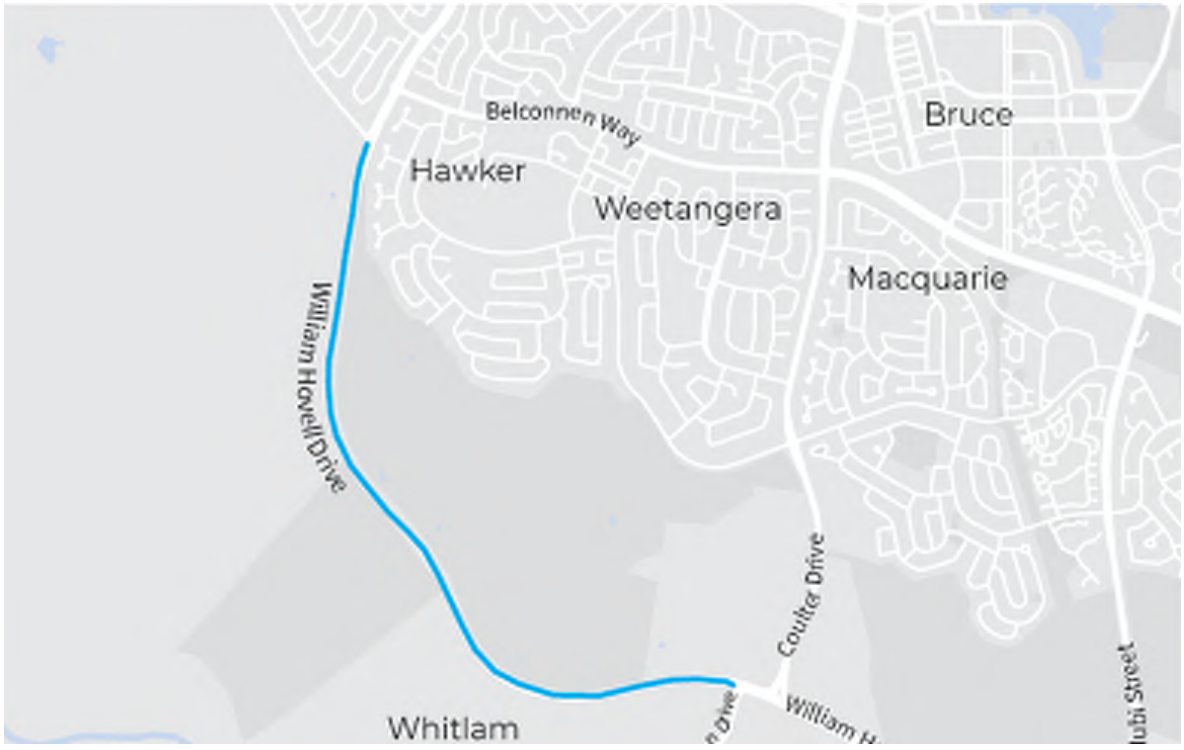
Major Projects Canberra

William Hovell Drive Duplication

Operational Road Traffic Noise Assessment



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Operational Road Traffic Noise Assessment

Major Projects Canberra

WSP
Level 2, 121 Marcus Clarke Street
Canberra ACT 2601
PO Box 1551
Canberra ACT 2600

Tel: +61 2 6201 9600
Fax: +61 2 6201 9666
wsp.com

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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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Glossary

dBA or 'A' Frequency Weighting	The 'A' frequency weighting roughly approximates to the Fletcher-Munson 40 phon equal loudness contour. The human loudness perception at various frequencies and sound pressure levels is equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). Humans are most sensitive to midrange frequency sounds, such as a child's scream. Sound level meters have inbuilt frequency weighting networks that very roughly approximates the human loudness response at low sound levels. It should be noted that the human loudness response is not the same as the human annoyance response to sound. Here low frequency sounds can be more annoying than midrange frequency sounds even at very low loudness levels.
Ambient Noise	The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. Ambient Noise is usually assessed as an energy average over a set time period 'T' ($L_{Aeq,\ T}$).
Equivalent Continuous Sound Level, L_{Aeq}	Many sounds, such as road traffic noise or construction noise, vary repeatedly in level over a period of time. More sophisticated sound level meters have an integrating/averaging electronic device inbuilt, which will display the energy time-average (equivalent continuous sound level - L_{Aeq}) of the 'A' frequency weighted sound pressure level. Because the decibel scale is a logarithmic ratio, the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.
Free Field	In acoustics, a free field is a measurement area not subject to significant reflection of acoustical energy. A free field measurement is typically not closer than 3.5 metres to any large flat object (other than the ground) such as a fence or wall or inside an anechoic chamber.
Typical human Response to Noise Level Changes	— Level difference is described in dB (e.g. difference between 65 dBA and 63 dBA is 2 dB) — Less than 2 dB = No perceivable difference — Up to 3 dB = Barely perceptible difference — 5 dB = Readily perceptible difference 10 dB = 'Doubling' (or 'halving') of noise level
Sound Pressure Level (L_P)	The level of sound measured on a sound level meter and expressed in decibels (dB). Where $L_P = 10 \log_{10} [P_a/P_0]^2$ dB (or $20 \log_{10} [P_a/ P_0]$ dB) where P_a is the root mean square sound pressure in Pascal and P_0 is a reference sound pressure conventionally chosen is 20 µPa (20×10^{-6} Pa) for airborne sound. L_P varies with distance from a noise source.
L_{10}	The noise level exceeded for 10% of the measurement period. This is typically used to describe the average maximum noise level.
$L_{10,\ 1\text{-hour}}$	Noise level exceeded for 10% of the time over a period of one hour.
$L_{10,\ 18\text{-hour}}$	Arithmetic average of the values of $L_{10,\ 1\text{-hour}}$ for each of eighteen one-hour periods between 6.00 am and 12.00 am.

Executive summary

This report summarises the results and findings of a road traffic noise assessment conducted in February to March 2022 for the proposed road upgrade of William Hovell Drive (the project). The project consists of the duplication of William Hovell Drive between Drake Brockman Drive and John Gorton Drive to allow for two lanes in each direction.

The project is an existing arterial road located in a mix of rural (NUZ3 zones) and suburban (RZ zones) land use types. Noise sensitive receivers potentially impacted by the project consist of medium density residential uses located to the north of the project area in Hawker, and to the south of the project area in a new residential development known as the Whitlam development.

The applicable noise criteria for the project is established based on planning guidelines outlined in the *Roads ACT Noise Management Guidelines* (2018) (NMG). The project is classified as "Upgrading Existing Roads in Existing Areas" for the residences in Hawker and "New Developments on Existing Roads" for the Whitlam Development. The relevant guideline levels are summarised as:

Table ES.1 Traffic noise levels resulting from upgraded roads in existing areas of noise sensitive land use, expressed as L_{Aeq} dB(A) Daytime, Ground Level

Existing traffic noise level at adjacent buildings[1]	**Traffic noise level at adjacent buildings after road works completed**
>60	Equal to existing level (not greater than 65)
55 – 60	60
<55	Not more than 5 dB(A) above existing level

Table ES.2 Maximum external traffic noise level(Target level) at the development, expressed as L_{Aeq} dB(A)

Land uses	**Target noise level**
Residential and community facilities daytime $L_{Aeq\ (15\ hour)}$ dB(A)	60
Residential Nighttime $L_{Aeq\ (9\ hour)}$ dB(A)	55
Commercial facilities	72

A road traffic noise prediction model was created using the SoundPLAN software package (version 8.2) implementing the Calculation of Road Traffic Noise (CoRTN, UK Department of Transport, 1988) method. The model is used to predict road traffic noise generated by the assessed roads within the study area for the following scenarios.

- Year 2022, measurement year, for current road traffic noise prediction and model validation. (supported by noise monitoring and concurrent traffic classification counts at three locations in February 2022)
- Year 2031, 'built' scenario referring to assessment scenario when the project is constructed and operational, for predicted horizon noise levels to be used for mitigation specification
- Year 2031, 'no built' scenario referring to the assessment year without the project but with the existing roads only.

Contribution of road traffic noise levels from William Hovell Drive are predicted to exceed the relevant noise criteria at up to 74 residential noise sensitive receivers as follows:

- Five receivers at Florina Place (up to 4 dB)
- One receiver at Kurundi Place (by 3 dB)
- Three receivers at Mainoru Place (up to 1 dB)

- One receiver west of the alignment (opposite Florina Place) (by 1 dB)
- 64 receivers in the Whitlam Estate (up to 4 dB). It is however noted that during planning stages of the Whitlam Estate, provision of noise mitigation is regarded as the responsibility of future house developers.

The NMG outlines the following methods that may be considered for the mitigation of road traffic noise where levels greater than the recommended maximum levels are predicted:

- Quieter road pavement
  - The use of low noise pavement (for example low noise stone mastic asphalt, open graded asphalt) is expected to provide a reduction of up to approximately 4 to 5dB in generated levels of road noise as compared to the modelled combination of surface types (open graded asphalt compared to chip seal). In consideration of the receivers exceeding the recommended maximum road noise levels, an approximate 750m length of low noise pavement, south of Drake Brockman Drive may prove to be an effective form of noise mitigation for all exceeding receivers. Where feasible and reasonable, such provision is also recommended considered for the southern section near Whitlam.
- Reduced speed limits
  - A reduction in speed limit is another effective form of noise mitigation. A reduction of 20km/hr (from 90km/hr to 70km/hr) would provide an approximate 1.5 – 2.0 dB reduction in generated road noise. In isolation, this mitigation measure would be an effective form of noise mitigation at road areas adjacent to Mainoru Place and west of the alignment.
- Noise barriers
  - To be effective, any noise barrier would need to extend along the eastern side of the project alignment, from north of the Drake Brockman Drive intersection to south of Mainoru Place. However, where other forms of noise mitigation are adopted for impacted properties on Mainoru Place, the barriers southern extent may be reduced to The Bicentennial Trail bridge. It is noted that any barrier would be most effective if built along the top of the existing noise bund in this area. It is however noted that noise barriers are commonly not considered feasible and reasonable for noise reductions of less than 5 dB.
    It is noted that noise barriers were previously considered as part of Whitlam's EDP. This strategy was largely considered to be not feasible and/or reasonable for Whitlam.
- Acoustic treatment of residential buildings.
  - Following the consideration of all reasonable and feasible mitigation measures outlined above, where exceedances are still considered likely, architectural acoustic treatment may be considered for potentially impacted properties per allowance in the NMG.

Notwithstanding the above, the NMG also states that the following issues should be considered before finalising any noise mitigation measures:

- Technical feasibility
- Visual impact
- Community preference
- Cost
- Effectiveness.

1 Introduction

1.1 Project description

WSP Australia Pty Ltd (WSP) has been engaged by Major Projects Canberra to prepare a road traffic noise assessment for the proposed road upgrade of William Hovell Drive (the project).

The project consists of the duplication of William Hovell Drive between Drake Brockman Drive and John Gorton Drive to allow for two lanes in each direction. The intersection between William Hovell Drive and Drake Brockman Drive/Kingsford Smith Drive will also be upgraded from a round-a-bout to a traffic light-controlled intersection, with two lanes in each direction.

The proposed road upgrade is presented in Figure 2.1.

1.2 Purpose of this report

This report details the road traffic noise assessment prepared for the project.

The purposes of this report are to:

- identify the relevant criteria applicable to the proposed upgrade,
- identify the needs for noise mitigation measures to be implemented to control impacts associated with the proposed upgrade,
- describe and detail the noise mitigation measures to demonstrate compliance with the relevant legislation.

2 Existing environment

2.1 Noise sensitive receivers

The project is an existing arterial road located in a mix of rural (NUZ3 zones) and suburban (RZ zones) land use types.

Noise sensitive receivers potentially impacted by the project consist of medium density residential uses located to the north of the project area in Hawker, and to the south of the project area in a new residential development known as the Whitlam development.

The residential noise sensitive receivers are mostly single storey dwellings, with occasional double storey dwellings.

An overview of the existing William Hovell Drive and the residential noise sensitive receivers is presented in Figure 2.1.

It should be noted that the building footprints adopted for the Whitlam subdivision are based on noise modelling and assessment conducted as part of the Estate Development Plan (EDP) of the subdivision for Suburban Land Agency. It is noted that the approved EDP for the subdivision accepted that future houses having direct frontage to William Hovell Drive would exceed the relevant external road noise guideline levels (Section 3). These land blocks are identified as 'noise affected' in the Whitlam Precinct Map and Code and that noise mitigation shall be considered in the build form of these houses. The build form of these most-affected houses will also be relied upon to provide noise shielding for subsequent rows of houses to allow those to comply with the relevant external guideline levels.

Note: Existing road alignments (Kingsford Smith Drive, Drake Brockman Drive, William Hovell Drive east of John Gorton Drive) covering approximately 500m from the ends of the project design alignment also included in the noise assessment but not shown here

Figure 2.1 Study area, monitoring locations and residential noise sensitive receivers

2.2 Background noise monitoring

This section describes the noise monitoring carried out to determine the existing road traffic noise levels in the study area.

2.2.1 Unattended noise monitoring methodology

Unattended noise measurements were recorded between 8 and 23 February 2022 to quantify the existing road traffic noise levels and support the validation of the developed road traffic noise prediction model. The noise monitoring was carried out in accordance with *Australian Standard AS 1055:2018 Acoustics, Description and Measurement of Environmental Noise (Standards Australia, 2018)* and *Australian Standard AS 2702:1984 Acoustics – Methods for the Measurement of Road Traffic Noise (Standards Australia, 1984).*

Table 2.1 presents the noise monitoring equipment used onsite, with the monitoring locations shown in Figure 2.1. Noise loggers were installed with microphone height at 1.5 metres and for the two properties in Hawker, at a distance of 1 metre from the most exposed building facade.

Table 2.1 Noise monitoring equipment – Unattended monitoring

Location	Address	Manufacturer and model	Serial number	Start date	Completion date
1	13 Florina Place, Hawker	Ngara S-Pack	878179	08/02/2022 6:30 pm	23/02/2022 2:30 pm
2	16 Mainoru Place, Hawker	Ngara S-Pack	87802C	08/02/2022 7:00 pm	23/02/2022 3:00 pm
3	Whitlam Development	ARL EL-316	16-207-008	08/02/2022 7:30 pm	23/02/2022 3:30 pm

2.2.2 Equipment calibration

Calibration of the noise monitoring equipment was carried out on-site before and after the measurements. No significant drifts in calibration (± 0.5 dB) were noted.

The noise monitoring equipment, including sound level meters and acoustic calibrators, carried current NATA laboratory certification. A copy of these certificates can be provided upon request.

2.2.3 Meteorological conditions and other extraneous noise sources

Meteorological conditions during the monitoring period were obtained from the Canberra Airport weather station located approximately 17 km east of the study area.

A summary of adverse weather events is presented in Table 2.2. Adverse weather conditions during the monitoring period are shown on the noise charts presented in Appendix A.

Noise monitoring data was excluded during periods of weather that adversely affected the monitoring data, specifically where wind speeds were greater than 5 m/s and during periods recording any rainfall.

In addition, the noise logging data at Whitlam on certain days was observed to be affected by extraneous noise sources (possible construction noise) that are most likely unrelated to road traffic noise. These noise events were also excluded from processing.

