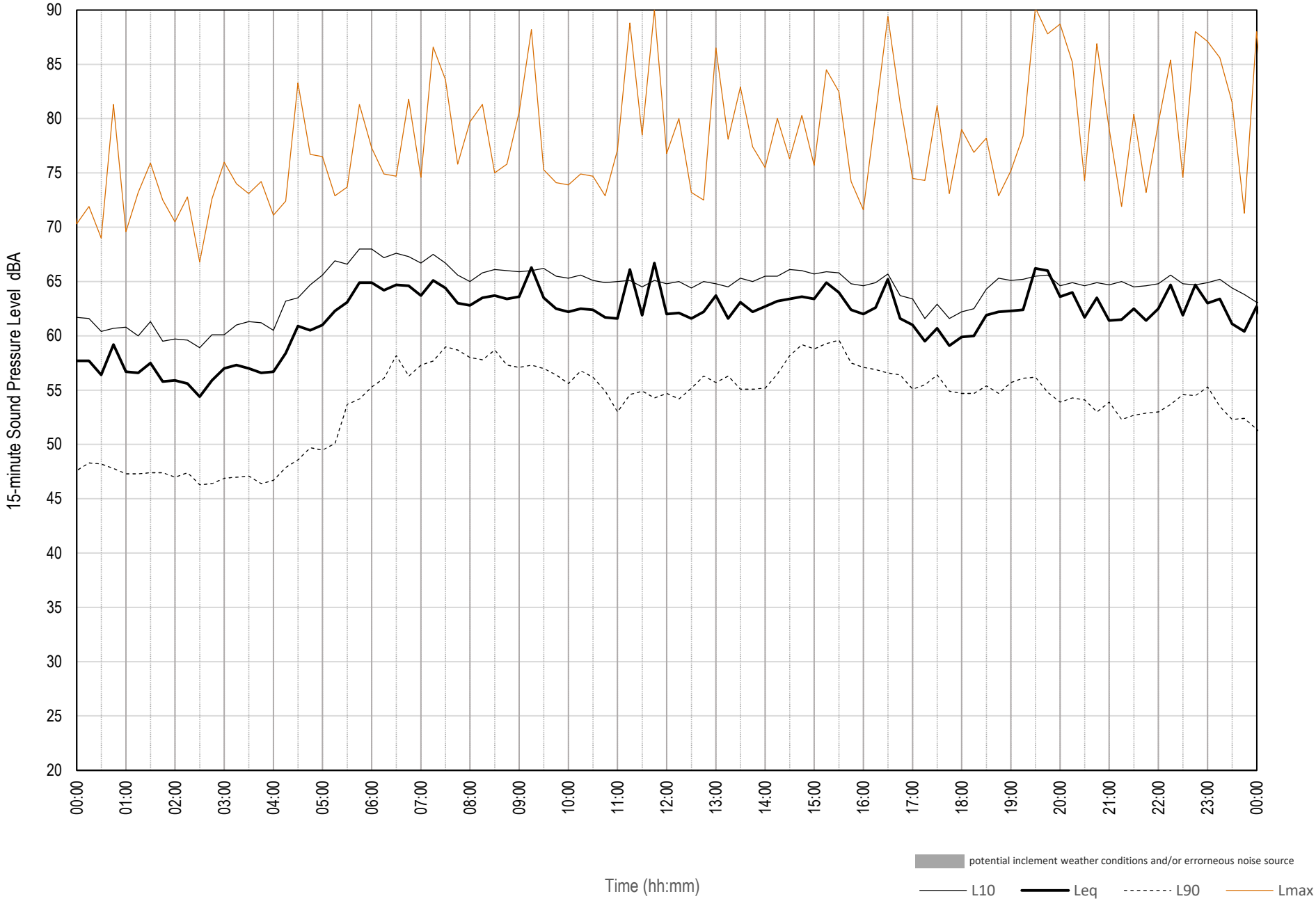
Measured Noise Levels -

Thursday, 18 August 2022



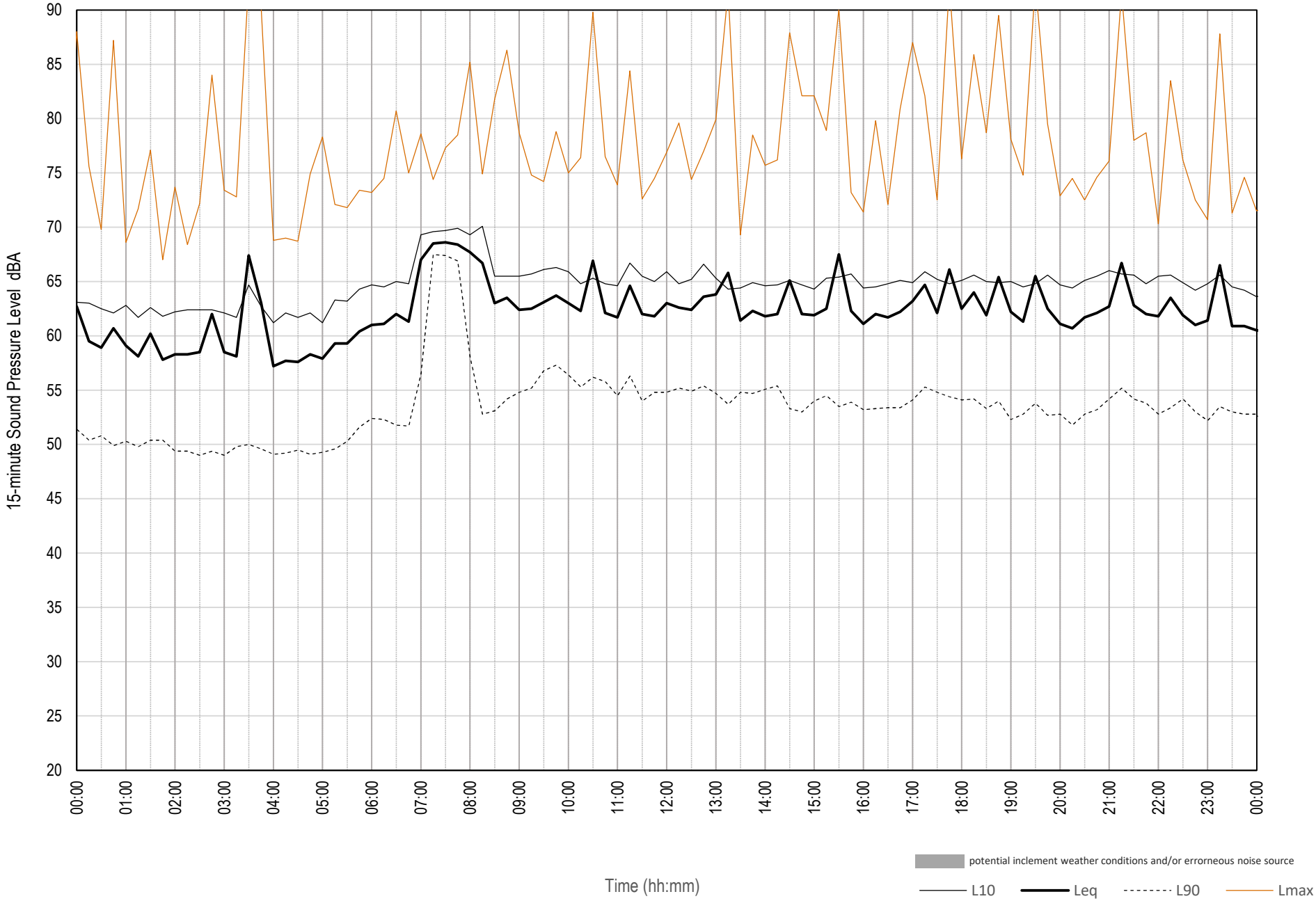
Measured Noise Levels -

Friday, 19 August 2022