Table 2.2 Adverse weather periods

Adverse weather type	Start time	End time
Rainfall	08/02/22 8:00 pm	08/02/22 10:00 pm
High wind speeds	09/02/22 12:30 pm	09/02/22 1:00 pm

Adverse weather type	Start time	End time
High wind speeds	09/02/22 1:30 pm	09/02/22 3:00 pm
High wind speeds	10/02/22 2:00 pm	10/02/22 3:30 pm
High wind speeds	10/02/22 6:30 pm	10/02/22 7:30 pm
Rainfall	11/02/22 8:30 am	11/02/22 9:00 am
High wind speeds	11/02/22 3:30 pm	11/02/22 7:00 pm
High wind speeds	12/02/22 2:30 pm	12/02/22 3:00 pm
High wind speeds	12/02/22 4:30 pm	12/02/22 7:00 pm
High wind speeds	12/02/22 7:30 pm	12/02/22 9:00 pm
High wind speeds	17/02/22 11:00 am	17/02/22 11:30 am
High wind speeds	17/02/22 4:30 pm	17/02/22 6:00 pm
Rainfall	18/02/22 8:30 am	18/02/22 9:00 am
High wind speeds	18/02/22 6:30 pm	18/02/22 7:30 pm
High wind speeds	19/02/22 5:00 pm	19/02/22 5:30 pm
High wind speeds	19/02/22 6:00 pm	19/02/22 6:30 pm

2.2.4 Measured road traffic noise levels

A summary of the measured free field road traffic noise levels is presented in Table 2.3. Appendix A presents the full results of the noise monitoring, including daily graphs.

Table 2.3 Measured road traffic noise levels

Location	Measured road (Address)	Measured noise level, dBA		
		$L_{Aeq,\ 15\ hour}$	$L_{Aeq,\ 9\ hour}$	L_{AMax}
		7am-10pm	10pm-7am	10pm-7am
1	13 Florina Place, Hawker	58	49	77
2	16 Mainoru Place, Hawker	51	48	72
3	Whitlam Development	59	53	74

2.2.5 Surveyed traffic volumes

Traffic counts were undertaken concurrently with the noise survey. These counts determined the number of vehicles, both light and heavy, using the roads associated with the project. Counts were undertaken at four locations along the proposal alignment. The results of these counts are presented in Table 2.4.

Table 2.4 Surveyed traffic volumes

Count Location	Vehicles per hour (Day, 7am-10pm)		Vehicles per hour (Night, 10pm-7am)		Heavy Vehicle %	Average Annual Daily Traffic – Both directions (AADT)
	North west	South east	North west	South east		
Drake-Brockman Dr, West of Kingsford Smith Dr	314	331	53	56	3.8%	10,662

Count Location	Vehicles per hour (Day, 7am-10pm)		Vehicles per hour (Night, 10pm-7am)		Heavy Vehicle %	Average Annual Daily Traffic – Both directions (AADT)
	North west	South east	North west	South east		
Kingsford Smith Dr, North of Drake-Brockman Dr	499	528	110	116	4.3%	17,443
William Hovell Dr, South of Drake-Brockman Dr	493	539	112	122	4.5%	17,589
William Hovell Dr, West of Coppins Crossing Rd	499	539	112	122	4.3%	17,678

3 Operational road traffic noise assessment

3.1 Road traffic noise criteria

Criteria for the management of road traffic noise in ACT is outlined in the *Roads ACT Noise Management Guidelines* (2018) (NMG). The guidelines detail relevant criteria for different road categories and situations. The criteria for situations relevant to this project have been outlined below. Section 7 is applicable to existing receivers (primarily in the northern end including Hawker), while Section 4 applies to buildings within the Whitlam development. The criteria for Whitlam are set so that they are consistent with the assessment criteria adopted in the EDP of the new subdivision (as the road corridor was already existing prior to development of the subdivision).

3.1.1 NMG Section 7: Upgrading Existing Roads in Existing Areas

Proposed upgrades of arterial and major collector roads in established development areas must consider noise impacts on adjacent blocks. Road upgrades should be planned, designed and constructed to achieve noise levels at the receiver below the maximum levels set out in Table 3.1.

Table 3.1 Traffic noise levels resulting from upgraded roads in existing areas of noise sensitive land use, expressed as L_{Aeq} dB(A) Daytime, Ground Level

Existing traffic noise level at adjacent buildings[1]	**Traffic noise level at adjacent buildings after road works completed**
>60	Equal to existing level (not greater than 65)
55 – 60	60
<55	Not more than 5 dB(A) above existing level

Note 1: The traffic noise levels incorporate an allowance for reflection from the facade of the building under investigation. Measurements should be taken at one metre forward of the building facade. In cases where the building is not yet constructed, measurements should be taken at a distance of one metre in front of the proposed building facade, or one metre forward of the minimum set-backs required under the Territory Plan, and 2.5 dB(A) added to the measurement to allow for future facade reflection. Measurements should be taken at a height of 1.2 - 1.5 metres above ground level.

Where these criteria are predicted to be exceeded, Schedule 3 of the NMG outlines that consideration of acoustic barriers and / or acoustic treatment of buildings may be required to reduce any predicted noise impacts.

3.1.2 NMG Section 4: New Developments on Existing Roads

Proposed noise sensitive developments located adjacent to arterial or major collector roads are to be planned, designed and constructed to standards that provide: external noise levels based on the existing conditions at the receiver below the maximum levels set out in Table 3.2, or; internal noise levels that meet the Australian Standard AS 2107

Table 3.2 Traffic noise levels resulting from upgraded roads in existing areas of noise sensitive land use, expressed as L_{Aeq} dB(A) Daytime, Ground Level

Existing traffic noise level at adjacent buildings[1]	**Traffic noise level at adjacent buildings after road works completed**
>60	Equal to existing level (not greater than 65)
55 – 60	60
<55	Not more than 5 dB(A) above existing level

Note 1: The acceptable traffic noise levels incorporate an allowance for reflection from the facade of the building under investigation. Measurements and predictions should be taken at one metre forward of the building facade. In cases where the building is not yet built, measurements should be taken at a distance of one metre in front of the proposed building facade, and 2.5 dB(A) added to the measurement to allow for future facade reflection. Measurements should be taken at a height of 1.2 - 1.5 metres above ground level or the known floor level.

It is expected that day time levels will be the dominant source of road noise and therefore the day time criteria will be used to assess noise impacts on the Whitlam development.

Where these criteria are predicted to be exceeded, Schedule 1 of the NMG outlines that consideration of building set back, acoustic barriers and / or acoustic treatment of buildings may be required to reduce any predicted noise impacts.

3.2 Modelling methodology

A road traffic noise prediction model was created using the SoundPLAN software package (version 8.2) implementing the Calculation of Road Traffic Noise (CoRTN, UK Department of Transport, 1988) method. The model is used to predict road traffic noise generated by the assessed roads within the study area.

The noise prediction model accounts for various factors including traffic volumes and composition (light and heavy vehicle mixture), vehicle speeds, road gradients, pavement surfaces, ground absorptions, shielding and reflections from topography, buildings, and barriers.

The noise prediction model contains the relevant data for the assessment of the following scenarios, as stipulated in the engagement brief:

- Year 2022, measurement year, for current road traffic noise prediction and model validation.
- Year 2031, 'built' scenario referring to assessment scenario when the project is constructed and operational, for predicted horizon noise levels to be used for mitigation specification
- Year 2031, 'no built' scenario referring to the assessment year without the project but with the existing roads only.

The assessment considers the three scenarios and noise levels are predicted at each sensitive receiver. As required, the noise prediction model is also used to nominate feasible mitigation measures to meet the relevant criteria at the residential noise sensitive receivers.

3.2.1 Inputs and assumptions

Table 3.3 details the modelling parameters used for the prediction of road traffic noise levels and their sources.

Table 3.3: Road traffic noise modelling inputs and assumptions

Input parameter	Source reference
Ground elevation geometry	ELVIS (Elevation and depth) Foundation spatial data 1m resolution bare earth Digital Elevation Model (DEM)
Building heights	From ACT Government Open Geospatial Data (ACTmapi)
Road Alignment	SMEC Design – 24 February 2022 Existing road alignments (Kingsford Smith Drive, Drake Brockman Drive, William Hovell Drive east of John Gorton Drive) sourced from ELVIS covering approximately 500m from the ends of the project design alignment
Assessment standard	Calculation of Road Traffic Noise NSW (CoRTN NSW)
L_{10} to L_{eq} conversion	-3dB
Traffic volumes	Refer section 2.2.5 existing traffic volumes. Design year forecast – SMEC traffic report

Input parameter	Source reference
Percentage of Heavy Vehicles	Sourced from traffic survey. Refer section 2.2.5
Source Heights & Corrections (3 source height)	0.5 m for light vehicle tyres / no correction 0.5 m for heavy vehicle tyres / -5.5dB correction 1.5 m for heavy vehicle engines / -2.5dB correction 3.6 m for heavy vehicle exhausts / -8.5dB correction
Road traffic speeds	Posted / design speeds
Road Surface / Corrections	Existing road – DGA (zero correction) from 240m west of Coopers Crossing Road and 400m south of the Drake Brockman Drive. 14mm chip seal remainder (+3 correction) Proposed design – Combination of 50mm AC14, Prime (AMC00), 7mm low cutter seal and 7mm sprayed seal (+ 2 correction)
Ground Absorption	75% soft ground for grass, wooded areas, and park land 50% soft ground for residential / suburban land use 25% soft ground for commercial and industrial land use
ARRB Correction*	Free field levels: 0.7 dB(A) applied for free field monitoring locations Facade corrected levels: -1.7 dB(A) applied for façade corrected assessment locations
Façade correction	+2.5dB
Receiver Height	1.5m ground floor

(1) As per *Austroads – An approach to the validation of Road traffic noise models (Austroads Inc 2002)*

3.2.2 Traffic volumes

Traffic volume predictions were derived from traffic model results presented in the SMEC Traffic Report. The predicted traffic volumes were provided for the year 2031 which will be implemented as the future traffic year. The results of the traffic counts undertaken during noise monitoring were used to calculate existing road traffic noise levels.

For the future traffic scenario, the spread of traffic across the 24 hour period during the existing traffic survey was used to determine the 2031 daytime (15 hour) traffic volumes. Table 3.4 outlines the modelled road traffic numbers.

Table 3.4 Future 2031 traffic volumes (15 hour daytime)

Direction	AADT	Percentage daytime	Total volume (per hour)	Light vehicles (per hour)	Heavy vehicles (per hour)
William Hovell Drive 2021					
Eastbound	8,493	88%	499	478	21
Westbound	9,183	88%	539	516	23
Kingsford Smith Drive 2021					
Northbound	8,475	88%	499	477	22
Southbound	8,964	88%	528	505	23
William Hovell Drive 2031					
Eastbound	10,207	88%	599	572	27
Westbound	9,718	88%	571	545	26
Kingsford Smith Drive 2031					
Northbound	9,794	88%	577	552	25
Southbound	9,971	88%	587	562	25

3.2.3 Model validation

The noise model used for the assessment was subjected to a validation process to ensure the accuracy of the road traffic noise predictions. The model validation process allows for the identification of any errors in the modelling setup and where validated, demonstrates that the noise model accurately represents the existing real-world conditions.

The validation process compared measured road traffic noise levels for the current year 2022 (as outlined in section 2.2.4) with the modelled road traffic noise levels for the same year using the traffic volumes measured during the noise monitoring period (refer section 2.2.5).

Table 3.5 presents a summary of the measured and predicted noise levels.

Table 3.5: Modelled versus measured levels – noise monitoring locations

Measurement location	Day time $L_{Aeq,\ 15\ hour}$ dBA		
	Predicted noise level	**Measured noise level**	**Difference**
13 Florina Place, Hawker	58.7	57.5	+1.2
16 Mainoru Place, Hawker	52.7	51.3	+1.4
Whitlam Development	59.0	58.7	+0.3
Median			+1.2

The predictive model shows good agreement at all locations, with differences lower than +/- 1.4 dB. The median of the differences is +1.2 dB.

Noise predictions being within +/- 2 dB of the measured noise levels, the model is considered validated and suitable to predict road traffic noise levels for year 2031 without any calibration factor applied.

3.3 Predicted road traffic noise levels

Predicted road traffic noise levels at all modelled residential noise sensitive receivers as indicated in Appendix B for the daytime period ($L_{Aeq, 15hour}$) are presented in Appendix C (tabulated results).

Road traffic noise levels due to contribution from William Hovell Drive are predicted to exceed the relevant noise criteria at up to 74 residential noise sensitive receivers as follows (and indicated in Figure 3.1 and Figure 3.2):

- Five receivers at Florina Place (up to 4 dB)
- One receiver at Kurundi Place (by 3 dB)
- Three receivers at Mainoru Place (up to 1 dB)
- One receiver west of the alignment (opposite Florina Place) (by 1 dB)
- 64 receivers in the Whitlam Estate (up to 4 dB, see further discussions in Section 4.2.4).

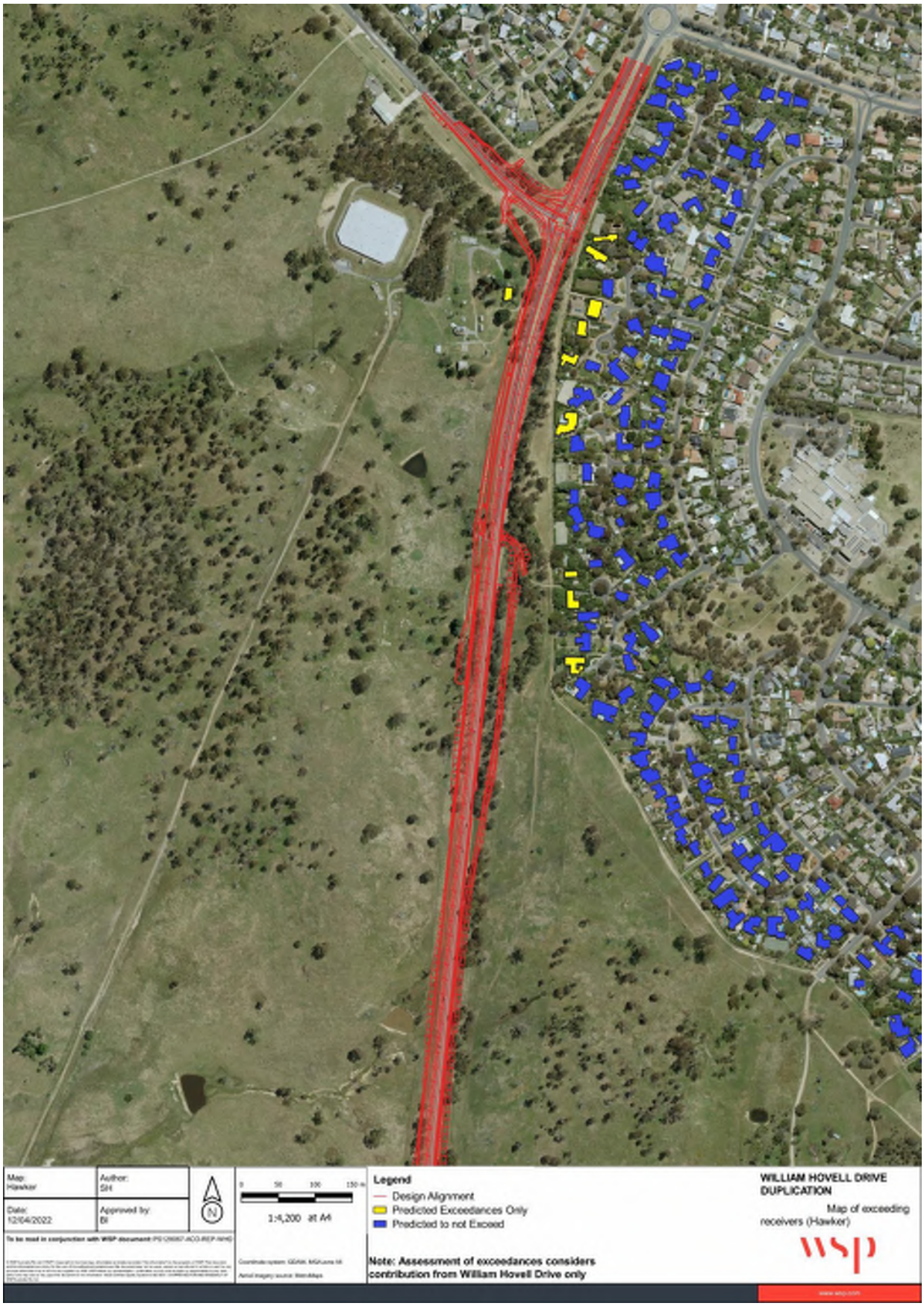

Figure 3.1 Exceeding receivers in northern section (primarily Hawker)

Figure 3.2 Exceeding receivers in southern section (Whitlam)

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4 Noise mitigation

4.1 Introduction

The NMG outlines the following methods that may be considered for the mitigation of road traffic noise where levels greater than the recommended maximum levels are predicted:

- Quieter road pavement
- Reduced speed limits
- Noise barriers
- Acoustic treatment of existing buildings.

It states that the following issues should be considered before finalising any noise mitigation measures:

- Technical feasibility
- Visual impact
- Community preference
- Cost
- Effectiveness.

4.2 Consideration of noise mitigation measures

As discussed in Section 2.1, certain houses within the Whitlam Estate having direct frontage has been identified as 'noise affected' and accepted to exceed the external road noise criteria in the estate's EDP. The respective builders are responsible in providing a build form capable of complying with the relevant internal noise targets.

The following recommendations for noise mitigation and their likely effectiveness have been presented below for discussion with Major Projects Canberra. These are recommended to be considered in full and implemented in the final road design where feasible and reasonable. It should be noted that the mitigation assessment is based on noise contribution from William Hovell Drive only.

4.2.1 Quieter road pavement

A quieter pavement surface is typically the preferred form of noise mitigation as it reduces source noise levels. This provides protection to both outside recreational areas and internal noise levels and also has the least visual impact.

A quieter pavement surface would typically be considered where there are groups of four or more receivers that exceed the criteria and before the use of noise barriers. The use of low noise pavement (for example low noise stone mastic asphalt, open graded asphalt) is expected to provide a reduction of up to approximately 4 to 5dB in generated levels of road noise as compared to the modelled combination of surface types.

In consideration of the receivers exceeding the recommended maximum road noise levels, an approximate 750m length of low noise pavement, south of Drake Brockman Drive may prove to be an effective form of noise mitigation for all exceeding receivers in Hawker.

It is acknowledged that road noise mitigation in the form our houses' build form is the primary strategy as per the approved EDP of the Whitlam subdivision. Notwithstanding, provision of quieter road pavement where feasible and reasonable will provide general acoustic improvement and is recommended considered (e.g. 2 dB improvement by using dense graded asphalt over chip seal or 4 to 5 dB by using open graded asphalt over chip seal as previously discussed).

4.2.2 Reduced speed limits

A reduction in speed limit is another effective form of noise mitigation. A reduction of 20km/hr (from 90km/hr to 70km/hr) would provide an approximate 1.5 – 2.0 dB reduction in generated road noise.

In isolation, this mitigation measure would be an effective form of noise mitigation at road areas adjacent to Mainoru Place and west of the alignment.

4.2.3 Noise barriers

To be effective, any noise barrier would need to extend along the eastern side of the project alignment, from north of the Drake Brockman Drive intersection to south of Mainoru Place. However, where other forms of noise mitigation are adopted for impacted properties on Mainoru Place, the barriers southern extent may be reduced to The Bicentennial Trail bridge. It is noted that any barrier would be most effective if built along the top of the existing noise bund in this area.

Precise extent and height of any noise barrier would require additional noise modelling following the confirmation of Major Projects mitigation preferences.

It is however noted that noise barriers are commonly not considered feasible and reasonable for noise reductions of less than 5 dB.

It is noted that noise barriers were previously considered as part of Whitlam's EDP. This strategy was largely considered to be not feasible and/or reasonable for Whitlam.

4.2.4 Property treatments

Following the consideration of all reasonable and feasible mitigation measures outlined above, where exceedances are still considered likely, architectural acoustic treatment may be considered for potentially impacted properties. This treatment would aim to ensure that internal noise levels comply with *AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors.* As previously discussed, this strategy is the key strategy as part of development of Whitlam.

WSP has undertaken a review and comparison between the identified exceedances in Whitlam against the findings of the EDP noise assessment and Whitlam Precinct Map and Code under the ACT Territory Plan 2008. This assessment has indicated that there is generally a net reduction in Whitlam blocks predicted to exceed the external noise criteria (due to contribution from William Hovell Drive) under the current road design (as presented graphically in Figure 3.2):

- 15 properties that were identified as 'noise affected' in the Whitlam Precinct Map and Code are now predicted to be compliant with the NMG planning guidelines. These properties are:
  - ID6697 to ID6704 – Blocks 15 to 23 Section 6
  - ID6592 to ID9595 – Blocks 1 to 4 Section 28
  - ID6597 to ID6599 – Blocks 1, 13 and 14 Section 25
- Four properties that were not identified as 'noise affected' in the Whitlam Precinct Map and Code or in previous EDP are now predicted to exceed the NMG planning guidelines marginally by 1 dB.
  - ID6611 – Block 11 Section 26
  - ID6931 – Block 2 Section 25
  - ID6553 and ID6554 – two land blocks on the top north-western corner of Whitlam Stage 4
  - It is observed that these exceeding properties are isolated in nature while other houses in similar vicinity are largely compliant. In addition, the noise validation (Section 3.2.3) indicates that the modelled results are likely to include a possible slight over-prediction. In conjunction with the fact that a 1 dB difference in noise levels are typically not noticeable, these marginal exceedances are expected to be insignificant. Notwithstanding, as part of

considering road noise mitigation to be incorporated in the final road design, these receivers are recommended to be considered with the other exceeding receivers.

5 Limitations

This Report is provided by WSP Australia Pty Limited (WSP) for Major Projects Canberra (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 13 January 2022 and agreement with the Client dated 9 February 2022 (Agreement).

5.1 PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (Permitted Purpose).

5.2 QUALIFICATIONS AND ASSUMPTIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

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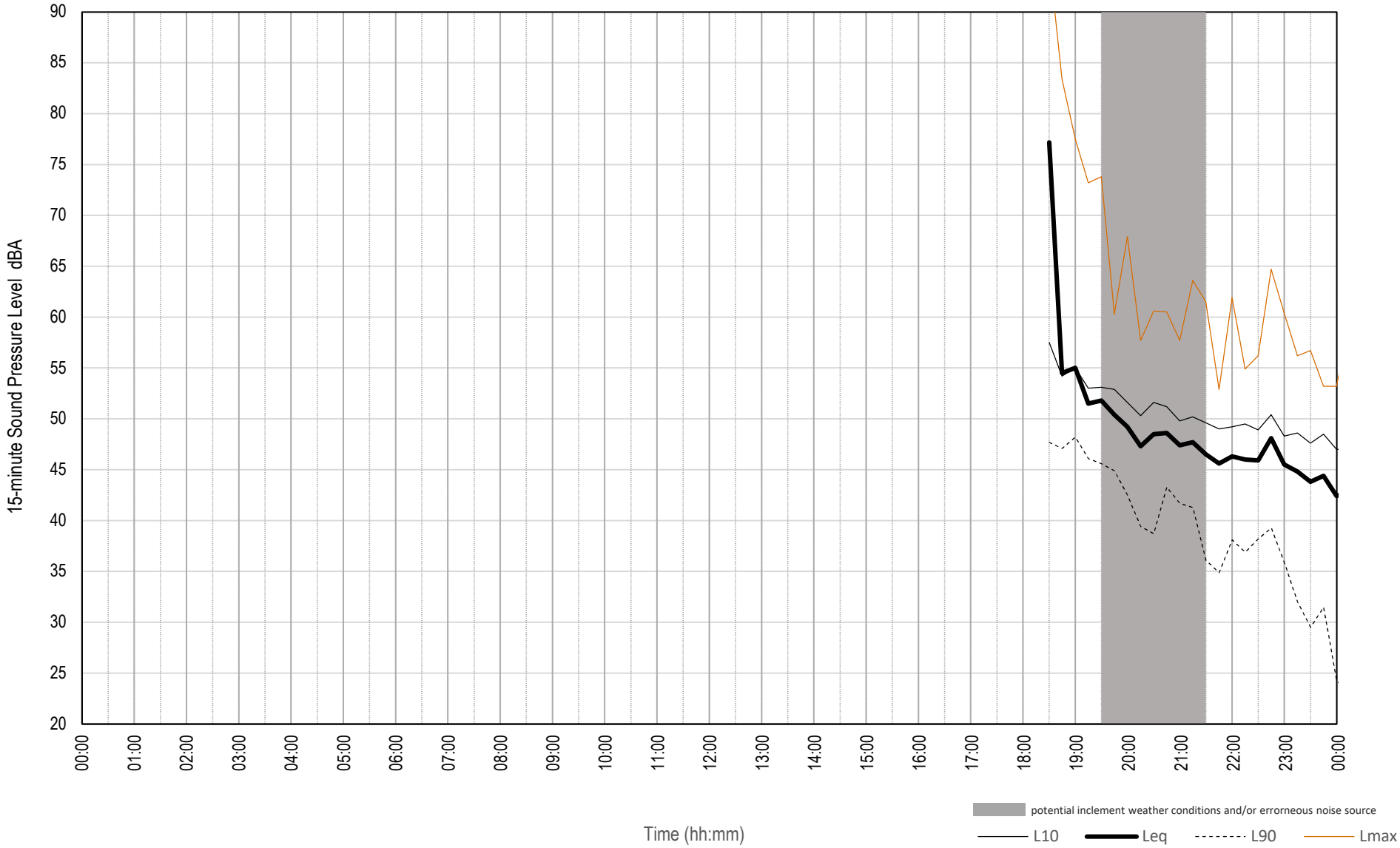
Appendix A

Noise monitoring results

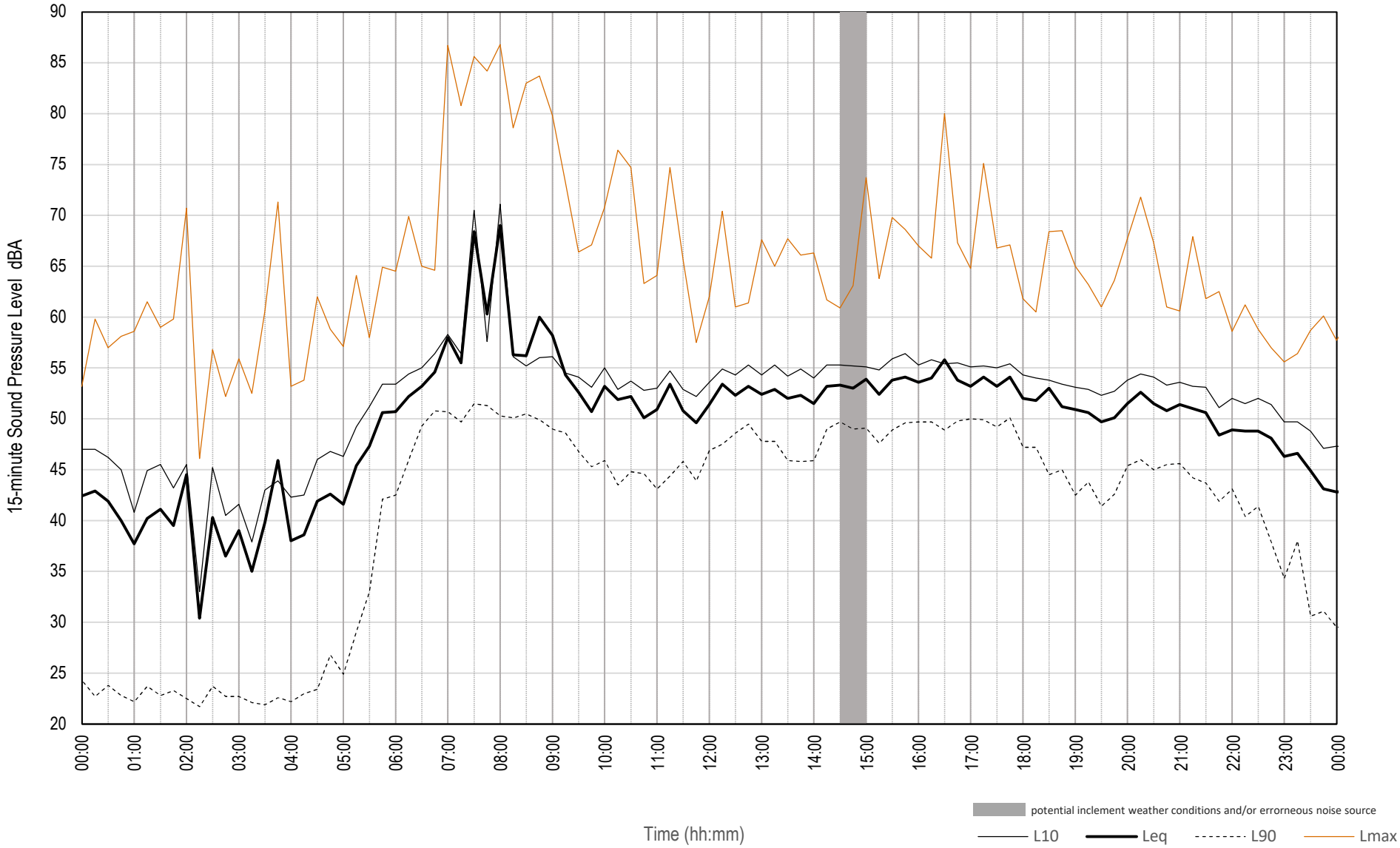
Measured Noise Levels - 13 Florina Pl, Hawker