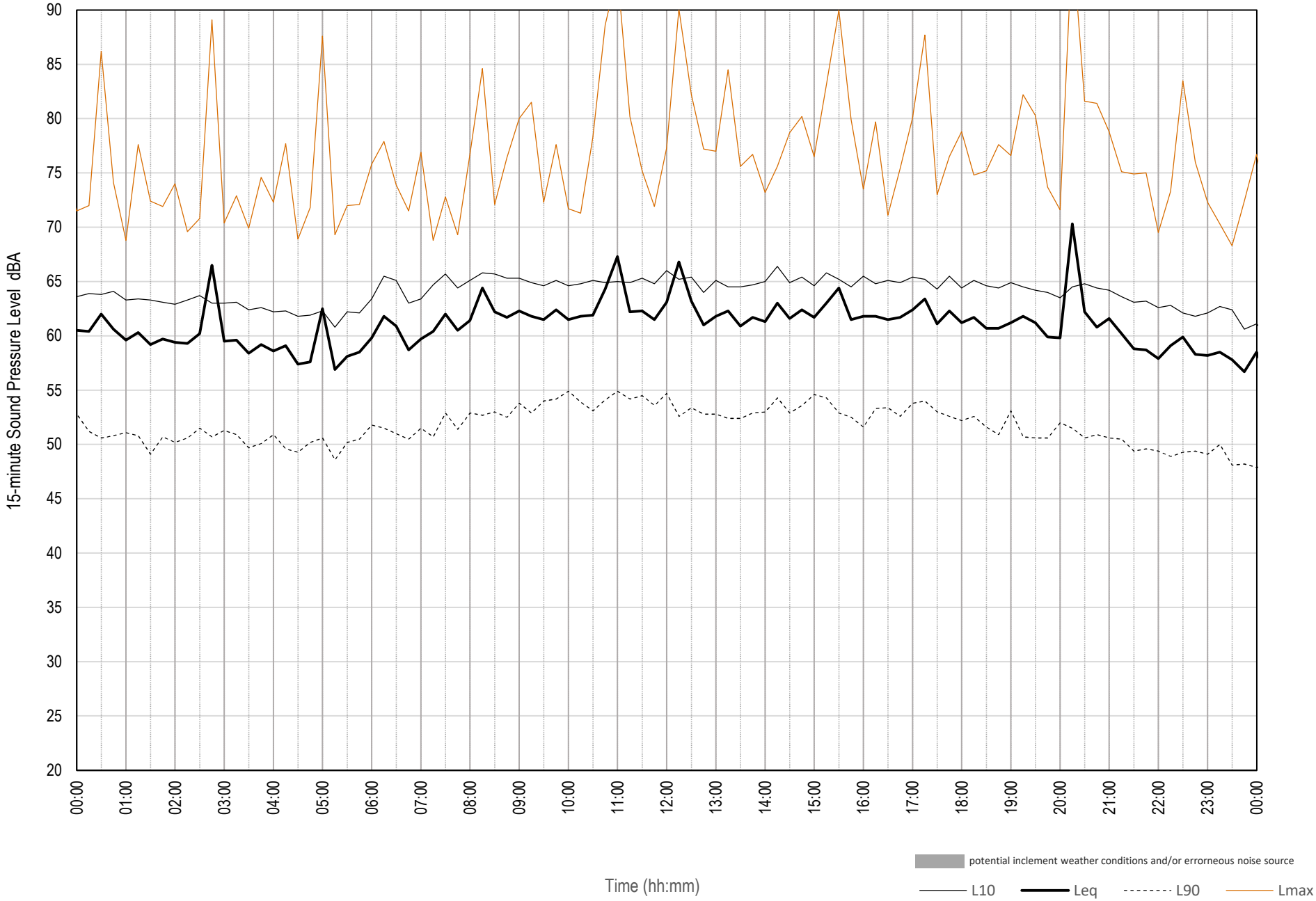
Measured Noise Levels -

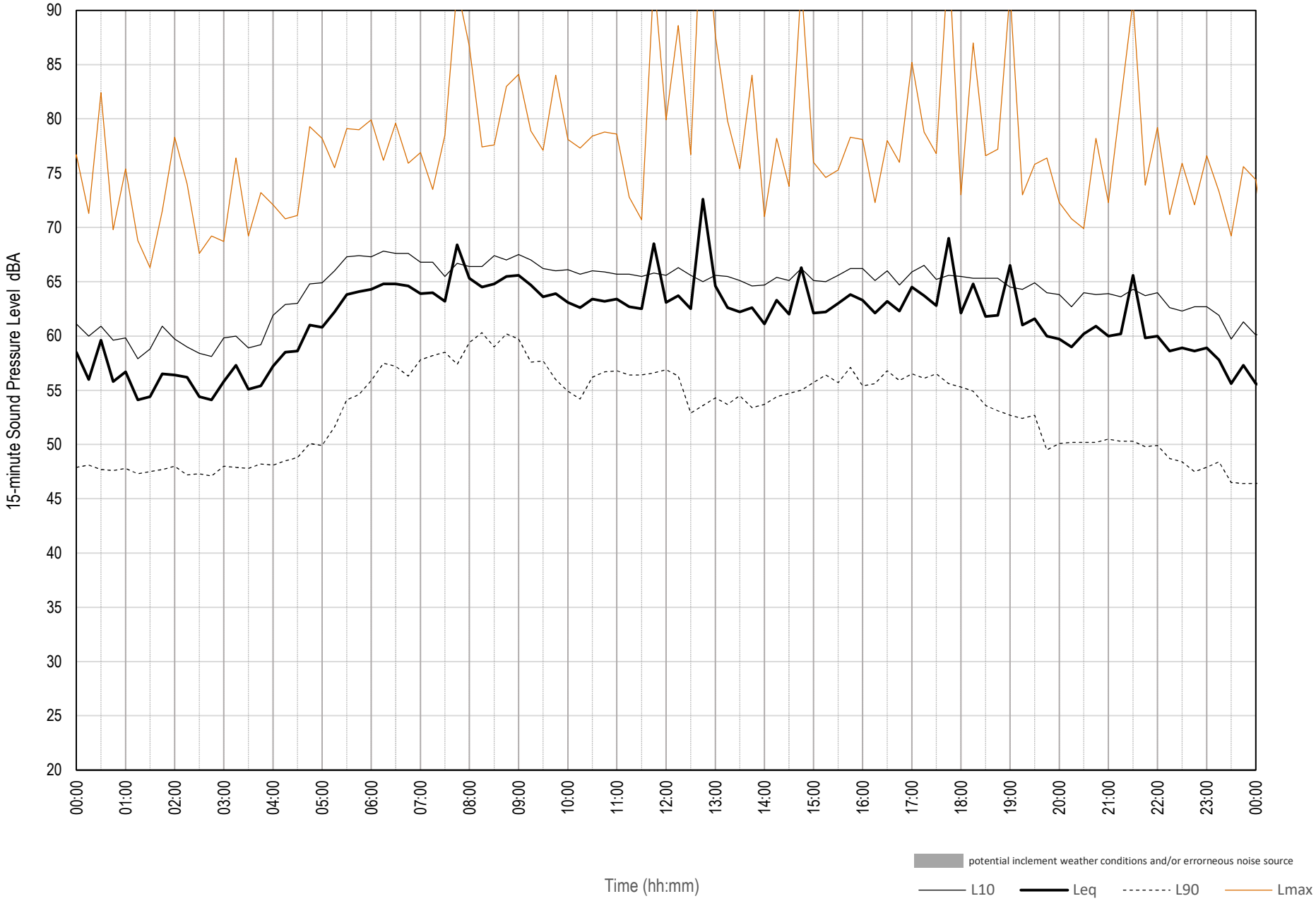
Saturday, 20 August 2022



Measured Noise Levels -

Sunday, 21 August 2022




15-minute Sound Pressure Level dBA
90
85
80
75
70
65
60
55
50
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40
35
30
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20
00:00
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Time (hh:mm)
potential inclement weather conditions and/or errorneous noise source
L10
Leq
L90
Lmax

Measured Noise Levels -

Tuesday, 23 August 2022