Tuesday, 08 February 2022



Measured Noise Levels - 13 Florina Pl, Hawker

Wednesday, 09 February 2022



Measured Noise Levels - 13 Florina Pl, Hawker

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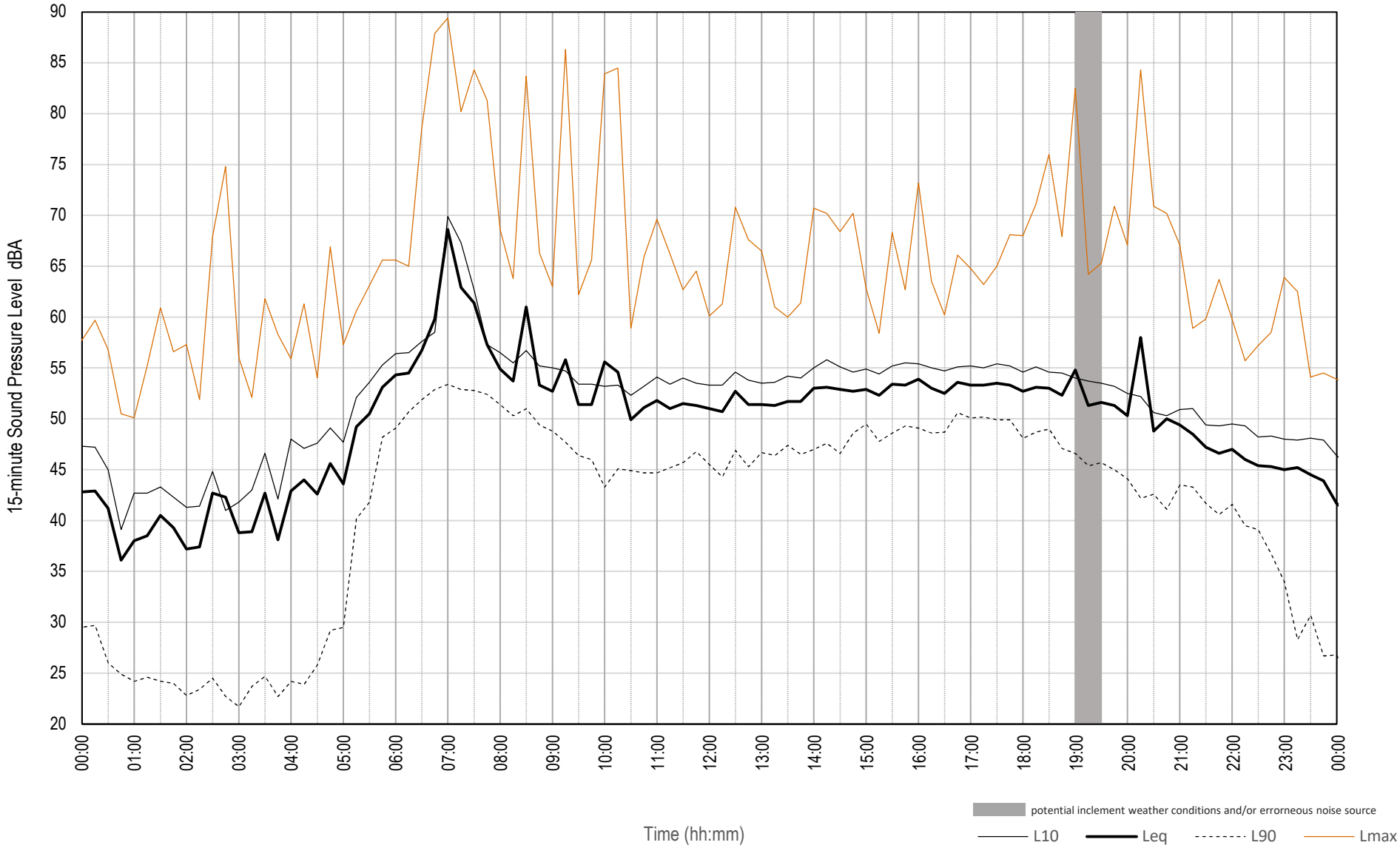

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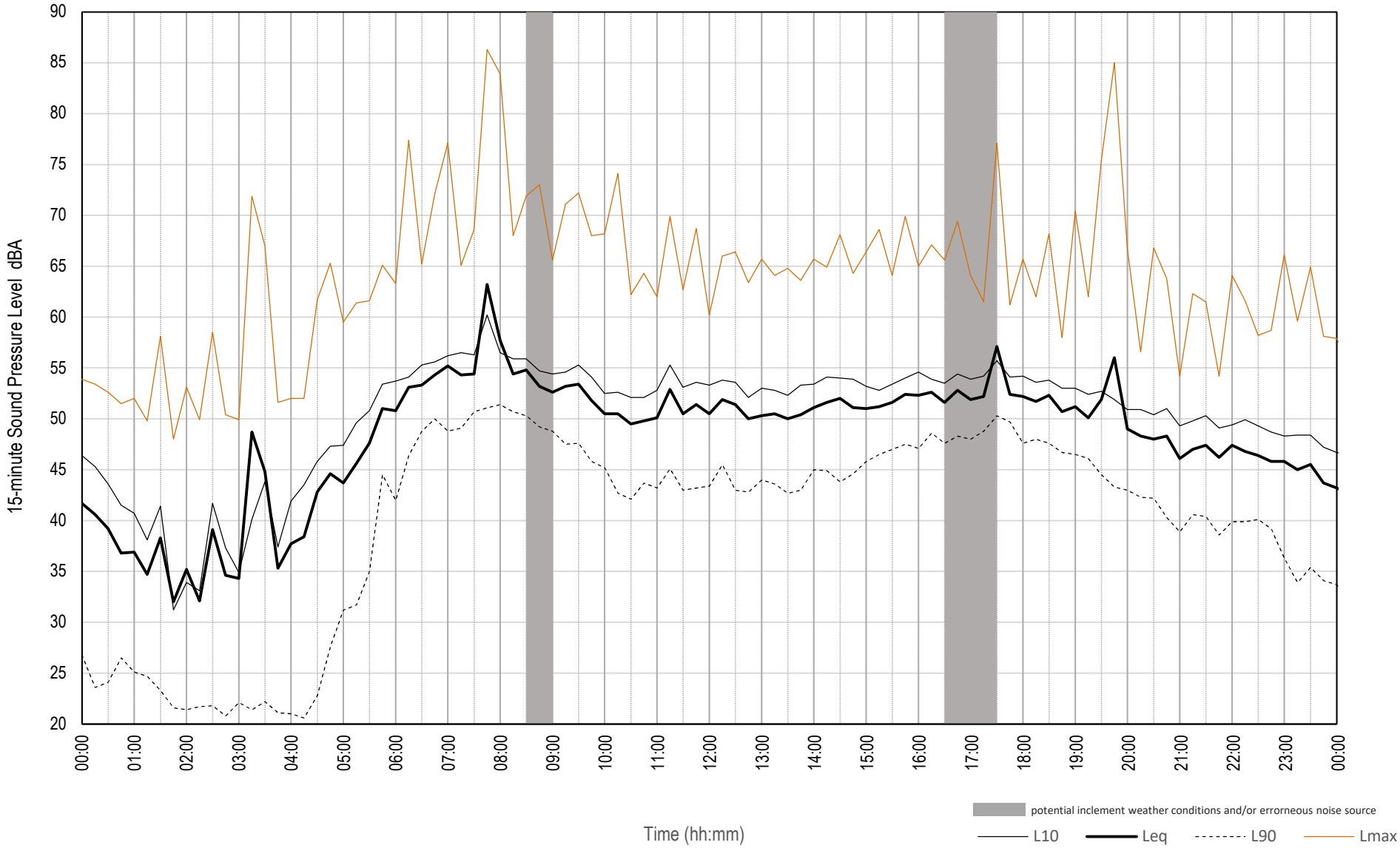

Measured Noise Levels - 13 Florina Pl, Hawker

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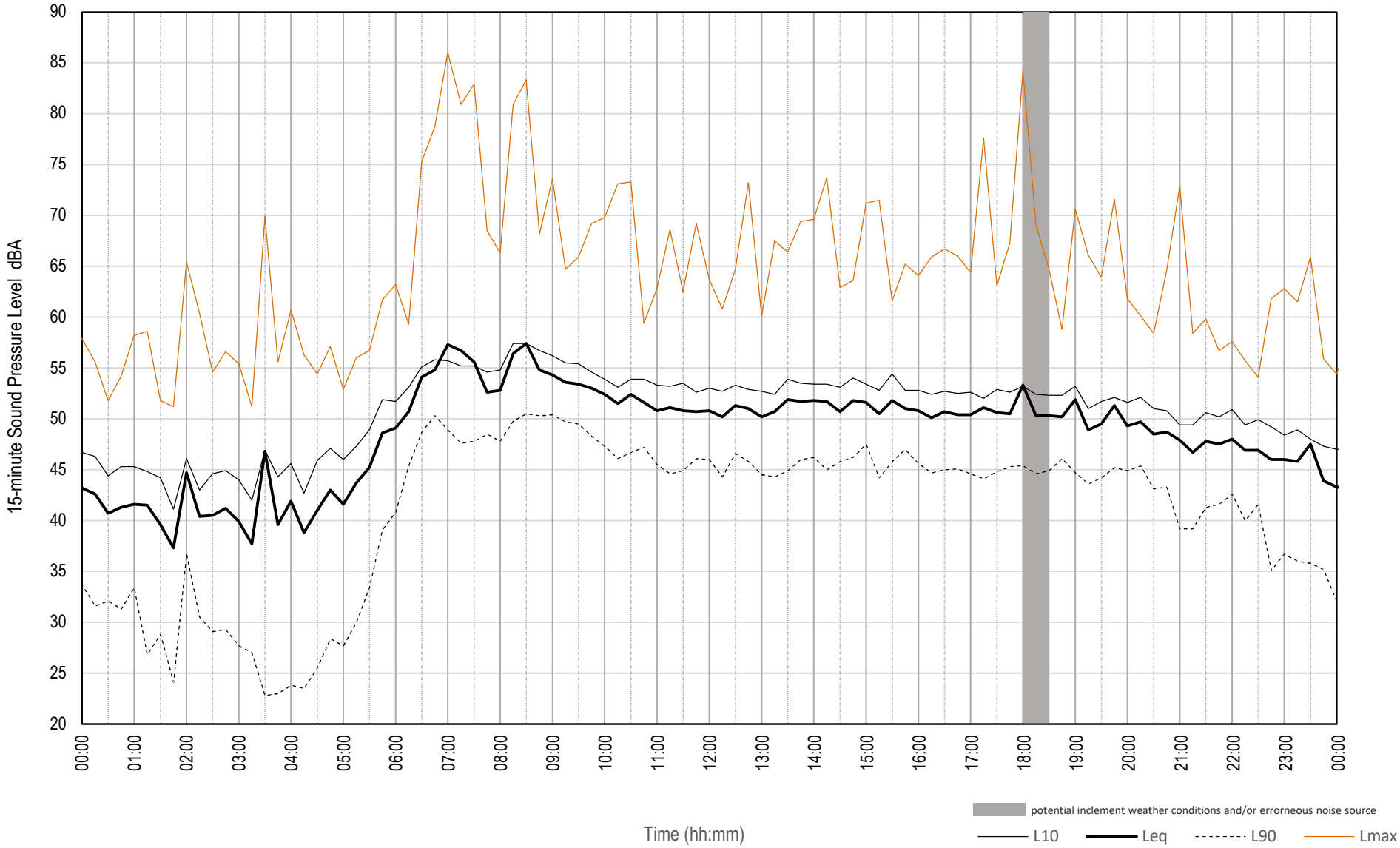

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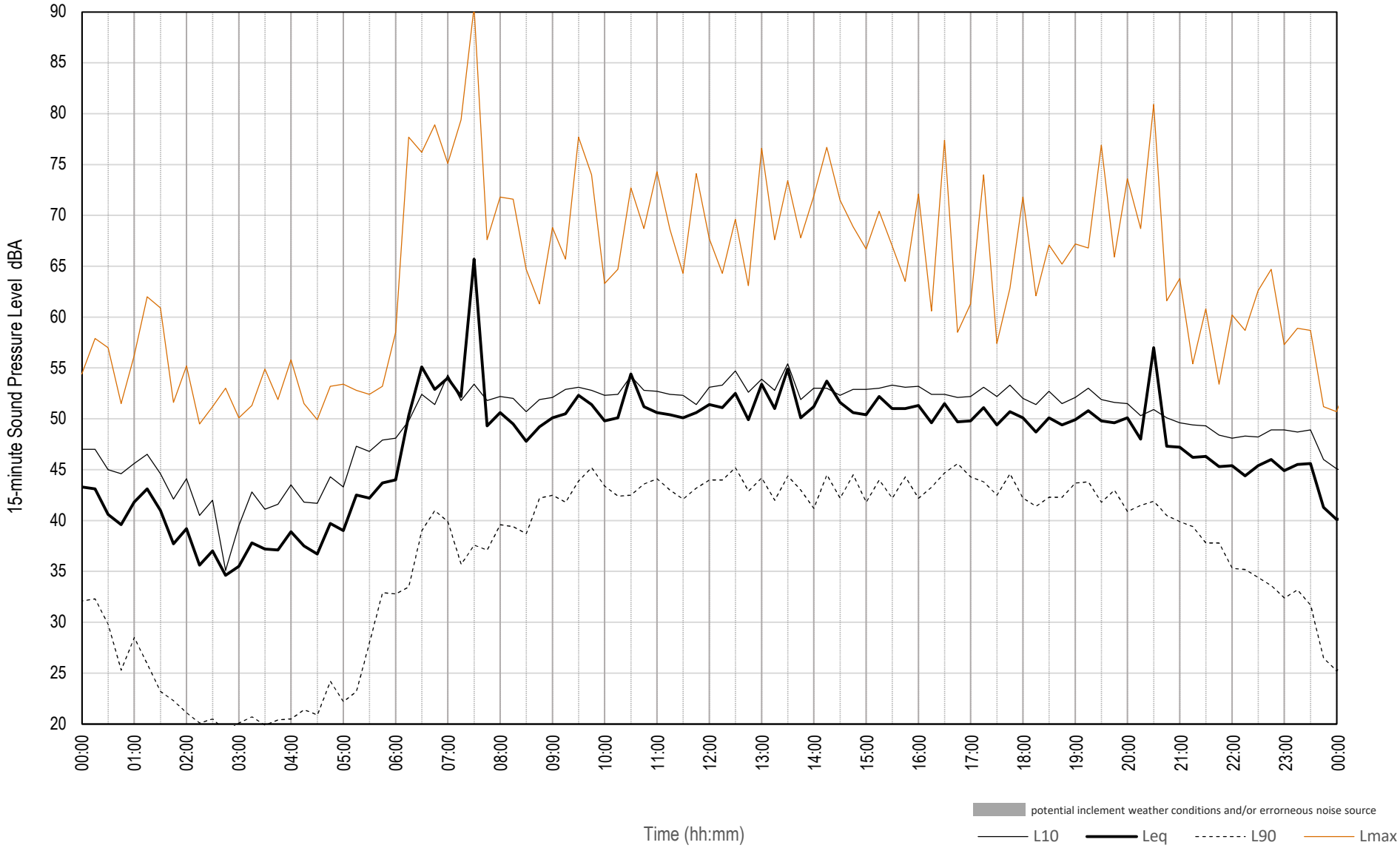

Measured Noise Levels - 13 Florina Pl, Hawker

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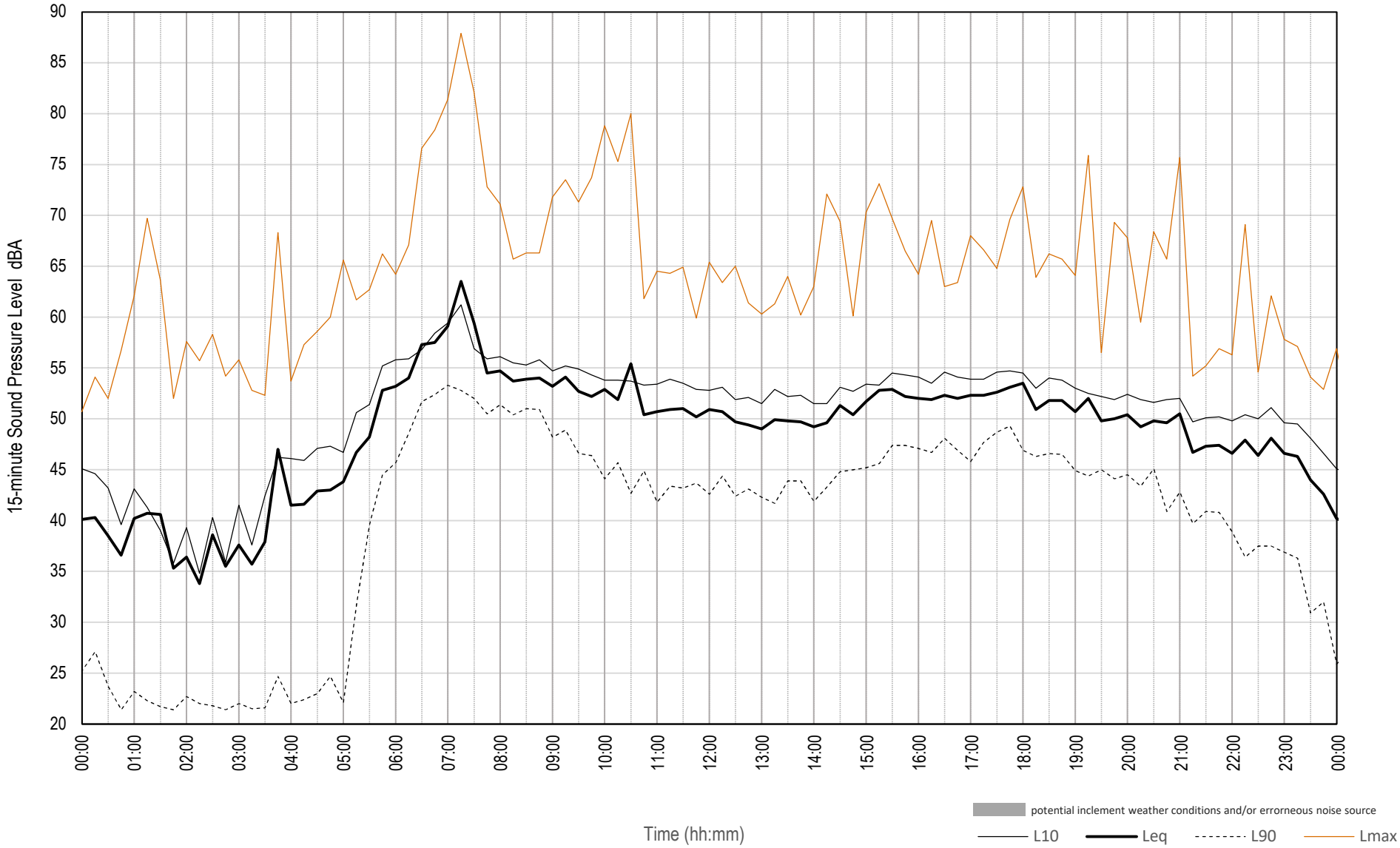

Measured Noise Levels - 13 Florina Pl, Hawker

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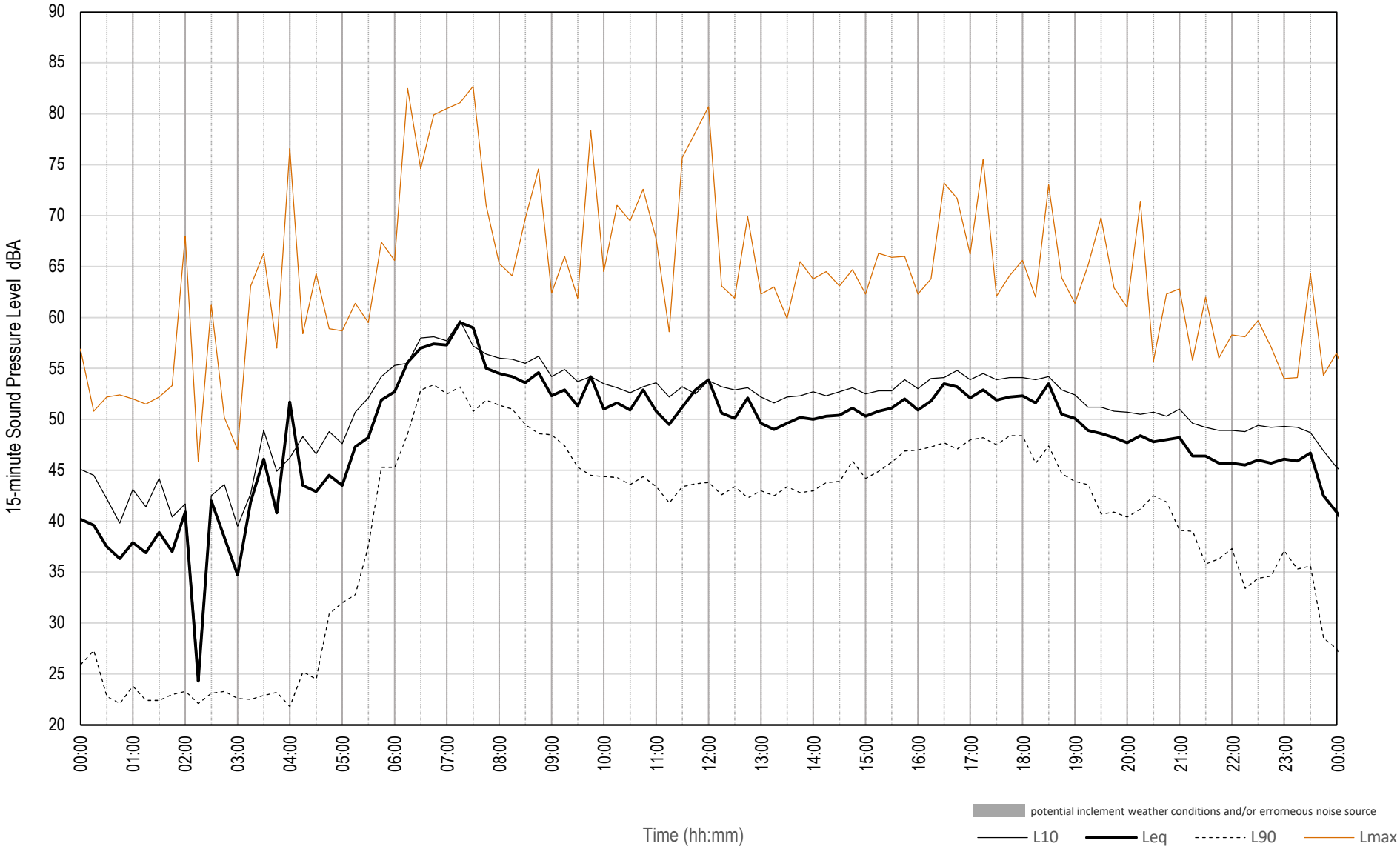

Measured Noise Levels - 13 Florina Pl, Hawker

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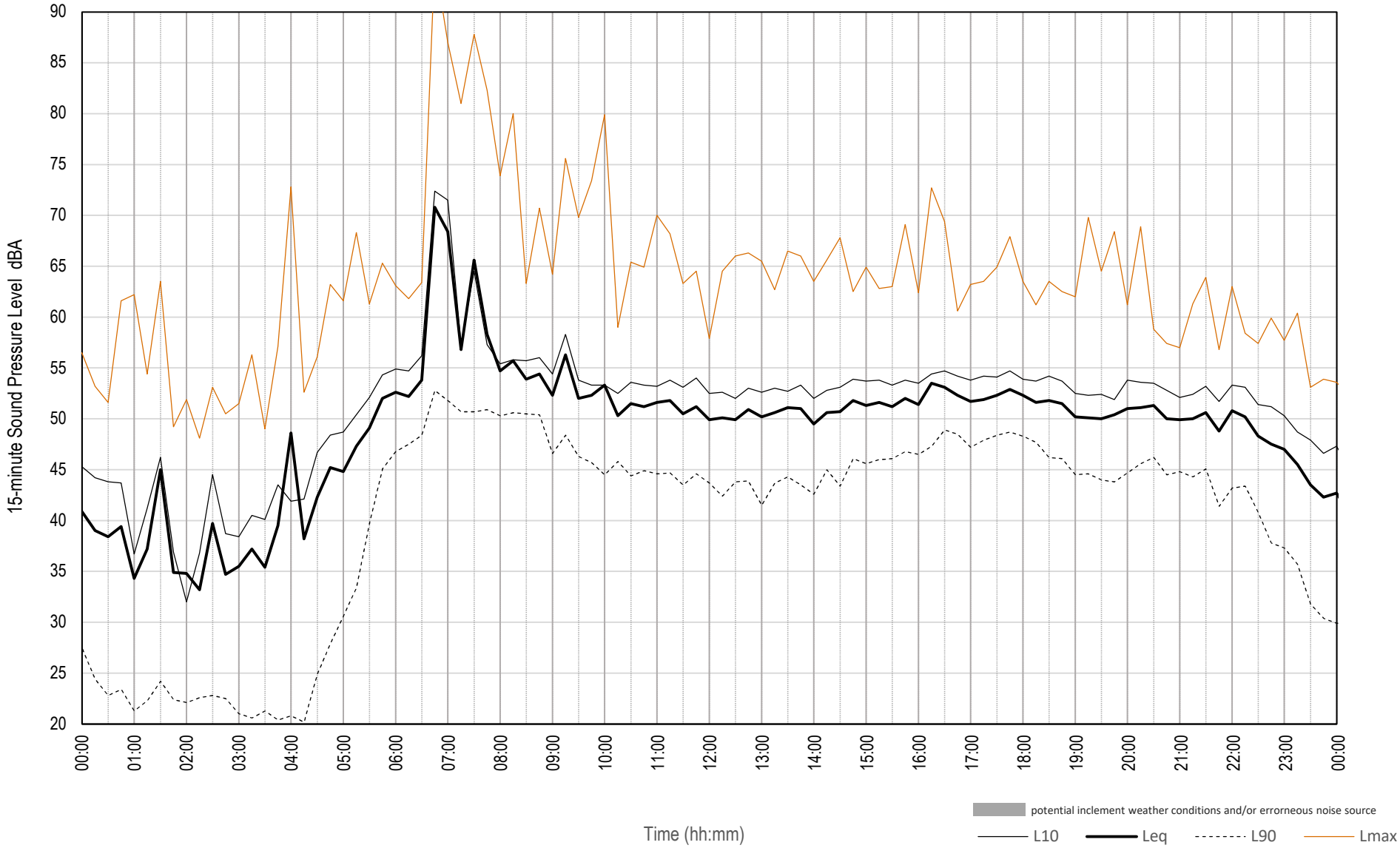

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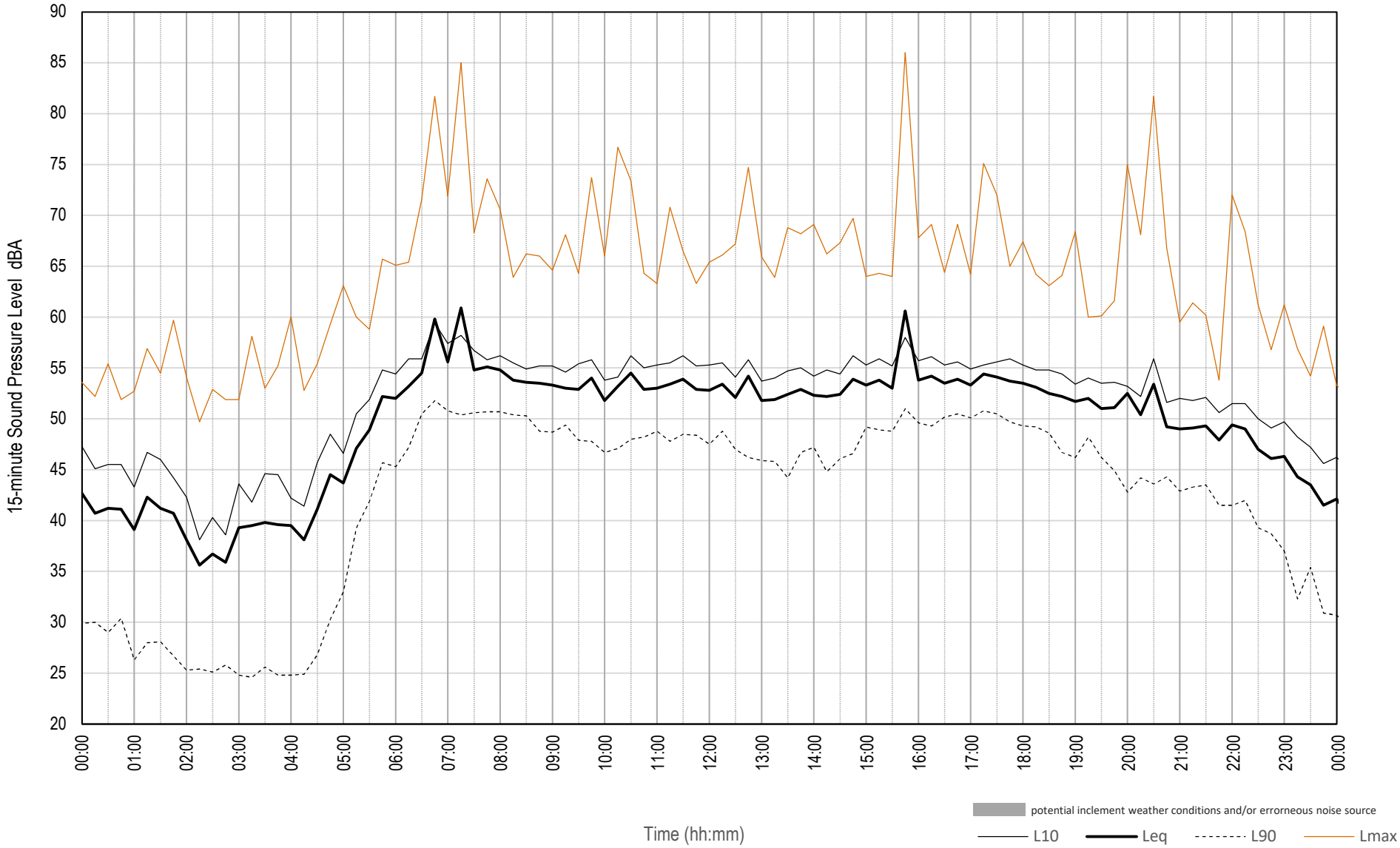

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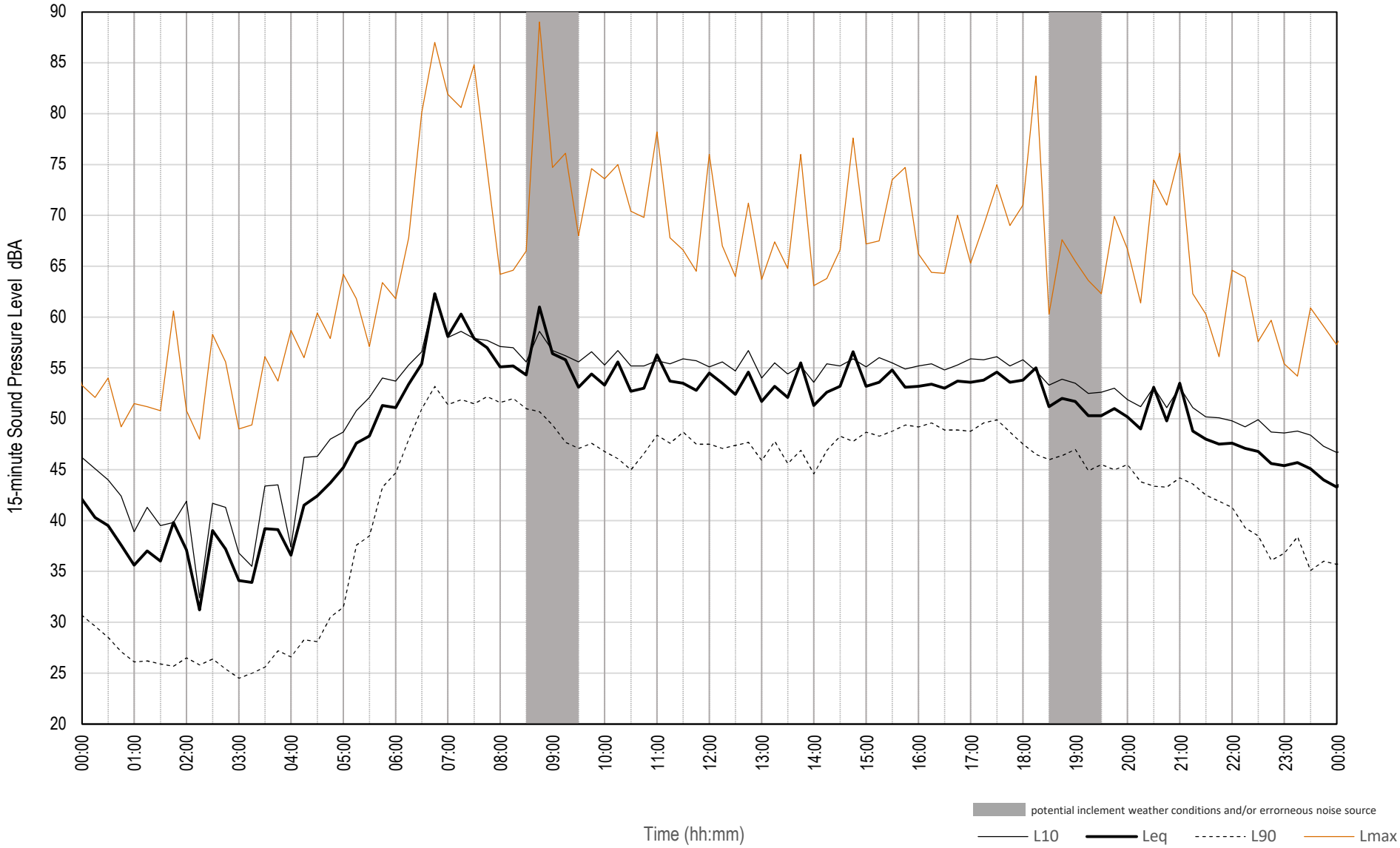

Measured Noise Levels - 13 Florina Pl, Hawker

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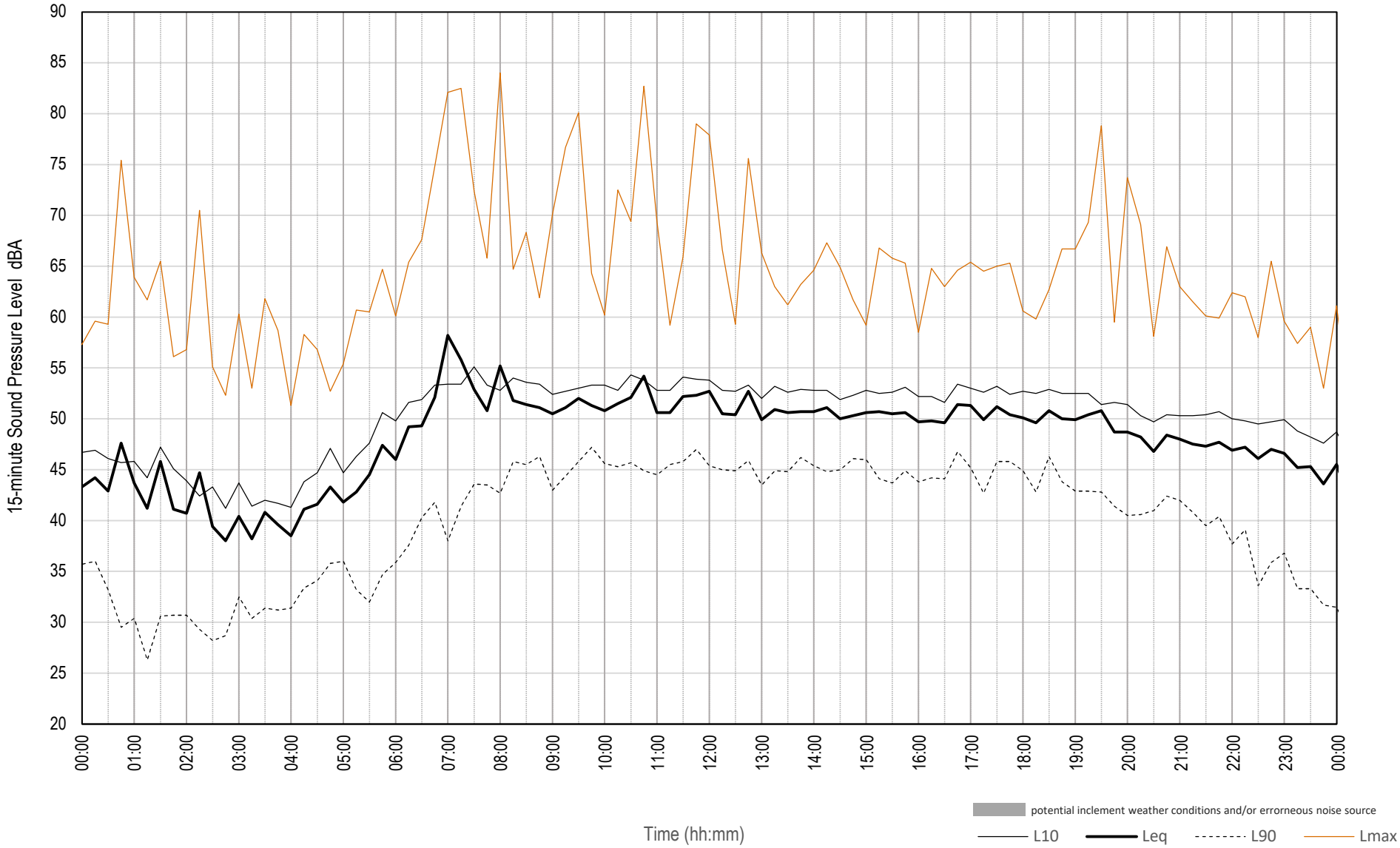

Measured Noise Levels - 13 Florina Pl, Hawker

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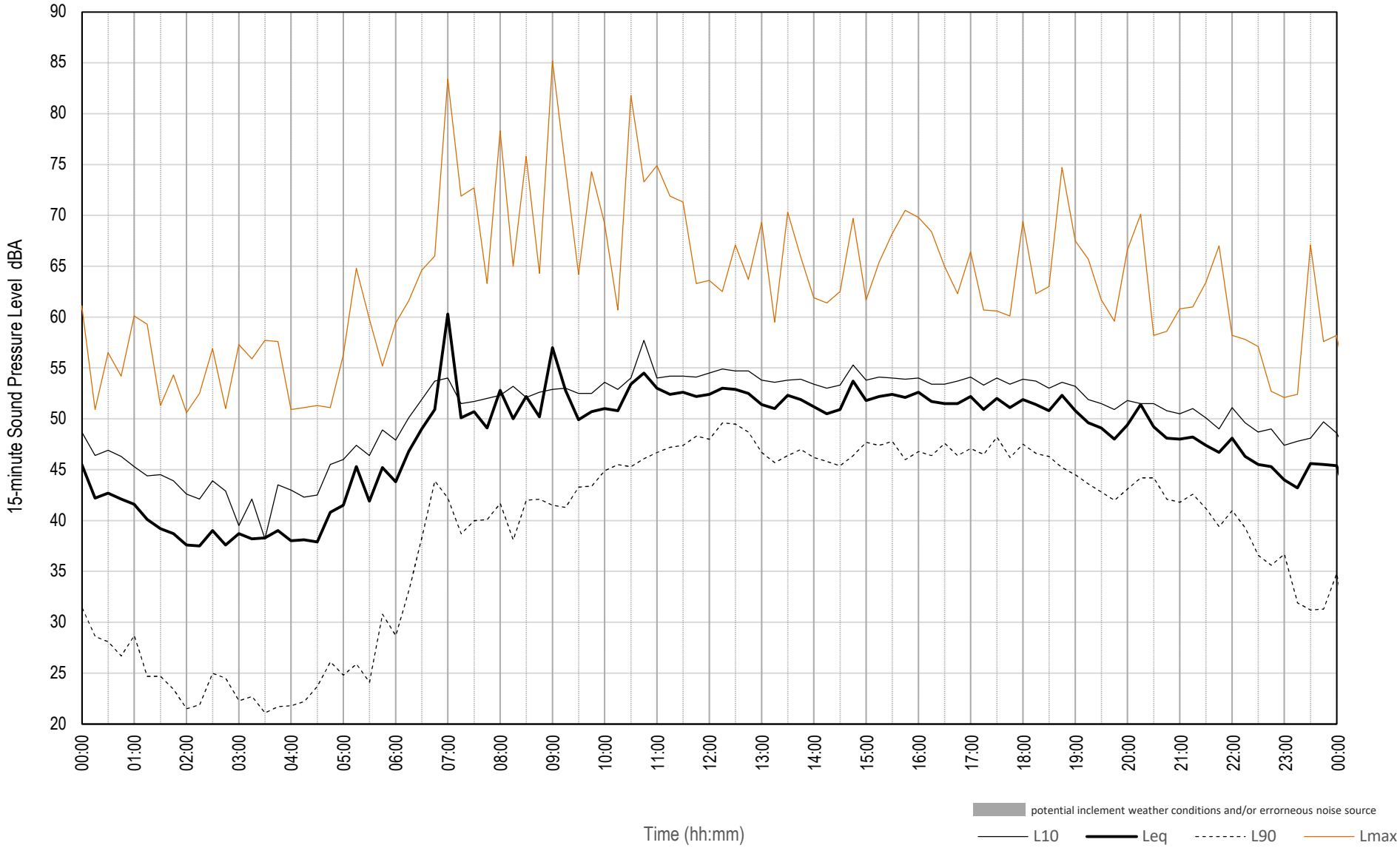

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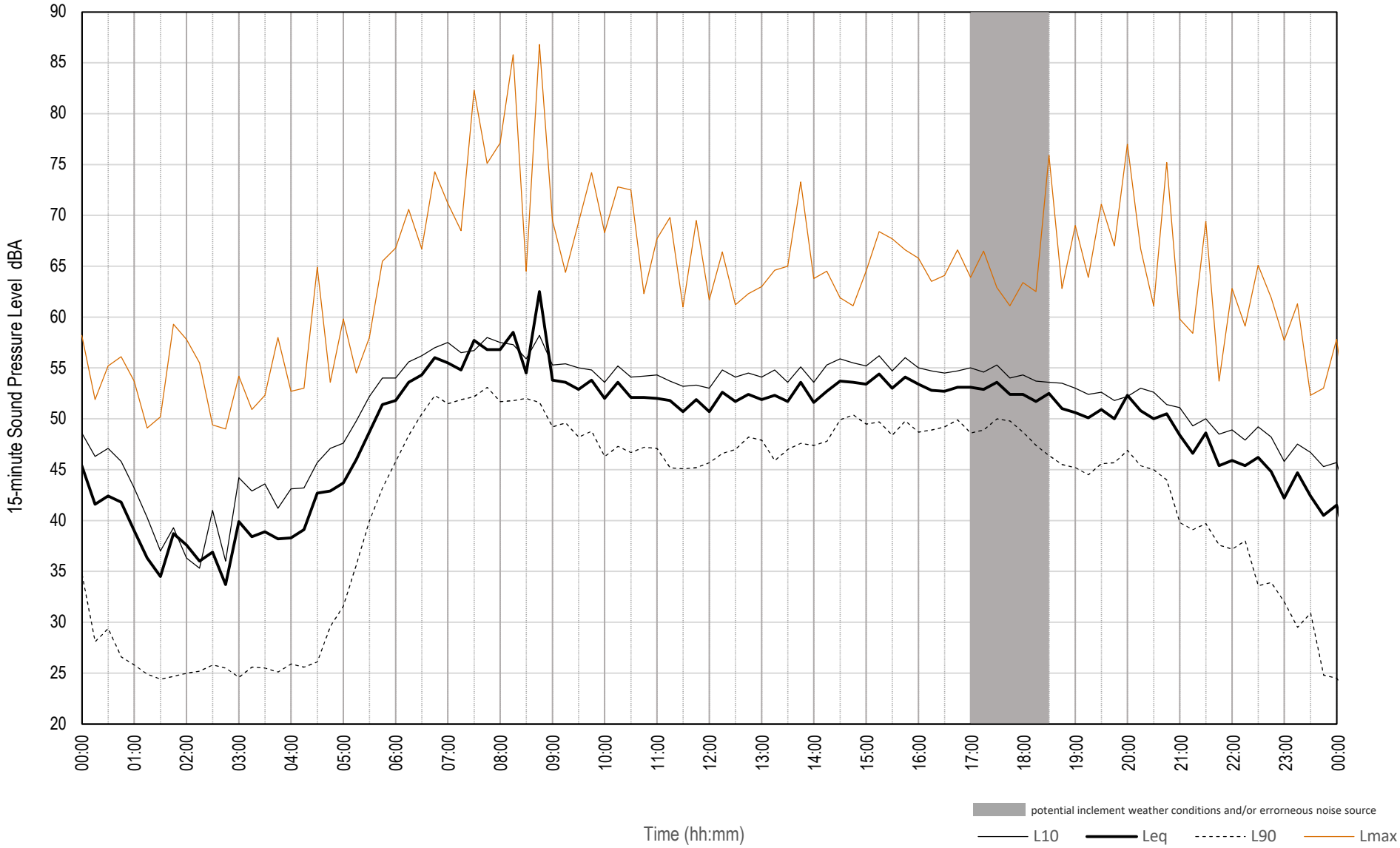

Measured Noise Levels - 13 Florina Pl, Hawker

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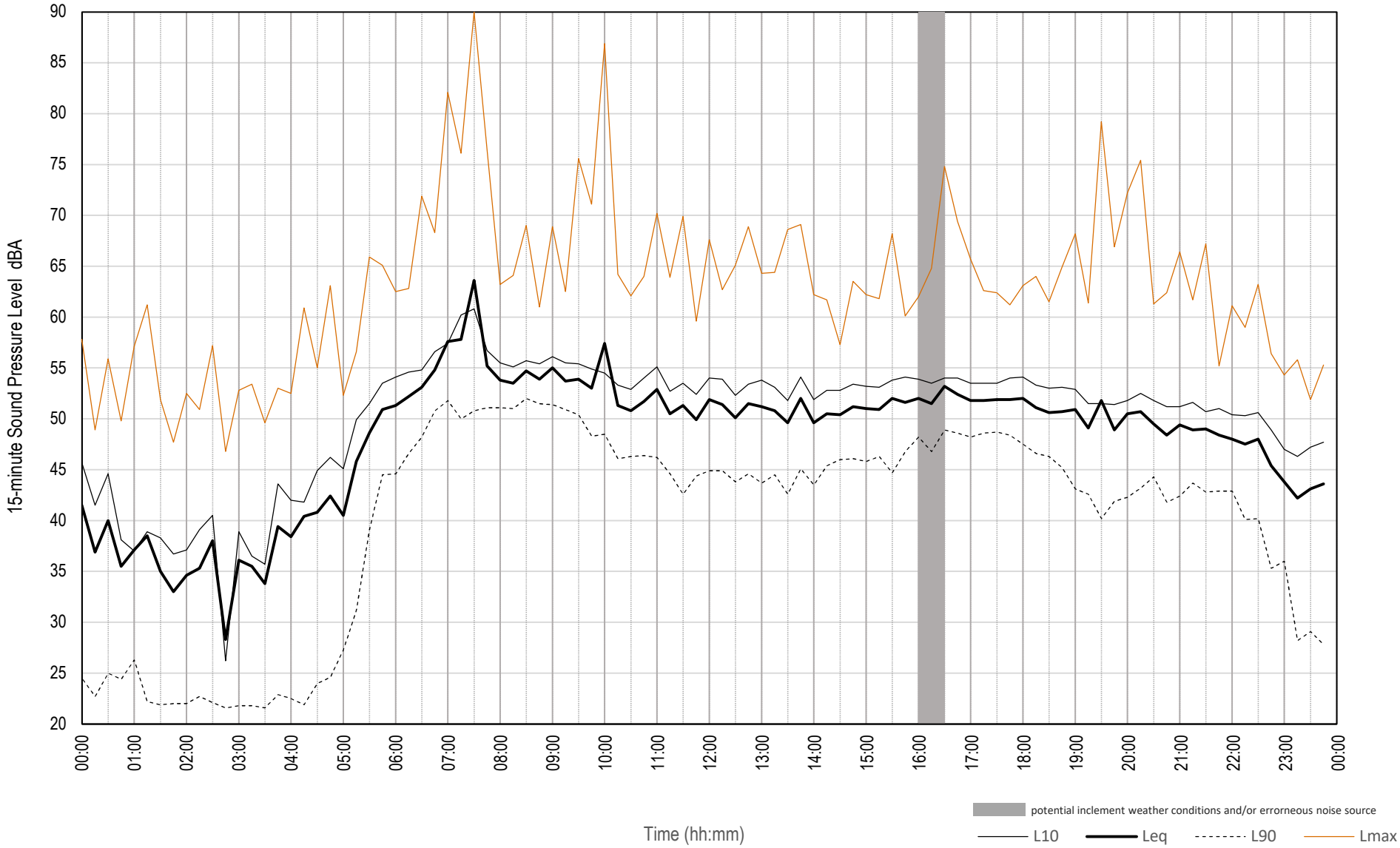
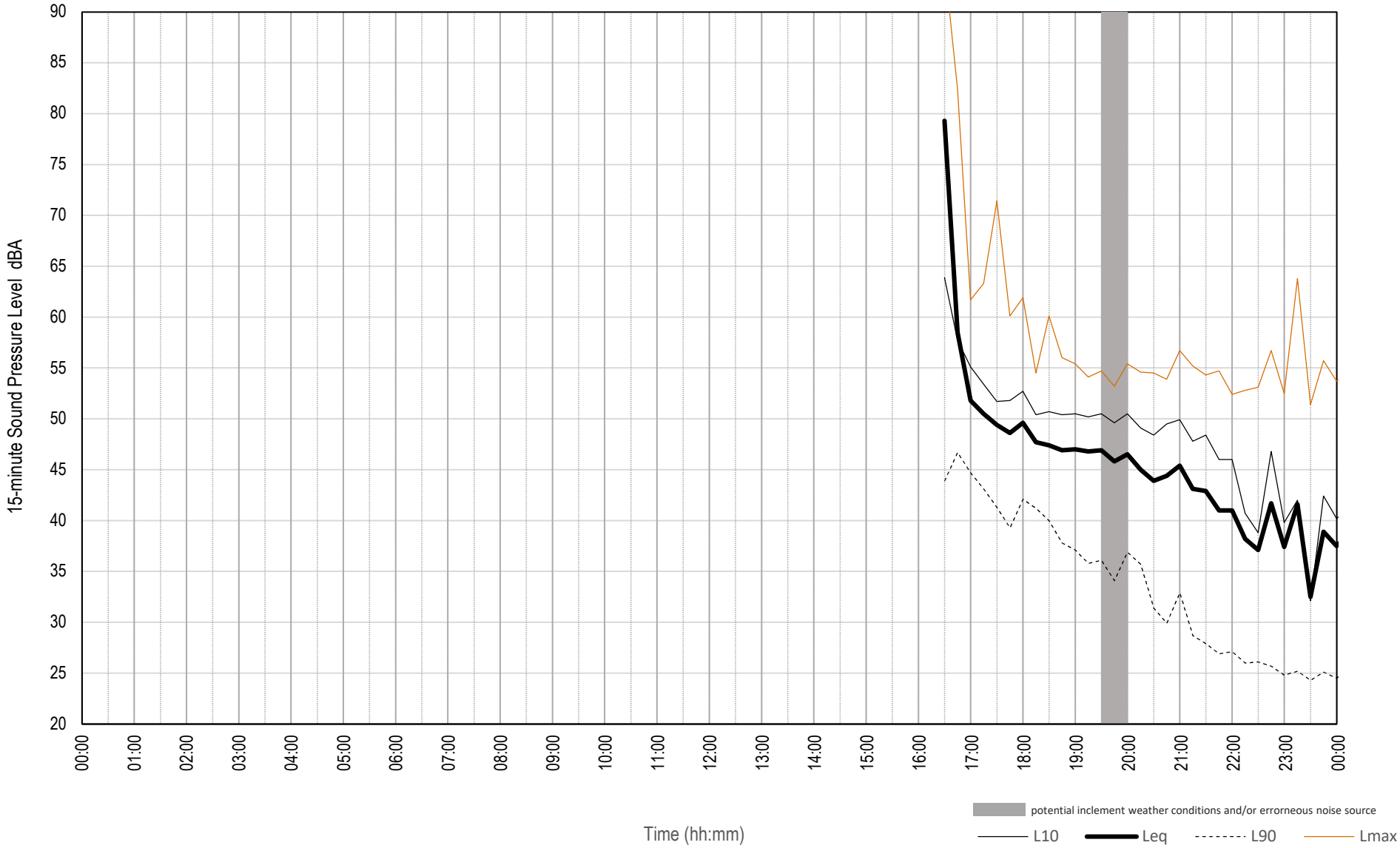


Measured Noise Levels - 16 Mainoru Pl, Hawker

Tuesday, 08 February 2022



Measured Noise Levels - 16 Mainoru Pl, Hawker

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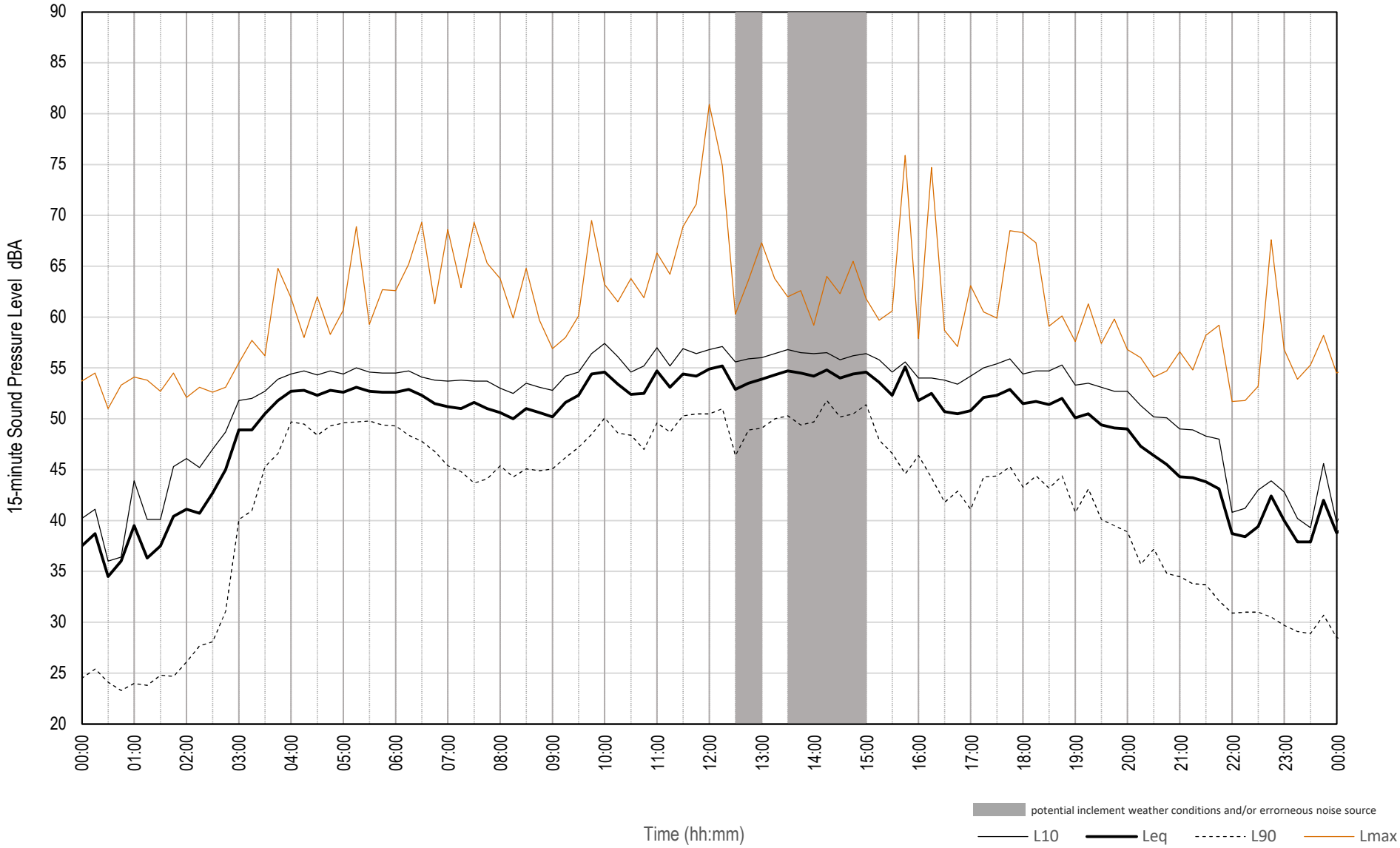

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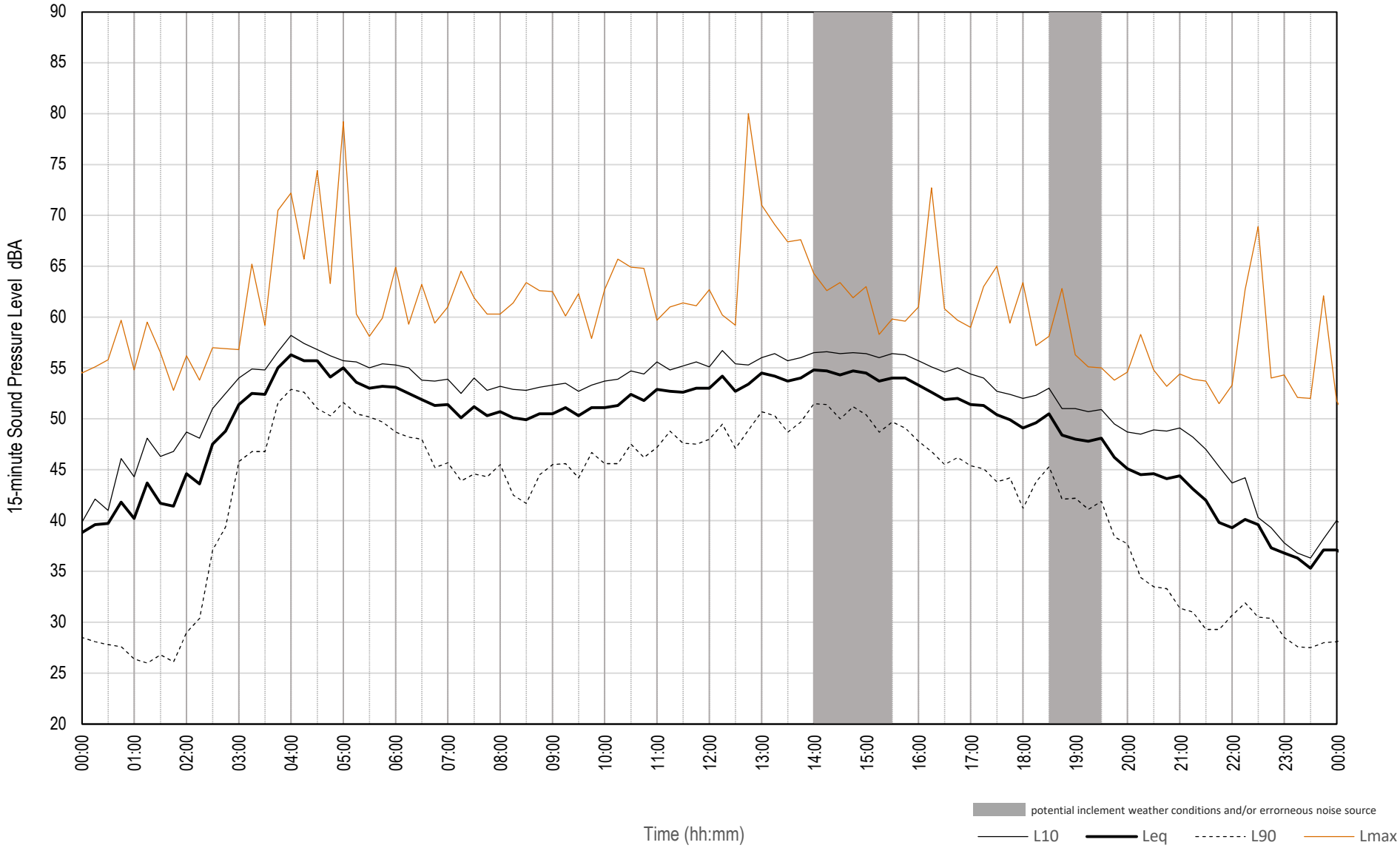

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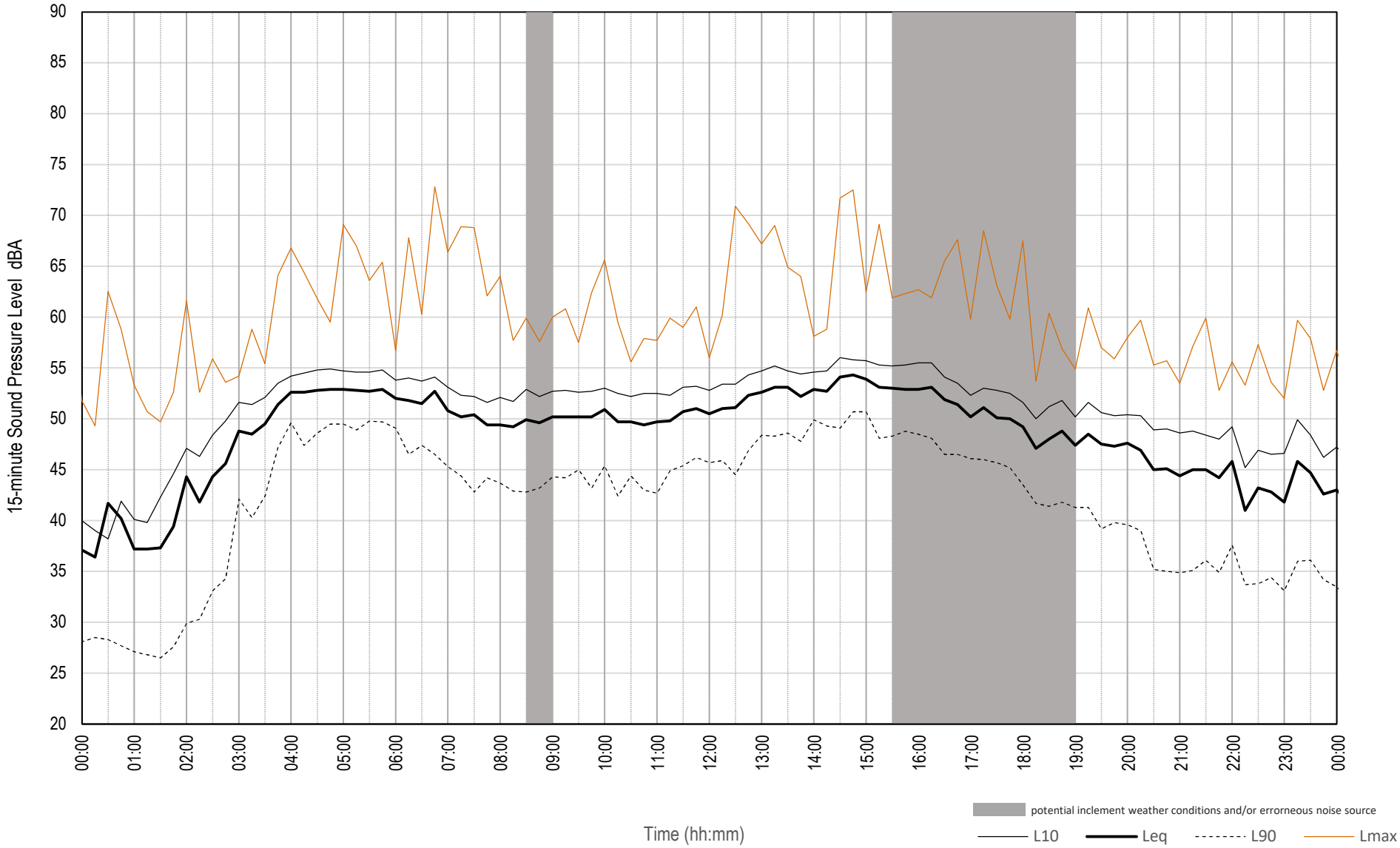

Measured Noise Levels - 16 Mainoru Pl, Hawker

Saturday, 12 February 2022

Measured Noise Levels - 16 Mainoru Pl, Hawker

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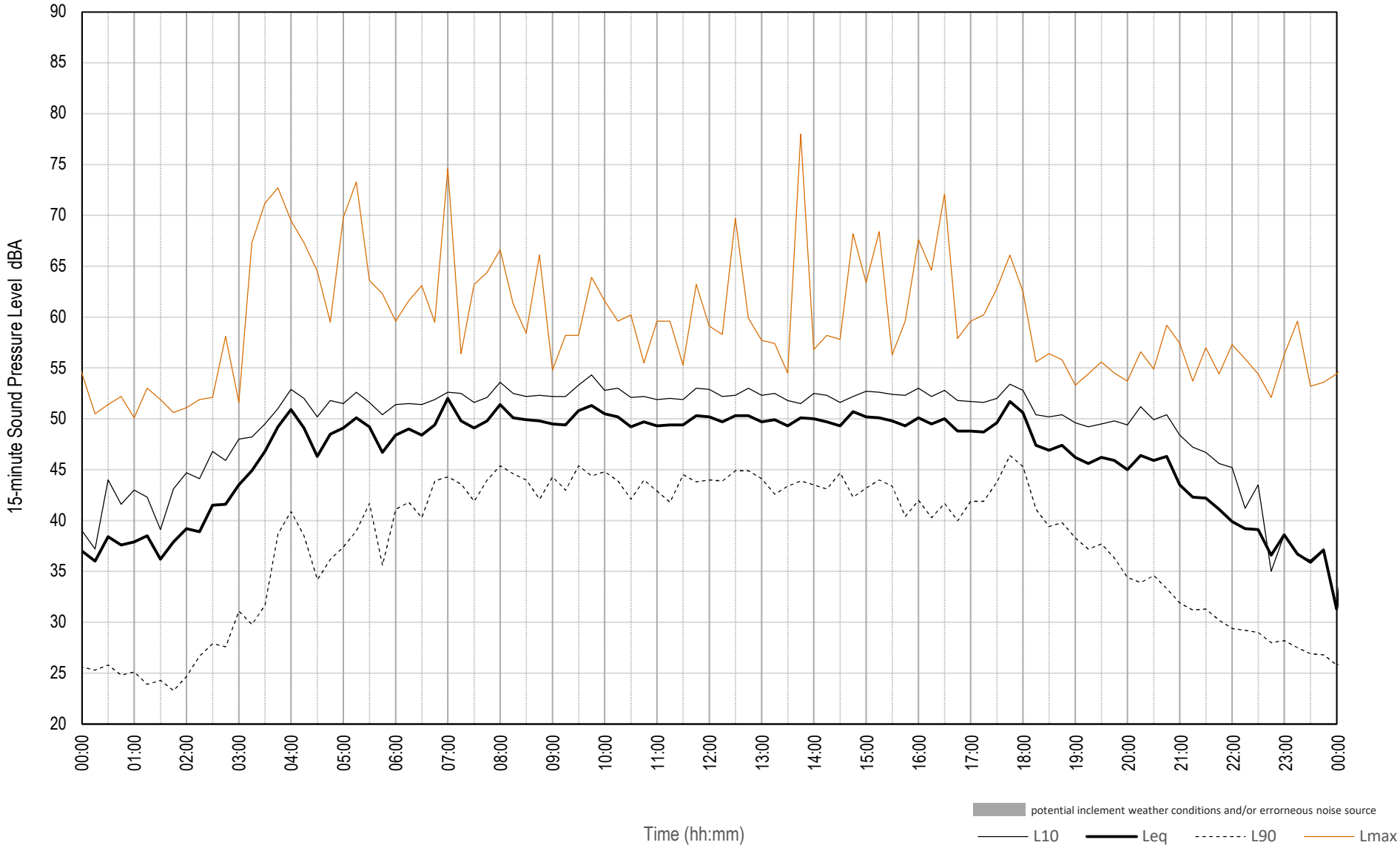

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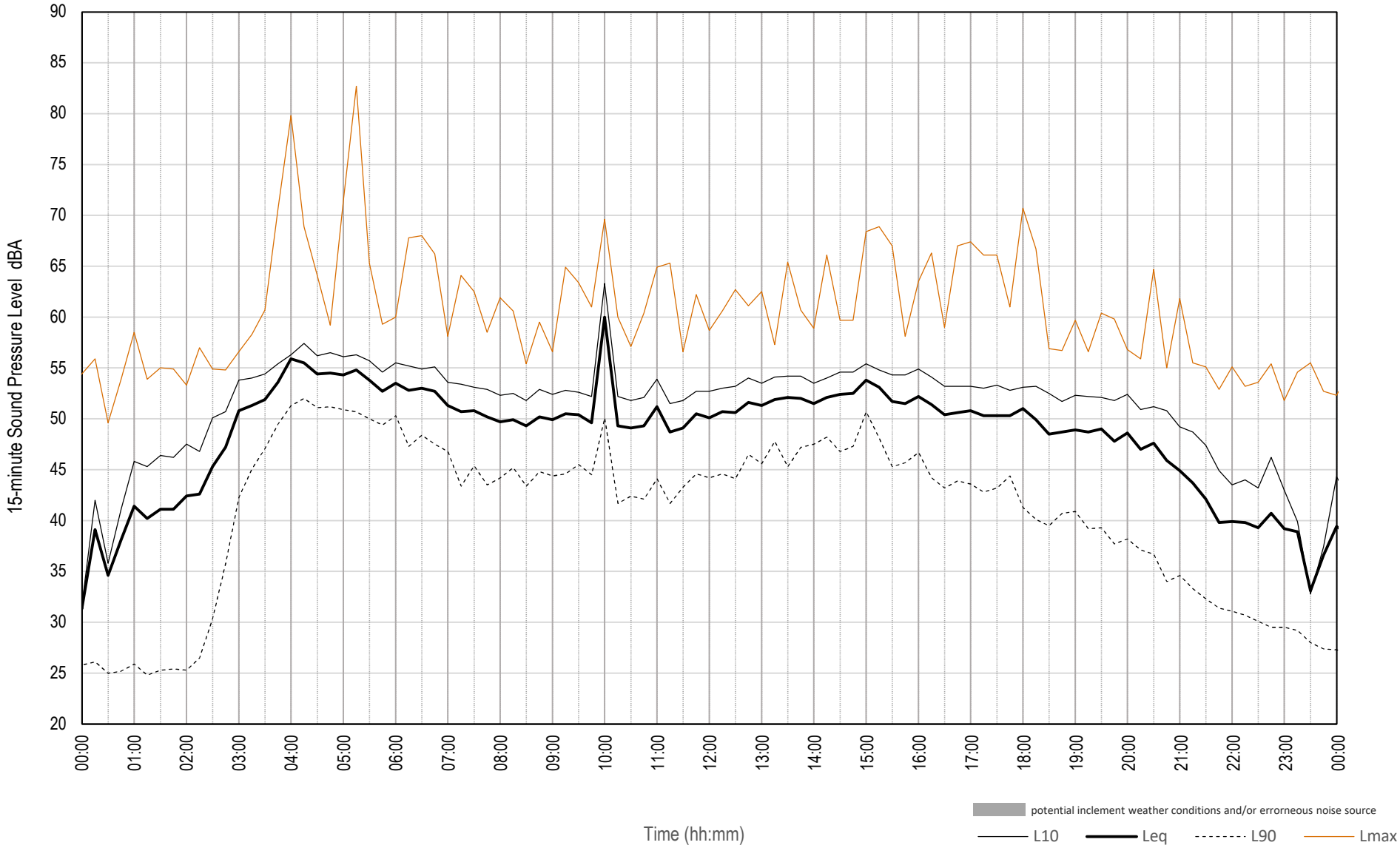

Measured Noise Levels - 16 Mainoru Pl, Hawker

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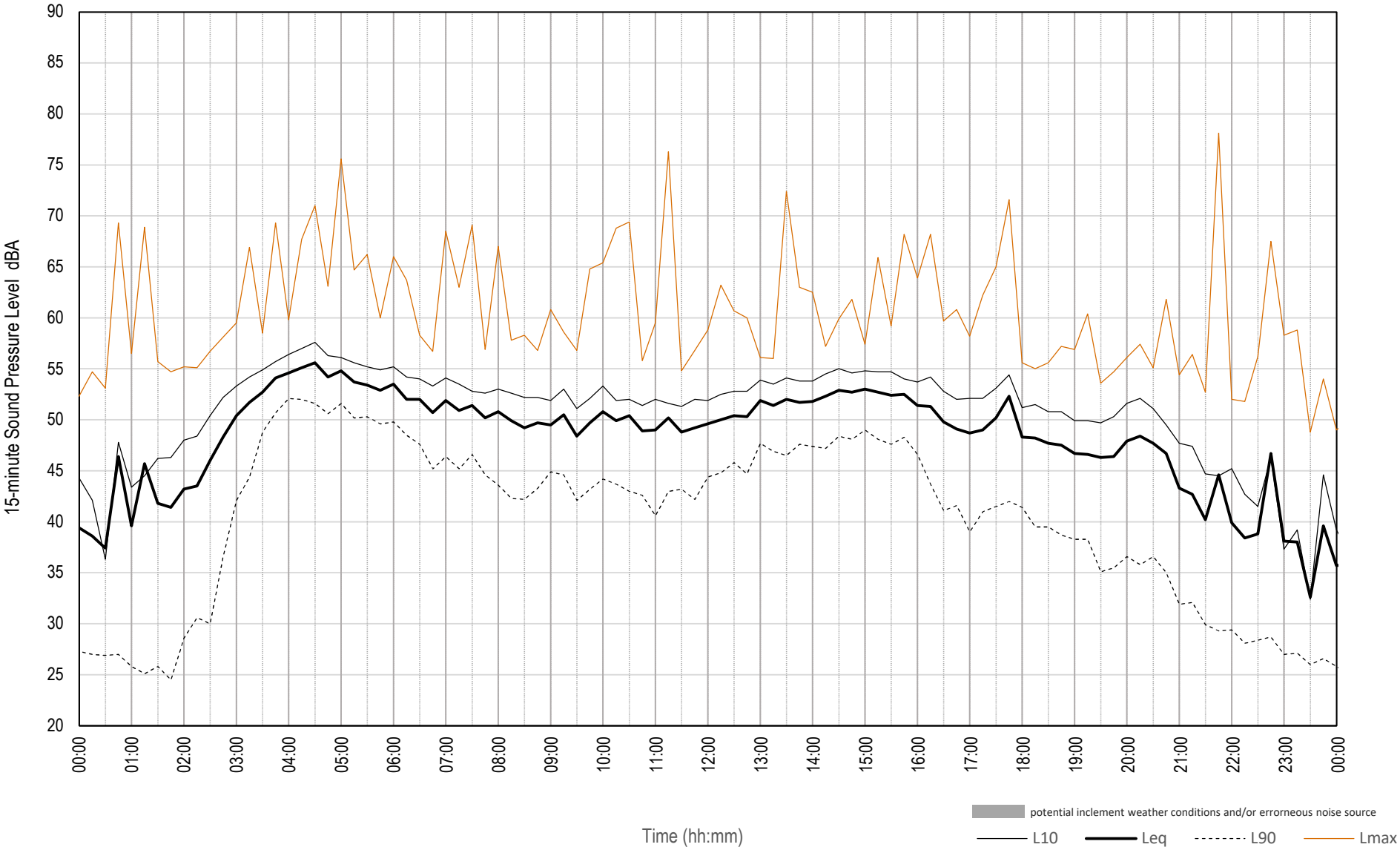

Measured Noise Levels - 16 Mainoru Pl, Hawker

Wednesday, 16 February 2022